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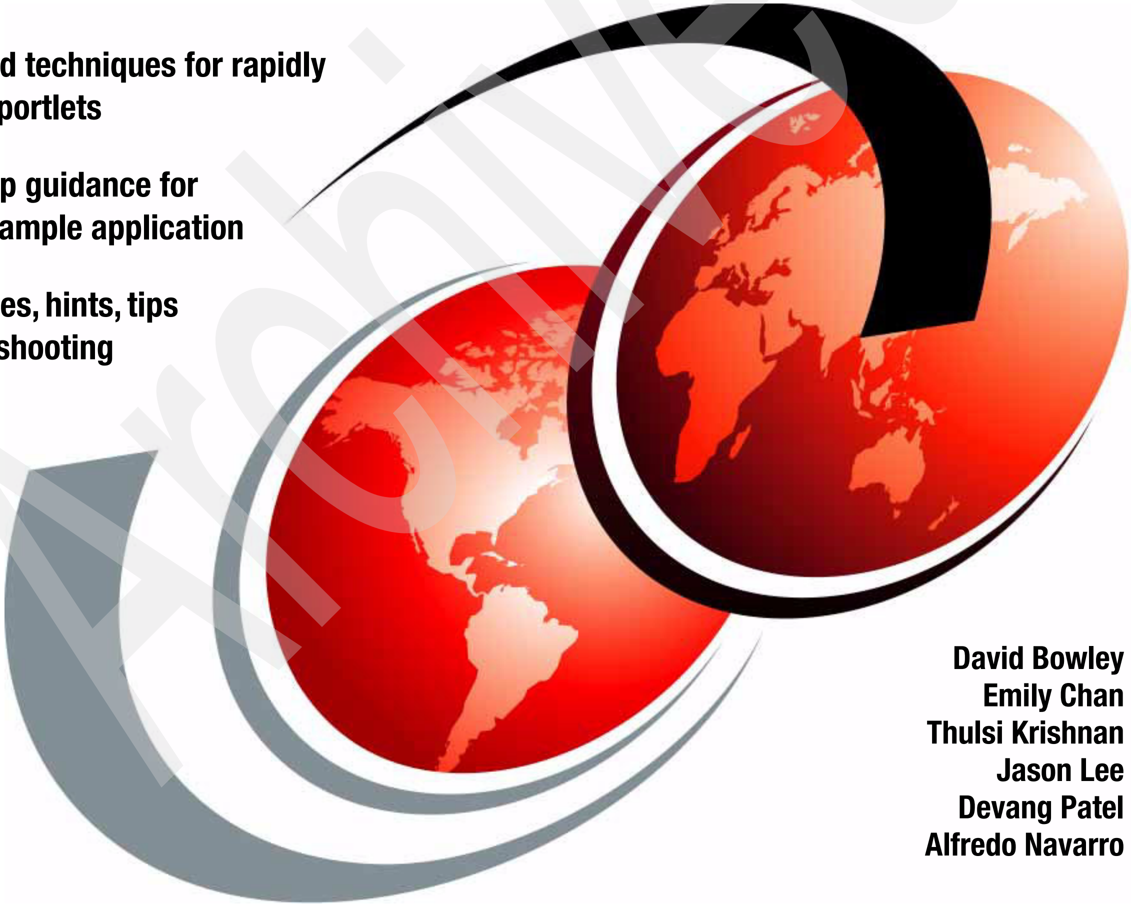
Portal Application Development Using WebSphere Portlet Factory

Features and techniques for rapidly developing portlets

Step-by-step guidance for building a sample application

Best practices, hints, tips and troubleshooting



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International Technical Support Organization

Portal Application Development Using WebSphere Portlet Factory

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Contents

Preface

WebSphere® Portlet Factory is a powerful and flexible tool for rapidly building portlets on top of a service-oriented architecture. It enables developers to quickly and easily leverage their company's core assets, automatically assembling them into custom, high-value portlets.

In this book, we show you specific techniques and a best practices approach for developing portlets using WebSphere Portlet Factory. Using a fictitious company scenario, we discuss how to build a Customer Self Service and Customer Representative application. Within this context, we cover the following topics:

- Installing and configuring the Portlet Factory development environment
- How to create and consume data services from SQL, Domino® and a Web service
- Step-by-step guidance for creating the portlets and enabling inter-portlet communication
- Advanced UI design techniques, including the use of AJAX for type ahead functionality and working with the Dojo Builders
- Enabling the use of profiling
- Deployment production considerations
- Troubleshooting and debugging techniques

The team that wrote this book

This book was produced by a team of specialists from around the world working at the International Technical Support Organization, Cambridge, Massachusetts, USA Center.

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Emily Chan is a Technical Consultant in IBM Global Business Services based out of Sydney, Australia. She has 3 years of experience in various projects focusing on products based on the WebSphere Portal framework. She holds a Bachelor degree of Computer System Engineering from the University of New South Wales. Her area of expertise is Portal Content Management focusing on Portal framework design, build and performance testing.

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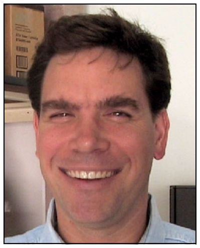
Jason Lee is a Portal Technical Leader for IBM Lotus Software Group ASEAN and leads the pre-sales engagements in the region. He has over 8 years of development and management experience and has been involved in many intranet and extranet portal projects which include development of the Singapore Government's e-business portal. He holds a masters in computer science and business administration from the National University of Singapore and Bradford University respectively. His experiences include development in ASP/DCOM, J2EE Frameworks and other web technologies.

Devang Patel is a Team Lead in WebSphere Portlet Factory Technical Support Organization based out of Research Triangle Park, NC, US. He has 5 years of experience in various products based on the WebSphere Portal framework. He holds a Masters degree in Computer Science from North Carolina State University. His areas of expertise include rapid J2EE application development, designing complex user interfaces, and Sarbanes-Oxley compliance framework. He has written extensively on serviceability related topics.

Alfredo Navarro is a Senior Software Engineer in Lotus Workforce Management based on the Dublin Software Lab, Ireland. He has 7 years of experience in Enterprise Application Integration, Web Services and Portal applications. He holds a degree in Computer Science from the University of Zaragoza, Spain. He has spent more than 5 years working as Architect in Germany and developing skills in integration technologies, workflow engines and back-end connectors. His areas of expertise include J2EE application development, software architecture and design patterns. He has written extensively on data integration topics. He likes to travel, learn other cultures, sports, read about new technologies and enjoy the time with the family and friends.



John Bergland is a project leader at the ITSO, Cambridge Center. He manages projects that produce IBM Redbooks® about IBM and Lotus Software products. Before joining the ITSO in 2003, John worked as an Advisory IT Specialist with IBM Software Services for Lotus (ISSL), specializing in Notes and Domino messaging and collaborative solutions.

Special acknowledgement

This Redbook effort was successful in large part due to the strong commitment and direct involvement of the WebSphere Portlet Factory Development Team.

We wish to thank the following members for their support and their efforts during this residency.

Dee Zepf is the Product Manager for WebSphere Portlet Factory. Dee returned to IBM in 2006 as part of the Bowstreet acquisition and she brings over 15 years of software experience to her role at IBM. Previously, at Bowstreet, she was the Director of Product Management responsible for driving product requirements and design. Prior to joining Bowstreet Dee spent nine years at Lotus\IBM where she held various engineering and product management positions.

Jonathan Booth is lead architect for the IBM WebSphere Portlet Factory products. These products came through the IBM acquisition of Bowstreet, where Jonathan was lead architect for seven years. Across a series of releases, the Portlet Factory products have pioneered the use of software automation techniques to address difficult software development problems, such as developing custom applications and portlets that access complex back end systems. Prior to Bowstreet, Jonathan was a senior architect at Lotus and IBM, where he was lead architect for Freelance Graphics® and related products.

Martin Romano is a software architect for the WebSphere Portlet Factory products, who returned to IBM as part of the Bowstreet acquisition. Prior to his tenure at Bowstreet, Martin worked on portal and presentation graphics products at IBM/Lotus, and wrote operating systems and digital imaging software at companies including AT&T and Kodak.

Louise Simonds is the development manager for WebSphere Portlet Factory. She joined IBM as part of the Bowstreet acquisition. Prior to assuming a management role, Louise enjoyed a long career as a developer on a wide variety of software products including Portlet Factory, on-line travel booking, and CAD/CAM/simulation tools for printed circuit and chip packaging technologies.

Ruth Seltzer has developed and managed software products for more than 20 years and is currently Senior Engineering Manager for the IBM WebSphere Portlet Factory Products. These products came to IBM through the acquisition of Bowstreet, where Ruth was variously Director of Engineering and Director of Product Management for 5 years. Prior to Bowstreet Ruth was the Director of Engineering at Framework Technologies, a provider of collaboration and information management software for mechanical engineering projects. Before joining Framework Technologies Ruth was Director of Development at Lotus and IBM where she managed the Graphics Product Group, creators of Freelance Graphics and related products.

David Gawron is an IBM product architect in the WebSphere Portlet Factory group. He joined IBM at the end of 2005 as part of the Bowstreet Software acquisition. Over the last eight years Dave has been involved in many aspects of Portlet Factory's development and is the architect responsible for the product's integration with several IBM products and various back-ends including relational databases and ERP systems. Dave's current focus is on helping customers and internal IBM groups effectively utilize Portlet Factory in their Portal development efforts. Prior to joining Bowstreet, Dave was a senior principal consultant specializing in software development for integrated call centers.

Additional thanks to the following members who reviewed the material and provided extremely valuable technical guidance and direction for the team.

- **Michael Burati** - Senior Software Engineer - WebSphere Portlet Factory. He is a member of original founding development team at Bowstreet, acquired by IBM Dec2005/January 2006. Prior to working at Bowstreet, Michael was a Senior Consulting Engineer at Hewlett Packard on OSF DCE technology, and Technical Marketing Consultant at Apollo Computer, acquired by HP.
- **Michael Bourgeois** is a software engineer for the WebSphere Portlet Factory team. He joined Bowstreet in January 2000 as a QA Manager for the Factory. He moved into Development Management of offshore solutions and was promoted to Director of Engineering for the Work Force Management and Executive Dashboards products. While in this role, he traveled to India to work with the team and Holland for the first installation and deployment. When Bowstreet was acquired by IBM in 2005, Michael returned to a Software Engineering position on the Designer team. He currently works on Installation, Project Creation and Deployment, and has been certified in advanced SWT.
- **Thomas Dolan** was the Quality Engineering Team Lead for Websphere Portlet Factory. Special thanks to Tom for his contributions to writing about Considerations for WebSphere Application Server CE.

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1

Introduction

This chapter presents an overview of the capabilities, benefits, and use of the WebSphere Portlet Factory.

1.1 Overview of WebSphere Portlet Factory

WebSphere Portlet Factory is a powerful and flexible tool for rapidly building portlets on top of a service-oriented architecture. Developers are able to quickly and easily leverage their company's core assets, automatically assembling them into custom, high-value portlets. Portlets created with WebSphere Portlet Factory are dynamic, robust Java™ 2 Enterprise Edition (J2EE) applications that react automatically to change. They can be further modified by business users in real time to meet changing business requirements, without requiring any coding, or duplicating and versioning of assets. By eliminating the need to code all of these implementations and their variations, WebSphere Portlet Factory simplifies the development, deployment, and change management process, saving companies time and money.

1.2 Capabilities of WebSphere Portlet Factory

The primary features and capabilities of WebSphere Portlet Factory are as follows:

- **Multi-page custom portlets without coding**

  The WebSphere Portlet Factory rapid application development (RAD) capabilities and ease of use enable developers of all skill sets to create multi-page, complex portlets. Developers build portlets by defining a sequence of highly adaptive software components, called *builders*, which have an easy-to-use interface. Developers assemble builders into *models*, which then generate the application code. In this way, developers can capture and automate the process of building dynamic portlets, instead of explicitly coding each portlet.

- **Robust integration capabilities with enterprise applications and data**

  WebSphere Portlet Factory provides automatic integration with existing applications and data, including SAP®, Lotus Domino, PeopleSoft®, Siebel®, Web Services, relational databases, and Excel®. Developers can quickly create composite, high-value portlets that leverage existing investment in your existing applications and data.

- **Automatic integration with WebSphere Portal**

  With WebSphere Portlet Factory, you have direct integration with IBM WebSphere Portal features such as portlet wiring, Click-to-Action, business user configuration, people awareness, WebSphere Portal groups, and the credential vault. Portlets are deployed automatically to WebSphere Portal software.

- **Support for SOA development**

  WebSphere Portlet Factory provides powerful technology for speeding the creation of service-oriented applications and portlets. It includes data services builders along with data integration builders, which together automate the process of creating services from systems such as SAP and Lotus Domino. This services approach provides a clean way to separate the back end services of an application from the presentation layer. It also automatically creates testing support for back end services, and it enables front end presentation development and testing without requiring a back end connection.

- **Many portlet variations from a single code base**

  With the profiling capability of WebSphere Portlet Factory, developers can easily create multiple portlet variations from one code base, without requiring any additional code changes or redeployment.

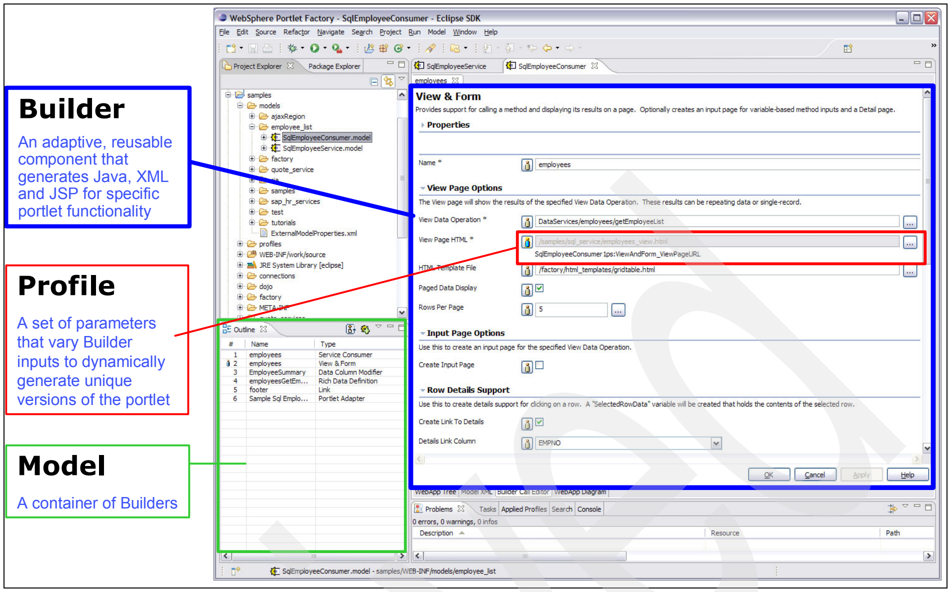
- **Automation of frequently occurring development tasks**

  By creating new builders, developers and architects can capture commonly used design patterns and company-specific business processes as reusable components for all developers, enforcing application architecture and development best practices.

1.3 Development with WebSphere Portlet Factory

With WebSphere Portlet Factory, developers build portlets by snapping together a sequence of components called builders. Each builder has a simple wizard-like user interface and does the work of automatically generating or modifying part of an application. A builder implements an application design pattern. Users assemble builders into models, which WebSphere Portlet Factory software then executes to dynamically generate the application code, including Java Server Pages (JSPs), Java classes, and XML documents, as well as the low-level artifacts that make up the portlet application. In this way, developers can capture and automate the process of building dynamic portlets, instead of explicitly coding each portlet. Developers can quickly and easily create multiple highly customized portlets from one code base, without requiring additional code changes or redeployment.

WebSphere Portlet Factory software includes an easy-to-use graphical tool, called IBM WebSphere Portlet Factory Designer, for creating, viewing, and running portlets (see Figure 1-1). The WebSphere Portlet Factory Designer tool plugs seamlessly into IBM Rational® Application Developer software and the open source Eclipse integrated development environment (IDE).


Builder
An adaptive, reusable component that generates Java, XML and JSP for specific portlet functionality
Profile
A set of parameters that vary Builder inputs to dynamically generate unique versions of the portlet
Model
A container of Builders
WebSphere Portlet Factory - SqlEmployeeConsumer - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
Project Explorer
Package Explorer
samples
models
ajaxRegion
employee_list
SqlEmployeeConsumer.model
SqlEmployeeService.model
factory
quote_service
samples
sap_hr_services
test
tutorials
ExternalModelProperties.xml
profiles
WEB-INF/work/source
JRE System Library [eclipse]
connections
dojo
factory
META-INF
SqlEmployeeService
SqlEmployeeConsumer
employees
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram
Problems
Tasks
Applied Profiles
Search
Console
OK
Cancel
Apply
Help

Outline

#	Name	Type
1	employees	Service Consumer
2	employees	View & Form
3	EmployeeSummary	Data Column Modifier
4	employeesGetEm...	Rich Data Definition
5	footer	Link
6	Sample Sql Emplo...	Portlet Adapter

View & Form

Provides support for calling a method and displaying its results on a page. Optionally creates an input page for variable-based method inputs and a Detail page.

Properties

Name * employees

View Page Options

The View page will show the results of the specified View Data Operation. These results can be repeating data or single-record.

View Data Operation * DataServices/employees/getEmployeeList

View Page HTML * /samples/sql_service/employees_view.html
SqlEmployeeConsumer1ps:ViewAndForm_ViewPageURL

HTML Template File /factory/html_templates/gridtable.html

Paged Data Display ☑

Rows Per Page 5

Input Page Options

Use this to create an input page for the specified View Data Operation.

Create Input Page □

Row Details Support

Use this to create details support for clicking on a row. A "SelectedRowData" variable will be created that holds the contents of the selected row.

Create Link To Details ☑

Details Link Column EMPNO

0 errors, 0 warnings, 0 infos

Description	Resource	Path

SqlEmployeeConsumer.model - samples/WEB-INF/models/employee_list

Figure 1-1 Portlet Factory Designer

As highlighted in Figure 1-1, there are three key concepts—builders, models, and profiles—that are used when developing applications with Portlet Factory. We take a closer look at each of those concepts in the following sections.

1.3.1 Builders

A *builder* is the core building block that automates design and development tasks performed by developers. Builders free the developer from having to deal with the low-level complexities of developing portlets and integrating with external data sources.

For example, to access any enterprise data source such as a relational database management system (RDBMS), SAP installation, IBM Lotus Domino server, Oracle® installation, or a Web service, developers can simply use one of the provided data access builders such as a SAP function call or structured query language (SQL) call. The developer simply specifies inputs for connecting to the external system and then selects the specific function he or she wants to access. Builder inputs can be populated easily using the builder’s graphical, wizard-like interface, with drop-down lists for selecting functions and options.

After the developer populates the inputs and clicks OK, Portlet Factory software constructs the code for accessing the data and generates a schema defining all the data structures used. The developer can then use the service operation builder to create a service interface for the function. Then, a single view and form builder can be used to create pages for searching, viewing results, or updating data from that service. The user does not need to create a single line of code for all of this functionality.

Portlet Factory builders are similar to the “wizards” found in many development tools in that they present a set of simple options to the user, and then generate a set of code artifacts based on the responses, thereby speeding initial development. However, builders go far beyond traditional wizards in that builders are designed to re-execute on every change of the application. Because Portlet Factory builders generate a metadata representation of the code they generate, other builders can introspect the application and adapt to changes made in other builders. In this way, builders empower a greatly enhanced iterative development approach: as builders are added or changed, previously added builders re-execute and adapt to the changing application. Traditional wizard-based code generation, in contrast, is typically a “one-shot deal” because once the code has been generated, the user must resort to low-level hand coding to make further changes.

In addition to the capabilities provided by out-of-the-box builders, Java developers can easily create new builders that encapsulate desired design patterns and development standards. By creating builders, developers can automate common development tasks and enable true reuse of code. In addition, through builders, architects and senior developers can enforce compliance to company architectural and code standards. And builders can save developers time and effort by helping to ensure the consistency and quality of code. One of the keys to the power of WebSphere Portlet Factory software is that new builders can easily include any functionality of existing builders. They can also automatically include portions of the design-time UI of other builders. This enables the easy creation of high-level builders. These high-level builders can encapsulate any high-level application design pattern, whether vertical or horizontal, customer-specific or general.

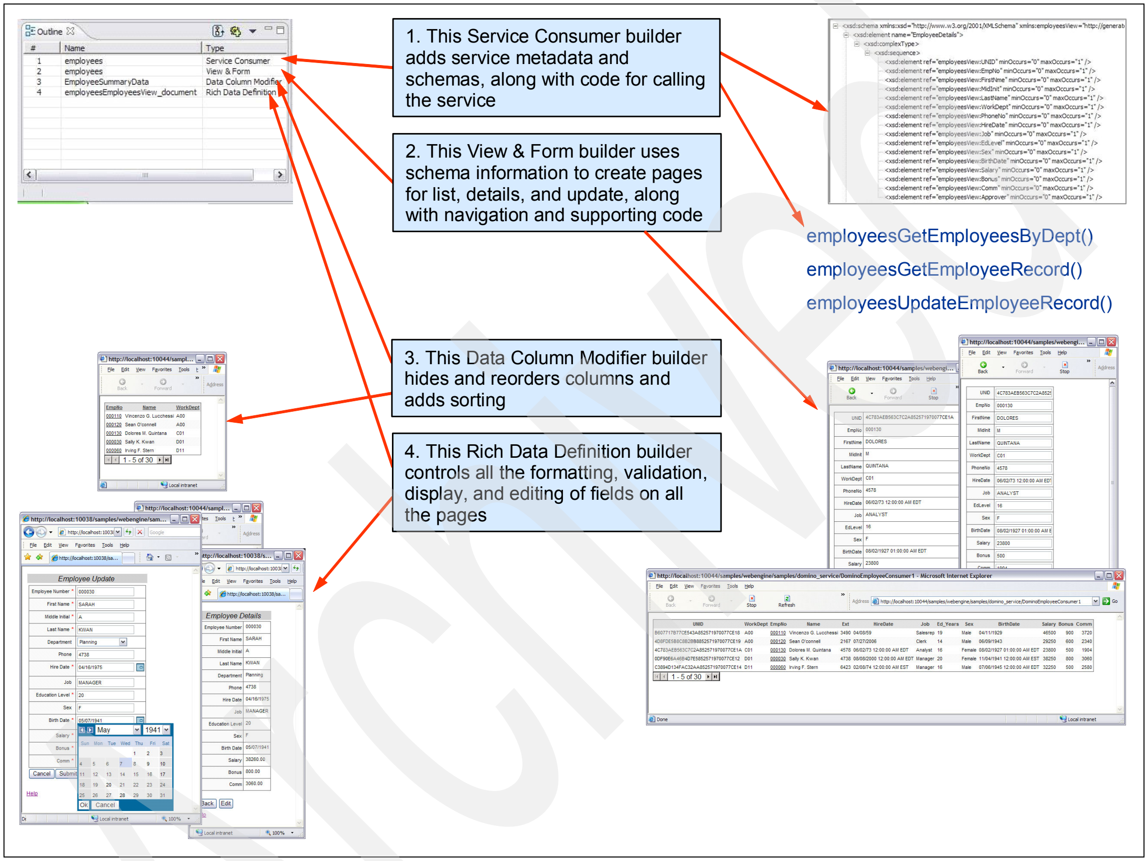
1.3.2 Models

A *model* is a sequenced collection of builders that generates the application components that implement the behavior, structure, data, and presentation of the application.

Internally, a model is simply an XML file containing a series of calls to builders.

Application development with Portlet Factory is typically divided into two main parts: the service layer, which provides data access using a service-oriented architecture, and the presentation or portlet layer, which provides the application user interface. Some models will typically contain data-oriented builders to implement the service layer while other models will contain presentation-oriented builders to implement the user interface. A presentation model can automatically be run as a portlet or as a standalone J2EE application.

Figure 1-2 illustrates a simple model for Portlet Factory based on four builders.



#	Name	Type
1	employees	Service Consumer
2	employees	View & Form
3	EmployeeSummaryData	Data Column Modifier
4	employeesEmployeesView_document	Rich Data Definition

1. This Service Consumer builder adds service metadata and schemas, along with code for calling the service

2. This View & Form builder uses schema information to create pages for list, details, and update, along with navigation and supporting code

3. This Data Column Modifier builder hides and reorders columns and adds sorting

4. This Rich Data Definition builder controls all the formatting, validation, display, and editing of fields on all the pages

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:employeesView="http://generat
  <xsd:element name="EmployeeDetails">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="employeesView:UNID" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:EmpNo" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:FirstNme" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:MidInit" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:LastName" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:WorkDept" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:PhoneNo" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:HireDate" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Job" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:EdLevel" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Sex" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:BirthDate" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Salary" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Bonus" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Comm" minOccurs="0" maxOccurs="1" />
        <xsd:element ref="employeesView:Approver" minOccurs="0" maxOccurs="1" />
```

employeesGetEmployeesByDept()

employeesGetEmployeeRecord()

employeesUpdateEmployeeRecord()

Figure 1-2 Simple model example

Figure 1-2 illustrates how four builders can be used to create a 3-page application.

1. First, a *Service Consumer builder* is used to select a service and make it available in the application. The builder creates metadata describing the service and its operations, with the schemas for the inputs and outputs, and it generates code for calling the service.
2. The second builder is the *View & Form builder*. This builder uses the schema information for the service and generates pages with fields based on

the schema fields. In this case it generates three pages: a table page showing a list of employees, a page for viewing the details about an employee, and a page for updating employee information. The builder also generates some initial navigation between the pages.

3. The third builder in this application is the *Data Column Modifier*. This builder modifies the employee list table, doing things like hiding some columns, rearranging columns, and adding sorting support.
4. The fourth and last builder in this simple example is *Rich Data Definition*. This builder is used to control all the formatting, validation, data display, and editing of all the fields on all three pages. It does this by associating those UI characteristics with the schema, then the page elements are in turn generated from the schema using this supplemental information.

1.3.3 Profiles

A *profile* contains a set of inputs that varies the way a portlet behaves. A profile feeds values into builders based on user identity or other contextual information (such as the day of the week). Using profiles, you can automatically generate different variations of a generic portlet (from the same model) for different users or situations. Configured profiles are extremely easy to implement with WebSphere Portlet Factory.

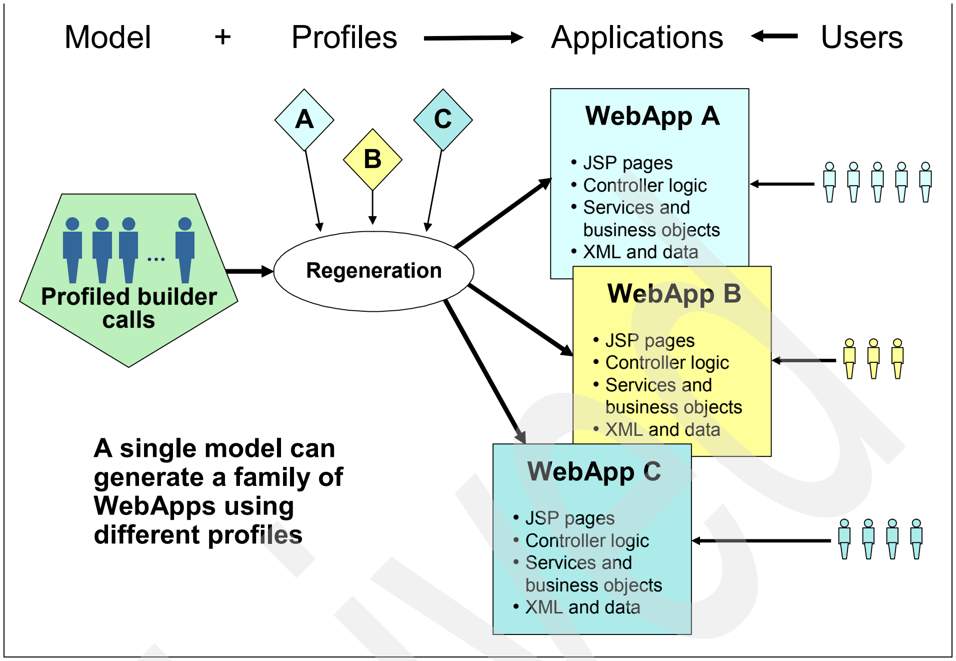


Figure 1-3 One model, many applications

The profiling capabilities in Portlet Factory can also be used to implement runtime customization of an application by business users or administrators. This runtime customization is done in a browser interface, for example, using the *configure* functionality of WebSphere Portal.

Note for those who have not yet worked with Portlet Factory: Depending on your learning style (top-down or bottom-up), we recommend that you take the time here to run through the Portlet Factory product tutorial or skip ahead to Chapter 3, “Creating projects” on page 39 to get a better feel for the basic concepts of Portlet Factory development before diving into the following description of Portlet Factory architecture.

1.4 Architecture

In this section we provide a closer look at the architecture of the Portlet Factory and the key concepts described previously. We begin with more details about the key Portlet Factory concepts and how they function together.

1.4.1 Builders

As discussed previously, builders are the foundation of the Portlet Factory automation technology. The basic structure of a builder is actually quite simple. A builder is defined by an XML file (a “builder definition” or BuilderDef) that describes three main pieces of information:

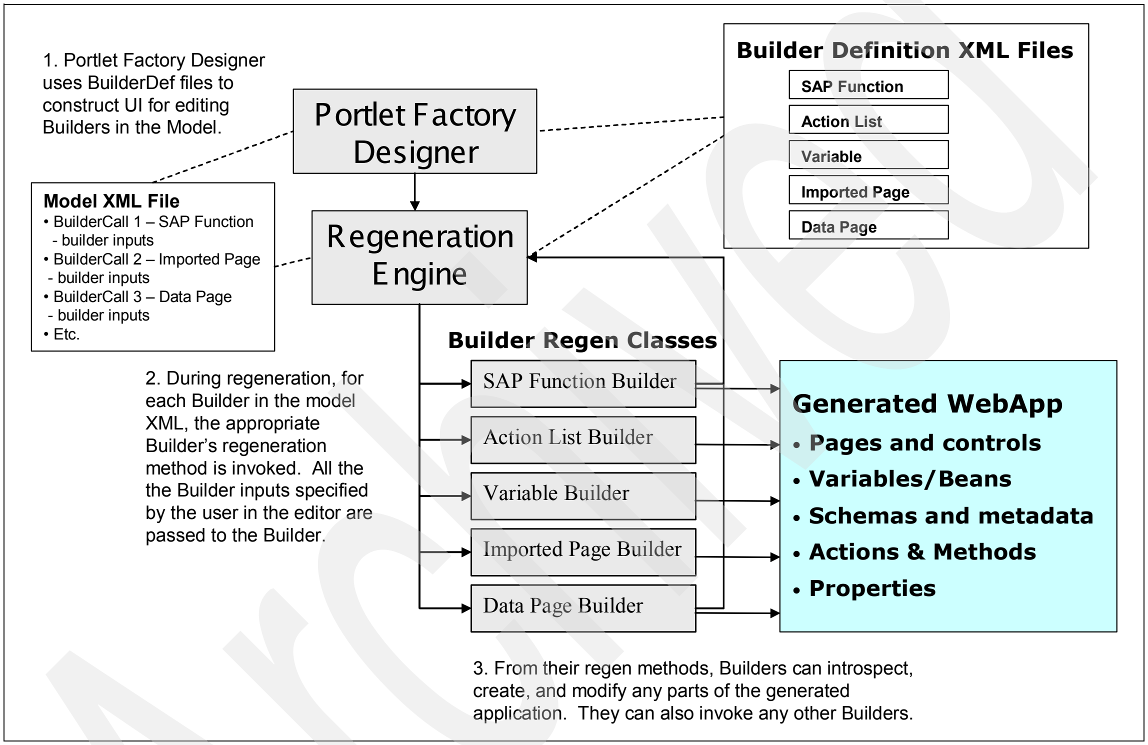
- Implementation Java class: The code that performs the builder’s automation task, run during application generation. In this class, developers implement a method (typically called `doBuilderCall`) to add or modify elements in the application under construction. Builders can also programmatically invoke other builders in this class, enabling the combination and aggregation of builders into powerful high-level builders.
- Inputs this builder expects: A builder can accept any number of parameters or “builder inputs.” The builder definition enumerates the inputs to the builder and the widgets to use when displaying these inputs in the designer tool. There are a wide variety of widgets available to use, from simple text input to tree pickers to a Java method editor. These input definitions are used by the designer to auto-generate a user interface for the builder.
- Display metadata: Controls how this builder shows up in the designer, including the builder’s user-visible name, its description, and its builder palette category.

1.4.2 Models

A Portlet Factory model is the fundamental object that developers use to build a Portlet Factory application. A model is an XML file that contains a list of builder calls, or invocations of Portlet Factory builders with specified inputs. As such, a Portlet Factory model acts as a blueprint for a Web application or portlet: a sequence of instructions showing how to generate the application. Given a model, the application can be constructed by sequentially executing the contained builder calls. This process is known as *generation*; it is sometimes also called *regeneration* or *regen*.

1.4.3 Generation

The Portlet Factory generation engine is responsible for evaluating a model's builder calls, thereby creating the specified application artifacts. Generation happens both in the designer and on the server. In the designer, a generation is triggered each time a model is opened or a modified builder call is saved or applied. On the server, generation happens only when a request is made for a model/profile combination that has not yet been evaluated, and the results of generation are cached. In order to perform a generation, the Portlet Factory generation engine loops over the builder calls in the model. Each builder call contains the ID of the associated builder, along with the inputs for this call. The generation engine looks up the builder using the specified ID, yielding a builder implementation Java class. This implementation class is loaded and executed, passing in the inputs from the builder call. These builders create application artifacts by making calls on the Portlet Factory WebApp API. These API calls create an in-memory representation of a Web application or portlet which is known as the *WebApp*.



1. Portlet Factory Designer uses BuilderDef files to construct UI for editing Builders in the Model.

2. During regeneration, for each Builder in the model XML, the appropriate Builder's regeneration method is invoked. All the the Builder inputs specified by the user in the editor are passed to the Builder.

3. From their regen methods, Builders can introspect, create, and modify any parts of the generated application. They can also invoke any other Builders.

Figure 1-4 The Generation Process in Designer

The generation process includes multiple phases to avoid builder order dependencies. For example, a builder call (for instance, Data Page) could reference an object created by a builder call that is lower down in the model (for example, Imported Page). The multiple phases of generation ensure that errors will not typically occur when a builder call (like Data Page) is processed that references an object not yet in the WebApp (like a page). Builders that create objects do so in the first phase, called "*Construction*," while those that modify previously created objects do their work in the"*Post-Construction*" phase.

There is actually one level of indirection between the generation engine itself and execution of the builder: the "*GenHandler*" class. A GenHandler specifies how to call the builder implementation code, defining the interface that a particular class of builders needs to have. Each builder defines in its BuilderDef the name of the GenHandler class it expects to call it. In theory this allows sets of builders to be created that operate on customer-defined domain objects (for example, Invoice, Customer); in practice, the Portlet Factory builders use GenHandlers that operate on the more generic WebApp abstraction.

1.4.4 WebApp

Builders create a collection of objects, collectively known as the WebApp, which act as an abstract representation of the application under construction. The WebApp consists of the following types of objects:

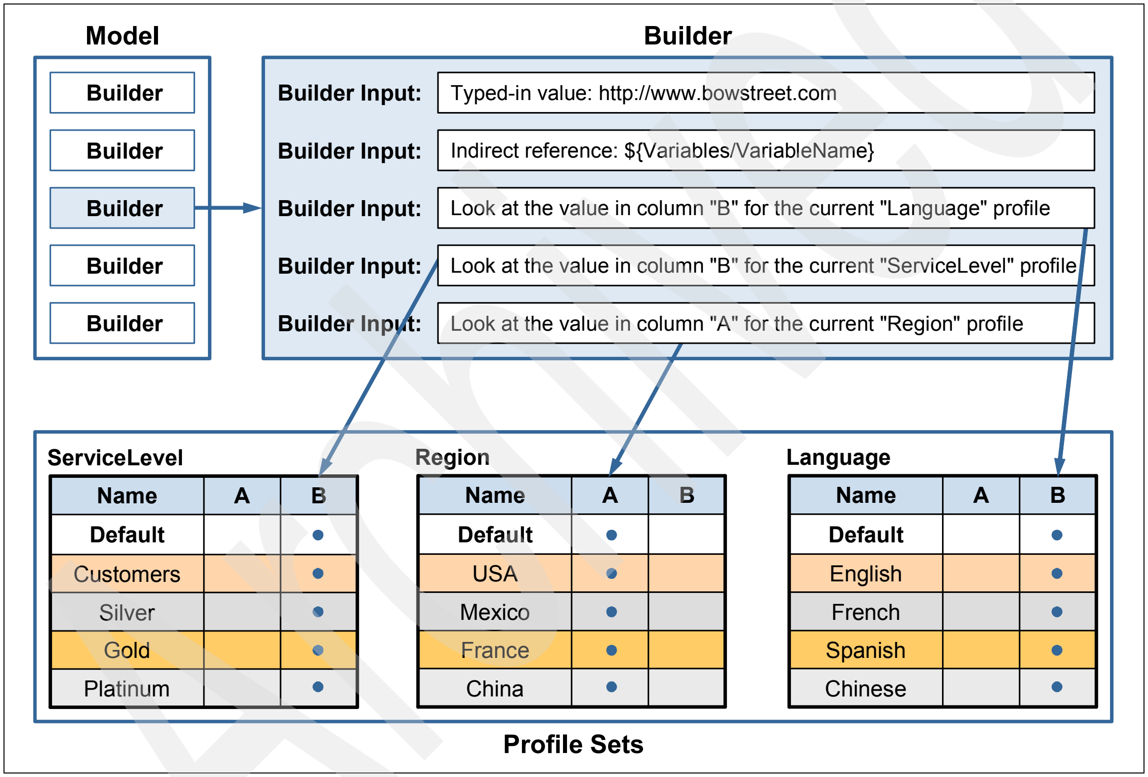
- Page - A container for JSP™ code used as a piece of the presentation of the application
- Variable - Holds a piece of data, such as a string, an XML structure or a Java bean
- Schema - Description of the structure of a type of XML data used by the application
- Method/Action List - Generated Java code used to implement application actions
- Data Service - Metadata about services that may be defined or consumed by this application
- Linked Java Object - Reference to an instance of an external Java class whose methods become available as application actions
- Linked Model - connection to another model with which this application can collaborate

Portlet Factory has a complete API for creating and manipulating these objects. This API is used directly by low-level builders, and indirectly by higher-level builders, which invoke other builders programmatically.

1.4.5 Generation, Part 2: Profiling

The prior discussion of what happens during generation left out a key piece: *profiling*. Portlet Factory's profiling mechanism enables you to inject variability into the generation process by providing an external way to specify values for any builder input. One way of looking at the influence of profiling on generation is that with profiling, generation becomes a "configure application variant" request, where the description of what changes in each application variant is stored or managed separately from code.

As the generation engine loops over each builder call in a model and prepares to invoke the associated builder, it first examines the builder inputs contained in the builder call. If any of these inputs has been marked as being “profile enabled,” the value for this input does not come from the saved builder inputs in the builder call: instead, the specified profile set is consulted to provide the current input value to be passed to the builder. The profile set defines the names and types of the elements under its control as well as specifying how to compute the appropriate profile values.



Builder Input: Typed-in value: http://www.bowstreet.com

Builder Input: Indirect reference: ${Variables/VariableName}

Builder Input: Look at the value in column "B" for the current "Language" profile

Builder Input: Look at the value in column "B" for the current "ServiceLevel" profile

Builder Input: Look at the value in column "A" for the current "Region" profile

ServiceLevel

Name	A	B
Default		●
Customers		●
Silver		●
Gold		●
Platinum		●

Region

Name	A	B
Default	●	
USA	●	
Mexico	●	
France	●	
China	●	

Language

Name	A	B
Default		●
English		●
French		●
Spanish		●
Chinese		●

Figure 1-5 High-level view of a profiled builder call

Figure 1-5 is a simplified view of a model with a profiled builder call. Three of this builder call’s inputs are shown being profile enabled, each against a different profile set.

A profile set can contain multiple “profiles,” each of which is a named set of values corresponding to the named elements defined by the profile set. In

Figure 1-3 on page 8 there is one profile set with three profiles, named “A,” “B,” and “C”. Depending on which profile is selected, a different set of application artifacts will be generated. A profile set can specify, by using a set of Java classes, what mechanism should be used to determine which profile to use for a given request. The choice of which profile to apply can be made based on a wide variety of factors, such as:

- User ID
- J2EE role
- Client device type
- Request parameter values
- Portlet configuration or preference data
- Application-specific data, for example, product type

This list is not exhaustive: the rules for profile determination are fully extensible, if necessary, via the use of custom Java code.

Note that because the entire application is created by builders, and any builder input can be profiled, there are no limits on what can be modified by profiling. Presentation, workflow, logic, services, and so forth, can all be varied by profile as much as you want. The Portlet Factory, however, will only generate new artifacts (such as a JSP page, or a Java class) for a given profile if the artifact in question has different contents than the corresponding artifact in the default (base) profile. This helps protect against unnecessary proliferation of application artifacts in the presence of multiple profiles.

2

Scenario introduction

This book discusses the techniques and best practices for developing portlets using WebSphere Portlet Factory within the context of a realistic business scenario, highlighting a specific sample application. The sample application is based on a fictitious company, ITSO Renovations, a home building materials supplier and distribution company.

This chapter introduces the scenario and provides an overview of the application functionality. It shows the application portlets from the end user perspectives of a Customer Service Representative (CSR) and an external customer.

This chapter also provides a reference table for specific Portlet Factory functionality, showing where in this book, and in the sample application, this functionality is discussed in detail.

2.1 Overview of the sample scenario

For the purpose of providing a realistic business context throughout this book, we designed a sample scenario, which we then built using WebSphere Portlet Factory. The scenario includes two applications, a Customer Service Self Help application and a Customer Service Representative application, for an imaginary company, ITSO Renovations.

2.1.1 Scenario background

ITSO Renovations is a fictitious home building materials supplier and distribution company. They have used WebSphere Portlet Factory to develop a portal-based application for better servicing customer needs. The service portal application is designed to improve customer service in the following ways:

- It provides a single unified interface for customer service representatives to retrieve and update customer information, and report on the status of existing orders.
- It allows customers to access the system directly and check on the status of their orders, thereby enabling a customer self-service capability.
- It provides a new “Go Shopping” portlet, allowing a user of the system to create a new order and add items to or remove items from the order.

2.1.2 Roles specific to the sample application scenario

For the sake of this scenario, we are interested in two specific end user roles:

- A *customer service representative* (also referred to as a CSR, an internal employee of ITSO Renovations), who focuses on taking inquiries from customers about an existing order, or taking new orders on behalf of a customer. Additionally, the customer service representative can look up customer information and edit the information as needed. These capabilities, now made more efficient and easier to perform via a more intuitive user interface, enable ITSO Renovations to provide improved customer service.
- An *external customer*, who can access the system directly to check on the status of an existing order, or to place a new order. Additionally, the customer can edit and update their customer information if necessary, such as updating the shipping address or entering the name of a new contact person.

2.2 Preview of the sample application

This section provides a preview of the application you will build using the techniques and approaches described throughout this book.

Note: The sample code used in developing this application is available for download. Refer to Appendix G, “Additional material” on page 693 for the URL and specific instructions on how to download the code.

The following chapters provide detailed steps to build the portlets:

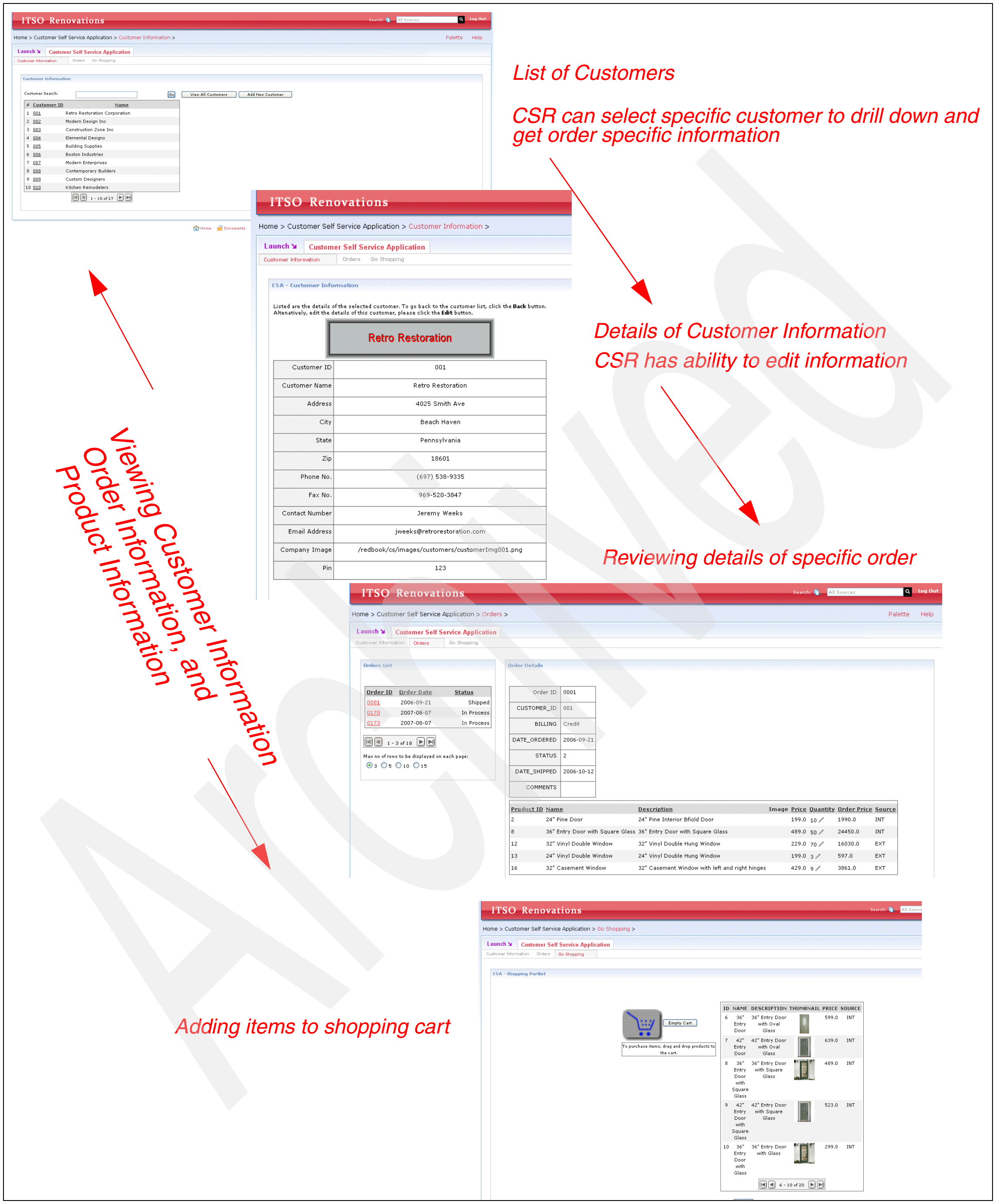
- Chapter 5, “Creating Data Services: Access to back-end systems” on page 105
- Chapter 6, “Creating portlets: Making it work” on page 221
- Chapter 7, “Creating portlets: Designing the UI” on page 275
- Chapter 8, “Enabling portlet communication” on page 361
- Chapter 9, “Customizing the application using profiling” on page 421
- Chapter 10, “Creating the Go Shopping portlet” on page 501

2.2.1 Overview of the application functionality

The service portal application provides the following functionality:

- Customer service representatives can retrieve and update customer information, and report on the status of existing orders. A customer service representative can also create a new order for a customer using the Go Shopping portlet.
- Customers can access the system directly and check on the status of their orders.
- A user can create a new order and add items to or remove items from the order using the Go Shopping portlet.

Figure 2-1 on page 18 shows a high-level flow of the functionality from the perspective of a customer services representative. Each of the specific portlets is discussed in greater detail in subsequent sections.



#	Customer ID	Name
1	001	Retro Restoration Corporation
2	002	Modern Design Inc
3	003	Construction Zone Inc
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Customer ID	001
Customer Name	Retro Restoration
Address	4025 Smith Ave
City	Beach Haven
State	Pennsylvania
Zip	18601
Phone No.	(697) 538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	/redbook/cs/images/customers/customerImg001.png
Pin	123

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 18

Max no of rows to be displayed on each page:
● 3 ○ 5 ○ 10 ○ 15

Order ID	0001
CUSTOMER_ID	001
BILLING	Credit
DATE_ORDERED	2006-09-21
STATUS	2
DATE_SHIPPED	2006-10-12
COMMENTS	

Product ID	Name	Description	Image	Price	Quantity	Order Price	Source
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	10	1990.0	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

To purchase items, drag and drop products to the cart.

ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
6	36" Entry Door	36" Entry Door with Oval Glass		599.0	INT
7	42" Entry Door	42" Entry Door with Oval Glass		639.0	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	INT
9	42" Entry Door with Square Glass	42" Entry Door with Square Glass		523.0	INT
10	36" Entry Door with Glass	36" Entry Door with Glass		299.0	INT

6 - 10 of 20

List of Customers

CSR can select specific customer to drill down and get order specific information

Details of Customer Information

CSR has ability to edit information

Reviewing details of specific order

Viewing Customer Information, Order Information, and Product Information

Adding items to shopping cart

Figure 2-1 Application functionality from a customer service representative perspective

2.2.2 Use cases applicable to the CSR

Upon logging in to the system as a customer service representative, the user can perform the following functions:

- Create a customer
- Search for a customer
- View customer details
- Edit customer details
- View orders
- View details and status of orders placed
- Add an order via the Go Shopping tab

Figure 2-2 illustrates the specific options and decision points within each of the functions available to a CSR.

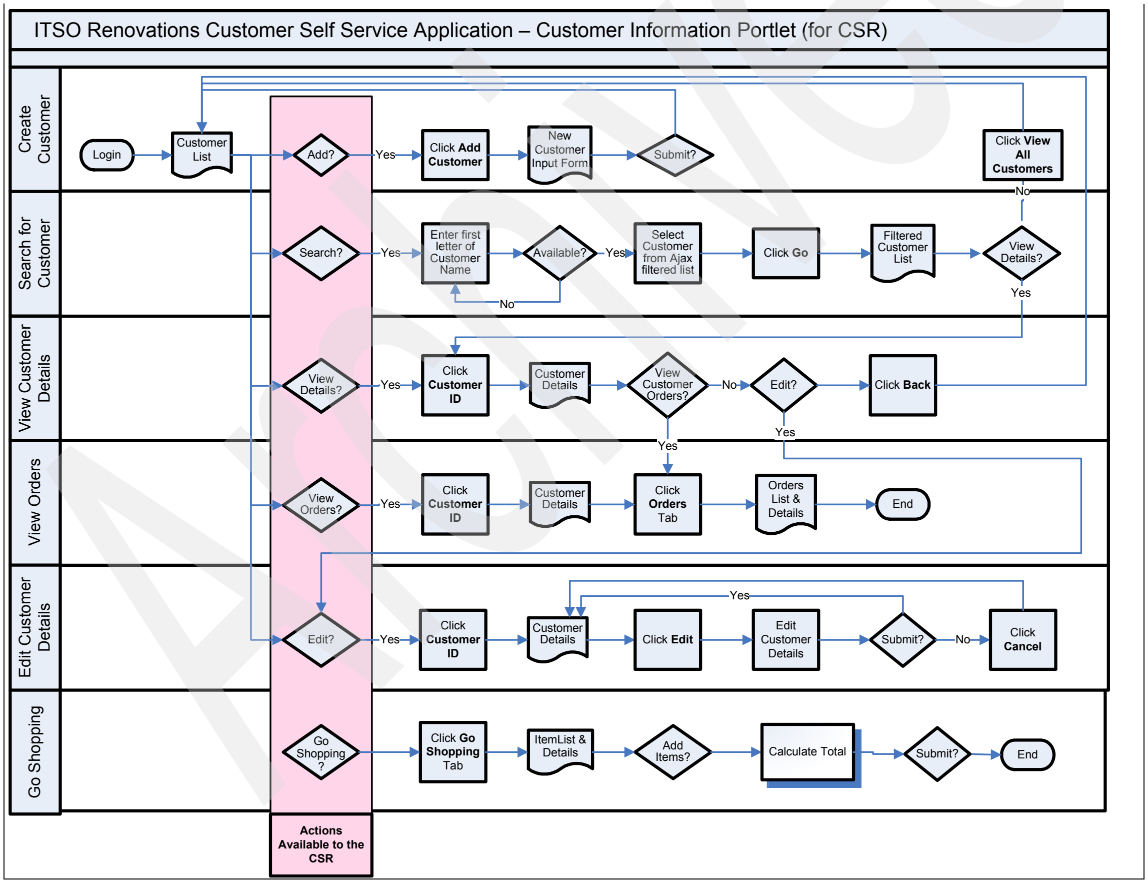


Figure 2-2 Functional choices for a customer service representative

2.2.3 Use cases applicable to an external customer

Upon logging in to the system as an external customer, the user can perform the following functions:

- View details about their customer account information
- Edit customer account information
- View orders placed
- View details and status of orders placed
- Add an order via the Go Shopping tab

Figure 2-3 illustrates the specific options and decision points within each of the functions available to an external customer logging in to the system.

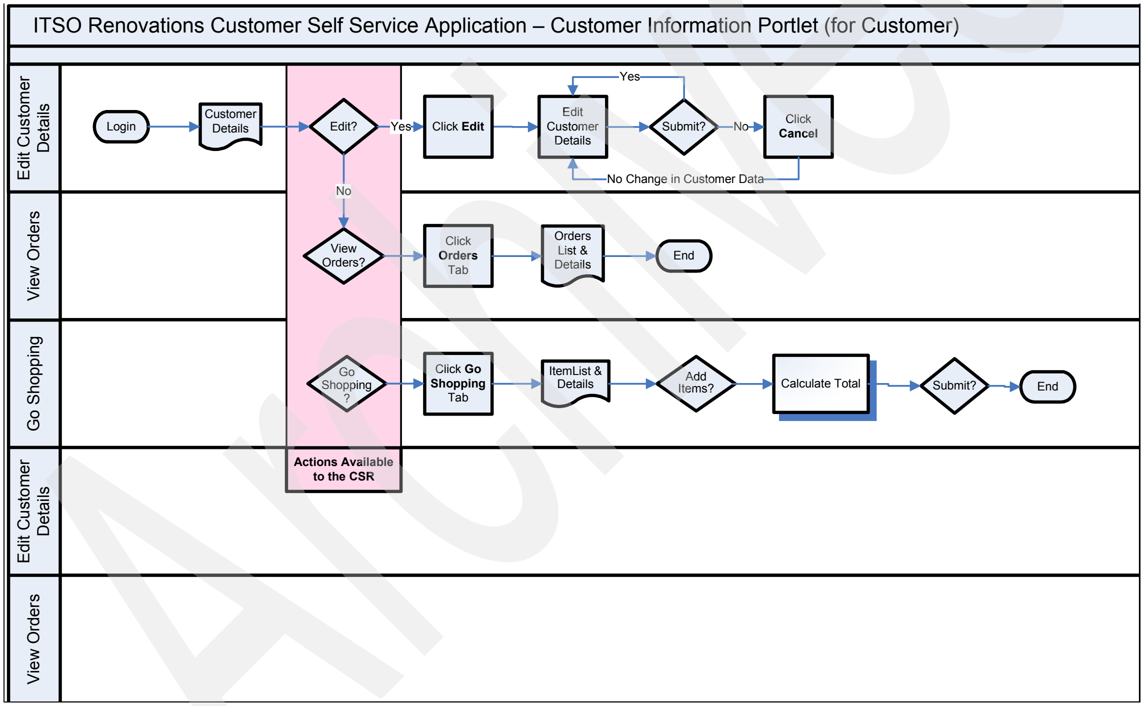


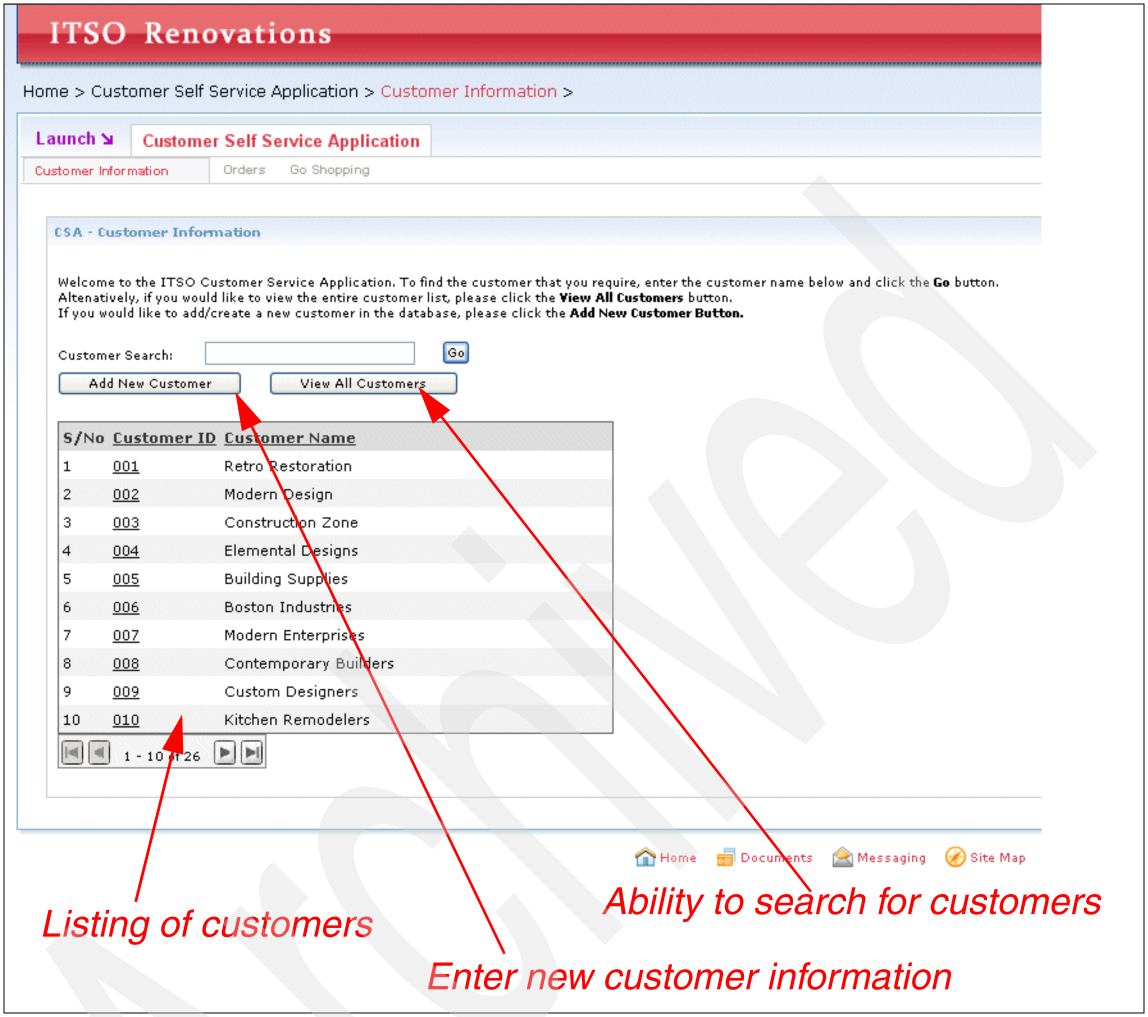
Figure 2-3 Functional choices for an external customer

2.3 Review of specific portlets - CSR perspective

This section discusses each of the specific portlets and its functions in greater detail. We begin by discussing the portlets specific to the role of the customer service representative.

2.3.1 Reviewing customer information

Upon first logging in to the system, the CSR is presented with a list of existing customers. The CSR can navigate to a specific customer to view the detailed customer information and the orders that customer has placed, or the CSR can enter information for a new customer. Figure 2-4 on page 22 illustrates how a CSR can view the list of customers.



ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch ↘
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button. Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button.
If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer Search: ______ Go

Add New Customer | View All Customers

S/No	Customer ID	Customer Name
1	001	Retro Restoration
2	002	Modern Design
3	003	Construction Zone
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

1 - 10 of 26

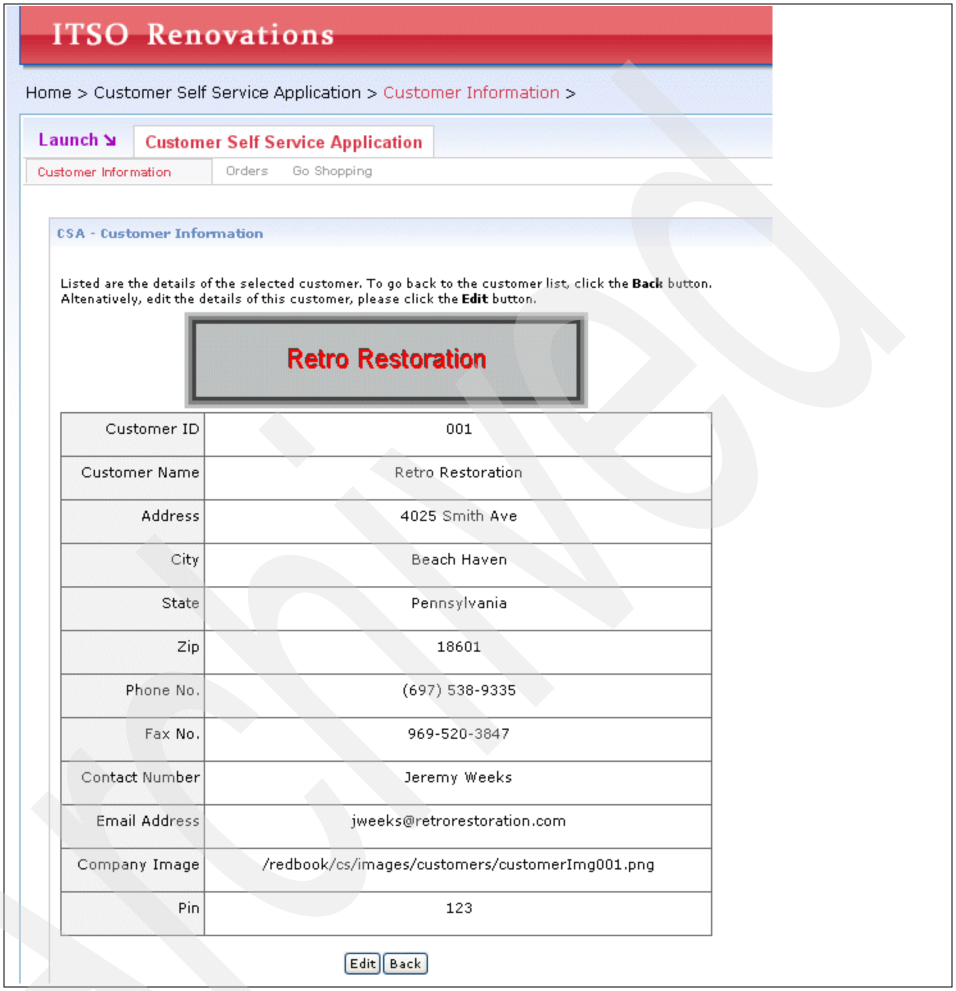
Ability to search for customers

Listing of customers

Enter new customer information

Figure 2-4 Viewing a list of customers

Upon selecting the specific customer, the CSR is presented with detailed information about that customer (Figure 2-5). From within this portlet, the CSR has the ability edit and modify customer information if necessary.

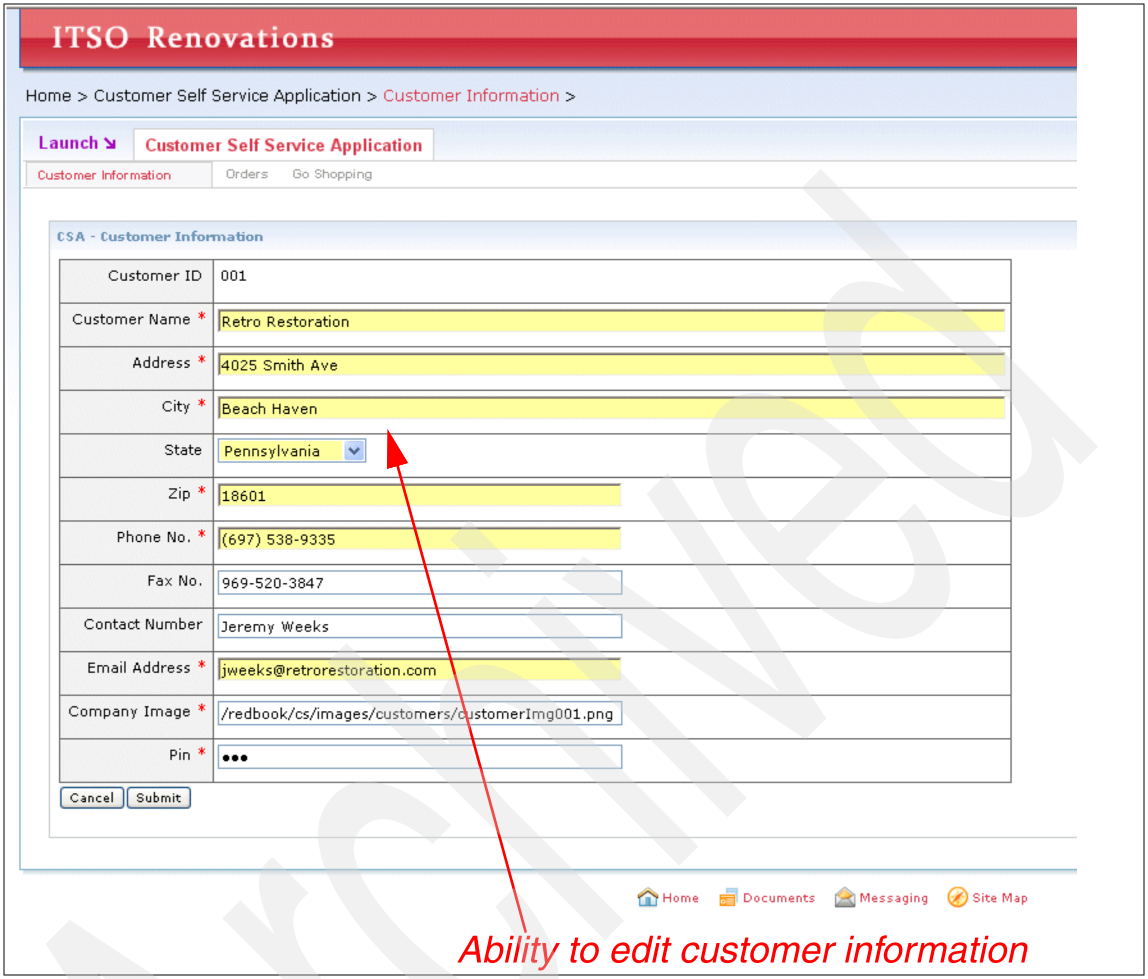

ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch ↘
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Customer ID	001
Customer Name	Retro Restoration
Address	4025 Smith Ave
City	Beach Haven
State	Pennsylvania
Zip	18601
Phone No.	(697) 538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	/redbook/cs/images/customers/customerImg001.png
Pin	123

Figure 2-5 Details of customer information

Figure 2-6 on page 24 illustrates how a Customer Service Representative can edit specific customer information on a record.



ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Customer ID	001
Customer Name *	Retro Restoration
Address *	4025 Smith Ave
City *	Beach Haven
State	Pennsylvania
Zip *	18601
Phone No. *	(697) 538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address *	jweeks@retrorestoration.com
Company Image *	/redbook/cs/images/customers/customerImg001.png
Pin *	●●●

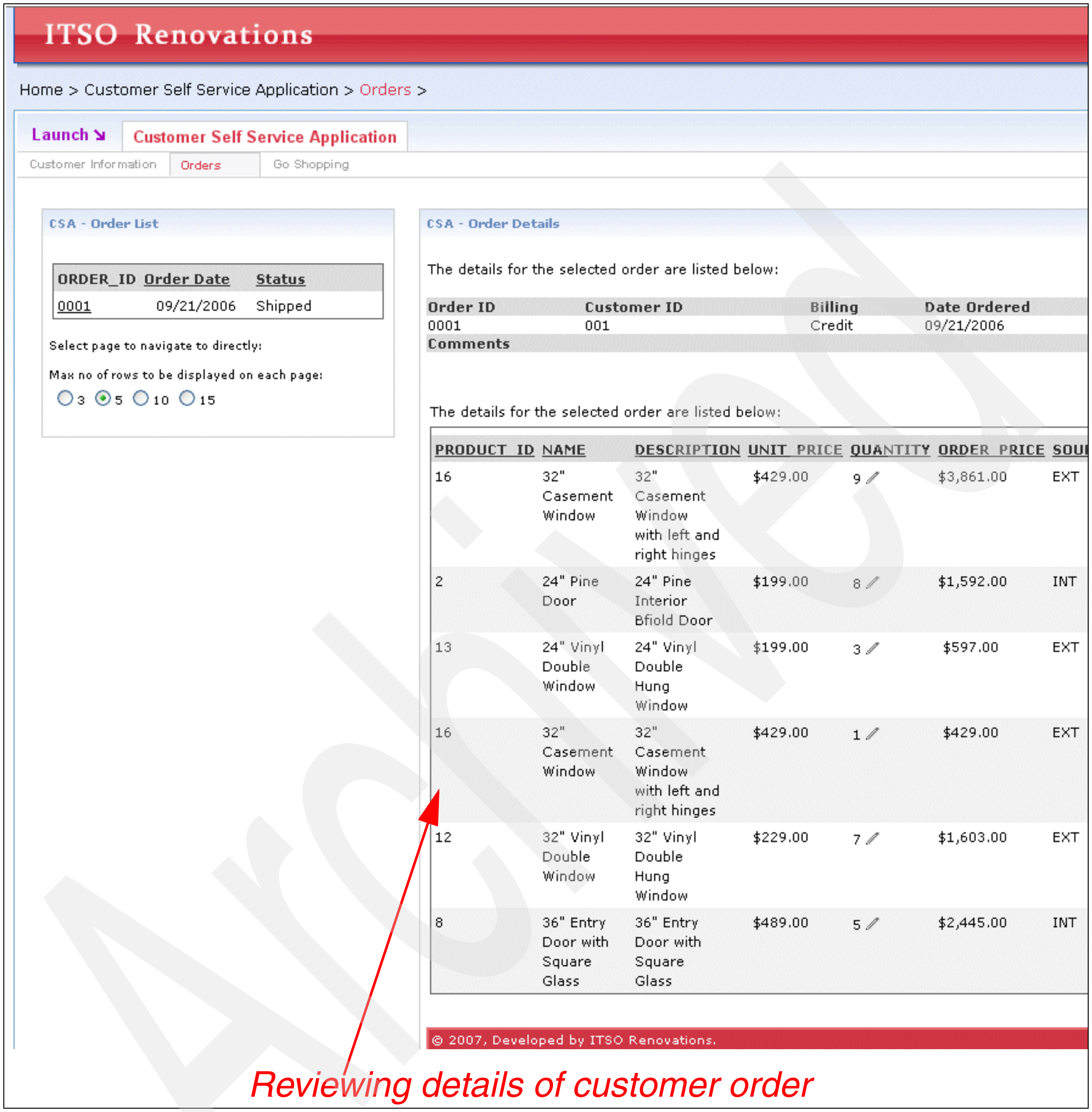
Cancel
Submit
Home
Documents
Messaging
Site Map

Ability to edit customer information

Figure 2-6 Editing customer information

2.3.2 Reviewing customer order information

Once a specific customer has been selected, the CSR has the ability to view an overall listing of their orders placed, and to view the specific details of a particular order. Figure 2-7 on page 25 illustrates the details of a specific order.



ITSO Renovations

Home > Customer Self Service Application > Orders >

Launch ↘ | Customer Self Service Application

Customer Information | Orders | Go Shopping

CSA - Order List

ORDER_ID	Order Date	Status
0001	09/21/2006	Shipped

Select page to navigate to directly:

Max no of rows to be displayed on each page:

○ 3 ● 5 ○ 10 ○ 15

CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered
0001	001	Credit	09/21/2006

Comments

The details for the selected order are listed below:

PRODUCT ID	NAME	DESCRIPTION	UNIT PRICE	QUANTITY	ORDER PRICE	SOU
16	32" Casement Window	32" Casement Window with left and right hinges	$429.00	9	$3,861.00	EXT
2	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	8	$1,592.00	INT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window	$199.00	3	$597.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges	$429.00	1	$429.00	EXT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window	$229.00	7	$1,603.00	EXT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass	$489.00	5	$2,445.00	INT

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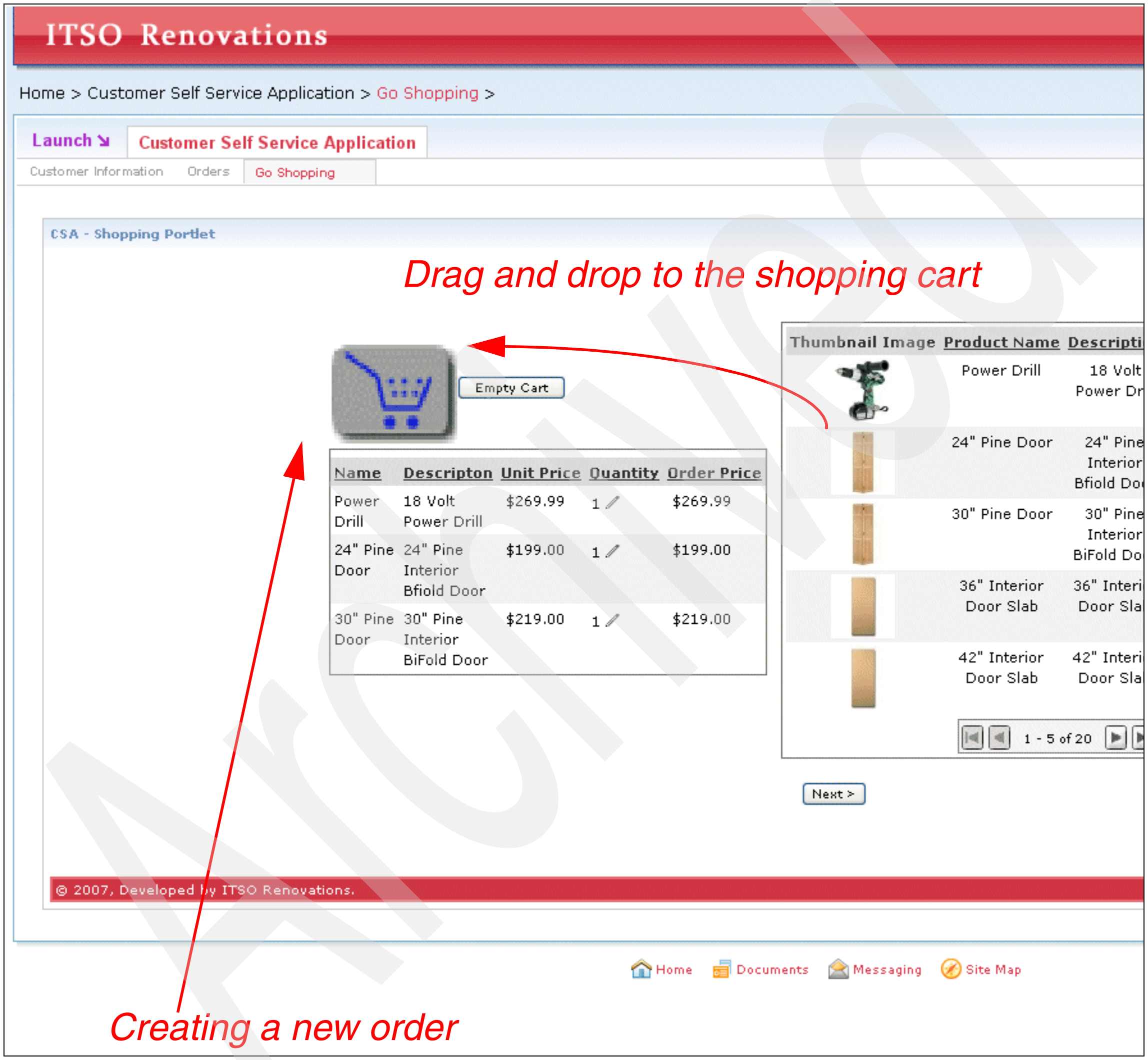
Reviewing details of customer order

Figure 2-7 Reviewing the details of a specific order

2.3.3 Creating a new order on behalf of a customer

The customer service representative has the ability to create a new order on behalf of the customer, as shown in Figure 2-8. The CSR must simply drag items from the list of items on the right side of the portlet into the shopping cart.



ITSO Renovations

Home > Customer Self Service Application > Go Shopping >

CSA - Shopping Portlet

Drag and drop to the shopping cart

Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	$269.99	1	$269.99
24" Pine Door	24" Pine Interior Bfiold Door	$199.00	1	$199.00
30" Pine Door	30" Pine Interior BiFold Door	$219.00	1	$219.00

Thumbnail Image	Product Name	Descripti
	Power Drill	18 Volt Power Dr
	24" Pine Door	24" Pine Interior Bfiold Do
	30" Pine Door	30" Pine Interior BiFold Do
	36" Interior Door Slab	36" Interi Door Sla
	42" Interior Door Slab	42" Interi Door Sla

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Creating a new order

Figure 2-8 Creating a new order for a customer

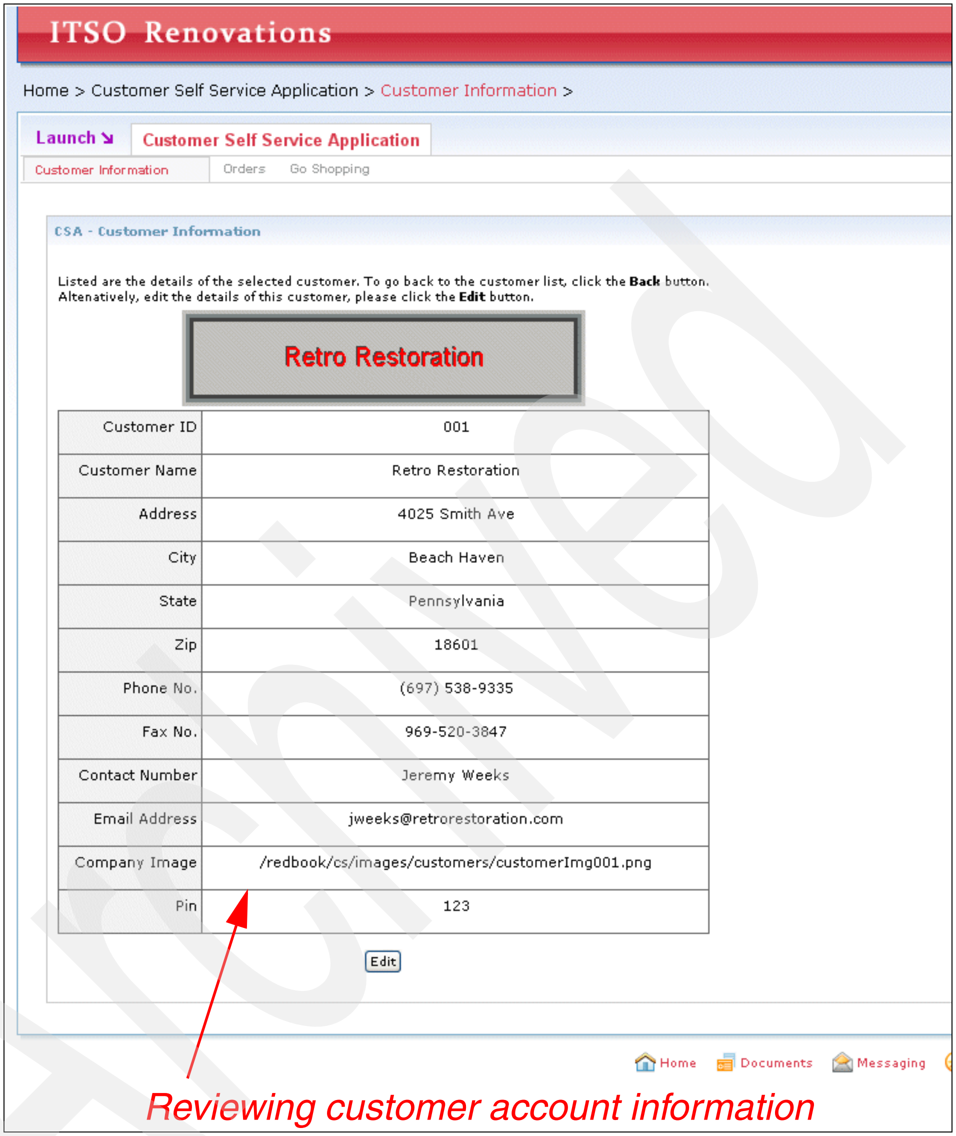
2.4 Review of specific portlets - Customer perspective

This section highlights the functionality of the portlets for an external customer logging into the application.

2.4.1 Customer information based on authentication credentials

The functionality for an external customer is similar to that of the customer service representative, with one key exception: the customer logging in will only see information for their own account.

For example, as shown in Figure 2-9 on page 28, the customer Retro Restoration has logged into the system and is presented with their account information.



ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Retro Restoration

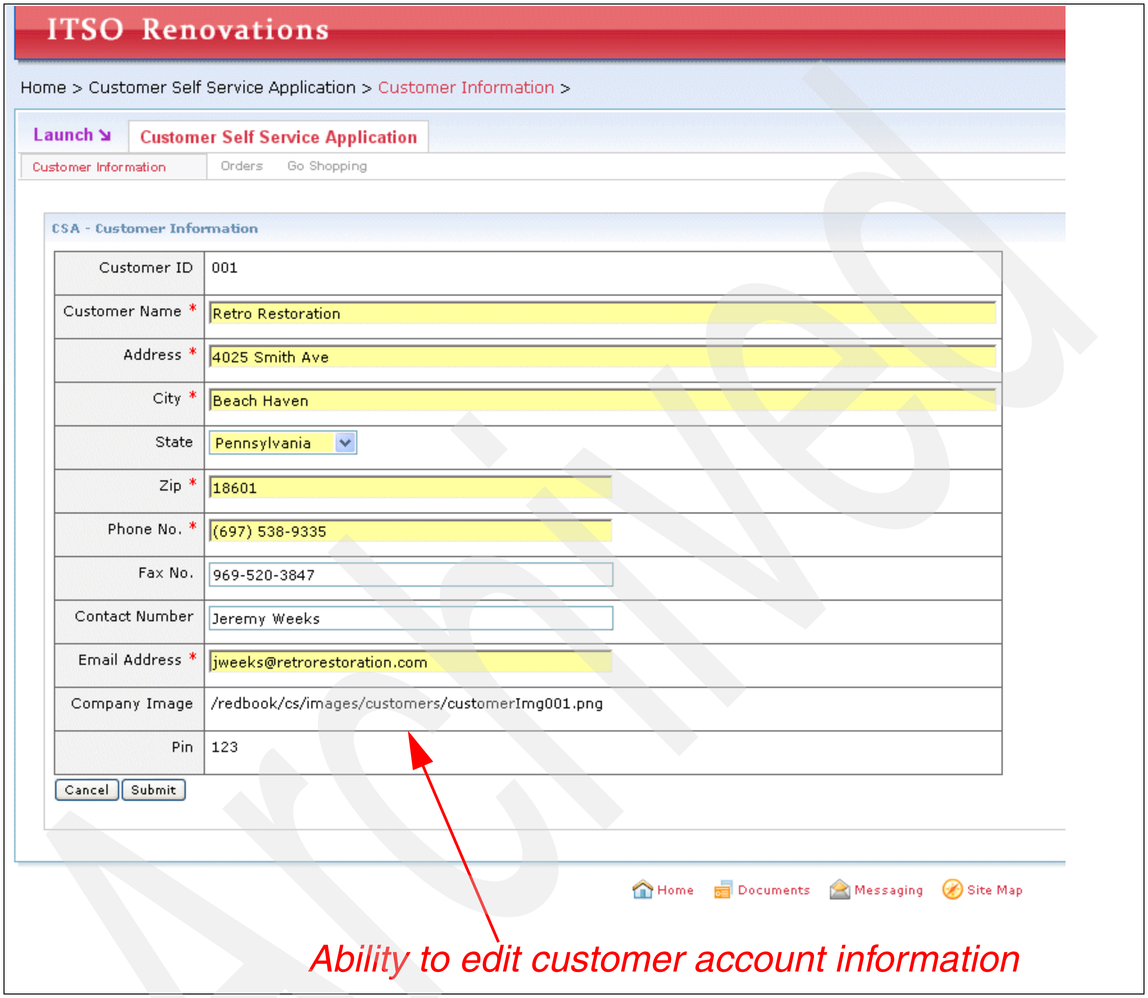
Customer ID	001
Customer Name	Retro Restoration
Address	4025 Smith Ave
City	Beach Haven
State	Pennsylvania
Zip	18601
Phone No.	(697) 538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	/redbook/cs/images/customers/customerImg001.png
Pin	123

Reviewing customer account information

Figure 2-9 Upon logging in, a customer is presented with their customer information

The customer has the ability to edit and update their own account information if necessary. Once the customer clicks the edit button, they can edit the fields, as shown in Figure 2-10.

h



ITSO Renovations
Home > Customer Self Service Application > Customer Information >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Customer ID	001
Customer Name *	Retro Restoration
Address *	4025 Smith Ave
City *	Beach Haven
State	Pennsylvania
Zip *	18601
Phone No. *	(697) 538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address *	jweeks@retrorestoration.com
Company Image	/redbook/cs/images/customers/customerImg001.png
Pin	123

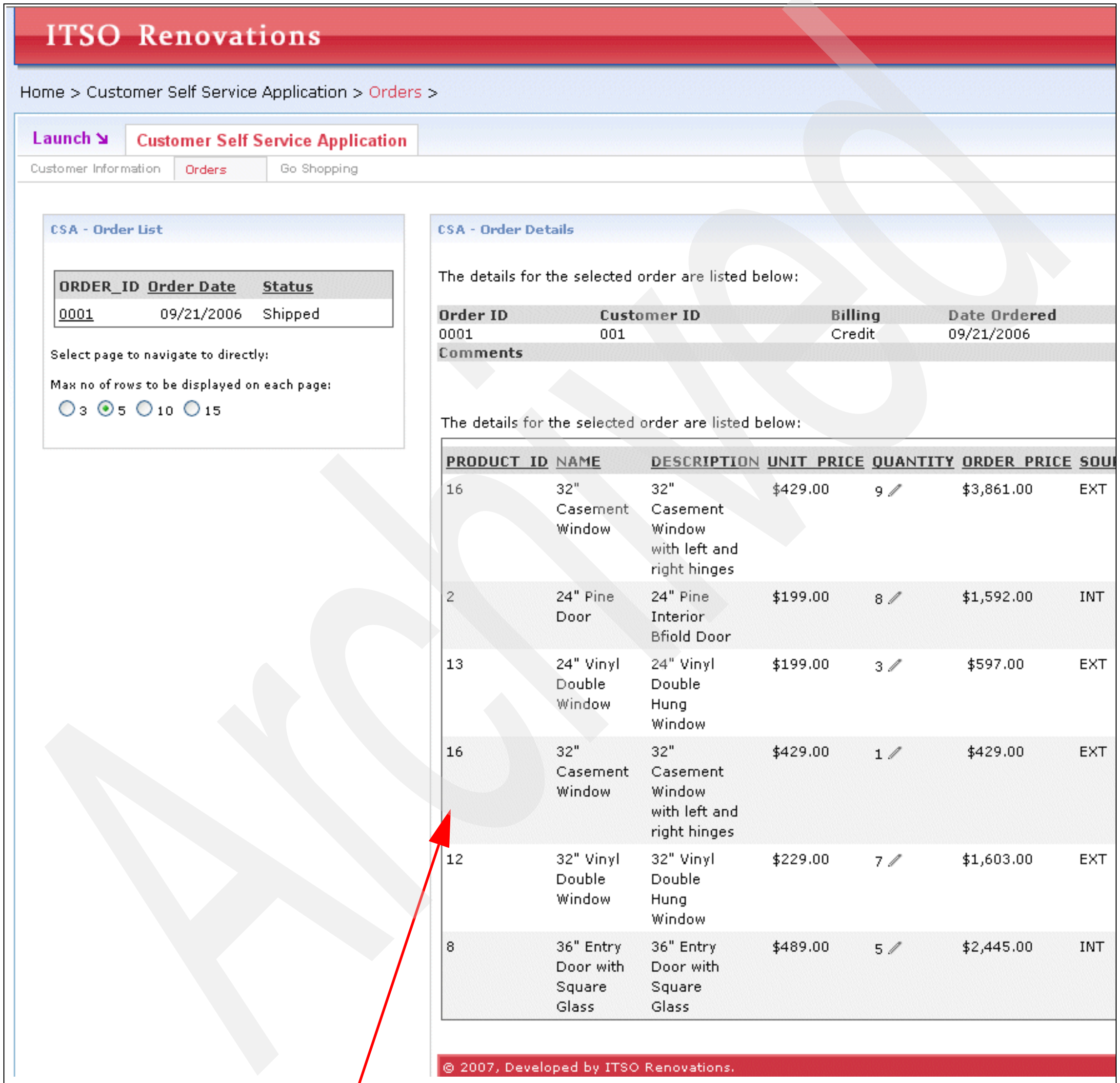
Cancel
Submit
Home
Documents
Messaging
Site Map

Ability to edit customer account information

Figure 2-10 Customer has the ability to edit their account information

2.4.2 Customer perspective - Reviewing orders

Once logged into the system, the customer has the ability to review each of their orders. Clicking an order results in display of the specific details of the order (Figure 2-11).



ITSO Renovations

Home > Customer Self Service Application > Orders >

CSA - Order List

ORDER_ID	Order Date	Status
0001	09/21/2006	Shipped

Select page to navigate to directly:

Max no of rows to be displayed on each page:

○ 3 ● 5 ○ 10 ○ 15

CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered
0001	001	Credit	09/21/2006

Comments

The details for the selected order are listed below:

PRODUCT_ID	NAME	DESCRIPTION	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOU
16	32" Casement Window	32" Casement Window with left and right hinges	$429.00	9 ✎	$3,861.00	EXT
2	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	8 ✎	$1,592.00	INT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window	$199.00	3 ✎	$597.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges	$429.00	1 ✎	$429.00	EXT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window	$229.00	7 ✎	$1,603.00	EXT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass	$489.00	5 ✎	$2,445.00	INT

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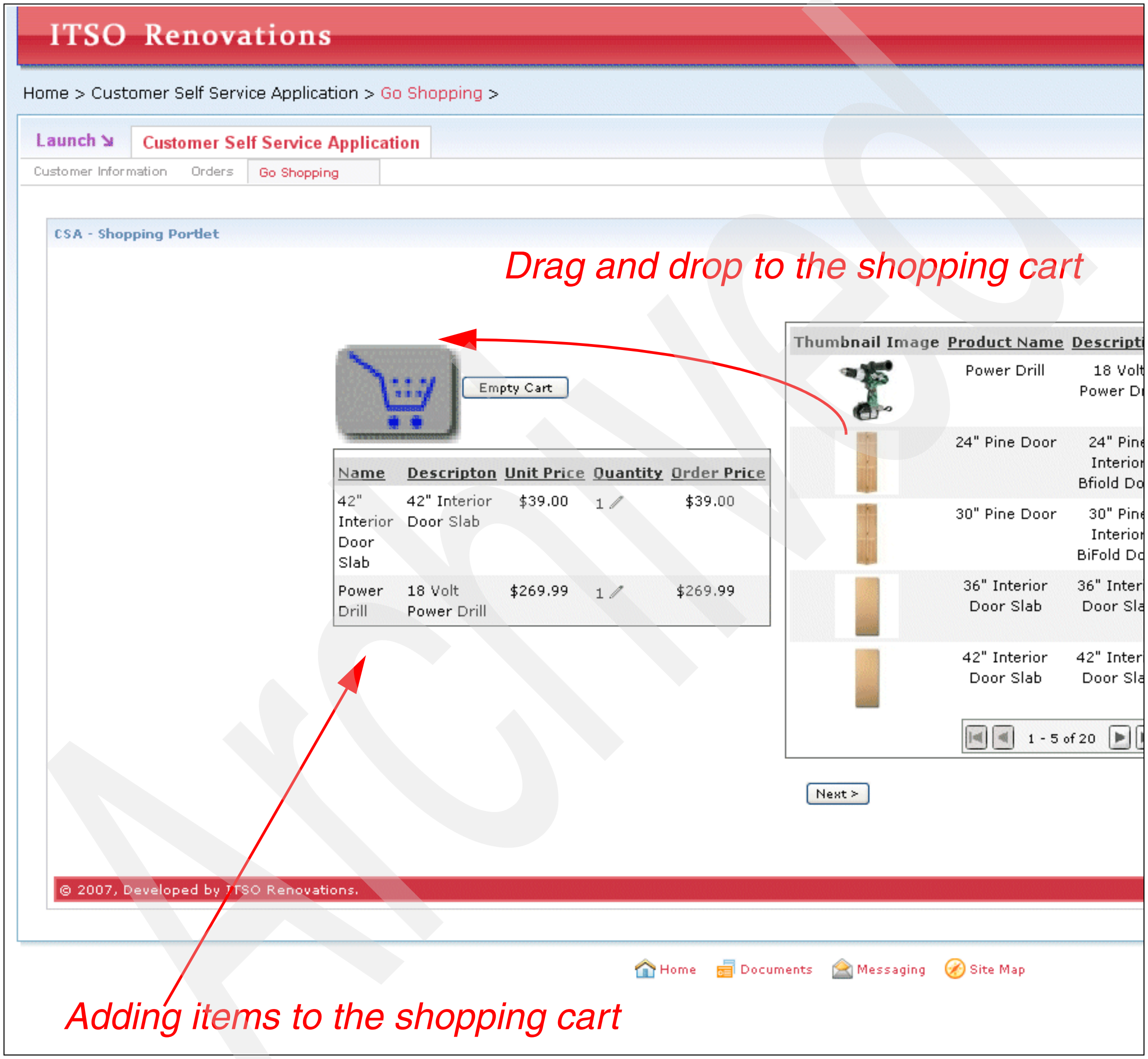
Reviewing details of customer order

Figure 2-11 Reviewing the details of an order

2.4.3 Customer perspective - Creating a new order

The customer can place a new order by clicking the Go Shopping tab. From within the Go Shopping portlet, a customer adds new items to their shopping cart by simply dragging and dropping items from the list on the right.


ITSO Renovations
Home > Customer Self Service Application > Go Shopping >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Shopping Portlet
Empty Cart
Next >
© 2007, Developed by ITSO Renovations.
Home
Documents
Messaging
Site Map

Drag and drop to the shopping cart

Name	Descripton	Unit Price	Quantity	Order Price
42" Interior Door Slab	42" Interior Door Slab	$39.00	1	$39.00
Power Drill	18 Volt Power Drill	$269.99	1	$269.99

Thumbnail Image	Product Name	Descripti
	Power Drill	18 Volt Power Dr
	24" Pine Door	24" Pine Interior Bfiold Do
	30" Pine Door	30" Pine Interior BiFold Do
	36" Interior Door Slab	36" Inter Door Sla
	42" Interior Door Slab	42" Inter Door Sla

1 - 5 of 20

Adding items to the shopping cart

Figure 2-12 Creating a new order and adding items to the shopping cart

Complete information about these functional portlets, and details on how to build each one, are provided in subsequent chapters. The next section identifies in which chapter each Portlet Factory function is covered.

2.5 Mapping functional areas of sample application and capabilities of Portlet Factory

The following tables describe specific features and the builders and techniques used to implement them.

2.5.1 Data Services

Table 2-1 highlights features implemented and functionality relating to the Data Services portion of the application.

Table 2-1 Data Services features implemented and builders used

Feature and description	Builders and techniques used	Reference
Data Structures Definition of data structures for the Application Data Service Interface. Import the structure from a XSD file or as input of the builder	**Definitions models** Models under \redbook\cs\data\def Builders: Schema builder	Chapter 4
Data Service Definition Definition of the data service and operations. It defines the Application Data Service Interface using the XML file based implementation.	**XML file models** Models under \redbook\cs\data\file Builders: Service Definition Service Operation	Chapter 4
Local XML access sample Implementation of a data service to access local XML files.	**XML file models** Models under \redbook\cs\data\file Builders: Import to XML Linked Java Object	Chapter 5
SQL Data Services Implementation of a data service to access relational databases.	**Database models** Models under \redbook\cs\data\db Builders: SQL DataSource SQL Call	Chapter 5
SQL Data Services - Data Transformations using IXml API Data transformations using IXml API implemented in a Java class.	**Java class OrderDBProviderHelper** Method: transformOrderItems()	Chapter 5

Feature and description	Builders and techniques used	Reference
SQL Data Services - Customize data column access to work with binary data: read and write How to customize the data column access in SQL builders to select and update/insert in a table that contains a binary column (BLOB).	**Database models** **CustomerDBProvider** **ProductDBProvider** Builders: SQL Statement **DBProviderHelper.model** Builders: Action List Linked Java Object **Java class DBProviderHelper**	Chapter 5
SQL Data Services - implementation of transactions Implementation of user defined transactions that involves the execution of several SQL Statements.	**Database models OrderDBProvider** Builders: SQL Statement SQL Transaction **Java class OrderDBProviderHelper** Methods: createOrderWithItems() updateOrderItemsList()	Chapter 5
Domino Data Access Service Implementation of a data service to access a Domino database.	**Domino models** **ProductDetailsProvider** Builders: Domino Data Access SQL Transaction **Java class ProductDetailsProvider Helper**	Chapter 5
Domino Data Access Service - Data Transformation using Transform builders Data transformations for Domino data using builders.	**Domino models** **ProductDetailsProvider** Builders: Transform	Chapter 5
Data Service for external Web Service access Implementation of a data service to access an external web service.	**Web Service models** **ProductWSProvider** Builders: WebServiceCall	Chapter 5
Data Service for external Web Service access - accessing static content How to access static content provided by the web service (images, PDF files, and so forth).	**Web Service models** **ProductWSProvider** Builders: Method Variable	Chapter 5
Data Service for external Web Service access - Profiling the Web Service URL using a properties file Profile the Web Service URL using a properties file.	**Profile Set Configurations** Java class PropertyFileValueSetter	Chapter 5

Feature and description	Builders and techniques used	Reference
Creating stub service for data services Auto generation of Stub Services to work disconnected from the real back-end system.	**Data access models** Builders: Service Definition	Chapter 5
Creation of a Web Service using WebSphere Portlet Factory How to create expose a Data Service as a Web Service.	**ProductWebService** Builders: Service Definition	Appendix B

2.5.2 Basic user interface portlets

Table 2-2 highlights features implemented and functionality relating to creating the basic User Interface portlets. These topics are covered in detail in Chapter 6, “Creating portlets: Making it work” on page 221.

Table 2-2 Basic user interface portlet features implemented and builders used

Feature and description	Builders and techniques used
Creating Basic User Interface/Portlets Consumes the Data Services and creates a basic user interface using high level builders. Uses the Portlet Adapter builder to execute models as portlets. Also utilizes the WPS Credential builder to access the WebSphere Portal Credential Vault.	**CustomerInfo Model** Service Consumer View & Form Imported Page Portlet Adapter WPS Credential
Creating Basic User Interface/Portlets Uses the fundamental Data Page builder to create a portlet capable of displaying a list of orders.	**OrderList Model** Service Consumer Imported Page Data Page Portlet Adapter
Creating Basic User Interface/Portlets Uses multiple Data Page builders to create a Order Details portlet. Also utilizes the Linked Java Object builder to conduct Order calculations, etc.	**OrderDetails Model** Service Consumer Imported Page Data Page Linked Java Object Portlet Adapter.

2.5.3 Advanced user interface portlets

Table 2-3 highlights features implemented and functionality relating to advanced development with the user interface. These topics are covered in detail in Chapter 7, “Creating portlets: Designing the UI” on page 275.

Table 2-3 Advanced user interface portlet features implemented and builders used

Feature and description	Builders and techniques used
Rich Data Definition Consistently format the output of the dataset views as well as the input forms.	**CustomerInfo Model** Rich Data Definition
UI Manipulation Formats the output of the dataset views as well as the input forms. Controls UI down to the field level in terms of sorting, alignment, color, data input type (e.g. via a text area or a calendar input control) as well as validation.	**CustomerInfo Model** Rich Data Definition Highlighter Data Column Modifier
Paging Paginates the data set returned and provides paging buttons (to navigate across pages) and paging links (to navigate directly to a page) for navigation.	**OrderList Model** Paging Assistant Paging Buttons Paging Links
Radio Button Selection Provides radio buttons for setting the page size.	**OrderList Model** Radio Buttons Group HTML Event Action
Dojo Tooltip and Ajax Inline Edit Implements the dojo inline editing dojo tooltip pop up for product details. Implements inline editing of the quantity of a product ordered without refreshing the entire page.	**OrderDetails Model** Dojo Tooltip Dojo Inline Edit Client Event Handler Event Handler Event Declaration
Dojo Drag and Drop Implements the dojo drag and drop feature of a product from a product catalog to a shopping cart.	**ShoppingCart Model** Dojo Drag Source Dojo Drag Target
Enabling a model with the Dojo toolkit Importing the dojo library and implementing the dojo rich text editor for the order page of the shopping module.	**OrderPage Model** Dojo Enable Text Area Attribute Setter

2.5.4 Portlet communication and profiling

Table 2-4 highlights features implemented and functionality relating to portlet communication and profiling.

Table 2-4 Portlet communication and profiling features implemented and builders used

Feature and description	Builders and techniques used	Reference
Portlet Communication Enables the CustomerInfo model to communicate with the OrderList model via a shared variable and for the CSR scenario, a Portlet Factory Event is required whereas for the Customer scenario, only the shared variable is sufficient.	**UIEvent Model** Variable Shared Variable Event Declaration **CustomerInfo Model** Imported Model Action List **OrderList Model** Imported Model Event Handler Action List	Chapter 8
Portlet Communication Enables the OrderList model to communicate with the OrderDetails model via a shared variable and a Portlet Factory Event.	**UIEvent Model** Variable Shared Variable Event Declaration **OrderList Model** Imported Model Link Action List **OrderDetails Model** Imported Model Event Handler Action List	Chapter 8
Portlet Communication Enables the CustomerCredentials model to communicate with the CustomerInfo model using a Portlet Factory Event.	**UIEvent Model** Event Declaration **CustomerCredentials Model** Imported Model **CustomerInfo Model** Imported Model Event Handler	Chapter 8

Feature and description	Builders and techniques used	Reference
Profiling for Different Entry Paths Enables the CustomerGroup and CSRGroup entering the application via two different paths.	**CustomerInfo Model** Page WPS Credential Action List **Profile Set** com.ibm.redbook.cs.psets.wpsgroup **Profile Set Selection Handler** WPS Group Segment Handler **Profile-enabled Builder** main (CustomerInfo - Action List)	Chapter 9
Profiling for Different Data Field Properties Enables the data field properties varying based on the user group using two RDD files. Customers are not supposed to allowed to modify the PIN and IMAGE fields of their details.	**Profile Set** com.ibm.redbook.cs.psets.wpsgroup **Profile Set Selection Handler** WPS Group Segment Handler **Profile-enabled Builder** CustomerService (CustomerInfo - Service Consumer)	Chapter 9
Profiling for Different Component Visibility Properties Enables the application to hide/show different components based on the user group. Customers are not supposed to see the Back button on the Customer Details View Page.	**CustomerInfo Model** Visibility Setter **Profile Set** com.ibm.redbook.cs.psets.wpsgroup **Profile Set Selection Handler** WPS Group Segment Handler **Profile-enabled Builder** back_button (CustomerInfo - Visibility Setter)	Chapter 9
Runtime Customization Enables users to personalize the OrderDetails portlet during runtime. They are given the options to hide/show the Product ID, Thumbnail and Source columns.	**OrderDetails Model** Data Column Modifier **OrderDetailsCustomiser Model** Portlet Customizer **Profile-enabled Builder** ITEM (OrderDetails - Data Column Modifier)	Chapter 9

3

Creating projects

In this chapter we describe the process of setting up a new WebSphere Portlet Factory project in the WebSphere Portlet Factory Designer. A brief introduction to deployment is given, then we step through the process of creating a project for the Customer Service application and deploying it to a WebSphere Portal 6.0 server. Deployment is covered in more detail in Chapter 11, “Production deployment” on page 613 of this book.

Also in this chapter, we outline the file structure of WebSphere Portlet Factory projects, as well as the process of setting up the folder structure for the Customer Service application. The different types of WAR files that you can produce from the WebSphere Portlet Factory Designer are discussed and we walk you through the process of creating a sample portlet, which you can use to test your project settings.

Finally, we take you through the process of adding feature sets into your project that are required in this book. A brief outline of how to preview and run your WebSphere Portlet Factory applications is also given.

> **Important:** This chapter focuses on how to set up your local development environment for development, testing, and *local machine deployment*. Refer to Appendix A, “Setting up the environment” on page 631 for details on how to set up the complete development environment to run the sample application.

Note: If you will be setting up a new WebSphere Portlet Factory project in the WebSphere Portlet Factory Designer using the RAD UTE (Unified Testing Environment), use this chapter together with Appendix D, “Configuring the RAD Unified Test Environment” on page 673, which describes special considerations.

3.1 Overview

In this chapter we demonstrate how to create and configure your WebSphere Portlet Factory projects using the WebSphere Portlet Factory Designer. At the end of this chapter, you should have a working WebSphere Portlet Factory project (with an appropriate folder structure), which you can use as a basis for developing the Customer Service application that you will build in subsequent chapters of this book.

This chapter contains the following sections:

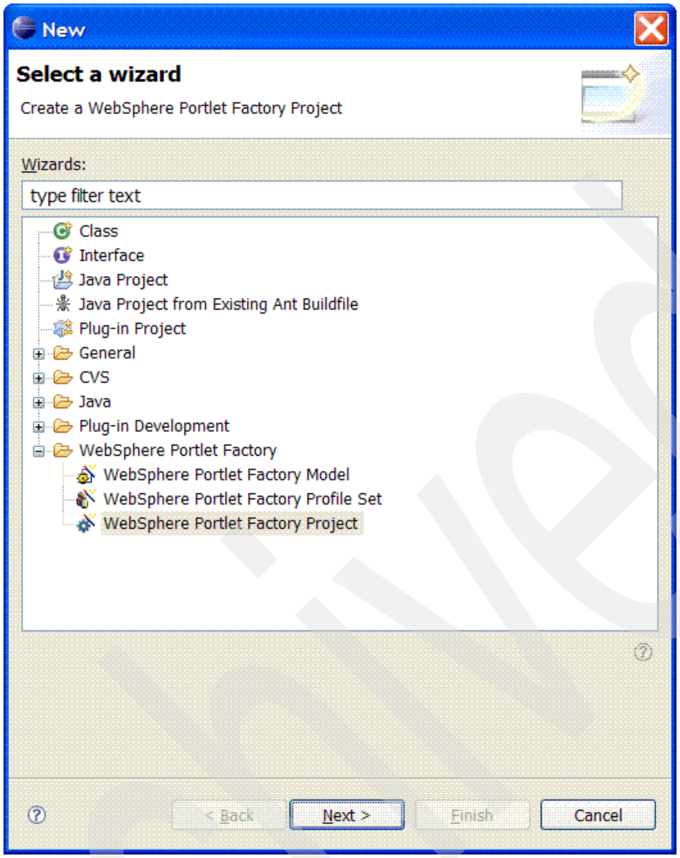
- Creating a project
- Project structure
- Deployment
- Testing
- Adding a feature set

3.2 Creating a project

All development artifacts in WebSphere Portlet Factory are stored in a WebSphere Portlet Factory project in the WebSphere Portlet Factory Designer. A single WebSphere Portlet Factory project can contain multiple portlets or Web applications, but you must create one of these projects before you can begin development in WebSphere Portlet Factory.

To create a WebSphere Portlet Factory project, follow these steps:

1. Select **New** → **WebSphere Portlet Factory Project** from the File menu. If the WebSphere Portlet Factory Project option does not appear, select **File** → **New** → **Other...**, then select **WebSphere Portlet Factory** → **WebSphere Portlet Factory Project** from the dialog that follows (see Figure 3-1). Click **Next** when finished.


New

Select a wizard

Create a WebSphere Portlet Factory Project

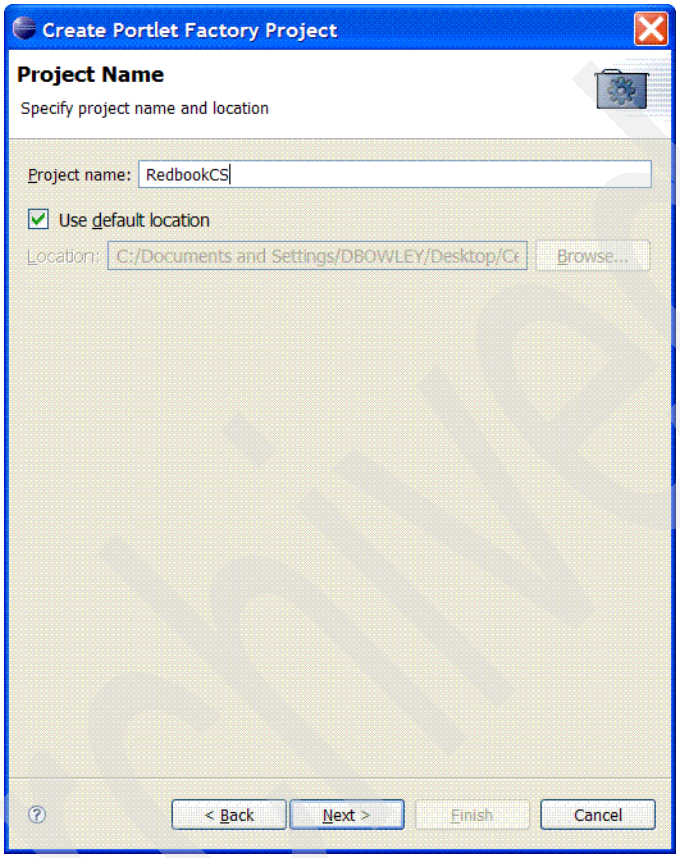
Wizards:

type filter text

Class
Interface
Java Project
Java Project from Existing Ant Buildfile
Plug-in Project
General
CVS
Java
Plug-in Development
WebSphere Portlet Factory
WebSphere Portlet Factory Model
WebSphere Portlet Factory Profile Set
WebSphere Portlet Factory Project
< Back
Next >
Finish
Cancel

Figure 3-1 Create a WebSphere Portlet Factory Project wizard

2. Give your project a name. Because we are creating a project for the Customer Service sample application, which is used throughout this book, we named the project `RedbookCS`, as shown in Figure 3-2.



Create Portlet Factory Project

Project Name

Specify project name and location

Project name: RedbookCS

☑ Use default location

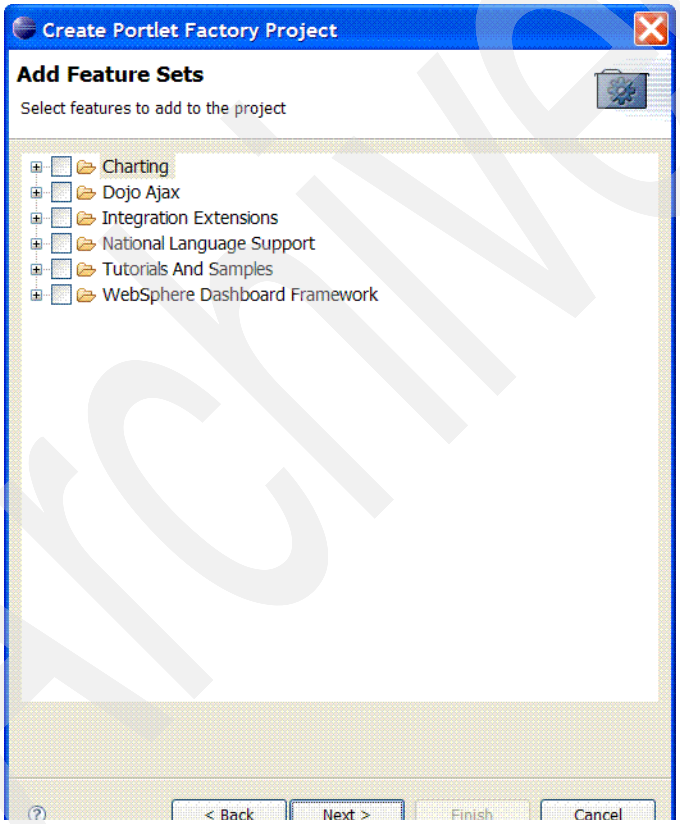
Location: C:/Documents and Settings/DBOWLEY/Desktop/Ce

Figure 3-2 Naming the project

3. The next screen (Figure 3-3) allows you to specify which feature sets your project will use. *Feature sets* are collections of functionality that can be plugged into your WebSphere Portlet Factory project. For example, selecting the Lotus Collaboration Extension feature set under the Integration Extensions heading gives you access to a series of builders to integrate your application with Lotus Domino databases. Click **Next** to proceed to the next stage of the project creation wizard.

Note: Once you have created a project, you can configure it at any time by opening the project properties dialog. To open the dialog, select **Properties** from the **Project** menu, or click the project folder in the Project Explorer or Navigator view and press Alt+Enter. You can use the settings on this dialog to specify everything from the Java build path to the project's Javadoc™ location. Once the dialog has opened, click the **WebSphere Portlet Factory** heading to view a list of options related specifically to WebSphere Portlet Factory.

Configuring your project after it has been created is particularly useful when adding feature sets, or when changing deployment configurations.



Create Portlet Factory Project

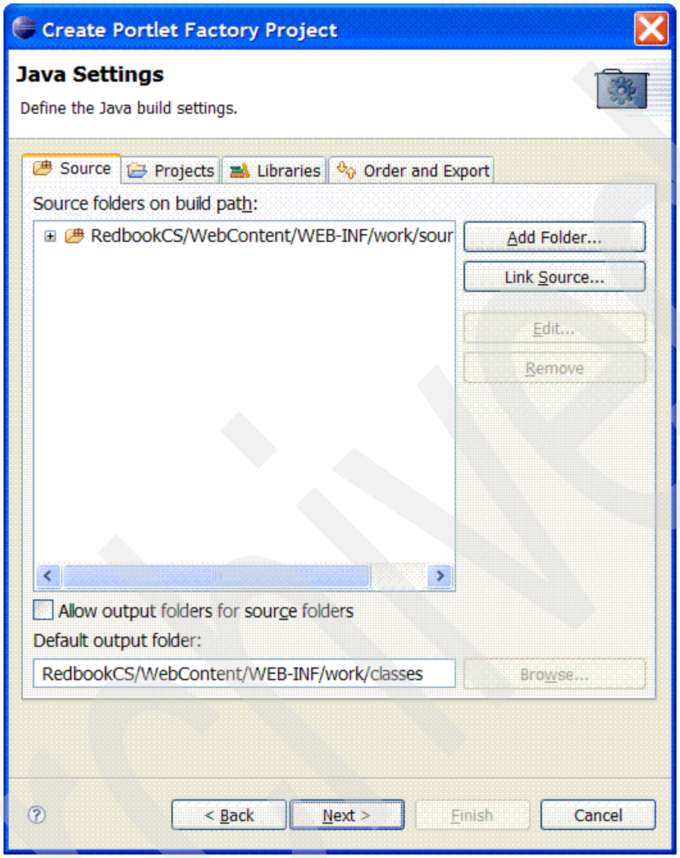
Add Feature Sets

Select features to add to the project

- ☐ Charting
- ☐ Dojo Ajax
- ☐ Integration Extensions
- ☐ National Language Support
- ☐ Tutorials And Samples
- ☐ WebSphere Dashboard Framework

Figure 3-3 Adding Feature Sets

4. The next screen (Figure 3-4) allows you to specify your Java build settings. You don’t need to make any adjustments to these settings, so click **Next** to proceed.



Java Settings

Define the Java build settings.

Source folders on build path:

RedbookCS/WebContent/WEB-INF/work/sour

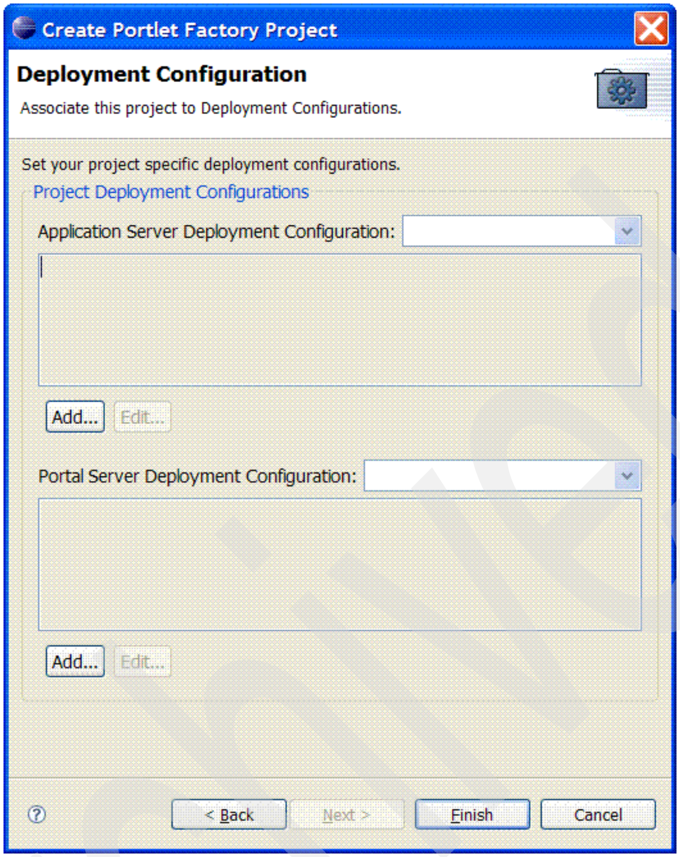
☐ Allow output folders for source folders

Default output folder:

RedbookCS/WebContent/WEB-INF/work/classes

Figure 3-4 Specifying the Java Build Settings

5. The final screen (Figure 3-5) allows you to specify your deployment configurations. Later in this section, we discuss how to set up your deployment configurations; but for now, just leave this page blank and click **Finish**. The WebSphere Portlet Factory Designer will create all of the artifacts for your project and return you to the IDE.



Create Portlet Factory Project

Deployment Configuration

Associate this project to Deployment Configurations.

Set your project specific deployment configurations.

Project Deployment Configurations

Application Server Deployment Configuration:

Portal Server Deployment Configuration:

Figure 3-5 Specify your deployment configurations

You have now successfully created a WebSphere Portlet Factory project. You should see a new project opened up in the Project Explorer view (Figure 3-6). Note that you will not actually be able to test or run your application until you set up a deployment profile because the deployment profile will specify the servers you would like to run your application on.

The next section covers the file structure of WebSphere Portlet Factory projects. Towards the end of this chapter, we return to the project setup to outline how you can use deployment profiles to deploy your applications in WebSphere Portlet Factory. Finally, we create a basic portlet to test your configuration.

3.3 Project structure

Each WebSphere Portlet Factory project is structured into several main folders, as shown in Figure 3-6.

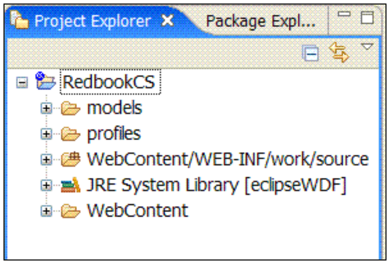


Figure 3-6 Example of project structure

Models

The models directory houses all of the models in your project. All models need to go into this directory, although you should store them in subdirectories that more clearly delineate their purpose. (Note that the models directory shown at this top level is actually just a link to the models directory contained under the WebContent folder, so you can use either folder.)

For the Customer Service application, add the following subfolders to the models directory. You can add folders to the models directory by right-clicking the **models** directory in the Project Explorer view and selecting **New** → **Folder** from the pop-up context menu. We gave the folders the following names and purposes:

- models/redbook/cs/data/db: Provider models for DB
- models/redbook/cs/data/def: Models containing data definitions
- models/redbook/cs/data/domino: Provider models for Domino access
- models/redbook/cs/data/file: Provider models for plain file implementation
- models/redbook/cs/data/migrate: Models used for migrating data
- models/redbook/cs/data/test: Models used for test or administration purposes
- models/redbook/cs/data/ws: Provider models for Web services
- models/redbook/cs/ui/common: Model holding Portlet Factory events and shared variables
- models/redbook/cs/ui/customer: UI models for customer portlets
- models/redbook/cs/ui/order: UI models for order portlets
- models/redbook/cs/ui/shopping: UI models for shopping portlets

Profiles

The profiles directory stores all of your profile sets, which in turn house your profiles and profile entries (as with the models directory, note that the profiles directory is actually just a link to the profiles directory contained under the WebContent folder, so you can use either folder).

WebContent/WEB-INF/work/source

This directory contains all of your Java source files. Code in this directory will be automatically compiled to the WebContent/WEB-IN/work/classes folder when it is saved in the WebSphere Portlet Factory Designer.

JRE System Library

This folder contains all of the libraries in your Java runtime environment. You do not normally need to change anything in this folder.

WebContent

The WebContent folder contains all of the artifacts directly servable to the client (minus the contents of the WEB-INF folder). It consists of the following subdirectories:

- **Factory**
  All the servable resources pertaining to the WebSphere Portlet Factory core reside in this directory. HTML pages for the applications that comprise the Factory and images are all in this directory.
- **WEB-INF**
  The WEB-INF folder is the main folder used in WebSphere Portlet Factory projects, and contains all of the design elements that are not directly servable to the client. These directories are listed in Table 3-1.

Table 3-1 Subdirectories under WEB_INF

Directory	Description
WEB-INF/bin	Contains various batch files and scripts.
WEB-INF/builders	Contains all of the builder definition files used in the Factory.
WEB-INF/classes	Part of Factory's class path. Contains the deployable Java classes used by your Web applications.
WEB-INF/clientLibs	Part of Factory's class path. Stores the deployable JAR files used by your Web applications.
WEB-INF/config	Contains the property files used by the Factory.
WEB-INF/factory	Contains non servable Factory core elements.

Directory	Description
WEB-INF/lib	Part of the Factory's class path. Contains all the JAR files used by the Factory.
WEB-INF/logs	Contains log files from the Factory.
WEB-INF/manifests	Contains a manifest of all the files in your project.
WEB-INF/models	Contains all the models installed as part of the Factory, as well as models you create.
WEB-INF/profiles	Contains all of your profile sets.
WEB-INF/script_templates	Contains .jst templates.
WEB-INF/work	Contains sample Java source files and classes.
WEB-INF/work/classes	The work/classes directory is also part of Factory's class path. All classes in this directory get dynamically loaded by the Factory.
WEB-INF/work/source	Contains sample code and serves as a convenient place to store Java source files for your Web applications.

- Subfolders specific to the Customer Service application

  For the Customer Service application, you should also add the following subfolders to the WebContent directory. You can add folders to the WebContent directory by right-clicking the **WebContent** directory in the Project Explorer view and selecting **New** → **Folder** from the pop-up context menu. The folders and their contents are:

  – WEB-INF/resources/redbook/cs/data_definitions: Xml data definition files for displayed data

  – WEB-INF/resources/redbook/cs/properties: Service and server properties files

  – WEB-INF/resources/redbook/cs/sqlscripts: Sql scripts

  – WEB-INF/resources/redbook/cs/xml/data: Xml data sample files

  – WEB-INF/resources/redbook/cs/xsd: Xml schemas for data

  – redbook/cs/html: Html templates

  – redbook/cs/images/customers: Images used on the customer portlets

  – redbook/cs/images/products: Images used on the products portlets

  – redbook/cs/tmp: Temp files

3.4 Deployment

A WebSphere Portlet Factory project is a collection of artifacts available to your application at design time. Before you can test or run your application, you need to deploy the application as a WAR file to an application server or portal server.

In this section we discuss some of the basic concepts used in deployment, and describe how to deploy your application as a WAR file to a locally installed WebSphere Portal 6.0 server. For a more detailed discussion of deployment, see Chapter 11, “Production deployment” on page 613.

3.4.1 WAR files

A WAR file is an archive consisting of application artifacts, which can be deployed to an application server or portal server. Once deployed, applications can be automatically refreshed from your IDE, so that they do not need to be completely rebuilt every time you want to make changes (although there are scenarios where you have to rebuild your application in order to update it). Automatic refresh of WAR files is discussed in more detail in Chapter 11.

There are three types of WAR files that you can deploy from WebSphere Portlet Factory:

- Development WAR
- Portlet WAR
- Deployment WAR

These WAR files are discussed in the following sections.

Note: Earlier versions of WebSphere Portlet Factory do not use the same terminology to refer to their WAR files. Consult your specific version’s product documentation if you are using a version of WebSphere Portlet Factory earlier than 6.0.1.

Development WAR

Your project will create a development WAR whenever you use an application server deployment configuration. This WAR is deployed to an application server, and contains certain developer-friendly artifacts (such as an index page that lets you browse all of the models in your project). These artifacts help developers achieve faster development cycles, although you would not usually deploy these artifacts into production. (Do you really want end users to be able to cycle through all of the models in your project?) The development WAR is created at project creation time and is continually refreshed during development. When you preview your application directly from your IDE, you will always use the development WAR.

Portlet WAR

Portlet application developers can create a portlet WAR to see their applications running in a portal container. There is only one portlet WAR and it is used for both development and production deployment. This WAR is created at project creation time and is continually refreshed during development (although note that certain changes will require the project to be re-deployed). This is the only WAR type which will let you view your application as one or more portlets, and thereby take advantage of functionality offered by the portlet container (such as wiring, portlet security, and so forth).

Deployment WAR

Standalone application developers can create a deployment WAR, which may be deployed on any supported application server (such as WebSphere Application Server 6). This WAR is built by executing an Ant script. The deployment WAR is used to deploy non portlet applications, and does not contain any of the development-only artifacts included in the development WAR. You might use this option to, for example, deploy a Web service provider.

You can deploy WAR files by right-clicking your project's root folder (that is, the RedbookCS folder) and then selecting Build Portlet Factory WAR. This will open a context menu listing the three possible WAR files that you can deploy. You will only be able to deploy WAR files that are supported by the deployment profiles you have configured; WAR files that are not supported will be greyed out. Deployment profiles are discussed in the next section.

> **Note:** Deploying a WAR file directly from your IDE is not always possible (for example, when deploying to remote portal servers that you cannot access through the file system). In these scenarios, you need to build the WAR file, and then manually deploy it through the server's administration interface. Manual deployment is discussed in Chapter 11.

3.4.2 Deployment configurations

There are two types of deployment configurations you can set up in WebSphere Portlet Factory, as follows:

Application Server deployment configuration

This configuration covers the development and deployment WAR files. You can use either an ordinary application server or a portal server for this configuration (although, if you are using a portal server, you will be running your applications as servlets rather than portlets). Whenever you preview an application from your IDE, you will automatically be using the application server deployment configuration.

In order to use the automatic refresh option with this configuration, the server must be either local (that is, on the same machine as the WebSphere Portlet Factory Designer) or on a remote machine mapped to the local machine through the file system (so that it is possible to access files on the portal server from your local machine).

Portal Server deployment configuration

This configuration covers the portlet WAR file, and must be set to use a portal server. You cannot configure your portal server deployment configuration to point to an ordinary application server (that is, one without a portlet container). Whenever you run an application on a portal server, you will be using the portal server deployment configuration.

As with the previous configuration, in order to use the automatic refresh option, the server must be either local (meaning on the same machine as the WebSphere Portlet Factory Designer) or on a remote machine mapped to the local machine through the file system (so that it is possible to access files on the portal server from your local machine).

In the next section, we demonstrate how to configure the RedbookCS project created earlier to deploy and automatically refresh a WAR file on a locally installed WebSphere Application Server 6.0 server.

Setting up deployment configurations

To deploy and automatically refresh a WAR file on a locally installed WebSphere Application Server 6.0 server, follow these steps:

1. Open up the project properties dialog by left-clicking the root folder in your WebSphere Portlet Factory project (RedbookCS) and selecting **Properties** from the **Project** menu.
2. Select **Deployment Info** from the **WebSphere Portlet Factory** section, as shown in Figure 3-7 on page 52.
3. The first deployment configuration you will add is for the application server, which will be used to preview your application before it is deployed to the portal server. Click **Add** under the Application Server Deployment Configuration section (shown also in Figure 3-7).

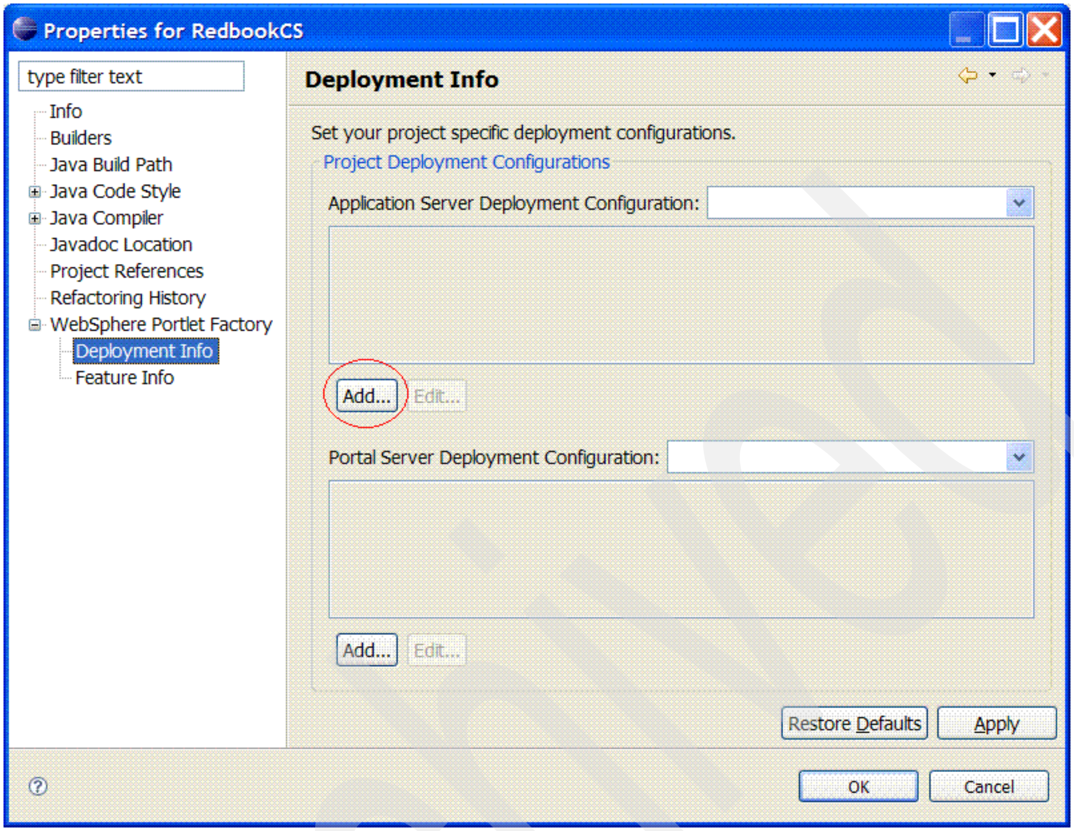


Figure 3-7 Select Deployment Info and prepare to add an application server

4. Enter the appropriate information in the New Deployment Configuration dialog box. Our entries and selections are shown in Figure 3-8 on page 53.

   a. Configuration name (do not use spaces). We entered `ApplicationServer`.

   b. Write a description for the configuration, such as `Server used for previewing portlets`.

   c. In the Server Type field, choose the appropriate option for your application server. WebSphere Portlet Factory supports several types of application servers, including WebSphere Application Server and Tomcat. Because we are using WebSphere Portal Server 6.0 as our application server, we selected `WebSphere Application Server 6.x` from the drop-down list. Choosing an option from this drop-down list will display a number of additional options at the bottom of the dialog.

   d. Type your installed applications directory into the Installed Applications Dir field. Your installed applications directory is a directory called `installedApps` under the application server. You also need to specify a cell name into which to install; this should be an immediate subdirectory of the installedApps directory. We used:

```
c:\ibm\WebSphere\profiles\wp_profile\installedApps\ITSO
```

e. Enter the hostname for the server. We used `localhost` because we are connecting to a local WebSphere Portal 6.0 server.

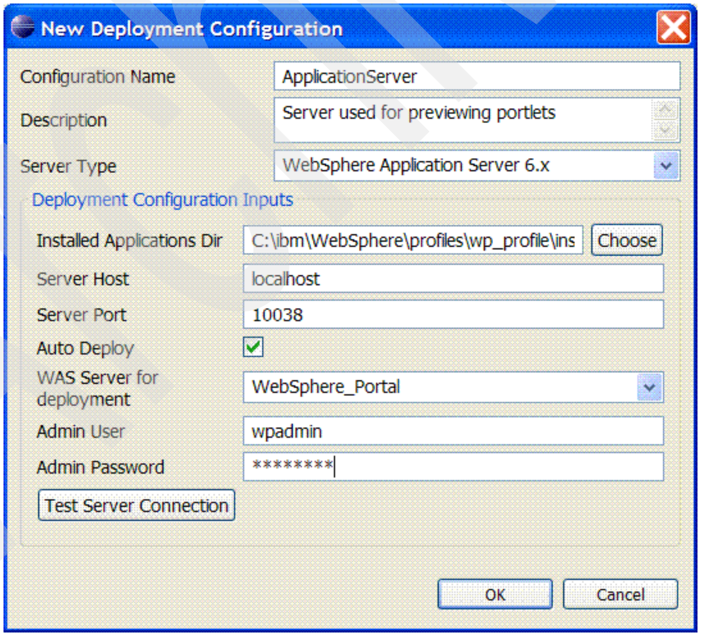
f. Enter a port to use when connecting to the server. Note that this port will be different depending on the type and version of the server you are using. The default port for WebSphere Portal 6.0 is 10038.

g. Make sure the Auto Deploy check box is selected. This ensures that your application is automatically deployed to the target server.

h. Specify the name of the application server you would like to deploy to. We used `WebSphere_Portal`.

i. Enter a username and password to connect to the server. This user must have administrator access to the server (which is why you would usually not use the Auto Deploy option with production servers). We used the `wpadmin` account that we used to set up the Portal Server.

j. You should now see a screen similar to that shown in Figure 3-8, although the exact settings may differ depending on your environment.



New Deployment Configuration

Configuration Name: ApplicationServer

Description: Server used for previewing portlets

Server Type: WebSphere Application Server 6.x

Deployment Configuration Inputs

Installed Applications Dir: C:\ibm\WebSphere\profiles\wp_profile\ins

Server Host: localhost

Server Port: 10038

Auto Deploy: ☑

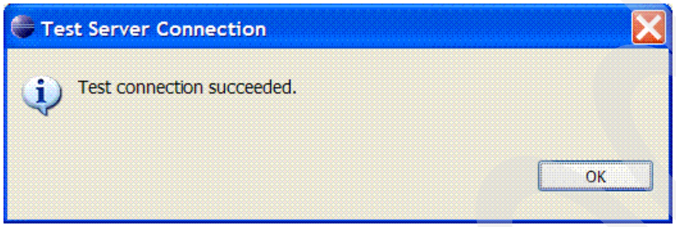
WAS Server for deployment: WebSphere_Portal

Admin User: wpadmin

Admin Password: ********

Figure 3-8 Deployment configuration settings

5. Before proceeding, test the connection to make sure these settings are correct. To test the connection, click the **Test Server Connection** button at the bottom of the dialog. This may take up to a few minutes, depending on the speed of your machine. Once the test has completed, you should see a success dialog (Figure 3-9) or an error message with which you can troubleshoot the problem. The most common mistakes are related to an invalid username or password, or an incorrectly specified hostname.



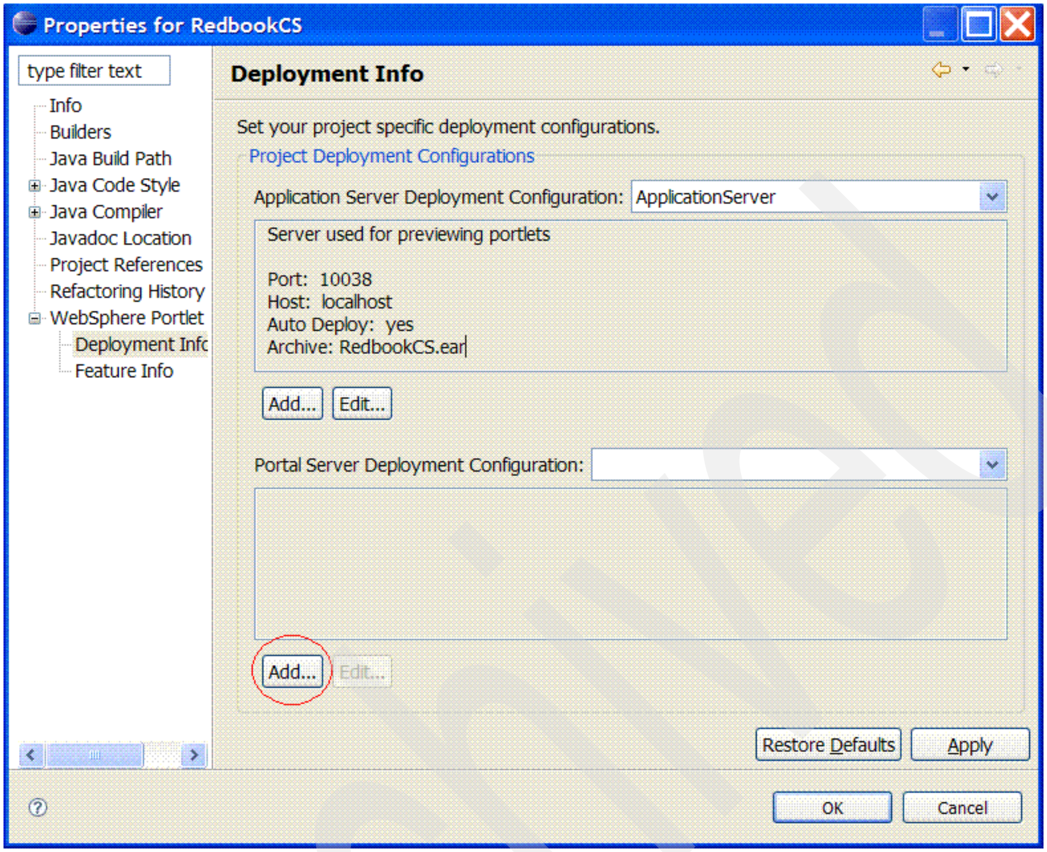
Test connection succeeded.

Figure 3-9 Verifying a successful test connection

6. Click **OK** when you have successfully tested your application server deployment configuration.

The process for specifying the portal server deployment configuration is essentially the same. The portal server is where you deploy your portlets to. In this book, we are using the same WebSphere Portal 6.0 server we used earlier.

7. Click **Add** under the Portal Server Deployment Configuration section, as shown in Figure 3-10.



Set your project specific deployment configurations.

Application Server Deployment Configuration: ApplicationServer

Server used for previewing portlets

Port: 10038
Host: localhost
Auto Deploy: yes
Archive: RedbookCS.ear

Portal Server Deployment Configuration:

Figure 3-10 Portal Server Deployment Configuration

8. Enter the appropriate information in the Portal Server Configuration dialog box. Our entries and selections are shown in Figure 3-11 on page 56.

   a. When the Portal Server Configuration dialog appears, give your configuration a name (don’t use spaces). We used `PortalServer`.

   b. Write a description for the configuration. We used `Server used to run portlets in a portlet container`.

   c. In the Server Type field, choose the appropriate option for your portal server. Because we are using WebSphere Portal Server 6.0, we selected `WebSphere Portal 6.x` from the drop-down list. Choosing an option from this list will display a number of additional options at the bottom of the dialog.

   d. Choose a Portlet API for your portlet. WebSphere Portlet Factory supports both Java Standard Portlets (JSR-168 compliant portlets) and WebSphere

Native Portlets (WebSphere Portlet API portlets). Make sure `Java Standard` is selected.

e. Type in the root directory for your portal server installation. Ours is `C:\Program Files\IBM\WebSphere6\PortalServer`.

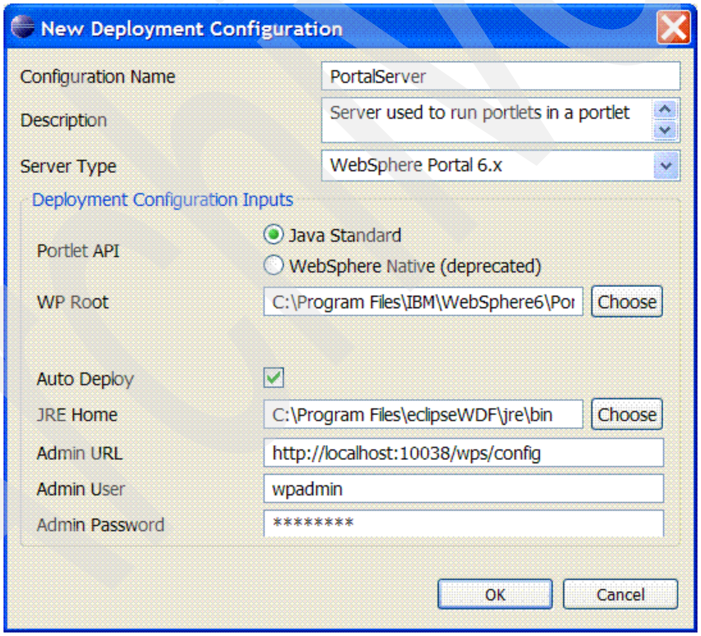
f. Make sure the Auto Deploy check box is selected.

g. Type in the JRE™ Home directory; the default directory should be fine. We used `C:\Program Files\eclipseWDF\jre\bin`.

h. Type in the Admin URL for your portal server. We used `http://localhost:10038/wps/config`. Note that the port number will be different depending on the portal server and version you are using.

i. Enter a username and password to connect to the portal server. This username must have administrator access to the portal server. We used the `wpadmin` user that we used to set up the portal server.

j. The deployment configuration dialog should now appear similar to Figure 3-11.



New Deployment Configuration

Configuration Name: PortalServer

Description: Server used to run portlets in a portlet

Server Type: WebSphere Portal 6.x

Deployment Configuration Inputs

Portlet API: ● Java Standard ○ WebSphere Native (deprecated)

WP Root: C:\Program Files\IBM\WebSphere6\Por

Auto Deploy: ☑

JRE Home: C:\Program Files\eclipseWDF\jre\bin

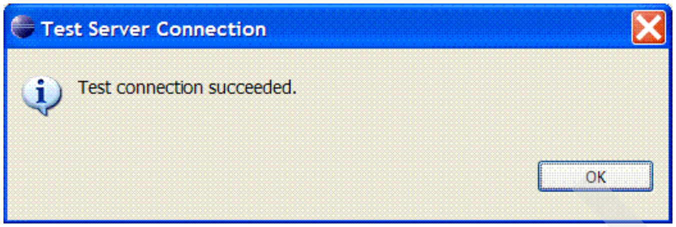
Admin URL: http://localhost:10038/wps/config

Admin User: wpadmin

Admin Password: ********

Figure 3-11 Deployment configuration dialog

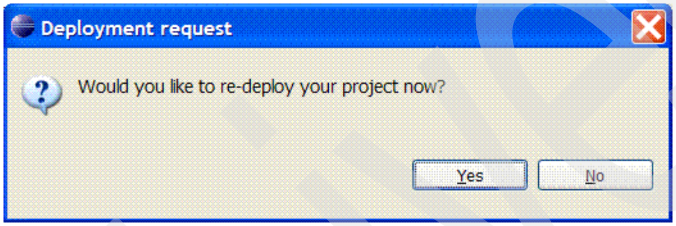
9. Click **OK** when finished. This will automatically test your configuration. You should see a success dialog upon completion, as shown in Figure 3-12.



Test connection succeeded.

Figure 3-12 Verifying test connection

10. Click **OK** on the Deployment Info dialog to finish updating the deployment configurations. A dialog will appear (Figure 3-13) asking whether you would like to re-deploy your application. Click **OK**.



Would you like to re-deploy your project now?

Figure 3-13 Re-deploying your application

You have now set up your deployment configurations and deployed your application to a WebSphere Portal 6.0 server. To test your configurations, follow the steps in the next section.

3.5 Testing

Before you can test your deployment configurations, you must create a test model. Follow these steps to create a basic test model in WebSphere Portlet Factory:

1. Select **New** → **WebSphere Portlet Factory Model** from the **File** menu. If the WebSphere Portlet Factory Model option does not appear, select **File** → **New** → **Other...**, then select **WebSphere Portlet Factory** → **WebSphere Portlet Factory Model** from the dialog that follows (see Figure 3-14). Click OK when finished.

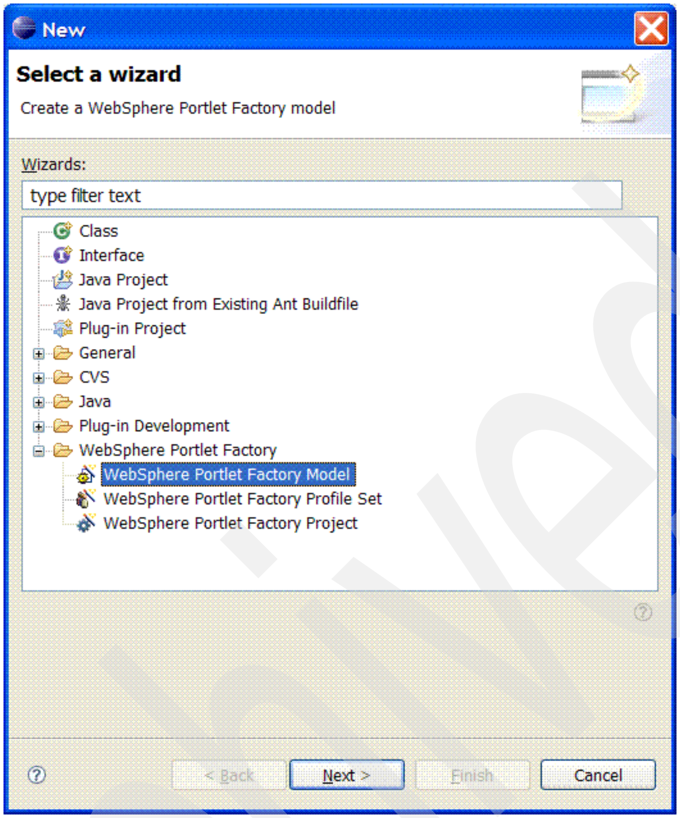
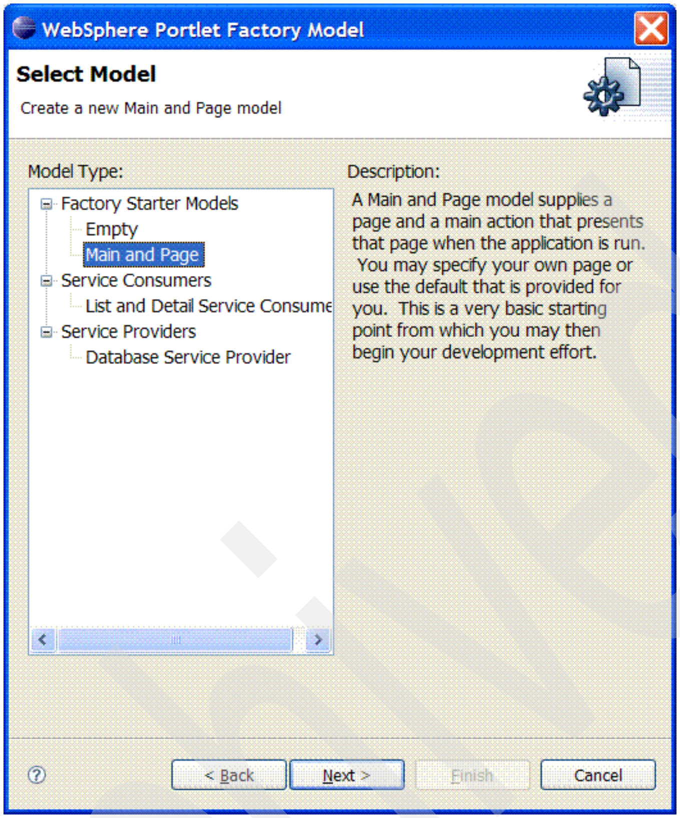

New
Select a wizard
Create a WebSphere Portlet Factory model
Wizards:
type filter text
Class
Interface
Java Project
Java Project from Existing Ant Buildfile
Plug-in Project
General
CVS
Java
Plug-in Development
WebSphere Portlet Factory
WebSphere Portlet Factory Model
WebSphere Portlet Factory Profile Set
WebSphere Portlet Factory Project
< Back
Next >
Finish
Cancel

Figure 3-14 Select a WebSphere Portlet Factory Model wizard

2. Select the **RedbookCS** project and click **Next**.
3. Select the type of model you would like to create. You can select from a number of pre-defined model templates, or just create an empty model. Select **Main and Page** under the **Factory Starter Models** heading, as shown in Figure 3-15. This will start a wizard to let you create a simple model with a test page.


WebSphere Portlet Factory Model

Select Model

Create a new Main and Page model

Model Type:

- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consume
- Service Providers
  - Database Service Provider

Description:

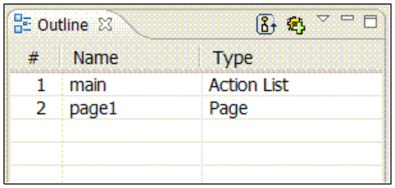
A Main and Page model supplies a page and a main action that presents that page when the application is run. You may specify your own page or use the default that is provided for you. This is a very basic starting point from which you may then begin your development effort.

Figure 3-15 Select a model type

4. On the next panel, specify **Simple Page** and click **Next**.
5. Specify the name and location of your model in the project file structure on the next panel. We typed the following entries:

Model name:	`TestPortlet`
Folder:	`WebContent/WEB-INF/models/redbook/cs/data/test/`

   Click **Finish**.
6. A model called TestPortlet will now be added to your project, and will be opened in both the Outline view in the bottom left of the screen and the Builder Editor in the top right quadrant of the screen. The TestPortlet should contain two builders (an Action List and a Page builder), and will appear in the Outline view as shown in Figure 3-16.

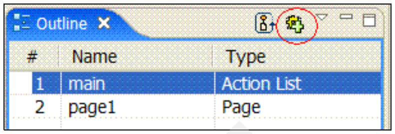


Outline

#	Name	Type
1	main	Action List
2	page1	Page

Figure 3-16 Outline view of TestPortlet

7. The TestPortlet model is presently not designated as a portlet. To designate the model as a portlet, you need to add a Portlet Adapter builder to the model. To do this, click the cog icon (Figure 3-17) to open the Builder Palette dialog.

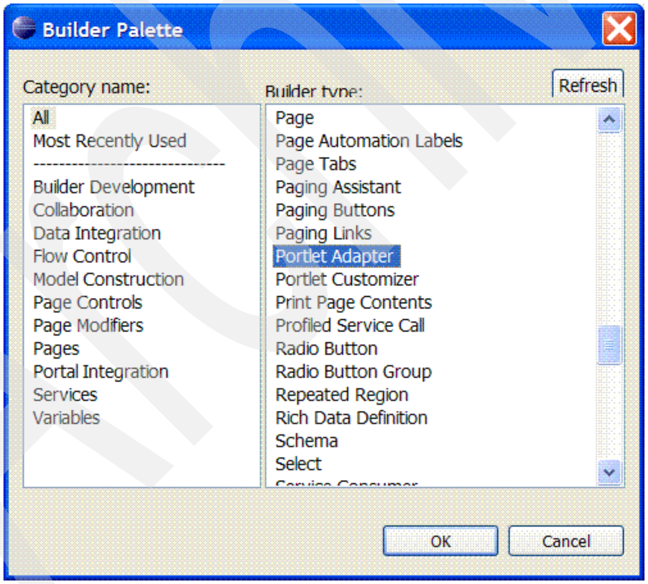


Outline

#	Name	Type
1	main	Action List
2	page1	Page

Figure 3-17 The cog icon

8. Select **Portlet Adapter** in the Builder Palette (Figure 3-18) and click **OK**.



Builder Palette

Category name:

All
Most Recently Used

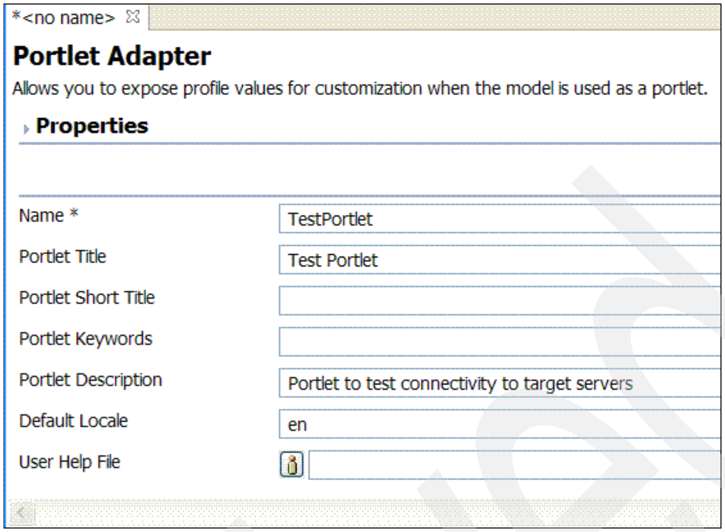
Builder Development
Collaboration
Data Integration
Flow Control
Model Construction
Page Controls
Page Modifiers
Pages
Portal Integration
Services
Variables

Builder type:

Page
Page Automation Labels
Page Tabs
Paging Assistant
Paging Buttons
Paging Links
Portlet Adapter
Portlet Customizer
Print Page Contents
Profiled Service Call
Radio Button
Radio Button Group
Repeated Region
Rich Data Definition
Schema
Select
Service Consumer

Figure 3-18 Select the Portlet Adapter

9. The Portlet Adapter builder will open in the Builder Editor. Enter a name, title, and description for the portlet as shown in Figure 3-19.



*<no name>

Portlet Adapter

Allows you to expose profile values for customization when the model is used as a portlet.

Properties

Name *	TestPortlet
Portlet Title	Test Portlet
Portlet Short Title	
Portlet Keywords	
Portlet Description	Portlet to test connectivity to target servers
Default Locale	en
User Help File	

Figure 3-19 Portlet Adapter builder

10. Save the model by pressing Ctrl+S.
11. Your model will now be made available to the portal server as a portlet once the application is deployed. To deploy your application, right-click the root folder of your project in the IDE (RedbookCS) and select **Build Portlet Factory WAR → Build Portlet WAR**.

You are now ready to test your deployment configurations. To test your Application Server deployment configuration, complete these steps:

1. With the TestPortlet model still open in the Outline view, click the play button on the toolbar at the top of the screen (Figure 3-20). This will open the Run profile dialog.

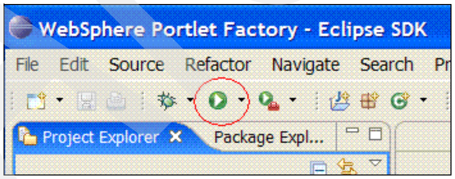
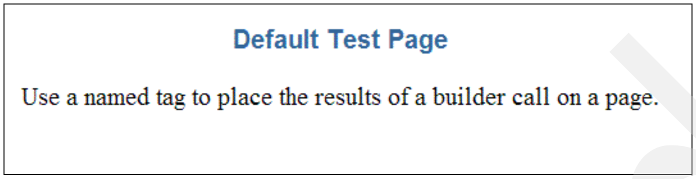


Figure 3-20 The play button

2. Double-click the **WebSphere Portlet Factory** category to open a new WebSphere Portlet Factory run profile.
3. Give the new profile a name; we used `WPFProfile`.

4. Accept the remaining settings by clicking **Run**.

Once you press the Run button, your portlet should open as a Web application in your default browser, as shown in Figure 3-21.



Default Test Page

Use a named tag to place the results of a builder call on a page.

Figure 3-21 Portlet opened as a Web application

For future tests, you will not need to create additional run profiles. You can simply select the profile from the drop-down menu next to the play button on the toolbar, or if the WPFProfile was the last profile you used, then you can simply click the play button.

Previewing your portlets

Previewing your portlets in this way is fast and easy, although note that your portlet doesn't have any of the functionality provided by the portlet container (you can't see any other portlets, for example). To see what your portlet will look like inside the portlet container (and to thereby test your Portal Server deployment configuration), complete these steps:

1. Log in to your portal server using an internet browser.
2. Navigate to the page you would like to use as a test page for your portlet. We used the Welcome page, which is the first page displayed when logging into the portal.
3. Add the Test Portlet portlet to the page. In WebSphere Portal 6.0, you can do this by clicking the + icon.

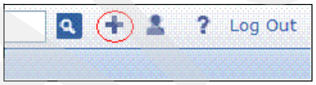
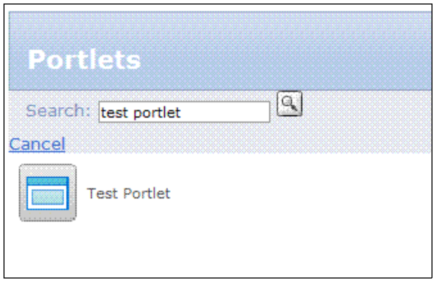


Figure 3-22 The + icon

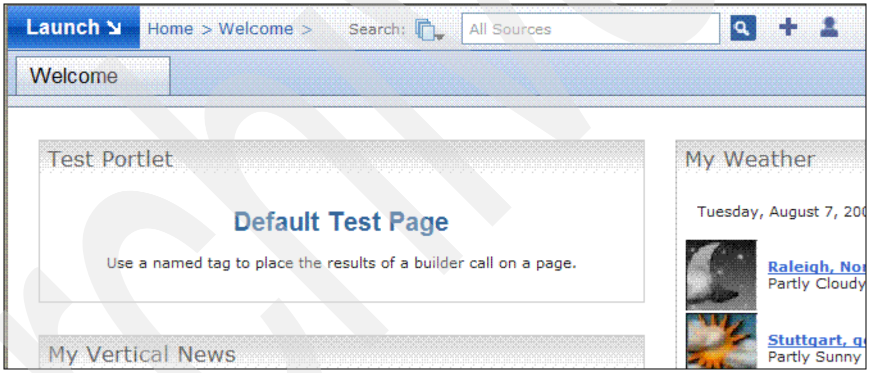
4. When the Portlet palette window appears, type `Test Portlet` in the search box and press the magnifying glass icon to begin searching. The Test Portlet should appear in the Portlet palette as shown in Figure 3-23.



Search: test portlet

Figure 3-23 The Portlet palette with the Test Portlet displayed

5. Click and drag the Test Portlet icon onto the portal page and drop it where you would like the portlet displayed.
6. Press the + icon again to hide the Portlet palette window.
7. Once you have added the Test Portlet to the page, the portlet should appear as shown in Figure 3-24.



Default Test Page

Use a named tag to place the results of a builder call on a page.

Figure 3-24 The test portlet on the portal page

8. Once you are satisfied that the portlet appears correctly, log out of the portal.

3.6 Adding a feature set

Once it is up and running, your project already has a fairly comprehensive set of builders for you to create an application. However, if you would like to extend the application with back-end integration with systems such as Domino, SAP, or PeopleSoft, or if you would like to enhance the UI using the Dojo toolkit, or create charts, you have to add the feature sets into your project.

Adding the feature sets to your project entails including the relevant libraries and jar files, and setting the appropriate class paths into your project. These are not included by default to avoid adding unnecessary libraries into your project.

The Domino and Dojo feature sets are required to build the application described in this book. Follow these steps to include these feature sets in your project:

1. Right-click your project and select **Properties** from the pop-up menu (Figure 3-25).

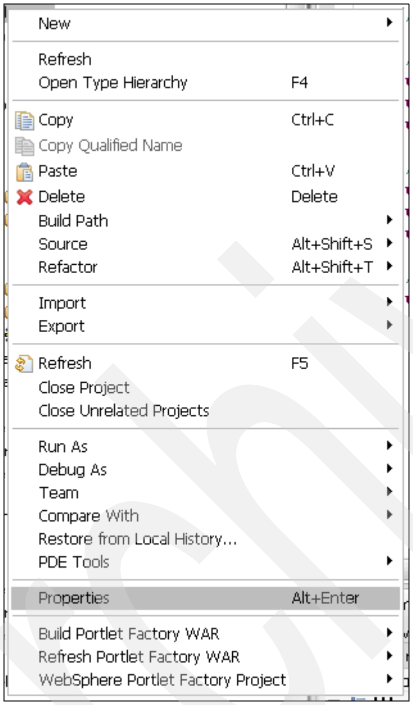
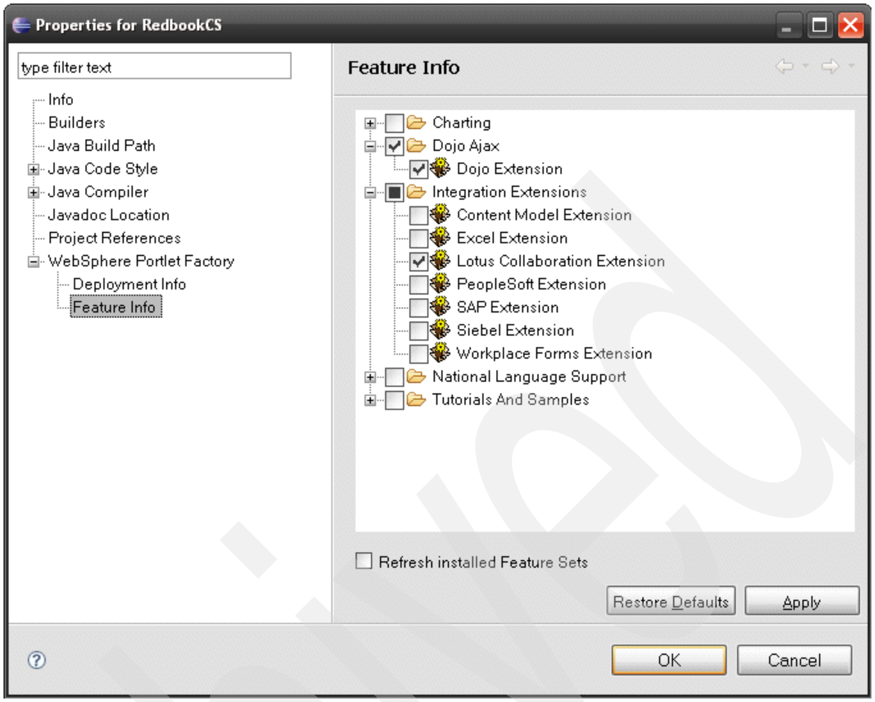


Figure 3-25 Selecting Properties

2. In the dialog that follows, click the + to expand the options of **WebSphere Portlet Factory**, then select **Feature Info**.
3. In the list of features shown on the right panel, select the **Dojo Ajax** feature and select the **Integration Extensions** → **Lotus Collaboration Extension** feature to include in your project as shown in Figure 3-26 on page 65.



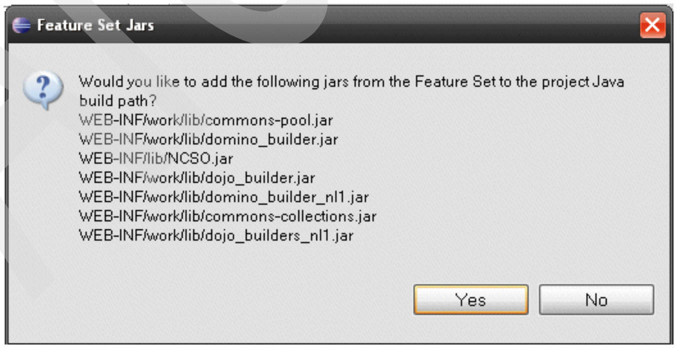
- □ Charting
- ☑ Dojo Ajax
  - ☑ Dojo Extension
- ■ Integration Extensions
  - □ Content Model Extension
  - □ Excel Extension
  - ☑ Lotus Collaboration Extension
  - □ PeopleSoft Extension
  - □ SAP Extension
  - □ Siebel Extension
  - □ Workplace Forms Extension
- □ National Language Support
- □ Tutorials And Samples

□ Refresh installed Feature Sets

Figure 3-26 Selecting specific features

4. Click **OK** to confirm your selection and Portlet Factory will begin to include the necessary files for the feature sets selected.

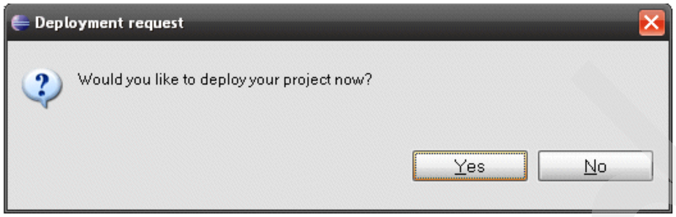
5. A dialog box will appear to confirm whether you would like to include the jar files that are required for the feature sets that you have selected (Figure 3-27). Click **Yes** to continue.



Would you like to add the following jars from the Feature Set to the project Java build path?
WEB-INF/work/lib/commons-pool.jar
WEB-INF/work/lib/domino_builder.jar
WEB-INF/lib/NCSO.jar
WEB-INF/work/lib/dojo_builder.jar
WEB-INF/work/lib/domino_builder_nl1.jar
WEB-INF/work/lib/commons-collections.jar
WEB-INF/work/lib/dojo_builders_nl1.jar

Figure 3-27 Jar file confirmation

6. Upon confirmation, Portlet Factory will include the jar files stated and a dialog box will appear to confirm whether you would like to deploy your project (Figure 3-28). Click **Yes** to continue.



Would you like to deploy your project now?

Figure 3-28 Confirmation to deploy the project

> **Important:** This chapter has focused on how to set up your local development environment for development, testing, and *local machine deployment*. Refer to Appendix A, "Setting up the environment" on page 631 for details on how to set up the complete development environment to run the sample application.

3.7 Conclusion

In this chapter we discussed how to create and configure projects using the WebSphere Portlet Factory Designer. We also outlined the structure of these projects, the different types of WAR files used in WebSphere Portlet Factory, and the basics of deploying WebSphere Portlet Factory projects.

If you have followed through the steps in this section, you should have a working WebSphere Portlet Factory project, which you will be able to use as a basis for building the Customer Service application. In the next chapter we will further develop the Customer Service application created in this chapter, with particular attention paid to data services in WebSphere Portlet Factory.

4

Data Services: Overview and interface definition

This chapter discusses the key concepts and interface definitions for the Data Services layer. The purpose of the Data Services layer is to access data that is used by the application in the business logic and presentation layers. In the case of either a 2-tier or 3-tier architecture model, the data access is always a separate layer that provides connectivity with back-end data systems.

WebSphere Portlet Factory provides support to clearly define a separated data access layer in accordance with a service provider and service consumer architecture. It offers connectivity with back-end systems that is easy to implement and transparent to the developer.

This chapter starts with an overview of the Data Services capabilities of WebSphere Portlet Factory, and continues with the definition of the service interface as the first step in the creation of the Data Services layer.

To clearly illustrate all concepts within the context of a real scenario, we describe the development of the Service Interface in the example application ITSO Renovations. We have followed a progressive development process from the architecture to the final implementation.

> **Note:** This chapter is closely related to Chapter 5, “Creating Data Services: Access to back-end systems” on page 105. This chapter covers the concepts and interface definitions, while the next chapter focuses on the steps for building and implementing the data services.

4.1 Overview of the technical goals

The data access layer is one of the most important development components in any enterprise application. It is responsible for providing access to data contained in the back-end systems that will be used by the business logic and presentation layers within the application. It is very important to provide a clear architecture and design to avoid unnecessary dependencies and interactions with other parts of the application.

WebSphere Portlet Factory offers a simple approach to develop the data access based on services, and moving in the direction of an SOA architecture. All data access is represented as a service to other layers of the application. Moving forward with the service concept, it can easily be enabled as a Web service, so that other external applications can access it. We denote the data access layer as the *Data Service layer* because it accesses back-end data and exposes it as a service.

The main technical goal of this chapter is to explain the definition of a Data Service interface that fulfills the requirement of separation between back-end data and the rest of the layers, meaning business logic and presentation. The goal for the next chapter is the development of specific back-end access once the interface is well defined. These goals are reached by using WebSphere Portlet Factory in the best possible way.

4.1.1 Value to the Portlet Factory developer

WebSphere Portlet Factory provides powerful technology for speeding the creation of service-oriented applications and portlets. It includes data services builders along with data integration builders, which automate the process of connecting to systems such as SAP and Lotus Domino systems. This services approach provides a clean way to separate the back-end services of an application from the business logic and presentation layer.

It also includes some robust lower-level builders, such as a Linked Java object and Web Service Call builder, that make it easy to integrate with any system via

Web services or Java APIs. For example, a Web Service Call builder can be used to quickly integrate with systems that have a Web Service interface.

In this chapter and the next one, using the ITSO Renovations application for a background, we explore and implement the following Portlet Factory concepts:

- Separation of the Data Service layer from business logic and presentation layers.
- Support for a well defined and comprehensive architecture and design of Data Services.
- Flexibility in the definition of the Service Interface.
- Data transformations – from simple visual mappings to complex Java code to transform XML content.
- Use of a large range of builders for SQL, Domino, Web Services and other back-end systems. They are easy to use and highly configurable.
- Testing support for each service as well as additional debug and logging features in some specific back-end builders. Each service can be independently tested and the builder generates automatically a user interface to execute each operation, display results, or provide input values.
- Support for the creation of Stub Services that allow you to continue the development of the application even if the back-end system is not accessible.
- Profiling support, for example to allow swapping between service implementations or provide access configuration properties.
- Ability to expose any service as an external Web Service with just one click. The WSDL is generated automatically, and other applications can retrieve it to discover the functionality and invoke the service operations.

4.2 Data Services in Portlet Factory

WebSphere Portlet Factory features a Data Services layer providing full support for the service provider-consumer paradigm required in an SOA environment. It enables the definition of clean, well-defined service interface that separates the user interface from back-end data.

The key benefits are to:

- Enable reuse of existing assets across projects and departments
- Automate back end connectivity
- Speed creation of new applications
- Promote application flexibility

4.2.1 Architecture overview

Data Services builders in WebSphere Portlet Factory provide an entry point to SOA for your application. These builders provide a flexible data services layer that allows a developer to create the interface that separates the user interface from the back-end data.

Service-oriented architecture provides a number of benefits, including:

- Customers can encapsulate their back-end data access into a set of well-defined services, which can then be reused across their portal or dashboard projects. If they already have some applications exposed as services, WebSphere Portlet Factory can readily consume those services. If not, they can create the services, including the Integration Builders that make application connectivity fast and easy. For example, using WebSphere Portlet Factory's SAP capabilities, you can quickly connect to SAP and expose one or more of its APIs or BAPIs as services.
- Customers can speed the creation of new applications and new portlets by reusing data services.
- It promotes application flexibility. Customers can reuse the same portlet user interface with different data services. For example, they can easily swap out the data service that drives these portlets. SOA promotes flexibility by enabling you to dynamically swap out different services without having to change the rest of the layers of the application.

The main concept is summarized in Figure 4-1.

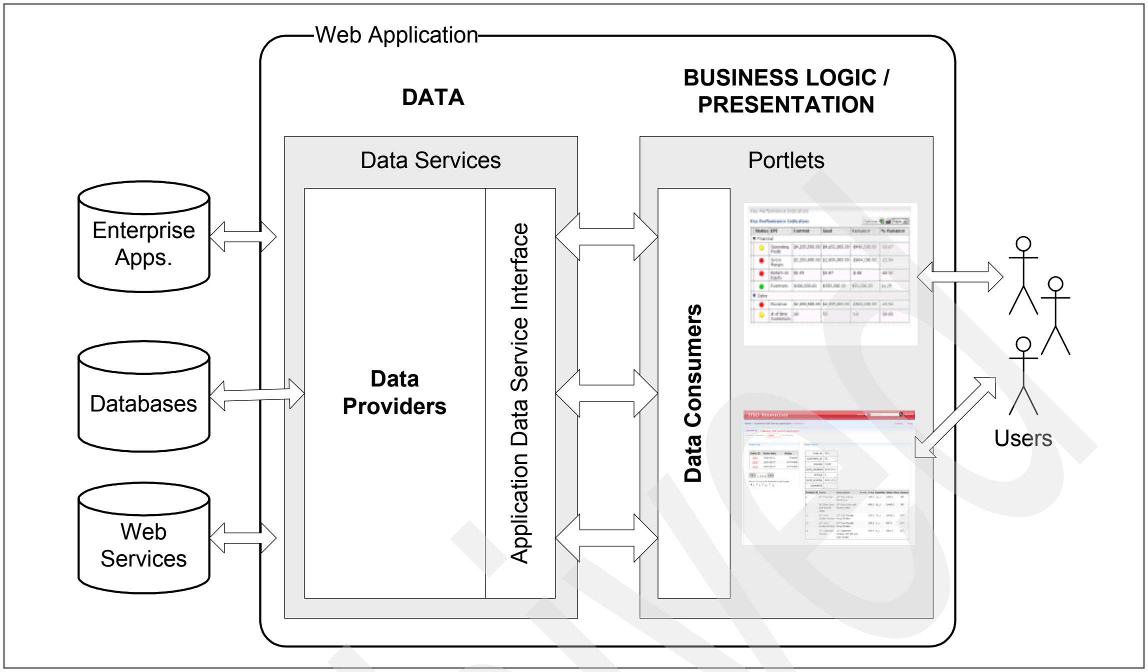


Figure 4-1 The WebSphere Portlet Factory's service-oriented architecture

4.2.2 Supported back-end systems

WebSphere Portlet Factory provides support to connect with the most commonly used back-end systems in current applications. It provides a set of builders for each one that makes access simple, with almost no need to write any additional Java code, except to implement some special functionality.

The back-end builders that conform to the data integration capabilities of WebSphere Portlet Factory can be categorized in these groups:

- Core Data Integration builders: Exist in each project and are used to integrate with core back-end systems:
  - Relational databases: SQL builders
  - J2EE integration: EJB™ and JMS builders
- Extended Data Integration builders: Used for specific back-end systems. The project must add the Integration Extension feature set to have the builders available. The supported back-end systems using the extensions are:
  - Excel files
  - Domino databases using Lotus Collaboration Extension

  - PeopleSoft
  - SAP
  - Siebel
  - Workplace™ Forms
  - Documents in Portal Document Manager using the Content Model Extension
- Web Service builders: Provide access to external Web Services and are part of each project.

Some applications require access to other back-end systems that are currently not supported, like legacy applications or custom data sources. If the back end provides a Web Service interface you can use the existing builders and treat it like an external Web Service; otherwise, you can implement the access following the Java API of the back end and using the low-level Linked Java Object builder. Another possibility is to implement a custom builder that can be reused across different projects.

4.2.3 General concepts

Be certain you understand the following concepts and definitions before getting into the details of creating Data Services:

- *Data Domain*: The set of data that the application is accessing. It can be divided in different domains depending on the application (for example, Customer Data Domain, Order Data Domain, and so forth).
- *Application Data Service Interface*: The interface of the data access layer in the context of the application. It is completely dependent on the requirements of the application and should provide only the expected functionality. This interface is visible to the business logic and presentation layers and could be published as a Web Service. It can be divided into different interfaces depending on the application (for example, Customer Data Service Interface, Order Data Service Interface, and so forth).

  In relation to the interface, *Data Structures* define the format of the input and output message of the operation. The interface is XML based, so the Data Structure is defined in XSD.
- *Data Provider*: The model that is responsible to access a back-end system. It implements one of the Application Data Service Interfaces. This is the real implementation of the Data Service and it contains specific builders for the back-end system that it is connecting to.

One model (for example, a running XML file-based implementation) can be defined as the interface that it is implemented by the other Data Provider models.

There is currently no possibility in WebSphere Portlet Factory to define an interface without implementation. On the other hand, providing this simple file-based implementation, provides your application with additional testing support features and allows you to continue the development of other layers without having implemented the final access to the real back-end systems. Having an interface to real back-end systems is obviously required for large applications, but during the internal development cycle, you are not forced always to build an interface for your providers. When working with small projects or defining internal services to the application, you can create a service without an interface and this will decrease development efforts.

  The following builders are provided to create the service definition and build a Data Provider model:

  - Service Definition: Operations will reference this definition.
  - Service Operation: Operation to execute. It consists of Operation Inputs (input message) and Operation Results (output message), both of which must have a schema (Data Structure) assigned.

  They define the service and operations that actually work with the Application Data Service Interface.

  The Data Provider can contain only one public and several private Service Definitions. The public one can be exposed additionally as an external Web Service, so other applications can retrieve the WSDL and invoke the operations.

- *Data Consumer*: The consumer of the Data Provider. All models can act as data consumers of services defined in the same project, even Data Provider models. The Service Consumer builder is used to invoke a local service defined by a Data Provider model.
- *Data Transformation*: Transformation of the data between the Service Operation and the actual implementation provided by the specific back-end builder. Sometimes the Data Structure (XSD) of the Inputs/Results does not match the structure of the back-end operation; in such cases it is necessary to apply an XML transformation of the data.

4.3 Developing Data Services in the sample application

This section describes the role of Data Services within the ITSO Renovations sample application and presents details about the architecture and design. Finally, it outlines the steps we followed during the development and testing of the sample application.

4.3.1 Role of Data Services in ITSO Renovations

The role of Data Services in the ITSO Renovations project is to provide access to the data in the back-end systems following an SOA architecture. All data sources are defined as services that are accessed by the business and presentation layers of the application.

It must provide a common way of accessing the data separating the real back-end implementation from the interface of the service. The most important step is the definition of the Application Data Service Interface for the different data domains. In our sample application we distinguish the following data domains:

- Customer data
- Order and order items data
- Product data

The role of the data services within the architecture is illustrated in Figure 4-2.

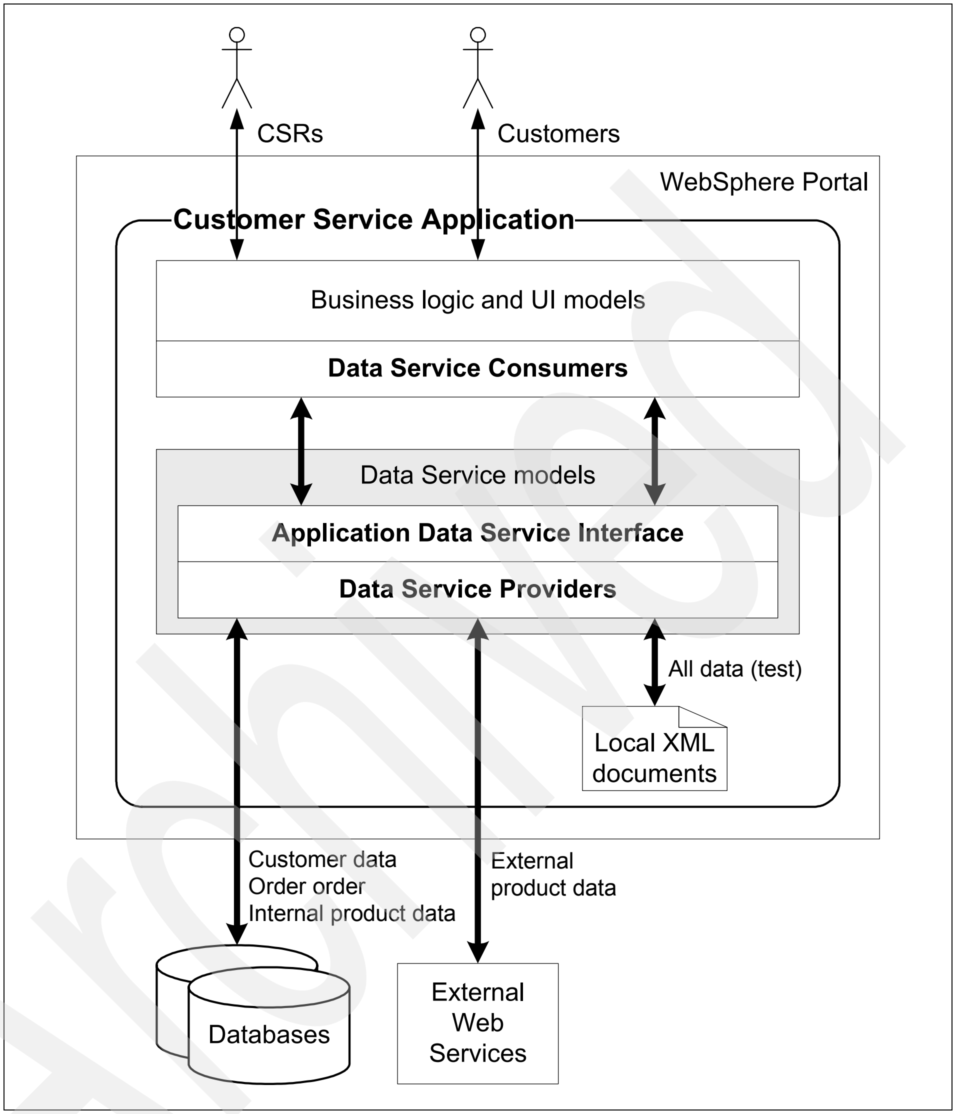


Figure 4-2 Data Services in the application architecture

The application follows a two-tier architecture in which the data services layer provides access to the back-end systems that expose the data to the layers above: namely the *business logic* and the *presentation layers*. Both layers are implemented using WebSphere Portlet Factory and following the SOA architecture allows you to decouple them by providing a well-defined data services interface.

4.3.2 Architecture and design

The architecture of data services in the ITSO Renovations project is based on SOA. Each data access to the back-end system is provided as a service with a well-defined interface.

The sample application is accessing data from different back-end systems. Table 4-1 shows which systems are involved in each data domain.

Table 4-1 Data domains and related back-end systems

Data domain	Back-end system
Customer data	Relational database
Order data	Relational database
Product data (list available products)	Relational database
Internal products data (details)	Domino database
External products data (details)	External Web service

Additionally, the application contains a full functional implementation accessing data from local XML files. This allows you to test all data services without connectivity to the real back-end system.

ITSO Renovations data model

The data model for ITSO Renovations consists of two parts:

- Customer and order data as a relational data model
- Product data as a single view in Domino or retrieved from an external Web service

The relational data model consists of four main tables:

- CUSTOMER: Contains customer data.
- ORDER: Contains order data and is related with the CUSTOMER table using the CUSTOMER_ID foreign key to reflect the orders that the customer has placed.
- PRODUCT: Contains a simplified view of the products list in order to establish the foreign key relationship with the ORDER_ITEM table. This information is redundant, with all products existing in Domino and external systems. The column SOURCE defines where the product details are placed:
  - INT: Internal product for ITSO Renovations. The product details are saved in the Domino database.

   - ENT: External product provided by an external company to ITSO Renovations. The product details are accessed using a Web service provided by the external company.

- ORDER_ITEM: Reflects the relationship between ORDER and PRODUCT using the foreign keys ORDER_ID and PRODUCT_ID respectively. It defines which products are part of the order and in what quantity.

Figure 4-3 shows the relational data model and the previous relationships.

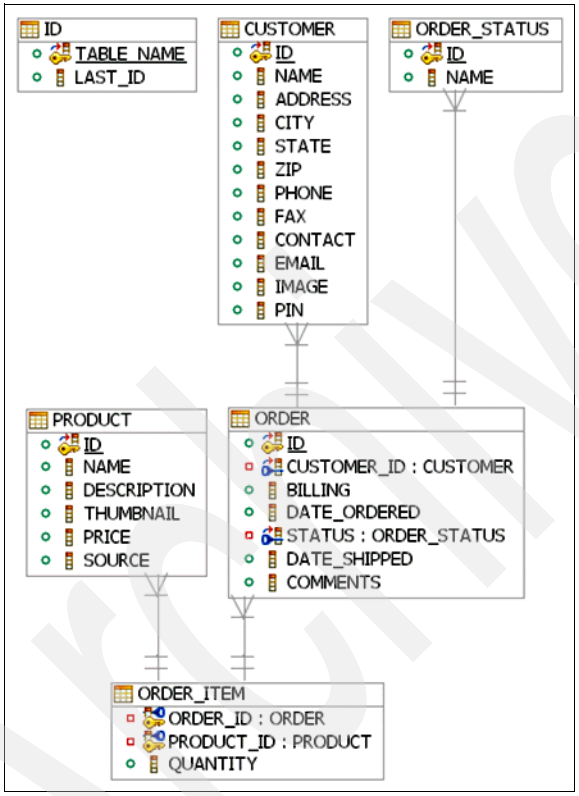


Figure 4-3 Relational data model

The external data model contains one table, PRODUCT, that contains all product details: long description, technical details, images, and so forth. Table 4-2 identifies the data provided for each product.

The Domino database and the external Web services are responsible to return the data following this structure.

Table 4-2 Definition of the PRODUCT table

Column name	Data type
ID (key) *	String
NAME *	String
DESCRIPTION *	String
LONGDESCRIPTION	String
THUMBNAIL *	Binary
PICTURE	Binary
PICTUREPOSITION	String
KEYWORD	String
WEIGHT	Double
Size	Double
AUNDIENCECODE	Integer
SUPPLIERINFO	String
MANUFACTURER	String
SKU	String
PRICE *	Double
CATEGORY	String

Table 4-2 note: All columns marked with * are duplicated in the available products table in the relational database.

Architecture details

The Data Services architecture for ITSO Renovations must follow the previous data model. From a high-level point of view it contains two types of interfaces:

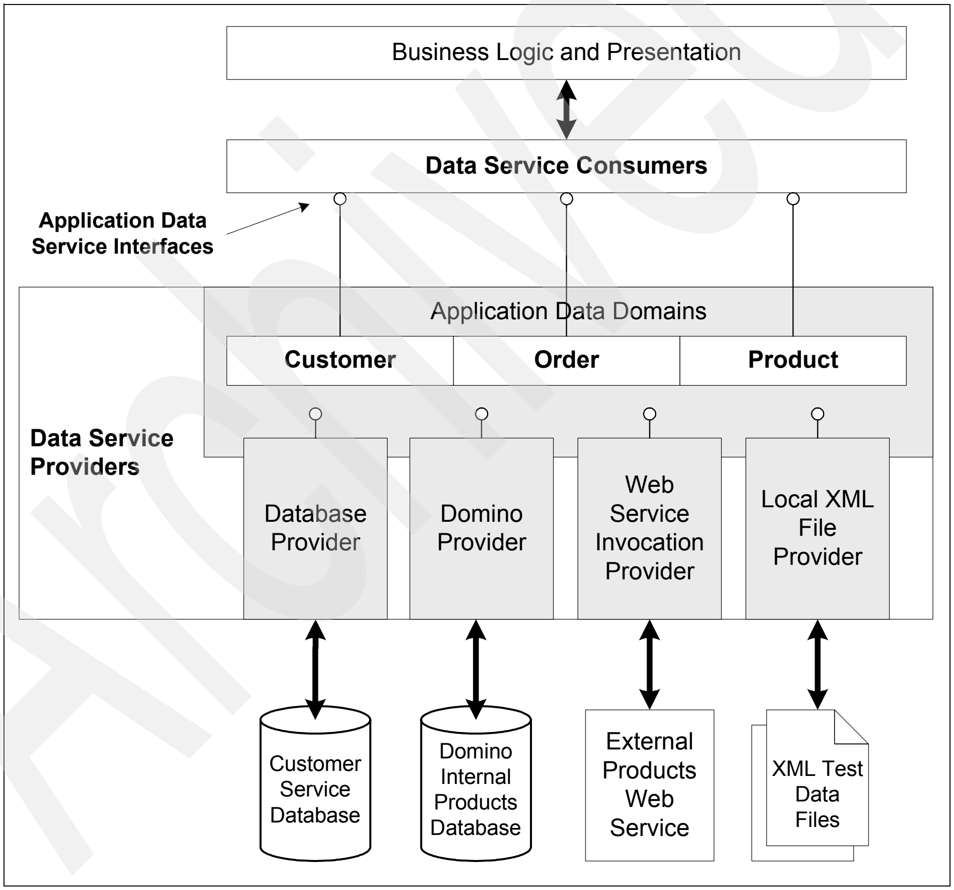
- Application Data Services interfaces: The public interfaces that are visible to the consumers of the data services layer
- Back-end interfaces: Specific for each back-end access

This model provides some benefits to the whole architecture, including:

- Separation between the service definition of the application and the specific back-end implementation.

- Modular structure: Different logical modules and providers for each back-end system. This allows the addition of other back ends in an isolated way. It could be necessary to provide data transformations to match the application data service interface, but in this case they are back end specific and inside of each module.
- Flexibility: The interface of the application data services is flexible and allows the addition of more functionality, like new data domains, without impacts in the existing functionality. It will be necessary to extends the specific implementations to access the new data.

Considering the previous requirements, Figure 4-4 shows the high-level architecture for ITSO Renovations.



Business Logic and Presentation
Data Service Consumers
Application Data Service Interfaces
Application Data Domains
Customer
Order
Product
Data Service Providers
Database Provider
Domino Provider
Web Service Invocation Provider
Local XML File Provider
Customer Service Database
Domino Internal Products Database
External Products Web Service
XML Test Data Files

Figure 4-4 High-level architecture of ITSO Renovations Data Services

The Application Data Service Interface contains the public interface that the data consumers are accessing, in our case the business logic and user interface models. This interface does not necessarily match the low-level back-end data services interfaces. It should be generic, and operations must follow the functional requirements of the application for each data domain.

The specific interfaces—databases, Domino, and Web services in our scenario—will be specific to the back-end implementation, with all the necessary custom code to access the data.

Data transformations might be required to match the Application Data Service Interface and the specific interfaces of the implementations.

Data Services design in WebSphere Portlet Factory

The architecture described is generally valid regardless of the implementation details and the nature of the application (rich client, web, or another kind of application). In our scenario we are implementing a web application using WebSphere Portlet Factory; the design details that follow are specific to this environment.

Before we get into the design details, we need to point out the following considerations for designing data services in WebSphere Portlet Factory:

- Data Services builders are contained in WebSphere Portlet Factory Models like any other kind of builder. The design should cover a good structure of models and avoid duplication of builders across them.
- Group all models for one specific back-end system in one folder (for example, different folders for database, Domino, and so forth).
- Extract common builders used by several models in a common model that is imported where it is needed.
- Consider using private services where you need to isolate, in a more granular way, specific functionality when accessing a back-end.
- Create different models for each data domain or group (for example, customer, order, or product). This is a good practice in order to avoid models with a large number of builders.
- Define a wrapper service that can access different back-end systems. In this case the client is transparent to the back-end system, so it can access one or gather data from several.

Figure 4-5 shows a proposed design for the ITSO Renovations data service providers that incorporates these considerations and architectural details.

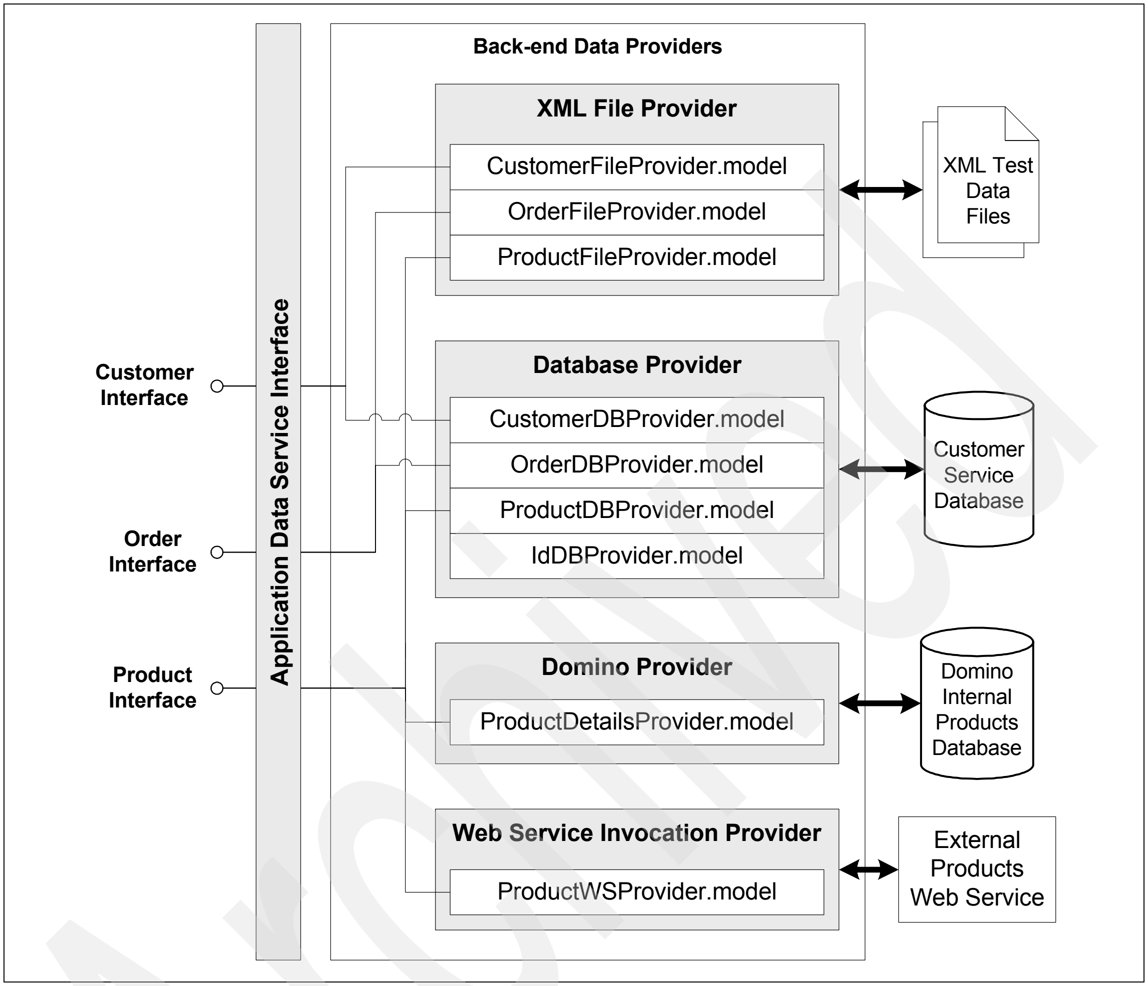


Figure 4-5 Draft design for ITSO Renovations Data Services

It consists of four main data providers:

- DB: Provides access to the relational database
- Domino: Provides access to the Domino database
- XML File: Provides access to local XML files with test data
- Web Service Invocation: Provides access to invoke external Web Services

Each of them is implementing an Application Data Service Interface for the data domain it is covering and the specific interface and implementation to connect with the back-end system. Additionally, they each contain data structure definitions, data transformations, and custom implementations as needed for special data access in the back-end (for example, binary columns in a database).

The described design is valid, but it can be improved with the following modifications:

- Group all data structure definitions in a model and import it where required. This avoids duplication across models, thereby reducing maintenance and making future upgrades or changes easier.
- Group the custom implementation for special data access in one model that can be imported by all models that are accessing the same back-end system. This action increases maintainability, reduces redundancy, and lowers the possibility of failures.
- Add a private service definition in the Domino case to isolate the specific implementation from the application interface. This level of indirection allows you to perform low level tests with Domino to analyze the returned data. It also allows additional logic to exist between the private and public services.
- Create a wrapper data provider to access product details. This hides the source of the back-end data from the data consumer.

The final design for ITSO Renovations incorporates these improvements and is illustrated in Figure 4-6.

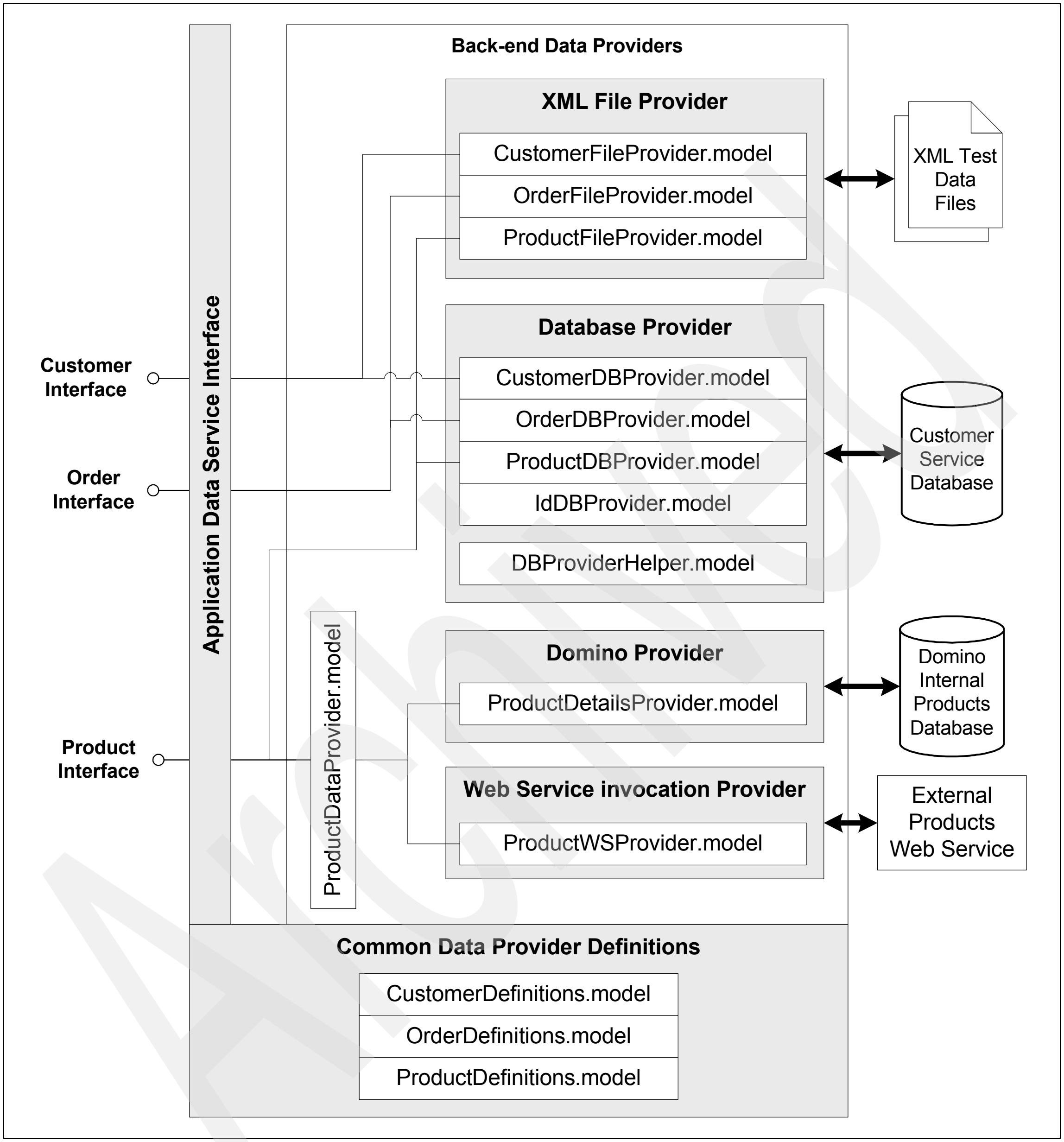
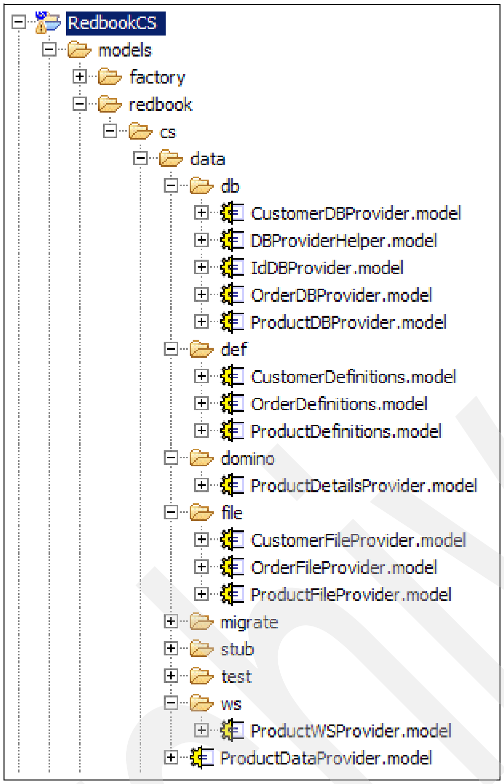


Figure 4-6 Final design of ITSO Renovations Data Services

When development is complete, the folders and models structure for data services in WebSphere Portlet Factory will look like Figure 4-7.



```
RedbookCS
  models
    factory
    redbook
      cs
        data
          db
            CustomerDBProvider.model
            DBProviderHelper.model
            IdDBProvider.model
            OrderDBProvider.model
            ProductDBProvider.model
          def
            CustomerDefinitions.model
            OrderDefinitions.model
            ProductDefinitions.model
          domino
            ProductDetailsProvider.model
          file
            CustomerFileProvider.model
            OrderFileProvider.model
            ProductFileProvider.model
          migrate
          stub
          test
          ws
            ProductWSProvider.model
          ProductDataProvider.model
```

Figure 4-7 Folders and models structure for Data Services

At this point it is not necessary to create all the models shown in the figure. Other chapters guide you in the development of the data services; the figure is included here to give you a preview of where your development efforts are headed.

Now that you have a high-level view of the architecture and design decisions, you are ready to look at the low-level design and implementation details.

4.3.3 Development steps and guidelines

Our development of data services in the ITSO Renovations application followed a structured procedure that is recommended for all WebSphere Portlet Factory applications that require access to data from different back-end systems.

This section provides a brief overview of the development steps we followed to create the ITSO Renovations application. Our project consisted of the following phases: architecture, design, implementation, review, and testing.

Architecture

Define the architecture, from high to low level. Determine the role of data services in relationship to the whole application, and where to locate them in the application architecture. Analyze which systems are accessed and to which category they belong:

- Internal implementations: XML or plain text file, or memory based
- Relational databases
- External web services
- Domino databases
- ERP systems: SAP, PeopleSoft or similar
- External legacy systems: accessed using Java API, JCA, EJB, or JMS

Define the application data service interface independently of the back-end system and how it is related to the specific implementation. At this stage it is important to find out if there are special systems that cannot be covered by the application interface; define the architecture accordingly to this special case.

Design

1. High level design of the solution. Determine which WebSphere Portlet Factory models are necessary based on the previous architecture. Define the relationships between them and any common functionality in base models that can be imported.
2. Design the application data service interface depending on the domain of the application. Divide the whole functionality into different data domains if possible (for example, customer, order, product data) to enable you to distribute the implementation efforts and decrease the complexity of the models.

   The definition of the interface for each data domain consists of the following steps:

   a. Define the main data structures and entities that will be involved in the data domain (for example, customer, order, order item, product data structure).

   b. Define the service operations. What operations must be performed with the data: read, write, delete, update, and so forth. Define the input and output messages for each operation.

   c. Complete the set of data structures with simple ones that are required by the operations in the input or output messages (for example, input filter parameters, returned confirmation code, and so forth).

The definition of the interface must be done in conjunction with the requirements of the business logic and presentation layer that actually will access this interface.

Implementation

1. Implement XSD files for each main data structure or entity used in the application interface.
2. Implement the Application Data Service Interfaces by creating operations and using the previous data structures. Create additional simple structures required by some operations as input or output messages. These services will be populated to each model that is connected to a back-end system. At this point it is not possible to provide the actual implementation of each operation.
3. Implement each back-end access: databases, Domino, web services, and so forth.
4. Link the specific back-end implementations with the operations created according to the application service interface. At this point, some operations might need data transformations to adjust the input and output messages of the specific implementation.
5. Add additional functionality that is back end specific to access special data types (for example, binary columns in databases). Add any special back-end logic that is not covered by core builders provided by WebSphere Portlet Factory.

Review

Review the design to determine if there are some parts of the functionality that can be extracted and shared in common models.

Test

1. Perform development tests of the data services. This step can include tests of specific back-end access; in some cases it might be necessary to create private services to decouple them from the application service operations.
2. Test data services using the application data service interface. If the same data can be retrieved from different data sources, try to switch between different back-end data providers using profiling.

The project phases presented here are guidelines that are useful during the development of data services in a typical scenario but they may not apply to all projects. In every case, the goals of good architecture and design should be:

- Modularity: Define modules and split the interface to allow the distribution of development efforts and increase maintenance.
- Flexibility and extensibility: The interface should be open and flexible to allow future extensions.
- Reusability: Common functionality and definitions should be reusable.
- Transparency of the back-end implementations and ease of use by the application layers that are consuming data services.
- Easy test support when possible, and if this does not require big impacts in the whole design.

4.4 Design and implementation of data structures and Application Data Service Interfaces

The first step, before starting the actual development of the back-end Data Providers, is the design and implementation of the main data structures and interfaces of the Application Data Service Interface. This section shows how to work with data structures, service definitions, and operations in WebSphere Portlet Factory by providing step by step instructions for implementing the ITSO Renovations application. It contains some best practices and hints that can be applied to other applications as well.

4.4.1 Data structures

ITSO Renovations contains several data structures for the main entities of the application. Since all data service interfaces are XML based (that is, all data exchanged between providers and provider-consumers is within XML documents), it is necessary to create XSD files (XML Schema Definitions) for each main entity involved in the operations. These are the data structures that are public to the Data Consumers.

Table 4-3 identifies the main entities in the application and the location of the XSD files in the project folder.

Table 4-3 Entities and paths of the XSD files

Entity name	XSD path
Customer	\WEB-INF\resources\redbook\cd\xsd\customer.xsd
Order	\WEB-INF\resources\redbook\cd\xsd\order.xsd
Order Item	\WEB-INF\resources\redbook\cd\xsd\order_items.xsd
Order Status	\WEB-INF\resources\redbook\cd\xsd\order_status.xsd
Product	\WEB-INF\resources\redbook\cd\xsd\product.xsd

These data structures define a single record and a list of records. Using this approach, the same schema can be reused by different operations by pointing to the right element or type.

Once data structures are created, they can be imported into the project. To do this in a structured way, we include them in common models that will be reused later by the Data Provider models. Perform the following steps to make the data structures (schemas) accessible in the project.

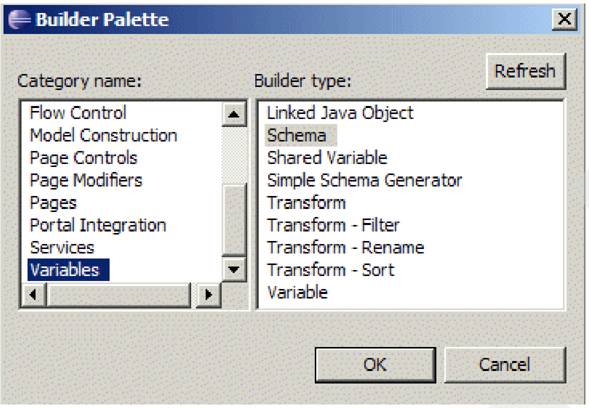
1. Create a folder that will contain the models for common definitions:

   ```
   <Project Root>\models\redbook\cs\data\def
   ```

2. Create a new WebSphere Portlet Factory Model under the previous folder that will contain the common definitions. It is recommended to create different models for each data domain to avoid having extra builders included when importing the model. Create the model for Customer:

   ```
   CustomerDefinitions.model
   ```

3. Add a Schema builder to the previous model to import the XSD file of the customer data domain. This builder is under the Variables category in the Builder Palette.

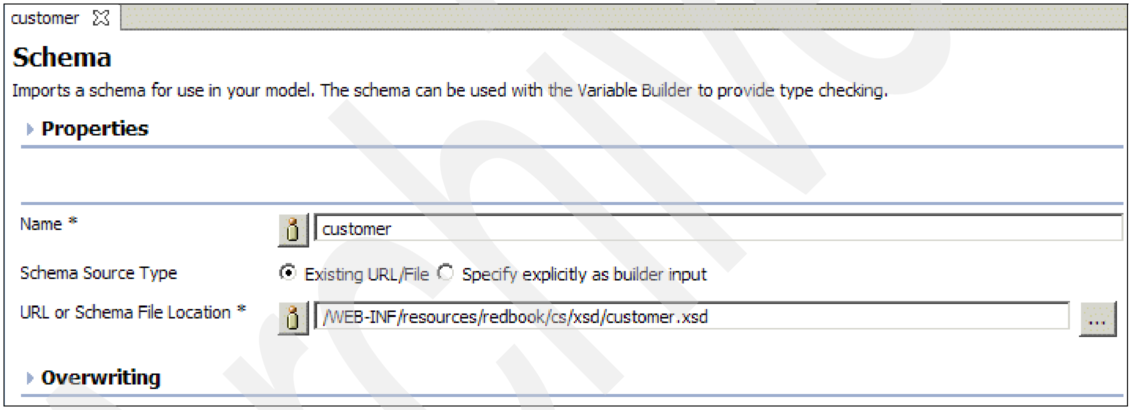


Category name: Variables

Builder type: Schema

Figure 4-8 Variables category in the Builder Palette

4. Configure the builder to provide the path of the XSD file for customer.



Schema

Imports a schema for use in your model. The schema can be used with the Variable Builder to provide type checking.

Name * customer

Schema Source Type ● Existing URL/File ○ Specify explicitly as builder input

URL or Schema File Location * /WEB-INF/resources/redbook/cs/xsd/customer.xsd

Figure 4-9 Schema builder when using existing URL/File

It is also possible to define the complete XSD as builder input. (This option is covered later, when we create simple data structures for some input/output messages of operations.)

5. Repeat steps 2 through 4 to import the schemas of Order and Product domains.

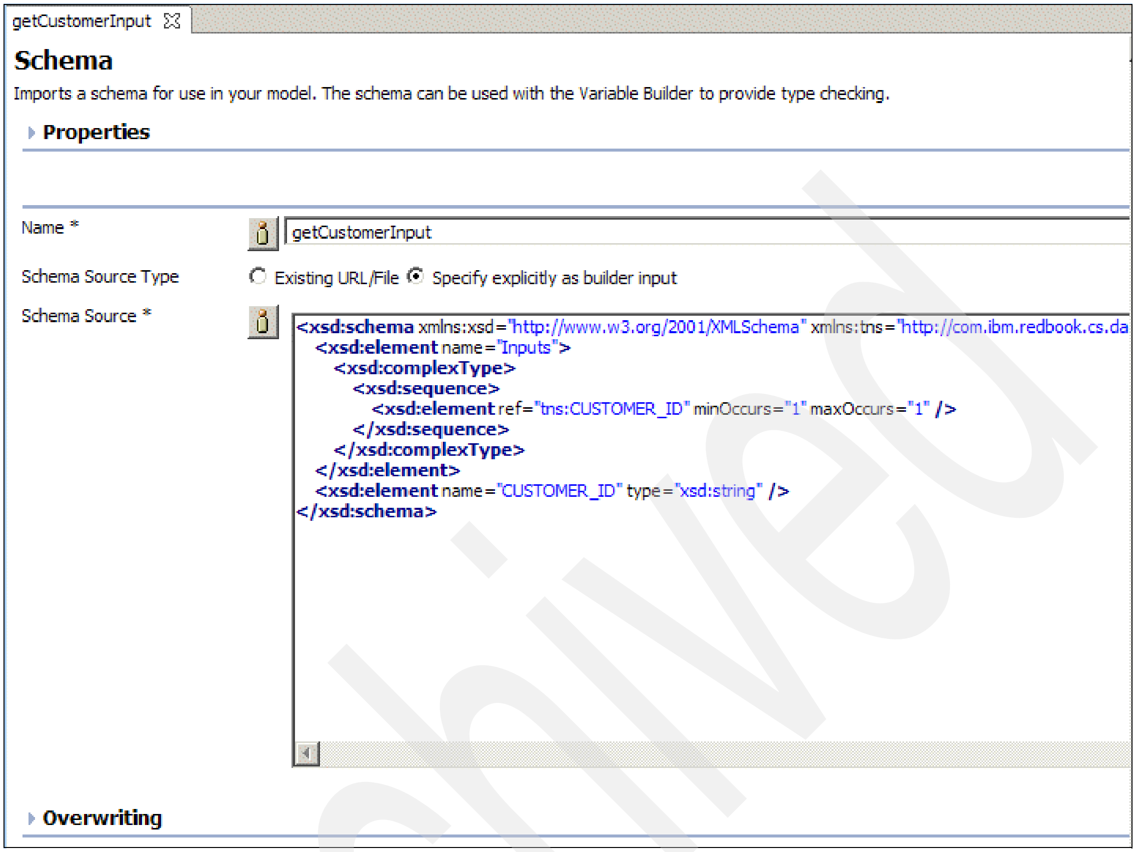
Table 4-4 Proposed names for models and schemas for all entities

Model name	Schema builder name	Entity name
CustomerDefinitions.model	customer	Customer
OrderDefinitions.model	order	Order
	orderItems	Order Items
	orderStatus	Order Status
ProductDefinitions.model	product	Product

These are the main data structures used by the operations; we will come back to these models to define simple data structures that are common and used as input and output messages of the operations. They will be defined as input builder content, but it is possible to create them as external XSD files and use the previous mechanism to import them into the model.

These are the steps for defining the schema as input of the builder:

1. Add a new Schema builder in the model.
2. Configure the builder by selecting `Specify explicitly as builder input` in the Schema Source Type field. A text box will be opened where you can type the schema (Figure 4-10).



getCustomerInput

Schema

Imports a schema for use in your model. The schema can be used with the Variable Builder to provide type checking.

Properties

Name * getCustomerInput

Schema Source Type ○ Existing URL/File ● Specify explicitly as builder input

Schema Source *

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:tns="http://com.ibm.redbook.cs.da
  <xsd:element name="Inputs">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="tns:CUSTOMER_ID" minOccurs="1" maxOccurs="1" />
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="CUSTOMER_ID" type="xsd:string" />
</xsd:schema>
```

Overwriting

Figure 4-10 Schema builder when Specify explicitly as builder input is selected

In this case the schema is included as content of the builder (inside of the model XML file).

Some recommendations regarding data structure definitions follow.

- Use external XSD files when the structures are provided externally or for main entities in your application.
- Use content within the builder for simple data structures used for parameters or simple results of operations.
- It is very important to use different target namespaces for each structure, especially if the operation will be exposed as a web service. Follow a convention for the creation of the namespace. For ITSO Renovations the pattern of the namespace is:

  http://com.ibm.redbook.cs.data/2007/schema/*<schema_builder_name>*

Here, <*schema_builder_name*> is the name of the builder used when adding the schema to the model (for example, customer, order, and so forth).

If the schema is generated by WebSphere Portlet Factory, it will use a default namespace; we recommend that this be changed.

- You can use the Simple Schema Generator builder if you have some sample data and you want to generate the schema automatically. The sample data is provided from an existing Variable within the current WebApp for the model. Consider providing your own target namespace URI.

Once the Schema builders are created, they will be part of the WebApp tree under the Schema leaf and they are accessible by other builders using the builder name.

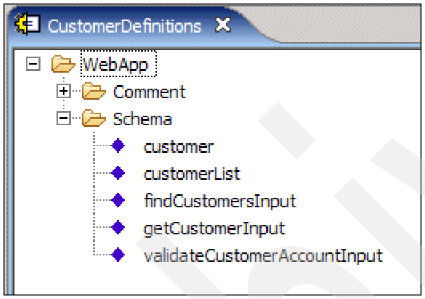


Figure 4-11 WebApp tree for schemas

4.4.2 Application Data Service Interface: Definition and operations

The application data service definition provides the public interface that will be visible to data consumers in the business logic and presentation layers. Before starting with the actual implementation of the service it is important to analyze the functional requirements of the data service and find out what should be public and accessible by data consumers. At this point we define the main interface of the data service providers using the data structures imported in the previous section.

First we describe the required functionality in each data domain and the public operations that will be available. The following tables describe the services and operations for ITSO Renovations. This information is used later for the creation of the Service Definition and Service Operations that will conform the application data service interface of the Data Providers.

Table 4-5 Customer Service definition

Operation name	Inputs	Results	Description
getCustomers	No inputs	List of Customer entities	Returns the list of all customers data
getCustomersList	No inputs	List of Customer ID and Name	Returns the list of all customers, but only providing ID and Name
getCustomer	Customer ID	Customer entity	Returns the customer data for the given ID
findCustomers	Customer name	List of complete Customer entities	Returns the list of all customers data matching the given pattern for the Name
createCustomer	Customer entity	No results	Creates a new customer
updateCustomer	Customer entity	No results	Updates an existing customer
validateCustomerAccount	Customer ID PIN	True or False	Validates the customer account using the given PIN, returning True if valid or False otherwise
getNextCustomerId	No inputs	Customer ID	Returns the next available customer ID to create a new one

Table 4-6 Order Service definition

Operation name	Inputs	Results	Description
getOrders	No inputs	List of Order entities	Returns the list of all orders data (without items, only order details)
getOrdersList	No inputs	List of Order ID, Data Ordered, and Status	Returns the list of all orders but only the ID, Data Ordered, and Status
getCustomerOrders	Customer ID	List of Order entities	Returns the list of all orders data (without items, only order details) for a given Customer ID
getCustomerOrdersList	Customer ID	List of Order ID, Data Ordered, and Status	Returns the list of all orders for a given Customer ID. Only the ID, Data Ordered and Status
getOrder	Order ID	Order entity	Returns the order details (without items) for the given Order ID
getOrderItems	Order ID	List of Order Item entities	Return the list of all order items for the given Order ID
createOrder	Order entity	No results	Creates a new order (without items, only order details)
createOrderWithItems	List of Order Item entities	No results	Creates a new order with items in one transaction

Operation name	Inputs	Results	Description
createOrderItem	Order Item entity	No results	Creates a single order item
updateOrder	Order entity	No results	Updates an existing order (without items, only order details)
updateOrderItem	Order Item entity	No results	Updates a single order item
updateOrderItemsList	List of Order Item entities	No results	Update a list of order items for the same order in one transaction
getOrderStatusList	No Inputs	List of Order Status entities	Returns the list of all possible order states
getNextOrderId	No Inputs	Order ID	Returns the next available order ID to create a new one

Table 4-7 Product Service definition

Operation name	Inputs	Results	Description
getProducts	No inputs	List of Product entities	Returns the list of all products data
getProduct	Product ID	Product entity	Returns the product details for the given Product ID

At this point it is important to notice that WebSphere Portlet Factory does not allow you to implement an interface that does not contain implementation because each Service Operation requires an action/method to call. This has the advantage that you can bind the interface with a real test implementation and be ready to check whether your interface is correct and follows your design. On the other hand, it is not possible to define an abstract interface that is not bound to a specific implementation. Each interface must be bound to a specific implementation and when necessary, duplicated in all actual implementations.

Considering this limitation, in our example we bind the interface to the XML file-based implementation. (This is described in the next chapter when implementing a Data Provider for local XML files.) At this point, we create the Service Definition and Operation in the File model without any action to invoke (without a real implementation). This results in some errors in WebSphere Portlet Factory, which will disappear when the operations are bound to the file-based implementation as described in the next chapter.

WebSphere Portlet Factory provides two builders to create the service with operations:

- Service Definition builder
- Service Operation builder

They are located under the Services category of the Builder Palette (Figure 4-12).

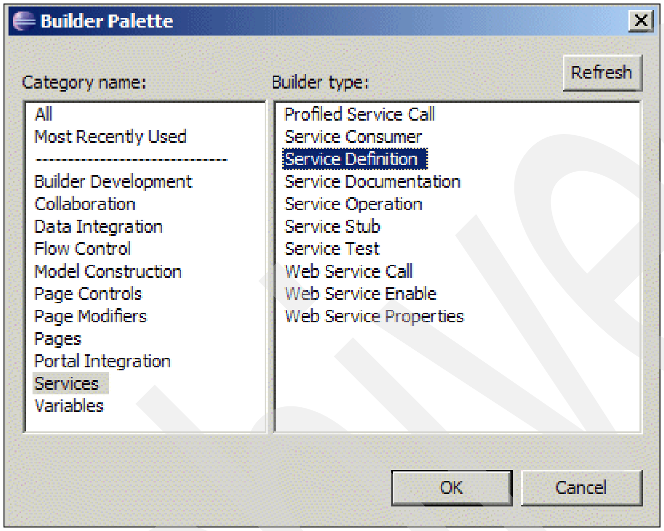


Figure 4-12 Services category in the Builder Palette

Creation of Data Services

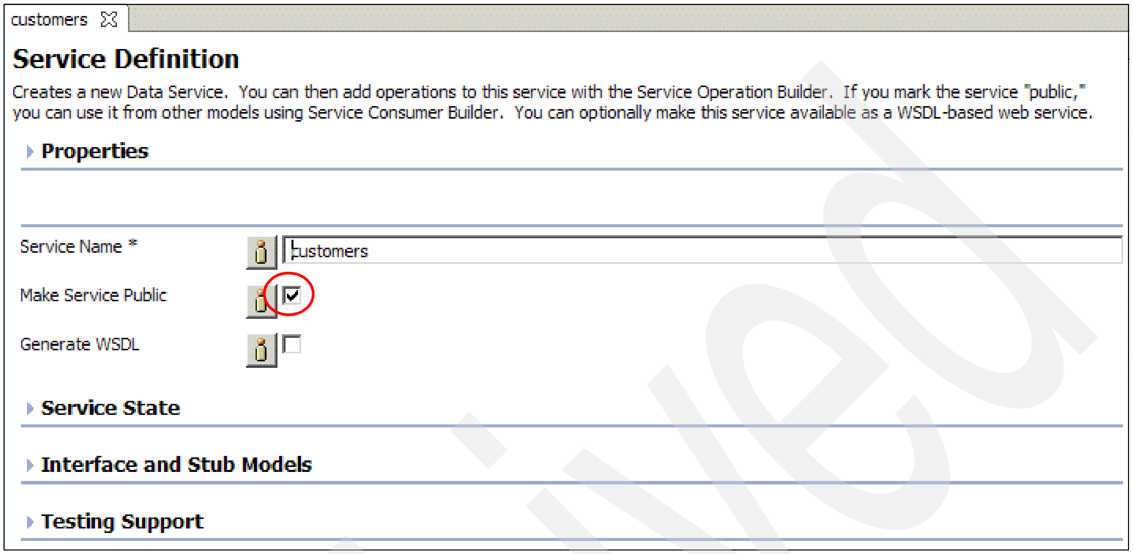
The first step is the creation of the Application Data Service Interfaces for each data domain. Table 4-8 shows the data domains, model names, and service names for ITSO Renovations. Follow the steps to create all File Data Providers that will contain the interfaces.

Table 4-8 Data domains, model and service names

Data domain	Model name	Service name
Customer	CustomerFileProvider.model	customers
Order	OrderFileProvider.model	orders
Product	ProductFileProvider.model	products

1. Create a File Data Provider model using a name from the previous table. This model should be empty, without any default builder.

2. Add a Service Definition builder with the name from previous table. Make sure that the service is public by checking the option in the configuration of the builder.



customers

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * customers

Make Service Public ☑

Generate WSDL □

Service State

Interface and Stub Models

Testing Support

Figure 4-13 Service Definition builder: Customers

3. Repeat these steps for each data domain, using the names in the table.

Creation of Data Operations

The services are ready to include the public operations using the values provided in the next three tables.

Table 4-9 Operations for Data Service: Customers

Operation	Inputs schema	Results schema
getCustomers	No inputs	customer/Customers
getCustomersList	No inputs	customerList/Customers (*)
getCustomer	getCustomerInput/Inputs (*)	customer/Customer
findCustomers	findCustomersInput/Inputs (*)	customer/Customers
createCustomers	customer/Customer	No results
updateCustomer	customer/Customer	No results
validateCustomerAccount	validateCustomerAccountInput/Inputs	No inputs (later will be replaced by the structure of the called action)
getNextCustomerId	No inputs	No inputs (later will be replaced by the structure of the called action)

Table 4-10 Operations for Data Service: Orders

Operation	Inputs schema	Results schema
getOrders	No inputs	order/Orders
getOrdersList	No inputs	orderList/Orders (*)
getCustomerOrders	getCustomerOrdersInput/Inputs (*)	order/Orders
getCustomerOrdersList	getCustomerOrdersInput/Inputs	orderList/Orders
getOrder	getOrderInput/Inputs (*)	order/Order
getOrderItems	getOrderInput/Inputs	orderItems/Order
createOrder	order/Order	No results
createOrderWithItems	orderItems/Order	No results
createOrderItem	createOrderItemInput/ITEM (*)	No results
updateOrder	order/Order	No results
updateOrderItem	createOrderItemInput/ITEM	No results
updateOrderItemsList	orderItems/Order	No results
getOrderStatusList	No inputs	orderStatus/OrderStatus
getNextOrderId	No inputs	No inputs (later will be replaced by the structure of the called action)

Table 4-11 Operations for Data Service: Products

Operation	Inputs schema	Results schema
getProducts	No inputs	product/Products
getProduct	getProductInput/Inputs (*)	product/Product

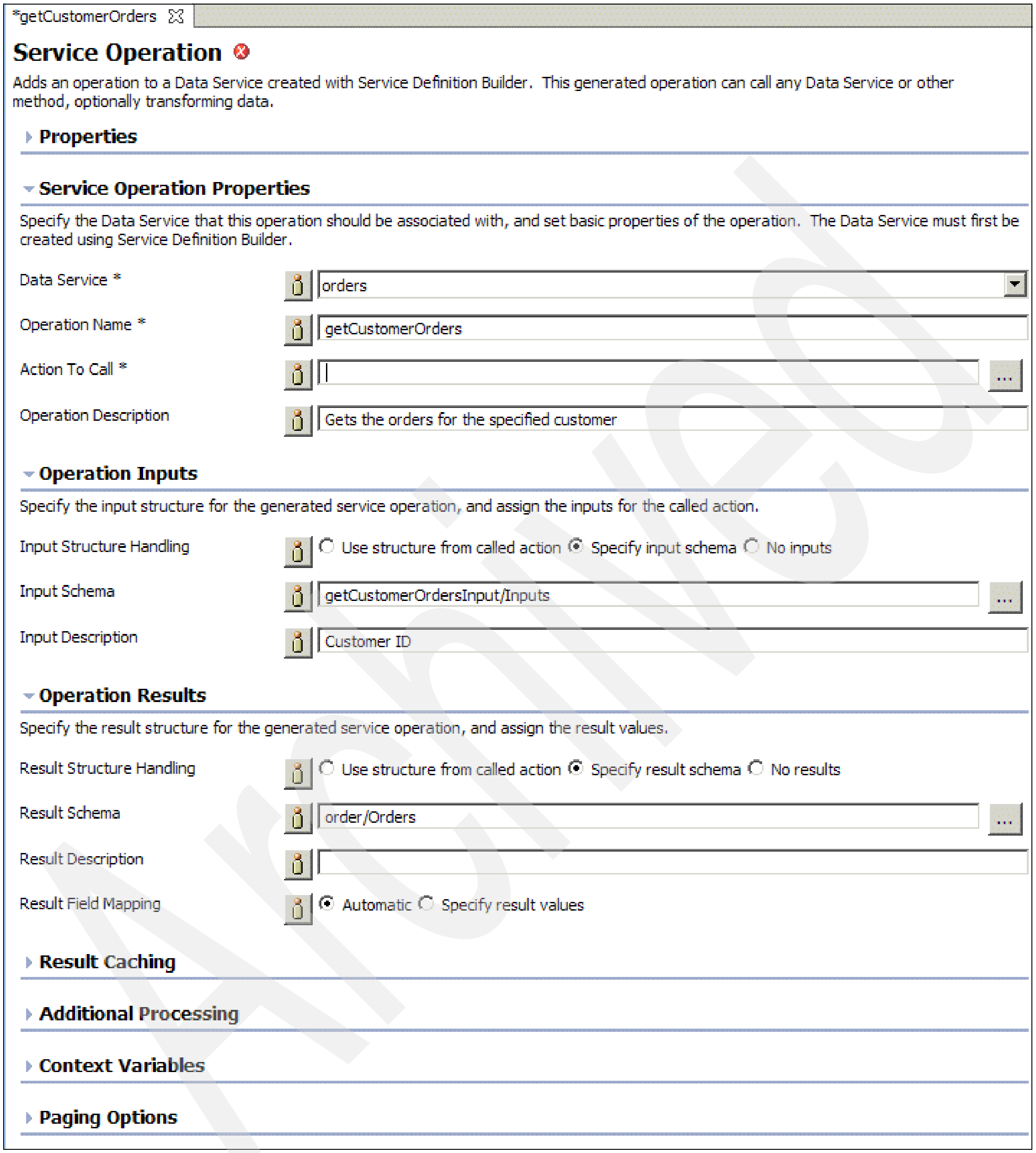
In the preceding tables, (*) means that the Schema must be created under the definitions model of the data domain. The Schema can be created providing the input to the builder and getting the contents from the files under the folder:

```
\<project_root\WebContent\WEB-INF\resources\
redbook\cs\xsd\explicity_input
```

with the name of the builder (for example, getProductInput.xsd). See 4.4.1, “Data structures” on page 87 for details.

The names and inputs/result schemas are obtained as a result of the design of the interfaces that we introduced at the beginning of the section. The operations can be added to the service using the following steps:

1. Open a File Data Provider for the data domain.
2. Add a Service Operation builder and configure it (Figure 4-14)>



*getCustomerOrders

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

Properties

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service *	orders
Operation Name *	getCustomerOrders
Action To Call *	
Operation Description	Gets the orders for the specified customer

Operation Inputs

Specify the input structure for the generated service operation, and assign the inputs for the called action.

Input Structure Handling	○ Use structure from called action ● Specify input schema ○ No inputs
Input Schema	getCustomerOrdersInput/Inputs
Input Description	Customer ID

Operation Results

Specify the result structure for the generated service operation, and assign the result values.

Result Structure Handling	○ Use structure from called action ● Specify result schema ○ No results
Result Schema	order/Orders
Result Description	
Result Field Mapping	● Automatic ○ Specify result values

Result Caching

Additional Processing

Context Variables

Paging Options

Figure 4-14 Example of Service Operation builder: getCustomerOrders

Make the appropriate entries and selections:

- Data Service: The public service definition associated with the data domain that this operation belongs to.
- The operation name as provided in the previous tables.
- Do not provide a value in the Action to Call. This will be filled later when creating the XML Data Provider.
- Specify the Operation Inputs and Results schemas using the values from the previous tables. The corresponding definitions model must be imported to have access to the Schemas.

In most cases, it is recommended to specify schemas for the input and results to provide clear element names in the input and output messages. WebSphere Portlet Factory provides support to automatically generate structures when the called action is provided. You should use the auto generation mechanism for inputs and results of simple types like boolean, integer, or string. It is also recommended to use the auto generation mechanism when the called action is an operation of another data service. There are some other mechanisms to bring the schema into the operations, for example, the usage of variable and simple schema generation. Depending on your application you can use the most adequate mechanism to define the schemas for operations.

In ITSO Renovations there are few cases where auto generation is used:

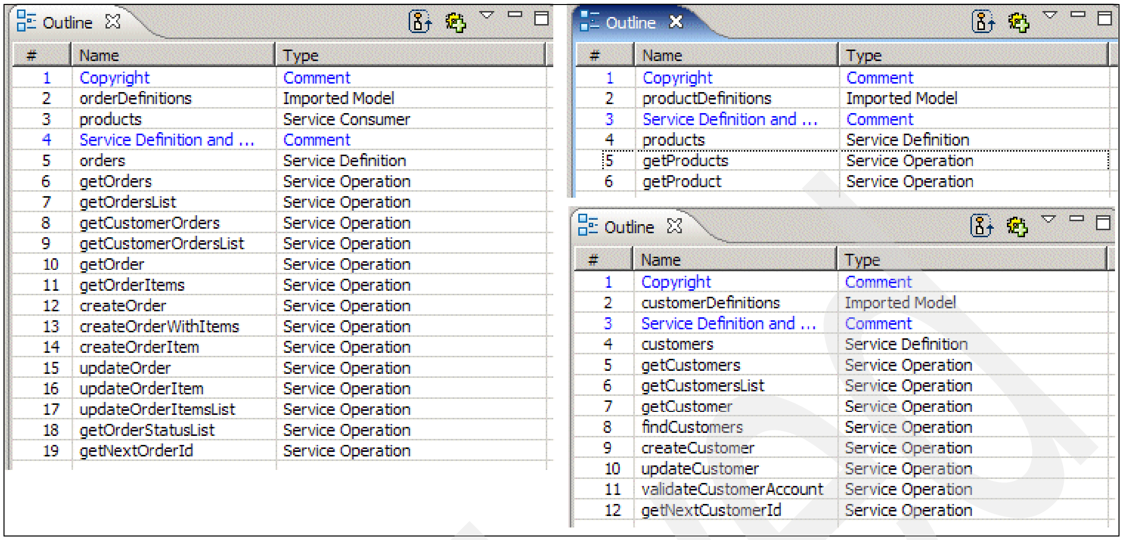
- customers.validateCustomerAccount
- customers.getNextCustomerId
- orders.getNextOrderId

In these cases select the **No results** option and when the action to call is provided, switch to **Use the structure from called action** and define the operation completely.

After creating all operations you will see some errors that the action is not provided. For the moment, ignore them; later we provide the XML file implementation to complete the interface.

3. Repeat the previous steps for all data domains and operations of the sample application following the descriptions provided in the previous tables.

Figure 4-15 shows the builders for each model when all interfaces are defined.



Outline

#	Name	Type
1	Copyright	Comment
2	orderDefinitions	Imported Model
3	products	Service Consumer
4	Service Definition and ...	Comment
5	orders	Service Definition
6	getOrders	Service Operation
7	getOrdersList	Service Operation
8	getCustomerOrders	Service Operation
9	getCustomerOrdersList	Service Operation
10	getOrder	Service Operation
11	getOrderItems	Service Operation
12	createOrder	Service Operation
13	createOrderWithItems	Service Operation
14	createOrderItem	Service Operation
15	updateOrder	Service Operation
16	updateOrderItem	Service Operation
17	updateOrderItemsList	Service Operation
18	getOrderStatusList	Service Operation
19	getNextOrderId	Service Operation

Outline

#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	Service Definition and ...	Comment
4	products	Service Definition
5	getProducts	Service Operation
6	getProduct	Service Operation

Outline

#	Name	Type
1	Copyright	Comment
2	customerDefinitions	Imported Model
3	Service Definition and ...	Comment
4	customers	Service Definition
5	getCustomers	Service Operation
6	getCustomersList	Service Operation
7	getCustomer	Service Operation
8	findCustomers	Service Operation
9	createCustomer	Service Operation
10	updateCustomer	Service Operation
11	validateCustomerAccount	Service Operation
12	getNextCustomerId	Service Operation

Figure 4-15 Service Definition and Operation builders for customers, orders and products

After the development of data structures and application data service interfaces, we defined the public interface for the data services layer. Service Consumers can already use it to continue the development of the business logic and presentation layers.

The procedures outlined in this section illustrate some best practices that can be applied to any application that requires data access:

- Determine the entities in the application and create XSD files for each one. All data service interfaces in WebSphere Portlet Factory are XML based.
- Create base definition models that include the XSD files and some additional schemas for the input and output messages of the operations.
- Design the interfaces of the data service access: which services are required based on the data domains, public operations and required additional schemas.
- Create the Service Definition and Operations in WebSphere Portlet Factory based on the interface design. This interface is bound to a real implementation (for example, a test XML file based implementation) and future data providers will be required to implement the interface defined at this point.

4.5 Summary and best practices

One of the most important parts of enterprise applications is accessing data from back-end systems. WebSphere Portlet Factory provides a powerful technology to implement this data access following an SOA architecture. In this chapter we have provided an introduction to the capabilities of WebSphere Portlet Factory in data integration, specifically:

- Clear separation of the data access layer from the business logic and presentation layers.
- Definition of the data access layer as services that can easily be exposed as web services if this is required.
- Integration with the most common back-end data systems: relational databases, Domino, SAP, Siebel, and so forth.

We have introduced architecture and design guidelines that can be easily applied to any kind of web application developed with WebSphere Portlet Factory. Finally, we have illustrated how to create data structures and application data service interfaces using our sample application ITSO Renovations.

The most important best practices when defining the architecture and design of Data Services are summarized as follows:

- Discover the role of accessing data from back-end systems in your specific application.
- List the back-end systems you are going to access and categorize them based on these rules:
  - Core (SQL, J2EE, and so forth) or extended (SAP, Siebel, and so forth).
  - Web Service enabled or not.

  Obtain the data models for the data you need to access in each back-end system. This will give you an idea of the existing data domain entities.
- Create the architecture of the data access layer, keeping in mind that it should be separated from other layers of the application and should provide a clear and well-defined interface.
- Design the data access layer based on architecture decisions and diagrams. Since you are using WebSphere Portlet Factory, you can include required foundation models, leverage the relationships between them, and identify common functionality between similar models.
- Define the data service interfaces of your application based on the functional requirements and involved data domains.

- Create data structures for the main data entities and import them into the definition models.
- Create Data Services and Operations following the previous design of the application data service interface. Do not worry if you cannot provide an implementation at this time; the main goal is the definition of the interface.

All best practices and concepts we have highlighted in this chapter are applicable to all projects, especially to big ones. The definition of the application data service interface is a good practice that will increase the quality of your application but it is not a mandatory requirement when building data services. If you are building small and simple applications, you can create data services without defining this interface and speed up your development and decrease efforts. It is also not necessary when creating private or internal services within the application. Again, this depends of the complexity and size of the application you are building, but in every case WebSphere Portlet Factory provides the right technology and tools to cover all types of projects.

5

Creating Data Services: Access to back-end systems

This chapter continues the discussion regarding how to create Data Services to access back-end systems. It provides design and implementation details for the following scenarios:

- Custom Data Service: Exemplified by a local XML access sample, this is how to integrate with back ends for which WebSphere Portlet Factory does not offer builders.
- SQL Data Service: This is the most common case when accessing relational databases.
- Domino Data Service: One of the integration extensions that WebSphere Portlet Factory provides to access back-end systems.
- Data Service to access an external web service: The most generic mechanism to access a back-end system is the web service interface.

This chapter also introduces integration with other back-end systems like SAP and J2EE data integration: JMS and EJB.

In summary, the chapter should give a good overview of the capabilities of WebSphere Portlet Factory for data integration. It illustrates all concepts via the sample application ITSO Renovations, but the ideas presented can be applied to any other web application.

5.1 Custom Data Service: Local XML access sample

WebSphere Portlet Factory provides builders to access a number of commonly used back-end systems; however, in some applications you might need to access a back-end system that is currently not supported. In this situation you must provide the implementation for connecting and accessing the data.

The implementation is Java based and uses the capability of WebSphere Portlet Factory to include Java classes within the model using the Linked Java Object builder. Service operations will invoke the methods implemented in the Java objects via this builder.

To illustrate accessing a custom Data Provider, ITSO Renovations includes a local XML file based data source used for testing purposes. It also helps in the definition of the application data service interface we discussed in the previous chapter, providing the actions to call by Service Operations. In this section, we describe how to design, implement, and test a custom data service to connect with this file based back-end system. We highlight best practices throughout, which can be applied to your specific application.

5.1.1 Overview of accessing a custom data service

Custom data services are responsible to access back-end systems that are not supported by builders in WebSphere Portlet Factory. In that situation the implementation is provided using Java classes that uses the specific back-end Java API.

The Linked Java Object (LJO) builder is used to have Java classes available within a model. Once the Java class is linked, the other builders have access to its public methods; Service Operations can invoke the available methods in the LJO. Figure 5-1 illustrates this design principle.

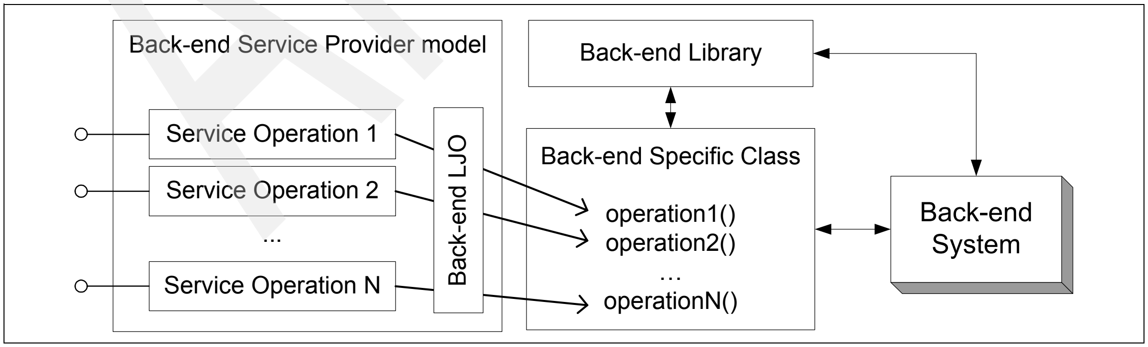


Figure 5-1 Common design for a custom Data Service implemented in Java

For each service, there is an LJO that is responsible to access the XML files. The interface of the Java class contains a set of public methods that fits with the operations of the services. This is not required but it clarifies which method is handling each service operation. Additionally, the Java class can access any other public or private methods within the class or other Java classes and external libraries available in the classpath of the application.

The LJO represents an object of the Java class that it is linking. Depending on the configuration of the builder, this object can have a different scope in the web application: request, session, session with failover, and application (read-only). We cover all possibilities in the next section. If you need to keep connection pools or objects that are shared across all users, you can use a singleton design pattern.

It is recommended that public methods, visible via the LJO builder, follow this rule for the signature:

```
public <return_type> <method_name> (WebAppAccess webAppAccess,
   ,<additional_parameters>, ...) {
   ...
}
```

You have full access to the Web Application context inside of the Java class by using the parameter WebAppAccess. Using this object you can access all of the application entities such as methods, variables, linked models, and so forth.

If you need to work with XML content, IXml provides you convenient methods to parse, serialize, and navigate through XML documents.

The complete API of WebAppAccess and IXml is provided as part of the Reference section of WebSphere Portlet Factory Help.

5.1.2 Implementing the service

The implementation for accessing a custom back-end system can be done using Java code and linked using the LJO builders as discussed in the previous section. ITSO Renovations provides a local XML file based implementation for testing purposes and to help in the completion of the Application Data Service Interface. The following diagram (Figure 5-2) displays the implementation details for the local XML access.

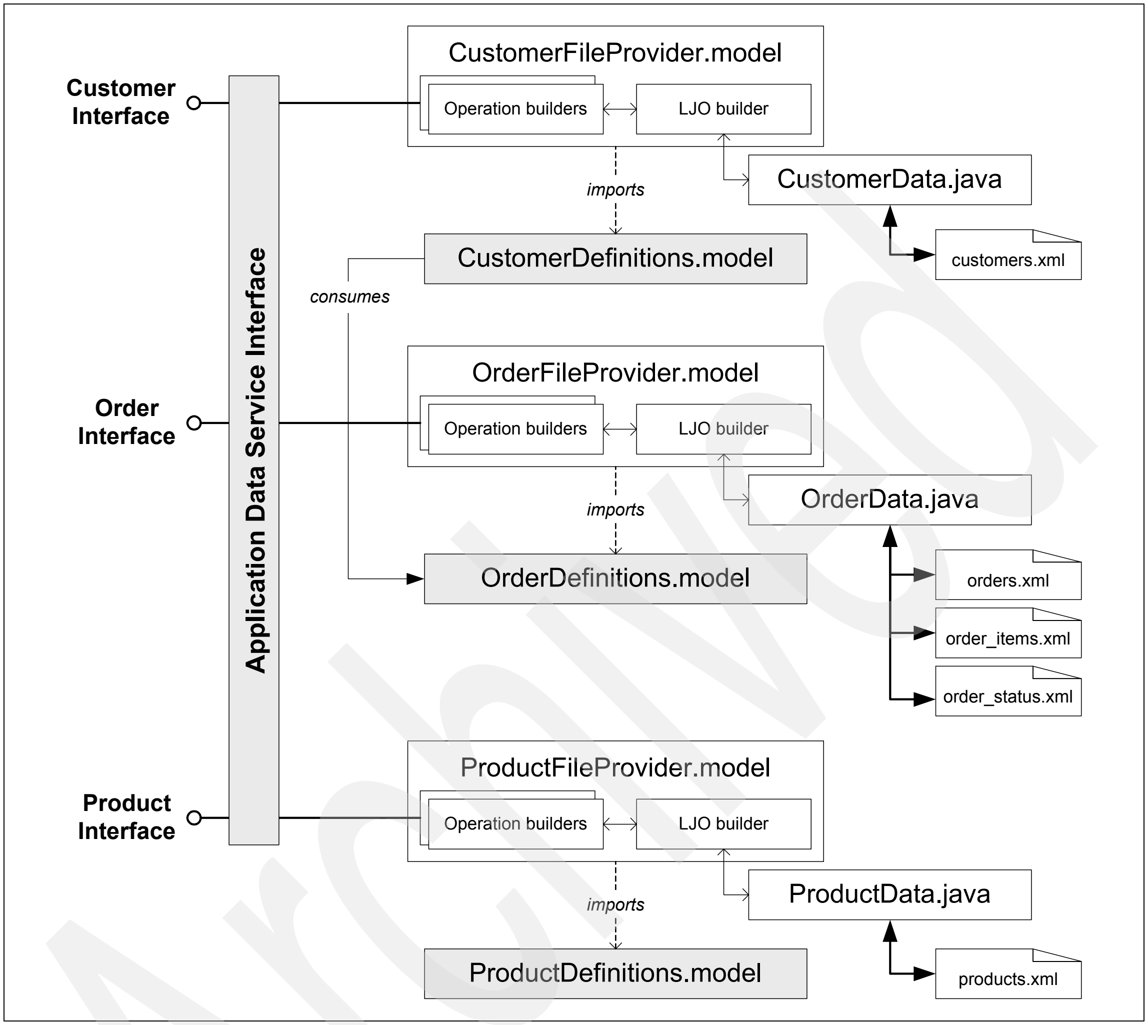


Figure 5-2 Design of local XML access

There is an LJO for each data service that is responsible to access the XML documents related to the data domain. The XML documents are imported as XML variables in WebSphere Portlet Factory and they are kept during the current user session.

The following steps describe how we have implemented the XML access for ITSO Renovations.

Import XML content in the models

Import the XML files in the models to keep the data along with the session. Table 5-1 identifies the XML files used by each model.

Table 5-1 Import XML files details

Model name	Import to XML builder name	XML file name	Variable schema
CustomerFileProvider	customers	customers.xml	customers/Customer
OrderFileProvider	orders	orders.xml	orders/Orders
	orderItems	order_items.xml	orderItems/Order
	orderStatus	order_status.xml	orderStatus/OrderStatus
ProductFileProvider	products	products.xml	product/Products

Follow these steps to import the XML data:

1. Open the model for the File Provider and add a new Import to XML builder. This builder can be found under the Data Integration category of the Builder Palette (Figure 5-3).

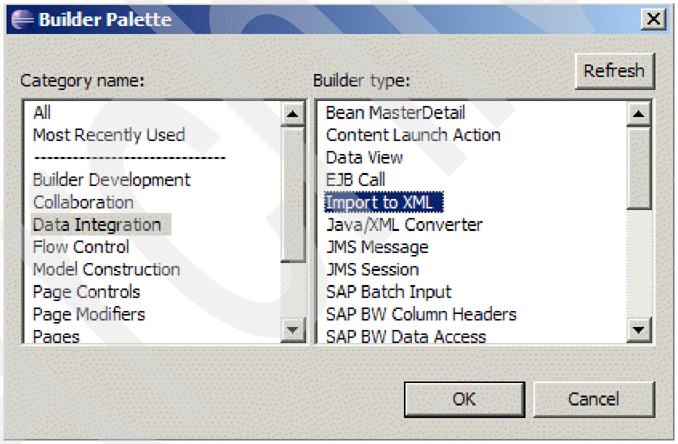
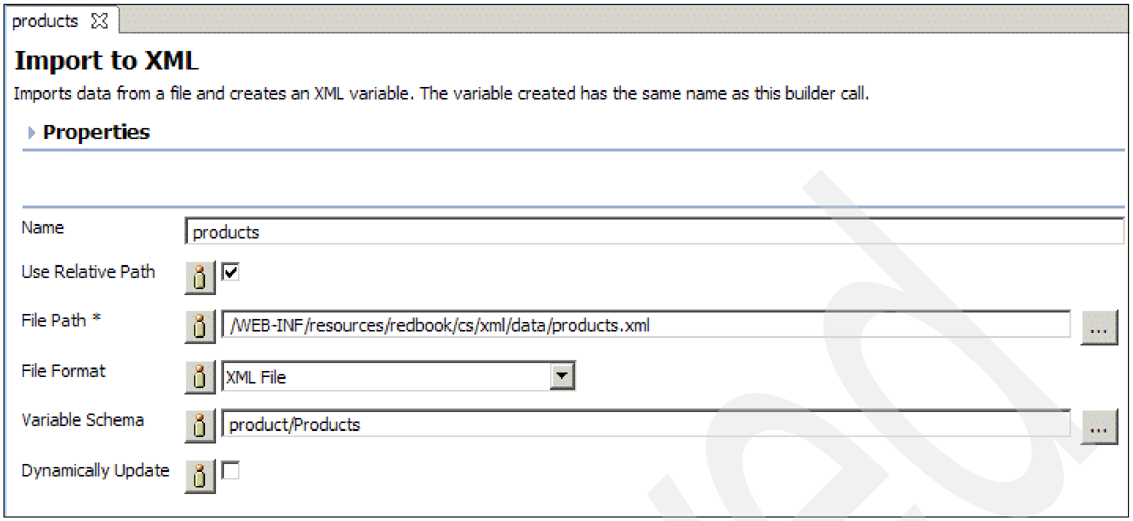


Figure 5-3 Data Integration category in the Builder Palette

2. Configure the builder, providing the relative path of the XML file and the variable schema used to validate the content. The definitions model where the schemas are defined must have been imported prior to this. All XML files are located under the following folder:

   \WEB-INF\resources\redbook\cs\xml\data


products

Import to XML

Imports data from a file and creates an XML variable. The variable created has the same name as this builder call.

Properties

Name: products

Use Relative Path: ☑

File Path *: /WEB-INF/resources/redbook/cs/xml/data/products.xml

File Format: XML File

Variable Schema: product/Products

Dynamically Update: □

Figure 5-4 Import to XML builder: Products

3. Repeat the previous steps for each XML file, using the details provided in Table 5-1.

Importing an XML file will create in the model a variable with the contents of the XML file and using as a name the builder name. This mechanism can be used by any kind of model when reading XML files and making the content accessible in the model.

Implementation of LJO to access XML content

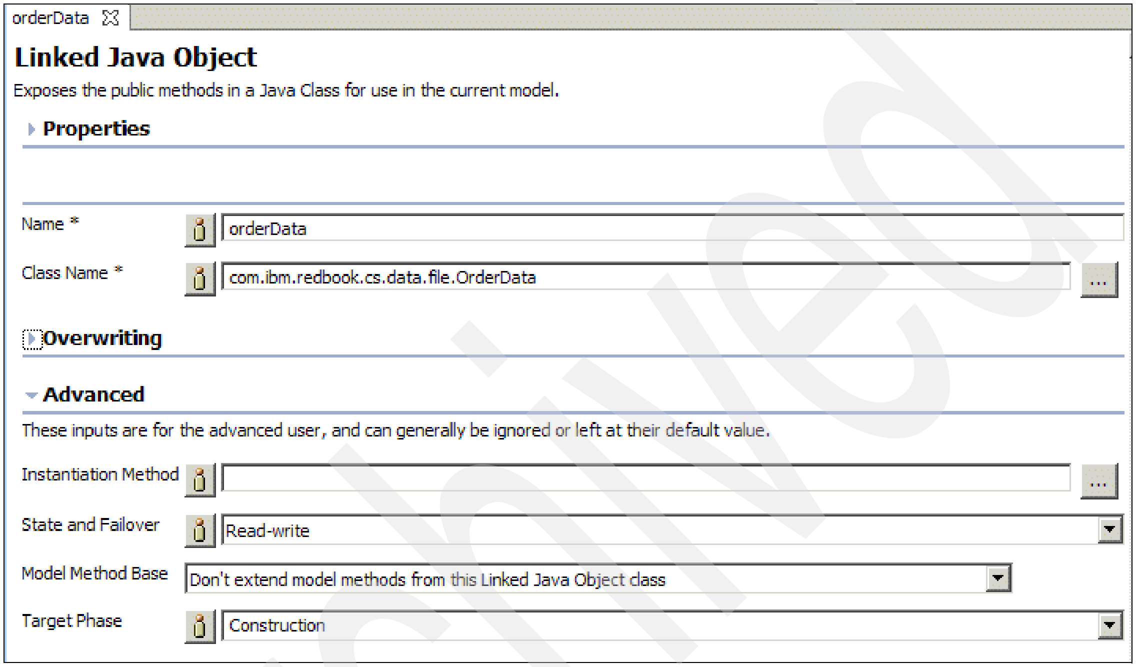
The Java classes with the local XML file based implementation are already provided in the code of ITSO Renovations at \WEB-INF\work\source. The package name is com.ibm.redbook.cs.data.file. We access these classes from the models by using the Linked Java Object builder. Table 5-2 shows details about the classes and LJO builders required in each File Provider model.

Table 5-2 LJO details

Model name	Linked Java Object builder name	Class name
CustomerFileProvider	customerData	com.ibm.redbook.cs.data.file.CustomerData
OrderFileProvider	orderData	com.ibm.redbook.cs.data.file.OrderData
ProductFileProvider	productData	com.ibm.redbook.cs.data.file.ProductData

Follow these steps to create a Linked Java Object builder for each class:

1. Open the model for the File Provider and add a new Linked Java Object builder. The builder is under the Variables category of the Builder Palette.
2. Configure the builder and select the builder name and class name provided in Table 5-2.



orderData

Linked Java Object

Exposes the public methods in a Java Class for use in the current model.

Properties

Name * orderData

Class Name * com.ibm.redbook.cs.data.file.OrderData

Overwriting

Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default value.

Instantiation Method

State and Failover Read-write

Model Method Base Don't extend model methods from this Linked Java Object class

Target Phase Construction

Figure 5-5 Linked Java Object builder: orderData linked with OrderData.java class

The scope is set to Read-write, so the same instance of the object is valid for the complete session.

3. Repeat the previous steps for each LJO builder defined in the table.

An LJO can have one of several scopes. Selected in the Advanced section of the builder, the available scopes have the following meanings:

- Read-write: Session scope and serializable fields are persistent for failover if the web application server allows persistence of the session.
- Read-write but not persisted for failover: Session scope but not persistence.
- Read-only: Shared across all users, application scope but only for read only.
- Request scoped: The object is only valid on a per request basis.

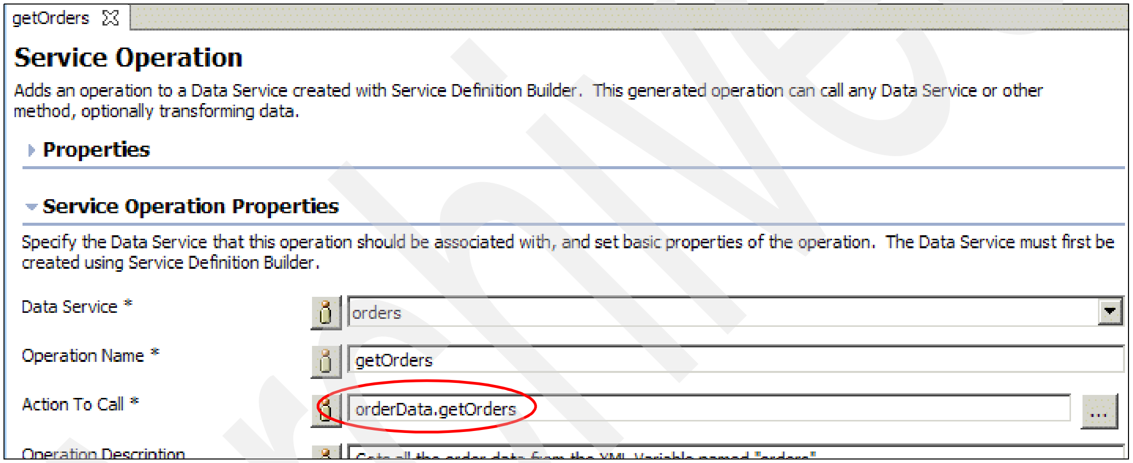
To complete the implementation, two variables (Variable builder) are defined to keep the last used IDs for customers and orders:

- CustomerFileProvider model: lastCustomerId (Integer)
- OrderFileProvider model: lastOrderId (Integer)

Invoking the methods of LJO from a Service Operation

The Service Operation builders can now be modified to specify the Action To Call when the operation is executed. In this case they will execute the methods in the Linked Java Object.

1. Open the File Provider model and open each Service Operation builder that was created previously (4.4.2, “Application Data Service Interface: Definition and operations” on page 92). Complete the builder configuration by providing the Action To Call input with the method of the LJO to invoke.


getOrders

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

Properties

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service * orders

Operation Name * getOrders

Action To Call * orderData.getOrders

Operation Description Gets all the order data from the XML Variable named "orders"

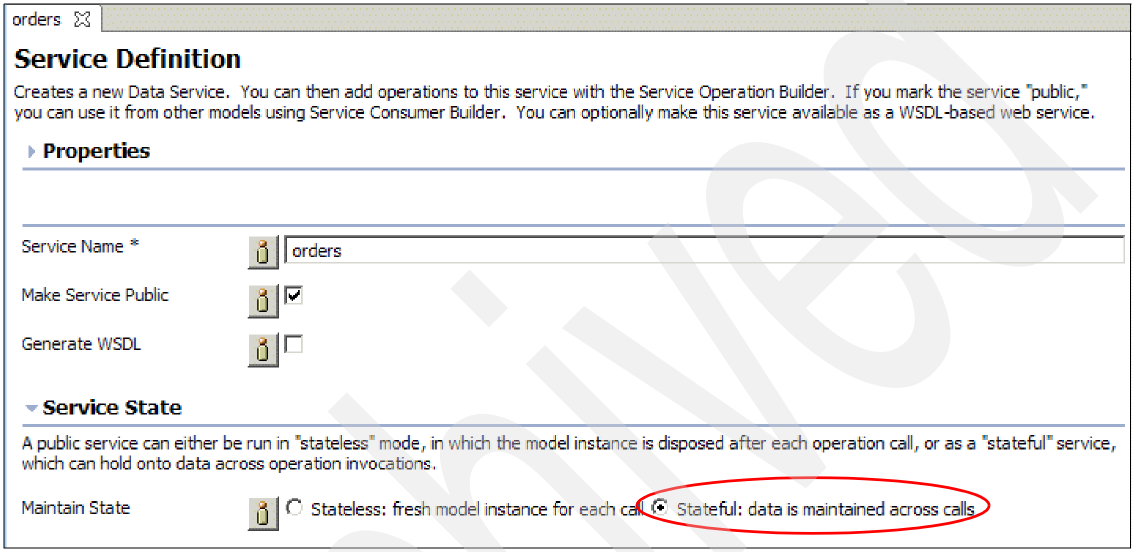
Figure 5-6 Service Operation builder: specify Action To Call to invoke LJO method

We used the same names of the service operations for the methods in the Java classes.

2. Repeat the previous step for each File Provider model.
3. The interface can be completed by using the structure of the called action for the Results schemas in these cases:
   - customers.validateCustomerAccount
   - customers.getNextCustomerId
   - orders.getNextOrderId

   The service is completed and the interface defined at this point will be used for the implementation of the other Data Services. Since the interface is bound to the XML-based implementation, it is possible to do the first functional tests to determine whether it fulfills the design described in the previous chapter.

4. The implementation of the XML File access requires our application to keep the service stateful to ensure that data is maintained in memory during the session. To do this, change the Service State in the Service Definition builders for customers, orders, and products (Figure 5-7).



orders

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * orders

Make Service Public ☑

Generate WSDL □

Service State

A public service can either be run in "stateless" mode, in which the model instance is disposed after each operation call, or as a "stateful" service, which can hold onto data across operation invocations.

Maintain State ○ Stateless: fresh model instance for each call ● Stateful: data is maintained across calls

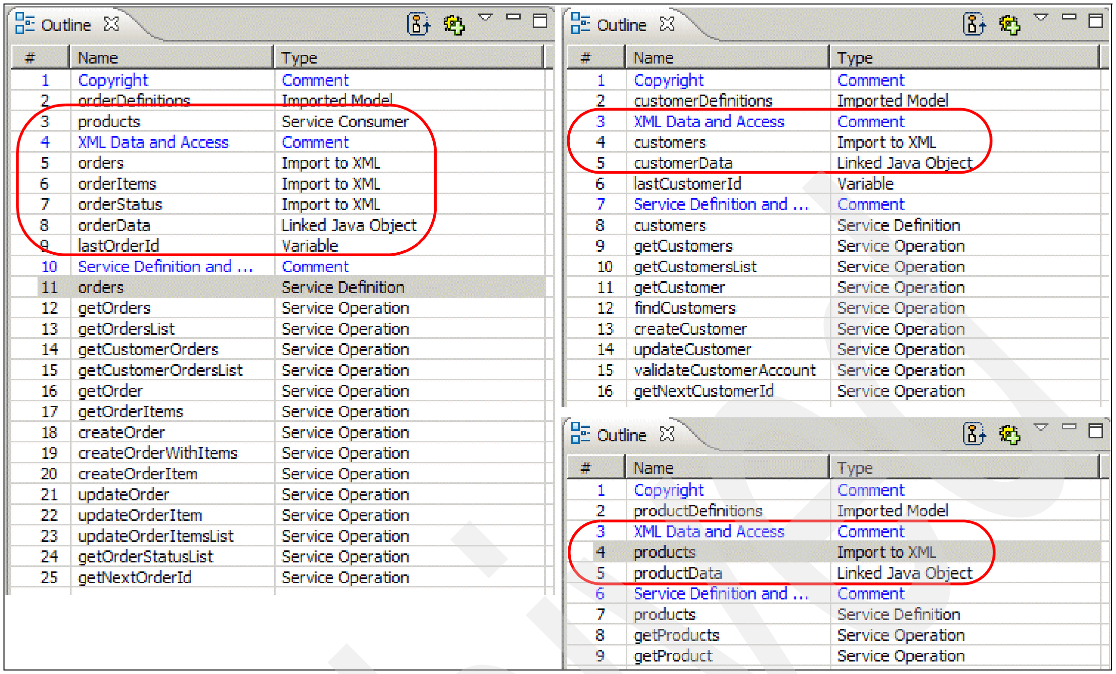
Figure 5-7 Service Definition builder: Set service state

When the service is used by the Service Consumer, it creates an instance of the Service Provider model that can be disposed of after each operation or kept across operation invocations within the user session. Because it is an instance of the complete model, all variables and LJO are involved; even if variables are defined in the session scope they can be disposed of if the service that contains them is stateless.

The XML file-based implementation is provided for testing purposes and there are some limitations to consider:

- The data is read from the files and kept during the current user session.
- Any changes in the data are only reflected in memory. Customer information is shared across users and orders data is valid for each user session.

After implementing the XML file-based Data Provider you should have the models and builders shown in Figure 5-8.



Outline

#	Name	Type
1	Copyright	Comment
2	orderDefinitions	Imported Model
3	products	Service Consumer
4	XML Data and Access	Comment
5	orders	Import to XML
6	orderItems	Import to XML
7	orderStatus	Import to XML
8	orderData	Linked Java Object
9	lastOrderId	Variable
10	Service Definition and ...	Comment
11	orders	Service Definition
12	getOrders	Service Operation
13	getOrdersList	Service Operation
14	getCustomerOrders	Service Operation
15	getCustomerOrdersList	Service Operation
16	getOrder	Service Operation
17	getOrderItems	Service Operation
18	createOrder	Service Operation
19	createOrderWithItems	Service Operation
20	createOrderItem	Service Operation
21	updateOrder	Service Operation
22	updateOrderItem	Service Operation
23	updateOrderItemsList	Service Operation
24	getOrderStatusList	Service Operation
25	getNextOrderId	Service Operation

Outline

#	Name	Type
1	Copyright	Comment
2	customerDefinitions	Imported Model
3	XML Data and Access	Comment
4	customers	Import to XML
5	customerData	Linked Java Object
6	lastCustomerId	Variable
7	Service Definition and ...	Comment
8	customers	Service Definition
9	getCustomers	Service Operation
10	getCustomersList	Service Operation
11	getCustomer	Service Operation
12	findCustomers	Service Operation
13	createCustomer	Service Operation
14	updateCustomer	Service Operation
15	validateCustomerAccount	Service Operation
16	getNextCustomerId	Service Operation

Outline

#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	XML Data and Access	Comment
4	products	Import to XML
5	productData	Linked Java Object
6	Service Definition and ...	Comment
7	products	Service Definition
8	getProducts	Service Operation
9	getProduct	Service Operation

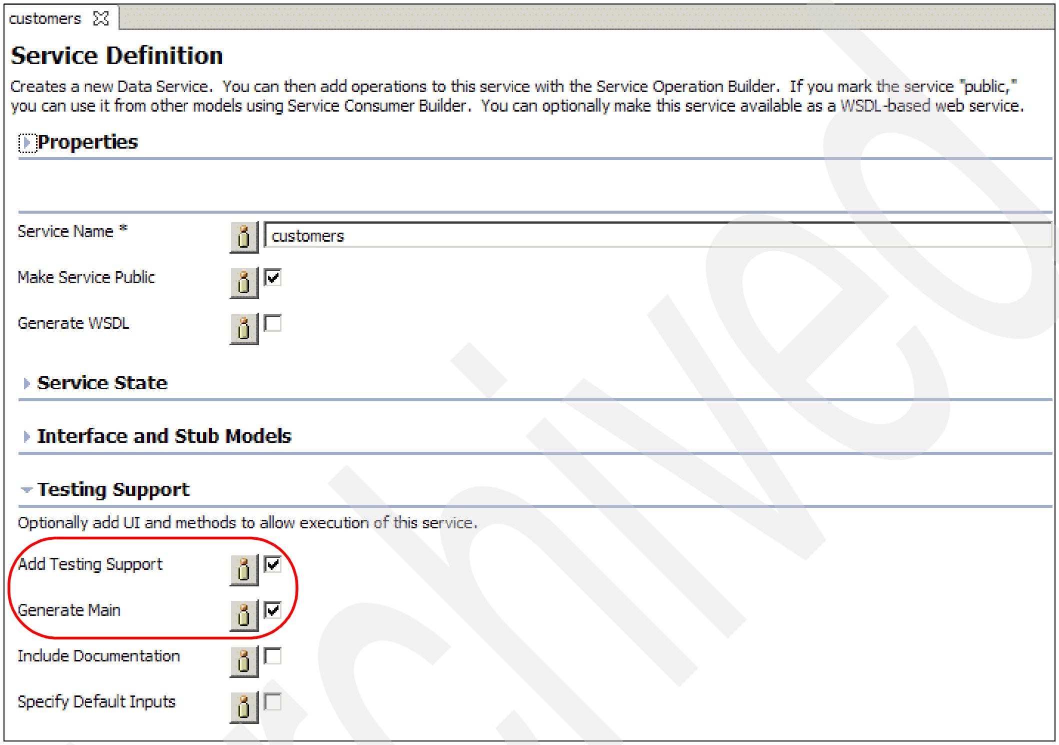
Figure 5-8 Models and builders for local XML access: Customers, orders and products

In this section we have covered the use of Linked Java Object builders and how to import XML content into the model. We recommend the following best practices when using Java classes inside the models:

- Use Linked Java Object builders to connect with Java classes that can implement access to custom back-end systems.
- Define an LJO per service to provide the implementation. If possible, define the same method names as the service operation names to make the implementation more clear and readable.
- Think about the scope of LJO based on the application-specific scenario and use of the builder.
- Look in the API for WebAppAccess and IXml to discover what is available when implementing the code of the LJO.
- Use the Import to XML builder to import XML content and make it accessible in the model.
- Consider the Service State in the Service Definition builder because it can change the behavior when it is used by the service consumers.

5.1.3 Testing and debugging the service

WebSphere Portlet Factory offers a mechanism to test the Data Service by checking the options Add Testing Support and Generate Main in the Service Definition builder (Figure 5-9).



customers

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * customers

Make Service Public ☑

Generate WSDL □

Service State

Interface and Stub Models

Testing Support

Optionally add UI and methods to allow execution of this service.

Add Testing Support ☑

Generate Main ☑

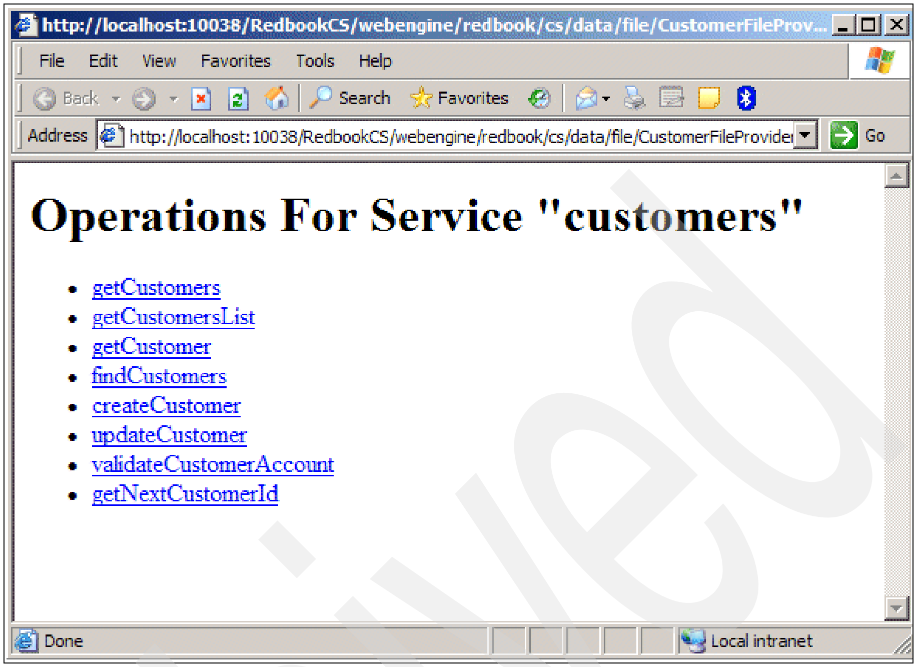
Include Documentation □

Specify Default Inputs □

Figure 5-9 Service Definition: Adding testing support

With these actions, the model will have an internal main action list that will be used when running the model from inside of WebSphere Portlet Factory Designer. You could have conflicts if you have your own main action list or more than one service with testing support; therefore, ensure that only one main is available at one time. In addition, the testing support internally generates pages, data pages, forms, and so forth to test all methods.

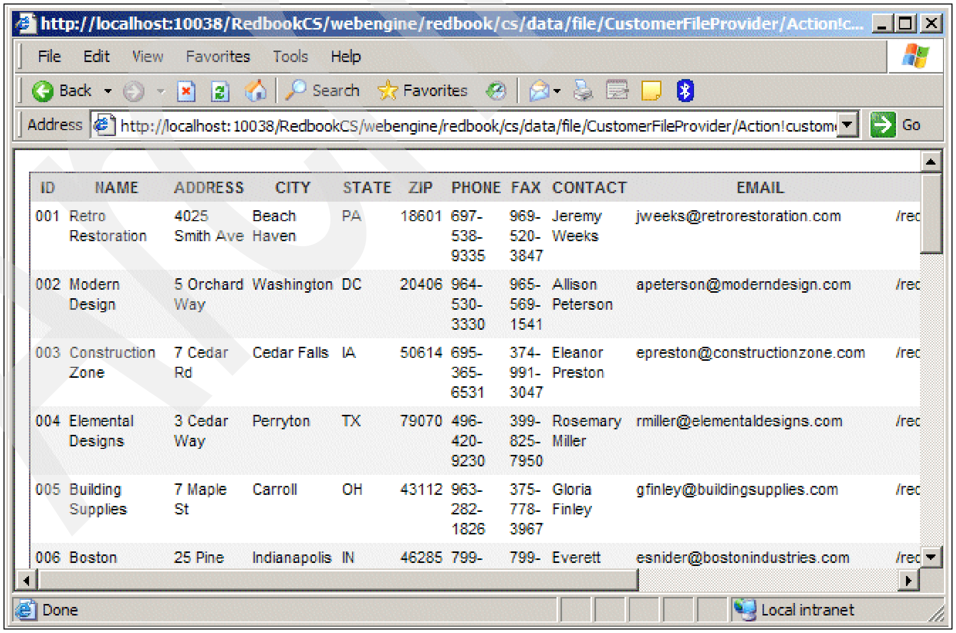
The following three figures show some examples of running the testing support for the model CustomerFileProvider.


http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/CustomerFileProv...
File Edit View Favorites Tools Help
Back Search Favorites
Address
http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/CustomerFileProvider
Go
Done
Local intranet

Operations For Service "customers"

- getCustomers
- getCustomersList
- getCustomer
- findCustomers
- createCustomer
- updateCustomer
- validateCustomerAccount
- getNextCustomerId

Figure 5-10 Testing support: List of customers service operations


http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/CustomerFileProvider/Action!c...
File Edit View Favorites Tools Help
Back Search Favorites
Address
http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/CustomerFileProvider/Action!custom
Go
Done
Local intranet

ID	NAME	ADDRESS	CITY	STATE	ZIP	PHONE	FAX	CONTACT	EMAIL	
001	Retro Restoration	4025 Smith Ave	Beach Haven	PA	18601	697-538-9335	969-520-3847	Jeremy Weeks	jweeks@retrorestoration.com	/rec
002	Modern Design	5 Orchard Way	Washington	DC	20406	964-530-3330	965-569-1541	Allison Peterson	apeterson@moderndesign.com	/rec
003	Construction Zone	7 Cedar Rd	Cedar Falls	IA	50614	695-365-6531	374-991-3047	Eleanor Preston	epreston@constructionzone.com	/rec
004	Elemental Designs	3 Cedar Way	Perryton	TX	79070	496-420-9230	399-825-7950	Rosemary Miller	rmiller@elementaldesigns.com	/rec
005	Building Supplies	7 Maple St	Carroll	OH	43112	963-282-1826	375-778-3967	Gloria Finley	gfinley@buildingsupplies.com	/rec
006	Boston	25 Pine	Indianapolis	IN	46285	799-	799-	Everett	esnider@bostonindustries.com	/rec

Figure 5-11 Testing support: Result of executing the operation getCustomers

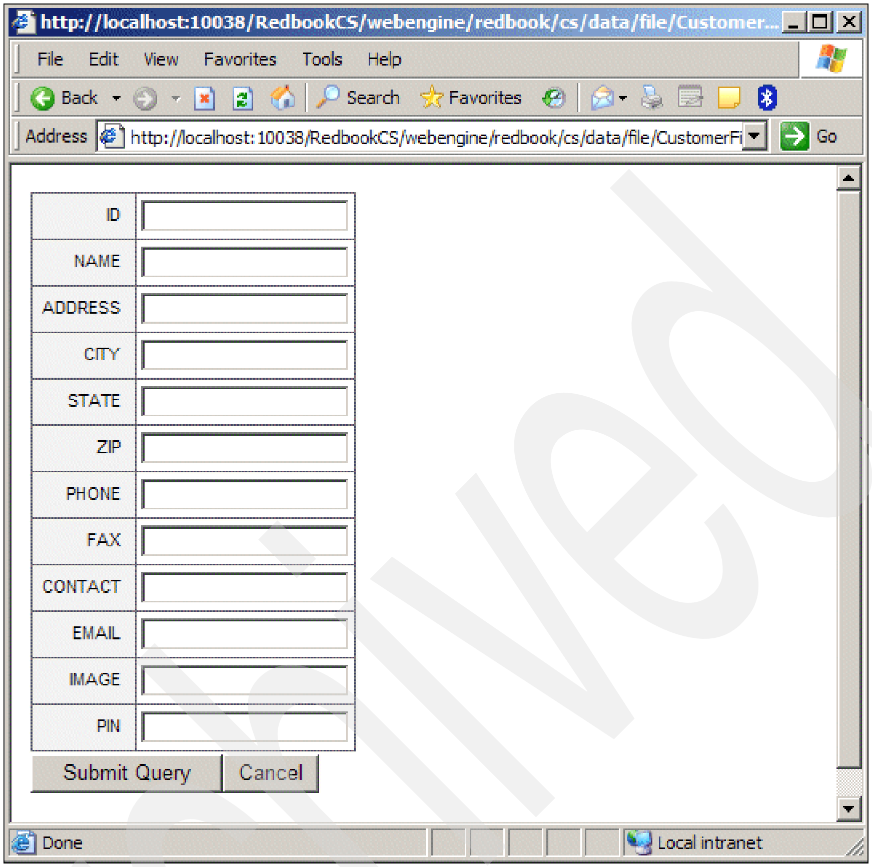

http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/Customer...
File
Edit
View
Favorites
Tools
Help
Back
Search
Favorites
Address
http://localhost:10038/RedbookCS/webengine/redbook/cs/data/file/CustomerFi
Go
ID
NAME
ADDRESS
CITY
STATE
ZIP
PHONE
FAX
CONTACT
EMAIL
IMAGE
PIN
Submit Query
Cancel
Done
Local intranet

Figure 5-12 Testing support: Input form for the operation createCustomer

You can test each operation of the interface independently without any additional builder in the model.

WebSphere Portlet Factory uses the standard debug capabilities provided by the Eclipse infrastructure. Within the designer you can connect remotely to your application server running in debug mode and start debugging sessions for your Java code.There is currently no direct support for debugging models and builders from the designer, but it is possible to debug the Java classes that are being generating.

5.2 SQL Data Services

SQL Data Services provide access to relational database back-end systems like DB2®, Cloudscape™, Oracle, and similar applications. WebSphere Portlet Factory offers a set of builders that enable you to perform database integration in an easy and graphical way. There is no need to write Java code except when your application requires some customized data transformation or special functionality that is not covered directly by the builders.

The SQL builders offer a simple mechanism to define the statements, and they hide the implementation details to connect to and access databases.

This section describes the available SQL builders, the functionality they provide, and how we used them in the ITSO Renovations application. These procedures can be applied to web application that requires access to relational databases.

5.2.1 Overview and available SQL builders

A group of builders in WebSphere Portlet Factory enable you to easily connect to and access databases. They are part of the Data Integration category in the Builder Palette (Figure 5-13).

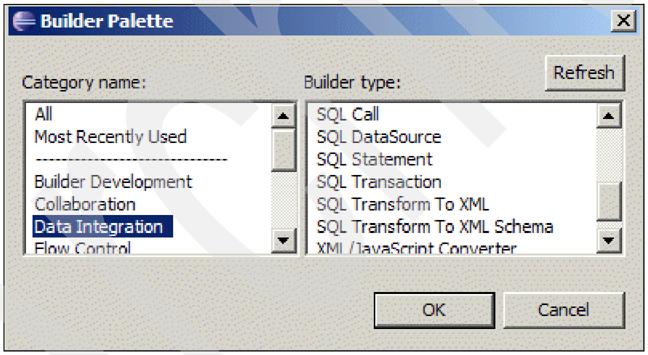


Figure 5-13 Data Integration category in Builder Palette: SQL builders

We can distinguish two groups of builders depending on what level of abstraction they are reflecting:

- *Top-level builders* cover high-level functionality and usually require more configuration but less implementation in Java code or action lists. They are useful when the requirements are simple and the builder can hold all necessary functionality (for example, SQL calls in a single transaction).

- *Modifier builders* contain basic and low-level database operations and definitions. They can be used to override configuration of top-level builders when this is required. They also help to define common configuration like SQL Data Sources, SQL Statements, and so forth.

The data exchanged with the database is in XML format for those builders that are executing SQL statements. Input and result sets are XML documents, so it is possible that additional transformations or configuration of element names are required to accommodate the associated Application Data Service Interface.

The available SQL builders in WebSphere Portlet Factory, presented in this list from high- to low-level, are:

- SQL Call: This is a top-level builder for calling SQL statements without writing any Java code. The SQL statement (select, insert, update, delete) can be easily created even if it requires parameters. The main features of the builder are:
  - Database Explorer to query the database, discover, and select the metadata automatically: List of available tables and stored procedures, definition of tables including column names, data types, and so forth.
  - Configuration of result set handling: Concurrency options, paging support, customize element names for the XML that contains results, and so forth.
  - The names of generated methods can be customized.
  - Switch on events, statistics, and logging.
  - Some configurations can be overridden by modifier builders: Data Source, Statement, and Transformation.
- SQL Data Source: This builder accesses the JNDI resident Data Source and uses it as a JDBC™ connection factory. It provides a common place to define the data source, then reuse this same data source in other builders.
- SQL Statement: This builder creates JDBC statements that are ready for execution. They can be Prepared Statements (SQL statements) or Callable Statements (for calling stored procedures in the database). The main features of the builder are:
  - Configuration for special handling of parameters and result sets, more advanced and detailed than in the SQL Call builder.
  - Definition of result set performance parameters.
  - Definition of execution throttles.
  - Switch on events, statistics, and logging.

  It is a modifier builder that can override the SQL statement configuration of the SQL call builder when more flexibility is required. SQL statements can be invoked directly from Java code or action lists because they represent ready-for-execution JDBC statements.

- SQL Transaction: Top-level builder for creating a list of Statements that are ready for execution as a transaction. It does not define a transaction by itself, but it defines which SQL Statement builders can participate inside of one transaction. The boundaries of the transaction and the execution of the statements must be done programatically in Java code or action lists.
- SQL Transform: These builders allow you to customize the transformation that turns SQL result sets into XML variables.
  - To XML: Transformation from SQL result set into XML variable. It can be used to override existing transformation in the SQL Call builders. It provides a more advanced and configurable transformation and it can be reused by different builders.
  - To XML Schema: Generates XML schemas from the execution of SQL statements.

The following sections explain in detail some functionality of the builders within the ITSO Renovations application.

5.2.2 Design for ITSO Renovations - Customer and order information

SQL Data Services are used by ITSO Renovations to access data about customers and orders saved in a relational database. This section describes the design of the required models, relationships between them, and how they implement the Application Data Service Interface. Our example is implemented using a DB2 database but it does not have any specific SQL statement for this database, so other relational databases, like Cloudscape, Oracle, or similar, can be used.

Following the relational model defined in 4.3.2, “Architecture and design” on page 76, create models for accessing data in the following domains:

- Customer: Access information about customers following the interface of customer information.
- Order: Access information about customer orders following the interface of order information.
- Product: Access information about available products, but without details that will be accessed by the Domino and Web Services Data Services.
- ID: Access the ID table that provides help to get a new unique identifier for new orders and customers.

All data is kept in the database following the data model described in the previous chapter. The goal is to design a SQL Data Provider Service that accesses the data of the previous domains and is linked with the service definitions and operations defined in the Application Data Service Interface. Figure 5-14 shows the initial design for SQL Data Services.

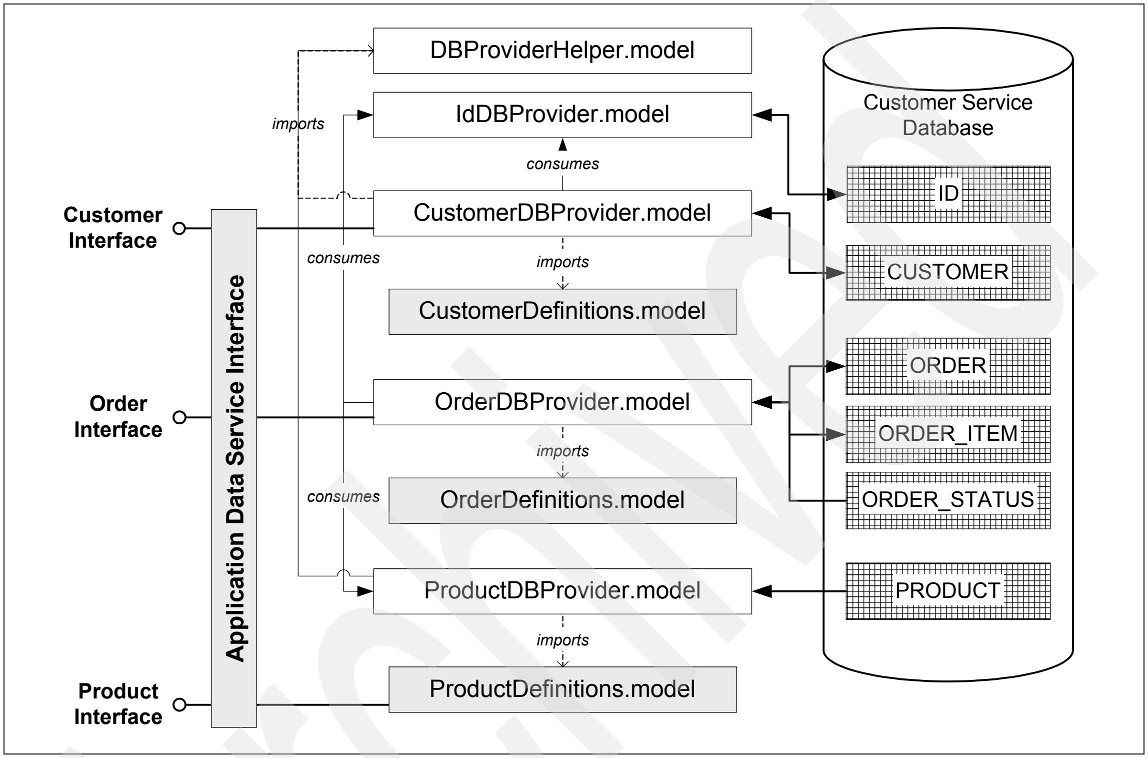


Figure 5-14 Design SQL Data Services

This design will be updated during the implementation to cover special treatment of data (for example, CLOB columns in database), implementation of transactions, and some other special custom behavior to fulfill the requirements of the application.

It is a good practice to provide a high-level design of the Data Service at this stage. It will be extended during the implementation with all the specific WebSphere Portlet Factory functionality. The next section covers the details for implementing the service and operations.

5.2.3 Implementing the service and operations

During the implementation of SQL Data Services it is important to identify which SQL builders will be necessary. It is a best practice to start using top-level builders like SQL Call, then use modifier builders in cases when special functionality is required, such as:

- Custom data column access, for example, working with binary data (BLOB columns in database) or, in generic terms, the non standard data types that require specific casting, even in some cases specific to a database provider.
- Implementation of transactions that involve the execution of more than one SQL statement, for example, several insert/update/delete operations in one transaction.
- To add pre and post processing of data when executing a SQL statement. This is the typical case when a customized data transformation is required or some additional data processing is necessary before the service operation returns results. This requires wrapping the execution of the SQL builder within a Linked Java Object or an Action List.
- When using modifier builders (for example, a SQL statement) it is necessary to initialize the inputs manually and perform the execution of the builder programatically. In this case an Action List can be used, or for more complex processing, a Linked Java Object.

From a high-level point of view, the tasks performed to implement SQL Data Services are:

1. Create WebSphere Portlet Factory models for the SQL Data Service. One per data domain provides a clear organization of the models in your application.
2. Import definition builders with the data structures. Add Service Consumers to access data required by the implementation of the SQL operations.
3. Add the service definition and operations from the models where they were defined: XML access file Data Provider.
4. Add SQL Call builders for the implementation of SQL operations and set them as Action to Call in the service operations.
5. Review the implementation and add Linked Java Object method calls and Action List builders in these operations that require additional data processing. Define data transformations to match the inputs and results schemas of the interfaces using the Transformation builder or programatically using the IXml API.
6. Determine whether customized data column access is required. (For example, this will be required if you need to work with binary columns or data types requiring special casting mechanisms.)

7. Implement transactions involving several SQL statement executions.

To implement the SQL Data Service in ITSO Renovations as we did in our lab, perform the following steps:

1. Create DB Service Provider models. You can create an empty model or get a basic set of builders by selecting the Database Service provider model type. In our example, we create an empty model to illustrate the creation of all necessary builders. Using the details provided in Table 5-3, create the DB Provider models under the folder \WEB-INF\models\redbook\cs\data\db.

Table 5-3 SQL Data Provider models

Data domain	Model
Customer	CustomerDBProvider
Order	OrderDBProvider
Product	ProductDBProvider
Id	IdDBProvider

2. Import the models and add the related Service Consumers as identified in Table 5-4.

Table 5-4 Imported and Service Consumer models

Model	Imported model	Service Consumer (builder name)
CustomerDBProvider	data.def.CustomerDefinitions data.db.DBProviderHelper	data.db.IdDBProvider (ids)
OrderDBProvider	data.def.OrderDefinitions	data.db.IdDBProvider (ids)
ProductDBProvider	data.def.ProductDefinitions data.db.DBProviderHelper	

   The imported models contain the schema definitions of the interface. The Service Consumer builders access data of another data domain (for example, the Customer model must get the next available ID from the IdDBProvider model). It is possible to add a Service Consumer of another type (for example, File or Web Service) if the scenario requires it; in our example all DB Providers are using other DB Providers.

3. Add the service definition and operations that the DB Data Service must implement. The interface was defined previously, during the creation of the XML access file Data provider. There are several ways to bring the interface into the model: copy or re-type the builders, use a profiled imported model, add a custom builder, and so forth. The most convenient and simple way is to

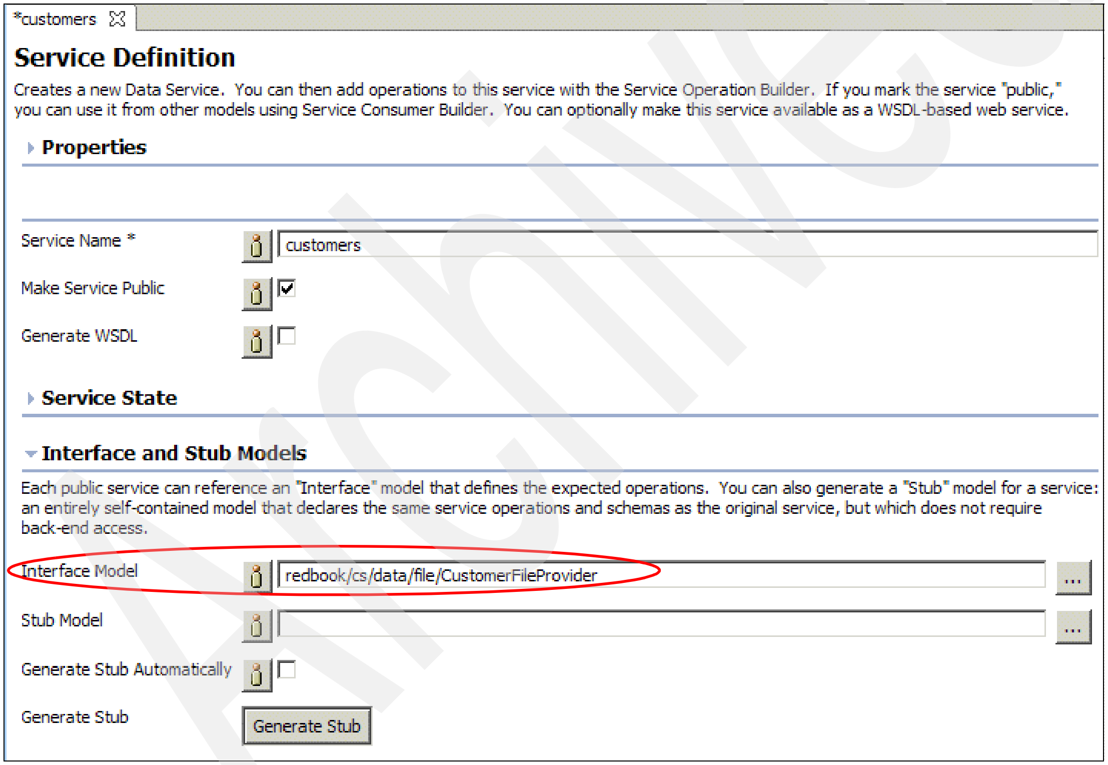
copy and paste the builders into the DB Service models. This is the approach we followed in ITSO Renovations:

a. Open the File Provider model, select the Service Definition and all Service Operations.

b. Copy the selection and paste it into the DB Provider model.

c. After this operation you will receive several errors that the Action to Call is not found. This will be fixed when you add the real SQL builder to be invoked when executing the operation.

d. To validate the implementation against the service interface, modify the Service Definition in the DB Provider model to use the interface of the File Provider model. This action will ensure that all the operations of the service are implementing the expected interface.



Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Service Name *: customers

Make Service Public: ☑

Generate WSDL: ☐

Each public service can reference an "Interface" model that defines the expected operations. You can also generate a "Stub" model for a service: an entirely self-contained model that declares the same service operations and schemas as the original service, but which does not require back-end access.

Interface Model: redbook/cs/data/file/CustomerFileProvider

Stub Model:

Generate Stub Automatically: ☐

Generate Stub: Generate Stub

Figure 5-15 Service Definition builder: Set Interface Model

e. Repeat the previous steps for each DB Provider model using the specifications from Table 5-5.

Table 5-5 Copy and set interfaces for DB Provider Models

Copy from (set as interface to implement)	Copy to (DB Provider model)
data.file.CustomerFileProvider	data.db.CustomerDBProvider
data.file.OrderFileProvider	data.db.OrderDBProvider
data.fileProductFileProvider	data.db.ProductDBProvider

Create the new IdDBProvider.model that will provide access to the ID table to get the next available identifier for new orders and customers. In this case you create a new Service Definition that will be consumed by the Customer and Order DB Provider models and that is not part of the Application Data Service interface. Create the Service Definition and Operation builders following the inputs from Table 5-6 and Table 5-7.

Table 5-6 Id Service Definition

Operation name	Inputs	Results	Description
getNextId	TABLE_NAME ID_SIZE	Next available ID as String	Returns the next ID as String for the Table given as an argument and formatted with leading zeros until reaching the size provided as the argument

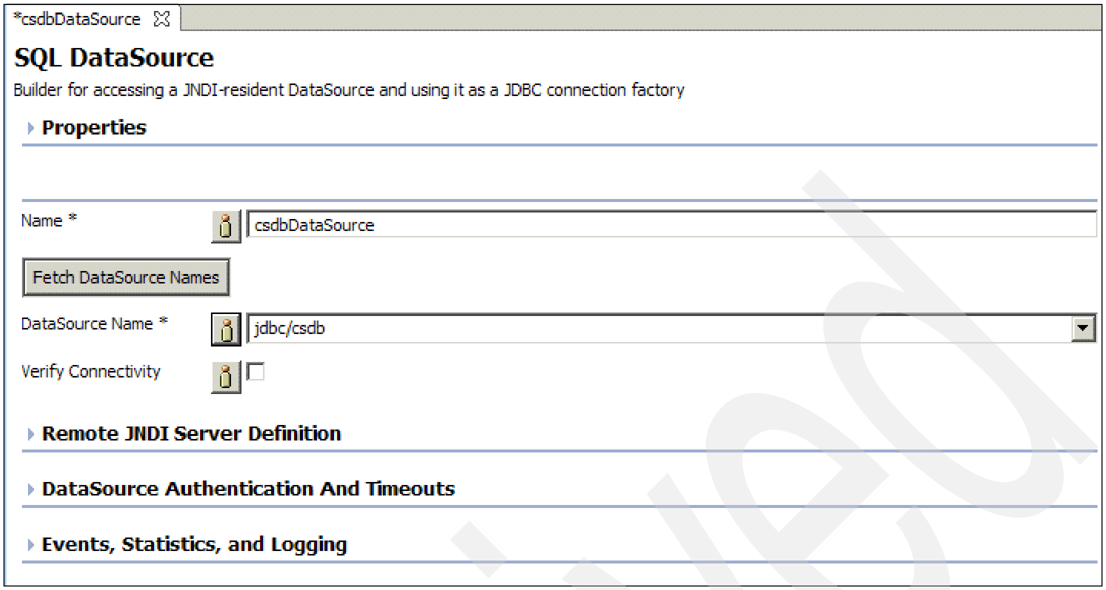
Table 5-7 Operations for Data Service: ids

<table>
<tr><th>Operation</th><th>Inputs schema</th><th>Results schema</th></tr>
<tr><td>getNextId</td><td>Automatic</td><td>Automatic</td></tr>
<tr><td colspan="3">Define an Action List: getNextIdAL (TABLE_NAME: String, ID_SIZE: int) return String

This is the Action to Call by the previous operation. Notice that the schemas are generated automatically from the interface of the Action List.</td></tr>
</table>

Use the implementation of the service provided as part of the final application. This is not covered in detail here, but it is a simple exercise that can help you to understand the implementation of the other services.

4. Create the SQL Data Source that will be used by the rest of SQL builders (Figure 5-16.


*csdbDataSource

SQL DataSource

Builder for accessing a JNDI-resident DataSource and using it as a JDBC connection factory

Properties

Name * csdbDataSource

Fetch DataSource Names

DataSource Name * jdbc/csdb

Verify Connectivity □

Remote JNDI Server Definition

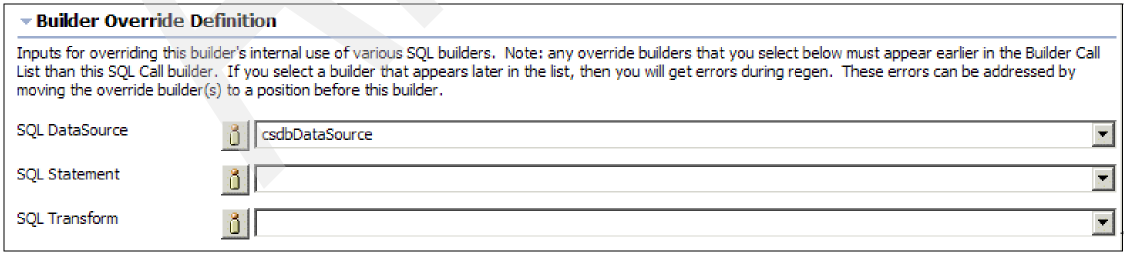
DataSource Authentication And Timeouts

Events, Statistics, and Logging

Figure 5-16 SQL DataSource builder

During the creation of the SQL Data Source you provide the JNDI name of the Data Source registered in your application server. By default it is assumed that this is the same server where the web application is running. If this is not the case you can define a remote JNDI server. The data source can already contain authentication information for the back-end system; if this is not the case the user name and password can be defined in the builder under the DataSource Authentication section.

5. Add SQL Call builders with the statements to execute. Override the SQL Data Source in the Builder Override Definition section to use the previously defined SQL DataSource builder (Figure 5-17). It is possible to provide the JNDI name in the SQL Call builder but it is more maintainable to define it once and reuse it in all SQL builders.


Builder Override Definition

Inputs for overriding this builder's internal use of various SQL builders. Note: any override builders that you select below must appear earlier in the Builder Call List than this SQL Call builder. If you select a builder that appears later in the list, then you will get errors during regen. These errors can be addressed by moving the override builder(s) to a position before this builder.

SQL DataSource csdbDataSource

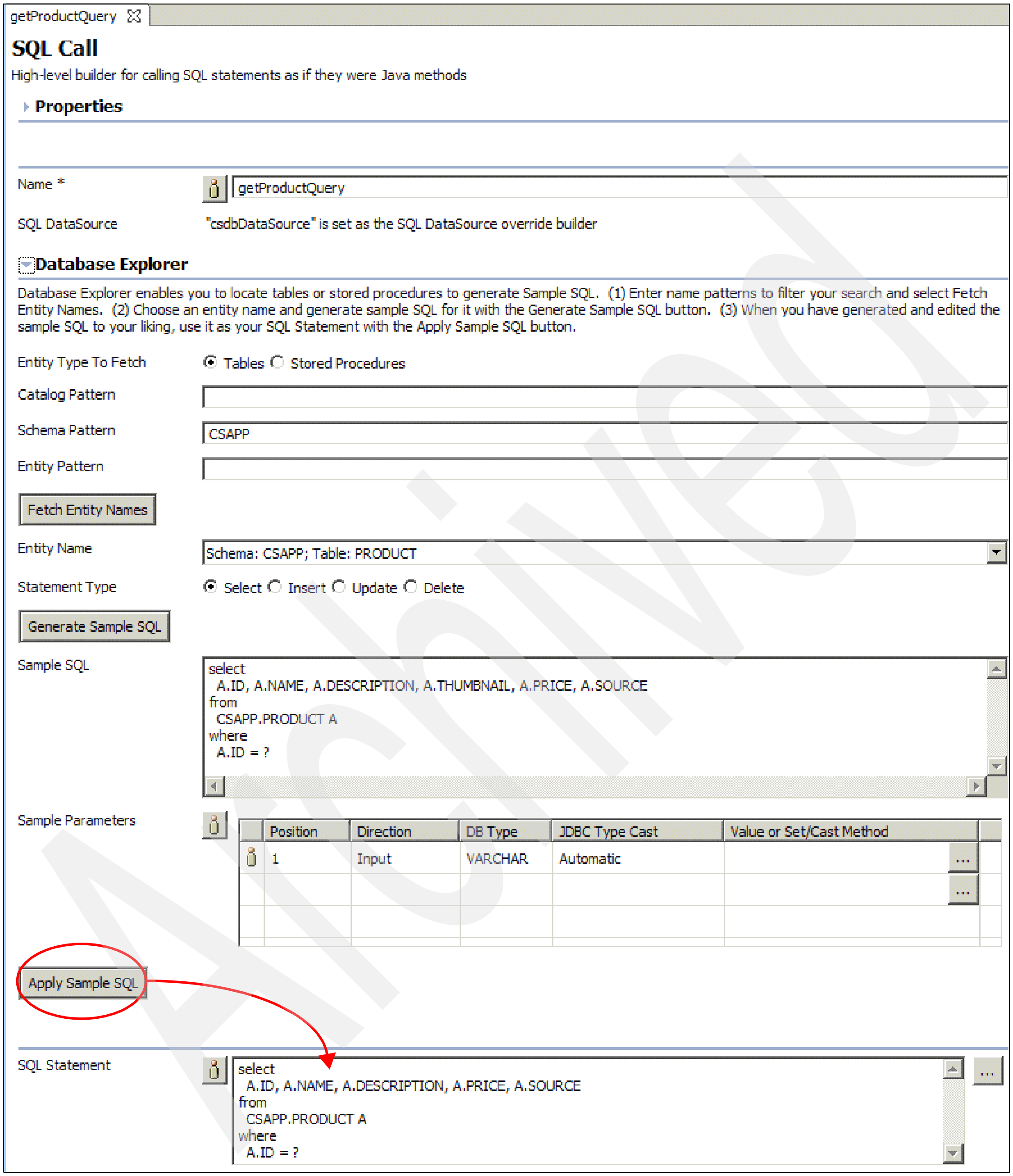
SQL Statement

SQL Transform

Figure 5-17 SQL Call builder: Override definitions

Provide a name for the SQL Call builder. Do not use the same name used in the service operation because you could have some conflicts with the generated resources. The builder contains a Database Explorer to help you build the SQL statement that will be executed:

- List entities (tables or stored procedures) from the database. You can filter the result using schemas and catalog patterns.
- Generate a sample SQL statement: Select, insert, update, delete. You can modify the statement or provide one of your own. The syntax is standard SQL. Parameter use is the same as when creating Java Prepared SQL statements: each parameter is represented with ? as a place holder.



getProductQuery ☒

SQL Call

High-level builder for calling SQL statements as if they were Java methods

▸ **Properties**

Name * getProductQuery

SQL DataSource "csdbDataSource" is set as the SQL DataSource override builder

Database Explorer

Database Explorer enables you to locate tables or stored procedures to generate Sample SQL. (1) Enter name patterns to filter your search and select Fetch Entity Names. (2) Choose an entity name and generate sample SQL for it with the Generate Sample SQL button. (3) When you have generated and edited the sample SQL to your liking, use it as your SQL Statement with the Apply Sample SQL button.

Entity Type To Fetch ● Tables ○ Stored Procedures

Catalog Pattern

Schema Pattern CSAPP

Entity Pattern

Entity Name Schema: CSAPP; Table: PRODUCT

Statement Type ● Select ○ Insert ○ Update ○ Delete

Sample SQL

```
select
  A.ID, A.NAME, A.DESCRIPTION, A.THUMBNAIL, A.PRICE, A.SOURCE
from
  CSAPP.PRODUCT A
where
  A.ID = ?
```

Sample Parameters

Position	Direction	DB Type	JDBC Type Cast	Value or Set/Cast Method
1	Input	VARCHAR	Automatic	...
				...

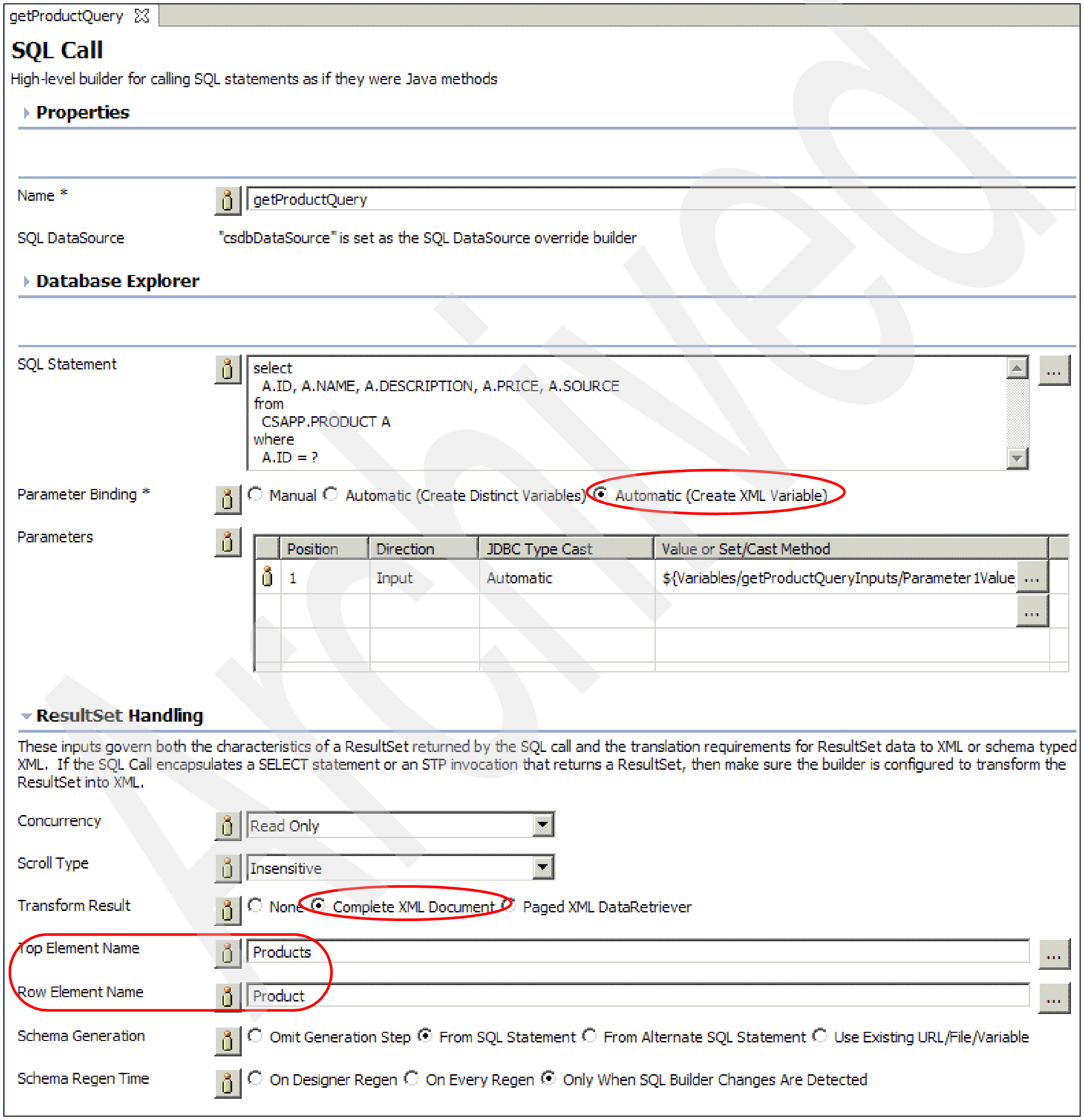
SQL Statement

```
select
  A.ID, A.NAME, A.DESCRIPTION, A.PRICE, A.SOURCE
from
  CSAPP.PRODUCT A
where
  A.ID = ?
```

Figure 5-18 SQL Call builder: Database Explorer makes it easy to build the SQL statement

Apply the sample SQL statement and it will be copied into the SQL Statement input builder together with the parameters. You can modify the statement and parameters to adjust them to your requirements. This will be the actual statement that will be executed by the builder.

The SQL Call builder offers several configuration options to define input parameters and handle the result set (Figure 5-19).



getProductQuery

SQL Call

High-level builder for calling SQL statements as if they were Java methods

Properties

Name * getProductQuery

SQL DataSource "csdbDataSource" is set as the SQL DataSource override builder

Database Explorer

SQL Statement

```
select
  A.ID, A.NAME, A.DESCRIPTION, A.PRICE, A.SOURCE
from
  CSAPP.PRODUCT A
where
  A.ID = ?
```

Parameter Binding * ○ Manual ○ Automatic (Create Distinct Variables) ● Automatic (Create XML Variable)

Parameters

Position	Direction	JDBC Type Cast	Value or Set/Cast Method
1	Input	Automatic	${Variables/getProductQueryInputs/Parameter1Value

ResultSet Handling

These inputs govern both the characteristics of a ResultSet returned by the SQL call and the translation requirements for ResultSet data to XML or schema typed XML. If the SQL Call encapsulates a SELECT statement or an STP invocation that returns a ResultSet, then make sure the builder is configured to transform the ResultSet into XML.

Concurrency: Read Only

Scroll Type: Insensitive

Transform Result ○ None ● Complete XML Document ○ Paged XML DataRetriever

Top Element Name: Products

Row Element Name: Product

Schema Generation ○ Omit Generation Step ● From SQL Statement ○ From Alternate SQL Statement ○ Use Existing URL/File/Variable

Schema Regen Time ○ On Designer Regen ○ On Every Regen ● Only When SQL Builder Changes Are Detected

Figure 5-19 SQL Call builder: Statement, parameters and result set handling

Brief descriptions of the main builder inputs follow; consult the WebSphere Portlet Factory documentation for complete details. The main builder inputs are:

- SQL Statement: This is the final statement that will be executed in the database.
- Parameters: Represented with ? in the SQL statement and indexed by position starting with 1. Each time a new parameter is included in the statement, a new row is added to the Parameters table. The parameter binding defines how to obtain the value:
  - Manual: You provide the binding between an existing variable and the parameter.
  - Automatic (Create Distinct Variables): Automatically creates a variable for each parameter.
  - Automatic (Create XML Variable): Automatically creates one XML variable with elements for each parameter.

  By default, each parameter is mapped to a variable and the JDBC Type Cast is automatic. In some special cases you can provide your own method to set the value in the parameter. We cover this case in detail in 5.2.5, "Customize data column access in SQL builders: Working with binary data" on page 145.
- ResultSet Handling: There are several configuration options to define the characteristics of the result set returned by the SQL call and the translation requirements for result set data to XML:
  - Concurrency: The concurrency mode for the result set.
  - Scroll type: Type of result set.
  - Transform Result: Type of transform result to create when the query is executed:

    Complete XML Document means that the complete result set is transformed into an XML Document.

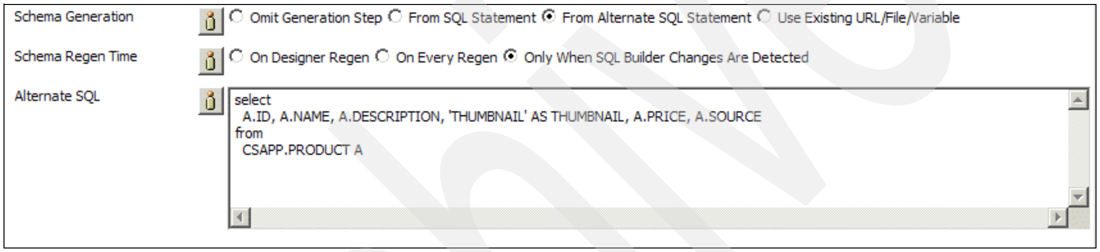
    Paged XML DataRetriever means that it is possible to retrieve the results in pages and control this behavior. This option is especially useful when a large amount of data is returned.
  - Top Element Name and Row Element Name: you can customize the names of the root and the element that represent each row in the XML document. If no names are provided, the builder uses the default names: RowSet for the root and Row for each row element. These options are only available if a Transform Result is defined.

- Schema Generation: How to generate the XML schema for the results of the SQL operation. There are four possibilities:

  Omit Generation Step: Does not generate the schema automatically. This is the case when transformation of the result set into an XML document is not required.

  From SQL Statement: This is the default option. It uses the SQL statement from the input of the builder to generate the schema, the one that is actually executed during execution of the operation in runtime. If the previous top and row element names are provided, this is reflected in the generated schema.

  From Alternate SQL Statement: you can provide an additional SQL statement only for generation of the schema. This is useful when the builder cannot generate the schema automatically from the statement provided in the builder. This is the typical case when the statement is too complex and the builder cannot retrieve the metadata properly.



Schema Generation ○ Omit Generation Step ○ From SQL Statement ● From Alternate SQL Statement ○ Use Existing URL/File/Variable

Schema Regen Time ○ On Designer Regen ○ On Every Regen ● Only When SQL Builder Changes Are Detected

Alternate SQL

```
select
  A.ID, A.NAME, A.DESCRIPTION, 'THUMBNAIL' AS THUMBNAIL, A.PRICE, A.SOURCE
from
  CSAPP.PRODUCT A
```

Figure 5-20 SQL Call Builder: generation of schema from an alternate SQL statement

  For example, when retrieving data from a table with a BLOB column, the builder cannot retrieve the data type automatically, so you need to provide an alternate statement to generate a schema and force specific columns with the desired data types. In the previous example, the THUMBNAIL column is a BLOB, but we want to have an element of type string to return the path of the file with the binary content.

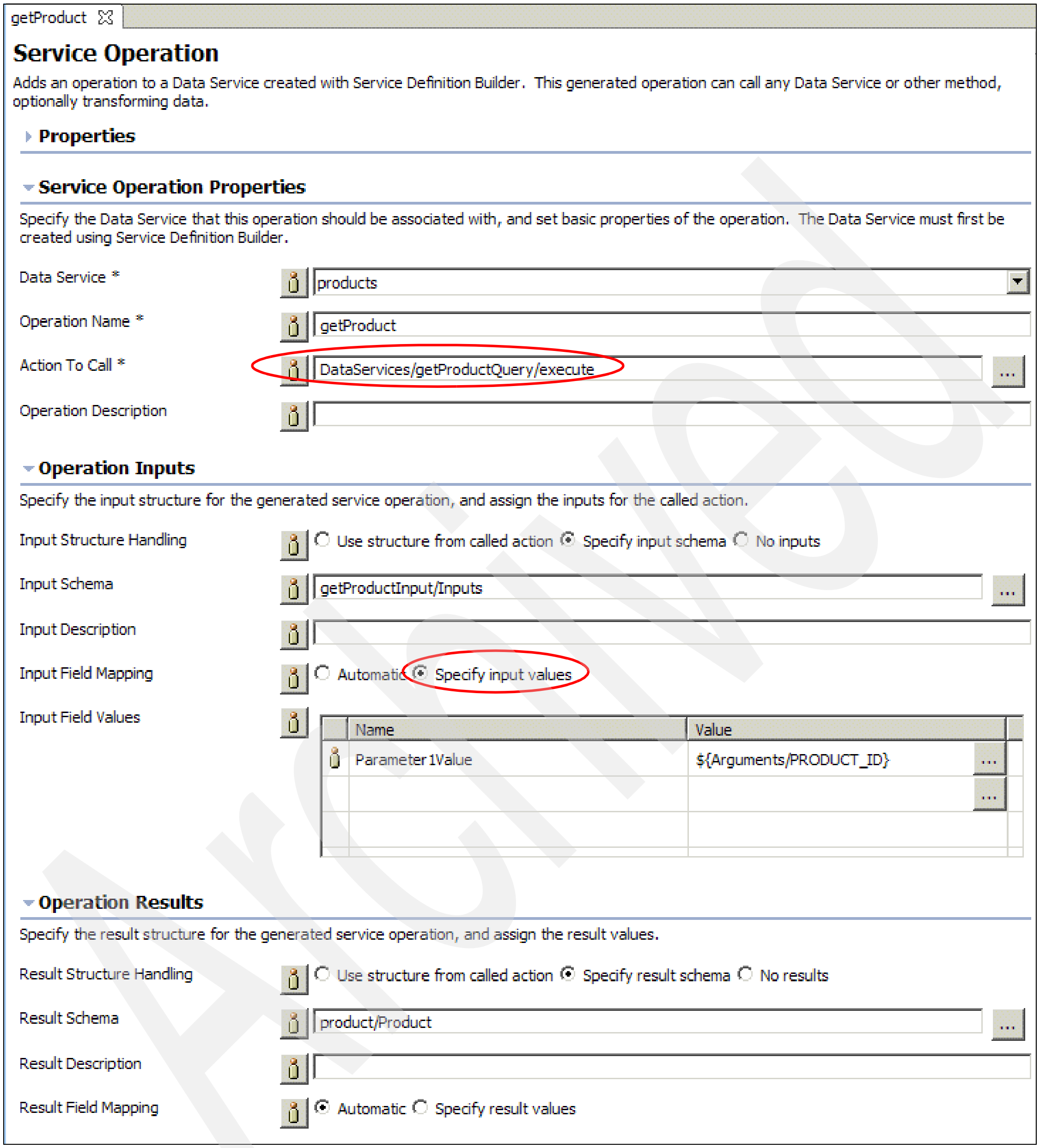
  Use Existing URL/File/Variable: You manually provide the schema to use, from a URL, local file, or value of a variable.

- Regen Time: This option defines when the schema is regenerated. By default is only when SQL Builder changes are detected, but you can set to generate it on every regeneration of the model or only when it happens in the designer. This option is only possible when the schema generation is from the SQL Statement.

We provide one SQL Call as example; you can implement the rest based on the requirements of the operation and expected structure for input/results. The name of the builder should be different from the name of the Service

Operation. Do not use the same name in two or more builders to avoid conflicts with the generated methods, resources, and so forth.

Once all SQL Call builders are created, set them as the Action To Call in each Service Operation. It might be necessary to specify the input and result fields mapping between the action to call and the service operation. The automatic field mapping only works if the names of the fields are identical in the SQL Call and the Service Operation schemas.



getProduct

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

Properties

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service *	products
Operation Name *	getProduct
Action To Call *	DataServices/getProductQuery/execute
Operation Description	

Operation Inputs

Specify the input structure for the generated service operation, and assign the inputs for the called action.

Input Structure Handling	○ Use structure from called action ● Specify input schema ○ No inputs
Input Schema	getProductInput/Inputs
Input Description	
Input Field Mapping	○ Automatic ● Specify input values
Input Field Values	

Name	Value
Parameter1Value	${Arguments/PRODUCT_ID}

Operation Results

Specify the result structure for the generated service operation, and assign the result values.

Result Structure Handling	○ Use structure from called action ● Specify result schema ○ No results
Result Schema	product/Product
Result Description	
Result Field Mapping	● Automatic ○ Specify result values

Figure 5-21 Service Operation builder: action to call is a SQL Call builder

Set all actions to call using the details provided in the following three tables.

Table 5-8 Customers service definition: Actions to call by Service Operation builders

Service operation	Action to call
getCustomers	DataServices/getCustomersQuery/execute
getCustomersList	DataServices/getCustomersListQuery/execute
findCustomers	findCustomersAL (Using an Action List for special functionality)
getCustomer	getCustomerAL (Using an Action List for special functionality)
createCustomer	DataServices/createCustomerInsert/execute
updateCustomer	DataServices/updateCustomerSql/execute
validateCustomerAccount	validateCustomerAccountAL (Using an Action List for special functionality)
getNextCustomerId	DataServices/ids/getNextId (Notice that it is using the Service Consumer ids)

Table 5-9 Orders service definition: Actions to call by Service Operation builders

Service operation	Action to call
getOrders	DataServices/getOrdersQuery/execute
getOrdersList	DataServices/getOrdersListQuery/execute
getCustomerOrders	DataServices/getCustomerOrdersQuery/execute
getCustomerOrdersList	DataServices/getCustomerOrdersListQuery/execute
getOrder	DataServices/getOrderQuery/execute
getOrderItems	getOrderItemsAL (Using an Action List for special transformation of results)
createOrder	DataServices/createOrderInsert/execute
createOrderWithItems	orderDBProviderHelper.createOrderWithItems (Using a LJO method to control the transaction)
createOrderItem	orderDBProviderHelper.createOrderItem (Using a LJO method for special functionality)
updateOrder	DataServices/updateOrderSql/execute
updateOrderItem	DataServices/updateOrderItemSql/execute

Service operation	Action to call
updateOrderItemsList	orderDBProviderHelper.updateOrderItemsList (Using a LJO method to control the transaction)
getOrderStatusList	DataServices/getOrderStatusListQuery/execute
getNextOrderId	DataServices/ids/getNextId (Notice that it is using the Service Consumer ids)

Table 5-10 Products service definition: Actions to call by Service Operation builders

Service operation	Action to call
getProducts	DataServices/getProductsQuery/execute
getProduct	DataServices/getProductQuery/execute

6. Some operations require additional data processing, pre or post the execution of the operation. In these situations, the execution of the SQL Call builder will not be done directly unless else a new Action List is provided to add the required functionality:

   – customers.findCustomers

   – customers.validateCustomerAccount

   – orders.createOrderItem

   Notice the previous cases we have in ITSO Renovations and how the SQL Call builder is invoked programatically. Details about how to invoke the SQL builders programatically are provided in a later section.

   There are some cases where the mapping of top and row elements is not enough to match the target schema. In this case you need to provide a data transformation using the Transformation builder, or IXml API for more complex transformations. ITSO Renovations requires special data transformations using IXml API in the following case:

   – orders.getOrderItems

   See 5.2.4, “Data transformations: Use of IXml API” on page 140 for details about implementing complex transformations using the IXml API.

7. Some scenarios require additional customized data column access. This is the case of images (binary data) in the ITSO Renovations application. In order to apply custom data transformations to the result set it is necessary to create an additional SQL Statement builder and override it in the SQL Call. We have following cases in our application:

   – customers.getCustomers

- customers.getCustomer
- products.getProducts

  Section 5.2.5, “Customize data column access in SQL builders: Working with binary data” on page 145 provides detailed information about how to access binary data in these specific cases. It describes the implementation pattern, required builders, and the code that must be implemented.

8. SQL Call builders are simple executions of one SQL statement in one transaction. There are some scenarios where it is required to execute several statements within one transaction. In this case the SQL Call builder cannot be used and separate SQL Statement builders must be created. The SQL Transaction builder is used to define which statements can take part in the transaction. We have several of these cases in ITSO Renovations:

   - orders.createOrderWithItems
   - orders.updateOrderItemsList

   See 5.2.6, “Implementation of transactions” on page 161 for details about how to implement these transactions that involve more than one SQL statement.

Code generated by SQL builders

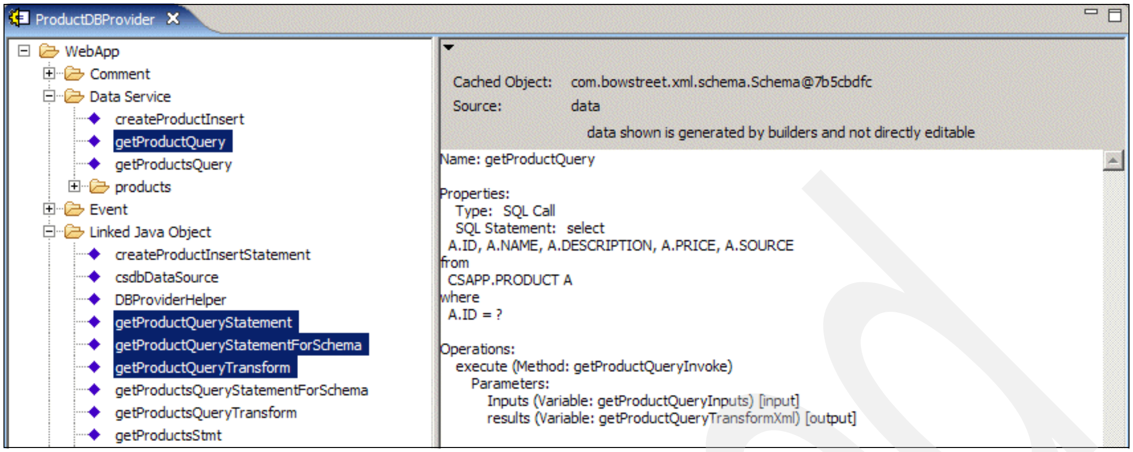
SQL builders, like other WebSphere Portlet Factory builders, generate code and some other resources at execution time. The designer offers the possibility to visualize what is generated using the WebApp Tree view of the model. It is interesting to walk through the helper LJOs, methods, and schemas that are generated. They can be accessed programatically in these cases:

- Java code using the WebAppAccess object
- Action List or Method builders
- Reference to generated structures

This section shows what is generated by the two main builders: SQL Call builder and SQL Statement builder.

SQL Call builder

The builder metadata appears as a child of the Data Service leaf in the WebApp tree (Figure 5-22). In the right window you see a short summary with the SQL statement, the generated operation with parameters, and the internal variables that are used to keep the data. The builder uses some internal Linked Java Objects to work with the Statement and perform the result set to XML transformation.

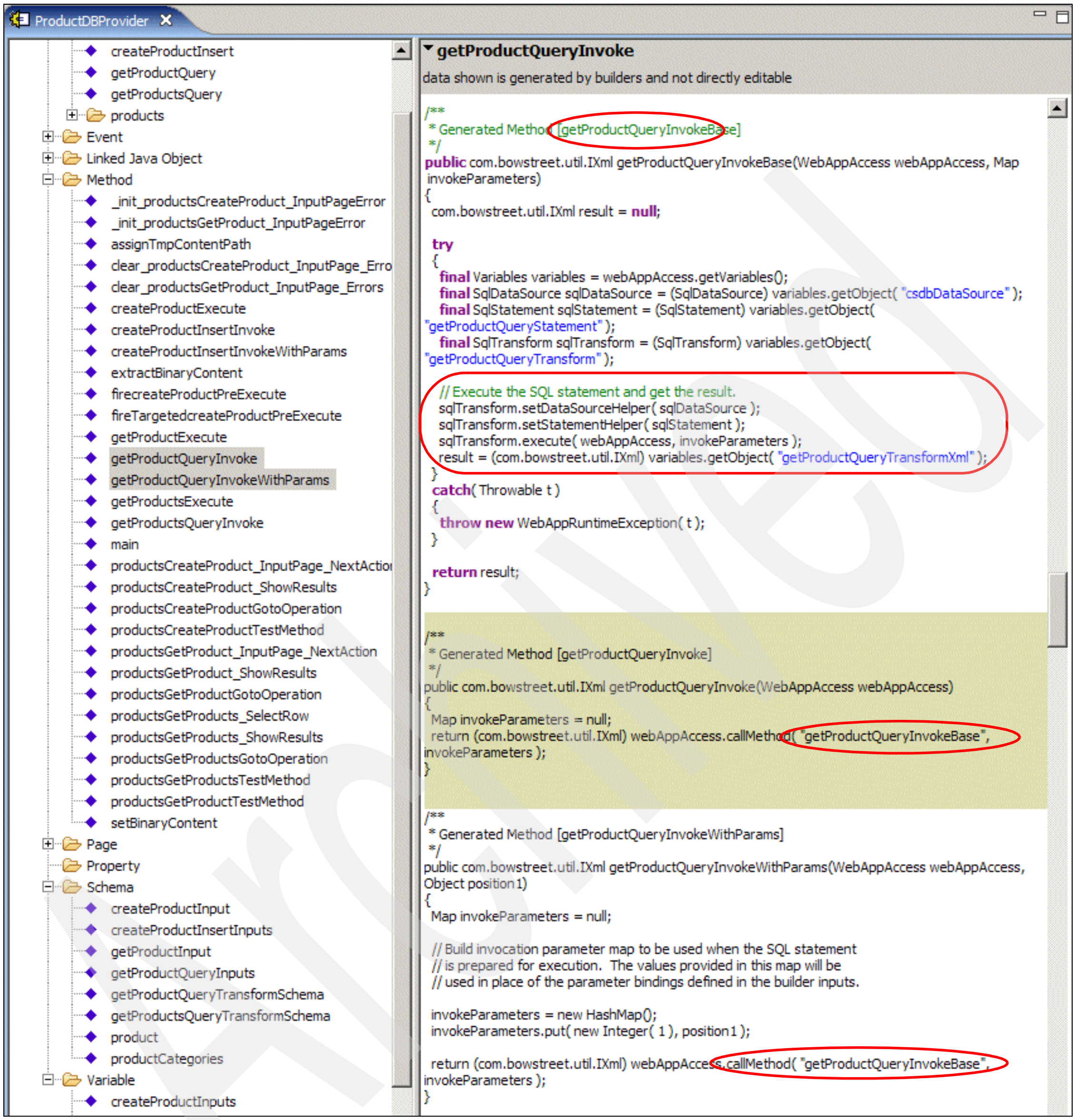


```
Cached Object:   com.bowstreet.xml.schema.Schema@7b5cbdfc
Source:          data
                   data shown is generated by builders and not directly editable
Name: getProductQuery

Properties:
  Type:  SQL Call
  SQL Statement:  select
 A.ID, A.NAME, A.DESCRIPTION, A.PRICE, A.SOURCE
from
 CSAPP.PRODUCT A
where
 A.ID = ?

Operations:
  execute (Method: getProductQueryInvoke)
    Parameters:
      Inputs (Variable: getProductQueryInputs) [input]
      results (Variable: getProductQueryTransformXml) [output]
```

Figure 5-22 SQL Call builder: Generated Data Service and internal LJO

Two methods are generated to execute the SQL call (Figure 5-23). They can be programatically invoked using the callMethod() from the WebAppAccess object.

The generated code (right window) contains a base method that is invoked by either of the methods <builder_name>Invoke() or <builder_name>InvokeWithParams(). The difference between these methods is the use of parameters. If your SQL statement contains parameters, use InvokeWithParams, otherwise, use null values.

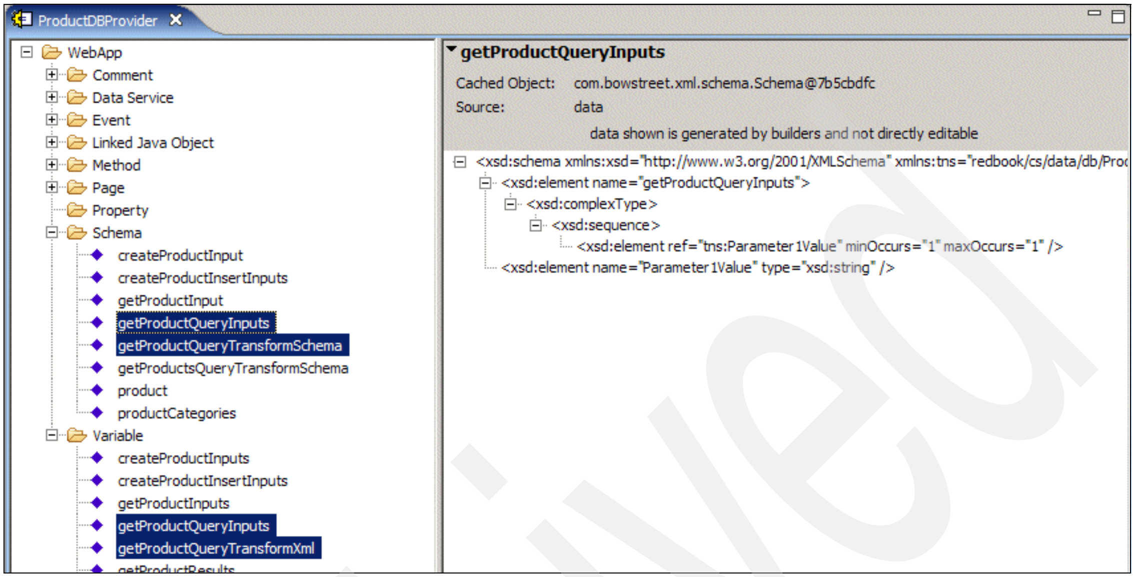

ProductDBProvider
createProductInsert
getProductQuery
getProductsQuery
products
Event
Linked Java Object
Method
_init_productsCreateProduct_InputPageError
_init_productsGetProduct_InputPageError
assignTmpContentPath
clear_productsCreateProduct_InputPage_Erro
clear_productsGetProduct_InputPage_Errors
createProductExecute
createProductInsertInvoke
createProductInsertInvokeWithParams
extractBinaryContent
firecreateProductPreExecute
fireTargetedcreateProductPreExecute
getProductExecute
getProductQueryInvoke
getProductQueryInvokeWithParams
getProductsExecute
getProductsQueryInvoke
main
productsCreateProduct_InputPage_NextActio
productsCreateProduct_ShowResults
productsCreateProductGotoOperation
productsCreateProductTestMethod
productsGetProduct_InputPage_NextAction
productsGetProduct_ShowResults
productsGetProductGotoOperation
productsGetProducts_SelectRow
productsGetProducts_ShowResults
productsGetProductsGotoOperation
productsGetProductsTestMethod
productsGetProductTestMethod
setBinaryContent
Page
Property
Schema
createProductInput
createProductInsertInputs
getProductInput
getProductQueryInputs
getProductQueryTransformSchema
getProductsQueryTransformSchema
product
productCategories
Variable
createProductInputs
getProductQueryInvoke

data shown is generated by builders and not directly editable

```
/**
 * Generated Method [getProductQueryInvokeBase]
 */
public com.bowstreet.util.IXml getProductQueryInvokeBase(WebAppAccess webAppAccess, Map
 invokeParameters)
{
 com.bowstreet.util.IXml result = null;

 try
 {
  final Variables variables = webAppAccess.getVariables();
  final SqlDataSource sqlDataSource = (SqlDataSource) variables.getObject( "csdbDataSource" );
  final SqlStatement sqlStatement = (SqlStatement) variables.getObject(
"getProductQueryStatement" );
  final SqlTransform sqlTransform = (SqlTransform) variables.getObject(
"getProductQueryTransform" );

  // Execute the SQL statement and get the result.
  sqlTransform.setDataSourceHelper( sqlDataSource );
  sqlTransform.setStatementHelper( sqlStatement );
  sqlTransform.execute( webAppAccess, invokeParameters );
  result = (com.bowstreet.util.IXml) variables.getObject( "getProductQueryTransformXml" );
 }
 catch( Throwable t )
 {
  throw new WebAppRuntimeException( t );
 }

 return result;
}


/**
 * Generated Method [getProductQueryInvoke]
 */
public com.bowstreet.util.IXml getProductQueryInvoke(WebAppAccess webAppAccess)
{
 Map invokeParameters = null;
 return (com.bowstreet.util.IXml) webAppAccess.callMethod( "getProductQueryInvokeBase",
invokeParameters );
}


/**
 * Generated Method [getProductQueryInvokeWithParams]
 */
public com.bowstreet.util.IXml getProductQueryInvokeWithParams(WebAppAccess webAppAccess,
Object position1)
{
 Map invokeParameters = null;

 // Build invocation parameter map to be used when the SQL statement
 // is prepared for execution.  The values provided in this map will be
 // used in place of the parameter bindings defined in the builder inputs.

 invokeParameters = new HashMap();
 invokeParameters.put( new Integer( 1 ), position1 );

 return (com.bowstreet.util.IXml) webAppAccess.callMethod( "getProductQueryInvokeBase",
invokeParameters );
}
```

Figure 5-23 SQL Call builder: Generated Methods

Finally, the builder generates the schemas for the inputs and results and the variables that contain the data when the statement is executed (Figure 5-24).



getProductQueryInputs

Cached Object: com.bowstreet.xml.schema.Schema@7b5cbdfc

Source: data

data shown is generated by builders and not directly editable

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:tns="redbook/cs/data/db/Proc
  <xsd:element name="getProductQueryInputs">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="tns:Parameter1Value" minOccurs="1" maxOccurs="1" />
  <xsd:element name="Parameter1Value" type="xsd:string" />
```

Figure 5-24 SQL Call builder: generated schemas and variables

- <builder_name>Inputs

  <builder_name>Inputs contains the input value for parameters of the SQL statement. The schema is <builder_name>Inputs.

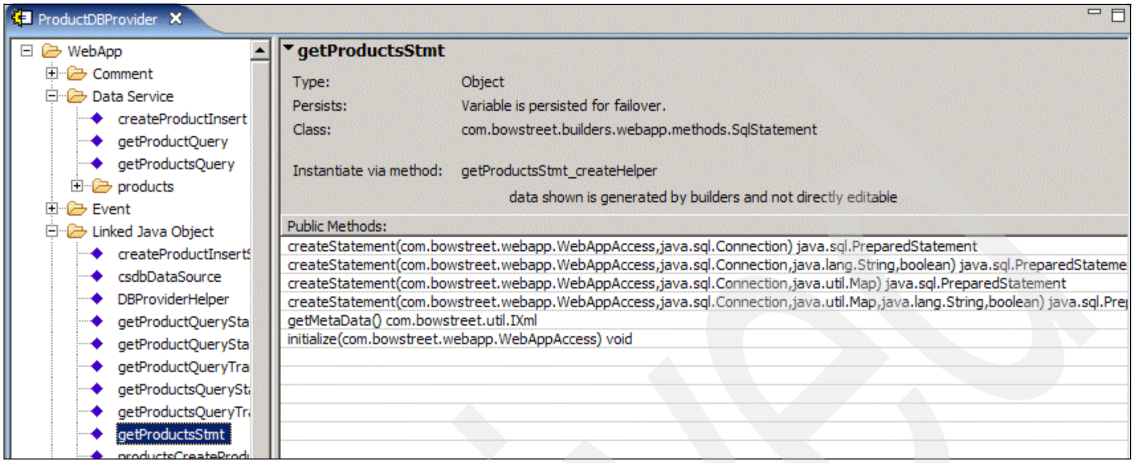
- <builder_name>TransformXml

  <builder_name>TransformXml contains the XML document with the results after the transformation of the result set into the XML. The schema is <builder_name>TransformXml.

The generated code and resources can be different depending on whether the SQL Call contains parameters, results, or both. We have provided an example that covers both cases.

SQL Statement builder

This builder generates only an internal Linked Java Object with convenient methods to create a Prepared SQL Statement (Figure 5-25).



getProductsStmt

Type: Object
Persists: Variable is persisted for failover.
Class: com.bowstreet.builders.webapp.methods.SqlStatement

Instantiate via method: getProductsStmt_createHelper

data shown is generated by builders and not directly editable

Public Methods:

```
createStatement(com.bowstreet.webapp.WebAppAccess,java.sql.Connection) java.sql.PreparedStatement
createStatement(com.bowstreet.webapp.WebAppAccess,java.sql.Connection,java.lang.String,boolean) java.sql.PreparedStateme
createStatement(com.bowstreet.webapp.WebAppAccess,java.sql.Connection,java.util.Map) java.sql.PreparedStatement
createStatement(com.bowstreet.webapp.WebAppAccess,java.sql.Connection,java.util.Map,java.lang.String,boolean) java.sql.Pre
getMetaData() com.bowstreet.util.IXml
initialize(com.bowstreet.webapp.WebAppAccess) void
```

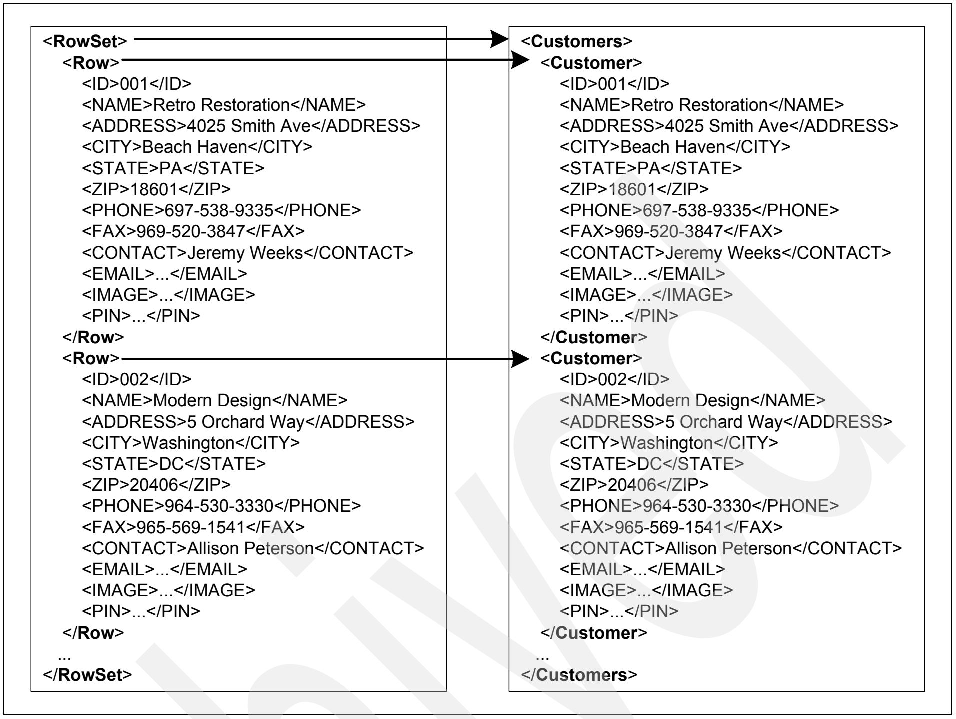
Figure 5-25 SQL Statement builder: Generated LJO

All these methods of the Linked Java Object can be invoked in Action List and Java code to create prepared SQL statements.

Some of the generated methods are used in the following sections to manually implement the functionality of the service operation. In our example they are accessed from LJOs and Action List builders.

5.2.4 Data transformations: Use of IXml API

In most cases it is enough to provide the mapping to the target structure using the result set handling of the SQL Call or SQL Statement builders. This is the case when we transform from one plain data structure to another plain data structure (Figure 5-26).



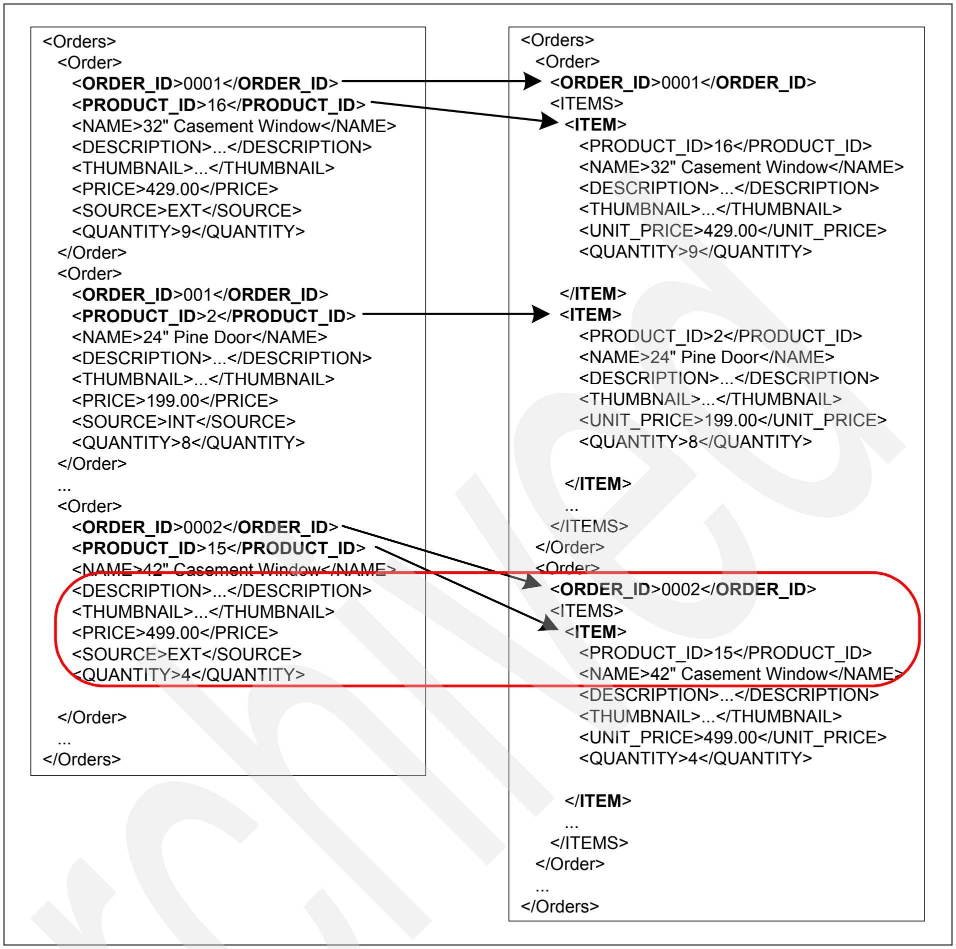
```
<RowSet>
  <Row>
    <ID>001</ID>
    <NAME>Retro Restoration</NAME>
    <ADDRESS>4025 Smith Ave</ADDRESS>
    <CITY>Beach Haven</CITY>
    <STATE>PA</STATE>
    <ZIP>18601</ZIP>
    <PHONE>697-538-9335</PHONE>
    <FAX>969-520-3847</FAX>
    <CONTACT>Jeremy Weeks</CONTACT>
    <EMAIL>...</EMAIL>
    <IMAGE>...</IMAGE>
    <PIN>...</PIN>
  </Row>
  <Row>
    <ID>002</ID>
    <NAME>Modern Design</NAME>
    <ADDRESS>5 Orchard Way</ADDRESS>
    <CITY>Washington</CITY>
    <STATE>DC</STATE>
    <ZIP>20406</ZIP>
    <PHONE>964-530-3330</PHONE>
    <FAX>965-569-1541</FAX>
    <CONTACT>Allison Peterson</CONTACT>
    <EMAIL>...</EMAIL>
    <IMAGE>...</IMAGE>
    <PIN>...</PIN>
  </Row>
  ...
</RowSet>
```

```
<Customers>
  <Customer>
    <ID>001</ID>
    <NAME>Retro Restoration</NAME>
    <ADDRESS>4025 Smith Ave</ADDRESS>
    <CITY>Beach Haven</CITY>
    <STATE>PA</STATE>
    <ZIP>18601</ZIP>
    <PHONE>697-538-9335</PHONE>
    <FAX>969-520-3847</FAX>
    <CONTACT>Jeremy Weeks</CONTACT>
    <EMAIL>...</EMAIL>
    <IMAGE>...</IMAGE>
    <PIN>...</PIN>
  </Customer>
  <Customer>
    <ID>002</ID>
    <NAME>Modern Design</NAME>
    <ADDRESS>5 Orchard Way</ADDRESS>
    <CITY>Washington</CITY>
    <STATE>DC</STATE>
    <ZIP>20406</ZIP>
    <PHONE>964-530-3330</PHONE>
    <FAX>965-569-1541</FAX>
    <CONTACT>Allison Peterson</CONTACT>
    <EMAIL>...</EMAIL>
    <IMAGE>...</IMAGE>
    <PIN>...</PIN>
  </Customer>
  ...
</Customers>
```

Figure 5-26 Plain-to-plain data structure mapping

We are only interested in renaming the top and row element names. In this case the column names of the database must be the same as the element names in the target XML file. If this is not the case, a Transformation builder can be used to apply the corresponding renaming and filtering of necessary elements.

There are some other cases where we transform from a plain to a hierarchical structure. In this case the transformation can be implemented manually within a method of a Linked Java Object. In this scenario, you need to know the IXml API that allows you to access and create XML content.



```
<Orders>
  <Order>
    <ORDER_ID>0001</ORDER_ID>
    <PRODUCT_ID>16</PRODUCT_ID>
    <NAME>32" Casement Window</NAME>
    <DESCRIPTION>...</DESCRIPTION>
    <THUMBNAIL>...</THUMBNAIL>
    <PRICE>429.00</PRICE>
    <SOURCE>EXT</SOURCE>
    <QUANTITY>9</QUANTITY>
  </Order>
  <Order>
    <ORDER_ID>001</ORDER_ID>
    <PRODUCT_ID>2</PRODUCT_ID>
    <NAME>24" Pine Door</NAME>
    <DESCRIPTION>...</DESCRIPTION>
    <THUMBNAIL>...</THUMBNAIL>
    <PRICE>199.00</PRICE>
    <SOURCE>INT</SOURCE>
    <QUANTITY>8</QUANTITY>
  </Order>
  ...
  <Order>
    <ORDER_ID>0002</ORDER_ID>
    <PRODUCT_ID>15</PRODUCT_ID>
    <NAME>42" Casement Window</NAME>
    <DESCRIPTION>...</DESCRIPTION>
    <THUMBNAIL>...</THUMBNAIL>
    <PRICE>499.00</PRICE>
    <SOURCE>EXT</SOURCE>
    <QUANTITY>4</QUANTITY>

  </Order>
  ...
</Orders>
```

```
<Orders>
  <Order>
    <ORDER_ID>0001</ORDER_ID>
    <ITEMS>
      <ITEM>
        <PRODUCT_ID>16</PRODUCT_ID>
        <NAME>32" Casement Window</NAME>
        <DESCRIPTION>...</DESCRIPTION>
        <THUMBNAIL>...</THUMBNAIL>
        <UNIT_PRICE>429.00</UNIT_PRICE>
        <QUANTITY>9</QUANTITY>

     </ITEM>
     <ITEM>
        <PRODUCT_ID>2</PRODUCT_ID>
        <NAME>24" Pine Door</NAME>
        <DESCRIPTION>...</DESCRIPTION>
        <THUMBNAIL>...</THUMBNAIL>
        <UNIT_PRICE>199.00</UNIT_PRICE>
        <QUANTITY>8</QUANTITY>

      </ITEM>
      ...
    </ITEMS>
  </Order>
  <Order>
    <ORDER_ID>0002</ORDER_ID>
    <ITEMS>
      <ITEM>
        <PRODUCT_ID>15</PRODUCT_ID>
        <NAME>42" Casement Window</NAME>
        <DESCRIPTION>...</DESCRIPTION>
        <THUMBNAIL>...</THUMBNAIL>
        <UNIT_PRICE>499.00</UNIT_PRICE>
        <QUANTITY>4</QUANTITY>

      </ITEM>
      ...
    </ITEMS>
  </Order>
  ...
</Orders>
```

Figure 5-27 Example plain-to-hierarchical data structure mapping

ITSO Renovations provides examples of all kind of transformations. Previously we described how to use the result set handling. In 5.3.4, “Data transformations: Use of Transform builders” on page 185 we cover the Transform builder when working with Domino data. In this section we analyze how to implement a Java-based transformation using the IXml API for the hierarchical case.

Example 5-1 shows the code we used to transform the data returned by the SQL Call builder (already with top and row elements renamed) into the hierarchical data structure expected by the service operation (Figure 5-27). In this example, notice the use of IXml API to navigate and work with the XML elements.

Example 5-1 Code for tranformOrderItems() in OrderDBProviderHelper Java class

```
public IXml transformOrderItems(WebAppAccess webAppAccess, String orderID, IXml sqlOrderItems) {
    // create the top level elements for order and items
    IXml resultOrderElement = XmlUtil.create(DataConstants.ELEM_ORDER);
    resultOrderElement.addChildWithText(DataConstants.ELEM_ORDER_ID, orderID);
    IXml resultItemsElement = resultOrderElement.addChildElement(DataConstants.ELEM_ITEMS);

    // get the list of all order items and transformed in the required
    // target structure
    List sqlOrderItemsList = sqlOrderItems.getChildren(DataConstants.ELEM_ORDER);
    for (int i = 0; i < sqlOrderItemsList.size(); i++) {
        IXml sqlOrderItem = (IXml) sqlOrderItemsList.get(i);
        IXml resultItemElement = resultItemsElement.addChildElement(DataConstants.ELEM_ITEM);
        resultItemElement.addChildElement(
            sqlOrderItem.findElement(DataConstants.ELEM_PRODUCT_ID).cloneElement());
        resultItemElement.addChildElement(
            sqlOrderItem.findElement(DataConstants.ELEM_NAME).cloneElement());
        resultItemElement.addChildElement(
            sqlOrderItem.findElement(DataConstants.ELEM_DESCRIPTION).cloneElement());
        resultItemElement.addChildElement(
            sqlOrderItem.findElement("THUMBNAIL").cloneElement());
        resultItemElement.addChildElement(DataConstants.ELEM_UNIT_PRICE).
            copyContent(sqlOrderItem.findElement(DataConstants.ELEM_PRICE));
        resultItemElement.addChildElement(
            sqlOrderItem.findElement(DataConstants.ELEM_QUANTITY).cloneElement());
        resultItemElement.addChildElement(
            sqlOrderItem.findElement(DataConstants.ELEM_SOURCE).cloneElement());
    }
    return resultOrderElement;
}
```

This example shows how to transform the items of one order as required by the application. Figure 5-27 shows the general concept to transform all items for all orders that could be easily implemented with minor changes in the previous code.

All XML content in WebSphere Portlet Factory is represented as an IXml object: documents and elements. Refer to the API for more information about this class. The most useful methods extracted from the API are defined in Table 5-11.

Table 5-11 Useful methods when transforming XML with IXml API

Method summary
void addChildElement(IXml xml) Moves the specified element in the argument from its original parent to become the new last child of this element
IXml addChildElement(java.lang.String name) Creates a new element with a name of the argument.
IXml addChildWithText(java.lang.String name, java.lang.String text) Similar to addChildElement.

Method summary
void addText(java.lang.String value) Creates a text node having the text of the first argument and makes it the new last child of this.
IXml cloneElement() Creates a new unparented node whose attributes are the same as this node's attributes.
void copyContent(IXml xml) Copy all the children of the xml argument (text and elements) and add them as children of this.
IXml findElement(java.lang.String path) Finds the specified element under this using an xpath like notation.
java.util.List getChildren() Returns a list of all of the children elements of this element.
java.util.List getChildren(java.lang.String name) Returns a list of all of the element children of this element whose name matches the specified name.
IXml getFirstChildElement() Returns the first child of this element.
IXml getNextSiblingElement() Returns the next sibling of this element or null if this is the last child of its parent.
java.lang.String getText() Returns the text from the first child text node of this element.
java.lang.String getText(java.lang.String path) Finds the specified element and gets its first text value using an xpath like notation.
void removeChildElement(IXml child) Removes the specified immediate child and makes it parentless.
void removeChildElement(java.lang.String child) Removes the named immediate child from this element and makes the removed child parentless.
void removeChildren() Removes all of the children from this element.
void setName(java.lang.String name) Renames this element with the specified name.
void setText(java.lang.String value) Sets the first text node value for this element.

Another useful class of the XML API is com.bowstreet.util.XmlUtil, which provides methods to parse and create XML documents.

These methods are very useful when implementing XML data transformations, but all methods of IXml API can be used in any context when working with XML content inside of WebSphere Portlet Factory.

Finally, we note some best practices and considerations when working with IXml:

- IXml objects can represent variables in the WepApp tree. For example, in a Service Operation, inputs and results are stored in variables of IXml type. You can set the values directly for the input variable but it is not recommended to modify the results variable for operations accessing the back-end systems. It is possible to do transformations directly in the results variable to improve efficiency, but it should be done carefully because these are the actual results from the back-end operation and some service operations could expect them unchanged.
- Consider the use of clone IXml objects instead of modifying the object directly if you want to keep the original data. For example, when SQL Call builder returns data in a variable, create a new one for the result of the transformation and clone those elements that must be copied to the target or create new ones. If you assign the element, you will have a reference and both variables will share the objects and produce some side effects. Consider the specific application scenario when selecting the best approach.
- Consider memory usage. You can create variables in the model that will be valid during the user session and therefore the memory footprint per session could increase. When possible, use temporary variables in the Java methods that do not keep the data in the session.

5.2.5 Customize data column access in SQL builders: Working with binary data

SQL builders in WebSphere Portlet Factory provide automatic JDBC type cast for parameter and result values for simple data types. There are some cases for which this is not possible because of binary data or database dependent types. The builders support high configurability in data casting and allow the developer to provide customized methods.

Before getting into the details of the implementation, you should understand what is happening with the data when a SQL Call is invoked. This is illustrated in Figure 5-28.

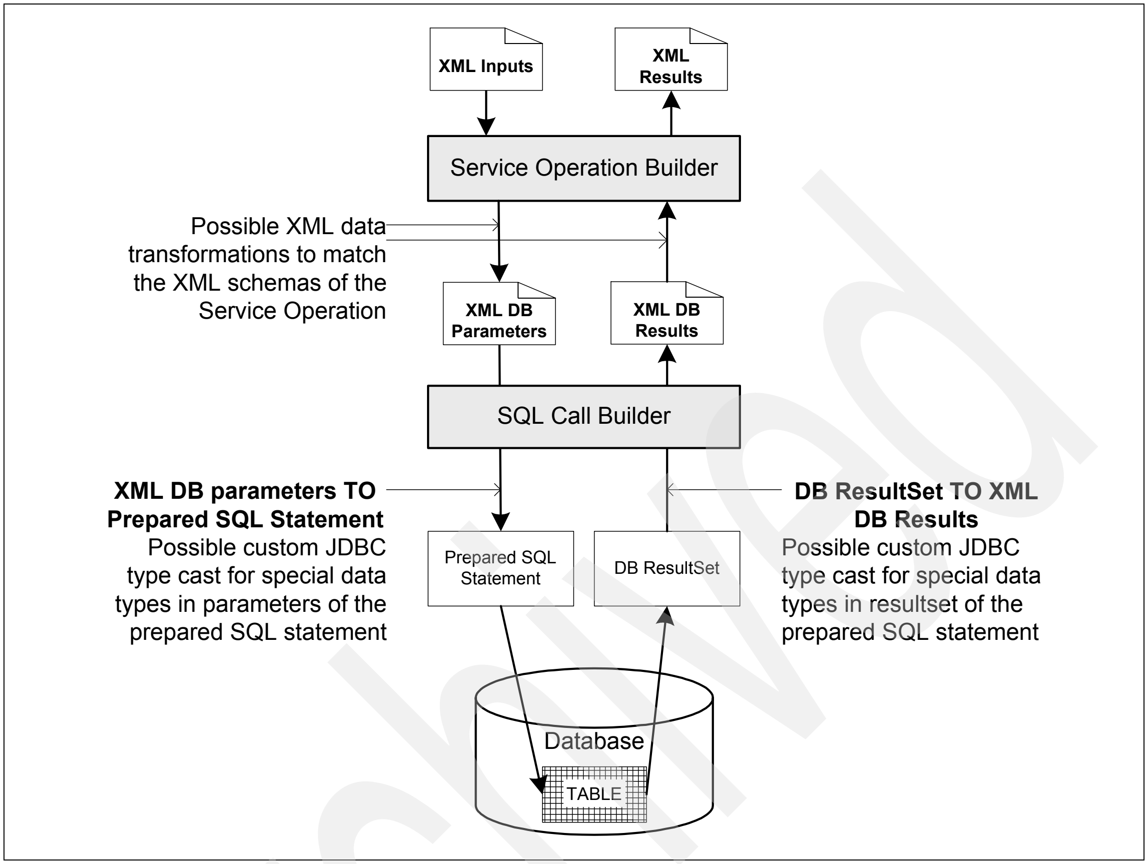

XML Inputs
XML Results
Service Operation Builder
Possible XML data transformations to match the XML schemas of the Service Operation
XML DB Parameters
XML DB Results
SQL Call Builder
XML DB parameters TO Prepared SQL Statement
Possible custom JDBC type cast for special data types in parameters of the prepared SQL statement
DB ResultSet TO XML DB Results
Possible custom JDBC type cast for special data types in resultset of the prepared SQL statement
Prepared SQL Statement
DB ResultSet
Database
TABLE

Figure 5-28 SQL Call Builder: XML flow and execution details

Since the result set handling in the SQL Call builder does not offer custom JDBC type casting, it is necessary to create a SQL Statement builder to define the new data type casting. The statement in the SQL Call builder must be overridden with the new SQL Statement builder just created.

ITSO Renovations provides examples of inserting and retrieving binary data (BLOB database columns). In this section we analyze in detail the scenario of inserting and selecting a record with an image in one of the columns.

Insert record with an image column: Create customer

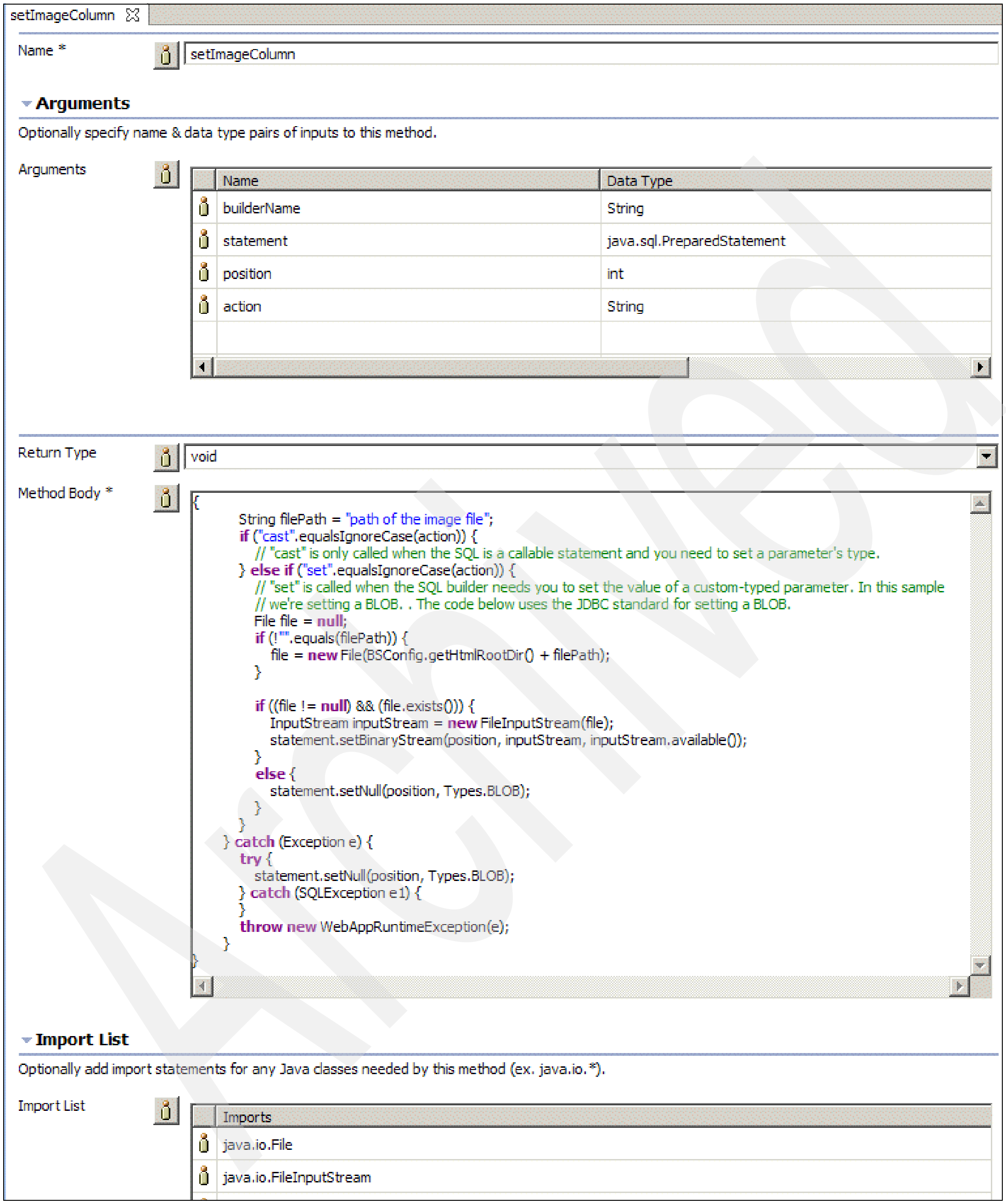
Create customer requires inserting of a record that contains a BLOB column: IMAGE. It it necessary to customize the method to set the input parameter for that column instead of using the JDBC automatic type cast.

You can provide your own method to perform a custom type cast and value definition. It must take the parameters described in Table 5-12 and return void.

Table 5-12 Parameters of the custom set method for SQL Input Parameters

Parameter	Description
BuilderName	This string parameter will contain the name of the SQL Statement Builder that is calling the method to perform a custom type cast and value definition. You can define one method for each custom type cast you have defined or you can bundle all of your type casts together and use this input to identify which specific type cast to apply when called by the Builder.
Statement	This object parameter is the actual JDBC PreparedStatement or CallableStatement that was created by the Builder and is being prepared for execution. The method is responsible for setting the input type of the positional parameter. It is also responsible for defining the input value to be used by the statement when it is executed.
position	This integer parameter identifies the positional parameter in the SQL statement for which the type cast is to be performed.
action	This new string parameter is used to specify whether the method is being called to cast an output parameter of a stored procedure call, or to set the output parameter's value.

You can create a Method builder like the one shown in Figure 5-29.



Name * setImageColumn

Arguments

Optionally specify name & data type pairs of inputs to this method.

Arguments

Name	Data Type
builderName	String
statement	java.sql.PreparedStatement
position	int
action	String

Return Type void

Method Body *

```
{
      String filePath = "path of the image file";
      if ("cast".equalsIgnoreCase(action)) {
        // "cast" is only called when the SQL is a callable statement and you need to set a parameter's type.
      } else if ("set".equalsIgnoreCase(action)) {
        // "set" is called when the SQL builder needs you to set the value of a custom-typed parameter. In this sample
        // we're setting a BLOB. . The code below uses the JDBC standard for setting a BLOB.
        File file = null;
        if (!"".equals(filePath)) {
          file = new File(BSConfig.getHtmlRootDir() + filePath);
        }

        if ((file != null) && (file.exists())) {
          InputStream inputStream = new FileInputStream(file);
          statement.setBinaryStream(position, inputStream, inputStream.available());
        }
        else {
          statement.setNull(position, Types.BLOB);
        }
      }
    } catch (Exception e) {
      try {
        statement.setNull(position, Types.BLOB);
      } catch (SQLException e1) {
      }
      throw new WebAppRuntimeException(e);
    }
}
```

Import List

Optionally add import statements for any Java classes needed by this method (ex. java.io.*).

Import List

Imports
java.io.File
java.io.FileInputStream

Figure 5-29 Method builder for custom JDBC type cast

The problem with this solution is that you are not able to debug this code in the designer. You can implement the method in a Java class and access it using the LJO builder, but you cannot invoke it as part of the set/cast method of the input parameter because only Method or Action List builders with the previous interface are allowed.

We implemented the following solution:

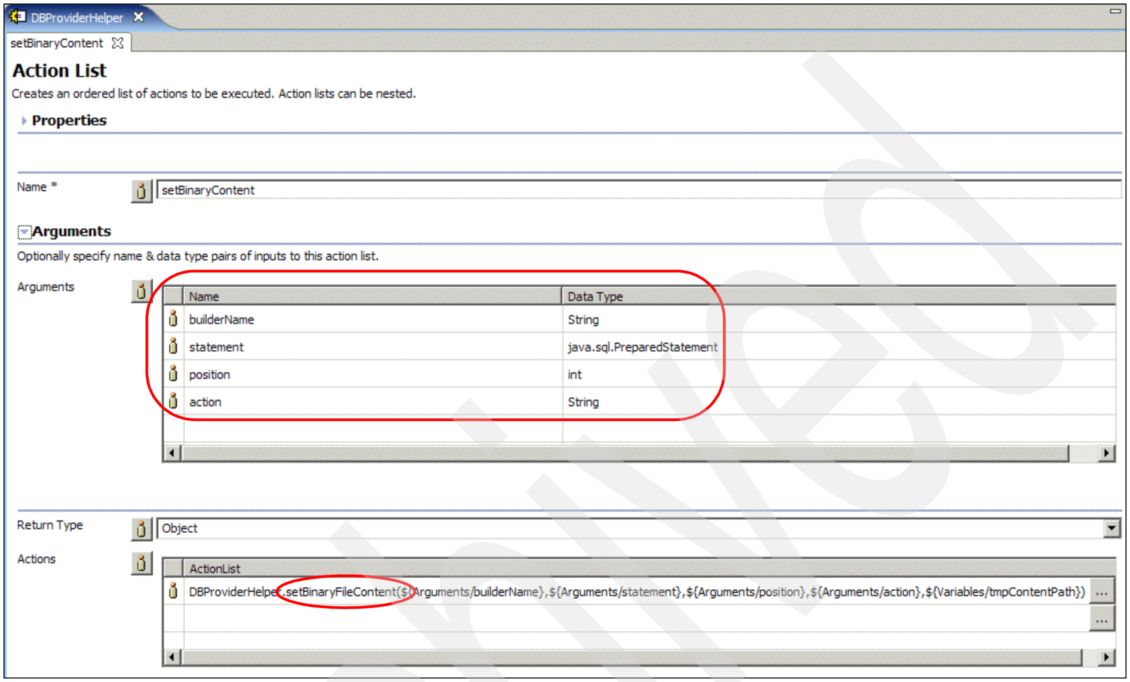
1. Implement the logic to set the binary content in a helper Java class and access it via LJO builder. In our example, the code of the method is in com.ibm.redbook.cs.data.db.DBProviderHelper.java.

Example 5-2

```
public void setBinaryFileContent(WebAppAccess webAppAccess, String builderName,
    java.sql.PreparedStatement statement, int position, String action, String filePath) {
    try {
        if ("cast".equalsIgnoreCase(action)) {
            // "cast" is only called when the SQL is a callable statement
            // and you need to set a parameter's type.
            // You can return null in this case.
        } else if ("set".equalsIgnoreCase(action)) {
            // "set" is called when the SQL builder needs you to set the
            // value of a custom-typed parameter. In this sample
            // we're setting a BLOB. Many DB drivers have special classes to
            // efficiently handle LOB types so you'll need to
            // consult the docs for your DB / driver to see what they
            // recommend. The code below uses the JDBC standard
            // for setting a BLOB.
            File file = null;
            if (!"".equals(filePath)) {
                file = new File(BSConfig.getHtmlRootDir() + filePath);
            }

            if ((file != null) && (file.exists())) {
                InputStream inputStream = new FileInputStream(file);
                statement.setBinaryStream(position, inputStream, inputStream.available());
            }
            else {
                statement.setNull(position, Types.BLOB);
            }
        }
    } catch (Exception e) {
        try {
            statement.setNull(position, Types.BLOB);
        } catch (SQLException e1) {
        }
        throw new WebAppRuntimeException(e);
    }
}
```

Notice the marked area where the binary content is set in the parameter by position.

2. Create an Action List to invoke the previous LJO method (Figure 5-30).



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * setBinaryContent

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments

Name	Data Type
builderName	String
statement	java.sql.PreparedStatement
position	int
action	String

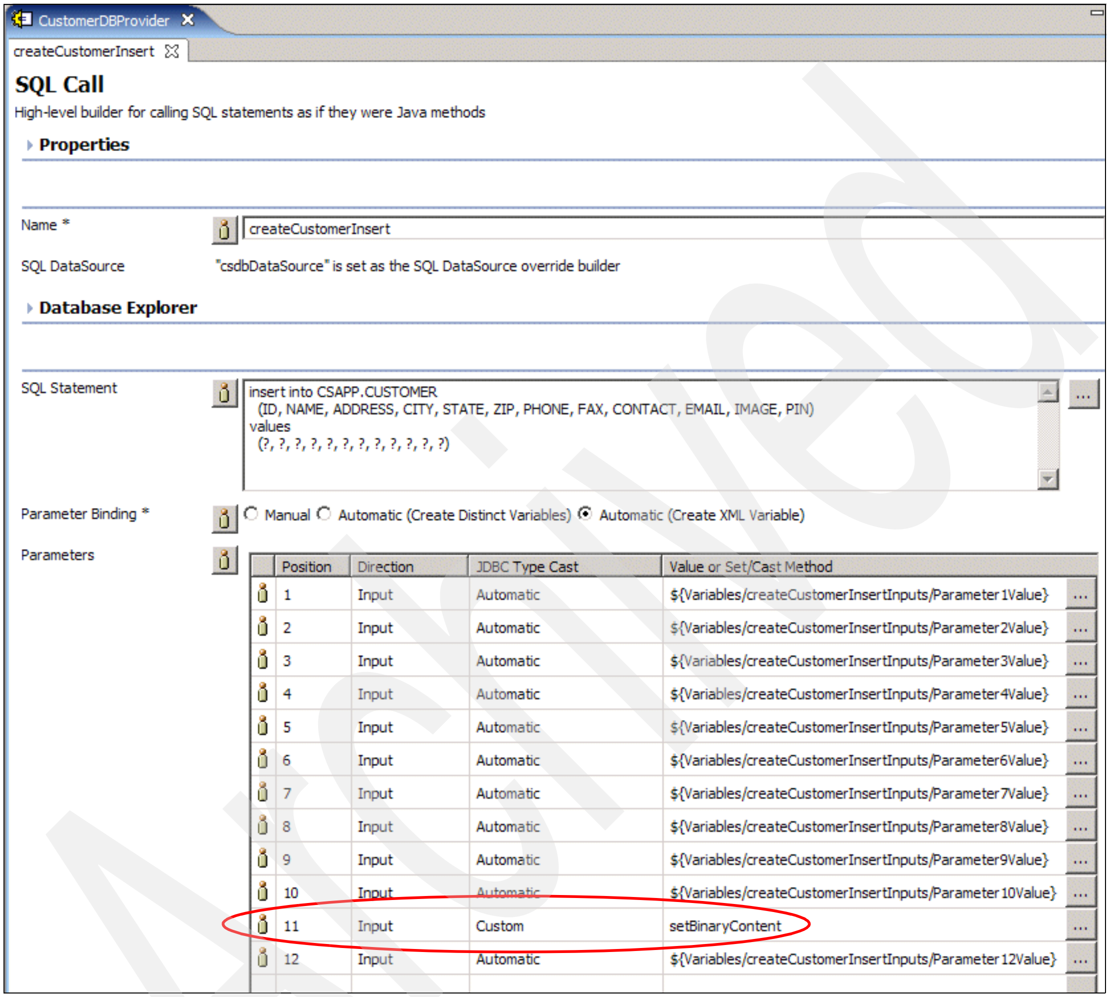
Return Type: Object

Actions

ActionList
DBProviderHelper.setBinaryFileContent(${Arguments/builderName},${Arguments/statement},${Arguments/position},${Arguments/action},${Variables/tmpContentPath})

Figure 5-30 Action List builder: setBinaryContent in DBProviderHelper.model

3. Set the previous Action List as Set/Cast Method in the Parameters of the SQL Call builder: createCustomerInsert builder in CustomerDBProvider.model (Figure 5-31).



SQL Call

High-level builder for calling SQL statements as if they were Java methods

Properties

Name * createCustomerInsert

SQL DataSource "csdbDataSource" is set as the SQL DataSource override builder

Database Explorer

SQL Statement

```
insert into CSAPP.CUSTOMER
  (ID, NAME, ADDRESS, CITY, STATE, ZIP, PHONE, FAX, CONTACT, EMAIL, IMAGE, PIN)
values
  (?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?, ?)
```

Parameter Binding * ○ Manual ○ Automatic (Create Distinct Variables) ● Automatic (Create XML Variable)

Parameters

Position	Direction	JDBC Type Cast	Value or Set/Cast Method
1	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter1Value}
2	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter2Value}
3	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter3Value}
4	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter4Value}
5	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter5Value}
6	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter6Value}
7	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter7Value}
8	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter8Value}
9	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter9Value}
10	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter10Value}
11	Input	Custom	setBinaryContent
12	Input	Automatic	${Variables/createCustomerInsertInputs/Parameter12Value}

Figure 5-31 SQL Call builder: Set custom type cast method

4. In order to reuse this functionality in several models, the Action List is defined in a separate helper model that is imported where needed:

DBProviderHelper.model

Figure 5-32 shows the implementation details and what is happening when inserting the record.

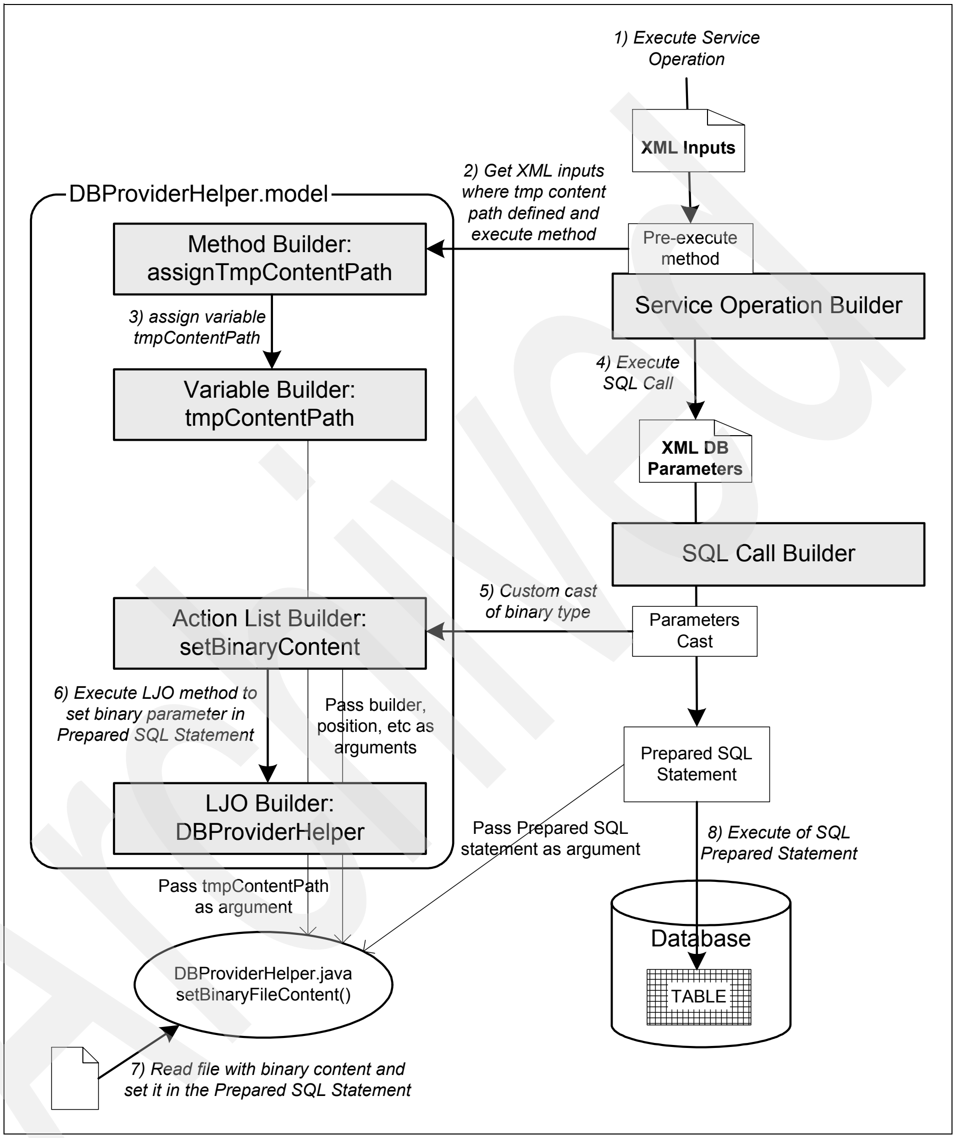
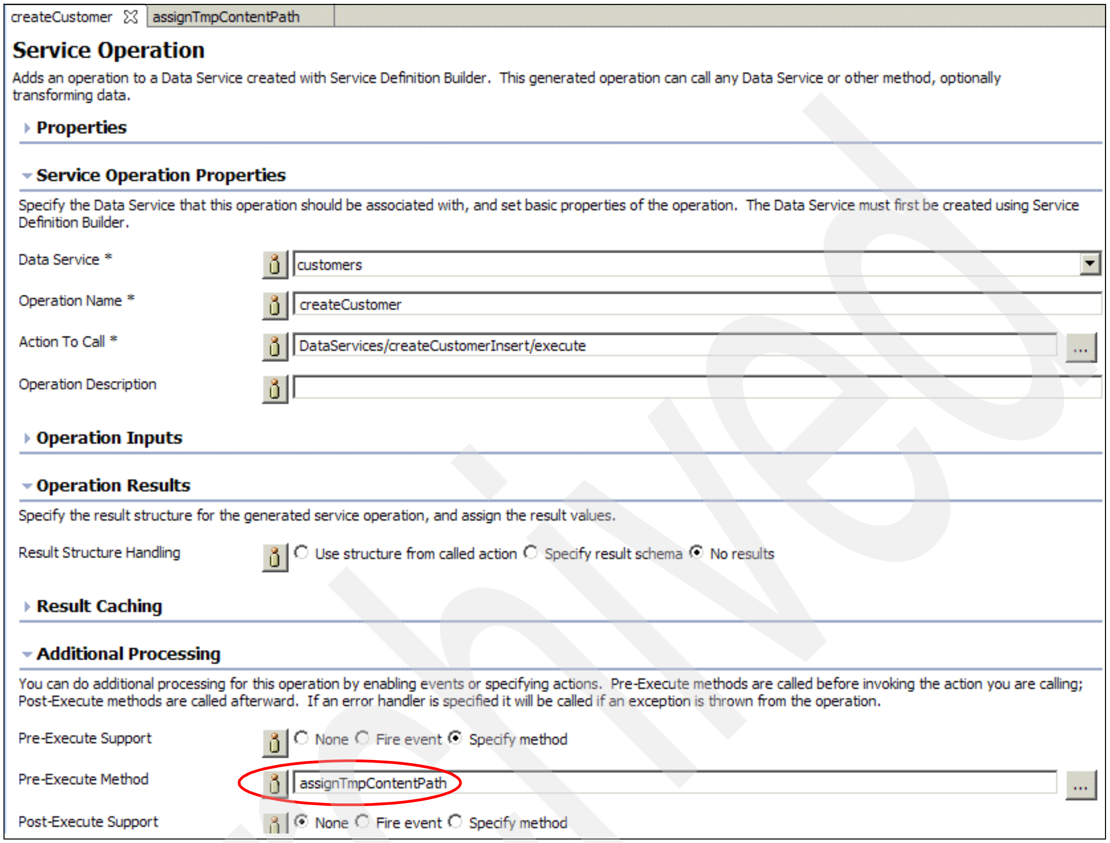

1) Execute Service Operation
XML Inputs
2) Get XML inputs where tmp content path defined and execute method
Pre-execute method
Service Operation Builder
DBProviderHelper.model
Method Builder: assignTmpContentPath
3) assign variable tmpContentPath
Variable Builder: tmpContentPath
4) Execute SQL Call
XML DB Parameters
SQL Call Builder
5) Custom cast of binary type
Action List Builder: setBinaryContent
Parameters Cast
6) Execute LJO method to set binary parameter in Prepared SQL Statement
Pass builder, position, etc as arguments
Prepared SQL Statement
LJO Builder: DBProviderHelper
Pass Prepared SQL statement as argument
8) Execute of SQL Prepared Statement
Pass tmpContentPath as argument
Database
TABLE
DBProviderHelper.java setBinaryFileContent()
7) Read file with binary content and set it in the Prepared SQL Statement

Figure 5-32 Setting binary content as an input parameter in SQL Prepared Statements

The path of the file that contains the binary data is also parameterized in the Java method and the value is provided from a temporary model variable. The caller of the operation must set first the path of the input file. In our scenario, the

Service Operation has a pre-execution action that sets the value of this variable before executing the SQL Call builder (Figure 5-33).



Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service *	customers
Operation Name *	createCustomer
Action To Call *	DataServices/createCustomerInsert/execute
Operation Description	

Operation Results

Specify the result structure for the generated service operation, and assign the result values.

Result Structure Handling	○ Use structure from called action ○ Specify result schema ● No results

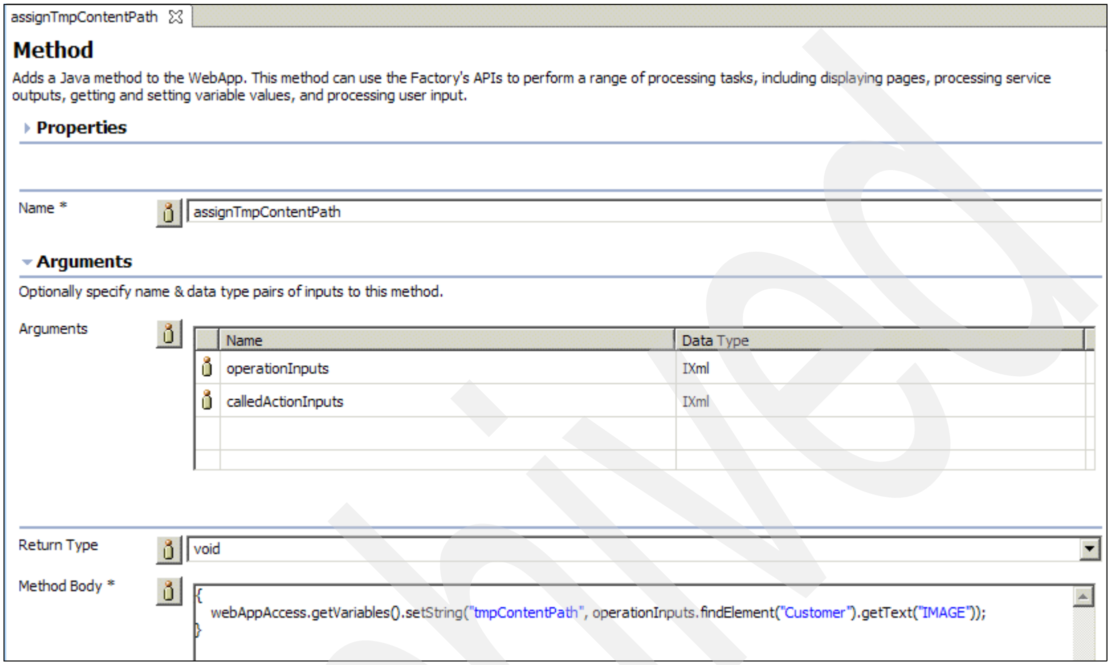
Additional Processing

You can do additional processing for this operation by enabling events or specifying actions. Pre-Execute methods are called before invoking the action you are calling; Post-Execute methods are called afterward. If an error handler is specified it will be called if an exception is thrown from the operation.

Pre-Execute Support	○ None ○ Fire event ● Specify method
Pre-Execute Method	assignTmpContentPath
Post-Execute Support	● None ○ Fire event ○ Specify method

Figure 5-33 Service Operation builder: Set pre-execution method

This is the method that is invoked pre-execution of the operation. It assigns the temporary variable with the path of the file that contains the binary data. The variable value is used by the previous Action List to give the information about the file location to the custom type cast method (Figure 5-34).



Method

Adds a Java method to the WebApp. This method can use the Factory's APIs to perform a range of processing tasks, including displaying pages, processing service outputs, getting and setting variable values, and processing user input.

Properties

Name * assignTmpContentPath

Arguments

Optionally specify name & data type pairs of inputs to this method.

Arguments

Name	Data Type
operationInputs	IXml
calledActionInputs	IXml

Return Type void

Method Body *

```
{
  webAppAccess.getVariables().setString("tmpContentPath", operationInputs.findElement("Customer").getText("IMAGE"));
}
```

Figure 5-34 Method builder: Assigning temporary variable with the path of the file

The described mechanism is valid for any column with binary data. This solution has some issues that must be considered when used in a real environment:

- The path of the binary content is a temporary path part of the serveable content of the web application. It is not user specific, so to avoid interactions in a multiuser concurrent environment, the path should be session dependent. We have not covered the complete implementation to make the example easy to understand.
- The current solution supports one binary parameter per statement because we have only one variable for the path of the file with binary data. It is possible to provide an array of strings with the paths for all the binary parameters.

The main concept is illustrated in this example and with a little effort it is possible to adjust it to any specific application requirements.

Select record with an image column: Get customer

Get customer requires getting a complete record from the CUSTOMER table that contains a BLOB column: IMAGE. It is necessary to transform the result data from the SQL statement. The SQL Call builder does not provide the possibility to customize data transformations in the result set; for this reason it is necessary to create a SQL Statement builder that provides more configureability. The complete procedure is described later in the implementation steps.

In a similar way to inserting a record with an image, it is possible to provide a custom transform method for the result columns. This method must take the parameters described in Table 5-13 and return void.

Table 5-13 Parameters of the custom transform method for SQL result set columns

Parameter	Description
BuilderName	A string parameter that contains the name of the SQL Statement Builder that is calling the method to perform a custom transform on a result set column.
columnNumber	An integer parameter that identifies either the SQL statement result set column or the output parameter that is to be transformed by the method. You can define one method for each column or output parameter that you will transform manually or you can bundle all of your transforms together and use this input to identify which column or output parameter is being transformed by the Builder.
columnValue	This object parameter is the actual result set column value or output parameter that this custom method is to transform into XML. Note that the value will be null if the column or output parameter contains a null value.
elementName	A string parameter that provides the name of the XML element containing the transformed data.
createVerboseXml	A boolean parameter that tells the method whether or not it is allowed to create XML that includes any special element attributes meaningful to this particular transformation. In most cases this parameter can be safely ignored.

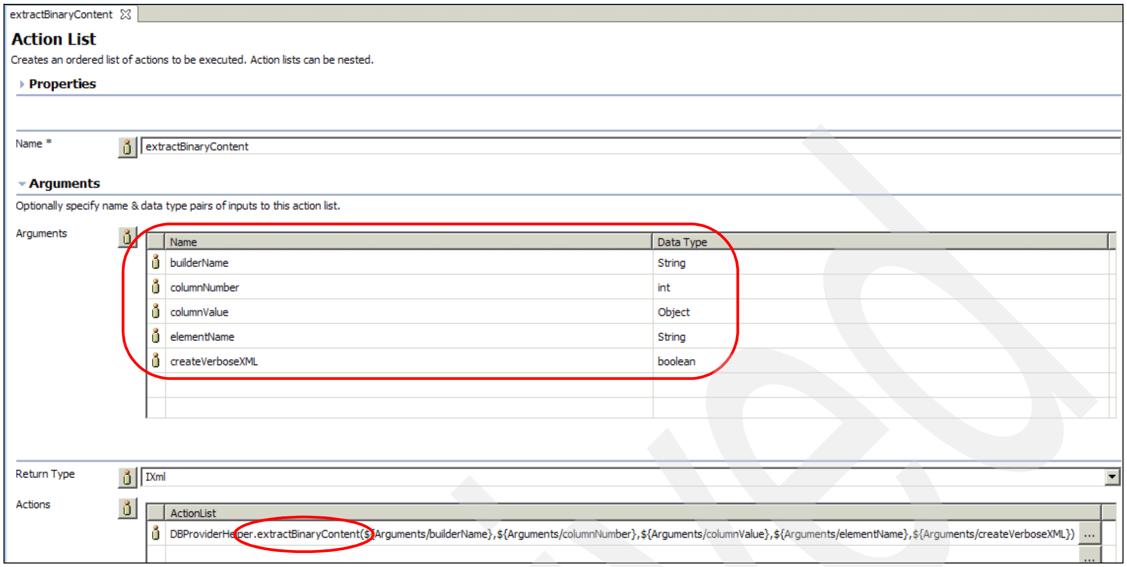
As previously discussed, it is only possible to provide Method or Action List builder calls as Transform Method. Following the same design we introduced for inserting a record with an image, the implementation steps for selecting binary content are as follows:

1. Implement the logic to extract the binary content in the DB helper Java class: com.ibm.redbook.cs.data.db.DBProviderHelper.java.

Example 5-3

```
public IXml extractBinaryContent(WebAppAccess webAppAccess, String builderName, int columnNumber,
    Object columnValue, String elementName, boolean createVerboseXML) {
    final IXml result = XmlUtil.create(elementName);

    try {
        switch (columnNumber) {
            case 1:
                webAppAccess.getVariables().setString("tmpContentPath",
                    builderName + "_" + Integer.toString(columnNumber)
                    + "_" + columnValue.toString() + ".tmp");
                result.setText(columnValue.toString());
                break;
            case 4:
            case 11:
                final String filePath = webAppAccess.getVariables().getString("tmpContentPath");

                // Extract the blob content and write it into the file.
                final Blob blobContent = (Blob) columnValue;
                if (blobContent != null) {
                    final InputStream inputStream = blobContent.getBinaryStream();
                    final byte[] buffer = new byte[4096];
                    int bytesRead = 0;

                    try {
                        final File file = new File(BSConfig.getHtmlRootDir() +
                            BINARY_TMP_PATH + "\\" + filePath);
                        final FileOutputStream outputStream = new FileOutputStream(file);

                        while ((bytesRead = inputStream.read(buffer)) > -1) {
                            outputStream.write(buffer, 0, bytesRead);
                        }
                        outputStream.close();

                        // Return a relative URL for the file just written.
                        result.setText(BINARY_TMP_URL + "/" + filePath);
                    }
                    catch (FileNotFoundException ex) {
                        // ignore if the file is not found, go on without binary content
                    }
                }
                break;
        }
    } catch (Exception e) {
        throw new WebAppRuntimeException(e);
    }

    return result;
}
```

2. Create an Action List to invoke the previous LJO method (Figure 5-35).



extractBinaryContent

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * extractBinaryContent

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments

Name	Data Type
builderName	String
columnNumber	int
columnValue	Object
elementName	String
createVerboseXML	boolean

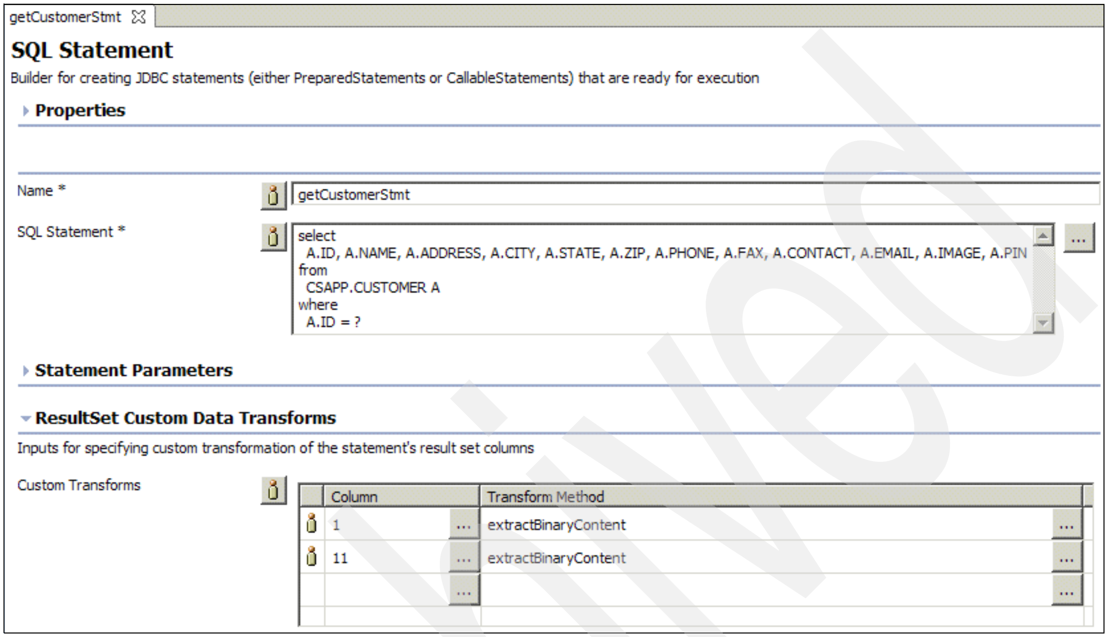
Return Type IXml

Actions

ActionList
DBProviderHelper.extractBinaryContent(${Arguments/builderName},${Arguments/columnNumber},${Arguments/columnValue},${Arguments/elementName},${Arguments/createVerboseXML})

Figure 5-35 Action List builder: extractBinaryContent in DBProviderHelper.model

3. Create a new SQL Statement builder that will override the statement in the SQL Call builder for get customer and set the previous Action List as Transform Method in the Result Set Custom Data Transforms. You specify by index which columns will apply the transformation (Figure 5-36).



getCustomerStmt

SQL Statement

Builder for creating JDBC statements (either PreparedStatements or CallableStatements) that are ready for execution

Properties

Name * getCustomerStmt

SQL Statement *

```
select
  A.ID, A.NAME, A.ADDRESS, A.CITY, A.STATE, A.ZIP, A.PHONE, A.FAX, A.CONTACT, A.EMAIL, A.IMAGE, A.PIN
from
  CSAPP.CUSTOMER A
where
  A.ID = ?
```

Statement Parameters

ResultSet Custom Data Transforms

Inputs for specifying custom transformation of the statement's result set columns

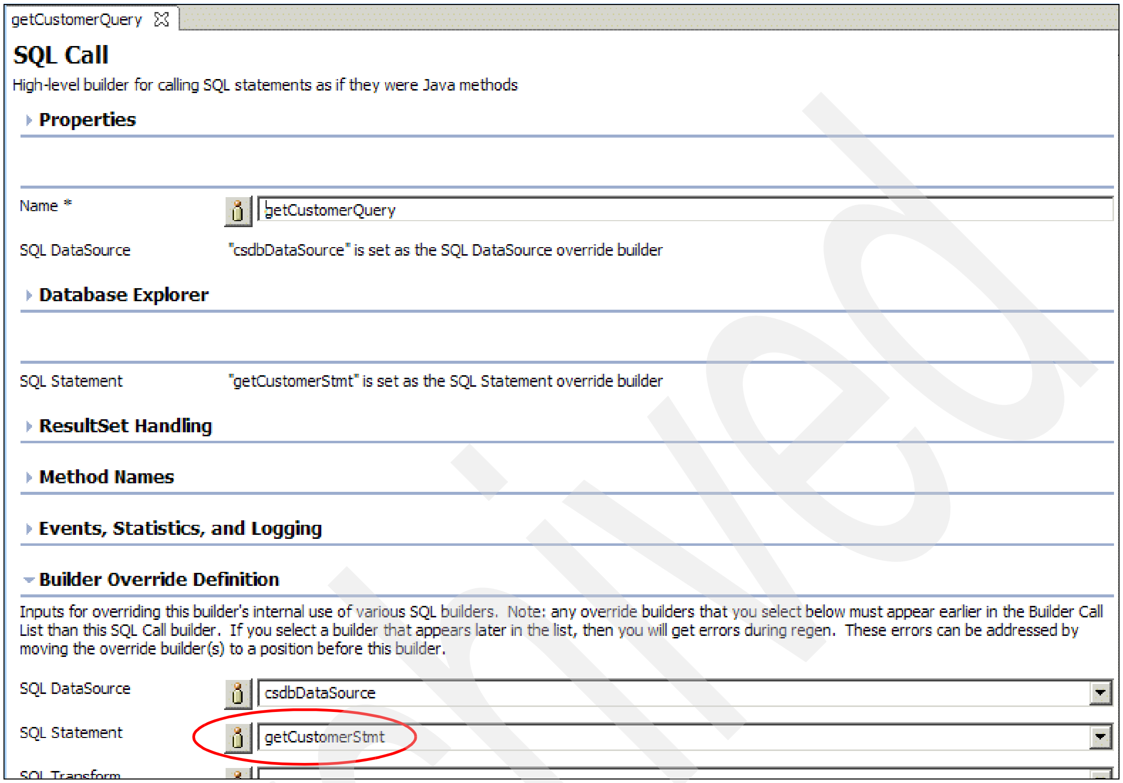
Custom Transforms

Column	Transform Method
1	extractBinaryContent
11	extractBinaryContent

Figure 5-36 SQL Statement builder: custom data transform for extracting binary content

Notice that we provide custom transforms for the column with the ID. Basically we use a visitor pattern in the way that first we apply the transformation method to this column to build a unique path for the binary content based on the primary key of the table. We save the path in a temporary variable that will be used during the transformation of the BLOB column to save the binary content in the file system under this path. This content will be part of the shareable content and the path now can be returned as content of the column and be displayed in the user interface layer.

4. Override the SQL statement with the new SQL Statement builder in the SQL Call builder for get customer (Figure 5-37).



getCustomerQuery

SQL Call

High-level builder for calling SQL statements as if they were Java methods

Properties

Name * getCustomerQuery

SQL DataSource "csdbDataSource" is set as the SQL DataSource override builder

Database Explorer

SQL Statement "getCustomerStmt" is set as the SQL Statement override builder

ResultSet Handling

Method Names

Events, Statistics, and Logging

Builder Override Definition

Inputs for overriding this builder's internal use of various SQL builders. Note: any override builders that you select below must appear earlier in the Builder Call List than this SQL Call builder. If you select a builder that appears later in the list, then you will get errors during regen. These errors can be addressed by moving the override builder(s) to a position before this builder.

SQL DataSource csdbDataSource

SQL Statement getCustomerStmt

SQL Transform

Figure 5-37 SQL Call builder: Override SQL Statement

Figure 5-38 shows the implementation details and what is happening when selecting the record.

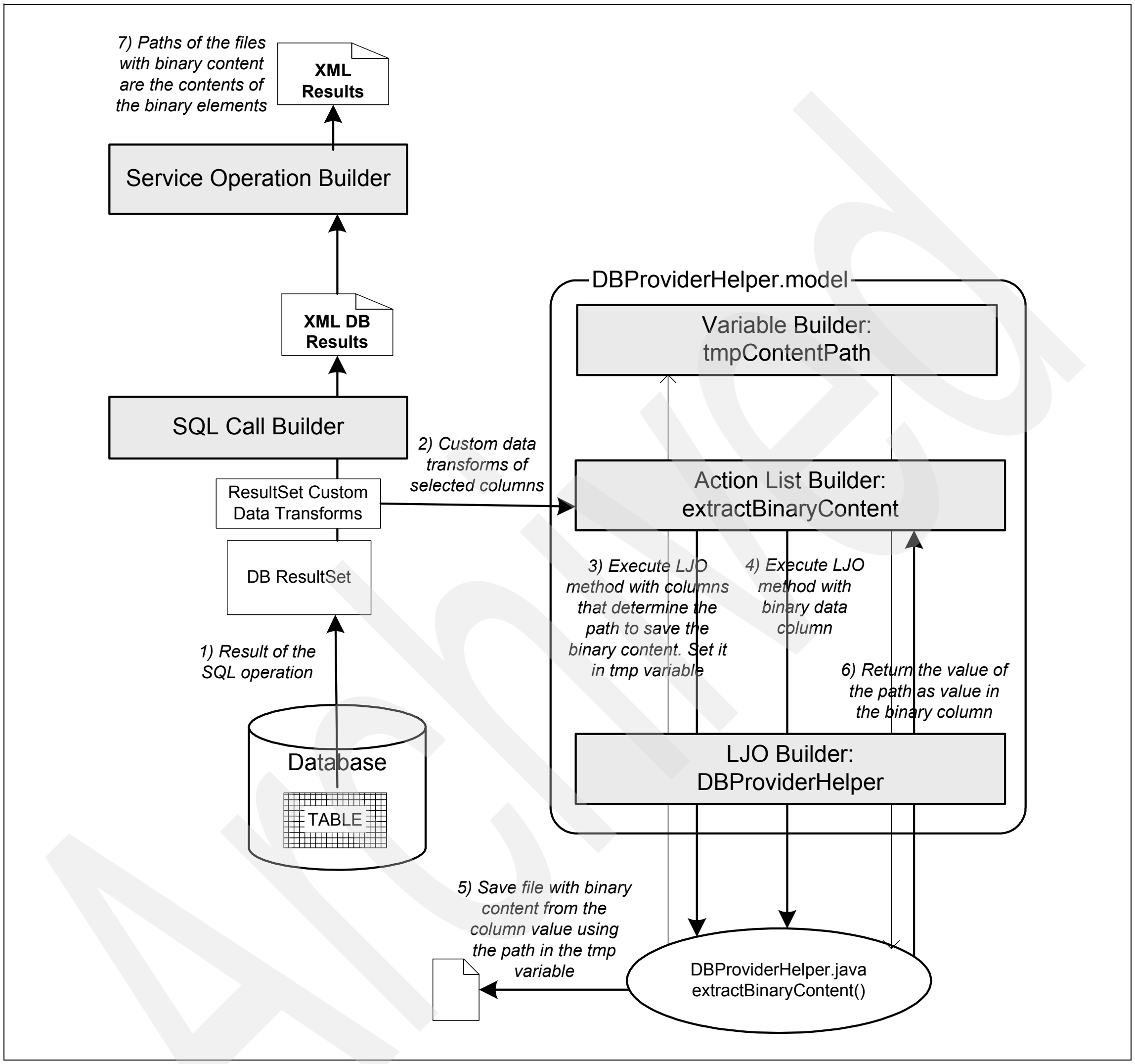

7) Paths of the files with binary content are the contents of the binary elements
XML Results
Service Operation Builder
XML DB Results
SQL Call Builder
ResultSet Custom Data Transforms
DB ResultSet
1) Result of the SQL operation
Database
TABLE
2) Custom data transforms of selected columns
DBProviderHelper.model
Variable Builder: tmpContentPath
Action List Builder: extractBinaryContent
3) Execute LJO method with columns that determine the path to save the binary content. Set it in tmp variable
4) Execute LJO method with binary data column
6) Return the value of the path as value in the binary column
LJO Builder: DBProviderHelper
5) Save file with binary content from the column value using the path in the tmp variable
DBProviderHelper.java extractBinaryContent()

Figure 5-38 Extracting binary content from SQL result sets

This is a generic mechanism that can be used to retrieve any binary content. You should consider some issues before using it in a real environment:

- The servable content is not session dependent. This could give some side effects when working in a concurrent multiuser environment. One solution is to provide a path for the binary content that is session dependent, probably using the session ID as part of the path.

- The current solution only allows one column with binary content. The custom transformation can be extended to support multiple columns and build some advanced mechanism during building of the paths for saving the binary content. For this problem it is interesting to use the visitor pattern as previously described.

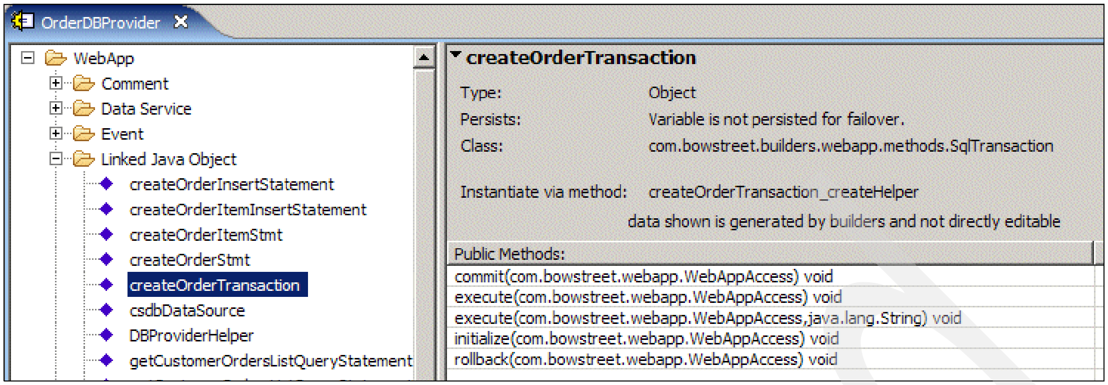
Previous examples showed the main concept when inserting and getting data from the database. It is possible to extend it to be more generic or to fulfill the requirements of your application environment. We can extract some best practices from this example:

- Binary data should not be delivered as bytes as part of the input or result XML of the service operation. This could make the variable in memory very large and cause issues with session memory footprints.
- The recommended approach is to save the binary data in the file system under the servable folder of the web application; this content is known as static in this context. The service operation will contain the path to this location in input or result XML documents.
- The user interface is responsible to work with the path of the file that contains the binary data to upload and download the contents.

5.2.6 Implementation of transactions

WebSphere Portlet Factory offers transaction support to execute more than one SQL statement in one transaction. SQL Call builder does not provide transaction behavior by itself, it executes one statement in one transaction. All statements involved in a transaction must be defined using the SQL Statement builder and the control of the transaction scope is done manually in Java code or Action Lists.

The SQL Transaction builder defines a set of steps that can be involved in one transaction. Each step is bound to one SQL Statement builder that defines the statement to be executed. Programatically you start the transaction, invoke the SQL Statement builders that are part of the transaction, and commit/rollback at the end. The SQL Transaction builder creates an internal LJO that provides a set of methods to control the transaction (Figure 5-39).



createOrderTransaction

Type: Object
Persists: Variable is not persisted for failover.
Class: com.bowstreet.builders.webapp.methods.SqlTransaction

Instantiate via method: createOrderTransaction_createHelper

data shown is generated by builders and not directly editable

Public Methods:

```
commit(com.bowstreet.webapp.WebAppAccess) void
execute(com.bowstreet.webapp.WebAppAccess) void
execute(com.bowstreet.webapp.WebAppAccess,java.lang.String) void
initialize(com.bowstreet.webapp.WebAppAccess) void
rollback(com.bowstreet.webapp.WebAppAccess) void
```

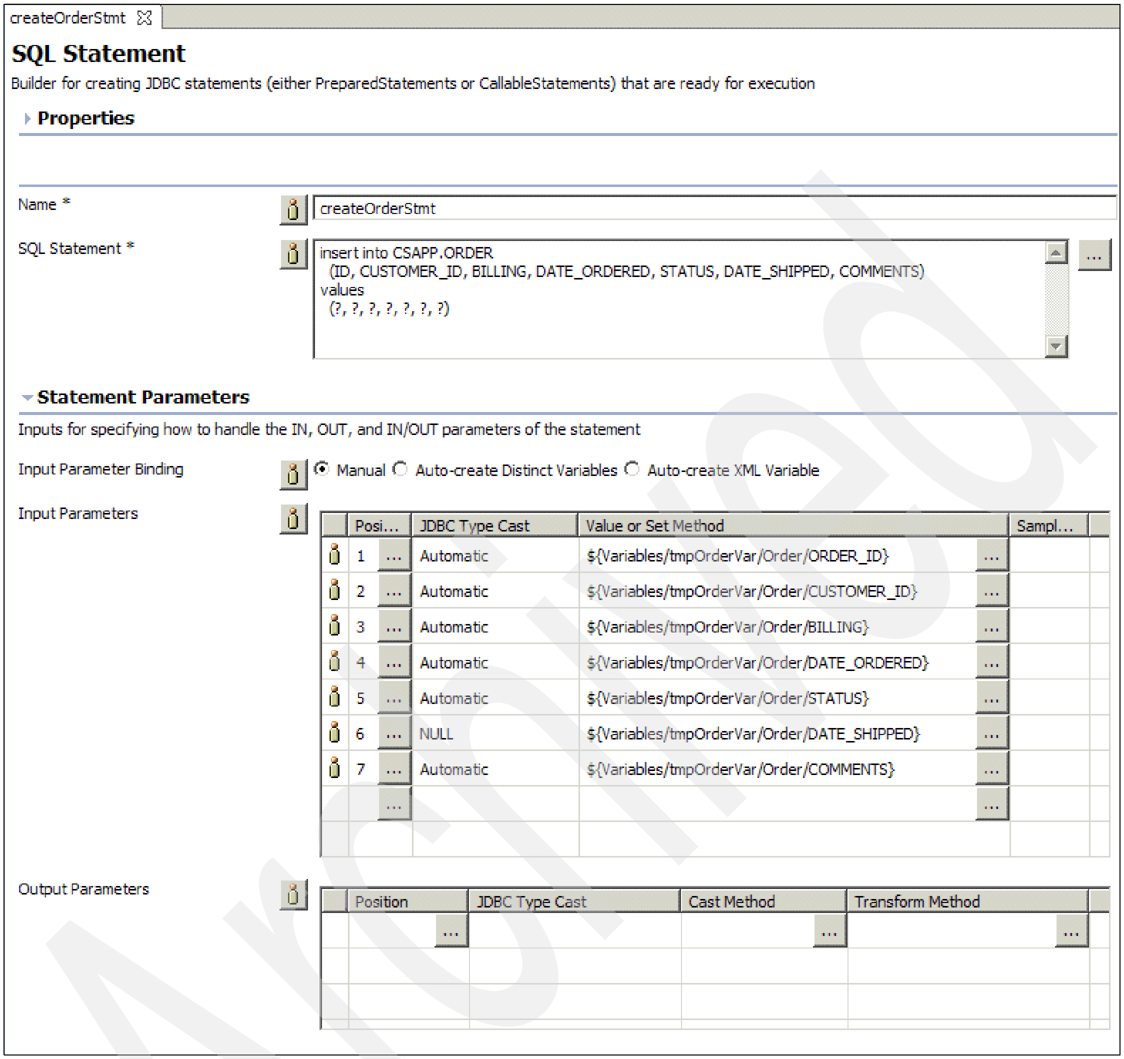
Figure 5-39 Internal LJO generated by the SQL Transaction builder

The implementation pattern can be summarize as follows:

1. Implement the statements to be executed as SQL Statement builders.
2. Add a SQL Transaction builder with a set of steps for the SQL statements that can be part of one transaction.
3. Implement the operation that must be executed in a transaction in a Java class available in WebSphere Portlet Factory via an LJO builder. This implementation is responsible to control the transaction and the execution of the steps bound with the SQL statements.
4. The Service Operation invokes the method defined in the LJO builder.

ITSO Renovations contains operations that require the execution of several SQL statements in one transaction. This section covers one of these operations: createOrderWithItems. This operation is responsible to create one order with all associated items. It requires executing the create order and create order item SQL statements in one single transaction. Considering the previous pattern, we follow these steps to implement this operation in one transaction:

1. Implementation of SQL Statement builders (Figure 5-40).



createOrderStmt

SQL Statement

Builder for creating JDBC statements (either PreparedStatements or CallableStatements) that are ready for execution

Properties

Name * createOrderStmt

SQL Statement *

```
insert into CSAPP.ORDER
  (ID, CUSTOMER_ID, BILLING, DATE_ORDERED, STATUS, DATE_SHIPPED, COMMENTS)
values
  (?, ?, ?, ?, ?, ?, ?)
```

Statement Parameters

Inputs for specifying how to handle the IN, OUT, and IN/OUT parameters of the statement

Input Parameter Binding ● Manual ○ Auto-create Distinct Variables ○ Auto-create XML Variable

Input Parameters

Posi...	JDBC Type Cast	Value or Set Method	Sampl...
1	Automatic	${Variables/tmpOrderVar/Order/ORDER_ID}	
2	Automatic	${Variables/tmpOrderVar/Order/CUSTOMER_ID}	
3	Automatic	${Variables/tmpOrderVar/Order/BILLING}	
4	Automatic	${Variables/tmpOrderVar/Order/DATE_ORDERED}	
5	Automatic	${Variables/tmpOrderVar/Order/STATUS}	
6	NULL	${Variables/tmpOrderVar/Order/DATE_SHIPPED}	
7	Automatic	${Variables/tmpOrderVar/Order/COMMENTS}	

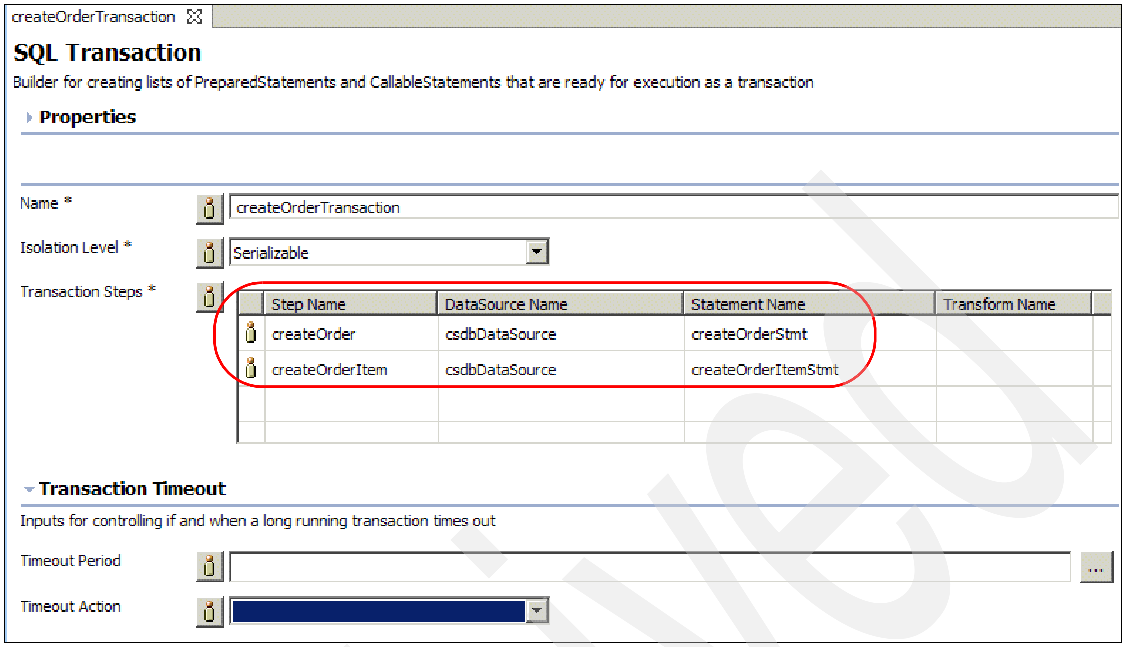
Output Parameters

Position	JDBC Type Cast	Cast Method	Transform Method

Figure 5-40 SQL Statement builder

The insert statements are taken from the related SQL Call builders. We have created two temporary variables to hold the input content of both statements. This allows us to assign a structure to the variable that matches with the Order and OrderItem structures and avoid additional transformations when setting the input values for the invocation of the operations in the Java code (see Example 5-4 on page 164).

2. Add a SQL Transaction builder defining the required steps that creates the order with items (Figure 5-41).



createOrderTransaction

SQL Transaction

Builder for creating lists of PreparedStatements and CallableStatements that are ready for execution as a transaction

Properties

Name *	createOrderTransaction
Isolation Level *	Serializable
Transaction Steps *	

Step Name	DataSource Name	Statement Name	Transform Name
createOrder	csdbDataSource	createOrderStmt	
createOrderItem	csdbDataSource	createOrderItemStmt	

Transaction Timeout

Inputs for controlling if and when a long running transaction times out

Timeout Period	
Timeout Action	

Figure 5-41 SQL Transaction builder

The Isolation Level input provides the isolation for all transactions created with this builder.

3. Implement the operation in the Java class OrderDBProviderHelper.

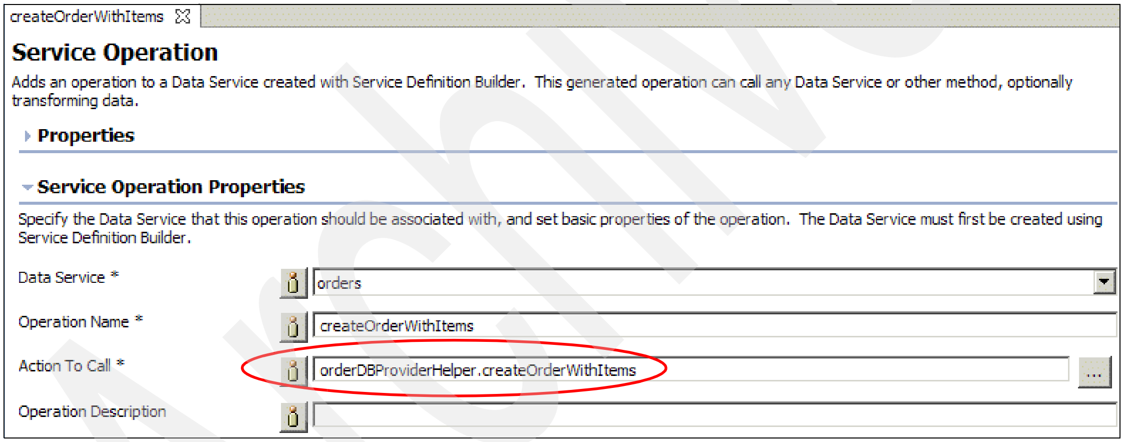
Example 5-4 Code for createOrderWithItems() in a transaction

```
public void createOrderWithItems(WebAppAccess webAppAccess, IXml orders) {
    IXml order = orders.findElement(DataConstants.ELEM_ORDER);
    String orderID = order.getText(DataConstants.ELEM_ORDER_ID);

    try {
        // creation of the order
        webAppAccess.getVariables().setXml("tmpOrderVar", order);
        webAppAccess.callMethod("createOrderTransaction.execute", "createOrder");

        // creation of order items
        IXml items = order.findElement(DataConstants.ELEM_ITEMS);
        for (IXml item = items.getFirstChildElement(); item != null; item =
            item.getNextSiblingElement()) {
            webAppAccess.getVariables().setXml("tmpOrderItemVar", item);
            webAppAccess.getVariables().getXml("tmpOrderItemVar").
                setText(DataConstants.ELEM_ORDER_ID, orderID);
            webAppAccess.callMethod("createOrderTransaction.execute", "createOrderItem");
        }
```

```
      //commit transaction
      webAppAccess.callMethod("createOrderTransaction.commit");
   }
   catch (Exception ex) {
      // any exception that occurs during the creation of orders or order items
      // will roll back the transaction
      webAppAccess.callMethod("createOrderTransaction.rollback");
      throw new WebAppRuntimeException(ex);
   }
}
```

The input document contains a complete order with details and the associated items. The idea is to invoke the SQL Transaction builder steps with the data order and order items data from the input document. It is not necessary to explicitly start the transaction; there is an active transaction from the last commit/rollback. At the end, in a successful case the commit is done over the SQL Transaction builder; rollback is done in an error case.

4. Set the Action to Call in the Service Operation to execute the method of the previous LJO (Figure 5-42).



createOrderWithItems ☒

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

Properties

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service * orders

Operation Name * createOrderWithItems

Action To Call * orderDBProviderHelper.createOrderWithItems ...

Operation Description

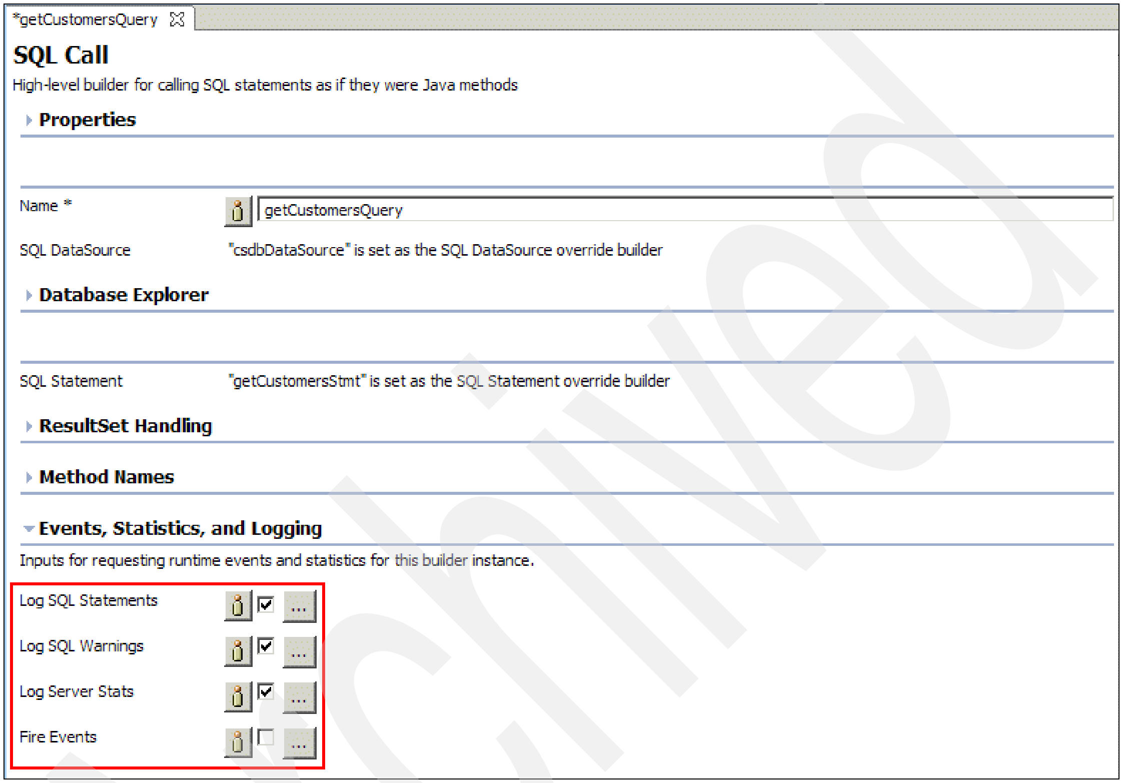
Figure 5-42 Service Operation builder: Set action to call to the LJO method with the transaction implementation

The previous mechanism provides high flexibility in definition of transactions. It is not required that one LJO method executes one transaction: it is possible to have several transactions within one operation, even over different data sources.

5.2.7 Testing and debugging the service

SQL Data Services provide the same set of testing support we have seen in the XML access Data Service case (see 5.1.3, “Testing and debugging the service” on page 115). You can enable testing support in the Service Definition and run debug sessions for your Java classes.

Additionally, SQL builders provide events, statistics, and logging support (Figure 5-43).



*getCustomersQuery

SQL Call

High-level builder for calling SQL statements as if they were Java methods

Properties

Name * getCustomersQuery

SQL DataSource "csdbDataSource" is set as the SQL DataSource override builder

Database Explorer

SQL Statement "getCustomersStmt" is set as the SQL Statement override builder

ResultSet Handling

Method Names

Events, Statistics, and Logging

Inputs for requesting runtime events and statistics for this builder instance.

Log SQL Statements ☑

Log SQL Warnings ☑

Log Server Stats ☑

Fire Events □

Figure 5-43 Example of enabling logging: SQL Call builder

If you enable logging, you can analyze statistics, warnings, and the final SQL statements executed by the builders in the database. All this information is saved in the following log files under the logs directory \WEB-INF\logs of the deployed web application in the server:

- Log SQL Statements: Log all of the SQL statements prepared for execution by the Builder. The log message will include the actual values used for each positional parameter in the SQL. Output is in the file general.txt.
- Log SQL Warnings: Log any SQL warnings that are generated as a result of preparing the SQL statement for execution. Output is in the file general.txt.
- Log Server Stats: Generate builder statistics for this builder instance. Output is in the file serverStats.txt.

You can also configure to trigger events when connections are acquired, transactions are committed or rolled back, statements are created, and so forth. It is possible to define event handlers (Event Handler builder) that listen for these events and perform some special actions.

SQL builders provide good mechanisms to debug and keep track of the activity in the database because they can:

- Track which SQL statements have been executed in the database.
- Define events to react under some database actions.
- Create statistics to analyze the performance of your database actions.

5.3 Domino Data Access Service

WebSphere Portlet Factory offers integration extensions to access third party products and back-end systems. In this book we cover in detail how to access Domino databases, and in 5.6.1, “SAP access” we discuss how to integrate with SAP systems.

Domino is provided as part of a feature set called Lotus Collaboration Extension; it features WebSphere Portlet Factory with a set of builders that allow you to access views and documents in Domino databases, as well as some other artifacts like agents, attachments, and so forth. It provides an easy way to connect to the server and access a database to retrieve views and documents. It is not necessary to write any Java code unless some special functionality is required.

ITSO Renovations contains an example of accessing an internal products database. It illustrates how to get a list of products (view access), and how to get the details about one product, (document access). This section demonstrates the capabilities of the Domino builders by describing the design we followed in our sample application and providing implementation details. At the end you will be able to test the service and discover how easy it is to access Domino with WebSphere Portlet Factory.

5.3.1 Overview and how to use Domino Access builders

In our Customer Self Service application, half of the product data is stored in a Lotus Domino database. This section describes how we created a Service Provider model to retrieve customer order information from Domino.

In this scenario, we use the Portlet Factory’s Domino Data Access builder to access the Domino database and views. Then we create the service definition, followed by a service operation that will retrieve the list of products from the Domino database and another service operation that retrieves the selected product given the document UNID. To demonstrate the ease of creating this model, we use the Domino Service Provider Wizard of Portlet Factory to create all the builders described.

Since the selected product will only return the product ID, we are not able to retrieve the Domino UNID of the document when the user clicks the selected product. To do this, we use a Linked Java Object that will return the UNID when given the product ID.

The LJO and its respective operations will be added to the model after it is created using the wizard. A high-level overview of the Domino Service Provider model is shown in Figure 5-44.

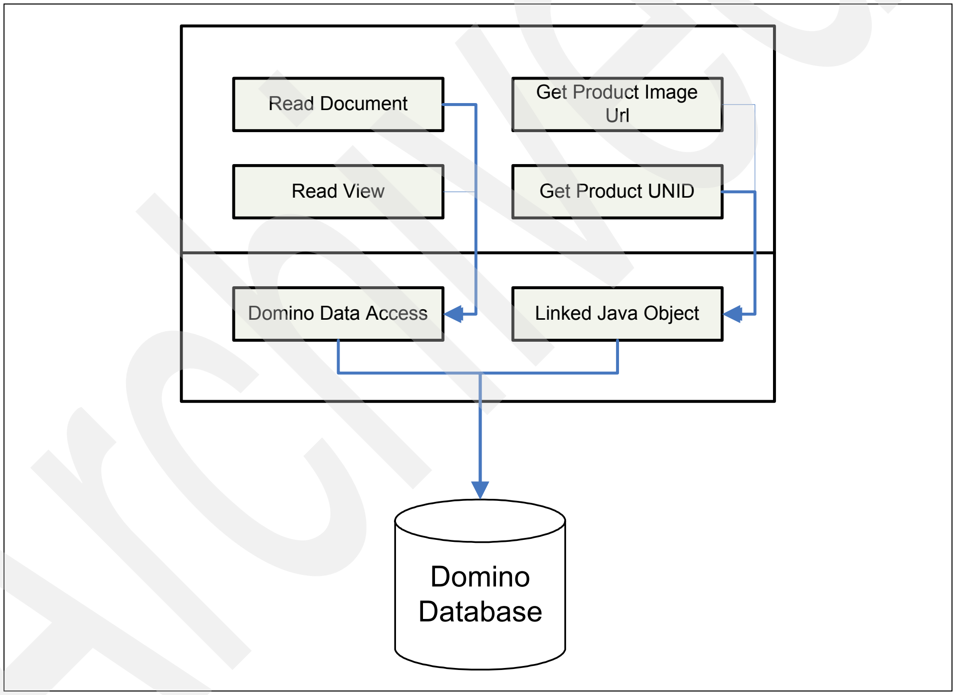


Figure 5-44 High-level overview of the Domino Service Provider model

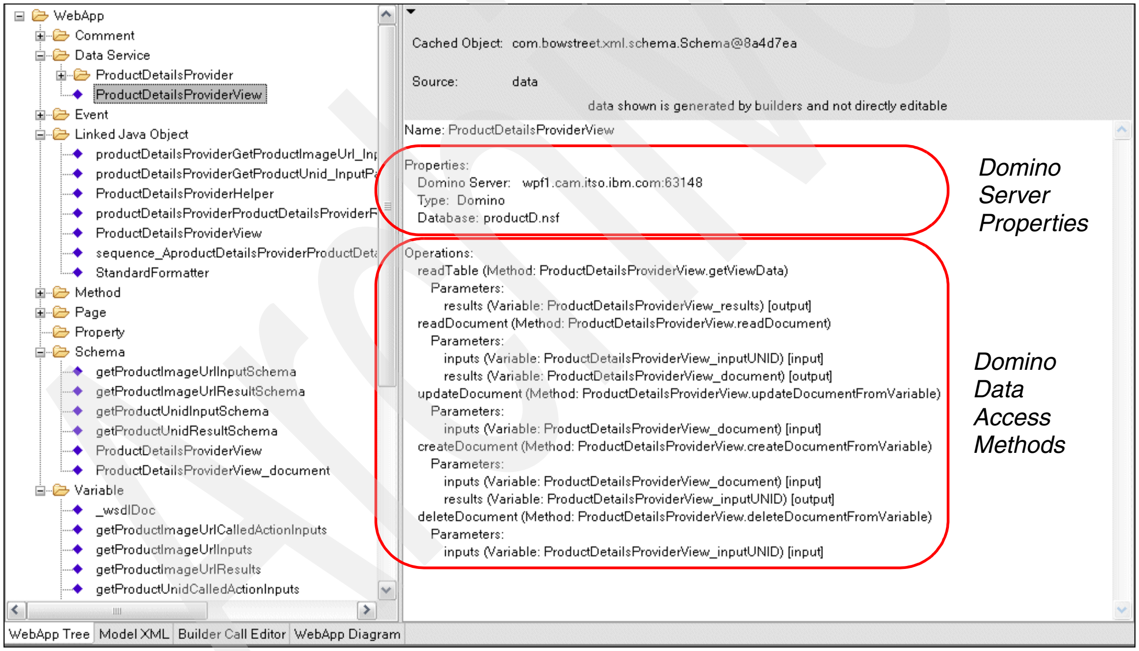
Using the Domino builders

In Chapter 3, when we added the Integration Extension → Lotus Collaboration Extension feature into the project, a set of builders and libraries was added to our project to enable the integration and access of Domino data. The builders added were Domino Attachment, Domino Data Access, Domino Formula, Domino Keyword Lookup, and Domino View & Form.

To provide access to Domino data, we use the Domino Data Access builder, which provides not only access to views within Domino, but also to document data. Enabling document support in this builder results in the builder creating five actions in the Data Service object in the WebApp:

- readTable: Reads the Domino view
- readDocument: Reads a single document given the document UNID as input
- updateDocument: Updates a document using an input structure containing all the form fields plus the document UNID
- createDocument: Creates a new document using an input structure containing all the form fields
- deleteDocument: Deletes the document given the document UNID as input

These operations can be seen when a Domino Data Access builder is added to a model by clicking the WebAppTree when the builder is selected, as shown in Figure 5-45.



```
WebApp
  Comment
  Data Service
    ProductDetailsProvider
    ProductDetailsProviderView
  Event
  Linked Java Object
    productDetailsProviderGetProductImageUrl_Inp
    productDetailsProviderGetProductUnid_InputPa
    ProductDetailsProviderHelper
    productDetailsProviderProductDetailsProviderF
    ProductDetailsProviderView
    sequence_AproductDetailsProviderProductDeta
    StandardFormatter
  Method
  Page
  Property
  Schema
    getProductImageUrlInputSchema
    getProductImageUrlResultSchema
    getProductUnidInputSchema
    getProductUnidResultSchema
    ProductDetailsProviderView
    ProductDetailsProviderView_document
  Variable
    _wsdlDoc
    getProductImageUrlCalledActionInputs
    getProductImageUrlInputs
    getProductImageUrlResults
    getProductUnidCalledActionInputs
```

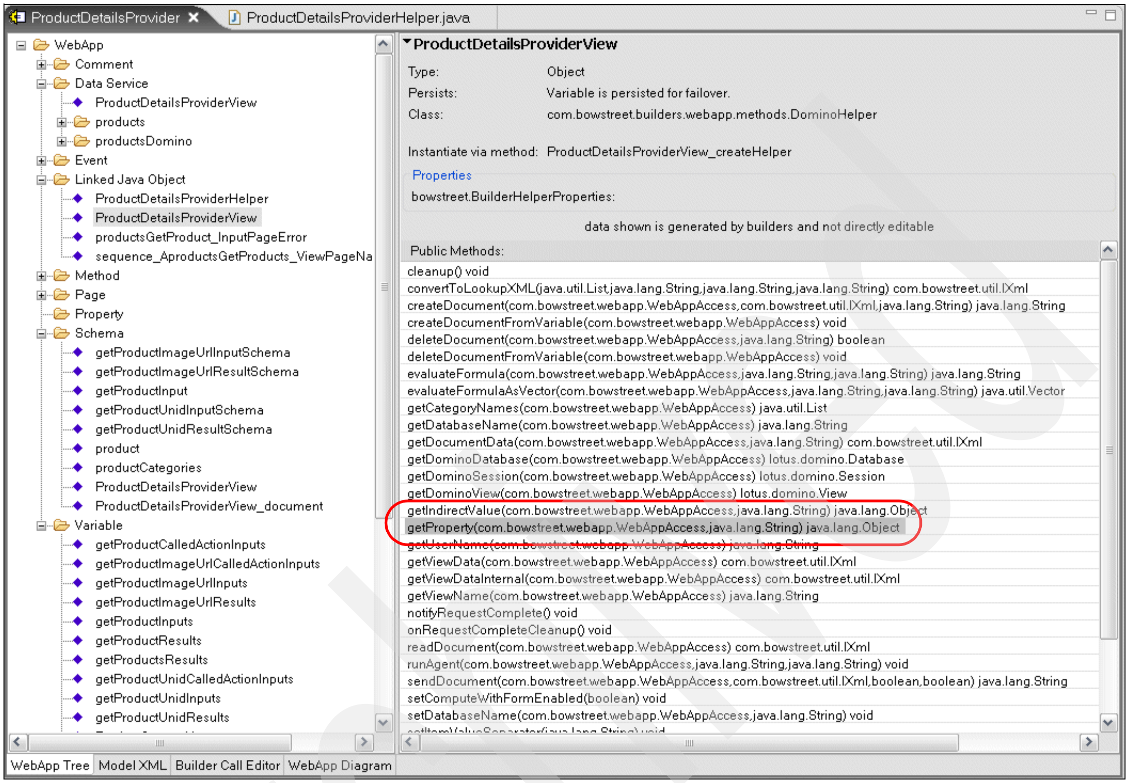
```
Cached Object:  com.bowstreet.xml.schema.Schema@8a4d7ea

Source:         data
                        data shown is generated by builders and not directly editable
Name: ProductDetailsProviderView

Properties:
  Domino Server:   wpf1.cam.itso.ibm.com:63148
  Type:  Domino
  Database: productD.nsf

Operations:
  readTable (Method: ProductDetailsProviderView.getViewData)
    Parameters:
      results (Variable: ProductDetailsProviderView_results) [output]
  readDocument (Method: ProductDetailsProviderView.readDocument)
    Parameters:
      inputs (Variable: ProductDetailsProviderView_inputUNID) [input]
      results (Variable: ProductDetailsProviderView_document) [output]
  updateDocument (Method: ProductDetailsProviderView.updateDocumentFromVariable)
    Parameters:
      inputs (Variable: ProductDetailsProviderView_document) [input]
  createDocument (Method: ProductDetailsProviderView.createDocumentFromVariable)
    Parameters:
      inputs (Variable: ProductDetailsProviderView_document) [input]
      results (Variable: ProductDetailsProviderView_inputUNID) [output]
  deleteDocument (Method: ProductDetailsProviderView.deleteDocumentFromVariable)
    Parameters:
      inputs (Variable: ProductDetailsProviderView_inputUNID) [input]
```

Domino Server Properties

Domino Data Access Methods

Figure 5-45 Operations and properties of the Domino Data Access builder

In the WebApp Tree view, you can also find the Linked Java Objects that are generated by the Domino Data Access builders and the methods for each of the objects, as shown in Figure 5-46 on page 170. In addition to the methods provided for accessing the Domino database, note that a getProperty method (circled) is also provided to read the credentials set in the config file, which is discussed later.


ProductDetailsProvider
ProductDetailsProviderHelper.java
WebApp
Comment
Data Service
ProductDetailsProviderView
products
productsDomino
Event
Linked Java Object
ProductDetailsProviderHelper
ProductDetailsProviderView
productsGetProduct_InputPageError
sequence_AproductsGetProducts_ViewPageNa
Method
Page
Property
Schema
getProductImageUrlInputSchema
getProductImageUrlResultSchema
getProductInput
getProductUnidInputSchema
getProductUnidResultSchema
product
productCategories
ProductDetailsProviderView
ProductDetailsProviderView_document
Variable
getProductCalledActionInputs
getProductImageUrlCalledActionInputs
getProductImageUrlInputs
getProductImageUrlResults
getProductInputs
getProductResults
getProductsResults
getProductUnidCalledActionInputs
getProductUnidInputs
getProductUnidResults
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

ProductDetailsProviderView

Type:	Object
Persists:	Variable is persisted for failover.
Class:	com.bowstreet.builders.webapp.methods.DominoHelper
Instantiate via method:	ProductDetailsProviderView_createHelper

Properties

bowstreet.BuilderHelperProperties:

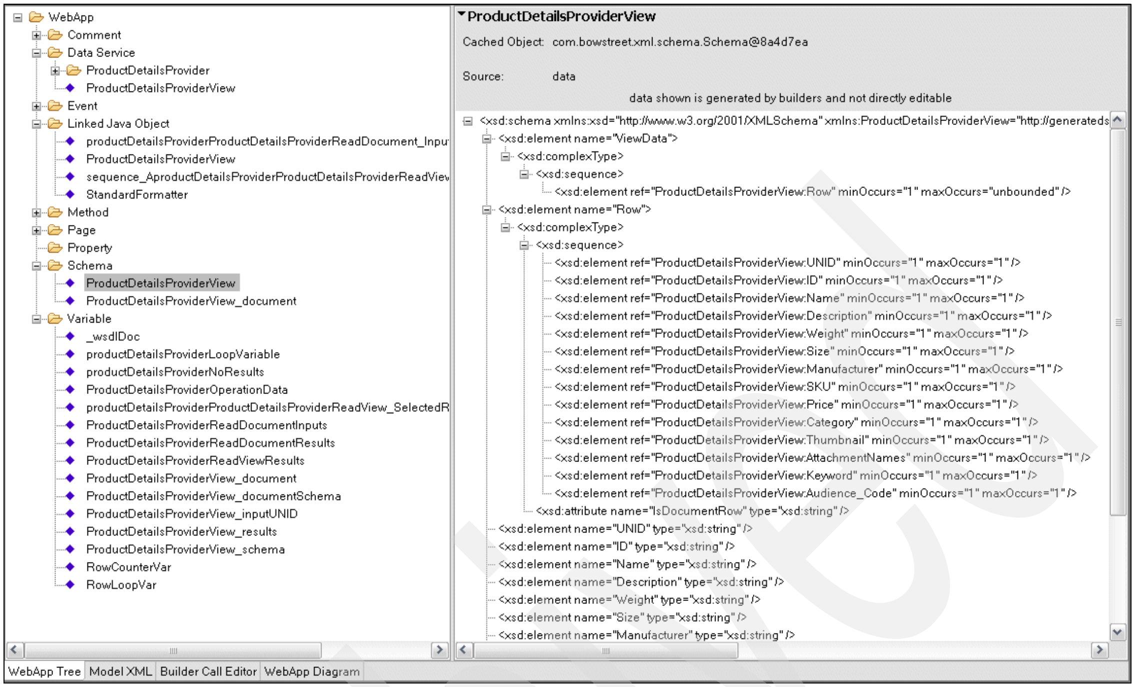
data shown is generated by builders and not directly editable

Public Methods:

```
cleanup() void
convertToLookupXML(java.util.List,java.lang.String,java.lang.String,java.lang.String) com.bowstreet.util.IXml
createDocument(com.bowstreet.webapp.WebAppAccess,com.bowstreet.util.IXml,java.lang.String) java.lang.String
createDocumentFromVariable(com.bowstreet.webapp.WebAppAccess) void
deleteDocument(com.bowstreet.webapp.WebAppAccess,java.lang.String) boolean
deleteDocumentFromVariable(com.bowstreet.webapp.WebAppAccess) void
evaluateFormula(com.bowstreet.webapp.WebAppAccess,java.lang.String,java.lang.String) java.lang.String
evaluateFormulaAsVector(com.bowstreet.webapp.WebAppAccess,java.lang.String,java.lang.String) java.util.Vector
getCategoryNames(com.bowstreet.webapp.WebAppAccess) java.util.List
getDatabaseName(com.bowstreet.webapp.WebAppAccess) java.lang.String
getDocumentData(com.bowstreet.webapp.WebAppAccess,java.lang.String) com.bowstreet.util.IXml
getDominoDatabase(com.bowstreet.webapp.WebAppAccess) lotus.domino.Database
getDominoSession(com.bowstreet.webapp.WebAppAccess) lotus.domino.Session
getDominoView(com.bowstreet.webapp.WebAppAccess) lotus.domino.View
getIndirectValue(com.bowstreet.webapp.WebAppAccess,java.lang.String) java.lang.Object
getProperty(com.bowstreet.webapp.WebAppAccess,java.lang.String) java.lang.Object
getUserName(com.bowstreet.webapp.WebAppAccess) java.lang.String
getViewData(com.bowstreet.webapp.WebAppAccess) com.bowstreet.util.IXml
getViewDataInternal(com.bowstreet.webapp.WebAppAccess) com.bowstreet.util.IXml
getViewName(com.bowstreet.webapp.WebAppAccess) java.lang.String
notifyRequestComplete() void
onRequestCompleteCleanup() void
readDocument(com.bowstreet.webapp.WebAppAccess) com.bowstreet.util.IXml
runAgent(com.bowstreet.webapp.WebAppAccess,java.lang.String,java.lang.String) void
sendDocument(com.bowstreet.webapp.WebAppAccess,com.bowstreet.util.IXml,boolean,boolean) java.lang.String
setComputeWithFormEnabled(boolean) void
setDatabaseName(com.bowstreet.webapp.WebAppAccess,java.lang.String) void
setItemValueSeparator(java.lang.String) void
```

Figure 5-46 Linked Java Objects generated by the Domino Data Access builder

Furthermore, since the Domino Data Access builder is specific to a view of a Domino database, it also automatically creates the schema of the view that is being retrieved (Figure 5-47).



```
WebApp
  Comment
  Data Service
    ProductDetailsProvider
    ProductDetailsProviderView
  Event
  Linked Java Object
    productDetailsProviderProductDetailsProviderReadDocument_Inpu
    ProductDetailsProviderView
    sequence_AproductDetailsProviderProductDetailsProviderReadView
    StandardFormatter
  Method
  Page
  Property
  Schema
    ProductDetailsProviderView
    ProductDetailsProviderView_document
  Variable
    _wsdlDoc
    productDetailsProviderLoopVariable
    productDetailsProviderNoResults
    ProductDetailsProviderOperationData
    productDetailsProviderProductDetailsProviderReadView_SelectedR
    ProductDetailsProviderReadDocumentInputs
    ProductDetailsProviderReadDocumentResults
    ProductDetailsProviderReadViewResults
    ProductDetailsProviderView_document
    ProductDetailsProviderView_documentSchema
    ProductDetailsProviderView_inputUNID
    ProductDetailsProviderView_results
    ProductDetailsProviderView_schema
    RowCounterVar
    RowLoopVar
```

ProductDetailsProviderView

Cached Object: com.bowstreet.xml.schema.Schema@8a4d7ea

Source: data

data shown is generated by builders and not directly editable

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:ProductDetailsProviderView="http://generateds
  <xsd:element name="ViewData">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="ProductDetailsProviderView:Row" minOccurs="1" maxOccurs="unbounded" />
  <xsd:element name="Row">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="ProductDetailsProviderView:UNID" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:ID" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Name" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Description" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Weight" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Size" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Manufacturer" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:SKU" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Price" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Category" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Thumbnail" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:AttachmentNames" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Keyword" minOccurs="1" maxOccurs="1" />
        <xsd:element ref="ProductDetailsProviderView:Audience_Code" minOccurs="1" maxOccurs="1" />
      <xsd:attribute name="IsDocumentRow" type="xsd:string" />
  <xsd:element name="UNID" type="xsd:string" />
  <xsd:element name="ID" type="xsd:string" />
  <xsd:element name="Name" type="xsd:string" />
  <xsd:element name="Description" type="xsd:string" />
  <xsd:element name="Weight" type="xsd:string" />
  <xsd:element name="Size" type="xsd:string" />
  <xsd:element name="Manufacturer" type="xsd:string" />
```

Figure 5-47 Schema generated by the Domino Data Access builder

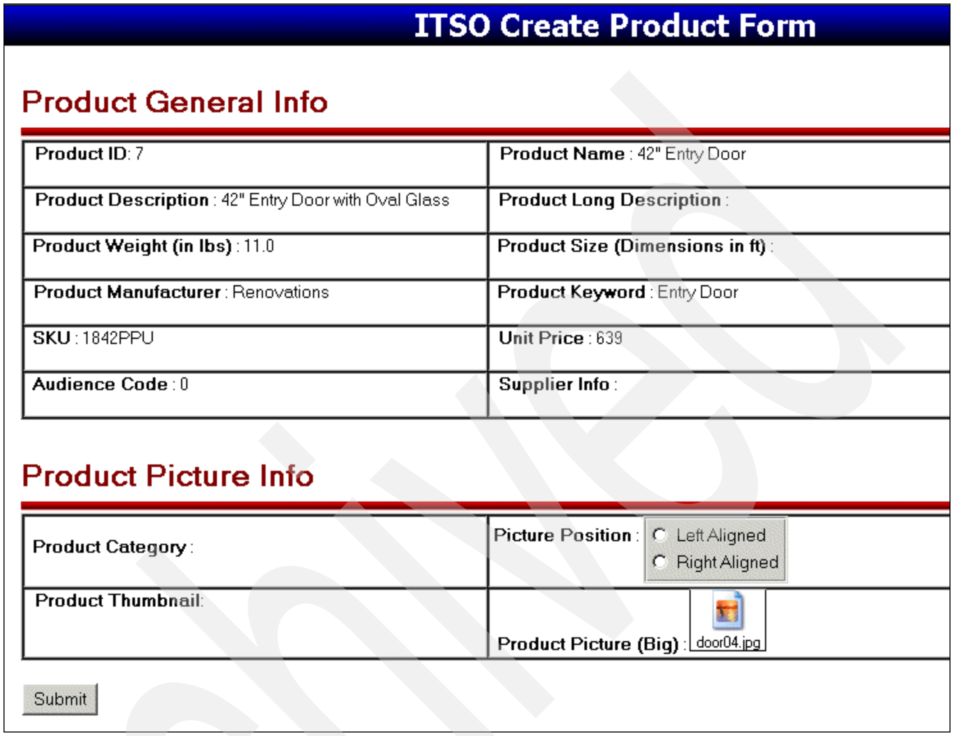
As you might have noticed when you included the Lotus Collaboration Extension feature set into your project, the Domino NCSO.jar is also included in the project, which allows you to write Java code/methods to extend any other functionality that you might not be able to accomplish with the builders described in the next few sections.

5.3.2 Design for ITSO Renovations: Product information

ITSO Renovations is accessing a Domino database to retrieve a list of all available internal products of the organization and to get the details about one specific product.

The service must follow the common product interface defined in 4.4.2, “Application Data Service Interface: Definition and operations” on page 92. The interface to access Domino is different from the common one, therefore a data transformation will be required to match them. To test the Domino access independently we defined a private service within the model that isolated the common from the specific back-end interface. The transformation stays between them to adjust the XML and follow the Product schema.

The design of the Product information in terms of the Domino Form input and the Domino View that will be used is shown in Figure 5-48 and Figure 5-49.



ITSO Create Product Form

Product General Info

Product ID: 7	**Product Name** : 42" Entry Door
Product Description : 42" Entry Door with Oval Glass	**Product Long Description** :
Product Weight (in lbs) : 11.0	**Product Size (Dimensions in ft)** :
Product Manufacturer : Renovations	**Product Keyword** : Entry Door
SKU : 1842PPU	**Unit Price** : 639
Audience Code : 0	**Supplier Info** :

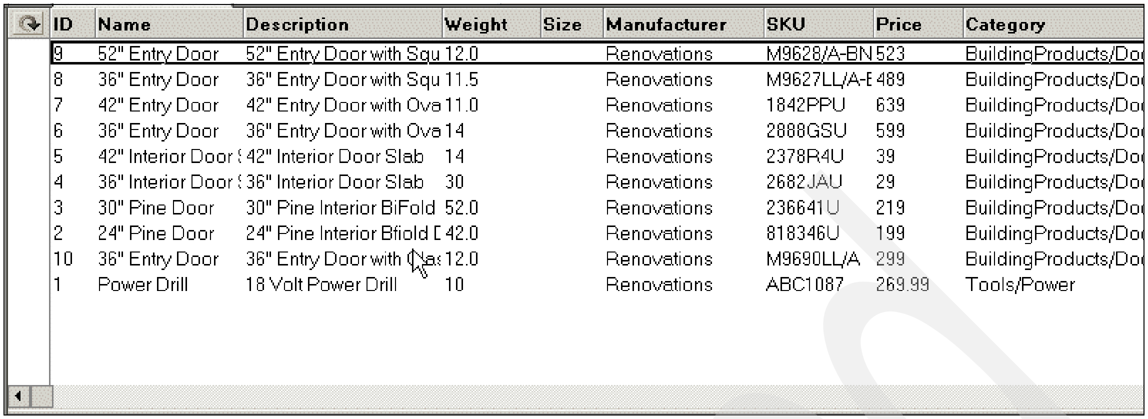
Product Picture Info

Product Category :	**Picture Position** : ○ Left Aligned ○ Right Aligned
Product Thumbnail:	**Product Picture (Big)** : door04.jpg

Submit

Figure 5-48   Form view of the product details in Domino

As shown in Figure 5-48, the user attaches the image of the product in the Product Picture (Big) field. This is stored as an attachment to the Notes document and can be retrieved in a document using the @AttachmentNames formula.



ID	Name	Description	Weight	Size	Manufacturer	SKU	Price	Category
9	52" Entry Door	52" Entry Door with Squ	12.0		Renovations	M9628/A-BN	523	BuildingProducts/Do
8	36" Entry Door	36" Entry Door with Squ	11.5		Renovations	M9627LL/A-E	489	BuildingProducts/Do
7	42" Entry Door	42" Entry Door with Ova	11.0		Renovations	1842PPU	639	BuildingProducts/Do
6	36" Entry Door	36" Entry Door with Ova	14		Renovations	2888GSU	599	BuildingProducts/Do
5	42" Interior Door S	42" Interior Door Slab	14		Renovations	2378R4U	39	BuildingProducts/Do
4	36" Interior Door S	36" Interior Door Slab	30		Renovations	2682JAU	29	BuildingProducts/Do
3	30" Pine Door	30" Pine Interior BiFold	52.0		Renovations	236641U	219	BuildingProducts/Do
2	24" Pine Door	24" Pine Interior Bfiold D	42.0		Renovations	818346U	199	BuildingProducts/Do
10	36" Entry Door	36" Entry Door with Cla	12.0		Renovations	M9690LL/A	299	BuildingProducts/Do
1	Power Drill	18 Volt Power Drill	10		Renovations	ABC1087	269.99	Tools/Power

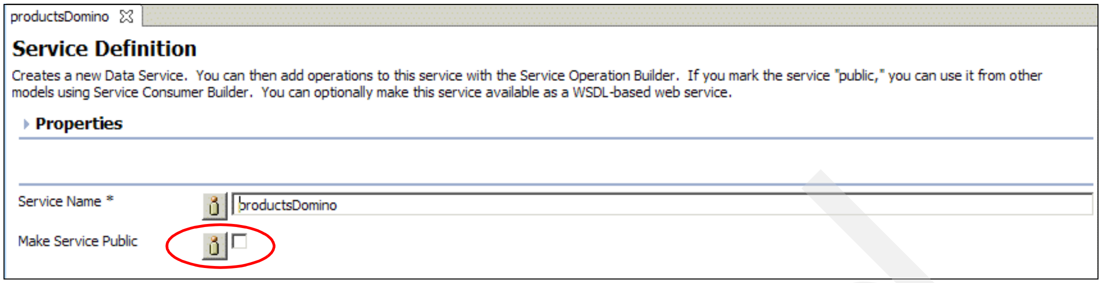
Figure 5-49 All Products view of the ProductD.nsf Domino database

The private service contains all specific functions for Domino access, including usage of the DominoDataAccess builder. Additionally, we have created a helper Java class with special functionality that is not provided by the builder. The definitions of the private service operations are in Table 5-14.

Table 5-14 Domino Service definition

Service operation	Description
ProductDetailsProviderReadView	Added when creating the Domino Data Provider. It access the database to read a view.
ProductDetailsProviderReadDocument	Added when creating the Domino Data Provider. It access the database to read a document.
getProductUnid	Helper operation to retrieve the UNID for a given product ID.
getProductImageUrl	Helper operation to retrieve the absolute URL of the image. It will be returned in the corresponding field of the image.

Note that the Service definition will be automatically added when creating the Domino Data Provider and must not be visible by data consumers. This is done by unselecting the Make Service Public option in the builder (Figure 5-50).


productsDomino

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * productsDomino

Make Service Public □

Figure 5-50 Service Definition builder for Domino access: Private service

Following are some recommendations for Domino access design:

- Use builders provided by the Domino - Lotus Collaboration Extension when it is possible. If the provided functionality is not enough for your specific requirements, provide an implementation in a Java class that will be accessed via an LJO builder.
- Define a private service definition to access Domino and retrieve all data without any transformation. This is very useful for testing purposes because you can test the Domino builders independently of your application interface. However, depending on the application, this is not always possible because this action adds overhead to the current model due to:
  - Additional builders for the Service Definition and Operations.
  - Generation of additional internal variables to keep the data for each operation (input/results), which increases the memory footprint for the session.

  In our example we have implemented a private data service to access Domino; it is invoked by the service operations that follow the application interface.
- Data transformations could be required to match the schemas of the input/results between the common and Domino interface. Consider using the Transformation builder if the transformation is simple, or a method in the Java class manipulating the XML documents following the IXml API.

5.3.3 Implementing the service

To implement the server, both the Domino and Portlet Factory must be configured to make sure the Domino Access builders will work.

Setting up DIIOP on Domino

The Domino integration builders use the Domino Java APIs, which communicate with Domino via CORBA. Therefore, your Domino server must be running the DIIOP task. Also, the connecting user must have ACL permissions to the database. To verify that DIIOP is running, try accessing:

```
http://<server_name>/diiop_ior.txt
```

If you are able to see a text string, the DIIOP task is running. If not, use the steps in the following article to set up your Domino server to support DIIOP ("NotesException: Could not get IOR from Domino Server" http://wpf1.cam.itso.ibm.com/diiop_ior.txt). For additional information on configuration, see the help file for the Domino Data Access and Domino View & Form builders.

Configuring the Domino connection and credentials

Before you create the provider model, the Domino server information and the credential information has to be set. This information can be supplied in several ways, which are described in the builder help. For this application, we created a properties file based on the example provided in WEB-INF\config\domino_config\redbook_domino_server.properties. Example 3-1 provides the contents of our properties file.

Example 5-5 Properties file

```
# servername. Replace localhost with the fully qualified
# server name of your domino server.
ServerName=localhost:63148

# Username and Password are required
UserName=administrator
Password=admin
```

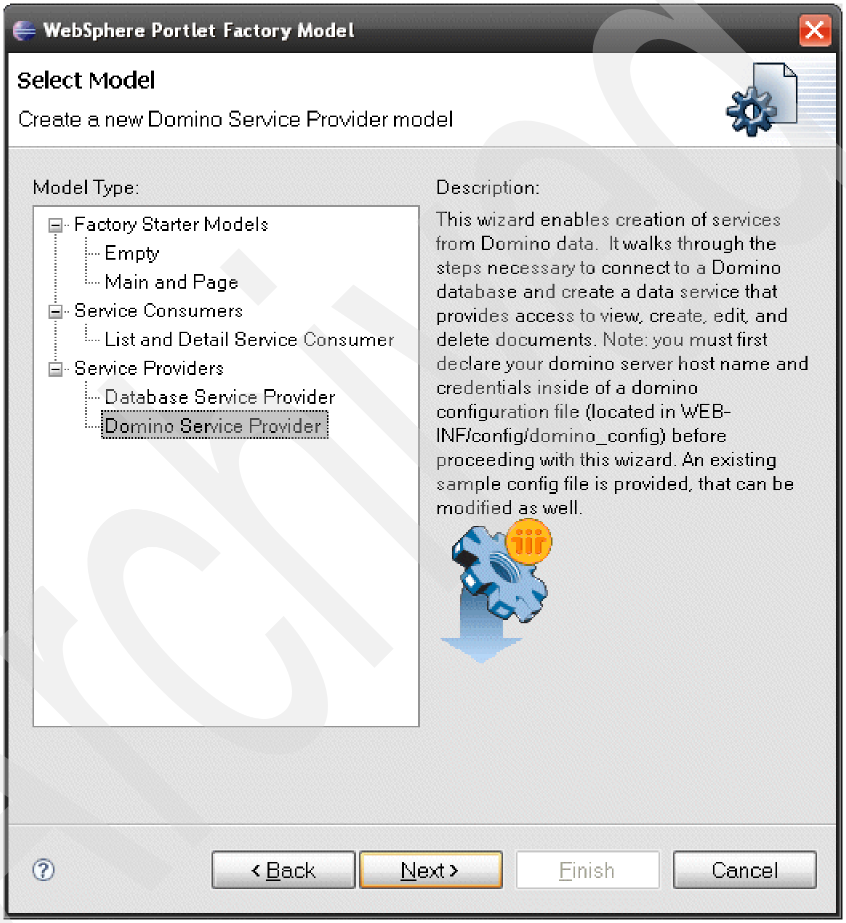
For the ServerName property, specify the fully qualified hostname of the machine where Domino is running. We also appended the DIIOP port number so that the IOR (Interoperable Object Reference) can be retrieved. We then specified a username and password for accessing the database.

With the Domino service running and the configurations in Portlet Factory completed, you can now proceed to create a Domino Provider.

Creating a Domino Provider model

To create the Domino Service Provider, use the Domino Service Provider Wizard to create an initial set of builders that provide you with access to the database. Perform the following steps to do this:

1. Create a new model by selecting the **redbook** → **cs** → **data** → **domino** folder.
2. Select **Domino Service Provider** from the Select Model screen.


WebSphere Portlet Factory Model

Select Model

Create a new Domino Service Provider model

Model Type:

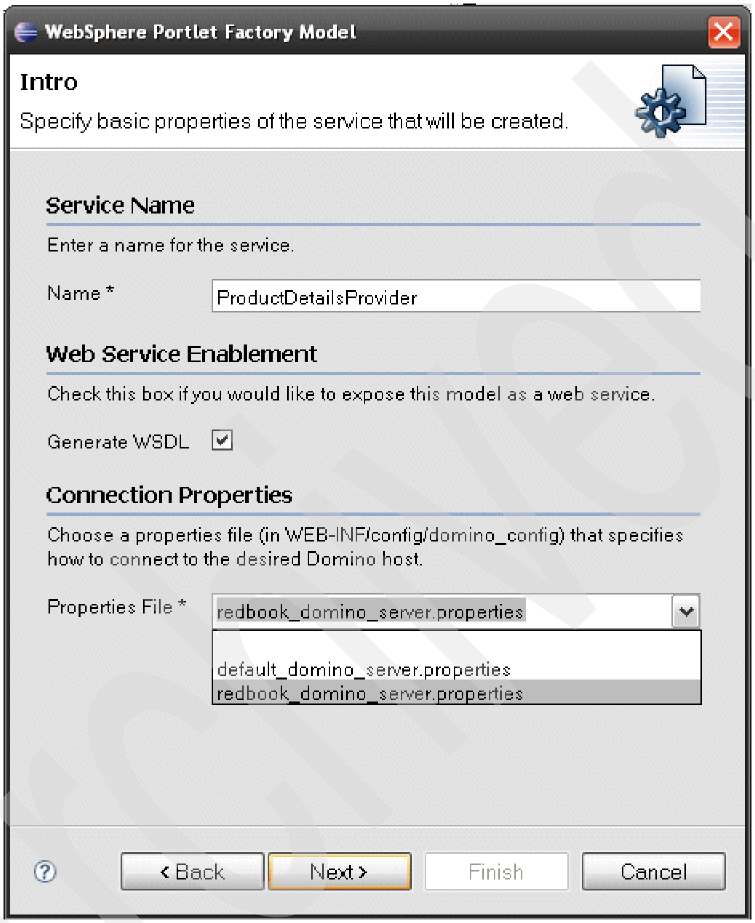
- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consumer
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

This wizard enables creation of services from Domino data. It walks through the steps necessary to connect to a Domino database and create a data service that provides access to view, create, edit, and delete documents. Note: you must first declare your domino server host name and credentials inside of a domino configuration file (located in WEB-INF/config/domino_config) before proceeding with this wizard. An existing sample config file is provided, that can be modified as well.

Figure 5-51 Creation of the Domino Service Provider

3. Provide the name of the service and select the properties file containing the Domino server name and credentials as highlighted in the previous section (Figure 5-52).



Intro

Specify basic properties of the service that will be created.

Service Name

Enter a name for the service.

Name * ProductDetailsProvider

Web Service Enablement

Check this box if you would like to expose this model as a web service.

Generate WSDL ☑

Connection Properties

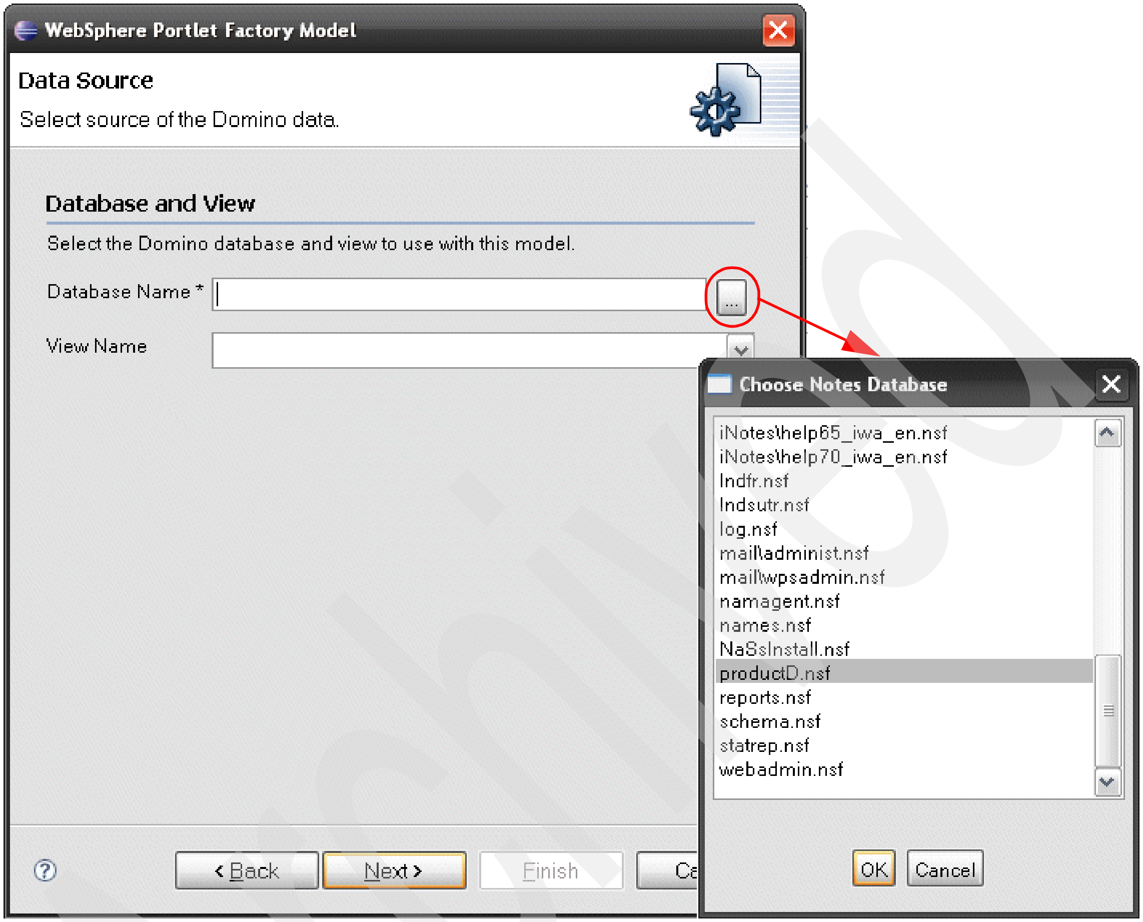
Choose a properties file (in WEB-INF/config/domino_config) that specifies how to connect to the desired Domino host.

Properties File * redbook_domino_server.properties

default_domino_server.properties
redbook_domino_server.properties

Figure 5-52 Details of the Domino Service Provider

4. Select the Domino database to be accessed (Figure 5-53).



Data Source

Select source of the Domino data.

Database and View

Select the Domino database and view to use with this model.

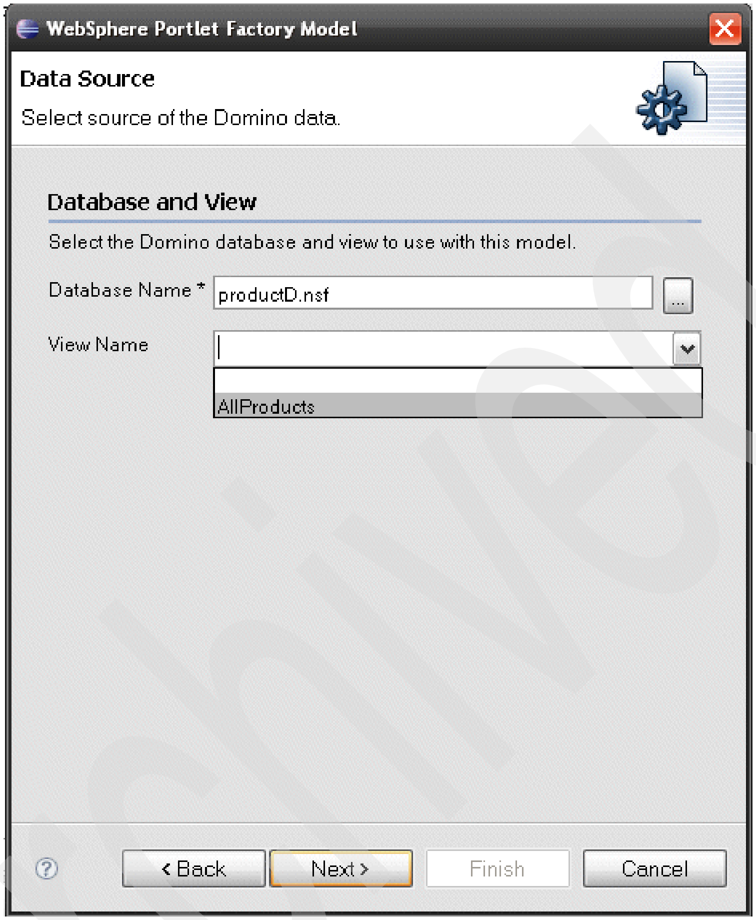
Database Name *

View Name

iNotes\help65_iwa_en.nsf
iNotes\help70_iwa_en.nsf
lndfr.nsf
lndsutr.nsf
log.nsf
mail\administ.nsf
mail\wpsadmin.nsf
namagent.nsf
names.nsf
NaSsInstall.nsf
productD.nsf
reports.nsf
schema.nsf
statrep.nsf
webadmin.nsf

Figure 5-53 Selection of the Notes database

5. Select the view of the database to be accessed (Figure 5-54).



WebSphere Portlet Factory Model

Data Source

Select source of the Domino data.

Database and View

Select the Domino database and view to use with this model.

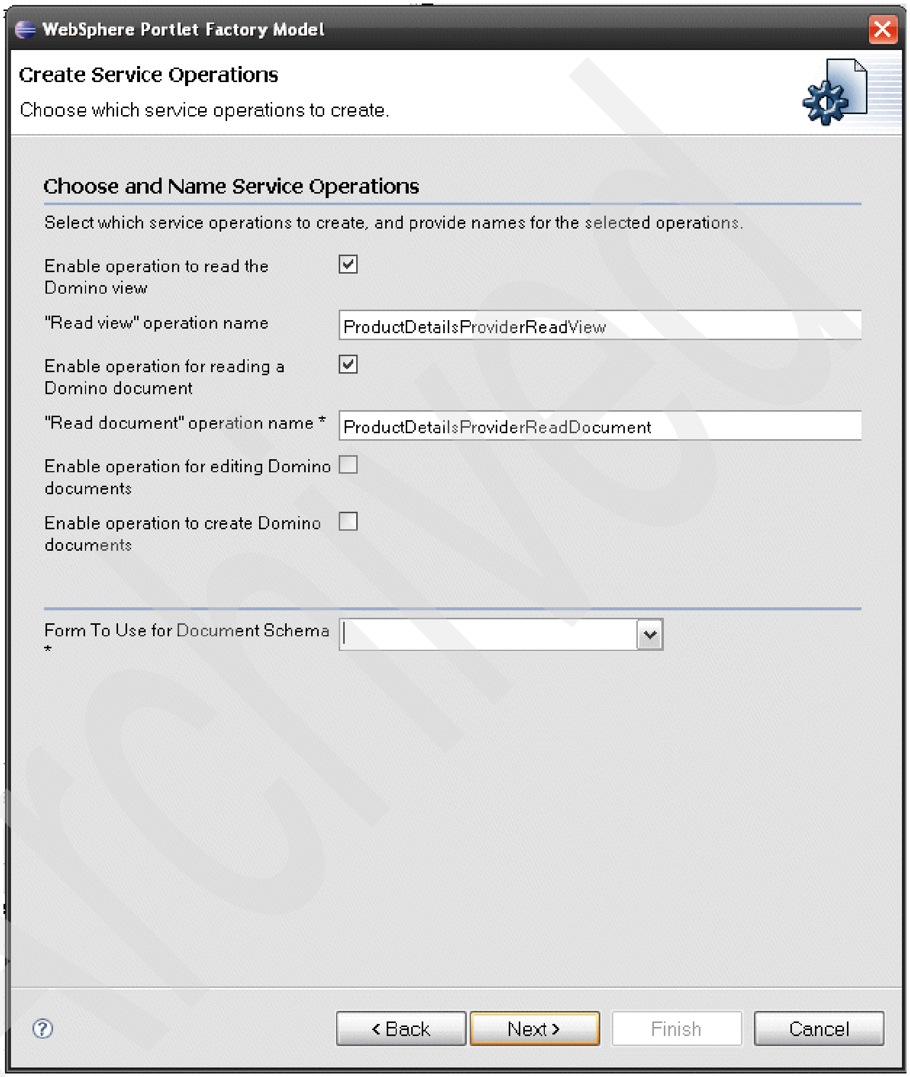
Database Name * productD.nsf

View Name

AllProducts

Figure 5-54 Selection of the View from the database

6. Enable the operation for reading a Domino document and provide the names for the respective service operations of reading the Domino View and Domino document (Figure 5-55).



WebSphere Portlet Factory Model

Create Service Operations

Choose which service operations to create.

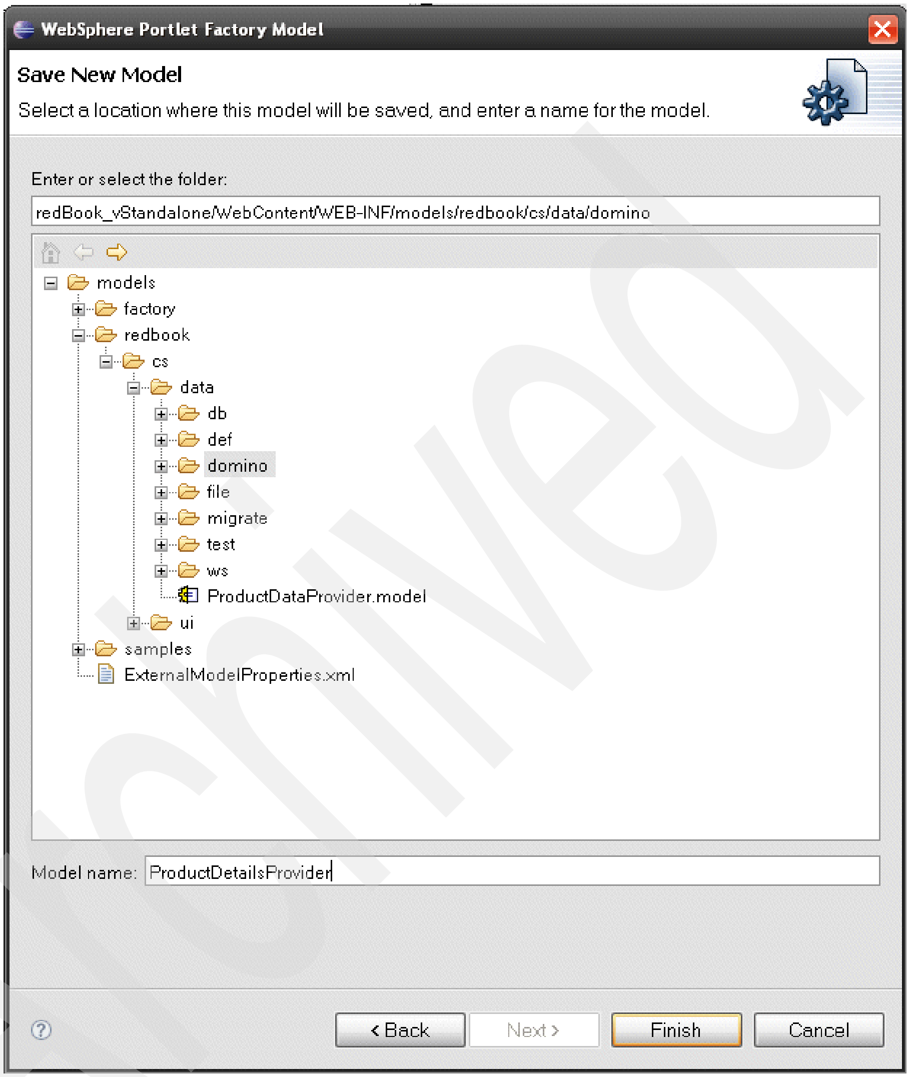
Choose and Name Service Operations

Select which service operations to create, and provide names for the selected operations.

Enable operation to read the Domino view	☑
"Read view" operation name	ProductDetailsProviderReadView
Enable operation for reading a Domino document	☑
"Read document" operation name *	ProductDetailsProviderReadDocument
Enable operation for editing Domino documents	□
Enable operation to create Domino documents	□
Form To Use for Document Schema *	

Figure 5-55 Definition of the main operations

7. Provide a Model name (Figure 5-56).



WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

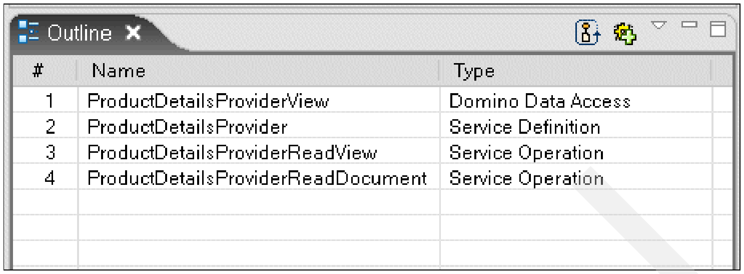
Enter or select the folder:

redBook_vStandalone/WebContent/WEB-INF/models/redbook/cs/data/domino

Model name: ProductDetailsProvider

Figure 5-56 Set the Provider name and finish the creation of the model

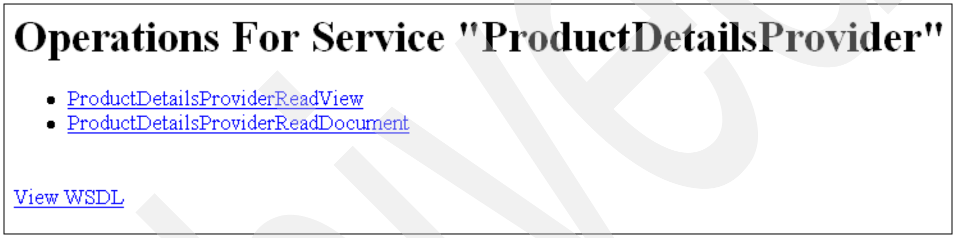
8. Click **Finish**. The wizard generates the list of builders necessary to create a Domino Data Provider model. Upon completion, you should see the list of builders created, as shown in Figure 5-57.



#	Name	Type
1	ProductDetailsProviderView	Domino Data Access
2	ProductDetailsProvider	Service Definition
3	ProductDetailsProviderReadView	Service Operation
4	ProductDetailsProviderReadDocument	Service Operation

Figure 5-57 List of Builders generated by the Domino Provider Wizard

9. To verify the Domino Data provider, run the model and the results will appear as shown.

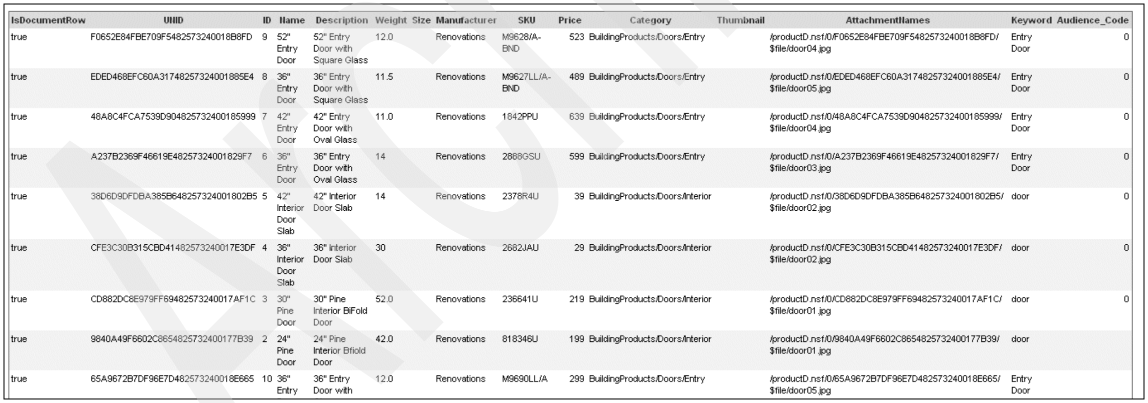


Operations For Service "ProductDetailsProvider"

- ProductDetailsProviderReadView
- ProductDetailsProviderReadDocument

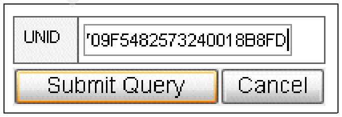
View WSDL

Figure 5-58 Service Operations created



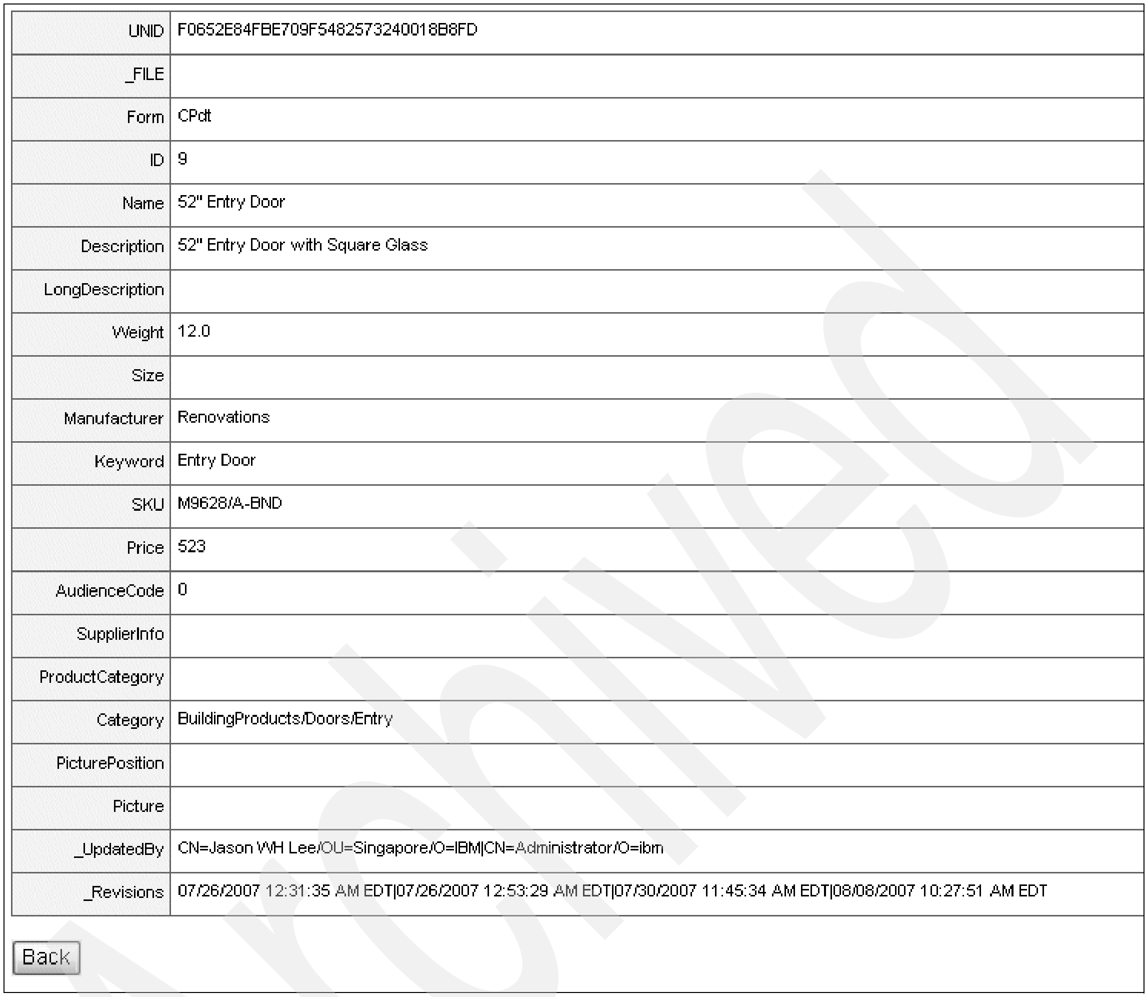
IsDocumentRow	UNID	ID	Name	Description	Weight	Size	Manufacturer	SKU	Price	Category	Thumbnail	AttachmentNames	Keyword	Audience_Code
true	F0652E84FBE709F5482573240018B8FD	9	52" Entry Door	52" Entry Door with Square Glass	12.0		Renovations	M9628/A-BND	523	BuildingProducts/Doors/Entry		/productD.nsf/0/F0652E84FBE709F5482573240018B8FD/ $file/door04.jpg	Entry Door	0
true	EDED468EFC60A3174825732400188 5E4	8	36" Entry Door	36" Entry Door with Square Glass	11.5		Renovations	M9627LL/A-BND	489	BuildingProducts/Doors/Entry		/productD.nsf/0/EDED468EFC60A31748257324001885E4/ $file/door05.jpg	Entry Door	0
true	48A8C4FCA7539D904825732400185999	7	42" Entry Door	42" Entry Door with Oval Glass	11.0		Renovations	1842PPU	639	BuildingProducts/Doors/Entry		/productD.nsf/0/48A8C4FCA7539D904825732400185999/ $file/door04.jpg	Entry Door	0
true	A237B2369F46619E48257324001829F7	6	36" Entry Door	36" Entry Door with Oval Glass	14		Renovations	2888GSU	599	BuildingProducts/Doors/Entry		/productD.nsf/0/A237B2369F46619E48257324001829F7/ $file/door03.jpg	Entry Door	0
true	38D6D9DFDBA385B648257324001802B5	5	42" Interior Door Slab	42" Interior Door Slab	14		Renovations	2378R4U	39	BuildingProducts/Doors/Interior		/productD.nsf/0/38D6D9DFDBA385B648257324001802B5/ $file/door02.jpg	door	0
true	CFE3C30B315CBD41482573240017E3DF	4	36" Interior Door Slab	36" Interior Door Slab	30		Renovations	2682JAU	29	BuildingProducts/Doors/Interior		/productD.nsf/0/CFE3C30B315CBD41482573240017E3DF/ $file/door02.jpg	door	0
true	CD882DC8E979FF69482573240017AF1C	3	30" Pine Door	30" Pine Interior BiFold Door	52.0		Renovations	236641U	219	BuildingProducts/Doors/Interior		/productD.nsf/0/CD882DC8E979FF69482573240017AF1C/ $file/door01.jpg	door	0
true	9840A49F6602C8654825732400177B39	2	24" Pine Door	24" Pine Interior Bfiold Door	42.0		Renovations	818346U	199	BuildingProducts/Doors/Interior		/productD.nsf/0/9840A49F6602C8654825732400177B39/ $file/door01.jpg	door	
true	65A9672B7DF96E7D482573240018E665	10	36" Entry	36" Entry Door with	12.0		Renovations	M9690LL/A	299	BuildingProducts/Doors/Entry		/productD.nsf/0/65A9672B7DF96E7D482573240018E665/ $file/door05.jpg	Entry Door	

Figure 5-59 ProductDetailsProviderReadView results



UNID	'09F5482573240018B8FD

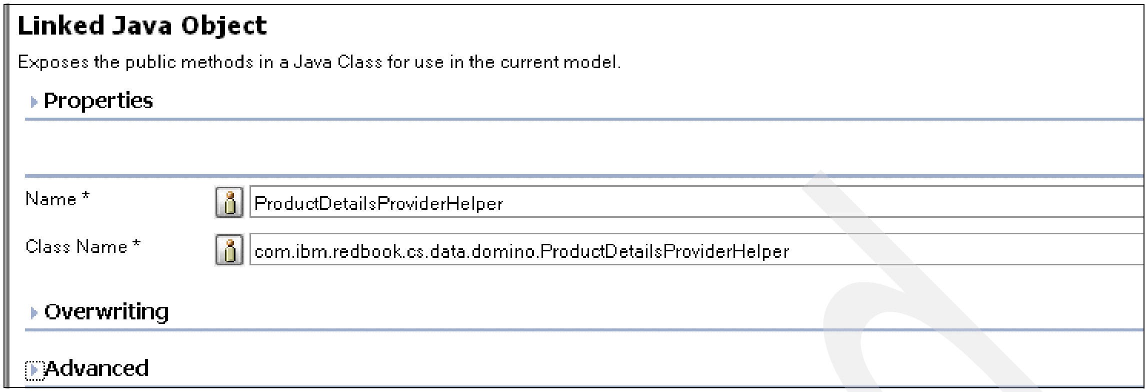
Figure 5-60 Input required for ProductDetailsProviderReadDocument



UNID	F0652E84FBE709F5482573240018B8FD
_FILE	
Form	CPdt
ID	9
Name	52" Entry Door
Description	52" Entry Door with Square Glass
LongDescription	
Weight	12.0
Size	
Manufacturer	Renovations
Keyword	Entry Door
SKU	M9628/A-BND
Price	523
AudienceCode	0
SupplierInfo	
ProductCategory	
Category	BuildingProducts/Doors/Entry
PicturePosition	
Picture	
_UpdatedBy	CN=Jason WH Lee/OU=Singapore/O=IBM|CN=Administrator/O=ibm
_Revisions	07/26/2007 12:31:35 AM EDT|07/26/2007 12:53:29 AM EDT|07/30/2007 11:45:34 AM EDT|08/08/2007 10:27:51 AM EDT

Figure 5-61 ProductDetailsProviderReadDocument Results

10. Once Domino Service Operations is created, you must create two more service operations to complete the provider model that will enable you to get the UNID of the Domino document and the attachment image URL given the product ID that is selected. Add an Linked Java Object referring to the ProductDetailsProviderHelper class (Figure 5-62).


Linked Java Object

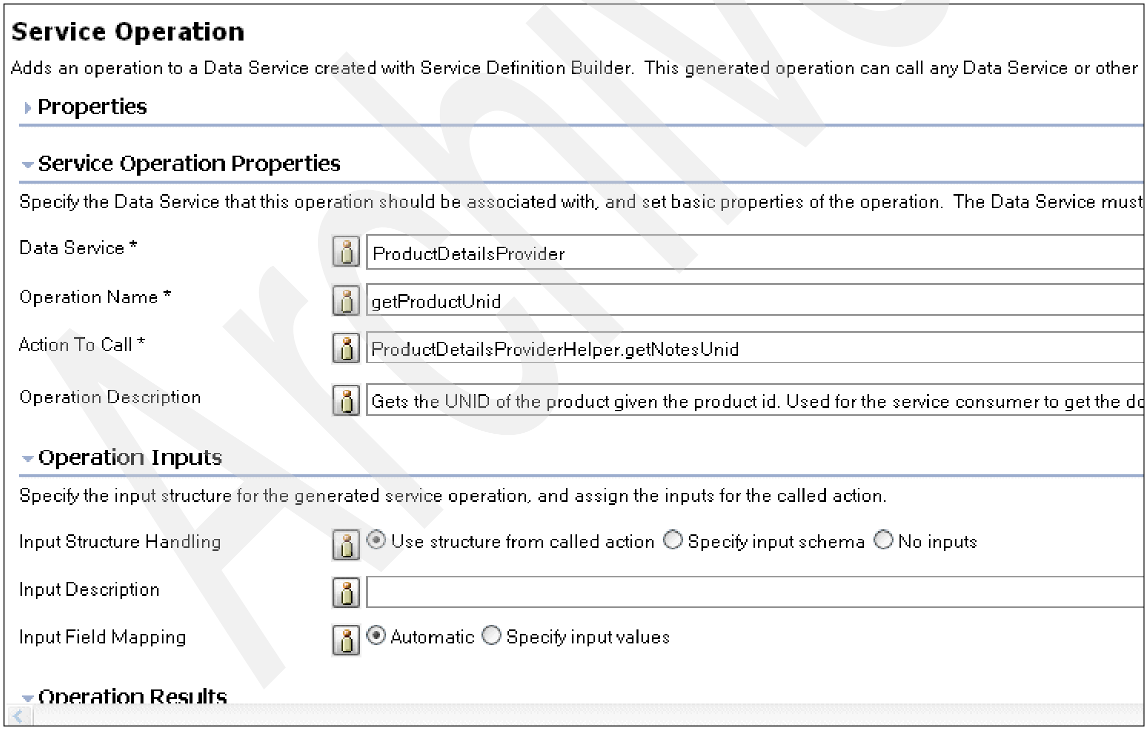
Exposes the public methods in a Java Class for use in the current model.

Name * ProductDetailsProviderHelper

Class Name * com.ibm.redbook.cs.data.domino.ProductDetailsProviderHelper

Figure 5-62 Linked Java Object builder: helper object for Domino Data Provider

11. Using the methods exposed through the Linked Java Object, create two service operations that can be invoked by the service consumer (Figure 5-63 and Figure 5-64).


Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other

Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must

Data Service * ProductDetailsProvider

Operation Name * getProductUnid

Action To Call * ProductDetailsProviderHelper.getNotesUnid

Operation Description Gets the UNID of the product given the product id. Used for the service consumer to get the dc

Operation Inputs

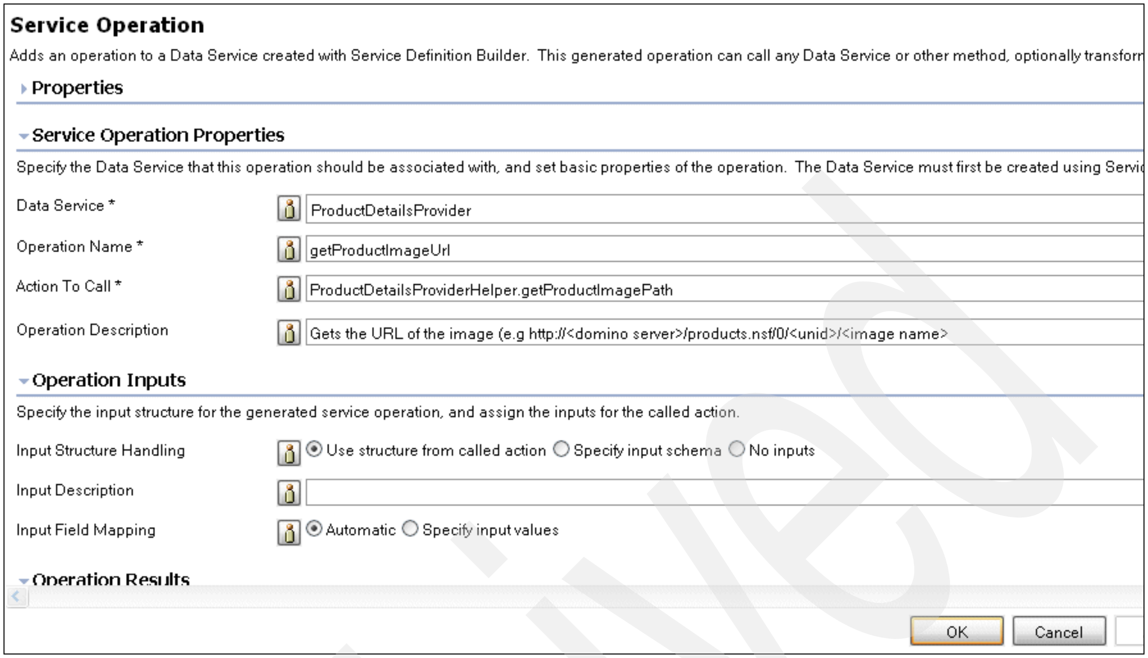
Specify the input structure for the generated service operation, and assign the inputs for the called action.

Input Structure Handling ● Use structure from called action ○ Specify input schema ○ No inputs

Input Description

Input Field Mapping ● Automatic ○ Specify input values

Figure 5-63 Adding the getProductUnid Service Operation



Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforn

▸ Properties

▾ Service Operation Properties

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Servic

Data Service *	ProductDetailsProvider
Operation Name *	getProductImageUrl
Action To Call *	ProductDetailsProviderHelper.getProductImagePath
Operation Description	Gets the URL of the image (e.g http://<domino server>/products.nsf/0/<unid>/<image name>

▾ Operation Inputs

Specify the input structure for the generated service operation, and assign the inputs for the called action.

Input Structure Handling	● Use structure from called action ○ Specify input schema ○ No inputs
Input Description	
Input Field Mapping	● Automatic ○ Specify input values

▾ Operation Results

Figure 5-64 Adding the getProductImageUrl Service Operation

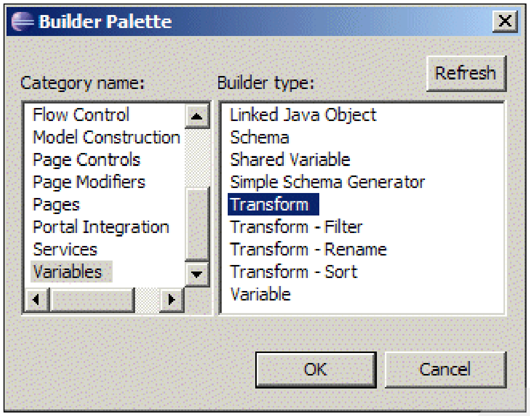
12. After creating the service operations that invoke the Linked Java Object methods, the Domino Data Provider would have two additional operations that would retrieve the UNID and Image URL given the product ID.

5.3.4 Data transformations: Use of Transform builders

The data transformation that is required in the scenario is simple and can be done using the Transform builder. It is a transformation from a plain XML (Domino document) into a plain XML (Product) schema. The documents in both cases contain a root element and a list of children without any additional hierarchy.

Perform the following steps to create the transformation between the results of the operation ProductDetailsProviderReadDocument and getProduct:

1. Add a Transform builder with the name transformProduct to the model ProductDetailsProvider (under models\redbook\cs\data\domino). The builder is located under the Variables category in the Builder Palette.



Builder Palette

Category name:

Flow Control
Model Construction
Page Controls
Page Modifiers
Pages
Portal Integration
Services
Variables

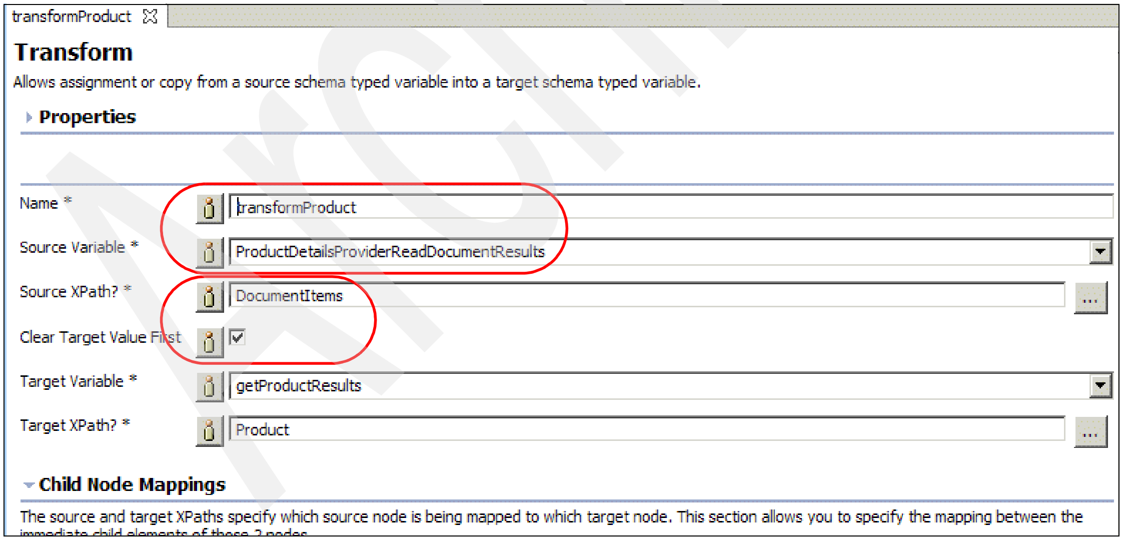
Builder type:

Linked Java Object
Schema
Shared Variable
Simple Schema Generator
Transform
Transform - Filter
Transform - Rename
Transform - Sort
Variable

Figure 5-65 Variables category in Builder Palette: Transform builders

There are some other builders related to transformations that can be used for other simple operations: filter, rename, and sort of data.

2. The source variable is pointing to the result variable of the operation ProductDetailsProviderReadDocument; the target variable to the result of the operation getProduct. The XPaths for source and target in this case are the root elements of both documents. We select to clean up the target value to ensure that previous executions are not appending values.



transformProduct

Transform

Allows assignment or copy from a source schema typed variable into a target schema typed variable.

Properties

Name * transformProduct

Source Variable * ProductDetailsProviderReadDocumentResults

Source XPath? * DocumentItems

Clear Target Value First ☑

Target Variable * getProductResults

Target XPath? * Product

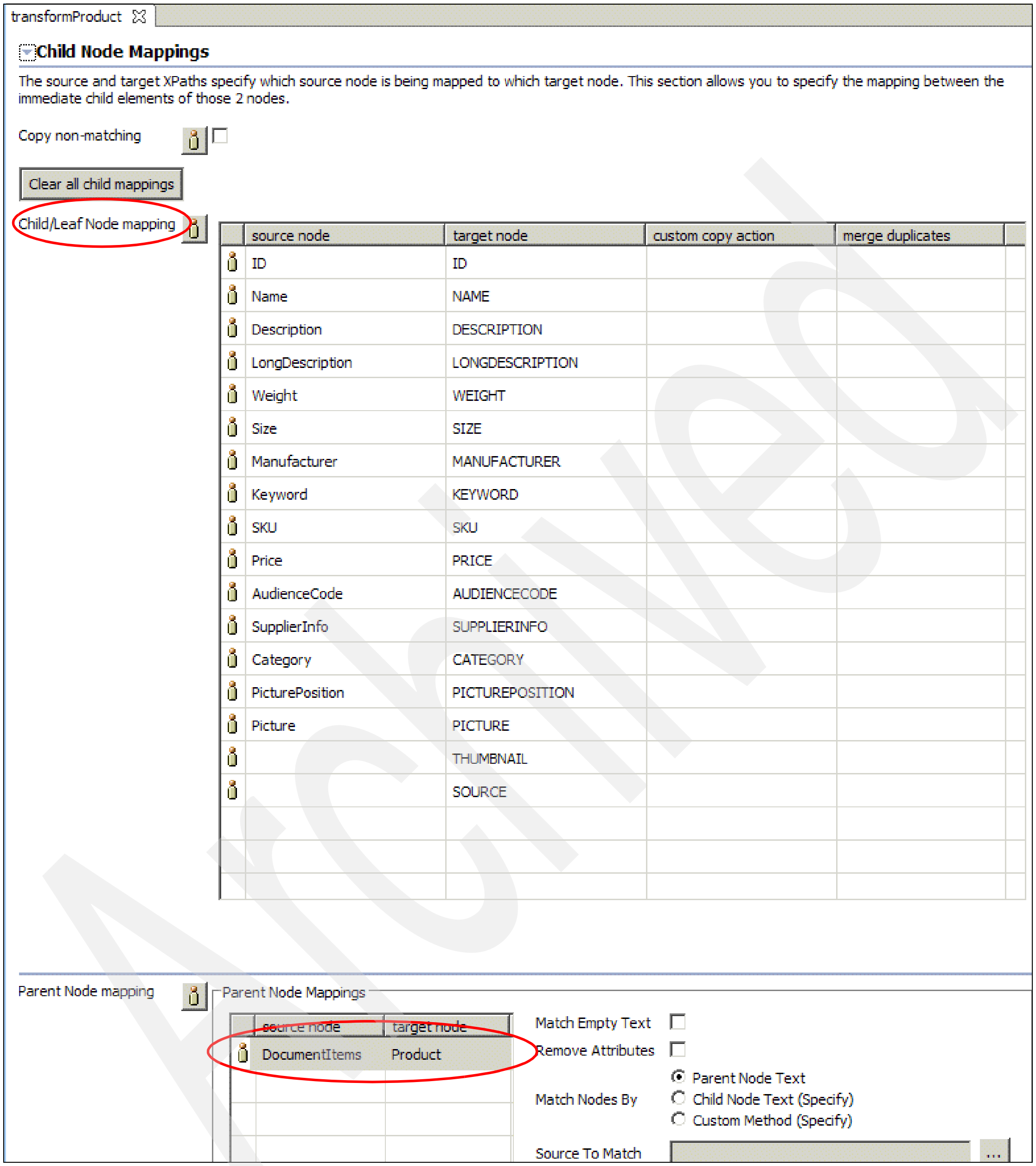
Child Node Mappings

The source and target XPaths specify which source node is being mapped to which target node. This section allows you to specify the mapping between the immediate child elements of these 2 nodes.

Figure 5-66 Transform builder: Defining source and target

3. Define the child node mappings. These are the mappings between the children of the root elements. Some values in the target do not have a mapping, so they are not provided by the source. Also, some values of the source do not have a corresponding mapping in the target; they are not used or filtered.

   The parent node mappings can remain by default since we have only a root element and no complex hierarchy. The builder provides additional options to control the mapping of parent nodes (refer the documentation of the builder for more details).



Child Node Mappings

The source and target XPaths specify which source node is being mapped to which target node. This section allows you to specify the mapping between the immediate child elements of those 2 nodes.

Copy non-matching □

Child/Leaf Node mapping

source node	target node	custom copy action	merge duplicates
ID	ID		
Name	NAME		
Description	DESCRIPTION		
LongDescription	LONGDESCRIPTION		
Weight	WEIGHT		
Size	SIZE		
Manufacturer	MANUFACTURER		
Keyword	KEYWORD		
SKU	SKU		
Price	PRICE		
AudienceCode	AUDIENCECODE		
SupplierInfo	SUPPLIERINFO		
Category	CATEGORY		
PicturePosition	PICTUREPOSITION		
Picture	PICTURE		
	THUMBNAIL		
	SOURCE		

Parent Node mapping

Parent Node Mappings

source node	target node
DocumentItems	Product

Match Empty Text □

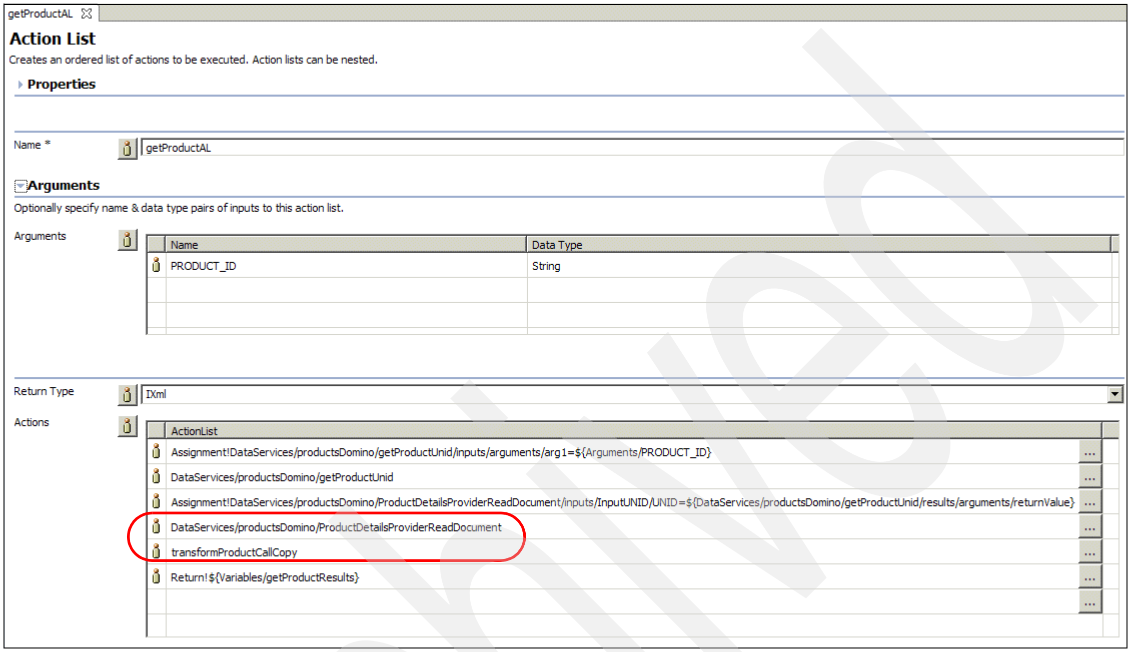
Remove Attributes □

Match Nodes By ● Parent Node Text ○ Child Node Text (Specify) ○ Custom Method (Specify)

Source To Match

Figure 5-67 Transform builder: child node and parent mappings

4. The mapping is ready and can be used by other builders or programatically in a Java class. In both cases the method to invoke is the same. In our scenario we execute the transformation after calling the Domino data service operation and we implement it using an Action List called getProductAL.


getProductAL

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name *: getProductAL

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments:

Name	Data Type
PRODUCT_ID	String

Return Type: IXml

Actions:

ActionList
Assignment!DataServices/productsDomino/getProductUnid/inputs/arguments/arg1=${Arguments/PRODUCT_ID}
DataServices/productsDomino/getProductUnid
Assignment!DataServices/productsDomino/ProductDetailsProviderReadDocument/inputs/InputUNID/UNID=${DataServices/productsDomino/getProductUnid/results/arguments/returnValue}
DataServices/productsDomino/ProductDetailsProviderReadDocument
transformProductCallCopy
Return!${Variables/getProductResults}

Figure 5-68 Action List builder: Invoking Domino and executing the transformation

This Action List is invoked by the Service Operation getProduct, which is part of the Product interface and should already exist in the model. Notice that the implementation contains two calls to the private service that accesses Domino. This behavior is transparent to the consumer of the operation, which is only able to invoke getProduct, and it hides all the complexity of accessing Domino.

Transform builder can be used by any service that requires simple data transformations. It can be used in a completely different context when you need to transform XML documents contained in variables inside of the model.

5.3.5 Testing the service

Domino Data Services provides the same testing support we showed in the XML access Data Service case (5.1.3, “Testing and debugging the service” on page 115). You can enable testing support in the Service Definition and run debug sessions for your Java classes.

By separating the Domino access from the common service, you can test both independently. Ensure that you do not have testing support enabled in both cases, otherwise you will have a compilation error because it generates two Main methods in the model. You can enable and disable the testing support in Service Definition without any impact on the normal functionality.

5.4 Data Service for external web services access

WebSphere Portlet Factory provides support to access external web services with a set of builders that make this task easy to implement without writing additional code. The builders are able to analyze WSDL files, discover the available operations, and make them accessible to other builders within a model.

In this section we identify the available builders, describe how to use them, and provide an example to access an external web service to retrieve product information from organizations that are external to ITSO Renovations. We show how to configure the builder and profile the URL of the service in a way that is easy to change. Finally, we introduce the testing capabilities and how to define a Service Stub to access local test data when the real service is not available.

In our example we provide the external web service that the builders are accessing. This service was developed with WebSphere Portlet Factory and is explained in detail in Appendix B, “Creating a Web service using WebSphere Portlet Factory” on page 645.

We can conclude that WebSphere Portlet Factory offers web service capabilities in two areas:

- Invocation of web services from the builders, acting like a client (covered in this section).
- Exposing a Service Definition and Operation builders as a web service that other applications can access (covered in the appendix).

5.4.1 Overview

The Web Service Call builder allows you to call an external operation of a web service. Using the WSDL definition of the web service, the builder discovers which operations are available, and can be configured to execute one of them. The service URL can be overridden in the builder or using the one defined in the service port of the WSDL file. Also it allows you to define additional SOAP and HTTP headers, authentication mechanisms, and proxy configuration.

The design of an application with Data Services that access external web services is summarized in Figure 5-69.

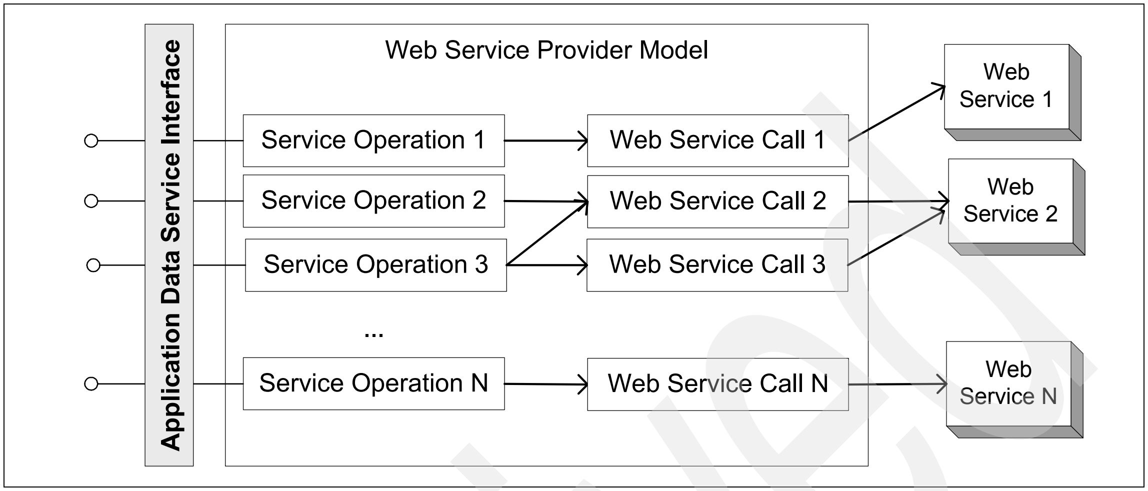


Figure 5-69 Common design for external web service access

The Application Data Service Interface is the one we described previously in this chapter; it offers the interface that data providers are exposing to the business logic and presentation layers. The Service Operation builders are responsible to execute the Web Service Call builder that is invoking the operation in the external service. It is possible that a data transformation is necessary to match the schemas of the input/results between the application and the web service operation interfaces. The same mechanisms we covered previously for Data Services can be used to perform the transformation.

Considerations and best practices when working with the Web Service Call builder include:

- The Web Service Call builder is connected with exactly one operation of one service. If you need to execute other operations from the same service and WSDL, create additional builders that retrieve the operation definitions from the same WSDL content.
- Data transformations could be necessary to match the interfaces of the service operation and the external web service operation.
- The WSDL file is only accessed during design time to retrieve the definition of the web service operation. Once the builder is configured and bound to one operation, it contains the schemas, request parameters, and service information from the WSDL. It will not be used during execution in runtime.

- All other builder inputs (service URL, proxy settings, authentication, and so forth) can be profiled to retrieve the values dynamically from a properties file or configured to get the values from other builders.

5.4.2 Design for ITSO Renovations: External product information

ITSO Renovations accesses product information from external organizations via web services. The interface of the external web service is not fixed and is provided by the external organization in the form of a WSDL file. The Data Service is responsible to transform the data to the Product interface of the ITSO Renovations application.

The design of the solution for our sample application is illustrated in Figure 5-70.

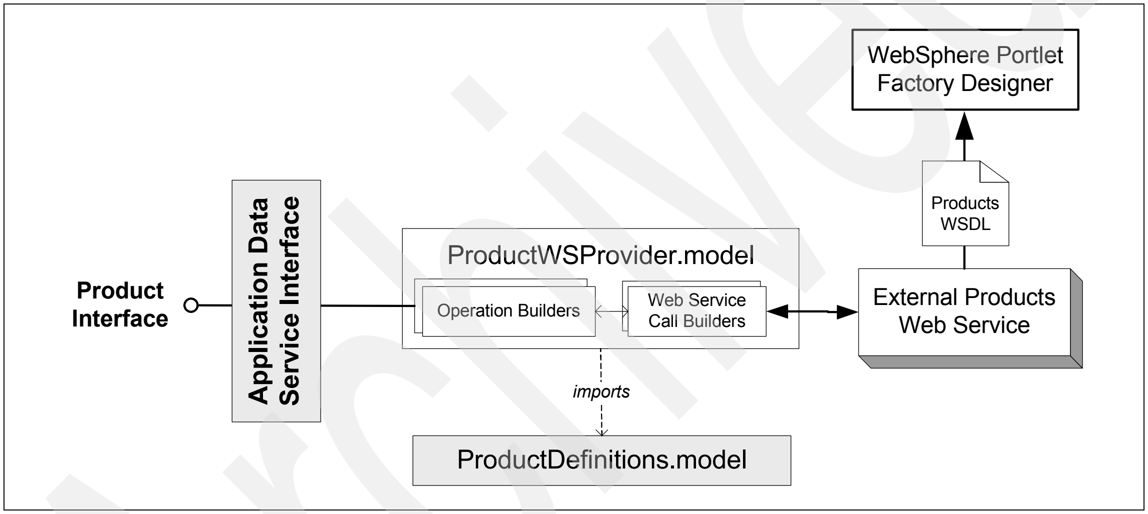

WebSphere Portlet Factory Designer
Products WSDL
Product Interface
Application Data Service Interface
ProductWSProvider.model
Operation Builders
Web Service Call Builders
External Products Web Service
imports
ProductDefinitions.model

Figure 5-70 Design for external Web Service access

The same design can be followed for connectivity with additional external web services without changing the product interface that is visible to the other layers of the application. This solution allows plug-in access to various external web services in a transparent way to the complete web application.

In our sample application, we followed the product interface in the external Web Service. It is not necessary to apply any additional transformation in this case, but this is not the most common scenario because you are not able to influence the web service interface of external organizations. This is enough for the current discussion because we covered the transformation capabilities in great detail in previous sections of this chapter.

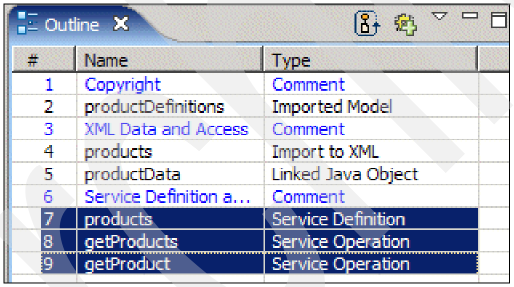
5.4.3 Implementing the service

This section describes how to implement access to an external web service that provides product information, following the design shown previously. From a high-level point of view, the implementation goals can be summarized as:

- Create the Data Provider model.
- Add the Web Service Call builders for the operations to execute in the external web service.
- Link the Service Operation builders with the Web Service Call builders via the Action to Call input.

These steps are similar to those presented previously for the Data Service implementation. In detail the implementation steps are:

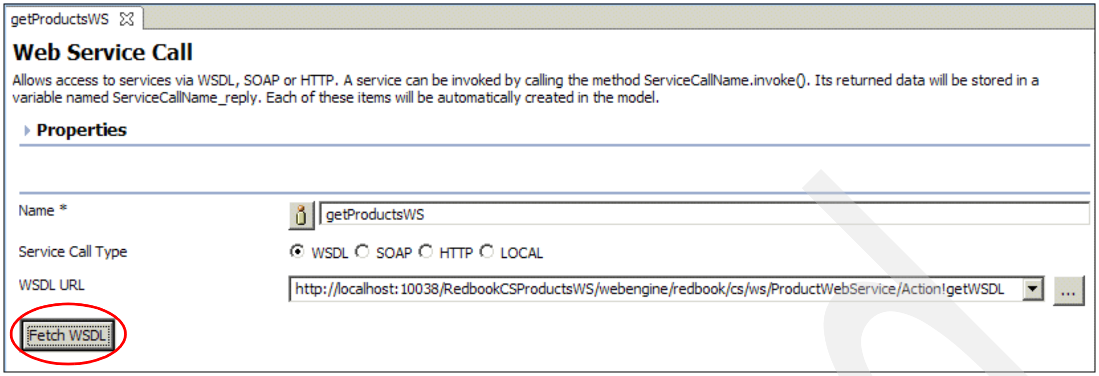
1. Create the Data Provider Web Service model ProductWSProvider.model under the folder \WEB-INF\models\redbook\cs\data\ws. It should be created empty because you will add the Service Definition and Operations from the common interface.
2. Add the Service Definition and Operations for the Product interface. Copy these builders from the ProductFileProvider.model into the new model.



#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	XML Data and Access	Comment
4	products	Import to XML
5	productData	Linked Java Object
6	Service Definition a...	Comment
7	products	Service Definition
8	getProducts	Service Operation
9	getProduct	Service Operation

Figure 5-71 Builders to copy from ProductFileProvider

3. In order to validate the implementation against the service interface, modify the Service Definition to use the interface of the File Provider model. This action will ensure that all the operations of the service are implementing the expected interface.
4. Add a new Web Service Call builder for the operation getProducts() as shown in Figure 5-72. Provide the URL/path of the WSDL of the external web service to connect to. In our example we used a local web service for product information. This is described in detail in Appendix B, "Creating a Web service using WebSphere Portlet Factory" on page 645.


getProductsWS

Web Service Call

Allows access to services via WSDL, SOAP or HTTP. A service can be invoked by calling the method ServiceCallName.invoke(). Its returned data will be stored in a variable named ServiceCallName_reply. Each of these items will be automatically created in the model.

Properties

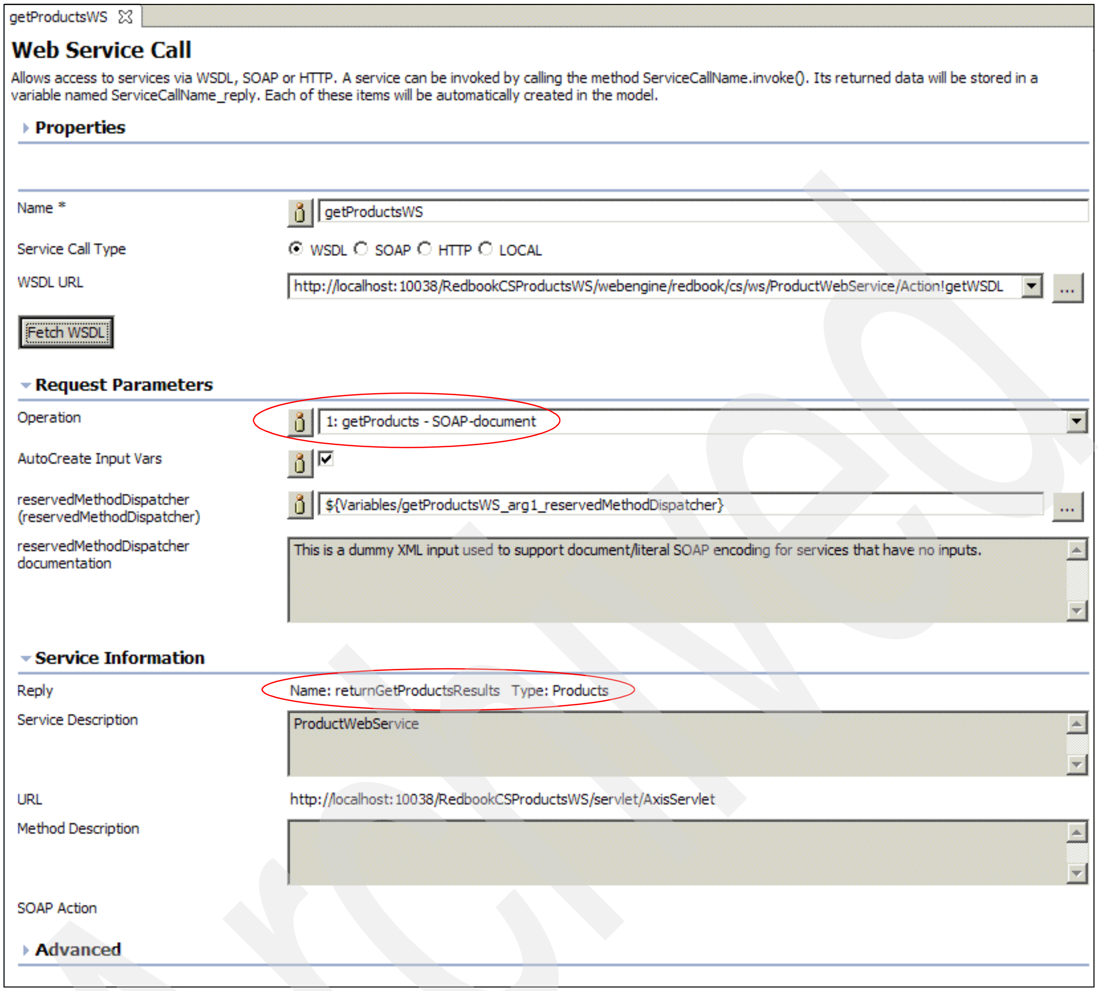
Name * getProductsWS

Service Call Type ● WSDL ○ SOAP ○ HTTP ○ LOCAL

WSDL URL http://localhost:10038/RedbookCSProductsWS/webengine/redbook/cs/ws/ProductWebService/Action!getWSDL

Figure 5-72 Web Service Call builder: Before fetching WSDL

There is nothing else to configure in the builder, so click **Fetch WSDL**. Once the WSDL is retrieved from the previous location, the builder is populated with the list of available operations in the WSDL (Figure 5-73).



getProductsWS ☒

Web Service Call

Allows access to services via WSDL, SOAP or HTTP. A service can be invoked by calling the method ServiceCallName.invoke(). Its returned data will be stored in a variable named ServiceCallName_reply. Each of these items will be automatically created in the model.

▸ **Properties**

Name * getProductsWS

Service Call Type ● WSDL ○ SOAP ○ HTTP ○ LOCAL

WSDL URL http://localhost:10038/RedbookCSProductsWS/webengine/redbook/cs/ws/ProductWebService/Action!getWSDL

▾ **Request Parameters**

Operation 1: getProducts - SOAP-document

AutoCreate Input Vars ☑

reservedMethodDispatcher (reservedMethodDispatcher) ${Variables/getProductsWS_arg1_reservedMethodDispatcher}

reservedMethodDispatcher documentation This is a dummy XML input used to support document/literal SOAP encoding for services that have no inputs.

▾ **Service Information**

Reply Name: returnGetProductsResults Type: Products

Service Description ProductWebService

URL http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet

Method Description

SOAP Action

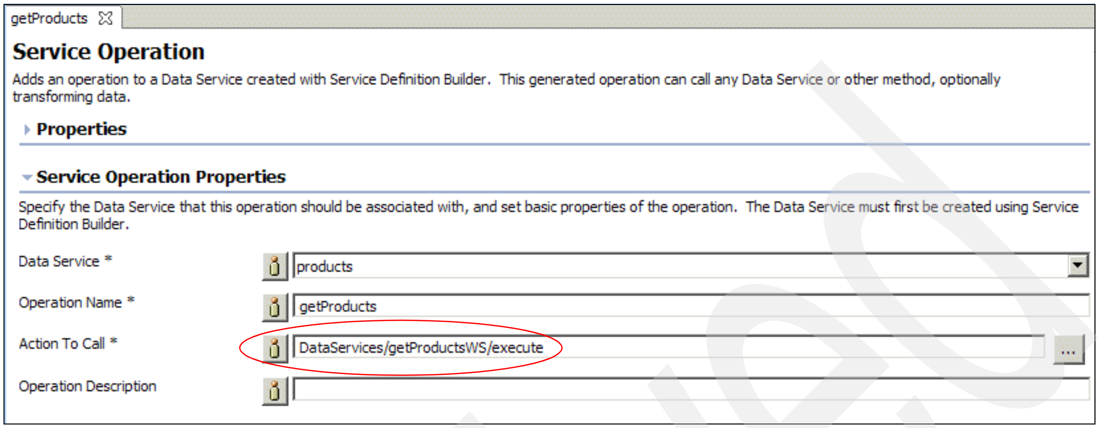
▸ **Advanced**

Figure 5-73 Web Service Call builder: After fetching WSDL

Select the desired operation, in our case the getProducts SOAP document. The rest of the information is filled in automatically from the WSDL file. The option AutoCreate Input Vars will create all necessary variables to hold the input values of the operation. Select this option unless you have your own variable to hold the data and that follows the schema of the inputs.

By default the service URL is retrieved from the port information of the WSDL file. Later in this section we discuss how to override this value to obtain the value from a properties file without regenerating and redeploying the complete application.

5. Link the Service Operation with the Web Service Call. Open the Service Operation builder for getProducts and set Action To Call to the Web Service Call builder you created in the previous step.



getProducts ☒

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

▸ **Properties**

▾ **Service Operation Properties**

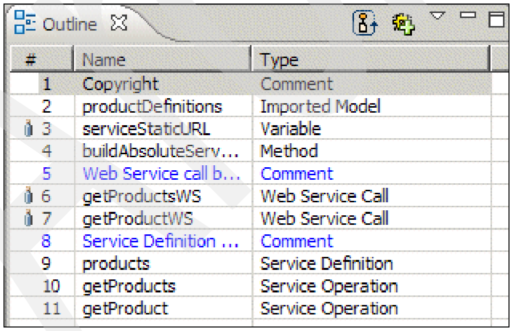
Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service *	products
Operation Name *	getProducts
Action To Call *	DataServices/getProductsWS/execute
Operation Description	

Figure 5-74 Service Operation builder: Set Action To Call to the Web Service Call

In this case, the interfaces of both operations match. If this it not the case, you need to implement a data transformation of the XML content using the Transform builder or a Java method and IXml API. In this case the Action to Call must be an Action List or a LJO method that performs the necessary pre and post processing of the data around the execution of the Web Service Call builder.

6. Repeat the same steps for the second operation: getProduct. The final situation of the builders will be similar to Figure 5-75.



Outline ☒

#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	serviceStaticURL	Variable
4	buildAbsoluteServ...	Method
5	Web Service call b...	Comment
6	getProductsWS	Web Service Call
7	getProductWS	Web Service Call
8	Service Definition ...	Comment
9	products	Service Definition
10	getProducts	Service Operation
11	getProduct	Service Operation

Figure 5-75 Builders for product external Web Service access: ProductFileProvider

The previous implementation pattern can be applied for all external web service operations you need to execute in the model. The following sections cover some advanced concepts related to the execution of external Web Service operations.

Accessing static content from the external web server

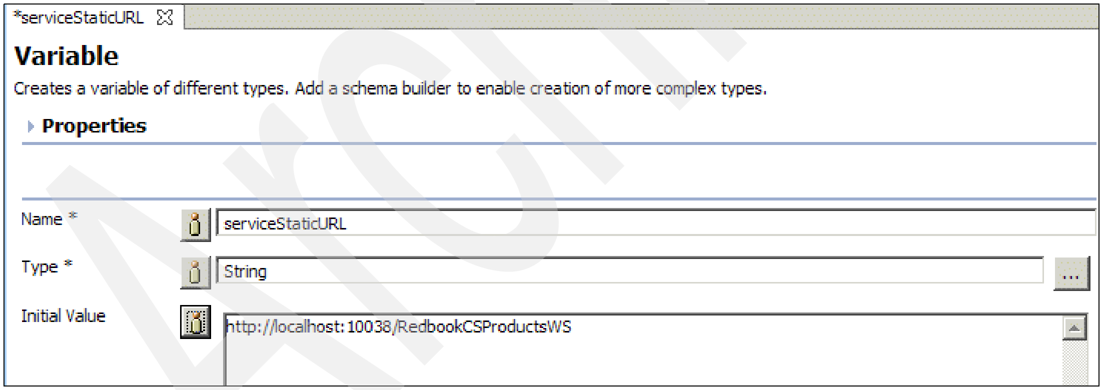
Some content is not retrieved as part of the XML document returned by the web service operation because it is too large: images, PDF documents, and so forth. We denote this as *static content* because it will be accessed directly in the web application using the URL of the web server that contains the service.

Assuming that the web service operation returns the relative URL to the resource in the server, the Data Service is responsible to append the location of the servable content to build the absolute URL.

We have an example of this technique in the ITSO Renovations application. As part of the product information, there is an image located in the web service that can be displayed by the web application. The web service operation returns the relative location in the server, and the Service Operation of the Data Service builds the absolute URL appending the location of the servable content with the relative path. This location is provided as configuration of the web application in a similar way to that of the web service end point (see “Profiling the Web Service URL using a properties file” on page 200 to learn how to access configuration properties).

Perform the following steps to retrieve the absolute URL of the product image:

1. Add a Variable builder that contains the URL with the location of static content in the web service (Figure 5-76).



*serviceStaticURL

Variable

Creates a variable of different types. Add a schema builder to enable creation of more complex types.

Properties

Name * serviceStaticURL

Type * String

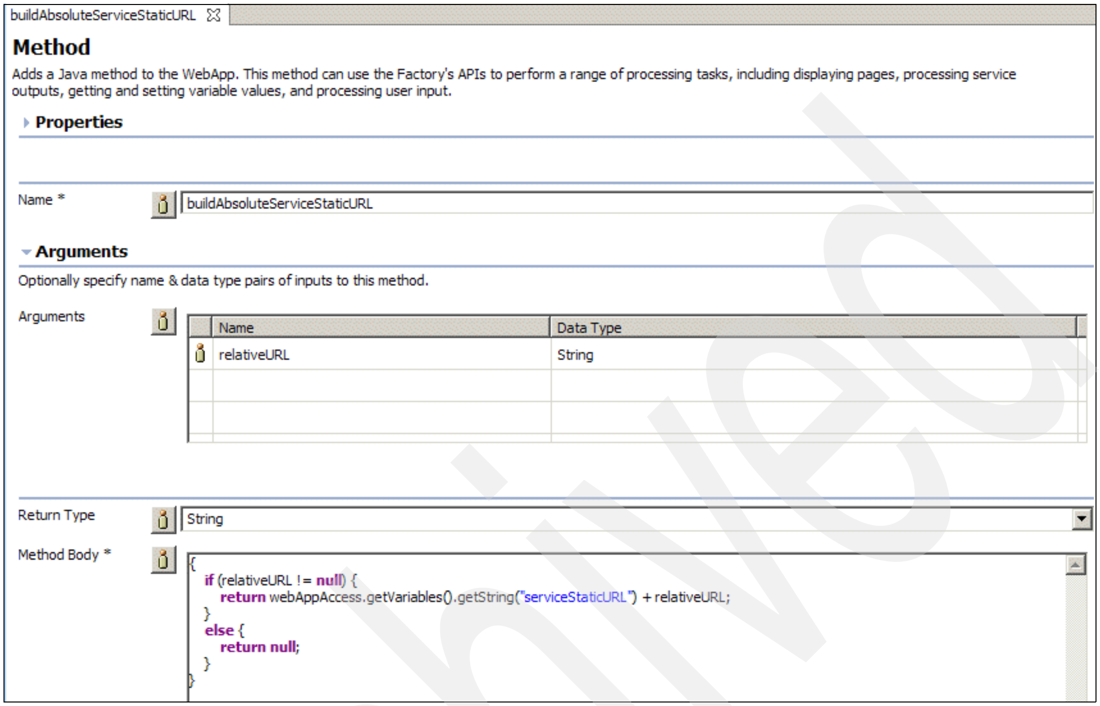
Initial Value http://localhost:10038/RedbookCSProductsWS

Figure 5-76 Variable builder: Contains service static URL

   At the moment we use a default value of the variable; in the next section we describe how to use profiling to get the value from a properties file and avoid regeneration and redeployment of the application.

2. Add a Method builder that receives as parameter the relative URL of the resource and appends it to the value of the previous variable. The result is the

absolute URL of the resource that can be used to access the resource: download the document, display the image, and so forth.



Method

Adds a Java method to the WebApp. This method can use the Factory's APIs to perform a range of processing tasks, including displaying pages, processing service outputs, getting and setting variable values, and processing user input.

Properties

Name * buildAbsoluteServiceStaticURL

Arguments

Optionally specify name & data type pairs of inputs to this method.

Arguments

Name	Data Type
relativeURL	String

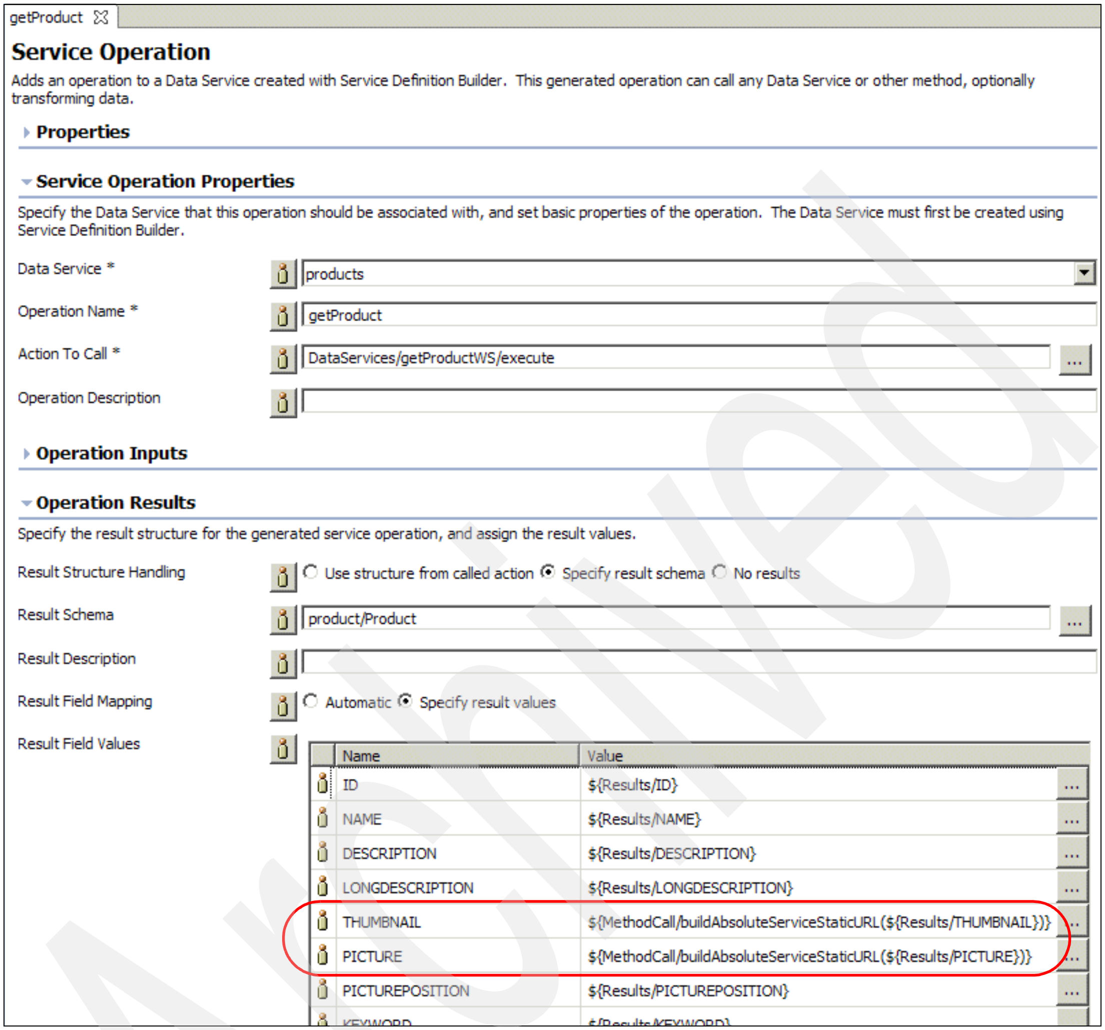
Return Type String

Method Body *

```
{
   if (relativeURL != null) {
      return webAppAccess.getVariables().getString("serviceStaticURL") + relativeURL;
   }
   else {
      return null;
   }
}
```

Figure 5-77 Method builder: Creates the absolute URL of the service static content

3. Use the previous method to modify the returned values for images in the getProduct() operation. This requires you to modify the operation results in the Service Operation builder to invoke the previous method using as parameter the value from the Web Service call. The result is set as the result of the service operation.



getProduct ☒

Service Operation

Adds an operation to a Data Service created with Service Definition Builder. This generated operation can call any Data Service or other method, optionally transforming data.

▸ **Properties**

▾ **Service Operation Properties**

Specify the Data Service that this operation should be associated with, and set basic properties of the operation. The Data Service must first be created using Service Definition Builder.

Data Service *	products
Operation Name *	getProduct
Action To Call *	DataServices/getProductWS/execute
Operation Description	

▸ **Operation Inputs**

▾ **Operation Results**

Specify the result structure for the generated service operation, and assign the result values.

Result Structure Handling	○ Use structure from called action ● Specify result schema ○ No results
Result Schema	product/Product
Result Description	
Result Field Mapping	○ Automatic ● Specify result values
Result Field Values	

Name	Value
ID	${Results/ID}
NAME	${Results/NAME}
DESCRIPTION	${Results/DESCRIPTION}
LONGDESCRIPTION	${Results/LONGDESCRIPTION}
THUMBNAIL	${MethodCall/buildAbsoluteServiceStaticURL(${Results/THUMBNAIL})}
PICTURE	${MethodCall/buildAbsoluteServiceStaticURL(${Results/PICTURE})}
PICTUREPOSITION	${Results/PICTUREPOSITION}
KEYWORD	${Results/KEYWORD}

Figure 5-78 Service Operation builder: Invoke the creation of the absolute URL for static content

We specify manually the mapping of the result field values, customizing the fields THUMBNAIL and PICTURE to invoke the method to set the value of the field as result of the Service Operation.

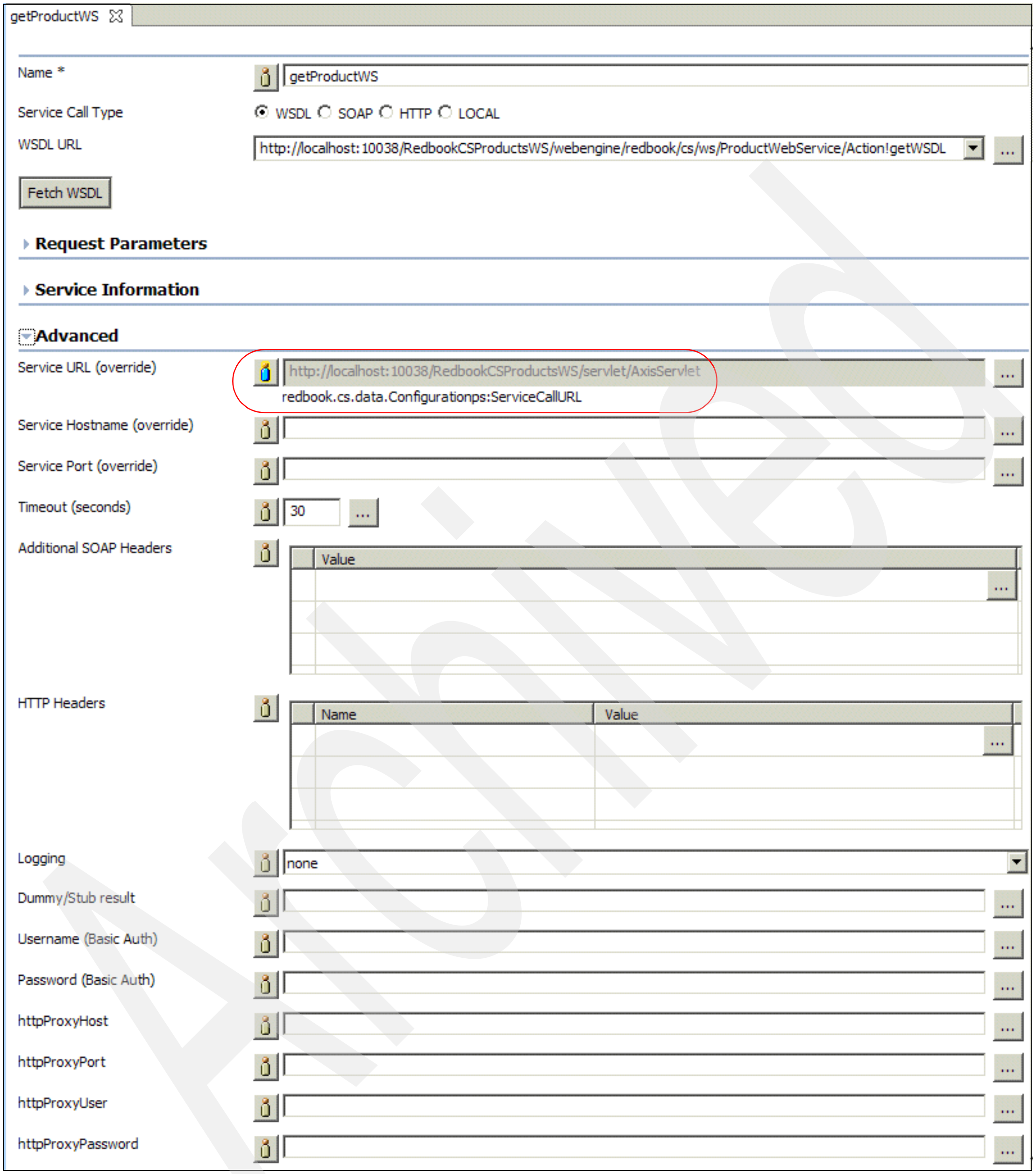
The pattern described in this section can be applied to access any servable content of the web service. If the operation already provides the absolute path of the resource, it is not necessary to do any additional work, but this will add the limitation of moving the web service between different machines.

The example has shown also how to specify the result field values manually. This gives the possibility of intercepting the result of the web service, modifying it in a method, and returning it as a result of the Service Operation. More complex logic can be applied for each field if it is required, such as executing logic in a LJO method, executing a lookup by an additional operation, and so forth.

Profiling the Web Service URL using a properties file

The service URL is retrieved by default from the WSDL when configuring the Web Service Call builder. This solution does not offer flexibility to provide a different location of the web service if this changes, since the WSDL is only used at design time to populate the builder inputs.

The Web Service Call builder provides a mechanism to override some inputs related to the service location: URL, host name, port, and timeout (Figure 5-79).



getProductWS

Name *: getProductWS

Service Call Type: ● WSDL ○ SOAP ○ HTTP ○ LOCAL

WSDL URL: http://localhost:10038/RedbookCSProductsWS/webengine/redbook/cs/ws/ProductWebService/Action!getWSDL

Request Parameters

Service Information

Advanced

Service URL (override): http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet
redbook.cs.data.Configurationps:ServiceCallURL

Service Hostname (override):

Service Port (override):

Timeout (seconds): 30

Additional SOAP Headers:

Value

HTTP Headers:

Name	Value

Logging: none

Dummy/Stub result:

Username (Basic Auth):

Password (Basic Auth):

httpProxyHost:

httpProxyPort:

httpProxyUser:

httpProxyPassword:

Figure 5-79 Web Service Call builder: Advanced configuration

The Advanced section also contains some settings for the proxy, authentication mechanism, and so forth.

In our scenario we override the value of the Service URL to be able to customize it. It is possible to provide the value directly or fetch it from a variable. The problem of this approach is that if the value changes, it will be available only after regeneration of the model, adding a limitation in configureability.

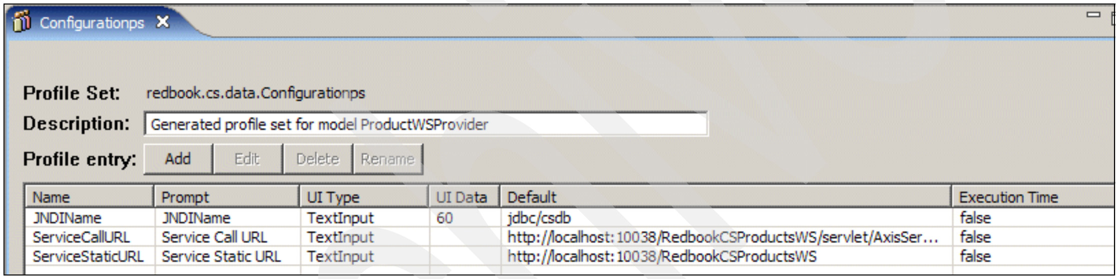
The solution we provide in our sample application is to profile the value and set it from a properties file. If the value changes, it will be available the next time the server is restarted (cache of the builders must be cleaned up) without regeneration and redeployment of the application.

These are the steps we followed to implement the solution:

1. Create a profile set with the entries you need to profile. In our example we profiled the URL for static content we mentioned in the previous section. Under the profiles folder of the project, select:

   File → New → WebSphere Portlet Factory Profile Set

   Add the profile entry `ServiceCallURL` (Figure 5-80).



Profile Set: redbook.cs.data.Configurationps

Description: Generated profile set for model ProductWSProvider

Name	Prompt	UI Type	UI Data	Default	Execution Time
JNDIName	JNDIName	TextInput	60	jdbc/csdb	false
ServiceCallURL	Service Call URL	TextInput		http://localhost:10038/RedbookCSProductsWS/servlet/AxisSer...	false
ServiceStaticURL	Service Static URL	TextInput		http://localhost:10038/RedbookCSProductsWS	false

Figure 5-80   Profile Set for configuration properties: redbook.cs.data.Configurationps

   The other entries are created in the same way:

   – ServiceStaticURL: Provides the URL for static servable content of the web service.

   – JNDIName: provides the JNDI name for database data sources (described in Appendix B, "Creating a Web service using WebSphere Portlet Factory" on page 645).

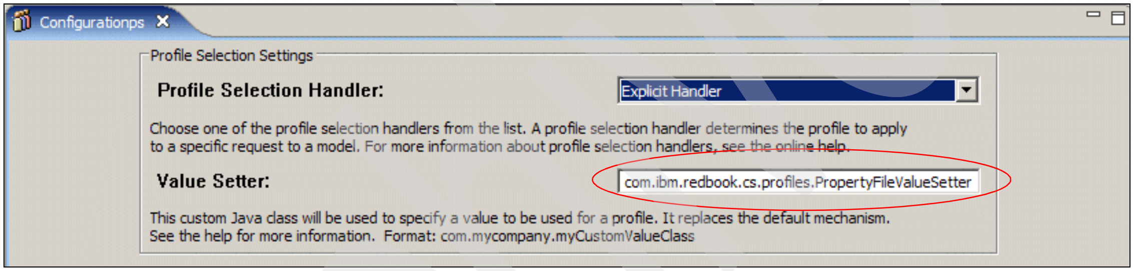
2. Provide a value setter class that will be applied when setting the value of each profile entry. This Java class contains a method, with a specific interface, that sets the profile entry values from a properties file. Use the provided Java class under the source directory com.ibm.redbook.cs.profiles.PropertyFileValueSetter and analyze the code. The interface of the method is like Example 5-6.

Example 5-6

```
public void updateProfileValues(HttpServletRequest request, Profile profile, String modelName,
    String explicitProfile, ModelInstanceCreator modelInstanceCreator) {
    ...
    // set those profile values defined in the properties file
    Iterator iter = profile.getValues();
    while (iter.hasNext()) {
        ProfileValue profileValue = (ProfileValue) iter.next();
        String propertyFileValue = properties.getProperty(profileValue.getName());
        if (propertyFileValue != null) {
            profileValue.setData(propertyFileValue);
        }
    }
}
```

You have access to the current profile to decide which profile values must be set within the method (see the previous code for a snapshot of working with the profile object).

The Java class for the value setter is part of the Select Handler configuration of the Profile Set.



Profile Selection Settings

Profile Selection Handler: Explicit Handler

Choose one of the profile selection handlers from the list. A profile selection handler determines the profile to apply to a specific request to a model. For more information about profile selection handlers, see the online help.

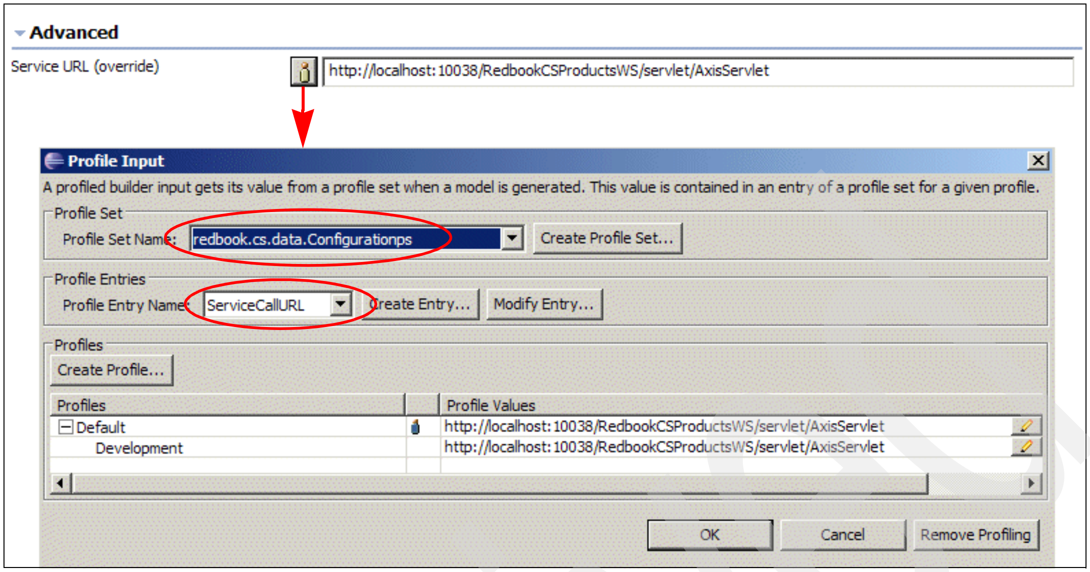
Value Setter: com.ibm.redbook.cs.profiles.PropertyFileValueSetter

This custom Java class will be used to specify a value to be used for a profile. It replaces the default mechanism. See the help for more information. Format: com.mycompany.myCustomValueClass

Figure 5-81 Profile Set: Specify the value setter class

Notice that we have used property names like the entries in order to simplify the solution. The value setter method implementation can be as complex as required by the application: values can be retrieved from a different source, logic can be more advanced, and so forth.

3. Profile the Service URL input in the Web Service Call. Open the Web Service Call builder and profile the input for the Service URL. Select the ProfileSet created previously and the entry name `ServiceCallURL`.



Advanced

Service URL (override) http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet

Profile Input

A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a profile set for a given profile.

Profile Set

Profile Set Name: redbook.cs.data.Configurationps

Profile Entries

Profile Entry Name: ServiceCallURL

Profiles

Profiles	Profile Values
Default	http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet
Development	http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet

Figure 5-82 Web Service Call builder: Set profile input for Service URL

Now the builder input is profiled and it is getting the value from the profile entry ServiceCallURL that is set by the previous Java class. In our scenario, values are defined in the following properties file:

\WEB-INF\resources\redbook\cs\properties\csapp.properties

```
# URL of the web service end point for products data
ServiceCallURL=http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet

# URL for static content for the web service
ServiceStaticURL=http://localhost:10038/RedbookCSProductsWS
```

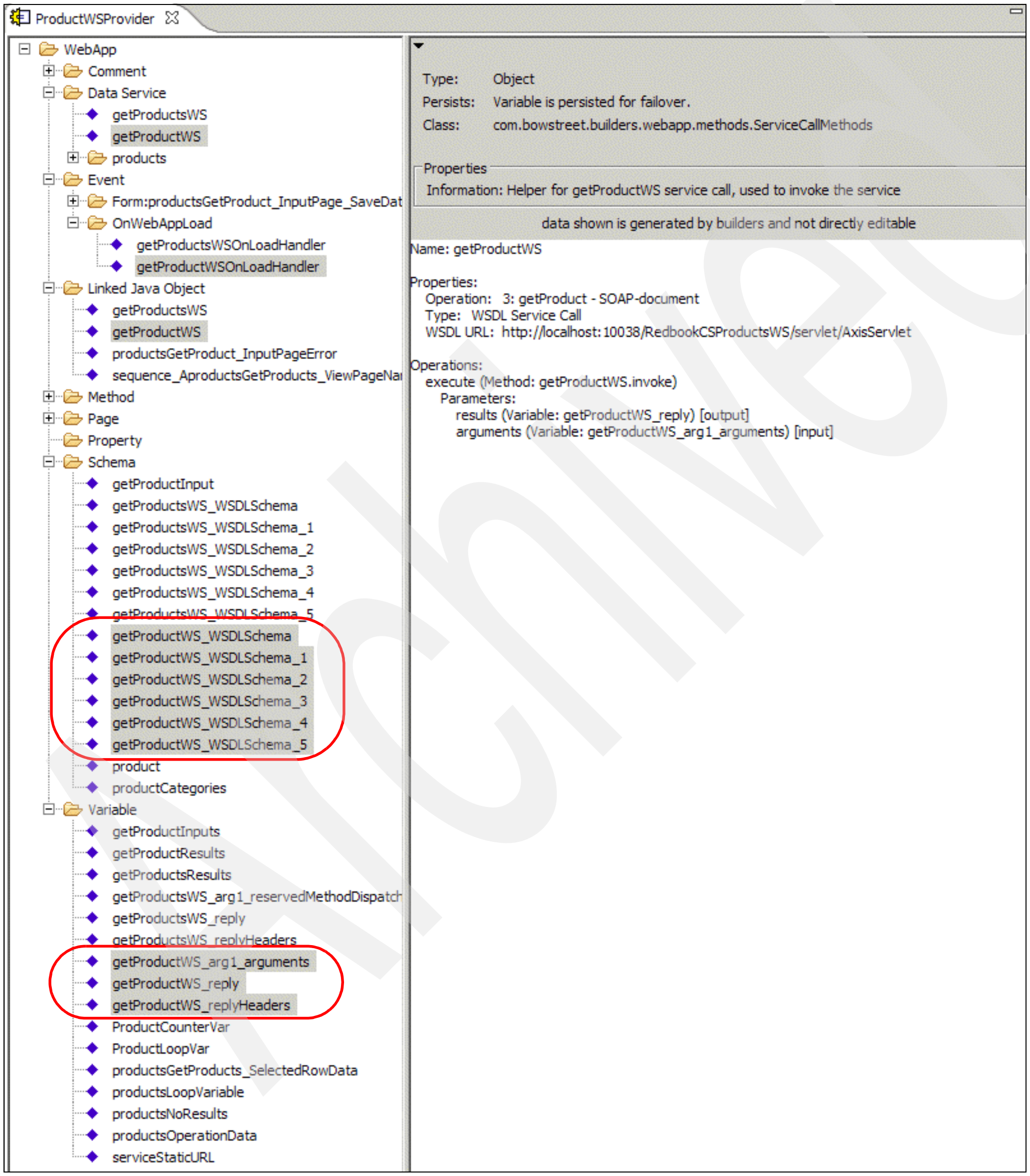
After profiling the input, you should have the same situation shown in Figure 5-79 on page 201.

You can use the same mechanism for the service static URL. The value of the variable is profiled with a new entry and therefore a new property.

This mechanism is generic and can be applied in any other scenario. The Java class setter value can be used by any profile set and is a highly configurable solution to set the values from other resources (such as properties file) instead of provide them as part of the profile set. More information about profiling is in Chapter 9, “Customizing the application using profiling” on page 421.

Generated code by external Web Service access builders

This section provides an introduction to the resources that are generated when adding a Web Service Call builder: internal LJO, schemas from the WSDL, variables for input/result values, and so forth. Figure 5-83 shows what is generated in the case of the getProduct() web service operation.



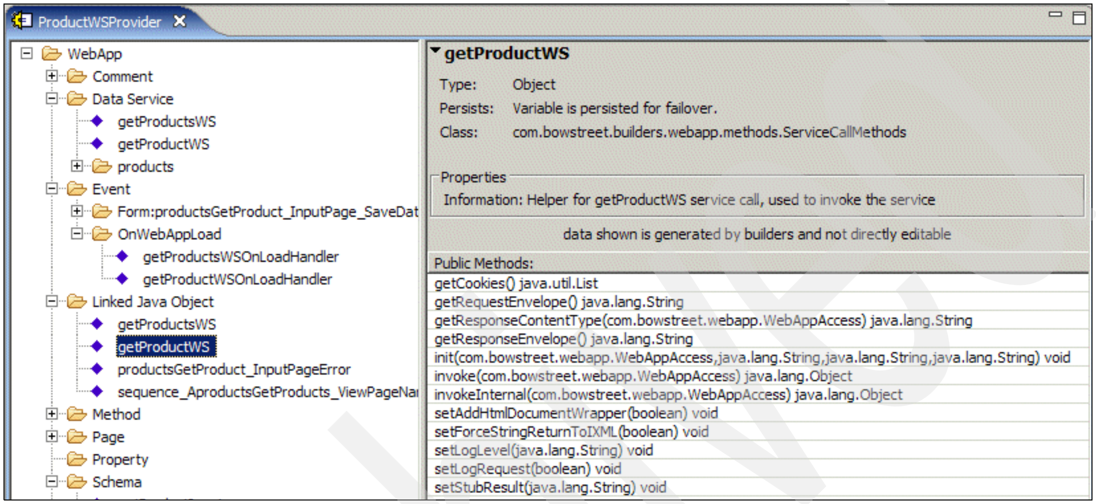
```
ProductWSProvider
WebApp
    Comment
    Data Service
        getProductsWS
        getProductWS
        products
    Event
        Form:productsGetProduct_InputPage_SaveDat
        OnWebAppLoad
            getProductsWSOnLoadHandler
            getProductWSOnLoadHandler
    Linked Java Object
        getProductsWS
        getProductWS
        productsGetProduct_InputPageError
        sequence_AproductsGetProducts_ViewPageNa
    Method
    Page
    Property
    Schema
        getProductInput
        getProductsWS_WSDLSchema
        getProductsWS_WSDLSchema_1
        getProductsWS_WSDLSchema_2
        getProductsWS_WSDLSchema_3
        getProductsWS_WSDLSchema_4
        getProductsWS_WSDLSchema_5
        getProductWS_WSDLSchema
        getProductWS_WSDLSchema_1
        getProductWS_WSDLSchema_2
        getProductWS_WSDLSchema_3
        getProductWS_WSDLSchema_4
        getProductWS_WSDLSchema_5
        product
        productCategories
    Variable
        getProductInputs
        getProductResults
        getProductsResults
        getProductsWS_arg1_reservedMethodDispatch
        getProductsWS_reply
        getProductsWS_replyHeaders
        getProductWS_arg1_arguments
        getProductWS_reply
        getProductWS_replyHeaders
        ProductCounterVar
        ProductLoopVar
        productsGetProducts_SelectedRowData
        productsLoopVariable
        productsNoResults
        productsOperationData
        serviceStaticURL
```

```
Type:      Object
Persists:  Variable is persisted for failover.
Class:     com.bowstreet.builders.webapp.methods.ServiceCallMethods

Properties
 Information: Helper for getProductWS service call, used to invoke the service

         data shown is generated by builders and not directly editable
Name: getProductWS

Properties:
  Operation:  3: getProduct - SOAP-document
  Type:  WSDL Service Call
  WSDL URL:  http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet

Operations:
  execute (Method: getProductWS.invoke)
    Parameters:
      results (Variable: getProductWS_reply) [output]
      arguments (Variable: getProductWS_arg1_arguments) [input]
```

Figure 5-83 Web Service Call builder: Generated resources

The generated variables (_arguments, _reply) contain the values for the inputs/results for the invocation of the web service operation. The schemas are retrieved from the WSDL and can be used to define additional temporary variables or apply data transformations.

The LJO can be used to access low-level functionality of the builder and implement some special low-level functionality (Figure 5-84).



ProductWSProvider

```
WebApp
  Comment
  Data Service
    getProductsWS
    getProductWS
    products
  Event
    Form:productsGetProduct_InputPage_SaveDat
    OnWebAppLoad
      getProductsWSOnLoadHandler
      getProductWSOnLoadHandler
  Linked Java Object
    getProductsWS
    getProductWS
    productsGetProduct_InputPageError
    sequence_AproductsGetProducts_ViewPageNa
  Method
  Page
  Property
  Schema
```

getProductWS

Type: Object
Persists: Variable is persisted for failover.
Class: com.bowstreet.builders.webapp.methods.ServiceCallMethods

Properties
Information: Helper for getProductWS service call, used to invoke the service

data shown is generated by builders and not directly editable

Public Methods:

```
getCookies() java.util.List
getRequestEnvelope() java.lang.String
getResponseContentType(com.bowstreet.webapp.WebAppAccess) java.lang.String
getResponseEnvelope() java.lang.String
init(com.bowstreet.webapp.WebAppAccess,java.lang.String,java.lang.String,java.lang.String) void
invoke(com.bowstreet.webapp.WebAppAccess) java.lang.Object
invokeInternal(com.bowstreet.webapp.WebAppAccess) java.lang.Object
setAddHtmlDocumentWrapper(boolean) void
setForceStringReturnToIXML(boolean) void
setLogLevel(java.lang.String) void
setLogRequest(boolean) void
setStubResult(java.lang.String) void
```

Figure 5-84 Web Service Call builder: generated internal LJO

All these resources can be accessed by other builders or programatically in Java code via the WebAppAccess object.

5.4.4 Testing the service

Data Services accessing external web services provide the same set of testing support we described in the XML access Data Service case (5.1.3, “Testing and debugging the service” on page 115); you can enable testing support in the Service Definition and run debug sessions for your Java classes.

Additionally it is possible to enable a logging mechanism in the Web Service call in the Advance section of the Web Service Call builder. The Logging drop-down list enables you to select from the following logging levels:

- None: Do not produce any logging information.
- Inputs and outputs only: Log the input and output SOAP messages (no envelopes).

- Envelopes only: Log only the envelopes of the input and output SOAP messages.
- All: Log complete input and output SOAP messages.

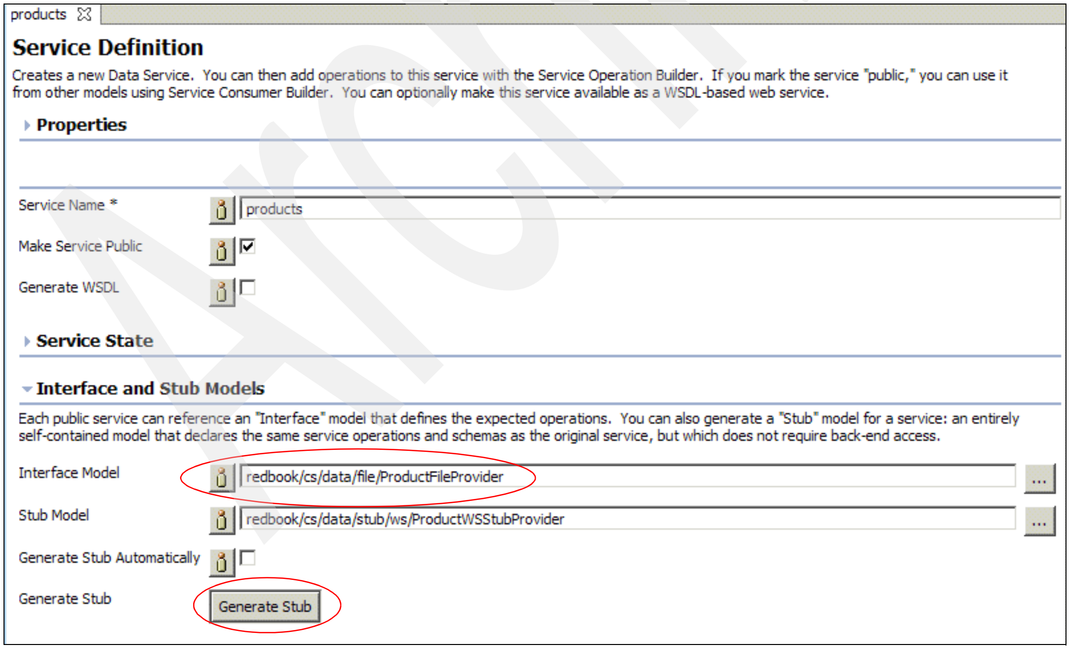
Increasing the log level provides a debug mechanism for each Web Service call and makes it possible to analyze input and output messages. The log is written in a file located in the log folder of the deployed web application in the server, \WEB-INF\logs\debugTracing.txt.

5.4.5 Creating a Stub Service for testing

The external web service might not be accessible during development of the application. In this situation it is interesting to provide a Stub Service that simulates the behavior of the real web service but without connection to the back-end system.

Perform the following steps to create the Stub Service for the Product Web Service Data Provider:

1. Open the product Service Definition from the ProductWSProvider model.
2. Provide a path and model name for the Stub Service and click **Generate Stub**.



products

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * products

Make Service Public ☑

Generate WSDL □

Service State

Interface and Stub Models

Each public service can reference an "Interface" model that defines the expected operations. You can also generate a "Stub" model for a service: an entirely self-contained model that declares the same service operations and schemas as the original service, but which does not require back-end access.

Interface Model redbook/cs/data/file/ProductFileProvider

Stub Model redbook/cs/data/stub/ws/ProductWSStubProvider

Generate Stub Automatically □

Generate Stub

Figure 5-85 Service Definition builder: Generate Stub models

We placed all of our Stub models under the path redbook/cs/data/stub with different subfolders for each Data Service.

3. The Stub Service is generated and can be used during generation time in design time. To enable this, update the following file:

   \WEB-INF\config\service_mappings\mappings.xml

   If the file does not exist, copy the example mappings.xml.example into a new one with the name mappings.xml.

   Ensure that you have the following entry under the <ServiceMappings> element:

   ```
   <ForAllServices when="regen-time" where="designer">
      <UseStub />
   </ForAllServices>
   ```

   This action will enable the use of Stub Services (when defined) for *all* the services of the application. You can enable the Stub on a *per service* basis using the <ForService> element. For more information about this file refer to the WebSphere Portlet Factory documentation.

After creating the Stub Service, you can continue developing the application without having access to the back-end system. You should not see any error regarding connectivity.

This mechanism is applicable to any Data Service we have seen in this chapter, specifically SQL and Domino. The creation of Stub Services can be applied to any Service Definition created in your application.

5.5 High-level Data Services: Wrapping access to back-end systems

There are some applications that access the same type of data from different back-end systems. In the previous chapter, we introduced an architecture that makes this possible because all data access is implementing the same interface independent of what back-end system is behind it. If we have two or more implementations of one interface covering the same data domain, we can define a high-level Data Service that, while consuming different implementations, will hide which is the actual back-end system you are accessing. The determination of which system to access can be based on some input parameters of the operation, the configuration, or complex business logic in the new wrapper Data Service.

This section covers this situation as it applies to the ITSO Renovations application. The concept of providing high-level interfaces could be extended to create a hierarchy. WebSphere Portlet Factory allows one Service Provider to access others by using Service Consumer builders. In every case, it is recommended to keep the main architecture simple and to not build complex relationships between Data Services. Each Data Service should be defined within a data domain following the requirements of the application.

5.5.1 Design for ITSO Renovations: Product information

ITSO Renovations accesses product details from two data sources: Domino and external web services. The business logic and presentation layers should be able to access this information without special interfaces and configurations for each back-end system. The design of this solution is shown in Figure 5-86.

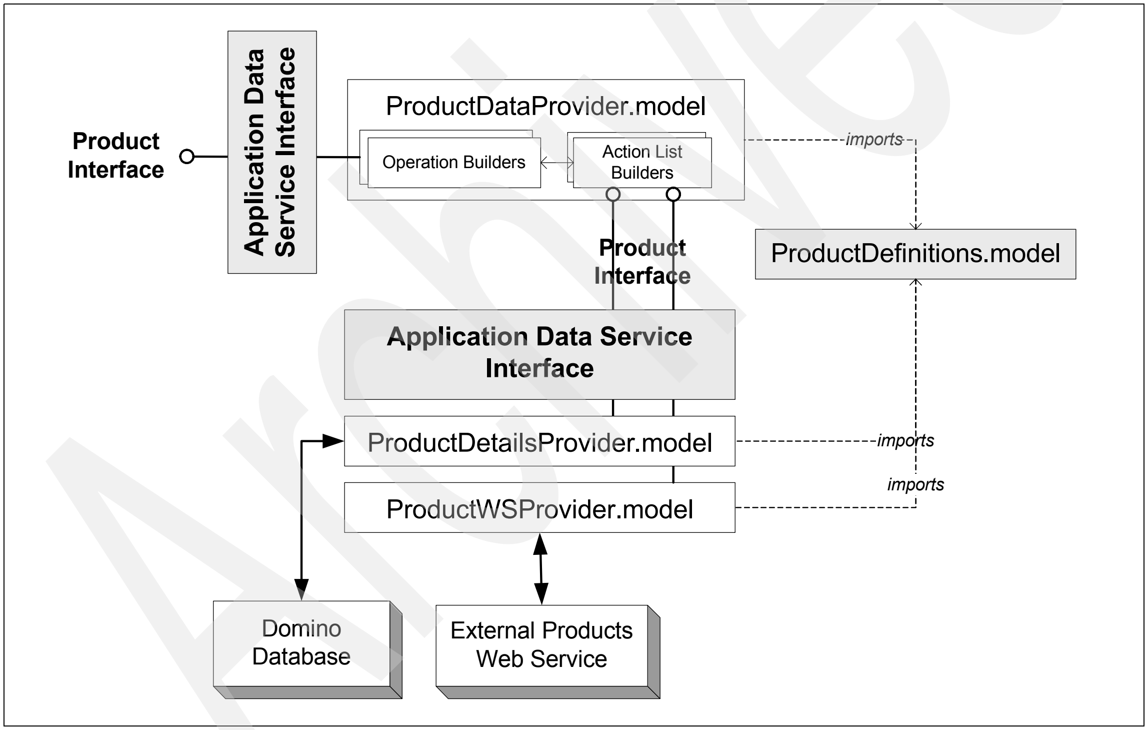


Figure 5-86 Design of the high-level Product Data Provider

The ProductDataProvider is acting like a wrapper of Domino and Web Service providers. The business logic and presentation layers should access this service if they need to access all product information independent of which back-end it is located in. In this scenario, the new model is consuming data from different back-end systems that use the same interface, so no data transformation is required; only merging will be necessary to return all data from both back-end systems.

The decision of which back end is accessed is made in the Service Operation implementation of the ProductDataProvider and can be based on some input parameters of the operation. In our specific case we have two operations in the interface with different requirements:

- getProducts: Accesses all service consumers to retrieve the existing products and return the result of merging all data. This should be an easy operation because the product interface is the same in all Data Services.
- getProduct: Contains a parameter, source, that determines whether the product is from Domino or Web Service. Once the source is determined, this information is used to inform the new model so that the model will access the correct consumer.

5.5.2 Implementing the service

The implementation is similar to that described previously in this chapter. The main difference is that in this case the model will contain Service Consumer builders to access the different Data Services.

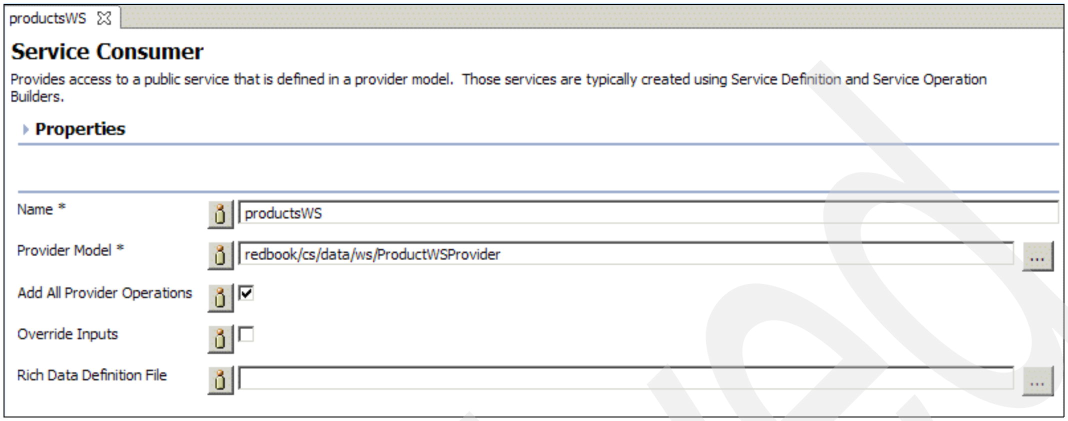
Perform the following steps to implement the Product Data Provider:

1. Create a new empty WebSphere Portlet Factory model called ProductDataProvider. The location, logically outside of the specific folders where you created your previous services because it is not back-end specific, is \models\redbook\cs\data\ProductDataProvider.model.
2. Add the product service interface as you did for the Domino and external Web Service cases:
   a. Import the ProductDefinitions.model using the Imported Model builder.
   b. Copy the Service Definition and Operations from the ProductFileProvider.model into the new one.
   c. Add as Interface Model the ProductFileProvider.model.
3. Add the data consumers for Domino and Web Services. Create two Service Consumer builders as identified in Table 5-15.

Table 5-15 Service consumers and provider models

Service Consumer	Provider model
productsDomino	redbook/cs/data/domino/ProductDetailsProvider
productsWS	redbook/cs/data/ws/ProductWSProvider

Figure 5-87 is an example of one of the Service Consumer builders. Ensure that you select Add All Provider Operations; the builder allows you to select which operations are visible if this setting is not checked.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definition and Service Operation Builders.

Properties

Name * productsWS

Provider Model * redbook/cs/data/ws/ProductWSProvider

Add All Provider Operations ☑

Override Inputs □

Rich Data Definition File

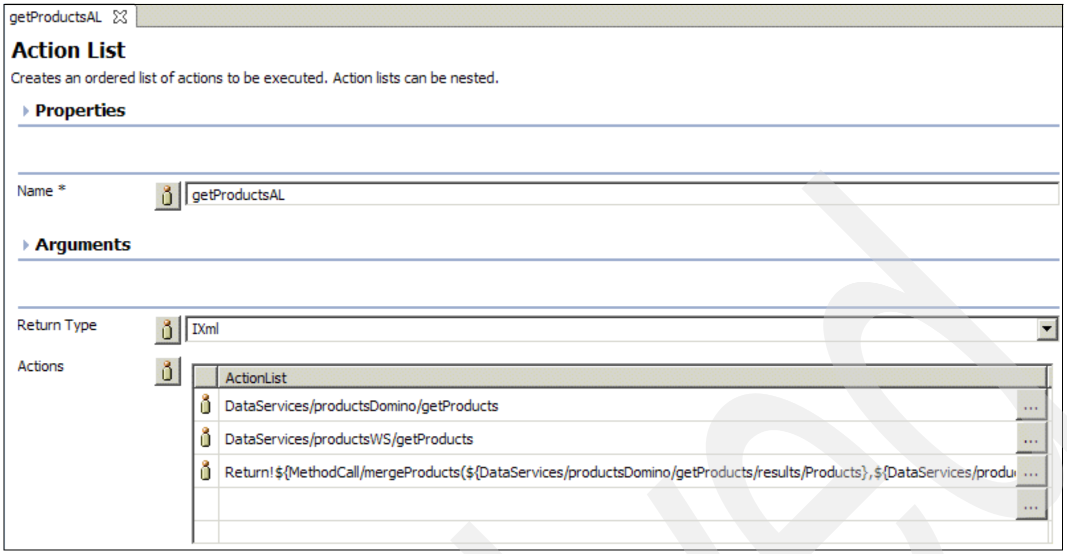
Figure 5-87 Service Consumer builder: accessing Web Service provider

4. Implement the logic for each Service Operation based on application requirements.
5. In the Service Operation builders, set as Action to Call the Action List or Linked Java Object method that implements the logic.

The following sections show the details of the implementation of both operations. Some concepts discussed are the same as we have seen throughout this chapter: programatic invocation of service operations, usage of IXml API, and so forth.

Implementing getProducts

This operation needs to access both consumers, merge the data, and return the result of the operation. We implemented the logic in an Action List builder with the help of a Method builder to merge XML documents.



getProductsAL

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * getProductsAL

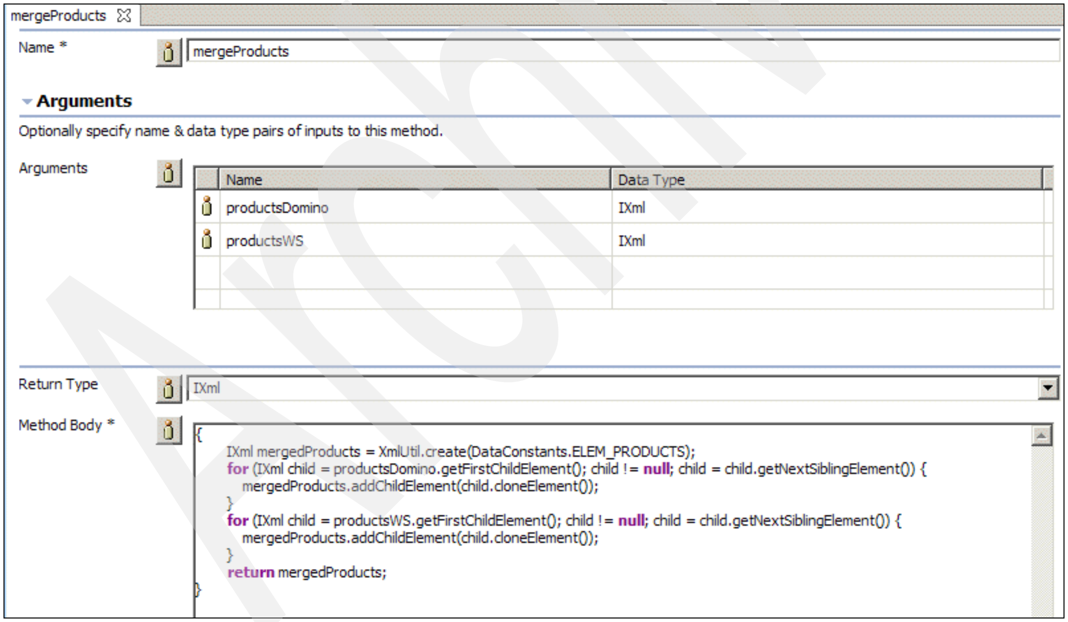
Arguments

Return Type IXml

Actions

ActionList
DataServices/productsDomino/getProducts
DataServices/productsWS/getProducts
Return!${MethodCall/mergeProducts(${DataServices/productsDomino/getProducts/results/Products},${DataServices/produ

Figure 5-88 Action List builder: getProductsAL



mergeProducts

Name * mergeProducts

Arguments

Optionally specify name & data type pairs of inputs to this method.

Arguments

Name	Data Type
productsDomino	IXml
productsWS	IXml

Return Type IXml

Method Body *

```
{
    IXml mergedProducts = XmlUtil.create(DataConstants.ELEM_PRODUCTS);
    for (IXml child = productsDomino.getFirstChildElement(); child != null; child = child.getNextSiblingElement()) {
      mergedProducts.addChildElement(child.cloneElement());
    }
    for (IXml child = productsWS.getFirstChildElement(); child != null; child = child.getNextSiblingElement()) {
      mergedProducts.addChildElement(child.cloneElement());
    }
    return mergedProducts;
}
```

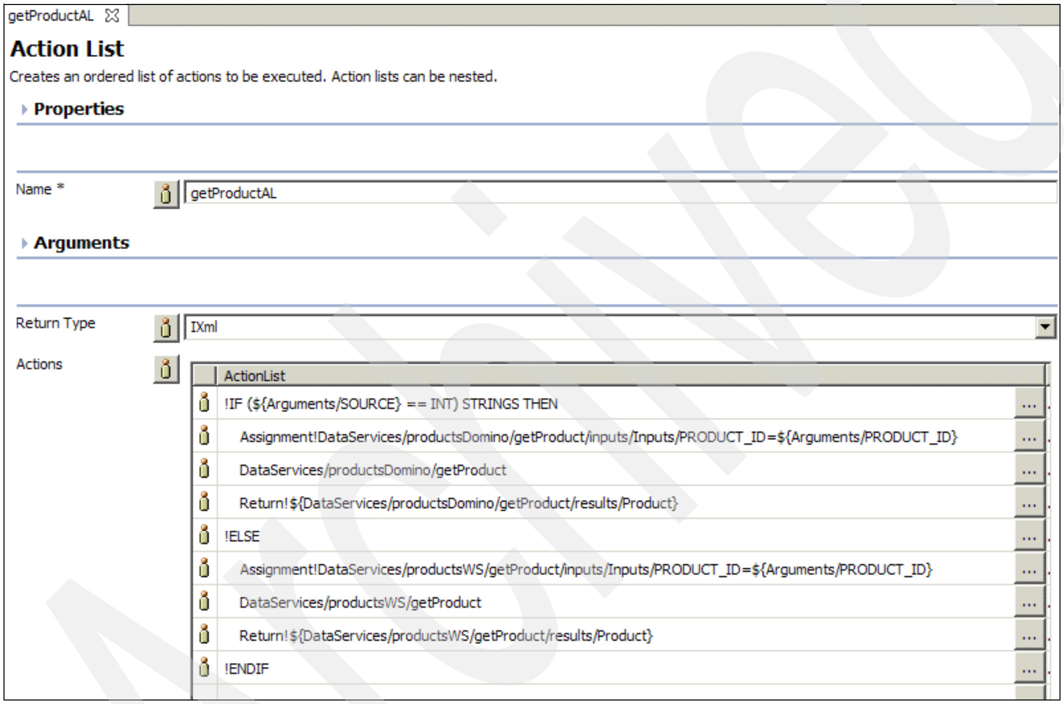
Figure 5-89 Method builder: mergeProducts

The Service Operation invokes the Action List getProductsAL that is invoking the getProducts operation in both Data Services. The result of these invocations is provided to the Method mergeProducts that is merging both documents using the IXml API. The merged result is returned by the Service Operation.

Implementing getProduct

This operation accesses Domino or Web Service based on the input parameter SOURCE. The logic is implemented in an Action List that makes the decision which Data Service to access:

- INT: Access Domino database
- EXT: Access external Web Service



getProductAL

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * getProductAL

Arguments

Return Type IXml

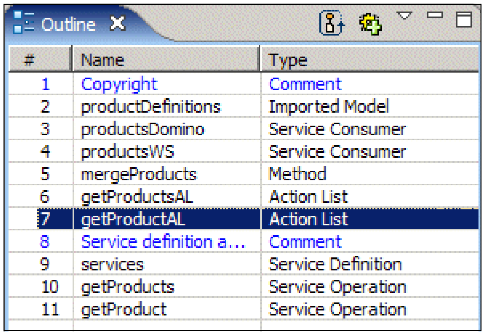
Actions

ActionList
!IF (${Arguments/SOURCE} == INT) STRINGS THEN
Assignment!DataServices/productsDomino/getProduct/inputs/Inputs/PRODUCT_ID=${Arguments/PRODUCT_ID}
DataServices/productsDomino/getProduct
Return!${DataServices/productsDomino/getProduct/results/Product}
!ELSE
Assignment!DataServices/productsWS/getProduct/inputs/Inputs/PRODUCT_ID=${Arguments/PRODUCT_ID}
DataServices/productsWS/getProduct
Return!${DataServices/productsWS/getProduct/results/Product}
!ENDIF

Figure 5-90 Action List builder: getProduct

Notice how Action List can implement simple decision branches. If you need more complex logic (loops, Java API access, and so forth) it is recommended that you delegate the call to a method in a Java class using a Linked Java Object builder.

In the end, the ProductDataProvider model will contain the builders listed in Figure 5-91.



#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	productsDomino	Service Consumer
4	productsWS	Service Consumer
5	mergeProducts	Method
6	getProductsAL	Action List
7	getProductAL	Action List
8	Service definition a...	Comment
9	services	Service Definition
10	getProducts	Service Operation
11	getProduct	Service Operation

Figure 5-91 Builders after development of ProductDataProvider model

5.5.3 Testing the service

This data service provides the same testing support we described in the XML access Data Service case (see 5.1.3, “Testing and debugging the service” on page 115). You can enable testing support in the Service Definition and run debug sessions for your Java classes. It is also possible to generate Service Stubs because from the WebSphere Portlet Factory point of view this is a normal Service Definition.

5.6 Accessing other back-end systems

In this chapter we have seen how to access the most common back-end systems:

- Standard back ends, meaning relational databases and web services
- Non standard back ends, specifically Domino, using integration extensions
- Custom back-end systems for which there are no builders

We have illustrated each of these cases using the ITSO Renovations example application. In this section we provide a brief introduction to other common back-end systems used by many web applications. We also present guidelines for accessing back-end systems for which WebSphere Portlet Factory does not provide builders.

In most situations, we recommend using the design we described in the previous and current chapters and these development phases:

- Define an Application Data Service Interface based on the application requirements. It should be independent of the back-ends.

- Implement specific back-end access using existing available builders. Apply required transformations to match the Application Data Service interface.

5.6.1 SAP access

WebSphere Portlet Factory provides a set of builders to access an SAP system. To use these builders in your WebSphere Portlet Factory project you need to add the feature set called “Integration Extensions - SAP Extension.” This action will add all builders, libraries, and resources necessary to develop SAP access.

SAP builders use the SAP JCo library to access and interact with SAP. This library must be present in the classpath of the web application. It is not provided as part of the feature set because it is a decision of the user to choose the right library version depending on the SAP back-end version. The library JAR file, must be located in the \WEB-INF\lib directory of the WebSphere Portlet Factory project. It also should be added as part of the classpath of the project. Finally, it must be copied under the following location where WebSphere Portlet Factory is installed:

<Installation_directory>\WPFDesigner\eclipse\plugins\
com.bowstreet.designer.core_6.0.1\lib\

This is required by the builders so that they have access to the JCo library, during design time, for browsing of BAPI® functions and metadata access.

The next step is to configure SAP access using a properties file:

\WEB-INF\config\sap_config\default_sap_server.properties

You can use the default or create a new one that will be referenced by the SAP builders. We recommend creating a new one so you can access different systems depending on the environment: development, test, or production. The file that is used in the builders can be profiled easily to switch between environments. (The mechanism for doing this is the same one used for Domino Data Service and described in detail in 5.3.3, “Implementing the service” on page 174.)

The SAP extension provides top and modifier builders that cover all standard access to SAP. The main builders are:

- SAP View & Form: Top level builder that provides support for calling SAP remote-enabled functions or BAPI and displaying the results on a page. If the function requires input values, optionally it creates an input page for the function Import values. This is the fastest mechanism to create a user interface to invoke a BAPI in SAP. It does not provide the separation between presentation and data access, everything is contained in one unique builder.

- SAP Function Call: Top level builder that provides support for calling a BAPI. It provides mechanisms to browse in the list of available functions in SAP. Once a function is selected, the metadata (that is, all schemas for input/results of the BAPI) is retrieved automatically. The builder generates all necessary internal variables to access all values from/to the BAPI call.
- SAP Transaction: Top level builder to group several SAP Function Calls in one transaction. It is important to use it when updating data because SAP requires locking the records during an update.
- SAP Properties: Modifier builder to retrieve a specific properties file that provides the connection settings.

There are other builders to perform more detailed operations in the SAP system. Refer to the help provided by WebSphere Portlet Factory to get complete details about the builders.

5.6.2 J2EE Data Integration: EJB access and JMS support

WebSphere Portlet Factory provides a set of standard builders for J2EE data integration: EJB and JMS support. This section briefly describes the available builders and their functionality.

EJB access

The EJB Call builder can be used to link with an EJB, providing access to methods defined in the home and remote interfaces. The builder is configured with the access to the JNDI server where the EJB is registered and the EJB name to call. The main information from the ejb-jar.xml is retrieved: name, JNDI name, and home/remote interfaces. There are additional settings to generate the constructor method.

Once the builder is created and configured, the EJB methods from the home and remote interfaces are available to other builders and Java classes in the model.

JMS support

There are two builders that allow sending of messages to a queue/topic from a model. First a JMS Session builder must be added to define the JMS session settings: JNDI server where the JMS destination is registered, connection factory, name/type of the destination, and optionally some JMS advance options like message priority, expiration, or authentication data. Now it is possible to add JMS Message builders to create and send messages to a JMS destination: queue or topic. The JMS Message builder requires a JMS Session builder to perform the actual send operation; when the JMS Message builder is executed the message is sent over the destination defined in the JMS Session.

Once the previous builders are created and configured, all builders and Java classes of the model will be able to send JMS messages to the associated destinations (JMS Session linked to the JMS Message).

5.6.3 Accessing back-end systems without Portlet Factory builders

There are some application scenarios where it is required to access back-end systems like legacy applications or custom data sources. If WebSphere Portlet Factory does not provide builders, the application architecture and design must reflect the custom access to these back-end systems.

There are at least two possibilities to implement access to these special back-end systems:

- Implementation with customized builders. This is the most elegant solution because these builders can be reused by other applications. On the other hand, it requires more development effort. The design of the builders should be considered carefully in order to allow them to be reusable. This solution is not covered in this book.
- Implementation using Java code. This is the straightforward solution and valid for each specific application. The implementation is provided using Java classes that are available in the models via the Linked Java Object builders. It is possible to create a Java library with all complexity confined to accessing the back end, and simple Java classes in the WebSphere Portlet Factory project that delegate the calls to the library. You can apply design patterns like *facade* or *proxy* in your solution. In every case, if you need to reuse the functionality in other web applications, you will need to repeat the creation of the Linked Java Object builders. This is the solution we covered in 5.1, "Custom Data Service: Local XML access sample" on page 106.

The decision to use of one of these solutions is an architecture and design decision. Some factors to consider are:

- Complexity of the back-end system.
- Whether this back-end system can be accessed by other web applications developed with WebSphere Portlet Factory.
- Implementation efforts.
- Role of the special back-end system within the whole application. For example, if the application is simple it may not make sense to implement a customized builder.
- How the chosen solution fits into the complete architecture of the application.

There are other possibilities to access custom back-end systems, but in this section we have covered these solutions that best fit in with the whole idea of WebSphere Portlet Factory.

5.7 Summary and best practices

WebSphere Portlet Factory provides powerful mechanisms to connect with various back-end systems with limited requirements for Java code implementation. Configuring the builders properly will give you almost 80 percent of the final implementation and hides from you all the complexity caused by accessing the back-end systems. Assuming that you need special functionality in your application, the other 20 percent of implementation effort should cover those cases where you need to provide Java code for custom transformation and special data access.

In this chapter we have covered the most important back-end systems; you should now have a good overview as well as practical details that can be applied to your specific application. We have illustrated all concepts by following the implementation of our sample application: ITSO Renovations.

In this and the previous chapter, we have tried to present the best possible architecture and design when implementing data services in WebSphere Portlet Factory. You should notice that we have adhered to the basic concept of always separating the data access from the business logic and presentation. This has been possible because we established a clear and well defined Application Data Service Interface that is public to the rest of the layers in the application. The whole idea is a best practice that can be applied to many real-life scenarios. By following this pattern, you will have a clean and modular architecture that will allow you to distribute development tasks and the final application will be easy to test, extend, and maintain.

We conclude by summarizing the most important best practices and recommendations when accessing back-end systems:

- Use top level builders when possible. If this is not the case, use low level and modifier builders in the most structured way possible.
- Extract common functionality in helper models that can be imported by others. With a little bit more effort it may be possible to provide a generic solution for a problem, which can then be reused it in other places. A good example was the access of binary content in Database Data Providers.
- Keep in mind the Application Data Service Interface, including how the back end specific data services will be linked with it and which data transformations

will be required. Decide which transformation mechanisms to use depending on the complexity of the structures.

- Accessing special back-end systems, like Domino, SAP, Siebel, and so forth, requires adding a feature set of data integration to make all builders and resources available.
- Consider the use of Stub Services to develop the rest of the application even if the back-end systems are not available.
- Consider providing a simple local implementation (for example, XML file based) of the Application Data Service Interface as soon as possible. This will give you a proof of concept that the interface is correct and will allow you to continue the development in the business logic and presentation layers. The implementation of specific back-end systems can be done in parallel and without dependencies between development teams (distribution of tasks and modularity).
- The development of one specific back-end system should be able to run independently. It can execute isolated tests and the development integration steps are minimal if it has followed the Application Interface.

The final recommendation when developing data services in WebSphere Portlet Factory is:

> Do not start creating modules and builders immediately. Begin by considering the architecture from a high- to low-level perspective, specifically:
>
> – The role of data access in the complete application
>
> – Which back-end systems you need to integrate with
>
> – What application interface your data services must provide
>
> Start painting high-level diagrams, then go step by step into details to the low-level back-end access. When you have identified which systems you need to access, find out what builders WebSphere Portlet Factory offers. Implement custom access when you have no available builders.
>
> Design your specific data services while keeping in mind the data domains you need to cover. Implement and test each back-end data service independently. Integrate all data services at the end and perform application tests.
>
> Keep these keywords in mind: top-down view, clear architecture and design, simple implementation, isolation tests, modularity.

6

Creating portlets: Making it work

This chapter describes the process to connect to some of the data services that we created in Chapter 4 and 5 to build the basic user interface and consumer models for our ITSO Renovation - Customer Self-Service application.

6.1 Overview

In this chapter, we describe how to create “consumer” models that use the services we exposed in chapter 4 and 5. The previous chapter introduced us to the methodology for building back-end “services” models; this chapter introduces the methodology for building front-end “consumer” models. Taken together, these chapters illustrate the basic development strategy for building complete applications with WebSphere Portlet Factory; further chapters build on relevant issues within this overall context.

Here, we build models that employ Data Services to feed some sophisticated front-end builders, which generate a presentation for the data returned by the service. In later chapters, this presentation are tweaked with “modifier” builder calls – a deliberate and ubiquitous part of the development strategy.

Think of a WebSphere Portlet Factory model as a code generator. (The Factory itself has been called a code generator; this is not true. It is an environment for making code generators.) So, when you build a model using builder calls, you are in effect building a customized code generator. Adding builder calls simply adds “stations” to this assembly line; by adding enough builder calls (out of the box ones, ones that call in your own custom methods and helper objects, and even calls to your own custom builders themselves) you can get exactly the code generator you want.

6.2 Portlet design overview

In this and the next three chapters, we iteratively develop three separate portlets for our ITSO Renovations - Customer Self Service application. The portlets and their key features are as follows:

- **Customer Information portlet**

  This is the primary portlet in our application. The Customer Information portlet is profiled such that there are two separate runtime entry paths into the portlet, one for the *Customer Service Representative (CSR)* and the other for the *Customer*. This profiling is based on which WebSphere Portal Server group each user is part of (CSRGroup or CustomerGroup).

  - The CSR will be able to:
    - Display a list of all customers and drill down to get details about any customer
    - Edit any customer details
    - Search for any customer
    - Add new customers
  - The Customer will be able to:
    - Personalize the Customer Information portlet and save their account access information in the portal credential vault
    - View the details of just their own account once the portlet is personalized.
    - Edit their account information

- **Order List portlet**

  The Order List portlet is responsible for displaying the list of orders placed by a customer. Using portlet to portlet communication and event handling, this portlet will be populated automatically based in the customer selected in the Customer Information portlet.

- **Order Details portlet**

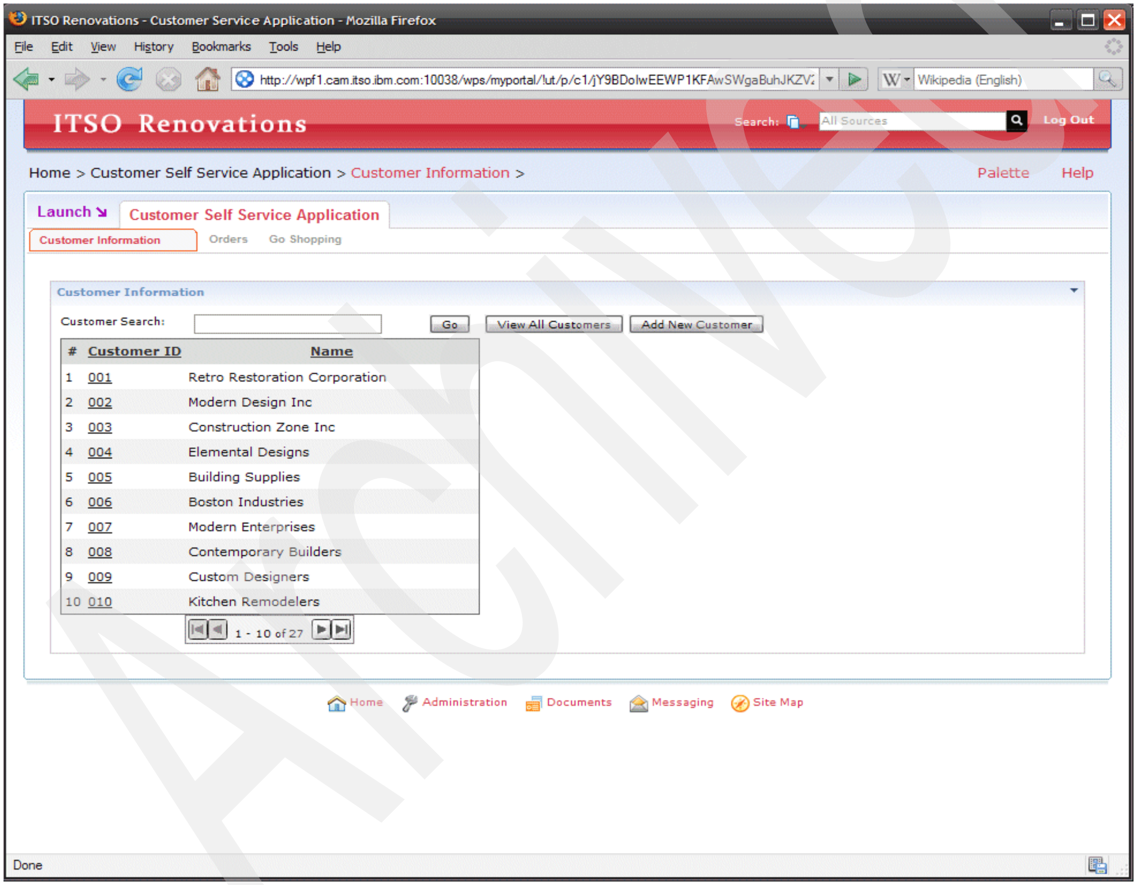
  The Order Details portlet is geared to display the details about a specific order and the list of items included in the order. This portlet also is populated automatically based on the selected order in the Order List portlet. Other functions of this portlet include the ability to:

  - Fetch and display additional product details from a Domino database as well as from a external remote web service
  - Alter the item quantity on the fly

– Personalize the portlets and configure (show/hide) the display columns at runtime

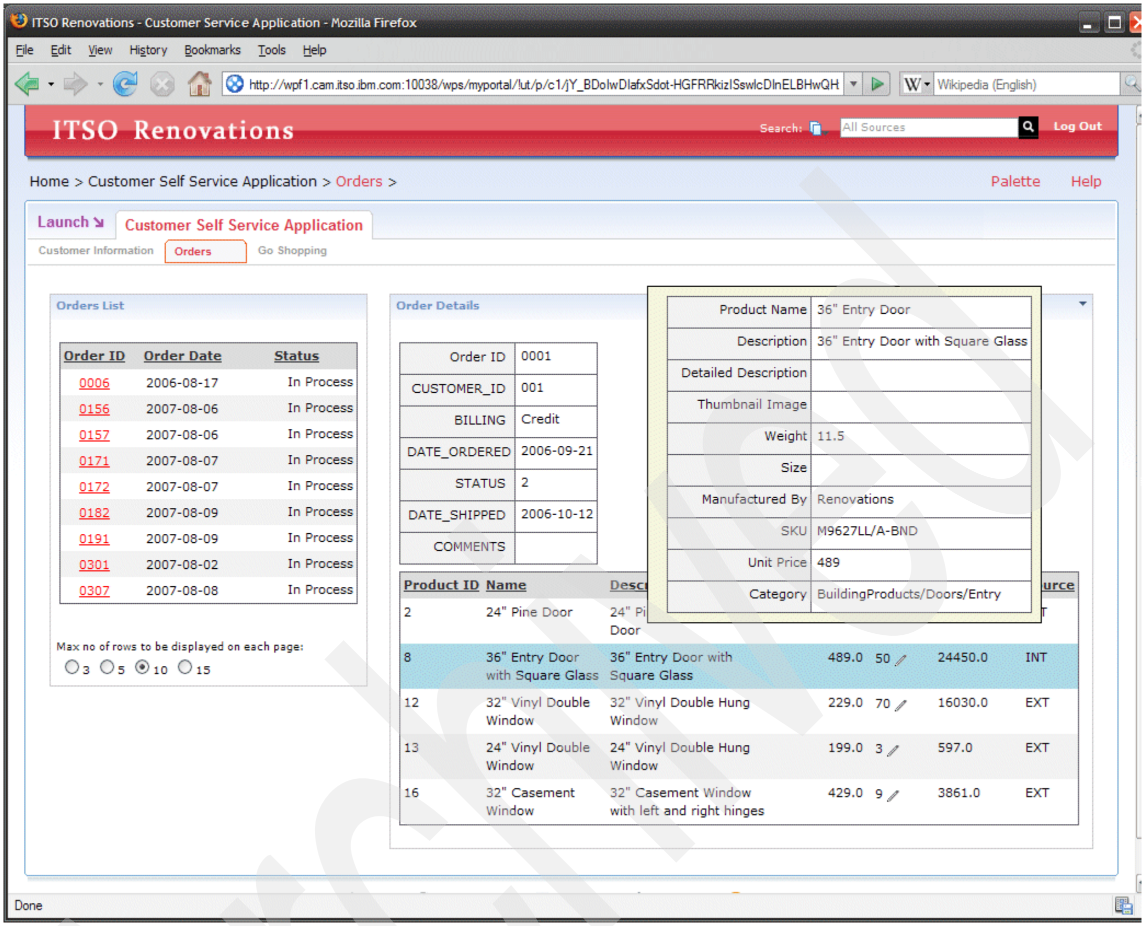
Since we are developing our ITSO Renovations - Customer Self Service application as a portal-based application (that is, portlets), we will have portal elements such as labels, pages, and so forth. on which our portlets will be housed. The creation of these portal-specific elements will be discussed later in this chapter.

The following two figures provide a glimpse of the solution that is our ultimate goal.


ITSO Renovations - Customer Service Application - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://wpf1.cam.itso.ibm.com:10038/wps/myportal/!ut/p/c1/jY9BDolwEEWP1KFAwSWgaBuhJKZV
Wikipedia (English)
ITSO Renovations
Search:
All Sources
Log Out
Home > Customer Self Service Application > Customer Information >
Palette
Help
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
Customer Information
Customer Search:
Go
View All Customers
Add New Customer
1 - 10 of 27
Home
Administration
Documents
Messaging
Site Map
Done

#	Customer ID	Name
1	001	Retro Restoration Corporation
2	002	Modern Design Inc
3	003	Construction Zone Inc
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

Figure 6-1 Customer Information page with the Customer Information portlet



ITSO Renovations - Customer Service Application - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://wpf1.cam.itso.ibm.com:10038/wps/myportal/!ut/p/c1/jY_BDolwDlafxSdot-HGFRRkizlSswlcDlnELBHwQH
Wikipedia (English)
ITSO Renovations
Search:
All Sources
Log Out
Palette
Help
Launch
Customer Information
Go Shopping
Done

Home > Customer Self Service Application > Orders >

Customer Self Service Application

Orders

Orders List

Order ID	Order Date	Status
0006	2006-08-17	In Process
0156	2007-08-06	In Process
0157	2007-08-06	In Process
0171	2007-08-07	In Process
0172	2007-08-07	In Process
0182	2007-08-09	In Process
0191	2007-08-09	In Process
0301	2007-08-02	In Process
0307	2007-08-08	In Process

Max no of rows to be displayed on each page:
○ 3 ○ 5 ● 10 ○ 15

Order Details

Order ID	0001
CUSTOMER_ID	001
BILLING	Credit
DATE_ORDERED	2006-09-21
STATUS	2
DATE_SHIPPED	2006-10-12
COMMENTS	

Product Name	36" Entry Door
Description	36" Entry Door with Square Glass
Detailed Description	
Thumbnail Image	
Weight	11.5
Size	
Manufactured By	Renovations
SKU	M9627LL/A-BND
Unit Price	489
Category	BuildingProducts/Doors/Entry

Product ID	Name	Desc				urce
2	24" Pine Door	24" Pi Door				T
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass	489.0	50	24450.0	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window	229.0	70	16030.0	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window	199.0	3	597.0	EXT
16	32" Casement Window	32" Casement Window with left and right hinges	429.0	9	3861.0	EXT

Figure 6-2 Orders page showing the Order List and Order Details portlets

6.2.1 The context of this chapter

In this chapter, we introduce the basic process to construct front-end consumer models. We use this process to build the first of the three portlets mentioned previously. Our goal for this chapter is to create three standalone portlets that verify that we have connectivity to the back-end services models and can generate the basic user interface. Since the first iteration of the three portlets would be standalone (that is, no inter-portlet communication), we hard wire some of the inputs in the portlets so that we can visualize the basic layout and structure of the portlets. The last section of this chapter explains the linkage and use of portal-specific elements (credential vault and so forth).

In chapter 7, we discuss UI design and add more functionality to the application by using rich data definitions and some of the newer Web 2.0 builders (Ajax, Dojo, and so forth). The Order Details portlet will be able to access additional product details by tapping into a Domino database or an external web service at runtime.

In chapter 8, we discuss portlet to portlet communication. This is when we remove all the hard wires and establish true portlet to portlet communication and event handling. In this chapter, the Customer Information, Order List, and Order Details portlets are hooked or wired together such that actions in one portlet would cause events in another.

In chapter 9, we discuss profiling. We then profile our application and create two separate runtime entry paths to our application, one for the CSR and the other for the customer. We also customize and profile several other items in the application so that our two user sets have different runtime experiences.

Additional topics are discussed in other chapters when appropriate.

6.3 Development the WebSphere Portlet Factory way

With WebSphere Portlet Factory, developers build portlets by snapping together a sequence of components called *builders*. Each builder has a simple wizard-like user interface and does the work of automatically generating or modifying part of an application. A builder implements an application design pattern.

Builders are assembled into models, which are like application production lines. Each time a change is made to any of the builders in a model, the application code is regenerated, allowing the developer to iteratively develop a custom portlet application. The builders generate all the application code, including JSPs, Java classes, and XML documents.

Development continues by adding builders to your model until you have the desired functionality. Along the way, you can test the model by running it from the Designer tool, using any application server to see the intermediate results. You do not need to deploy to the portal unless you need to test portal-specific features such as portlet-to-portlet communication.

Development with WebSphere Portlet Factory is an iterative process. If you do not like what a builder has created, you can go back, change the builder's input values, and have the entire portlet application update instantly. Or, you can add additional builders to your model that modify what other builders have created. You can also import your own Java code, HTML, style sheets, and JSPs to get the exact functionality desired. In short, WebSphere Portlet Factory supports rapid prototyping, and it also includes all the necessary capabilities for you to turn your quick prototype into a production-ready portlet.

6.3.1 High-level overview of building portlets

This section describes the high-level steps for building data-driven consumer portlets with WebSphere Portlet Factory.

1. **Create a service consumer model.**

   Create a new service consumer model, to which you will add all of the builders necessary to call the appropriate data services and generate the user interface. Add a Service Consumer builder to this model; this is used to provide access to a public service created by the builders in a service provider model. Note that we may add multiple service consumer builders to our model to access multiple service providers.

2. **Create the initial presentation interface.**

   After a service is available, the next step is to build the user interface. The most common builder to use for this is View & Form. This builder is a high-level builder that automatically generates pages for viewing and editing data from data services. This builder is explained in further detail later in this chapter.

   Alternatively, in some cases, you may need to create the initial presentation for a model by using a combination of other builders such as Data Page, Input Form, or any lower level UI builders. These will also be discussed in detail later in this chapter.

3. **Add builders to achieve the exact functionality required.**

   After we have created our initial presentation page or pages, the next step is usually to add additional modifier builders that add new features to the model. For example, if we use View & Form builder to create a page with a table of service results, we can then add a Data Column Modifier builder to rearrange or hide columns, or to add column sorting functionality. Or, if we want to add a navigation link, we can use a Link builder.

   The development process then continues by iteratively making changes to the model and testing them out. At any time we can open any of the builders in the model and change any of the values. We can also temporarily disable any builders, by using the right-click menu on the builder in the Outline view.

   As we continue to customize our application by adding and editing builders, the number of builders in the model will increase.

> **Tip:** As a best practice, we recommend keeping the number of builders in a model to under 50 since models larger than that tend to be more difficult to work with.

To keep the number of builders small, you can use builders such as Imported Model, Linked Model, and Model Container to make your application more modular.

4. **Add the portlet wrapper to the model.**

   The final step in creating the user interface model is to add a Portlet Adapter builder to the model. This builder adds the portlet wrapper to your model and enables it to be executable within the portal container.

6.3.2 Key builders for consumer models

This section describes the functionality of some of the key builders that we are going to use to develop the portlets for our ITSO Renovations - Customer Self Service application.

- **Service Consumer builder**

  The Service Consumer builder makes all the operations defined in a Service Provider model available for use. It enables other builders to reference all the information provided by the service, including the input and output schemas, the operations and the associated variables. With the Service Consumer builder making the data available to the Page Automation system, you can use the entire array of Page Automation builders to generate pages. For example, the View & Form builder can reference service information, including the input and result schemas, and automatically generate complex presentation elements such as forms and list views.

- **UI generating/Page Automation builders**

  WebSphere Portlet Factory provides us with a vast collection of UI builders that can be used for generating and modifying our application. Before we get into the details, it is important to understand the fundamentals of high-level builders and low-level builders in WebSphere Portlet Factory.

  High-level builders are builders that encapsulate the functionality of many of the lower level builders into a simple user interface. High-level builders are themselves implemented by using multiple lower level builders.

  For example, a View & Form builder is a high-level builder because it wraps the functionality of many lower level builders such as a Data Page, Paging Buttons, and so forth. Another example of a high-level builder is the Domino

View and Form builder. Under the covers, it is implemented by using Domino Data Access, and so forth.

> **Important:** As a rule of thumb, use the highest level builder available for the job.
>
> It is more efficient to use the high-level builder because it reduces the number of builders in the model, which in turn eliminates the need to hook up multiple lower level builders needed to derive the same functionality. Having fewer builders in the model makes it more easily readable.
>
> Also, if granular control is needed during development time, it is a lot easier to decompose a high-level builder call into multiple lower level constituents than to group together a number of low-level builders into a high-level call.

Some of the key UI builders are:

– **View & Form builder**

  The View & Form builder is a high-level builder that can be used to create a portlet with a view page that displays the results from a service operation, with optional pages for input, details, and update. As with other builders, you can selectively add the functionality that you require. For example, you can have this builder just create the view page and not the input, details, and update pages. Here are a few examples of portlet use cases ideally suited to the View & Form builder:

  - A portlet displays a list of expenses, and allows users to click to see the details of an expense, and then update that expense.
  - An employee directory portlet enables users to search for an employee and view a table of results for the selected employee.
  - A “Personal Information” portlet in an HR employee self-service application allows users to view and edit their own personal data.

  The View & Form builder automates the creation of:

  - A view page that displays a table or single record of data.
  - An optional input page for the specified view operation, with optional validation.
  - An optional detail page that displays either data from the selected row in the view page or data from another data service or method.
  - An optional update page for editing details or results data.
  - Navigation between the pages (buttons).

   - **Data Page builder**

     The Data Page builder, as the name suggests, provides you with the ability to display data resulting from a service call, SQL statement, or any other builder call that provides data. The data does need to be defined by a schema for the Data Page builder to work. Most service calls and SQL statement builder calls add a schema to the model that defines the data being returned.

     While working with data page or any other high-level builder that uses the data page functionality under the covers, there are two basic ways for generating the UI with datapage: using HTML Templates, or using an existing presentation and then gluing the elements to the named tag on the page. These are discussed further in Chapter 7.

   - **Input Form builder**

     The Input Form builder creates an input page for a data service operation or a method. It is much like View & Form input page support, but the next action after submitting the input form is a user-specified action. This builder is suitable for operations that do not have result data to display. If you do want to display result data from the operation, you should consider using the View & Form builder instead because that builder generates a results page.

     We utilize the Input Form builder later in this chapter when we build the Customer Information model to implement the functionality to add new customers.

- **Application Logic and Flow control builders**

  Three builders (Action List, Methods, and Linked Java Objects) available in WebSphere Portlet Factory can help regulate application logic and flow.

   - **Action List builder**

     - An Action List is a simple list of model actions that can help in loading pages, calling methods, making variable assignments, and in creating simple branching statements. (If/Then/Else)
     - The builder allows the use of indirect referencing.
     - It generates a method in the WebApp's methods class.

   - **Method builder**

     - Method builder provides us with a mechanism to write standard Java code directly in the builder's input.
     - It provides a means to make simple calls to pages, and execute methods and service calls.

- It can be used to formulate more sophisticated branching statements than those allowed by the Action List builder.
- It adds a Java method to the WebApp's runtime methods class.

– **Linked Java Object builder**

- The Linked Java Object (LJO) builder points to a Java object in the classpath and it makes the object's public methods available to the model. These methods become model actions and can be triggered from any other builder in the model.
- LJO is the best option to consume existing code and can be used to formulate complex business logic in the methods in the Java class.
- LJO method can get a handle on the running WebApp by specifying the WebAppAccess as the first argument in the method's signature.

6.3.3 Best practices for designing large applications

When building large applications with WebSphere Portlet Factory, it is a good idea to break out functionality into separate models. This may achieve one or more of these goals:

- Number of builders in the model becomes fewer, which makes the model more "readable."
- Functionality can be developed simultaneously by developers working on separate models at the same time.
- A single model can be imported into multiple other models, keeping the administration of the imported model's functionality centralized.

There are a number of builders that can help you achieve modularity in your application. These include the Imported Model builder, the Linked Model builder and the Model Container builder.

- **Imported Model builder**

  The Imported Model builder can be used to import a model (target model) and its complete builder call set into another model (host model). When you import a model into another, all the attributes of the target model are imported into the host model at generation time. The target model has read-only status. This means that the host model can invoke all the builder calls of the target model, but cannot change any of the builder inputs of those builder calls.

  By using the Imported Model technique to pull target models into a host model, only one WebApp is generated. Hence both the host's and target's artifacts are ultimately local. One key point to note here is that there could be naming conflicts resulting in regeneration errors if the artifacts (such as Builder Names) of the host and the target model have the same names.

For our ITSO Renovations - Customer Self Service application, we will use the Imported Model builder described in detail in Chapter 9.

- **Linked Model builder**

  The Linked Model builder can be used to link a model (linked model) and its artifacts in another model (host model). Linked models are the primary unit of modularity for an application. They are roughly analogous to classes in Java. They contain methods and state data, and support the distinction between public and private access. From a host model, you can directly access any public methods, Linked Java Objects (LJOs), and action lists in a linked model.

  Using the Linked Model technique, the host model simply points to another WebApp (linked model), which remains independent of host. This approach can be very useful if many models need to link to a common utility functionality module.

  The key difference between the Imported Model approach and the Linked Model approach in achieving modularity is that in the case of Linked Model, two separate WebApps exist (host and linked). And since there are two separate WebApps, the Linked Model approach is ideally suited to be used when you want to retrieve data or functionality from another model but not the user interface (UI).

  > **Important:** Linked Model builder is best suited for linking to data and logic that resides in another model. It is not suited for linking to any user interface elements (pages, buttons, forms, and so forth) that may reside in another model. The Model Container builder is ideal for retrieving user interface components from another model.

  For our ITSO Renovations - Customer Self Service application, we will use the Linked Model builder, which is discussed in detail in Chapter 7.

- **Model Container builder**

  The Model Container builder allows a model to host another model at a named page location. Under the covers, the hosted model is partially implemented using the Linked Model functionality.

You can use a Model Container approach to make a model self-contained and allow it to be inserted into a web page. Using multiple models, with model containers, provides two main advantages:

- For developers: Using Model containers makes shared development easier. Multiple developers can collaborate on page content and creation. Each developer can work independently and contribute a model that provides specific content to the same page.
- For web users: Model Container builders provide a consistent page context. A web page incorporating contained models enables users to remain in that page's context, even as they drill down into a model in search of additional content. This keeps users oriented, and it also facilitates users' access to content in other models on the page.

Here is a typical example of how modular development might be used: Let us assume that a news site is supported by several developers. Each developer is responsible for the creation and maintenance of a certain type of news section (weather, sports, international, business, society, education, and so forth) on the page. Using container builders, each developer can develop a portion of this overall page's content and then plug his or her model into the page.

From the point of view of someone accessing the page, the page is displayed as a seamless whole, offering a mosaic of news content. However, as a user clicks down into the news model to view details about international events, for instance, the overall context of the page remains constant, with only the international news model segment of the page changing.

Each model is assigned to a container, which is a placeholder for the model to be displayed. Models can also contain containers.

A container can have more than one model assigned to it, but only one model can be displayed (active) in the container at a time. You may want to think of a container as an electrical outlet. You can have only one item (your models) plugged into an outlet at a time, but you can change the model displayed in the container. Models can have containers. Think of a power strip as a model that has three containers. In each container only one model can be displayed at a time, even though more than one model might be assigned to the container. Those models can also have containers, and so forth. You can have an unlimited nesting of models within containers.

For our ITSO Renovations - Customer Self Service application, we will use the Model Container builder described in detail in Chapter 10 when we design the Shopping portlet.

6.4 Building the web application

This section describes the process of building the three primary models for our ITSO Renovations - Customer Self Service application.

6.4.1 Customer information

In this section, we create the first iteration of the Customer Information model, which will enable users to do the following:

- Display a list of customers and get detailed information about any customer
- Edit customer information
- Search for a customer
- Add a new customer

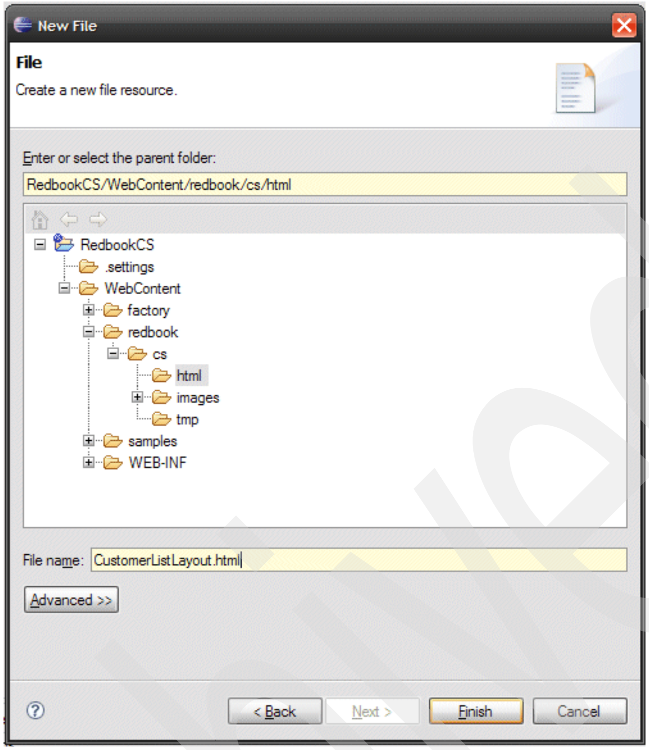
Creating the base HTML pages

First, we are going to create a base HTML pages that will host static content and named Tags that will be used as anchors in our UI model for inserting dynamic content structures and other page elements such as buttons, text fields, and so forth.

The process of creating the base HTML pages is optional but it is very useful in creating portlets with the desired UI layout. Think of these as “shell pages” that our high-level builders (View and Form, Data Page, and so forth) will start with to generate their presentation.

Do the following to create the base HTML files:

1. Click **File** → **New** → **Other** to launch the wizard.
2. Select **General** → **File** and click **Next**.
3. Type or select the parent folder as `RedbookCS/WebContent/redbook/cs/html`, enter the file name as `CustomerListLayout.html` and click **Finish** to create an empty HTML file.



Enter or select the parent folder: RedbookCS/WebContent/redbook/cs/html

File name: CustomerListLayout.html

Figure 6-3 Creating the CustomerListLayout.html file

4. Right-click the newly created CustomerListLayout.html file and select **Open With → Text Editor**. This will allow you to edit the file and create a basic layout of Customer List page. Copy and paste the HTML in Example 6-1 into this file.

Example 6-1

```
<html>
<body>
<form name="ITSO_REDBOOK_FORM_CustomerListLayout" method="post">
<TABLE>
   <TR>
      <TD align="left" valign="top">Customer Search: </TD>
      <TD align="left" valign="top"><span name="searchBox"></span></TD>
      <TD align="left" valign="top">
         <span name="searchButton"></span>
      </TD>
      <TD align="left" valign="top">
         <span name="viewAllCustomers"></span>
      </TD>
      <TD align="left" valign="top">
         <span name="addNewCustomer"></span>
      </TD>
   </TR>
   <TR>
      <TD colspan=3 align="center" valign="top">
         <span name="data"></span>
         <span name="paging_buttons"></span>
      </TD>
   </TR>
</TABLE>
</form>
</body>
</html>
```

Pay attention to the tags on the HTML page that have the **name=** attribute. We call these *named elements* and there are six of them in our HTML file:

- searchBox
- searchButton
- viewAllCustomers
- addNewCustomer
- data
- paging_buttons

All six of the tags happen to be <span> tags, but the type of tag does not matter as long as it has a **name=** attribute on it. A little later, we place a text field, buttons, and other UI elements on the named tags.

By creating our own shell HTML page like this one, with all the named elements that our model builders require, we can adjust the look and feel of how and where these components are laid out.

5. Save and close the CustomerListLayout.html file.
6. Create another base HTML file to use for the Customer Details page. Repeat Steps 1 through 3 to create a new HTML file and name it `CustomerDetailsLayout.html`
7. Right-click the CustomerDetailsLayout.html file and select **Open With** → **Text Editor**. Copy and paste the HTML in Example 6-2 into the file.

Example 6-2

```
<html>
<body>
<form name="ITSO_REDBOOK_FORM_CustomerDetailsLayout" method="post">
<TABLE>
```

```
   <TR>
      <TD colspan=3 align="center" valign="top">
         <span name="image_holder"></span>
      </TD>
   </TR>
   <TR>
      <TD colspan=3 align="center" valign="top">
         <span name="data"></span><br>
         <span name="update_button" />
         <span name="back_button" />
      </TD>
   </TR>
</TABLE>
</form>
</body>
</html>
```

8. Save and close the HTML file.

Creating the CustomerInfo model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by performing the following steps:

1. Select **File** → **New** → **WebSphere Portlet Factory Model.** This will launch the model creation wizard.

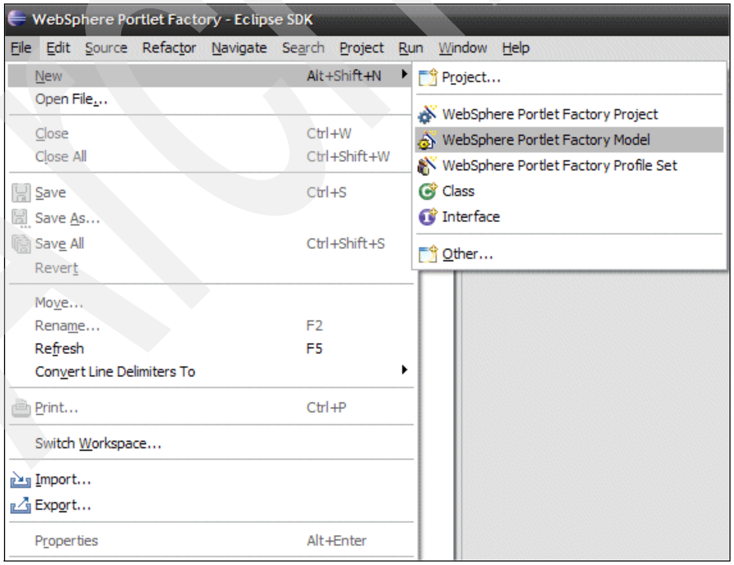
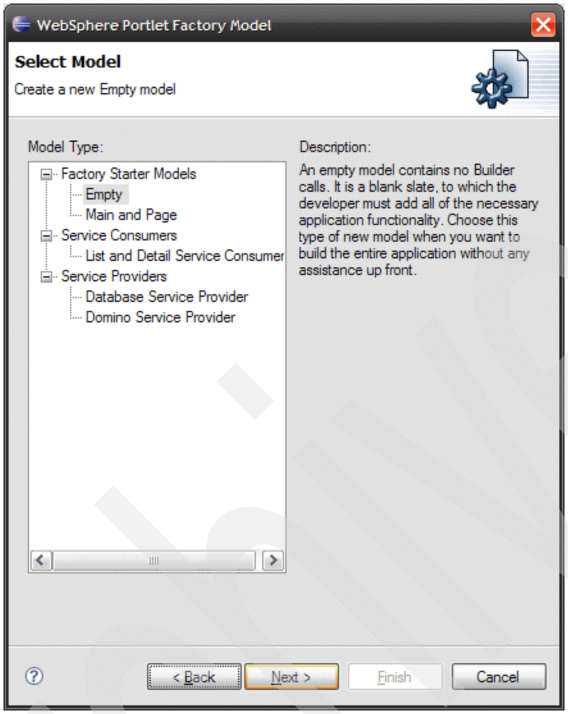


Figure 6-4 Creating a new model

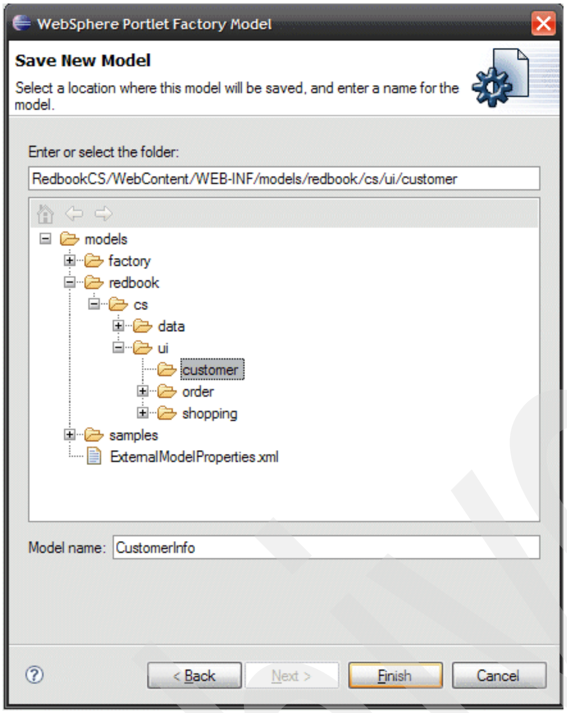
2. In the Choose Project pane, select **RedbookCS** as the project and then click **Next**.
3. In the Select Model pane, select the Model Type as **Factory Starter Models** → **Empty** and click **Next**.



An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 6-5 Selecting the Empty Factory Starter Model

4. In the Save New Model pane, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/customer** as the folder and **CustomerInfo** as the model name.
5. Click **Finish** to save the model.


WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder: RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/customer

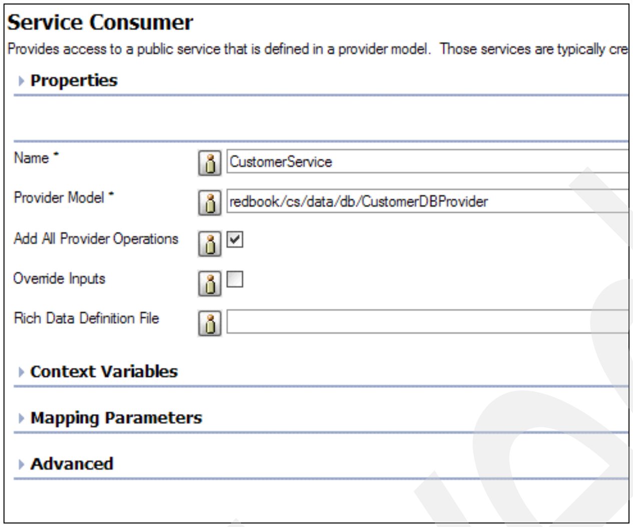
Model name: CustomerInfo

Figure 6-6 Saving the CustomerInfo model

Binding to the Service Provider model

Now that we have an empty CustomerInfo.model, we need to add a Service Consumer builder so that we can connect to the customer data service provider model that we built in Chapters 4 and 5. The Service Consumer builder is an integral part of creating SOA-based applications. It provides a binding mechanism to couple the UI model with the data service model.

1. From the builder palette, select the **Service Consumer** builder and click **OK** to add it to the **CustomerInfo** model.
2. Name the builder `CustomerService`.
3. To select the Provider Model, click the ellipsis and select the **redbook/cs/data/db/CustomerDBProvider** model.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically cre

Properties

Name * CustomerService

Provider Model * redbook/cs/data/db/CustomerDBProvider

Add All Provider Operations ☑

Override Inputs □

Rich Data Definition File

Context Variables

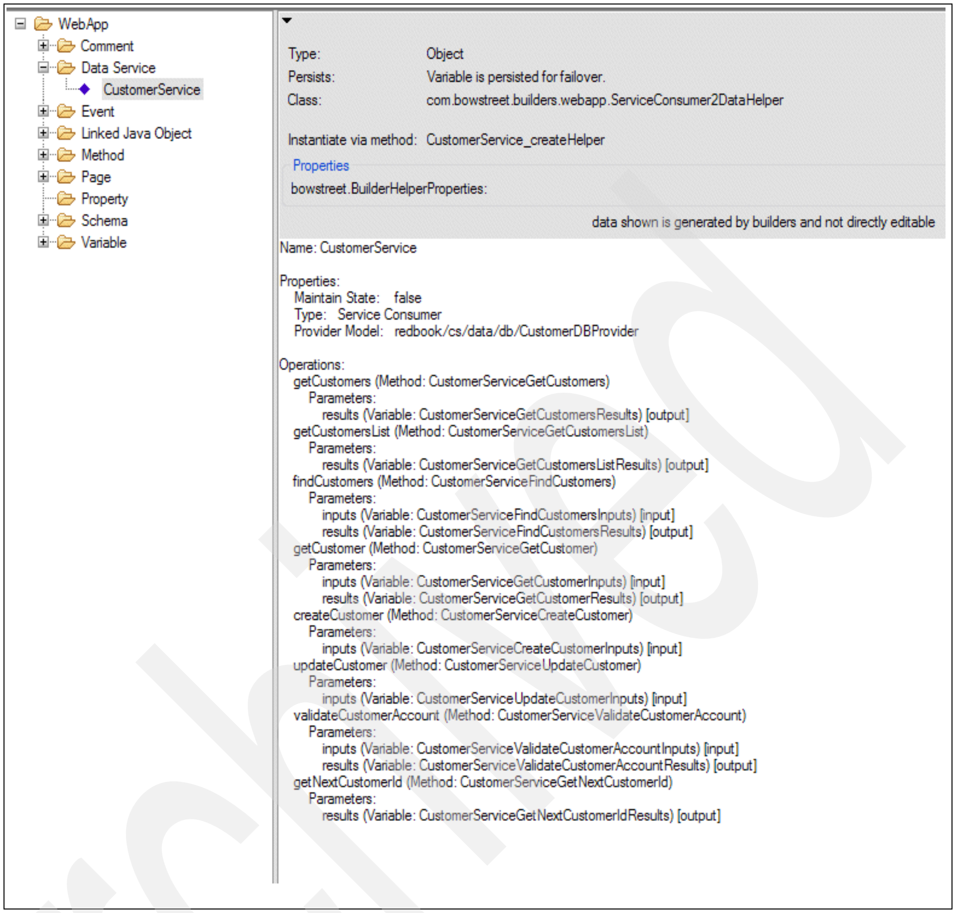
Mapping Parameters

Advanced

Figure 6-7   Service Consumer model

> **Attention:** When we choose a Provider Model, the builder editor inspects the model, looks for Service Definition and Operation builder calls, and pulls the service interface into the consumer model. Notice that by default the Service Consumer will add all discovered service operations to your consumer model. You can, however, limit the number of operations that are visible by unchecking the Add All Provider Operations checkbox and then enabling the operations individually.

4. For our CustomerService Service Consumer builder, leave the Add All Provider Operations checked. Click **OK** and save the model.
5. Review the CustomerInfo model's WebApp Tree showing all the operations that have been exposed by the ServiceConsumer builder.



```
Type:                       Object
Persists:                   Variable is persisted for failover.
Class:                      com.bowstreet.builders.webapp.ServiceConsumer2DataHelper

Instantiate via method:     CustomerService_createHelper
Properties
bowstreet.BuilderHelperProperties:
                                   data shown is generated by builders and not directly editable
Name: CustomerService

Properties:
   Maintain State:   false
   Type:   Service Consumer
   Provider Model:   redbook/cs/data/db/CustomerDBProvider

Operations:
   getCustomers (Method: CustomerServiceGetCustomers)
      Parameters:
         results (Variable: CustomerServiceGetCustomersResults) [output]
   getCustomersList (Method: CustomerServiceGetCustomersList)
      Parameters:
         results (Variable: CustomerServiceGetCustomersListResults) [output]
   findCustomers (Method: CustomerServiceFindCustomers)
      Parameters:
         inputs (Variable: CustomerServiceFindCustomersInputs) [input]
         results (Variable: CustomerServiceFindCustomersResults) [output]
   getCustomer (Method: CustomerServiceGetCustomer)
      Parameters:
         inputs (Variable: CustomerServiceGetCustomerInputs) [input]
         results (Variable: CustomerServiceGetCustomerResults) [output]
   createCustomer (Method: CustomerServiceCreateCustomer)
      Parameters:
         inputs (Variable: CustomerServiceCreateCustomerInputs) [input]
   updateCustomer (Method: CustomerServiceUpdateCustomer)
      Parameters:
         inputs (Variable: CustomerServiceUpdateCustomerInputs) [input]
   validateCustomerAccount (Method: CustomerServiceValidateCustomerAccount)
      Parameters:
         inputs (Variable: CustomerServiceValidateCustomerAccountInputs) [input]
         results (Variable: CustomerServiceValidateCustomerAccountResults) [output]
   getNextCustomerId (Method: CustomerServiceGetNextCustomerId)
      Parameters:
         results (Variable: CustomerServiceGetNextCustomerIdResults) [output]
```

Figure 6-8 WebApp tree showing the operations provided by the CustomerService

Displaying data in View and Form builder

Perform the following steps to add the View and Form builder for displaying the Customer List:

1. Open the CustomerInfo model if it is not already open.
2. From the builder palette, select **View & Form Builder** and click **OK** to add it to the CustomerInfo model.
3. Set the following values for the View and Form builder:

   Name: `CustomerList`

   View Data Operation: `DataServices/CustomerService/getCustomersList`

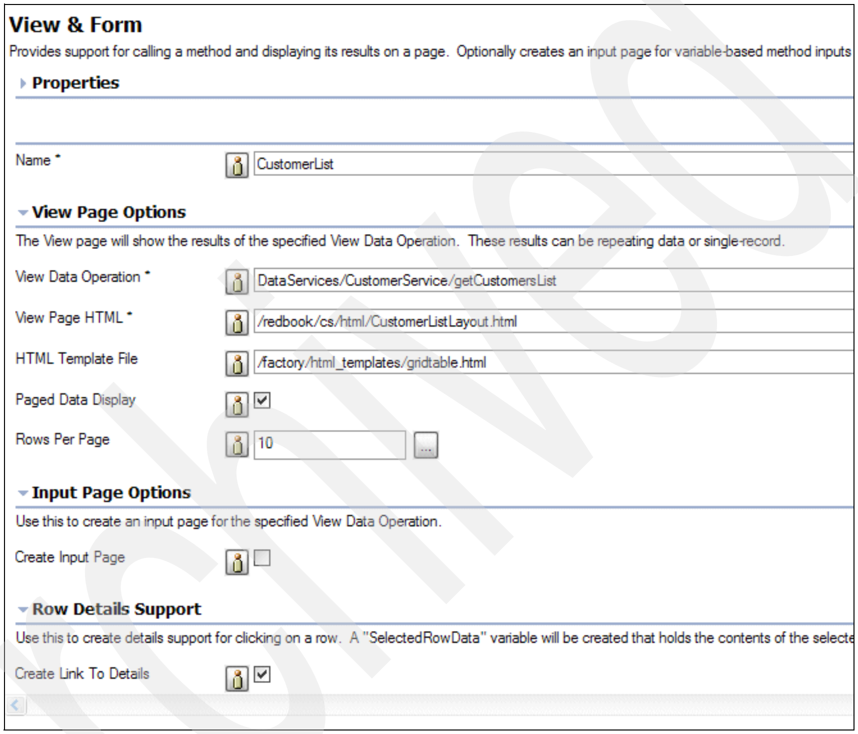
View Page HTML: `/redbook/cs/html/CustomerListLayout.html`
This is the file we created earlier in this section.

Paged Data Display: `(checked)`

Rows Per Page: `10`

Advance > Generate Main: `(checked)`

4. Click **OK** and save the model.



View & Form

Provides support for calling a method and displaying its results on a page. Optionally creates an input page for variable-based method inputs

Properties

Name * CustomerList

View Page Options

The View page will show the results of the specified View Data Operation. These results can be repeating data or single-record.

View Data Operation * DataServices/CustomerService/getCustomersList

View Page HTML * /redbook/cs/html/CustomerListLayout.html

HTML Template File /factory/html_templates/gridtable.html

Paged Data Display ☑

Rows Per Page 10

Input Page Options

Use this to create an input page for the specified View Data Operation.

Create Input Page □

Row Details Support

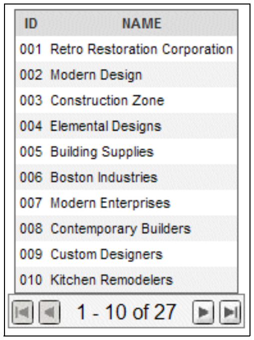
Use this to create details support for clicking on a row. A "SelectedRowData" variable will be created that holds the contents of the selecte

Create Link To Details ☑

Figure 6-9 View & Form builder

> **Tip:** While creating the UI models, it is a good practice to execute a model after making small changes to ensure that the desired changes are indeed taking effect.

5. Execute the CustomerInfo.model in WebSphere Portlet Factory to verify that it can connect to the CustomerDBProvider.model and run the service operation to get the customer list. Upon running the model, the browser should display the list shown in Figure 6-10.



ID	NAME
001	Retro Restoration Corporation
002	Modern Design
003	Construction Zone
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

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Figure 6-10 Customer List view

6. Add another View & Form builder to display the customer details. Open the CustomerInfo.model if it not already open. Select **View & Form Builder** from the builder palette and add it to the CustomerInfo.model

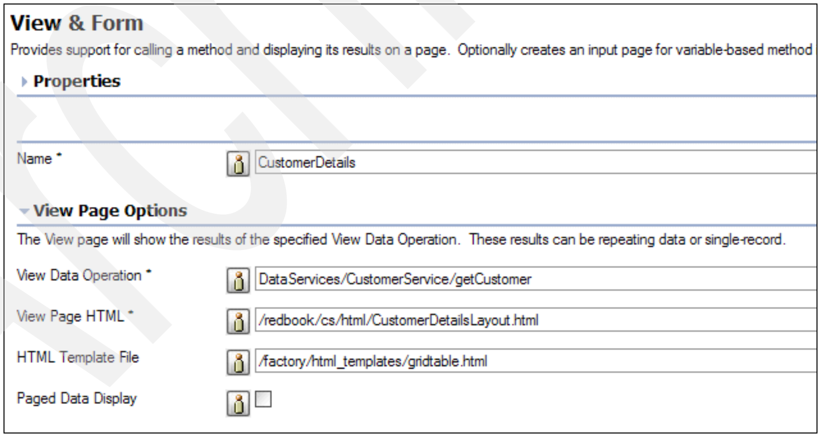
7. Set the following values for the View and Form builder:

   Name: `CustomerDetails`

   In the View Page Options section of the builder:

   View Data Operation: `DataServices/CustomerService/getCustomer`

   View Page HTML: `/redbook/cs/html/CustomerDetailsLayout.html`



View & Form

Provides support for calling a method and displaying its results on a page. Optionally creates an input page for variable-based method

Properties

Name * CustomerDetails

View Page Options

The View page will show the results of the specified View Data Operation. These results can be repeating data or single-record.

View Data Operation * DataServices/CustomerService/getCustomer

View Page HTML * /redbook/cs/html/CustomerDetailsLayout.html

HTML Template File /factory/html_templates/gridtable.html

Paged Data Display □

Figure 6-11 Customer Details View & Form builder

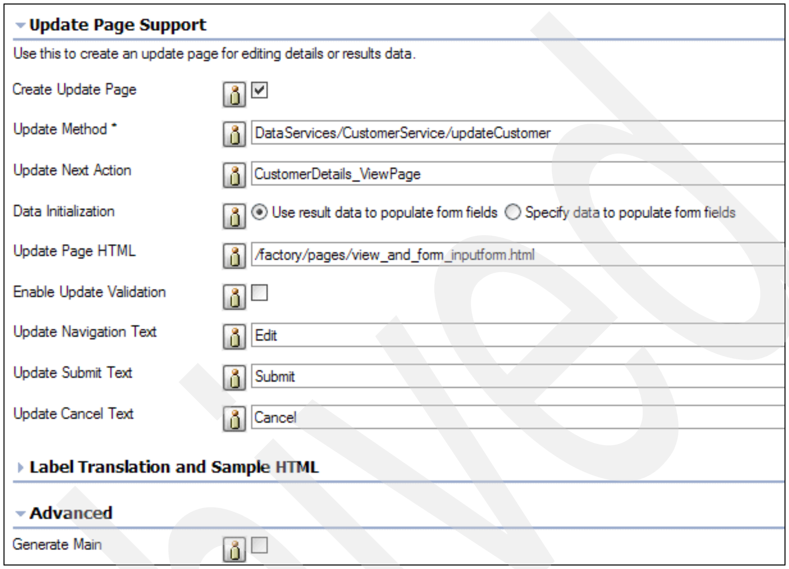
In the Update Page Support section of the builder:

Create Update Page: `(checked)`

Update Method: `DataServices/CustomerService/updateCustomer`

Update Next Action: `CustomerDetails_ViewPage`

This input value determines the page to display after the update form has been submitted. In our case, we would like to go back to the customer details view page.



Update Page Support

Use this to create an update page for editing details or results data.

Create Update Page ☑

Update Method * DataServices/CustomerService/updateCustomer

Update Next Action CustomerDetails_ViewPage

Data Initialization ● Use result data to populate form fields ○ Specify data to populate form fields

Update Page HTML /factory/pages/view_and_form_inputform.html

Enable Update Validation □

Update Navigation Text Edit

Update Submit Text Submit

Update Cancel Text Cancel

Label Translation and Sample HTML

Advanced

Generate Main □

Figure 6-12 Customer Details View & Form builder showing update page support

Advance > Generate Main: (`unchecked`)

We are doing this because the first View & Form builder [CustomerList] that we added to the model is already generating the main method for the model.

> **Important:** If multiple View & Form Builders in the model are generating the main method, you will see the following error in the WebSphere Portlet Factory Designer when the model is saved:
>
> ```
> This Builder Call caused the following exception: Attempt to
> create duplicate action main in model.
> ```

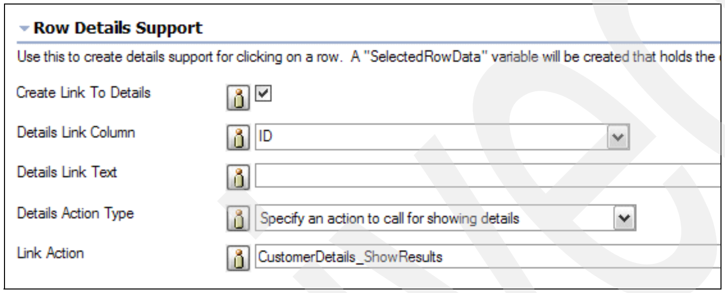
8. In this step, we link the two View and Form builders so that the users will be allowed to click the Customer ID on the CustomerList and be able to view the details for that customer in the CustomerDetails View.

   a. Open the CustomerList View and Form builder in the Builder Call Editor.

b. In the Row Details Support section, make the following entries and selections:

Create Link To Details:	(checked)
Link Details Column:	ID
Details Action Type:	Specify an action to call for showing details.
Link Action:	CustomerDetails_ShowResults

This is the method that generates the Customer Details view.



Row Details Support

Use this to create details support for clicking on a row. A "SelectedRowData" variable will be created that holds the

Create Link To Details ☑

Details Link Column ID

Details Link Text

Details Action Type Specify an action to call for showing details

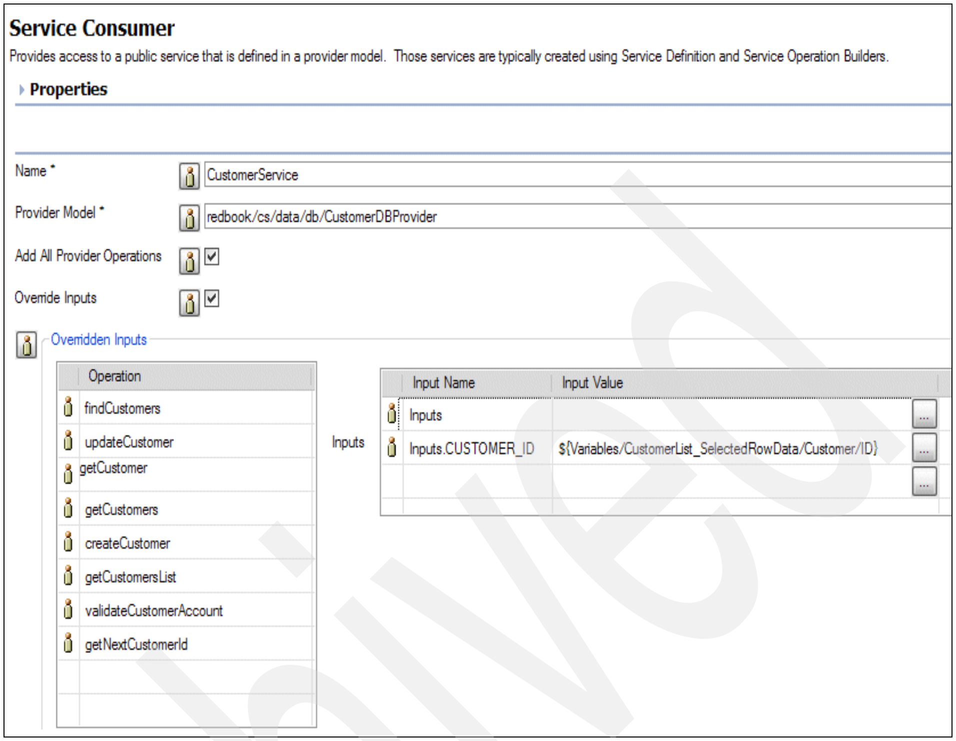
Link Action CustomerDetails_ShowResults

Figure 6-13 Customer List View & Form builder showing the Row Details Support

Overriding the input in Service Consumer

Now that we have basic View & Form builders set up in our CustomerInfo.model, we need do one more thing before they are truly connected.

1. Open the CustomerService Service Consumer builder in the Builder Call Editor.
2. Check the option to **Override Inputs**. Once checked, a list of operations provided by the CustomerDBProvider.model will be visible. Here we can override the inputs for any individual operations.
3. Click the **getCustomer** operation to view its inputs.
4. In the inputs section, set the Inputs.CUSTOMER_ID to `${Variables/CustomerList_SelectedRowData/Customer/ID}`. We are overriding this input so that when the getCustomer operation is run by the CustomerDetails View & Form builder, it fetches the Customer ID from the selected (clicked) row of the CustomerList View and Form builder.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definition and Service Operation Builders.

Properties

Name * CustomerService

Provider Model * redbook/cs/data/db/CustomerDBProvider

Add All Provider Operations ☑

Override Inputs ☑

Overridden Inputs

Operation
findCustomers
updateCustomer
getCustomer
getCustomers
createCustomer
getCustomersList
validateCustomerAccount
getNextCustomerId

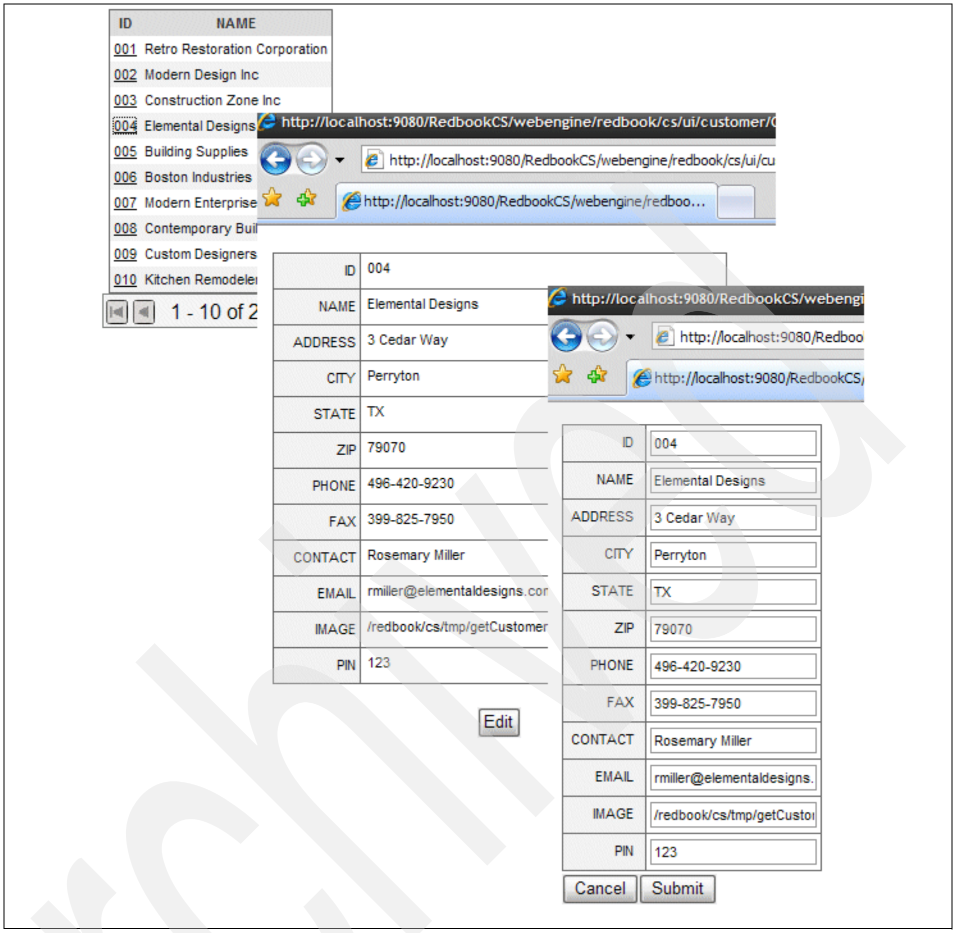
Inputs

Input Name	Input Value
Inputs	
Inputs.CUSTOMER_ID	${Variables/CustomerList_SelectedRowData/Customer/ID}

Figure 6-14 Service Consumer builder inputs being overridden

> **Important:** The CustomerList_SelectedRowData is a variable (also known as an artifact) produced by the high-level View and Form builder (in our case the CustomerList View and Form builder). This variable holds the value of the selected row when we click the Customer ID on the customer list. We used this variable while overriding the inputs in the service consumer builder to channel in the selected customer ID to the getCustomer operation.

5. Execute the CustomerInfo.model. You should now be able to click any **Customer ID** on the customer list to view the details. In the customer details view, you should also be able to click the **Edit** button to change the customer details information.



ID	NAME
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprise
008	Contemporary Buil
009	Custom Designers
010	Kitchen Remodelei

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http://localhost:9080/RedbookCS/webengine/redbook/cs/ui/customer/(

http://localhost:9080/RedbookCS/webengine/redbook/cs/ui/cu

http://localhost:9080/RedbookCS/webengine/redboo...

ID	004
NAME	Elemental Designs
ADDRESS	3 Cedar Way
CITY	Perryton
STATE	TX
ZIP	79070
PHONE	496-420-9230
FAX	399-825-7950
CONTACT	Rosemary Miller
EMAIL	rmiller@elementaldesigns.cor
IMAGE	/redbook/cs/tmp/getCustomer
PIN	123

http://localhost:9080/RedbookCS/webengi

http://localhost:9080/Redboo

http://localhost:9080/RedbookCS/

ID	004
NAME	Elemental Designs
ADDRESS	3 Cedar Way
CITY	Perryton
STATE	TX
ZIP	79070
PHONE	496-420-9230
FAX	399-825-7950
CONTACT	Rosemary Miller
EMAIL	rmiller@elementaldesigns.
IMAGE	/redbook/cs/tmp/getCusto
PIN	123

Figure 6-15 Execution of the CustomerInfo model showing the list, details, and edit functionality

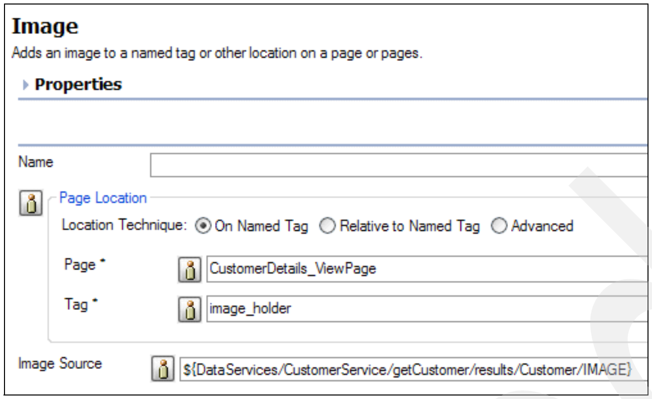
Adding image and back button to the Customer Details view

1. From the builder palette, select and add an Image builder to the model and configure it with the following values.

   Page Location:

Page:	`CustomerDetails_ViewPage`
Tag:	`image_holder`

   Image Source:
   `${DataServices/CustomerService/getCustomer/results/Customer/IMAGE}`



Image

Adds an image to a named tag or other location on a page or pages.

Properties

Name

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * CustomerDetails_ViewPage

Tag * image_holder

Image Source ${DataServices/CustomerService/getCustomer/results/Customer/IMAGE}

Figure 6-16 Image builder

2. Click **OK** and save the model.
3. From the builder palette, select and add a Button builder to the model and configure it with the following values:

   Page location:

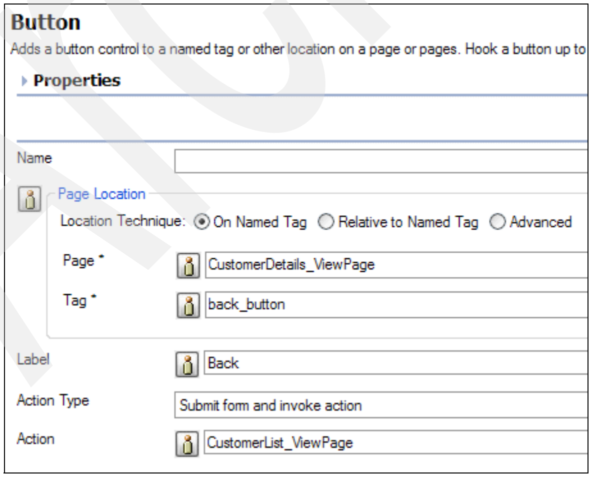
   Page: `CustomerDetails_ViewPage`

   Tag: `back_button`

   Label: `back`

   Action Type: `Submit form and invoke action`

   Action: `CustomerList_ViewPage`



Button

Adds a button control to a named tag or other location on a page or pages. Hook a button up to

Properties

Name

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * CustomerDetails_ViewPage

Tag * back_button

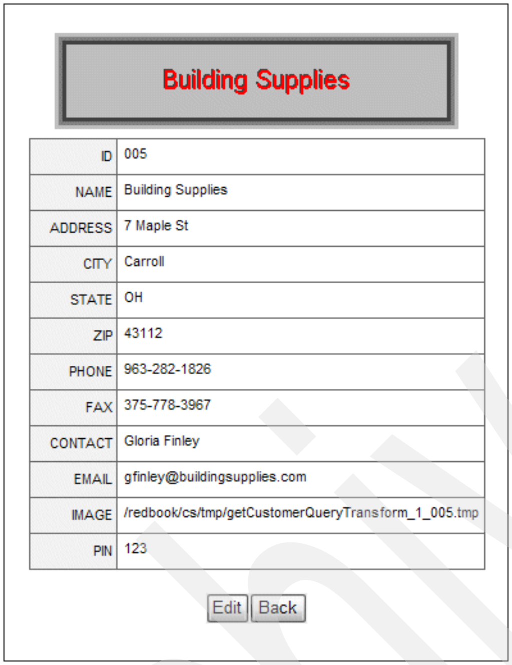
Label Back

Action Type Submit form and invoke action

Action CustomerList_ViewPage

Figure 6-17 Button builder

4. Click **OK** and save the model.
5. Execute the model. Click any **Customer ID** to view the details page. You should see the company image and also the back button on this page.



Building Supplies

ID	005
NAME	Building Supplies
ADDRESS	7 Maple St
CITY	Carroll
STATE	OH
ZIP	43112
PHONE	963-282-1826
FAX	375-778-3967
CONTACT	Gloria Finley
EMAIL	gfinley@buildingsupplies.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_005.tmp
PIN	123

Figure 6-18 CustomerInfo model showing customer details

Adding the search functionality

In this section, we add the ability to search for customers. To do this, we add the following builders to the model:

- Text Field: For allowing users to type in the search string
- Button: For triggering the search process
- Action List: For conducting the search process

Perform the following steps to implementing this functionality:

1. From the builder palette, select and add a Text Field builder to the CustomerInfo.model. Populate it with the following inputs:

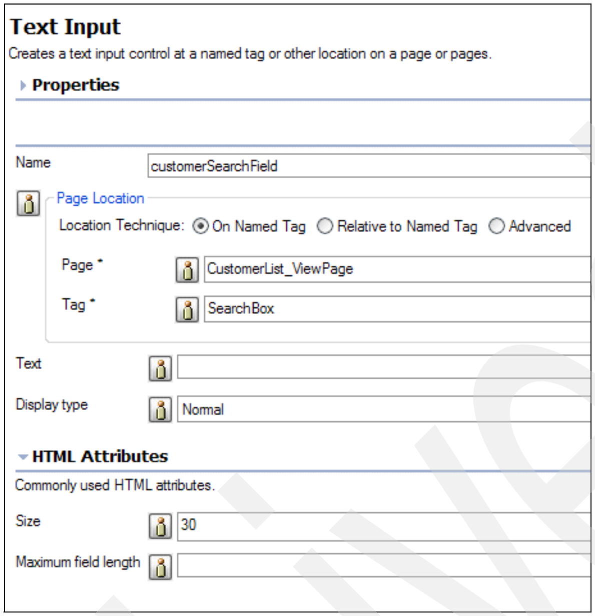
   Name: `customerSearchField`

   Page Location:

   Page: `CustomerList_ViewPage`

   Tag: `searchBox`

In the HTML attributes section, set the Size to 30.



Text Input

Creates a text input control at a named tag or other location on a page or pages.

Properties

Name: customerSearchField

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: CustomerList_ViewPage

Tag *: SearchBox

Text:

Display type: Normal

HTML Attributes

Commonly used HTML attributes.

Size: 30

Maximum field length:

Figure 6-19 Text Input builder for search functionality

2. Click **OK** and save the model.
3. Next we implement the search process in an Action List builder. This Action List will have one input parameter, which will be the search string. From the builder palette, add an Action List builder to the CustomerInfo model and set the following values:

   Name: `executeSearch`

   Expand the Arguments section to specify the name and datatype of the arguments. Here we need to specify just one argument for the search text.

   Name: `searchText`

   Data Type: `String`

   Specify these actions in the Action List:

   `CustomerServiceFindCustomersWithArgs(${Arguments/searchText})`

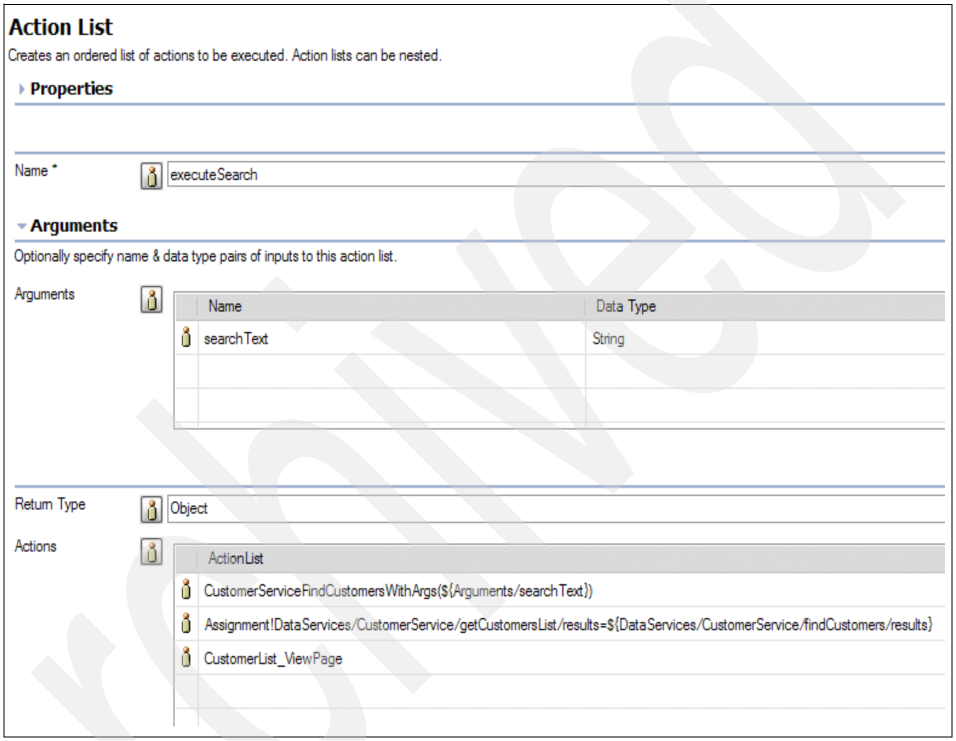
   This action executes the findCustomer operation of the CustomerService and channels in the search argument.

```
Assignment!DataServices/CustomerService/getCustomersList/results=
${DataServices/CustomerService/findCustomers/results}
```

This assignment statement sets the data in the CustomerList with the results obtained upon running the findCustomer operation.

```
CustomerList_ViewPage
```

This action simply refreshes the CustomerList_ViewPage.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * executeSearch

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments

Name	Data Type
searchText	String

Return Type Object

Actions

ActionList
CustomerServiceFindCustomersWithArgs(${Arguments/searchText})
Assignment!DataServices/CustomerService/getCustomersList/results=${DataServices/CustomerService/findCustomers/results}
CustomerList_ViewPage

Figure 6-20 Action List builder showing the search execution process

4. Click **OK** and save the model.
5. We need a button for triggering our search action. Add a new Button builder to the model and set the following inputs values:

   Page Location:

Page:	`CustomerList_ViewPage`
Tag:	`searchButton`

Label:	`Go`
Action:	`executeSearch`

In the Arguments section, set the input mappings for the argument: **executeSearch_Arg1** to value: **${Inputs/SearchBox}**

6. Click **OK** and save the model.
7. Add a new Button builder to the model and configure it with the following inputs:

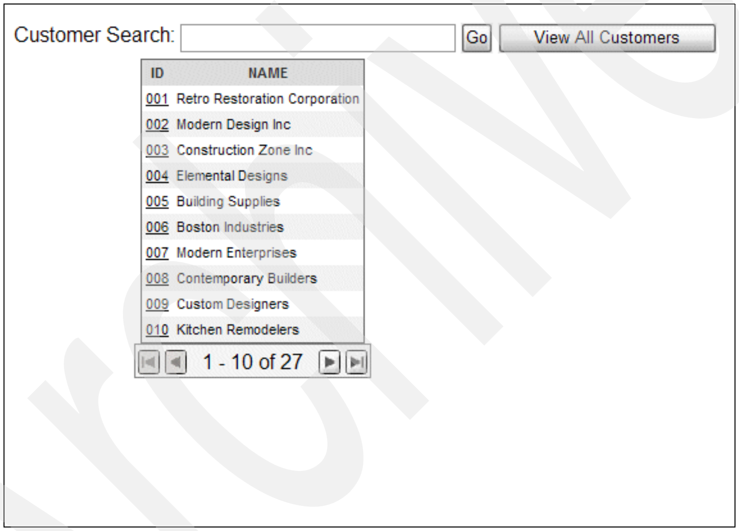
   Page Location:

   Page: `CustomerList_ViewPage`

   Tag: `viewAllCustomers`

   Label: `View All Customers`

   Action: `CustomerList_ShowResults`
8. Click **OK** and save the model.
9. Execute the model.



ID	NAME
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

Figure 6-21 CustomerInfo model

Implementing the functionality to add a new customer

In this section, we utilize an Input Form builder along with Action List and Buttons to implement the functionality to add a new customer.

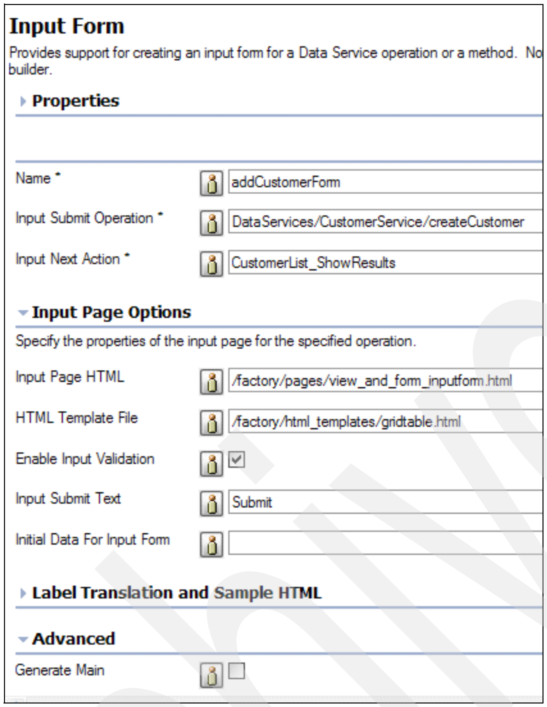
1. Add an Input Form builder to the model and configure it with the following values:

   Name: `addCustomer`

   Input Submit Operation: `DataServices/CustomerService/createCustomer`

Input Next Action: `CustomerList_ShowResults`

Advanced > Generate Main: (`unchecked`)



Input Form

Provides support for creating an input form for a Data Service operation or a method. No
builder.

Properties

Name *	addCustomerForm
Input Submit Operation *	DataServices/CustomerService/createCustomer
Input Next Action *	CustomerList_ShowResults

Input Page Options

Specify the properties of the input page for the specified operation.

Input Page HTML	/factory/pages/view_and_form_inputform.html
HTML Template File	/factory/html_templates/gridtable.html
Enable Input Validation	☑
Input Submit Text	Submit
Initial Data For Input Form	

Label Translation and Sample HTML

Advanced

Generate Main	□

Figure 6-22 Input Form builder for adding new customers.

2. Click **OK** and save the model.
3. Add an Action List builder to the model and configure it with the following:

   Name: `addCustomer`

   Specify the actions below in the Action List:

   `DataServices/CustomerService/getNextCustomerId`

   This action calls the getNextCustomerId method exposed by the Customer Service to get a unique Customer ID from the database.

   ```
   Assignment!DataServices/CustomerService/createCustomer/inputs/Cus
   tomer/ID=${DataServices/CustomerService/getNextCustomerId/results
   /arguments/returnValue}
   ```

   The above statement assigns the result of the **`getNextCustomerId`** operation to the input of the **`createCustomer`** operation.

`addCustomerForm_InputPage`

This action renders the input page for adding new customer.

4. Click **OK** and save the model.
5. Add a Button builder to trigger the addCustomer process. Configure it with the following values:

   Page Location:

   Page: `CustomerList_ViewPage`

   Tag: `addNewCustomer`

   Label: `Add New Customer`

   Action: `addCustomer`
6. Click **OK** and save the model.
7. Add another Button builder to the model. This is a cancel button that we place on the Input Form in case the user decides not to add a customer. Configure it with the following values:

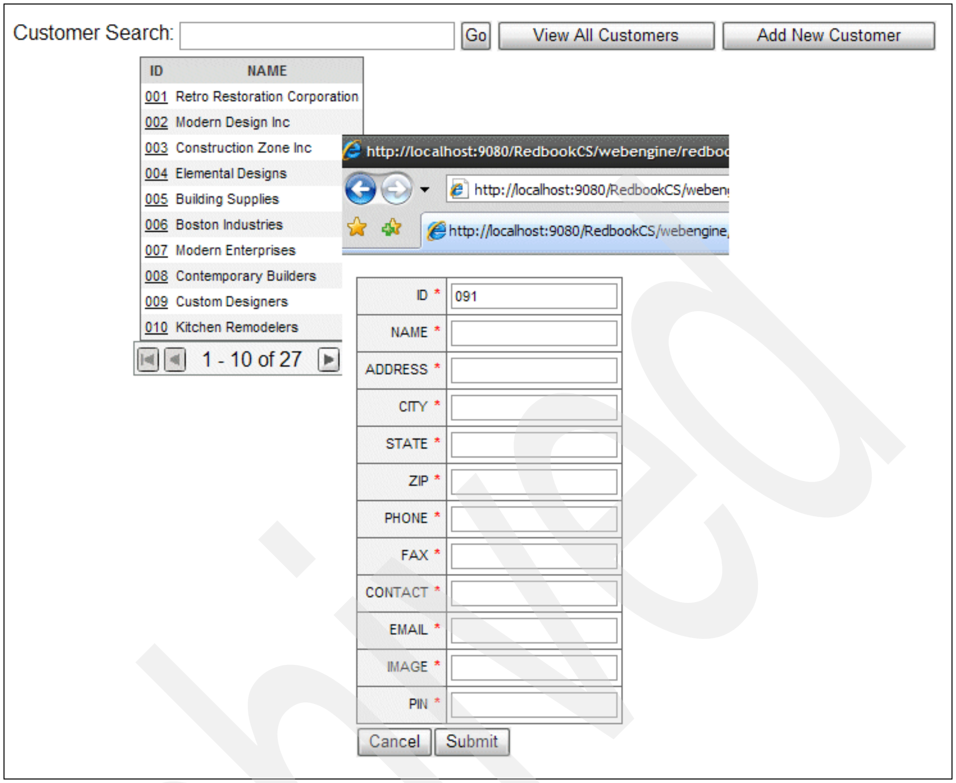
   Page Location:

   Page: `addCustomerForm_InputPage`

   Tag: `cancel_button`

   Label: `Cancel`

   Action: `main`
8. Click **OK** and save the model.
9. Execute the model. Click the **Add New Customer** button. Note that the ID is automatically populated.


Customer Search:
Go
View All Customers
Add New Customer
http://localhost:9080/RedbookCS/webengine/redboo
http://localhost:9080/RedbookCS/weben
http://localhost:9080/RedbookCS/webengine,
Cancel
Submit

ID	NAME
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

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ID *	091
NAME *	
ADDRESS *	
CITY *	
STATE *	
ZIP *	
PHONE *	
FAX *	
CONTACT *	
EMAIL *	
IMAGE *	
PIN *	

Figure 6-23 Customer Info model showing the input form to add new customer

This completes the construction of our Customer Info model.

6.4.2 Order List model

In this section we create a bare bones version of the Order List model. The Order List model will be able to consume the Order Service and to execute an operation to get a list of orders for a customer. In this version of the model, we hard wire the default inputs (Customer ID) for the Order Service Consumer so that we can view and test the basic execution of the Order List model.

In Chapter 8, when we introduce and discuss event handling and portlet to portlet communication, we remove all the hard wires and default inputs from the Order Service Consumer because we will be able to execute and render the Order List based on the selected customer in the Customer Information portlet.

Creating the base HTML page

This procedure is similar to the one we used to create the Customer Info model, beginning with creating the base HTML layout page for the Order List model.

1. Create a new HTML file in the RedbookCS/WebContent/redbook/cs/html directory and name it `OrderListLayout.html`
2. Open it for editing and copy and paste the HTML from Example 6-3 into the file.

Example 6-3

```
<HTML>
<BODY>
<FORM name="ITSO_REDBOOK_FORM_OrderDetailsLayout" method="post">
   <TABLE>
      <TR>
         <TD colspan="3" align="left" valign="top">
            <SPAN name="OrderList"></SPAN>
         </TD>
      </TR>
   </TABLE>
   <SPAN name="PagingBtns"></SPAN><br>
   <SPAN name="DisplayRowsText">Max no of rows to be displayed on
each page:</SPAN>
   <SPAN name="DisplayRows"></SPAN>
</FORM>
</BODY>
</HTML>
```

3. Save and close the file.

Developing the OrderList model

1. Create a new empty model in the RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/order directory and name it `OrderList.model`.
2. Our order list needs to connect to the Order service provider model that we built in Chapter 4 and 5. For this we need a Service Consumer Builder. From the builder palette, add a Service Consumer builder to the OrderList model and configure it with the following values:

   Name: `OrderService`

   Provider Model: `redbook/cs/data/db/OrderDBProvider`

Override Inputs: (`checked`)

Then set the default input for the **`getCustomerOrdersList`** operation:

Input Name: `Inputs.CUSTOMER_ID`

Input Value: `001`

3. Click **OK** and save the model.
4. Add an Imported Page Builder to the OrderList model to import the base HTML page that we created previously. Configure it with the following values:

   Name: `orderList`

   Page to Import: `/redbook/cs/html/OrderListLayout.html`
5. Click **OK** and save the model.
6. Add an Action List builder to the model. This will be our “main” method and the entry point for the execution of the model. Configure it with the following values:

   Name: `main`

   Actions:

   `DataServices/OrderService/getCustomerOrdersList`

   This method makes the call to the getCustomerOrderList operation of the OrderService to get a list of all Orders for customer [Customer_ID=001] that we had set as the default input.

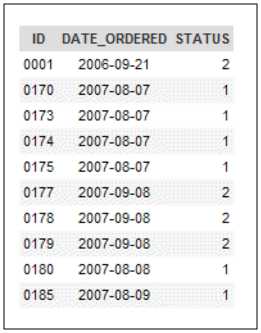
   `orderList`

   This action renders the orderList page.
7. We need a mechanism to display the data (that is, the List of Orders) on the orderList page. For this, we will use a Data Page builder. From the builder palette, add a Data Page builder to the OrderList model and configure it with the following values:

   Variable: `DataServices/OrderService/getCustomerOrdersList/results`

   Page in Model: `orderList`

   Location for New Tags: `OrderList`
8. Click **OK** and save the model.
9. Execute the OrderList.model. You should see a table with a list of orders showing the ID, DATE_ORDERED, and STATUS of orders, like the one in Figure 6-24.



ID	DATE_ORDERED	STATUS
0001	2006-09-21	2
0170	2007-08-07	1
0173	2007-08-07	1
0174	2007-08-07	1
0175	2007-08-07	1
0177	2007-09-08	2
0178	2007-09-08	2
0179	2007-09-08	2
0180	2007-08-08	1
0185	2007-08-09	1

Figure 6-24 Order List model showing the list of orders

6.4.3 Order Details model

The last of the three models that we are going to create in this chapter is the OrderDetails model. Just like the OrderList model, for the first iteration of this model we are going to channel in the default inputs for the Order Service Operations to test the basic functionality. In Chapter 8 we remove these default inputs and establish true portlet to portlet communication.

Creating the base HTML page

Similar to what we did previously to create the CustomerInfo and OrderList models, we begin by creating the base HTML layout page for the OrderDetails model.

1. Create a new HTML file in the RedbookCS/WebContent/redbook/cs/html directory and name it `OrderDetailsLayout.html`
2. Open it for editing and copy and paste the following HTML into the file.

```
<HTML>
<BODY>
<FORM name="ITSO_REDBOOK_FORM_OrderDetailsLayout" method="post">
<TABLE>
   <TR>
   <TD colspan="3" align="left" valign="top">
      <SPAN name="orderInformation"></SPAN>
   </TD>
   </TR>
</table>
<table>
<TR>
   <TD align="left" valign="top"><SPAN name="orderItems"></SPAN></TD>
</TR>
</TABLE>
```

```
</FORM>
</BODY>
</HTML>
```

3. Save and close the file.

Developing the Order Details model

1. Create a new empty model in the RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/order directory and name it `OrderDetails.model`.
2. We need a Service Consumer builder in the Order Details model for connecting to the Order Details Provider. From the builder palette, add a Service Consumer builder to the OrderDetails model and configure the following values:

   Name: `OrderService`

   Provider Model: `redbook/cs/data/db/OrderDBProvider`

   Override Inputs: `(checked)`.

   Then set the default inputs for the following operations:

Operation	Input name	Input value
getOrder	Inputs.ORDER_ID	0001
getOrderItems	Inputs.ORDER_ID	0001

3. Click **OK** and save the model.
4. Add an Imported Page builder to the OrderDetails model to import the base HTML page that we created earlier. Configure it with the following values:

   Name: `orderDetails`

   Page to Import: `/redbook/cs/html/OrderDetailsLayout.html`
5. Click **OK** and save the model.
6. For the OrderDetails.model, we need two data pages: one to display the Order Information (Order_ID, Customer_ID, Billing, Date_Ordered, Status, Date_Shipped, Comments), and another to display the list of Items (Product_ID, Name, Description, Thumbnail, Unit_Price, Quantity, Order_Price, Source) in the Order.
   a. From the builder palette, add a Data Page builder to the OrderDetails.model and configure it with the following values:

      Variable: `DataServices/OrderService/getOrder/results`

Page in Model: `orderDetails`

Location for New Tags: `OrderDetails`

b. Click **OK** and save the model.

c. Add another Data Page builder to the OrderDetails.model and configure it with the following values:

Name: `orderItems`

Variable: `DataServices/OrderService/getOrderItems/results/Orders/Order/ITEMS`

Page in Model: `orderDetails`

Location for New Tags: `orderItems`

d. Click **OK** and save the model.

7. Add an Action List builder to the model. This will be our “main” method and the entry point for the execution of the model. Configure it with the following values:

Name: `main`

Actions:

`DataServices/OrderService/getOrder`

This method makes a call to the getOrder operation of the OrderService to get the data for Order [Order_ID=0001] that we had set as the default input in the Service Consumer.

`DataServices/OrderService/getOrderItems`

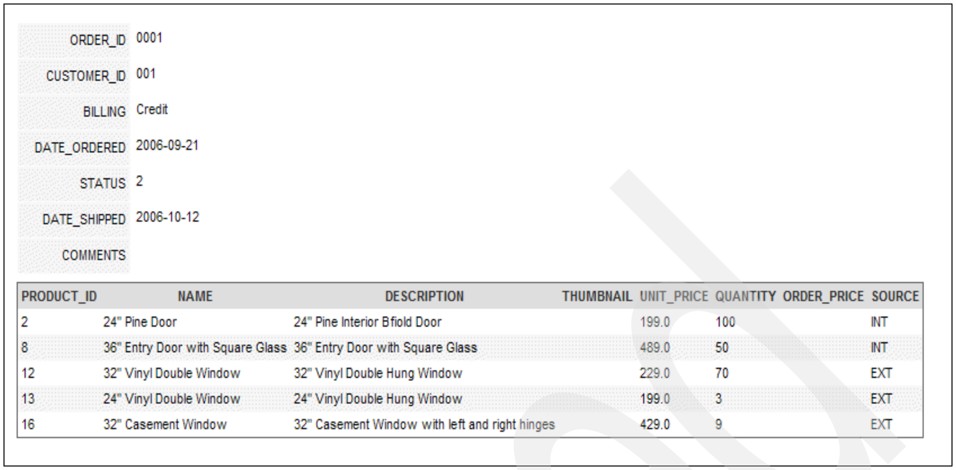
This method makes a call to the getOrderItems operation of the OrderService to get a list of all items in the Order [Order_ID=0001]

`orderDetails`

This action renders the orderDetails page.

8. Click **OK** and save the model.

9. Execute the OrderDetails.model. You should see the Order Details page showing two separate datapages, one displaying the order information and the other displaying the list of items in the order in a tabular format.



ORDER_ID	0001
CUSTOMER_ID	001
BILLING	Credit
DATE_ORDERED	2006-09-21
STATUS	2
DATE_SHIPPED	2006-10-12
COMMENTS	

PRODUCT_ID	NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfold Door		199.0	100		INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50		INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70		EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3		EXT
16	32" Casement Window	32" Casement Window with left and right hinges		429.0	9		EXT

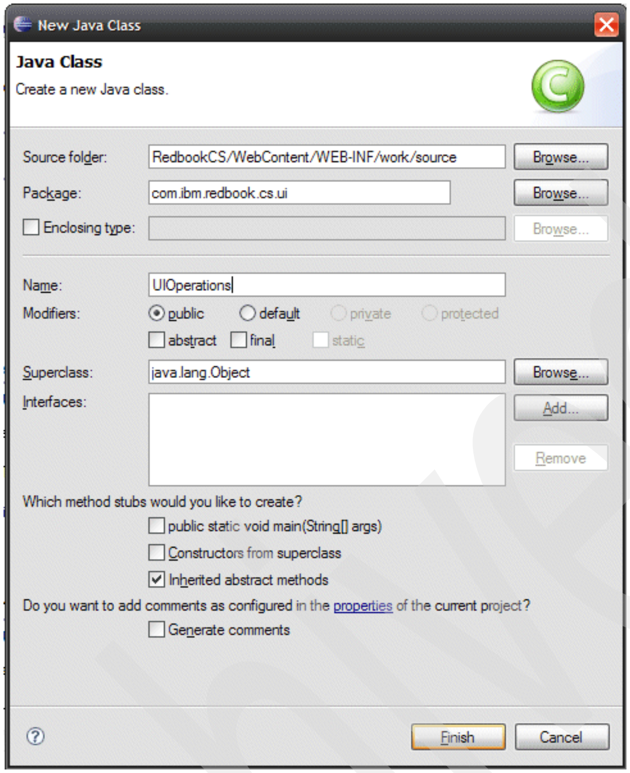
Figure 6-25 OrderDetails model showing the details about an order

10. If you look closely at the second datapage (orderItems) in Figure 6-25, you will see that the `ORDER_PRICE` column is empty. This is because the order price is not stored in the database but can be computed on the client side by multiplying the `UNIT_PRICE` and `QUANTITY`. We are going to do this calculation in a method in a Java class and then utilize a Linked Java Object Builder to execute the method.

    First we need to create a Java file and create a method that does the calculation. To create the Java file, click **File** → **New** → **Class**. This will launch the dialog box to create a new Java class. Configure it with the following values:

    Package: `com.ibm.redbook.cs.ui`

    Name: `UIOperations`



New Java Class

Java Class

Create a new Java class.

Source folder: RedbookCS/WebContent/WEB-INF/work/source

Package: com.ibm.redbook.cs.ui

□ Enclosing type:

Name: UIOperations

Modifiers: ● public ○ default ○ private ○ protected

□ abstract □ final □ static

Superclass: java.lang.Object

Interfaces:

Which method stubs would you like to create?

□ public static void main(String[] args)

□ Constructors from superclass

☑ Inherited abstract methods

Do you want to add comments as configured in the properties of the current project?

□ Generate comments

Figure 6-26 LJO creation dialog box

11. Click **Finish**. This will create the UIOperations.java file in the Redbook/WebContent/WEB-INF/work/source/com/ibm/redbook/cs/ui directory.

12. Open the UIOperations.java file in a editor and add the following updateQuanity method to it. This updateQuantity method basically iterates through the itemList, gets the unit price and quantity, multiples them and sets that value in the order price.

```
public void updateQuantity(WebAppAccess webAppAccess, IXml itemList)
{
     IXml item=itemList.getFirstChildElement();
     while(item!=null)
     {
          double unitPrice= Double.parseDouble(
item.getText("UNIT_PRICE"));
          int quantity=Integer.parseInt(item.getText("QUANTITY"));
          item.setText("ORDER_PRICE","" +(unitPrice*quantity));
```

```
        item=item.getNextSiblingElement();
    }
}
```

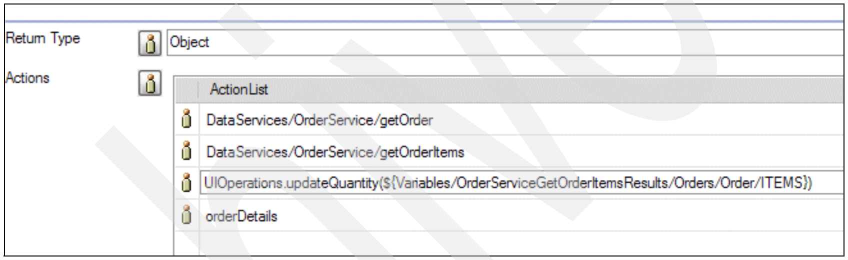
13. Save and close the UIOperations.java file.

14. From the builder palette, add a Linked Java Object builder to the OrderDetails.model, configure it with the following values, and save the model:

Name:	`UIOperations`
Class Name:	`com.ibm.redbook.cs.ui.UIOperations`

15. Execute this method in the main Action List prior to display the orderDetails page. Open the main Action List and insert the following statement:

    ```
    UIOperations.updateQuantity(
    ${Variables/OrderServiceGetOrderItemsResults/Orders/Order/ITEMS})
    ```



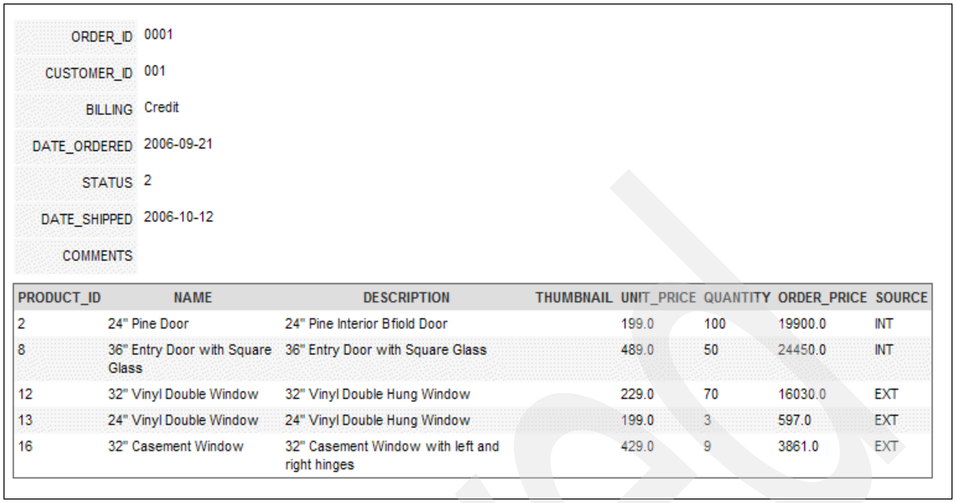
Return Type: Object

Actions:

ActionList
DataServices/OrderService/getOrder
DataServices/OrderService/getOrderItems
UIOperations.updateQuantity(${Variables/OrderServiceGetOrderItemsResults/Orders/Order/ITEMS})
orderDetails

Figure 6-27 main Action List with the LJO UpdateQuantity method

16. Save and execute the OrderDetails.model. You should now see the `ORDER_PRICE` column populated.



ORDER_ID	0001
CUSTOMER_ID	001
BILLING	Credit
DATE_ORDERED	2006-09-21
STATUS	2
DATE_SHIPPED	2006-10-12
COMMENTS	

PRODUCT_ID	NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	100	19900.0	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

Figure 6-28 OrderDetails model showing the computed order price

6.5 Converting the web application into portlets

Once we have finished building the basic WebSphere Portlet Factory models, we can deploy them to WebSphere Portal. To do this, we need to simply add one additional builder, the Portlet Adapter builder, to our models. This builder will create a portlet wrapper for the model and enable it to run within the WebSphere Portal container.

Each model with the Portlet Adapter builder will be an individual portlet in the portlet war file. The key thing to remember here is that even when we have the portlet adapter in our models, we can still run the models standalone as well as in a portlet.

Do the following for each of the three models (CustomerInfo, OrderList, OrderDetails) that we built in this chapter:

1. Open the model in the WebSphere Portlet Factory Designer.
2. From the builder palette, add the Portlet Adapter builder to the model.
3. Specify a Name and Portlet Title in the Portlet Adapter builder for each of the models:

   – Model: CustomerInfo

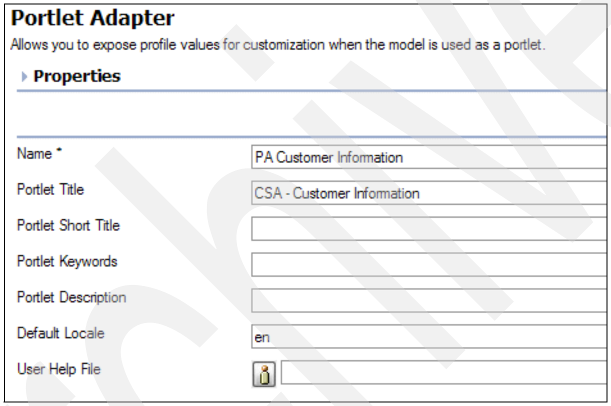
     Name: PA Customer Information
     Portlet Title: CSA - Customer Information

- Model: OrderList

  Name: PA Order List
  Portlet Title: CSA - Order List
- Model: OrderDetails

  Name: PA Order Details
  Portlet Title: CSA - Order Details

> **Tip:** It is a good practice to prefix the Portlet Title with the name of the application that the portlet is a part of. In large portal environments, this helps identify portlets quickly and aids the portlet administration process.
>
> In our case, all the portlets belong to the Customer Service Application, thus the prefix `CSA`.



Portlet Adapter

Allows you to expose profile values for customization when the model is used as a portlet.

Properties

Name *	PA Customer Information
Portlet Title	CSA - Customer Information
Portlet Short Title	
Portlet Keywords	
Portlet Description	
Default Locale	en
User Help File	

Figure 6-29 Portlet Adapter builder for the Customer Info model

4. Click **OK**.
5. Save and close each of the models.

> **Note:** The portlet adapter builder also provides a mechanism to specify the edit and configure modes for the portlet. We discuss this in further detail later in this chapter and also in Chapter 9 when we discuss profiling.

6. Right-click the **RedbookCS project** and select **Build Portlet Factory War** → **Build Portlet war**. This will build the portlet war file in the <WP_Home>/installableApps directory. If auto deploy is enabled, it will also install the portlet war file in WebSphere Portal.

Important: The only time you need to rebuild Portlet WARs is:

1. When you are making changes to Portlet Adapter builder calls in the models that will become portlets, that is, when you add a Portlet Adapter builder call to a model, when you remove a Portlet Adapter builder call from a model (or delete the model itself), or when you make changes to name, title, or description inside an existing Portlet Adapter builder call.
2. When you add, remove, or edit any Cooperative Portlet (Source/Target) builders in your model.

Either of these actions modifies the portlet.xml file, which is why a rebuild of the Portlet WAR file is required.

If you make other changes to the model, such as adding or editing other builder calls, these changes will automatically propagate out to the deployed directory on the application or portal server upon each project build (which, by default in Eclipse, is with each resource save). In other words save your model, and the model file is updated automatically:

- In the project contents folder (workspace)
- On the application server under the deployed app folder
- On the portal server under the deployed app folder

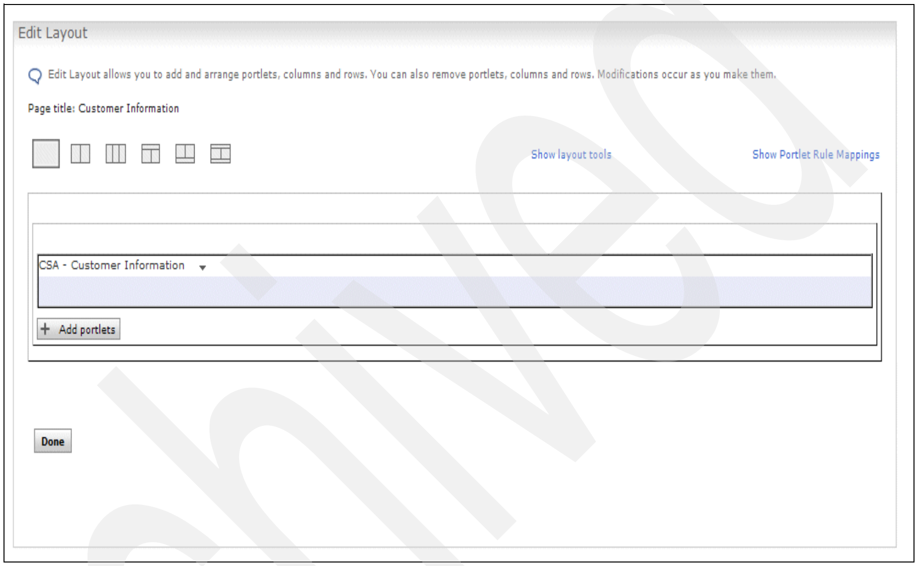
For iterative development, this is a very nice convenience. As you might imagine, then, once a related group of portlets (WebApp project) is completed, you will often elect to rebuild the Portlet WAR, so that the installable .WAR file is in perfect sync with the deployed WAR directory. During iterative development and testing, though, this is not necessary because of how Designer automates the migration of files and code onto the application or portal server.

6.6 Configuring pages and portlets in WebSphere Portal

In this section, we create labels and pages in WebSphere Portal for our ITSO Customer Self Service Application and add the three portlets we created to these pages.

1. Bring up a browser window and access the WebSphere Portal Server. The URL will be something like `http://<hostname>:10038/wps/portal`
2. Log into the portal as the portal administrative user. (Typically this user is the `wpsadmin`)
3. Click the **Administration** link to go to the portal administration section.

4. On the left side, click **Portal User Interface** → **Manage Pages.**
5. Under Content Root, create a new label and call it `ITSO Customer Self Service`.
6. Click the newly created label and create 2 pages, `Customer Information` and `Orders`.
7. Edit the Customer Information page and choose a single column layout. Add the `CSA - Customer Information` portlet to the page.



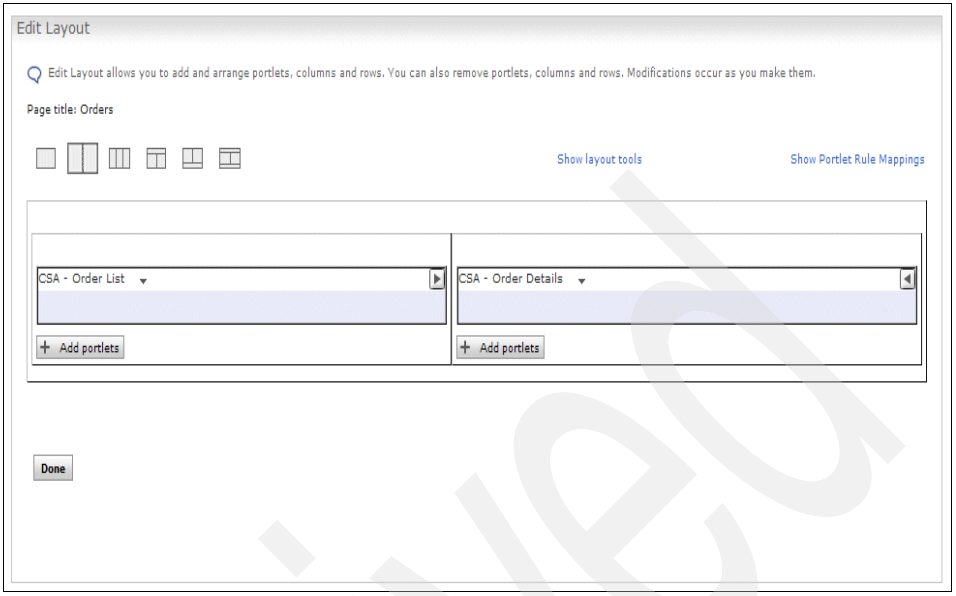
Edit Layout

Edit Layout allows you to add and arrange portlets, columns and rows. You can also remove portlets, columns and rows. Modifications occur as you make them.

Page title: Customer Information

Figure 6-30 Customer Information page layout

8. Edit the Orders page and choose a two column layout. Add the `CSA - Order List` portlet in the left column and the `CSA - Order Details` portlet in the right column.


Edit Layout

Edit Layout allows you to add and arrange portlets, columns and rows. You can also remove portlets, columns and rows. Modifications occur as you make them.

Page title: Orders

Figure 6-31 Orders page layout

6.7 Accessing the Portal Credential Vault

The WebSphere Portal Credential Vault mechanism is useful for portlets that require credentials different from the credentials used by the WebSphere Portal. This might occur when a portlet needs to submit unique credentials to a back-end system such as a database, Lotus Domino server, web service, and so forth.

6.7.1 WPS Credential builder

WebSphere Portlet Factory allows models to tap into the WebSphere Portal Credential Vault with the aid of the WPS Credential Builder. It encapsulates the functionality of the Credential Vault for accessing user credentials from within a portlet model. This builder adds a Linked Java Object and related instantiate method to the model. The LJO class will be an implementation of a CredentialVault interface. This builder can be used to access credentials (user names, passwords, and so forth) stored in the WebSphere Portal credential vault.

There are four types of credentials that you can configure for the vault:

- Portlet private: To access in Credential Vault user credentials that are not shared among portlets
- Shared: To access in Credential Vault user credentials that are shared among the user's portlets
- Administrative: To access in Credential Vault user credentials that can be shared among all portlets in that user's session
- System: To access in Credential Vault system credentials shared among all users and all portlets

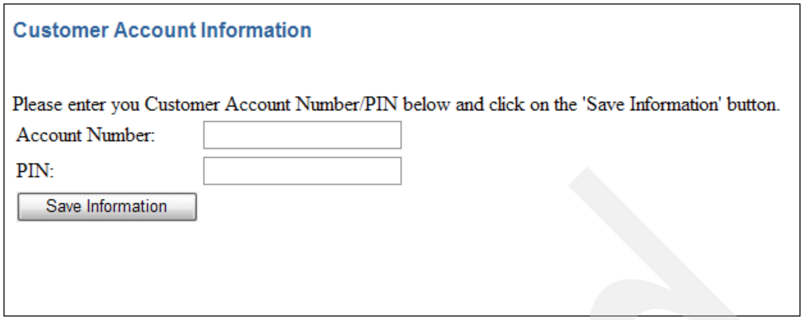
6.7.2 Using WPS Credential builder in our application

For our ITSO Customer Self Service Application, we are going to use the Credential Vault to store the customer account number and pin. This information is unique to each customer and it needs to be shared among all the user’s portlets.

In this section we are not going to build any model from scratch; instead, we review the usage of the WPS Credential builder in the CustomerCredentials.model that is included in the redbook code.

We are then going to use this CustomerCredentials.model as the Custom Edit Type for our CSA - Customer Information portlet. In later chapters, we profile the application such that there will be two separate entry paths: one for the CSRs and one for the Customers.

1. Download the source code from the redbook ftp site: Import the WebSphere Portlet Factory archive file named Chapter6.zip into your project.
2. Right-click the RedbookCS project and select **Import**. Select **Other** → **WebSphere Portlet Factory archive,** then click **Next**. Select **Chapter6.zip** and click **Finish** to import the CustomerCredentials.model into the project.
3. Open the CustomerCredentials.model in the RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/customer folder for review. The basic user interface of this model looks like that shown in Figure 6-32.


Customer Account Information

Please enter you Customer Account Number/PIN below and click on the 'Save Information' button.

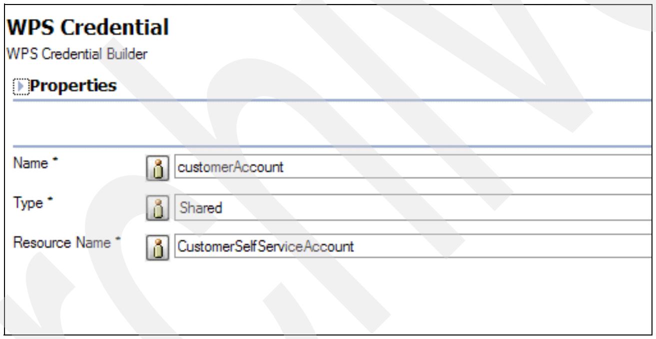
Account Number:

PIN:

Figure 6-32 User interface of the CustomerCredential model

This is a simple model with Service Consumer, Imported Page, Action Lists, and Buttons, which enables users to save their CustomerID and Pin in the WebSphere Portal Credential vault via the WPS Credential builder.

4. Open the WPS Credential builder named **customerAccount** in CustomerCredentials.model in the Builder Call Editor.


WPS Credential

WPS Credential Builder

Properties

Name * customerAccount

Type * Shared

Resource Name * CustomerSelfServiceAccount

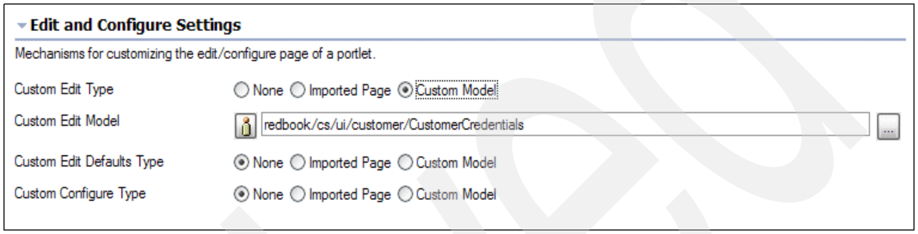
Figure 6-33 WPS Credentials builder

Note that the WPS Credential Type is `Shared`. This is because we want the user credentials to be visible across all users' portlets.

The Resource Name is the reference by which the credentials are stored inside the WebSphere Portal Credential vault. In our case we are referencing the vault that stores the Customer Account Number and PIN by alias CustomerSelfServiceAccount. Any model in our ITSO Renovations Customer Self Service application can access this credential vault by referencing the Resource Name and can obtain the customer account number and pin.

5. That's all the information we need to review at the moment. Close the CustomerCredentials.model

6. Expose this CustomerCredentials.model as the Custom Edit Type for the CSA Customer Information portlet. To do this, open the CustomerInfo.model and open the portlet adapter builder named PA Customer Information in the builder call editor.
7. Expand the **Edit and Configure Settings** section of the Portlet Adapter builder. For Custom Edit Type, select **Custom Model** and point to the redbook/cs/ui/customer/CustomerCredentials model. This specifies the model to execute when the user chooses to Personalize the CSA - Customer Information portlet.



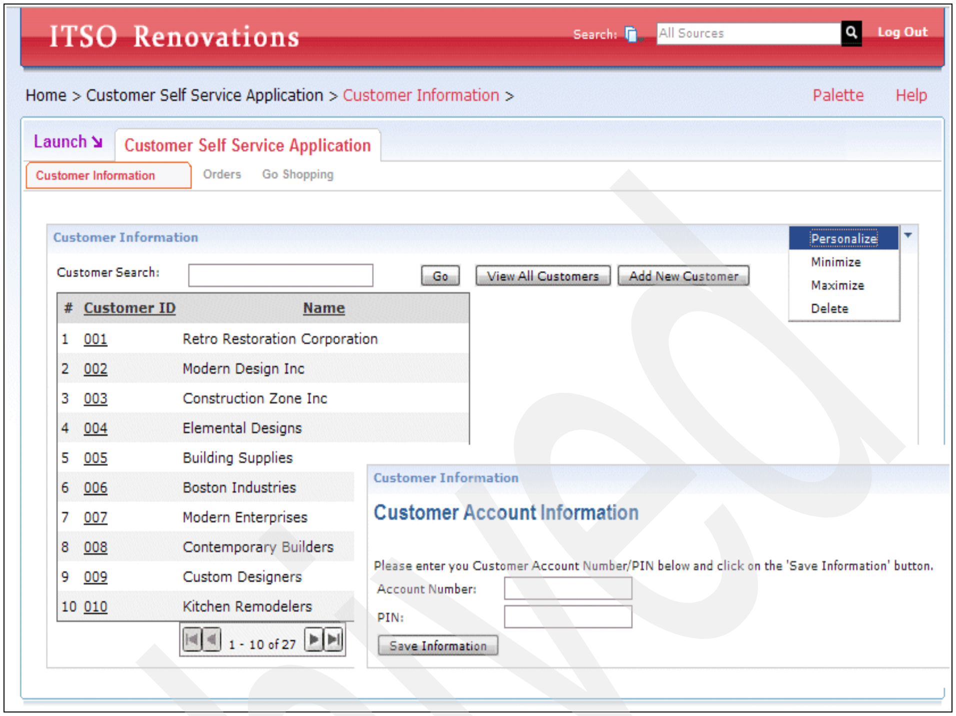
Edit and Configure Settings

Mechanisms for customizing the edit/configure page of a portlet.

Custom Edit Type	○ None ○ Imported Page ● Custom Model
Custom Edit Model	redbook/cs/ui/customer/CustomerCredentials
Custom Edit Defaults Type	● None ○ Imported Page ○ Custom Model
Custom Configure Type	● None ○ Imported Page ○ Custom Model

Figure 6-34 Edit and Configure Settings of the Portlet Adapter Builder

8. Save and close the CustomerInfo.model
9. Rebuild the portlet war.
10. Log in to the portal and render the Customer Information page on which the Customer Information portlet is housed. Click the top right corner of the portlet and click the option **Personalize**. The portlet will enter the edit mode and render the CustomerCredentials.model. In Chapter 9, when we discuss profiling, we describe how to build additional business logic around the credentials element.



#	Customer ID	Name
1	001	Retro Restoration Corporation
2	002	Modern Design Inc
3	003	Construction Zone Inc
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

Please enter you Customer Account Number/PIN below and click on the 'Save Information' button.

Account Number:

PIN:

Figure 6-35 Customer Information portlet with the option to personalize

6.8 Summary

In this chapter we have covered the creation of a basic user interface for our ITSO Renovations - Customer Service application. We created three portlets (CustomerInformation, OrderList, and OrderDetails) with the WebSphere Portlet Factory Designer, tested them on the application server outside the portal framework, and then snapped them into the portal framework using the Portlet Adapter builder.

This chapter introduced a number of concepts, including the methodology and technique of building a “front-end” or “consumer” model that employs simplified data service calls to a separate “back-end” model. This involves three basic steps:

- Connect to your services.
- Lay down a “starting point” with high-level Page Automation builder calls, such as View & Form and Data Page.
- Refine this starting point with Page Automation “modifier” builder calls.

Further development of application models that consume data services will be refinements on these basic steps. In later chapters we undertake these refinements to illustrate architectural best practices, to reinforce the concept of regeneration, and to illustrate the value of profile-enabling your models.

This chapter also introduced several sophisticated builder editors. By now you are developing an array of skills for navigating among the full range of builder editors available in the out-of-the-box WebSphere Portlet Factory.

You were introduced to the concept of “shell pages,” whereby a “base” HTML page is imported into the model to build up a JSP, on which other builder calls place, or locate, their work. These files live within the project, and are editable outside the model either by Eclipse or a more robust HTML editor.

You are ready to move on to the chapters where we describe how to customize the UI for our application, introduce profiling, and establish communication among portlets.

7

Creating portlets: Designing the UI

This chapter describes the tools and techniques for designing the User Interface (UI) using the Portlet Factory.

The tools and techniques include:

- Using the Rich Data Definition builder to control field-level presentation and validation of data
- Using the Paging Assistant builder to control how much data is displayed
- Using Ajax to implement the type ahead feature in the application
- Using Dojo Inline Edit to perform inline editing of information
- Using the Dojo Tooltip builder to display dynamic tooltips
- Using the Dojo Enable builder to implement other Dojo features
- Using other Portlet Factory builders to extend your UI
- Editing your HTML pages to extend the UI

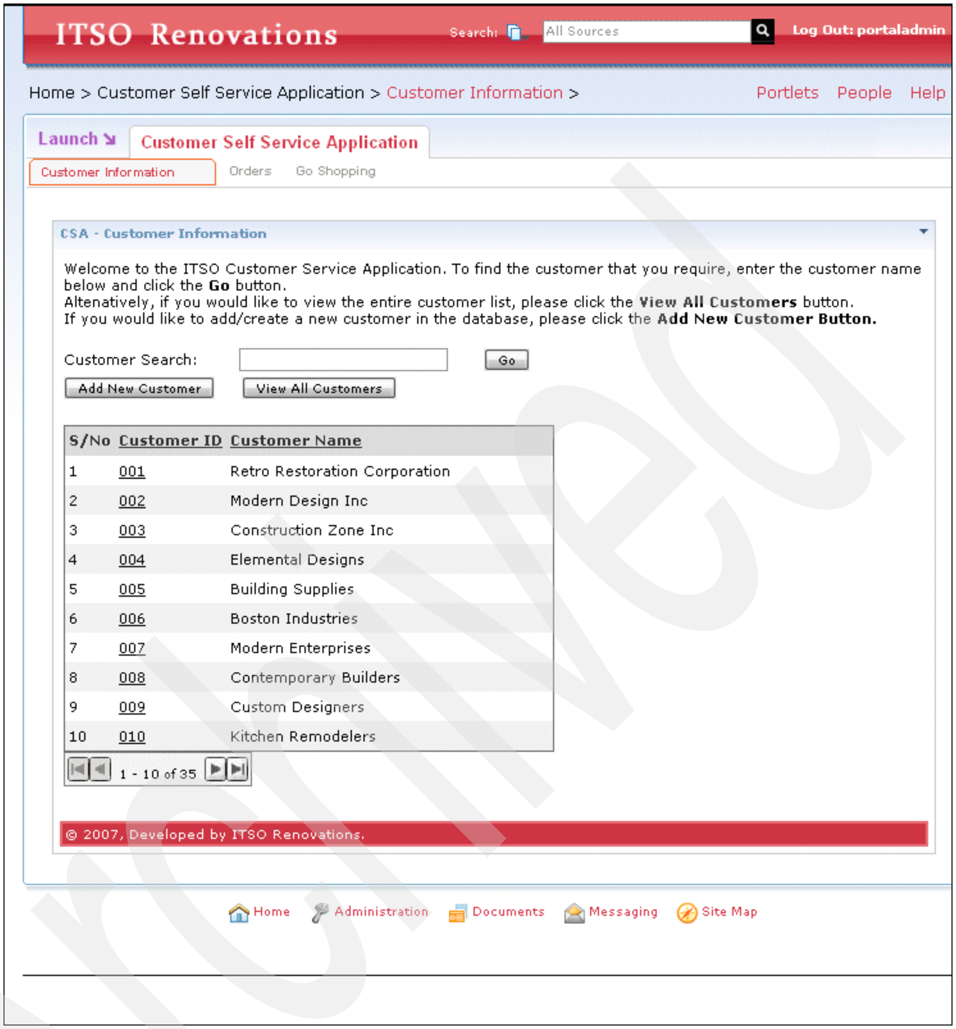
7.1 Introduction

In the previous chapter, when creating the Customer Information, Order List, and Order Details portlets, we were mainly focused on techniques for displaying information using the View and Form and Input Form builders with the back-end data. By now, you should be familiar with creating data services, using data consumers, and rapidly creating views and forms from these services.

However, user applications often involve more than just presenting the data. Acceptance of a system is often dependent on the usability of the application or product. Users tend to be IT savvy and have high expectations of applications in terms of usability, efficiency in performing their tasks, and aesthetic aspects (for example, whether the colors and overall look of the system are in line with the corporate colors and image).

Having a web application behave like a traditional desktop application seems to be more of a requirement nowadays. Rich Internet Applications (RIA) are becoming common, and being able to rapidly develop such applications without the need to handle complex DHTML code is essential for all developers who want to keep up with the trends.

In this chapter, we describe how to enrich the UI of the customer service application to illustrate how this can be done for other applications. By way of introduction, the following seven figures show how the portlets will appear after adding the UI features covered in this chapter.


ITSO Renovations
Search:
All Sources
Log Out: portaladmin
Home > Customer Self Service Application > Customer Information >
Portlets People Help
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button.
Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button.
If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer Search: [ ] Go

Add New Customer | View All Customers

S/No	Customer ID	Customer Name
1	001	Retro Restoration Corporation
2	002	Modern Design Inc
3	003	Construction Zone Inc
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

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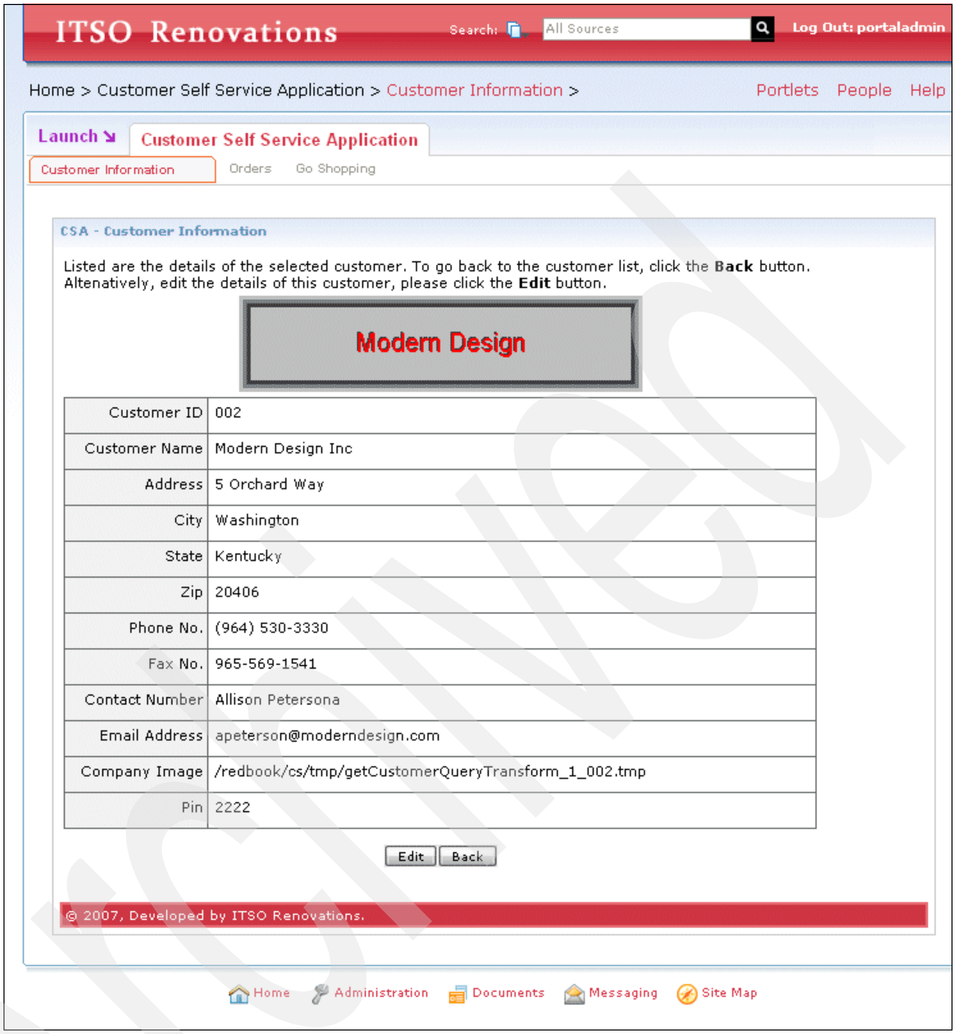
Figure 7-1 Customer Information Portlet: Customer List



Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Customer ID	002
Customer Name	Modern Design Inc
Address	5 Orchard Way
City	Washington
State	Kentucky
Zip	20406
Phone No.	(964) 530-3330
Fax No.	965-569-1541
Contact Number	Allison Petersona
Email Address	apeterson@moderndesign.com
Company Image	/redbook/cs/tmp/getCustomerQueryTransform_1_002.tmp
Pin	2222

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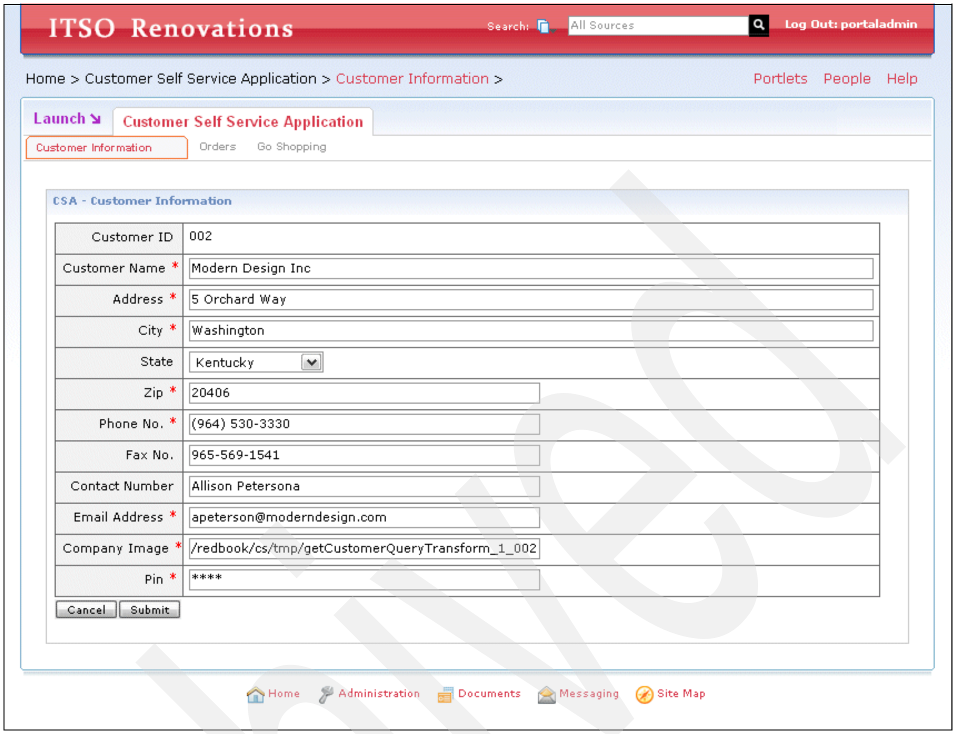
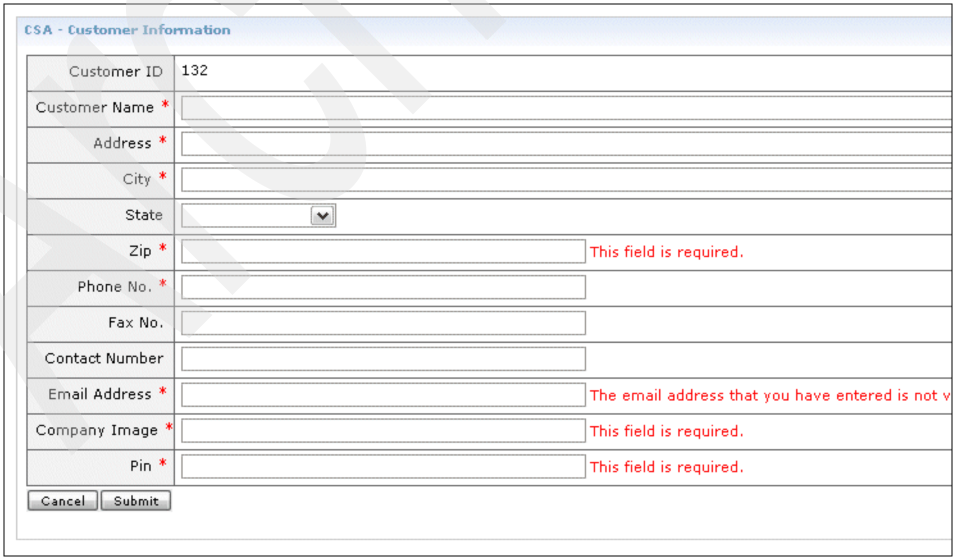
Figure 7-2 Customer Information Portlet: Customer Details



CSA - Customer Information

Customer ID	002
Customer Name *	Modern Design Inc
Address *	5 Orchard Way
City *	Washington
State	Kentucky
Zip *	20406
Phone No. *	(964) 530-3330
Fax No.	965-569-1541
Contact Number	Allison Petersona
Email Address *	apeterson@moderndesign.com
Company Image *	/redbook/cs/tmp/getCustomerQueryTransform_1_002
Pin *	****

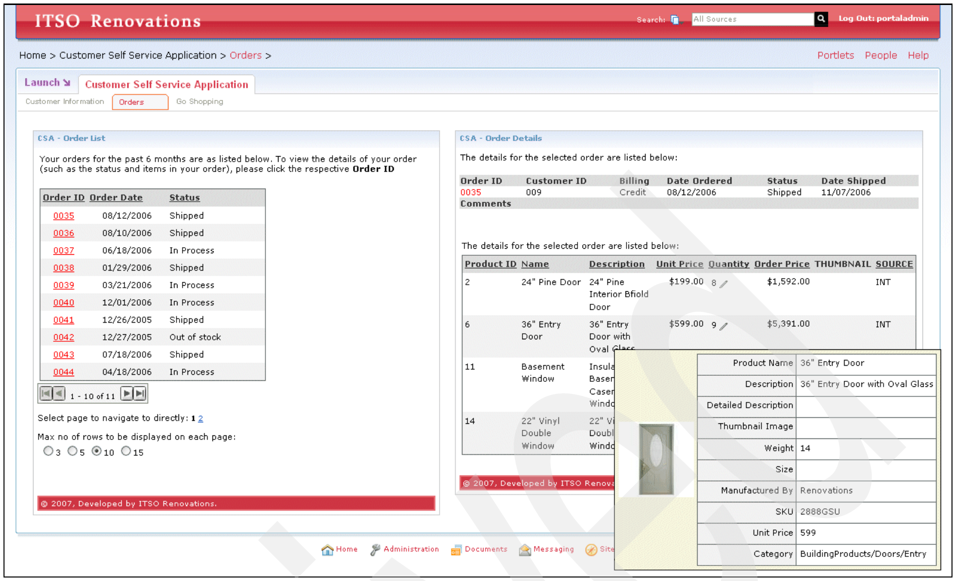
Figure 7-3 Customer Information Portlet: Edit Customer Details



CSA - Customer Information

Customer ID	132	
Customer Name *		
Address *		
City *		
State		
Zip *		This field is required.
Phone No. *		
Fax No.		
Contact Number		
Email Address *		The email address that you have entered is not v
Company Image *		This field is required.
Pin *		This field is required.

Figure 7-4 Customer Information Portlet: Add New Customer



Home > Customer Self Service Application > Orders >

CSA - Order List

Your orders for the past 6 months are as listed below. To view the details of your order (such as the status and items in your order), please click the respective **Order ID**

Order ID	Order Date	Status
0035	08/12/2006	Shipped
0036	08/10/2006	Shipped
0037	06/18/2006	In Process
0038	01/29/2006	Shipped
0039	03/21/2006	In Process
0040	12/01/2006	In Process
0041	12/26/2005	Shipped
0042	12/27/2005	Out of stock
0043	07/18/2006	Shipped
0044	04/18/2006	In Process

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Select page to navigate to directly: **1** 2

Max no of rows to be displayed on each page:
○ 3 ○ 5 ● 10 ○ 15

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CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipped
0035	009	Credit	08/12/2006	Shipped	11/07/2006
Comments					

The details for the selected order are listed below:

Product ID	Name	Description	Unit Price	Quantity	Order Price	THUMBNAIL	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	8	$1,592.00		INT
6	36" Entry Door	36" Entry Door with Oval Glass	$599.00	9	$5,391.00		INT
11	Basement Window	Insula Baser Caser Windo					
14	22" Vinyl Double Window	22" Vi Doubl Windo					

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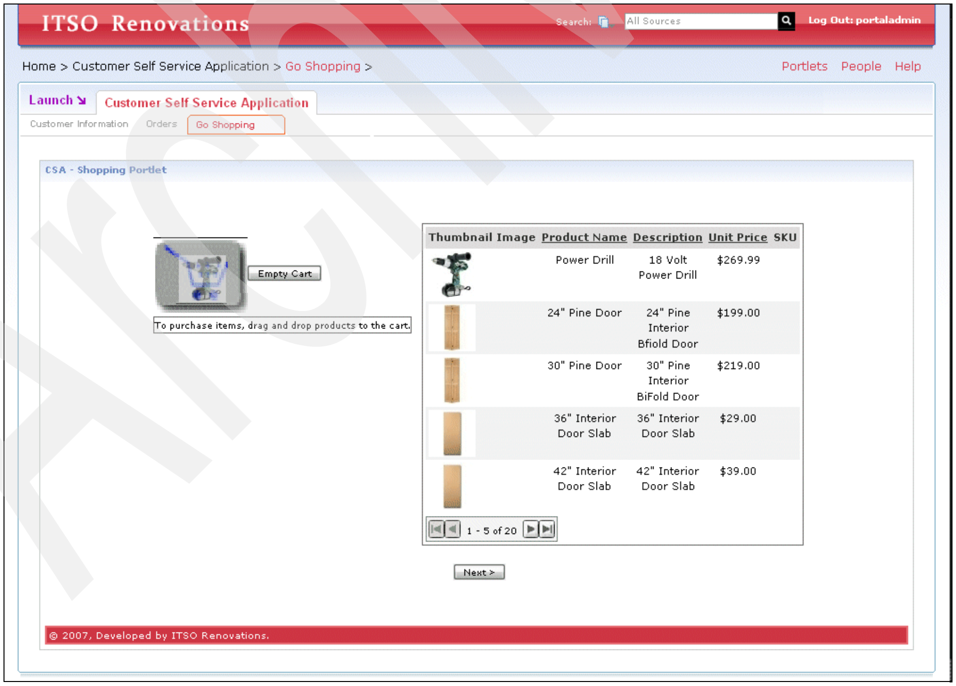
Product Name	36" Entry Door
Description	36" Entry Door with Oval Glass
Detailed Description	
Thumbnail Image	
Weight	14
Size	
Manufactured By	Renovations
SKU	2888GSU
Unit Price	599
Category	BuildingProducts/Doors/Entry

Figure 7-5 Order List and Details Portlet after applying the UI elements



Home > Customer Self Service Application > Go Shopping >

CSA - Shopping Portlet

To purchase items, drag and drop products to the cart.

Thumbnail Image	Product Name	Description	Unit Price	SKU
	Power Drill	18 Volt Power Drill	$269.99	
	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	
	30" Pine Door	30" Pine Interior BiFold Door	$219.00	
	36" Interior Door Slab	36" Interior Door Slab	$29.00	
	42" Interior Door Slab	42" Interior Door Slab	$39.00	

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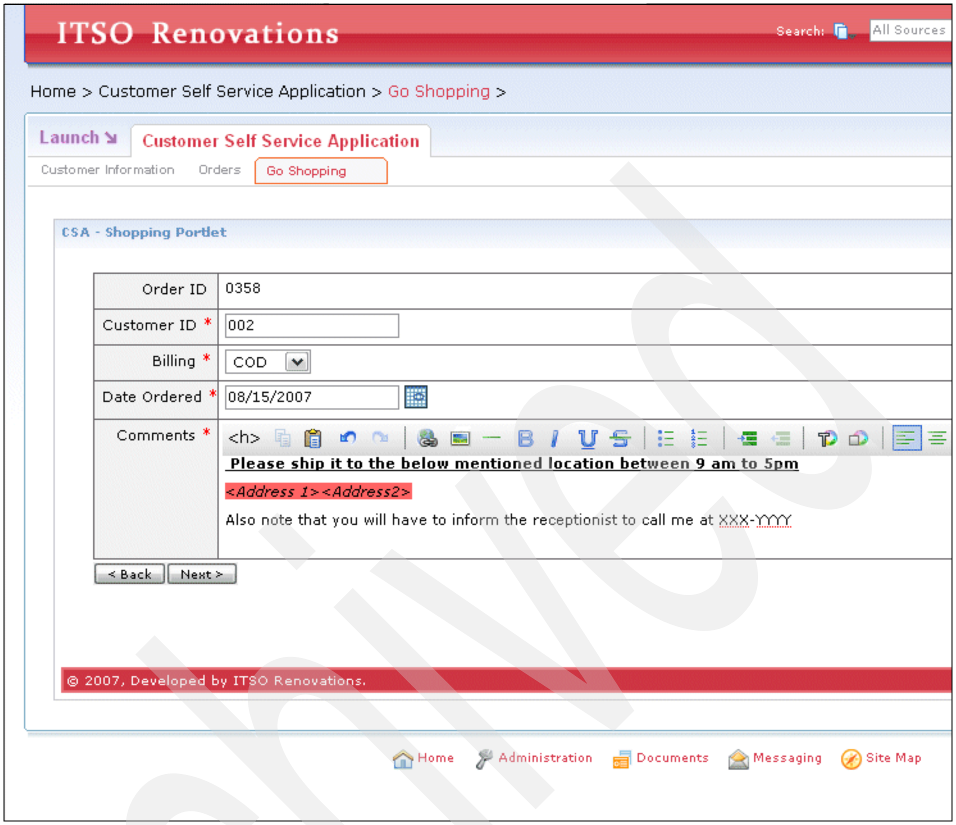
Figure 7-6 Shopping Portlet with the drag and drop functionality



Order ID	0358
Customer ID *	002
Billing *	COD
Date Ordered *	08/15/2007
Comments *	<h> **Please ship it to the below mentioned location between 9 am to 5pm** *<Address 1><Address2>* Also note that you will have to inform the receptionist to call me at XXX-YYYY

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Figure 7-7 Shopping Portlet confirmation window with the Dojo rich text editor

7.1.1 What you will learn

This chapter demonstrates how to implement a UI as illustrated in the previous figures. The use of the builders is demonstrated in discrete examples for each portlet. Different builders are used to achieve different UI features; an overview of the portlets modified, the builders used, and the features implemented is provided in Table 7-1.

Table 7-1 Summary of features implemented and builders used

Portlet	Features and key UI builders used	Summary of features
All	**Generic UI builders** Highlighter	Enables the highlighting of rows when the user moves their mouse over the items. Helps to highlight the current selection.
Customer Information (redbook → cs → ui → customer → CustomerInfo.model)	**UI elements** Rich Data Definition Highlighter Data Column Modifier	Formats the output of the dataset views as well as the input forms. Controls UI down to the field level in terms of sorting, alignment, color, data input type (for example. via a text area or a calendar input control) as well as validation.
Order List (redbook → cs → ui → order → OrderList.model)	**Paging** Paging Assistant Paging Buttons Paging Links **Radio button selection** Radio Buttons Group HTML Event Action **UI enhancement** HTML	Paginates the data set returned and provides paging buttons (to navigate across pages) and paging links (to navigate directly to a page) for navigation. Provides radio buttons for setting the page size.
Order Details (redbook → cs → ui → order → OrderDetails.model)	**Dojo tooltip** Dojo Tooltip Dojo Inline Edit Client Event Handler Event Handler Event Declaration	Implements the Dojo inline editing Dojo tooltip pop up for product details. Implements inline editing of the quantity of a product ordered without refreshing the entire page.
Shopping (redbook → cs → ui → order → ShoppingProductCatalog.model and ShoppingCart.model)	**Dojo drag and drop** Dojo Drag Source Dojo Drag Target **UI enhancement** Visibility Setter	Implements the Dojo drag and drop feature of a product from a product catalog to a shopping cart.
Shopping (redbook → cs → ui → shopping → OrderPage.model)	**Dojo enablement** Dojo Enable Text Area Attribute Setter	Implements the Dojo rich text editor for the order page of the shopping module.

7.2 Using a Rich Data Definition file

The Rich Data Definition file (RDD) is a file that enables control of the UI at the field level in a centralized and automated way. Besides controlling the UI, the RDD file also allows the addition of UI “data definition” information into the fields of a schema. This information includes most settings found in the Data Field Modifier and Data Column Modifier builders.

7.2.1 Why use an RDD?

An RDD file allows you to control how data is displayed within a project or an organization from a centralized location. For example, a company might mandate that all revenue displayed should be up to 2 decimal places. Or you might simply want to standardize the table width whenever a table of the company’s products is displayed. If all project teams work with a common RDD file when coding data service consumers, any data rendered by the service consumers will be displayed in the same way, ensuring consistency across the project.

Such a feature is especially useful for teams working on different modules of an application because conflicts can often arise when one team labels a field such as CUSTOMER_ID as Customer ID while another team names it User ID. Using an RDD will ensure consistency in information display, minimize conflicts in application development, and increase the user friendliness of your application.

7.2.2 RDD in ITSO Renovations

The ITSO Renovations application includes several examples of how an RDD can be used to customize the output. The features demonstrated in our sample portlets are identified in Table 7-2.

Table 7-2 RDD features demonstrated

Portlet	Feature demonstrated
Customer Information	Table column sizing and alignment Table column sorting Label assignment to database fields Resizing the customer input and edit form Defining the type of HTML input element for each field of input form Allowing validation on the customer input and edit form Formatting customer phone numbers

Portlet	Feature demonstrated
Order List	Table column sizing and alignment Table column sorting Label assignment to database fields Changing font color of Order ID LookupTable builder call
Order Details	- Formatting the display (for example, Unit and Total Price)
Go Shopping	- Reordering the display of the table fields - Hiding the fields from display - Setting a field to be non-editable

7.2.3 Adding RDD to the Customer Information portlet

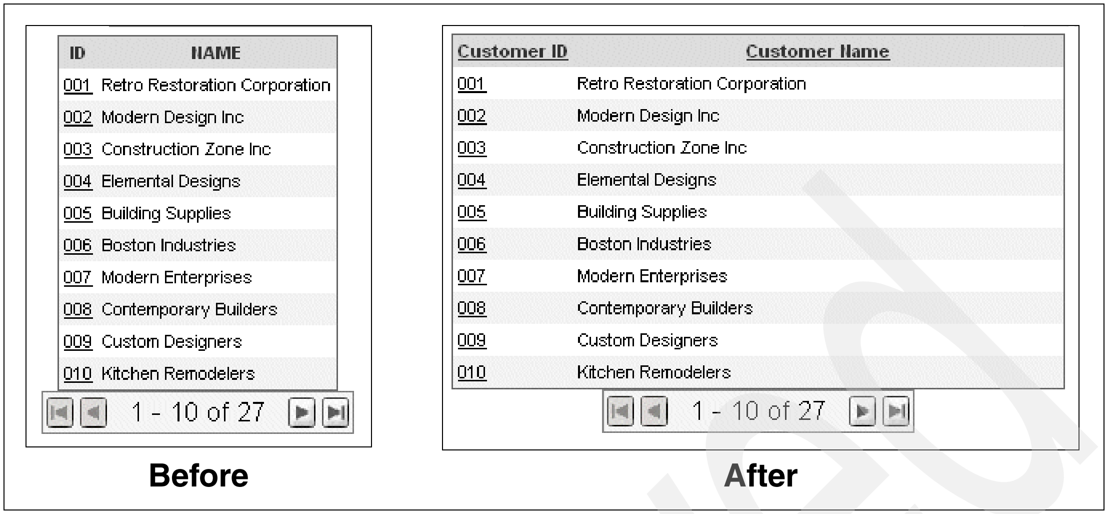
Before we begin to examine the details of an RDD, we first assign relevant RDDs to the various portlets.

In this scenario, the Customer Information portlet is modified to achieve the following:

- Make the Customer Name column sortable and change the color of the Order ID from black to red.
- Change the field names of the customer information portlet to user friendly text that also applies to the Add Customer and Edit Customer input form.
- Change the input form for the Add/Edit Customer to display a drop-down list of US states.
- Perform validation for the Add/Edit customer input form.

Open the project that you have created in the previous chapter and open the CustomerInfo model by selecting **Project** → **models** → **redbook** → **cs** → **ui** → **customer.**

1. Open the **CustomerService** service consumer builder.
2. Click the ellipsis ... button beside the Rich Data Definition File field and select **WEB-INF** → **resources** → **redbook** → **cs** → **data_definitions** → **cs_customer_info.xml file**.
3. Save the model by clicking the **Save** icon.
4. Run and test the model by clicking the **Run** button. The changes in the Customer List view that result from applying the RDD are shown in Figure 7-8.



Before

ID	NAME
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

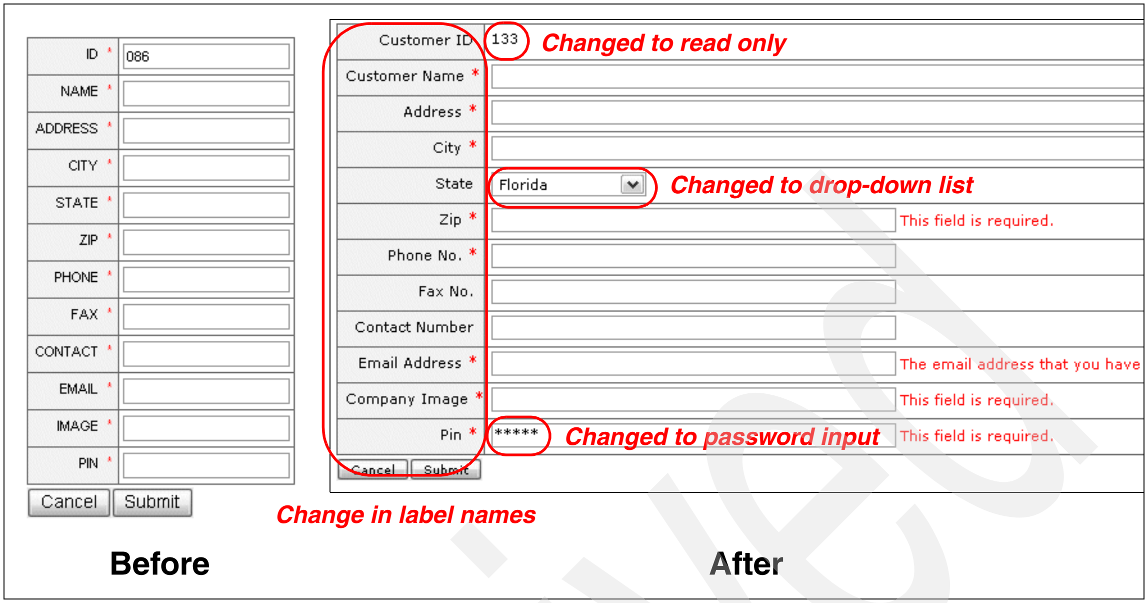
After

Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

Figure 7-8 Customer List View before and after applying the RDD

Note that the column names have been changed from the database field names to user friendly names. Also, try sorting the columns based on the Customer Name or Customer ID. The spacing has also changed. Note that all this is done without writing a single line of code.

5. To see the changes made in the input form, click the **Add Customer** button. The changes in the Add Customer View that result from applying the RDD are shown in Figure 7-9.



ID *	086
NAME *	
ADDRESS *	
CITY *	
STATE *	
ZIP *	
PHONE *	
FAX *	
CONTACT *	
EMAIL *	
IMAGE *	
PIN *	

Customer ID	133	
Customer Name *		
Address *		
City *		
State	Florida	
Zip *		This field is required.
Phone No. *		
Fax No.		
Contact Number		
Email Address *		The email address that you have
Company Image *		This field is required.
Pin *	*****	This field is required.

Figure 7-9 Add Customer before and after applying the RDD

Note that the field names for ID and NAME are consistent with the reformatted view page. The ID has now become read only because the Customer ID is system generated. Also, the input text boxes now have the field size as well as the maxlength defined. Mandatory fields are prefixed by a red asterisk (*) next to the field label. Finally, the States input field is now a drop-down list of all available US states.

7.2.4 Adding RDD to the Order List portlet

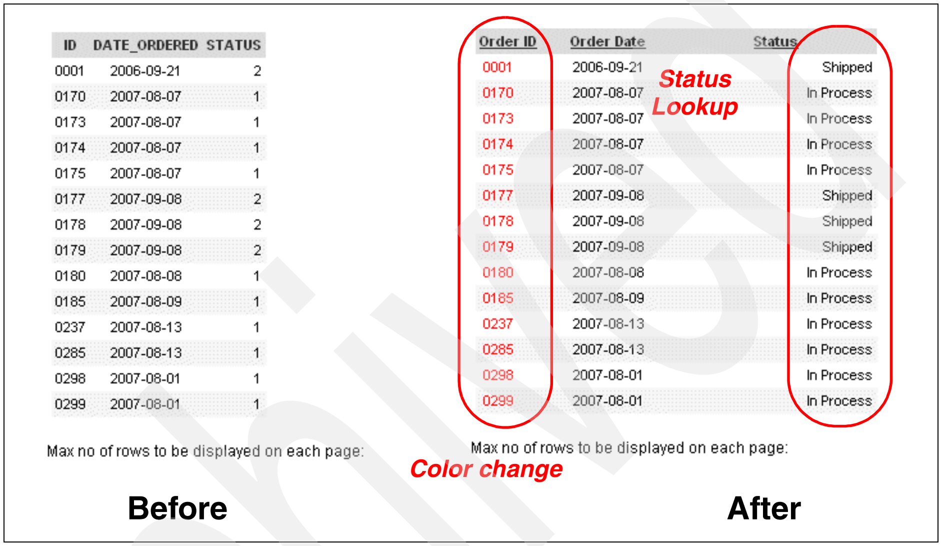
In this scenario, the Order List portlet is modified to achieve the following:

- Change the column behavior of the Order List portlet in terms of sorting, width, and alignment.
- Make a call to the LookupTable builder to get the order status based on the order status code.

Open the project that you created in the previous chapter and open the CustomerInfo model by selecting **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** folder.

1. Open the **Orderlist** service consumer builder.

2. Click the ellipsis ... button beside the Rich Data Definition File field and select **WEB-INF** → **resources** → **redbook** → **cs** → **data_definitions** → **cs_order_def.xml file**.
3. Save the model by clicking the **Save** icon.
4. Run and test the model by clicking the **Run** button. The changes in the Customer List view that result from applying the RDD are shown in Figure 7-10.



ID	DATE_ORDERED	STATUS
0001	2006-09-21	2
0170	2007-08-07	1
0173	2007-08-07	1
0174	2007-08-07	1
0175	2007-08-07	1
0177	2007-09-08	2
0178	2007-09-08	2
0179	2007-09-08	2
0180	2007-08-08	1
0185	2007-08-09	1
0237	2007-08-13	1
0285	2007-08-13	1
0298	2007-08-01	1
0299	2007-08-01	1

Max no of rows to be displayed on each page:

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process
0174	2007-08-07	In Process
0175	2007-08-07	In Process
0177	2007-09-08	Shipped
0178	2007-09-08	Shipped
0179	2007-09-08	Shipped
0180	2007-08-08	In Process
0185	2007-08-09	In Process
0237	2007-08-13	In Process
0285	2007-08-13	In Process
0298	2007-08-01	In Process
0299	2007-08-01	In Process

Max no of rows to be displayed on each page:

Figure 7-10 Order List before and after applying the RDD

In addition to the changes that are also seen in the Customer Information portlet, note that the Order Status is no longer represented by the status code but by its logical name (for example Shipped, In Process, and so forth). Also, the Order ID is now displayed in red.

7.2.5 Adding RDD to the Order Details and Product Details model

By now you probably know how to assign an RDD file to a service consumer model, so we do not go through any additional examples here. Before proceeding to the discussion about how RDD works, assign the RDD files identified in Table 7-3 to the appropriate service consumers of the models listed.

To identify what has changed in the user interface, refer to the figures in the previous chapter or simply run the model after you have removed the reference to the RDD file in the respective service consumer.

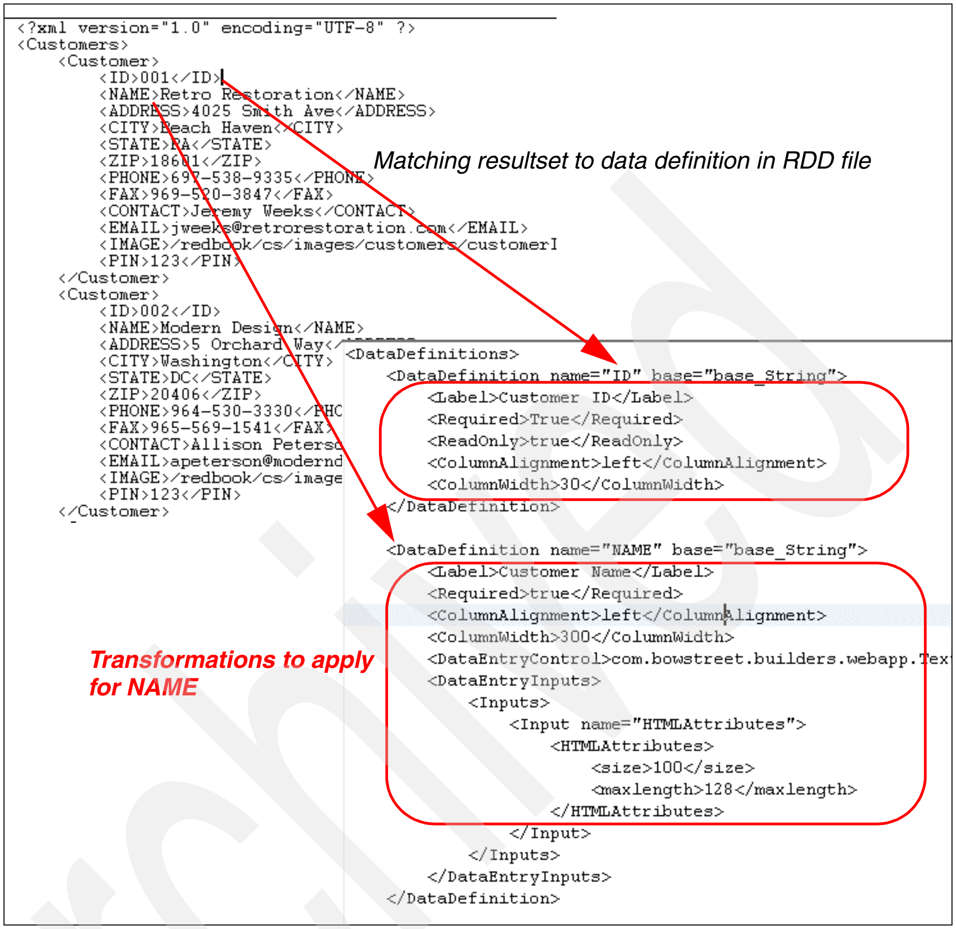
Table 7-3 RDD file assignments for the Customer Self Service Application

Portlet	Model	Service consumer	RDD file to assign
Customer Information	CustomerInfo	CustomerService	cs_customer_info.xml
Order List	OrderList	OrderService	cs_order_def.xml
Order Details	OrderDetails	OrderService	cs_order_details_def.xml
Order Details (Dojo Tooltip)	ProductTooltip	ProductService	cs_product_def.xml
Go Shopping	ShoppingUIImports	scOrdersService	cs_shopping_details_def.xml
		scProductService	cs_product_def.xml
		scCustomerService	cs_customer_info.xml

7.2.6 How an RDD file works

As shown in the previous examples, assigning an RDD to a service consumer modifies the fields of the dataset returned. When an RDD file is assigned to the service consumer, any invocation of the services provided by the service consumer builder will go through a data transformation before it is returned to the calling method/builder.

In order to determine the type of transformation to be applied, the service consumer matches the returned schema against the corresponding definition in the RDD file. For example, when the getCustomerList service is invoked, the elements of the result set will be matched against the definitions in the RDD. In this case, the ID value of the CUSTOMER element returned by the service is matched against the ID data definition of the RDD file as shown in Figure 7-11.



```
<?xml version="1.0" encoding="UTF-8" ?>
<Customers>
    <Customer>
        <ID>001</ID>
        <NAME>Retro Restoration</NAME>
        <ADDRESS>4025 Smith Ave</ADDRESS>
        <CITY>Beach Haven</CITY>
        <STATE>PA</STATE>
        <ZIP>18601</ZIP>
        <PHONE>697-538-9335</PHONE>
        <FAX>969-520-3847</FAX>
        <CONTACT>Jeremy Weeks</CONTACT>
        <EMAIL>jweeks@retrorestoration.com</EMAIL>
        <IMAGE>/redbook/cs/images/customers/customerI
        <PIN>123</PIN>
    </Customer>
    <Customer>
        <ID>002</ID>
        <NAME>Modern Design</NAME>
        <ADDRESS>5 Orchard Way</
        <CITY>Washington</CITY>
        <STATE>DC</STATE>
        <ZIP>20406</ZIP>
        <PHONE>964-530-3330</PHC
        <FAX>965-569-1541</FAX>
        <CONTACT>Allison Petersc
        <EMAIL>apeterson@modernd
        <IMAGE>/redbook/cs/image
        <PIN>123</PIN>
    </Customer>
```

Matching resultset to data definition in RDD file

```
<DataDefinitions>
    <DataDefinition name="ID" base="base_String">
        <Label>Customer ID</Label>
        <Required>True</Required>
        <ReadOnly>true</ReadOnly>
        <ColumnAlignment>left</ColumnAlignment>
        <ColumnWidth>30</ColumnWidth>
    </DataDefinition>

    <DataDefinition name="NAME" base="base_String">
        <Label>Customer Name</Label>
        <Required>true</Required>
        <ColumnAlignment>left</ColumnAlignment>
        <ColumnWidth>300</ColumnWidth>
        <DataEntryControl>com.bowstreet.builders.webapp.Tex
        <DataEntryInputs>
            <Inputs>
                <Input name="HTMLAttributes">
                    <HTMLAttributes>
                        <size>100</size>
                        <maxlength>128</maxlength>
                    </HTMLAttributes>
                </Input>
            </Inputs>
        </DataEntryInputs>
    </DataDefinition>
```

Transformations to apply for NAME

Figure 7-11 How the result set is matched to the RDD data definitions

Upon obtaining a match, the RDD changes the ID label to Customer ID as defined and applies the other transformations for format and display as stated within the <DataDefinition> tag (for example, Column Alignment and Column Width).

Thus, as long as the builders in your models invoke the service consumers with an RDD specified, all data rendered will go through the same transformation to produce the same labels, validation, and any other behavior that is specified in the RDD. The process of data transformation is as shown in Figure 7-12.

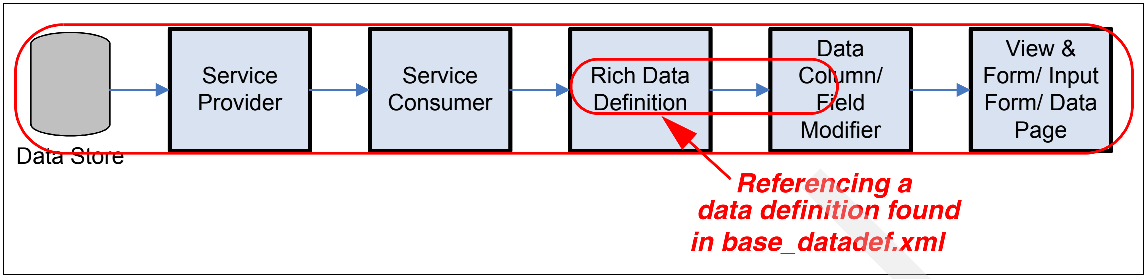

Data Store
Service Provider
Service Consumer
Rich Data Definition
Data Column/ Field Modifier
View & Form/ Input Form/ Data Page
Referencing a data definition found in base_datadef.xml

Figure 7-12 How Data is transformed using RDD, Data Column and Field Modifier

While you could achieve the same effect by using a combination of Data Column Modifiers, Data Field Modifiers, and LookupTable builders, ensuring that every model uses or creates the same data column modifiers or lookup tables to render the same data would not be efficient. Assigning an RDD file in the service consumer is much more effective and ensures that the data retrieved by the invocation of services exposed by the service consumer will be rendered and modified consistently without the need for any other builders.

7.2.7 When to use individual modifiers or builders instead of RDD

Given the power of an RDD file (or an RDD builder), why should we use the data column modifier (or related) builders? The reason is simple: while RDD files can control the behavior of the UI, there are times when you might want to override the default RDD settings and impose your own definition.

For example, while everyone in the company might view monetary information up to 2 decimal places, departments such as accounting and finance or ERP system often view information up to 4 decimal places. In this case, rather than writing an RDD file specifically for this purpose, you can simple add a data column modifier to override the existing behavior of an RDD.

RDD files thus provide baseline definitions to automate the generation of your data, while builders such as the data column modifier or data field modifier give you the flexibility to override the definitions when required.

7.2.8 Referencing and extending RDD files

In some instances, when you use an RDD file, you might want to change a few definitions for a set of models that you are using. Rather than copying and changing the existing file, you can reference an existing RDD file, inherit its definitions, and extend or override them with your own.

To inherit the definitions and reference an existing RDD file, simply define a base definition file from which the current RDD file will read and include it in the existing list of RDD definitions as shown in Example 7-1. Note that it does not matter if you define a base definition file at the beginning or at the end of the file.

Example 7-1 Extending an RDD File in cs_customer_info.xml

```
<BaseDefinitions>
   <!-- you can include more than one base definition here -->
   <BaseDefinition>/WEB-INF/resources/redbook/cs/data_definitions/
base_datadef.xml</BaseDefinition>
</BaseDefinitions>
```

Once you have specified the base definition files, you can inherit or extend the definitions in that file. Simply specify the base definition that you would like to inherit by using the base attribute in the data definition tag. To override the existing behavior, define the same children in your data definition with the new values and these values will take precedence over the base definition.

As shown in Example 7-2, the DATE_ORDERED field references another definition labelled base_Date. The Label, Column Sorting and Column Width will take precedence if the same attributes are specified in the base definition file.

Example 7-2 Extending a existing date definition

```
<DataDefinition name="DATE_ORDERED" base="base_Date">
            <Label>Date Ordered</Label>
            <ColumnSorting>date</ColumnSorting>
            <ColumnWidth>50</ColumnWidth>
</DataDefinition>
```

RDD structure in the Customer Self Service application

The structure of the RDD files for the Customer Information portlet is shown in Figure 7-13 on page 293. As shown in the diagram, the RDD files in this application have been logically separated into four tiers.

On the bottom tier are the RDD files that consist of the primary lookup values such as the list of countries and the US states. They can be included or excluded from the libraries as required. This level will consist of generic lookup libraries that span across applications. The standard base definitions that comes shipped with Portlet Factory are the us_states.xml and country_code.xml files, which can be found in the /WEB-INF/resources/redbook/cs/data_definitions directory.

The next level is the generic definitions, which contain the data definitions of the the basic types such as integer, decimal, string and date, and so forth, and thus can span across multiple applications. These definitions normally define the sort order (if applicable) as well as any formatting that is required. The standard base definition in Portlet Factory is the base_datadef.xml.

Next comes the application-specific libraries. The definitions you specify here should be application-wide definitions and are generated with reference to the schema of your application. These are normally generated and modified by the data integration developer, which is covered in greater detail in “How to create an RDD” on page 308.

Finally, we have the module-, model-, profile-specific RDD files. At this level, RDDs mainly extend existing RDDs and overwrite definitions specific to the module or user role (profiling of RDD is covered in the next chapter).

Through the use of such an architecture we have created a highly extensible and reusable structure in which any new module or profile that is created can simply extend existing definitions and add definitions for the fields whose behavior is different from the default.

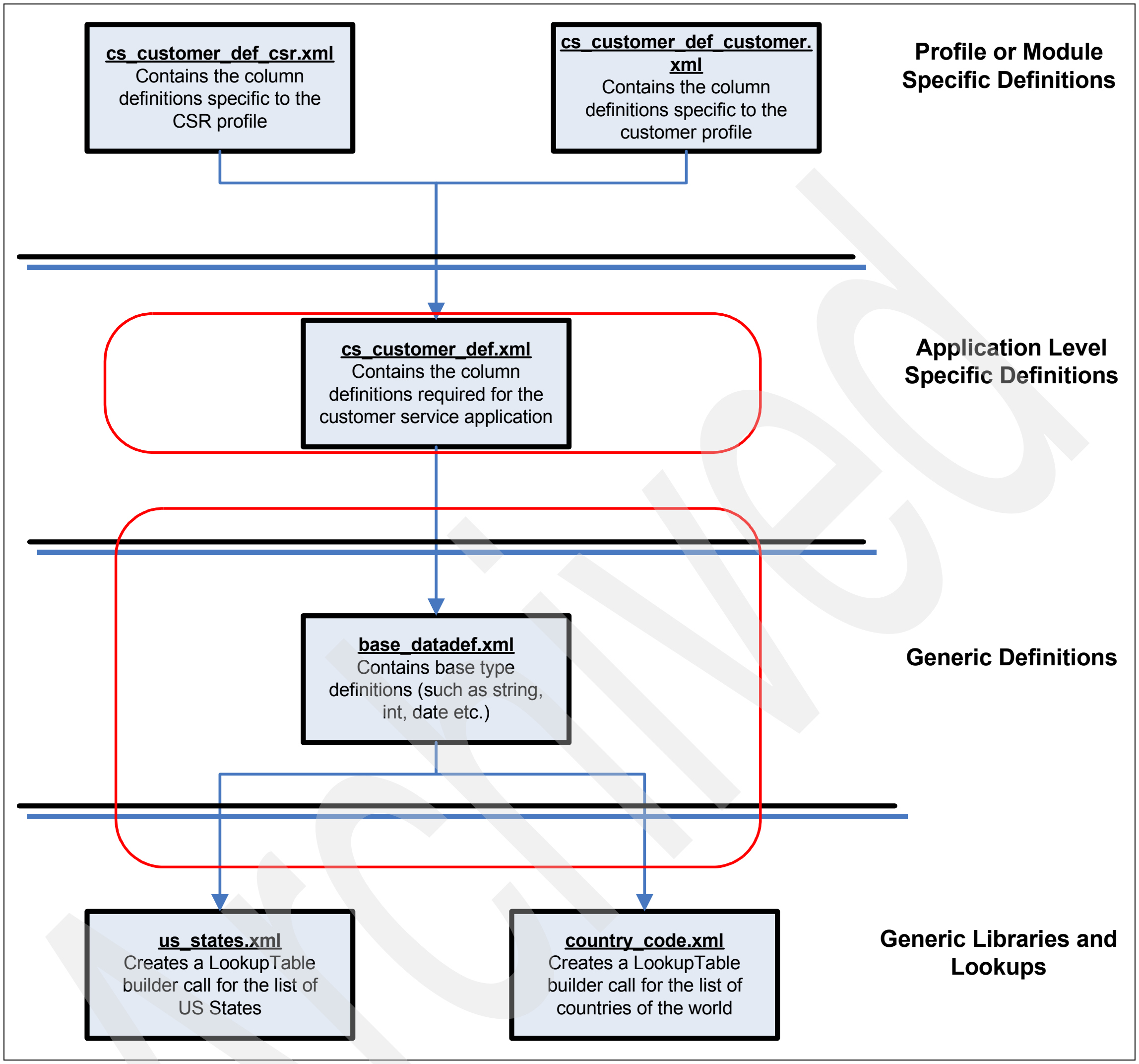

cs_customer_def_csr.xml
Contains the column definitions specific to the CSR profile
cs_customer_def_customer.xml
Contains the column definitions specific to the customer profile
Profile or Module Specific Definitions
cs_customer_def.xml
Contains the column definitions required for the customer service application
Application Level Specific Definitions
base_datadef.xml
Contains base type definitions (such as string, int, date etc.)
Generic Definitions
us_states.xml
Creates a LookupTable builder call for the list of US States
country_code.xml
Creates a LookupTable builder call for the list of countries of the world
Generic Libraries and Lookups

Figure 7-13 The Customer Information portlet RDD file structure

Based on this structure, you might realize that referencing can happen at multiple levels. You can reference a field from a base data definition, which in turn references a field from another base data definition, and so on.

In Example 7-3 the field STATE (found in cs_customer_info.xml) references the field base_US_States (found in base_datadef.xml). Upon inspecting the definition in base_datadef.xml (Example 7-4) you will find that base_US_States actually refers to a base_US_StatesLookup field (found in us_states.xml). Finally, when you inspect the us_states.xml file, you will find that the file consists of a key-value pair lookup table of all the US states.

Example 7-3 STATE definition in cs_customer_info.xml

```
<DataDefinition name="STATE" base="base_US_States">
       <Label>State</Label>
        <Required>false</Required>
        <DataType>string</DataType>

</DataDefinition>
```

Example 7-4 Base_US_States refering to the base_US_StatesLookup definition in the us_states.xml file

```
   <!-- lookup table with US states -->
    <DataDefinition name="base_US_States" base="base_US_StatesLookup">
    <!-- The list is in separate XML file -->
    </DataDefinition>
```

In the next chapter, we further extend the cs_customer_info.xml to allow users with different profiles to use different RDD files and thus have different field behavior (for example, view only or read only) depending on the login profile.

Next we discuss some examples of field-level control in the RDD files and how they work.

7.2.9 Examples of modifiers in the RDD Files

In this section, we discuss the data definitions that did the transformations in the previous scenarios. The examples that we cover are:

- Changing the column behavior in terms of sorting, alignment, and table width, and table contents attributes such as color
- Performing a lookup table call
- Adding a calendar picker to a date field
- Performing output formatting and translation of data
- Performing validation for input forms

Changing column behavior (All portlets)

RDD works by specifying the field-level attributes within the field tags in an RDD file. For instance, Example 7-5 shows the data definition for the ID field of the

Order List Portlet. The values inside the <ColumnSorting>, <ColumnAlignment> and <ColumnWidth> tags determine how the values are treated within the table.

By adding an <Attributes> tag in the definition, you can also determine the font, style, color, and various other HTML attributes of the data within the column.

Also, the <Label> tag converts the schema field name to a user friendly label that will be used in all input forms or views showing the schema.

Example 7-5 Data definition for the ID field in the Order List portlet

```
<DataDefinition name="ORDER_ID">
      <Label>Order ID</Label>
       <ColumnSorting>Number</ColumnSorting>
         <ColumnAlignment>center</ColumnAlignment>
       <ColumnWidth>30</ColumnWidth>
       <Attributes>
        <Attribute>
           <Name>style</Name>
            <Value>color:blue</Value>
        </Attribute>
           <Attribute>
            <Name>style</Name>
            <Value>color:red</Value>
        </Attribute>
    </Attributes>
   </DataDefinition>
```

Performing a LookupTable call (Order List portlet)

In addition to affecting the column display behavior, a builder call can be made at the field level. As shown in Example 7-6, a call to the LookupTable builder is made. This call maps the Status ID to the Status Name for the order. This is done within the <LookupTable> tag. The original order status (1, 2, 3, 4) has been converted to the logical representation (Shipped, Order pending, and so forth).

You might have noticed that below the <LookupTable> tag, there is actually a <ServiceInfo> tag that makes a ServiceConsumer2Builder call. The reason for this is that the LookupTable builder call is getting the lookup from a service consumer builder that does not create a lookup.

To convert this service consumer call into a lookup, a ServiceInfo child element needs to be added as an child element of the LookupTable element, which creates an additional builder that supports getting lookup data, which is then reference by the LookupTable.

Example 7-6 Data definition for the ID field in the Order List portlet

```
   <DataDefinition name="STATUS">
      <Label>Status</Label>
      <ColumnSorting>string</ColumnSorting>
      <ColumnWidth>150</ColumnWidth>
         <LookupTable>
            <Name>orderStatus</Name>
<BuilderID>com.bowstreet.builders.webapp.LookupTableBuilder</BuilderID>
            <Inputs>
               <Input name = "DataType">XmlData</Input>
               <Input name = "VariableType">ValueTagLabelTag</Input>
               <Input name = "GetDataFrom">BuilderInput</Input>
               <Input name = "TablePosition">InFront</Input>
               <Input name = "Name">orderStatus</Input>
               <Input name =
"XmlData">${MethodCall/ordersGetOrderStatusList}</Input>
               <Input name = "ValueElementName">ID</Input>
               <Input name = "LabelElementName">NAME</Input>
            </Inputs>
         <ServiceInfo>

<BuilderID>com.bowstreet.builders.webapp.ServiceConsumer2Builder</BuilderID>
                  <Inputs>
                     <Input name = "UseAllOperations">true</Input>
                     <Input name = "OverrideInputs">false</Input>
                     <Input name = "Name">orders</Input>
                     <Input name =
"ProviderModel">redbook/cs/data/db/OrderDBProvider</Input>
                     <Input name = "OperationName">getOrderStatusList</Input>
                  </Inputs>
             </ServiceInfo>
         </LookupTable>
   </DataDefinition>
```

While Example 7-6 shows one method of creating a lookup table call within the RDD via a data service, Example 7-7 shows you an alternate way of creating a lookup via a SQL call. Here, we create the SQL call directly to retrieve the lookup values.

Example 7-7 Alternate method for calling the LookupTable builder via SQL

```
   <DataDefinition name="STATUS">
      <LookupTable>

<BuilderID>com.bowstreet.builders.webapp.LookupTableBuilder</BuilderID>
         <Name>STATUS</Name>
         <Inputs>
            <Input name = "BuilderCallEnabled">true</Input>
            <Input name = "BuilderCallCategory">General</Input>
            <Input name = "DataType">DatabaseQuery</Input>
            <Input name = "VariableType">ValueTagLabelTag</Input>
            <Input name = "GetDataFrom">BuilderInput</Input>
            <Input name = "TablePosition">InFront</Input>
            <Input name = "Name">STATUS</Input>
            <Input name = "SqlDataSource">jdbc/csdb</Input>
            <Input name = "SqlStatement">SELECT * FROM CSAPP.ORDER_STATUS</Input>
            <Input name = "ValueElementName">ID</Input>
            <Input name = "LabelElementName">NAME</Input>
            <Input name = "Concurrency">ReadOnly</Input>
            <Input name = "ScrollType">Insensitive</Input>
         </Inputs>
      </LookupTable>

      <Label>Status1</Label>
      <ColumnWidth>150</ColumnWidth>
   </DataDefinition>
```

Note that in this example the lookup table is the result of a SQL call with the returned fields being defined as the values for the value-label pair. This in turn translates the order status value into the corresponding status text.

Any lookup call can be embedded into an RDD file. The reason for doing so is to pre-define the behavior of the field to ensure standardization and avoid confusion. For example, defining a text area builder call for a field ensures that developers will not use a text box builder to represent that form instead.

Details about how to obtain the builder call XML for a field to place in the RDD file are in “Using the RDD to make builder calls” on page 298.

Adding a calendar picker for a date field (Go Shopping)

Another common functionality is the use of a calendar UI to allow the user to select the input date. Traditionally, this has been done using javascript libraries. Instead, after applying the RDD file for the OrderPage model of the Go Shopping portlet, the field now has a calendar picker available.

In your list of builders, there is actually a Calendar Picker builder. What the RDD has done, as with the Lookup Table example presented previously, is make a builder call to the Calendar Picker builder and associate it with the field in which it is defined.

In our example, the data definition of the DATE_ORDERED field in cs_shopping_details_def.xml does not make any call to the Calendar Picker builder, but references the base_Date definition that is found in the base_datadef.xml file instead (see “Referencing and extending RDD files” on page 290). Example 7-9 shows the call made to the Calendar Picker builder.

Example 7-8 Data definition of DATE_ORDERED field in cs_shopping_details_def.xml

```
<DataDefinition name="DATE_ORDERED" base="base_Date">
            <Label>Date Ordered</Label>
            <ColumnSorting>date</ColumnSorting>
            <ColumnWidth>50</ColumnWidth>
</DataDefinition>
```

Example 7-9 Data definition of base_Date in base_datadef.xml

```
<!-- date - this assumes internal date format is yyyy/MM/dd -->
<DataDefinition name="base_Date">
<DataEntryControl>com.bowstreet.builders.webapp.CalendarPickerBuilder</DataEntr
yControl>
      <DataEntryInputs>
         <Inputs>
            <Input name="ButtonType">Image</Input>
            <Input name="Label">...</Input>
            <Input
name="ButtonImage">/factory/images/calendar/calendar_picker.gif</Input>
            <Input name="Format"
resource_key="BaseDate_DisplayFormat">MM/dd/yyyy</Input>
            <Input name="Theme">blue</Input>
            <Input name="SingleClick">true</Input>
            <Input name="DefaultLanguage">en</Input>
         </Inputs>
      </DataEntryInputs>
      <FormatExpr
resource_key="BaseDate_FormatExpr">Format(yyyy-MM-dd$MM/dd/yyyy)</FormatExpr>
      <TranslateExpr
resource_key="BaseDate_TranslateExpr">Translate(yyyy-MM-dd$MM/dd/yyyy)</Transla
teExpr>
      <ValidateExpr>Date(yyyy-MM-dd)</ValidateExpr>
   </DataDefinition>
```

Using the RDD to make builder calls

In the previous examples, we have shown how you can use your RDD to call and bind the fields to builders such as a lookup table for display or a calendar picker for input. However, because RDD files are basically text files, the challenge is figuring out the builder call library and attributes code that you need to place in the <DataDefinition> tag.

There is actually a simple way to do this. Instead of looking at the libraries, add the builder and fill in the information required for your model. Upon completion, click the **Model XML** tab found on the left of the **Builder Call Editor** tab. The builder call XML snippet will be displayed and you can copy and modify the generated builder call definition and place it in the field's <DataDefinition> tag in the RDD file to bind the field to the builder. With the definition set in the RDD file, you can now delete your builder from your model.

> **Note:** It is recommended practice to disable a builder to test your changes before deleting it. To do this, simply right-click the builder in the model and select **Disable**. The model will now run without executing the builder in the model.

To demonstrate this, we convert the ADDRESS field in the Add Customer input form from a text input field to a text area within the RDD as follows:

Open the project that was created previously and select **Redbook** → **models** → **redbook** → **ui** → **customer** → **CustomerInfo** model.

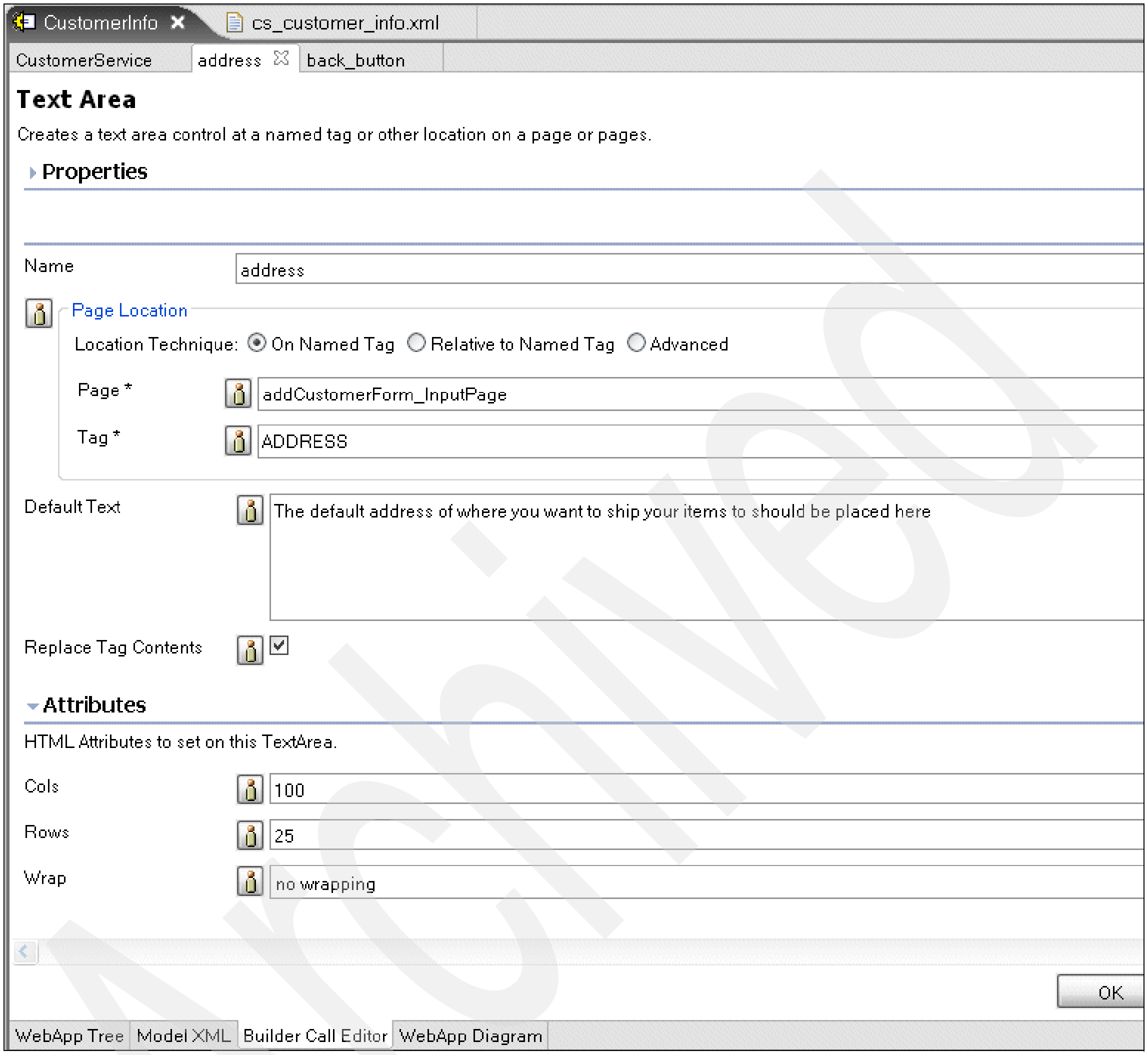
1. Add the Text Area builder to the model.
   a. Click the **Builder Palette** icon in the Outline view (lower left).
   b. Scroll to and select the **Text Area builder** and provide the following values:

Name:	`address`
Location:	`On Named Tag`
Page:	`addCustomerForm_InputPage`
Tag:	`ADDRESS`
Default Text:	“`The default address of where you want to..`”

   c. Expand the **Attributes** section and provide the following values:

Cols:	`100`
Rows:	`25`
Wrap:	`No wrapping`

   d. Click **OK** to add your builder into the model (Figure 7-14).



Text Area

Creates a text area control at a named tag or other location on a page or pages.

Properties

Name: address

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: addCustomerForm_InputPage

Tag *: ADDRESS

Default Text: The default address of where you want to ship your items to should be placed here

Replace Tag Contents: ☑

Attributes

HTML Attributes to set on this TextArea.

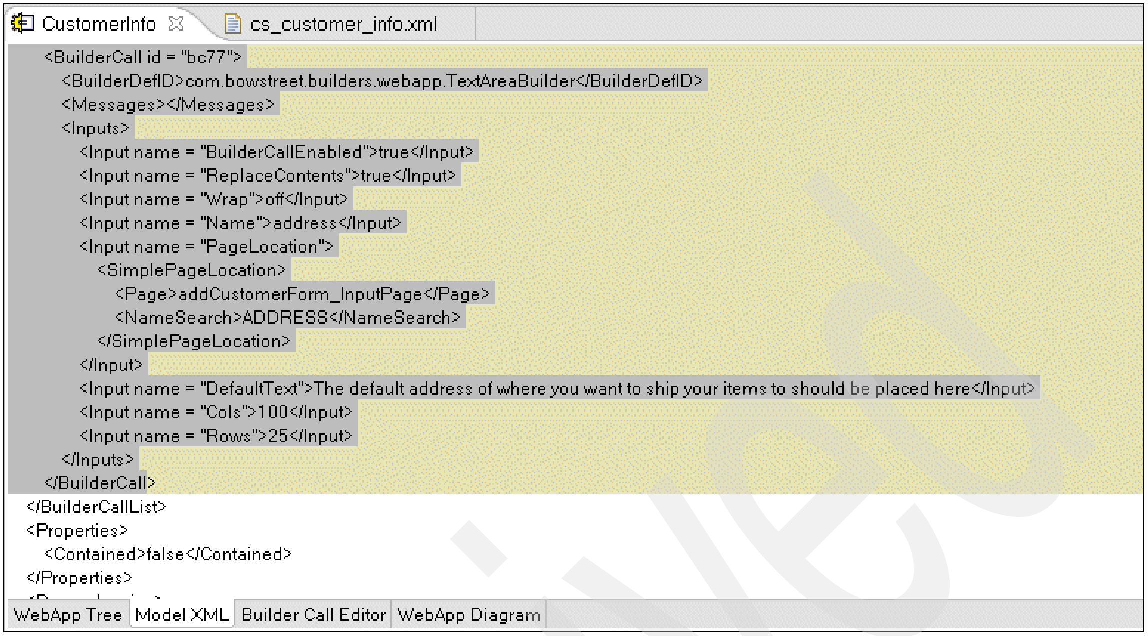
Cols: 100

Rows: 25

Wrap: no wrapping

Figure 7-14 Input for the Text Area Input Builder

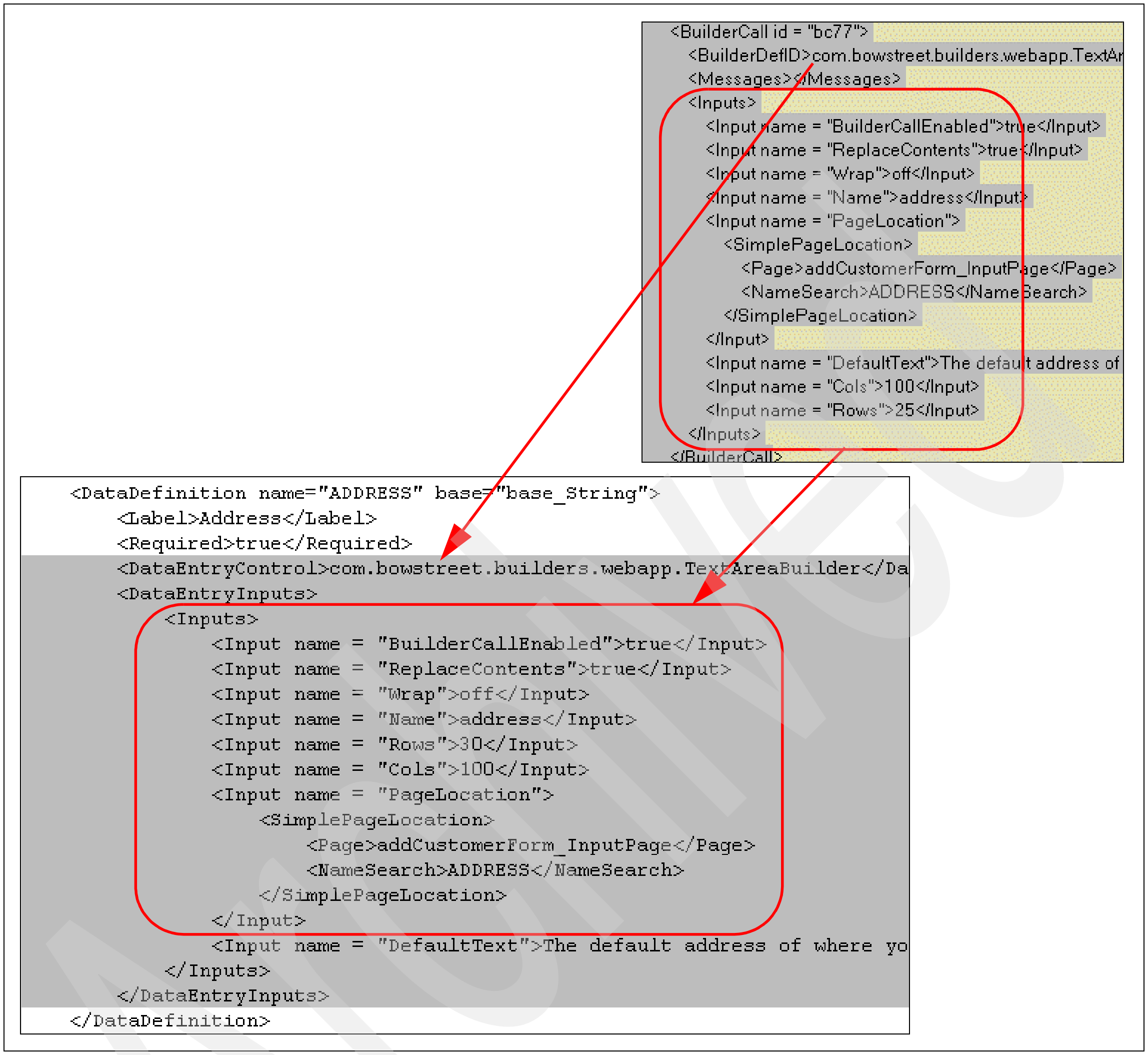
2. Click the **Model XML Table** and the builder call XML code will appear, highlighted as shown in Figure 7-15.



```
    <BuilderCall id = "bc77">
      <BuilderDefID>com.bowstreet.builders.webapp.TextAreaBuilder</BuilderDefID>
      <Messages></Messages>
      <Inputs>
        <Input name = "BuilderCallEnabled">true</Input>
        <Input name = "ReplaceContents">true</Input>
        <Input name = "Wrap">off</Input>
        <Input name = "Name">address</Input>
        <Input name = "PageLocation">
          <SimplePageLocation>
            <Page>addCustomerForm_InputPage</Page>
            <NameSearch>ADDRESS</NameSearch>
          </SimplePageLocation>
        </Input>
        <Input name = "DefaultText">The default address of where you want to ship your items to should be placed here</Input>
        <Input name = "Cols">100</Input>
        <Input name = "Rows">25</Input>
      </Inputs>
    </BuilderCall>
  </BuilderCallList>
  <Properties>
    <Contained>false</Contained>
  </Properties>
```

Figure 7-15 Generated XML code for the Text Area builder

3. Copy the values of the <BuilderDefID> and <Inputs> tags into the <DataEntryControl> and <DataEntryInputs> tag of the ADDRESS field in the cs_customer_info.xml RDD file as shown in Figure 7-16.

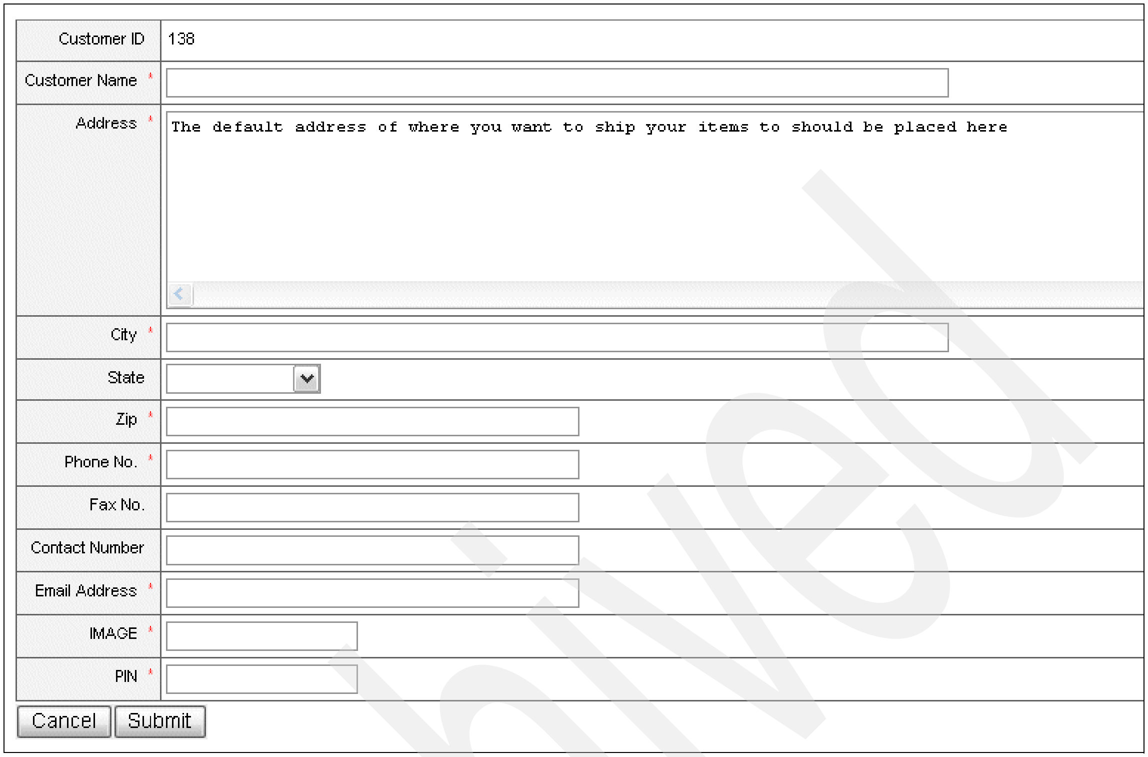


```
<BuilderCall id = "bc77">
  <BuilderDefID>com.bowstreet.builders.webapp.TextAr
  <Messages></Messages>
  <Inputs>
    <Input name = "BuilderCallEnabled">true</Input>
    <Input name = "ReplaceContents">true</Input>
    <Input name = "Wrap">off</Input>
    <Input name = "Name">address</Input>
    <Input name = "PageLocation">
      <SimplePageLocation>
        <Page>addCustomerForm_InputPage</Page>
        <NameSearch>ADDRESS</NameSearch>
      </SimplePageLocation>
    </Input>
    <Input name = "DefaultText">The default address of
    <Input name = "Cols">100</Input>
    <Input name = "Rows">25</Input>
  </Inputs>
</BuilderCall>
```

```
    <DataDefinition name="ADDRESS" base="base_String">
        <Label>Address</Label>
        <Required>true</Required>
        <DataEntryControl>com.bowstreet.builders.webapp.TextAreaBuilder</Da
        <DataEntryInputs>
            <Inputs>
                <Input name = "BuilderCallEnabled">true</Input>
                <Input name = "ReplaceContents">true</Input>
                <Input name = "Wrap">off</Input>
                <Input name = "Name">address</Input>
                <Input name = "Rows">30</Input>
                <Input name = "Cols">100</Input>
                <Input name = "PageLocation">
                    <SimplePageLocation>
                        <Page>addCustomerForm_InputPage</Page>
                        <NameSearch>ADDRESS</NameSearch>
                    </SimplePageLocation>
                </Input>
                <Input name = "DefaultText">The default address of where yo
            </Inputs>
        </DataEntryInputs>
    </DataDefinition>
```

Figure 7-16 New inputs for the RDD file

4. Disable your builder by right-clicking it and select **Disable**. (Note that you can delete it, but we recommend that you test the result before deleting it.)
5. Save the model by clicking the **Save** 💾 icon.
6. Run and test the model by clicking the **Run** ▶ button. The Add Customer screen will have a text area input box as shown in Figure 7-17.



Customer ID	138
Customer Name *	
Address *	The default address of where you want to ship your items to should be placed here
City *	
State	
Zip *	
Phone No. *	
Fax No.	
Contact Number	
Email Address *	
IMAGE *	
PIN *	

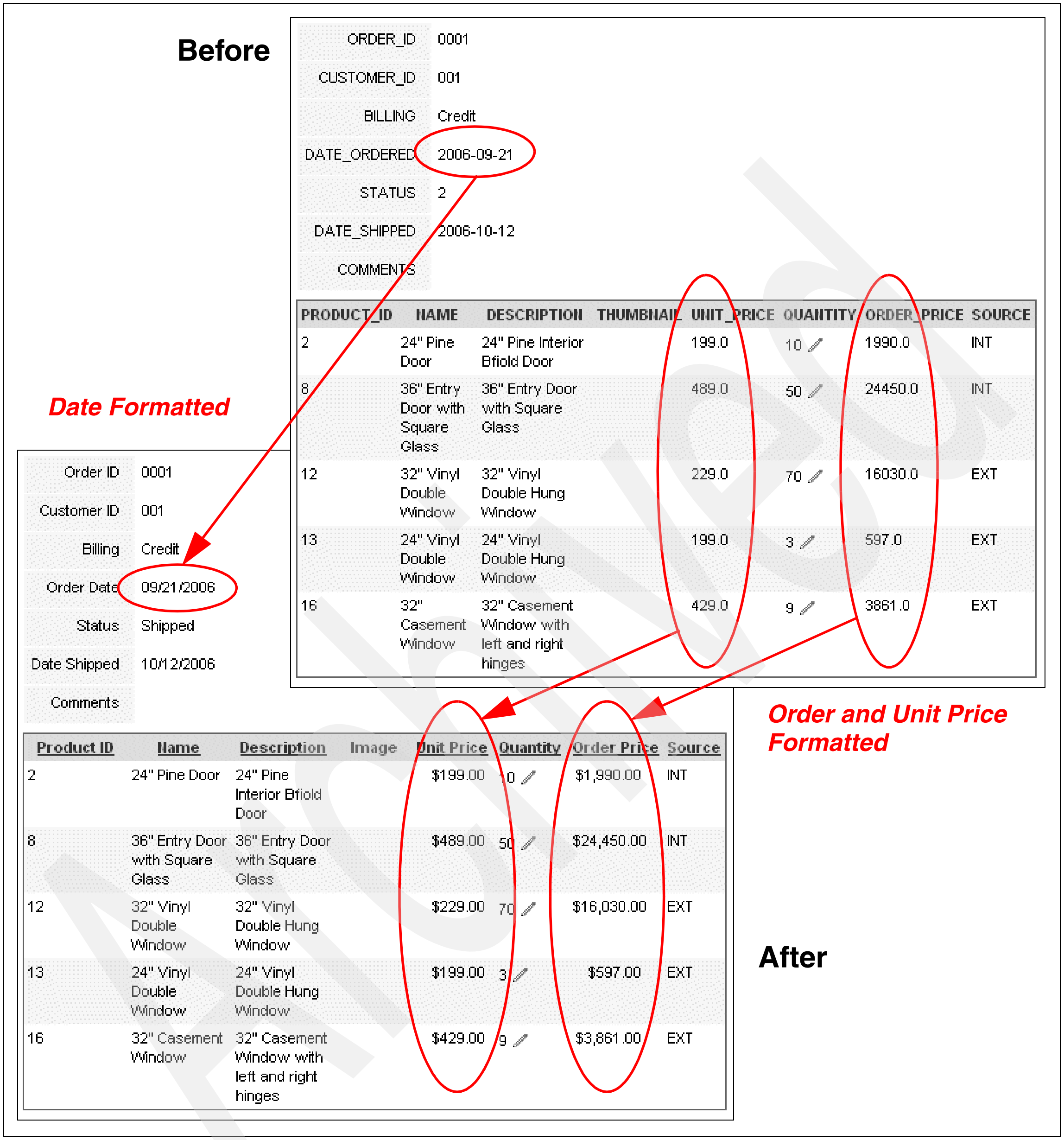
Figure 7-17 Text area input builder call from an RDD

7.2.10 Formatting the output

RDD files can also help in formatting the output before it is displayed to the user or after the user has entered information into your system. This is useful when the data representation in your database is different from the data presentation in your system.

RDD files can actually support simple formatting natively. This includes formatting dates and currency to the desired formats. An example of this in the Customer Self Service application is in the Order Details portlet, where the dates have been changed from YYYY-MM-DD to DD/MM/YYYY and the unit price has been changed from its native number format (for example, 123) to the currency format ($123.00) as shown in Figure 7-18.

By having separate RDD files for different profiles or locales, you can define different date, currency, and time formats, thereby internationalizing or profiling your application without the need to code.



ORDER_ID	0001
CUSTOMER_ID	001
BILLING	Credit
DATE_ORDERED	2006-09-21
STATUS	2
DATE_SHIPPED	2006-10-12
COMMENTS	

PRODUCT_ID	NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	10	1990.0	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

Order ID	0001
Customer ID	001
Billing	Credit
Order Date	09/21/2006
Status	Shipped
Date Shipped	10/12/2006
Comments	

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	Source
2	24" Pine Door	24" Pine Interior Bfiold Door		$199.00	10	$1,990.00	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		$489.00	50	$24,450.00	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		$229.00	70	$16,030.00	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		$199.00	3	$597.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		$429.00	9	$3,861.00	EXT

Figure 7-18 Order Details portlet before and after applying the RDD files

To change the format of the unit price, we placed the expression within the <FormatExpr> tag, which changes the format of the input string to transform it from its native form to the desired application-specific form.

Example 7-10 shows the data definition of the item unit price in the order details item list that formats the price from 123.00 to $123.00.

Example 7-10 Formatting unit price in the Order Details portlet in cs_order_details_def.xml

```
<DataDefinition name="UNIT_PRICE" base="base_Currency">
   <Label>Unit Price</Label>
   <ColumnWidth>50</ColumnWidth>
   <!-- takes the input number and adds a dollar sign in front -->
   <FormatExpr>NumberFormat($#,###.00)</FormatExpr>
</DataDefinition>
```

While Portlet Factory supports the simple formatting of dates and numbers, there might be cases where you want to perform customized formatting. For example, the Customer Self Service application stores the phone number of a customer as <Area Code>-<3 Digits>-<4 Digits>. However, to ensure consistency in display, the display should be formatted to add the parenthesis to the area code and replace the dash after the area code with a white space. This has to apply to all pages displaying the phone number.

To apply the formatting to the output, we created a formatter class that does the formatting of not just the output, but also the input that we use later for validation. This class implements the com.bowstreet.methods.IInputFieldFormatter interface, which provides the following services:

- Formatting any value: Changes the format of the value provided to make it more readable or fulfill some other display requirement
- Translating any value: Changes the format of the field value as it is entered by the user to one that complies with the schema or some other data storage requirement (for example, currency to decimal)
- Validating any value: Validates an input string to ensure that it is valid
- Setting error messages: Sets the error message when validation fails

To invoke this class, define the fully qualified class name in a <FormatterClass> tag within the field's data definition. This will invoke the `format` method of the class with the field's data and format expression type defined in the <FormatExpr> tag. By using the FormatExpr tag, you can define different styles of formatting, which is especially useful for customizing the output for localization and profiling.

Example 7-11 shows the formatting class that is called and the format expression that is being invoked.

Example 7-11   Tags used to invoke the format method of the formatter class

```
<DataDefinition name="PHONE">
   <Label>Phone</Label>
   ...
   <FormatterClass>com.ibm.cs.properties.csValidation</FormatterClass>
   <FormatExpr>Phone Format</FormatExpr>
   ...
</DataDefinition>
```

Once invoked, the format method of the csValidation class is invoked, as shown in Example 7-12. Notice that the method will take the phone number as the input and string “Phone Format” as the strFormatExpr. This would then invoke the `formatUSPhoneNumber` subroutine to format the input as required.

If you have defined other formats (for example, worldwide phone formats), you would have to include the code to match the appropriate strFormatExpr passed in and invoke the necessary subroutine to handle it.

Example 7-12   Methods for formatting the phone number

```
public String format (String strInput, String strFormatExpr) {
   //check if there is no error with the validation
   if (getErrorMessage() ==null) {
      if (strInput!=null && !strInput.equals("")) {
         if (strFormatExpr.equals(PHONE_FORMATEXPR)) {
            return (formatUSPhoneNumber(strInput, strFormatExpr));
         }
      }
   }
   return ""; //if there is no format expression return empty str
}

//formats the phone number to the format of (xxx)<space>xxx-xxxx
private String formatUSPhoneNumber (String strInput, String 
strFormatExpr) {
    String strResult = strInput;

    //check if the phone number is at least 10.
    if (!(strInput.length() < PHONE_MIN_LENGTH)) {
       System.out.println ("In formatUSPhoneNumber");
       strResult = "(" + strInput.substring(0,3)+ ") " + 
strInput.substring(4,7) +
                    "-" + strInput.substring(8,strInput.length());
    }
```

```
        return strResult;
    }
```

Performing validation

Besides controlling how the data is displayed, RDD can also control how input is received. Out of the box, RDD supports validation of mandatory fields, displaying the message "This field is required" whenever an input is not provided.

To ensure this, simply include the <Required>true</Required> tag into the <DataDefinition> tag of the field. Adding this to the data field will make the following changes to your input form:

- Make Portlet Factory insert an asterisk (*) into an Input or Edit form using the schema that is defined.
- Performs mandatory field checking to ensure that the input field has an input.

However, validation is often more complex than that. For example, credit card numbers requires an exact 16 digit sequence, US phone numbers require an area code followed by 7 other digits, and e-mail addresses should be in the format of <name>@<domain>.<subdomain>.

Such validation can be easily done by writing a simple java class with a validation method that validates the input string with the appropriate subroutine. As with the previous section, the formatter class is invoked, except this time, the `validate` method of the class takes the validation type string from the <ValidateExpr> tag as shown in Example 7-13.

Example 7-13 Tags used in invoke the validate method of the formatter class

```
<DataDefinition name="EMAIL">
   <Label>Phone</Label>
   ...
   <FormatterClass>com.ibm.cs.properties.csValidation</FormatterClass>
   <FormatExpr>Phone Format</FormatExpr>
   <ValidateExpr>Email Validation</ValidateExpr>
   ...
</DataDefinition>
```

The validate method then decides on the subroutine used to verify the input based on the ValidateExpr string.

To set the error message when the validation fails, use the `setErrorMessage` method. This error message will then be retrieved by the input form when the validation fails.

7.2.11 How to create an RDD

In the previous example we created the RDD file from scratch; however, this need not be the case. A base RDD file of the schema can be easily created using the Rich Data Definition builder.

The steps are as follows:

1. Add the services to your model using the Service Consumer builder. (Note that you can do the same in the service provider model after all your service operations have been added.)
2. Add the Rich Data Definition builder to the model.
   a. Click the **Builder Palette icon** in the Outline view (lower left).
   b. Scroll to and select the **Rich Data Definition** builder and provide the following values:
      - In the schema drop-down list, select the schema for which you would like to generate an RDD.

      > **Note:** In the service provider model, the schema name is represented by the service operation name, while in the service consumer model, the schema name is represented in the form of <Service Consumer Name><Service Operation Schemas>. Therefore, the service operation getOrderItems, which returns the OrderItems schema from the OrderService service consumer, would generate an OrderServiceOrderItems schema.

      - Once the schema is selected, the list of fields available in the service appears in the Data Definition as shown in Figure 7-19 on page 310.

   c. Base Data Definition File: Click the ellipsis ... button and select **WEB-INF** → **factory** → **data_definitions** → **base_datadef.xml** file.

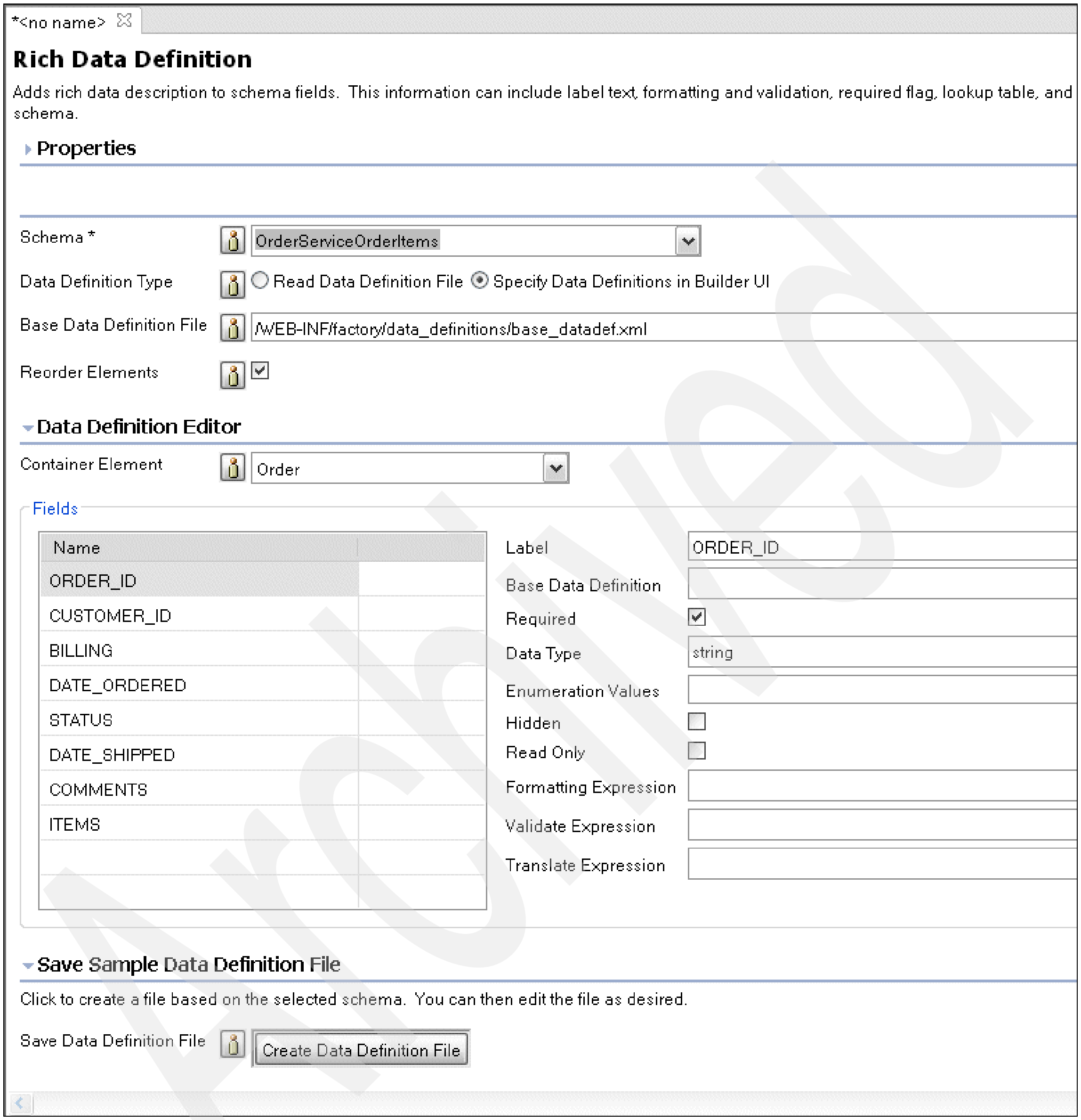
      > **Note:** As a form of good practice, RDD files should extend from a base file that contains the basic type definitions and the commonly used builder calls (for example, Lookup Tables and Calendar Picker) so as to maintain modularity and reduce duplication. A good start would be to extend the base_datadef.xml found in the /WEB-INF/factory/data_definitions/ directory.

   d. Container Element: Select **Order** from the drop-down list.
   e. For each field in the list, provide the appropriate input:

      Label: The display name for the field.

Base Data Definition: Select the appropriate data type.
Required: Check if the field is a mandatory field for the input form.
Data Type: Select the appropriate data type.
Enumeration Values: Enter comma-separated values if the field takes the information from the list of values. If you have a lookup table for the values, leave this blank and use the lookup table method instead.
Hidden: Check if the field is not to be displayed.
Read Only: Check if the field is not to be edited but just displayed in the input form.
Formatting Expression®: Select the type of formatting appropriate for your data.
Validate Expression: Select the type of validation appropriate for your data.
Translate Expression: Select the type of translation appropriate for your data.

f. Once completed, in the Save Sample Data Definition File section, click the **Create Data Definition File** button and save your file into the project as shown in Figure 7-19.



*<no name>

Rich Data Definition

Adds rich data description to schema fields. This information can include label text, formatting and validation, required flag, lookup table, and schema.

Properties

Schema * OrderServiceOrderItems

Data Definition Type ○ Read Data Definition File ● Specify Data Definitions in Builder UI

Base Data Definition File /WEB-INF/factory/data_definitions/base_datadef.xml

Reorder Elements ☑

Data Definition Editor

Container Element Order

Fields

Name
ORDER_ID
CUSTOMER_ID
BILLING
DATE_ORDERED
STATUS
DATE_SHIPPED
COMMENTS
ITEMS

Label	ORDER_ID
Base Data Definition	
Required	☑
Data Type	string
Enumeration Values	
Hidden	□
Read Only	□
Formatting Expression	
Validate Expression	
Translate Expression	

Save Sample Data Definition File

Click to create a file based on the selected schema. You can then edit the file as desired.

Save Data Definition File [Create Data Definition File]

Figure 7-19 The Rich Data Definition builder

3. Once saved, delete the builder from the model.

4. Open the **Service Consumer** builder of the model and select the newly created RDD file in the Rich Data Definition File field.

7.2.12 RDD summary

While the examples presented here illustrate a number of the features RDD can implement, it is capable of doing much more. The RDD builder only creates a basic RDD file that controls field-level sorting, display, formatting, and validation. Features such as making a call to the LookupTable builder and controlling the HTML input form values are not provided in the RDD builder.

The WebSphere Portlet Factory builder call help is useful in providing more ideas for extending the RDD file. However, sometimes both of these resources might not be enough.

RDD is a powerful builder that you will use in most, if not all, of your models. This builder lets you select a schema in your model. For each field in the selected schema, you can specify labels, control types, lookup tables, formatting, validation, and much more—just by using a single instance of this builder—and ensure consistency across all your models and pages by changing just one file.

Table 7-4 identifies the column modifiers and the file for which each is used.

Table 7-4 Summary of RDD features and references

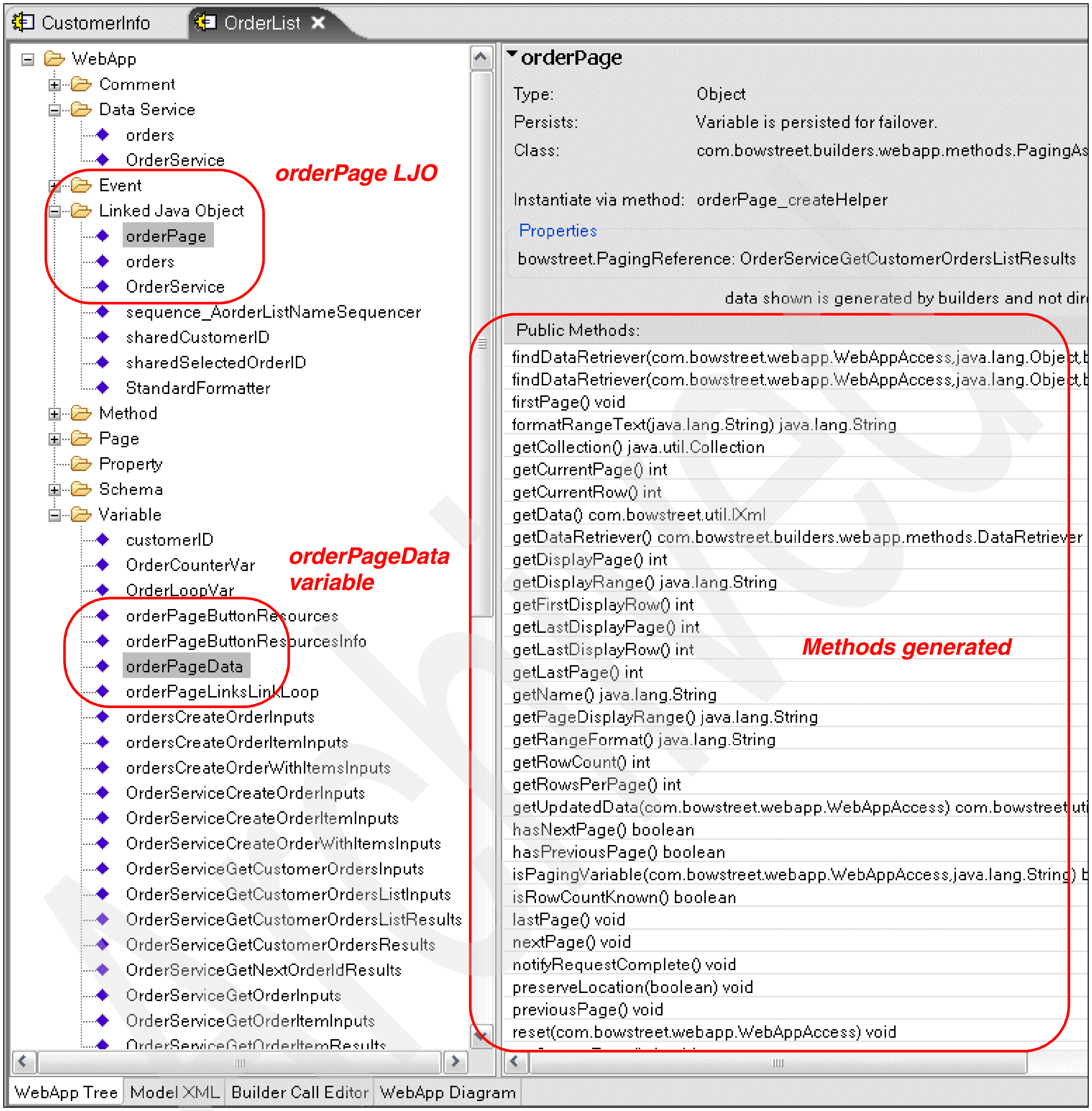
Property	Description	References
<ColumnAlignment>	Use the <ColumnAlignment> tag to determine if the column is *right, center* or *left* aligned.	cs_order_def.xml cs_customer_info.xml
<ColumnWidth>	Sets the width of the column in the table. Accepts absolute value and relative size as well (for example, 20%).	
<ColumnSorting>	Allows the column to be sorted in the order based on the data type specified. The data types include Case Insensitive String, Case Sensitive String, Number, Date, Not Sortable.	
<Attribute>	Allows the HTML attributes of the field to be set. Attributes include text color, font, size, and so forth.	
<DisplayMode>	Allows the hiding of fields.	
<Label>	Changes the schema field name to a user friendly label.	
<Required>	Determines if the field is a mandatory field within the data input form.	
<BaseDefinitions>	Allows the current RDD file to reference other RDD files and definitions.	cs_customer_def.xml

Property	Description	References
<LookupTable>	Makes a call to the LookupTable builder and converts the code value to the string value.	
<FormatterClass>	Used to include a class that is to be invoked for formatting and validation.	
<FormatExpr>	Used for formatting the output.	
<ValidateExpr>	Expression used for validation of the input.	cs_product_def.xml

7.3 Paging your data

When working with large datasets, it is often necessary to paginate the data display by specifying the number of rows of data shown at one time. While the View and Form builder provides such functionality automatically, this feature is not available when using lower level builders such as the Data Page builder.

In such cases, the Paging Assistant builder is used to provide the ability to navigate through the dataset. When the builder is added, an LJO is added to the WebApp, which wraps the specified data source in an IXml object and provides methods to access records one “page” at a time or one record at a time. As with the other builders shown in this book, you can view the LJO that is created, the variable storing the paged data, and the methods that are provided in the WebApp Tree tab as shown in Figure 7-20.



- WebApp
  - Comment
  - Data Service
    - orders
    - OrderService
  - Event
  - Linked Java Object
    - orderPage
    - orders
    - OrderService
    - sequence_AorderListNameSequencer
    - sharedCustomerID
    - sharedSelectedOrderID
    - StandardFormatter
  - Method
  - Page
  - Property
  - Schema
  - Variable
    - customerID
    - OrderCounterVar
    - OrderLoopVar
    - orderPageButtonResources
    - orderPageButtonResourcesInfo
    - orderPageData
    - orderPageLinksLinkLoop
    - ordersCreateOrderInputs
    - ordersCreateOrderItemInputs
    - ordersCreateOrderWithItemsInputs
    - OrderServiceCreateOrderInputs
    - OrderServiceCreateOrderItemInputs
    - OrderServiceCreateOrderWithItemsInputs
    - OrderServiceGetCustomerOrdersInputs
    - OrderServiceGetCustomerOrdersListInputs
    - OrderServiceGetCustomerOrdersListResults
    - OrderServiceGetCustomerOrdersResults
    - OrderServiceGetNextOrderIdResults
    - OrderServiceGetOrderInputs
    - OrderServiceGetOrderItemInputs
    - OrderServiceGetOrderItemResults

orderPage

Type: Object
Persists: Variable is persisted for failover.
Class: com.bowstreet.builders.webapp.methods.PagingAs

Instantiate via method: orderPage_createHelper

Properties
bowstreet.PagingReference: OrderServiceGetCustomerOrdersListResults

data shown is generated by builders and not dir

Public Methods:

```
findDataRetriever(com.bowstreet.webapp.WebAppAccess,java.lang.Object,b
findDataRetriever(com.bowstreet.webapp.WebAppAccess,java.lang.Object,b
firstPage() void
formatRangeText(java.lang.String) java.lang.String
getCollection() java.util.Collection
getCurrentPage() int
getCurrentRow() int
getData() com.bowstreet.util.IXml
getDataRetriever() com.bowstreet.builders.webapp.methods.DataRetriever
getDisplayPage() int
getDisplayRange() java.lang.String
getFirstDisplayRow() int
getLastDisplayPage() int
getLastDisplayRow() int
getLastPage() int
getName() java.lang.String
getPageDisplayRange() java.lang.String
getRangeFormat() java.lang.String
getRowCount() int
getRowsPerPage() int
getUpdatedData(com.bowstreet.webapp.WebAppAccess) com.bowstreet.uti
hasNextPage() boolean
hasPreviousPage() boolean
isPagingVariable(com.bowstreet.webapp.WebAppAccess,java.lang.String) b
isRowCountKnown() boolean
lastPage() void
nextPage() void
notifyRequestComplete() void
preserveLocation(boolean) void
previousPage() void
reset(com.bowstreet.webapp.WebAppAccess) void
```

orderPage LJO

orderPageData variable

Methods generated

Figure 7-20 The LJO, variable, and methods created by the Paging Assistant builder

However, the Paging Assistant builder only paginates the data; it does not provide any navigation controls to your page. To achieve that, use either the Paging Links or the Paging Buttons builder, or both, to add the data navigation controls to the page. Figure 7-21 shows how the Paging Assistant, Buttons and Links work together.

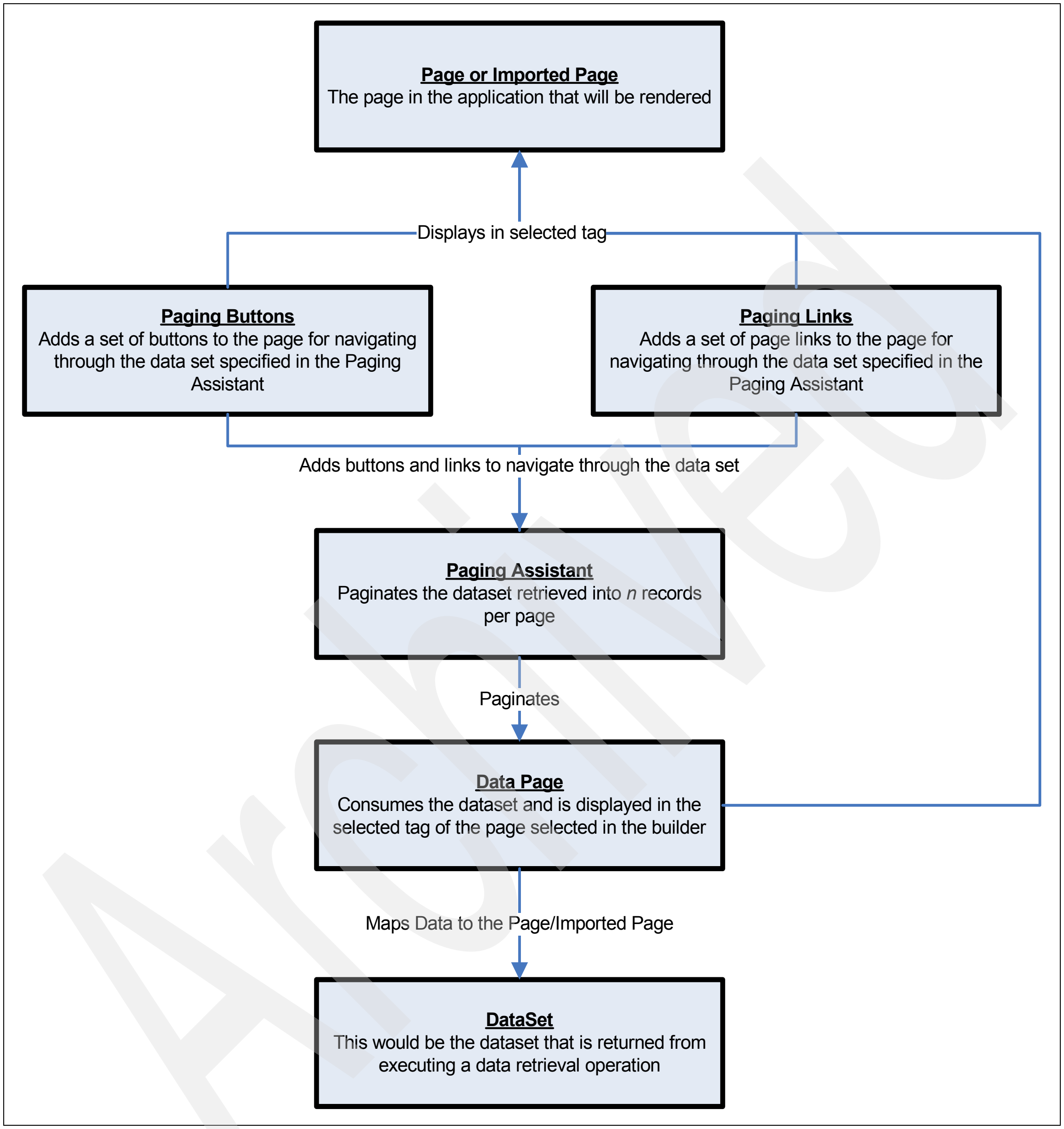

Page or Imported Page
The page in the application that will be rendered
Displays in selected tag
Paging Buttons
Adds a set of buttons to the page for navigating through the data set specified in the Paging Assistant
Paging Links
Adds a set of page links to the page for navigating through the data set specified in the Paging Assistant
Adds buttons and links to navigate through the data set
Paging Assistant
Paginates the dataset retrieved into n records per page
Paginates
Data Page
Consumes the dataset and is displayed in the selected tag of the page selected in the builder
Maps Data to the Page/Imported Page
DataSet
This would be the dataset that is returned from executing a data retrieval operation

Figure 7-21 Using the Paging Assistant, Buttons and Links builders

7.3.1 Adding pagination in the Order List portlet

In the Order List portlet, the list of orders is displayed using the **orderList** Data Page builder. The Data Page builder is a lower level builder and does not have the ability to paginate by default.

Open the project created previously and select **Redbook** → **models** → **redbook** → **ui** → **order** → **OrdersList** model.

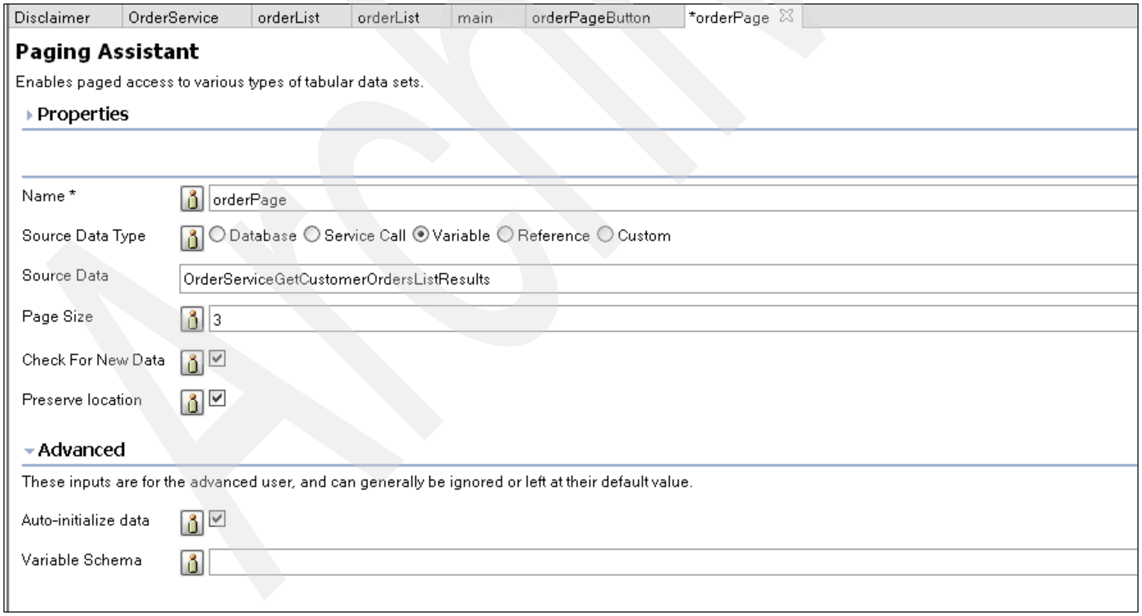
1. Add the Paging Assistant builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Paging Assistant builder** and provide the following values:

Name:	`orderPage`
Source Data Type:	`Variable`
Source Data:	Select `OrderServiceGetCustomerOrdersListResults` from the drop-down list.
Page Size:	`3`
All other fields:	Leave as default

   c. Click **OK** to add your builder into the model.



Paging Assistant

Enables paged access to various types of tabular data sets.

Properties

Name * orderPage

Source Data Type ○ Database ○ Service Call ● Variable ○ Reference ○ Custom

Source Data OrderServiceGetCustomerOrdersListResults

Page Size 3

Check For New Data ☑

Preserve location ☑

Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default value.

Auto-initialize data ☑

Variable Schema

Figure 7-22 Paging Assistant builder inputs

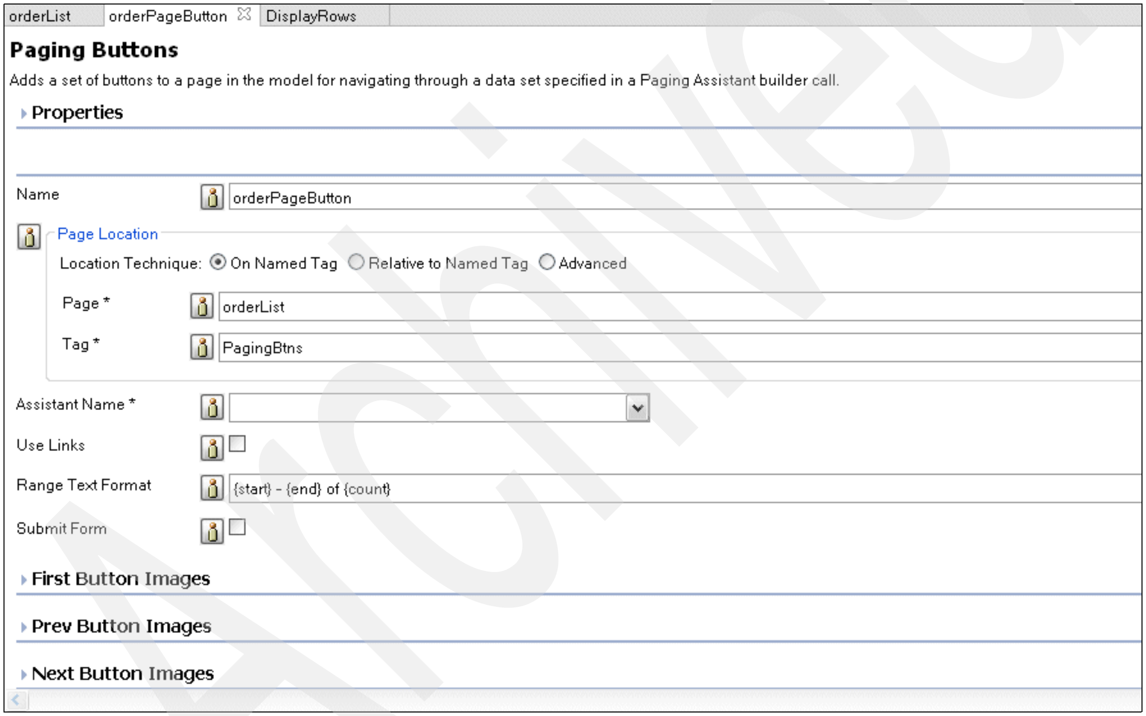
2. Add the Paging Button builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Paging Buttons builder** and provide the following values:

Name:	`orderPageButton`
Location Technique:	`On Named Tag`
Page:	`orderList`
Tag:	`PagingBtns`
Assistant Name:	Select `orderPage` from the drop-down list.
All other fields:	Leave as default

   c. Click **OK** to add your builder into the model.



orderList | orderPageButton ☒ | DisplayRows

Paging Buttons

Adds a set of buttons to a page in the model for navigating through a data set specified in a Paging Assistant builder call.

Properties

Name: orderPageButton

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: orderList

Tag *: PagingBtns

Assistant Name *:

Use Links: □

Range Text Format: {start} - {end} of {count}

Submit Form: □

First Button Images

Prev Button Images

Next Button Images

Figure 7-23 Paging Buttons builder inputs

3. Change the data page variable to consume the paged data from the paging assistant instead of the data service.

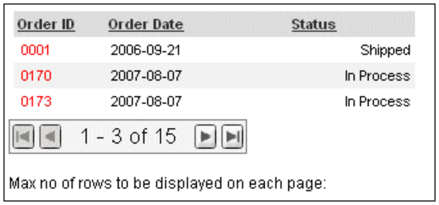
   a. Click the **orderList Data Page builder** in the Outline view (lower left).

   b. Click the ellipsis ... button besides the Variable field and select **Variables** → **orderPageData**.

   c. Click **OK** to close the builder.

4. Save the model by clicking the **Save** icon.

5. Run and test the model by clicking the **Run** button. The data will be displayed in pages of three rows each, with the paging buttons placed below the displayed dataset (Figure 7-24).



Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 15

Max no of rows to be displayed on each page:

Figure 7-24 Result of using the Paging Assistant and Paging Buttons builder

Adding paging links

At this point your data will be paginated. When you run your model the display will show the first 3 rows of data, along with the paging buttons to move through the entire dataset. However, if the dataset is large, and the number of rows per page small, the paging buttons are not an efficient way of moving to a particular data item, such as to record 100 out of 200. To do this, we might want the default page size to be 20 rows per page instead of 3, and a set of page links that can bring us directly to the required page.

Use the following steps to add page links for easier access to specific records:

1. Add the Paging Links builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

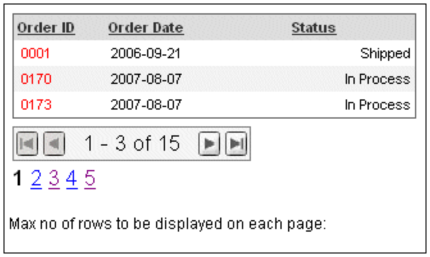
   b. Scroll to and select the **Paging Links builder** and provide the following values:

Name:	`orderPageLinks`
Location Technique:	`On Named Tag`
Page:	`orderList`
Tag:	`PageLinks`
Assistant Name:	Select `orderPage` from the drop-down list.
All other fields:	Leave as default

   c. Click **OK** to add your builder into the model.

2. Save the model by clicking the **Save** icon.

3. Run and test the model by clicking the **Run** button. The data will be displayed in pages of three rows each, with the paging buttons placed below the displayed dataset as shown in Figure 7-24.



Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 15

1 2 3 4 5

Max no of rows to be displayed on each page:

Figure 7-25 Result of using the Paging Links builder

Controlling rows per page using the Radio Button Group

In this scenario, we use the Radio Button Group to allow the user to control the number of rows per page that is to be displayed. Often, when using the Radio Button Group builder, three other builders are included to process the inputs:

1. HTML Event Action builder: This builder allows the model to “catch” the OnClick (or any other HTML event) action for the Radio Button Group selection on the page. Once invoked, the builder can invoke other actions such as submitting the form or calling an action list.
2. Action List: Often called by the HTML Event Action builder to process the Radio Button Group input and redirect to another page.
3. Method: To capture the value of the input of the Radio Button Group.

Figure 7-26 shows how the builders work together in processing a Radio Button Group onClick event.

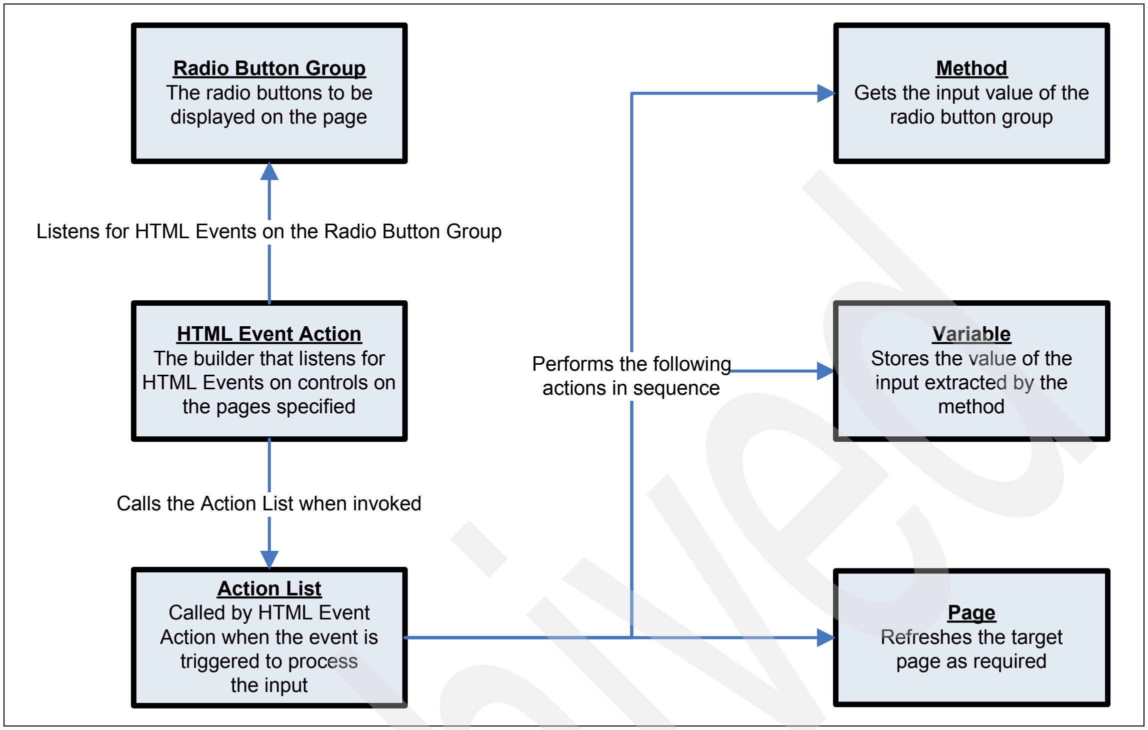

Radio Button Group
The radio buttons to be displayed on the page
Listens for HTML Events on the Radio Button Group
HTML Event Action
The builder that listens for HTML Events on controls on the pages specified
Calls the Action List when invoked
Action List
Called by HTML Event Action when the event is triggered to process the input
Performs the following actions in sequence
Method
Gets the input value of the radio button group
Variable
Stores the value of the input extracted by the method
Page
Refreshes the target page as required

Figure 7-26 Processing a Radio Button Group input

Perform the following steps to enhance the paging ability created in the previous steps:

1. Add the Radio Button Group builder to the model.
   a. Click the **Builder Palette icon** in the Outline view (lower left).
   b. Scroll to and select the **Radio Button Group builder** and provide the following values:

Name:	`DisplayRows`
Location Technique:	`On Named Tag`
Page:	`orderList`
Tag:	`DisplayRows`
Lookup Table Used:	`None`
Radio Group Data:	`3, 5, 10, 15`
Selected Value:	`${MethodCall/orderPage.getRowsPerPage}`
Orientation:	`Horizontal`
All other fields:	Leave as default

   c. Click **OK** to add the builder into the model.

2. Add the Variable builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Variable builder** and provide the following values:

      Name: `rowsDisplayed`
      Type: `Integer`
      Initial Value: `3`

   c. Click **OK** to add the builder into the model.

3. Add the Method builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Method builder** and provide the following values:

      Name: `getRadioButtonInput`
      Method Body: Type in the code shown in Example 7-14.

Example 7-14 Code for the getRadioInput builder

```
{
   //get the input selected by the user in the radio button group
   String rowDisplayed= webAppAccess.getRequestInputs().getInputValue(“DisplayRows”);

   //set the rowsDisplayed variable to the value that was entered
   webAppAccess.getVariables().setString (“rowsDisplayed”, rowDisplayed);
}
```

   c. Click **OK** to add the builder into the model.

4. Add the Action List builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and select the following actions to perform in sequence:

      Name: `radioButtonChange`

      Actions: Add the following actions to the Action List:

      - Click the ellipsis … button beside the first empty row of the Actions list and select **Methods** → **getRadioButtonInput** method.
      - Click the ellipsis … button beside the next empty row of the Actions list and select **Methods** → **orderPage** → **setRowsPerPage**.
      - The method call arguments dialog box will pop up. Click the ellipsis … button beside the input text box and select the **Variables** → **rowsDisplayed**.

- Click the ellipsis button beside the next empty row of the Actions list and select **Pages** → **orderList**.

Tag: `PagingBtns`

5. Add the HTML Event Action builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

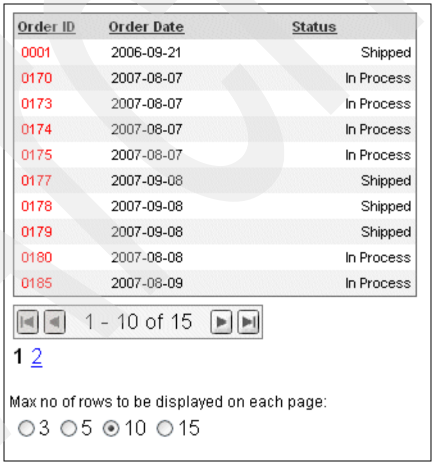
   b. Scroll to and select the **HTML Event Action builder** and provide the following values:

Name:	`DisplayRows`
Location Technique:	`On Named Tag`
Page:	`orderList`
Tag:	`DisplayRows`
Event Name:	`onClick`
Action Type:	`Submit form and invoke action`
Action:	Click the ellipsis button beside the input text box and select **Methods** → **radioButtonChange**
All other fields:	Leave as default

   c. Click **OK** to add your builder into the model.

   d. Save the model by clicking the **Save** icon.

   e. Run and test the model by clicking the **Run** button. Select the number of rows per page to be displayed as **10**. The number of paging links will become 2 and the number of rows per page will be refreshed to 10 as shown in Figure 7-27.



Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process
0174	2007-08-07	In Process
0175	2007-08-07	In Process
0177	2007-09-08	Shipped
0178	2007-09-08	Shipped
0179	2007-09-08	Shipped
0180	2007-08-08	In Process
0185	2007-08-09	In Process

1 - 10 of 15

1 2

Max no of rows to be displayed on each page:

○3 ○5 ●10 ○15

Figure 7-27 Adding the Radio Buttons Group to control the rows per page

7.4 Using the Ajax type-ahead builder

With the recent spread of Ajax (Asynchronous JavaScript™) on the Web, many application developers have started to explore different ways to take advantage of having interactions with the server without needing to reload the whole page.

One feature that exploits the use of Ajax is the *type-ahead* feature. Type-ahead occurs when the user enters text into a field and the system displays fully formed guesses based on the letters the user has already entered. The lookup is based entirely on a server and does not require caching on the client side.

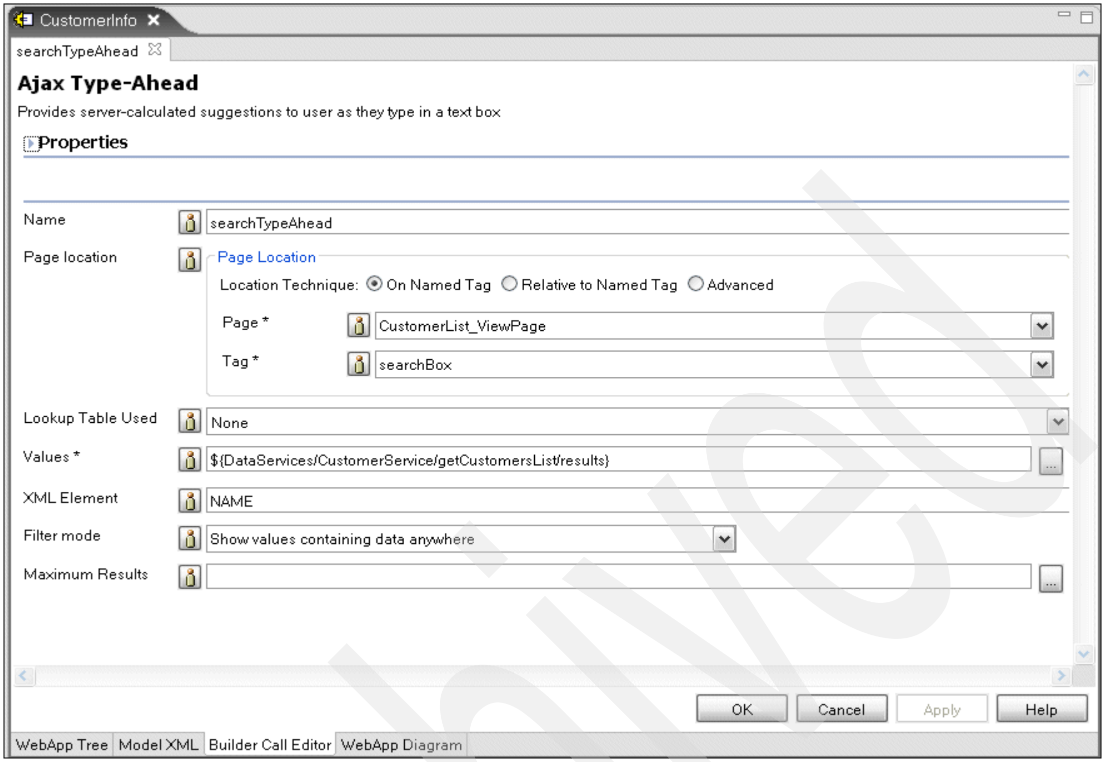
To use the Ajax Type-Ahead builder in the portlet factory, you first define which text input element will be providing the input string for matching. After that, define the data service that the builder will call and the XML element (or field name) for which the lookup will be performed when the user provides an input.

Once the input is keyed in, a call is made to the server to invoke the data service specified with the list of matching values returned and displayed on the text input element selected. The type of matching performed is defined in the Filter Mode option, where matching could be done on the start of the string or as a substring. Note that in this builder, the matching done is case-sensitive.

Perform the following steps to add the Ajax type-ahead feature to the Customer Information portlet.

1. Open the project created previously and open the CustomerInfo model by selecting **Project** → **redbook** → **cs** → **ui** → **customer** folder.
2. Click the **Builder Palette icon** in the Outline view (lower left).
3. Scroll to and select the **Ajax Type-Ahead builder** and provide the following values (Figure 7-28):

Name:	`searchTypeAhead`
Location Technique:	`On Named Tag`
Page Location:	`CustomerList_ViewPage`
Tag:	`searchBox`
Lookup Table Used:	`None`
Values:	Click the ellipsis … and select **DataServices** → **CustomerService** → **getCustomersList** → **results** to select `${DataServices/CustomerService/getCustomersList/results}`
XML Element:	`NAME`
Filter Mode:	`Show values containing data anywhere`



Ajax Type-Ahead

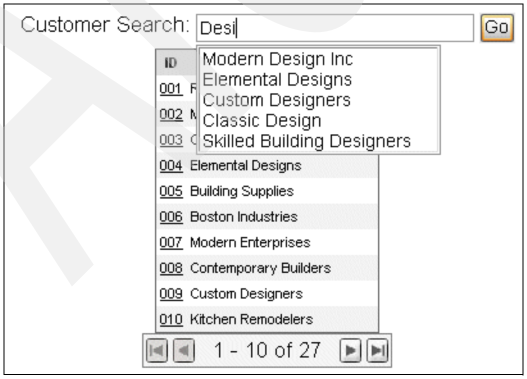
Provides server-calculated suggestions to user as they type in a text box

Properties

Name	searchTypeAhead
Page location	Page Location Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced Page * CustomerList_ViewPage Tag * searchBox
Lookup Table Used	None
Values *	${DataServices/CustomerService/getCustomersList/results}
XML Element	NAME
Filter mode	Show values containing data anywhere
Maximum Results	

Figure 7-28   Ajax Type-Ahead builder inputs

4. Save the model by clicking the **Save** icon.
5. Run and test the model by clicking the **Run** button. Give an initial input of a customer name and a drop-down list of matching values will appear as shown in Figure 7-29.



Customer Search: Desi

Modern Design Inc
Elemental Designs
Custom Designers
Classic Design
Skilled Building Designers

ID	
001	F
002	M
003	C
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

1 - 10 of 27

Figure 7-29   Ajax Type-Ahead on the Customer Information portlet

7.5 Using the Dojo builders

The *Dojo toolkit* is a modular Open Source DHTML toolkit written in Javascript. Traditionally, DHTML has been complex and cumbersome to code, which prevented the mass adoption of dynamic web application development.

Dojo allows you to easily and quickly build dynamic capabilities into web pages and other Ajax-based applications. Among the features that can be implemented using Dojo are drag and drop, inline editing of data, and tooltips. Combined with Ajax calls, Dojo enables data to be refreshed dynamically, which makes web sites more user friendly, responsive, and functional.

The Dojo Ajax feature set must be deployed before the Dojo builders will appear on your builder list and be available for use. If you do not see any of the Dojo builders in your builder list (for example, Dojo Inline Edit), you have to add them into your project.

7.5.1 Creating a Dojo tooltip in the Product Details portlet

When creating a web application, using *tooltips* to provide users with hints or guidance can increase the user-friendliness greatly. Tooltips allow users to access this information while still staying within the current page and context, and at the same time avoid the hassle of having the page refresh and possibly losing some data when the they go back to the original page.

In this scenario, the order details portlet will display a Dojo tooltip showing the product details and the product image when the user moves the mouse over the specific product within the order. This is done via a data service call to the server dynamically, according to the item selected.

Because this tooltip is also be used in later chapters by other models, build the tooltip as a separate model and link it into the OrderDetails model.

Create the ProductTooltip model

Open the project created previously and create a product folder by selecting **Redbook** → **models** → **redbook** → **ui** → **order** folder.

1. Add the **Product** folder to the model.

   a. Right-click the **ui** folder in the Project Explorer view (top left).

   b. Select **New** → **Folder** and provide the following value:

      Folder Name: `product`

2. Add the **ProductTooltip** model to the folder.

   a. Right-click the newly created **product** folder in the Project Explorer view (top left).

   b. Select **New** → **WebSphere Portlet Factory Model** and provide the following values:

Choose Project:	`RedbookCS`
Select Model:	`Factory Starter Models → Empty`
Model Name:	`ProductTooltip`

3. Add the **Service Consumer** builder to the model.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Service Consumer builder** and provide the following values:

Name:	`ProductService`
Provider Model:	Click the ellipsis ... button and select the **redbook** → **cs** → **data** → **ProductDataProvider** model.
Rich Data Definition File:	Click the ellipsis ... button and select the **WEB-INF** → **resources** → **redbook** → **cs** → **data_definitions** → **cs_product_def.xml** file.

   c. Click **OK** to add the builder into your model.

4. Add the Variable builder to the model to store the image URL for the product detail.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Variable builder** and provide the following values:

Name:	`productImageUrl`
Type:	Click the ellipsis ... button and select the **String** datatype.

   c. Click **OK** to add the builder into your model.

5. Add the **Page** builder as the tooltip page that is to be displayed.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Page builder** and provide the following values:

Name:	`tooltipPage`
Page Contents HTML:	Replace the existing content inside the <div> tags with the following code:

```
<table border=”0”>
   <tr>
      <td><span name="imageTag"></span></td>
      <td><span name="namedTag"></span></td>
   </tr>
```

```
</table>
```

c. Click **OK** to add the model into your builder.

6. Add the **Data Page** builder to the model to get the product data.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Data Page builder** and provide the following values:

Name:	`tooltipPage`
Variable:	Click the ellipsis button and select **DataServices** → **ProductService** → **getProduct** → **results**
Page in Model:	Select the `tooltip` page from the drop-down list. Upon selecting the page, more fields will appear below.
Location for New Tags:	Select `namedTag` from the drop-down list.
All other fields:	Leave as default

   c. Click **OK** to add the builder into your model.

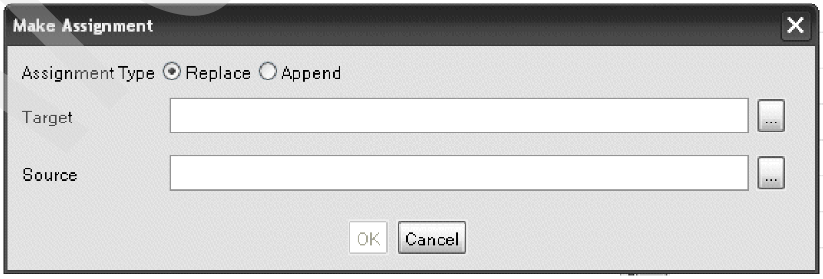
7. Add the Action List builder to the model to store the image URL for the product detail.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and provide the following values:

Name:	`generateTooltip`
Actions:	Add the following actions to the Action List.

   - Click the ellipsis … button beside the first empty row of the Actions list and select **Special** → **Assignment** to bring up the Make Assignment dialog box as shown in Figure 7-30.

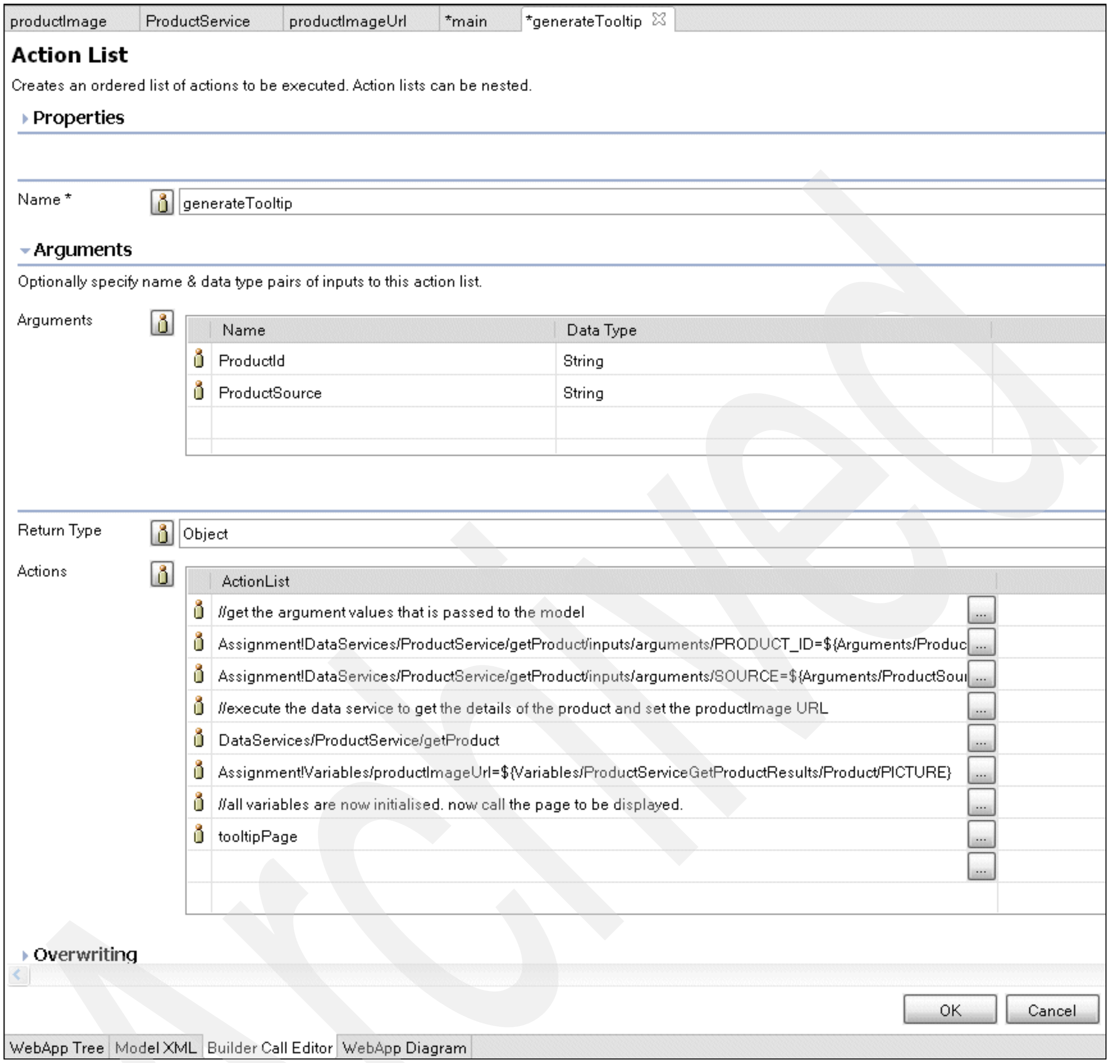


Assignment Type ● Replace ○ Append

Figure 7-30 Make Assignment dialog box

  - Click the ellipsis … button beside the Target field and select **DataServices** → **ProductService** → **getProduct** → **inputs** → **arguments** → **PRODUCT_ID** as the target variable to set.
  - Click the ellipsis … button beside the Source field and select **Arguments** → **ProductId**.
  - Click the ellipsis … button on the next empty row of the **Actions** list and select **Special** → **Assignment** to bring up the Make Assignment dialog box.
  - Click the ellipsis … button beside the Target field and select **DataServices** → **ProductService** → **getProduct** → **inputs** → **arguments** → **SOURCE** as the target variable to set.
  - Click the ellipsis … button beside the Source field and select **Arguments** → **ProductSource**.
  - Click the ellipsis … button on the next empty row of the **Actions** list and select **Data Services** → **ProductService** → **getProduct** to call the data service to get the product details based on the arguments set in the previous step.
  - Click the ellipsis … button on the next empty row of the **Actions** list and select **Special** → **Assignment** to bring up the Make Assignment dialog box.
  - Click the ellipsis … button beside the Target field and select **Variables** → **productImageUrl** as the target variable to set.
  - Click the ellipsis … button beside the Source field and select **Variables** → **ProductServiceGetProductResults** → **Product** → **PICTURE** as the source variable (this is the product detail field obtained from calling the getProduct service in the previous step).
  - Click the ellipsis … button on the next empty row of the **Actions** list and select **Pages** → **tooltipPage** to display the product details page.

c. The inputs for the generateTooltip action list builder are shown in Figure 7-31.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name *: generateTooltip

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments:

Name	Data Type
ProductId	String
ProductSource	String

Return Type: Object

Actions:

ActionList
//get the argument values that is passed to the model
Assignment!DataServices/ProductService/getProduct/inputs/arguments/PRODUCT_ID=${Arguments/Produc
Assignment!DataServices/ProductService/getProduct/inputs/arguments/SOURCE=${Arguments/ProductSou
//execute the data service to get the details of the product and set the productImage URL
DataServices/ProductService/getProduct
Assignment!Variables/productImageUrl=${Variables/ProductServiceGetProductResults/Product/PICTURE}
//all variables are now initialised. now call the page to be displayed.
tooltipPage

Figure 7-31 GenerateTooltip Action List builder inputs

8. Add the Image builder to the model to store the image URL for the product detail.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Image builder** and provide the following values:

Name:	`productImage`
Location Technique:	`On Named Tag`
Page:	`tooltipPage`

Tag: `imageTag`

Image Source: Click the ellipsis … button and select **Variables** → **productImageUrl**.

c. Click **OK** to add the builder into your model.

At this point, your model is ready to render the product details when a specific product is selected. However, since there is no product selected and no main action defined, running the model will result in an error.

Testing the ProductTooltip model

One of the ways to test a model is to create a main action list that will set any required arguments and then call the corresponding starting builder of the model. Once the testing is complete, you can either disable the builder (so that you can test it again in the future by enabling it) or delete the builder (if you would like to ship the product). In this builder, we create a main action list and disable it after testing is complete.

Use the following steps to add the Action List builder to the model to store the image URL for the product detail.

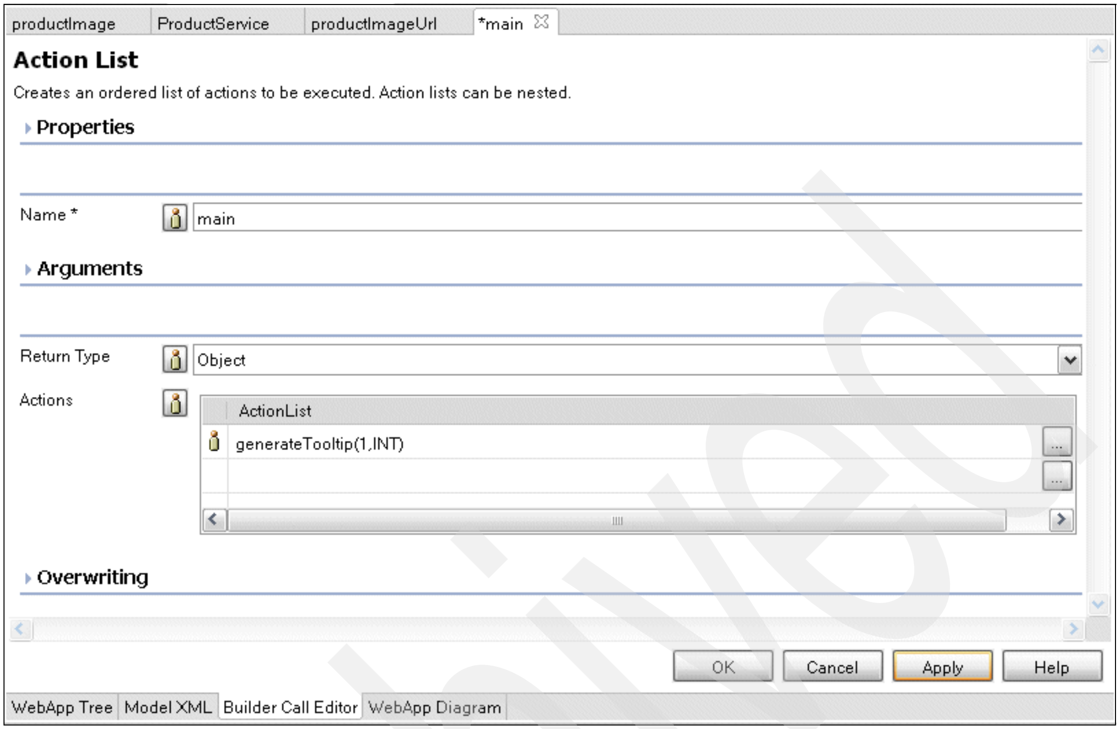
1. Click the **Builder Palette icon** in the Outline view (lower left).
2. Scroll to and select the **Action List builder** and provide the following values.

   Name: `main`
   (Note that this is case sensitive. If you typed in `Main`, your model will not run.)

   Actions: In the action list, add the following action to invoke the generateTooltip action list with the ProductId and ProductSource values that it requires:

   ```
     generateTooltip (1, INT)
   ```

   Note that the arguments passed are not being encased in quotes even though a string variable is expected.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type: Object

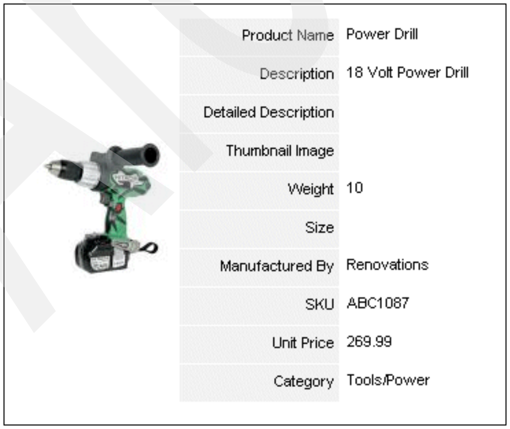
Actions:

ActionList
generateTooltip(1,INT)

Overwriting

Figure 7-32 Main Action List builder inputs

3. Save the model by clicking the **Save** icon.
4. Run and test the model by clicking the **Run** button. The product details together with the image of the product are shown in Figure 7-33.



Product Name	Power Drill
Description	18 Volt Power Drill
Detailed Description	
Thumbnail Image	
Weight	10
Size	
Manufactured By	Renovations
SKU	ABC1087
Unit Price	269.99
Category	Tools/Power

Figure 7-33 Product Details Tooltip page

Create the ProductTooltip model

With the Dojo tooltip created, we can now link it to the OrderDetails model and generate a tooltip whenever the user moves their mouse over a product listed in the product details.

1. Add the **Linked Model** builder to include the ProductTooltip model created from the previous step.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Linked Model builder** and provide the following values:

      Name: `productTooltip`
      Model: Click the ellipsis ... button and select **redbook** → **cs** → **ui** → **product** → **ProductTooltip** model.
      Instance Rule: `Always use same instance and state data for a session.`

   c. Click **OK** to add the builder to your model.

2. Add the **Dojo Tooltip** builder to pop up a Dojo tooltip whenever the user places the mouse over a specific product.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Dojo Tooltip builder** and provide the following values:

      Name: `dojoTooltip`
      Location Technique: `On Named Tag`
      Tag: `ColumnData`
      (The ColumnData tag covers the entire row.)
      Tooltip Type: `Action`
      Tooltip Action: Click the ellipsis ... button and select **redbook** → **cs** → **ui** → **product** → **ProductTooltip** model.
      Input Mappings: Enter the values shown in Table 7-5.

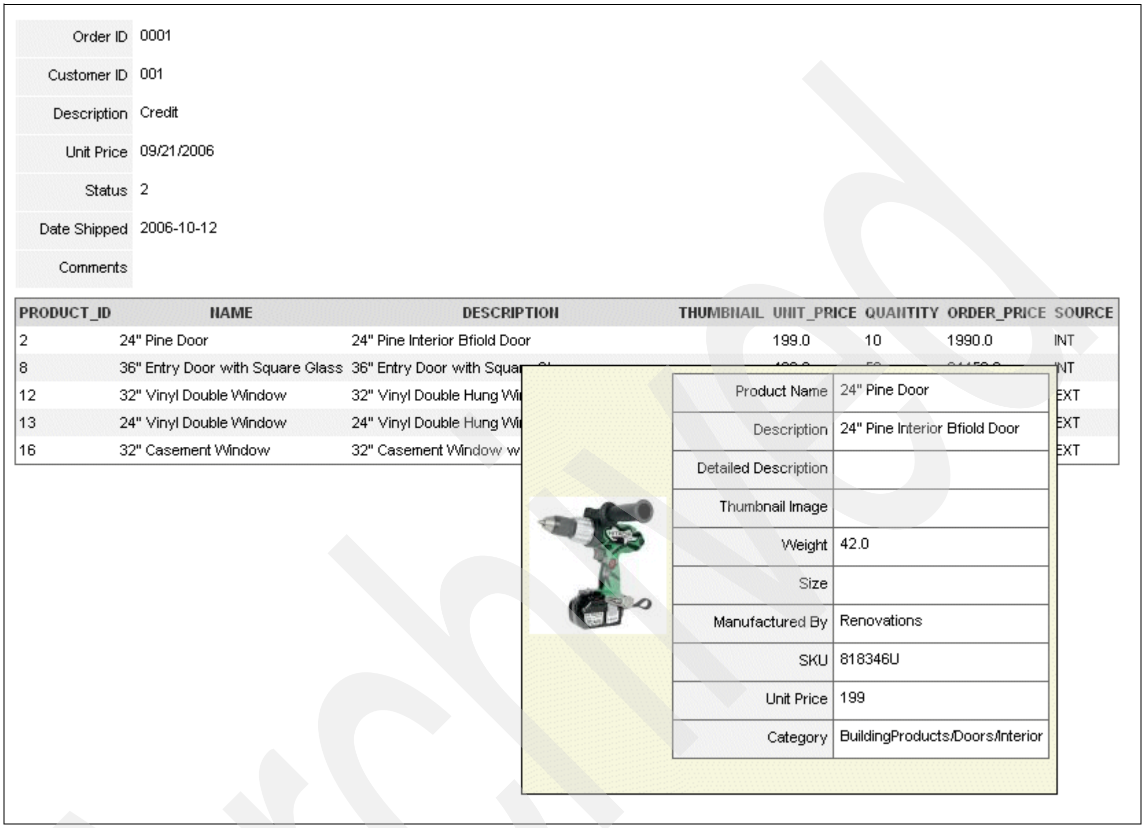
      Table 7-5 Input mappings for the Dojo Tooltip builder

Name (Type in)	Value (Can be selected using the ellipsis icon)
`ProductId`	${Variables/ITEMLoopVar/PRODUCT_ID}
`ProductSource`	${Variables/ITEMLoopVar/SOURCE}

   c. Click **OK** to add the builder to the model.

3. Save the model by clicking the **Save** icon.

4. Run and test the model by clicking the **Run** ▶ button. Place your mouse over any of the products listed in the order and the tooltip will appear as shown in Figure 7-34.



Order ID	0001
Customer ID	001
Description	Credit
Unit Price	09/21/2006
Status	2
Date Shipped	2006-10-12
Comments	

PRODUCT_ID	NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	10	1990.0	INT
8	36" Entry Door with Square Glass	36" Entry Door with Squar					NT
12	32" Vinyl Double Window	32" Vinyl Double Hung Wi					EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Wi					EXT
16	32" Casement Window	32" Casement Window w					EXT

Product Name	24" Pine Door
Description	24" Pine Interior Bfiold Door
Detailed Description	
Thumbnail Image	
Weight	42.0
Size	
Manufactured By	Renovations
SKU	818346U
Unit Price	199
Category	BuildingProducts/Doors/Interior

Figure 7-34 Order Details portlet with Dojo tooltip enabled

Linked versus imported models

In the following section, we describe how to add the ProductTooltip model as a Linked model to the OrdersDetails model.

Using Linked and Imported model builders is very useful in modularizing your application. They also encourage better system organization and code reuse. In our case of the Product Tooltip model that you have just created, the model is actually used both in the Order Details portlet (to display the purchased product details) as well as in the Go Shopping portlet (to display the product details in the product catalog).

Besides the obvious code reuse, another rule of thumb to start using these builders is when you find your models overloaded with too many builders.

How do we decide whether to use a Linked Model or an Imported Model? The following considerations should help you to decide:

Linked Model: This is the primary unit of modularity for an application. As the name implies, using this builder will only link you to the model and thus the builders of the model can only be referenced, but not used directly as part of your model.

For example, if you link to a model that has a page builder in it, you will *not* be able to access that page directly; if you use a text builder, you will *not* find the linked model pages in the list of pages to place your text in. This is because those builders are not native to the existing model. They can only be referenced or invoked via method calls or other builder calls.

Imported Model: As the name implies, using an imported model builder will import all related builders of the selected builder into your existing builder. One use of this is to store all generic data definitions and schemas in a model and to import it using an Imported Model builder. Using the Linked Model builder in this example will not work since the schema builders are not part of your model.

Because imported models do not have their own namespaces, importing another model can cause name conflicts, and you should always watch for errors encountered during generation time when importing a model. One simple practice to avoid naming conflicts is to provide distinct model prefixes to builders for the respective models.

An imported model has “read only” status, which means that the host model invokes all the builder calls in the imported model, but cannot change any of the builder inputs of those builder calls.

7.5.2 Adding Dojo Inline Edit in the Order Details portlet

Inline editing is an important feature that makes it possible for users to edit information without the need for a screen refresh. The removal of a screen refresh gives the user a richer and more convenient experience, especially when the user is modifying sets of data in the same page and would like to see the effect of the changes without having to submit the page.

One example of this is HTML editing, where users would like to see the behavior of the changes made to the text without the need for a submit because they might only be exploring the effect of the change.

In the following example, the Dojo Inline Edit feature is implemented on the Order Details portlet. The user is given the choice to edit the quantity of the product that is purchased, then submit the changes to display the new price of purchase without the need for a page submit. The user could then continue to change the quantity of other products purchased based on preference or budget.

Open the OrderDetails model and perform the following steps:

1. Add the Action List builder to process the change when the user does an inline edit.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and provide the following values:

Name:	`updateItemQuantityAndPrice`
Return Type:	`void`
Actions:	Add the following actions to the Action List:

- Click the ellipsis ... button and select **Methods** → **UIOperations** → **updateQuantity** to call the Link Java Object method to recompute the total price of purchase after the quantity has been changed.
- When the method is selected, the Define Method Call Arguments dialog box is displayed to request the argument value. Click the ellipsis ... button and select **OrderServiceGetOrderItemsResults** → **Orders** → **Order** → **ITEMS**. This will pass in the list of items for the order being displayed as the argument.
- Click the ellipsis ... button of the **Actions** list and select **Pages** → **orderDetails**. This will bring the user back to the orderDetails page after the prices have been recomputed.

2. Add the Dojo Inline Edit builder to include the inline editing function on a field within the list of order items.

   a. Click the **Builder Palette icon** in the Outline view (lower left).

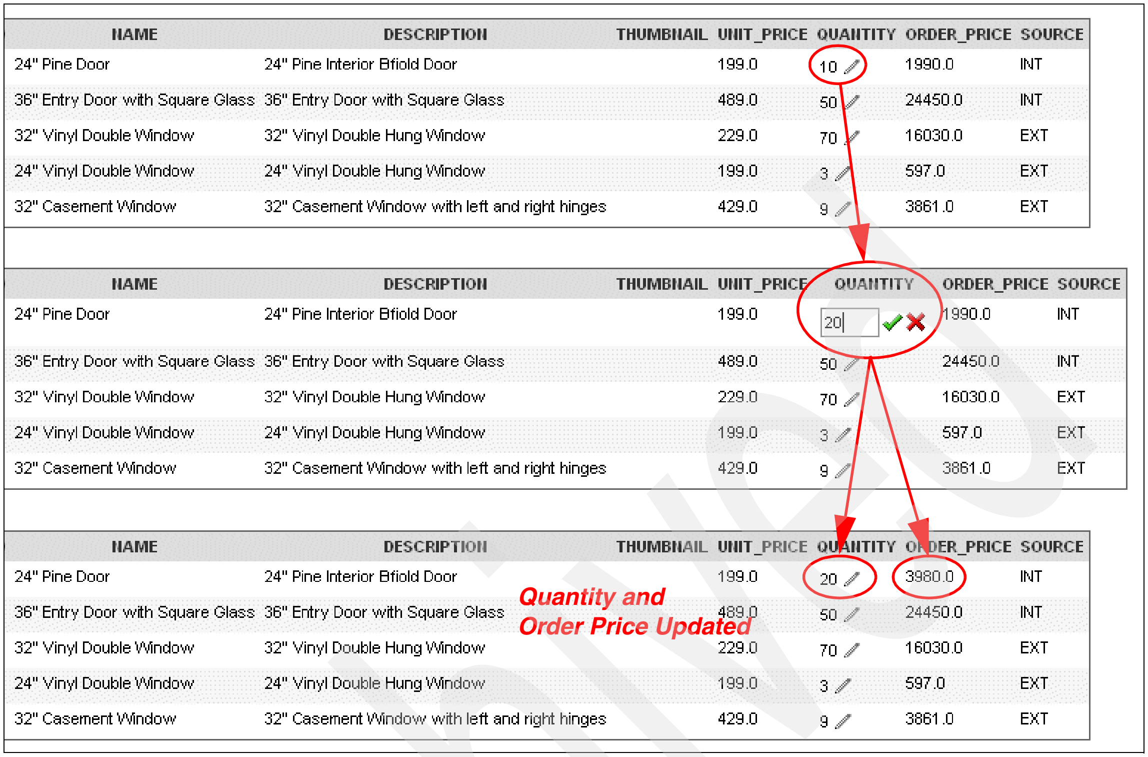
   b. Scroll to and select the **Dojo Inline Edit builder** and provide the following values:

Name:	`dojoInlineEdit`
Fields:	Click the ellipsis ... button and select the **[orderDetails]orderItems** → **ITEMS** → **ITEM** → **QUANTITY** field. This will cause the quantity of each item in the order items list to be inline editable.
Submit Form:	`Check`
Action:	Click the ellipsis ... button and select the **Methods** → **updateItemQuantityAndPrice** method. This will fire the action list defined in the previous step to recompute the total price for each item.

   c. Click **OK** to add the builder to your model.

3. Save the model by clicking the **Save** icon.

4. Run and test the model by clicking the **Run** button. Try to change the quantity of the items ordered and check that the corresponding Order Price is updated (Figure 7-35 on page 336).



NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
24" Pine Door	24" Pine Interior Bfiold Door		199.0	10	1990.0	INT
36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
24" Pine Door	24" Pine Interior Bfiold Door		199.0	20 ✓ ✗	1990.0	INT
36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
24" Pine Door	24" Pine Interior Bfiold Door		199.0	20	3980.0	INT
36" Entry Door with Square Glass	36" Entry Door with Square Glass		489.0	50	24450.0	INT
32" Vinyl Double Window	32" Vinyl Double Hung Window		229.0	70	16030.0	EXT
24" Vinyl Double Window	24" Vinyl Double Hung Window		199.0	3	597.0	EXT
32" Casement Window	32" Casement Window with left and right hinges		429.0	9	3861.0	EXT

Quantity and Order Price Updated

Figure 7-35 Dojo Inline Edit

7.6 Dojo drag and drop

A “drag and drop” feature has long been considered by developers as good to have but difficult to implement. Handling complex DHTML code has made adoption of this feature very slow even though the feature has existed for a long time.

In this section we demonstrate a drag and drop feature using the scenario of adding items from a product catalog into a shopping cart. Because the full implementation is covered later, we only illustrate the creation of the source and target models and the use of the Dojo builders that enable it here.

The model used to run both models, enable the drag and drop functionality, and demonstrate the entire shopping flow is covered in Chapter 10, “Creating the Go Shopping portlet” on page 501.

Create the shopping cart (drag and drop target)

This model creates an image to which the customer can drag and drop a product from the product catalog. When the product is dropped onto the image, the shopping cart is refreshed to show the selections made so far.

Open the project and open the **Redbook** → **models** → **redbook** → **ui** → **shopping** → **ShoppingCart** model.

1. Add the Image builder to the model.
   a. Click the **Builder Palette** icon in the Outline view (lower left).
   b. Scroll to and select the **Image builder** and provide the following values:

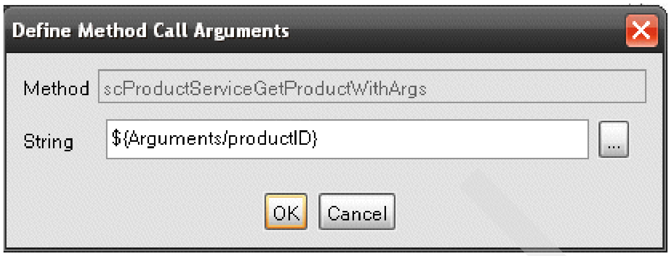
Name:	`cart`
Location Technique:	`Relative to Named Tag`
Page:	Select **cartLayoutPage** from the drop-down list.
Tag:	Select **OrderInformation** from the drop-down list.
Placement:	`After`
New Tag Name:	`cartImage`
Image Source:	Click the ellipsis … button followed by the **Choose File** tab and select the **redbook** → **cs** → **images** → **cart.gif** image.

   c. Click **OK** to add the builder to the model.

2. Add to the model the Action List builder that is invoked when a product is dragged and dropped onto the Dojo target (the image we added).
   a. Click the **Builder Palette** icon in the Outline view (lower left).
   b. Scroll to and select the **Action List builder** and provide the following values:

Name:	`addProduct`
Arguments:	Enter the following argument: Name: `productID` Data Type: `String`
Actions:	Add the following actions to the Action List:

   - Click the ellipsis … button beside the first empty row of the **Actions** list and select **Method** → **scProductServiceGetProductWithArgs** to invoke the method to retrieve the details of the selected product that has been dropped onto the cart. This will bring up the Define Method Call Arguments dialog box.



Define Method Call Arguments

Method: scProductServiceGetProductWithArgs

String: ${Arguments/productID}

Figure 7-36 Define Method Call Arguments dialog box

- Click the ellipsis ... button beside the String field and select **Arguments**/**productID** as the parameter to pass to the method as shown in Figure 7-36.

c. Click **OK** to continue to the next action.

- Click the ellipsis ... button on the next empty row of the **Actions** list and select **Methods** → **UIOperations** → **addItem** method to call the data service to add the dropped product to a variable containing the current set of products in the cart. This will again bring up the Define Method Call Arguments dialog box.
- Click the ellipsis ... button beside the com.bowstreet.util.IXml field and select **Variables** → **varNewOrderItems** → **ITEMS** as the variable to which the selected item will be added.
- Click the ellipsis ... button beside the second com.bowstreet.util.IXml and select **Data Services** → **scProductService** → **getProduct** → **results** → **Products** → **Product** to obtain the product that retrieves the result (product selected) from the previous action.

d. Click **OK** to continue to the next action.

- Click the ellipsis ... button on the next empty row of the **Actions** list and select **Pages** → **cartLayoutPage** to define the image as the target for users to drop the items selected to.

e. Click **OK** to add the builder to your model.

3. Add the Dojo Drop Target builder to display the items that have been added to the cart.

a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Dojo Drop Target builder** and provide the following values:

Name:	`dropTarget`
Variable:	`On Named Tag`
Page in Model:	Select **cartLayoutPage** from the drop-down list.

Tag: Select **cartImage** from the drop-down list.
Drop Action: Click the ellipsis … button and select **Methods** → **addProduct** to invoke the action list created in the previous step.
Drop Type: *

c. Click **OK** to add the builder to your model.

4. Add the Data Page builder to display the items that have been added to the cart.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Data Page builder** and provide the following values:

   Name: `orderItems`
   Variable: Click the ellipsis … button and select **Variables** → **varNewOrderItems** → **ITEMS** to display the ITEMS variable containing all the items in the shopping cart.
   Location for New Tags: Select **OrderDetails** from the drop-down list.

   c. Click **OK** to add the builder to your model.

Create the product catalog (drag and drop source)

This model generates the product catalog for the application and creates a Dojo Drag Source to allow you to drag the product selected to a region.

1. Add the Data Page builder to the model to display the list of products available.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Data Page builder** and provide the following values:

   Name: `products`
   Variable: Click the ellipsis … button and select **DataServices** → **scProductService** → **getProducts** → **results** to display the products.
   Page in Model: Select **pageProductCatalog** from the drop-down list**.**
   Location for New Tag: Select **ProductCatalog** from the drop-down list.

   c. Click **OK** to add the builder into your model.

2. Add the Image builder to display the product image when the list of products is displayed.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Image builder** and provide the following values:

Name:	`thumbnail`
Location Technique:	`On Named Tag`
Page:	Select **pageProductCatalog** from the drop-down list.
Tag:	Select **THUMBNAIL** from the drop-down list.
Image Source:	Click the ellipsis … button and select **Variables** → **ProductLoopVar** → **Product** → **THUMBNAIL** to obtain the thumbnail image file name from the list of products retrieved by the data page.

c. Click **OK** to add the model into your builder.

3. Add the Dojo Drag Source builder to the model to get the product data.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

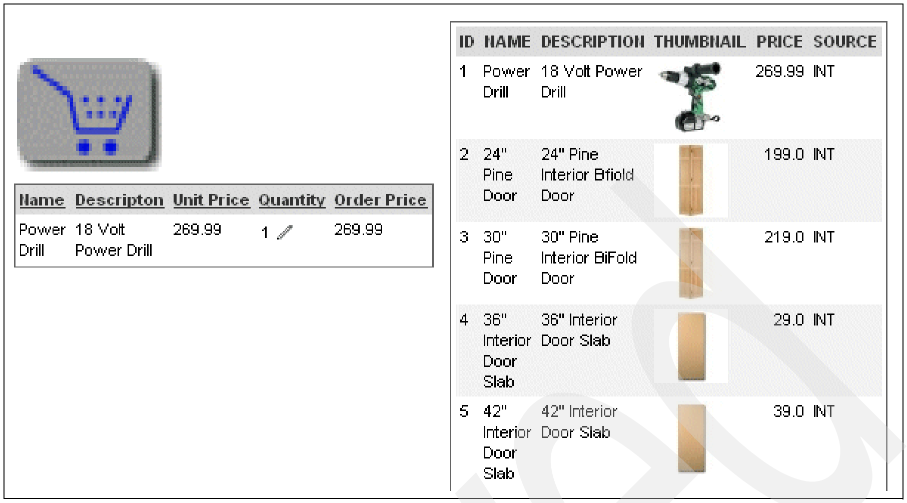
   b. Scroll to and select the **Dojo Drag Source builder** and provide the following values:

Name:	`dragSource`
Location Technique:	`On Named Tag`
Page:	Select **pageProductCatalog** from the drop-down list.
Tag:	Select **THUMBNAIL** from the drop-down list.
Drag Source Data:	Click the ellipsis … button and select **Variables** → **ProductLoopVar** → **Product** → **ID** to select the **product ID** as the value that is being passed to the shopping cart when the product is dropped.

   c. Click **OK** to add the model into your builder.

4. Save the model by clicking the **Save** icon.

5. Run and test the model by clicking the **Run** button. Drag a product from the list of products displayed to the shopping cart image and you should get results similar to those shown in Figure 7-37.



Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	269.99	1	269.99

ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

Figure 7-37 Implementing Dojo Drag and Drop

7.7 Using other Dojo features

In the previous sections, the Dojo examples were created using builders that were provided by Portlet Factory. However, does not mean that other Dojo features cannot be implemented.

In this scenario, we implement the Dojo editor for a textarea input for which Portlet Factory does not have a builder. To do this, we first Dojo-enable the page, then set the attribute of the HTML element that we would like to convert to, as shown in the following steps.

Note that this example references the OrderPage model that is described in Chapter 10, “Creating the Go Shopping portlet” on page 501. However, the model can be modified and run on its own, and thus does not require you to read Chapter 10 before trying the example.

Creating a Dojo Rich Text Editor

Open the project that has been created and open the **Redbook** → **models** → **redbook** → **ui** → **shopping** → **OrderPage** model.

1. Add the Imported Model builder to the model to include the ShoppingUI services and events to your model.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Imported Model builder** and provide the following values:

   Name: `ShoppingUIImports`
   Model: Click the ellipsis [...] button and select the **redbook** → **cs** → **ui** → **Shopping** → **ShoppingUIImports** model.

c. Click **OK** to add the builder into your model.

2. Add the Action List builder to the model to add the steps for running the model.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and provide the following values:

      Name: `main`
      Actions: Add the following actions to the Action List:

      - Click the ellipsis [...] button and select **DataServices** → **scOrdersService** → **getNextOrderId** to get the next order ID for the order that is to be created.
      - Click the ellipsis [...] button on the next empty row of the Actions list and select **Special** → **Assignment** to bring up the Make Assignment dialog box.
      - Click the ellipsis [...] button beside the Target field and select **Variables** → **varnewOrder** → **Order** as the target variable to set.
      - Click the ellipsis [...] button beside the Source field and select **DataServices** → **scOrdersService** → **getNextOrderId** → **results** → **arguments** → **returnValue** to get the return value of the getNextOrderId method that you called at the start of this action list.
      - Click the ellipsis [...] button on the next empty row of the Actions list and select **Page** → **shoppingDetails_InputPage** to refresh the page when the variables have been loaded.

   c. Click **OK** to add the builder into your model.

3. Add to the model the Action List builder that the input form will call. This action list does not perform any actions but is necessary because it is required by the input form builder.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and provide the following values:

      Name: `noop`
      Return Type: `void`

   c. Click **OK** to add the builder into your model.

4. Add the Input Form builder to the model.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Input Form builder** and provide the following values:

Name:	`shoppingDetails`
Input Submit Operation:	`noop`
Input Next Action:	`noop`
Input Page HTML:	Leave as default
Input Variable:	Click the ellipsis … button and select the **Variables** → **varNewOrder** → **Order** variable for the builder.
All other fields:	Leave as default

   - Click the ellipsis … button on the next empty row of the Actions list and select **Page** → **shoppingDetails_InputPage** to refresh the page when the variables have been loaded.

5. Add the Action List builder to the model to add the steps for running the model.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Action List builder** and provide the following values:

Name:	`main`
Actions:	Add the following actions to the Action List:

   - Click the ellipsis … button on the next empty row of the Actions list and select **Special** → **Assignment** to bring up the Make Assignment dialog box.
   - Click the ellipsis … button beside the Target field and select **Variables** → **varCustomerID** as the target variable to set.

   - Click the ellipsis … button beside the Source field and select **Inputs** → **CUSTOMER_ID**.
   - Click the ellipsis … button on the next empty row of the Actions list and select **Methods** → **fireevtReloadPrimaryContainer** to invoke the event.
   - The Define Method Call Arguments dialog box will appear, requesting the arguments to be passed to this method. For this field, type in `redbook/cs/ui/shopping/ConfirmationPage`.

   c. Click **OK** to add the action to the list.

   d. Click **OK** to add the builder into your model.

6. Add the Button builder to the model.

a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Button builder** and provide the following values:

Name:	`back`
Location Technique:	`Relative to Named Tag`
Page:	Select **shoppingDetails_InputPage** from the drop-down list.
Tag:	Select **submit_button** from the drop-down list.
Placement:	Select **Before** from the drop-down list.
New Tag name:	`Back`
Label:	`<-- Back`
Action Type:	Submit form and invoke action
Action:	Click the ellipsis … button and select **Methods** → **fireevtReloadPrimaryContainer** (This is discussed in detail in Chapter 10).

c. Click **OK** to add the builder into your model.

7. Add the Button builder to the model.

a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Button builder** and provide the following values:

Name:	`submitOverride`
Location Technique:	`On Named Tag`
Page:	Select **shoppingDetails_InputPage** from the drop-down list.
Tag:	Select **submit_button** from the drop-down list.
New Tag name:	`Next -->`
Label:	`Next -->`
Action Type:	Submit form and invoke action
Action:	Click the ellipsis … button and select **Methods** → **submitShoppingDetails** to invoke the action list that you created.

c. Click **OK** to add the builder into your model.

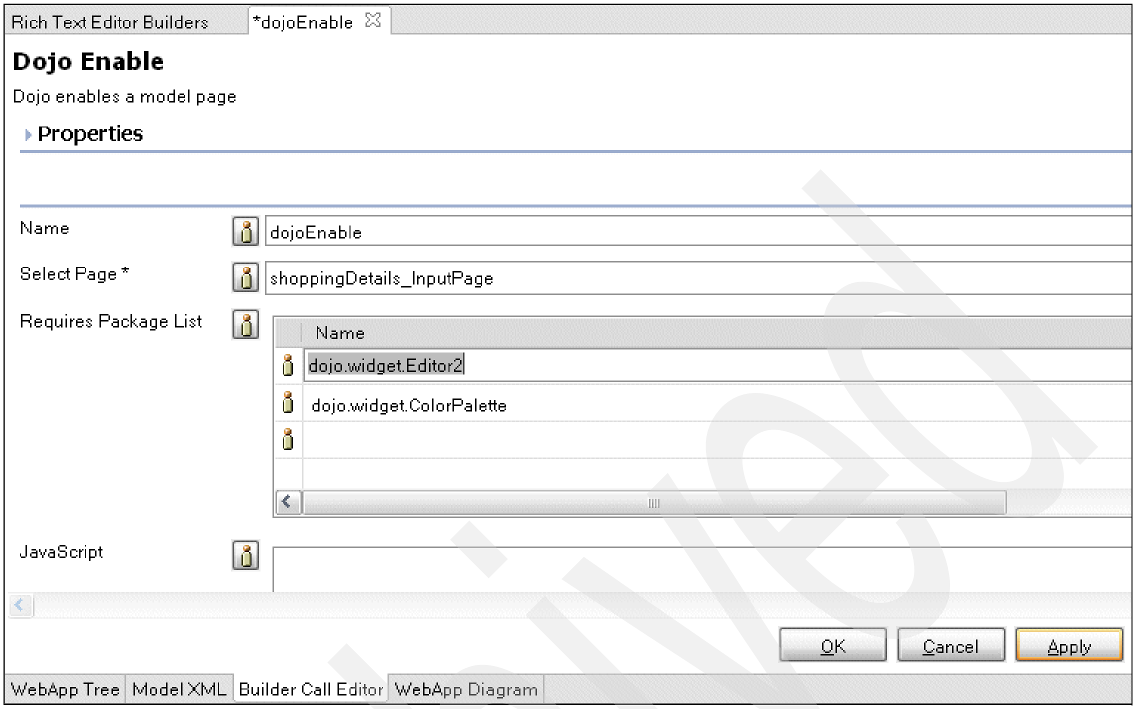
8. Add the Dojo Enable builder to the model.

a. Click the **Builder Palette** icon in the Outline view (lower left).

b. Scroll to and select the **Dojo Enable builder** and provide the following values:

Name:	`dojoEnable`
Select Page:	`shoppingDetails_InputPage`
Requires Package List:	`dojo.widget.Editor2` `dojo.widget.ColorPalette`

c. Click **OK** to add the builder into your model.



Rich Text Editor Builders | *dojoEnable

Dojo Enable

Dojo enables a model page

Properties

Name: dojoEnable

Select Page *: shoppingDetails_InputPage

Requires Package List:

Name
dojo.widget.Editor2
dojo.widget.ColorPalette

JavaScript:

Figure 7-38 Dojo Enable Builder inputs

9. To convert the field into a text area input, add the Text Area builder to the model.

   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Text Area builder** and provide the following values:

Name:	`comments`
Location Technique:	`On Named Tag`
Page:	Select **shoppingDetails_InputPage** from the drop-down list.
Tag:	Select **COMMENTS** from the drop-down list.

   c. Click **OK** to add the builder into your model.

10. To convert the text area into a Dojo Rich Text Editor, the attributes of the text area field have to be set. This is done by add the Attribute Setting builder to the model.

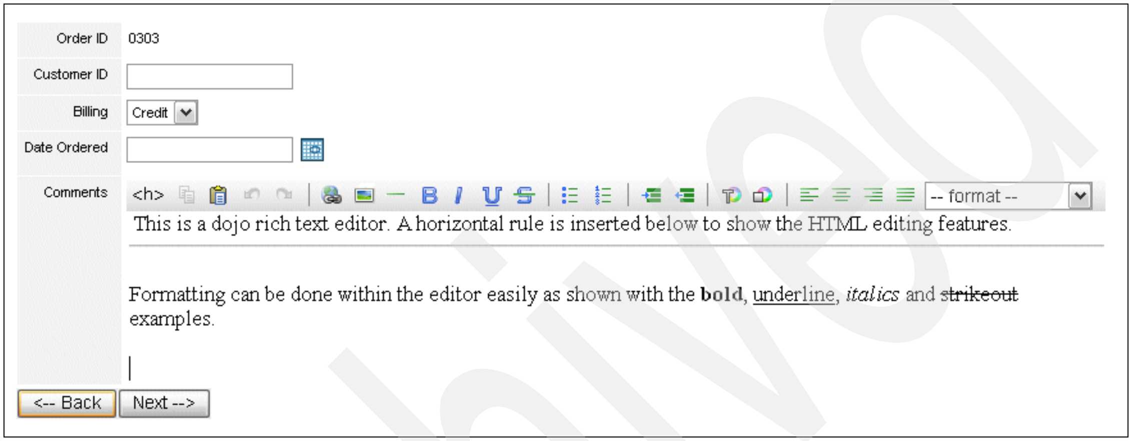
   a. Click the **Builder Palette** icon in the Outline view (lower left).

   b. Scroll to and select the **Attribute Setter builder** and provide the following values:

Name:	`comments`
Location Technique:	`On Named Tag`
Page:	Select **shoppingDetails_InputPage** from the drop-down list.
Tag:	Select **COMMENTS** from the drop-down list.

c. Save the model by clicking the **Save** icon.

11. Run and test the model by clicking the **Run** button. The input text area of the model should now appear as a Rich Text Editor as shown in Figure 7-39.



Order ID 0303

Customer ID

Billing Credit

Date Ordered

Comments

This is a dojo rich text editor. A horizontal rule is inserted below to show the HTML editing features.

Formatting can be done within the editor easily as shown with the **bold**, underline, *italics* and ~~strikeout~~ examples.

Figure 7-39 Applying the Dojo Rich Text Editor to a input text area field

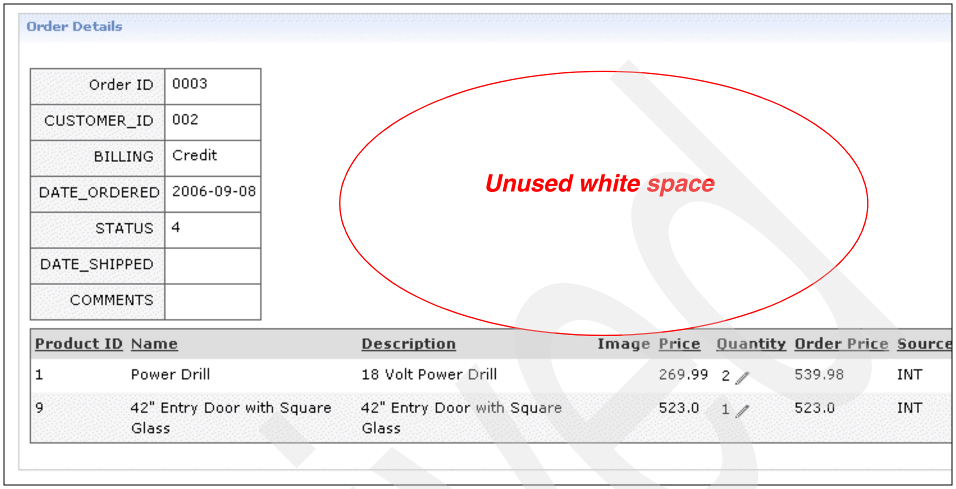
Note that if your model has already defined a field to be an input text area in the RDD file, then there is no need to use the text area builder to convert the text input field to a input text area field. The purpose of doing so in this example is to explicitly demonstrate how an attribute setter can add or modify the attributes of another builder.

7.8 Customizing the UI

So far, we have presented the features that you can implement using the builders in the portlet factory. This should give you a sense of just how quickly you can implement UI features to enrich an application greatly.

However, besides these features, there is still the issue of handling the layout. As you probably have noticed by now, when you want to manipulate the way the fields are displayed, the RDD, Data Column Modifiers, and Data Field Modifiers would probably do the trick, but they do not allow you to specify if you want the data grid to be displayed in a horizontal or vertical fashion.

For example, in our Order Details portlet, you probably noticed that the Order Details placed at the top of the Order Items list has a fair amount of white space to the right of it which makes the UI slightly unbalanced, as shown in Figure 7-40.



Order ID	0003
CUSTOMER_ID	002
BILLING	Credit
DATE_ORDERED	2006-09-08
STATUS	4
DATE_SHIPPED	
COMMENTS	

Product ID	Name	Description	Image	Price	Quantity	Order Price	Source
1	Power Drill	18 Volt Power Drill		269.99	2 ✎	539.98	INT
9	42" Entry Door with Square Glass	42" Entry Door with Square Glass		523.0	1 ✎	523.0	INT

Figure 7-40 Order Details UI

In addition to the obvious unused white space, there is also the issue of layout in terms of the portlet look and feel. In the portlet in Figure 7-40, there is a lack of styling and no instructions to inform the customers that the product details would be displayed by a tooltip if they moved their mouse over it, or that clicking on the pencil icon (✎) would enable them to edit the quantity ordered. Without those elements, all that we have built would be useless to the user.

This section explains the components in the UI of a portlet factory page and the general techniques in user interface development.

7.8.1 UI elements of a Portlet Factory page

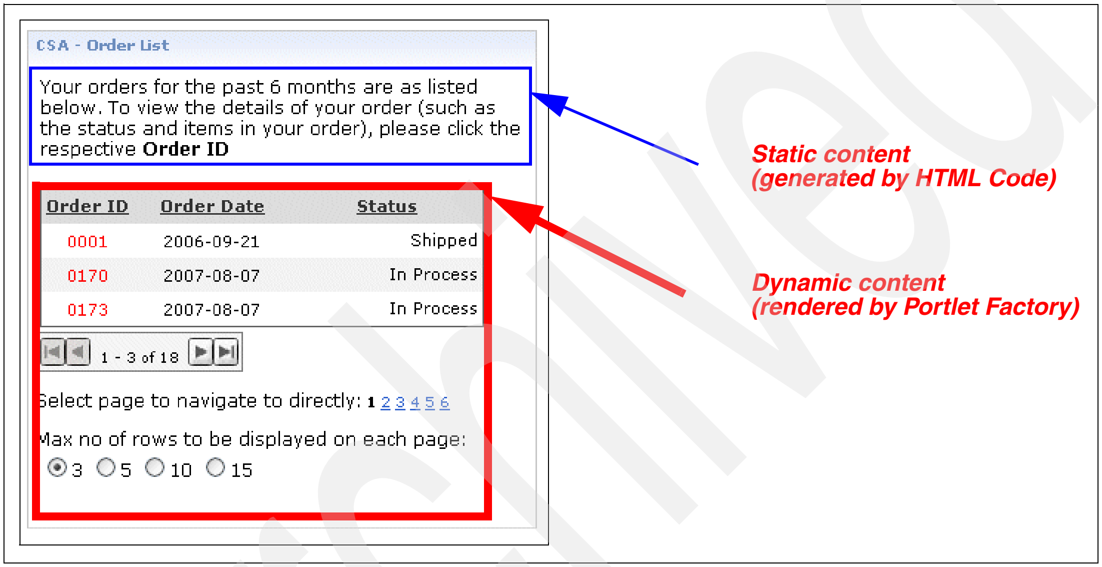
In handling the user interface of a portlet factory page, you must first understand the elements involved in creating a portlet factory page.

So far, the models that generate data have been using mainly the View & Form builder or the combination of Imported Page and Data Page builders to create your page.

In most cases, a page generated by portlet factory is broken down into two components:

- Static content: The content is coded via HTML, as specified in the View Page HTML field of the View & Form builder inputs or the Page to Import field in the Imported Page builder.
- Dynamic content: The content is rendered automatically by Portlet Factory via an HTML template, which by default is the gridtable.html found in the HTML Template field of both the View & Form builder, Input Form and Data Page builders. More details on HTML templates are covered in the next section.

Figure 7-41 shows the static and dynamic content of the Orders List portlet of the application.



CSA - Order List

Your orders for the past 6 months are as listed below. To view the details of your order (such as the status and items in your order), please click the respective **Order ID**

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

Select page to navigate to directly: 1 2 3 4 5 6

Max no of rows to be displayed on each page:
● 3 ○ 5 ○ 10 ○ 15

Static content (generated by HTML Code)

Dynamic content (rendered by Portlet Factory)

Figure 7-41 Static and dynamic content of a portlet factory page

To see the HTML code for this portlet, perform the following steps with the orderDetails portlet that you have built so far.

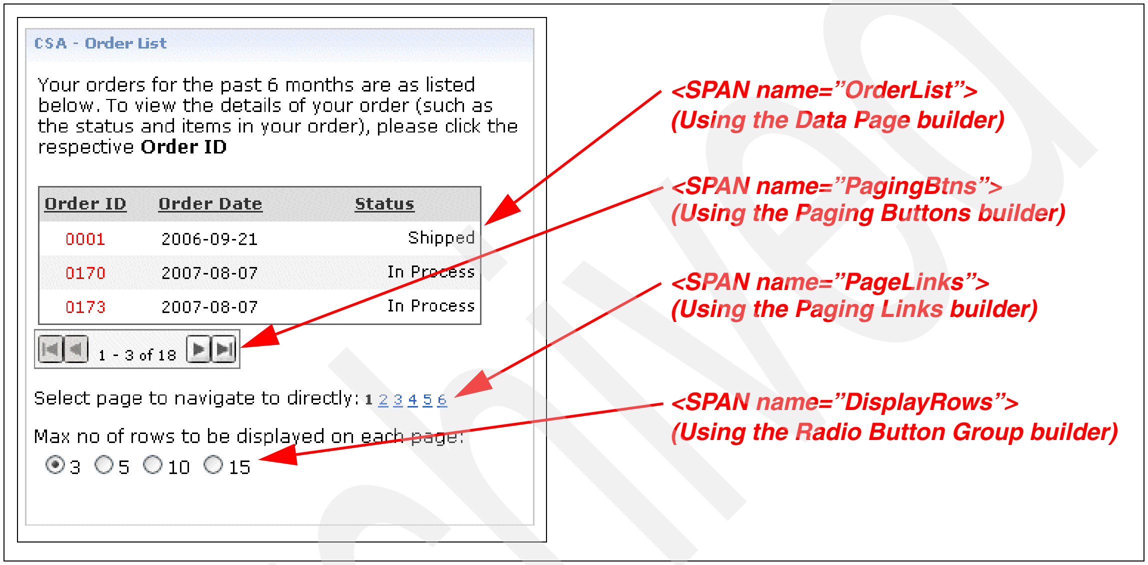
1. Open the **orderList Imported Page builder** and set the following value:

   Page to Import: Click the ellipsis … button and select **redbook** → **cs** → **html** → **OrderListLayout_Revised.html** to use this as the **HTML template** instead.

2. Click the **Edit Page** button to see the HTML source code of the imported page.
3. Save the model by clicking the **Save** 💾 icon.
4. Run and test the model by clicking the **Run** ▶ button.

Besides the HTML templates that render your data dynamically, don’t forget that you have also added UI builders that latch themselves onto the tags specified in the static HTML pages. These tags allow you to “place” your UI elements onto a page. To shift them around the page, all you need to do is to move the corresponding tags.

To provide you with a better understanding of which are the dynamic contents of your model, Figure 7-42 shows the tags in the HTML source code that match the elements and the builders that automate the output in the rendered HTML.



CSA - Order List

Your orders for the past 6 months are as listed below. To view the details of your order (such as the status and items in your order), please click the respective **Order ID**

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 18

Select page to navigate to directly: 1 2 3 4 5 6

Max no of rows to be displayed on each page:

● 3 ○ 5 ○ 10 ○ 15

<SPAN name=”OrderList”>
(Using the Data Page builder)
<SPAN name=”PagingBtns”>
(Using the Paging Buttons builder)
<SPAN name=”PageLinks”>
(Using the Paging Links builder)
<SPAN name=”DisplayRows”>
(Using the Radio Button Group builder)

Figure 7-42 Matching the imported HTML page to the output

With the difference between static and dynamic content established, we can begin to modify the static UI of our application.

Customizing the static content

Most applications and portlets normally would have a set of standard instructions, headers, or footers that you would like to include. In this scenario, we edit the HTML of an imported page to insert the instructions for the order list portlets and include an HTML builder to store an HTML block that will be inserted as a footer to the order list page.

While you can directly edit the HTML code to insert the footer, using HTML builders to store blocks of reusable HTML code allows you to create a model that can be imported into other models. By doing so, you will be able to update your headers or footers from a single location and effect the change to all other pages of your application.

To begin, open the **Redbook** → **models** → **redbook** → **ui** → **order** → **OrderList** model.

1. Edit the existing orderList imported page to include the instructions and the footer.

   a. Click the **orderList imported page builder** in the Outline view (lower left).

   b. Click the **Edit Page**.

   c. Scroll down to the bottom of Page Contents (HTML) and add the following lines to the HTML.

```
<SPAN name=”DisplayRows” class=”instructions”></span>
<br><br>

<!-- insert this line into your code -->
<SPAN name=”footer”></span>

</form>
</body>
</html>
```

   d. Click **OK** to save your changes.

2. Add an HTML builder to the model. (Note, we have not created a separate model for you to import. This is left as an exercise for the reader.)

   a. Click the **Builder Palette icon** in the Outline view (lower left).

   b. Scroll to and select the **HTML builder** and provide the following values:

Name:	footer
Location Technique:	On Named Tag
Page:	orderList
Tag:	footer

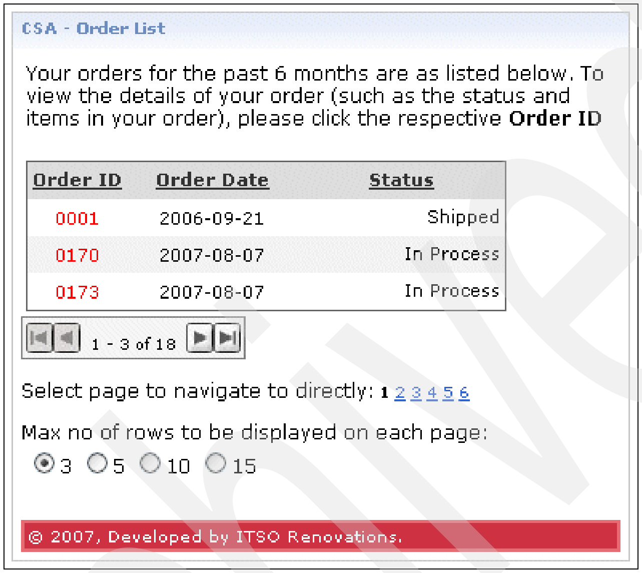
   c. Add the following code in the HTML field.

```
<table width="100%" border="0" cellspacing="0" cellpadding="2">
  <tr bgcolor="#E46E74">
    <td height="1%">
      <table width="100%" border="0" cellspacing="0" cellpadding="2">
   <tr>
     <td width='100%' align="left" class="indexMenu">
       &copy; 2007, Developed by ITSO Renovations. All Rights Reserved
       </td>
    </tr>
      </table>
    </td>
  </tr>
```

```
</table>
```

d. Click **OK** to add your builder into the model.

3. Save the model by clicking the **Save** 💾 icon.
4. Run and test the model by clicking the **Run** ▶ button. Your portlet should now have the footer shown in Figure 7-43.



CSA - Order List

Your orders for the past 6 months are as listed below. To view the details of your order (such as the status and items in your order), please click the respective **Order ID**

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 18

Select page to navigate to directly: 1 2 3 4 5 6

Max no of rows to be displayed on each page:

● 3 ○ 5 ○ 10 ○ 15

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Figure 7-43 Result of applying the HTML builder into Order List portlet

> **Note:** Always rename the HTML file that you are going to use if you intend to make changes in the static HTML file and store it in a separate directory for reference. Editing a default HTML file such as view_and_form_view.html might result in errors because it is the default HTML referenced by all the other builders in your project.

To customize the static content, simply edit the corresponding HTML page that is referenced in the builders you are using to render the content. The default HTML differs with the builder that you use. For the View & Form builder, the HTML to edit would be the view_and_form_view.html form that is found in the <Project Root>/WebContent/factory/pages directory. For the Input Form builder, the HTML used would be view_and_form_inputform.html found in the same directory.

Customizing the dynamic content

While Portlet Factory can fully automate the presentation of your data, there could be instances when you would like to have full control over display of your data. In this case, you would not use HTML templates; instead, you would hard code all of the display named tags in the static html file that you defined earlier.

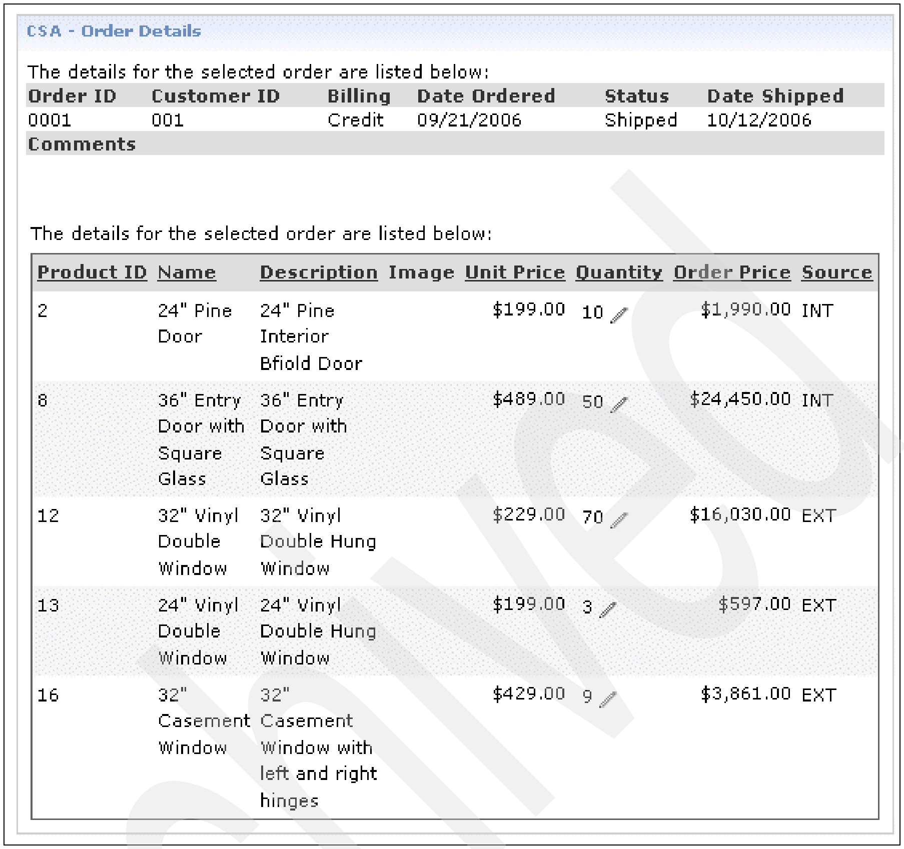
In this example, we modify the Order Details layout to remove the white space on the screen as shown in Figure 7-40 on page 347.

To change the look and feel of the Order Details portlet and see the changes in the HTML code, perform the following steps with the orderDetails portlet that you have built so far.

1. Open the **orderDetails Imported Page builder** and set the following value:

   Page to Import: Click the ellipsis button and select **redbook** → **cs** → **html** → **OrderDetailsLayout_Revised.html** to use this as the HTML template instead.

2. Click the **Edit Page** button to see the HTML source code of the imported page.
3. Save the model by clicking the **Save** icon.
4. Run and test the model by clicking the **Run** button. You will see the order details now laid out in a horizontal format as shown in Figure 7-44.



CSA - Order Details

The details for the selected order are listed below:

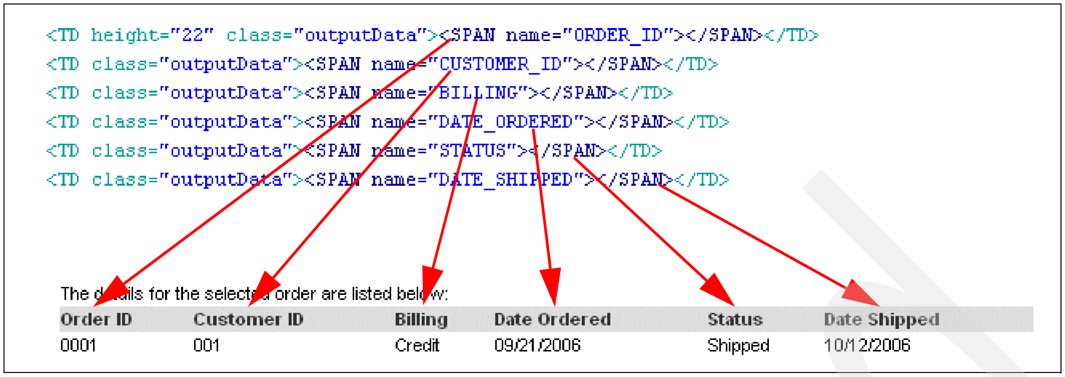
Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipped
0001	001	Credit	09/21/2006	Shipped	10/12/2006
Comments					

The details for the selected order are listed below:

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	Source
2	24" Pine Door	24" Pine Interior Bfiold Door		$199.00	10	$1,990.00	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		$489.00	50	$24,450.00	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		$229.00	70	$16,030.00	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		$199.00	3	$597.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		$429.00	9	$3,861.00	EXT

Figure 7-44 Order Details UI after changing the imported HTML page

On viewing the HTML code, you will notice that the fields corresponding to the order details have been hard coded within the <span name="orderInformation"> tag with the layout of the order details coded exactly as you would have done in a normal JSP page. What has happened here is that the tag names in the table correspond exactly to the field name of the data set and when they are rendered, the data automatically latches itself to its corresponding tag as shown in Figure 7-45 on page 354.



```
<TD height="22" class="outputData"><SPAN name="ORDER_ID"></SPAN></TD>
<TD class="outputData"><SPAN name="CUSTOMER_ID"></SPAN></TD>
<TD class="outputData"><SPAN name="BILLING"></SPAN></TD>
<TD class="outputData"><SPAN name="DATE_ORDERED"></SPAN></TD>
<TD class="outputData"><SPAN name="STATUS"></SPAN></TD>
<TD class="outputData"><SPAN name="DATE_SHIPPED"></SPAN></TD>
```

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipped
0001	001	Credit	09/21/2006	Shipped	10/12/2006

Figure 7-45 How the customized HTML is tied to the display

Note: While this technique provides full control over the layout of the pages, it does cause tight coupling between the data and the code. This means that any changes in the data schema would also require changes to the front-end code. Changes in your RDD would also not be reflected because the table has already been hard coded. This method should be used only when you are unable to customize your layout using the existing builders.

7.9 HTML templates in Portlet Factory

Note: This is an advanced topic for the purpose of understanding page generation. If you would like to carry on with the building of the application, you can skip this section.

The goal of using HTML Templates is to enable the Page Automation code of Portlet Factory to build HTML that looks handcrafted but is instead generated from a description of the data.

With HTML Templates, you handle your data at a fairly high level of presentation abstraction, unlike the traditional way of coding. Traditionally, when creating a simple HTML page, you know the exact values you want to display, and you only need to be concerned with how to lay them out. When you are creating a JSP page, you think of the data more abstractly, by field name or by some other reference technique. You also have to consider how to render sections of repeated elements, such as the rows from a database query. You know the structure of your data, not the actual values, in terms of the fields that you have in the result set, the number of rows, and possibly even the field order if you are doing low level coding.

With just a few templates, you can define the overall look for an entire application with hundreds of pages in it. In addition, by changing the templates (with Profiling), you can change the overall look dramatically, without sacrificing the quality of the appearance at all.

In general, you should not be creating HTML Templates from scratch. The existing set of HTML Templates provided by Portlet Factory should be sufficient to render most datasets. If there is a need to modify the data format or layout, the use of RDD files, Form Layout builder, Style Sheets, and other builders should be sufficient. Using the methods highlighted in “UI elements of a Portlet Factory page” on page 347 should also be considered.

However, if there is still a requirement to customize the HTML template, it would be more effective to modify an existing HTML template (for example, gridtable.html) rather than creating one from scratch. To modify one that almost suits your requirements, we recommend the following steps:

1. Run your model.
2. Compare the generated HTML with the HTML template that is used to generate it.
3. Remove the sections of code that are not required.
4. Run the model and ensure that the changes do not affect the application.
5. Modify the HTML template to meet your requirements.
6. Run the model again.

Note that these steps should be performed incrementally. Carefully sculpting out pieces and modifying them would enable you to control the changes and understand the HTML templates better.

For more information on HTML templates, refer to the article “Introducing WebSphere Portlet Factory HTML Templates” found at `http://www.ibm.com/developerworks/websphere/library/techarticles/0607_odonnell/0607_odonnell.html`.

7.10 Other UI builders

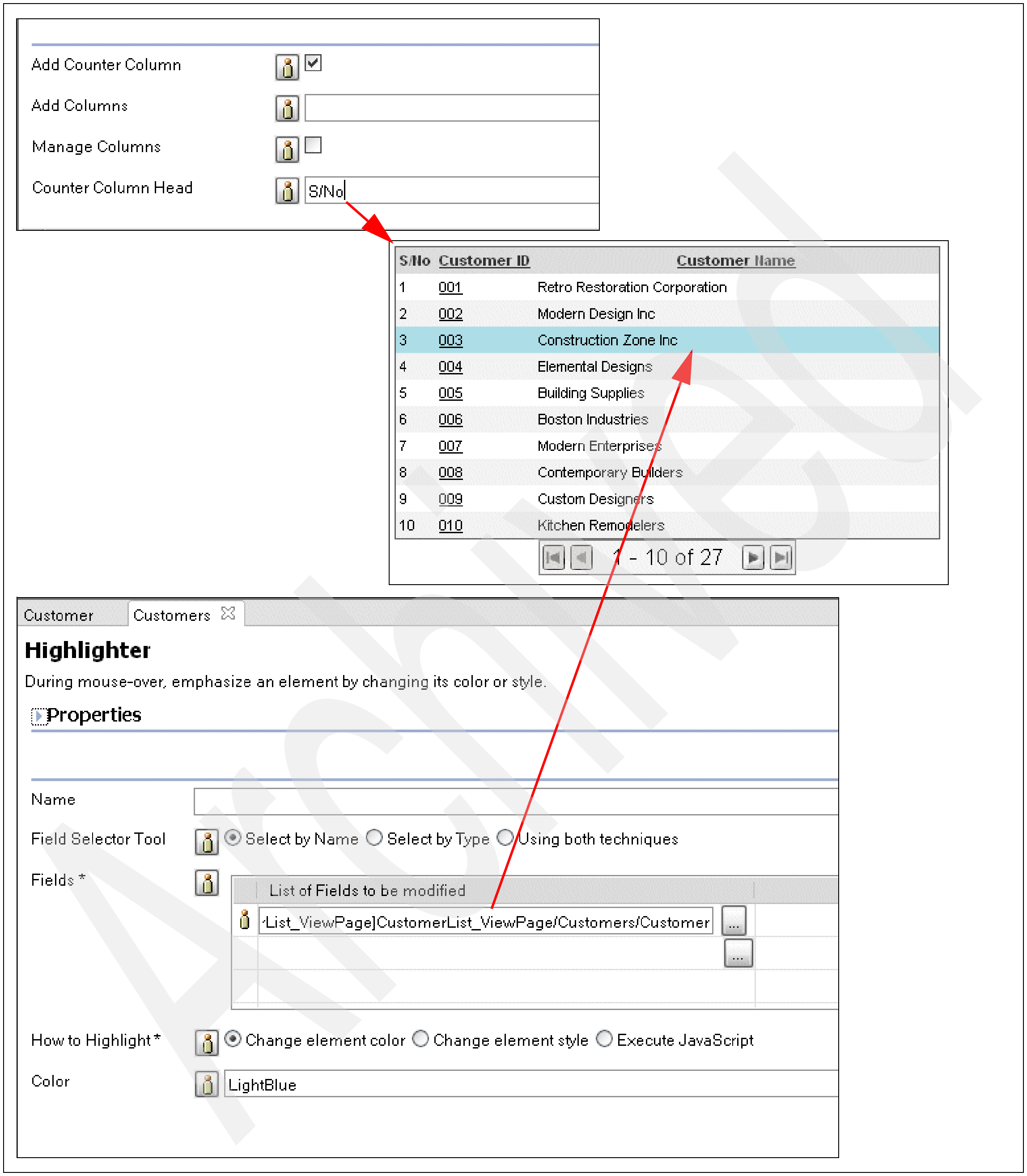
Besides the concepts covered so far, there are many additional builders that can manipulate the UI that cannot be exhaustively covered in this book. This section describes some of the more commonly used builders in the Portlet Factory and mentions some other builders for the user to explore.

Data Column Modifier

In the case of customizing the UI at the model or individual page level, besides using the RDD, the Data Column Modifier is a highly useful builder that allows you to manipulate the selected schema of the page.

In addition to column sorting, hiding, alignment and width setting, one of the key features often used by developers is the addition of a counter column for the rows in a table.

Clicking the Add Counter Column checkbox will add a counter column to the table, uncheck the Manage Columns checkbox since the RDD will do that, and define the counter label in the Counter Column Head field as shown in Figure 7-46.



Add Counter Column	☑
Add Columns	
Manage Columns	☐
Counter Column Head	S/No

S/No	Customer ID	Customer Name
1	001	Retro Restoration Corporation
2	002	Modern Design Inc
3	003	Construction Zone Inc
4	004	Elemental Designs
5	005	Building Supplies
6	006	Boston Industries
7	007	Modern Enterprises
8	008	Contemporary Builders
9	009	Custom Designers
10	010	Kitchen Remodelers

1 - 10 of 27

Customer | Customers

Highlighter

During mouse-over, emphasize an element by changing its color or style.

Properties

Name

Field Selector Tool ● Select by Name ○ Select by Type ○ Using both techniques

Fields *

List of Fields to be modified

·List_ViewPage]CustomerList_ViewPage/Customers/Customer

How to Highlight * ● Change element color ○ Change element style ○ Execute JavaScript

Color LightBlue

Figure 7-46 Adding a Counter Column and Highlighter in the Customer Information portlet

Highlighter

Highlighting a selected row when the user performs a mouse over is a good way to indicate the current selection. To include this in your model, add a Highlighter builder and in the Fields field, select the row element that you wish to highlight (in the case of the customer self-service application, the row element is *customer* since each row represents a customer. The result is as shown in Figure 7-46.

Some other builders that are not covered in this book but that might be of interest to the reader are identified in Table 7-6.

Table 7-6 Some additional UI builders

Builder	Description
Form Layout	Allows a section of data to be formatted to multiple columns.
Visibility Setter	Hides/Displays data within the selected tag. Useful for displaying messages when there is no data set or hiding sections of data in response to user actions.
Print Page Contents	Allows you to set a block of content to printer-friendly format. Often used together with Excel Export builder (requires the Excel Extension feature to be included).
Attribute Setter	Allows you to set the attribute of any HTML element in a page. Particularly useful to manage styles and colors of HTML elements in response to events without using scripts.

7.11 Conclusion

This chapter has shown many examples to both control and augment your UI. RDD files are very effective for centralizing control and managing the UI in a consistent fashion. They are also highly extensible and thus allow a structured way of building up the UI control.

Other UI builders, such as the Paging Assistant, Data Column Modifier, and Highlighter builders, have also been highlighted as the common builders that you would typically use to handle the UI elements in controlling your data. These builders allow you to quickly and easily control data without the need for back end or javascript coding as it is traditionally done.

Ajax and Dojo builders have also been covered; these tools enable you to build Rich Internet Applications (RIA) in keeping up with latest developments of web programming.

Last but not least, we demonstrated the way to perform low-level control of your UI through the editing of the HTML files.

The examples presented here should enable you to create a user-friendly and highly functional user interface for your application.

8

Enabling portlet communication

In this chapter we describe the types of inter-portlet communication supported by Portlet Factory and demonstrate how to create the communication links for our CustomerInfo Model, Order List Model, Order Details Model, and CustomerCredentials Model.

There are a few ways to implement inter-portlet communication in Portlet Factory, each with certain advantages over the others. With our Customer Self Service Application (CSA), we have chosen to use a combination of *Portlet Factory events* and *shared variables* as the mechanism for communication, mainly due to the ease of implementation.

To complete the steps in this chapter, you need to have installed copies of WebSphere Portal and WebSphere Portlet Factory 6.0.1. You also need to have set up the data service providers described in previous chapters, and to have built and deployed the CustomerInfo, Order List, Order Details, and CustomerCredentials models described in Chapter 6, “Creating portlets: Making it work” on page 221. The UI components described in Chapter 7, “Creating portlets: Designing the UI” on page 275 are preferred but not essential.

> **Note:** The sample code (Chapter8.zip) that shipped with this chapter cannot be run in standalone mode. The project must be deployed in WebSphere Portal for it to work.

8.1 Overview

In the previous chapters, we built the data services for the CSA and most of the functionality of its portlets in standalone mode. In this chapter, we discuss how to build the communication links among the CustomerInfo, OrderList, OrderDetails and CustomerCredentials models for the CSA.

We will be using a combination of Portlet Factory events and shared variables to build the communication links for our application. We have chosen this type of inter-portlet communication mainly due to the ease of implementation, but in general, the major advantage of the Portlet Factory events over the other mechanisms is its ability to support standalone J2EE application, meaning WebSphere Portal is not required for building the communication links.

Briefly, the Portlet Factory events and shared variables work together by causing an event to be broadcast to all models whenever a shared variable is changed. Any model that is listening to that event will retrieve the updated value of the shared variable to carry out its tasks.

By the end of this chapter, we will have the four models communicating with each other and they will no longer work as standalone portlet applications.

Table 8-1 summarizes the features of CSA covered in this chapter and the techniques or builders used to implement these features.

Table 8-1 Summary of features implemented and builders/techniques used

Feature	Description	Builders or techniques used
Portlet communication	Enables the CustomerInfo model to communicate with the OrderList model via a shared variable. For the CSR scenario, a Portlet Factory event is required; for the Customer scenario, the shared variable is sufficient.	**UIEvent Model** Variable Shared Variable Event Declaration **CustomerInfo Model** Imported Model Action List **OrderList Model** Imported Model Event Handler Action List

Feature	Description	Builders or techniques used
Portlet communication	Enables the OrderList model to communicate with the OrderDetails model via a shared variable and a Portlet Factory event.	**UIEvent Model** Variable Shared Variable Event Declaration **OrderList Model** Imported Model Link Action List **OrderDetails Model** Imported Model Event Handler Action List
Portlet communication	Enables the CustomerCredentials model to communicate with the CustomerInfo model using a Portlet Factory event.	**UIEvent Model** Event Declaration **CustomerCredentials Model** Imported Model **CustomerInfo Model** Imported Model Event Handler

Value to end users

Inter-portlet communication allows end users to have a more dynamic application because user behavior in one portlet may invoke another portlet to perform automatically. This saves end users time by proactively displaying related data or carrying out tasks that end users may wish to proceed to next. This communication capability also provides more flexibility in terms of presenting the application to the end users. It is now possible to divide the application into different components (portlets) that can reside on different portal pages.

8.2 Types of inter-portlet communication

There are three general types of inter-portlet communication supported by Portlet Factory builders:

- **Portlet Factory events**

  These events are a simple way to implement inter-model communication, both in Portal and when running standalone. These events work in both IBM Portlet API mode and Standard portlet API mode. When an event is fired, it is broadcast to all models in the same user session, and any models that are listening for the event will have their event handler called. Events can have any number of arguments, of simple or complex types. These events are fired explicitly and don't have any user interface of their own. The builders used for Portlet Factory events are Event Declaration and Event Handler.

- **Cooperative Portlet events: Click-to-Action and Property Broker**

  These are mechanisms defined by WebSphere Portal for inter-portlet communication, and are only available when running in Portal. Click-to-Action is a Portal mechanism that uses drop-down menus to control portlet interaction; it is available only when running a project in IBM Portlet mode. In Standard portlet mode, Cooperative Portlets must be configured using the "Wires" tool. The builders used for Cooperative Portlet events are Cooperative Portlet Source, Cooperative Portlet Target, and Event Handler.

  Using this type of inter-portlet communication enables portlets developed using different tools to be used together in composite applications. It encourages reuse of components, and allows developers to build customizable portlet applications that can be plugged into other portlet applications via the WebSphere Property Broker.

  IBM WebSphere Portal Express Version 6 - Customizing Portal Express for Small to Medium Business, REDP-4316 provides a detail example showing how two portlets developed using different tools can communicate with each other using this technique. See the following Web site for details:
  `http://www.redbooks.ibm.com/redpieces/abstracts/redp4316.html?Open`

  > **Note:** Portlet Factory Events provide a convenient way of linking portlets because they do not require external wiring in Portal like the Cooperative Portlet Events do. However, some major advantages of using Cooperative Portlet Events are:
  >
  > - The ability to send events across deployment WARs
  > - Communication between non-Portlet Factory portlets
  > - Support of wiring across portal pages
  > - The ability to react to events that are triggered before instantiation
  >
  > Portlet Factory Events have a dependency on the rendering order of the portlets.

- **Shared variables**

  This is a Portlet Factory feature that lets you share a variable across all the models in a user session. This feature works both in Portal (either portlet mode) and when running standalone. The models do not have to be on the same portal page. The builder used for this is Shared Variable. This feature is often coupled with one of the event mechanisms described previously, so that when a portlet modifies a shared variable it can notify other portlets that a value has changed. In the CSA, shared variables are used together with the Portlet Factory events mechanism to enable inter-portlet communication.

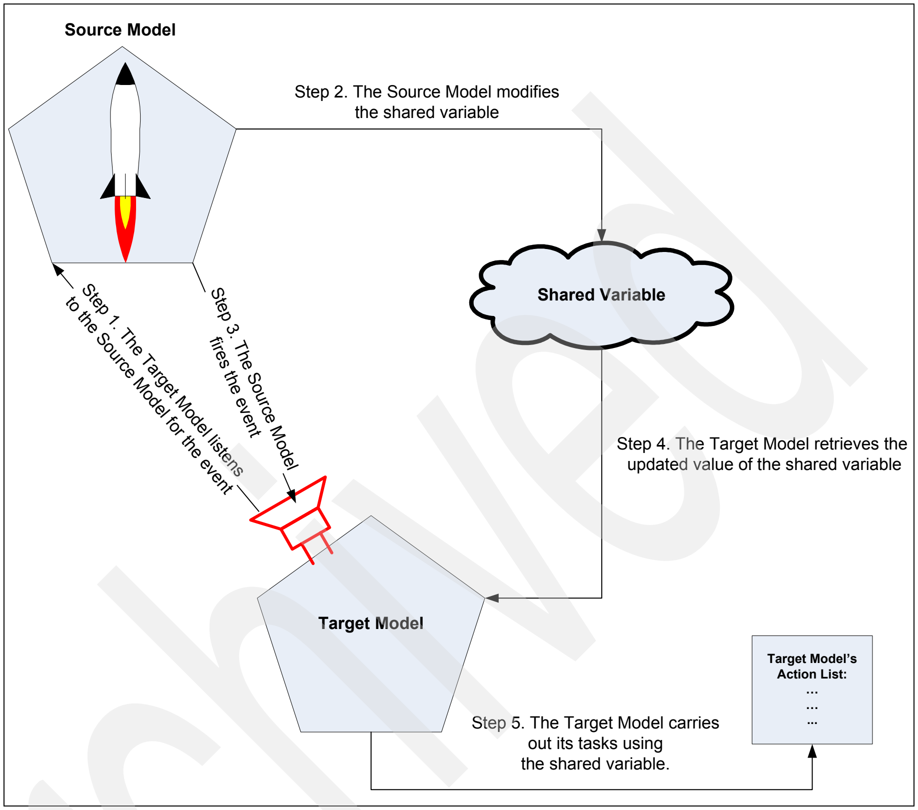

Source Model
Step 2. The Source Model modifies the shared variable
Shared Variable
Step 1. The Target Model listens to the Source Model for the event
Step 3. The Source Model fires the event
Step 4. The Target Model retrieves the updated value of the shared variable
Target Model
Step 5. The Target Model carries out its tasks using the shared variable.
Target Model's Action List:
...
...
...

Figure 8-1 How shared variables work when coupled with an event mechanism

8.2.1 Types of inter-portlet events

There are four types of inter-portlet events available in Portlet Factory: Click-to-Action (C2A), Property Broker Link, Property Broker Action, and Portlet Factory events. The key differences between these event types are summarized in Table 8-2. There are also differences in behavior depending on whether portlets are using IBM Portlet mode or Standard mode (JSR 168).

Table 8-2 Summary of key features of the event mechanisms

	Click-to-Action	**Property Broker Link**	**Property Broker Action**	**Portlet Factory Events**
Platform support	Portal only, IBM Portlet mode only*	Portal only (either mode)	Portal only (either mode)	Portal (either mode) and standalone J2EE supported
User interface	C2A drop-down menu	Link in standard portlet mode; C2A drop-down menu in IBM Portlet mode	No UI (event must be explicitly fired by application)	No UI (event must be explicitly fired by application)
Arguments supported	Simple argument value	Simple argument value or single complex argument value	Simple argument value or single complex argument value	Multiple complex argument types
Event configuration	No wiring required - matches event names and types	Requires explicit Portlet wiring in standard portlet mode	Requires explicit Portlet wiring in standard portlet mode	No wiring required - matches event names and types

* Click-to-Action menus are displayed only in IBM Portlet mode, but the same models can be configured with Portlet Wiring in Standard portlet mode and will display a simple link UI instead of a drop-down menu.

> **Note:** For detailed sample code for different types of inter-portlet communication, see `http://www-128.ibm.com/developerworks/websphere/zones/portal/portletfactory/samples/misc.html`

8.3 Inter-portlet communication for CSA

In this section we provide step-by-step instructions for building the following three portlet communication links for our CSA:

1. CustomerInfo Model to OrderList Model (across Portal pages)

   When a CSR logs into the application, he is presented with a list of customers in the CustomerInfo portlet. When the CSR clicks on any ID link of a customer, the customer details are displayed in the current portlet and the OrderList portlet on the Order portal page retrieves the orders that the customer has previously placed and displays them when the CSR browses to that page. The variable that is used to invoke the action of the OrderList model is the ID value of the customer.

The customer scenario works in a manner similar to that of the CSR, except when a customer logs into the application the CustomerInfo portlet displays the details about that customer by default. (This is based on the assumption that the customer has already set up his credential details.)

2. OrderList Model to OrderDetails Model

   When a customer or CSR clicks the Order ID link in the OrderList portlet, the details about that order are displayed in the OrderDetails portlet on the same page. The variable that is used to invoke the action of the OrderDetails model is the ID value of the order selected.

3. CustomerCredentials Model to CustomerInfo Model

   In Chapter 6, “Creating portlets: Making it work” on page 221, we created a CustomerCredentials model to set up customers’ credential details when the customers log in for the first time. The CustomerInfo portlet should refresh itself automatically, showing the details for the customer when he returns from the credential details personalize page (provided that the data he enters is valid).

8.3.1 CustomerInfo Model to OrderList Model

At a high level, the steps to enable communications between the CustomerInfo and Orderlist models are:

1. Create an event declaration and shared variable. The event is fired from the CustomerInfo model when a new customer has been selected. The shared variable holds the customer ID, which is communicated between the models.
2. The CustomerInfo model sets the customerID variable and fires the event when the customer is selected.
3. The OrderList model catches the event and updates the customer orders based on the customerID value.

The details about these steps are provided in the following sections.

Note: As mentioned before, there are two possible use cases for the CustomerInfo Model to OrderList Model inter-portlet communication: the CSR use scenario and the customer use scenario. In this chapter, we only cover the CSR scenario. Details about the customer scenario are included in Chapter 9, “Customizing the application using profiling” after we customize the application for the customer use cases using profiling.

Nevertheless, it is worth mentioning here that there is a difference between the two scenarios in terms of creating the communication link between the CustomerInfo model and the OrderList model; we explain the difference in 9.6.1, “Different entry paths for customers and CSRs” on page 438

Creating and importing the UIEvent model

This model is used as the common model that declares the Portlet Factory Events as well as the shared variables. This will be imported into both the CustomerInfo Model and OrderList Model.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **common** and right-click the common folder. Click **New** → **WebSphere Portlet Factory Model**.

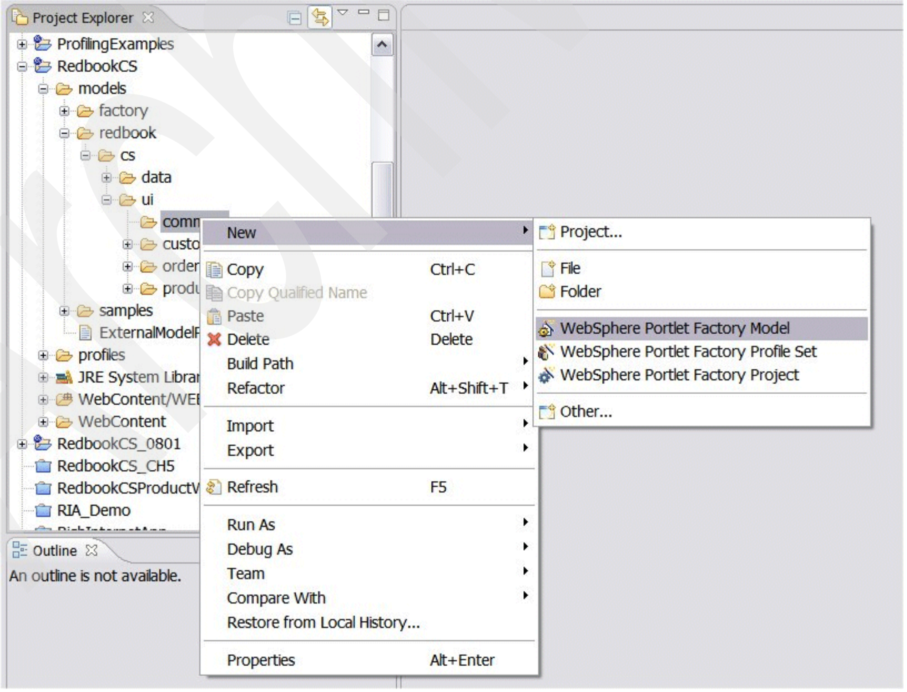
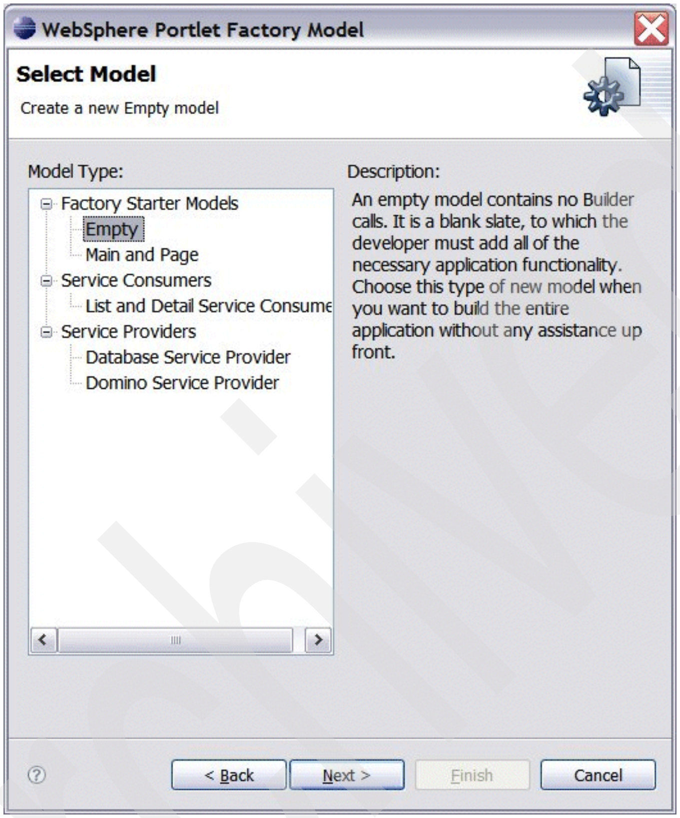


Figure 8-2 Creating a new WebSphere Portlet Factory Model

2. In the Choose Project window, choose **RedbookCS** and click **Next**.
3. In the Select Model window, choose **Empty** under Factory Starter Models and click **Next**.



WebSphere Portlet Factory Model

Select Model

Create a new Empty model

Model Type:

- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consume
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 8-3 Selecting an Empty model to begin with for the UIEvent Model

4. In the Save New Model window, make sure the two inputs are as follows:

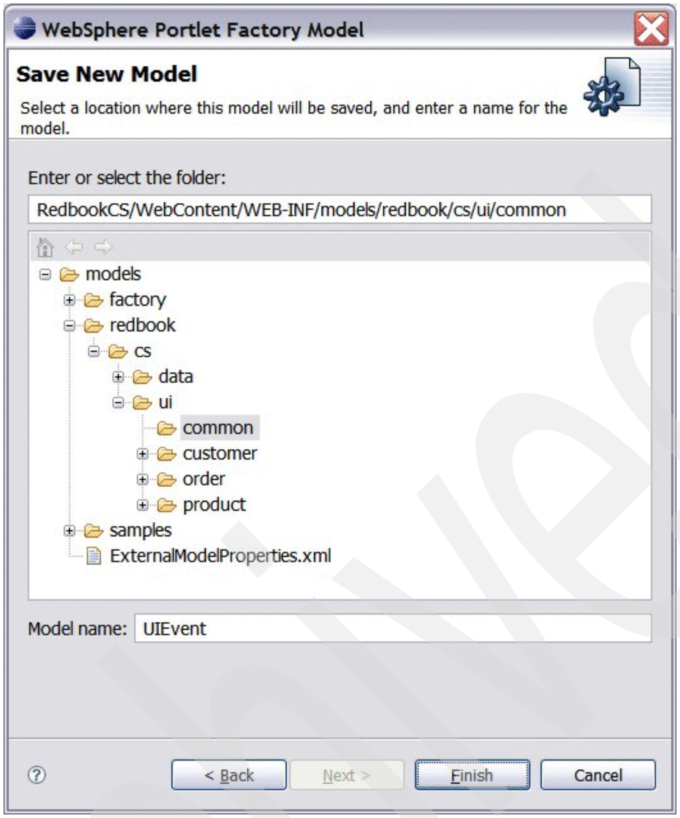
   Enter or select the folder:

   ```
   RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/common
   ```

   Model name:

   ```
   UIEvent
   ```

5. Click **Finish**.



WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder: RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/common

```
models
  factory
  redbook
    cs
      data
      ui
        common
        customer
        order
        product
  samples
  ExternalModelProperties.xml
```

Model name: UIEvent

Figure 8-4 Save the new UIEvent model

Declaring the event and shared variable in the UIEvent model

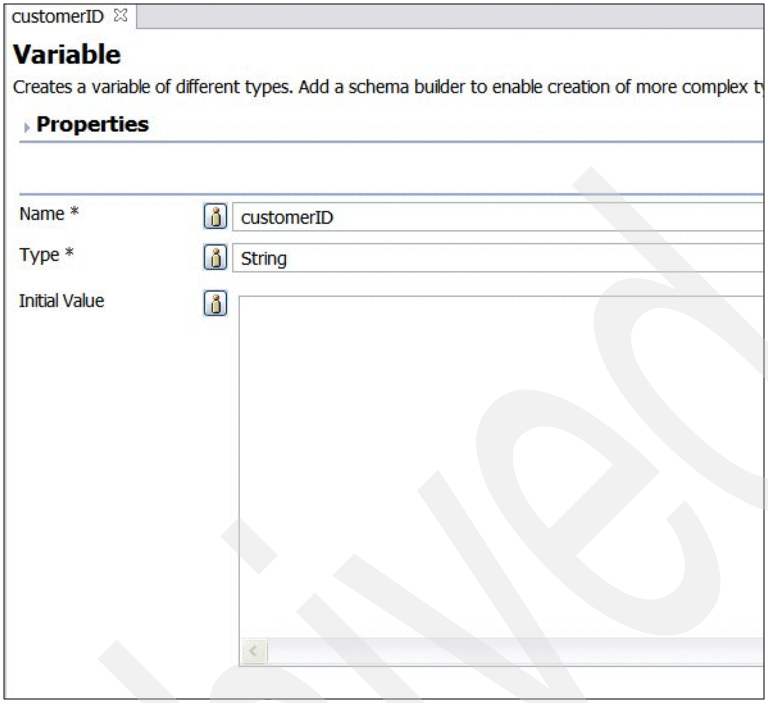
First, we create the customerID shared variable. The shared variable customerID declared in the UIEvent model is used to store the ID of the customer that is currently logged in or the ID of the customer that a CSR has selected.

Perform the following steps to create a normal variable and then turn it into a shared variable:

1. In the UIEvent model, click the ✚ button to add a Variable builder.
2. Make the following entries and selections; leave other values as default:

Name:	`customerID`
Type:	`String`

   Click **Apply**.



customerID

Variable

Creates a variable of different types. Add a schema builder to enable creation of more complex t

Properties

Name * customerID

Type * String

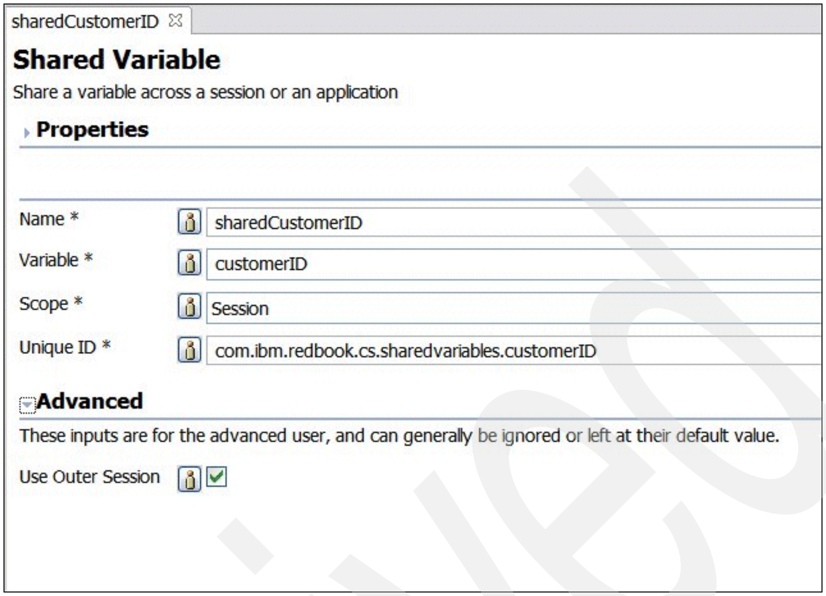
Initial Value

Figure 8-5 Create the customerID variable

3. Click the button to add a Shared Variable builder.
4. Make the following entries and selections; leave the other values as default.

Name:	`sharedCustomerID`
Variable:	`customerID`
Scope:	`Session`
Unique ID:	`com.ibm.redbook.cs.sharedvariables.customerID`

Click **Apply**.



sharedCustomerID

Shared Variable

Share a variable across a session or an application

Properties

Name * sharedCustomerID

Variable * customerID

Scope * Session

Unique ID * com.ibm.redbook.cs.sharedvariables.customerID

Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default value.

Use Outer Session ☑

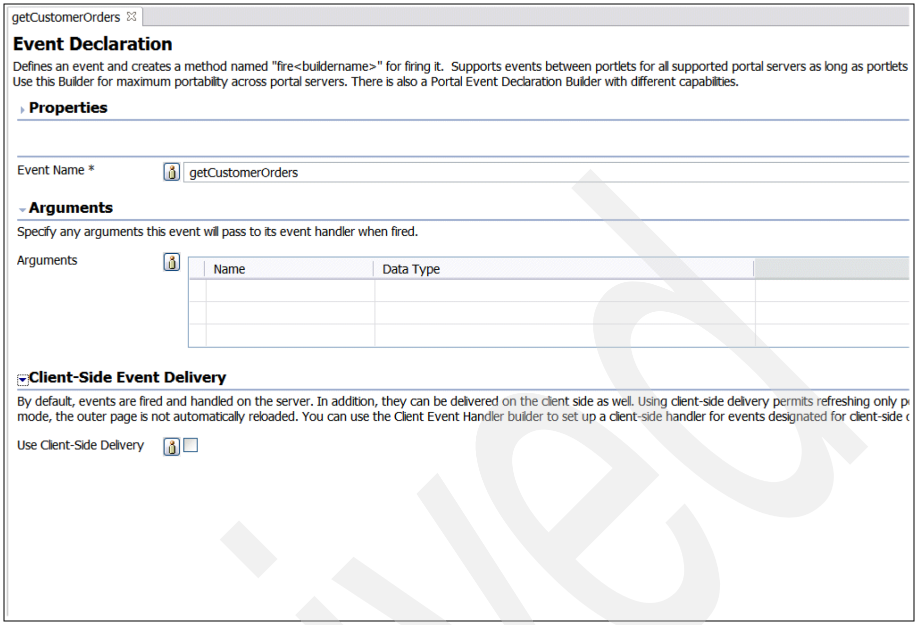
Figure 8-6 Turn the customerID variable into a shared variable

5. Save the UIEvent model by clicking the **Save** icon (💾).

Next, we create the getCustomerOrders event. The **getCustomerOrders** event declared in the UIEvent model is to be fired by the CustomerInfo model to let the OrderList model know that the customerID shared variable has just been changed. The OrderList model will then proceed to carry out its tasks based on the new customerID value.

1. In the UIEvent model, click the ✚ button to add an Event Declaration builder.
2. Name the Event Declaration builder `getCustomerOrders` and leave all the other options as default. Click **Apply**.

> **Note:** You do not need to specify any arguments to pass with this event because you will be passing the information via the sharedCustomerID shared variable.



Event Declaration

Defines an event and creates a method named "fire<buildername>" for firing it. Supports events between portlets for all supported portal servers as long as portlets
Use this Builder for maximum portabilty across portal servers. There is also a Portal Event Declaration Builder with different capabilities.

Properties

Event Name * getCustomerOrders

Arguments

Specify any arguments this event will pass to its event handler when fired.

Arguments

Name	Data Type

Client-Side Event Delivery

By default, events are fired and handled on the server. In addition, they can be delivered on the client side as well. Using client-side delivery permits refreshing only p
mode, the outer page is not automatically reloaded. You can use the Client Event Handler builder to set up a client-side handler for events designated for client-side c

Use Client-Side Delivery □

Figure 8-7 Create the getCustomerOrders Event in the UIEvent Model

3. Save the UIEvent model by clicking **Save** ( ).

Firing the event from the CustomerInfo model

In the CustomerInfo model, we need to set the value of the customerID shared variable whenever a CSR views the details of a customer by clicking the customer's ID link. Then an event will be fired to notify the OrderList model of the change in the customerID value.

1. In Project Explorer, select **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **customer** → **CustomerInfo.model**. Double click **CustomerInfo.model** to open it.

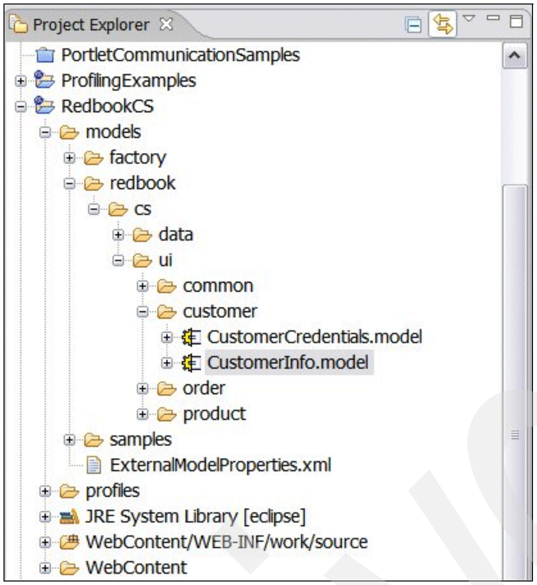
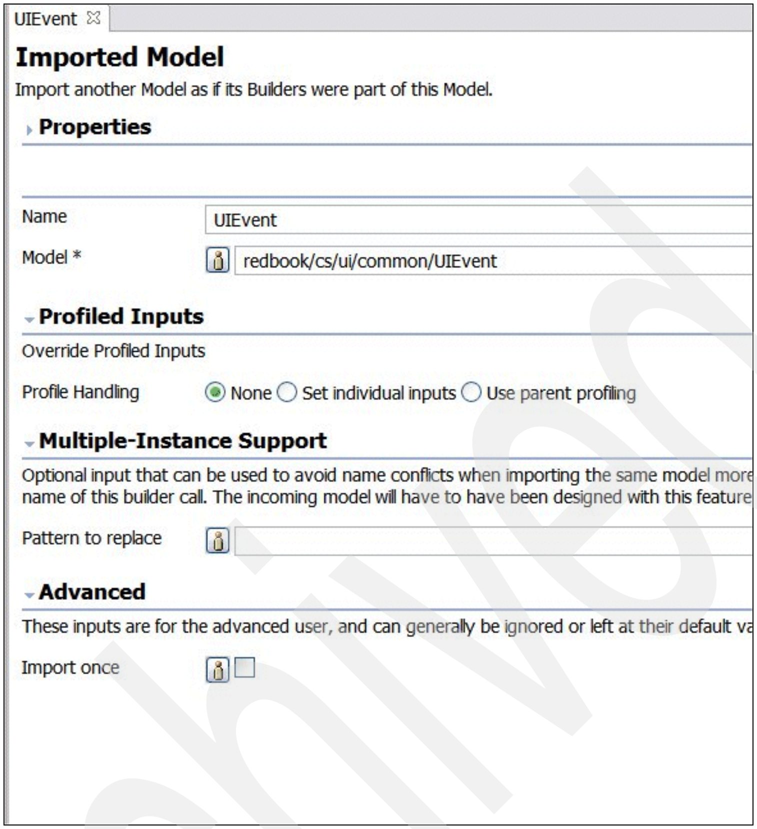


Figure 8-8 Open up the CustomerInfo Model

2. Import the UIEvent model, which contains the definition for the event and the shared variable. In the CustomerInfo model, click the button to add an Imported Model builder.

3. Name the Imported Model builder `UIEvent` and make sure that path to the model reads `redbook/cs/ui/common/UIEvent`. Leave the rest as default and click **Apply**.

   At this point, the CustomerInfo model should be able to see the event and shared variable declared in the UIEvent model.



UIEvent ☒

Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name	UIEvent
Model *	redbook/cs/ui/common/UIEvent

Profiled Inputs

Override Profiled Inputs

Profile Handling ● None ○ Set individual inputs ○ Use parent profiling

Multiple-Instance Support

Optional input that can be used to avoid name conflicts when importing the same model more
name of this builder call. The incoming model will have to have been designed with this feature

Pattern to replace

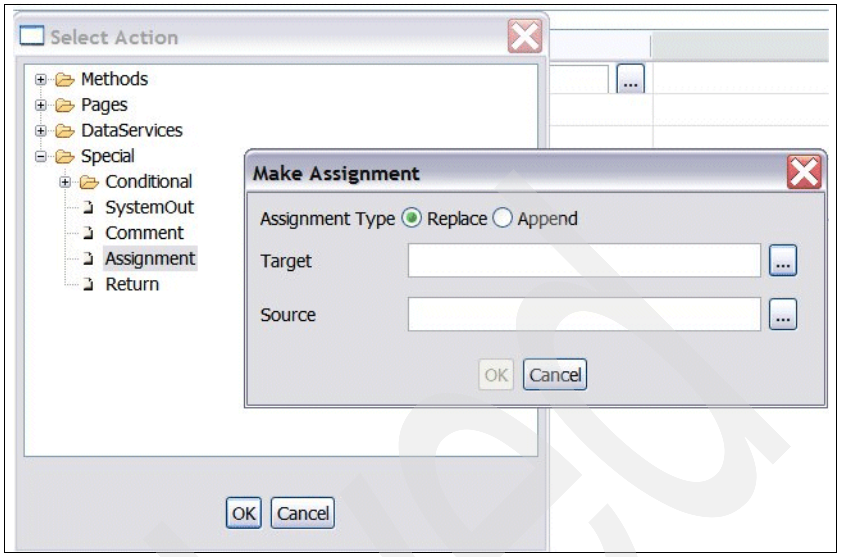
Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default va

Import once □

Figure 8-9 Import the UIEvent Model into the CustomerInfo Model

4. Create an Action List in the CustomerInfo model and name it `getCustomerDetails`. In the CustomerInfo model, click the button to add an Action List builder.
5. The getCustomerDetails action list should carry out three tasks when a CSR clicks a customer's ID link.
   a. Set the value of the customerID shared variable to the Customer ID value selected.
      i. Click the ... button on the first empty row of the Action List Table.
      ii. In the Select Action window, expand **Special** and click **Assignment**. The Make Assignment dialog pops up (Figure 8-10).



Assignment Type ● Replace ○ Append

Target

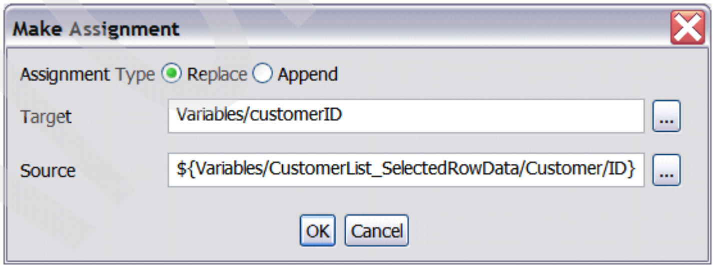
Source

Figure 8-10 Make Assignment in an Action List

iii. Click the ellipsis button ... next to the Source input field. In the Choose Reference window choose the ID value **Variables** → **CustomerList_SelectedRowData** → **Customer** → **ID**. Click **OK**.

iv. Click the ... button next to the Target input field. In the Variables window choose the value **Variables** → **customerID**. Click **OK**.

v. Leave the Assignment Type in the Make Assignment window as **Replace**. Click **OK**.



Assignment Type ● Replace ○ Append

Target Variables/customerID

Source ${Variables/CustomerList_SelectedRowData/Customer/ID}

Figure 8-11 Setting the customerID shared variable

b. Fire the getCustomerOrders event.

i. Click the ... button on the next empty row of the Action List table.

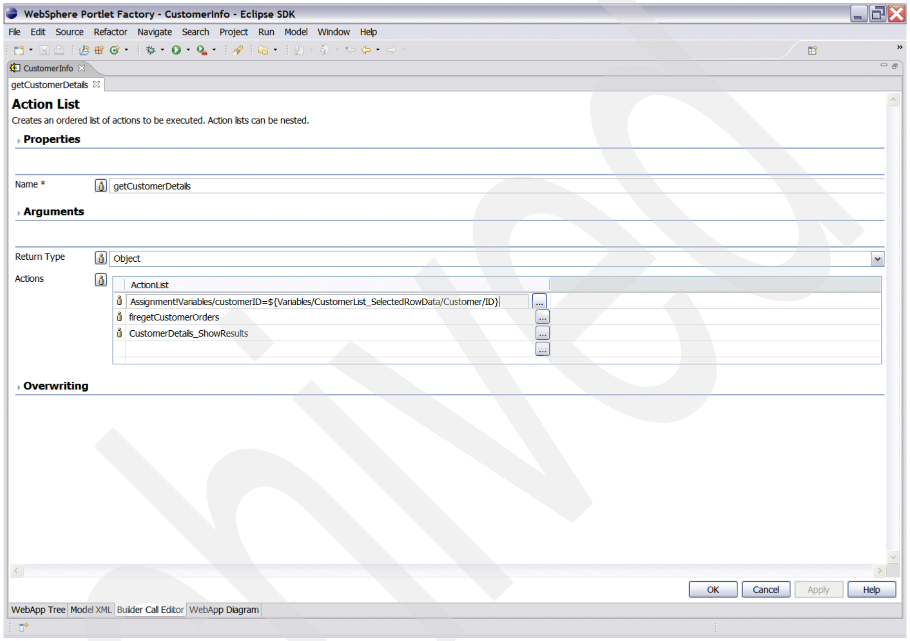
ii. In the Select Action window, expand **Methods** and click **firegetCustomerOrders**. Click **OK**.

c. Display the details of the customer selected.

   i. Click the ... button on the next empty row of the Action List table.

   ii. In the Select Action window, expand **Methods** and click **CustomerDetails_ShowResults**. Click **OK**.

6. Click **Apply** on the getCustomerDetails Action List builder.


WebSphere Portlet Factory - CustomerInfo - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
CustomerInfo
getCustomerDetails
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * getCustomerDetails

Arguments

Return Type Object

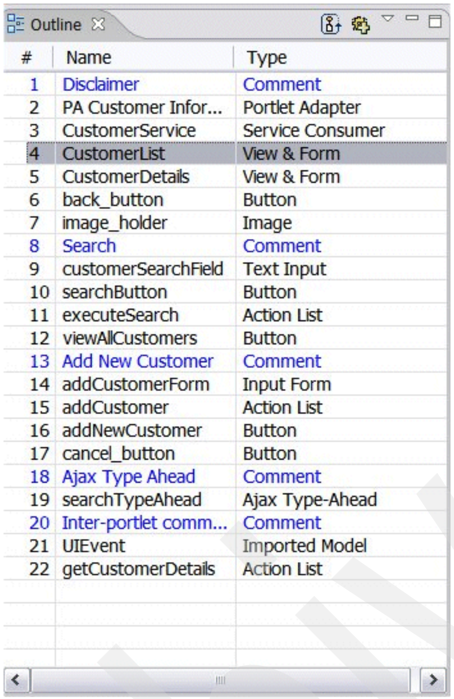
Actions

ActionList
Assignment!Variables/customerID=${Variables/CustomerList_SelectedRowData/Customer/ID}
firegetCustomerOrders
CustomerDetails_ShowResults

Overwriting

Figure 8-12 Click Apply to save the getCustomersDetails action list

7. Call this getCustomerDetails Action List when a CSR clicks on a customer's ID link to view the details. In the Outline pane, double-click the View & Form builder named **CustomerList**. The CustomerList builder is opened in the Edit pane.

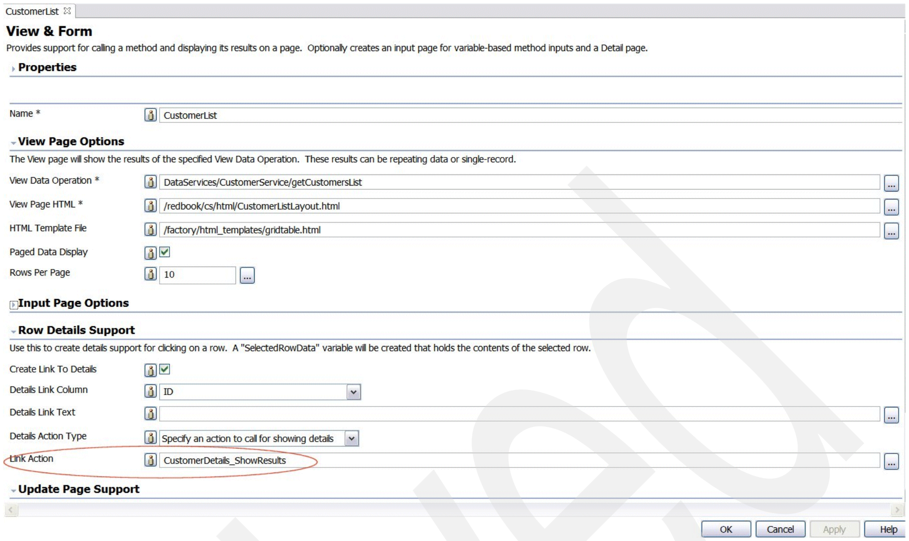


Outline

#	Name	Type
1	Disclaimer	Comment
2	PA Customer Infor...	Portlet Adapter
3	CustomerService	Service Consumer
4	CustomerList	View & Form
5	CustomerDetails	View & Form
6	back_button	Button
7	image_holder	Image
8	Search	Comment
9	customerSearchField	Text Input
10	searchButton	Button
11	executeSearch	Action List
12	viewAllCustomers	Button
13	Add New Customer	Comment
14	addCustomerForm	Input Form
15	addCustomer	Action List
16	addNewCustomer	Button
17	cancel_button	Button
18	Ajax Type Ahead	Comment
19	searchTypeAhead	Ajax Type-Ahead
20	Inter-portlet comm...	Comment
21	UIEvent	Imported Model
22	getCustomerDetails	Action List

Figure 8-13 Open the CustomerList View & Form builder

8. Scroll down to the Row Details Support section in the CustomerList builder and click the ... button next to the Link Action input field.



CustomerList

View & Form

Provides support for calling a method and displaying its results on a page. Optionally creates an input page for variable-based method inputs and a Detail page.

Properties

Name * CustomerList

View Page Options

The View page will show the results of the specified View Data Operation. These results can be repeating data or single-record.

View Data Operation * DataServices/CustomerService/getCustomersList

View Page HTML * /redbook/cs/html/CustomerListLayout.html

HTML Template File /factory/html_templates/gridtable.html

Paged Data Display ☑

Rows Per Page 10

Input Page Options

Row Details Support

Use this to create details support for clicking on a row. A "SelectedRowData" variable will be created that holds the contents of the selected row.

Create Link To Details ☑

Details Link Column ID

Details Link Text

Details Action Type Specify an action to call for showing details

Link Action CustomerDetails_ShowResults

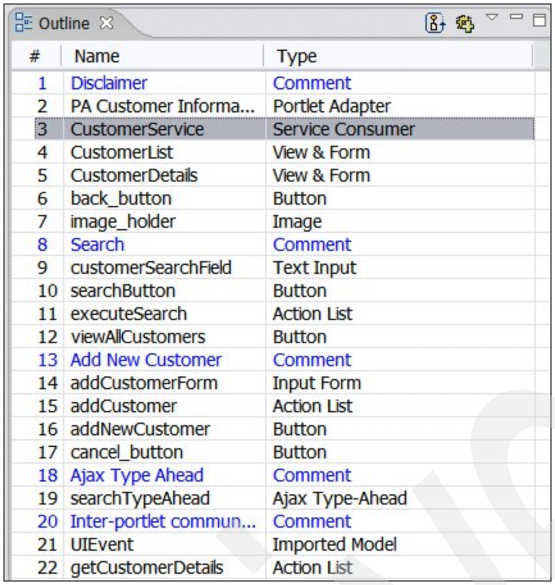
Update Page Support

Figure 8-14 Modify the Link Action under the Row Details Support section

9. In the Selection Action without Arguments window, choose **Methods** → **getCustomerDetails** and click **OK**.

10. Click **Apply** on the CustomerList View & Form builder.

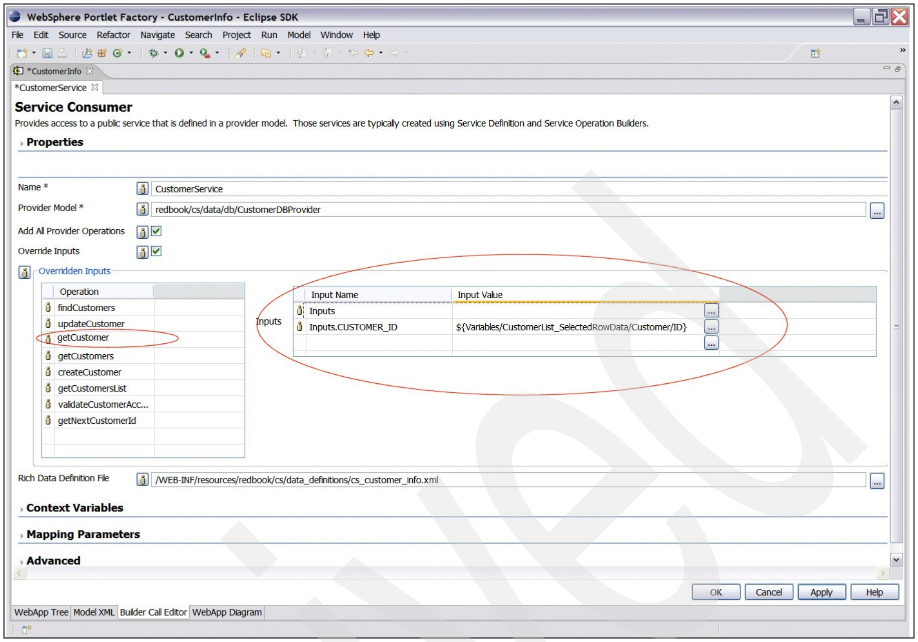
11. Change the hard-wired input parameter for the **getCustomer** method entered earlier (described in Chapter 6) in the Service Consumer builder. In the Outline pane, double-click the Service Consumer builder named **CustomerService**. The CustomerService builder is opened in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	PA Customer Informa...	Portlet Adapter
3	CustomerService	Service Consumer
4	CustomerList	View & Form
5	CustomerDetails	View & Form
6	back_button	Button
7	image_holder	Image
8	Search	Comment
9	customerSearchField	Text Input
10	searchButton	Button
11	executeSearch	Action List
12	viewAllCustomers	Button
13	Add New Customer	Comment
14	addCustomerForm	Input Form
15	addCustomer	Action List
16	addNewCustomer	Button
17	cancel_button	Button
18	Ajax Type Ahead	Comment
19	searchTypeAhead	Ajax Type-Ahead
20	Inter-portlet commun...	Comment
21	UIEvent	Imported Model
22	getCustomerDetails	Action List

Figure 8-15 Open up the CustomerService builder

12. In the CustomerService builder, scroll down to the Overridden Inputs section. Under the Operation Table, click the **getCustomer** method. The names and values of its inputs should appear in the Inputs table (Figure 8-16).



WebSphere Portlet Factory - CustomerInfo - Eclipse SDK

Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definition and Service Operation Builders.

Properties

Name * CustomerService

Provider Model * redbook/cs/data/db/CustomerDBProvider

Add All Provider Operations ☑

Override Inputs ☑

Overridden Inputs

Operation
findCustomers
updateCustomer
getCustomer
getCustomers
createCustomer
getCustomersList
validateCustomerAcc...
getNextCustomerId

Inputs

Input Name	Input Value
Inputs	
Inputs.CUSTOMER_ID	${Variables/CustomerList_SelectedRowData/Customer/ID}

Rich Data Definition File /WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info.xml

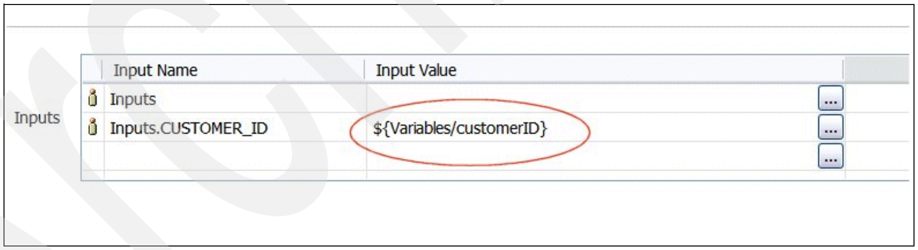
Context Variables

Mapping Parameters

Advanced

Figure 8-16 Inputs of the getCustomer method are shown in the Inputs table

13.Click the ellipsis button on the Inputs.CUSTOMER_ID row, then select **Variables → customerID.**



Inputs

Input Name	Input Value
Inputs	
Inputs.CUSTOMER_ID	${Variables/customerID}

Figure 8-17 The modified value of the CUSTOMER_ID input

14.Click **Apply** to save the CustomerService builder.

Note: The original hard-wired input value source is from the data of the selected customer row (that is, the customer that the CSR clicks on to view his details). However, this input value will not work for the customer scenario because when a customer logs in to view his details, he will not have to select from the list of customers. Therefore, we use the customerID shared variable as the input instead. (It will work for both scenarios because we have the customerID value set before invoking the method to display the details of the customer).

15. Save the CustomerInfo model by clicking the button.

Handling event in the OrderList Model

By now, you should have the CustomerInfo model firing the getCustomerOrders event whenever the customerID shared variable is updated. Perform the following steps to set up the OrderList model to react to this event.

1. In Project Explorer, select **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** → **OrderList.model**. Double-click **OrderList.model** to open it.

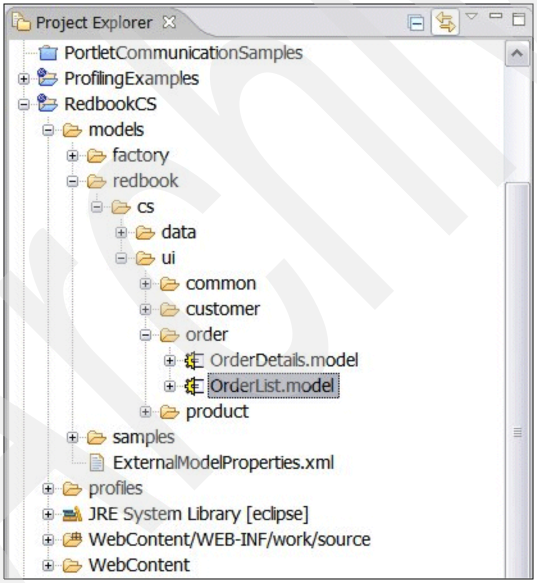
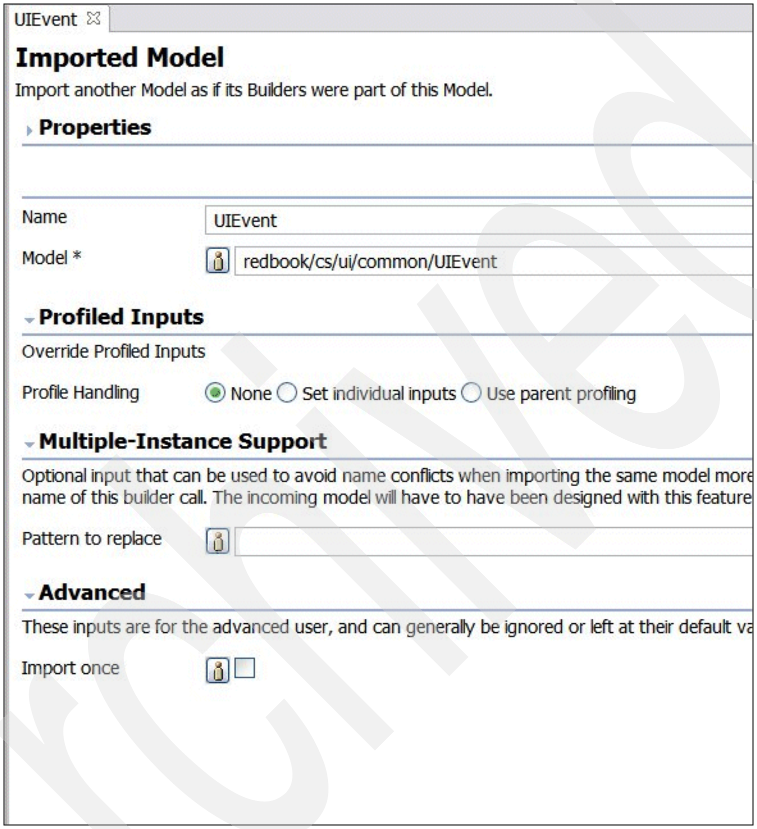


Figure 8-18 Open the OrderList model

2. Import the UIEvent model. In the OrderList model, click to add an Imported Model builder.

3. Name the Imported Model builder `UIEvent` and make sure the path to the model is `redbook/cs/ui/common/UIEvent`. Leave the rest as default and click **Apply**.

   At this point, the OrderList model should be able to see the event and shared variable declared in the UIEvent model.



UIEvent

Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name: UIEvent

Model *: redbook/cs/ui/common/UIEvent

Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

Multiple-Instance Support

Optional input that can be used to avoid name conflicts when importing the same model more name of this builder call. The incoming model will have to have been designed with this feature

Pattern to replace:

Advanced

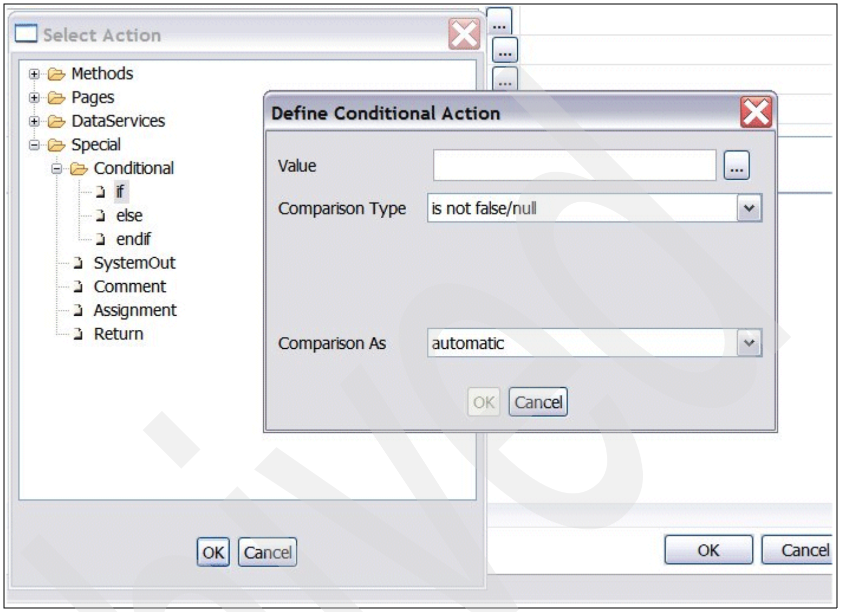
These inputs are for the advanced user, and can generally be ignored or left at their default va

Import once: □

Figure 8-19 Import the UIEvent Model into the OrderList Model

4. Create a new action list in the OrderList model to carry out the tasks when the OrderList model reacts to the getCustomerOrders event. In the OrderList model, click to add an Action List builder.
5. Name the action list `getCustomerOrders`. It should do the following:
   a. Check whether the customerID shared variable is NULL. If it is *not* null, call the DataServices method getCustomerOrdersList to retrieve the list of orders that the customer (with the customerID) has previously purchased.

i. Click the ... button on the first row of the Action List table. In the Select Action window, choose **Special** → **Conditional** → **if**. The Define Conditional Action dialog box opens (Figure 8-20).



Value

Comparison Type: is not false/null

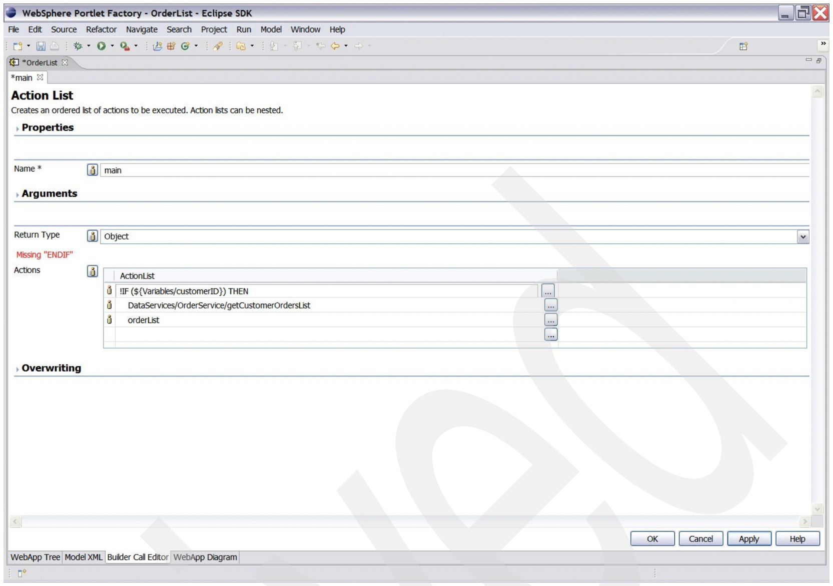
Comparison As: automatic

Figure 8-20 Set up the conditional action

ii. Create a conditional statement to check if the customerID is not NULL. Click the ... button next to the Value input field. In the Choose Reference window, choose **Variables** → **customerID**. Click **OK**.

iii. Leave everything else in the Define Conditional Action box as default and click **OK**.

iv. The getCustomerOrders Action List builder should appear as shown in Figure 8-21. Ignore the `Missing ENDIF` error for now.


WebSphere Portlet Factory - OrderList - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderList
*main
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type Object

Missing "ENDIF"

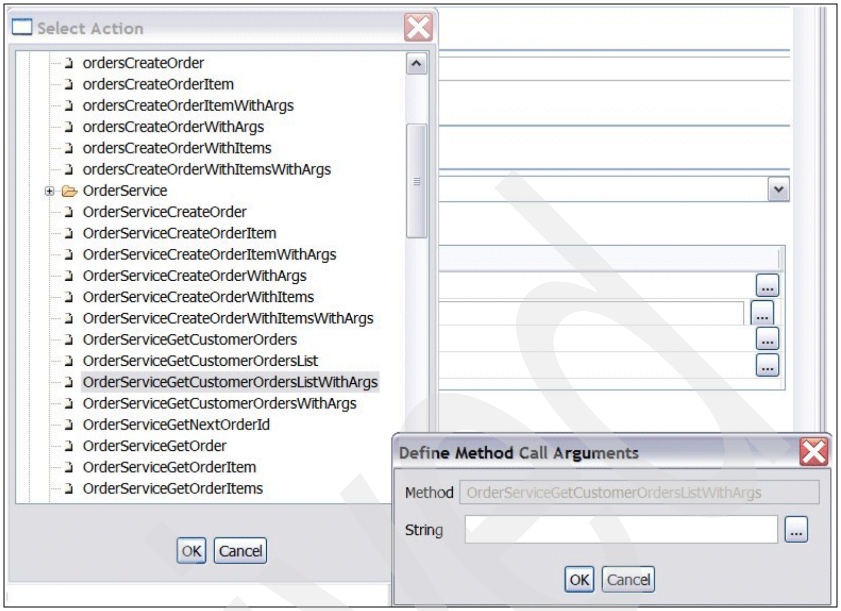
Actions

ActionList
!IF (${Variables/customerID}) THEN
DataServices/OrderService/getCustomerOrdersList
orderList

Overwriting

Figure 8-21 Ignore the Missing ENDIF error

v. Click the ... button on the second row of the Action List Table. In the Select Action window, choose **Methods** → **OrderServiceGetCustomerOrderListWithArgs**. The Define Method Call Arguments dialog box opens (Figure 8-22).


Select Action
ordersCreateOrder
ordersCreateOrderItem
ordersCreateOrderItemWithArgs
ordersCreateOrderWithArgs
ordersCreateOrderWithItems
ordersCreateOrderWithItemsWithArgs
OrderService
OrderServiceCreateOrder
OrderServiceCreateOrderItem
OrderServiceCreateOrderItemWithArgs
OrderServiceCreateOrderWithArgs
OrderServiceCreateOrderWithItems
OrderServiceCreateOrderWithItemsWithArgs
OrderServiceGetCustomerOrders
OrderServiceGetCustomerOrdersList
OrderServiceGetCustomerOrdersListWithArgs
OrderServiceGetCustomerOrdersWithArgs
OrderServiceGetNextOrderId
OrderServiceGetOrder
OrderServiceGetOrderItem
OrderServiceGetOrderItems
OK
Cancel
Define Method Call Arguments
OK
Cancel

Method: OrderServiceGetCustomerOrdersListWithArgs

String: ...

Figure 8-22 Call the DataServices Method to get the list of orders

vi. Click the ... button next to the String input field. In the Choose Preference window, choose **Variables** → **customerID.** Click **OK** to close the Choose Preference window, then click **OK** again to close the Define Method Call Arguments window.

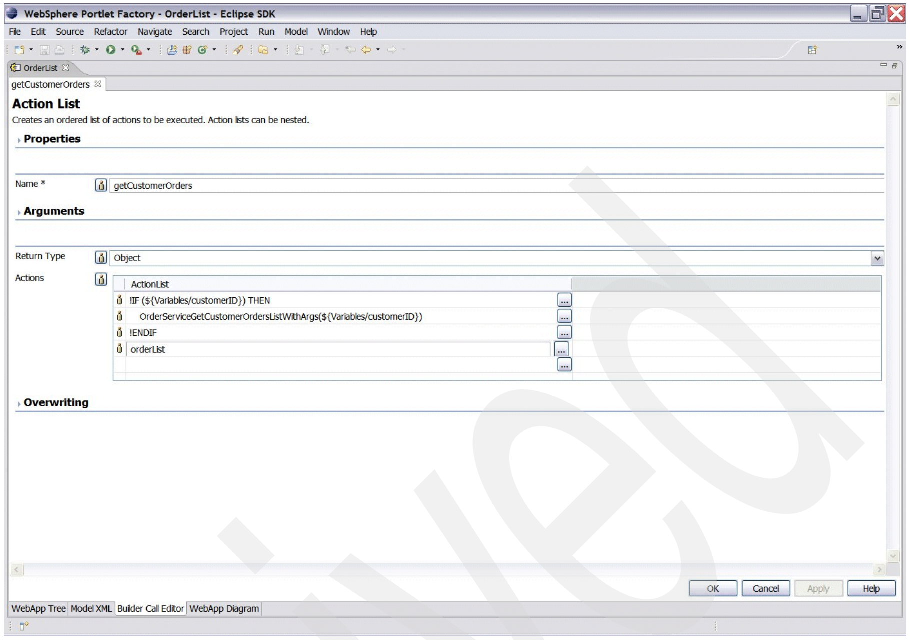
> **Note:** The reason we have chosen to use the OrderServiceGetCustomerOrderListWithArgs method here is to demonstrate alternative ways of invoking a method.

vii. Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **Special** → **Conditional** → **endif**. Click **OK**.

b. Display the OrderList page.

i. Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **Pages** → **orderList**. Click **OK**.

6. Click **Apply** to save the changes made in the getCustomerOrders Action List builder.



WebSphere Portlet Factory - OrderList - Eclipse SDK

getCustomerOrders

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name *: getCustomerOrders

Return Type: Object

Actions:

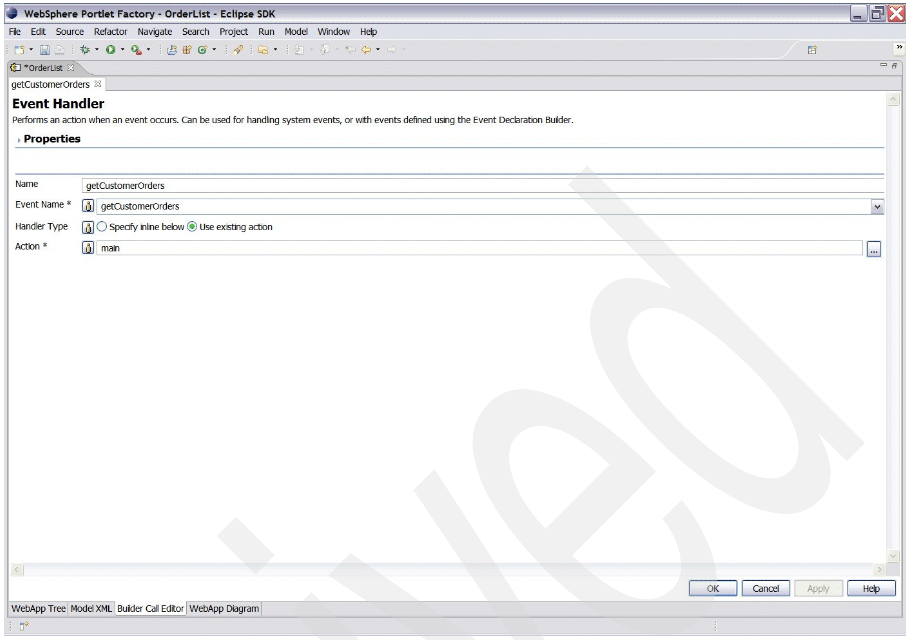
```
ActionList
!IF (${Variables/customerID}) THEN
   OrderServiceGetCustomerOrdersListWithArgs(${Variables/customerID})
!ENDIF
orderList
```

Figure 8-23 The new Action List builder - getCustomerOrders

7. Create an Event Handler that will listen to the getCustomerOrders event. In the OrderList model, click ✚ to add an Event Handler builder.

8. Complete the form as follows, then click **Apply**.

Name:	Enter `getCustomerOrders`
Event Name:	Select **getCustomerOrders** from the drop-down list
Handle Type:	Select **Use existing action**
Action:	Click the **...** button next to the Action input field, then select **Methods** → **getCustomerOrders** from the Select Action window. Click **OK** in that window.


WebSphere Portlet Factory - OrderList - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderList
getCustomerOrders
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Event Handler

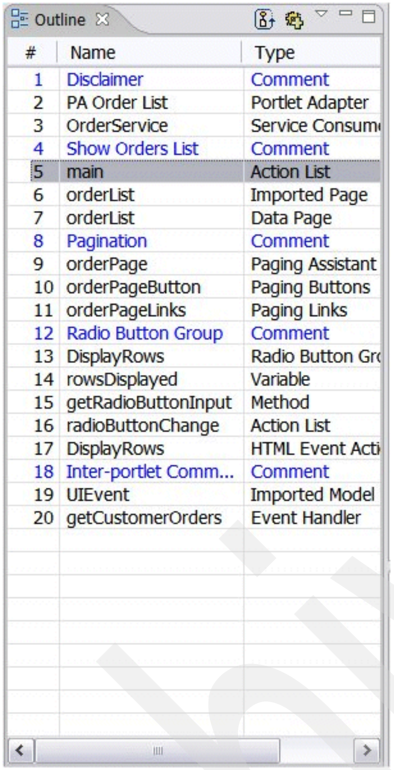
Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name	getCustomerOrders
Event Name *	getCustomerOrders
Handler Type	○ Specify inline below ● Use existing action
Action *	main

Figure 8-24 Create the getCustomerOrders Event Handler builder in the OrderList model

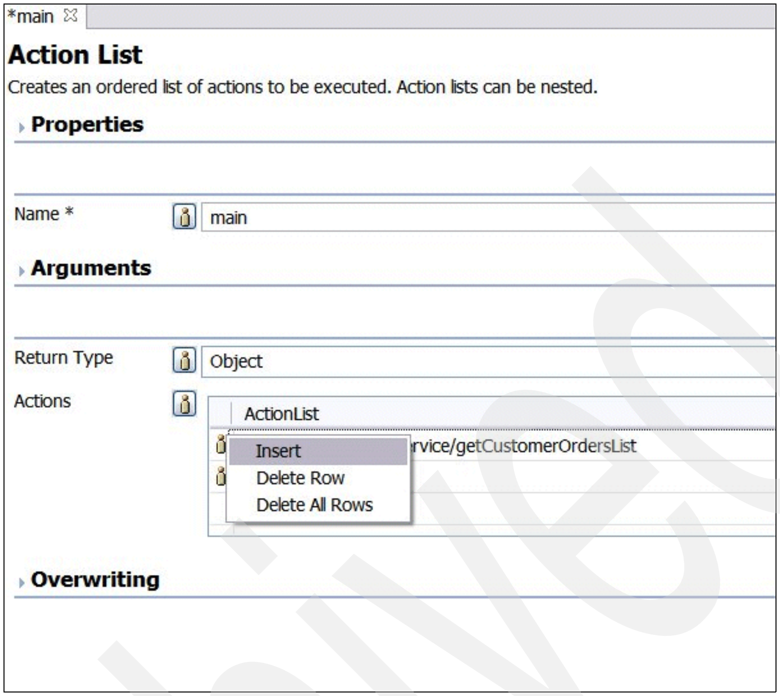
9. Modify the main Action List of the OrderList model. In the Outline pane, double-click the Action List builder named **main**. The main builder will open in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	PA Order List	Portlet Adapter
3	OrderService	Service Consum
4	Show Orders List	Comment
5	main	Action List
6	orderList	Imported Page
7	orderList	Data Page
8	Pagination	Comment
9	orderPage	Paging Assistant
10	orderPageButton	Paging Buttons
11	orderPageLinks	Paging Links
12	Radio Button Group	Comment
13	DisplayRows	Radio Button Gr
14	rowsDisplayed	Variable
15	getRadioButtonInput	Method
16	radioButtonChange	Action List
17	DisplayRows	HTML Event Acti
18	Inter-portlet Comm...	Comment
19	UIEvent	Imported Model
20	getCustomerOrders	Event Handler

Figure 8-25 Open up the main Action List in the OrderList model

10. In the main Action List table, right-click the icon next to the first row of the table. Click **Delete All Rows** to remove all the existing actions.



*main

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type Object

Actions

ActionList

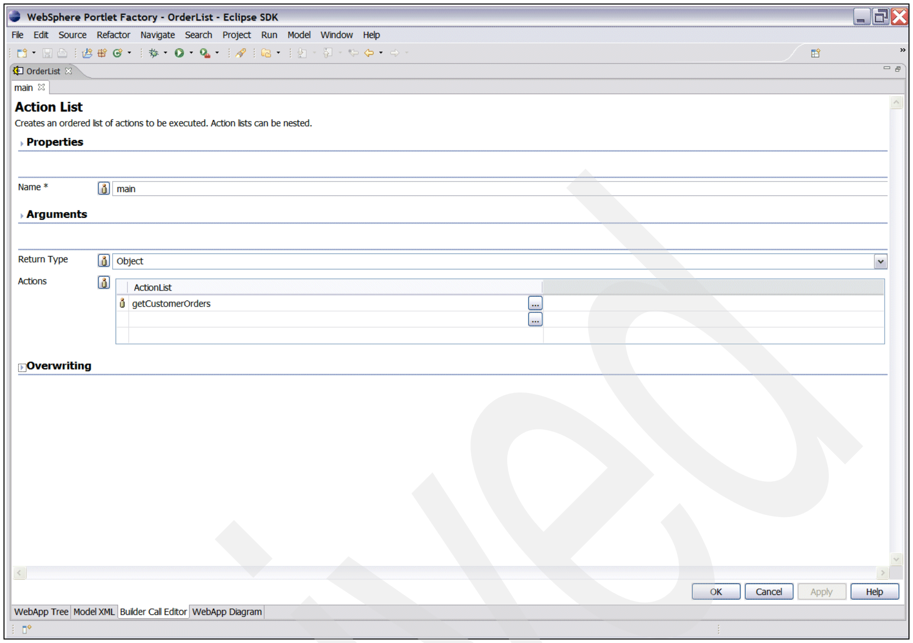
rvice/getCustomerOrdersList

Figure 8-26 Delete the existing actions in the main Action List

11. Make main call the new action list that you just created, getCustomerOrders. Click the ... button on the first row of the Action List table and select **Methods** → **getCustomerOrders** from the Select Action window. Click **OK** to close that window.

> **Note:** The reason that the main action list has to call the getCustomerOrders action list here is to handle the situation that when a CSR clicks on a customer's ID link before the OrderList portlet has been instantiated, the OrderList portlet will not be able to respond to events fired by the CustomerInfo model. Having the main method call the same action list here enforces that the OrderList portlet will still display the order list details as expected even when the event is fired before its instantiation.

12. Click **Apply** on the main Action List builder (Figure 8-27).



WebSphere Portlet Factory - OrderList - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
OrderList
main
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type Object

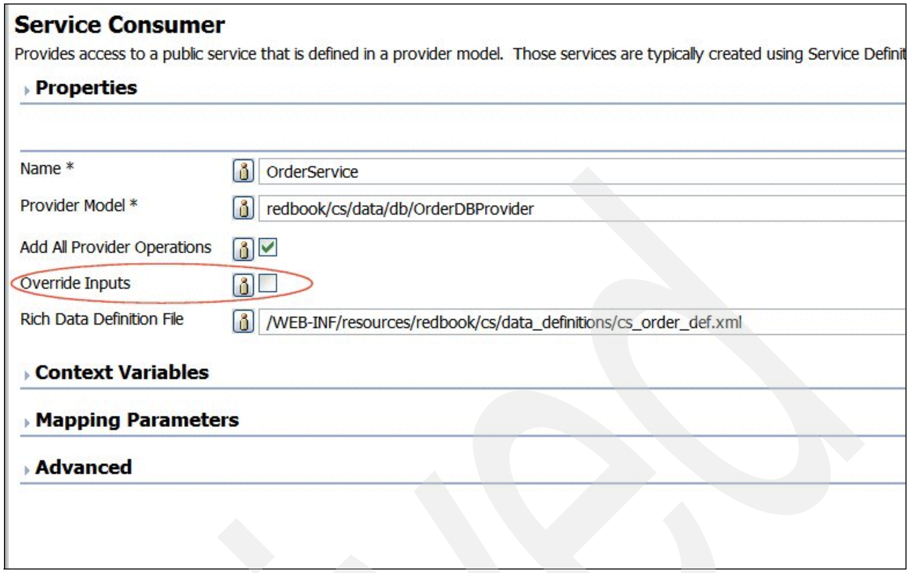
Actions

ActionList
getCustomerOrders

Overwriting

Figure 8-27 Click Apply to save the main action list

13. Before we can test this link, we need to remove the hard-coded input value entered in the OrderService Service Consumer builder (described in Chapter 6). In the Outline pane, double-click the **Service Consumer builder** named **OrderService**. The **OrderService** builder will open in the Edit pane.
14. Uncheck the box for **Override Inputs** option. Click **Apply**.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definit

Properties

Name * OrderService

Provider Model * redbook/cs/data/db/OrderDBProvider

Add All Provider Operations ☑

Override Inputs □

Rich Data Definition File /WEB-INF/resources/redbook/cs/data_definitions/cs_order_def.xml

Context Variables

Mapping Parameters

Advanced

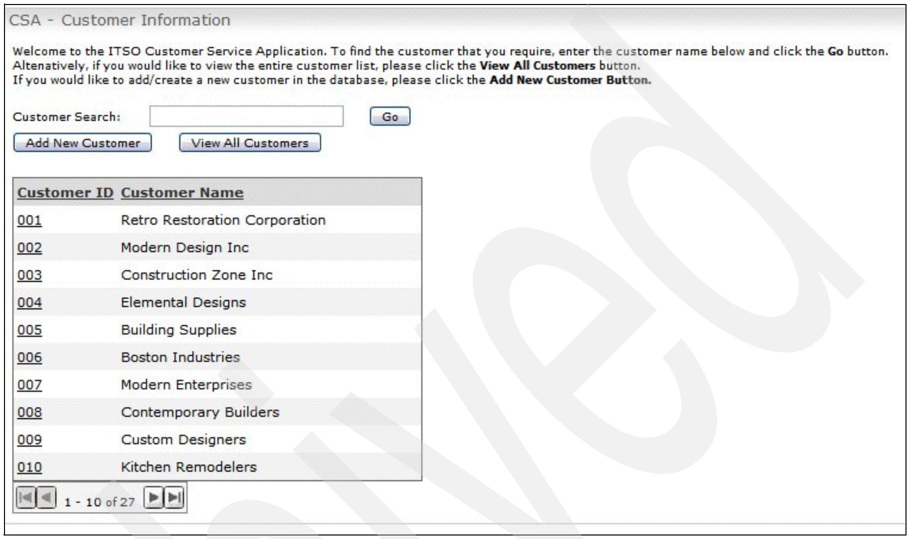
Figure 8-28 Disable the Override Inputs option

15. Save the OrderList model by clicking the 💾 button.

Testing the inter-portlet communication link

You can now test the link that you just created.

1. Log into Portal. The CustomerInfo portlet on the Customer page will resemble Figure 8-28 after logging in.



CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button.
Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button.
If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer Search: [Go]

[Add New Customer] [View All Customers]

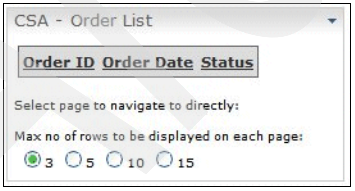
Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

1 - 10 of 27

Figure 8-29 CustomerInfo portlet after logging in

> **Important:** Do not click any links in the CustomerInfo portlet.

2. Go to the Order portal page. The OrderList portlet should be empty, as shown in Figure 8-30.



CSA - Order List

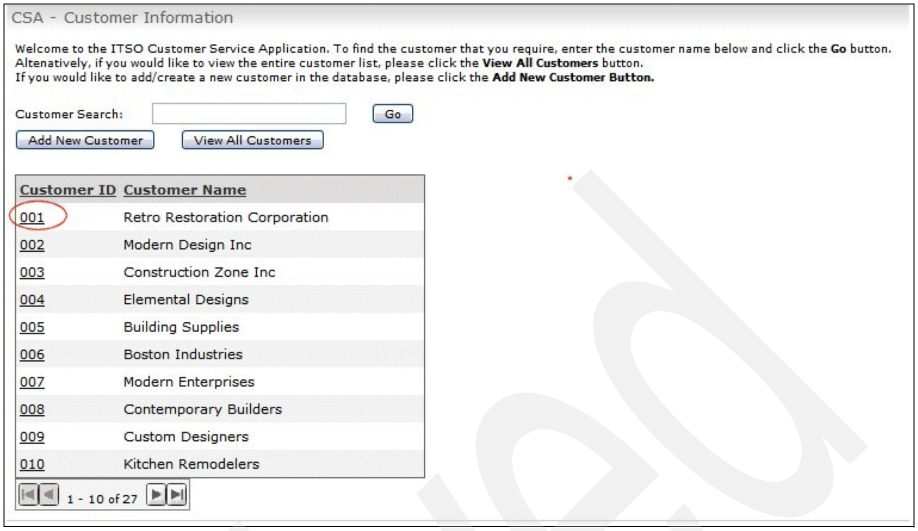
Order ID	Order Date	Status

Select page to navigate to directly:

Max no of rows to be displayed on each page:
● 3 ○ 5 ○ 10 ○ 15

Figure 8-30 OrderList Portlet should be empty

3. Go back to the Customer portal page and click the ID link of the first customer.



CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button. Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button. If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer Search: Go

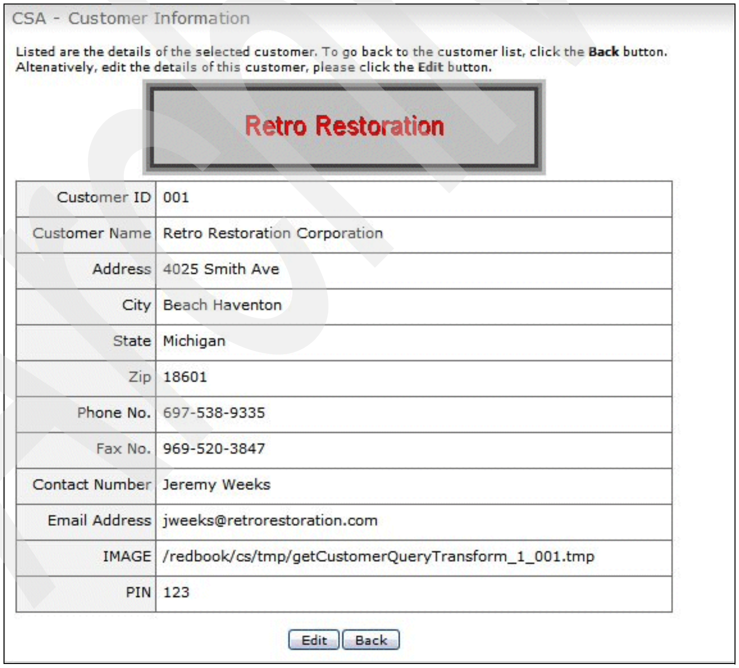
Add New Customer View All Customers

Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

1 - 10 of 27

Figure 8-31 Click the ID link of the first customer

4. The CustomerInfo portlet now displays the details about that customer.



CSA - Customer Information

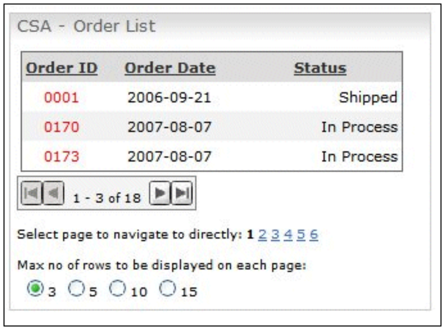
Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Edit Back

Figure 8-32 Customer details

5. Go to the Order portal page. The OrderList portlet now displays the list of orders that the selected customer has previously placed.



CSA - Order List

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 18

Select page to navigate to directly: 1 2 3 4 5 6

Max no of rows to be displayed on each page:
● 3 ○ 5 ○ 10 ○ 15

Figure 8-33 Orders placed by the selected customer

6. Switch back to the Customer portal page and select another customer. The content in the OrderList portlet will change each time you select another customer's details in the CustomerInfo portlet.

8.3.2 OrderList Model to OrderDetails Model

At a high level, the steps to enable communications between the OrderList and OrderDetails models are:

1. Create an event declaration and shared variable. The event will be fired from the OrderList model when a new order has been selected. The shared variable will hold the order ID that needs to be communicated between the models.
2. The OrderList model sets the selectedOrderID variable and fires the event when the order is selected.
3. The OrderDetails model catches the event and updates the order details based on the selectedOrderID value.

This inter-portlet communication link basically follows the same flow as the link between the CustomerInfo model and the OrderList model that we described in the previous section.

Declaring the event and share variable in the UIEvent model

First, we create the selectedOrderID shared variable. The shared variable **selectedOrderID** declared in the UIEvent model is used to store the ID of the selected order.

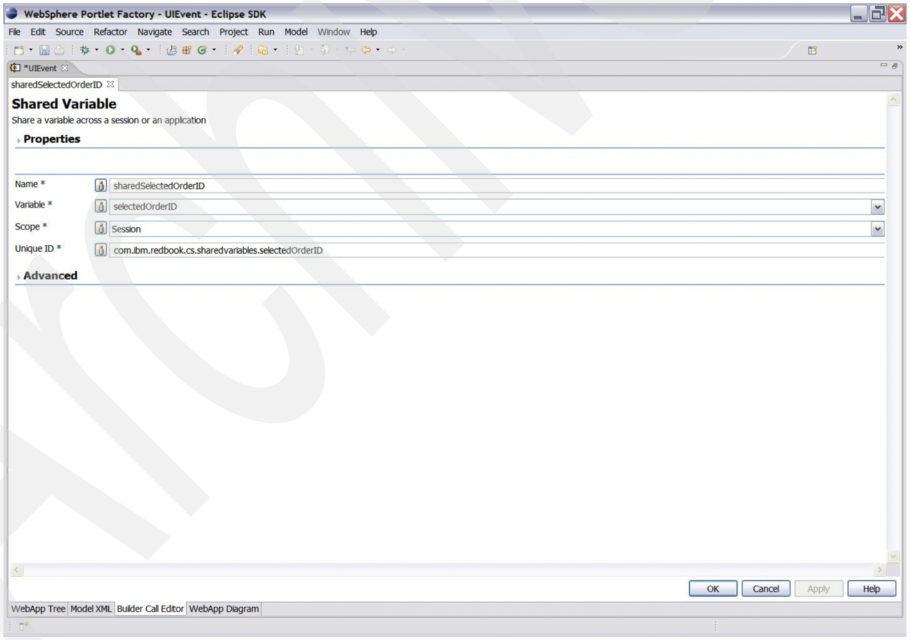
In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **common** → **UIEvent.model**. Double-click the **UIEvent.model** to open it.

Perform the following steps to create a normal variable and then turn it into a shared variable:

1. In the UIEvent model, click to add a Variable builder.
2. Enter the name for the Variable builder as `selectedOrderID` and select **String** as the Type. Leave everything else as default. Click **Apply**.
3. To make the selectedOrderID variable that we just created a shared variable in the UIEvent model, click to add a Shared Variable builder.
4. Make the following entries and selections; leave other values as default:

   Name: `sharedSelectedOrderID`
   Variable: `selectedOrderID`
   Scope: `Session`
   Unique ID: `com.ibm.redbook.cs.sharedvariables.selectedOrderID`

   Click **Apply**.


WebSphere Portlet Factory - UIEvent - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*UIEvent
sharedSelectedOrderID

Shared Variable

Share a variable across a session or an application

Properties

Name * sharedSelectedOrderID
Variable * selectedOrderID
Scope * Session
Unique ID * com.ibm.redbook.cs.sharedvariables.selectedOrderID

Advanced

OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

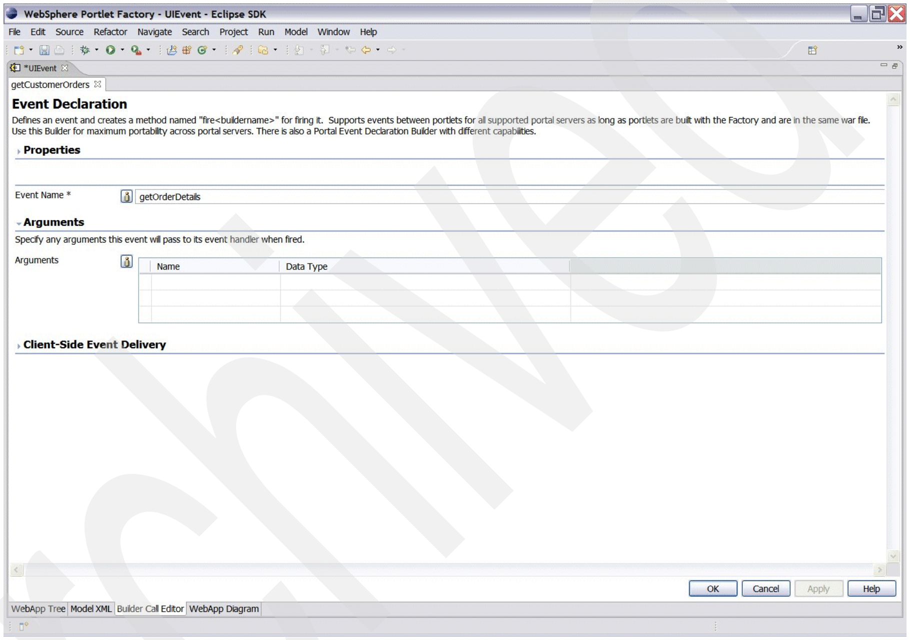
Figure 8-34 Turn the selectedOrderID variable into a shared variable

5. You have now finished creating the shared variable. Save the UIEvent model by clicking the button.

Create the getOrderDetails event

The getOrderDetails event declared in the UIEvent model is to be fired by the OrderList model to let the OrderDetails model know that the selectedOrderID shared variable has just been changed. The OrderDetails model will then proceed to carry out its tasks based on the new selectedOrderID value.

1. In the UIEvent model, click to add an Event Declaration builder.
2. Name the Event Declaration builder `getOrderDetails` and leave all the other options as default. Click **Apply**.



WebSphere Portlet Factory - UIEvent - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*UIEvent
getCustomerOrders

Event Declaration

Defines an event and creates a method named "fire<buildername>" for firing it. Supports events between portlets for all supported portal servers as long as portlets are built with the Factory and are in the same war file. Use this Builder for maximum portability across portal servers. There is also a Portal Event Declaration Builder with different capabilities.

Properties

Event Name * getOrderDetails

Arguments

Specify any arguments this event will pass to its event handler when fired.

Arguments

Name	Data Type

Client-Side Event Delivery

Figure 8-35 The getOrderDetails Event Declaration builder in the UIEvent Model

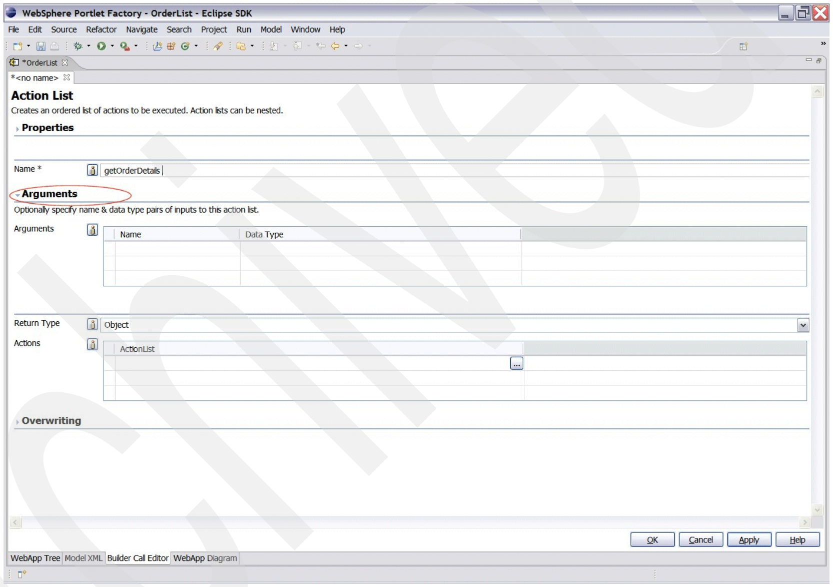
3. You have now finished creating the event. Save the UIEvent model by clicking the button.

Firing the event from the OrderList Model

In the OrderList model, we need to set the value of the selectedOrderList shared variable whenever a CSR or a customer clicks an ID link of the order that he wishes to view the details for. Then an event will be fired to notify the OrderDetails model of the change in the selectedOrderList value.

Unlike the previous case, where the customer ID links are created using the Views & Form’s Row Details Support option, with the OrderList model we need to turn the order ID fields into links with the help of a Link builder.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** → **OrderList.mode**l. Double-click the **OrderList.model** to open it.
2. Since the UIEvent model has already been imported, create a new action list that will set the selectedOrderID shared variable as well as firing the getOrderDetails event. In the OrderList model, click to add an Action List builder. Name this action list builder `getOrderDetails`.
3. The getOrderDetails action list should carry out the following three tasks when a CSR/customer clicks on an order ID link.
   a. Take the order ID as an input argument.
      i. Expand the Arguments section by clicking on the word **Argument**.


WebSphere Portlet Factory - OrderList - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderList
*<no name>

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * getOrderDetails

Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments

Name	Data Type

Return Type Object

Actions

ActionList

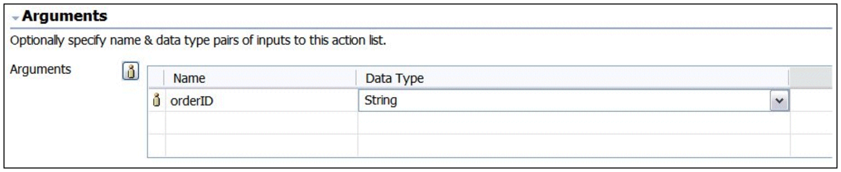
Overwriting

OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Figure 8-36 Expand the Arguments section in the Action List builder

      ii. Create a new argument with the following details:

Name:	`orderID`
Data Type:	`String`



Arguments

Optionally specify name & data type pairs of inputs to this action list.

Arguments

Name	Data Type
orderID	String

Figure 8-37 Create an argument for the getOrderDetails Action List

b. Set the value of the selectedOrderID shared variable equal to the argument of the action list.

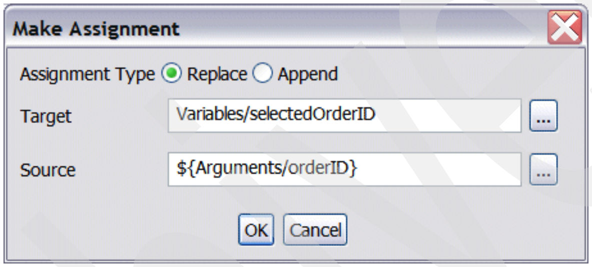
   i. Click the ... button on the first empty row of the Action List table.

   ii. In the Select Action window, expand **Special** and click **Assignment**.

   iii. Click the ... button next to the Source input field. In the Choose Reference window choose the ID value **Arguments** → **orderID**. Click **OK**.

   iv. Click the ... button next to the Target input field. In the Variables window choose the value **Variables** → **selectedOrderID**. Click **OK**.

   v. Leave the Assignment Type in the Make Assignment window as **Replace**. Click **OK**.



Make Assignment

Assignment Type ● Replace ○ Append

Target: Variables/selectedOrderID

Source: ${Arguments/orderID}

Figure 8-38 Setting the selectedOrderID shared variable

c. Fire the getOrderDetails event.

   i. Click the ... button on the next empty row of the Action List table.

   ii. In the Select Action window, expand **Methods** and click **firegetOrderDetails**. Click **OK**.

4. Click **Apply** on the getOrderDetails Action List builder.

5. We have to turn the order ID fields into links such that when a customer or CSR clicks on one of these, the getOrderDetails event will be fired. In the OrderList model, click to add a Link builder.

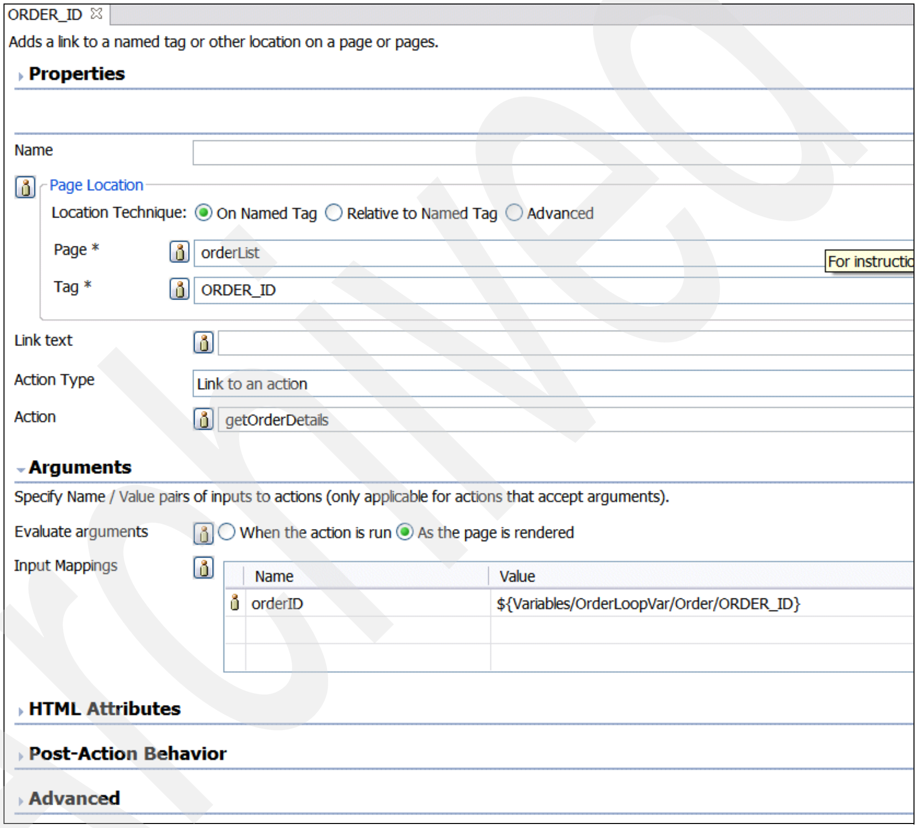
6. Leave the name of this builder blank so that it will take the HTML tag name as its name. Complete the form as follows and leave everything else as default.

Location Technique:	`On Named Tag`
Page:	`orderList`
Tag:	`ORDER_ID`
Action Type:	`Link to an action`
Action:	Click ... next the Action input field. Choose **Methods** → **getOrderDetails**. Click **OK**.

Evaluate arguments: Select `As the page is rendered` (You *must not* get this part wrong or the inter-portlet communication link will not work properly.)

Input Mappings Name: Replace `getOrderDetails_Arg1` with `orderID`.

Input Mappings Value: Click ... next to the Value input field. Choose **Variables** → **OrderLoopVar** → **Order** → **ORDER_ID**. Click **OK** to close the Choose Reference window.



ORDER_ID ☒

Adds a link to a named tag or other location on a page or pages.

Properties

Name

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * orderList

Tag * ORDER_ID

For instructio

Link text

Action Type: Link to an action

Action: getOrderDetails

Arguments

Specify Name / Value pairs of inputs to actions (only applicable for actions that accept arguments).

Evaluate arguments ○ When the action is run ● As the page is rendered

Input Mappings

Name	Value
orderID	${Variables/OrderLoopVar/Order/ORDER_ID}

HTML Attributes

Post-Action Behavior

Advanced

Figure 8-39 Create the ID Link builder

Note: Two other components are generated behind the scenes when the Link builder is created:

- Order ID Links on JSP page

  The Link builder generates a set of order ID links in the OrderList portlet. In order to identify each individual ID link, the Link builder uses the unique orderID value as a parameter of the **href** property of each link. For example, the first order may have
  `<a href=“http://...?orderID=001” />`
  whereas the second one may have
  `<a href=“http://...?orderID=002” />`

  Looking at the WebAppTree, here is the exact code generated for the set of ID links:

```
<a name="ID" ...

href='<%= JSPSupport.getActionURL(webAppAccess,"_gen_call_getOrderDetails",
new String[] {"orderID", ""+ webAppAccess.getVariables().getXmlText(
"OrderLoopVar","Order/ORDER_ID") }) %>'>

...

</a>
```

  Basically, it uses the orderID value of each order to generate a unique link; to identify which link is selected, we need to parse through the HTTP request parameters to retrieve the “orderID” value.

- Wrapper method (`_gen_call_getOrderDetails`)

  A wrapper method is generated automatically when the Link builder is created. Its basic function is to use the OrderLoopVar variable as a reference to retrieve the orderID parameter from the HTTP request. It then passes this orderID value to the Link builder Action (which is getOrderDetails in this case). The getOrderDetails action then carries out its tasks based on the input value.

  The time to evaluate the input argument is crucial because it may result in passing an incorrect value to the getOrderDetails action. To examine the differences between the two options of when the argument should be evaluated, we look at the codes generated in the WebApp Tree.

If the As the page is rendered option is chosen, the wrapper method looks like this:

```
public Object _gen_call_getOrderDetails(WebAppAccess webAppAccess){
    ...
    returnValue = webAppAccess.callMethod("getOrderDetails", new Object[] {
    webAppAccess.getRequestInputs().getInputValue("orderID") });
    ...
}
```

Notice that it actually parses through the input parameters of the HTTP request to retrieve the “orderID” value and then passes it to the getOrderDetails function.

Now, we look at the codes generated if the When the action is run option is chosen:

```
public Object _gen_call_getOrderDetails(WebAppAccess webAppAccess){
    ...
    returnValue = webAppAccess.callMethod("getOrderDetails", new Object[] {
    webAppAccess.getVariables().getXmlText("OrderLoopVar", "Order/ORDER_ID")
    });
    ...
}
```

Notice that with this option, the actual value of the Order/ORDER_ID of the OrderLoopVar variable is being passed to getOrderDetails, instead of the input parameter in the HTTP request. As the OrderLoopVar variable loops through the entire result set, it will always have the last result as the last instance (that is, choosing this option implies that no matter which order ID link you click, you will always only be able to see the order details of the last order).

Tip: You will find that in most cases when a LoopVar variable is involved, the “As the page is rendered” option is mostly likely the choice, whereas when a form is being submitted, the “When the action is run” option is most likely chosen.

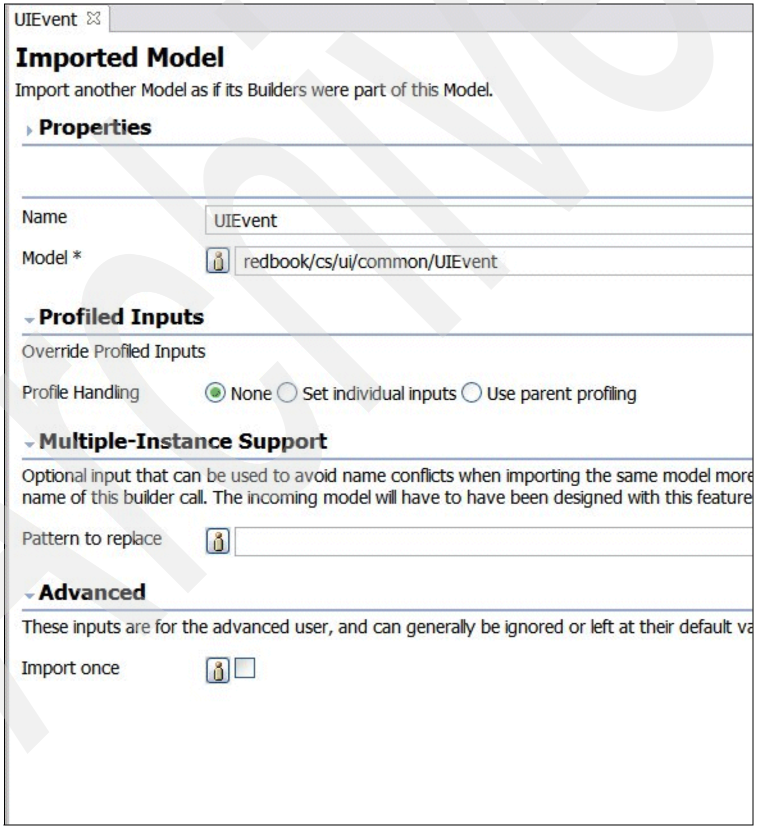
7. Click **Apply** to save the ID link builder.
8. Save the OrderList model by clicking the 💾 button.

Handling event in the OrderDetails model

By now, you should have the OrderList model firing the getOrderDetails event whenever the selectedOrderID shared variable is updated. We will now set up the OrderDetails model to react to this event.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** → **OrderDetails.model**. Double-click the **OrderDetails.model** to open it.
2. Import the UIEvent model. In the OrderList model, click to add an Imported Model builder.
3. Name the Imported Model builder `UIEvent` and make sure the path to the model reads `redbook/cs/ui/common/UIEvent`. Leave the rest as default and click **Apply**.

   At this point, the OrderDetails model should be able to see the event and shared variable declared in the UIEvent model.



UIEvent

Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name: UIEvent

Model *: redbook/cs/ui/common/UIEvent

Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

Multiple-Instance Support

Optional input that can be used to avoid name conflicts when importing the same model more name of this builder call. The incoming model will have to have been designed with this feature

Pattern to replace:

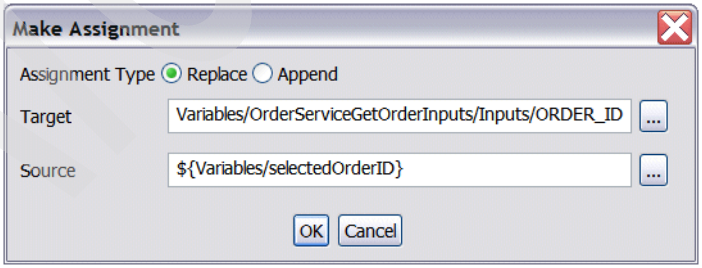
Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default va

Import once: □

Figure 8-40 Import the UIEvent model into the OrderList model

4. Create a new action list in the OrderDetails model to carry out the tasks when the OrderDetails model reacts to the getOrderDetails event. In the OrderDetails model, click to add an Action List builder.
5. Name the action list `getOrderDetails`. It should do the following:
   a. Check whether the selectedOrderID shared variable is NULL or not. If it is *not* null, call the Dataservices method: getOrder and getOrderItems to retrieve the details of the order.
      i. Click the ... button on the first row of the Action List table. In the Select Action window, choose **Special** → **Conditional** → **if**. The Define Conditional Action dialog box is displayed.
      ii. Create a conditional statement to check if the selectedOrderID is not NULL. Click the ... button next to the Value input field. In the Choose Reference window, choose **Variables** → **selectedOrderID**. Click **OK**.
      iii. Leave everything else on the Define Conditional Action as default and click **OK**.
      iv. Assign the input value for the **getOrder** Dataservices method. Click the ... button on the next empty row of the Action List table. In the Select Action window, expand **Special** and click **Assignment**.
      v. Click the ... button next to the Source input field. In the Choose Reference window choose the ID value **Variables** → **selectedOrderID**. Click **OK**.
      vi. Click the ... button next to the Target input field. In the Variables window choose the value **Variables** → **OrderServiceGetOrderInputs** → **Inputs** → **ORDER_ID**. Click **OK**.
      vii. Leave the Assignment Type in the Make Assignment window as **Replace**. Click **OK**.



Make Assignment

Assignment Type ● Replace ○ Append

Target: Variables/OrderServiceGetOrderInputs/Inputs/ORDER_ID

Source: ${Variables/selectedOrderID}

Figure 8-41 Set the input value for the getOrders Dataservices method

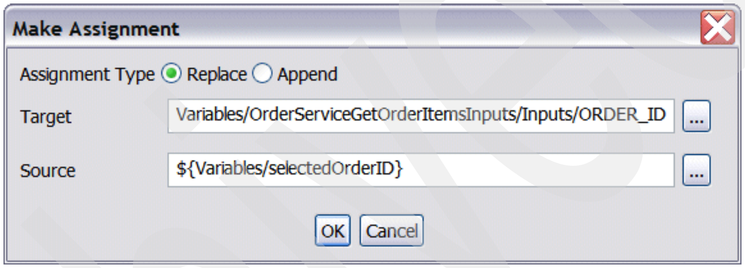
      viii. Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **DataServices** → **OrderService** → **getOrder**. Click **OK**.

ix. Assign the input value for the getOrderItems Dataservices method. Click the ... button on the next empty row of the Action List table. In the Select Action window, expand **Special** and click **Assignment**.

x. Click the ... button next to the Source input field. In the Choose Reference window choose the ID value **Variables** → **selectedOrderID**. Click **OK**.

xi. Click the ... button next to the Target input field. In the Variables window choose the value **Variables** → **OrderServiceGetOrderItemsInputs** → **Inputs** → **ORDER_ID**. Click **OK**.

xii. Leave the Assignment Type in the Make Assignment window as **Replace**. Click **OK**.



Make Assignment

Assignment Type ● Replace ○ Append

Target: Variables/OrderServiceGetOrderItemsInputs/Inputs/ORDER_ID ...

Source: ${Variables/selectedOrderID} ...

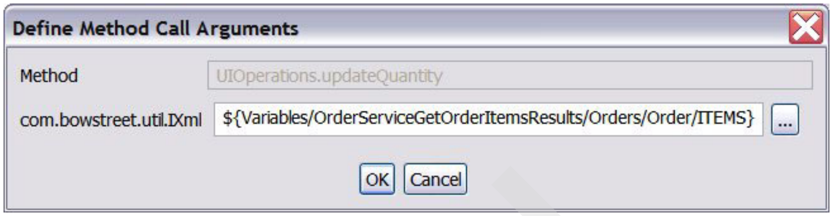
Figure 8-42 Set the input value of the getOrderItems Dataservices method

xiii. Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **DataServices** → **OrderService** → **getOrderItems**. Click **OK**.

> **Note:** We have demonstrated another way of invoking a method here by first assigning the inputs of a DataServices method and then invoking it.

xiv. Since our CSA will calculate the order price for each item on the presentation layer, we have to call a Linked Java Object function to perform the calculation. Note that the LJO has previously been added to the model (described in Chapter 6). Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **Methods** → **UIOperations** → **updateQuantity**.

xv. The Define Method Call Arguments window is displayed. Click the ... button next to the com.bowstreet.util.IXml Argument field. Choose **Variables** → **OrderServiceGetOrderItemsResults** → **Orders** → **Order** → **ITEMS**. Click **OK**.



Define Method Call Arguments

Method: UIOperations.updateQuantity

com.bowstreet.util.IXml: ${Variables/OrderServiceGetOrderItemsResults/Orders/Order/ITEMS}

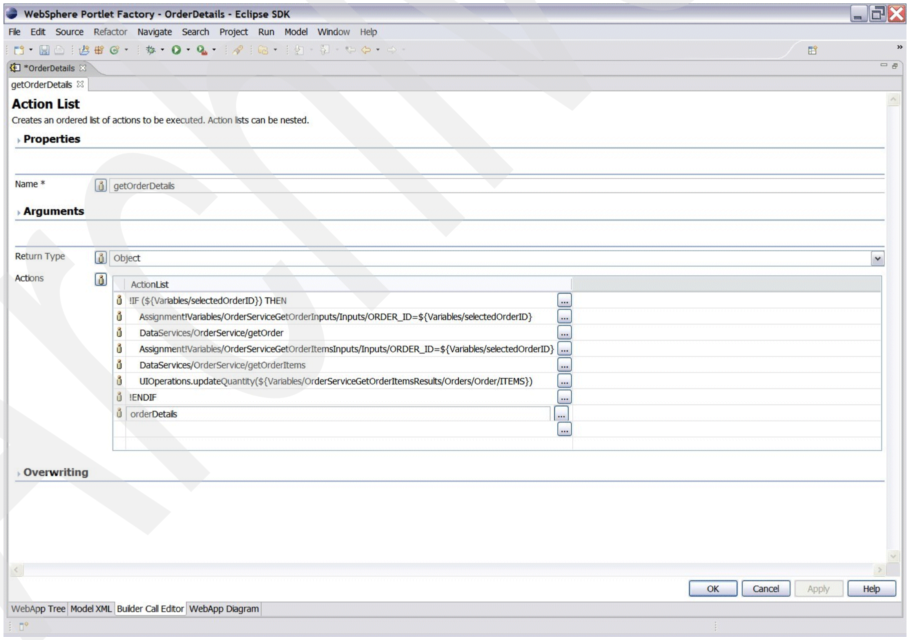
Figure 8-43 Assign the Input Argument for the updateQuantity LJO method

xvi.Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **Special** → **Conditional** → **endif**. Click **OK**.

b. Display the OrderDetails page.

Click the ... button on the next empty row of the Action List table. In the Select Action window, choose **Pages** → **orderDetails**. Click **OK**.

6. Click **Apply** to save the changes made in the getOrderDetails Action List builder.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name *: getOrderDetails

Arguments

Return Type: Object

Actions:

ActionList
!IF (${Variables/selectedOrderID}) THEN
Assignment!Variables/OrderServiceGetOrderInputs/Inputs/ORDER_ID=${Variables/selectedOrderID}
DataServices/OrderService/getOrder
Assignment!Variables/OrderServiceGetOrderItemsInputs/Inputs/ORDER_ID=${Variables/selectedOrderID}
DataServices/OrderService/getOrderItems
UIOperations.updateQuantity(${Variables/OrderServiceGetOrderItemsResults/Orders/Order/ITEMS})
!ENDIF
orderDetails

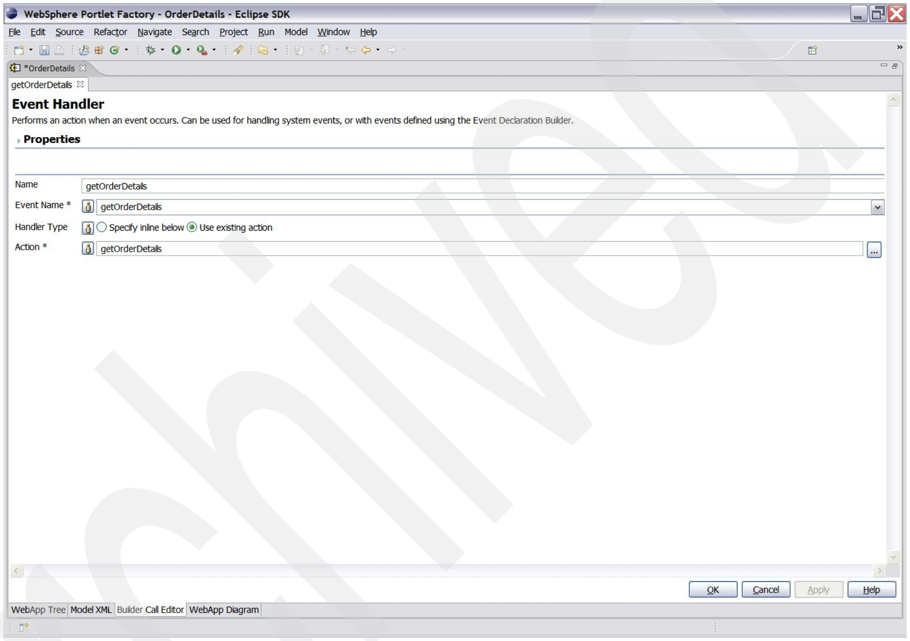
Overwriting

Figure 8-44 The completed getOrderDetails Action List builder

7. Create an Event Handler that will listen to the getOrderDetails event. In the OrderDetails model, click to add an Event Handler builder.

8. Make the following entries and selections.

Name:	`getOrderDetails`
Event Name:	`getOrderDetails` (select from the drop-down list)
Handle Type:	`Use existing action`
Action:	Click the ... button next to the Action input field, then select **Methods** → **getOrderDetails** from the Select Action window. Click **OK** in that window.


WebSphere Portlet Factory - OrderDetails - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderDetails
getOrderDetails

Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name: getOrderDetails

Event Name *: getOrderDetails

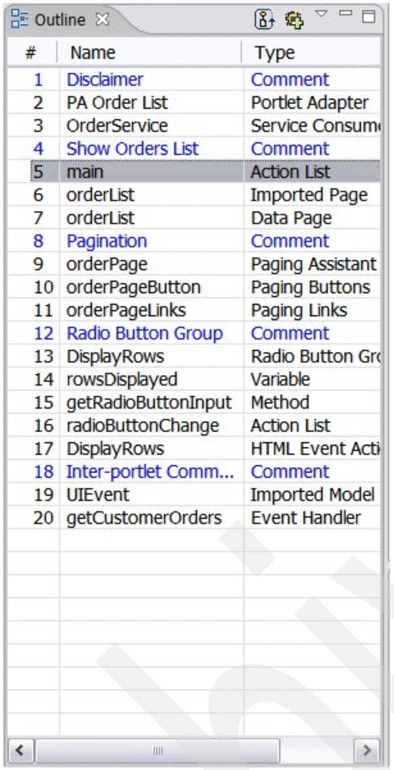
Handler Type: ○ Specify inline below ● Use existing action

Action *: getOrderDetails

OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Figure 8-45 Create the getOrderDetails Event Handler in the OrderDetails model

9. Modify the main Action List of the OrderDetails model. In the Outline pane, double-click the Action List builder named **main**. The **main** builder will open in the Edit pane.



Outline

#	Name	Type
1	Disclaimer	Comment
2	PA Order List	Portlet Adapter
3	OrderService	Service Consum
4	Show Orders List	Comment
5	main	Action List
6	orderList	Imported Page
7	orderList	Data Page
8	Pagination	Comment
9	orderPage	Paging Assistant
10	orderPageButton	Paging Buttons
11	orderPageLinks	Paging Links
12	Radio Button Group	Comment
13	DisplayRows	Radio Button Gr
14	rowsDisplayed	Variable
15	getRadioButtonInput	Method
16	radioButtonChange	Action List
17	DisplayRows	HTML Event Acti
18	Inter-portlet Comm...	Comment
19	UIEvent	Imported Model
20	getCustomerOrders	Event Handler

Figure 8-46 Open up the main Action List builder in the OrderDetails model

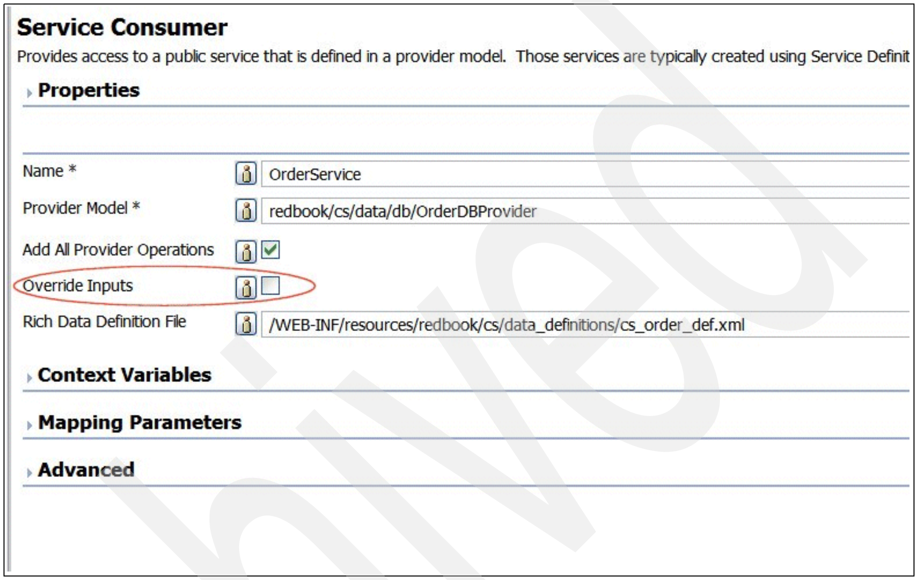
10. In this main Action List table, right-click the icon next the first row of the table. Click **Delete All Rows** to remove all the existing actions.
11. To make main call the new action list that we just created, getOrderDetails, click the ... button on the first row of the Action List table. Select **Methods** → **getOrderDetails** from the Select Action window. Click **OK** to close that window.

> **Note:** We have deliberately made the main method to call the getOrderDetails action, which might seems unnecessary here when the getOrderDetails Event Handler is already calling that action. We discuss the reason behind it in 9.6.4, "Runtime customization profiling" on page 472 when we demonstrate how to implement portlet runtime customization.

12. Click **Apply** on the main Action List builder.

13. Before you can test this link, you need to remove the hard-coded input value entered in the OrderService Service Consumer builder (described in Chapter 6). In the Outline pane, double-click the **Service Consumer** builder named **OrderService**. The **OrderService** builder will be opened in the Edit pane.

14. Uncheck the **Override Inputs** box. Click **Apply**.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definit

› **Properties**

Name * OrderService

Provider Model * redbook/cs/data/db/OrderDBProvider

Add All Provider Operations ☑

Override Inputs □

Rich Data Definition File /WEB-INF/resources/redbook/cs/data_definitions/cs_order_def.xml

› **Context Variables**

› **Mapping Parameters**

› **Advanced**

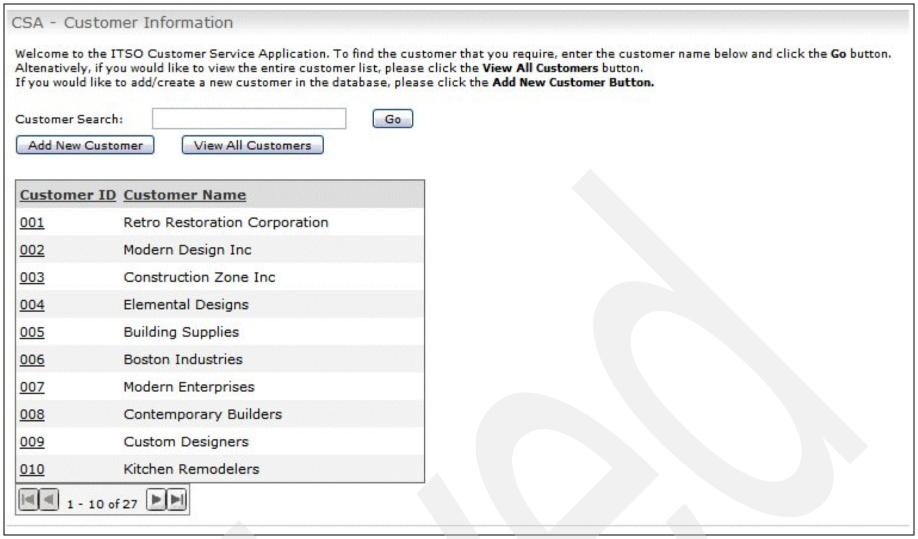
Figure 8-47 Disable the Override Inputs option

15. Save the OrderList model by clicking the 💾 button.

Testing the inter-portlet communication link

We are now ready to test the link that we just created.

1. Log into Portal. The CustomerInfo portlet on the Customer page will appear as shown in Figure 8-48.



CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button. Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button. If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer Search: [ ] Go

Add New Customer | View All Customers

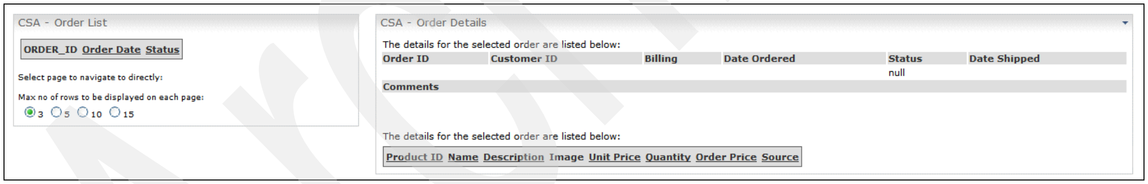
Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

1 - 10 of 27

Figure 8-48 CustomerInfo Portlet after logging-in

> **Important:** Do not click any links in the CustomerInfo portlet.

2. Go to the Order portal page. The OrderList portlet and the OrderDetails portlet should be empty, as shown in Figure 8-49.



CSA - Order List

ORDER_ID	Order Date	Status

Select page to navigate to directly:

Max no of rows to be displayed on each page:
● 3 ○ 5 ○ 10 ○ 15

CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipped
				null	

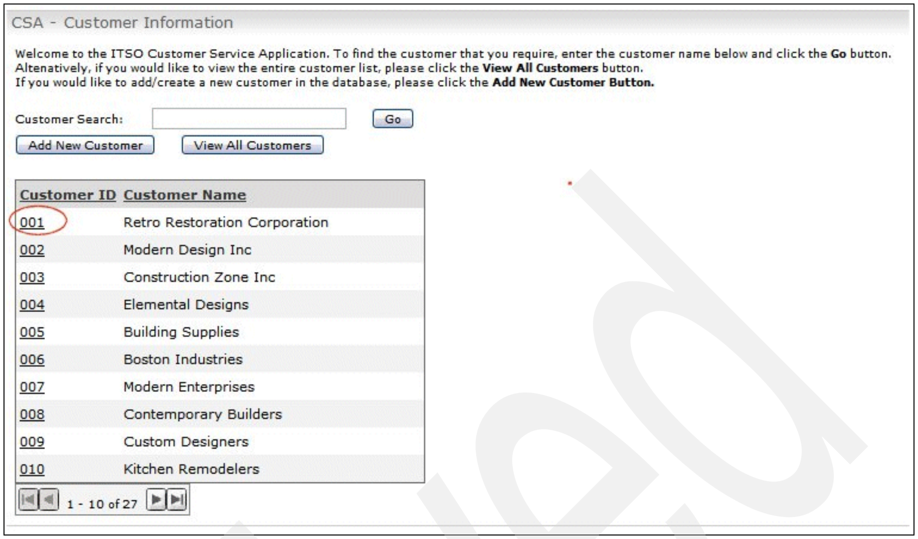
Comments

The details for the selected order are listed below:

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	Source

Figure 8-49 The OrderList portlet and the OrderDetails portlet should be empty

3. Go back to the Customer portal page and click the ID link of the first customer.

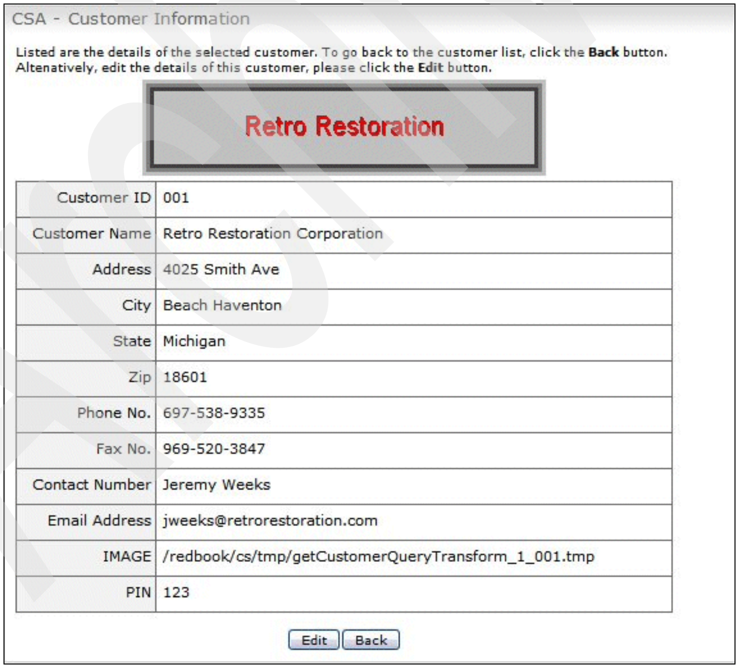

CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** button.
Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button.
If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

Figure 8-50 Click the ID Link of the First Customer

4. The CustomerInfo portlet should now display the details about that customer.

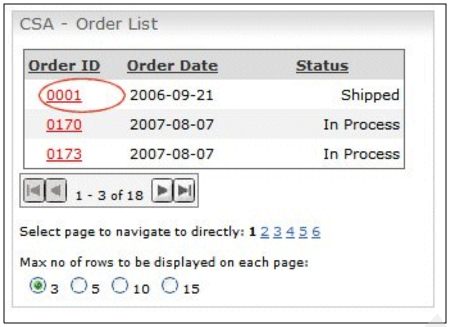

CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button.
Altenatively, edit the details of this customer, please click the **Edit** button.

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 8-51 Customer details

5. Go to the Order portal page. The OrderList portlet should now display the list of orders that the selected customer has previously placed; the OrderDetails portlet should still be empty.
6. Click the first order ID link in the OrderList portlet.



CSA - Order List

Order ID	Order Date	Status
0001	2006-09-21	Shipped
0170	2007-08-07	In Process
0173	2007-08-07	In Process

1 - 3 of 18

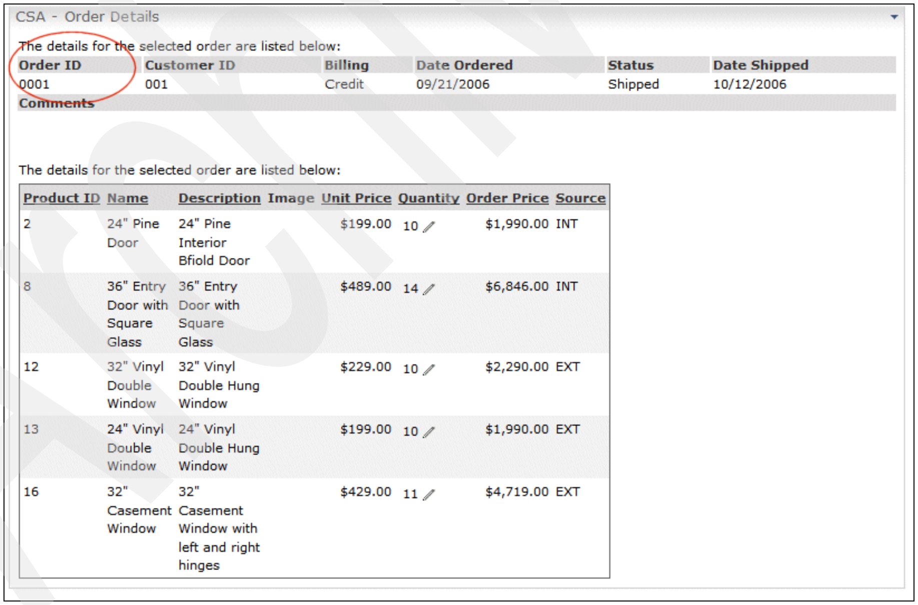
Select page to navigate to directly: 1 2 3 4 5 6

Max no of rows to be displayed on each page:

● 3 ○ 5 ○ 10 ○ 15

Figure 8-52 Click the first Order ID link in the OrderList portlet

7. The OrderDetails portlet should now display the details of the order just selected.



CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipped
0001	001	Credit	09/21/2006	Shipped	10/12/2006

Comments

The details for the selected order are listed below:

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	Source
2	24" Pine Door	24" Pine Interior Bfiold Door		$199.00	10	$1,990.00	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		$489.00	14	$6,846.00	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window		$229.00	10	$2,290.00	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window		$199.00	10	$1,990.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges		$429.00	11	$4,719.00	EXT

Figure 8-53 Order details for the order selected

8. Click other order ID links; the OrderDetails portlet will reflect the changes accordingly.

8.3.3 CustomerCredentials Model to CustomerInfo Model

The very first time a customer logs in, she will be prompted to enter her credential details before she can proceed further with the application. She will need to go to the Personalize page of the CustomerInfo portlet to set up credential details; by returning from the Personalize mode to the normal mode, the user should be able to see her details right away in the CustomerInfo Portlet. To ensure the CustomerInfo portlet refreshes itself automatically to meet this requirement, we need to fire an event from the CustomerCredential model to the CustomerInfo model letting it know that the credential details of the customer have now been set up correctly. The CustomerInfo model can then refresh itself by retrieving data from the credential vault.

At a high level, the following three steps are used to enable communications between the CustomerCredentials and CustomerInfo models.

1. Create an event declaration. The event will be fired from the CustomerCredentials model when a customer has correctly set up his or her credential details.
2. The CustomerCredentials model will fire the event when the customer is selected.
3. The CustomerInfo model will catch the event and update the customer details based on the credential values in the credentials vault.

Note: To test this link, we first need to complete the WPS Credential component of the application as described in 9.6.1, “Different entry paths for customers and CSRs” on page 438. We will only implement the link here and defer the testing to section 9.6.1.

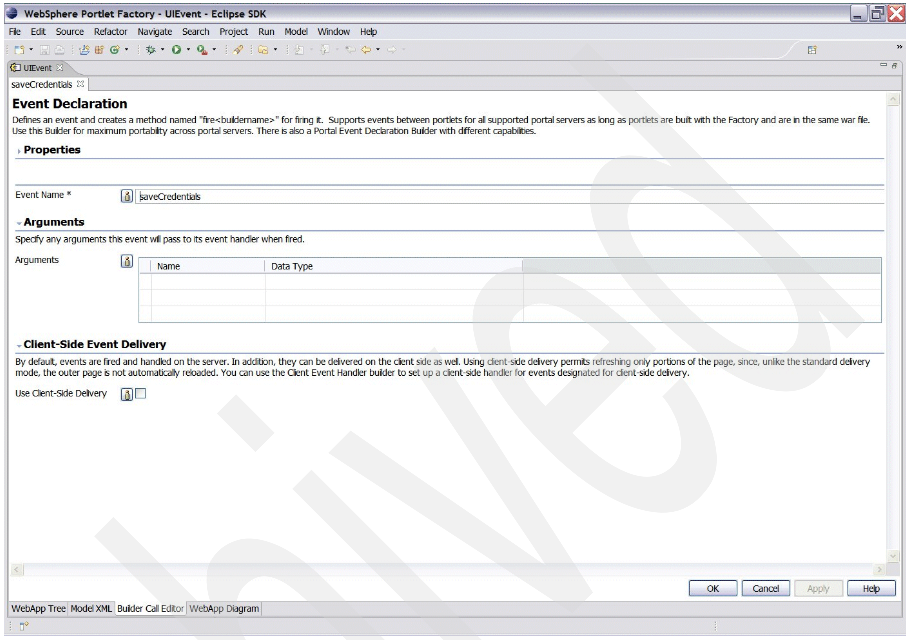
Declaring the event in UIEvent model

Note: In this case, we will not need a shared variable between the models because the data that is passed around is stored in the Credential Vault. We will be calling the LJO methods to set and get that data.

We will create the saveCredentials event first. The saveCredentials event declared in the UIEvent model is to be fired by the CustomerCredentials model to let the CustomerInfo model know that the credential details have been set up correctly by the customer. The CustomerInfo model will then proceed to carry out its tasks based on the data stored in the Credential Vault.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **common** → **UIEvent.model**. Double-click the **UIEvent.model** to open it.

2. In the UIEvent model, click to add an Event Declaration builder.
3. Name the Event Declaration builder `saveCredentials` and leave all the other options as default. Click **Apply**.


WebSphere Portlet Factory - UIEvent - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
UIEvent
saveCredentials
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Event Declaration

Defines an event and creates a method named "fire<buildername>" for firing it. Supports events between portlets for all supported portal servers as long as portlets are built with the Factory and are in the same war file. Use this Builder for maximum portability across portal servers. There is also a Portal Event Declaration Builder with different capabilities.

Properties

Event Name * saveCredentials

Arguments

Specify any arguments this event will pass to its event handler when fired.

Arguments

Name	Data Type

Client-Side Event Delivery

By default, events are fired and handled on the server. In addition, they can be delivered on the client side as well. Using client-side delivery permits refreshing only portions of the page, since, unlike the standard delivery mode, the outer page is not automatically reloaded. You can use the Client Event Handler builder to set up a client-side handler for events designated for client-side delivery.

Use Client-Side Delivery □

Figure 8-54 Declare the saveCredentials event in the UIEvent model

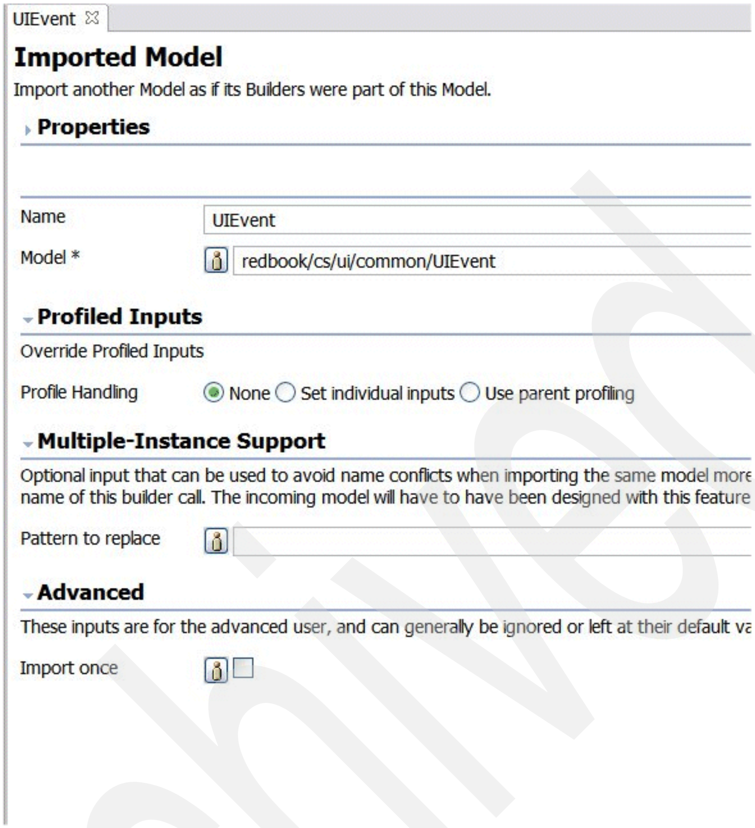
4. You have now finished creating the event. Save the UIEvent model by clicking the button.

Firing the event from the CustomerCredentials model

In the CustomerCredentials model, when a customer saves her credential details correctly, an event will be fired to notify the CustomerInfo model.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **customer** → **CustomerCredentails.mode**l. Double-click the **CustomerCredentails.model** to open it.
2. Import the UIEvent model. In the CustomerCredentials model, click to add an Imported Model builder.
3. Name the Imported Model builder `UIEvent` and make sure the path to the model reads `redbook/cs/ui/common/UIEvent`. Leave the rest as default and click **Apply**.

   At this point, the CustomerCredentials model should be able to see the event declared in the UIEvent model.


UIEvent ☒

Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name: UIEvent

Model *: redbook/cs/ui/common/UIEvent

Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

Multiple-Instance Support

Optional input that can be used to avoid name conflicts when importing the same model more
name of this builder call. The incoming model will have to have been designed with this feature

Pattern to replace:

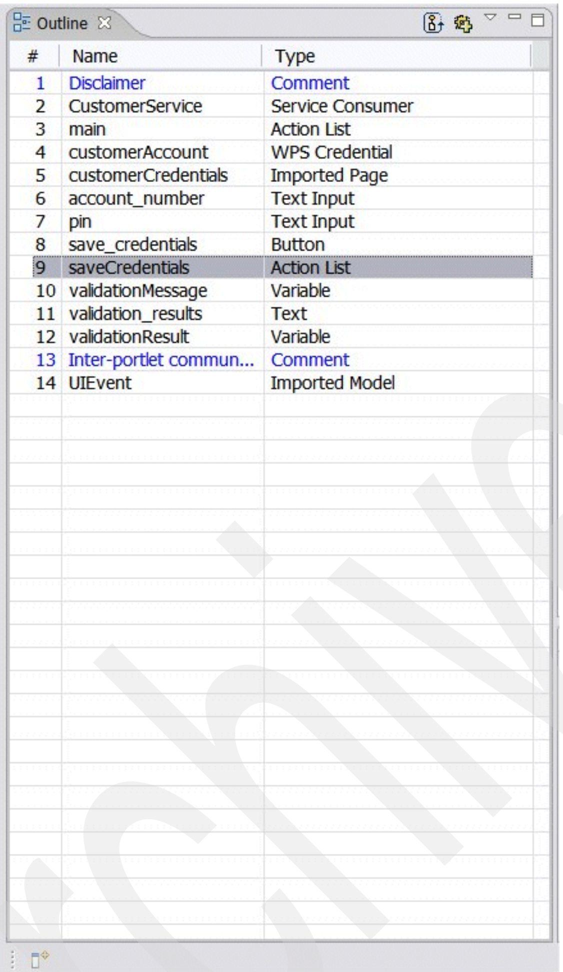
Advanced

These inputs are for the advanced user, and can generally be ignored or left at their default va

Import once: □

Figure 8-55 Import the UIEvent model into the CustomerInfo model

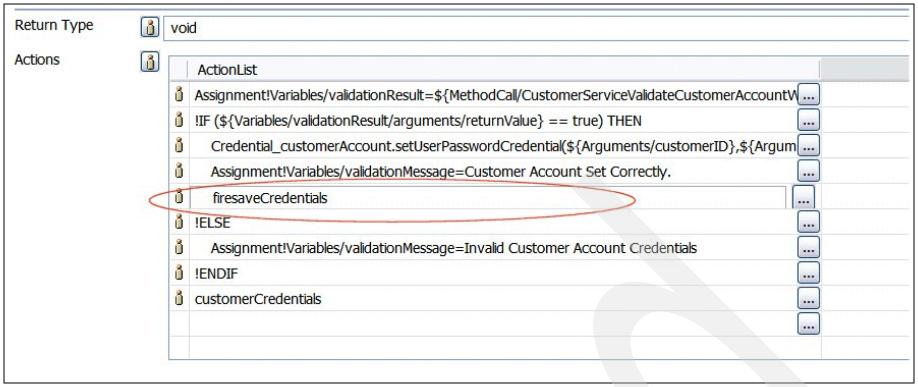
4. Verify that the saveCredentials Action List in the CustomerCredentials model does fire the saveCredentials event when a customer saves her valid credential details. In the Outline pane, double-click the **Action List** builder named **saveCredentials**. The **saveCredentials** builder will open in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	CustomerService	Service Consumer
3	main	Action List
4	customerAccount	WPS Credential
5	customerCredentials	Imported Page
6	account_number	Text Input
7	pin	Text Input
8	save_credentials	Button
9	saveCredentials	Action List
10	validationMessage	Variable
11	validation_results	Text
12	validationResult	Variable
13	Inter-portlet commun...	Comment
14	UIEvent	Imported Model

Figure 8-56 Open the saveCredentials Action List builder

5. In the Action List table, you should be able to see the firesaveCredentials method being called as shown in Figure 8-57.



```
Return Type    void
Actions        ActionList
               Assignment!Variables/validationResult=${MethodCall/CustomerServiceValidateCustomerAccountW
               !IF (${Variables/validationResult/arguments/returnValue} == true) THEN
                 Credential_customerAccount.setUserPasswordCredential(${Arguments/customerID},${Argum
                 Assignment!Variables/validationMessage=Customer Account Set Correctly.
                 firesaveCredentials
               !ELSE
                 Assignment!Variables/validationMessage=Invalid Customer Account Credentials
               !ENDIF
               customerCredentials
```

Figure 8-57 Verify that the firesaveCredentials method is called

> **Note:** This saveCredentials action list was created previously (described in Chapter 6). If you do not see the firesaveCredentials method being called in this action list, simply insert an empty row above the `ELSE` statement and call the method in the empty row. If the name of this method appears to be different, simply replace the existing one with this firesaveCredentials method.

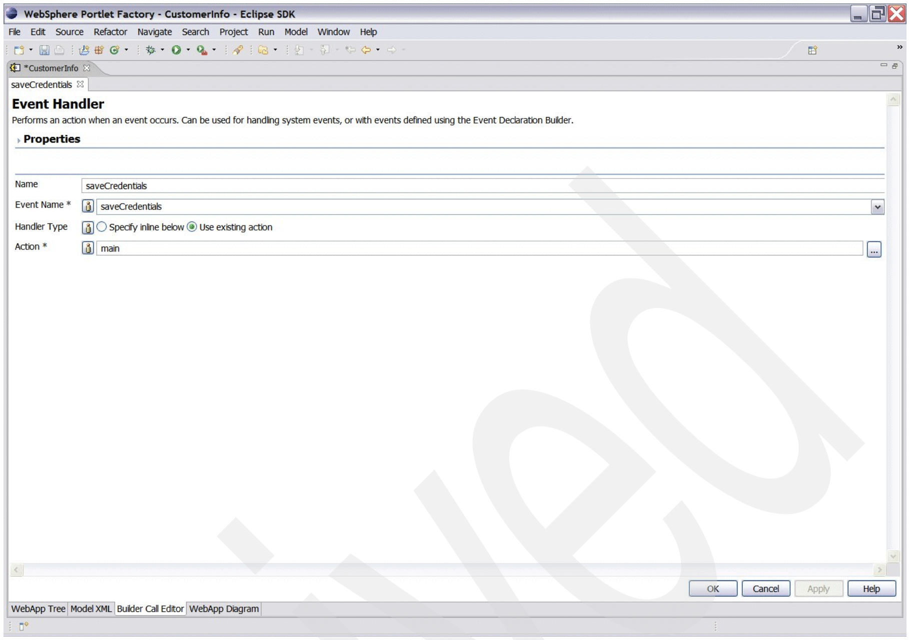
6. Save the CustomerCredentials model by clicking the 💾 button.

Handling the event in the CustomerInfo model

The CustomerInfo model should be listening to the saveCredentials event. When it receives one, it should call its main method to refresh its portlet page.

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **customer** → **CustomerInfo.model**. Double-click **CustomerInfo.model** to open it.
2. In the CustomerInfo model, click ✚ to add an Event Handler builder.
3. Make the following entries and selections in the Event Handler builder form:

Name:	`saveCredentials`
Event Name:	`saveCredentials`
Handler Type:	`Use existing action`
Action:	Click the ... button and select **Methods** → **main**


WebSphere Portlet Factory - CustomerInfo - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*CustomerInfo
saveCredentials
OK
Cancel
Apply
Help
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name: saveCredentials

Event Name *: saveCredentials

Handler Type: ○ Specify inline below ● Use existing action

Action *: main

Figure 8-58 Create the saveCredentials Event Handler

4. Click **Apply** to save the saveCredentials builder.
5. Save the CustomerInfo model by clicking the 💾 button.

8.4 Best practices

1. Using imported model for event declaration and shared variables

   It is generally a good practice to declare events and shared variables in a common model and then import the model into the event firing and event listening models. However, you should avoid using the common model as a dumping area for all the events and shared variables across many different models because it will become very hard to manage. Moreover, every time you import that common model, it will bring along lots of unrelated data and make the importing models unnecessarily large.

2. Using inter-portlet communication

   Whenever you think you need to implement inter-portlet communication, you should check whether that same behavior can be implemented by using a high-level builder. For instance, a View & Form builder allows you to view the details of a selected result set in the same portlet by enabling the Row Details Support option.

8.5 Conclusion

In this chapter, we have demonstrated how to create the inter-portlet communication links for our CSA. We have also discussed other possible ways of implementing inter-portlet communication. If you have followed the steps in this chapter, you should now have the three portlets working together as one application in WebSphere Portal.

Customizing the application using profiling

In this chapter we describe the basic concept of “profiling” in Portlet Factory. We also demonstrate how to apply various profiling techniques to our Customer Self Service Application.

To complete the steps in this chapter, you will need installed copies of WebSphere Portal and WebSphere Portlet Factory 6.0.1. We assume that you have followed the set up and configuration steps for the data service providers as described in chapters 4 and 5, and that you have built and deployed the CustomerInfo, OrderList, and OrderDetails portlets according to the procedures given in the previous three chapters.

> **Note:** The sample code (Chapter9.zip) available with this chapter *cannot* be run in standalone mode. You must deploy the project into WebSphere Portal for it to work.

9.1 Overview

In the previous chapters, we built the data services for the Customer Self Service application and built the portlets such that they are now working together as one application. To complete the Customer and Order components of our application, we now have to apply profiling to them.

Profiling in Portlet Factory is a very powerful and useful feature; it allows applications to have a high degree of flexibility to cater to different user cases and reduces the time and effort required to implement such applications. Therefore, it is important to understand the concept of profiling and to apply it in a manageable manner. In this chapter, we discuss what profiling means in Portlet Factory and the different types of profiling that can be done with Portlet Factory.

In the context of our Customer Self Service Application, we demonstrate the use of several profiling techniques. By the end of this chapter, we will have the Customer Self Service Application fully functioning as described in Chapter Chapter 2, “Scenario introduction” on page 15, except for the Go Shopping component.

Table 9-1 summarizes the features of CSA covered in this chapter as well as the builders and techniques used to implement these features.

Table 9-1 Summary of features implemented and builders and techniques used

Feature	Description of feature	Builders and techniques used
Profiling for different entry paths	Enables the CustomerGroup and CSRGroup to enter the application via two different paths.	**CustomerInfo model** Page WPS Credential Action List **Profile set selection handler** WPS Group Segment Handler **Profile-enabled builder** main (CustomerInfo - Action List)
Profiling for different data field properties	Enables the data field properties to vary based on the user group using two RDD files. Customers are not allowed to modify the PIN and IMAGE fields of their details.	**Profile set** com.ibm.redbook.cs.psets.wpsgroup **Profile set selection handler** WPS Group Segment Handler **Profile-enabled builder** CustomerService (CustomerInfo - Service Consumer)

Feature	Description of feature	Builders and techniques used
Profiling for different component visibility properties	Enables the application to hide or show different components based on the user group. Customers are not supposed to see the Back button on the Customer Details View page.	**CustomerInfo model** Visibility Setter **Profile Set** com.ibm.redbook.cs.psets.wpsgroup **Profile Set Selection handler** WPS Group Segment Handler **Profile-enabled builder** back_button (CustomerInfo - Visibility Setter)
Runtime customization	Enables users to personalize the OrderDetails portlet during runtime. They are given the option to hide or show the Product ID, Thumbnail and Source columns.	**OrderDetails model** Data Column Modifier **OrderDetailsCustomizer model** Portlet Customizer **Profile set** com.ibm.redbook.cs.psets.orderdetails customiser **Profile-enabled builder** ITEM (OrderDetails - Data Column Modifier)

9.1.1 Value to developers

Profiling allows developers to implement applications with a high degree of flexibility to fulfill various complicated real-life scenarios. Profiling can easily be applied from a high level down to very granular details of an application using Portlet Factory.

9.1.2 Value to users

Profiling adjusts an application's behaviors according to the end users' identities as well as other contextual information. End users receive only relevant components of the application, allowing the application to behave in a more personalized manner. End users also have the ability to further customize the user interface of the application to fit their own needs.

9.2 Profiling defined

Profiling in Portlet Factory allows automated generation of various versions of an application for different users. Depending on the type of profiling used, the behavior of the application is based on either pre-defined logic or end-user-specific inputs. For example, a manager can view the details of all the employees that he manages, while a normal employee can only view his own details in an HR system. In this case, the pre-defined logic takes care of the generation process; hence, neither user is aware of what happens behind the scene when the application is presented to him or her. On the other hand, when the manager personalizes a portlet application by hiding certain fields on a page, he is actively involved in creating his own profile for the portlet application to best fit his needs.

At a very high level, this is how profiling works in Portlet Factory: A profile-enabled application takes in values from different profiles during the regeneration phase and presents the users with different variations of the application based on their identities or other contextual information. The generation process of a profile-enabled application is shown in Figure 9-1.

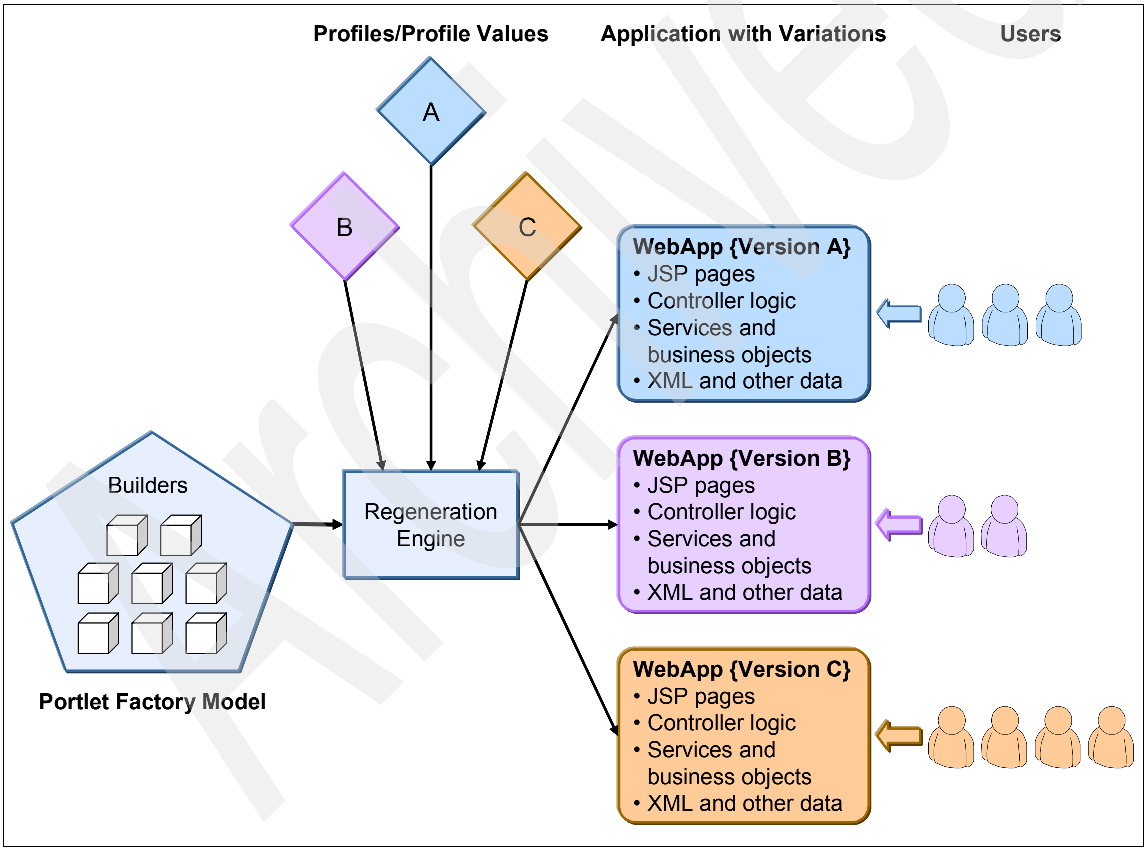


Figure 9-1 Generation process of a profile-enabled application in Portlet Factory

There are two basic steps to create a profile-enabled application in Portlet Factory:

1. Create or manage a profile set, profiles, profile entries, and profile values (defined in the next section).
2. Apply the profiles into appropriate builders.

In 9.4, “Types of profiling” on page 428, we explore how different types of profiling are implemented in the Customer Self Service Application.

9.3 Terms and definitions

Some important profiling terms are defined in the following list.

Profile set
A profile set is a collection of profiles. This acts like an interface that defines what values are stored in the profiles and how these values are to be accessed by the Regeneration Engine.

Profile
A profile is a collection of name value pairs that an application takes in during the regeneration process to create various behaviors for different users.

Profile entry
One or more profile entry items (name, UI type, and so forth) are used to describe the structure of the profile set.

Profile entry value
A profile value is associated with a profile entry in a profile and each value represents a possible variation in the behavior of an application.

For instance, a profile set named “Pet” contains profiles for a few popular kinds of animals that people like to keep as pets. These profiles might include Dog, Cat, Fish, and so forth. Each of these profiles contains a group of name and value pairs (in Portlet Factory terms, these are pairs of *profile entry* and *profile value*). For example, in the Dog profile, we might have a group of pairs like {(“name”, “dog”),(“favorite food”, “bone”)}; whereas for the Cat profile, we might have {(“name”, “cat”),(“favorite food”, “fish”)}. By encapsulating these profiles in the “Pet” profile set, Portlet Factory allows you to view different information based on the profile you selected using one user interface (that is, on the same fields of the same page).

This does not necessarily imply that all profiles will always have exactly the same elements displayed on the same page. This is because in addition to the ability to control the content behavior via profiling, Portlet Factory also allows you to set the visibility of certain elements (content or functions) on a page based on the profiles. For example, under the Dog and the Cat profiles, there might be a

“Listen to its voice” button that plays an audio clip of a dog barking or a cat meowing respectively. However, with the Fish profile, such a button might not be displayed at all.

From a technical point of view, Portlet Factory allows a clear separation between the presentation layer and the application logic. A developer will only have to develop one single user interface, but with the ability to easily modify the outcomes of an application by applying different profiles into the builders. Another benefit demonstrated in this example is that Portlet Factory allows developers to profile-enable an application down to a very granule level (that is, individual fields on a page or individual parameters of the application) without going through a lot of grief.

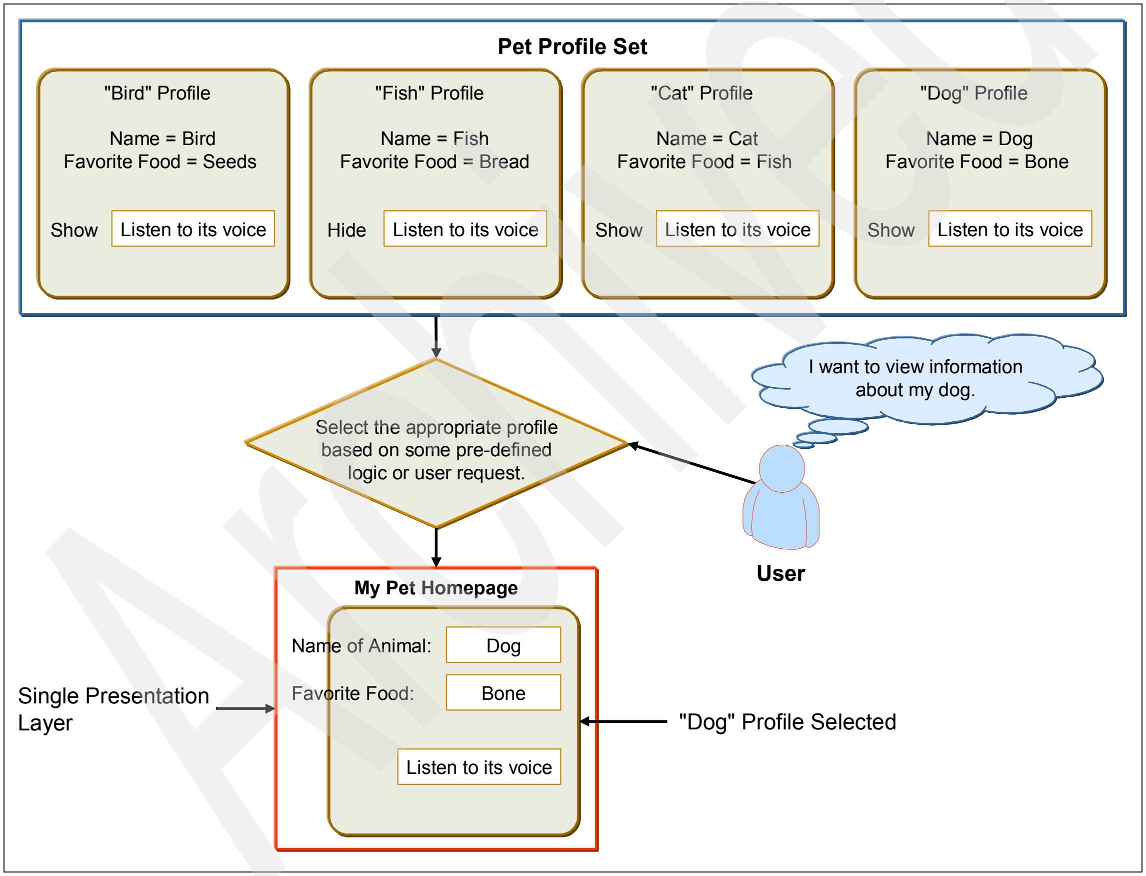


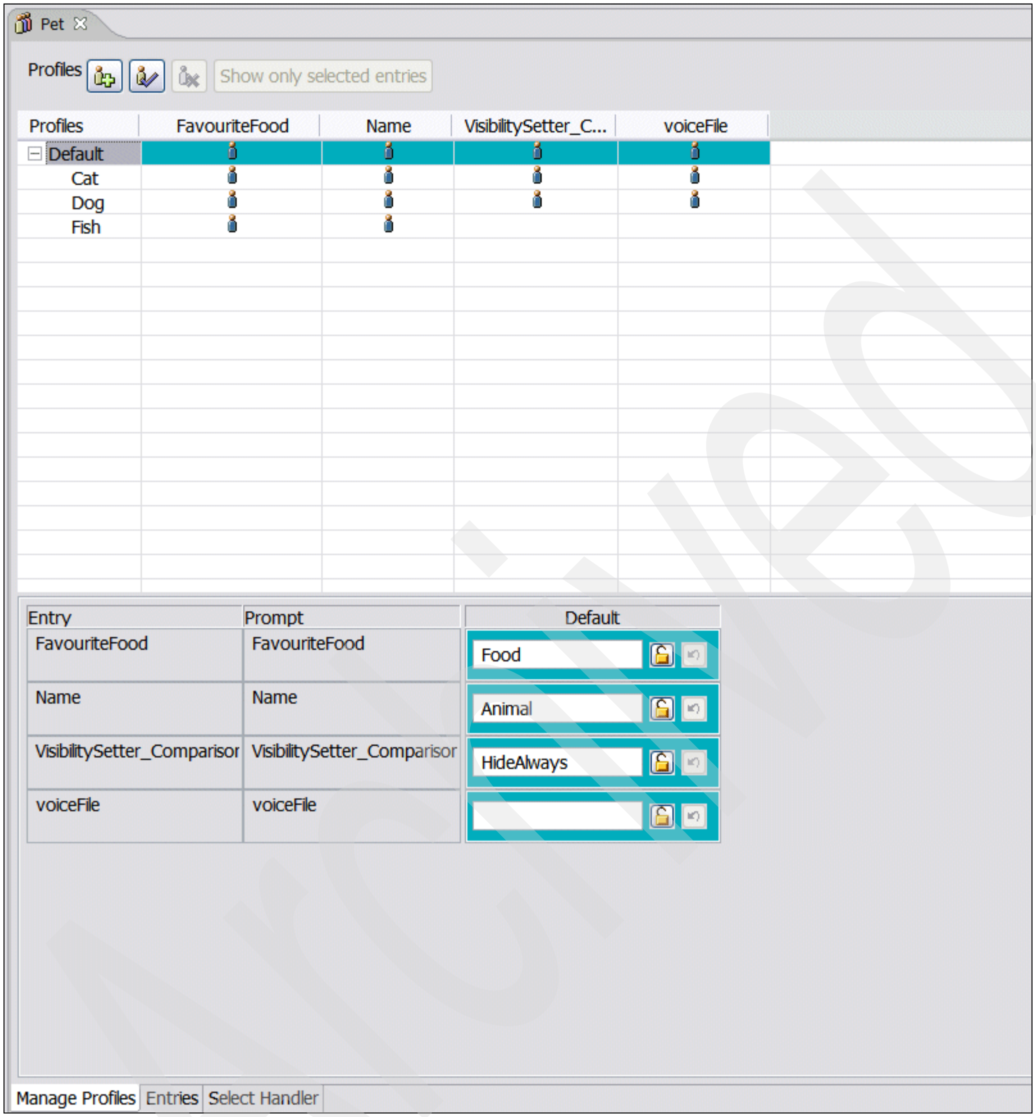
Figure 9-2 Separation between the presentation layer and the application logic in Portlet Factory

The definition of a profile set in a Portlet Factory project is in the format of an XML file with `.pset` as its suffix. These profile set files are stored in the `/WEB-INF/profiles` directory of the project.

Example 9-1 A subset of Pet.pset for the scenario described previously

```
<ProfileSet name="Pet" useQualifiedProfileNames="true">
   <Description>Generated profile set for model Pet</Description>
   <LastModifiedBy>wschan</LastModifiedBy>
   <ProfileSelectionClass>Explicit Handler</ProfileSelectionClass>
   <Models />
   <ProfileDef>
      <Entries>
         <Entry name="FavouriteFood" isRuntime="false">
            <UI type="TextInput">
               <Prompt>FavouriteFood</Prompt>
               <ExtraData>60</ExtraData>
            </UI>
         </Entry>
   </ProfileDef>
   <Profiles>
      <Profile name="Cat" last_modified="1186605057891"
      isContainer="false" parent="Default">
         <Values>
            <Value name="FavouriteFood">Fish</Value>
         </Values>
         <Roles />
      </Profile>
      <Profile name="Dog" last_modified="1186605057891"
      isContainer="false" parent="Default">
         <Values>
            <Value name="FavouriteFood">Bone</Value>
         </Values>
         <Roles />
      </Profile>
   </Profiles>
</ProfileSet>
```

There is no need to modify the profile set XML file directly because Portlet Factory provides a tool called *Profile Manager* to assist in managing all the profile sets. You can also create or modify the profile set during the profile enablement of a builder input. To access that, when the Designer is running in the WebSphere Portlet Factory perspective, go to **YourProject** → **profiles** and simply double-click any profile sets that you want to modify. The Profile Manager brings up the profile set that you selected in the Editor area. (Figure 9-3).



Profiles	FavouriteFood	Name	VisibilitySetter_C...	voiceFile
⊟ Default	●	●	●	●
Cat	●	●	●	●
Dog	●	●	●	●
Fish	●	●		

Entry	Prompt	Default
FavouriteFood	FavouriteFood	Food
Name	Name	Animal
VisibilitySetter_Comparisor	VisibilitySetter_Comparisor	HideAlways
voiceFile	voiceFile	

Figure 9-3 Profile Manager

9.4 Types of profiling

Portlet Factory provides two options of profiling techniques: *Profile selection* and *Profile value customization*. These techniques are discussed in detail in the following sections.

9.4.1 Profile selection

Profile selection can be implemented in either of two ways:

1. The application decides which profile to apply during regeneration based on some pre-defined profile selection logic. The selection process is carried out programmatically behind the scene using a profile selection handler. The first example in Section 9.2, where the manager and his employees get to see different information on the application, is a frequently used profiling selection technique. This example is based on the user groups defined in a group/user directory. Portlet Factory provides easy mechanisms (via the default Profile Selection Handlers) to integrate profiling with WebSphere Portal Group Directory as well as LDAP Group Directory. Another popular profile selection implementation is based on locale information. With Portlet Factory, developers can easily develop a multi-version application with different languages, date and currency formats, and so forth.

   Section 9.5.1, "Profile selection handlers" provides details on the default profile selection handlers that ship with Portlet Factory. It is not uncommon for developers to find that the default profile selection handlers do not completely cover the requirements of the application. Portlet Factory gives developers the flexibility to create their own selection logic; this is covered in Section 9.5.1 as well.

2. The profile selection process is exposed to end users using the Portlet Customizer mechanism, meaning exposing the options to the Portlet Edit/Config mode in Portal. This is not used as commonly as the previous technique.

9.4.2 Profile value customization

Similar to the profile selection technique, there are two ways that you can implement profile value customization:

1. The most common use case of profile value customization is to enable an end user to explicitly set profile values during runtime; these values are then used to regenerate the application. The concept behind this is the same as portlet customization in Edit and Config modes in WebSphere Portal. Portlet Factory allows you to create the Edit and Config pages without worrying about creating any portlet preference variables and matching these preferences with the corresponding properties of the portlet.

   Very often, the properties that a non portal administrator end user can modify have to do with the user interface. The user must have been granted the required security level in order to carry out the customization. In WebSphere Portal terms, the end user must have at least *privileged* access.

The three types of portlet value customization provided by Portlet Factory correspond to the three portlet customization modes in WebSphere Portal and have the following characteristics:

a. Custom edit type

   This is intended for end users with privileged access to customize the portlet application. The updates made here will only affect the individual user who made the modification and subsequently views the portlet on this page. It is known as the *Personalize* mode on WebSphere Portal 6. This technique is demonstrated in the Customer Service Application in Section 9.6.4.

b. Custom edit defaults type

   This is intended for portal administrators or users with sufficient access rights to change the default portlet application for all users. The updates made here affect all users who view the portlet on this page. However, these default values will be overridden if an individual user modifies them in the personalize mode. This technique is known as the *Edit Shared Settings* mode on WebSphere Portal 6.

c. Custom configure type

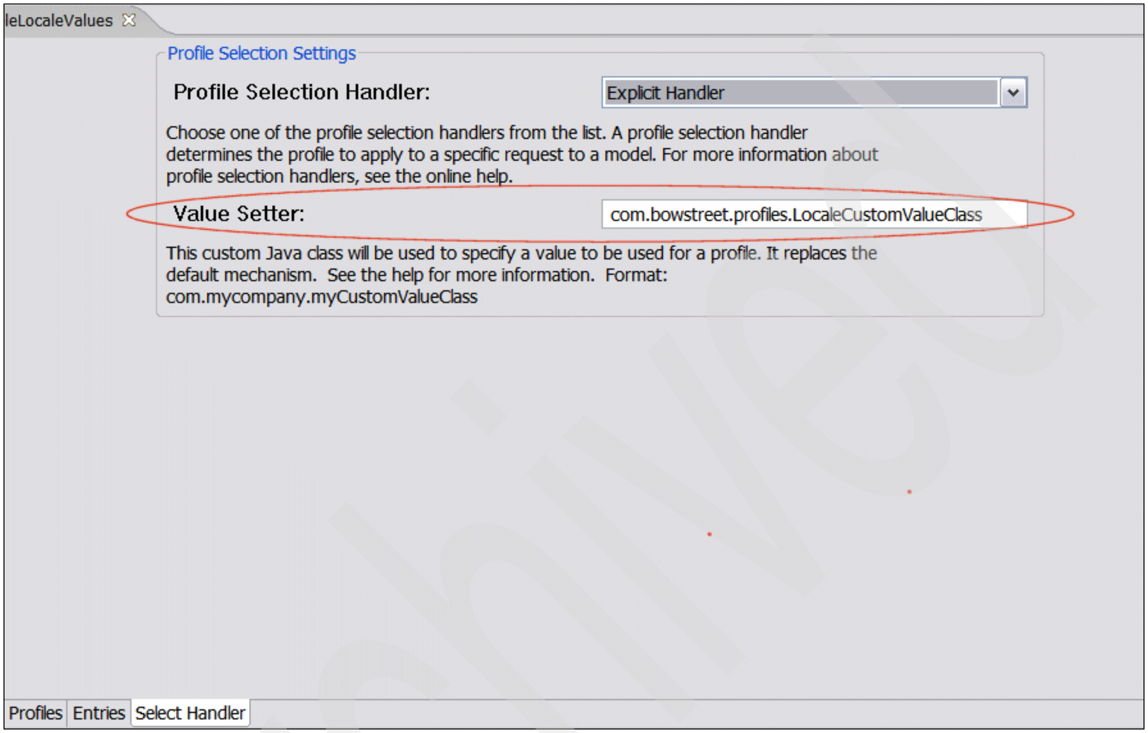
   This is intended for portal administrators or users with sufficient access rights to modify the default portlet application for all users across all pages. In other words, the updates made here will affect all users who view this portlet on any page. This option is known as the *Configure* mode on WebSphere Portal 6.

For each of these customization techniques, you can choose either to import a page or import a custom model to implement the portlet customizer.

2. Portlet Factory also provides a mechanism called *Value Setter* to enable profile value customization to be carried out programmatically. Value setter works in a manner similar to that of the profile selection handler, allowing developers to set some predefined logic to set individual profile values during the regeneration phase. There are also a few default value setters shipped with the Portlet Factory. We take a more detailed look at them in 9.5.2, “Value setter”.

9.5 Selection handlers

So far, we have mentioned that a profile-enabled application takes in values from different profiles during the regeneration phase to create variations in the application’s behavior. However, what is actually doing the work of selecting the “right” profile or setting the “right” values behind the scene? Portlet Factory has a mechanism called *selection handler,* and each selection handler can be either profile-based or profile-value-based. A selection handler is used to define the logic for choosing a profile or setting profile values during the regeneration phase of the application. Every profile set defined in Portlet Factory must be associated with one of these handlers.



Profile Selection Settings

Profile Selection Handler: Explicit Handler

Choose one of the profile selection handlers from the list. A profile selection handler determines the profile to apply to a specific request to a model. For more information about profile selection handlers, see the online help.

Value Setter: com.bowstreet.profiles.LocaleCustomValueClass

This custom Java class will be used to specify a value to be used for a profile. It replaces the default mechanism. See the help for more information. Format: com.mycompany.myCustomValueClass

Figure 9-4 Profile selection settings

9.5.1 Profile selection handlers

Portlet Factory provides a number of default profile selection handlers. In most cases, these are sufficient for developers to profile-enable their applications. However, developers can also define their own custom profile selection handlers when necessary. In this section we explore the default profile selection handlers and describe how to create a new profile selection handler.

Default profile selection handlers

The selection handlers provided by Portlet Factory by default are defined in Table 9-2.

Table 9-2 Default profile selection handlers provided by Portlet Factory

Handler name	Description
Explicit handler	Typically used during development so that you can preview models with different profiles applied.
File Segment handler	Associates a hard-coded user with a profile based on the user/profile mappings in an XML file.
J2EE Role handler	Associates the user with a J2EE role and returns the profile associated with that role.
LDAP Group Based Selection handler	Associates the user with an LDAP Group segment and queries the profile set to return the profile associated with the given LDAP Group.
Locale Selection handler	Associates the user with a language locale segment and returns the profile associated with the locale name. Use this handler with a WebSphere portlet or with a standalone Web application. Localization, however, is more commonly implemented using the other profiling technique, profile value customization via a value setter. This is covered in the next section.
Portal Execution Mode handler	Associates the request with a profile associated with a "standalone" mode or "running within a portal" mode. Use this selection handler to execute different code based on the execution mode. The deprecated name for this handler is "WPS Execution Mode Handler."
User Attribute handler	Selects a profile based on the value of a user attribute, where the name of the user attribute to use is configured in the selection handler's XML configuration file: `<project>/WebContent/WEB-INF/config/selection_handlers/userattributehandler.xml` One example is to select the profile based on the value of the jobTitle user attribute for each user (for example, Data Entry, or Manager, or CEO).

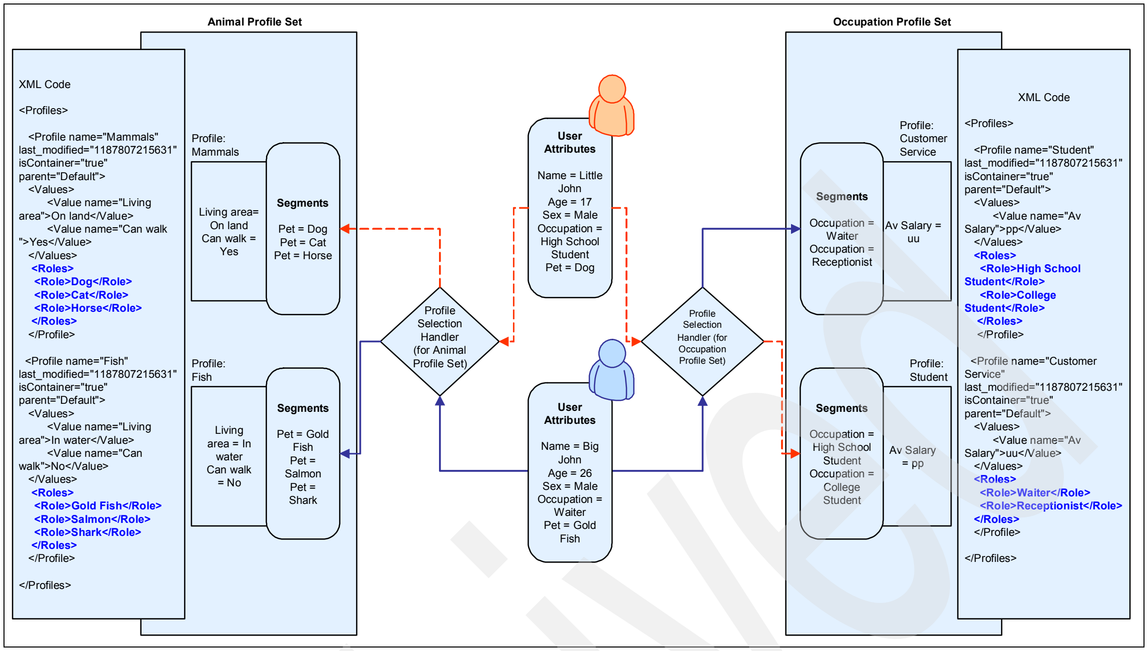
Handler name	Description
WP Composite Application Role Selection handler	Selects a profile based on the WebSphere Portal Composite Application Role that the user is in. This handler is only appropriate for portlets that are part of a composite application, not portlets just placed on a portal page outside of the WebSphere Portal template-based composite application framework. The definition file for this handler is located in: `WEB-INF/config/selection_handlers/wpcairolehandler.xml` This selection handler compares the composite application roles of which the user is a member with the external associations for the profiles in the associated profile set (under the Advanced section of the New or Edit profile dialog in the profile set editor). For example, for the profile privilegedUsers in a profile set, you could set external associations for “manager” and “executive” to correspond to roles created with those same names in the composite application in which the portlet will be used.
WPS Group Segment handler	Associates the request with the WebSphere Group to which the user belongs and returns the profile associated with that group. It can only be used with WebSphere Portal.

Note: The source code for many of the selection handlers ships with the Portlet Factory. You can find the source code in the selectionhandlers.zip file under the WEB-INF\work directory of your project.

How to create a selection handler

Another important concept related to developing customized profile selection handlers is that of *segments*.

The segments act as a binding between a user (or a use case scenario) and the corresponding profile. A selection handler will use one or more attributes of the user (or the use case scenario) to match it with a profile by comparing with the segment values of each profile in a profile set.


Animal Profile Set
Profile: Mammals
Living area= On land Can walk = Yes
Segments
Pet = Dog Pet = Cat Pet = Horse
Profile: Fish
Living area = In water Can walk = No
Segments
Pet = Gold Fish Pet = Salmon Pet = Shark
Profile Selection Handler (for Animal Profile Set)
User Attributes
Name = Little John Age = 17 Sex = Male Occupation = High School Student Pet = Dog
User Attributes
Name = Big John Age = 26 Sex = Male Occupation = Waiter Pet = Gold Fish
Profile Selection Handler (for Occupation Profile Set)
Occupation Profile Set
Profile: Customer Service
Segments
Occupation = Waiter Occupation = Receptionist
Av Salary = uu
Profile: Student
Segments
Occupation = High School Student Occupation = College Student
Av Salary = pp

XML Code

```
<Profiles>

   <Profile name="Mammals"
last_modified="1187807215631"
isContainer="true"
parent="Default">
   <Values>
         <Value name="Living
area">On land</Value>
         <Value name="Can walk
">Yes</Value>
   </Values>
    <Roles>
     <Role>Dog</Role>
     <Role>Cat</Role>
     <Role>Horse</Role>
    </Roles>
   </Profile>

  <Profile name="Fish"
last_modified="1187807215631"
isContainer="true"
parent="Default">
   <Values>
         <Value name="Living
area">In water</Value>
         <Value name="Can
walk">No</Value>
   </Values>
    <Roles>
     <Role>Gold Fish</Role>
     <Role>Salmon</Role>
     <Role>Shark</Role>
    </Roles>
   </Profile>

</Profiles>
```

XML Code

```
<Profiles>

   <Profile name="Student"
last_modified="1187807215631"
isContainer="true"
parent="Default">
   <Values>
         <Value name="Av
Salary">pp</Value>
   </Values>
   <Roles>
     <Role>High School
Student</Role>
     <Role>College
Student</Role>
    </Roles>
    </Profile>

  <Profile name="Customer
Service"
last_modified="1187807215631"
isContainer="true"
parent="Default">
   <Values>
         <Value name="Av
Salary">uu</Value>
   </Values>
   <Roles>
     <Role>Waiter</Role>
     <Role>Receptionist</Role>
   </Roles>
   </Profile>

</Profiles>
```

Figure 9-5 The concept of segments

In the example shown in Figure 9-5, Big John's occupation is Waiter, so the Profile Selection Handler of the Occupation Profile Set should match Big John with the Customer Service Profile when it finds the matching segment value in that profile. Similarly, the Profile Selection Handler of the Animal Profile Set should match Little John with the Mammals Profile, with the segment value being Dog.

A number of observations can be made from this example, including:

1. A segment can be anything that you wish to define as long as it is pertinent to the application. Even though in many cases a segment represents the user group of an user (like the WPS Group Segment handler uses the WebSphere Portal groups as its segments), a segment does not necessarily have to be tied to a "group/role based" mechanism. It can literally be any entity that developers wish to define it as.
2. There should be a 1-to-N relationship between profiles and segments. A profile can be associated with zero-to-N segments. (The most common case of a profile with no segments associated with it is the Default profile of a profile set.) A segment is typically associated with one profile in the profile set. The profile manager does not verify segment associations; therefore, developers should take care of this situation within the Profile Selection handler. The default Profile Selection handlers that ship with the Portlet

Factory will simply stop at the first matching profile.In the case of hierarchal profiles, the one that matches at the greatest depth will be selected.

3. In the XML file of the profile set, the segments actually appear under the <Roles> element, but keep in mind that a segment does *not* necessarily have to be tied to a "group/role based" mechanism.

Example 9-2 XML File of the profile set

```
<Profile name="Mammals" last_modified="1187807215631"
isContainer="true" parent="Default">
   <Values>
         <Value name="Living area">On land</Value>
         <Value name="Can walk ">Yes</Value>
   </Values>
   <Roles>
     <Role>Dog</Role>
     <Role>Cat</Role>
     <Role>Horse</Role>
   </Roles>
 </Profile>
```

Developers can use a mechanism called *SegmentList Interface* to allow the profile manager to show the available segments for a given selection handler. This makes the association between the segments and the profiles a lot easier because the developers do not have to enter the segments explicitly as external segments. However, in many cases, like the WPS Group Segment Handler, this SegmentList Interface mechanism will not work because it requires the group information from the WebSphere Portal.

From an implementation point of view, there are three steps to develop a customized profile selection handler:

1. Create a handler definition file. The handler definition file is an XML format file that lists the Java classes used to implement the profile selection handler and any properties of the profile selection handler. The handler file resides in the WEB-INF\config\selection_handlers directory of your project.

Example 9-3 The handler definition file for WPS Group Segment Handler

```
<Handler name="WPS Group Segment Handler">
   <Description>Handler that maps users to a segment using WPS group
   membership.
   </Description>
   <Selection
   class="com.bowstreet.profiles.ProxyProfileSelectionHandler">
      <Properties>
         <Property name="SelectionClass">
```

```
            com.bowstreet.ibmportal.profiles.WPSGroupProfileSelection
         </Property>
      </Properties>
   </Selection>
</Handler>
```

2. Extend the SelectionHandlerBase Class. This Java class associates the request with one or more segments and returns a profile based on your selection algorithm.
3. Implement the SegmentList Interface (optional). This Java class determines and returns a list of segments to be used by the Profile Manager when customizing profile entries. If you want to list all your segments in Profile Manager while managing the profiles, you need to implement the SegmentList Interface. If a Selection handler does not implement the SegmentList Interface, you have to add external segments for profiles in the Profile Manager. For example, WPS Group Segment handler does not implement the SegmentList Interface, so all the portal user group names cannot be listed in Profile Manager. Instead, you can specify the portal user group names for a profile by using the Add External button in the Profile Manager. (This WPS Group Segment handler example will be demonstrated in the Customer Self Service Application customer self service application.)

For a tutorial to create a simple customized selection handler, see *Developing portlets with the profiling capability of WebSphere Portlet Factory* at http://www.ibm.com/developerworks/websphere/library/tutorials/0703_wang/0703_wang.html

9.5.2 Value setter

Value setter is a mechanism for specifying the appropriate profile values during the application regeneration phase. When a value setter is defined for a profile set, the value setter option will override the profile selection handler option. The major difference between a value setter and a profile selection handler is that a value setter allows you to programmatically create profile values, as opposed to selecting a predefined profile containing static values.

Portlet Customizer uses this type of technique behind the scenes to implement end user personalization in Portal Edit/Config mode. Another common use of value setter is for localization of an application. For a detailed example of how to localize an application, see the *Localizing Portlets* tutorial at: http://www.ibm.com/developerworks/websphere/zones/portal/portletfactory/samples/misc.html

Default value setters

There are a number of default value setters provided by Portlet Factory, including the following:

- com.bowstreet.profiles.LocaleCustomValueClass

  This value setter is used in the com.bowstreet.profileset.SimpleLocaleValues default profile set. It relies on the user's locale preference to determine the correct language and country codes to apply to the Localized Resource builder call. It is essential that the Language and Country inputs of the Localized Resource builder call are associated with the LanguageCode and CountryCode Profile Entries in the SimpleLocaleValues profile set in order for this profile values handler to work properly.

  The benefit of using a value setter over a profile selection handler for localization is the ability to manage and store the locale data in a Resource Bundle instead of individual profile values.

- com.bowstreet.profiles.ProfileUpdateValueFromRequest

  This value setter is not tied to any default profile set. It gets profile values from correspondingly named request parameters (query string or post parameters). It is potentially useful in standalone Web applications, but probably not in portlets.

9.6 Profiling in our sample application

In this section we illustrate how various profiling techniques can be applied by implementing them in our Customer Self Service Application to efficiently create the following variations in the application's behavior:

1. Different entry paths for customers and CSRs

   When a CSR logs in, a list of all customers is displayed on the Customer Info Portlet, and if the CSR clicks any ID link of a customer, the details about that customer will be displayed in the same portlet.

   As for a customer, there are two possible scenarios:

   – First log-in ever (Credential details have not been set)
   When a customer logs into the Customer Self Service Application for the very first time, a message in the Customer Info Portlet advises him to set up his credential details. The customer will have to go to the Edit page of the portlet to set up an account using the access details that the CSR has previously provided to him. Providing that the credential details are valid, the customer will then be presented with his details in the Customer Info Portlet. From this point on, the customer will always see his details in the Customer Info Portlet when he logs in.

- Subsequent log-in (Credential details have been set correctly)
  If a customer has previously set up his credential details correctly, when he logs in he is presented with his details in the Customer Info Portlet.

2. Different field properties for customers and CSRs

   When a customer edits his details, he should not be allowed to modify the Image and PIN fields; when a CSR is editing a customer's details, the CSR will be given the permission to modify those two fields.

3. Different visibility of application components for customers and CSRs

   When a CSR selects to view the details about a customer, there should be a Back button that allows the CSR to go back to the list of customers that he sees when he first logs in. This enables the CSR to view details of another customer. However, this Back button should not be presented to any customers.

4. End users runtime customization

   In the Order Details Portlet, end users (both CSRs and customers) have the ability to specify whether or not to display any of the following columns: Product ID, Thumbnail, and Source. The customization is carried out during runtime on the Edit Page of the portlet.

9.6.1 Different entry paths for customers and CSRs

Our implementation of this application feature demonstrates the profile selection technique. To create the different entry paths for the Customer Group and the CSR Group, we apply profiles to the action lists being called by the main method in the Customer Info Model. Since this profiling is based on the user groups, we will be using the default WPS Group Segment Handler as the profile selection handler.

At a high level, the procedures to create the two different entry paths are:

1. Create the two user groups (CSRGroup and CustomerGroup) in Portal and assign privileged security access to the CSA for these groups.
2. Create the Profile Set and the two Profiles using the Profiling Manager. Associate a Selection Handler with the Profile Set created.
3. Set up the WPS Credential component of the CSA.
4. Create the entry path for the CSRGroup.
5. Create the entry path for the CustomerGroup.
6. Apply profiling to the main method of the CustomerInfo model to enable the two different entry paths based on the user group.

The following sections provide step by step instructions for these tasks along with the steps to test that profiling has been successfully implemented.

Create user groups in portal

1. Create the two user groups for the Customer Self Service Application. Log into portal as a portal administrator and go to the Users and Groups page by selecting **Administration** → **WebSphere Portal** → **Access** → **Users and Groups**. Create the following groups:

   – CSRGroup for all the customer sales representatives
   – CustomerGroup for all the customers

2. Under these group, create the following users:

   – CSRGroup Users:

     - csr1
     - csr2

   – CustomerGroup User:

     - customer1
     - customer2
     - customer3

   Use their user names as their passwords as well.

   > **Note:** Make sure these users all have *privileged* access to all the pages and portlets of the Customer Self Service Application. Consult WebSphere Portal help documentation if you are unsure how to create users or assign security access.

Create the profile set and profiles

Begin by creating the profile set needed for this WPS Group-based profiling.

1. In Project Explore, right-click **RedbookCS**. Select **New** → **WebSphere Portlet Factory Profile Set.**

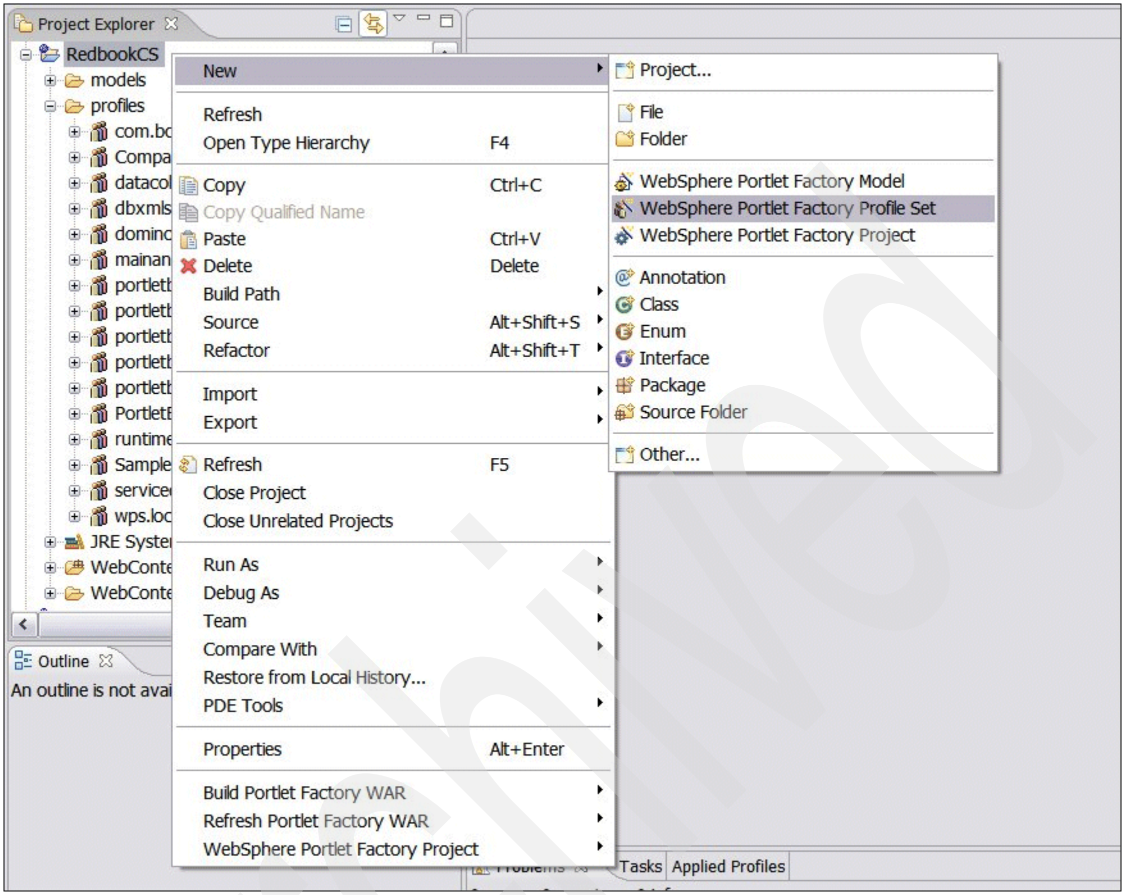
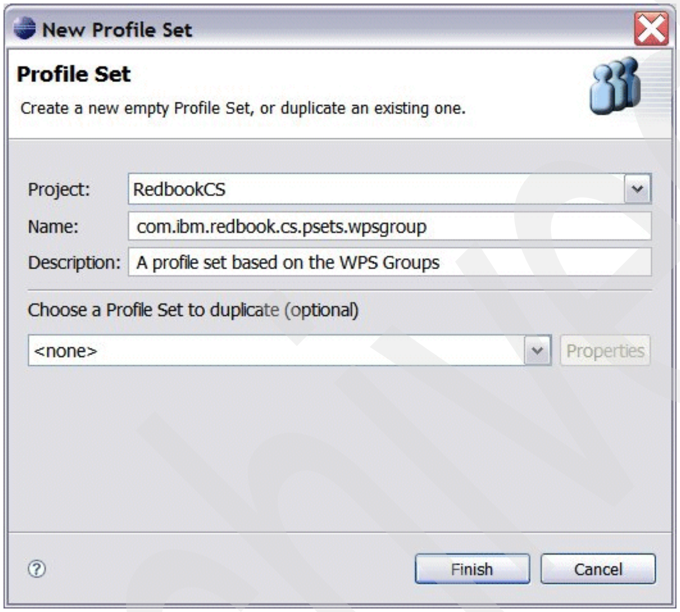


Figure 9-6 Create a new Profile Set

2. In the New Profile Set window, make the following entries and selections; leave everything else as default.

Project:	`RedbookCS`
Name:	`com.ibm.redbook.cs.psets.wpsgroup`
Description:	`A profile set based on the WPS Group`

   Click **Finish**.



New Profile Set

Profile Set

Create a new empty Profile Set, or duplicate an existing one.

Project: RedbookCS

Name: com.ibm.redbook.cs.psets.wpsgroup

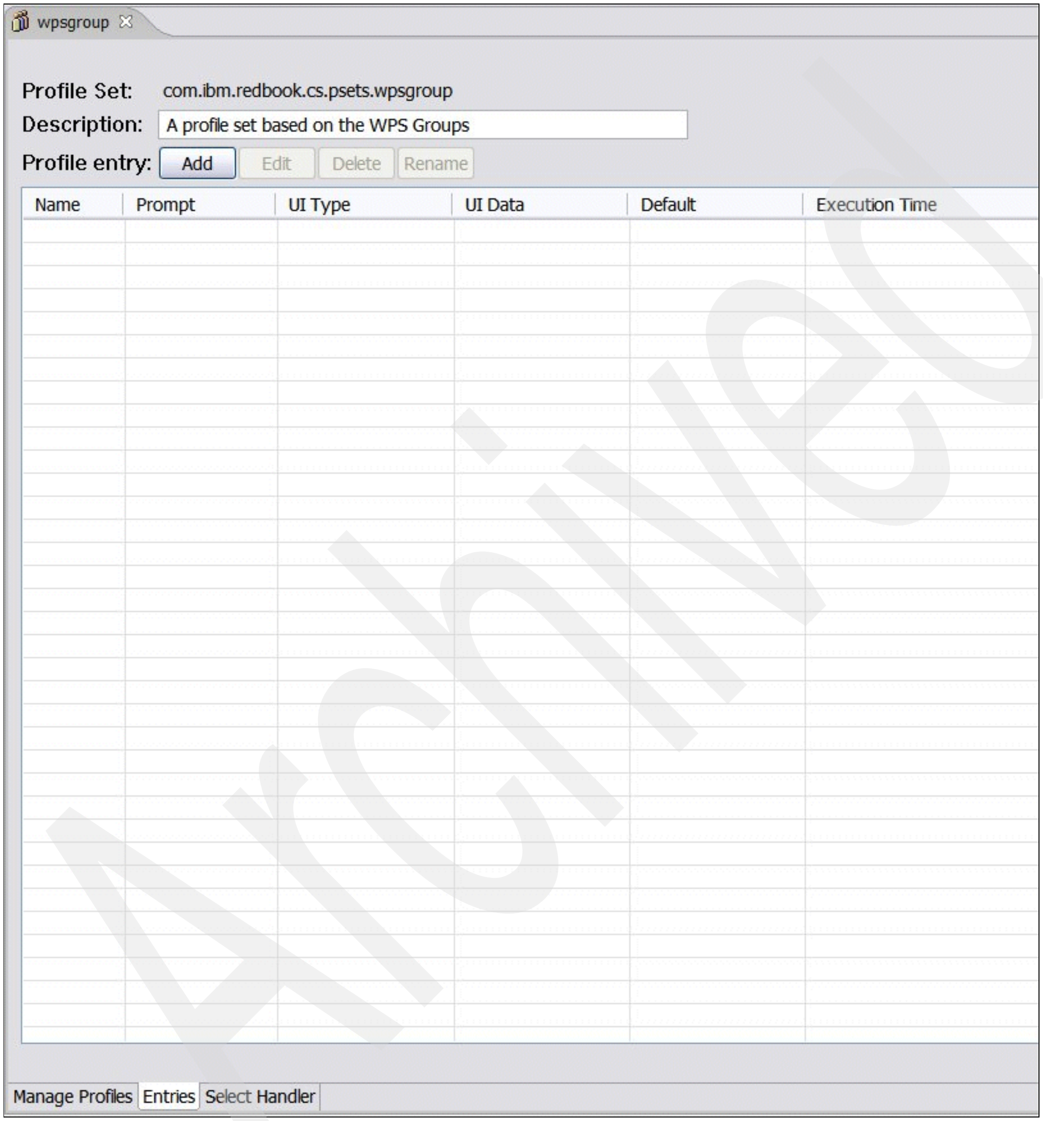
Description: A profile set based on the WPS Groups

Choose a Profile Set to duplicate (optional)

<none>

Figure 9-7 The New Profile Set is Based on the WPS Groups

3. The Profile Manager shown in Figure 9-8 opens once the profile set is created. To create the two profiles, select the **Manage Profiles** tab. The resulting window is shown in Figure 9-9.



Profile Set: com.ibm.redbook.cs.psets.wpsgroup

Description: A profile set based on the WPS Groups

Profile entry:

Name	Prompt	UI Type	UI Data	Default	Execution Time

Figure 9-8 Profile Manger of the com.ibm.redbook.cs.psets.wpsgroup profile set

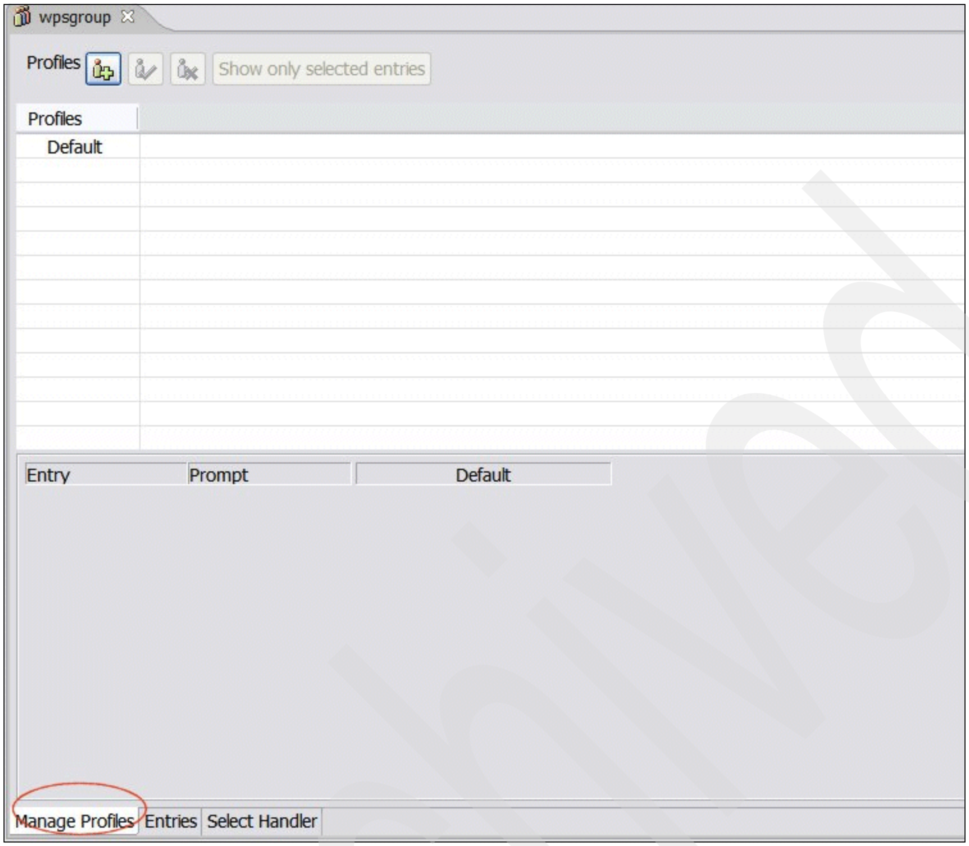
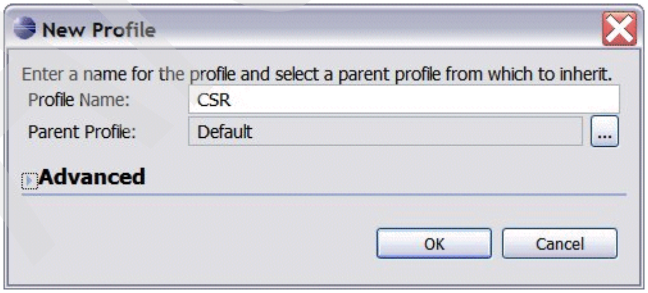


Figure 9-9 The Manage Profiles tab

4. Click the **Add new profile** button (✚) to create a new profile. When the New Profile window opens, name this profile `CSR`.



New Profile

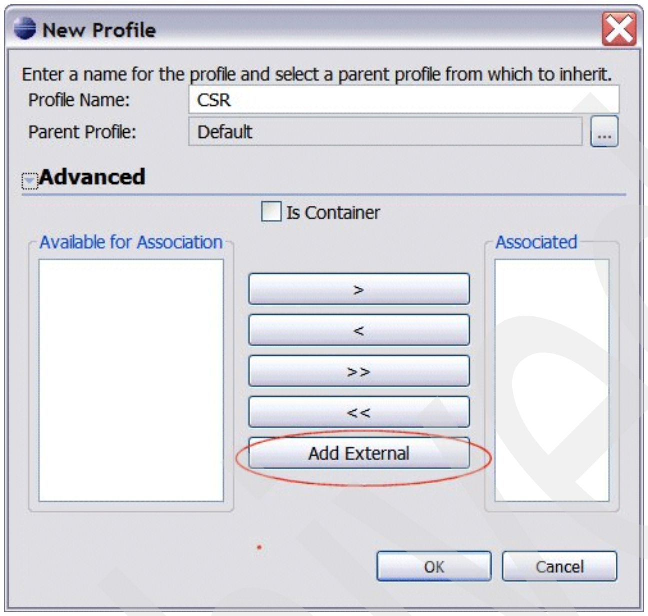
Enter a name for the profile and select a parent profile from which to inherit.

Profile Name: CSR

Parent Profile: Default

Figure 9-10 Create the CSR profile

5. To associate the CSRGroup created previously in portal with this profile, expand the Advanced section. Click **Add External**.



New Profile

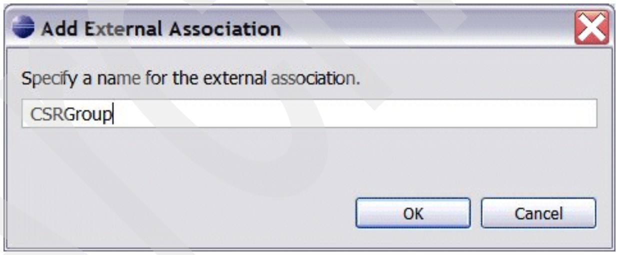
Enter a name for the profile and select a parent profile from which to inherit.

Profile Name: CSR

Parent Profile: Default

Figure 9-11   Associate the CSRGroup with this profile

6. In the Add External Association window, enter `CSRGroup` and click **OK**.



Add External Association

Specify a name for the external association.

CSRGroup

Figure 9-12   Specify the WPS Group name

> **Note:** It is very important that the group you enter here *exactly* matches the group name that you created in portal.

7. Click **OK** on the New Profile window.

   Now click the button to create the second profile. In the New Profile window, name this profile `Customer`.

8. To associate the CustomerGroup created previously in portal with this profile, expand the Advanced section. Click **Add External**.

9. In the Add External Association window, enter `CustomerGroup` and click **OK**.

> **Note:** It is very important that the group you enter here *exactly* matches the group name that you created in portal.

10. Click **OK** in the New Profile window. The Manage Profiles tab shown in Figure 9-13 is returned.

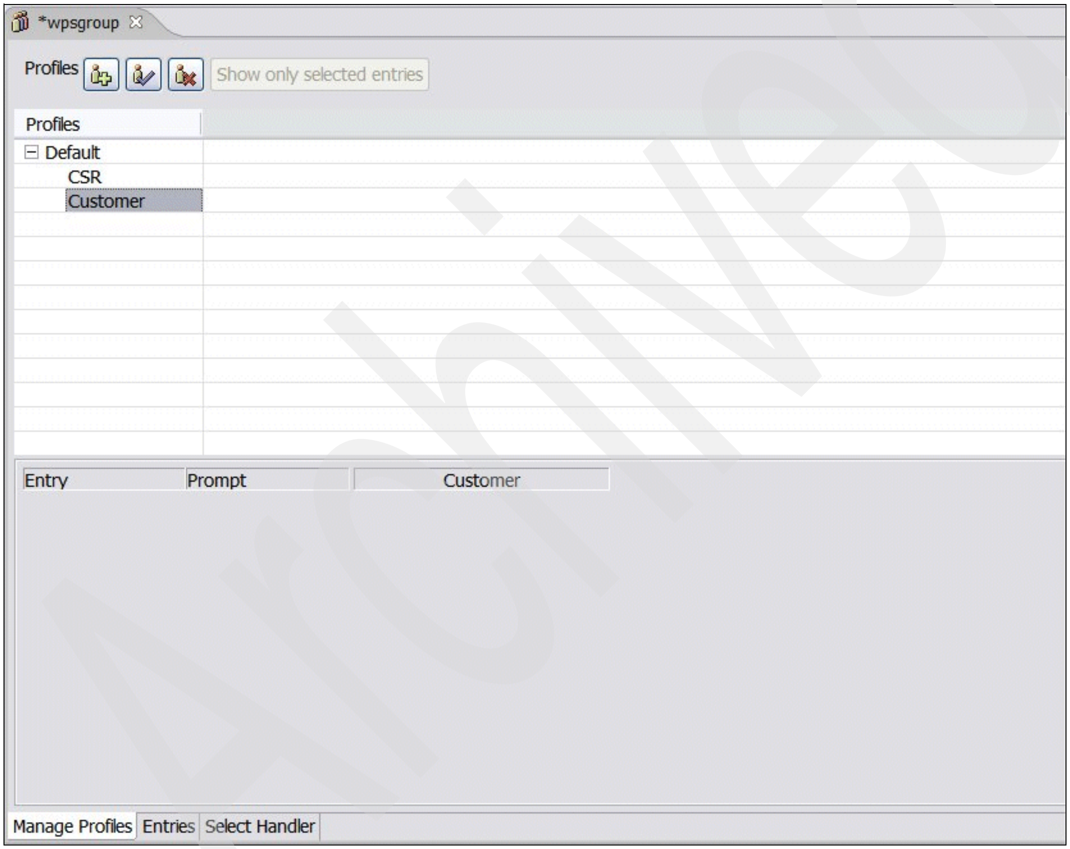
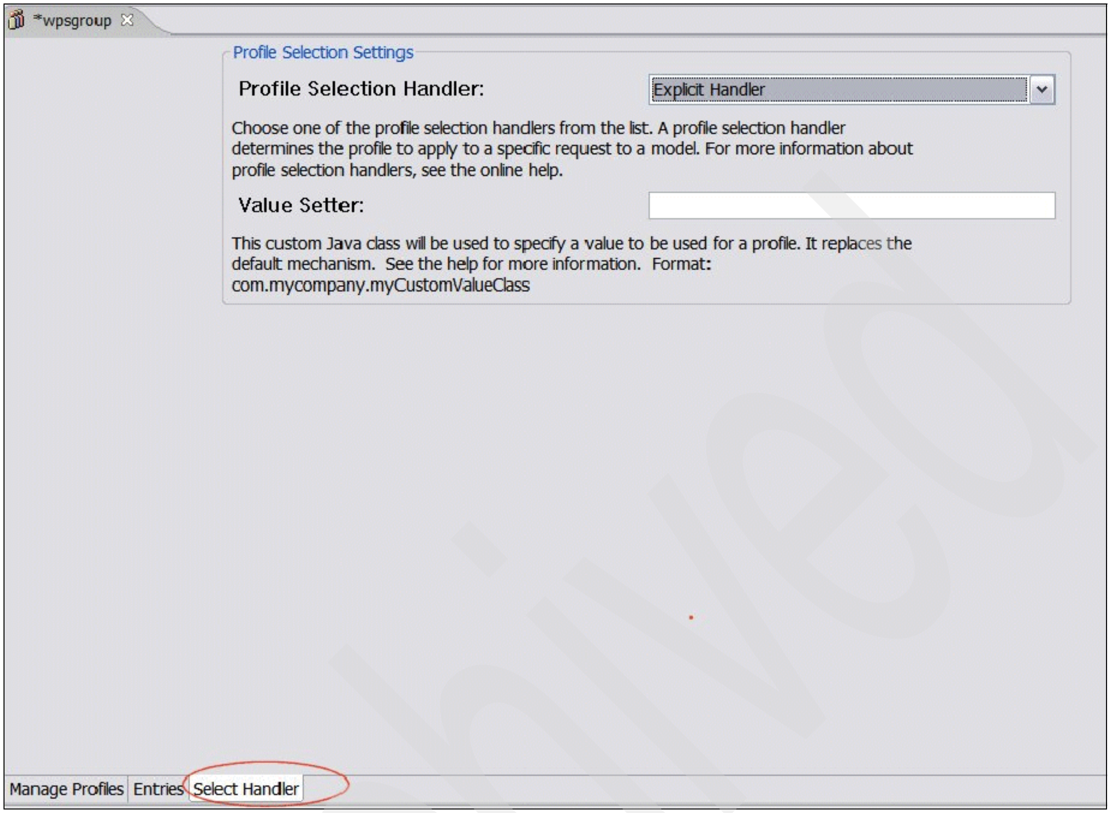


Figure 9-13 The Manage Profiles tab after creating the two profiles

11. To associate a Selection Handler with this profile set, click the **Select Handler** tab.



Profile Selection Settings

Profile Selection Handler: Explicit Handler

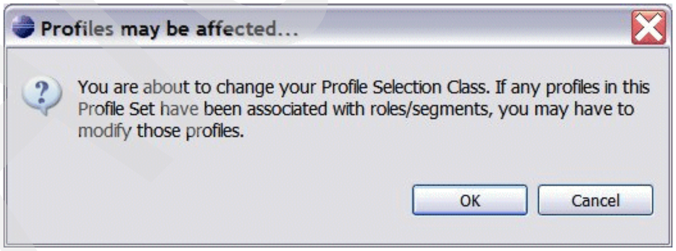
Choose one of the profile selection handlers from the list. A profile selection handler determines the profile to apply to a specific request to a model. For more information about profile selection handlers, see the online help.

Value Setter:

This custom Java class will be used to specify a value to be used for a profile. It replaces the default mechanism. See the help for more information. Format: com.mycompany.myCustomValueClass

Figure 9-14 The Select Handler tab

12. Select **WPS Group Segment Handler** as the Profile Selection Handler. Click **OK** in the confirmation box that pops up (Figure 9-15).


Profiles may be affected...

You are about to change your Profile Selection Class. If any profiles in this Profile Set have been associated with roles/segments, you may have to modify those profiles.

Figure 9-15 Profile selection handler confirmation box

13. Click the **Save** button (💾) to save the wpsgroup profile set.

Set up the WPS Credential component

> **Note:** The fact that we introduce the WPS Credential builder here may have made profiling seem a bit more complicated; however, the concept of applying profiling to the action lists to allow alternative page flows in a model should remain the same even without the WPS Credential component.

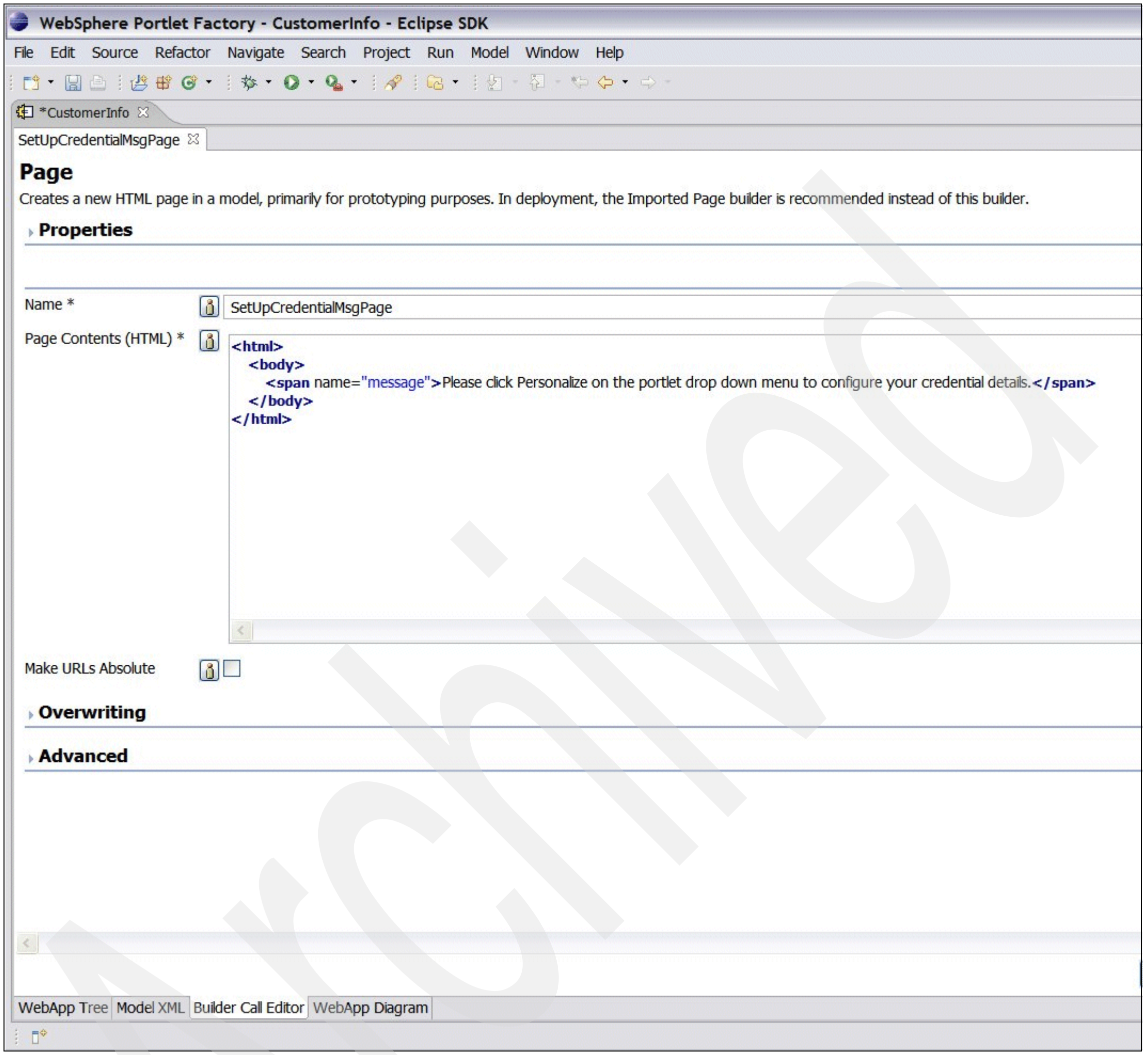
When the customer logs in for the first time, he will be prompted to set up his credential details. Otherwise, the customer will not be able to use the Customer Self Service Application. The credential details are to be provided by a CSR external to this application.

We previously built and imported the CustomerCredentials model into the CustomerInfo model. Now, we use that to build the entry path for the customers.

1. Create a page with a message asking the customer to set up his credential details. In the CustomerInfo model, click the button to add a Page builder.
2. Name the page `SetUpCredentialMsgPage` and paste the following HTML sample content into the Page Contents box:

```
<html>
   <body>
      <span name="message">Please click Personalize on the portlet
      drop down menu to configure your credential details.</span>
   </body>
</html>
```

3. Click **Apply** to save the Page builder.


WebSphere Portlet Factory - CustomerInfo - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*CustomerInfo
SetUpCredentialMsgPage
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Page

Creates a new HTML page in a model, primarily for prototyping purposes. In deployment, the Imported Page builder is recommended instead of this builder.

Properties

Name * SetUpCredentialMsgPage

Page Contents (HTML) *

```
<html>
  <body>
    <span name="message">Please click Personalize on the portlet drop down menu to configure your credential details.</span>
  </body>
</html>
```

Make URLs Absolute □

Overwriting

Advanced

Figure 9-16 A page with a static message notifying customers to set up their credential details

4. To access the details stored in the Portal Credential Vault, add a WPS Credential builder. In the CustomerInfo model, click the button to add a WPS Credential builder.

5. Make the following entries and selections:

Name:	`customerAccount`
Type:	`Shared`
Resource Name:	`CustomerSelfServiceAccount`

> **Note:** The details entered here must *exactly* match the details in the customerAccount WPS Credential builder of the CustomerCredentials model.

6. Click **Apply** to save the customerAccount WPS Credential builder.

Set up an Action List for CSRs

1. In the CustomerInfo model, click the button to add an Action List builder and name it `showCustomersList`.
2. To make the showCustomersList action list display the list of all customers, do the following:
   a. Click the ... button on the first empty row of the Action List Table.
   b. In the Select Action window, choose **Methods** → **CustomerList_ShowResults**.
   c. Click **Apply** to save the showCustomersList builder.

Set up an Action List for customers

1. In the CustomerInfo model, click the button to add an Action List builder and name it `checkCredentials`.
2. Perform the steps to make the checkCredentials action list do the following tasks:
   a. Check whether the logged in customer’s credential details exist in the credential vault.
      i. Click the ... button on the first empty row of the Action List Table.
      ii. In the Select Action window, choose **Special** → **Conditional** → **if**. The Define Conditional Action window pops up.
      iii. Click the ... button next to the Value Input Field in the Define Conditional Action window. Choose **MethodCall** → **Credential_customerAccount** → **doesCredentialExist**.
      iv. Click **OK** on the Define Conditional Action window.
   b. If the details exist, set the customerID shared variable (declared in the UIEvent model) equal to the user ID retrieved from the credential vault and then show the customer details.
      i. Click the ... button on the next empty row of the Action List Table.
      ii. In the Select Action window, choose **Special** → **Assignment**. The Make Assignment window pops up.

    iii. Click the [...] button next to the Source Input Field in the Make Assignment window. Choose **MethodCall** → **Credential_customerAccount** → **getUserID**.

    iv. Click the [...] button next to the Target Input Field in the Make Assignment window. Choose **Variables** → **customerID**.

    v. Leave the Assignment Type as **Replace**.

    vi. Click **OK**.

    vii. Click the [...] button on the next empty row of the Action List Table.

    viii. In the Select Action window, choose **Methods** → **CustomerDetails_ShowResults**.

  c. If the credential details do not exist, display the SetUpCredentialMsgPage.

    i. Click the [...] button on the next empty row of the Action List Table.

    ii. In the Select Action window, choose **Special** → **Conditional** → **else**.

    iii. Click the [...] button on the next empty row of the Action List Table.

    iv. In the Select Action window, choose **Pages** → **SetUpCredentialMsgPage**.

    v. Click the [...] button on the next empty row of the Action List Table.

    vi. In the Select Action window, choose **Special** → **Conditional** → **endif**.

3. Click **Apply** to save the checkCredentials builder.

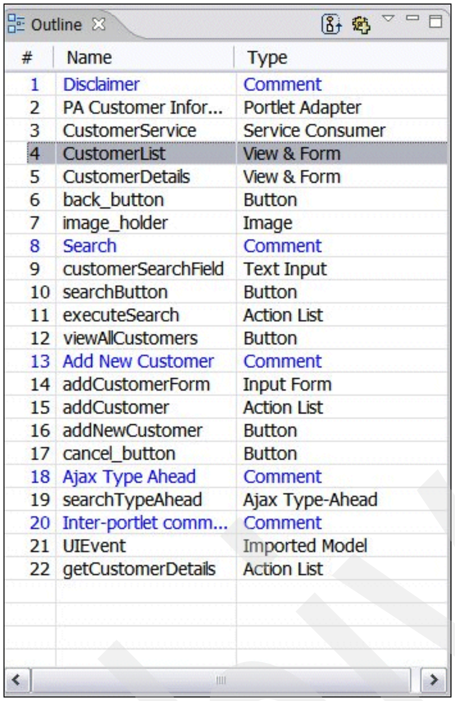
Note: In Section 8.3.1, “CustomerInfo Model to OrderList Model” on page 367, we briefly mentioned that there is a difference in the inter-portlet communication link between the customer scenario and the CSR scenario. With the customer case here, note that we have only set the shared variable in the checkCredentials action to make this communication link between the two models work without firing any event. The reasons for this are as follows:

1. When a customer logs into the application, he will be presented with his own details in the CustomerInfo portlet on the Customer portal page and his orders will also be listed in the OrderList portlet on the Order portal page. Unlike the CSR’s scenario, the content of the OrderList portlet of this customer will not be changing due to any actions in the CustomerInfo model (because the customer will only be able to view his own details, whereas a CSR can click the customer ID links of all customers to view their details). As a result, the OrderList portlet will not be expecting any events fired by the customer.
2. The second reason has to do with the order of the two portlets being rendered. The Customer ID shared variable has already been set when the CustomerInfo portlet is first being rendered and the fact that the OrderList portlet is residing on the second page eliminates the need for firing an event at all. When the customer browses to the Order portal page, the main method of the OrderList portlet will be called during its instantiation. The main method will see the shared variable has already been set and will use it to retrieve and display the list of orders that the customer has placed previously.

This scenario demonstrates a way to use shared variables only to allow different models to communicate. However, there is a strong dependency on the order in which the portlets are rendered and whether or not data displayed in the second portlet is expected to be changed.

Apply profiling to the main method

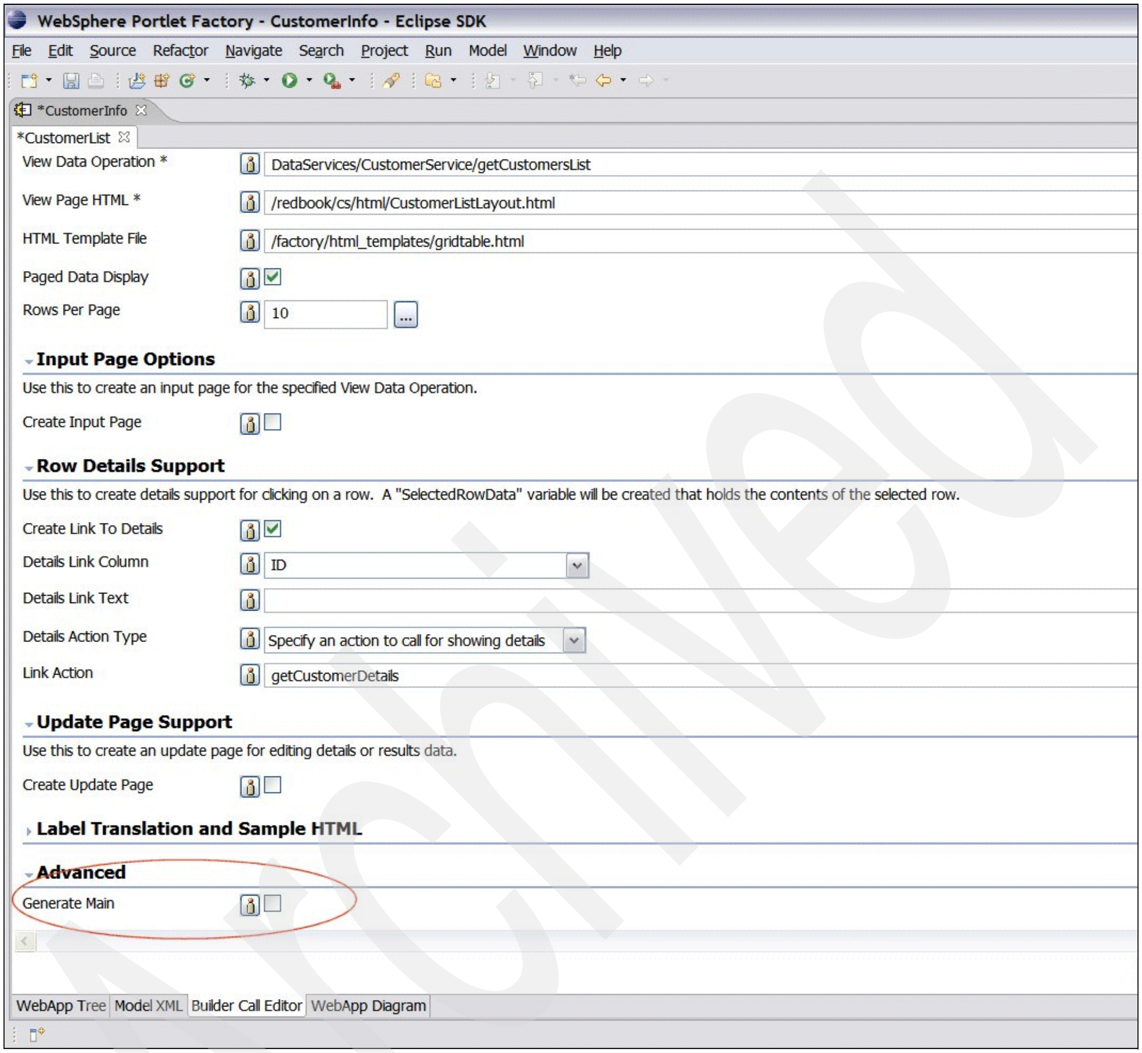
1. Remove the main method generated by the CustomerList View & Form builder. In the Outline pane, double-click the **View & Form** builder named CustomerList. It will open up the CustomerList builder in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	PA Customer Infor...	Portlet Adapter
3	CustomerService	Service Consumer
4	CustomerList	View & Form
5	CustomerDetails	View & Form
6	back_button	Button
7	image_holder	Image
8	Search	Comment
9	customerSearchField	Text Input
10	searchButton	Button
11	executeSearch	Action List
12	viewAllCustomers	Button
13	Add New Customer	Comment
14	addCustomerForm	Input Form
15	addCustomer	Action List
16	addNewCustomer	Button
17	cancel_button	Button
18	Ajax Type Ahead	Comment
19	searchTypeAhead	Ajax Type-Ahead
20	Inter-portlet comm...	Comment
21	UIEvent	Imported Model
22	getCustomerDetails	Action List

Figure 9-17 Open the CustomerList View & Form builder

2. Expand the Advanced section in the CustomerList builder and uncheck the **Generate Main** checkbox.


WebSphere Portlet Factory - CustomerInfo - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*CustomerInfo
WebApp Tree Model XML Builder Call Editor WebApp Diagram

*CustomerList

View Data Operation * DataServices/CustomerService/getCustomersList

View Page HTML * /redbook/cs/html/CustomerListLayout.html

HTML Template File /factory/html_templates/gridtable.html

Paged Data Display ☑

Rows Per Page 10

Input Page Options

Use this to create an input page for the specified View Data Operation.

Create Input Page □

Row Details Support

Use this to create details support for clicking on a row. A "SelectedRowData" variable will be created that holds the contents of the selected row.

Create Link To Details ☑

Details Link Column ID

Details Link Text

Details Action Type Specify an action to call for showing details

Link Action getCustomerDetails

Update Page Support

Use this to create an update page for editing details or results data.

Create Update Page □

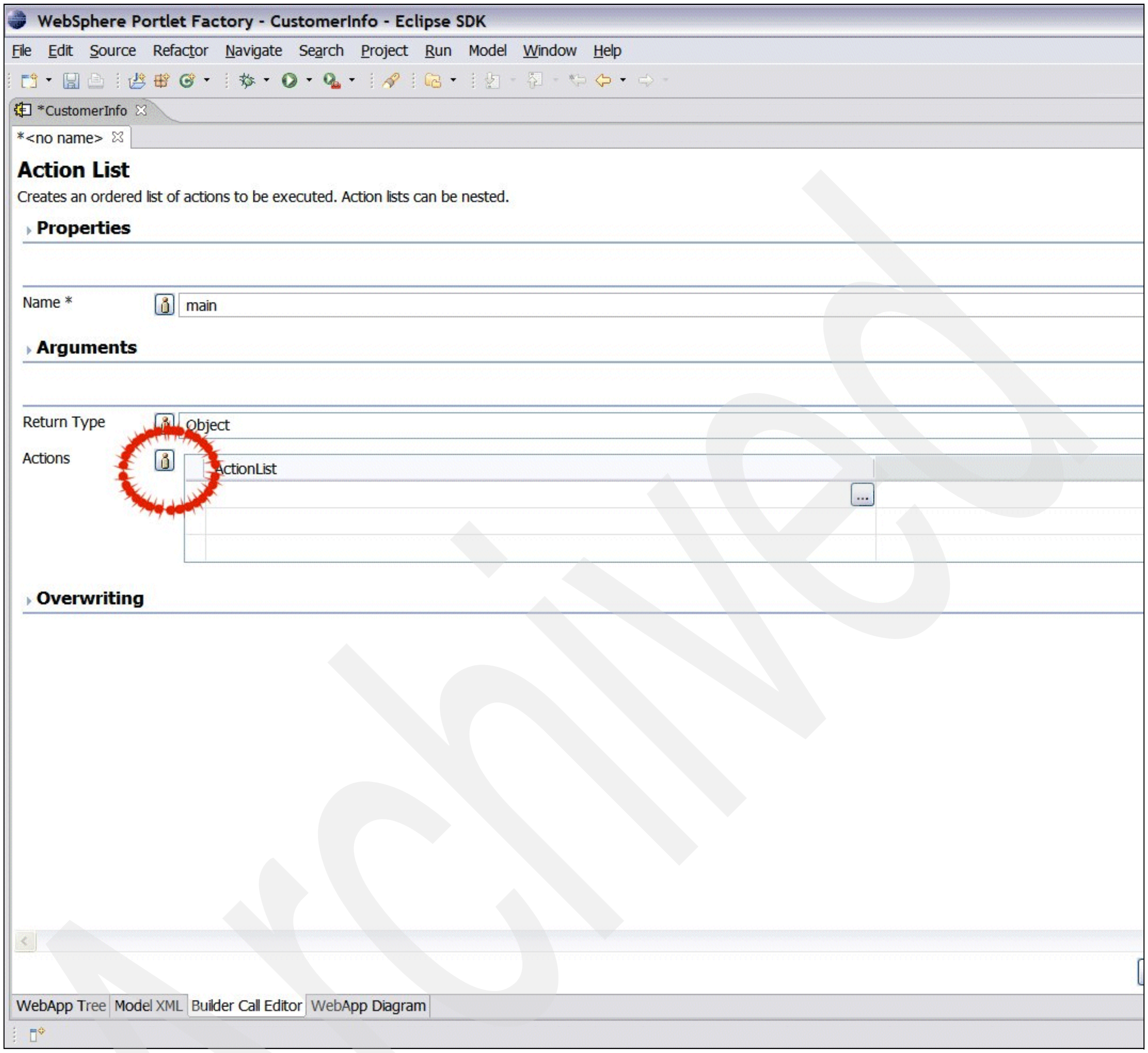
Label Translation and Sample HTML

Advanced

Generate Main □

Figure 9-18 Disable the generating main method option in the CustomerList builder

3. In the CustomerInfo model, click the button to add an Action List builder and name it `main`.
4. Click the **Profiling** icon next to the Action List Table.


WebSphere Portlet Factory - CustomerInfo - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*CustomerInfo
*<no name>

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type Object

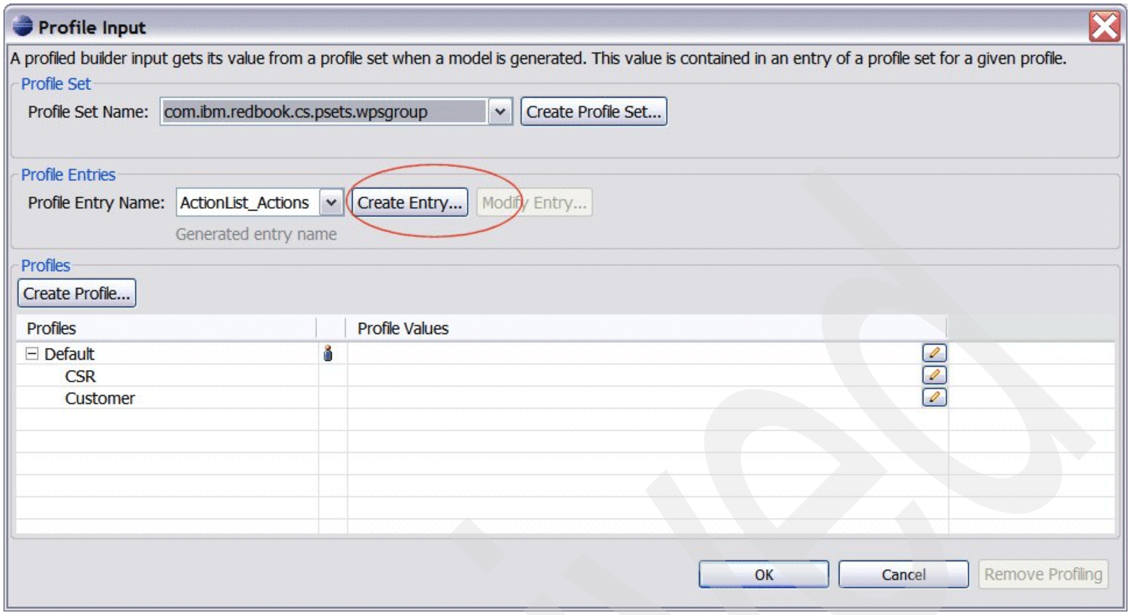
Actions ActionList

Overwriting

WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Figure 9-19 The Profile icon next to the Action List Table

5. In the Profile Input window, choose the profile set that you created previously: com.ibm.redbook.cs.psets.wpsgroup as the Profile Set Name.
6. Click the **Create Entry** button to create a profile entry.



Profile Input

A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a profile set for a given profile.

Profile Set

Profile Set Name: com.ibm.redbook.cs.psets.wpsgroup

Profile Entries

Profile Entry Name: ActionList_Actions

Generated entry name

Profiles

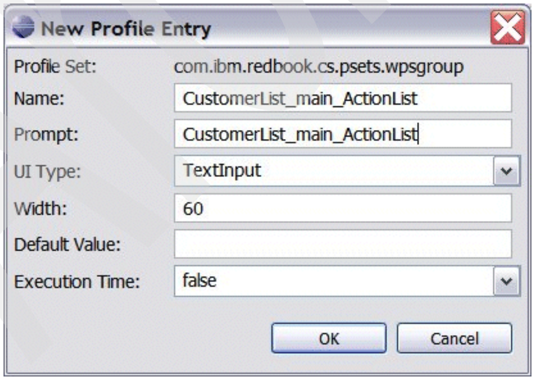
Profiles	Profile Values
⊟ Default	
CSR	
Customer	

Figure 9-20   Click the Create Entry button to create a profile entry

7. In the New Profile Entry window, make the following entries and leave everything else as default:

   Name: `CustomerList_main_ActionList`
   Prompt: `CustomerList_main_ActionList`

   Click **OK** to close the window.

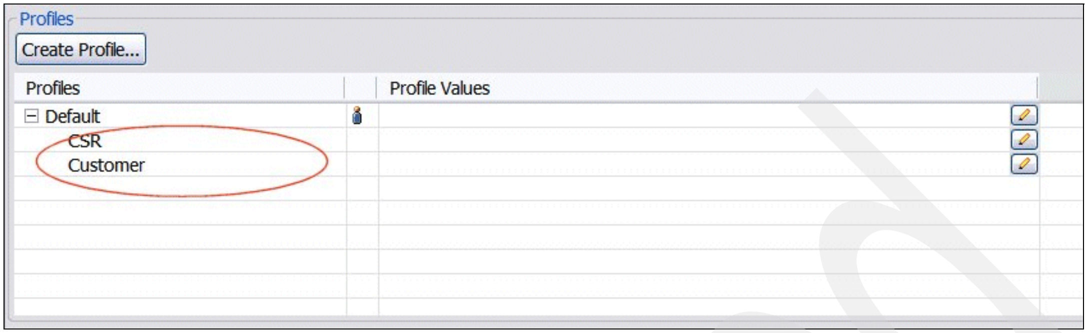


New Profile Entry

Profile Set:	com.ibm.redbook.cs.psets.wpsgroup
Name:	CustomerList_main_ActionList
Prompt:	CustomerList_main_ActionList
UI Type:	TextInput
Width:	60
Default Value:	
Execution Time:	false

Figure 9-21   Create a new profile entry for the main action list

8. In the Profiles section in the Profile Input window, the two profiles you created previously (CSR and Customer) should be visible.



Profiles

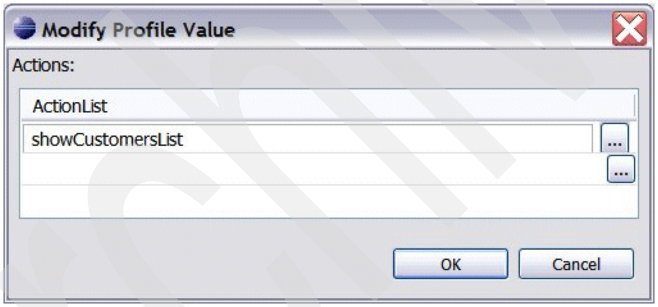
Create Profile...

Profiles		Profile Values
⊟ Default		
CSR		
Customer		

Figure 9-22 The two profiles created previously

9. Click the ✎ button next to the Profile Values Input on the CSR row.

10. In the Modify Profile Value window, click the ... button and select **Methods** → **showCustomersList**. Click **OK**.



Actions:

ActionList
showCustomersList

Figure 9-23 Set the main action list for the CSR profile

11. Click the ✎ button next to the Profile Values Input on the **Customer** row.

12. In the Modify Profile Value window, click the ... button and select **Methods** → **checkCredentials**. Click **OK**.

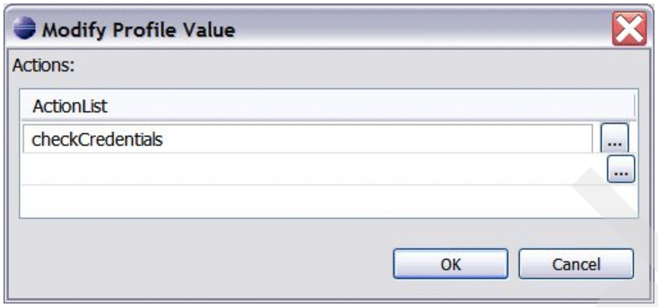
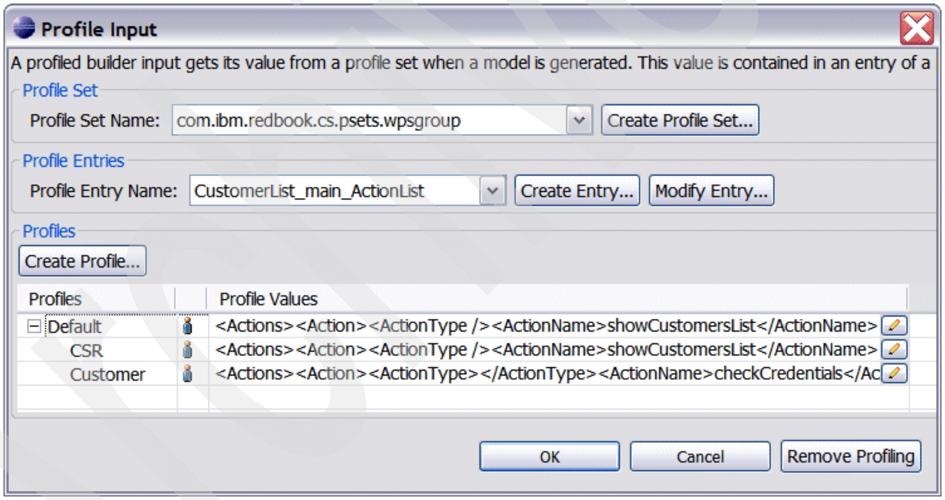


Figure 9-24 Set the main action list for the customer profile

13. Click the ✎ button next to the Profile Values Input on the **Default** row.

14. In the Modify Profile Value window, click the ... button and select **Methods** → **showCustomersList**. Click **OK**.

15. The Profile Entry window should appear as in Figure 9-25. Click **OK**.



Profile Input

A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a

Profile Set

Profile Set Name: com.ibm.redbook.cs.psets.wpsgroup

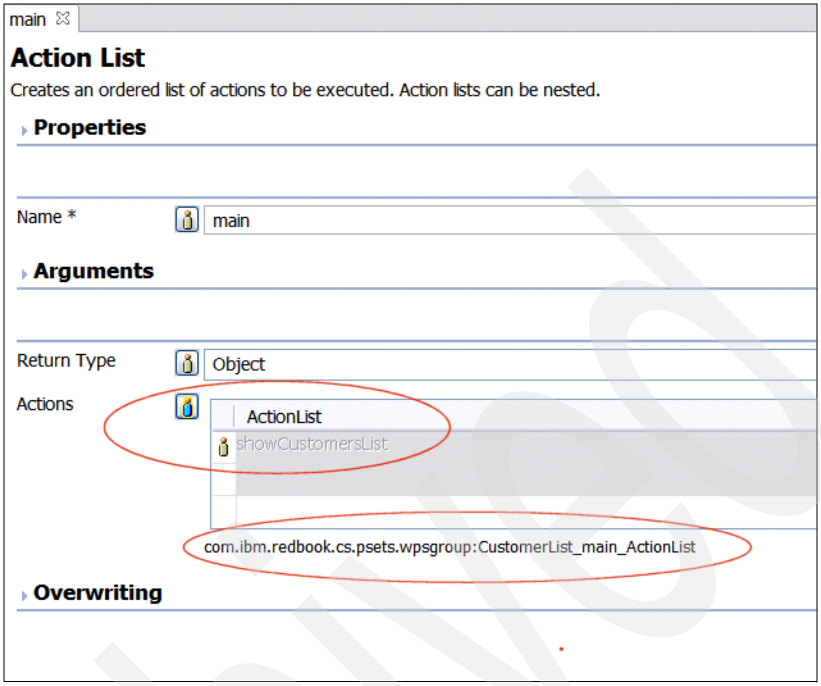
Profile Entries

Profile Entry Name: CustomerList_main_ActionList

Profiles	Profile Values
Default	<Actions><Action><ActionType /><ActionName>showCustomersList</ActionName>
CSR	<Actions><Action><ActionType /><ActionName>showCustomersList</ActionName>
Customer	<Actions><Action><ActionType></ActionType><ActionName>checkCredentials</Ac

Figure 9-25 The profiled action list for the main method

16. The main action list builder should look like Figure 9-26.



main ☒

Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * main

Arguments

Return Type Object

Actions

ActionList
showCustomersList

com.ibm.redbook.cs.psets.wpsgroup:CustomerList_main_ActionList

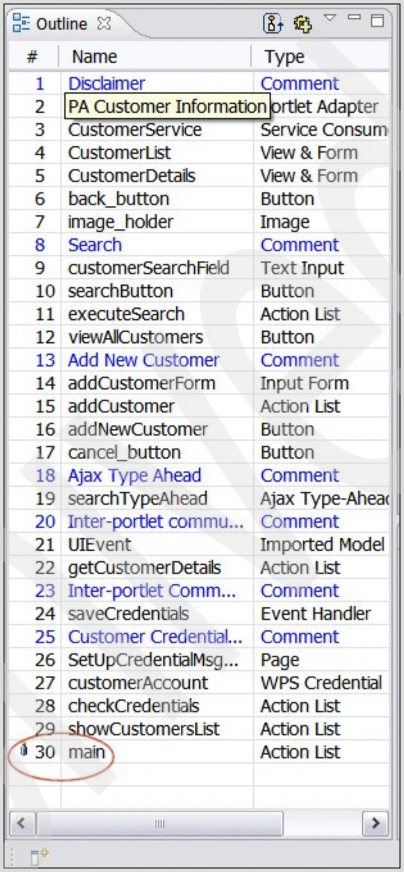
Overwriting

Figure 9-26 The profile-enabled main action list builder

> **Note:** The blue profiling icon next to the Action List Table indicates that the action list element has been profile enabled. To modify the profiled values, you must click the icon because the Action List Table has been greyed out.
>
> The long text appearing below the Action List Table is composed of two parts: the profile set name and the profile entry name for this element.

17. Click **OK** to save the main action list.
18. Save the CustomerInfo model by clicking the button.

Note: A quick way to tell whether profiling has been applied to a builder is to look at the Outline pane. If there is a blue profiling icon next to the builder name, it indicates that profiling has been applied to this builder.

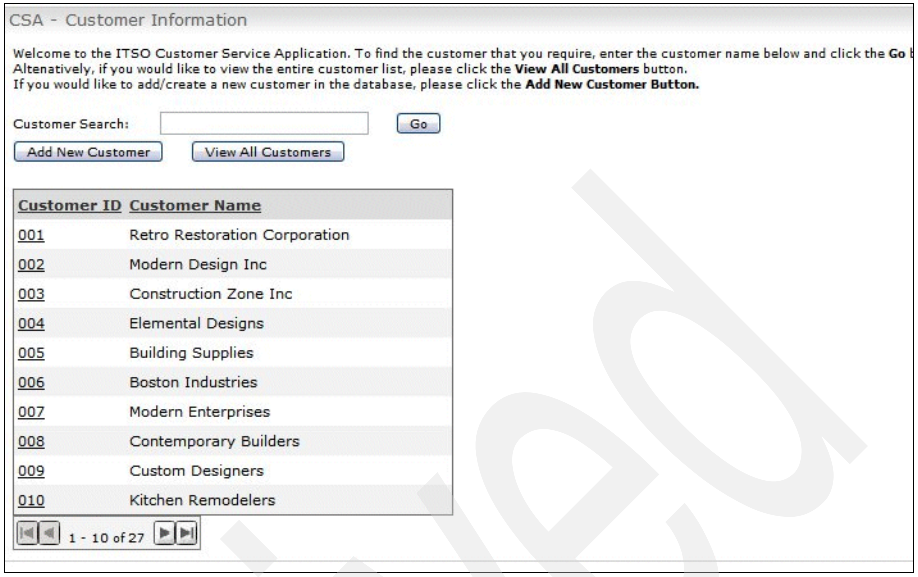


#	Name	Type
1	Disclaimer	Comment
2	PA Customer Information	ortlet Adapter
3	CustomerService	Service Consum
4	CustomerList	View & Form
5	CustomerDetails	View & Form
6	back_button	Button
7	image_holder	Image
8	Search	Comment
9	customerSearchField	Text Input
10	searchButton	Button
11	executeSearch	Action List
12	viewAllCustomers	Button
13	Add New Customer	Comment
14	addCustomerForm	Input Form
15	addCustomer	Action List
16	addNewCustomer	Button
17	cancel_button	Button
18	Ajax Type Ahead	Comment
19	searchTypeAhead	Ajax Type-Ahea
20	Inter-portlet commu...	Comment
21	UIEvent	Imported Model
22	getCustomerDetails	Action List
23	Inter-portlet Comm...	Comment
24	saveCredentials	Event Handler
25	Customer Credential...	Comment
26	SetUpCredentialMsg...	Page
27	customerAccount	WPS Credential
28	checkCredentials	Action List
29	showCustomersList	Action List
30	main	Action List

Figure 9-27 The blue profiling icon implies that builder has been profile enabled

Testing for different entry points

1. Log into the portal as csr1. As a CSR, you should be able to see the list of customers on the Customer portal page (Figure 9-28).



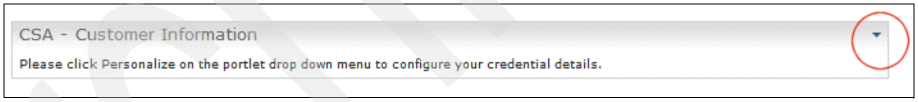
CSA - Customer Information

Welcome to the ITSO Customer Service Application. To find the customer that you require, enter the customer name below and click the **Go** b
Altenatively, if you would like to view the entire customer list, please click the **View All Customers** button.
If you would like to add/create a new customer in the database, please click the **Add New Customer Button.**

Customer ID	Customer Name
001	Retro Restoration Corporation
002	Modern Design Inc
003	Construction Zone Inc
004	Elemental Designs
005	Building Supplies
006	Boston Industries
007	Modern Enterprises
008	Contemporary Builders
009	Custom Designers
010	Kitchen Remodelers

Figure 9-28 csr1 should see the list of customers

2. Log into the portal as customer1. Because this is the first time customer1 logs in, you should see the page prompting you to enter credential details (Figure 9-29).



CSA - Customer Information

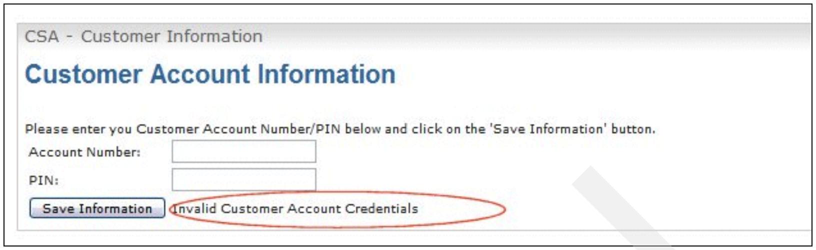
Please click Personalize on the portlet drop down menu to configure your credential details.

Figure 9-29 Credential details request to customer1

3. Click the down arrow ▾ in the top right corner of the Customer Information portlet and select **Personalize** from the drop-down menu. Enter the credential details as follow:

   Account Number: `001`
   PIN: `123`

4. If you have entered invalid credential details, an error message will appear next to the **Save Information** button when you try to save the details (Figure 9-30).



CSA - Customer Information

Customer Account Information

Please enter you Customer Account Number/PIN below and click on the 'Save Information' button.

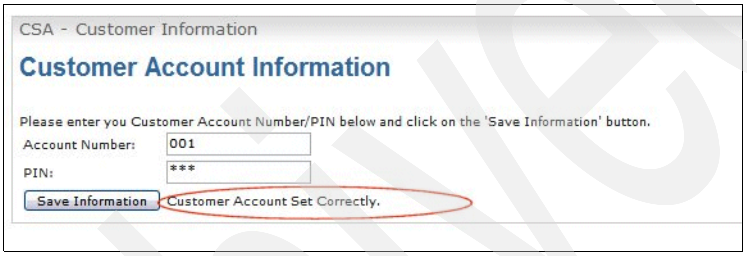
Account Number:

PIN:

Save Information Invalid Customer Account Credentials

Figure 9-30 Error message when invalid account details are entered

5. Click the **Save Information** button. If your inputs are valid the message in Figure 9-31 is returned.



CSA - Customer Information

Customer Account Information

Please enter you Customer Account Number/PIN below and click on the 'Save Information' button.

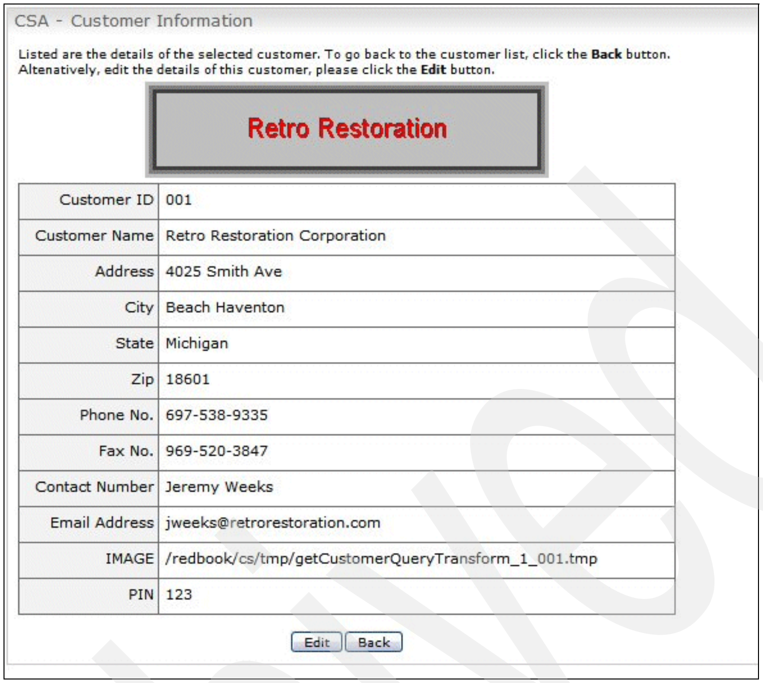
Account Number: 001

PIN: ***

Save Information Customer Account Set Correctly.

Figure 9-31 Confirmation message

6. Click the ▾ button in the top right corner of the Customer Information portlet and select **Back** from the drop-down menu. If you have set up the inter-portlet communication link between the CustomerCredentials model and the CustomerInfo model correctly (Section 8.3.3, "CustomerCredentials Model to CustomerInfo Model" on page 413), you should be able to view the details of customer 001 as shown in Figure 9-32.



CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Retro Restoration

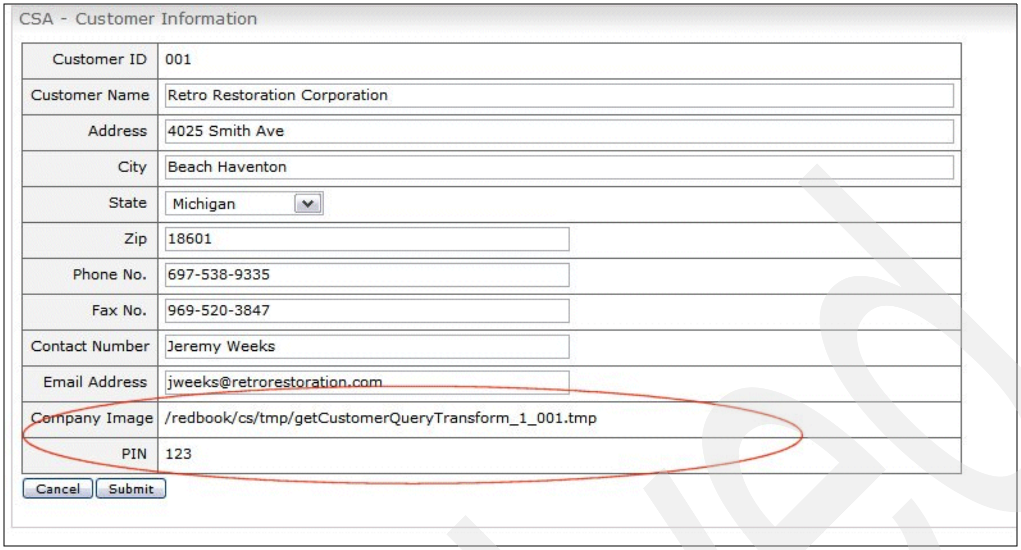
Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 9-32 Customer 001 details

> **Note:** After returning from the credential setup page, if you see the customer details page contains no data, one possible reason is that the inter-portlet communication between the CustomerCredentials model and the CustomerInfo model was not set up correctly.

9.6.2 Different field properties for customers and CSRs

Our implementation of this application feature demonstrates the profile selection technique. To vary the field properties on the Customer Details Edit Page in the Customer Info portlet, we apply profiles to the Rich Data Definition (RDD) file referenced in the Service Consumer builder. CSRs should be able to modify the IMAGE and the PIN fields on the Customer Details Edit Page, but customers should not be granted such permission.



CSA - Customer Information

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 9-33 Customer Details Edit page highlighting fields uneditable for customers

For details of how RDD files work, refer to Chapter 7. Since this profiling works on the same basis as the previous example, which implemented different entry points, we reuse the profile set and profiles created in the previous section.

At a high level, the steps to display different field properties for CSRs and customers are as follows:

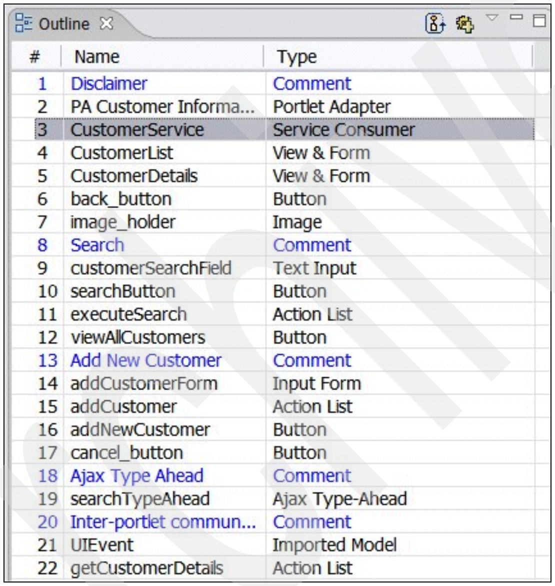
1. Apply profiling to the RDD entry of Service Consumer builder of the CustomerInfo model to enable the variations in field properties based on the user group.
2. Test whether profiling has been successfully implemented.

> **Note:** We have chosen to apply profiling to the RDD file in this sample to demonstrate various Portlet Factory profiling capabilities. Developers could have chosen to apply profiles at a much lower level (that is, to individual fields). However, we recommend that developers use RDD files to configure the properties of the data fields to avoid using an excessive number of builders.

Applying profiling to RDD file

There are two RDD files created for the CustomerInfo model based on the WPS Group. The CSRGroup uses the RDD file at /WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_csr.xml, while the CustomerGroup use the file /WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_customer.xml.

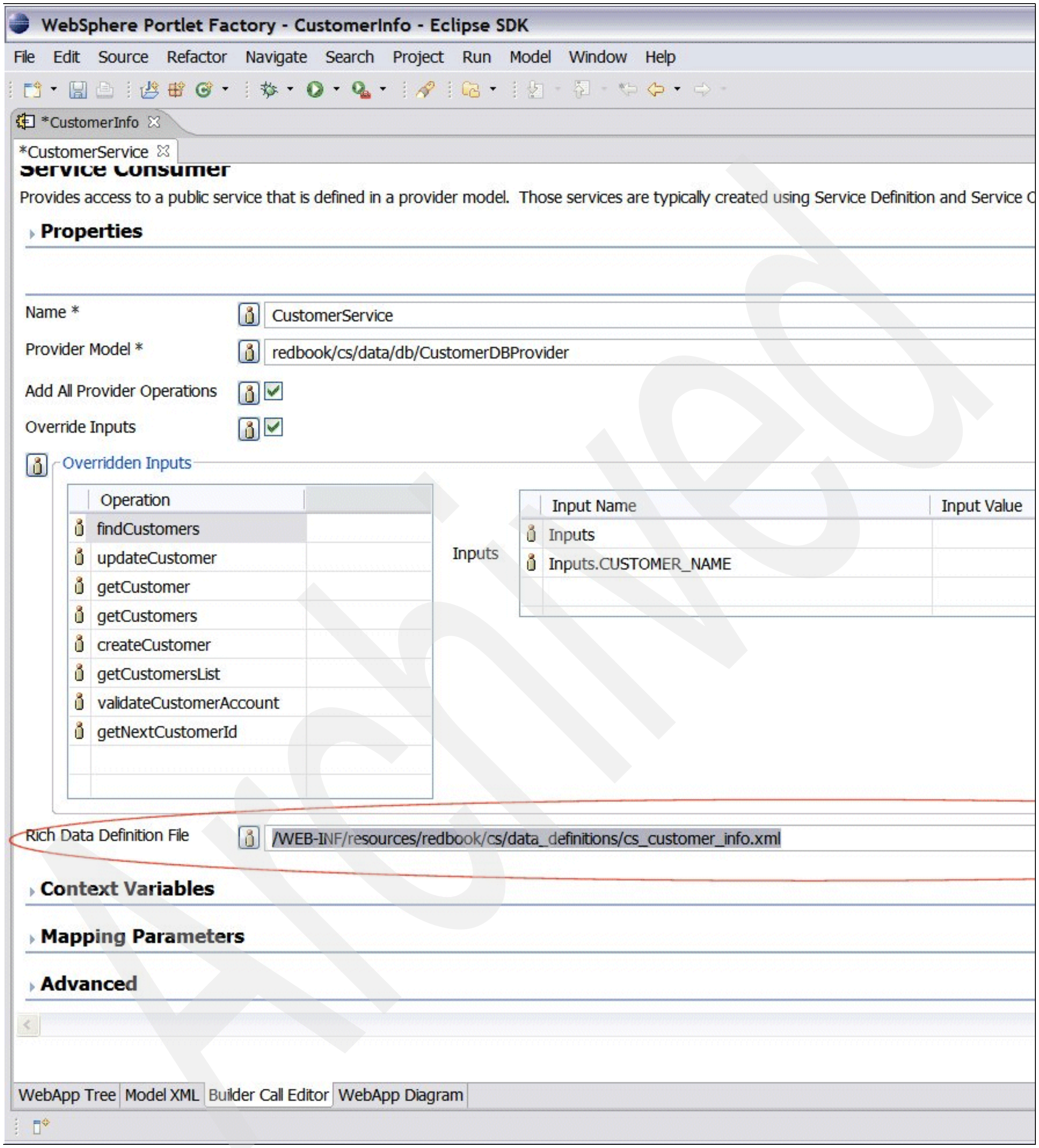
1. In Project Explorer, select **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **customer** → **CustomerInfo.model**. Double-click the **CustomerInfo.model** to open it.
2. In the Outline pane, double-click the Service Consumer builder named **CustomerService**. The CustomerService builder will open in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	PA Customer Informa...	Portlet Adapter
3	CustomerService	Service Consumer
4	CustomerList	View & Form
5	CustomerDetails	View & Form
6	back_button	Button
7	image_holder	Image
8	Search	Comment
9	customerSearchField	Text Input
10	searchButton	Button
11	executeSearch	Action List
12	viewAllCustomers	Button
13	Add New Customer	Comment
14	addCustomerForm	Input Form
15	addCustomer	Action List
16	addNewCustomer	Button
17	cancel_button	Button
18	Ajax Type Ahead	Comment
19	searchTypeAhead	Ajax Type-Ahead
20	Inter-portlet commun...	Comment
21	UIEvent	Imported Model
22	getCustomerDetails	Action List

Figure 9-34 Selecting the CustomerService builder

3. Scroll to the Rich Data Definition File field.



Service Consumer

Provides access to a public service that is defined in a provider model. Those services are typically created using Service Definition and Service C

Name * CustomerService

Provider Model * redbook/cs/data/db/CustomerDBProvider

Add All Provider Operations ☑

Override Inputs ☑

Overridden Inputs

Operation
findCustomers
updateCustomer
getCustomer
getCustomers
createCustomer
getCustomersList
validateCustomerAccount
getNextCustomerId

Inputs

Input Name	Input Value
Inputs	
Inputs.CUSTOMER_NAME	

Rich Data Definition File /WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info.xml

Figure 9-35 The Service Consumer builder with Rich Data Definition File field highlighted

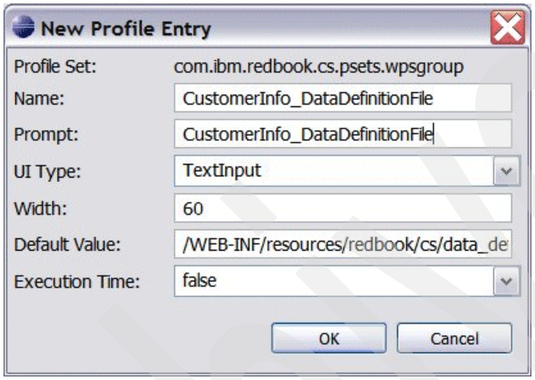
4. Click the button next to the Rich Data Definition File text box. By default, the Profile Set Name in the Profile input window should be

`com.ibm.redbook.cs.psets.wpsgroup`. Click the **Create Entry** button in the Profile Entry section.

5. In the New Profile Entry dialog bow, make the following entries and leave other fields as default.

   Name: `CustomerInfo_DataDefinitionFile`
   Prompt: `CustomerInfo_DataDefinitionFile`
   Default Value: `/WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_csr.xml`

   Click **OK**.



Profile Set:	com.ibm.redbook.cs.psets.wpsgroup
Name:	CustomerInfo_DataDefinitionFile
Prompt:	CustomerInfo_DataDefinitionFile
UI Type:	TextInput
Width:	60
Default Value:	/WEB-INF/resources/redbook/cs/data_de
Execution Time:	false

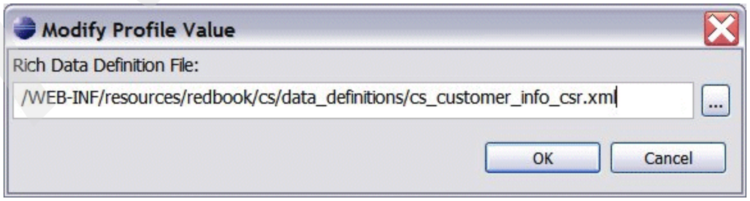
Figure 9-36 Modify the Profile Entry for the RDD file

6. In the Profiles section in the Profile Input window, the two profiles (CSR and Customer) that we created earlier should appear, with the Profile Values pre-populated.

7. *Since this profile uses the default profile value, you may choose to skip this step.*

   Click the ✎ button next to the Profile Values input on the **CSR** row. In the Modify Profile Value window, enter:
   `/WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_csr.xml`

   Click **OK**.



Rich Data Definition File: /WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_csr.xml

Figure 9-37 Set the RDD file for the CSR profile

8. Click the ✎ button next to the Profile Values input on the CSR row. In the Modify Profile Value window, enter:

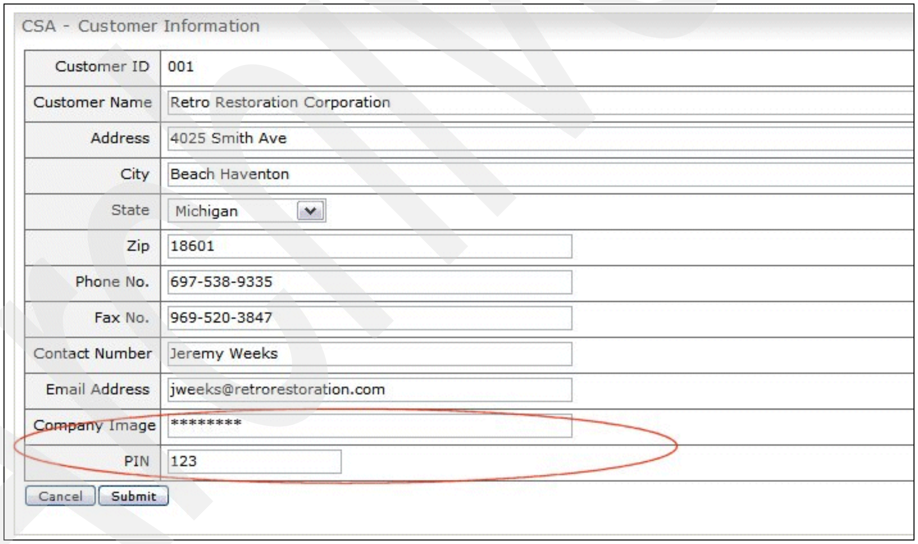
```
/WEB-INF/resources/redbook/cs/data_definitions/cs_customer_info_customer.xml
```

   Click **OK**.

9. Click **OK** to close the Profile Input window.
10. Click **Apply** to save the CustomerService Service Consumer builder.
11. Save the CustomerInfo model by clicking the 💾 button.

Testing for different field properties

1. Log into portal as csr1. You should see a list of customers.
   a. Click any customer ID link. This should bring you to the details page of the customer.
   b. Click the **Edit** button at the bottom of the page.
   c. On the Customer Details Edit page the Image and PIN fields should be editable.

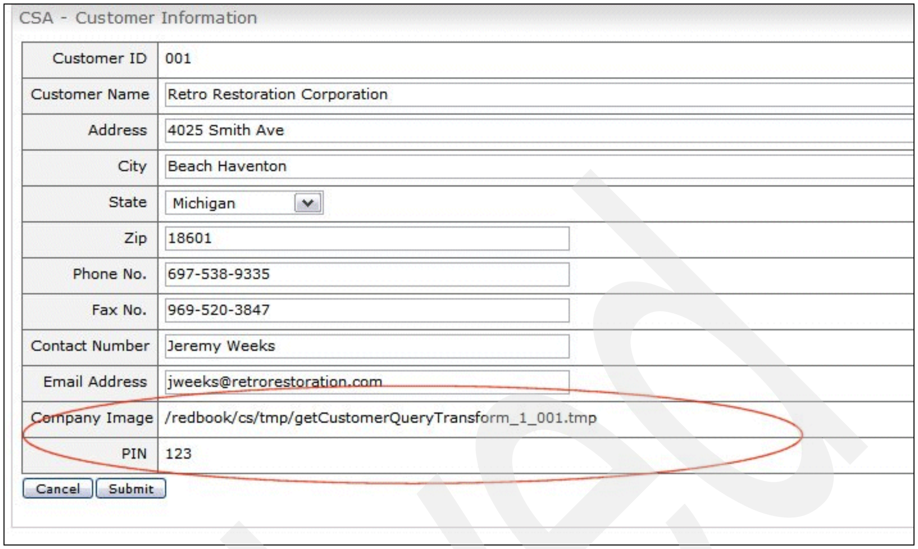


CSA - Customer Information

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	*********
PIN	123

Figure 9-38 CSR should be able to modify the Image and PIN fields

2. Log into portal as customer1. You should see the details about customer1.
   a. Click the **Edit** button at the bottom of the page.
   b. On the Customer Details Edit page, as a customer, the Image and PIN fields should *not* be editable.



CSA - Customer Information

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
Company Image	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 9-39 Customers should not be able to modify the Image and PIN fields

9.6.3 Different visibility of components for customers and CSRs

Our implementation of this application feature demonstrates the profile selection technique. To hide the Back button on the Customer Details Page in the Customer Info portlet, we apply profiles to the Visibility Setter builder for the Back button. Since this profiling works on the same basis as the previous examples, we reuse the profile set and profiles created in those section.

At a high level, the steps to create the different visibility of components are:

1. Add the Visibility Setter builder for the Back button on the Customer Details View page in the CustomerInfo model.
2. Apply profiling to the Visibility Rule of the Visibility Setter to enable different visibility settings for the application component based on the user group.
3. Test whether profiling has been successfully implemented.

Adding and profile-enabling the Visibility Setter builder

1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **customer** → **CustomerInfo.model**. Double-click **CustomerInfo.model** to open it.
2. In the CustomerInfo model, click the button to add a Visibility Setter builder.

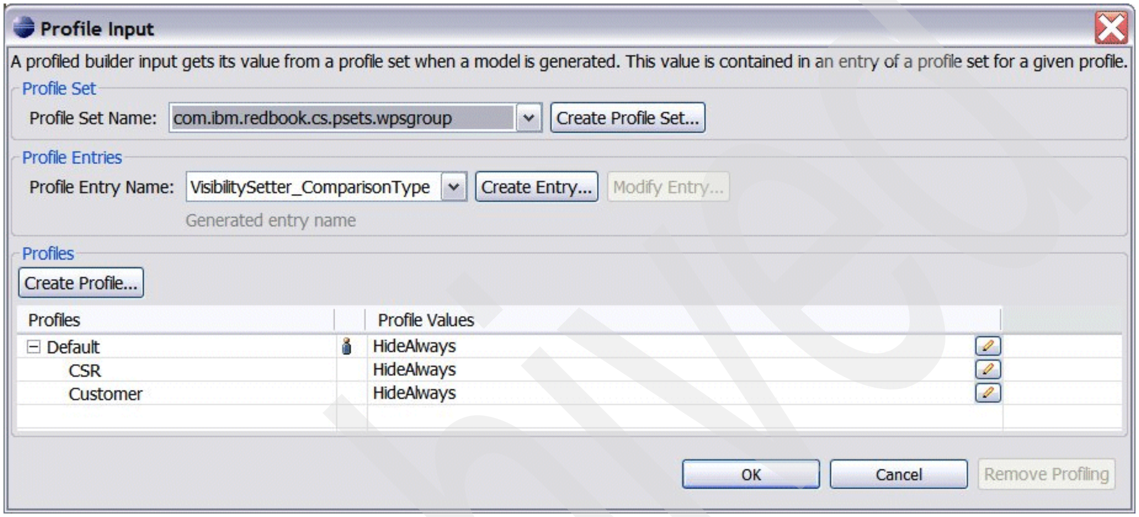
   a. Leave the name of this builder blank.

b. Leave Location Technique as `On Named Tag`.

c. Choose **CustomerDetails_ViewPage** as the Page.

d. Select **back_button** as the Tag.

3. Apply profiling on the Visibility Rule. Click the button next to the text Visibility Rule. By default, the Profile Set Name in the Profile Input window is `com.ibm.redbook.cs.psets.wpsgroup`.



Profile Input

A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a profile set for a given profile.

Profile Set

Profile Set Name: com.ibm.redbook.cs.psets.wpsgroup

Profile Entries

Profile Entry Name: VisibilitySetter_ComparisonType

Generated entry name

Profiles

Profiles	Profile Values
⊟ Default	HideAlways
CSR	HideAlways
Customer	HideAlways

Figure 9-40 Use the default profile set name

4. Click the **Create Entry** button in the Profile Entries section. Make the following selections and entries, and leave the rest as default.

Name:	`CustomerInfo_EditBackBtn_Visibility`
Prompt:	`CustomerInfo_EditBackBtn_Visibility`
Default Value:	`HideNever`

Click **OK**.

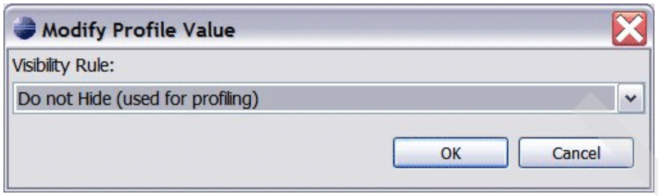
5. In the Profiles section in the Profile Input window, the two profiles (CSR and Customer) that we created earlier should be visible, with the Profile Values pre-populated.

6. Click the ✎ button next to the Profile Values input on the Customer row.

In the Modify Profile Value window, select **Always Hide**. Click **OK**.

7. *Since the CSR profile uses the default value (Do not Hide (used for profiling)), it may not be necessary to explicitly set the profile value for the CSR profile.* Click the ✎ button next to the Profile Values input on the CSR row.

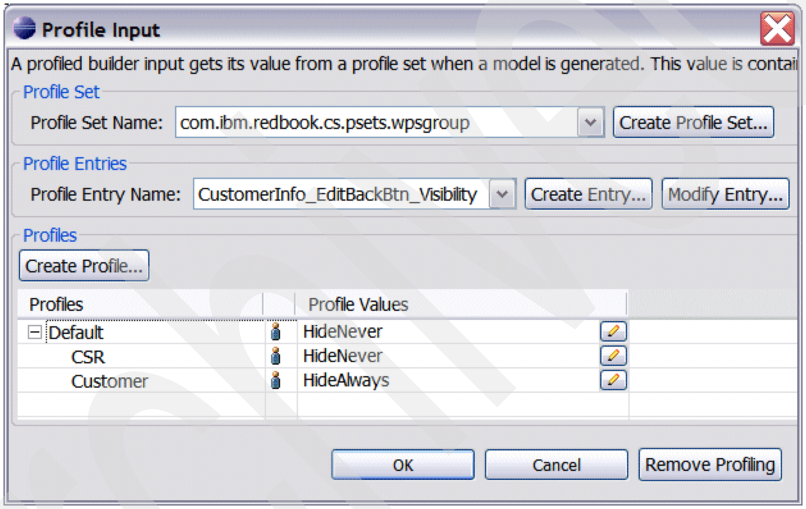
In the Modify Profile Value window, select **Do not Hide (used for profiling)**. Click **OK**.



Visibility Rule: Do not Hide (used for profiling)

Figure 9-41 Set the visibility rule for the CSRGroup

8. The Profile Input window should appear as in Figure 9-42.



A profiled builder input gets its value from a profile set when a model is generated. This value is contai

Profile Set Name: com.ibm.redbook.cs.psets.wpsgroup

Profile Entry Name: CustomerInfo_EditBackBtn_Visibility

Profiles	Profile Values
⊟ Default	HideNever
CSR	HideNever
Customer	HideAlways

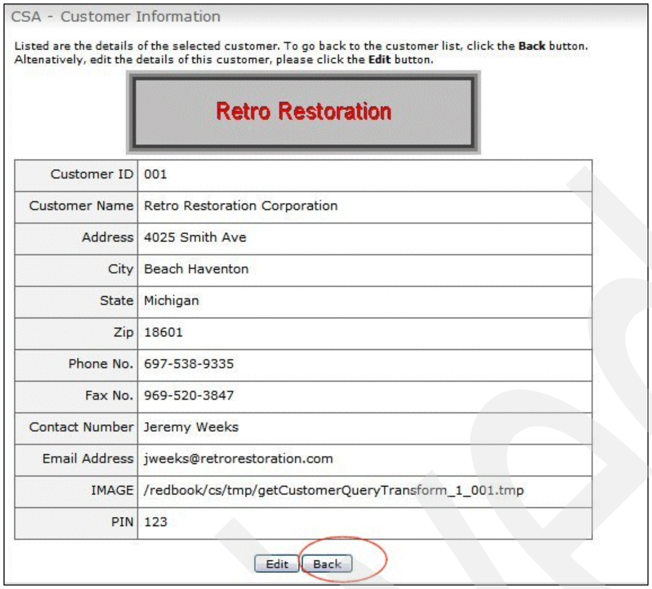
Figure 9-42 The Profile Input window for the Visibility Rule

9. Click **Apply** to save the back_button Visibility Setter builder.

10. Save the CustomerInfo model by clicking the button.

Testing for different visibility of application components

1. Log into portal as csr1. You should see a list of customers.
   a. Click any customer ID link. The details page for the customer will be displayed.
   b. The Back button should be visible on the Customer Details page.



CSA - Customer Information

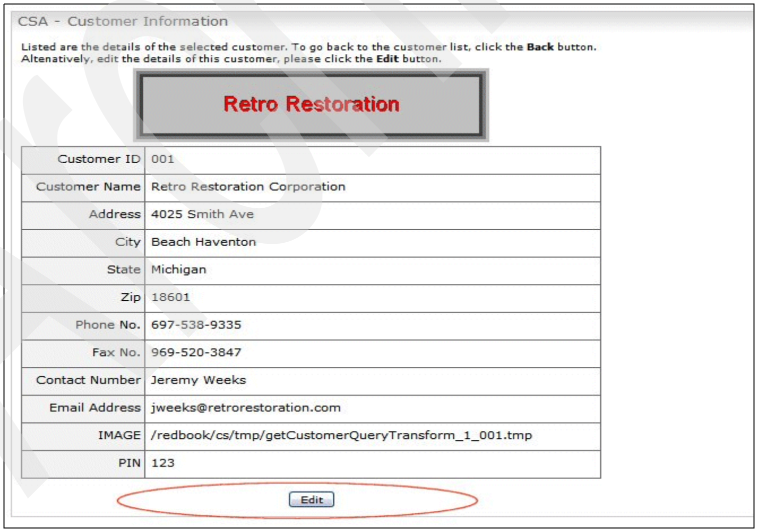
Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Retro Restoration

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 9-43 CSR's view of Customer Details page

2. Log into portal as customer1. The details for customer1 will be displayed. The Back button should *not* be visible at the bottom of the page.



CSA - Customer Information

Listed are the details of the selected customer. To go back to the customer list, click the **Back** button. Altenatively, edit the details of this customer, please click the **Edit** button.

Retro Restoration

Customer ID	001
Customer Name	Retro Restoration Corporation
Address	4025 Smith Ave
City	Beach Haventon
State	Michigan
Zip	18601
Phone No.	697-538-9335
Fax No.	969-520-3847
Contact Number	Jeremy Weeks
Email Address	jweeks@retrorestoration.com
IMAGE	/redbook/cs/tmp/getCustomerQueryTransform_1_001.tmp
PIN	123

Figure 9-44 Customer's view of Customer Details page

9.6.4 Runtime customization profiling

Our implementation of this application feature demonstrates the profile value customization technique. To allow end users to customize the Order Details Portlet, we need to create a new profile set and then profile-enable the Product ID, Thumbnail and Source data fields (that is, create profile entries for the three fields in the profile set just created). Because profile value customization uses Values Setter instead of Profile Selection handler, profiles are not required. Unlike the localization example, we do not need to define a value for the Value Setter because Portlet Factory will take care of that for the case of runtime portlet customization.

At a high level, the steps to implement runtime customization for the OrderDetails portlet are:

1. Create the profile set needed for the customization. We do not need to create any profiles in this profile set because we will be using a value-based selection handler.
2. Add a Data Column Modifier builder to the OrderDetails model. Using that builder, profile-enable the three data columns (Product ID, Thumbnail and Source).
3. Create the OrderDetailsCustomizer model in which we will create a Portlet Customizer builder that is associated with the OrderDetails portlet.
4. Associate the OrderDetailsCustomizer model as the portlet Edit mode for the OrderDetails portlet.
5. Test whether the runtime customization has been applied successfully.

Creating the profile set

Begin by creating the profile set needed for this WPS Group based profiling.

1. In Project Explorer, right-click **RedbookCS**. Select **New** → **WebSphere Portlet Factory Profile Set.**

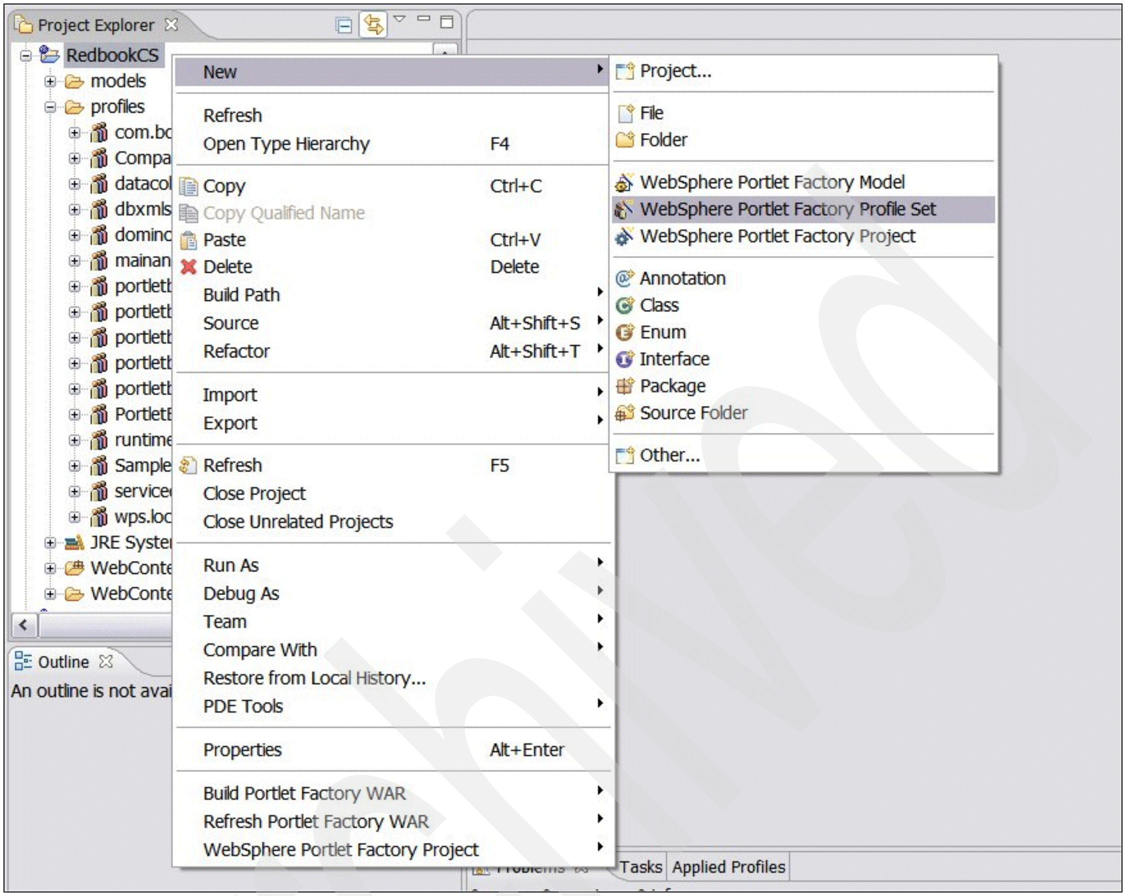
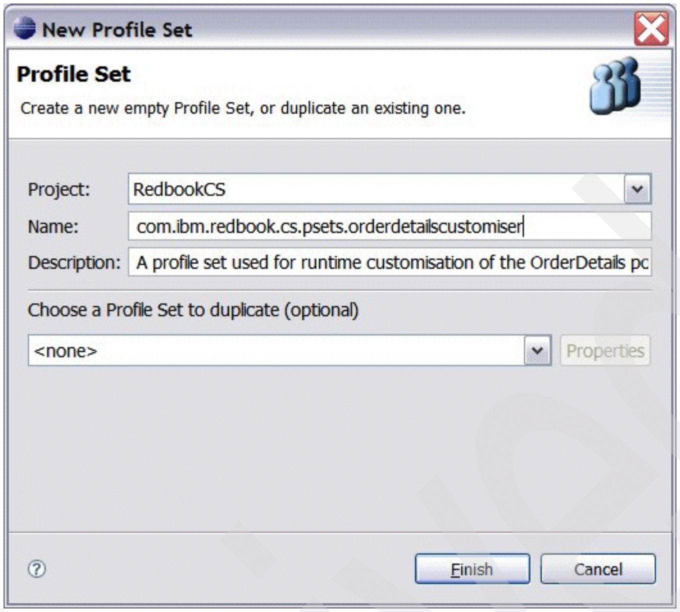


Figure 9-45 Create a new profile set

2. In the New Profile Set window, make the following entries and selections, and leave everything else as default.

   Project: `RedbookCS`
   Name: `com.ibm.redbook.cs.psets.orderdetailscustomiser`
   Description: `A profile set used for runtime customization of the OrderDetails portlet.`

   Click **Finish**.


New Profile Set

Profile Set

Create a new empty Profile Set, or duplicate an existing one.

Project: RedbookCS

Name: com.ibm.redbook.cs.psets.orderdetailscustomiser

Description: A profile set used for runtime customisation of the OrderDetails pc

Choose a Profile Set to duplicate (optional)

<none>

Figure 9-46 Create the profile set for runtime customization of OrderDetails portlet

3. The Profile Manager is opened up once the profile set is created. Because we will not need to create any profiles for runtime customization and there is no need to explicitly specify which Selection Handler to use, we can save the Profile Manager as it is and close it.

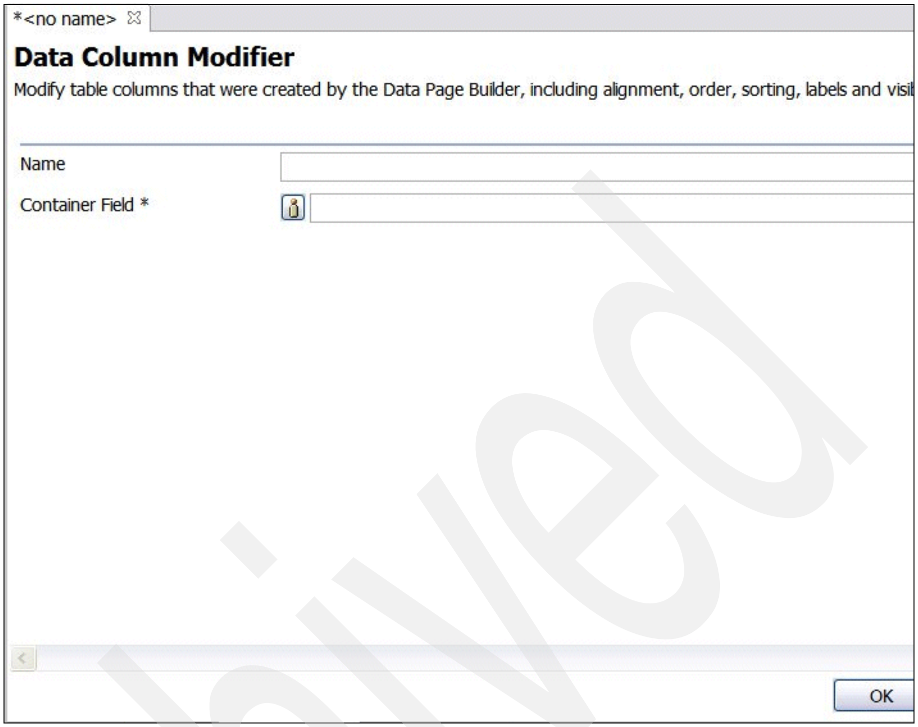
Profile-enabling the data columns

We need to add a Data Column Modifier builder into the OrderDetails model in order to have the ability to manage the properties of each individual column of the OrderDetails Data Page.

1. In Project Explorer, select **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** → **OrderDetails.model**. Double-click **OrderDetails.model** to open it.

2. In the OrderDetails model, click the button to add a Data Column Modifier builder.

   Leave the name blank.



*<no name>

Data Column Modifier

Modify table columns that were created by the Data Page Builder, including alignment, order, sorting, labels and visi

Figure 9-47 Leave the name of the Data Column Modifier blank

3. In the **Container Field** row, click the **...** button. Select **[orderDetails]orderItems** → **ITEMS** → **ITEM**.

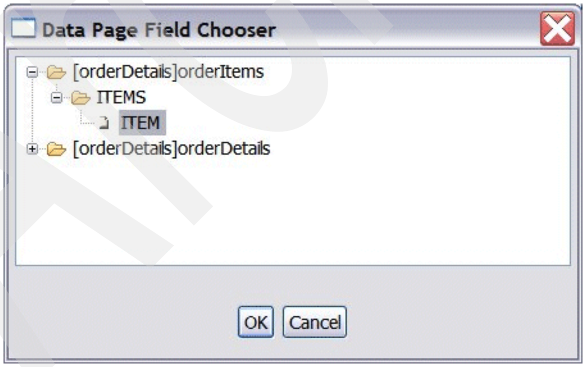
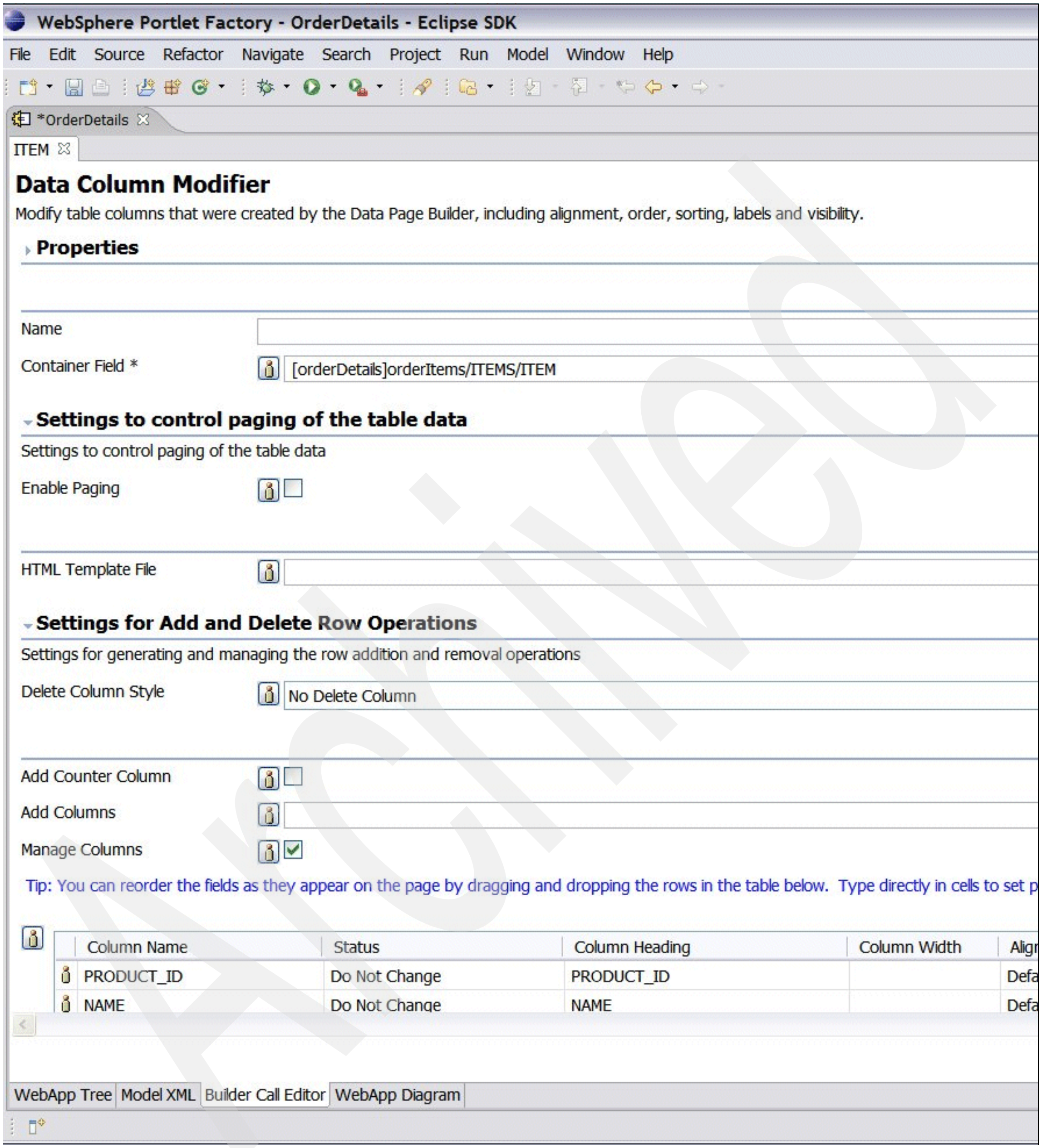


Figure 9-48 Choose the Container Field value for the data column modifier

4. Click **OK** in the Data Page Field Chooser window. The original Data Column Modifier builder will expand and appear as shown in Figure 9-49.


WebSphere Portlet Factory - OrderDetails - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderDetails
ITEM

Data Column Modifier

Modify table columns that were created by the Data Page Builder, including alignment, order, sorting, labels and visibility.

Properties

Name

Container Field * [orderDetails]orderItems/ITEMS/ITEM

Settings to control paging of the table data

Settings to control paging of the table data

Enable Paging □

HTML Template File

Settings for Add and Delete Row Operations

Settings for generating and managing the row addition and removal operations

Delete Column Style No Delete Column

Add Counter Column □

Add Columns

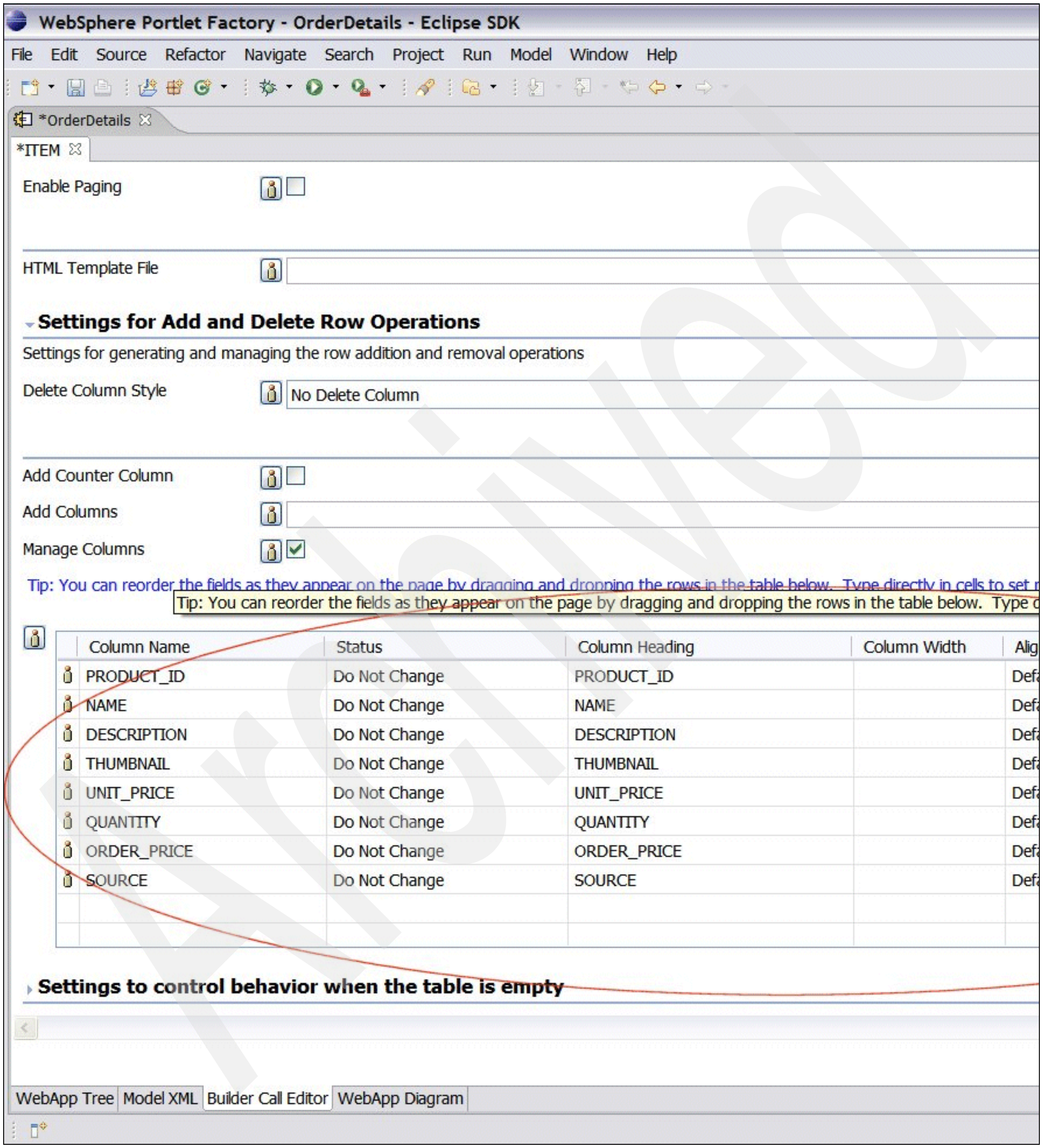
Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type directly in cells to set p

Column Name	Status	Column Heading	Column Width	Align
PRODUCT_ID	Do Not Change	PRODUCT_ID		Defa
NAME	Do Not Change	NAME		Defa

Figure 9-49 The Data Column Modifier builder

5. Scroll down to the Column Property Table, where the data columns of the ITEM (Data Container) and their properties are displayed.



WebSphere Portlet Factory - OrderDetails - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderDetails
*ITEM

Enable Paging □

HTML Template File

Settings for Add and Delete Row Operations

Settings for generating and managing the row addition and removal operations

Delete Column Style: No Delete Column

Add Counter Column □

Add Columns

Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type directly in cells to set r

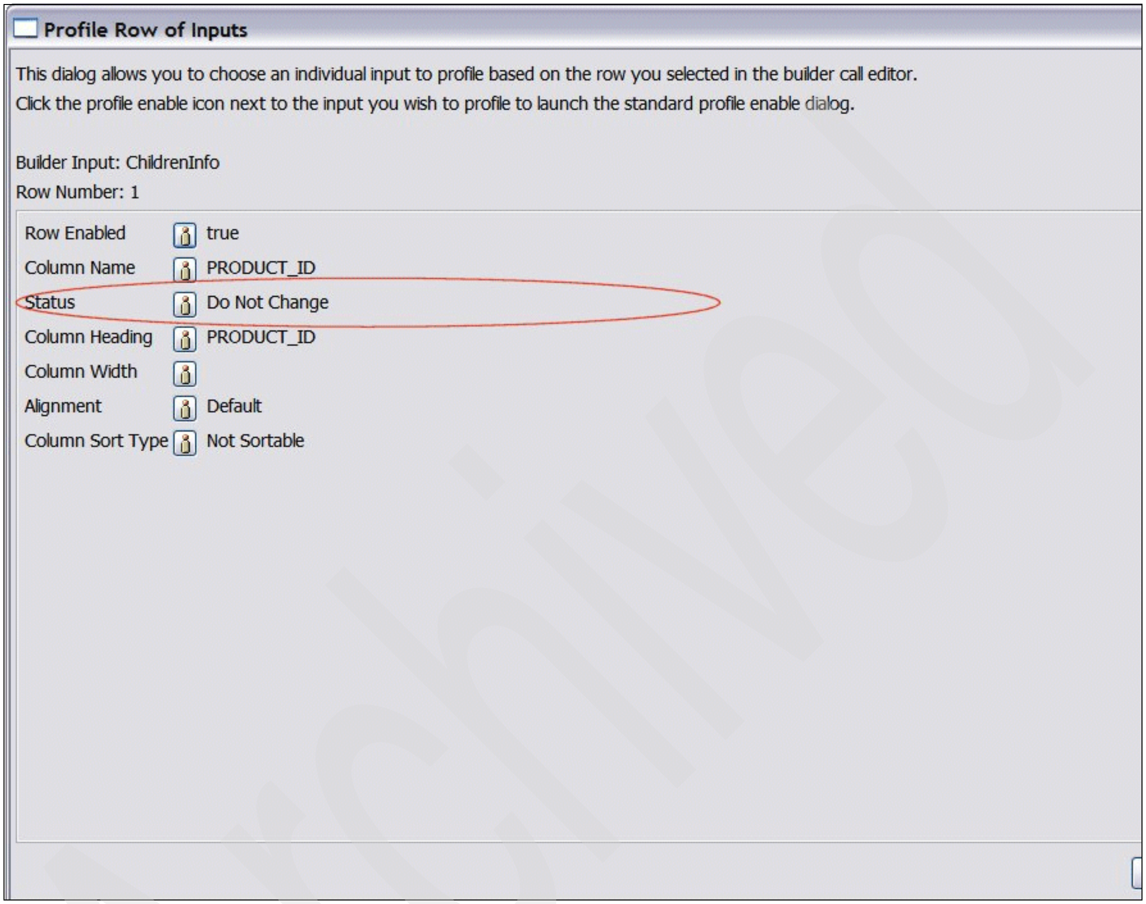
Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type d

Column Name	Status	Column Heading	Column Width	Alig
PRODUCT_ID	Do Not Change	PRODUCT_ID		Defa
NAME	Do Not Change	NAME		Defa
DESCRIPTION	Do Not Change	DESCRIPTION		Defa
THUMBNAIL	Do Not Change	THUMBNAIL		Defa
UNIT_PRICE	Do Not Change	UNIT_PRICE		Defa
QUANTITY	Do Not Change	QUANTITY		Defa
ORDER_PRICE	Do Not Change	ORDER_PRICE		Defa
SOURCE	Do Not Change	SOURCE		Defa

Settings to control behavior when the table is empty

Figure 9-50 The Column Property Table

6. Profile-enable the PRODUCT_ID column. Click the 👤 button next to PRODUCT_ID. The Profile Row of inputs window is displayed.



Profile Row of Inputs

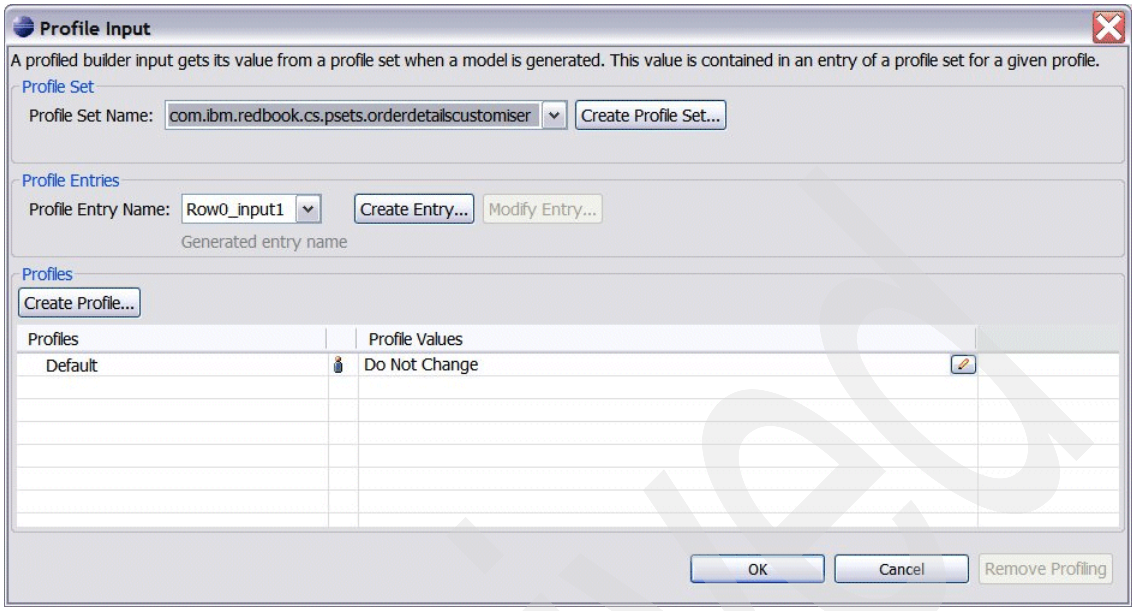
This dialog allows you to choose an individual input to profile based on the row you selected in the builder call editor.
Click the profile enable icon next to the input you wish to profile to launch the standard profile enable dialog.

Builder Input: ChildrenInfo
Row Number: 1

Row Enabled	true
Column Name	PRODUCT_ID
Status	Do Not Change
Column Heading	PRODUCT_ID
Column Width	
Alignment	Default
Column Sort Type	Not Sortable

Figure 9-51 The Profile Row of Inputs window for the PRODUCT_ID Column

7. Click the 👤 button on the **S**tatus row and the Profile Input window opens. Select `com.ibm.redbook.cs.psets.orderdetailscustomiser` as the Profile Set.



A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a profile set for a given profile.

Profile Set

Profile Set Name: com.ibm.redbook.cs.psets.orderdetailscustomiser

Profile Entries

Profile Entry Name: Row0_input1

Generated entry name

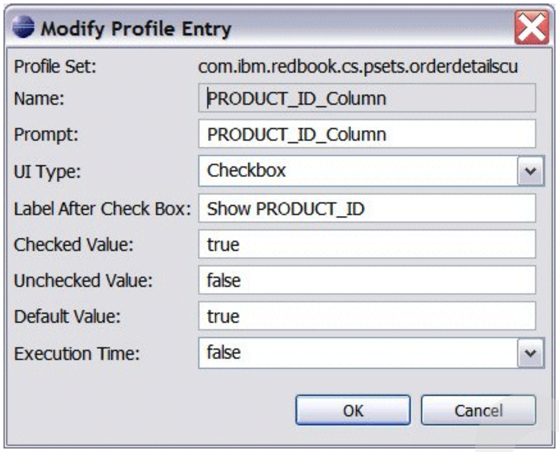
Profiles

Profiles	Profile Values
Default	Do Not Change

Figure 9-52 Choose com.ibm.redbook.cs.psets.orderdetailscustomiser as the profile set

8. Click the **Create Entry** button. In the Modify Profile Entry window, make the following entries and selections, then click **OK**.

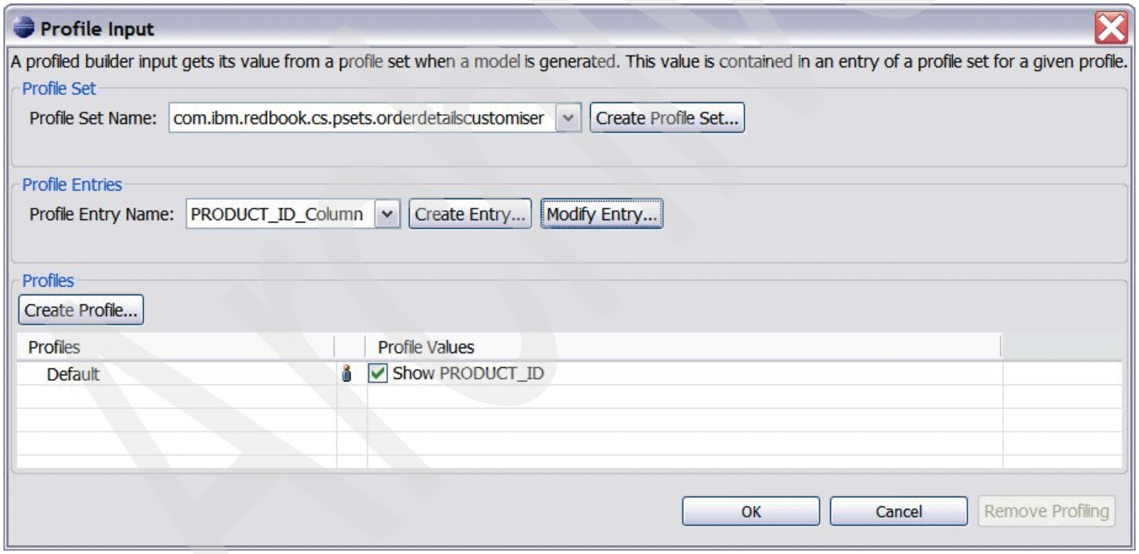
Name:	`PRODUCT_ID_Column`
Prompt:	`Show PRODUCT_ID`
UI Type:	`Checkbox`
Label After Check Box:	`Show PRODUCT_ID`
Checked Value:	`Do Not Change`
Unchecked Value:	`Hide`
Default Value:	`Do Not Change`
Execution Time:	`false`



Profile Set: com.ibm.redbook.cs.psets.orderdetailscu
Name: PRODUCT_ID_Column
Prompt: PRODUCT_ID_Column
UI Type: Checkbox
Label After Check Box: Show PRODUCT_ID
Checked Value: true
Unchecked Value: false
Default Value: true
Execution Time: false

Figure 9-53 Choose a Checkbox UI for the PRODUCT_ID column

9. The Profile Input window should now have a Profile Values entry as shown in Figure 9-54.



A profiled builder input gets its value from a profile set when a model is generated. This value is contained in an entry of a profile set for a given profile.

Profile Set Name: com.ibm.redbook.cs.psets.orderdetailscustomiser

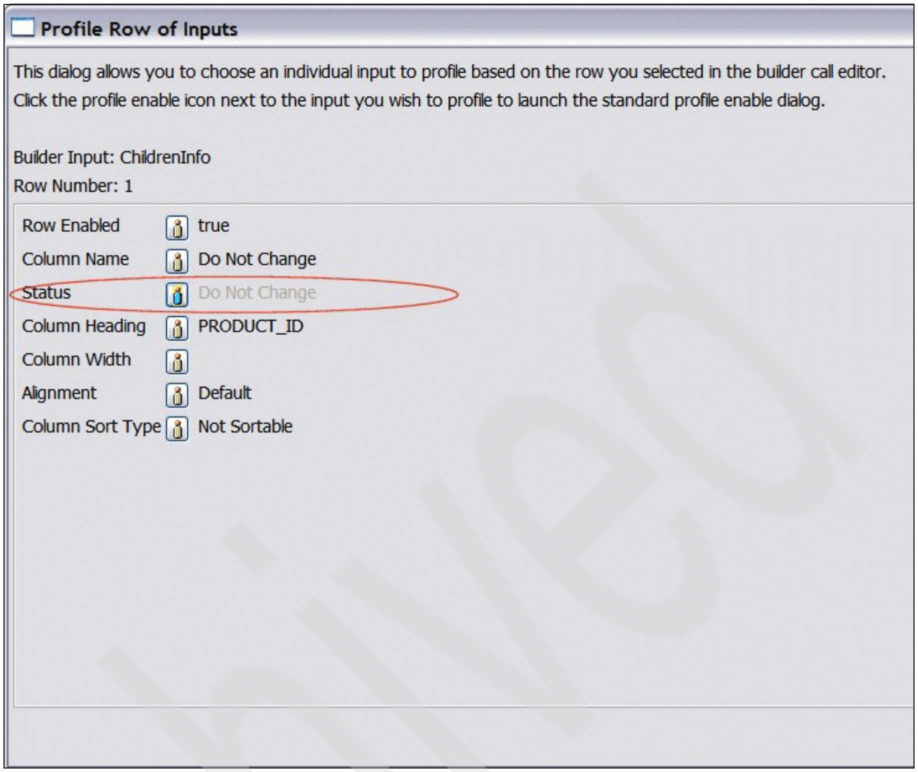
Profile Entry Name: PRODUCT_ID_Column

Profiles	Profile Values
Default	☑ Show PRODUCT_ID

Figure 9-54 There should now be a profile value in the Profiles section

10. Click **OK** to close the Profile Input window.

11. There should now a blue profiling icon next to Status in the Profile Row of Inputs window. Click **OK** to close that window.



This dialog allows you to choose an individual input to profile based on the row you selected in the builder call editor. Click the profile enable icon next to the input you wish to profile to launch the standard profile enable dialog.

Builder Input: ChildrenInfo
Row Number: 1

Row Enabled	true
Column Name	Do Not Change
Status	Do Not Change
Column Heading	PRODUCT_ID
Column Width	
Alignment	Default
Column Sort Type	Not Sortable

Figure 9-55 Blue profiling icon indicates PRODUCT_ID column is profile-enabled

12. in the Data Column Modifier builder, the Status field of the PRODUCT_ID should now be greyed out.

13. Profile-enable the THUMBNAIL column following the same flow used for PRODUCT_ID. Click the 👤 button next to THUMBNAIL. The Profile Row of Inputs window is displayed.

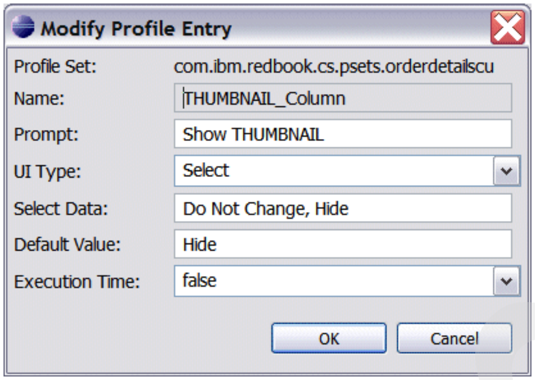
14. Click the 👤 button on the Status row and the Profile Input window opens. Select `com.ibm.redbook.cs.psets.orderdetailscustomiser` as the Profile Set.

15. Click the **Create Entry** button. In the Modify Profile Entry window, make the following entries and selections. We use a different UI Type for demonstration.

Name:	`THUMBNAIL_Column`
Prompt:	`Show THUMBNAIL`
UI Type:	`Select`
Select Data:	`Do Not Change, Hide`
Default Value:	`Hide`

Execution Time: `false`

Click **OK** to close the window.



Modify Profile Entry

Profile Set: com.ibm.redbook.cs.psets.orderdetailscu

Name: THUMBNAIL_Column

Prompt: Show THUMBNAIL

UI Type: Select

Select Data: Do Not Change, Hide

Default Value: Hide

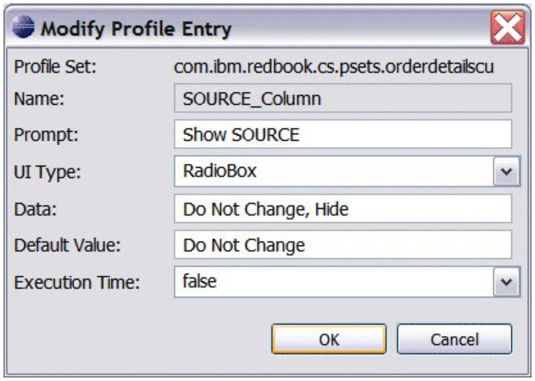
Execution Time: false

Figure 9-56 Choose a Select UI for the THUMBNAIL column

16. Click **OK** to close the Profile Input window.
17. There should now a blue profiling icon next to Status in the Profile Row of Inputs window. Click **OK** to close that window.
18. In the Data Column Modifier builder, the Status field of the THUMBNAIL should now be greyed out as well.
19. Profile-enable the SOURCE column following the same flow as previously. Click the button next to SOURCE. The Profile Row of Inputs window is displayed.
20. Click the button on the Status row; the Profile Input window opens. Select `com.ibm.redbook.cs.psets.orderdetailscustomiser` as the Profile Set.
21. Click the **Create Entry** button. In the Modify Profile Entry window, make the following entries and selections. This time use a different UI Type for demonstration.

Name:	`SOURCE_Column`
Prompt:	`Show SOURCE`
UI Type:	`RadioBox`
Data:	`Do Not Change, Hide`
Default Value	`Do Not Change`
Execution Time:	`false`

Click **OK** to close the window.



Modify Profile Entry

Profile Set: com.ibm.redbook.cs.psets.orderdetailscu

Name: SOURCE_Column

Prompt: Show SOURCE

UI Type: RadioBox

Data: Do Not Change, Hide

Default Value: Do Not Change

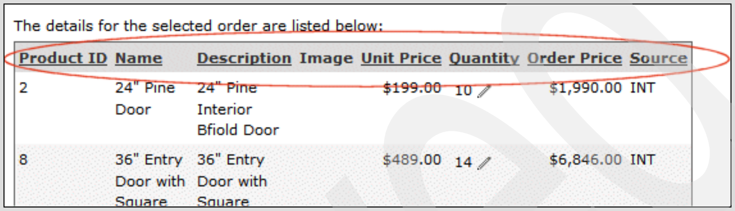
Execution Time: false

Figure 9-57 Choose a RadioBox UI Type for the SOURCE column

22. Click **OK** to close the Profile Input window.
23. There should now a blue profiling icon next to Status in the Profile Row of Inputs window. Click OK to close that window.
24. On the Data Column Modifier builder, the Status field of the SOURCE should now be greyed out too.
25. Click **Apply** to save the Data Column Modifier builder.
26. Save the OrderDetails model by clicking the 💾 button.

Note: We have deliberately chosen to use a Data Column Modifier (DCM) builder here as the profile-enabling tool for the three data fields to demonstrate that with the Manage Columns option checked, the DCM builder will override some of the formatting that the RDD file has done previously (Described in Chapter 7, “Creating portlets: Designing the UI” on page 275).

Here is how the OrderDetails portlet looks before the DCM builder is used.

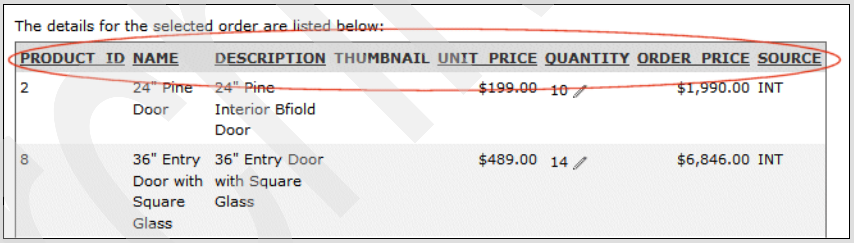


The details for the selected order are listed below:

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	Source
2	24" Pine Door	24" Pine Interior Bfiold Door		$199.00	10	$1,990.00	INT
8	36" Entry Door with Square	36" Entry Door with Square		$489.00	14	$6,846.00	INT

Figure 9-58 The column headers are formatted using the RDD file before the DCM builder is used

And here is how the OrderDetails portlet looks after the DCM builder is used.



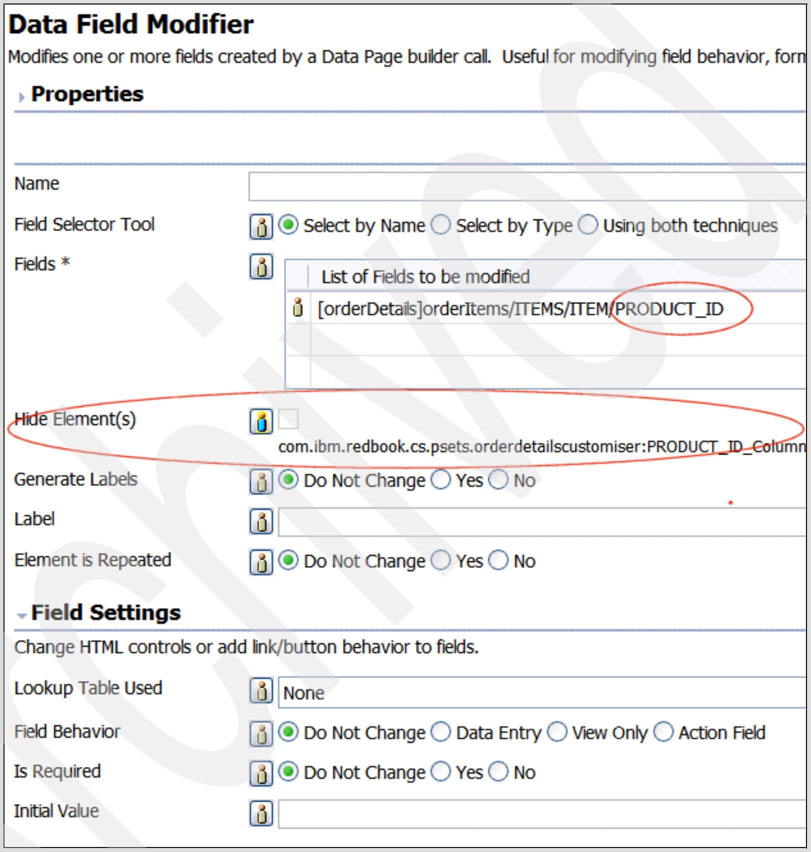
The details for the selected order are listed below:

PRODUCT ID	NAME	DESCRIPTION	THUMBNAIL	UNIT PRICE	QUANTITY	ORDER PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door		$199.00	10	$1,990.00	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass		$489.00	14	$6,846.00	INT

Figure 9-59 The column headers lost the format that the RDD file created

Notice that the formats of the column headers are overridden by the default “Column Heading” values stated in the DCM builder. However, other formats from the RDD file, such as the currency format and the sorting properties of each column, appear to be preserved even with the presence of the DCM builder.

To avoid having any of the formatting of the RDD file overridden, we should use a Data Field Modifier (DFM) builder for each of those three fields and profile-enable the fields from these DFM builders individually. This is a viable approach because DFM builder works on a lower level than the DCM builder and as a result we can explicitly specify which properties of a field are to be overridden and which are to be preserved.



Data Field Modifier

Modifies one or more fields created by a Data Page builder call. Useful for modifying field behavior, forn

Properties

Name	
Field Selector Tool	● Select by Name ○ Select by Type ○ Using both techniques
Fields *	List of Fields to be modified [orderDetails]orderItems/ITEMS/ITEM/PRODUCT_ID
Hide Element(s)	□ com.ibm.redbook.cs.psets.orderdetailscustomiser:PRODUCT_ID_Column
Generate Labels	● Do Not Change ○ Yes ○ No
Label	
Element is Repeated	● Do Not Change ○ Yes ○ No

Field Settings

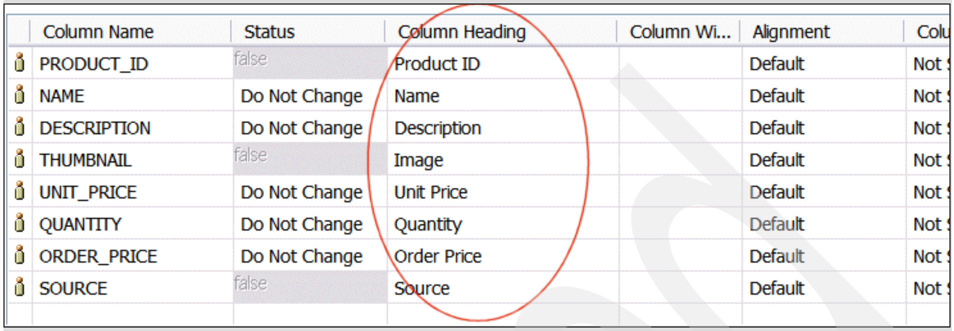
Change HTML controls or add link/button behavior to fields.

Lookup Table Used	None
Field Behavior	● Do Not Change ○ Data Entry ○ View Only ○ Action Field
Is Required	● Do Not Change ○ Yes ○ No
Initial Value	

Figure 9-60 Using a DFM builder provides you with more control on the field properties

This solution may not follow the best practice because it conflicts with the idea of minimizing the number of builders used in a model when possible. However, this is the only way we can ensure that all the work done by the RDD file is preserved.

In our CSA, instead of creating the three DFM builders, we will simply carry out the changes directly in the Data Column Modifier builder as follows:



Column Name	Status	Column Heading	Column Wi...	Alignment	Colu
PRODUCT_ID	false	Product ID		Default	Not
NAME	Do Not Change	Name		Default	Not
DESCRIPTION	Do Not Change	Description		Default	Not
THUMBNAIL	false	Image		Default	Not
UNIT_PRICE	Do Not Change	Unit Price		Default	Not
QUANTITY	Do Not Change	Quantity		Default	Not
ORDER_PRICE	Do Not Change	Order Price		Default	Not
SOURCE	false	Source		Default	Not

Figure 9-61 We will manually modify the column heading in the DCM builder for CSA

Creating OrderDetailsCustomiser model

1. In the Project Explorer, right-click **Redbooks** → **models** → **redbook** → **cs** → **ui** → **order**. Select **New** → **WebSphere Portlet Factory Model**.

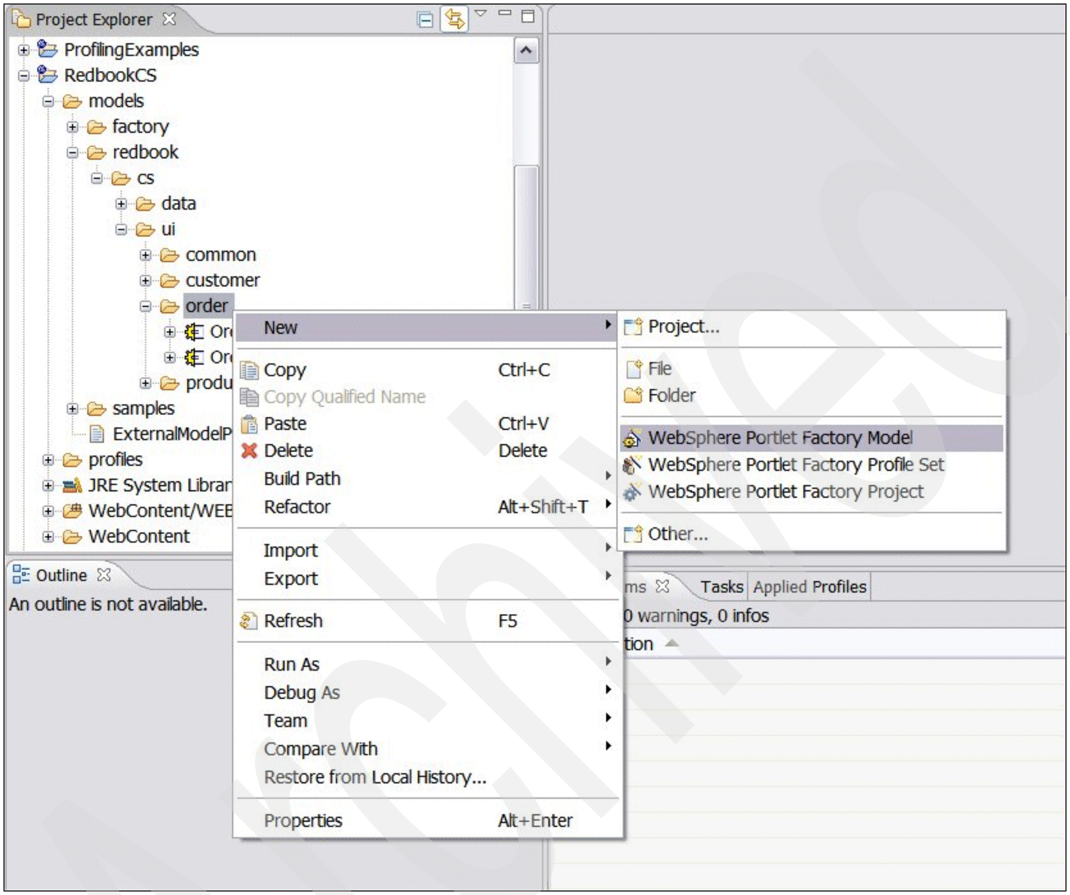


Figure 9-62 Create a new WebSphere Portlet Factory Model

2. Choose **RedbookCS** and click **Next**.
3. Choose **Factory Starter Models** → **Empty** and click **Next**.
4. In the next screen, make the following entries and selections:

   Folder: `RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/order`
   Model name: `OrderDetailsCustomiser`

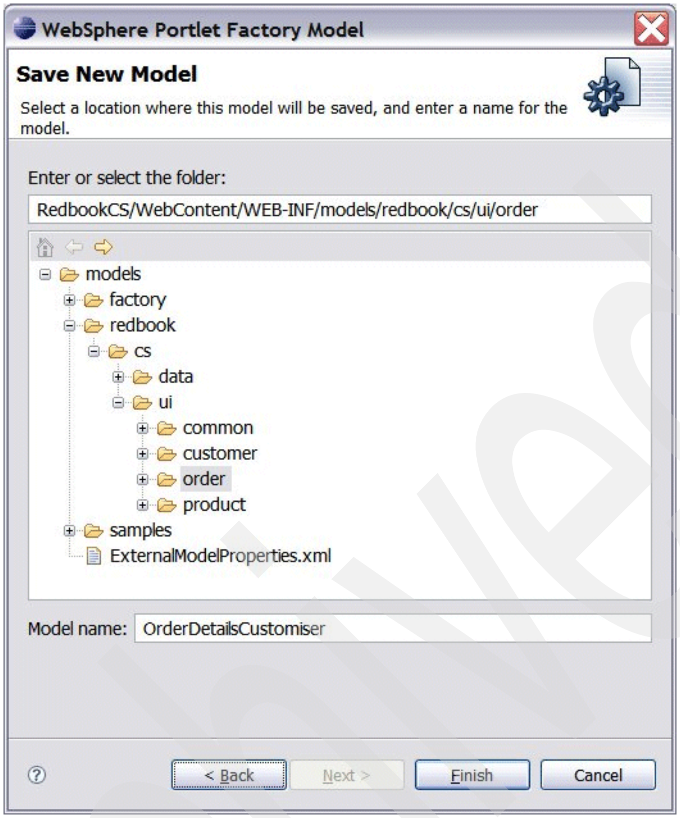
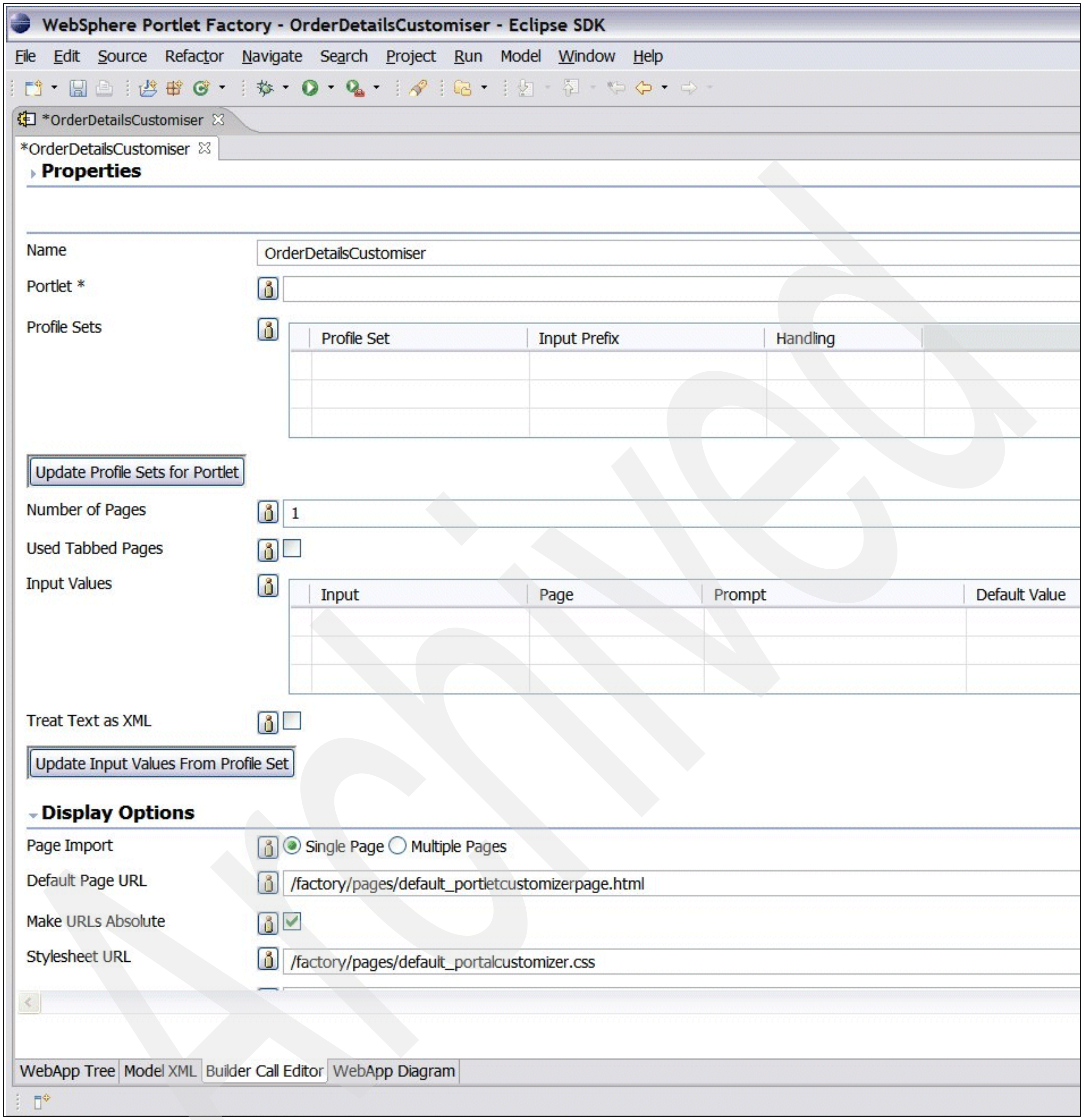

WebSphere Portlet Factory Model
Save New Model
Select a location where this model will be saved, and enter a name for the model.
Enter or select the folder:
RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/order
models
factory
redbook
cs
data
ui
common
customer
order
product
samples
ExternalModelProperties.xml
Model name:
OrderDetailsCustomiser
< Back
Next >
Finish
Cancel

Figure 9-63 Name the model OrderDetailsCustomiser

5. Click **Finish**.
6. In the OrderDetailsCustomiser model, click the ✚ button to add a Portlet Customizer builder.
7. Note that the Profile Sets and Input Values sections are empty by default. Name the builder `OrderDetailsCustomiser`.


WebSphere Portlet Factory - OrderDetailsCustomiser - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderDetailsCustomiser
*OrderDetailsCustomiser

Properties

Name: OrderDetailsCustomiser

Portlet *:

Profile Sets:

Profile Set	Input Prefix	Handling

Update Profile Sets for Portlet

Number of Pages: 1

Used Tabbed Pages: □

Input Values:

Input	Page	Prompt	Default Value

Treat Text as XML: □

Update Input Values From Profile Set

Display Options

Page Import: ● Single Page ○ Multiple Pages

Default Page URL: /factory/pages/default_portletcustomizerpage.html

Make URLs Absolute: ☑

Stylesheet URL: /factory/pages/default_portalcustomizer.css

Figure 9-64 The Profile Sets and the Input Values sections are empty by default

8. To select the model that this Portlet Customizer builder is associated with, click the ... button on the Portlet row. Select **redbook** → **cs** → **ui** → **order** → **OrderDetails**. Click **OK**.

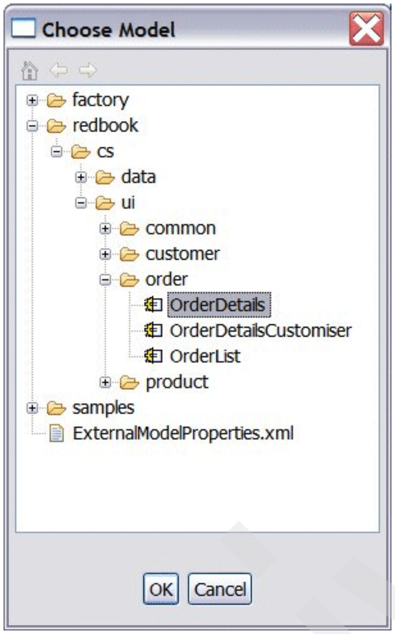
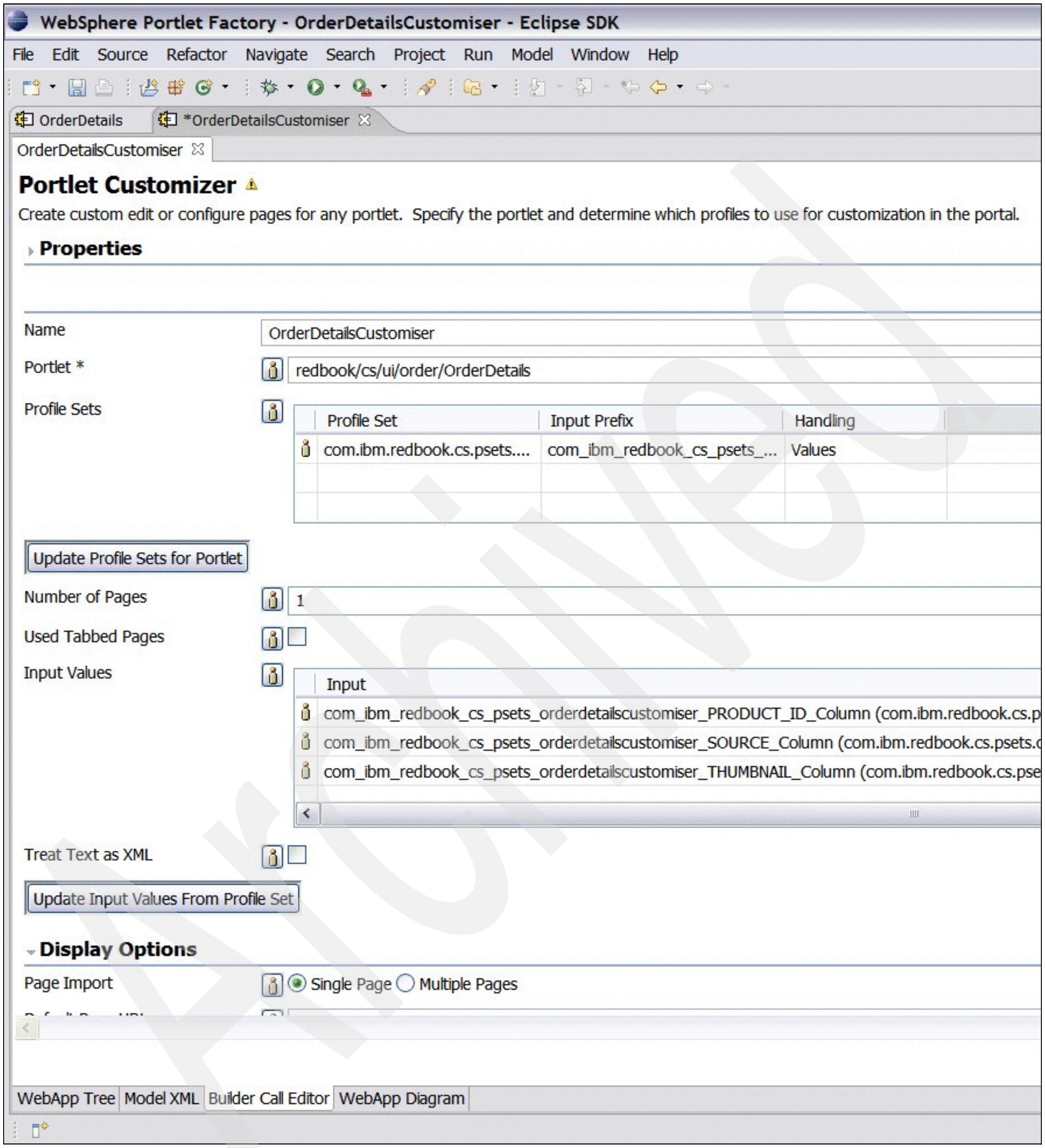


Figure 9-65 Select the model this Portlet Customizer is associated with

9. Note that the Profile Sets and Input Values sections are populated automatically after choosing the portlet. Ensure that the Profile Set handler is **Values**. Click **Apply** to save this builder.


WebSphere Portlet Factory - OrderDetailsCustomiser - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
OrderDetails
*OrderDetailsCustomiser
OrderDetailsCustomiser
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Portlet Customizer

Create custom edit or configure pages for any portlet. Specify the portlet and determine which profiles to use for customization in the portal.

Properties

Name: OrderDetailsCustomiser

Portlet *: redbook/cs/ui/order/OrderDetails

Profile Sets:

Profile Set	Input Prefix	Handling
com.ibm.redbook.cs.psets....	com_ibm_redbook_cs_psets_...	Values

Update Profile Sets for Portlet

Number of Pages: 1

Used Tabbed Pages: □

Input Values:

Input
com_ibm_redbook_cs_psets_orderdetailscustomiser_PRODUCT_ID_Column (com.ibm.redbook.cs.p
com_ibm_redbook_cs_psets_orderdetailscustomiser_SOURCE_Column (com.ibm.redbook.cs.psets.c
com_ibm_redbook_cs_psets_orderdetailscustomiser_THUMBNAIL_Column (com.ibm.redbook.cs.pse

Treat Text as XML: □

Update Input Values From Profile Set

Display Options

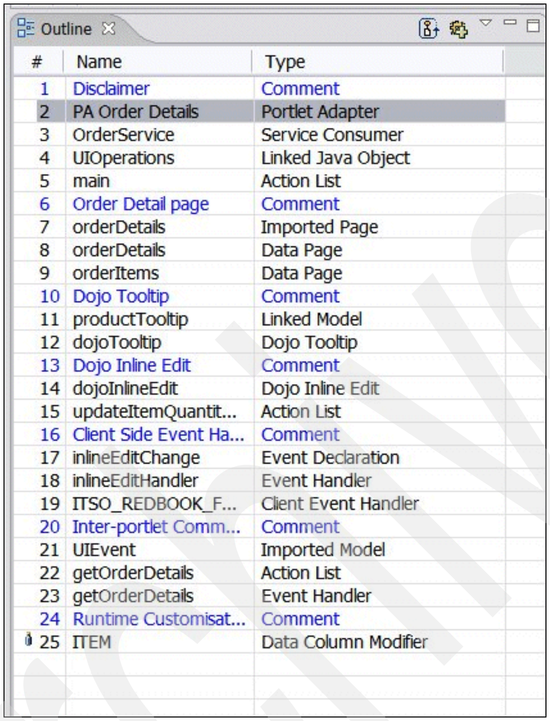
Page Import: ● Single Page ○ Multiple Pages

Figure 9-66 The Profile Sets and Input Values sections are populated automatically after choosing the Portlet

10.Save the OrderDetailsCustomiser model by clicking the 💾 button.

Setting up for OrderDetails model

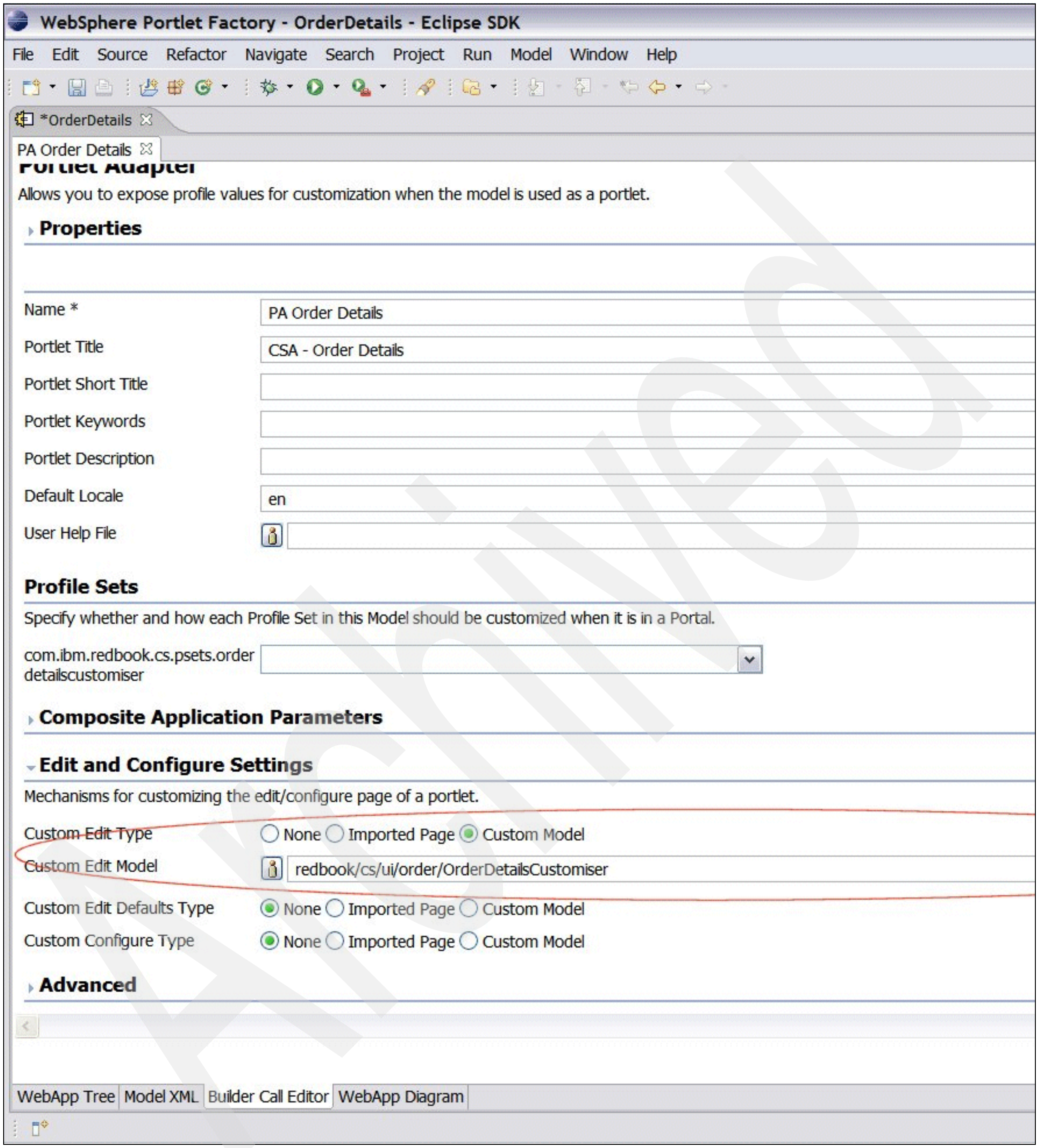
1. In Project Explorer, go to **RedbookCS** → **models** → **redbook** → **cs** → **ui** → **order** → **OrderDetails.model**. Double-click **OrderDetails.model** to open it.
2. In the Outline pane, double-click the **PA Order Details Portlet Adapter** builder. The builder opens in the Edit pane.



#	Name	Type
1	Disclaimer	Comment
2	PA Order Details	Portlet Adapter
3	OrderService	Service Consumer
4	UIOperations	Linked Java Object
5	main	Action List
6	Order Detail page	Comment
7	orderDetails	Imported Page
8	orderDetails	Data Page
9	orderItems	Data Page
10	Dojo Tooltip	Comment
11	productTooltip	Linked Model
12	dojoTooltip	Dojo Tooltip
13	Dojo Inline Edit	Comment
14	dojoInlineEdit	Dojo Inline Edit
15	updateItemQuantit...	Action List
16	Client Side Event Ha...	Comment
17	inlineEditChange	Event Declaration
18	inlineEditHandler	Event Handler
19	ITSO_REDBOOK_F...	Client Event Handler
20	Inter-portlet Comm...	Comment
21	UIEvent	Imported Model
22	getOrderDetails	Action List
23	getOrderDetails	Event Handler
24	Runtime Customisat...	Comment
25	ITEM	Data Column Modifier

Figure 9-67 Open the Portlet Adapter builder

3. Scroll down to Edit and Configure Settings. For the Custom Edit Type, choose **Custom Model**.
4. Click the ... button on the Custom Edit Model row.
5. Select **redbook** → **cs** → **ui** → **order** → **OrderDetails** and click **OK**.


WebSphere Portlet Factory - OrderDetails - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Model Window Help
*OrderDetails
PA Order Details
WebApp Tree
Model XML
Builder Call Editor
WebApp Diagram

Portlet Adapter

Allows you to expose profile values for customization when the model is used as a portlet.

Properties

Name *	PA Order Details
Portlet Title	CSA - Order Details
Portlet Short Title	
Portlet Keywords	
Portlet Description	
Default Locale	en
User Help File	

Profile Sets

Specify whether and how each Profile Set in this Model should be customized when it is in a Portal.

com.ibm.redbook.cs.psets.orderdetailscustomiser

Composite Application Parameters

Edit and Configure Settings

Mechanisms for customizing the edit/configure page of a portlet.

Custom Edit Type	○ None ○ Imported Page ● Custom Model
Custom Edit Model	redbook/cs/ui/order/OrderDetailsCustomiser
Custom Edit Defaults Type	● None ○ Imported Page ○ Custom Model
Custom Configure Type	● None ○ Imported Page ○ Custom Model

Advanced

Figure 9-68 Associate the OrderDetailsCustomiser model as the Custom Edit model of the OrderDetails portlet

6. Click **Apply** to save the changes.

7. Save the OrderDetails model by clicking the 💾 button.

Testing for portlet runtime customization

1. Before you can test the runtime customization feature, you must refresh the Portlet WAR because changes were made to the Portlet Adapter. Do this by right-clicking the **RedbookCS** project in the Project Explorer. Then select **Refresh Portlet Factory WAR** → **Refresh Portlet Deployment WAR(s)**.

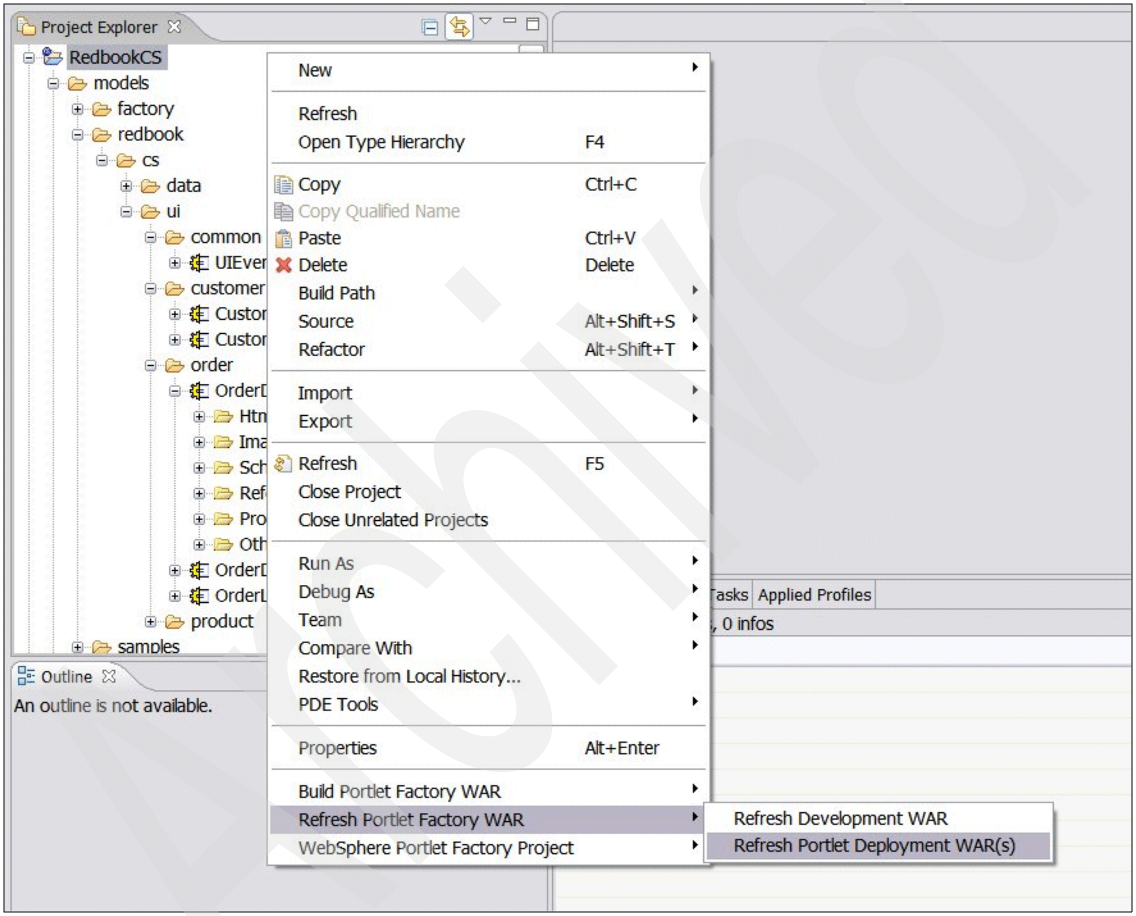
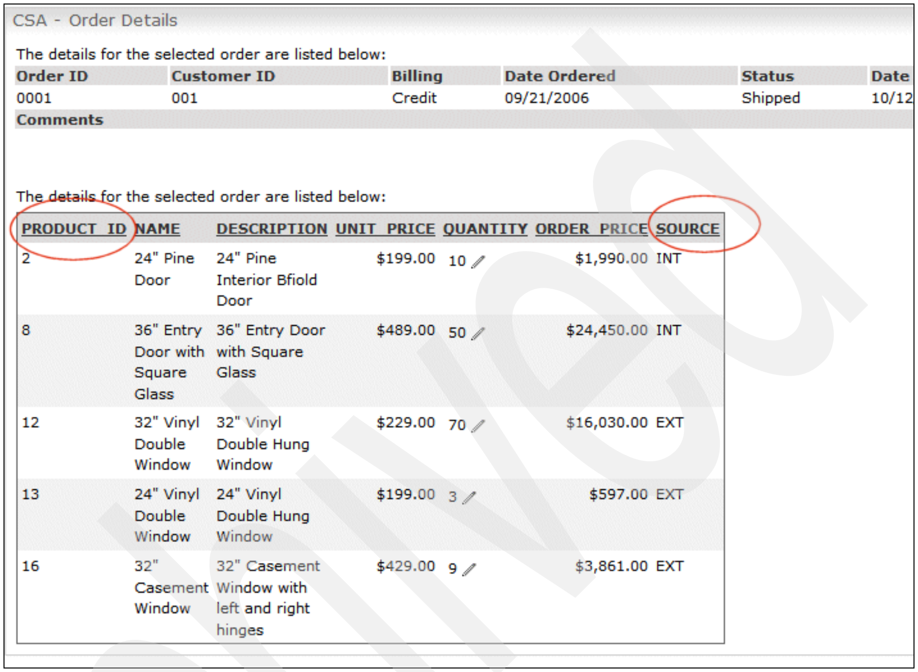


Figure 9-69 Refreshing the Portlet Deployment WAR

2. Log into portal as customer1. (Note that CSRs will have the same feature available to them.)

3. Go to the Order portal page after the Customer Information portlet is rendered.

4. In the Order List portlet, click any order ID. The details of that order are displayed in the Order Details portlet. By default, you should be able to see the two columns including the PRODUCT_ID and SOURCE columns, and the THUMBNAIL is hidden in the Order Details portlet.



CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date
0001	001	Credit	09/21/2006	Shipped	10/12

Comments

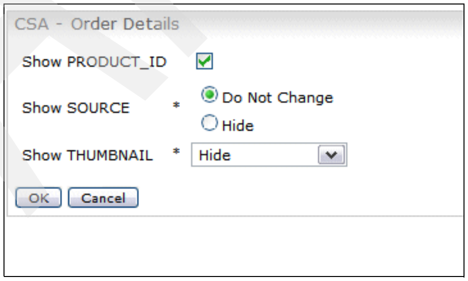
The details for the selected order are listed below:

PRODUCT_ID	NAME	DESCRIPTION	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
2	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	10	$1,990.00	INT
8	36" Entry Door with Square Glass	36" Entry Door with Square Glass	$489.00	50	$24,450.00	INT
12	32" Vinyl Double Window	32" Vinyl Double Hung Window	$229.00	70	$16,030.00	EXT
13	24" Vinyl Double Window	24" Vinyl Double Hung Window	$199.00	3	$597.00	EXT
16	32" Casement Window	32" Casement Window with left and right hinges	$429.00	9	$3,861.00	EXT

Figure 9-70 The Order Details portlet

5. Click the ▾ button on the top right corner of the Order Details portlet and click **personalize**.

6. The personalize page shown in Figure 9-71 is displayed. Note that the three columns have different types of UIs.



CSA - Order Details

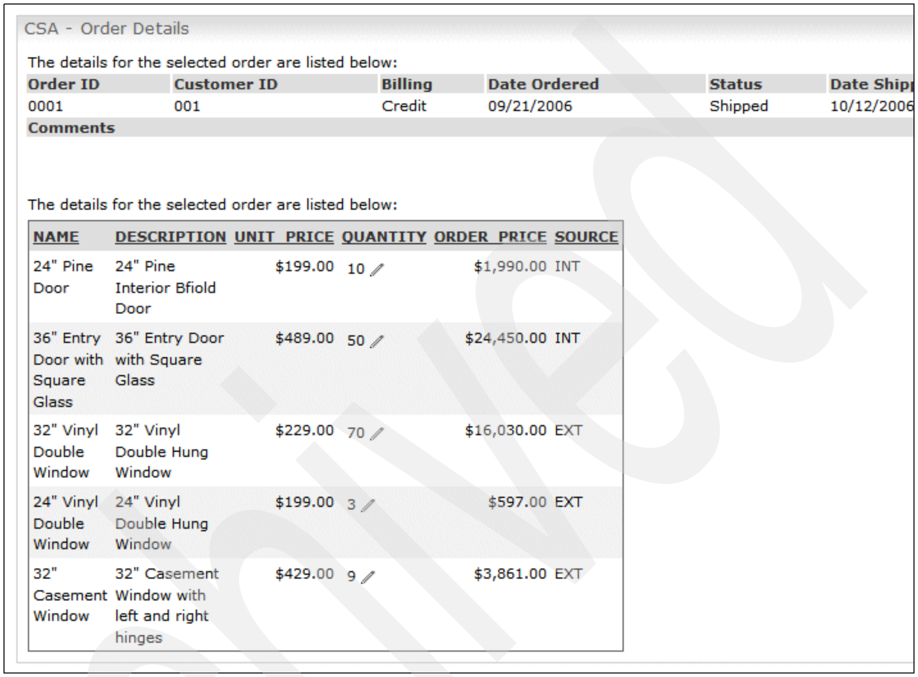
Show PRODUCT_ID ☑

Show SOURCE * ● Do Not Change ○ Hide

Show THUMBNAIL * Hide

Figure 9-71 Portlet customization page for Order Details portlet

7. Uncheck Show PRODUCT_ID. Click **OK**.
8. You should still be able to see the same set of data displayed in the Order Details portlet (that is, portlet state is maintained when switching from personalize mode to View mode), but the PRODUCT_ID is now hidden.



CSA - Order Details

The details for the selected order are listed below:

Order ID	Customer ID	Billing	Date Ordered	Status	Date Shipp
0001	001	Credit	09/21/2006	Shipped	10/12/2006
Comments					

The details for the selected order are listed below:

NAME	DESCRIPTION	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
24" Pine Door	24" Pine Interior Bfiold Door	$199.00	10	$1,990.00	INT
36" Entry Door with Square Glass	36" Entry Door with Square Glass	$489.00	50	$24,450.00	INT
32" Vinyl Double Window	32" Vinyl Double Hung Window	$229.00	70	$16,030.00	EXT
24" Vinyl Double Window	24" Vinyl Double Hung Window	$199.00	3	$597.00	EXT
32" Casement Window	32" Casement Window with left and right hinges	$429.00	9	$3,861.00	EXT

Figure 9-72 Same set of data is displayed with the PRODUCT_ID column now hidden

Note: In Chapter 8, “Enabling portlet communication” on page 361, we briefly mentioned that we deliberately called the getOrderDetails action in the main method while the getOrderDetails Event Handler is already doing so. The primary reason for this is to allow the portlet to “maintain state” after returning from Edit/Config mode. Each time a portlet returns from Edit/Config mode, a new instance of the portlet is created; thus it will not have the same data from the previous instance. Having the getOrderDetails action called in the main method again enforces the new instance portlet to re-acquire and display the same data (using the selectedOrderID shared variable). As a result, state can be maintained from Edit/Config mode to View mode.

9.7 Best practices

We recommend that the following simple software lifecyle be used to implement profiling:

Analysis phase

- Identify all the variations in the application's behavior.
- Identify what the influencing factors are for each of the variations.

Design phase

- Group the related influencing factors.
- Design the profile set/profile structures.
- Decide how the profile values are accessed by the regeneration engine (that is, by using a profile selection handler or a value setter).
- Design for selection handlers if required.

Implementation phase

- Create profile sets, profiles, profile entry and profile values as designed.
- Implement selection handlers if required.
- Associate these profile sets with the appropriate builders.

Testing phase

- For each variation of the application, test whether it is working as expected.

Among the factors you should consider during the project cycle, particularly in the design phase, are:

1. Creating and managing profile sets

   You might find that some profile entries in a profile set are shared across different models. In that case, separate these entries out from the model-specific entries and then group these shared entries into different profile sets based on their context.

2. Creating and managing profiles

   If you find that two or more profiles have the same values for many of the profile entries, create a base profile as the parent for these profiles such that these shared entry values can be taken at the parent level. For example, the Manager profile and the Assistant Manager profile can be built as the children of the Employee profile.

3. Naming conventions

   For profile sets, you may find it useful to distinguish among the model-specific profile sets as well as the shared profile sets by applying a meaningful naming convention. Also, a consistent prefix should be used to avoid any potential naming conflicts.

   Profiles and profile entries should be named based on their context. In particular with the profile entries, using the default names sometimes makes it very difficult to identify them, especially when they are from different builders of a model.

4. Default values for profile entries

   Whenever it makes sense to do so (that is, not violating the application logic), define an appropriate default value for each profile entry.

5. Testing

   The Portlet Factory Designer provides an easy way to test the implemented profiling in a standalone mode:

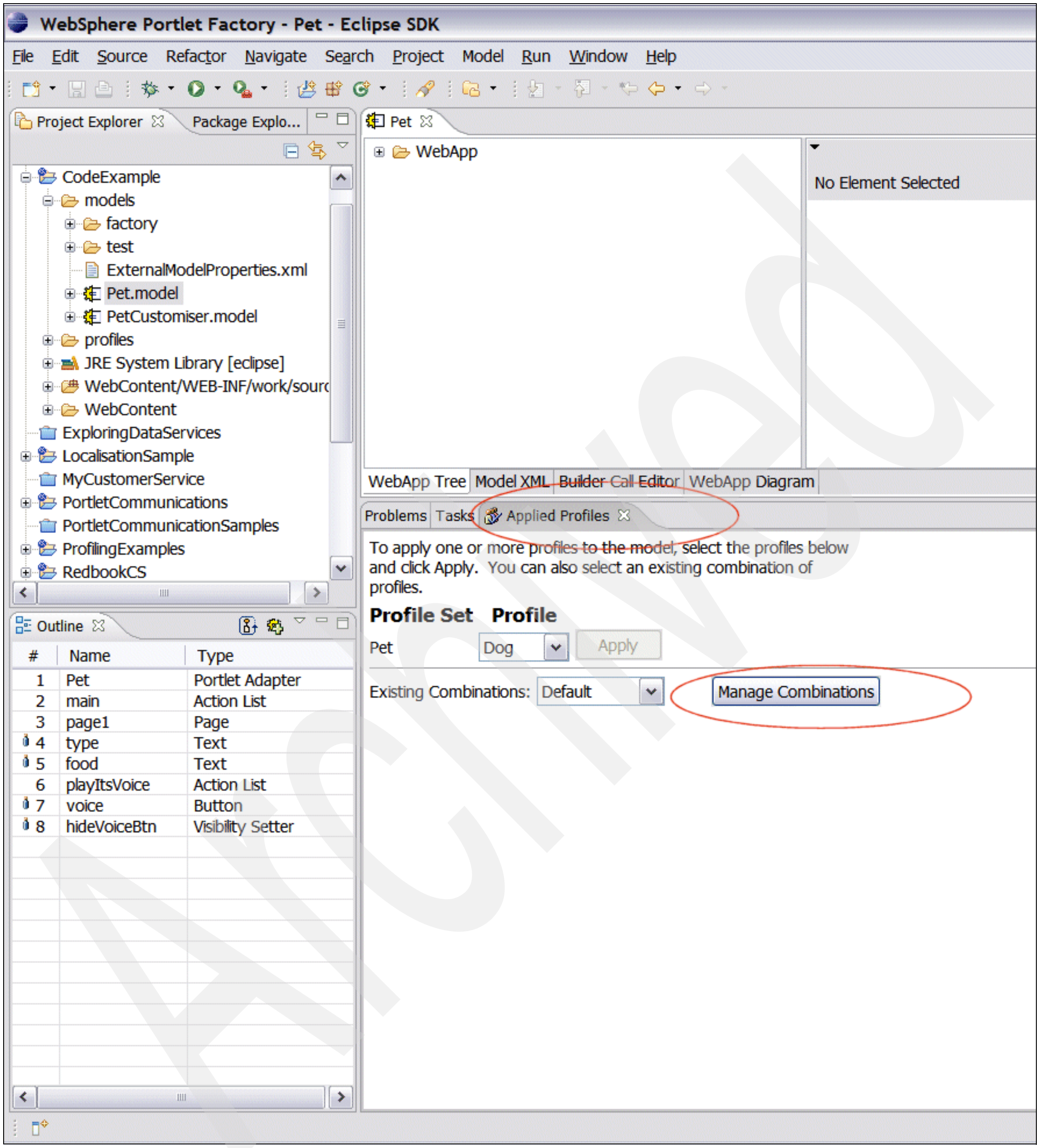
   a. Open the model that you would like to test and make sure it is active on the Editor Panel.

   b. Switch to the Applied Profiles view (in the bottom center panel).

   c. For each profile set this model uses, select a profile that you want to test and click **Apply**.

   d. Run the model by clicking the **Run** button (▶) on the tool bar.

   If more than one profile set is used in a model, the Manage Combinations function allows you to define different combinations of profiles selected for each profile set, then you can reuse these combinations. This eliminates the need to re-select the profile for each profile set every time you run the model.



- CodeExample
  - models
    - factory
    - test
    - ExternalModelProperties.xml
    - Pet.model
    - PetCustomiser.model
  - profiles
  - JRE System Library [eclipse]
  - WebContent/WEB-INF/work/sourc
  - WebContent
- ExploringDataServices
- LocalisationSample
- MyCustomerService
- PortletCommunications
- PortletCommunicationSamples
- ProfilingExamples
- RedbookCS

#	Name	Type
1	Pet	Portlet Adapter
2	main	Action List
3	page1	Page
4	type	Text
5	food	Text
6	playItsVoice	Action List
7	voice	Button
8	hideVoiceBtn	Visibility Setter

To apply one or more profiles to the model, select the profiles below and click Apply. You can also select an existing combination of profiles.

Profile Set	Profile
Pet	Dog

Apply

Existing Combinations: Default

Manage Combinations

Figure 9-73 Using the Applied Profiles View in the Portlet Factory Designer

9.8 Conclusion

In this chapter, we have demonstrated how to apply various profiling techniques for our Customer Self Service Application. We have also discussed the basic concept of profiling and some best practices to implement profiling. If you have followed the steps in this chapter, you should now have the Customer Self Service Application fully functioning as described in Chapter 2, except for the Go Shopping component.

10

Creating the Go Shopping portlet

This chapter describes how to create the Go Shopping portlet. It also illustrates a wizard-based design pattern used for building this portlet. This is the final portlet you will develop within the sample application. It combines all of the techniques learned in the previous chapters to create the complete application.

The models developed in this chapter are:

- GoShoppingPortlet
- ShoppingPage
- ShoppingCart & ShoppingProductCatalog
- OrderPage
- ConfirmationPage

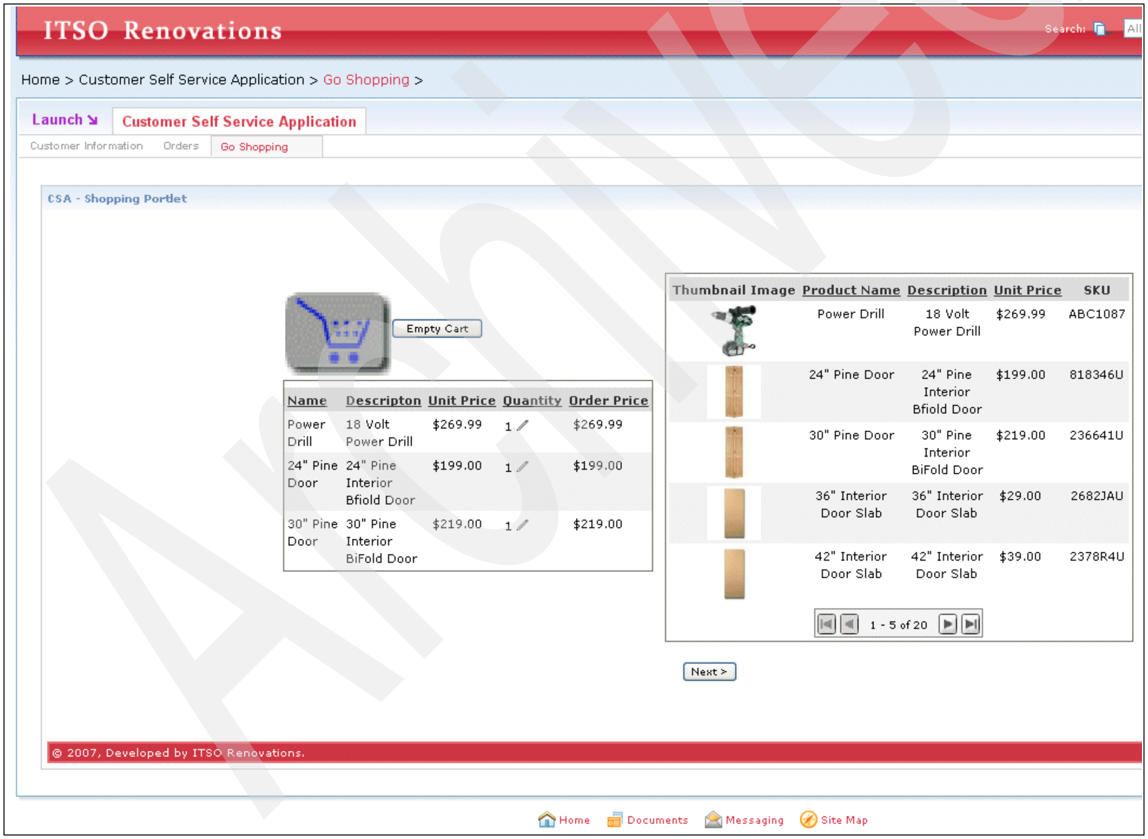
10.1 Preview of the portlet you will build in this chapter

The Go Shopping portlet enables the user to select products, enter order information and confirm their purchases. It is a step-by-step process where the user's final goal is to make a purchase. During the process, several decisions must made before the final purchase can be completed.

At a high level, the steps a user takes within this portlet are:

- Select from the product catalog
- Complete the order form
- Receive order confirmation

Figure 10-1 illustrates the Go Shopping portlet.



ITSO Renovations

Search: All

Home > Customer Self Service Application > Go Shopping >

Launch ↘ Customer Self Service Application

Customer Information Orders Go Shopping

CSA - Shopping Portlet

Empty Cart

Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	$269.99	1	$269.99
24" Pine Door	24" Pine Interior Bfiold Door	$199.00	1	$199.00
30" Pine Door	30" Pine Interior BiFold Door	$219.00	1	$219.00

Thumbnail Image	Product Name	Description	Unit Price	SKU
	Power Drill	18 Volt Power Drill	$269.99	ABC1087
	24" Pine Door	24" Pine Interior Bfiold Door	$199.00	818346U
	30" Pine Door	30" Pine Interior BiFold Door	$219.00	236641U
	36" Interior Door Slab	36" Interior Door Slab	$29.00	2682JAU
	42" Interior Door Slab	42" Interior Door Slab	$39.00	2378R4U

1 - 5 of 20

Next >

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Home Documents Messaging Site Map

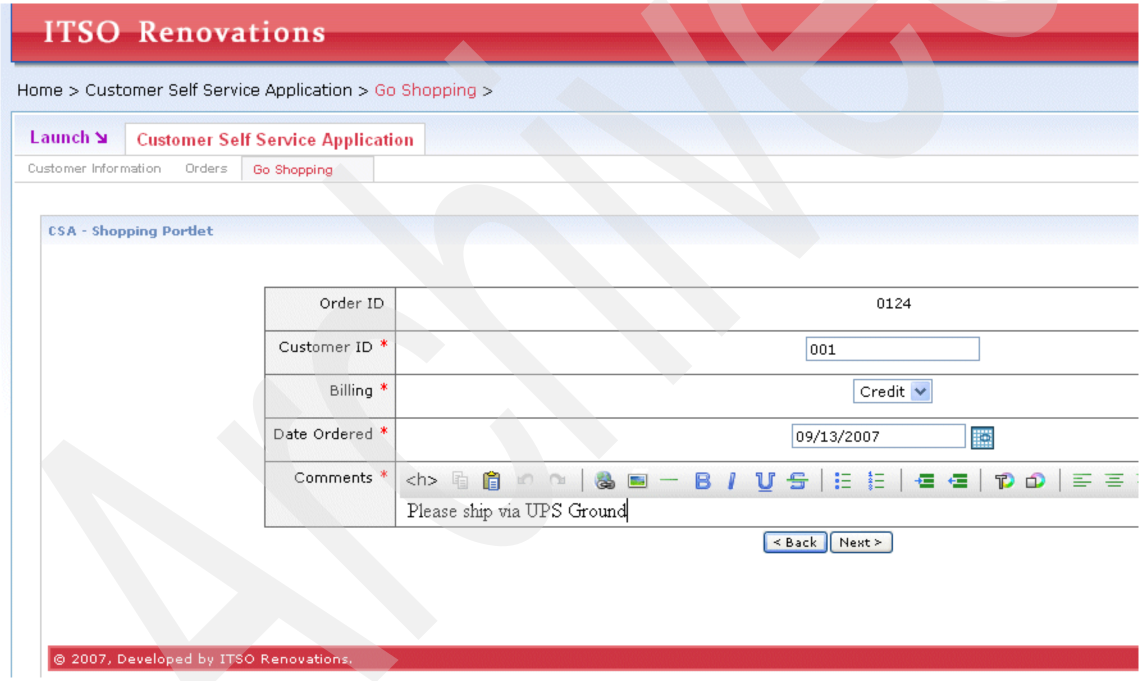
Figure 10-1 Overview of the Go Shopping portlet

Customers use the GoShopping portlet to select products, add them to their shopping cart, and confirm their order.

The first screen of the portlet shows the customer a list of products. (Figure 10-1)

Note that product data is paginated so that instead of viewing the complete list of products all at once, product data is presented in a smaller, easier to read listing. The first screen also illustrates a *shopping cart*, to which the customer adds their purchases. Behind the scenes, Dojo Drag Source and Dojo Drop Target builders are used to implement the drag and drop functionality, so customers can drag and drop the products to the shopping cart.

Once the items have been added to the cart, the customer completes the billing information. Figure 10-2 shows order page where the customer chooses the type of billing, selects the date ordered, and enters comments.


ITSO Renovations
Home > Customer Self Service Application > Go Shopping >
Launch
Customer Self Service Application
Customer Information
Orders
Go Shopping
CSA - Shopping Portlet

Order ID	0124
Customer ID *	001
Billing *	Credit
Date Ordered *	09/13/2007
Comments *	Please ship via UPS Ground

<h>
B
I
U
< Back
Next >
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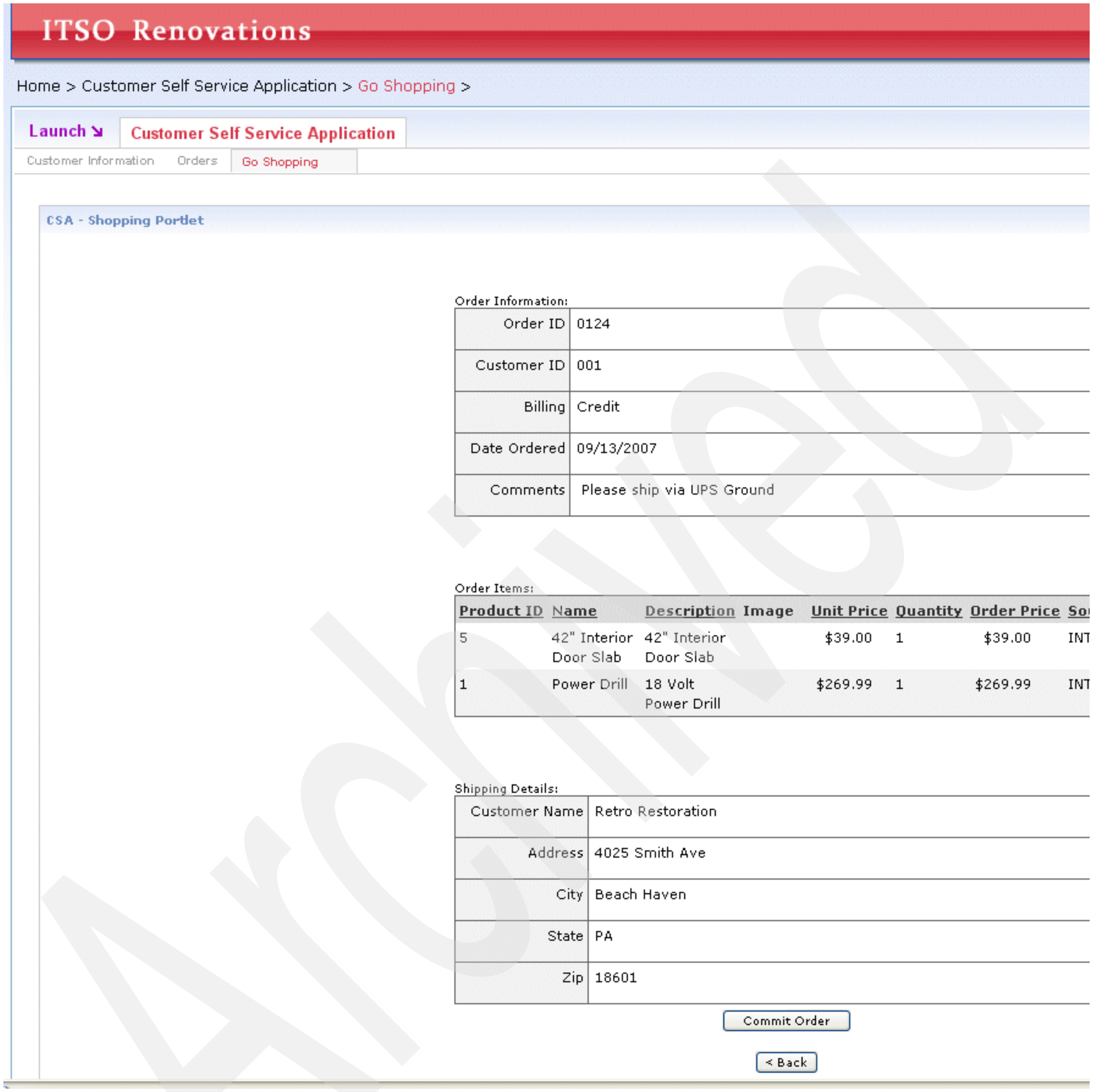
Figure 10-2 Customer provides details for ordering and billing

Figure 10-3 shows the order confirmation page, which displays the order information, a list of the items ordered and prices, and the shipping details. The customer can confirm the order by clicking the Commit Order button.



Order Information:

Order ID	0124
Customer ID	001
Billing	Credit
Date Ordered	09/13/2007
Comments	Please ship via UPS Ground

Order Items:

Product ID	Name	Description	Image	Unit Price	Quantity	Order Price	So
5	42" Interior Door Slab	42" Interior Door Slab		$39.00	1	$39.00	INT
1	Power Drill	18 Volt Power Drill		$269.99	1	$269.99	INT

Shipping Details:

Customer Name	Retro Restoration
Address	4025 Smith Ave
City	Beach Haven
State	PA
Zip	18601

Figure 10-3 Details and order confirmation

10.2 Components within the portlet

The GoShopping portlet is made up of the following components:

- The main portlet model, named GoShoppingPortlet

- ShoppingCart model

  This model incorporates the ShoppingPage model and the ShoppingProductCatalog model.
- OrderPage model
- ConfirmationPage model

The application has been designed to encapsulate different functionality as separate models. For example, ShoppingCart model functionality is the ShoppingCart. Customers use this functionality to add the products to their cart.

The other two models, OrderPage and ConfirmationPage, have been created for ordering and confirmation respectively. Encapsulating different functionalities as models makes implemention of the application cleaner.

Figure 10-4 shows a block diagram representation of the Go Shopping application.

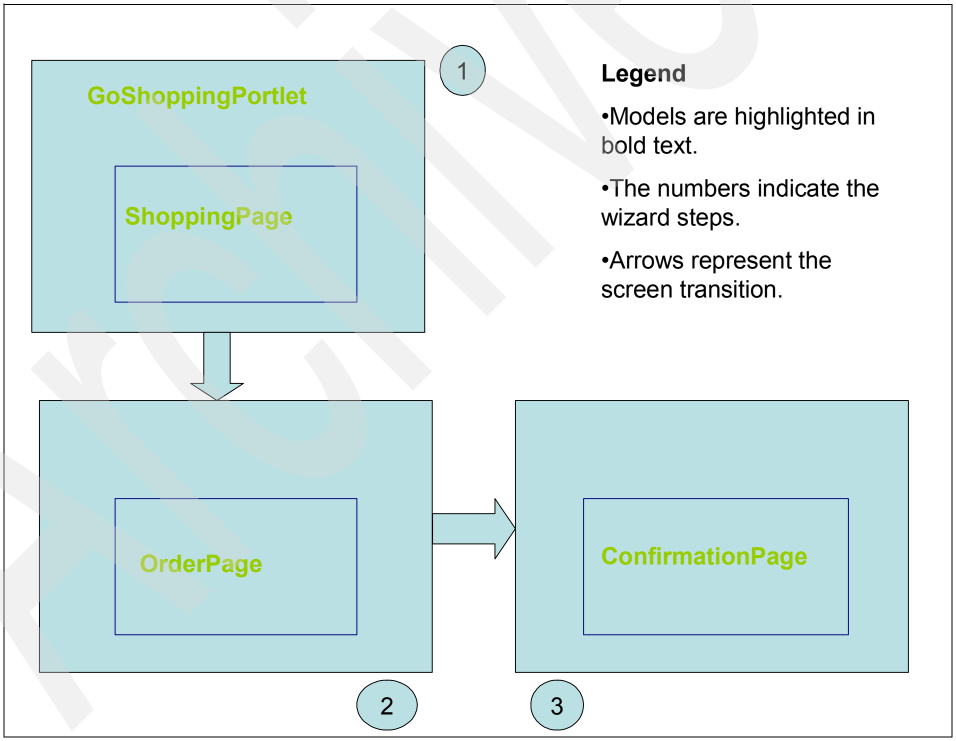

GoShoppingPortlet
ShoppingPage
1
OrderPage
ConfirmationPage
2
3
Legend
•Models are highlighted in bold text.
•The numbers indicate the wizard steps.
•Arrows represent the screen transition.

Figure 10-4 Block diagram showing the models used in the Go Shopping application

Note: The inner rectangular boxes represent the wizard screen. The outer rectangular box is the base screen. The entire screen can be thought of as the output generated by the base screen and the wizard screen.

Value to the developer in building this portlet

This modular approach to building the portlet, which segregates different functional pieces as separate models, provides the opportunity for you to learn about:

- The wizard-based approach
- Multiple Container models
- How the wizard based approach overcomes the back button navigation problem

Wizard-based approach

The key technique that you, as the developer, will learn in this implementation is the wizard design pattern, which takes the developer through the entire task one step at a time.

There are other approaches to building multiple screen portlets besides the wizard-based approach. While building the screens using the wizard-based design pattern, the models that are the wizard steps are dynamically selected and rendered. A call to the portlet shows the rendering produced by the base wizard model and the rendering produced by the inserted wizard step model.

One approach to building a multiple screen based portlet is to swap models in and out of one model container. There is a chance that the customer could trigger an “action not found” error by using the browser back button and then clicking an action. The wizard-based approach avoids this problem because it uses the inserted page builder, so the action URLs present in any cached HTML will correspond to actions that can be executed, whether or not the model being displayed to the user is the “current” one.

Once the decision is made to use models to represent different functional pieces, the question arises: How are we going to show the page rendered by a model as a part of the base wizard model? The answer is by using the model container in conjunction with a page builder. The model container displays a model at a named tag or other locations on a page or pages.

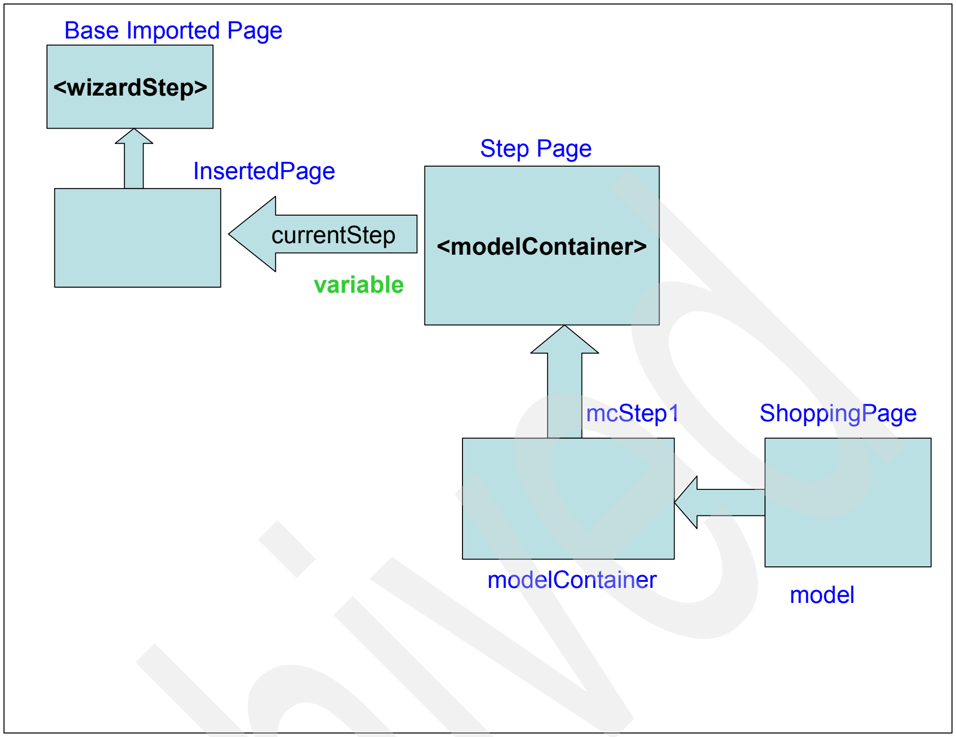


Figure 10-5 The builders in a wizard-based model

Figure 10-5 illustrates the wizard technique. The diagram has been expanded so that you can easily see how the various builders come together in this technique.

The key points in the relationship between the builders are as follows:

- The wizard can be assumed to be comprised of the main base wizard page; the base imported page "basePage" has a span element named "wizardStep" which is the target for the inserted page.
- The inserted page can be assumed to be the individual pages that get changed dynamically based on the button action in the individual wizard pages or the wizard step pages.
- The inserted page refers to the wizard screens by means of a variable "currentStep," which is set according to the action in the individual wizard step pages.
- The step pages have a span element named "modelContainer," which is the target for the model container.
- Finally, the individual model container holds a model.

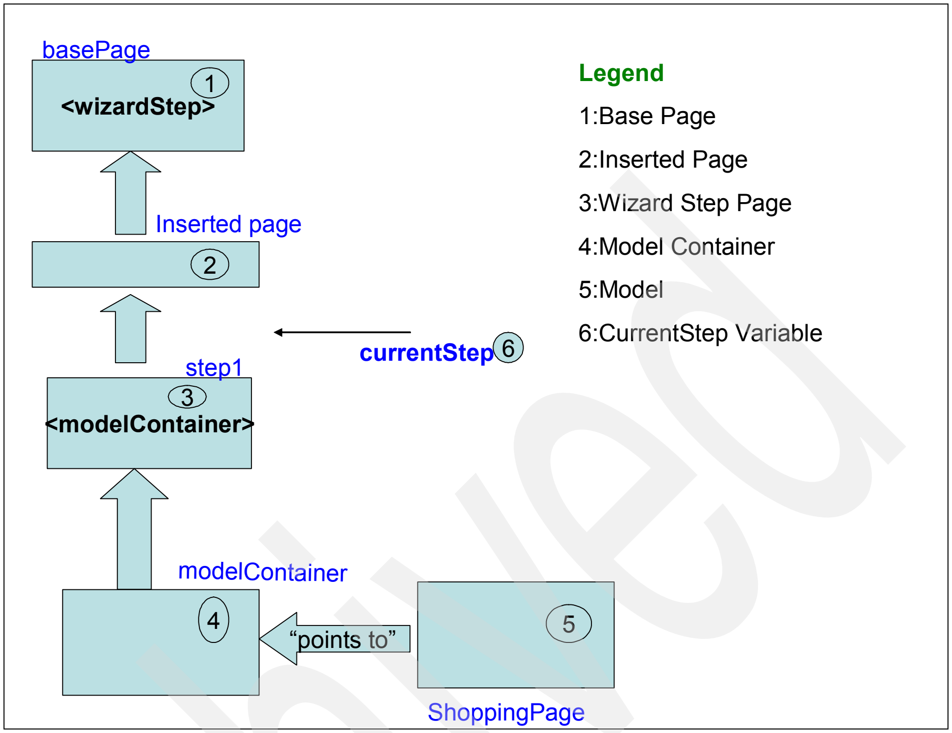


Figure 10-6 Technical elaboration of the wizard-based technique

Figure 10-6 shows the sequence of action among the various builders in the wizard. For simplicity we assume that it is the first time the user is invoking the portlet. The base page span element named "wizardStep" is acted upon by the inserted page. The inserted page refers to a page by means of a variable named "currentStep." The default value of the variable is "step1," which means that a page named "step1" gets inserted into the contents of the base page at the location "wizardStep." The "step1" page has a span element named "modelContainer," which is acted upon by the model container. The model container renders the model "ShoppingPage." The "step1" page contents gets populated by the contents of the model "ShoppingPage."

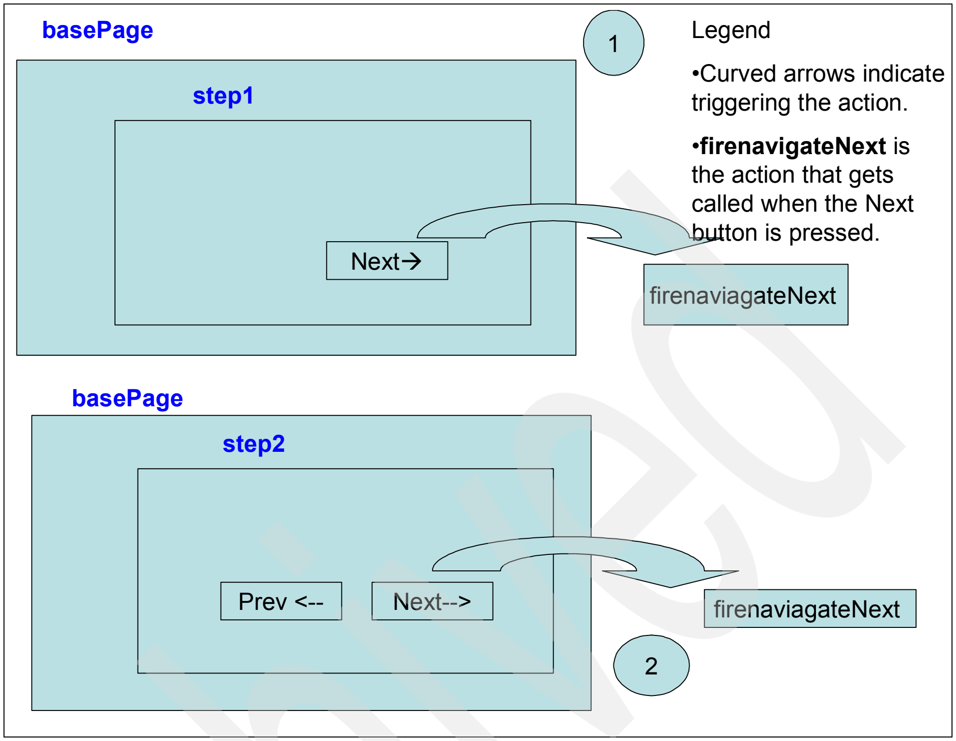

basePage
1
Legend
•Curved arrows indicate triggering the action.
•**firenavigateNext** is the action that gets called when the Next button is pressed.
step1
Next→
firenaviagateNext
basePage
step2
Prev <--
Next-->
firenaviagateNext
2

Figure 10-7   Transition from screen 1 to screen 2

Figure 10-7 illustrates the transition from wizard step 1 to wizard step 2. The transition happens when the user presses the Next button. The method called is “firenaviagateNext” and the implementation of the method is in the GoShoppingPortlet model. Example 10-1 shows the implementation code.

Example 10-1

```
{
    // get the variable that defines the wizard steps
    IXml wizardSteps =
webAppAccess.getVariables().getXml("wizardSteps");
    // determine what the current step is
    String currentStep =
webAppAccess.getVariables().getString("currentStep");

  outer:  if (wizardSteps != null)
    {
        // Find the current step with the list of all steps
        IXml elem = wizardSteps.getFirstChildElement();
        if(currentStep.equals("step3"))
        {

webAppAccess.getVariables().setString("currentStep","step1");
            break outer;
        }
        while (elem != null)
        {
            if (elem.getText().equals(currentStep))
            {
                // found a match
                // we're navigating forward - so get the next element
                IXml previousStep = elem.getNextSiblingElement();
                if (previousStep != null)
                {
                    // set this as the new inserted page

webAppAccess.getVariables().setString("currentStep",
previousStep.getText());
                    // quit the iteration
                    break;
                }
            }

            elem = elem.getNextSiblingElement();
        }
    }//close the outer if

    // redisplay the outer page
    webAppAccess.processPage("basePage");
}
```

Notes:

1. The variable "wizardSteps" defines the number of steps in the wizard.
2. The variable "currentStep" points to the current step the wizard is in.
3. The "basePage" is the wizard's main page.

The code in Example 10-1 shows the method that gets triggered when the Next button is pressed. The logic behind the method's implementation is:

- Obtain the IXml object "wizardSteps" using the method webAppAccess.getVariables().getXml("<XMLVARNAME>")

- Obtain the "`currentStep`" variable by using the method `webAppAccess.getVariables().getStirng("<STRINGVARNAME">)`
- Once you have obtained these two objects, find what step the wizard is in. The immediate step would be to find the next step and set it in the variable “currentStep” using the method `webAppAccess.getVariables().setString("currentStep","<STEPNAME>");`
- After setting the variable, process the "`basePage`" using the method

  `webAppAccess.processPage("<BASEPAGENAME>");`

> **Note:** The WebAppAccess interface, `com.bowstreet.webapp.WebAppAccess` has the following characteristics:
>
> - It represents the current, running WebApp.
> - It is passed into any model method called at runtime.
> - The controller looks first for a method with a signature that includes it.
> - All Method builder calls generate with an instance of WebAppAccess as the first argument.
> - It allows you to access other things too, including:
>   - System properties
>   - The HttpServletRequest object

> **Note:** The Web application (WebApp) is a profile-specific instance of a portlet application that is dynamically created by the WebSphere PortletFactory regeneration engine. Each builder, when called during regeneration, creates the artifacts that make up this WebApp, or run-time portlet application, such as pages, forms, variables, Java objects, and methods. The regeneration engine creates the WebApp by regenerating a model with a unique instance of profile data. The generated WebApp code is then processed by the WebSphere Portlet Factory execution engine to instantiate the executable Java EE application sessions.

10.3 A sample wizard model

Wizards are user interface elements where the user is led through a sequence of dialogs. Conceptually the technique relies on three pieces: wizard, event declaration, and steps in the wizard.

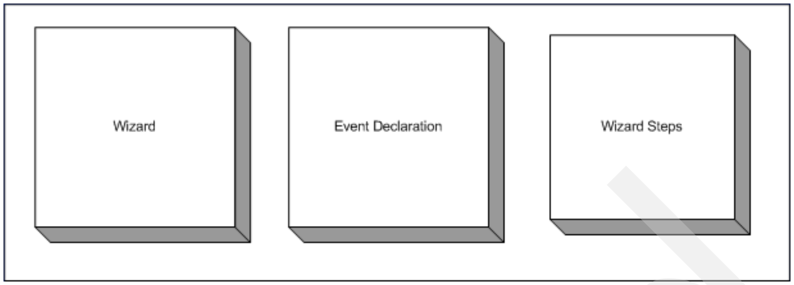


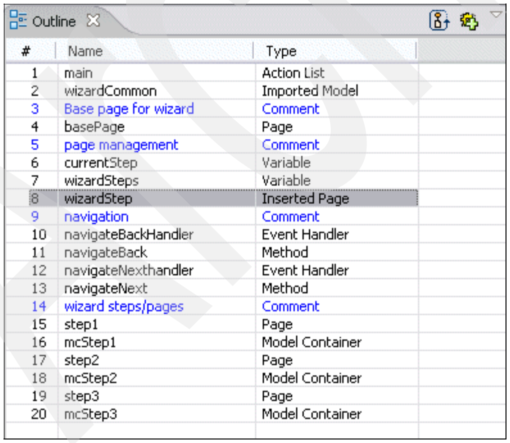
Figure 10-8 The pieces of a wizard

Based on the conceptual diagram in Figure 10-8, we have the following models in the sample wizard application:

- ShoppingWizard model
- ShoppingWizardCommon model
- ShoppingWizardStep model
  There are as many of these models as there are steps in the wizard.

ShoppingWizard Model

The ShoppingWizard can be compared to a base page and the individual Shopping Wizard Steps are the inserted pages that get dynamically inserted into the base page. The event declarations “navigateBack” and “navigateNext” are declared in the ShoppingWizardCommon model.

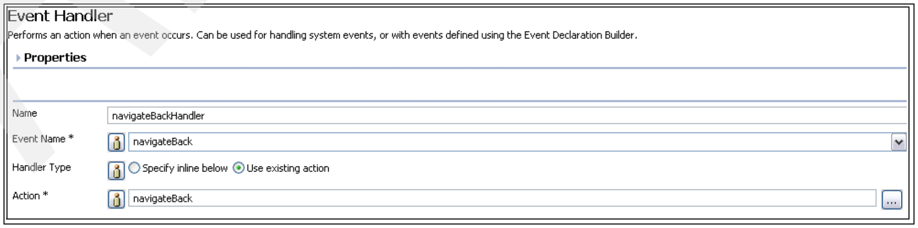


#	Name	Type
1	main	Action List
2	wizardCommon	Imported Model
3	Base page for wizard	Comment
4	basePage	Page
5	page management	Comment
6	currentStep	Variable
7	wizardSteps	Variable
8	wizardStep	Inserted Page
9	navigation	Comment
10	navigateBackHandler	Event Handler
11	navigateBack	Method
12	navigateNexthandler	Event Handler
13	navigateNext	Method
14	wizard steps/pages	Comment
15	step1	Page
16	mcStep1	Model Container
17	step2	Page
18	mcStep2	Model Container
19	step3	Page
20	mcStep3	Model Container

Figure 10-9 The base wizard model

The base model “ShoppingWizard” has 20 builders. Some of the builders that you need to pay attention to are defined here:

- Builder 1: One of the things you should have noticed is that this builder is named “main.” Because the execution in Java programs starts with the main, the model execution begins with the builder named “main.” There are builders that generate a “main” automatically.
- Builder 2: This is the imported model builder that imports the “ShoppingWizardCommon” into the model. As discussed previously, we have declared the common events in the “ShoppingWizardCommon” model.
- Builder 3: This is the comment builder. It is good practice to add a comment builder, just as comments in Java or portlet code help the reader of the code to understand it better.
- Builder 4: This is the page builder “basePage.” This is the base page of the wizard. Notice that there is a span named “wizardStep.” As discussed previously, the inserted page builder targets this span element.
- Builder 5: This is the comment builder “page management.”
- Builder 6: This is the variable builder “currentStep.” This is a very important builder; recall the previous discussion about the “currentStep” variable. The inserted page builder refers to the wizard page by means of this variable.
- Builder 7: This is the variable builder “wizardSteps.” This variable is of type XML. This variable holds the number of wizard steps in the wizard.
- Builder 8: This is the inserted page builder “wizardStep.” As discussed previously, the inserted page builder targets the span element named “wizardStep” in the base page.
- Builder 9: This is the comment builder.
- Builder 10: This is the event handler builder “navigateBackHandler.” As discussed previously, the individual wizards would have “<Back” and “Next>” buttons depending on the screen position. For example, wizard screen1 would have the “Next>” button but not the “<Back” button. To handle the event when the buttons gets clicked we utilize the event handler builder.



Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name: navigateBackHandler

Event Name *: navigateBack

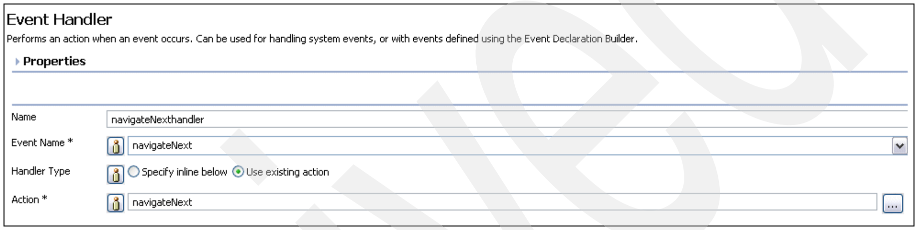
Handler Type: ○ Specify inline below ● Use existing action

Action *: navigateBack

Figure 10-10 The “navigateBackHandler”

Two important inputs that must be specified for this builder are the event name “navigateBack” and the action “navigateBack.”

- Builder 11: This is the method builder “navigateBack.” We have specified this action “navigateBack” in the event handler builder “navigateBackHandler.”
- Builder 12: This is the event handler builder “navigateNextHandler.” As discussed previously, the individual wizards would have “<Back” and “Next>” buttons depending on the screen position. For example, wizard screen 1 would have the “Next>” button but not the “<Back” button. To handle the event when the buttons gets clicked we utilize the event handler builder. This event handler builder would indicate what action gets called when the “Next>” button gets pressed.



Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

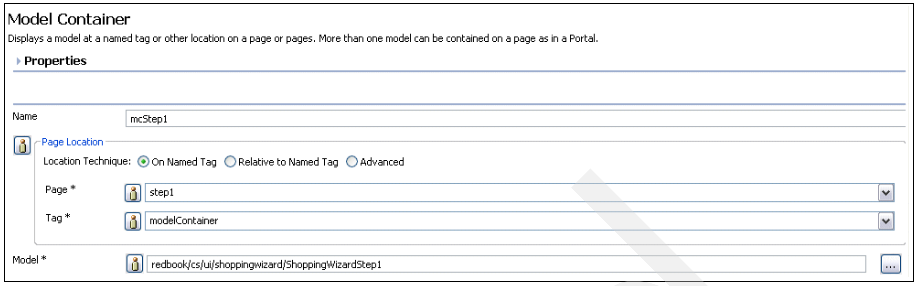
Properties

Name	navigateNexthandler
Event Name *	navigateNext
Handler Type	○ Specify inline below ● Use existing action
Action *	navigateNext

Figure 10-11 The “navigateNextHandler”

Two important inputs that must be specified for this builder are the event name “navigateNext” and the action “navigateNext.”

- Builder 13: This is the method builder “navigateNext.” We have specified this action “navigateNext” in the event handler builder “navigateNextHandler.”
- Builder 14: This is the comment builder.
- Builder 15: This is the wizard step page builder “step1.” Notice the span element named “modelContainer” in the page builder.
- Builder 16: This is the model container builder “mcStep1.” You can use a model container to make a model self-contained and allow it to be inserted into a web page. Using multiple models with model containers provides two main advantages.
  - **For developers** - Using model containers makes shared development easier. Multiple developers can collaborate on page content and creation. Each developer can work independently and contribute a model that provides specific content to the same page.
  - **For web users** - Model container builders provide a consistent page context. A web page incorporating contained models enables users to remain in that page’s context, even as they drill down into a model in search of additional content. This keeps users oriented, and it also facilitates their access to content in other models on the page.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained on a page as in a Portal.

Properties

Name: mcStep1

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: step1

Tag *: modelContainer

Model *: redbook/cs/ui/shoppingwizard/ShoppingWizardStep1

Figure 10-12 The model container builder “mcStep1”

The mandatory builder inputs for this builder are the Page, Tag, and Model.

This model container builder has the following inputs:

Page	`step1`
Tag	`modelContainer`
Model	`ShoppingWizardStep1`

- Builder 17: This is the page builder “step2.” Recall from the earlier discussion that the inserted page builder refers to the wizard pages by means of the “currentStep” variable. The “currentStep” variable holds the values “step1” or “step2” or “step3” depending on which wizard screen is being shown.
- Builder 18: This is the model container builder “mcStep2.” This model container builder has the following inputs:

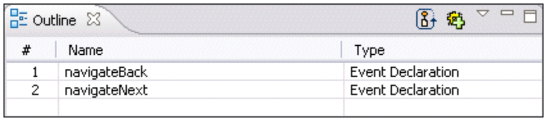
Page	`step2`
Tag	`modelContainer`
Model	`ShoppingWizardStep2`

- Builder 19: This is the page builder “step3.” This page has a span element named “modelContainer” that is targeted by the model container builder “mcStep3.”
- Builder 20: This is the model container builder “mcStep3.” This model container builder has the following inputs:

Page	`step3`
Tag	`modelContainer`
Model	`ShoppingWizardStep3`

ShoppingWizardCommon model

As previously discussed, the wizard technique has the event declaration in a separate model. This model contains the event declarations "navigateBack" and "navigateNext."

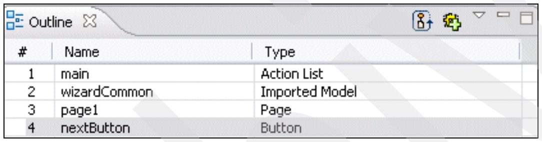


#	Name	Type
1	navigateBack	Event Declaration
2	navigateNext	Event Declaration

Figure 10-13 The ShoppingWizardCommon model

ShoppingWizardStep models

These are the wizard steps that get inserted dynamically into the base wizard page. Depending on the position of the screen they have "Next>" or "<Back" buttons, or both. For example, the first wizard step model has only a "Next>" button, while the third wizard step model has "<Back" and "Next>" buttons.



#	Name	Type
1	main	Action List
2	wizardCommon	Imported Model
3	page1	Page
4	nextButton	Button

Figure 10-14 The ShoppingWizardStep1 model

There are only four builders in the ShoppingWizardStep1 model. This model imports the common event declaration model "ShoppingWizardCommon."

10.4 Building the Go Shopping portlet

In this and the following sections we take you step-by-step through the building of the entire application. As mentioned previously, the complete application consists of the following:

- GoShoppingPortlet
- Shopping Page
  - Shopping Cart
  - Shopping Product Catalog
- Order Page
- Confirmation Page

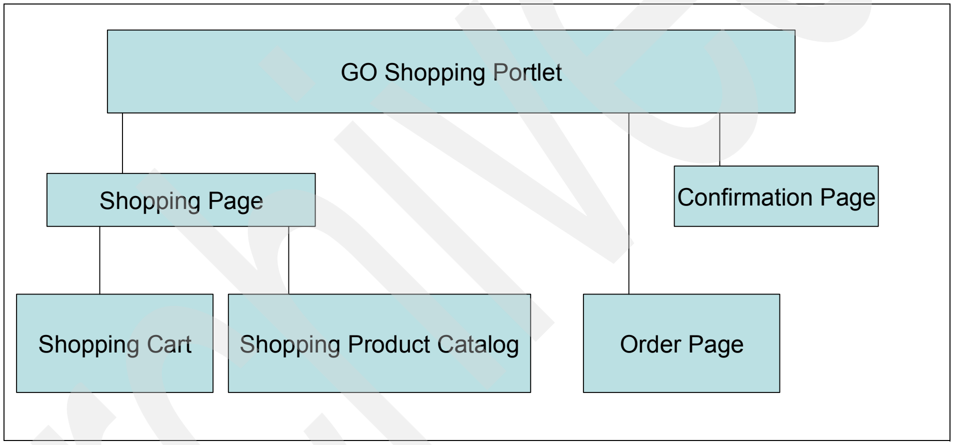


Figure 10-15 Block diagram of the Go Shopping portlet application

The Go Shopping Portlet application utilizes the following three DB providers:

- ProductDBProvider
- OrderDBProvider
- CustomerDBProvider

The services (consumer) utilized in the GoShopping portlet are:

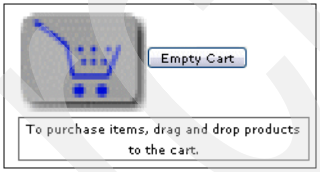
- OrdersService
- ProductService
- CustomerService

A service-oriented architecture, combined with Portlet Factory's SOA support, enables UI and back-end data access development to proceed in parallel once the developers have agreed upon the services that will be called, their inputs, and what the services return. UI developers can focus on creating the user experience while calling automatically generated stubbed-out data access services that return sample data. Back-end data access developers can complete their services and "test as they go" using Portlet Factory's built-in testing harness support. In this way the development team can make progress in parallel and have a high degree of confidence that the UI and data access integration will be seamless. Because of Portlet Factory's ability to dynamically regenerate the application, it is also easier for the UI to account for changes in the input and output of the services or take advantage of new services.

While we are building the portlet we assume that these back-end service providers are available. We then need to focus on building the UI functionality for the GoShoppingPortlet application.

The portlet can be divided into four parts:

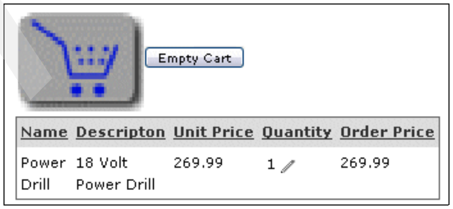
- Main portlet model, named GoShoppingPortlet model, is responsible for providing wizard support.
- ShoppingPage model is responsible for the core shopping functionality. It uses two models (ShoppingCart model and ShoppingProductCatalog model) for its functionality. We can consider ShoppingPage to be the base model that "contains" ShoppingCart and ShoppingProductCatalog models. The shopping cart model is responsible for providing the shopping cart functionality.



To purchase items, drag and drop products to the cart.

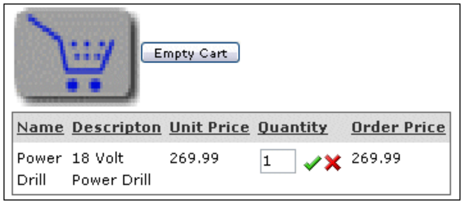
Figure 10-16 The ShoppingCart model

The model has a Dojo Drop target defined on the cart image, and customers can drag the desired product image onto the cart.



Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	269.99	1	269.99

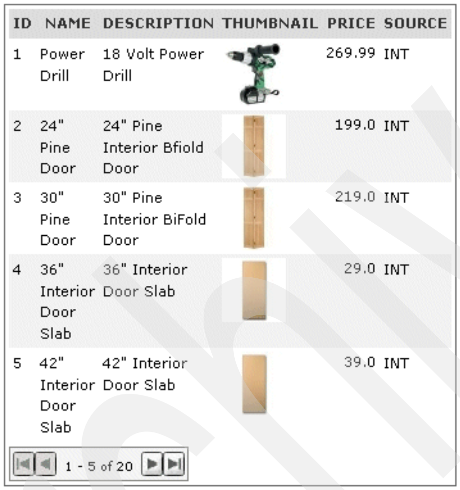
Figure 10-17 The ShoppingCart model (with product added)



Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	269.99	1 ✓ ✗	269.99

Figure 10-18 Customers can edit the quantity by clicking the pencil icon

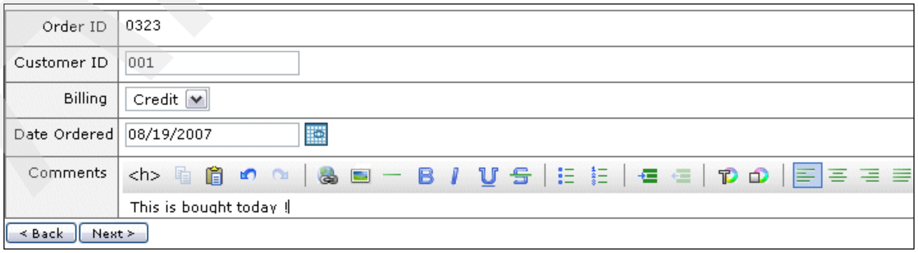
The ShoppingProductCatalog model is responsible for displaying the product catalog in a paginated fashion.



ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

Figure 10-19 The ShoppingProductCatalog model

- The OrderPage model is responsible for ordering information. The customer can select the mode of payment, enter date of purchase and enter comments in the rich text editor.

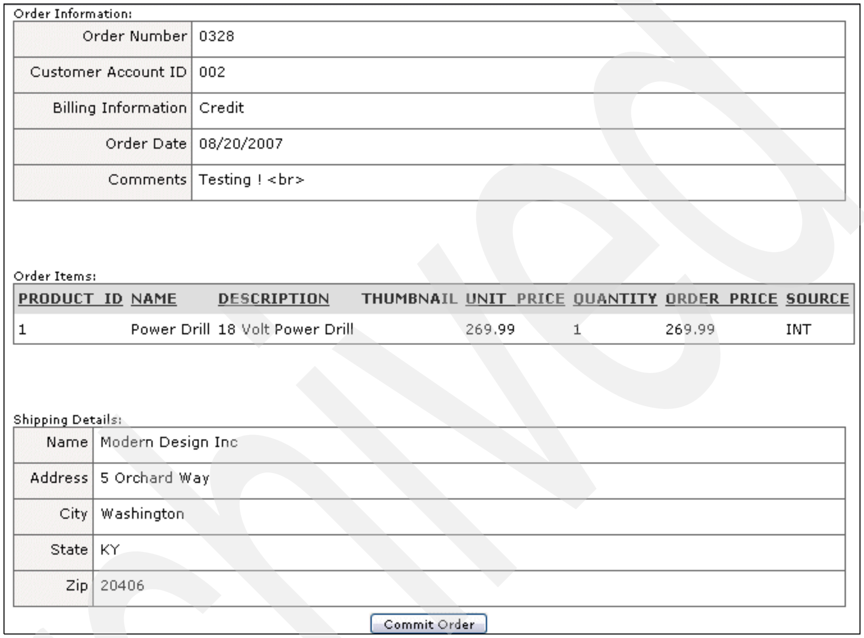


Order ID	0323
Customer ID	001
Billing	Credit
Date Ordered	08/19/2007
Comments	This is bought today !

Figure 10-20 The OrderPage model output

- The ConfirmationPage model lists the following in separate sections:
  - Order Information: Information about the Order.
  - Order Items: Information about the items purchased.
  - Shipping Details: The ship to address is displayed in this section.

  The customer can commit the order by clicking the “Commit Order” button.



Order Information:

Order Number	0328
Customer Account ID	002
Billing Information	Credit
Order Date	08/20/2007
Comments	Testing !

Order Items:

PRODUCT_ID	NAME	DESCRIPTION	THUMBNAIL	UNIT_PRICE	QUANTITY	ORDER_PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	1	269.99	INT

Shipping Details:

Name	Modern Design Inc
Address	5 Orchard Way
City	Washington
State	KY
Zip	20406

Figure 10-21 The confirmation page model output

10.5 Go Shopping portlet model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

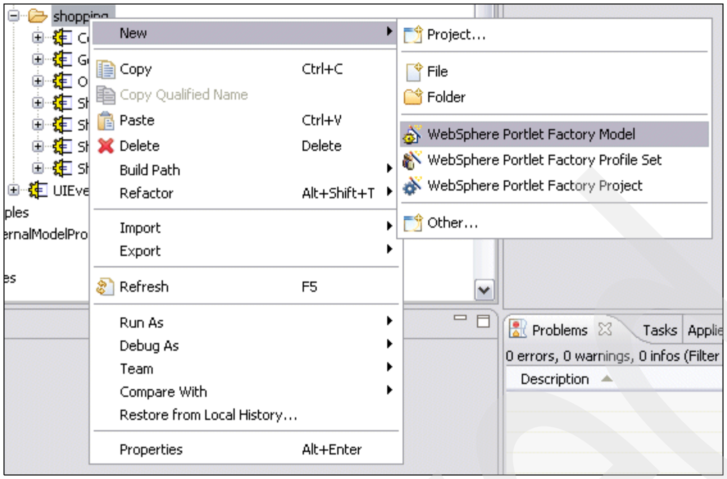
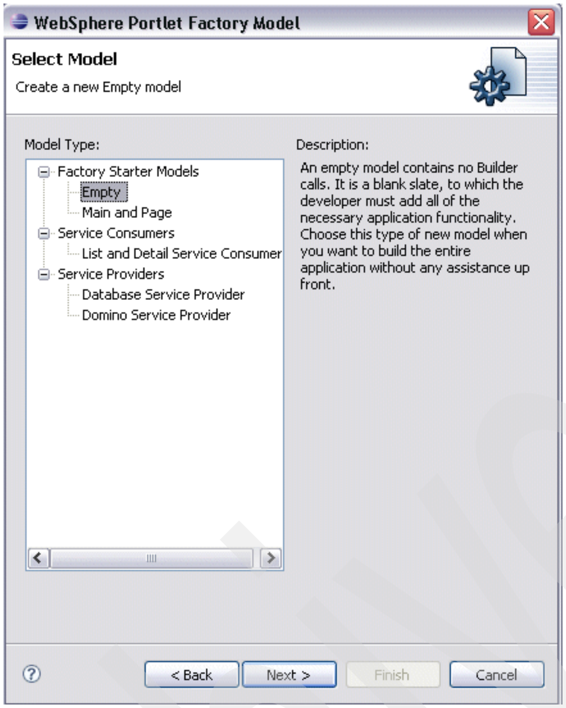


Figure 10-22 Creating a new model -GoShoppingPortlet

2. In the **Choose Project** window, select **RedbookCS** as the project and click **Next**.
3. In the Select Model window, select **Factory Starter Models** → **Empty** in the Model Type field and click **Next**.


WebSphere Portlet Factory Model

Select Model

Create a new Empty model

Model Type:

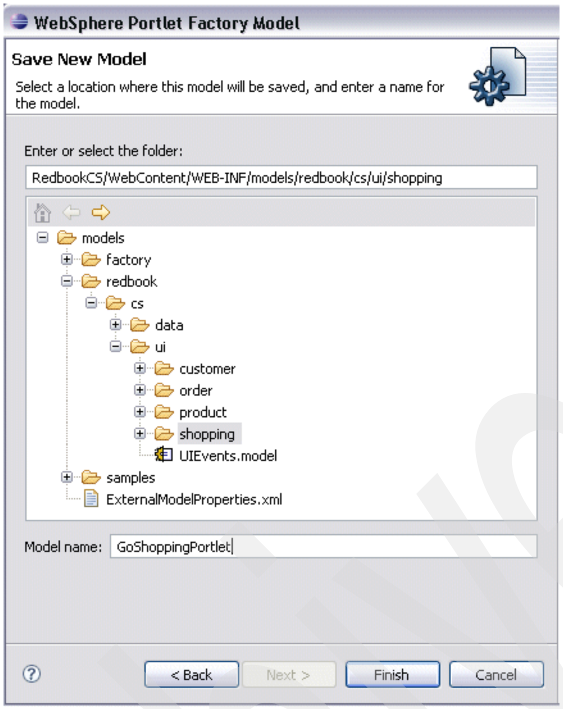
- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consumer
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-23 Selecting the Empty Factory Starter Model

4. In the **Save New Model** window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder and **GoShoppingPortlet** as the model name.



WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder: RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

```
models
  factory
  redbook
    cs
      data
      ui
        customer
        order
        product
        shopping
        UIEvents.model
  samples
  ExternalModelProperties.xml
```

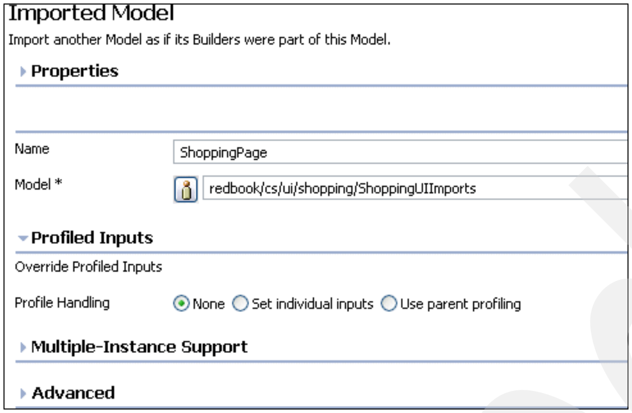
Model name: GoShoppingPortlet

Figure 10-24 Saving the GoShoppingPortlet model

Importing the ShoppingUIImports model

Now that we have an empty GoShoppingPortlet.model, we will import a "ShoppingUIImports" model. For now we will assume that this model is ready and available for import. This model is important because it contains helper functionality for the other models. For example, it has service consumers that consume OrderDBProvider, ProductDBProvider, and CustomerDBProvider. Think of this model as a C language #include.

1. From the builder palette, select the **Imported Model** builder and click **OK** to add it to the GoShoppingPortlet model.
2. Name the builder `ShoppingPage`.
3. To select the model, click the ellipsis button and select the **redbook/cs/ui/shopping/ShoppingUIImports** model.



Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name: ShoppingPage

Model *: redbook/cs/ui/shopping/ShoppingUIImports

Profiled Inputs

Override Profiled Inputs

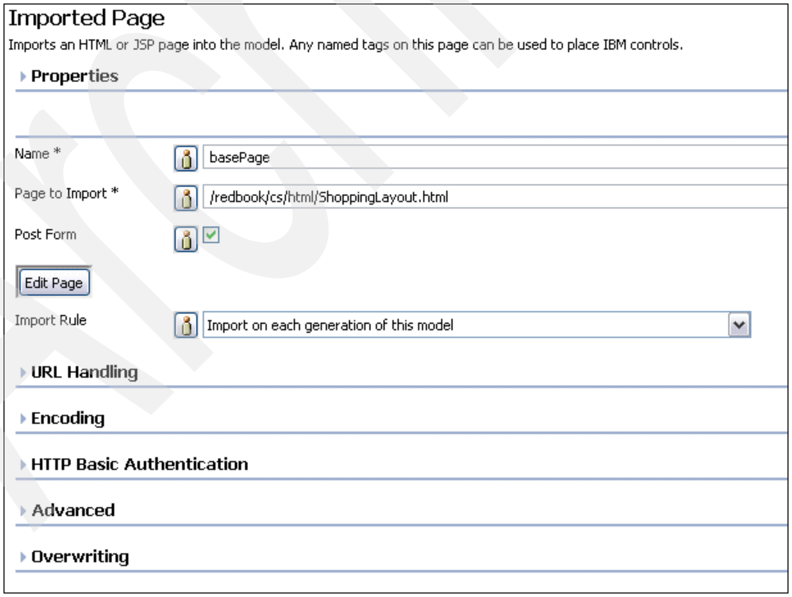
Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

Figure 10-25 Imported Model ShoppingUIImports

4. From the builder palette, select **ImportedPage** and click **OK** to add it to the GoShoppingPortlet model. Set the following values for the Imported Page builder:

Name:	`basePage`
Page to Import:	`/redbook/cs/html/ShoppingLayout.html`

5. Click **OK** and save the model.



Imported Page

Imports an HTML or JSP page into the model. Any named tags on this page can be used to place IBM controls.

Properties

Name *: basePage

Page to Import *: /redbook/cs/html/ShoppingLayout.html

Post Form: ☑

Import Rule: Import on each generation of this model

Figure 10-26 The Imported Page -basePage

6. We had assumed in the previous step the existence of “ShoppingLayout.html.” In this step we go through the creation of the HTML template ShoppingLayout. The HTML template will host static content and named tags that will be used as anchors in our UI model for inserting dynamic content structures and other page elements such as buttons, text fields, and so forth.

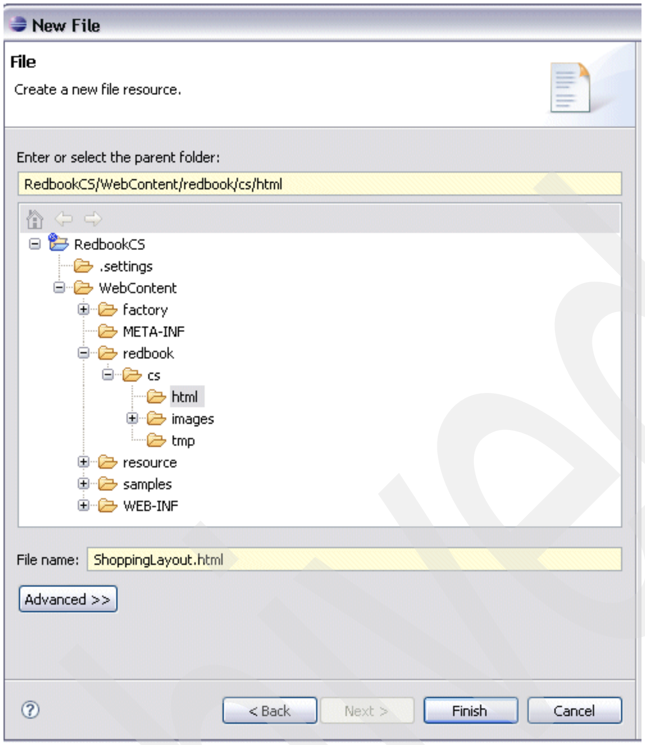
   You can use the HTML Templates feature to achieve a custom, handcrafted appearance for your applications without coding the HTML by hand. Think of an HTML Template as a collection of HTML snippets (constructs) that are selected and assembled by Portlet Factory’s page automation functionality. You make these constructs using normal HTML, and then you add some specifically named elements to tell Portlet Factory which construct is to be used for which purpose, and to identify the various pieces.

   Do the following to create the base HTML files:

   a. Click **File** → **New** → **Other** to launch the wizard.

   b. Select **General** → **File** and click **Next**.

   c. Type or select the parent folder as `RedbookCS/WebContent/redbook/cs/html`, enter the file name as `ShoppingLayout.html` and click **Finish** to create an empty HTML file.



File

Create a new file resource.

Enter or select the parent folder: RedbookCS/WebContent/redbook/cs/html

File name: ShoppingLayout.html

Figure 10-27 Base HTML template ShoppingLayout.html file

d. right-click the newly created **ShoppingLayout.html** file and select **Open With** → **Text Editor**. This will allow you to edit the file and create a basic layout of ShoppingLayout page. Copy and paste the HTML in Example 10-2 into this file.

Example 10-2 HTML for the basic layout of ShoppingLayout page

```
<HTML>
    <BODY>
        <FORM name="ITSO_REDBOOK_FORM_OrderPage1" method="post">
        <DIV align="center"> <SPAN name="CredentialsStatus"></SPAN> </DIV>
        <BR>
        <SPAN name="wizardStep"></SPAN><BR>
        <TABLE width="600">
           <TR>
           <TD width="50%" align="center" valign="top"><SPAN name="left"></SPAN></TD>
           <TD width="50%" align="center" valign="top"><SPAN name="right"></SPAN></TD>
            </TR>
           <TR>
           <TD colspan="2" align="center" valign="top"><SPAN name="row2"></SPAN></TD>
```

```
            </TR>
           </TABLE>
        </FORM><BR>
        <SPAN name="backButton"></SPAN>&nbsp;&nbsp;<SPAN name="nextButton"></SPAN>
    </BODY>
</HTML>
```

Pay attention to the tags on this HTML page that have the name=attribute. We call these “named elements” and there are seven of them in our HTML file:

- CredentialsStatus
- wizardStep
- left
- right
- row2
- nextButton
- backButton

All of the tags happen to be <span> tags, but the type of tag doesn’t matter as long as it has a name= attribute on it. A little later, we will place a text field, buttons, and other UI elements on these named tags.

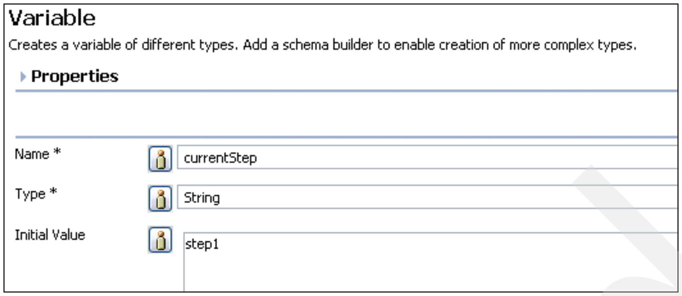
By creating our own “shell” HTML page like this one, will all the named elements that our model builders require, we can adjust the look and feel of how and where these components are laid out.

e. Save and close the ShoppingLayout.html file.

7. From the builder palette, select the **Variable builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Variable builder:

Name:	`currentStep`
Type:	`String`
Initial Value:	`step1`

Important: The value that the currentStep points to is very important. The values should match the wizard step pages and these step pages will be dynamically inserted at run time.



Variable

Creates a variable of different types. Add a schema builder to enable creation of more complex types.

Properties

Name * currentStep

Type * String

Initial Value step1

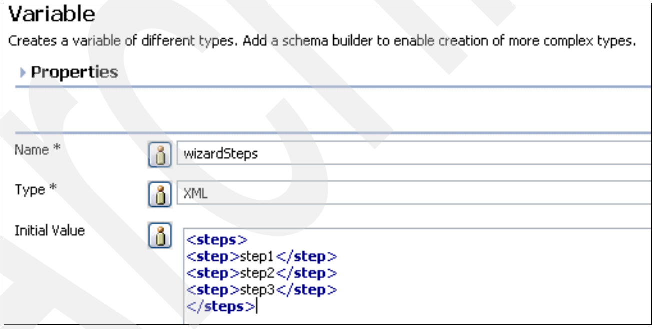
Figure 10-28 The variable builder "currentStep"

8. From the builder palette, select the **Variable builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Variable builder:

Name:	`wizardSteps`
Type:	`XML`

Initial Value:	`<steps>`
	`<step>step1</step>`
	`<step>step2</step>`
	`<step>step3</step>`
	`</steps>`

Click **OK** and save the model.



Variable

Creates a variable of different types. Add a schema builder to enable creation of more complex types.

Properties

Name * wizardSteps

Type * XML

Initial Value

```
<steps>
<step>step1</step>
<step>step2</step>
<step>step3</step>
</steps>
```

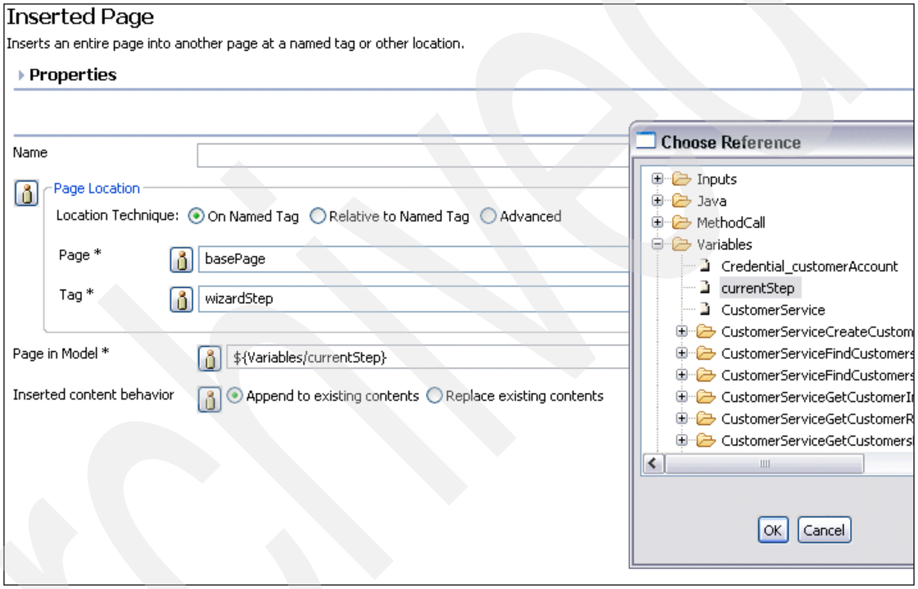
Figure 10-29 The wizardSteps variable builder

Important: The wizardSteps builder is another important variable in the wizard technique. The number of child elements in the <steps></steps> indicates the total number of wizard screens.

9. From the builder palette, select the **Inserted Page builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Inserted Page builder:

Name:	Leave this blank; it will take the name of the tag we specify in the tag input.
Page:	`basePage`
Tag:	`wizardStep`
Page in Model	Click the ellipses and select **Variables** → **currentStep**

Click **OK** and save the model.



Inserted Page

Inserts an entire page into another page at a named tag or other location.

Properties

Name:

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * basePage

Tag * wizardStep

Page in Model * ${Variables/currentStep}

Inserted content behavior ● Append to existing contents ○ Replace existing contents

Choose Reference
Inputs
Java
MethodCall
Variables
Credential_customerAccount
currentStep
CustomerService
CustomerServiceCreateCustom
CustomerServiceFindCustomers
CustomerServiceFindCustomers
CustomerServiceGetCustomerI
CustomerServiceGetCustomerR
CustomerServiceGetCustomers
OK
Cancel

Figure 10-30 The inserted page builder -wizardStep

- From the builder palette, select the **Method builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Method builder:

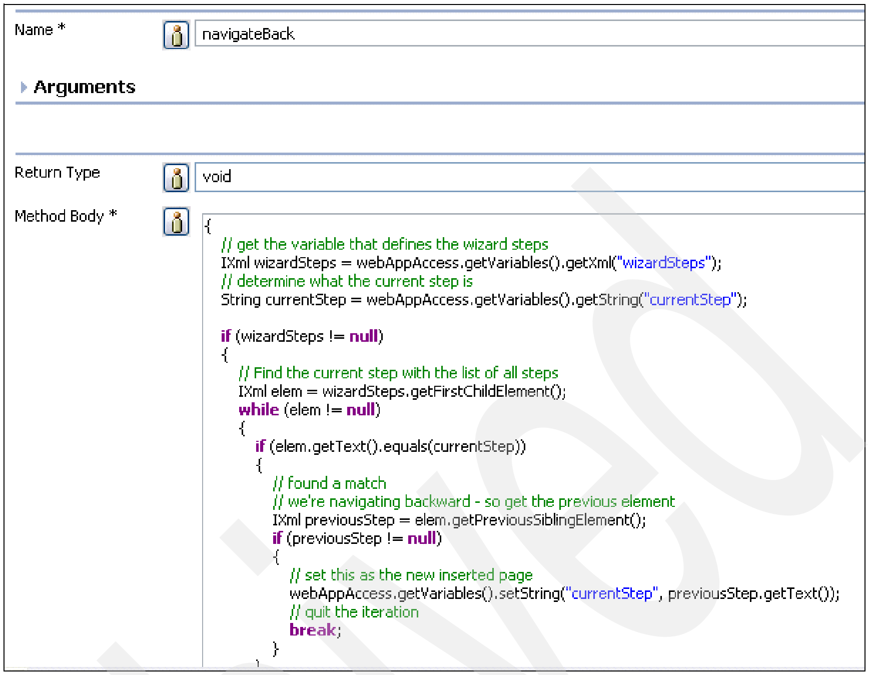
Name	`navigateBack`
Method Body	Copy and paste the Java code in Example 10-3 into box.

Example 10-3

```
// get the variable that defines the wizard steps IXml wizardSteps =
            webAppAccess.getVariables().getXml("wizardSteps");
// determine what the current step is String currentStep =
            webAppAccess.getVariables().getString("currentStep");
```

```
    if (wizardSteps != null)
    {
        // Find the current step with the list of all steps
        IXml elem = wizardSteps.getFirstChildElement();
        while (elem != null)
        {
            if (elem.getText().equals(currentStep))
            {
                // found a match
                // we're navigating backward - so get the previous element
                IXml previousStep = elem.getPreviousSiblingElement();
                if (previousStep != null)
                {
                    // set this as the new inserted page
                    webAppAccess.getVariables().setString("currentStep", previousStep.getText());
                    // quit the iteration
                    break;
                }
            }
            elem = elem.getNextSiblingElement();
        }
    }

    // redisplay the outer page
    webAppAccess.processPage("basePage");
}
```

f. Click **OK** and save the model.



Name * navigateBack

Return Type void

Method Body *

```
{
  // get the variable that defines the wizard steps
  IXml wizardSteps = webAppAccess.getVariables().getXml("wizardSteps");
  // determine what the current step is
  String currentStep = webAppAccess.getVariables().getString("currentStep");

  if (wizardSteps != null)
  {
    // Find the current step with the list of all steps
    IXml elem = wizardSteps.getFirstChildElement();
    while (elem != null)
    {
      if (elem.getText().equals(currentStep))
      {
        // found a match
        // we're navigating backward - so get the previous element
        IXml previousStep = elem.getPreviousSiblingElement();
        if (previousStep != null)
        {
          // set this as the new inserted page
          webAppAccess.getVariables().setString("currentStep", previousStep.getText());
          // quit the iteration
          break;
        }
```

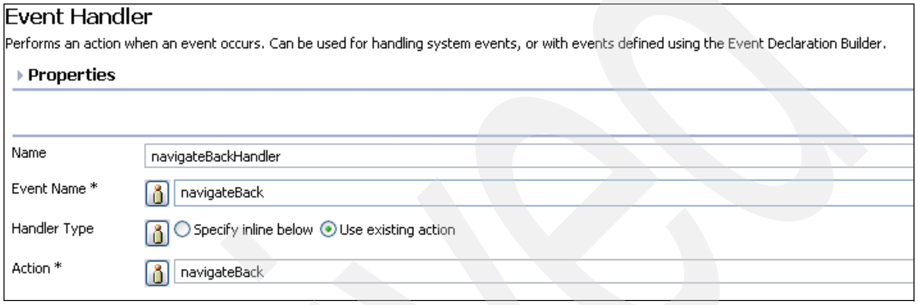
Figure 10-31 The navigateBack method builder

Attention: Where did the event “navigateBack” come from? Recall that we imported the model ShoppingUIImports model. One of the event declarations defined in that model is “naviageBack.”

10. From the builder palette, select the **Event Handler builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Event Handler builder:

Name:	`navigateBackHandler`
Event Name:	`navigateBack`
Handler Type:	`Use existing action`
Action:	`navigateBack`

Click **OK** and save the model.



Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name: navigateBackHandler

Event Name *: navigateBack

Handler Type: ○ Specify inline below ● Use existing action

Action *: navigateBack

Figure 10-32 The event handler -navigateBackHandler

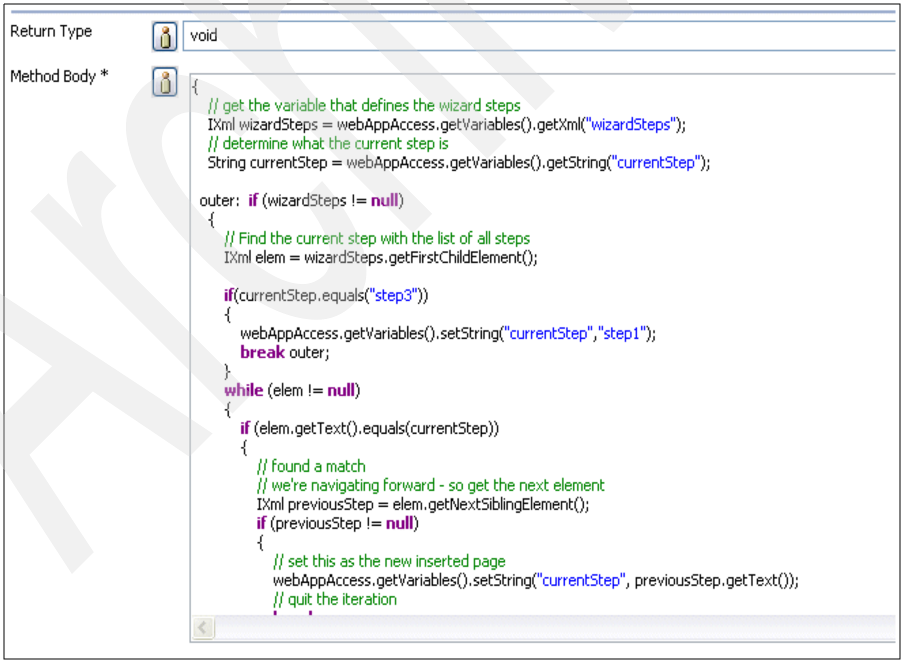
11. From the builder palette, select the **Method builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Method builder:

Name:	`navigateNext`
Method Body:	Copy and paste the Java code from Example 10-4 into the box.

Example 10-4

```
// get the variable that defines the wizard steps
    IXml wizardSteps = webAppAccess.getVariables().getXml("wizardSteps");
    // determine what the current step is
    String currentStep = webAppAccess.getVariables().getString("currentStep");

  outer:  if (wizardSteps != null)
    {
        // Find the current step with the list of all steps
        IXml elem = wizardSteps.getFirstChildElement();

        if(currentStep.equals("step3"))
        {
            webAppAccess.getVariables().setString("currentStep","step1");
            break outer;
        }
        while (elem != null)
        {
            if (elem.getText().equals(currentStep))
            {
                // found a match
                // we're navigating forward - so get the next element
                IXml previousStep = elem.getNextSiblingElement();
                if (previousStep != null)
                {
                    // set this as the new inserted page
                    webAppAccess.getVariables().setString("currentStep", previousStep.getText());
                    // quit the iteration
                    break;
                }
            }

            elem = elem.getNextSiblingElement();
        }
    }//close the outer if

    // redisplay the outer page
    webAppAccess.processPage("basePage");
}
{
```

Click **OK** and save the model.



Return Type: void

Method Body *

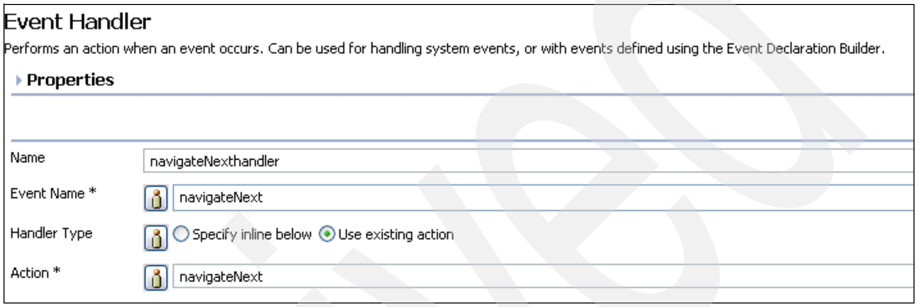
```
{
  // get the variable that defines the wizard steps
  IXml wizardSteps = webAppAccess.getVariables().getXml("wizardSteps");
  // determine what the current step is
  String currentStep = webAppAccess.getVariables().getString("currentStep");

 outer:  if (wizardSteps != null)
  {
    // Find the current step with the list of all steps
    IXml elem = wizardSteps.getFirstChildElement();

    if(currentStep.equals("step3"))
    {
      webAppAccess.getVariables().setString("currentStep","step1");
      break outer;
    }
    while (elem != null)
    {
      if (elem.getText().equals(currentStep))
      {
        // found a match
        // we're navigating forward - so get the next element
        IXml previousStep = elem.getNextSiblingElement();
        if (previousStep != null)
        {
          // set this as the new inserted page
          webAppAccess.getVariables().setString("currentStep", previousStep.getText());
          // quit the iteration
```

Figure 10-33 Method builder "navigateNext"

12. From the builder palette, select the **Event Handler builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Event Handler builder:

Name:	`navigateNexthandler`
Event Name:	`navigateNext`
Handler Type:	`Use existing action`
Action:	`navigateNext`

Click **OK** and save the model.



Event Handler

Performs an action when an event occurs. Can be used for handling system events, or with events defined using the Event Declaration Builder.

Properties

Name: navigateNexthandler

Event Name *: navigateNext

Handler Type: ○ Specify inline below ● Use existing action

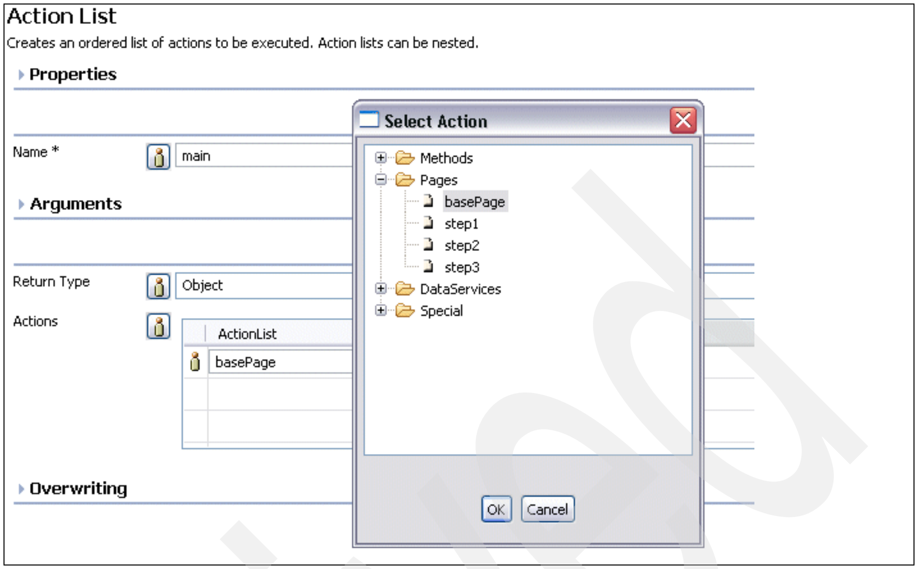
Action *: navigateNext

Figure 10-34 The event handler "navigateNext"

13. From the builder palette, select the **Action List builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Action List builder:

Name:	`main`
Actions:	`basePage`

Click **OK** and save the model.


Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name *: main

Return Type: Object

Actions: ActionList — basePage

Figure 10-35 The action list builder "main"

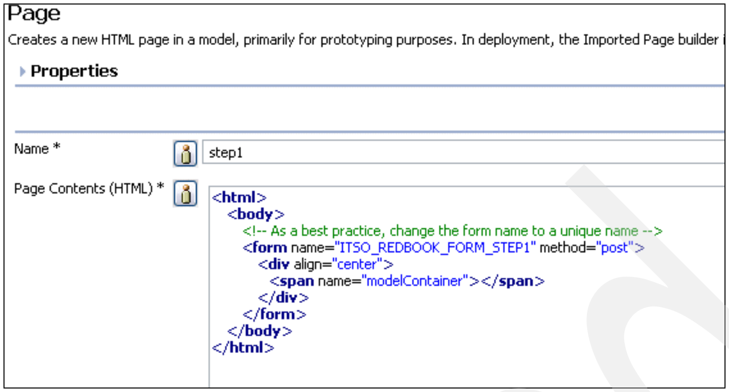
14. From the builder palette, select the **Page builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the page builder:

Name:	`step1`
Page Contents(HTML):	Copy and paste the HTML code from Example 10-5 into the box.

Example 10-5

```
<html>
    <body>
        <!-- As a best practice, change the form name to a unique name -->
        <form name="ITSO_REDBOOK_FORM_STEP1" method="post">
            <div align="center">
               <span name="modelContainer"></span>
            </div>
        </form>
    </body>
</html>
```

Click **OK** and save the model.



Page

Creates a new HTML page in a model, primarily for prototyping purposes. In deployment, the Imported Page builder

Name * step1

Page Contents (HTML) *

```
<html>
  <body>
    <!-- As a best practice, change the form name to a unique name -->
    <form name="ITSO_REDBOOK_FORM_STEP1" method="post">
      <div align="center">
        <span name="modelContainer"></span>
      </div>
    </form>
  </body>
</html>
```

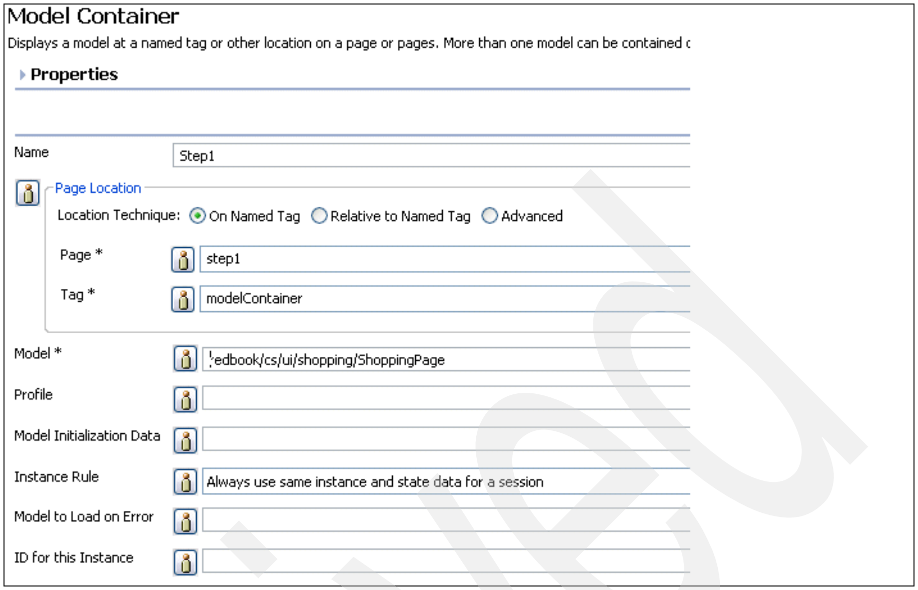
Figure 10-36 The page builder "step1"

15. From the builder palette, select the **Model Container builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Model Container builder:

Name:	`Step1`
Page:	`step1`
Tag:	`modelContainer`
Model:	`redbook/cs/ui/shopping/ShoppingPage`

Click **OK** and save the model.

> **Note:** We get an error in the IDE because we are pointing the model container to the non existent model redbook/cs/ui/shopping/ShoppingPage**.** Ignore this problem for the moment; we will fix it when we create the ShoppingPage model shortly.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained c

Properties

Name	Step1
Page Location	
Location Technique:	● On Named Tag ○ Relative to Named Tag ○ Advanced
Page *	step1
Tag *	modelContainer
Model *	!edbook/cs/ui/shopping/ShoppingPage
Profile	
Model Initialization Data	
Instance Rule	Always use same instance and state data for a session
Model to Load on Error	
ID for this Instance	

Figure 10-37 The model container "Step1"

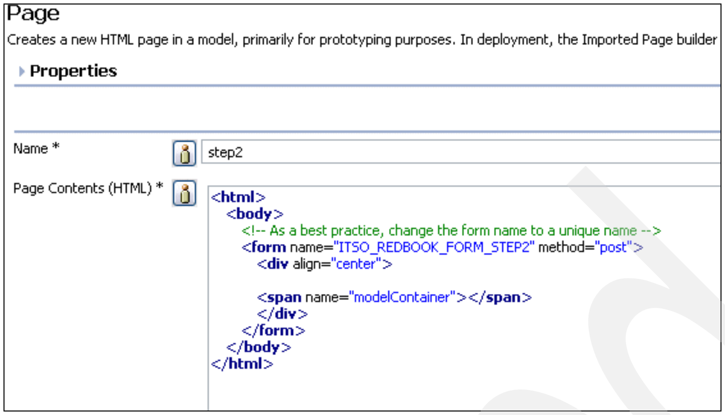
16. From the builder palette, select the **Page builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the page builder:

Name:	`step2`
Page Contents (HTML):	Copy and paste the HTML code from Example 10-6 into the box.

Example 10-6

```
<html>
    <body>
        <!-- As a best practice, change the form name to a unique name -->
        <form name="ITSO_REDBOOK_FORM_STEP2" method="post">
            <div align="center">

            <span name="modelContainer"></span>
            </div>
        </form>
    </body>
</html>
```

Click **OK** and save the model.



Page

Creates a new HTML page in a model, primarily for prototyping purposes. In deployment, the Imported Page builder

Properties

Name * step2

Page Contents (HTML) *

```
<html>
  <body>
    <!-- As a best practice, change the form name to a unique name -->
    <form name="ITSO_REDBOOK_FORM_STEP2" method="post">
      <div align="center">

      <span name="modelContainer"></span>
      </div>
    </form>
  </body>
</html>
```

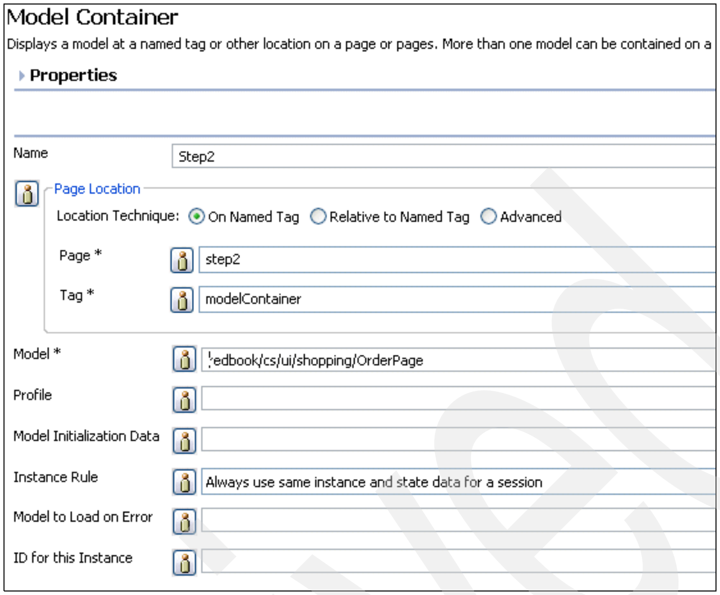
Figure 10-38 The page builder “step2”

17.From the builder palette, select the **Model Container builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Model Container builder:.

Name:	`Step2`
Page:	`step2`
Tag:	`modelContainer`
Model:	`redbook/cs/ui/shopping/OrderPage`

Click **OK** and save the model.

Note: We get an error in the IDE because we are pointing the model container to the non existent model redbook/cs/ui/shopping/OrderPage**.** Ignore this problem for the moment; we will fix it when we create the OrderPage model shortly.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained on a

Properties

Name: Step2

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: step2

Tag *: modelContainer

Model *: 'edbook/cs/ui/shopping/OrderPage

Profile:

Model Initialization Data:

Instance Rule: Always use same instance and state data for a session

Model to Load on Error:

ID for this Instance:

Figure 10-39 The model container “Step2”

18. From the builder palette, select the **Page builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the page builder:

Name: `step3`
Page Contents (HTML): Copy and paste the HTML code from Example 10-7 into the box.

Example 10-7

```
<html>
    <body>
        <!-- As a best practice, change the form name to a unique name -->
        <form name="ITSO_REDBOOK_FORM_STEP3" method="post">
            <div align="center">

            <span name="modelContainer"></span>
            </div>
        </form>
    </body>
</html>
```

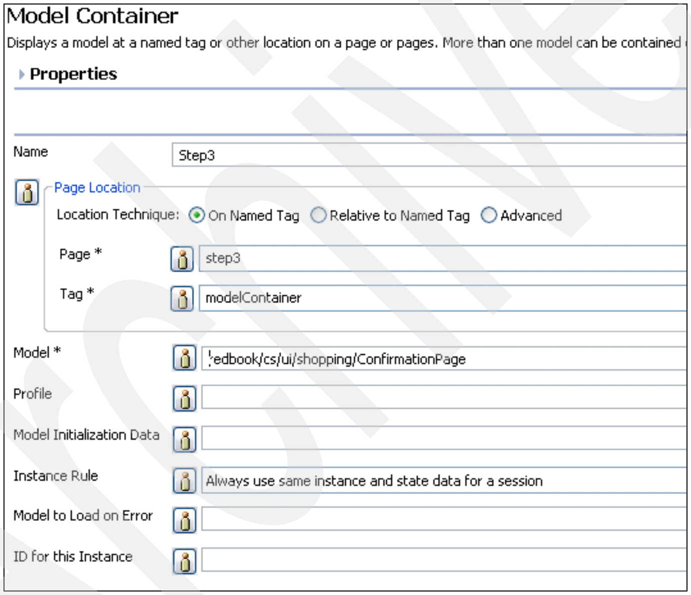
Click **OK** and save the model.

19. From the builder palette, select the **Model Container builder** and click **OK** to add it to the GoShoppingPortlet.model. Set the following values for the Model Container builder:

Name:	`Step3`
Page:	`step3`
Tag:	`modelContainer`
Model:	`redbook/cs/ui/shopping/ConfirmationPage`

Click **OK** and save the model.

> **Note:** We get an error in the IDE because we are pointing to the non existent model redbook/cs/ui/shopping/ConfirmationPage. Ignore this problem for the moment; we will fix it when we create the ConfirmationPage model shortly.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained

Properties

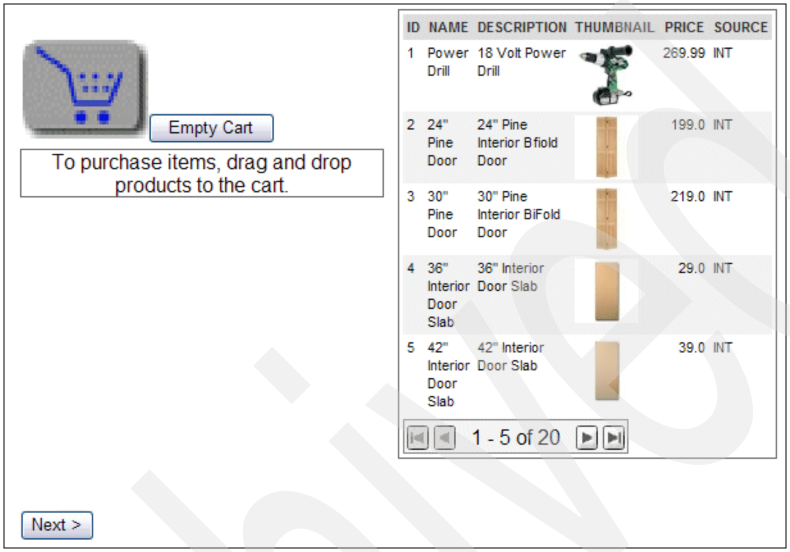
Name	Step3
Page Location	
Location Technique:	● On Named Tag ○ Relative to Named Tag ○ Advanced
Page *	step3
Tag *	modelContainer
Model *	redbook/cs/ui/shopping/ConfirmationPage
Profile	
Model Initialization Data	
Instance Rule	Always use same instance and state data for a session
Model to Load on Error	
ID for this Instance	

Figure 10-40 The model container builder "Step3"

10.6 Shopping Page model

As discussed earlier, the ShoppingPage model is responsible for the core shopping functionality. The next three figures illustrate the functionality of the finished ShoppingPage application.

Note: These figures were taken when the model was running in a stand-alone environment. Just as we run Java programs, we can run the model stand alone from the IDE.



Empty Cart

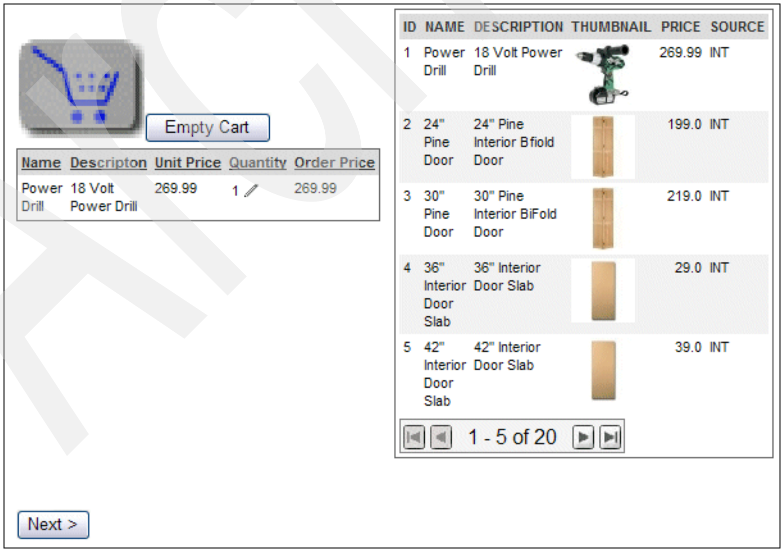
To purchase items, drag and drop products to the cart.

ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

1 - 5 of 20

Next >

Figure 10-41 The ShoppingPage model when run stand alone



Empty Cart

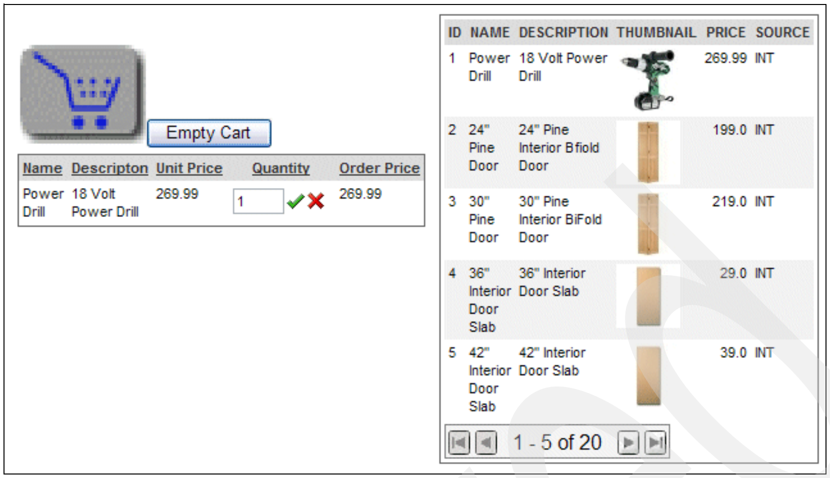
Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	269.99	1	269.99

ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

1 - 5 of 20

Next >

Figure 10-42 The shopping page application (products added to the cart)



Empty Cart

Name	Descripton	Unit Price	Quantity	Order Price
Power Drill	18 Volt Power Drill	269.99	1 ✓ ✗	269.99

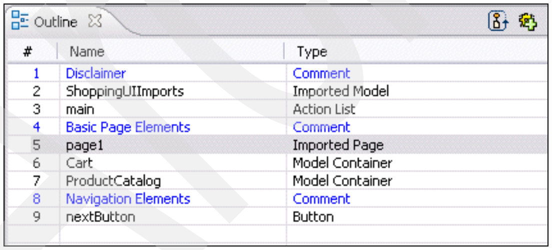
ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

1 - 5 of 20

Figure 10-43 The shopping page application (product numbers can be edited)

The ShoppingPage model houses two models: “ShoppingCart” and “ShoppingProductCatalog.” It is like a base model that utilizes the other two models, and is a good example of modularizing individual functional pieces as separate models.

Note: It is good practice in WPF development to keep the number of builders in a model to fewer than 50. Using model containers to contain models that are separate functional pieces helps achieve this goal.



#	Name	Type
1	Disclaimer	Comment
2	ShoppingUIImports	Imported Model
3	main	Action List
4	Basic Page Elements	Comment
5	page1	Imported Page
6	Cart	Model Container
7	ProductCatalog	Model Container
8	Navigation Elements	Comment
9	nextButton	Button

Figure 10-44 The ShoppingPage model

Figure 10-44 shows the builders in the ShoppingPage model. The important builders utilized are the Model Container builders, specifically builders number 6 and 7 in the model. You must have noticed the button “nextButton,” which is builder number 9 in the model. This button would take the user to the next wizard screen step, the order page.

Creating the ShoppingPage model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

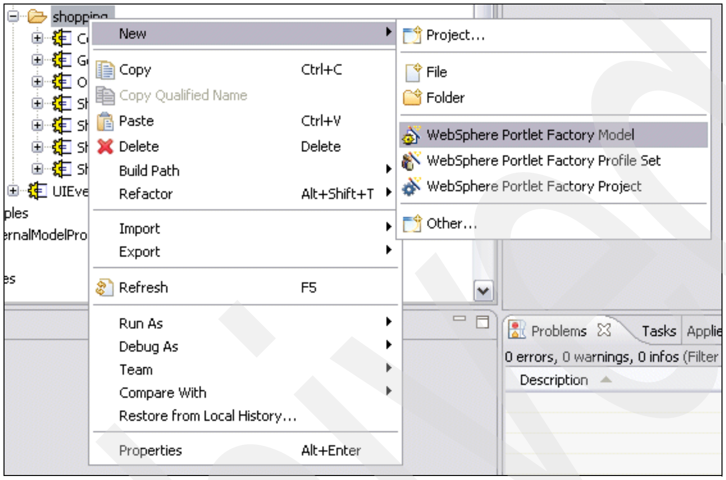
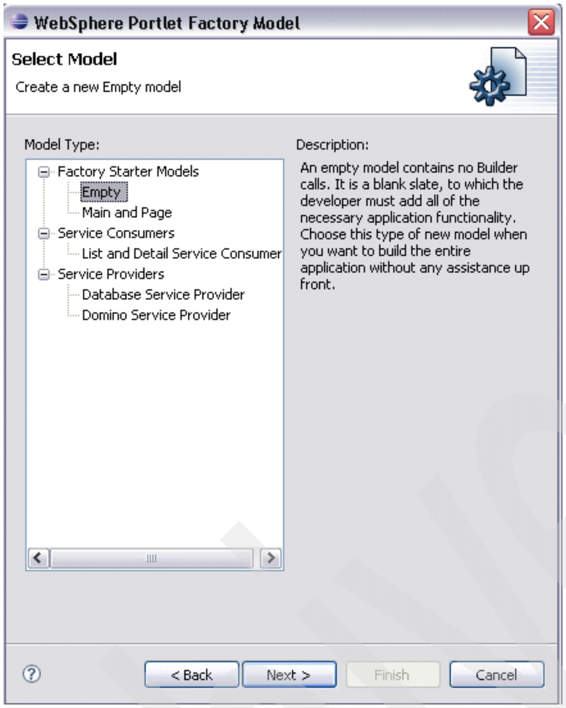


Figure 10-45 Creating a new model -ShoppingPage

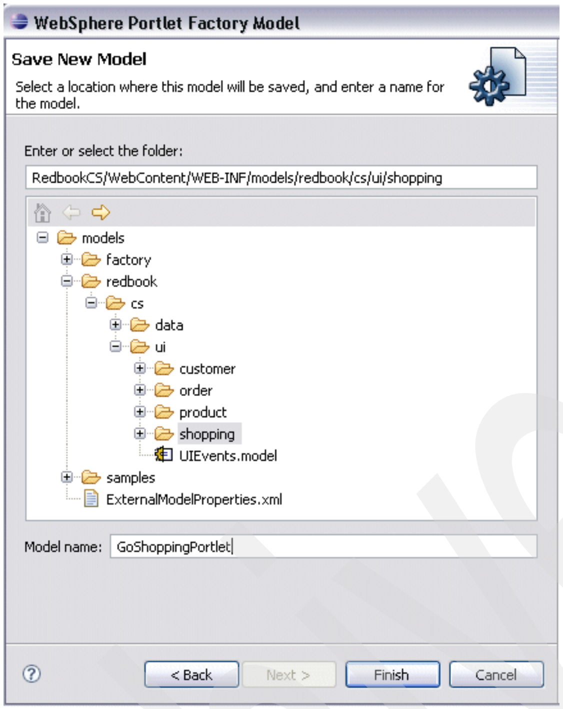
2. In the Choose Project window, select **RedbookCS** as the project and click **Next.**
3. In the Model Type field or the Select Model window, select **Factory Starter Models** → **Empty** and click **Next**.



An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-46 Selecting the Empty Factory Starter Model

4. In the Save New Model window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder and **ShoppingPage** as the model name.


WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder: RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

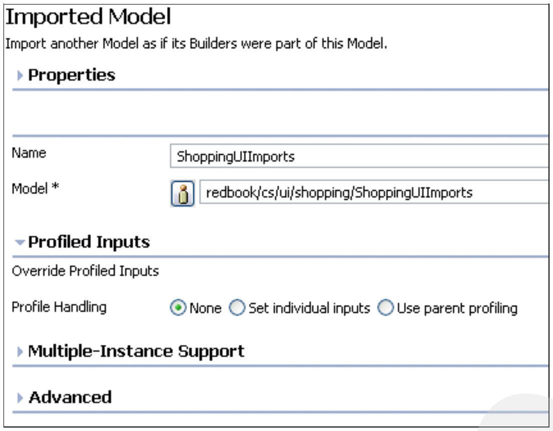
Model name: GoShoppingPortlet

Figure 10-47 Saving the Shoppingpage model

5. To import the ShoppingUIImports model, from the builder palette, select **Imported Model builder** and click **OK** to add it to the ShoppingPage model.

   a. Name the builder `ShoppingUIImports`.

   b. To select the model, click the ellipsis and select the **redbook/cs/ui/shopping/ShoppingUIImports** model.



Imported Model

Import another Model as if its Builders were part of this Model.

- Properties

Name: ShoppingUIImports

Model *: redbook/cs/ui/shopping/ShoppingUIImports

- Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

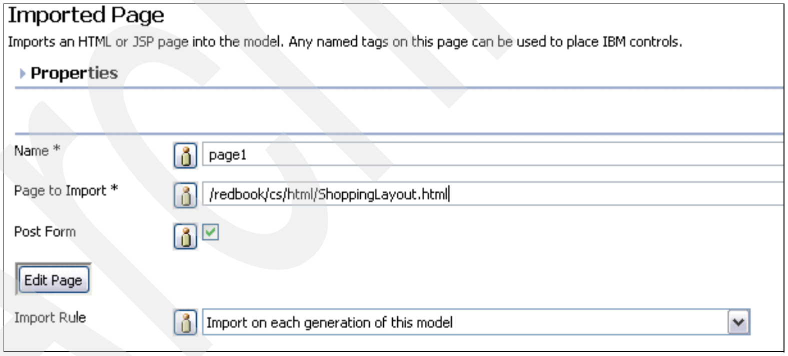
- Multiple-Instance Support
- Advanced

Figure 10-48 The imported model - ShoppingUIImports

6. From the builder palette, select the **Imported page builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Imported Page builder:

   Name: `page1`
   Page to Import: `/redbook/cs/html/ShoppingLayout.html`

   Click **OK** and save the model.



Imported Page

Imports an HTML or JSP page into the model. Any named tags on this page can be used to place IBM controls.

- Properties

Name *: page1

Page to Import *: /redbook/cs/html/ShoppingLayout.html

Post Form: ☑

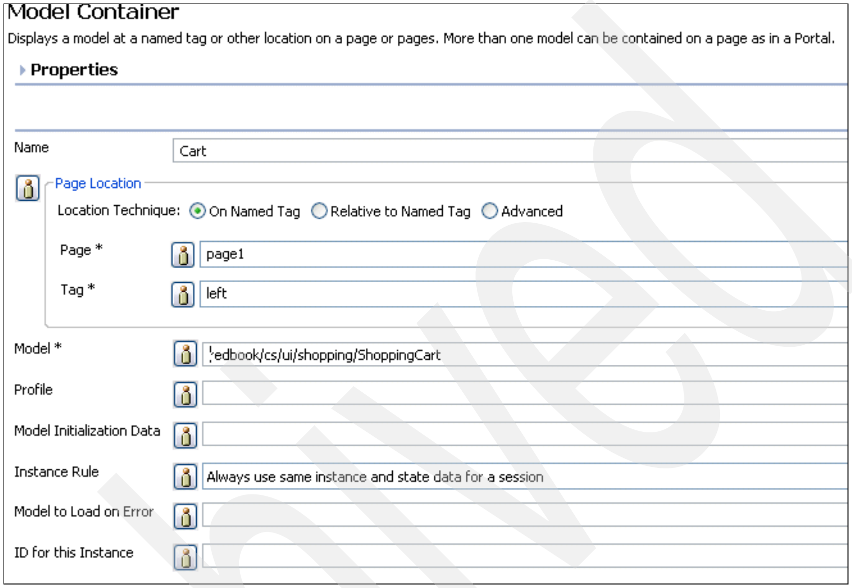
Import Rule: Import on each generation of this model

Figure 10-49 The imported page builder - page1

7. From the builder palette, select the **Model Container builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Model Container builder:

   Name: `Cart`
   Page: `page1`
   Tag: `left`
   Model: `redbook/cs/ui/shopping/ShoppingCart`

> **Note:** We get an error because we are pointing a model container to the non existent model redbook/cs/ui/shopping/ShoppingCart**.** Ignore this problem for the moment; we will fix it when we create the model shortly.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained on a page as in a Portal.

Properties

Name: Cart

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: page1

Tag *: left

Model *: redbook/cs/ui/shopping/ShoppingCart

Profile:

Model Initialization Data:

Instance Rule: Always use same instance and state data for a session

Model to Load on Error:

ID for this Instance:

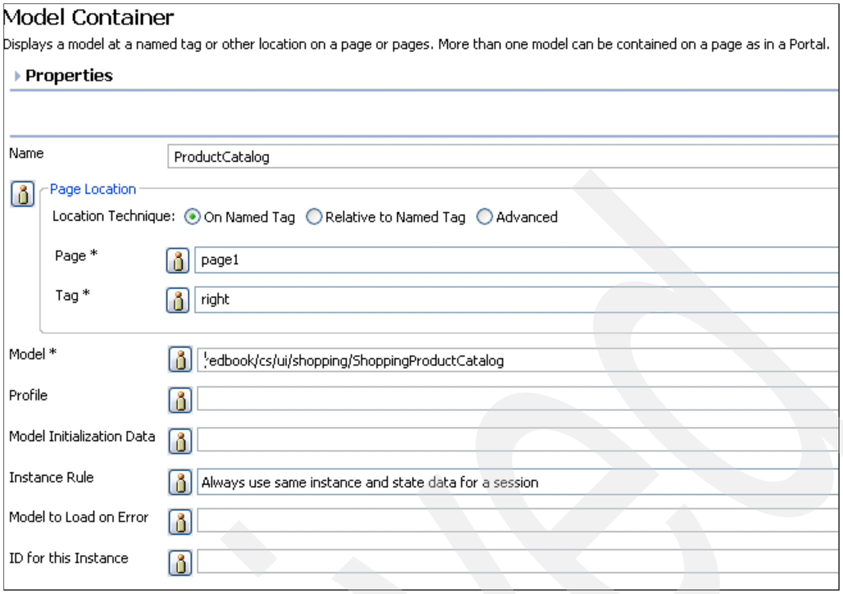
Figure 10-50 The model container - Cart

8. From the builder palette, select the **Model Container builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Model Container builder:

Name:	`ProductCatalog`
Page:	`page1`
Tag:	`right`
Model:	`redbook/cs/ui/shopping/ShoppingProductCatalog`

Click **OK** and save the model.

> **Note:** We get an error because we are pointing a model container to the nonexistent model redbook/cs/ui/shopping/ProductCatalog**.** Ignore this problem for the moment; we will fix it when we create the model shortly.



Model Container

Displays a model at a named tag or other location on a page or pages. More than one model can be contained on a page as in a Portal.

Properties

Name: ProductCatalog

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: page1

Tag *: right

Model *: 'edbook/cs/ui/shopping/ShoppingProductCatalog

Profile:

Model Initialization Data:

Instance Rule: Always use same instance and state data for a session

Model to Load on Error:

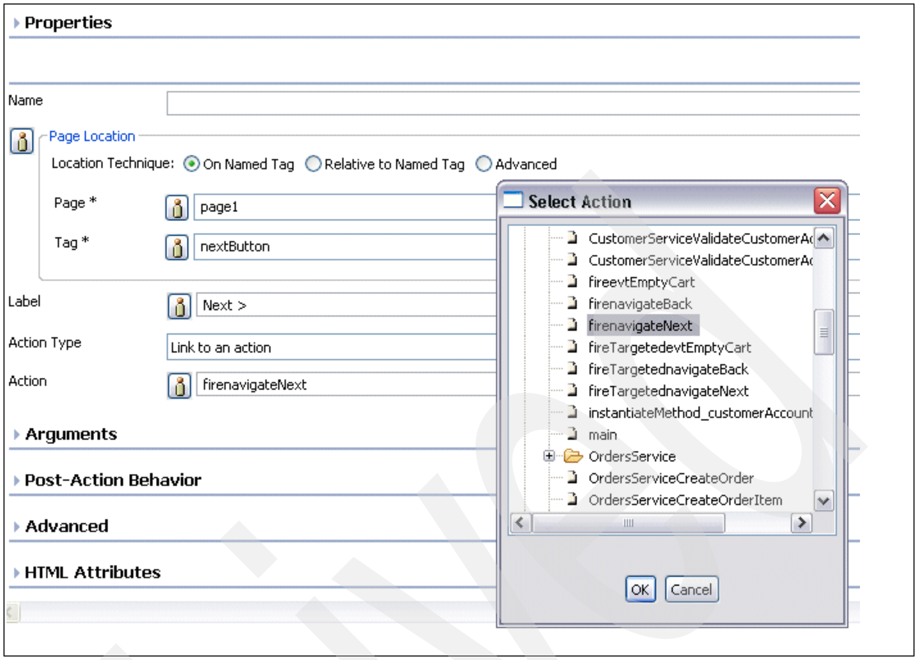
ID for this Instance:

Figure 10-51 The Model Container -ProductCatalog

9. From the builder palette, select the **Button builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the button builder:

Name:	Leave this field empty; the name defaults to the tag name that we will be selecting for this builder.
Page:	`page1`
Tag:	`nextButton`
Label:	`Next>`
Action:	Click the ellipsis button and select **firenavigateNext method**

Click **OK** and save the model.



Properties

Name

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * page1

Tag * nextButton

Label Next >

Action Type Link to an action

Action firenavigateNext

Arguments

Post-Action Behavior

Advanced

HTML Attributes

Select Action

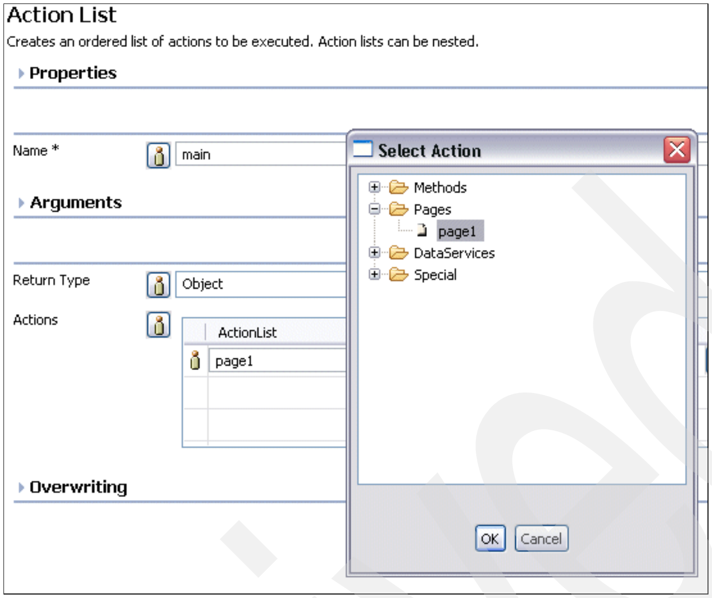
- CustomerServiceValidateCustomerAc
- CustomerServiceValidateCustomerAc
- fireevtEmptyCart
- firenavigateBack
- firenavigateNext
- fireTargetedevtEmptyCart
- fireTargetednavigateBack
- fireTargetednavigateNext
- instantiateMethod_customerAccount
- main
- OrdersService
- OrdersServiceCreateOrder
- OrdersServiceCreateOrderItem

Figure 10-52 The Button builder - nextButton

10.From the builder palette, select the **Action List builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Action List builder:

Name:	`main`
Actions:	`page1`

Click **OK** and save the model.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name * main

Return Type Object

Actions: ActionList — page1

Figure 10-53 The Action List builder - main

10.6.1 Cart model

At a high level, there are three steps involved in creating the Cart model:

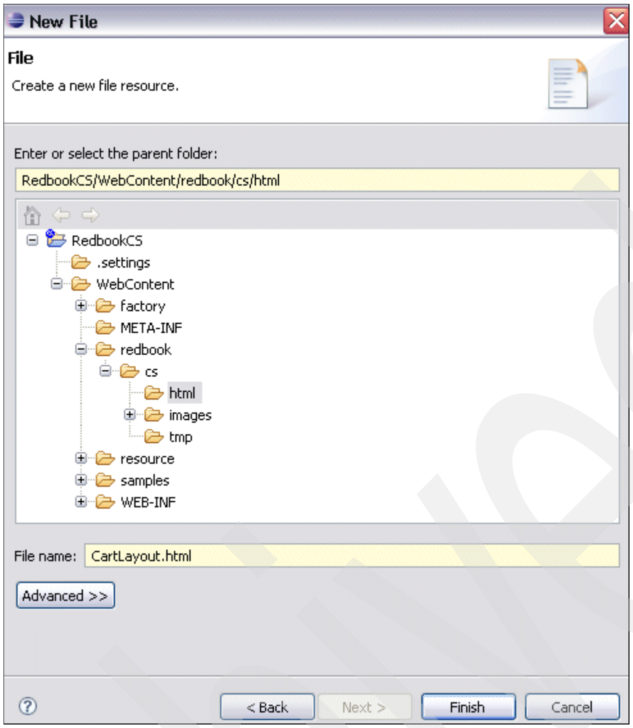
- Create the base HTML page
- Create the shopping cart model
- Import the ShoppingUIImports model

Creating the base HTML page

First, we create the base HTML page, cartLayoutPage, which will host static content and named Tags that will be used as anchors in our UI model for inserting dynamic content structures and other page elements such as buttons, images, and so forth.

Do the following to create the base HTML file:

1. Click **File** → **New** → **Other** to launch the wizard.
2. Select **General** → **File** and click **Next**.
3. Enter or select parent folder `RedbookCS/WebContent/redbook/cs/html`, enter the file name `cartLayoutPage.html`, and click **Finish** to create an empty HTML file.



Enter or select the parent folder: RedbookCS/WebContent/redbook/cs/html

File name: CartLayout.html

Figure 10-54 The CartLayout.html file

4. Right-click the newly created **CartLayout.html** file and select **Open With** → **Text Editor**. This will allow you to edit the file and create a basic layout of the CartLayout page. Copy and paste the HTML from Example 10-8 into this file.

Example 10-8

```
<HTML>
    <BODY>
        <FORM name="ITSO_REDBOOK_FORM_CartLayout" method="post">
        <DIV align="center"> <SPAN name="CredentialsStatus"></SPAN> </DIV>
        <BR>
        <TABLE>

           <TR>
           <TD colspan="3" align="left" valign="top"><SPAN name="OrderInformation"></SPAN>
         </TD>
           </TR>

           <TR>
           <TD align="left" valign="top"><SPAN name="OrderDetails"></SPAN></TD>
           </TR>
```

```
          <TR>
          <TD align="center" valign="top"><SPAN name="row3left"></SPAN></TD>
          <TD align="center" valign="top"><SPAN name="row3right"></SPAN></TD>
          </TR>

          <TR>
          <TD align="center" valign="top"><SPAN name="row4left"></SPAN></TD>
          <TD align="center" valign="top"><SPAN name="row4right"></SPAN></TD>
          </TR>
          <TR>
          <TD align="center" valign="top"><SPAN name="row5left"></SPAN></TD>
          <TD align="center" valign="top"><SPAN name="row5right"></SPAN></TD>
          </TR>
       </TABLE>
        </FORM>
    </BODY>
</HTML>
```

Note: Pay attention to the tags on the HTML page that have the name= attribute. We call these "named elements."

5. Save and close the CartLayout.html file.

Creating the ShoppingCart model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

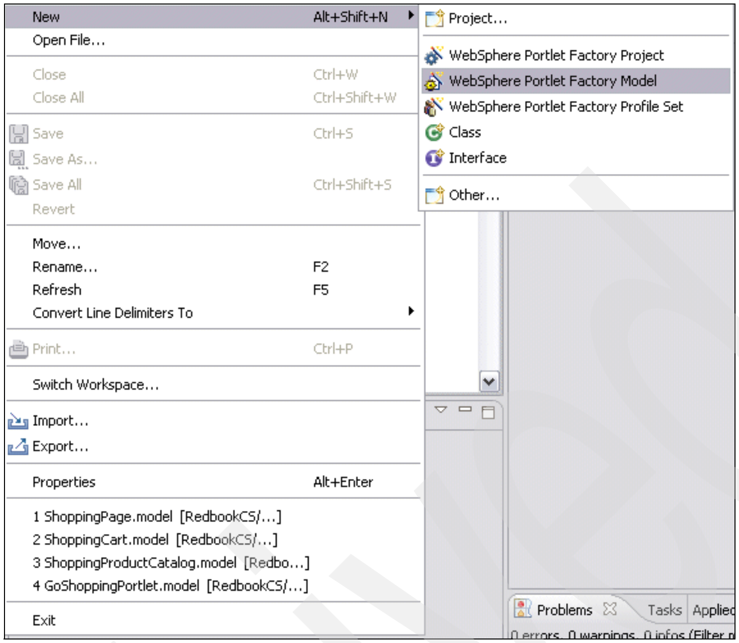
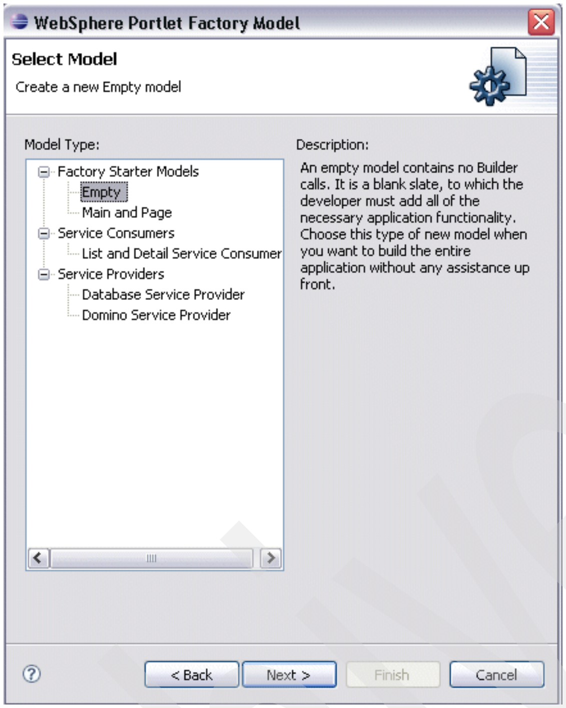

New Alt+Shift+N
Open File...
Close Ctrl+W
Close All Ctrl+Shift+W
Save Ctrl+S
Save As...
Save All Ctrl+Shift+S
Revert
Move...
Rename... F2
Refresh F5
Convert Line Delimiters To
Print... Ctrl+P
Switch Workspace...
Import...
Export...
Properties Alt+Enter
1 ShoppingPage.model [RedbookCS/...]
2 ShoppingCart.model [RedbookCS/...]
3 ShoppingProductCatalog.model [Redbo...]
4 GoShoppingPortlet.model [RedbookCS/...]
Exit
Project...
WebSphere Portlet Factory Project
WebSphere Portlet Factory Model
WebSphere Portlet Factory Profile Set
Class
Interface
Other...
Problems
Tasks
Applied
0 errors, 0 warnings, 0 infos (Filter m

Figure 10-55 Creating a new model - ShoppingCart

2. In the Choose Project screen, select **RedbookCS** as the project and click **Next**.
3. In the Model Type field in the Select Model window, select **Factory Starter Models** → **Empty** and click **Next**.



Select Model

Create a new Empty model

Model Type:

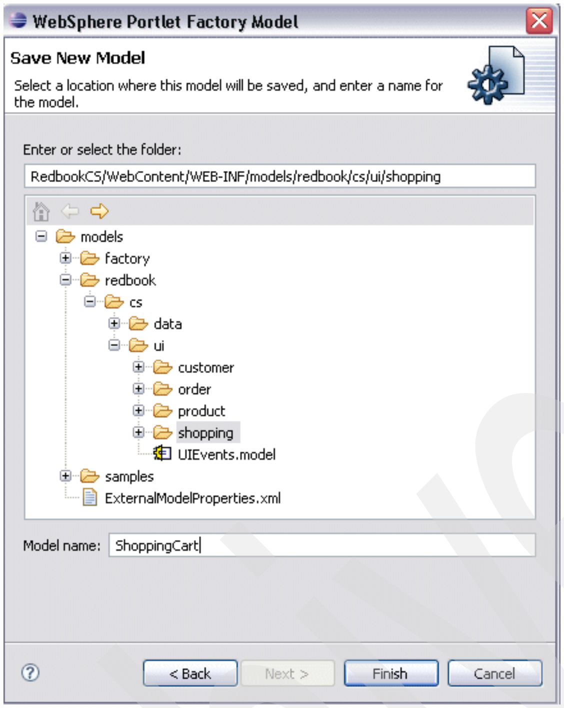
- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consumer
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-56 The Empty Factory Starter Model

4. In the Save New Model window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder enter `ShoppingCart` in the Model name field.



WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder:

RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

Model name: ShoppingCart

Figure 10-57 Saving the ShoppingCart model

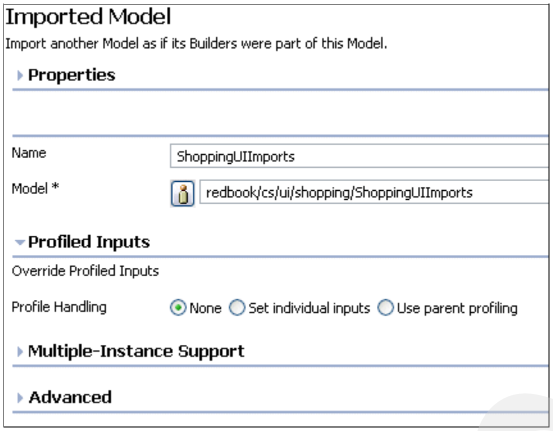
Importing the ShoppingUIImports model

Now that we have an empty GoShoppingPortlet.model, we will import a “ShoppingUIImports” model. For now we will assume that this model is ready and available for import. This model is important because it contains helper functionality for the other models. For example, it has service consumers that consume OrderDBProvider, ProductDBProvider, and CustomerDBProvider. Think of this model as a “Java” import.

1. From the builder palette, select the **Imported Model builder** and click **OK** to add it to the ShoppingCart model.

   a. Name the builder `ShoppingUIImports`.

   b. To select the model, click the ellipsis and select **redbook/cs/ui/shopping/ShoppingUIImports**.



Imported Model

Import another Model as if its Builders were part of this Model.

Properties

Name	ShoppingUIImports
Model *	redbook/cs/ui/shopping/ShoppingUIImports

Profiled Inputs

Override Profiled Inputs

Profile Handling ● None ○ Set individual inputs ○ Use parent profiling

Multiple-Instance Support

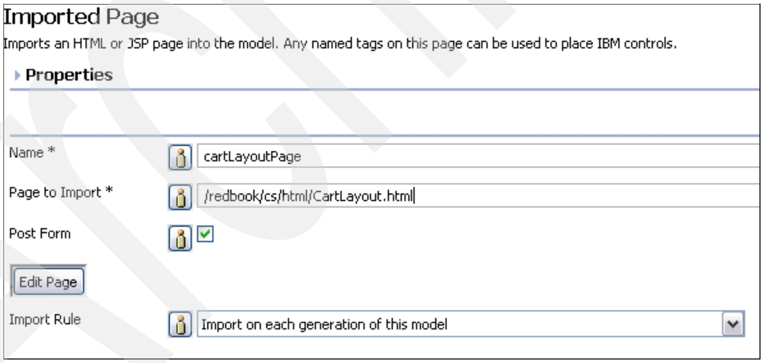
Advanced

Figure 10-58 The Imported Model - ShoppingUIImports

2. From the builder palette, select the **Imported Page builder** and click **OK** to add it to the ShoppingCart model. Set the following values for the Imported Page builder:

Name:	`cartLayoutPage`
Page to Import:	Click the ellipsis button and select **/redbook/cs/html/CartLayout.html HTML**.

c. Click **OK** and save the model.



Imported Page

Imports an HTML or JSP page into the model. Any named tags on this page can be used to place IBM controls.

Properties

Name *	cartLayoutPage
Page to Import *	/redbook/cs/html/CartLayout.html
Post Form	☑
Import Rule	Import on each generation of this model

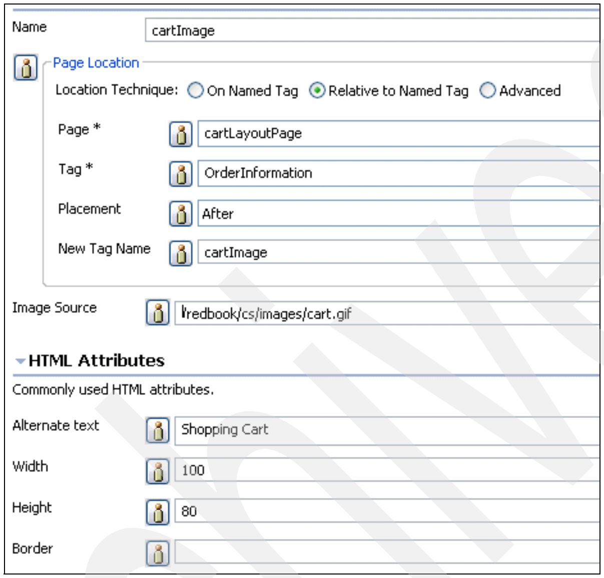
Figure 10-59 The ImportedPage - cartLayoutPage

3. From the builder palette, select the **Image builder** and click **OK** to add it to the Shoppingcart model. Set the following values for the Imported Page builder:

Name:	`cartImage`
Page Location:	`Relative to Named Tag`

Page: `cartLayoutPage`
Tag: `OrderInformation`
Placement: `After`
New Tag Name: `cartImage`
Image Source: Click the ellipsis button and select **/redbook/cs/images/cart.gif**

Click **OK** and save the model.



Name: cartImage

Page Location

Location Technique: ○ On Named Tag ● Relative to Named Tag ○ Advanced

Page *: cartLayoutPage

Tag *: OrderInformation

Placement: After

New Tag Name: cartImage

Image Source: /redbook/cs/images/cart.gif

HTML Attributes

Commonly used HTML attributes.

Alternate text: Shopping Cart

Width: 100

Height: 80

Border:

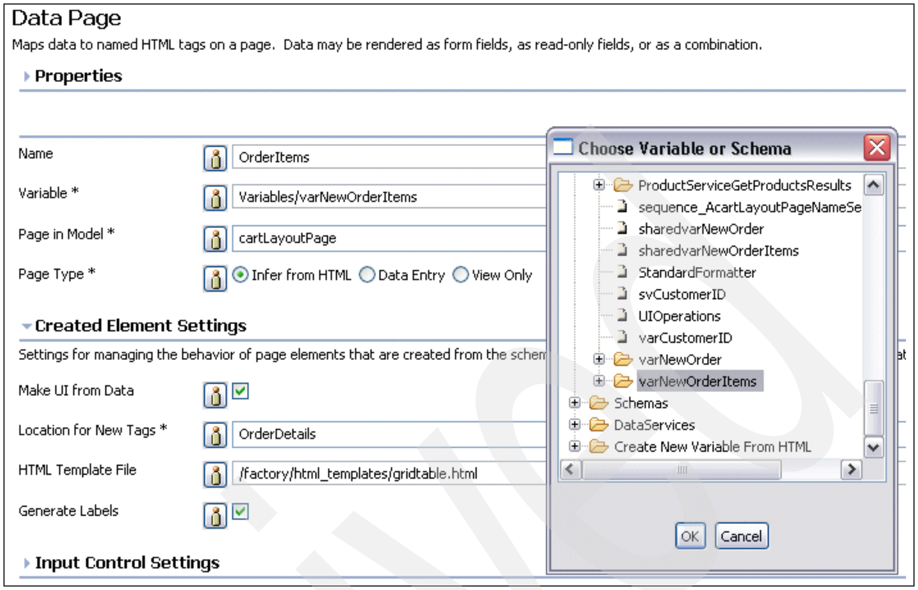
Figure 10-60 The Image Builder -cartImage

4. From the builder palette, select the **Data Page builder** and click **OK** to add it to the ShoppingCart model. Set the following values for the Data Page builder:

    Name: `OrderItems`
    Variable: Click the ellipsis button and select **Variables/varNewOrderItems**
    Page in Model: `cartLayoutPage`
    Page Type: `Infer from HTML`
    Make UI from Data: Selected
    Location for New Tags: `OrderDetails`
    HTML Template File: Click the ellipsis button and select **/factory/html_templates/gridtable.html**
    Generate Labels: Selected

    Leave remaining sections as they are.

Click **OK** and save the model.



Data Page

Maps data to named HTML tags on a page. Data may be rendered as form fields, as read-only fields, or as a combination.

Properties

Name: OrderItems

Variable *: Variables/varNewOrderItems

Page in Model *: cartLayoutPage

Page Type *: ● Infer from HTML ○ Data Entry ○ View Only

Created Element Settings

Settings for managing the behavior of page elements that are created from the schem

Make UI from Data: ☑

Location for New Tags *: OrderDetails

HTML Template File: /factory/html_templates/gridtable.html

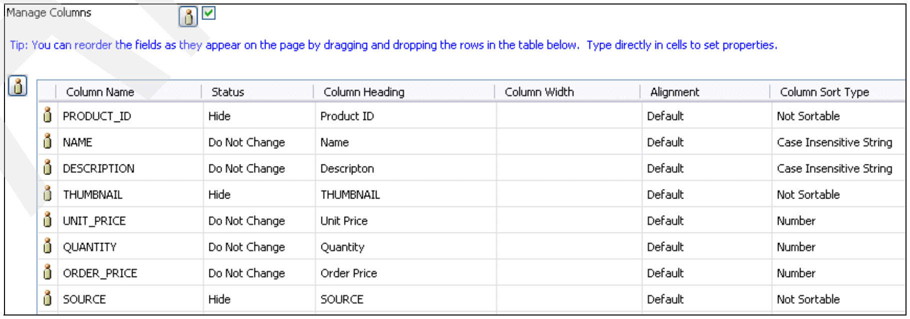
Generate Labels: ☑

Input Control Settings

Figure 10-61 The Data Page - OrderItems

5. From the builder palette, select the **Data Column Modifier builder** and click **OK** to add it to the ShoppingCart model. Set the following values for the Data Column Modifier builder:

Name:	`dataColumnModifierOrderItems`
Container Field:	Click the ellipsis button and select **[cartLayoutPage]OrderItems/ITEMS/ITEM**
Manage Columns:	Selected Modify the Status and Column Sort Type selections for the columns named in Table 10-1 and Table 10-2.



Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type directly in cells to set properties.

Column Name	Status	Column Heading	Column Width	Alignment	Column Sort Type
PRODUCT_ID	Hide	Product ID		Default	Not Sortable
NAME	Do Not Change	Name		Default	Case Insensitive String
DESCRIPTION	Do Not Change	Descripton		Default	Case Insensitive String
THUMBNAIL	Hide	THUMBNAIL		Default	Not Sortable
UNIT_PRICE	Do Not Change	Unit Price		Default	Number
QUANTITY	Do Not Change	Quantity		Default	Number
ORDER_PRICE	Do Not Change	Order Price		Default	Number
SOURCE	Hide	SOURCE		Default	Not Sortable

Figure 10-62 DataColumnModifier builder - dataColumnModifierOrderItems

Table 10-1 Column Sort Type selections for specified column names

Column Name	Column Sort Type
NAME	Case Insensitive String
DESCRIPTION	Case Insensitive String
UNIT_PRICE	Number
QUANTITY	Number
ORDER_PRICE	Number

> **Tip:** You can reorder the fields as they appear on the page by dragging and dropping the rows in the table (below Manage Columns). Type directly in cells to set properties.

Table 10-2 Column Status selections for specified column names

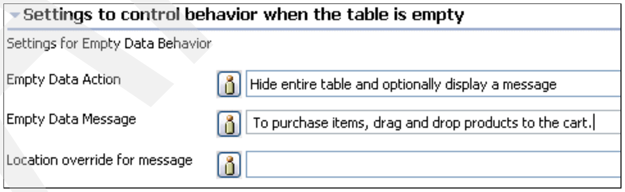
Column Name	Status
PRODUCT_ID	Hide
THUMBNAIL	Hide
SOURCE	Hide

After making the changes to the columns, the table should look like the table shown in Figure 10-62.

Under the section "Settings to control behavior when the table is empty" set the followings values:

Empty Data Action: `Hide entire table and optionally display a message`

Empty Data Message: `To purchase items, drag and drop products to the cart.`



Settings to control behavior when the table is empty

Settings for Empty Data Behavior

Empty Data Action: Hide entire table and optionally display a message

Empty Data Message: To purchase items, drag and drop products to the cart.

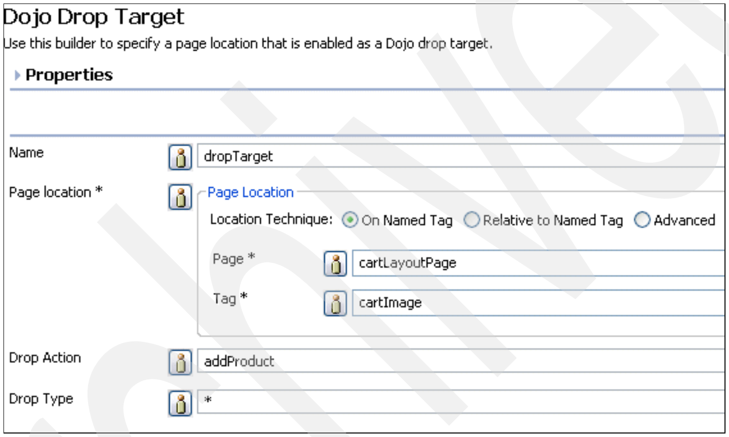
Location override for message:

Figure 10-63 The DataColumnModifier setting

6. From the builder palette, select the **Dojo Drop Target builder** and click **OK** to add it to the ShoppingCart model. Set the following values for the Dojo Drop Target builder:

Name:	`dropTarget`
Page:	`cartLayoutPage`
Tag:	`cartImage`
Drop Action:	`addProduct`
Drop Type:	Leave the input as it is.

> **Note:** We get an error in the IDE because we have input a nonexistent drop action addProduct**.** Disregard this for the moment; we will create an action addProduct shortly.



Dojo Drop Target

Use this builder to specify a page location that is enabled as a Dojo drop target.

Properties

Name: dropTarget

Page location *

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * cartLayoutPage

Tag * cartImage

Drop Action: addProduct

Drop Type: *

Figure 10-64 The Dojo Drop Target builder

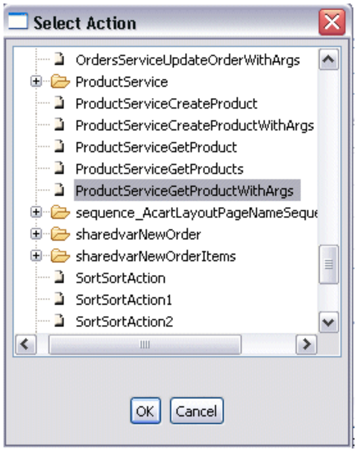
7. From the builder palette, select the **Action List builder** and click **OK** to add it to the ShoppingCart model. Set the following values for the Action List builder:

Name:	`addProduct`
Actions:	Click the ellipsis button and select the following actions:

   i. ProductServiceGetProductWithArgs(${Arguments/productID})

   ii. UIOperations.addItem(${Variables/varNewOrderItems/ITEMS},${DataServices/ProductService/getProduct/results/Products/Product})

   iii. cartLayoutPage

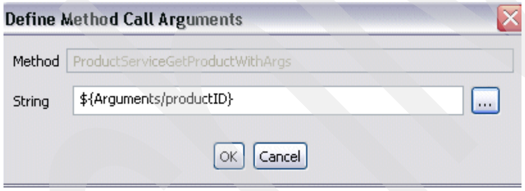


Select Action

- OrdersServiceUpdateOrderWithArgs
- ProductService
- ProductServiceCreateProduct
- ProductServiceCreateProductWithArgs
- ProductServiceGetProduct
- ProductServiceGetProducts
- ProductServiceGetProductWithArgs
- sequence_AcartLayoutPageNameSeque
- sharedvarNewOrder
- sharedvarNewOrderItems
- SortSortAction
- SortSortAction1
- SortSortAction2

Figure 10-65 The ActionList builder input setting

a. For action i, choose **ProductServiceGetProductWithArgs** and click **OK**. In the String field of the Define Method Call Arguments dialog click the ellipsis button and select **${Arguments/productID}**.

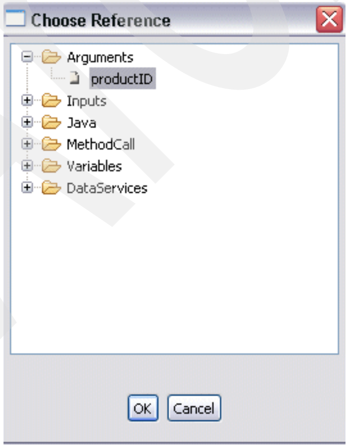


Define Method Call Arguments

Method ProductServiceGetProductWithArgs

String ${Arguments/productID}

Figure 10-66 The ActionList builder input setting

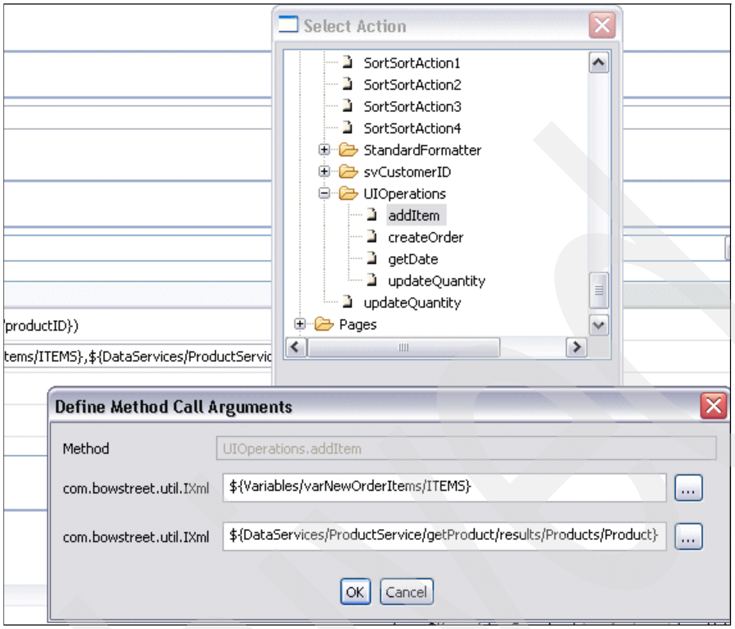


Choose Reference

- Arguments
  - productID
- Inputs
- Java
- MethodCall
- Variables
- DataServices

Figure 10-67 Selecting the argument reference

b. For action ii, select **UIOperations** → **addItem** and click **OK**.



Method: UIOperations.addItem

com.bowstreet.util.IXml: ${Variables/varNewOrderItems/ITEMS}

com.bowstreet.util.IXml: ${DataServices/ProductService/getProduct/results/Products/Product}

Figure 10-68 The ActionList builder setting

You are presented with a dialog for setting the method call arguments as shown in Figure 10-68.

For the first argument, click the ellipsis button and select **${Variables/varNewOrderItems/ITEMS}**

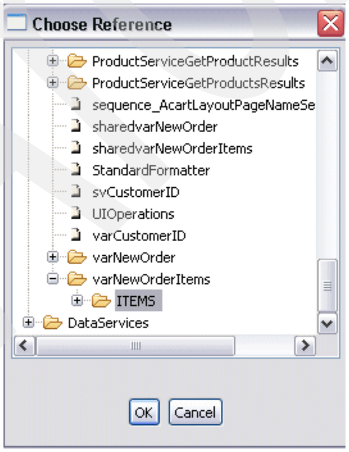


Figure 10-69 The ActionList builder setting reference

For the second argument, click the ellipsis button and select **${DataServices/ProductService/getProduct/results/Products/Product}**

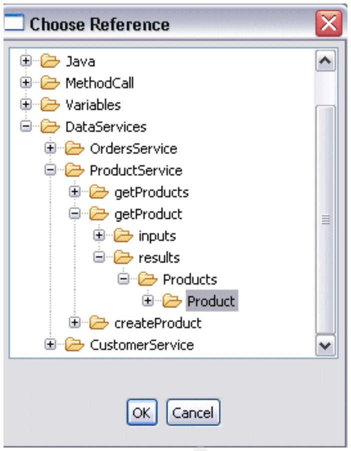


Figure 10-70 The ActionList builder setting

c. For action iii, click the ellipsis button and select **cartLayoutPage**.

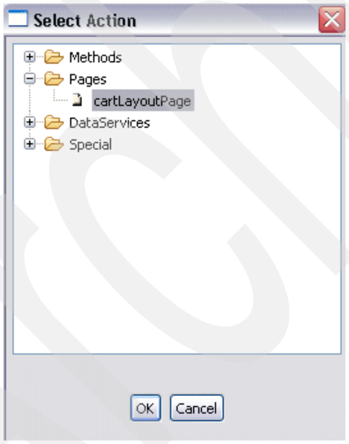


Figure 10-71 The ActionList builder setting

8. From the builder palette, select the **Dojo Inline Edit builder** and click **OK** to add it to the ShoppingCart model.

   a. Set the following values for the Dojo Inline Edit builder:

Name:	`editQuantity`
Fields:	Click the ellipsis and select **[cartLayoutPage]OrderItems/ITEMS/ITEM/QUANTITY**

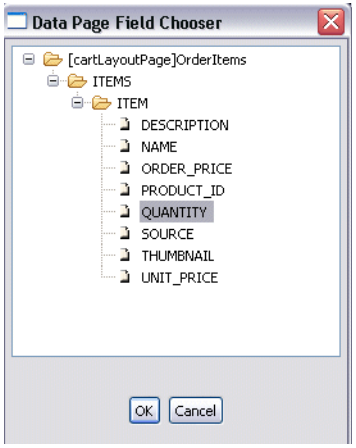


Figure 10-72 The Dojo Inline Edit builder input setting

b. Click the Submit Form check box.

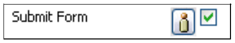

Submit Form ☑

Figure 10-73 The Dojo Inline Edit builder input setting

c. Action: Click the ellipsis button and select **updateQuantity**.

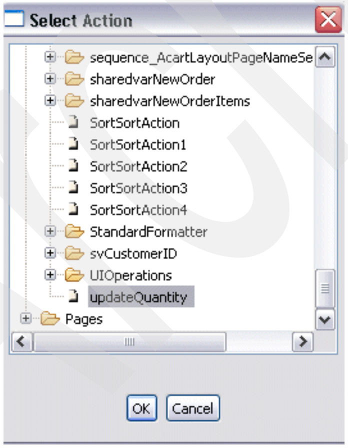


Figure 10-74 The Dojo Inline Edit Action input setting

d. Leave the rest of the sections in the builder as they are.

e. Click **OK** and save the model.

9. From the builder palette, select the **Action List builder** and click **OK** to add it to the ShoppingPage model.

   a. Set the following values for the Action List builder:

      Name: `updateQuantity`
      Actions: Click the ellipsis button and select **UIOperations.updateQuantity(${Variables/varNewOrderItems/ITEMS})**

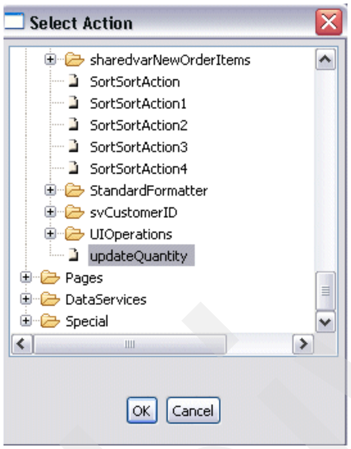
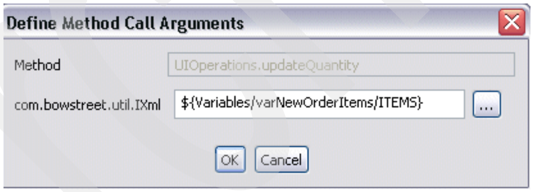


Figure 10-75 The Action List builder input setting

   b. Select the **updateQuantity method** under Methods and click **OK**. The dialog box for setting the method call arguments is returned.



Method: UIOperations.updateQuantity
com.bowstreet.util.IXml: ${Variables/varNewOrderItems/ITEMS}

Figure 10-76 The ActionList builder input setting

   c. Click the ellipsis button and select **${Variables/varNewOrderItems/ITEMS}**.

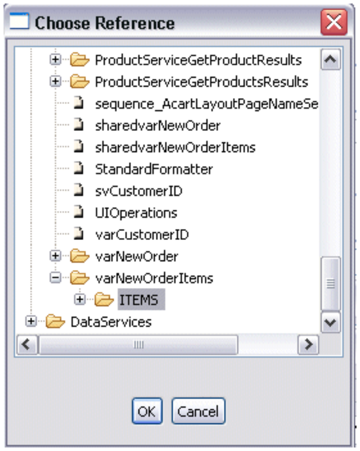


Figure 10-77 The ActionList builder input setting

d. Click the ellipsis button and select **cartLayoutPage**.

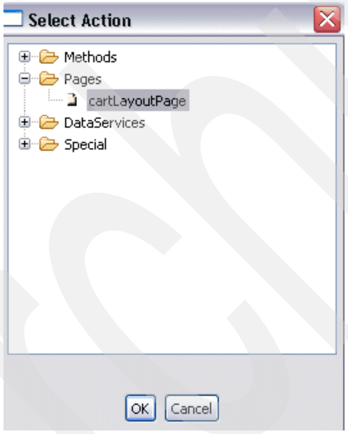


Figure 10-78 The ActionList builder input setting

e. Click **OK** and save the model.

10. From the builder palette, select the **Action List builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Action List builder:

Name:	`alEmptyCart`
Actions:	Click the ellipsis button and make the following entries and selections.

a. Select **Special** → **Conditional** → **Assignment**.

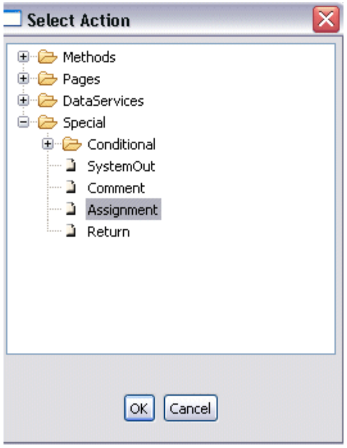
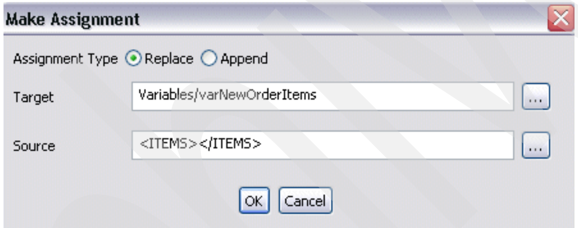


Figure 10-79 The ActionList builder action setting input

b. Click **OK**. A dialog box is returned.



Make Assignment

Assignment Type ● Replace ○ Append

Target: Variables/varNewOrderItems

Source: <ITEMS></ITEMS>

Figure 10-80

c. Click the ellipsis button by the Target field and select **Variables/varNewOrderItems**.

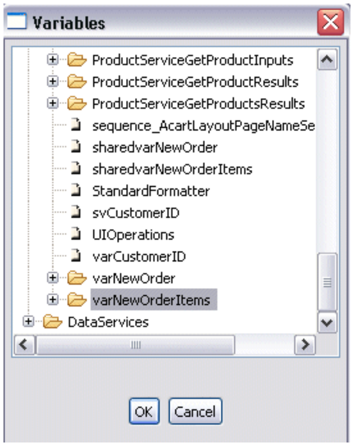
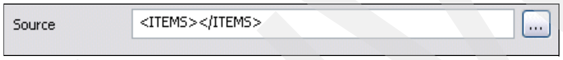


Figure 10-81 The ActionList builder action input setting

d. For the source, type `<ITEMS></ITEMS>`.



Source <ITEMS></ITEMS>

Figure 10-82 The ActionList builder action input setting

e. Click the ellipsis button. Select **Special** → **Conditional** → **Assignment**.

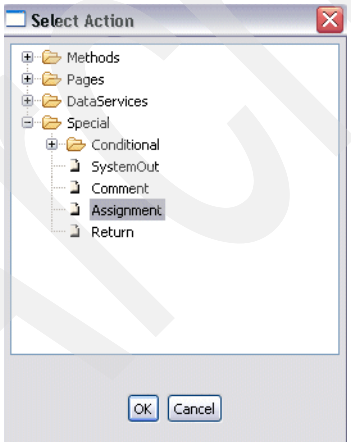
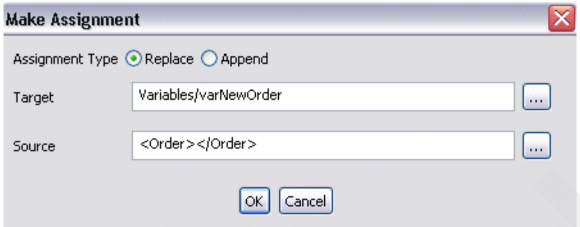


Figure 10-83 The ActionList builder action input setting

f. Click **OK**. A dialog box is returned.



Assignment Type ● Replace ○ Append

Target: Variables/varNewOrder

Source: <Order></Order>

Figure 10-84 The ActionList builder action input setting

g. For Target, click the ellipsis button and select **Variables/varNewOrder**.

h. For the source, type `<Order></Order>`.

i. Click the ellipsis button and select **cartLayoutPage**.

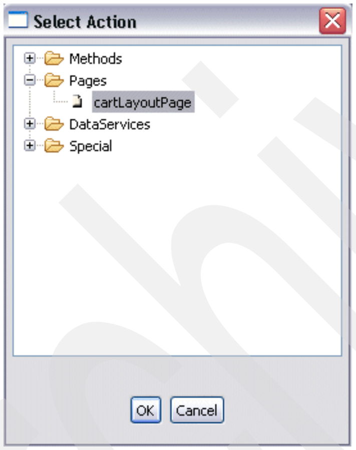
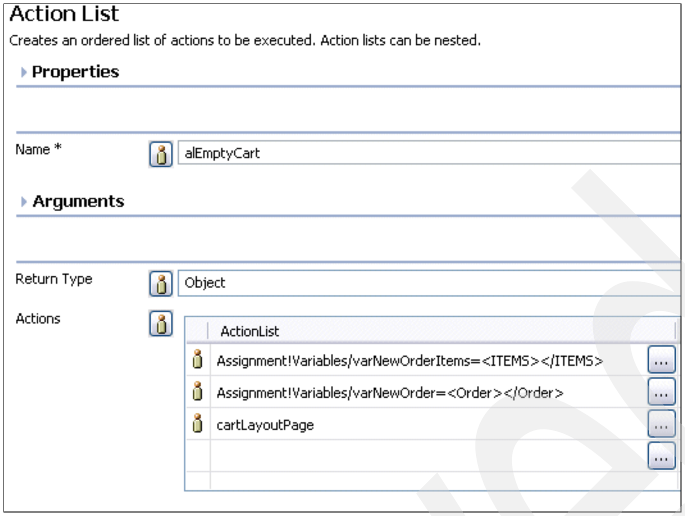


Figure 10-85 The ActionList builder input setting



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name *	alEmptyCart

Return Type	Object
Actions	ActionList
	Assignment!Variables/varNewOrderItems=<ITEMS></ITEMS>
	Assignment!Variables/varNewOrder=<Order></Order>
	cartLayoutPage

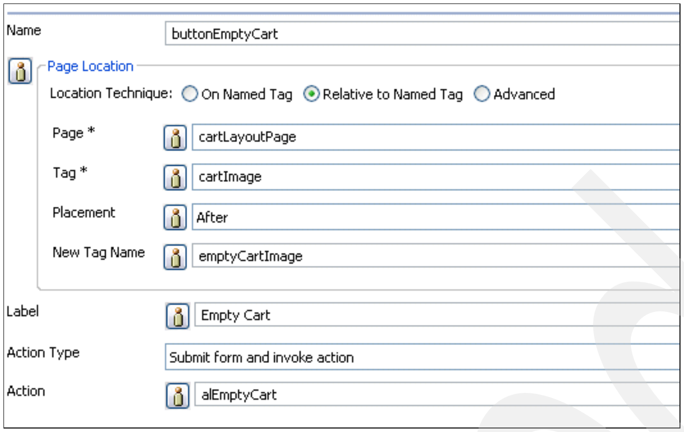
Figure 10-86 The ActionList builder alEmptyCart

11. From the builder palette, select the **Button builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Button builder:

Name:	`buttonEmptyCart`
Page:	`cartlayoutPage`
Tag:	`cartImage`
Placement:	`After`
New Tag Name:	`emptyCartImage`
Label:	`Empty Cart`
Action Type:	`Submit form and invoke action`
Action:	`alEmptyCart`

> **Note:** We get an error in the IDE because we are tying the button builder action input to the nonexistent action alEmptyCart. Disregard this for the moment; we will create the action alEmptyCart shortly.

Click **OK** and save the model.



Name: buttonEmptyCart

Page Location

Location Technique: ○ On Named Tag ● Relative to Named Tag ○ Advanced

Page *: cartLayoutPage

Tag *: cartImage

Placement: After

New Tag Name: emptyCartImage

Label: Empty Cart

Action Type: Submit form and invoke action

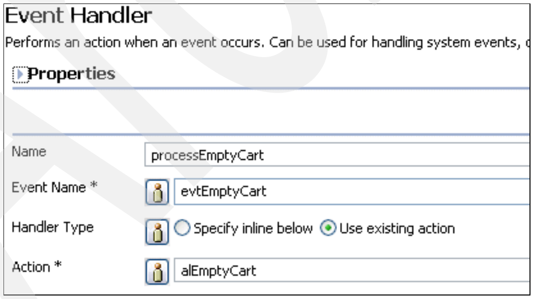
Action: alEmptyCart

Figure 10-87 The Button Builder Input settings

12. From the builder palette, select the **Event Handler builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Event Handler builder:

Name:	`processEmptyCart`
Event Name:	`evtEmptyCart`
Handler Type:	`Use existing action`
Action:	`alEmptyCart`

> **Note:** We get an error in the IDE because of tying the event handler with a nonexistent action alEmptyCart. For the moment we ignore this because we will be creating the action shortly.



Event Handler

Performs an action when an event occurs. Can be used for handling system events, c

Properties

Name: processEmptyCart

Event Name *: evtEmptyCart

Handler Type: ○ Specify inline below ● Use existing action

Action *: alEmptyCart

Figure 10-88 The Event Handler input setting

13. From the builder palette, select the **Action List builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Action List builder:

Name:	`alEmptyCart`
Actions:	Click the ellipsis button and make the following entries and selections.

a. Select **Special** → **Conditional** → **Assignment**

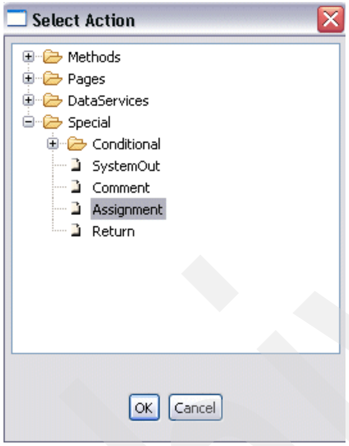
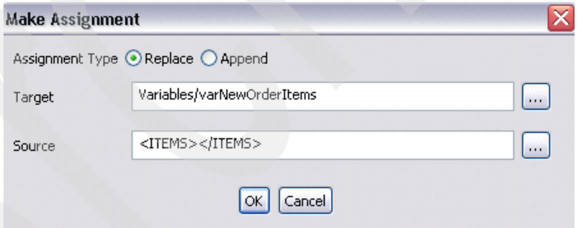


Figure 10-89 The ActionList builder action setting input

b. Click **OK**. A dialog box is returned.



Assignment Type ● Replace ○ Append

Target: Variables/varNewOrderItems

Source: <ITEMS></ITEMS>

Figure 10-90 The ActionList builder action setting input

c. Click the ellipsis button next to the Target field and select **Variables/varNewOrderItems**.

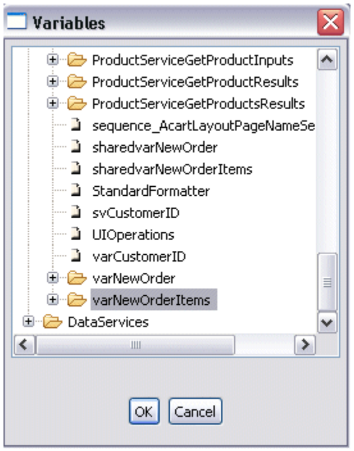
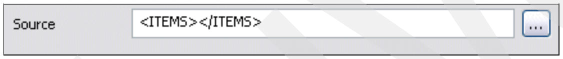


Figure 10-91 The ActionList builder action input setting

d. For the source, type `<ITEMS></ITEMS>`.



Source <ITEMS></ITEMS>

Figure 10-92 The ActionList builder action input setting

e. Click the ellipsis and select **Special** → **Conditional** → **Assignment**.

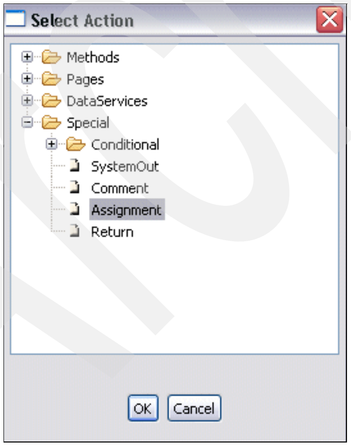
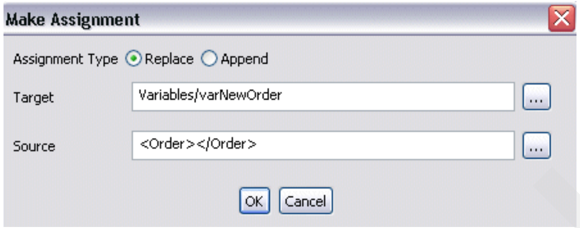


Figure 10-93 The ActionList builder action input setting

f. Click **OK**. A dialog box is returned.



Make Assignment

Assignment Type ● Replace ○ Append

Target: Variables/varNewOrder

Source: <Order></Order>

Figure 10-94 The ActionList builder action input setting

g. For Target, click the ellipsis button and select **Variables/varNewOrder**.

h. For the source, type `<Order></Order>`.

i. Click the ellipsis button and select **cartLayoutPage**.

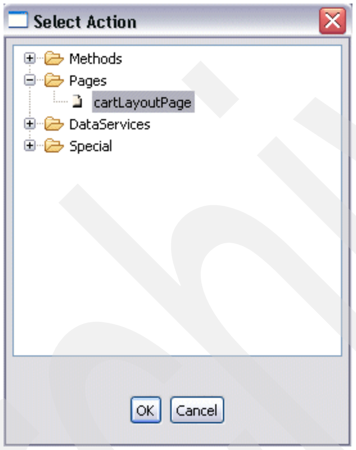
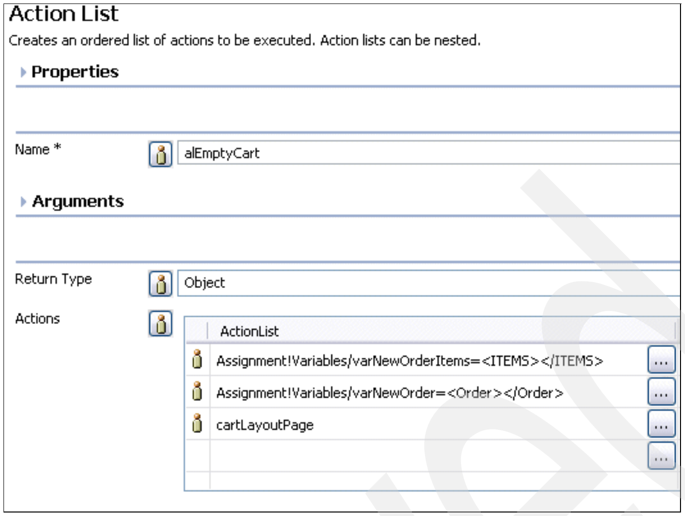


Figure 10-95 The ActionList builder input setting



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * alEmptyCart

Arguments

Return Type Object

Actions

ActionList
Assignment!Variables/varNewOrderItems=<ITEMS></ITEMS>
Assignment!Variables/varNewOrder=<Order></Order>
cartLayoutPage

Figure 10-96 The ActionList builder alEmptyCart

10.6.2 Shopping Product Catalog model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

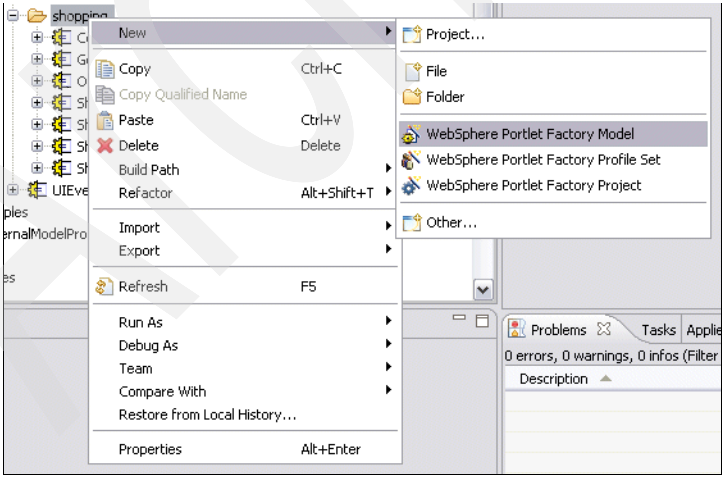
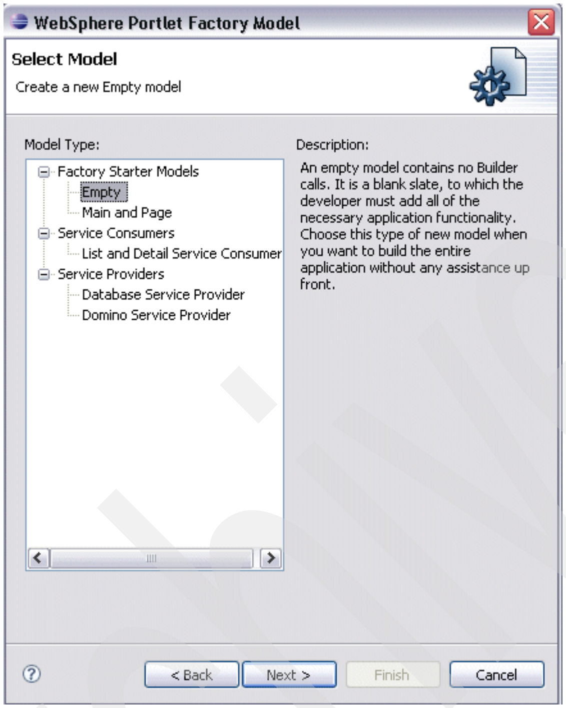


Figure 10-97 Creating a new model -ShoppingProductCatalog

2. In the Choose Project window, select **RedbookCS** as the project and click **Next**.
3. In the Model Type field of the Select Model window, select **Factory Starter Models** → **Empty** and click **Next**.



WebSphere Portlet Factory Model

Select Model

Create a new Empty model

Model Type:

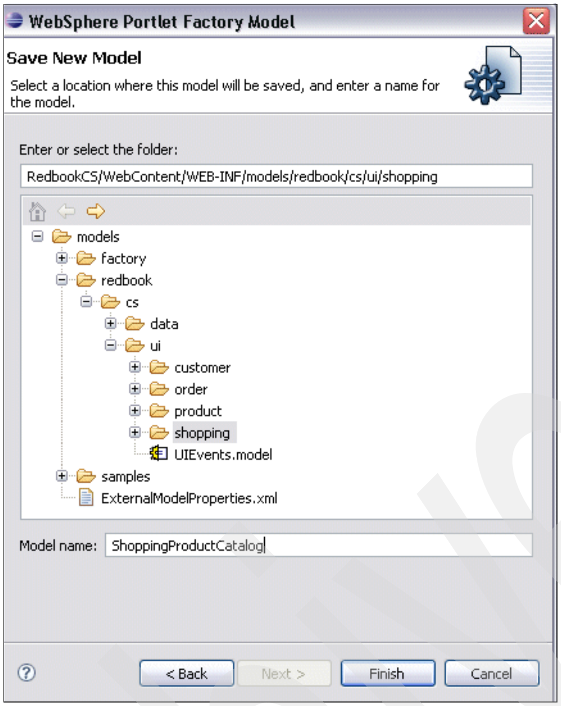
- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consumer
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-98 The Empty Factory Starter Model

- In the Save New Model window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder and **ShoppingProductCatalog** as the model name.


WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder:

RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

```
models
  factory
  redbook
    cs
      data
      ui
        customer
        order
        product
        shopping
        UIEvents.model
  samples
  ExternalModelProperties.xml
```

Model name: ShoppingProductCatalog

Figure 10-99 Saving the ShoppingProductCatalog model

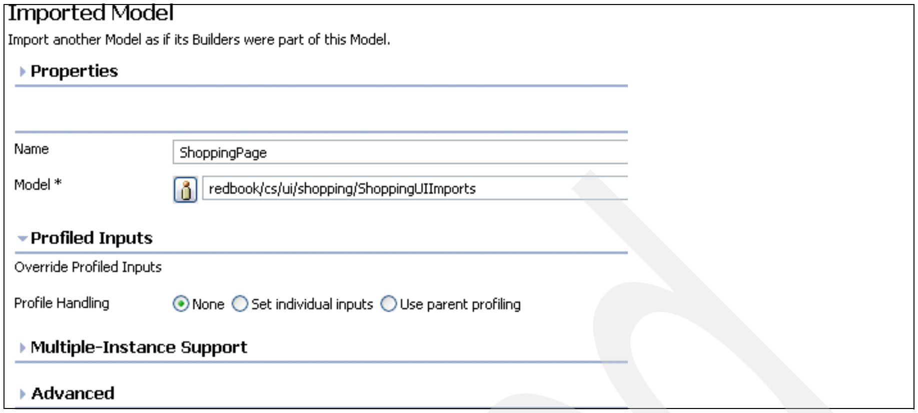
Importing the ShoppingUIImports model

Now that we have an empty ShoppingProductCatalog.model, the first thing we will do is import a "ShoppingUIImports" model.

1. From the builder palette, select the **Imported Model builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Imported Model builder:

Name:	`ShoppingUIImports`
Model:	`redbook/cs/ui/shopping/ShoppingUIImports`

   Click **OK** and save the model.



Imported Model

Import another Model as if its Builders were part of this Model.

▸ Properties

Name: ShoppingPage

Model *: redbook/cs/ui/shopping/ShoppingUIImports

▾ Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

▸ Multiple-Instance Support

▸ Advanced

Figure 10-100 The Imported Model builder

2. From the builder palette, select the **Page builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the page builder

Name:	`pageProductCatalog`
Page Contents (HTML):	Copy and paste the HTML code fro m Example 10-9b into the box.

Example 10-9

```
<html>
    <body>
        <!-- As a best practice, change the form name to a unique name -->
        <form name="ITSO_REDBOOK_FORM_ProductCatalog" method="post">
            <div align="center">
            <span name="ProductCatalog"></span>
            </div>
        </form>
    </body>
</html>
```

Click **OK** and save the model.

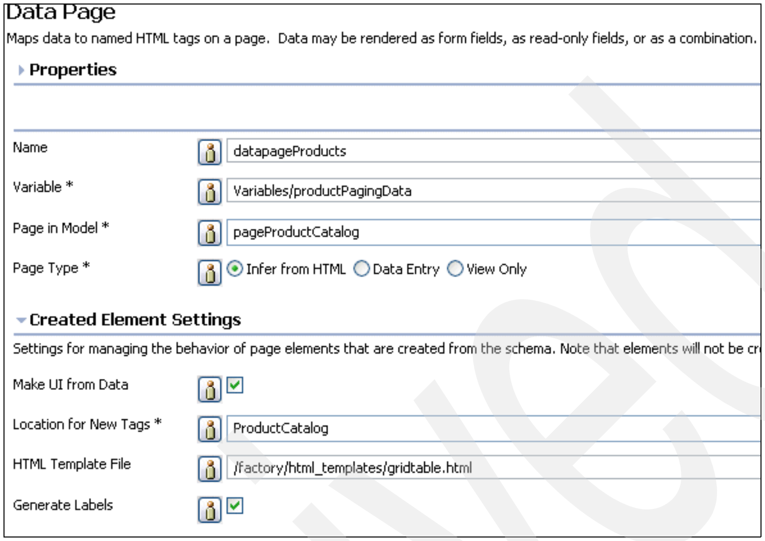
3. From the builder palette, select the **Data Page builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Data Page builder:

Name:	`datapageProducts`
Variable:	`Variables/productPagingData`
Page in Model:	`pageProductCatalog`
Page Type:	No need to change this input.

In the Create Element Settings section:

Location for New Tags: `ProductCatalog`

The rest of the builder inputs are left unchanged.



Data Page

Maps data to named HTML tags on a page. Data may be rendered as form fields, as read-only fields, or as a combination.

Properties

Name	datapageProducts
Variable *	Variables/productPagingData
Page in Model *	pageProductCatalog
Page Type *	● Infer from HTML ○ Data Entry ○ View Only

Created Element Settings

Settings for managing the behavior of page elements that are created from the schema. Note that elements will not be cr

Make UI from Data	☑
Location for New Tags *	ProductCatalog
HTML Template File	/factory/html_templates/gridtable.html
Generate Labels	☑

Figure 10-101 The Data Page builder - dataPageProducts

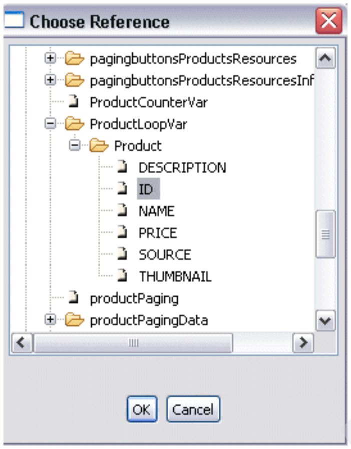
> **Note:** We get an error in the IDE because of tying the builder variable input to nonexistent variable Variables/productPagingData. Ignore this problem for now; we will create a builder (Paging Assistant) that will create this variable shortly.

> **Important:** Note the variable name input in the data page builder. It is Variables/productPagingData. We mentioned that we are going to use paging assistant to helping with the pagination functionality. For now we assume the name of the paging assistant is productPaging, and the variable that gets automatically created would be productPagingData (note the suffix Data)

4. From the builder palette, select the **Dojo Drag Source builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Dojo Drag Source builder:

   Name: `dragSource`
   Page: `productPageCatalog`
   Tag: `THUMBNAIL`

Drag Source Data: Click the ellipsis and select **${Variables/ProductLoopVar/Product/ID}**



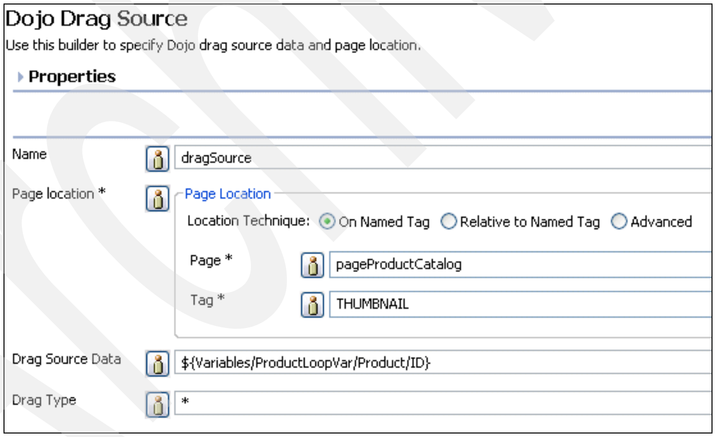
Choose Reference

- pagingbuttonsProductsResources
- pagingbuttonsProductsResourcesInf
- ProductCounterVar
- ProductLoopVar
  - Product
    - DESCRIPTION
    - ID
    - NAME
    - PRICE
    - SOURCE
    - THUMBNAIL
- productPaging
- productPagingData

Figure 10-102 The Dojo Drag Source builder - dragSource

Drag Type: Leave the input at its default value.

Click **OK** and save the model.



Dojo Drag Source

Use this builder to specify Dojo drag source data and page location.

Properties

Name	dragSource
Page location *	Page Location Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced Page * pageProductCatalog Tag * THUMBNAIL
Drag Source Data	${Variables/ProductLoopVar/Product/ID}
Drag Type	*

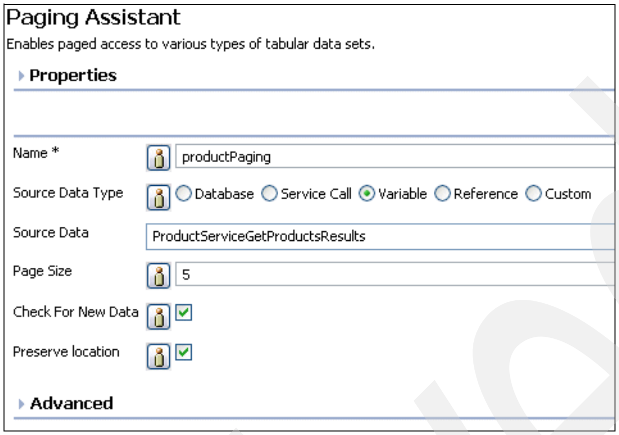
Figure 10-103 The Dojo Drag Source

5. From the builder palette, select the **Paging Assistant builder** and click **OK** to add it to the ShoppingPage model. Set the following values for the Paging Assistant builder:

Name:	`productPaging`
Source Data type:	`Varibale`
Source Data:	`ProductServiceGetProductsResults`

Page Size:	5

Leave the rest of the builder inputs as they are.



Paging Assistant

Enables paged access to various types of tabular data sets.

Properties

Name *	productPaging
Source Data Type	○ Database ○ Service Call ● Variable ○ Reference ○ Custom
Source Data	ProductServiceGetProductsResults
Page Size	5
Check For New Data	☑
Preserve location	☑

Advanced

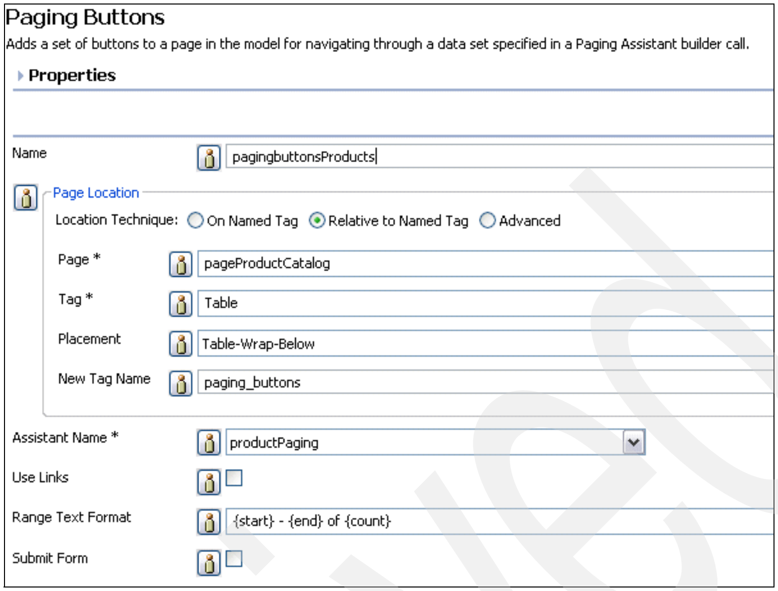
Figure 10-104 The Paging Assistant builder

6. From the builder palette, select the **Paging Buttons builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Paging Buttons builder:

Name:	`pagingbuttonsProducts`
Location Technique:	`Relative to Named Tag`
Page:	`pageProductCatalog`
Tag:	`Table`
Placement:	`Table-Wrap-Below`
New Tag Name:	`paging_buttons`
Assistant Name:	`productPaging`

Leave the rest of the builder inputs as they are.

Click **OK** and save the model.



Paging Buttons

Adds a set of buttons to a page in the model for navigating through a data set specified in a Paging Assistant builder call.

Properties

Name: pagingbuttonsProducts

Page Location

Location Technique: ○ On Named Tag ● Relative to Named Tag ○ Advanced

Page *: pageProductCatalog

Tag *: Table

Placement: Table-Wrap-Below

New Tag Name: paging_buttons

Assistant Name *: productPaging

Use Links: □

Range Text Format: {start} - {end} of {count}

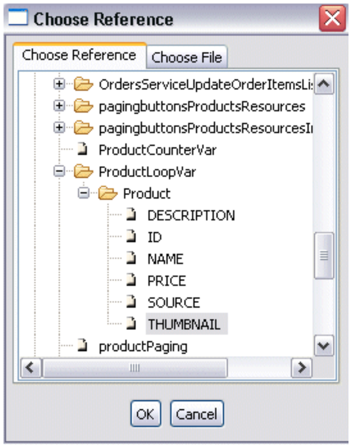
Submit Form: □

Figure 10-105 The Paging Buttons builder

7. From the builder palette, select the **Image builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Image builder:

Name:	`productThumb`
Page:	`pageProductCatalog`
Tag:	`THUMBNAIL`
Image Source:	`${Variables/ProductLoopVar/Product/THUMBNAIL}`

Click **OK** and save the model.



Choose Reference

Choose Reference | Choose File

```
⊞ OrdersServiceUpdateOrderItemsLi
⊞ pagingbuttonsProductsResources
⊞ pagingbuttonsProductsResourcesI
   ProductCounterVar
⊟ ProductLoopVar
   ⊟ Product
        DESCRIPTION
        ID
        NAME
        PRICE
        SOURCE
        THUMBNAIL
   productPaging
```

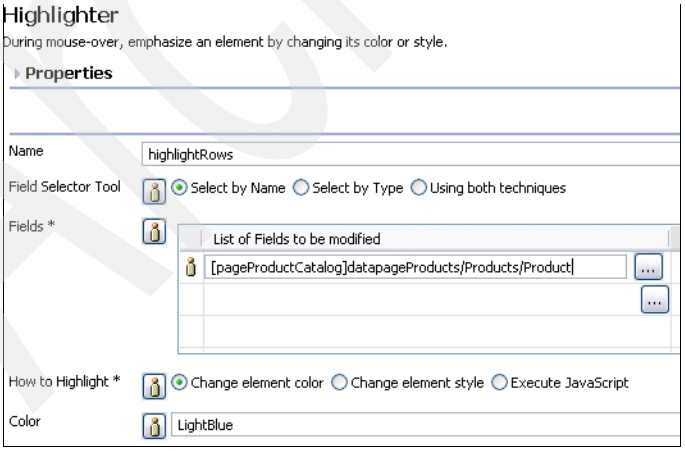
OK | Cancel

Figure 10-106 The Image builder input

8. From the builder palette, select the **Highlighter builder** and click **OK** to add it to the ShoppingProductCatalog model. Set the following values for the Highlighter builder:

Name:	`highlightRows`
Filed Selector Tool:	`Select by Name`
Fields:	`[pageProductCatalog]datapageProducts/Products/Product`
How to Highlight:	`Change element color`
Color:	`LightBlue`

Click **OK** and save the model.



Highlighter

During mouse-over, emphasize an element by changing its color or style.

Properties

Name: highlightRows

Field Selector Tool: ● Select by Name ○ Select by Type ○ Using both techniques

Fields *: List of Fields to be modified: [pageProductCatalog]datapageProducts/Products/Product

How to Highlight *: ● Change element color ○ Change element style ○ Execute JavaScript

Color: LightBlue

Figure 10-107 The Highlighter builder -highlightRows

10.7 Order Page model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

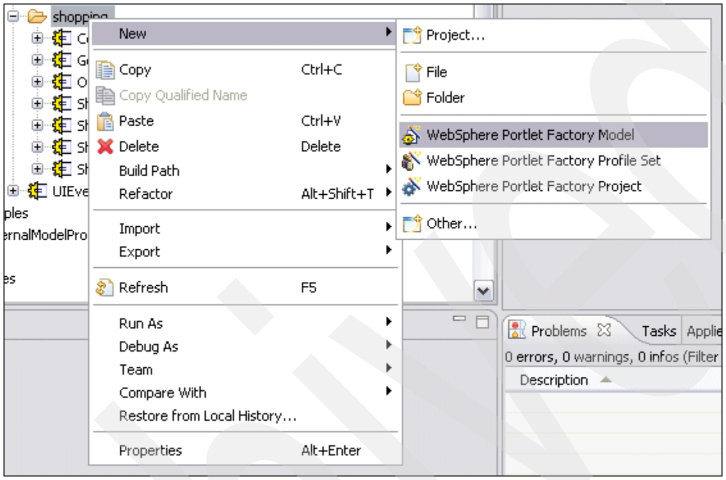
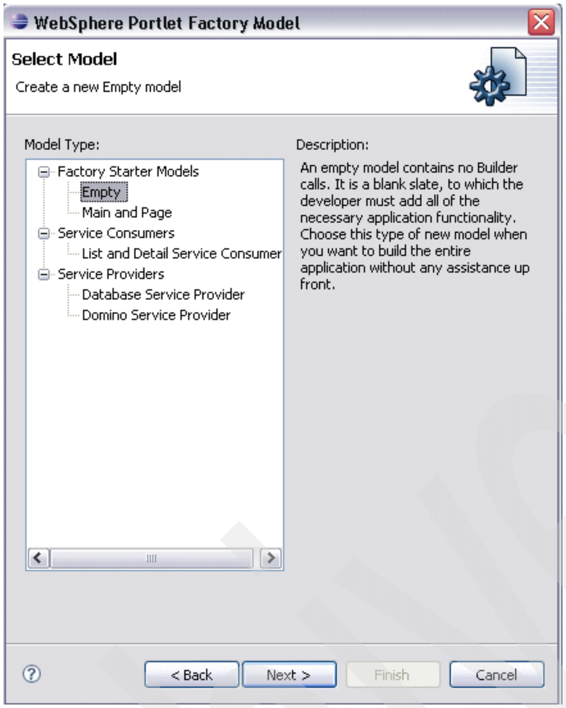


Figure 10-108 The new model creation

2. In the Choose Project window, select the **RedbookCS** as the project and click **Next**.
3. In the Model Type field of the Select Model window, select **Factory Starter Models** → **Empty** and then click **Next**.



Select Model

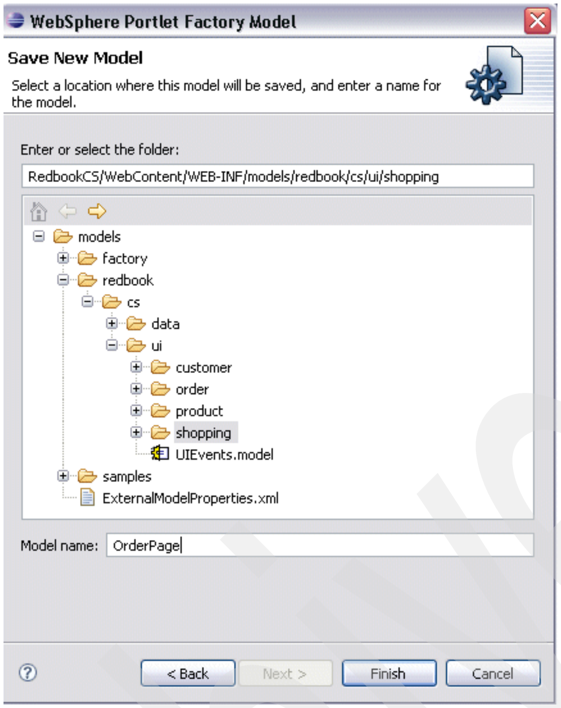
Create a new Empty model

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-109 The Empty Factory Starter model

4. In the Save New Model window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder and **OrderPage** as the model name.


WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder: RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

Model name: OrderPage

Figure 10-110 Saving the model OrderPage

Importing the ShoppingUIImports model

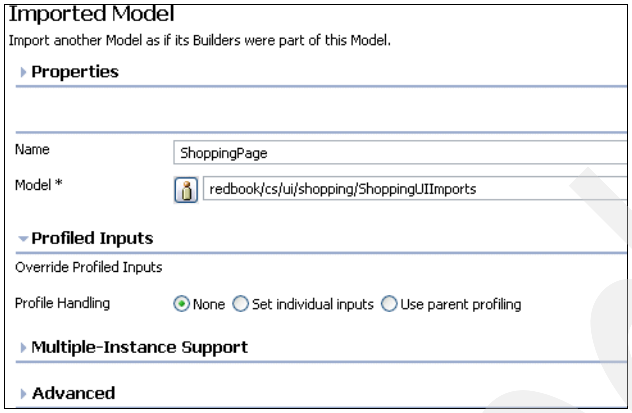
Now that we have an empty OrderPage.model, we will import a "ShoppingUIImports" model.

1. From the builder palette, select the **Imported Model builder** and click **OK** to add it to the OrderPage model. Set the following values for the Imported Model builder:

Name:	`ShoppingUIImports`
Model:	`redbook/cs/ui/shopping/ShoppingUIImports`

   Leave the rest of the builder inputs as they are.

   Click **OK** and save the model.



Imported Model

Import another Model as if its Builders were part of this Model.

▸ Properties

Name: ShoppingPage

Model *: redbook/cs/ui/shopping/ShoppingUIImports

▾ Profiled Inputs

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

▸ Multiple-Instance Support

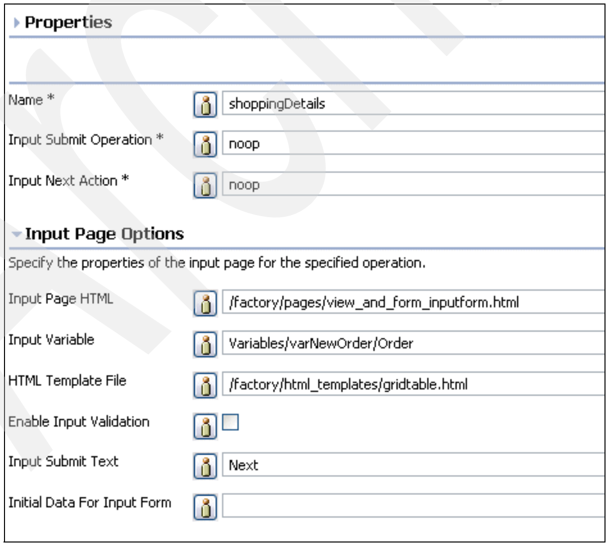
▸ Advanced

Figure 10-111 The Importetd Model builder

2. From the builder palette, select the **Input Form builder** and click **OK** to add it to the OrderPage model. Set the following values for the Input Form builder:

Name:	`shoppingDetails`
Input Submit Operation:	`noop`
Input Next Action:	`noop`
Input Variable:	`Variables/varNewOrder/Order`
Input Submit Text:	`Next`

   Click **OK** and save the model.



▸ Properties

Name *: shoppingDetails

Input Submit Operation *: noop

Input Next Action *: noop

▾ Input Page Options

Specify the properties of the input page for the specified operation.

Input Page HTML: /factory/pages/view_and_form_inputform.html

Input Variable: Variables/varNewOrder/Order

HTML Template File: /factory/html_templates/gridtable.html

Enable Input Validation: □

Input Submit Text: Next

Initial Data For Input Form:

Figure 10-112 The Input Form builder inputs.

3. From the builder palette, select the **Action List builder** and click **OK** to add it to the OrderPage model. Set the following values for the Action List builder:

Name:	`noop`
Actions:	`SystemOut!SubmitOpThatDoesNothing`

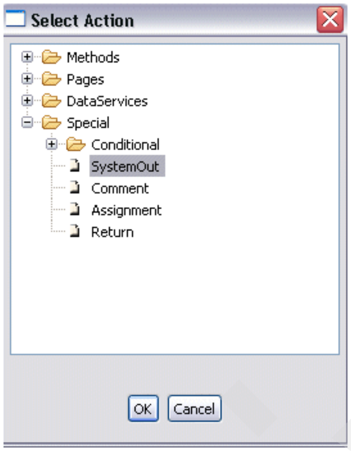
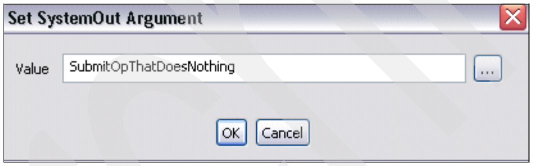


Figure 10-113 The ActionList builder input

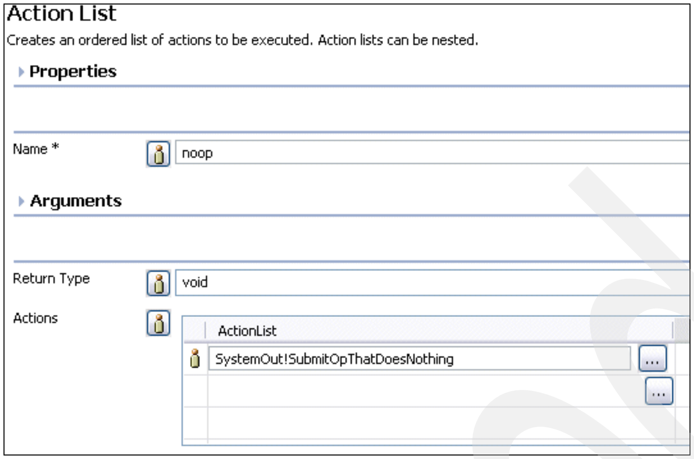
Click OK. In the dialog box, type `SubmitOpThatDoesNothing`.



Value: SubmitOpThatDoesNothing

Figure 10-114 The ActionList builder input

Click **OK** and save the model.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * noop

Arguments

Return Type void

Actions

ActionList
SystemOut!SubmitOpThatDoesNothing

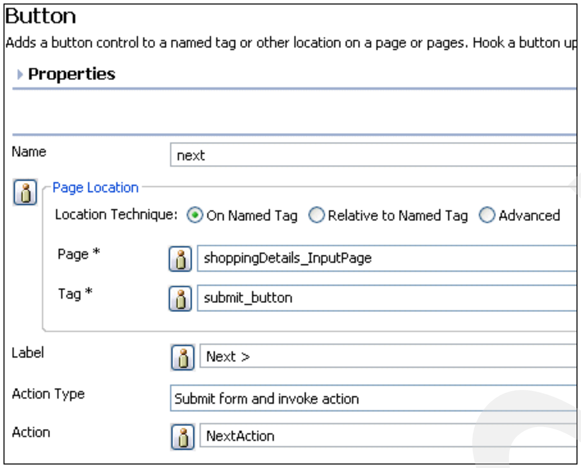
Figure 10-115 The ActionList builder

4. From the builder palette, select the **Button builder** and click **OK** to add it to the OrderPage model. Set the following values for the Button builder:

Name:	`next`
Page:	`shoppingDetails_InputPage`
Tag:	`submit_button`
Label:	`Next >`
Action Type:	`Submit form and invoke action`
Action:	`NextAction`

Leave the rest of the builder inputs as they are.

Click **OK** and save the model.



Button

Adds a button control to a named tag or other location on a page or pages. Hook a button up

Properties

Name: next

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: shoppingDetails_InputPage

Tag *: submit_button

Label: Next >

Action Type: Submit form and invoke action

Action: NextAction

Figure 10-116 The Button builder

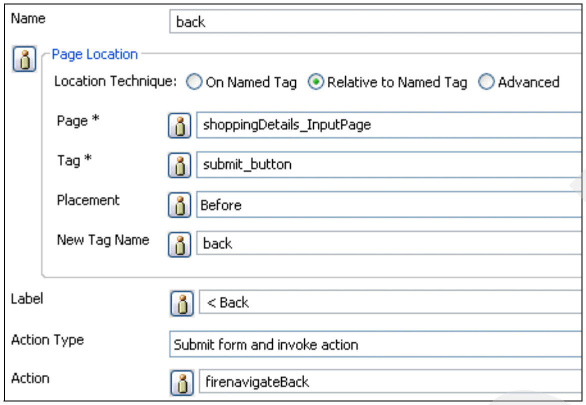
> **Note:** We get an error in the IDE because of tying the button to nonexistent action NextAction. For the moment we can ignore this error because we will be creating the action NextAction shortly.

5. From the builder palette, select the **Button builder** and click **OK** to add it to the OrderPage model. Set the following values for the Button builder:

Name:	`back`
Location Technique:	`shoppingDetails_InputPage`
Tag:	`submit_button`
Placement:	`Before`
New Tag Name:	`back`
Label:	`< Back`
Action Type:	`Submit form and invoke action`
Action:	`firenavigateBack`

Leave the rest of the builder inputs as they are.

Click **OK** and save the model.



Name: back

Page Location

Location Technique: ○ On Named Tag ● Relative to Named Tag ○ Advanced

Page *: shoppingDetails_InputPage

Tag *: submit_button

Placement: Before

New Tag Name: back

Label: < Back

Action Type: Submit form and invoke action

Action: firenavigateBack

Figure 10-117 The Button Builder

6. From the builder palette, select the **Action List builder** and click **OK** to add it to the OrderPage model. Set the following values for the Action List builder:

   Name: NextAction
   Actions: Click the ellipsis button and make the following entries and selections:

   Assignment!Variables/varCustomerID=${Inputs/CUSTOMER_ID}

   a. Click the ellipsis and select **Assignment**.

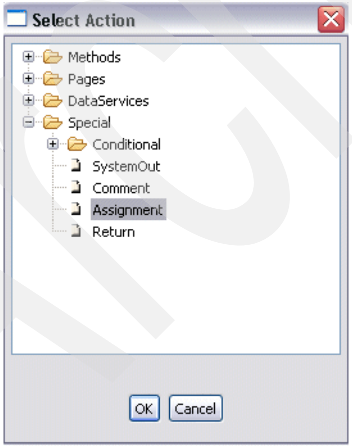
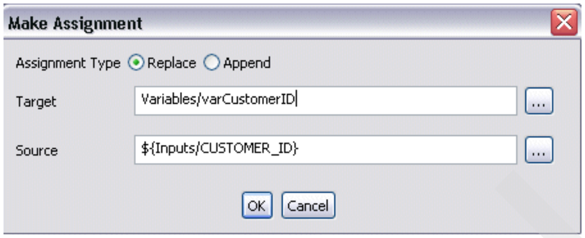


Figure 10-118 The ActionList builder action input

   b. Click **OK** and set the following values for the Target and Source:

      Target: `Variables/varCustomerID`
      Source: `${Inputs/CUSTOMER_ID}`



Assignment Type ● Replace ○ Append

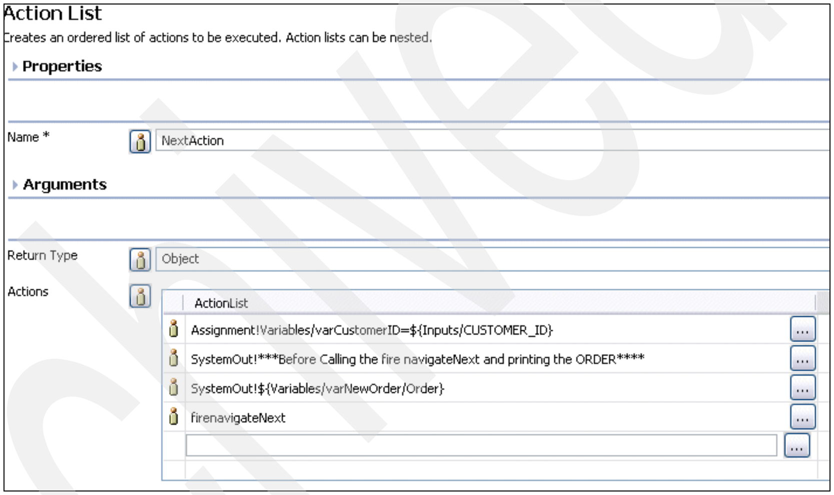
Target: Variables/varCustomerID

Source: ${Inputs/CUSTOMER_ID}

Figure 10-119 The ActionList builder action setting

c. Click the ellipsis and select the action **firenavigateNext**.

Click **OK** and save the model.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Name *: NextAction

Return Type: Object

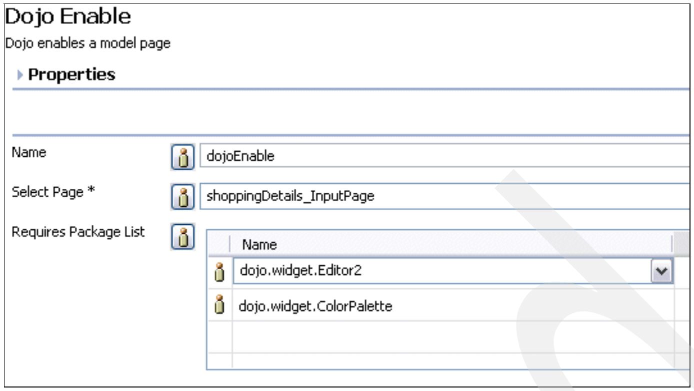
Actions:

ActionList
Assignment!Variables/varCustomerID=${Inputs/CUSTOMER_ID}
SystemOut!***Before Calling the fire navigateNext and printing the ORDER****
SystemOut!${Variables/varNewOrder/Order}
firenavigateNext

Figure 10-120 The ActionList builder input

7. From the builder palette, select the **Dojo Enable builder** and click **OK** to add it to the OrderPage model. Set the following values for the Dojo Enable builder:

Name:	`dojoEnable`
Select Page:	`shoppingDetails_InputPage`
Requires Package List:	Under the Name column select **dojo.widget.Editor2** and **dojo.widget.ColorPalette**



Dojo Enable

Dojo enables a model page

Properties

Name: dojoEnable

Select Page *: shoppingDetails_InputPage

Requires Package List:

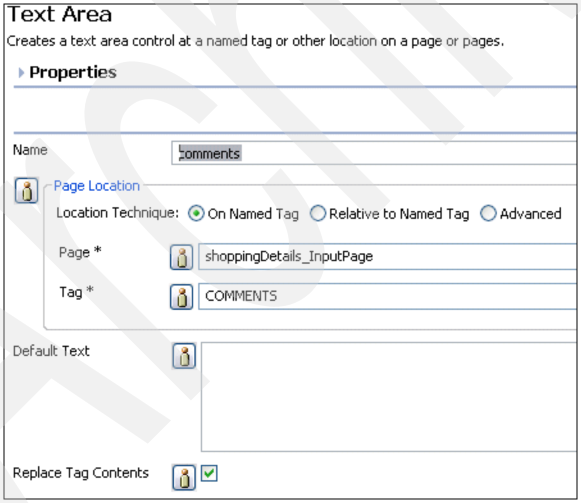
Name
dojo.widget.Editor2
dojo.widget.ColorPalette

Figure 10-121 The Dojo Enable builder input

8. From the builder palette, select the **Text Area builder** and click **OK** to add it to the OrderPage model. Set the following values for the Text Area builder:

Name:	`comments`
Page:	`shoppingDetails_InputPage`
Tag:	`COMMENTS`

Click **OK** and save the model.



Text Area

Creates a text area control at a named tag or other location on a page or pages.

Properties

Name: comments

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: shoppingDetails_InputPage

Tag *: COMMENTS

Default Text:

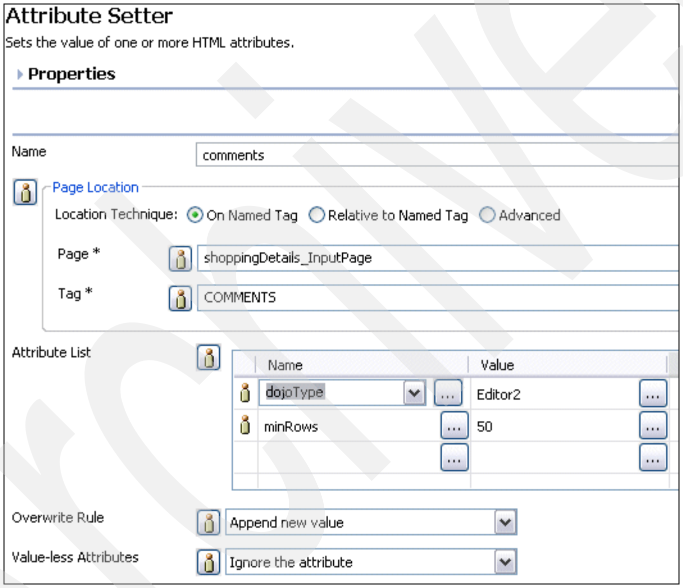
Replace Tag Contents ☑

Figure 10-122 The TextArea builder input

9. From the builder palette, select the **Attribute Setter builder** and click **OK** to add it to the OrderPage model. Set the following values for the Attribute Setter builder:

   Name: `comments`
   Page: `shoppingDetails_InputPage`
   Tag: `COMMENTS`
   Attribute List: Click the columns and create the following name/value pairs:
   Name: `dojoType` Value: `Editor2`
   Name: `minRows` Value: `50`
   Overwrite Rule: `Append new value`
   Value-less Attributes: Leave as is.

   Click **OK** and save the model.



Attribute Setter
Sets the value of one or more HTML attributes.
Properties

Name: comments
Page Location
Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced
Page *: shoppingDetails_InputPage
Tag *: COMMENTS

Attribute List

Name	Value
dojoType	Editor2
minRows	50

Overwrite Rule: Append new value
Value-less Attributes: Ignore the attribute

Figure 10-123 The Attribute Setter

10.8 Confirmation model

In the WebSphere Portlet Factory Designer, create a new empty model in the RedbookCS project by doing the following:

1. Select **File** → **New** → **WebSphere Portlet Factory Model**. This will launch the model creation wizard.

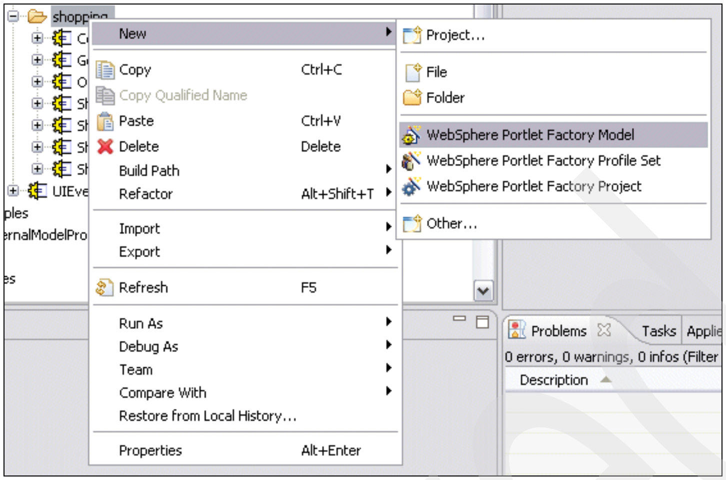
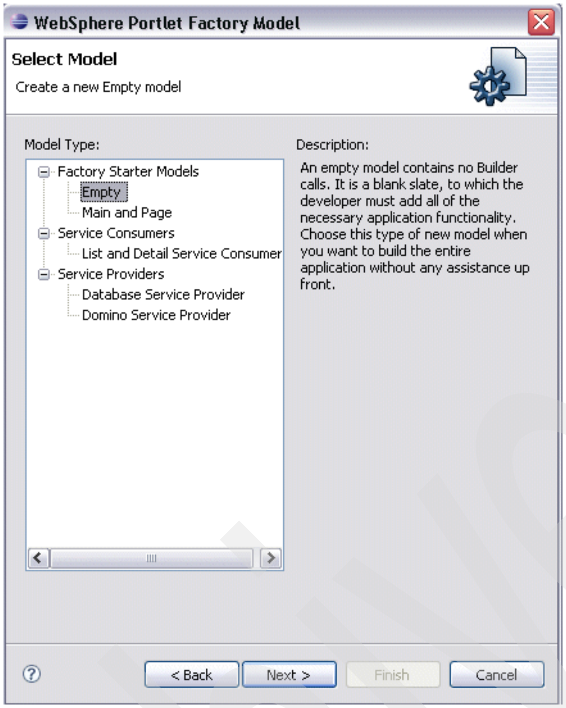


Figure 10-124 The new model creation

2. In the Choose Project window, select **RedbookCS** as the project and click **Next**.
3. In the Model Type field of the Select Model window, select **Factory Starter Models** → **Empty** and click **Next**.



Select Model

Create a new Empty model

Model Type:

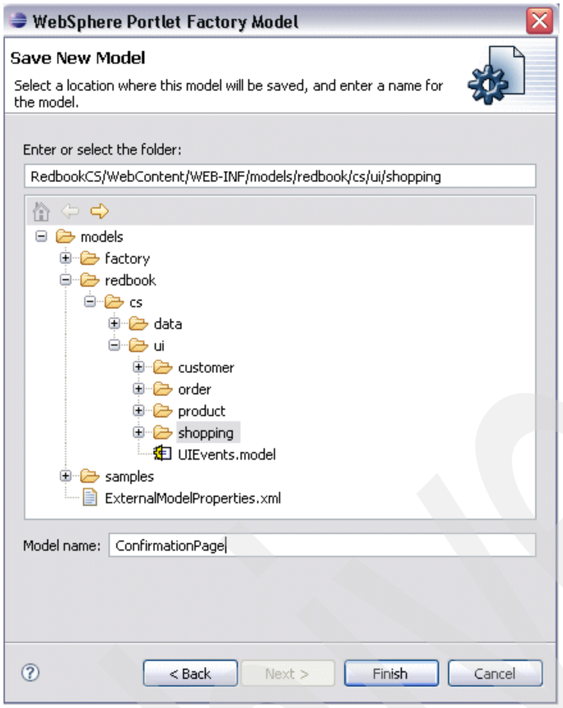
- Factory Starter Models
  - Empty
  - Main and Page
- Service Consumers
  - List and Detail Service Consumer
- Service Providers
  - Database Service Provider
  - Domino Service Provider

Description:

An empty model contains no Builder calls. It is a blank slate, to which the developer must add all of the necessary application functionality. Choose this type of new model when you want to build the entire application without any assistance up front.

Figure 10-125 The Empty Factory Starter Model

4. In the Save New Model window, select **RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping** as the folder and **ConfirmationPage** as the model name.


WebSphere Portlet Factory Model

Save New Model

Select a location where this model will be saved, and enter a name for the model.

Enter or select the folder:

RedbookCS/WebContent/WEB-INF/models/redbook/cs/ui/shopping

```
models
  factory
  redbook
    cs
      data
      ui
        customer
        order
        product
        shopping
        UIEvents.model
  samples
  ExternalModelProperties.xml
```

Model name: ConfirmationPage

Figure 10-126 Saving the confirmation model

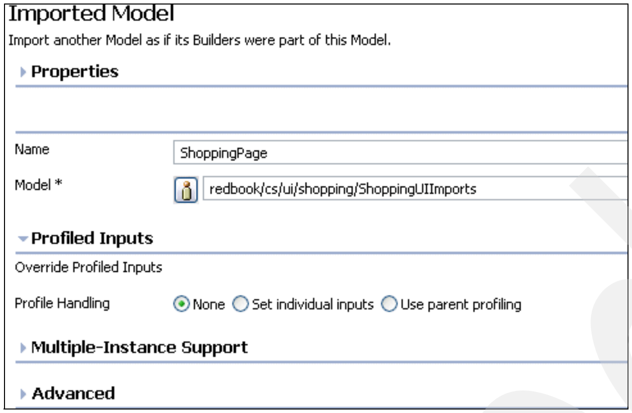
Importing the ShoppingUIImports model

Now that we have an empty ConfirmationPage.model, we will import a “ShoppingUIImports” model.

1. From the builder palette, select the **Imported Model builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Imported Model builder:

Name:	`ShoppingUIImports`
Model:	`redbook/cs/ui/shopping/ShoppingUIImports`

2. Click **OK** and save the model.



Imported Model

Import another Model as if its Builders were part of this Model.

Name: ShoppingPage

Model *: redbook/cs/ui/shopping/ShoppingUIImports

Override Profiled Inputs

Profile Handling: ● None ○ Set individual inputs ○ Use parent profiling

Figure 10-127 The Imported Model builder -ShoppingUIImports

Creating the base HTML page: ConfirmationPageLayout

Create a base HTML page, ConfirmationPageLayout, which will host static content and named Tags that will be used as anchors in our UI model for inserting dynamic content structures and other page elements such as buttons, images, and so forth.

1. Do the following to create the base HTML files:

   a. Click **File** → **New** → **Other** to launch the wizard.

   b. Select **General** → **File** and click **Next**.

   c. Type or select the parent folder **RedbookCS/WebContent/redbook/cs/html**, enter the file name as `ConfirmationPageLayout.html` and click **Finish** to create an empty HTML file.

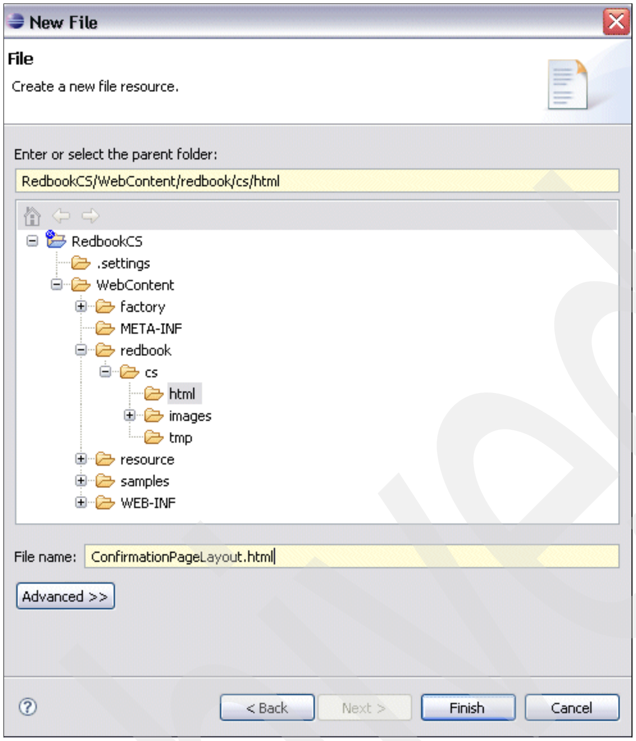


Figure 10-128 ConfirmationPageLayout HTML file creation

d. Right-click the newly created ConfirmationPageLayout.html file and select **Open With** → **Text Editor**. This will allow you to edit the file and create a basic layout of the CartLayout page. Copy and paste the HTML from Example 10-10 into this file.

Example 10-10

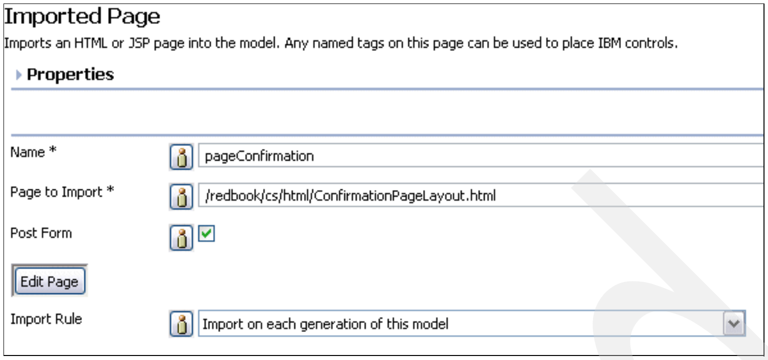
```
<HTML>
    <BODY>
        <FORM name="ITSO_REDBOOK_FORM_ConfirmationLayout" method="post">
        <DIV align="left"> <SPAN name="CredentialsStatus"></SPAN> </DIV>
        <BR>
        <TABLE>
           <TR>
           <TD colspan="3" align="left" valign="top"><SPAN name="row1"></SPAN>
         </TD>
           </TR>
           <TR>
           <TD align="left" valign="top">Order Information:<BR><SPAN
name="row2left"></SPAN></TD>
           <TD align="left" valign="top"><SPAN name="row2right"></SPAN></TD>
           </TR>

           <TR>
           <TD colspan="2" align="left" valign="top"><BR><BR><BR><BR>Order Items:
<BR>
           <SPAN name="row3"></SPAN></TD>
           </TR>
           <TR>

           <TD align="left" valign="top"><BR><BR><BR><BR>Shipping Details:<BR><SPAN
name="row4left"></SPAN></TD>
           <TD align="left" valign="top"><SPAN name="row4right"></SPAN></TD>
           </TR>
           <TR>
           <TD align="center" valign="top"><SPAN name="row5left"></SPAN></TD>
           <TD align="center" valign="top"><SPAN name="row5right"></SPAN></TD>
           </TR>
       </TABLE><BR>
       <span name="backButton"></span>&nbsp;&nbsp;<span name="nextButton"></span>
        </FORM>
    </BODY>
</HTML>
```

e. Save and close the ConfirmationPageLayout.html.

2. From the builder palette, select the **Imported Page builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Imported Page builder:

Name:	`pageConfirmation`
Page to Import:	`/redbook/cs/html/ConfirmationPageLayout.html`

Click **OK** and save the model.



Imported Page

Imports an HTML or JSP page into the model. Any named tags on this page can be used to place IBM controls.

Properties

Name *: pageConfirmation

Page to Import *: /redbook/cs/html/ConfirmationPageLayout.html

Post Form: ☑

Import Rule: Import on each generation of this model

Figure 10-129 The Imported Page

3. From the builder palette, select the **Data Page builder** and click **OK** to add it to the ConfirmationPage model.

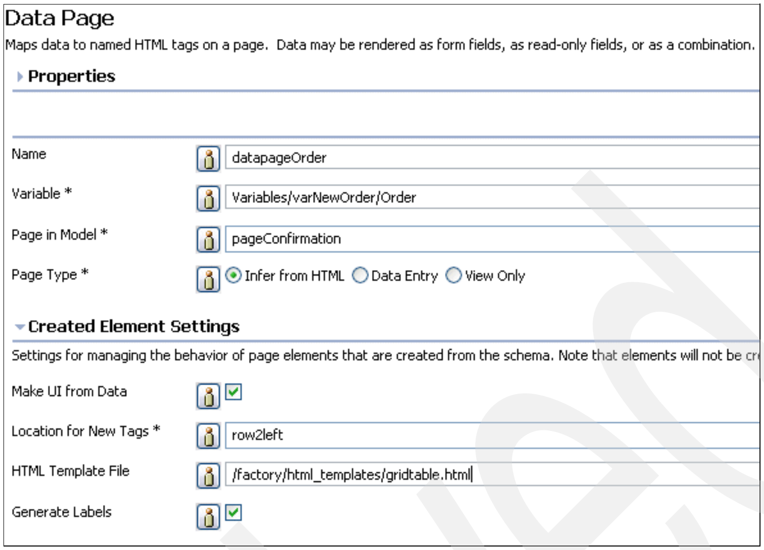
   a. Set the following values for the Data Page builder:

Name:	`datapageOrder`
Variable:	`Variables/varNewOrder/Order`
Page In Model:	`pageConfirmation`
Page Type:	`Infer from HTML`

   b. Created Element Settings:

Make UI from Data:	Checked.
Location for New Tags:	`row2left`.
HTML Template File:	`/factory/html_templates/gridtable.html`
Generate Labels:	Checked.

   c. Click **OK** and save the model.



Data Page

Maps data to named HTML tags on a page. Data may be rendered as form fields, as read-only fields, or as a combination.

Properties

Name	datapageOrder
Variable *	Variables/varNewOrder/Order
Page in Model *	pageConfirmation
Page Type *	● Infer from HTML ○ Data Entry ○ View Only

Created Element Settings

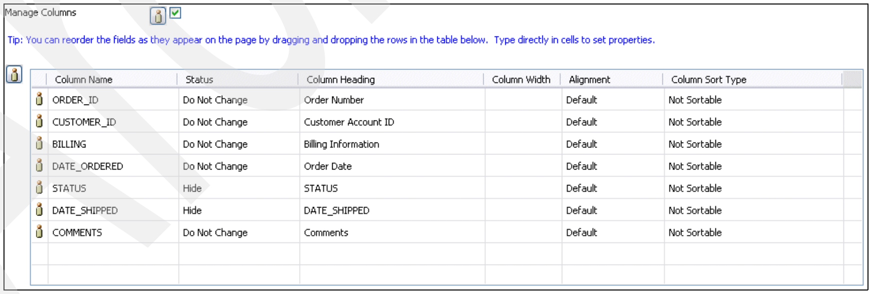
Settings for managing the behavior of page elements that are created from the schema. Note that elements will not be cr

Make UI from Data	☑
Location for New Tags *	row2left
HTML Template File	/factory/html_templates/gridtable.html
Generate Labels	☑

Figure 10-130 Data Page builder

4. From the builder palette, select the **Data Column Modifier builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Data Column Modifier builder:

Name:	`datacolumnmodifierOrder`	
Container Field:	`[pageConfirmation]datapageOrder/Order`	
Manage Columns:	Change the status of the following Column Names:	
	STATUS:	Hide
	DATE_SHIPPED:	Hide



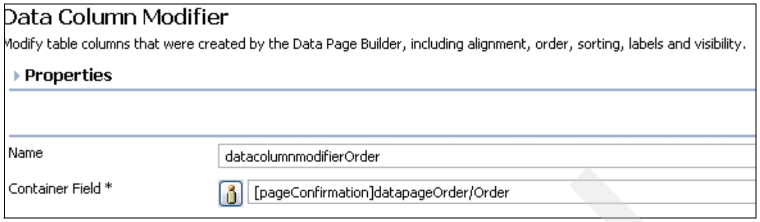
Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type directly in cells to set properties.

Column Name	Status	Column Heading	Column Width	Alignment	Column Sort Type
ORDER_ID	Do Not Change	Order Number		Default	Not Sortable
CUSTOMER_ID	Do Not Change	Customer Account ID		Default	Not Sortable
BILLING	Do Not Change	Billing Information		Default	Not Sortable
DATE_ORDERED	Do Not Change	Order Date		Default	Not Sortable
STATUS	Hide	STATUS		Default	Not Sortable
DATE_SHIPPED	Hide	DATE_SHIPPED		Default	Not Sortable
COMMENTS	Do Not Change	Comments		Default	Not Sortable

Figure 10-131 The Data Column Modifier Manage Columns

Click **OK** and save the model.



Data Column Modifier

Modify table columns that were created by the Data Page Builder, including alignment, order, sorting, labels and visibility.

Properties

Name: datacolumnmodifierOrder

Container Field *: [pageConfirmation]datapageOrder/Order

Figure 10-132 The Data Column Modifier Container Field Setting

5. From the builder palette, select the **Data Page builder** and click **OK** to add it to the ConfirmationPage model.

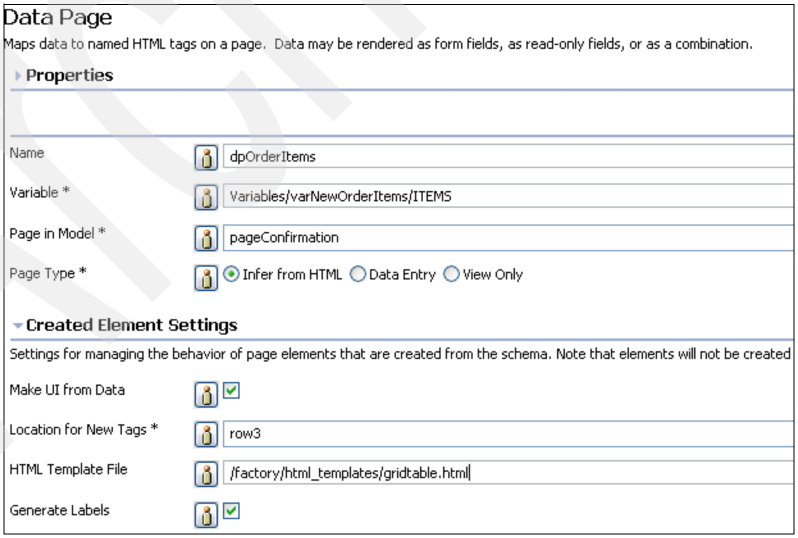
   a. Set the following values for the Data Page builder:

      Name: `dpOrderItems`
      Variable: `Variables/varNewOrderItems/ITEMS`
      Page in Model: `pageConfirmation`
      Page Type: `Infer from HTML`

   b. Created Element Settings:

      Make UI from Data: Checked
      Location for New Tags: `row3`
      HTML Template File: `/factory/html_templates/gridtable.html`
      Generate Labels: Checked

   c. Click **OK** and save the model.



Data Page

Maps data to named HTML tags on a page. Data may be rendered as form fields, as read-only fields, or as a combination.

Properties

Name: dpOrderItems

Variable *: Variables/varNewOrderItems/ITEMS

Page in Model *: pageConfirmation

Page Type *: ● Infer from HTML ○ Data Entry ○ View Only

Created Element Settings

Settings for managing the behavior of page elements that are created from the schema. Note that elements will not be created

Make UI from Data: ☑

Location for New Tags *: row3

HTML Template File: /factory/html_templates/gridtable.html

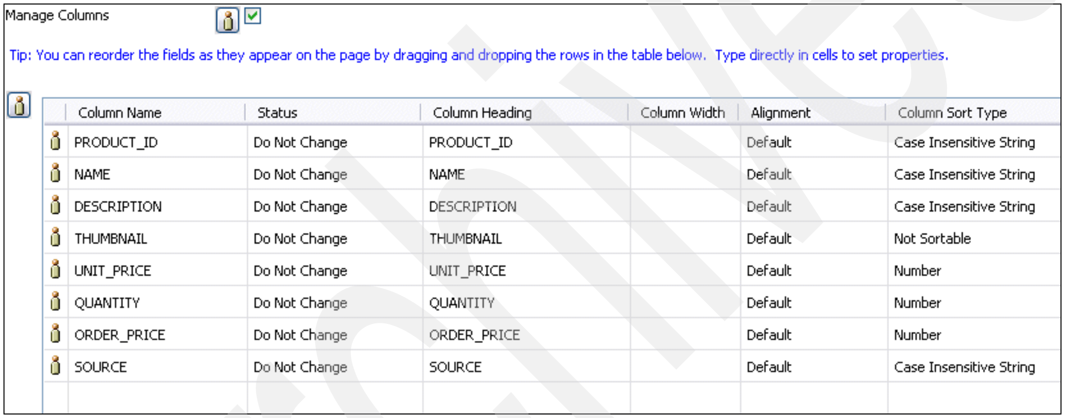
Generate Labels: ☑

Figure 10-133 The Data Page builder

6. From the builder palette, select the **Data Column Modifier builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Data Column Modifier builder:

   Name: `dcmOrderItems`
   Container Field: `[pageConfirmation]dpOrderItems/ITEMS/ITEM`
   Manage Columns: Change the Column Sort Type of the following Column Names:

PRODUCT_ID	Case Insensitive String
NAME	Case Insensitive String
DESCRIPTION	Case Insensitive String
THUMBNAIL	Not Sortable
UNIT_PRICE	Number
QUANTITY	Number
ORDER_PRICE	Number
SOURCE	Case Insensitive String



Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the table below. Type directly in cells to set properties.

Column Name	Status	Column Heading	Column Width	Alignment	Column Sort Type
PRODUCT_ID	Do Not Change	PRODUCT_ID		Default	Case Insensitive String
NAME	Do Not Change	NAME		Default	Case Insensitive String
DESCRIPTION	Do Not Change	DESCRIPTION		Default	Case Insensitive String
THUMBNAIL	Do Not Change	THUMBNAIL		Default	Not Sortable
UNIT_PRICE	Do Not Change	UNIT_PRICE		Default	Number
QUANTITY	Do Not Change	QUANTITY		Default	Number
ORDER_PRICE	Do Not Change	ORDER_PRICE		Default	Number
SOURCE	Do Not Change	SOURCE		Default	Case Insensitive String

Figure 10-134 The Data Column Modifier

7. From the builder palette, select the **Data Page builder** and click **OK** to add it to the ConfirmationPage model.

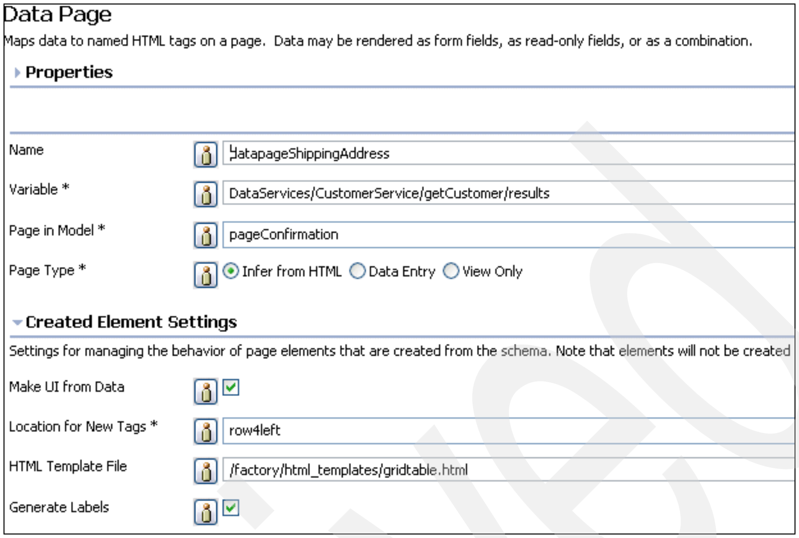
   a. Set the following values for the Data Page builder:

      Name: `datapageShippingAddress`
      Variable: `DataServices/CustomerService/getCustomer/results`
      Page in Model: `pageConfirmation`

   b. Created Element Settings:

      Make UI from Data: Checked
      Location for New Tags: `row4left`
      HTML Template File: `/factory/html_templates/gridtable.html`
      Generate Labels: Checked

c. Click **OK** and save the model.



Data Page

Maps data to named HTML tags on a page. Data may be rendered as form fields, as read-only fields, or as a combination.

▸ Properties

Name: datapageShippingAddress

Variable *: DataServices/CustomerService/getCustomer/results

Page in Model *: pageConfirmation

Page Type *: ● Infer from HTML ○ Data Entry ○ View Only

▾ Created Element Settings

Settings for managing the behavior of page elements that are created from the schema. Note that elements will not be created

Make UI from Data: ☑

Location for New Tags *: row4left

HTML Template File: /factory/html_templates/gridtable.html

Generate Labels: ☑

Figure 10-135 The Data Page builder

8. From the builder palette, select the **Data Column Modifier builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Data Column Modifier builder:

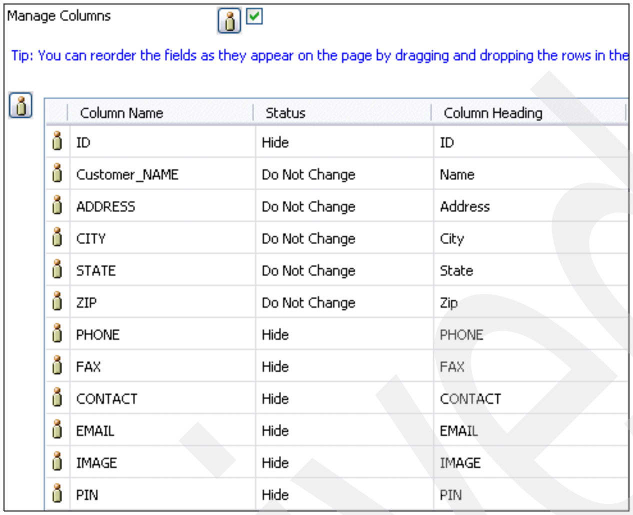
   Name: `datacolumnmodifierShippingAddress`
   Container Field: `[pageConfirmation]datapageShippingAddress/Customer`
   Manage Columns: Set the Status of the following Column Names:

ID	Hide
Customer_Name	Do not Change
ADDRESS	Do not Change
CITY	Do not Change
STATE	Do not Change
ZIP	Do not Change
PHONE	Hide
FAX	Hide
CONTACT	Hide
EMAIL	Hide
IMAGE	Hide
PIN	Hide

   Set the Column Heading values of the following Column Names:

Customer_Name	Name
ADDRESS	Address

CITY	City
STATE	State
ZIP	Zip



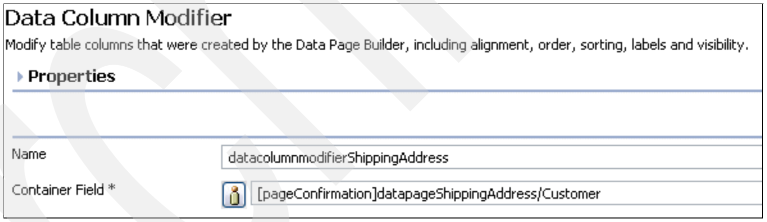
Manage Columns ☑

Tip: You can reorder the fields as they appear on the page by dragging and dropping the rows in the

Column Name	Status	Column Heading
ID	Hide	ID
Customer_NAME	Do Not Change	Name
ADDRESS	Do Not Change	Address
CITY	Do Not Change	City
STATE	Do Not Change	State
ZIP	Do Not Change	Zip
PHONE	Hide	PHONE
FAX	Hide	FAX
CONTACT	Hide	CONTACT
EMAIL	Hide	EMAIL
IMAGE	Hide	IMAGE
PIN	Hide	PIN

Figure 10-136 DataColumn Modifier manage columns

d. Click **OK** and save the model.



Data Column Modifier

Modify table columns that were created by the Data Page Builder, including alignment, order, sorting, labels and visibility.

Properties

Name: datacolumnmodifierShippingAddress

Container Field *: [pageConfirmation]datapageShippingAddress/Customer

Figure 10-137 The DataColumn Modifier

9. From the builder palette, select the **Action List builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Action List builder:

Name:	`CommitOrderTransaction`
Actions:	Click the ellipsis and select the following actions:

a. Assignment!DataServices/OrdersService/createOrderWithItems/inputs=${MethodCall/UIOperations.createOrder(${Variables/varNewOrder},${Variables/varNewOrderItems})}

Click the ellipsis and select **Assignment.**

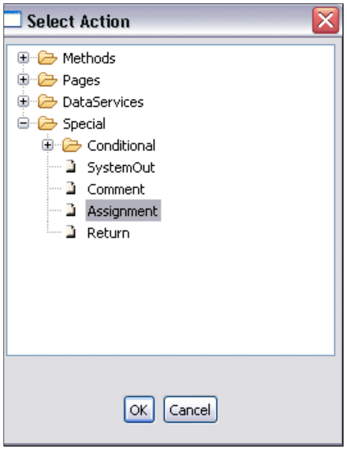
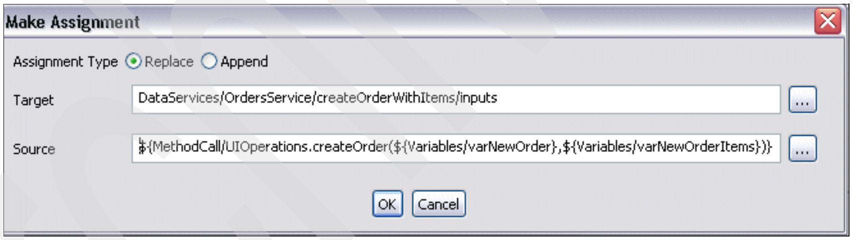


Figure 10-138 The Action List builder input setting

Click **OK** and set the following values for the Target and Source:

Target: `DataServices/OrdersService/createOrderWithItems/inputs`
Souce: `${MethodCall/UIOperations.createOrder(${Variables/varNewOrder},${Variables/varNewOrderItems})}`



Assignment Type ● Replace ○ Append

Target: DataServices/OrdersService/createOrderWithItems/inputs

Source: ${MethodCall/UIOperations.createOrder(${Variables/varNewOrder},${Variables/varNewOrderItems})}

Figure 10-139 The Action List builder assignment input

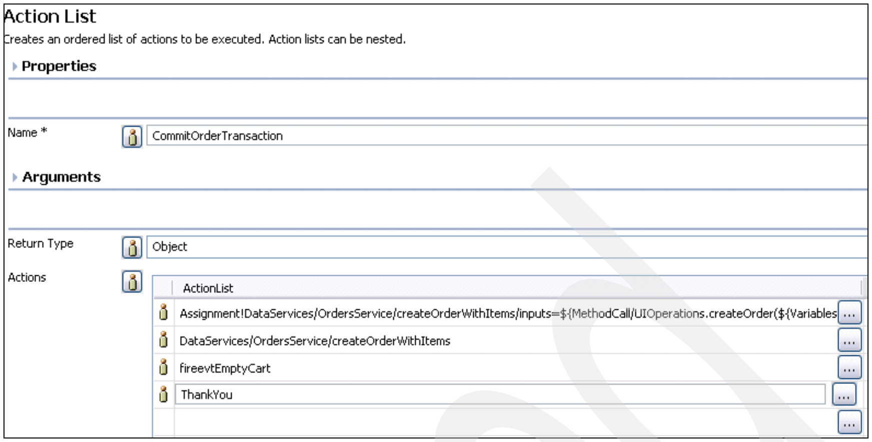
DataServices/OrdersService/createOrderWithItems

fireevtEmptyCart

ThankYou

Click **OK** and save the model.

Note: We get an error in the IDE because we have entered ThankYou as an action. For the moment we will ignore this issue; we will be creating the action shortly.



Action List

Creates an ordered list of actions to be executed. Action lists can be nested.

Properties

Name * CommitOrderTransaction

Arguments

Return Type Object

Actions

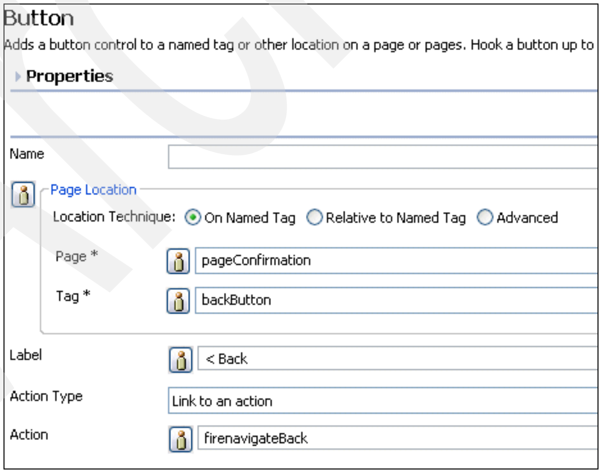
ActionList
- Assignment!DataServices/OrdersService/createOrderWithItems/inputs=${MethodCall/UIOperations.createOrder(${Variables
- DataServices/OrdersService/createOrderWithItems
- fireevtEmptyCart
- ThankYou

Figure 10-140 The ActionList builder

10.From the builder palette, select the **Button builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Button builder:

Name:	Leave this input blank
Page:	`pageConfirmation`
Tag:	`backButton`
Label:	`< Back`
Action Type:	`Link to an action`
Action:	`firenavigateBack`

b. Click **OK** and save the model.



Button

Adds a button control to a named tag or other location on a page or pages. Hook a button up to

Properties

Name

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page * pageConfirmation

Tag * backButton

Label < Back

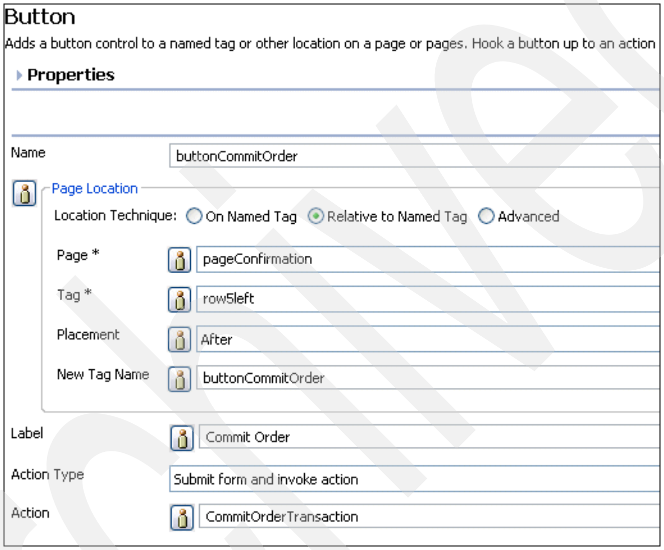
Action Type Link to an action

Action firenavigateBack

Figure 10-141 The Button Builder

11. From the builder palette, select the **Button builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Button builder:

Name:	`buttonCommitOrder`
Location Technique:	`Relative to Named Tag`
Page:	`pageConfirmation`
Tag:	`row5left`
Placement:	`After`
New Tag Name:	`buttonCommitOrder`
Label:	`Commit Order`
Action Type:	`Submit form and invoke action`
Action:	`CommitOrderTransaction`



Button

Adds a button control to a named tag or other location on a page or pages. Hook a button up to an action

Properties

Name: buttonCommitOrder

Page Location

Location Technique: ○ On Named Tag ● Relative to Named Tag ○ Advanced

Page *: pageConfirmation

Tag *: row5left

Placement: After

New Tag Name: buttonCommitOrder

Label: Commit Order

Action Type: Submit form and invoke action

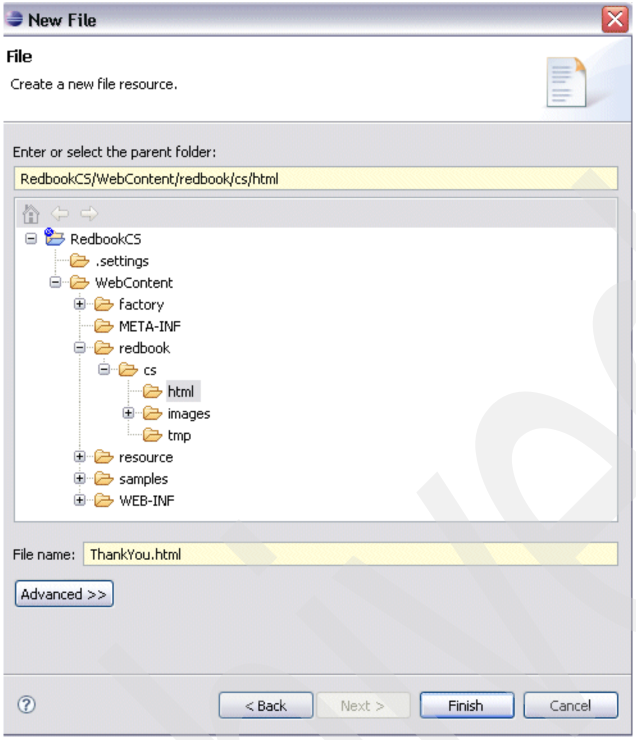
Action: CommitOrderTransaction

Figure 10-142 The Button Builder

Creating the base HTML page: ThankYou

Do the following to create the base HTML files:

1. Click **File** → **New** → **Other** to launch the wizard.
2. Select **General** → **File** and click **Next**.
3. Type or select the parent folder **RedbookCS/WebContent/redbook/cs/html**, enter the file name `ThankYou.html` and click **Finish** to create an empty HTML file.



Enter or select the parent folder: RedbookCS/WebContent/redbook/cs/html

File name: ThankYou.html

Figure 10-143 The ThankYou.html file

4. Right-click the newly created ThankYou.html file and select **Open With** → **Text Editor**. This will allow you to edit the file and create a basic layout of ThankYou page. Copy and paste the HTML from Example 10-11 into this file.

Example 10-11

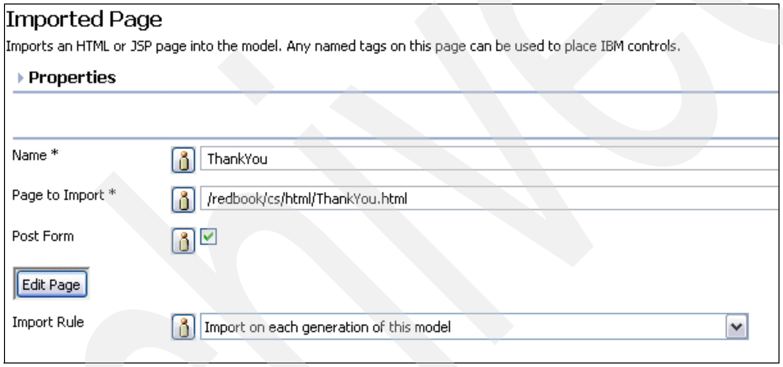
```
<HTML>
    <BODY>
        <FORM name="ITSO_REDBOOK_FORM_ConfirmPage" method="post">
         <TABLE width="600">
           <TR>
           <TD width="50%" align="center" valign="top">Thank You for ordering !, your
order has been committed to database</TD>
           <TD width="50%" align="center" valign="top"><SPAN
name="right"></SPAN></TD>
            </TR>
           <TR>
           <TD colspan="2" align="center" valign="top"><SPAN name="row2"></SPAN></TD>
            </TR>
           </TABLE>
        </FORM><BR>
        <SPAN name="shopButton"></SPAN>
    </BODY>
</HTML>
```

Save and close the HTML file.

5. From the builder palette, select the **Imported Page builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Imported Page builder:

Name:	`ThankYou`
Page to Import:	`/redbook/cs/html/ThankYou.html`

Click **OK** and save the model.



Imported Page

Imports an HTML or JSP page into the model. Any named tags on this page can be used to place IBM controls.

Properties

Name * ThankYou

Page to Import * /redbook/cs/html/ThankYou.html

Post Form ☑

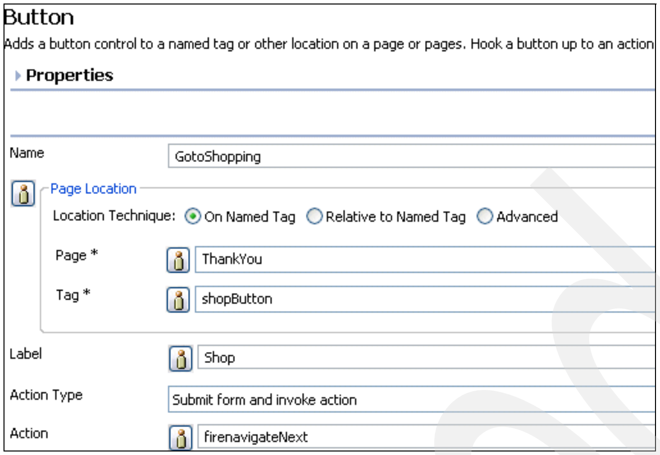
Import Rule Import on each generation of this model

Figure 10-144 The Imported Page builder

6. From the builder palette, select the **Button builder** and click **OK** to add it to the ConfirmationPage model. Set the following values for the Button builder:

Name:	`GotoShopping`
Page:	`ThankYou`
Tag:	`shopButton`
Label:	`Shop`
Action Type:	`Submit form and invoke action`
Action:	`firenaviagenext`

Click **OK** and save the model.



Button

Adds a button control to a named tag or other location on a page or pages. Hook a button up to an action

Name: GotoShopping

Page Location

Location Technique: ● On Named Tag ○ Relative to Named Tag ○ Advanced

Page *: ThankYou

Tag *: shopButton

Label: Shop

Action Type: Submit form and invoke action

Action: firenavigateNext

Figure 10-145 The Button builder

10.9 Conclusion

In this chapter, we have illustrated how to use a wizard-based approach to create the Go Shopping portlet. This chapter has also served as a comprehensive review of many techniques discussed throughout earlier chapters of the book.

11

Production deployment

This chapter describes the production deployment of the portlet WAR generated either from the WebSphere Portlet Factory Designer or using ANT scripts. Once the WAR file is generated, we discuss how to deploy it to the Portal Server. We also discuss how to exclude files from deployed archives. Finally, we mention several general deployment concepts of which you should be aware.

11.1 J2EE production deployment WAR (standalone non-portal applications)

Our J2EE Production Deployment WAR is different from the development WAR. We exclude a few models and some JSP files that are great development options, but not so great in production. For this reason, you should build a Production WAR and manually deploy it to your Application Server.

11.1.1 Building the Production War from the Designer

To build the Production War from the Designer, follow these steps:

1. Right-click your project and select **Application Server WAR Build WAR for a production deployment**.

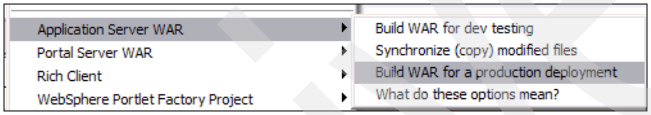
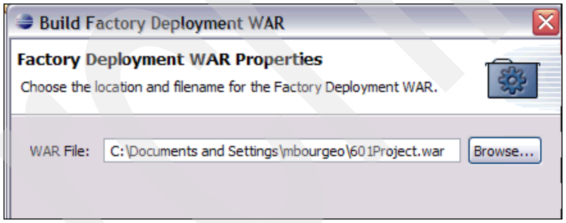

Application Server WAR
Portal Server WAR
Rich Client
WebSphere Portlet Factory Project
Build WAR for dev testing
Synchronize (copy) modified files
Build WAR for a production deployment
What do these options mean?

Figure 11-1 Select Application Server WAR

2. Set the path you want the archive to be built to, and click **Finish**.


Build Factory Deployment WAR

Factory Deployment WAR Properties

Choose the location and filename for the Factory Deployment WAR.

WAR File: C:\Documents and Settings\mbourgeo\601Project.war

Figure 11-2 Set the path

11.1.2 Deploying the production WAR to your application server

Now that you have a production WAR, manually deploy it to your Application server using the following steps. These instructions assume WebSphere Application Server 6.0.

1. Launch the WebSphere Administrative Console in a browser and log in. The URL for a WebSphere Administration Server 6.0 server is `https://hostname:10003/ibm/console`

2. Click **Applications** → **Install New Application**.

a. Enter the full path to the EAR file.

b. On the page about bindings and mappings, click **Next**. You should now see a 5-step process for installing the application.

c. Select **Installation Options** and click **Next**.

d. Map virtual hosts for Web modules; click **Next**.

e. Map modules to servers: Examine the value in the Server column of the table. By default, the application will be deployed to the server1 application server instance. If you intend to deploy to the WebSphere_Portal instance, check the box in the Select column, select the WebSphere_Portal instance in the Clusters and Servers field, and click **Apply**. Examine the value in the Server column again to ensure that the application is to be deployed to the correct server instance. Click **Next** to continue.

f. Map security roles to users/groups: By default, the AllAuthenticated column in the AllAuthenticatedUsers row is checked. Click **Next**.

g. Summary: Click **Finish**. Wait for deployment to finish because you have to save these changes.

3. Configure the application; it needs certain class loading settings before it will work properly.

   a. From the WebSphere Administration Server Admin Console, click **Applications** → **Enterprise Applications**.

   b. Find the application and click its name to open the configuration page.

   c. Set the classloader mode to Parent Last.

   d. Set the WAR class loader policy to Module and check the box to enable (class) reloading.

   e. Click **OK**, then click **Save** at the top of the screen. Click **Save** again to save these changes to the Master Configuration.

4. Start the application. If the application was deployed to the server1 instance, it can be started from **Applications** → **Enterprise Applications**. If the application was deployed to the WebSphere_Portal instance, the portal server must be restarted in order to start the application. Depending upon the security configuration, you may need the WebSphere Administration Server Admin (not the WebSphere Portal Server Admin) credentials to stop the WebSphere Portal Server server.

11.1.3 Portlet production deployment War

Ok, this isn't really a topic! We don't have any tricks up our sleeves when it comes to the portlet wars we generate. There is only one type of Portlet WAR, at least as it relates to deployment. For this reason you can use the same portlet WAR built during your development process in production.

Build the Portlet WAR with the Designer

1. Right click your project and select **Portal Server WAR** → **Build Portlet War**. The portlet WAR is built to the path you set in your portal deployment configuration plus installableApps/<PROJECT_NAME>.war.

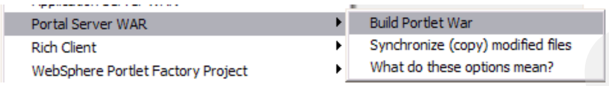
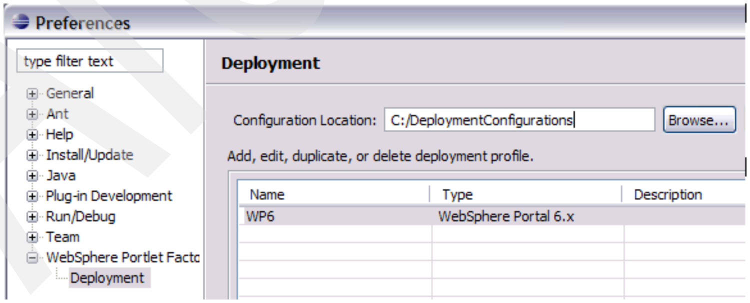

Portal Server WAR
Rich Client
WebSphere Portlet Factory Project
Build Portlet War
Synchronize (copy) modified files
What do these options mean?

Figure 11-3 The portlet war is built to the path you set in your portal deployment configuration

2. If you set the deployment configuration for auto-deployment, your application will be re-deployed to your development server. If you want to turn off deployment, adjust your deployment configuration.

Build the Portlet WAR on the command line

1. You need Ant installed and configured on your system to build the production WAR with the command line. For more information about setting up Ant, visit `http://ant.apache.org/manual/index.html`
2. Because our project structure and deployment configuration location is configurable, you need to set a couple of properties on the command line. You need to know where your `.bowstreet` file is relative to the `projectDeploy.xml` file, which you can figure out by looking in your project. You also need to know where your deployment configurations are located. You can see or change the deployment configuration location by selecting **Window** → **Preferences** → **WebSphere Portlet Factory** → **Deployment**.



Deployment

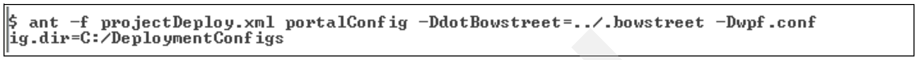
Configuration Location: C:/DeploymentConfigurations

Add, edit, duplicate, or delete deployment profile.

Name	Type	Description
WP6	WebSphere Portal 6.x	

Figure 11-4 Setting the deployment configuration location

3. Now that you have the values you need, you can invoke the build. On the command line, change directory (cd) to your <PROJECT>/WebContent directory and execute the portalConfig target in your projectDeploy ant script with the properties defined previously. For an example, see Figure 11-5.



```
$ ant -f projectDeploy.xml portalConfig -DdotBowstreet=../.bowstreet -Dwpf.conf
ig.dir=C:/DeploymentConfigs
```

Figure 11-5 Execute the portalConfig target in your projectDeploy ant script

4. You can build the portalConfig or standAloneConfig via the command line in this way. Remember, this is invoking your deployment configuration set up in the development environment, so if you are configured for auto deploy, your application will be deployed when you call it on the command line. For more detailed information on building your archives on the command line, refer to “Deploying from the command line” in the WebSphere Portlet Factory help system.

11.1.4 Deploying the Portlet WAR to your portal server

Because the Portlet War we generate is good for development or production environments, we can use our auto-deployment options. We assume, however, that most production environments will not allow auto-deployment, so here we provide the steps to do it manually.

1. Log into your Portal Admin server. On WebSphere Portal 6.0 the URL is like this: `http://hostname:port/wps/portal`. The default port is 100038.
2. Select the **Administration** option in the Product Links portlet on the right.

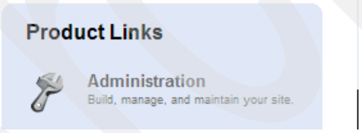


Figure 11-6 Product Links portlet

3. Expand **Portlet Management** on the left, and click **Web Modules**.
4. Click the **Install** button in the Manage Web Modules portlet.
5. Browse or type the path to your portlet WAR and click **Next**. This may take a little time, depending on how many portlets you have in your WAR.
6. Review the list of Portlet Applications and Portlets in the summary page and click **Finish** to deploy the WAR.

Your Portal War is now deployed!

11.2 Excluding files from your application

You can exclude files from your deployed application by simply editing the <PROJECT>/WebContent/.excludeFromServer file in your project. Just add a new line for each exclude with file paths that start at WEB-INF, for example, `WEB-INF/lib/myjar.jar`.

- You can exclude entire directories by naming them “nodeploy.” We do not deploy any file that has nodeploy in its path.
- This is true for both development and production deployment scenarios.

11.3 General deployment concepts

Here are a few general deployment concepts you may be interested in knowing more about. For more information on these topics and others, refer to the WebSphere Portlet Factory documentation.

- You may need to perform an automated task before or after your application has been deployed. You can extend the deployment process by implementing “pre” or “post” deployment actions. By providing an ant script in a certain location in the project, you can perform any task that ant or java can do.
- We have a custom ant task that will add a servlet to the web.xml file. Because our projects deploy to so many target server types, we need to generate several web.xml files depending on the server. You could create a pre-deployment task that adds your servlet to the appropriate web.xml files.
- Did you know that the deployment archive we generate is dependant on the server type? For example, we built an ear file for WebSphere Application Server development, WAR files for the Portal Server and WAS CE, and Tomcat just likes us to copy an open directory structure. We have attempted to insulate you from needing to know too much about the deployment process of your server, but it’s probably good to know.

12

Troubleshooting, debugging, and error handling

This chapter discusses best practices for troubleshooting a portlet factory application, triggering debug traces, and handling runtime errors. It also lists additional online resources where you can obtain the latest release notes and information about any known issues or limitations.

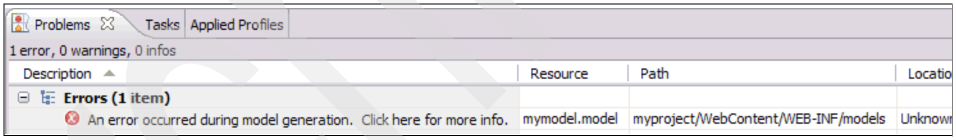
12.1 Troubleshooting

In addition to reading this chapter, we recommend that you read through the "Debugging Web Applications" section of the help installed along with WebSphere Portlet Factory. That documentation provides information about debugging, performance tuning, logging and tracing configuration, tracing specific variables and actions, and debugging the generated code.

To access this from within the help installed with Portlet Factory Designer, select **Eclipse** → **Help** → **Contents** → **IBM WebSphere Portlet Factory Designer** → **Working with Portlet Factory** → **Debugging Web Applications**.

12.1.1 Fixing compilation errors at design time

While working with the Method builder in the WebSphere Portlet Factory Designer, you are adding code that will be inserted into a single Java class file for the model at generation time. To avoid having to wait until the model is run to find compilation errors in such generated code, the designer calls the Java compiler to compile the model's generated Java class each time a generation occurs at design time. If there are any compilation errors in the model's generate Java class, they will show up as Errors in the Eclipse Problems view for that model.

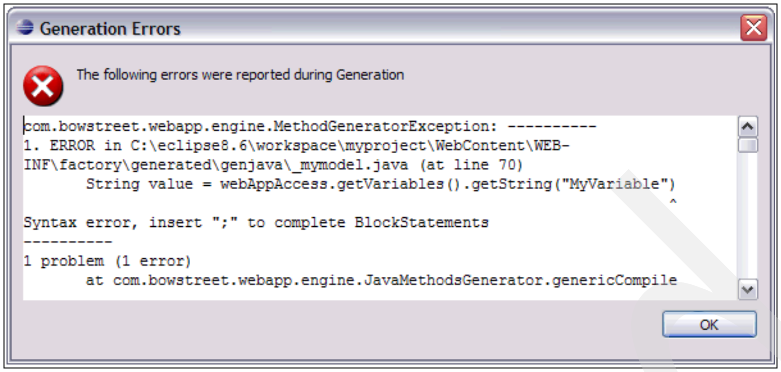


1 error, 0 warnings, 0 infos

Description	Resource	Path	Locatio
Errors (1 item)			
An error occurred during model generation. Click here for more info.	mymodel.model	myproject/WebContent/WEB-INF/models	Unknowr

Figure 12-1 Problems view

If you double-click the error line in the Problems view, a dialog showing the details of the compilation error will pop up that looks like Figure 12-2, showing the compilation errors reported by the Java compiler.



The following errors were reported during Generation

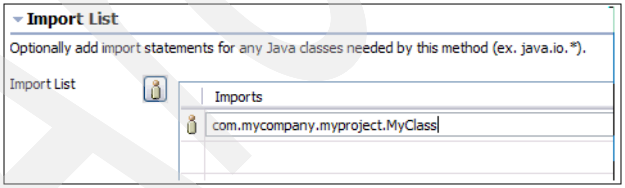
```
com.bowstreet.webapp.engine.MethodGeneratorException: ----------
1. ERROR in C:\eclipse8.6\workspace\myproject\WebContent\WEB-
INF\factory\generated\genjava\_mymodel.java (at line 70)
       String value = webAppAccess.getVariables().getString("MyVariable")
                                                                        ^
Syntax error, insert ";" to complete BlockStatements
----------
1 problem (1 error)
       at com.bowstreet.webapp.engine.JavaMethodsGenerator.genericCompile
```

Figure 12-2 Error details

Often the error will be obvious from this dialog and you can open the Method builder again and fix the code syntax.

If you need more context than that displayed in the dialog, then you can either open the Java file for the model (note the path is shown in the error dialog), or click a Method in the WebApp Tree View to see the generated Java methods for the model.

Another common reason for design time compilation errors with Method builder usage, is that developers forget to add import statements for classes that they are referencing from other Java packages. Import statements can be added to the generated Java class for the model using the Import List input toward the bottom of the Method builder. You do not need to add a semicolon at the end of the packages and classes listed in the import list input because one will be added for you automatically when the import statement is generated from the list.



Optionally add import statements for any Java classes needed by this method (ex. java.io.*).

Import List

Imports
com.mycompany.myproject.MyClass

Figure 12-3 Adding import statements

Tip: If you find yourself having to diagnose syntax errors or debug complicated Java code using Method builders, then you should consider moving that code to a Java class built using the Eclipse Java IDE and using the classes in your models with the Linked Java Object builder. The Eclipse Java IDE provides a lot more tools and syntax helpers than the Method builder can provide. The Method builder exists mainly to rapidly develop short convenience methods that tie actions and pages together, not for manually developing large, complex Java code.

12.1.2 Diagnosing, resolving, and reporting runtime errors

Even well designed and implemented applications may run into errors at runtime, so it's a good idea to know where to start looking when something does go wrong when you run your application for the first time (for example, if another developer didn't quite have the same idea about the interfaces you are sharing), or at runtime on deployment servers (for example, if a backend is not available or is misconfigured).

The first sign that something went wrong is usually an error returned to the browser following a request to the application. During development, this typically results in the WebSphere Portlet Factory default error page being returned, with exception information (click the show details link to see the full stack trace of exceptions). This default error page should be customized for your application's look and feel, and to provide only what end users should see (for example, “Contact an administrator at ...”) before deploying your applications for actual use. The default error page that is used when an exception is thrown that is not caught and handled by the application, is a JSP located in your project at: WebContent/factory/webapp/defaulterror.jsp. If the WPF runtime controller catches the exception, it sends it to this page as configured with the property bowstreet.webapp.errorHandler. If a J2EE servlet engine catches an unhandled exception, it sends it to this page as configured in the WAR's web.xml file within the <error-page> element.

Be sure to look at the entire stack trace details when investigating an exception, Often Java (for example, InvocationTargetException when calling methods via reflection) and application servers wrap the root cause exception in a higher level exception (for example, ServletException), and you may see multiple stack traces, with the outer wrapper showing up first, and the root cause exception being displayed separately or nested within the wrapped exception.

Sometimes, an error and exception reported to a user is actually caused by an earlier error and exception that occurred on the server. It is a good idea to look at the error logs for the application itself, and the error and standard output logs for your application server, for this additional error information. See your application or portal server administration documentation for log configuration and locations on those servers. The WebSphere Portlet Factory applications and portlets write error and diagnostic logs into the deployed WAR's WEB-INF/logs folder. The event.log file contains exceptions logged by the WPF runtime. The other logs located in the WEB-INF/logs folder are typically used for debugging and performance analysis, described in the next section. Be sure to look for all exceptions in the event log that occurred at and just before when an error was reported to the browser, because some exceptions are caused by other earlier exceptions and you may need all of the exception information that contributed to the problem to determine what is going wrong.

12.2 Debugging

If you run into problems that do not have obvious answers based on investigating the exceptions as described in the previous section, then your next step may be to troubleshoot the cause by debugging. As we will discuss, we recommend using Error Handlers on top-level actions, but not on all actions, and not on nested model actions, to avoid the processing after error issue.

There are various ways you can debug the runtime of a WPF application, including using the Eclipse Java debugger to debug LJO or generated Java methods, printing model variable values and Java variable data to the standard output stream, and the WPF Debug Tracing facility.

In the following WPF Help pages, you will find information on configuring the application server and designer for Java debugging, configuring debug levels for the log4j based logging facility, using the Debug Tracing Builder to trace model actions and variable values, interpreting the debug tracing files, and debugging generated Java code.

To access this from within the help installed with Portlet Factory Designer, select **Eclipse → Help → Help Contents → IBM WebSphere Portlet Factory Designer → Working with Portlet Factory → Debugging Web Applications.**

In addition to the general Debug Tracing builder, which allows you to log information about actions and variable values, some individual builders have their own advanced inputs to turn on builder-specific tracing. For instance, in the advanced section of the Web Service Call builder, there is a Logging input, which when set to All, will log the HTTP headers, request inputs, and SOAP request and response XML envelopes involved in a web service request, which can help you track down problems encountered when making a web service call. The most common cause of web service call failure other than network issues, is failure to send the correct XML (for example, incorrect namespace associations in Document style web service XML input documents) such that the web service cannot figure out which service to invoke based on the XML input being sent. Using this Web Service Call Logging input and looking at the actual SOAP envelope being sent is the best way to diagnose such issues.

12.2.1 Debugging back end connectivity issues

Some runtime issues are caused by connectivity or configuration problems with respect to back end systems such as databases or an IBM Lotus Domino server. WPF provides some utility JSPs to help you diagnose connectivity problems with databases and Domino servers, to remove WPF from the equation. The /factory/util/testDataSourceConnection.jsp page allows you to test JDBC Datasource access directly, without going through a WPF model or the WPF runtime, to determine whether a database and datasource are set up correctly. Often it is not a WPF SQL builder issue at all causing a problem, but rather a misconfigured JDBC Datasource on the application server itself, that causes DB connectivity issues. If you have the Lotus Collaboration feature (Domino Builders) added to your project, then you should also have a /factory/util/testDominoConnection.jsp page that can be hit directly with a browser to determine whether Domino is correctly configured to allow incoming HTTP and DIIOP requests. This is a useful diagnostic tool to remove the WPF runtime and builders from the equation when encountering Domino connectivity issues from your web application and portlets.

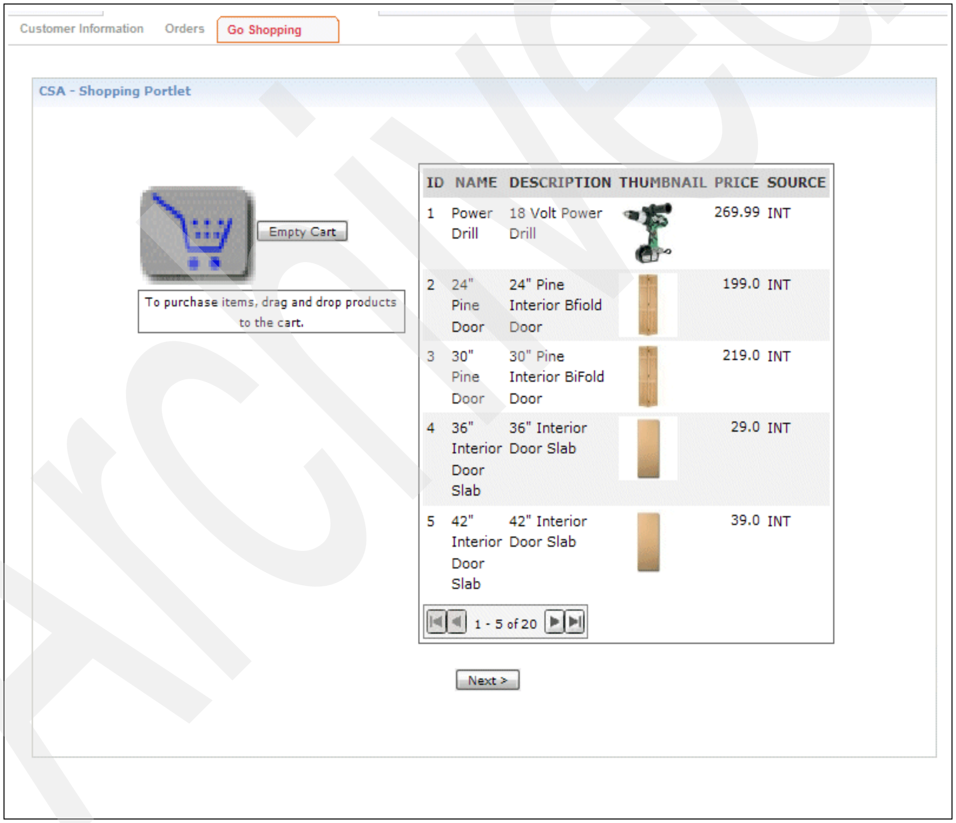
12.3 Error handling

WebSphere Portlet Factory provides a nifty mechanism to implement runtime error handling via the Error Handler Builder. This builder can be used to catch and handle errors pertaining to any model actions such as a Page, Method, or an Action List in the model. This pattern is very similar to the standard Java language Try/Catch block error handling mechanism.

The error handler builder can be placed in any model and the corresponding “try” and “catch” actions can be specified as builder inputs. The Try Action is the action we want the Error Handler builder to monitor and the Catch Action is the one we want to initiate if an exception occurs.

Attention: While the error handler builder can be placed in any model, we strongly recommend that you typically only want to target the Error Handler builder at top-level portlet model actions. You can get yourself into trouble if you try adding them to lower-level nested actions because the higher-level actions may then not know that an error has occurred and will continue processing as if nothing bad has happened.

In order to demonstrate the use of this builder in our application, we will add an Error Handler builder to one of the models in the CSA - Shopping portlet that we created in Chapter 10. The ShoppingProductCatalog.model in the CSA Shopping Portlet is responsible for displaying a list of products in the catalog that can be bought via the shopping portlet.



To purchase items, drag and drop products to the cart.

ID	NAME	DESCRIPTION	THUMBNAIL	PRICE	SOURCE
1	Power Drill	18 Volt Power Drill		269.99	INT
2	24" Pine Door	24" Pine Interior Bfiold Door		199.0	INT
3	30" Pine Door	30" Pine Interior BiFold Door		219.0	INT
4	36" Interior Door Slab	36" Interior Door Slab		29.0	INT
5	42" Interior Door Slab	42" Interior Door Slab		39.0	INT

Figure 12-4 CSA - Shopping Portlet

We will utilize the Error Handler builder to catch two separate error handing scenarios:

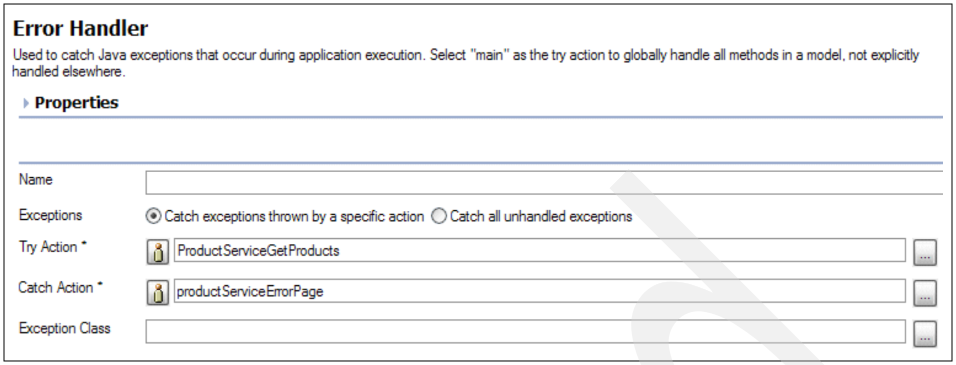
- The first is a very specific scenario where there is a failure to retrieve data (list of products for sale) from the Product DB Provider model. This could be caused if the database server is not running, or is inaccessible on the network, or is unavailable to the provider models for whatever other reason. We monitor the ProductServiceGetProducts method that is suppose to get a list of all the products from the database. In the event of a failure to run this method, we will display a static page with some informative message.
- The second is a more generic "catch all" scenario where we catch all the unhandled exceptions in the model. In this case also, we will display a separate static error page informing the user that something bad happened.

Do the following to implement these two error handling scenarios:

1. Open the redbook/cs/ui/shopping/ShoppingProductCatalog.model in WebSphere Portlet Factory.
2. From the builder palette, add a Page builder to the model. Configure it with the following inputs:
   - Name: `productServiceErrorPage`
   - Page Contents (HTML):

```
<html>
   <body>
      <div align="center">
         Unable to access products database.
      </div>
   </body>
</html>
```

3. Click **OK** and save the model.
4. From the builder palette, add an Error Handler Builder to the model and configure it with the following inputs:
   - Exception: Select `Catch exceptions thrown by a specific action`
   - Try Action: `ProductServiceGetProducts`
   - Catch Action: `productServiceErrorPage`



Error Handler

Used to catch Java exceptions that occur during application execution. Select "main" as the try action to globally handle all methods in a model, not explicitly handled elsewhere.

Properties

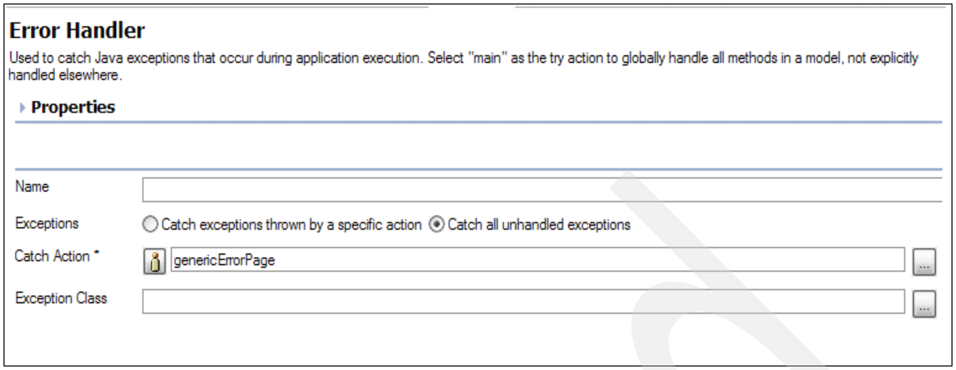
Name	
Exceptions	● Catch exceptions thrown by a specific action ○ Catch all unhandled exceptions
Try Action *	ProductServiceGetProducts
Catch Action *	productServiceErrorPage
Exception Class	

Figure 12-5 Error Handler to handle exceptions thrown by Product DB Provider service operations

5. Click **OK** and save the model.
6. Repeat these steps to add another static page and another Error Handler builder for trapping all unhandled exceptions in the model. Add another Page builder to the model and configure it with the following inputs:
   – Name: `genericErrorPage`
   – Page Contents (HTML):

```
<html>
   <body>
      <div align="center">
         Error occurred while rendering this portlet. Please
contact your system administrator.
      </div>
   </body>
</html>
```

7. Add another Error Handler builder to the model and configure with the following below:
   – Exception: Select `Catch all unhandled exceptions`
   – Catch Action: `genericErrorPage`



Error Handler

Used to catch Java exceptions that occur during application execution. Select "main" as the try action to globally handle all methods in a model, not explicitly handled elsewhere.

Properties

Name

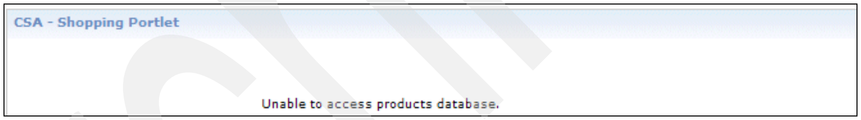
Exceptions ○ Catch exceptions thrown by a specific action ● Catch all unhandled exceptions

Catch Action * genericErrorPage

Exception Class

Figure 12-6 Generic Error Handler to catch all unhandled exceptions

8. Save and close the model.
9. You can test the error handing functionality that we implemented by simply shutting down the database server and then rendering the CSA Shopping portlet. The Shopping Product Catalog data page on the CSA Shopping portlet would throw an exception while fetching the products from the database and it would be handled by our Error Handler builder, which would then display the static `productServiceErrorPage` with the message `Unable to access products database.`



CSA - Shopping Portlet

Unable to access products database.

Figure 12-7 CSA - Shopping Portlet showing static error page/message when the database is not running.

Tip: The best practice in doing error handing is that typically you only want to target the Error Handler builder at top-level portlet model actions. You can get yourself into trouble if you try adding them to lower-level nested actions because the higher-level actions may then not know that an error has occurred and will continue processing as if nothing bad has happened

12.4 Other troubleshooting information

This section highlights additional on-line resources for current information.

12.4.1 Known limitations and issues

You can find known limitations and issues in the release notes for each WPF release.

http://www-128.ibm.com/developerworks/websphere/zones/portal/portletfactory/proddoc.html

It is a good idea to read through the release notes for the WPF release that you are working with, before starting any development project.

12.4.2 WebSphere Portlet Factory TechNotes

The WebSphere Portlet Factory support and development teams create and maintain a set of technical notes describing common complex tasks and common mistakes or issues that developers encounter.

http://www-1.ibm.com/support/search.wss?tc=SSRUWN+SS3LP9&rs=3044&rank=8&dc=DB520+D800+D900+DA900+DA800&dtm

Performance

A WebSphere Portlet Factory technote with the title “How can I improve WPF Performance?” on troubleshooting and improving performance of WPF-based applications is in the process of being published and should also be available from the TechNotes URL.

12.4.3 WebSphere Portlet Factory Forums

If you have debugged an issue, checked the release notes and technotes, and still can't get past a particular problem, then the WebSphere Portlet Factory forums are a good place to look for discussion threads on similar issues before resorting to customer support. Try searching for similar issues first, before posting a question that may have been answered already. If you decide to post a question about your issue, please be as thorough as possible in describing the details of the problem scenario, including WPF, Portal and Application Server versions and fixpack level, and a complete traceback for any exceptions that you encountered. There are separate forums for WPF Installation and Configuration, Best Practices, DB, Web Services, and some of the integration builders. Choose the forum most appropriate for your scenario when posting questions.

http://www.ibm.com/developerworks/forums/wsdd_forums.jsp

A

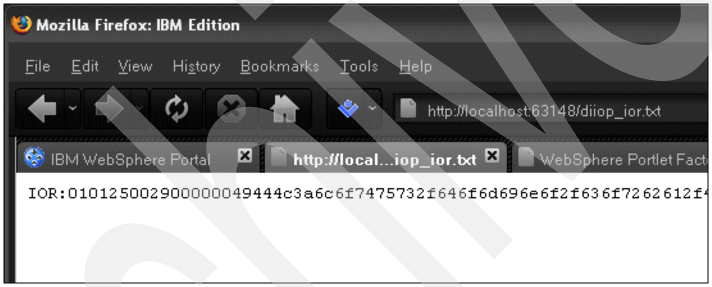
Setting up the environment

In the Customer Self Service Application, several components are required for the application in this book to run successfully. In this appendix, we describe how to set up the development (test) environment so that you will be able to successfully run the sample application described in this book.

Deploying the Domino database

In the application provided, one of the data sources used is a Domino database. This database serves out the product details information, which we discuss in detail later. This database can be found in Domino Products Database directory with the database name productD.nsf. To ensure that the Domino database is accessible by the application, execute the following steps.

1. For the database to be viewable by portlet factory, copy the productD.nsf into your Domino server's Data directory.
2. Set the server name, user name, and password for the Domino Server found in the **RedbookCS** → **WebContent** → **WEB-INF** → **config** → **domino_config** → **redbook_domino_server.properties** file.
3. Verify that the DIIOP is running in Domino by accessing the URL `http://<Domino Server>/diiop_ior.txt`. You should see the output shown in Figure A-1.

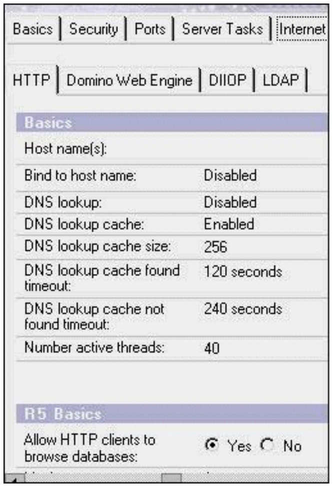


http://localhost:63148/diiop_ior.txt

```
IOR:010125002900000049444c3a6c6f7475732f646f6d696e6f2f636f7262612f4
```

Figure A-1 Verifying that DIIOP is running

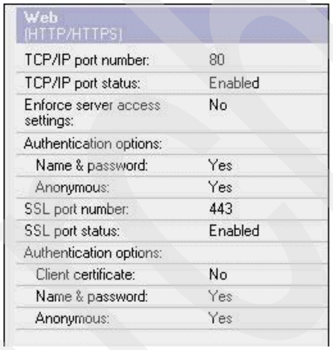
4. If DIIOP is not running, open the server document in the Domino Directory (names.nsf). On the **Ports** → **Internet Ports** → **DIIOP** tab, specify the **TCP/IP Port Number** for the DIIOP (which should be the same port number as you specified in the redbook_domino_server.properties file in the previous step). Also, set TCP/IP Port Status to enabled.
5. To access a database without knowing its file name (as the Portlet Factory Domino builders do), you must allow browsing over the network. In the Server document, go to the **Internet Protocols** → **HTTP** → **R5 Basics** tab. Set "Allow HTTP clients to browse databases" to Yes as shown in Figure A-2.



Basics	
Host name(s):	
Bind to host name:	Disabled
DNS lookup:	Disabled
DNS lookup cache:	Enabled
DNS lookup cache size:	256
DNS lookup cache found timeout:	120 seconds
DNS lookup cache not found timeout:	240 seconds
Number active threads:	40
R5 Basics	
Allow HTTP clients to browse databases:	● Yes ○ No

Figure A-2 Server document details

6. In the Server document, go to the **Ports** → **Internet Ports** → **Web** tab. Ensure that the authentication settings are set to allow Anonymous authentication as shown in the next figure.



Web (HTTP/HTTPS)	
TCP/IP port number:	80
TCP/IP port status:	Enabled
Enforce server access settings:	No
Authentication options:	
Name & password:	Yes
Anonymous:	Yes
SSL port number:	443
SSL port status:	Enabled
Authentication options:	
Client certificate:	No
Name & password:	Yes
Anonymous:	Yes

Figure A-3 Server document web settings

Creating the groups in Portal

In the Customer Self-Service Application, there are two groups of users that can access the application: the Customers and the Customer Service Representatives (CSRs). To view how Portlet Factory is able to provide different privileges and data to different group of users, create the groups and users listed in Figure A-1. You may assign any passwords for the users created.

Table A-1 Groups and users to be created

Group Name	Users
CSRGroup	csr1 csr2 csr3
Customer Group	customer1 customer2 customer3

Customer Self-Service Application details

Importing the application code

The application code for this redbook is available from our web site; and the instructions for downloading all of the sample code can be found in Appendix G, “Additional material” on page 693. To run this code, import the code into the project that you have created.

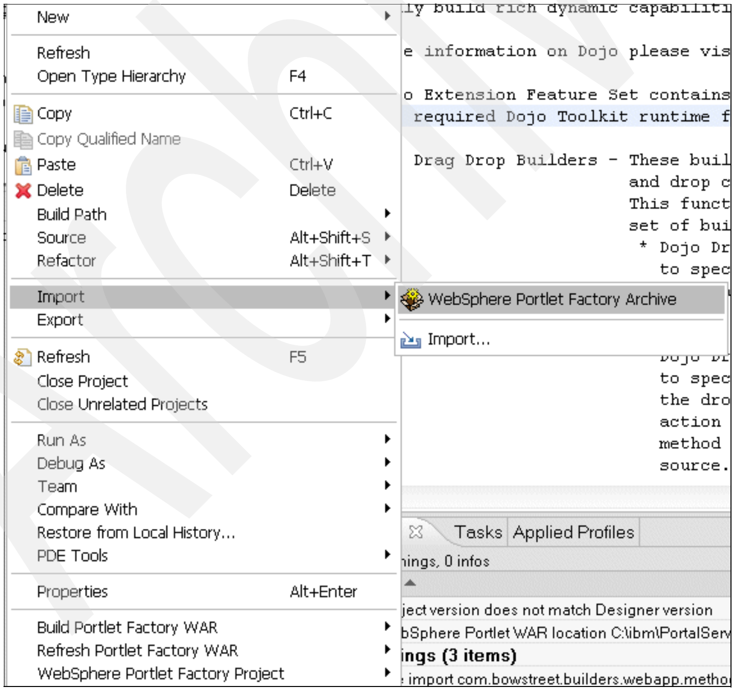


Figure A-4 Import the Customer Self Service Application into the project

Deploying the portlets

After the project has been imported, build the portlet war again. To deploy the newly imported portlets of the application, right-click the root folder of your project and select **Build Portlet Factory WAR** → **Build Portlet WAR** as shown.

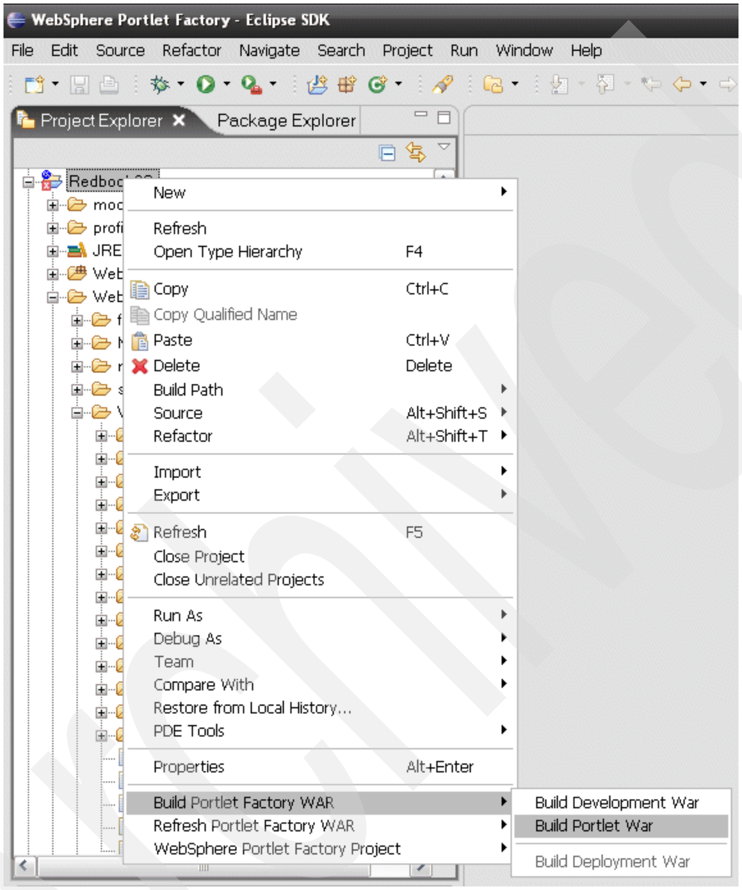


Figure A-5 Deploy portlet WAR

Creating the application schema and data

By now, you might have noticed that you have been able to run the application without creating a database at all. The reason for this is that the application has been running on data stored in XML files. Using XML files, the application is able to run standalone without the need for a database setup or data migration. Furthermore, when doing development, using XML files can allow you to modify the schema locally for testing before committing the changes to your database.

The application is also built to run with a standard RDBMS. To run the application using an RDBMS, execute the following steps. (The following steps were tested on a DB2 database).

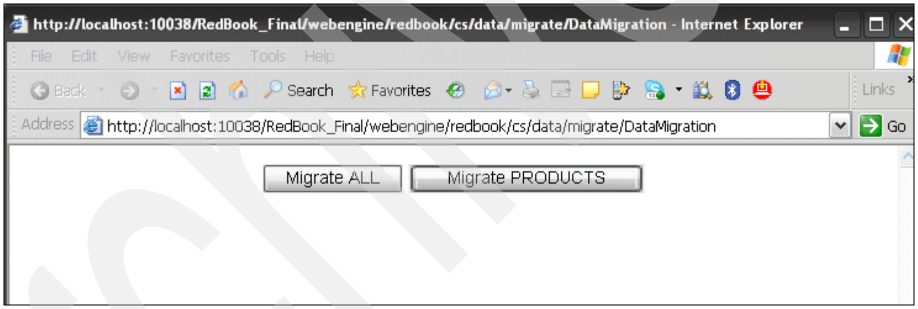
Create the database and tables

1. Create the database CSDB.
2. Run the sql file CSAPP.sql, which is located in the Database Schema Creation directory.

Migrate the data into the database

In the project that you have imported, there is a data migration utility that imports the data from the flat file into the database.

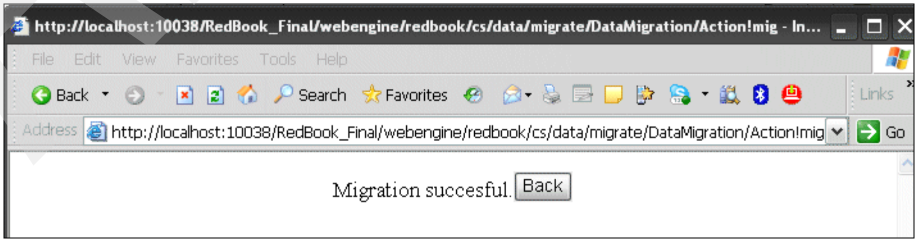
1. To use the utility, select **RedbookCS** → **models** → **redbook** → **cs** → **data** → **migrate** → **DataMigration.model**.
2. Run and test the model by clicking the **Run** button. The utility shown in Figure A-6 will appear.


http://localhost:10038/RedBook_Final/webengine/redbook/cs/data/migrate/DataMigration - Internet Explorer

Address: http://localhost:10038/RedBook_Final/webengine/redbook/cs/data/migrate/DataMigration

Figure A-6 Data migration utility

3. Click **Migrate All**.
4. The data migration will take a few minutes. Upon completion, the window shown in Figure A-7 will appear.


http://localhost:10038/RedBook_Final/webengine/redbook/cs/data/migrate/DataMigration/Action!mig - In...

Address: http://localhost:10038/RedBook_Final/webengine/redbook/cs/data/migrate/DataMigration/Action!mig

Migration succesful.

Figure A-7 Migration successful message

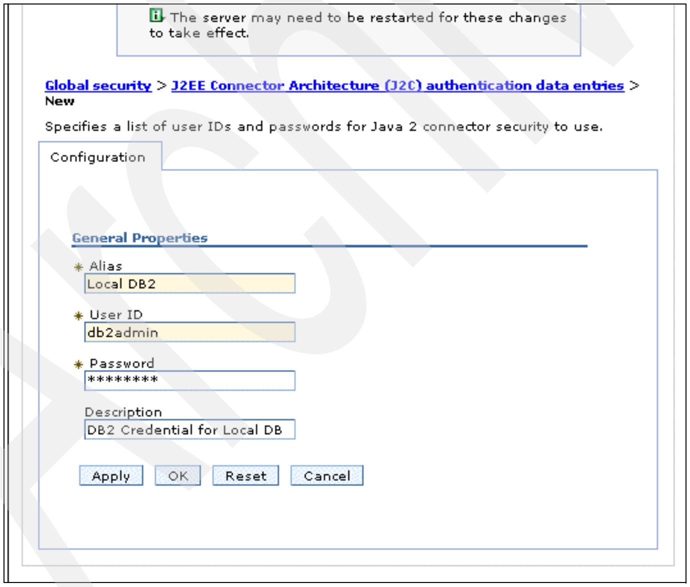
Create the JDBC connection

With the creation of the database, tables, and data completed, we will now create a JDBC data source in WebSphere Application Server (WAS). The general steps for creating a data source definition in WAS is as follows:

1. Add J2C authentication data for DB2.
2. Add a JDBC Provider for DB2.
3. Add a data source for the newly created DB2 JDBC provider.

Add J2C authentication data for DB2

1. Log into your WAS Administration Console at:
   `https://<portal server>:10039/ibm/console`
2. Select **Global Security** → **JAAS Configuration** from the left navigation menu.
3. Select **JAAS Configuration** → **J2C Authentication Data** from the right navigation menu under **Authentication** data.
4. Click the **New** button to create new J2C authentication data.
5. Enter the DB2 Credentials for your database as shown.



The server may need to be restarted for these changes to take effect.

Global security > J2EE Connector Architecture (J2C) authentication data entries > New

Specifies a list of user IDs and passwords for Java 2 connector security to use.

Configuration

General Properties

* Alias: Local DB2

* User ID: db2admin

* Password: ********

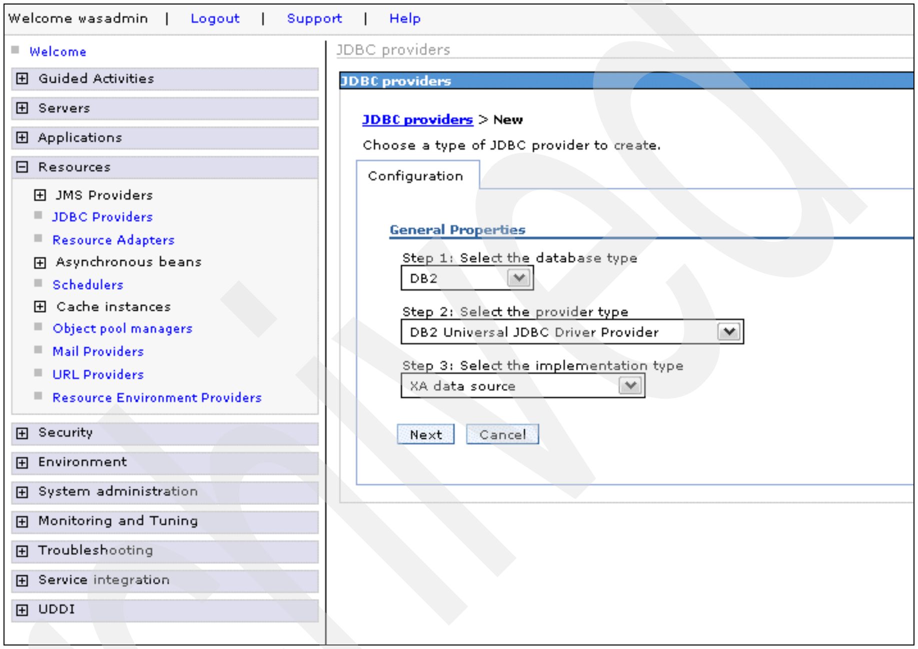
Description: DB2 Credential for Local DB

Figure A-8 J2C settings for DB2

6. Click **OK**. On the following screen, click the **Save** link at the top of the window to save your changes.

Add a JDBC provider for DB2

1. Select **Resources** → **JDBC Providers** from the left navigation menu.
2. The list of JDBC providers will appear on the right. Click **New** to create a new JDBC provider for the application.
3. Select the database type, provider type, and implementation type as shown in Figure A-9.



Choose a type of JDBC provider to create.

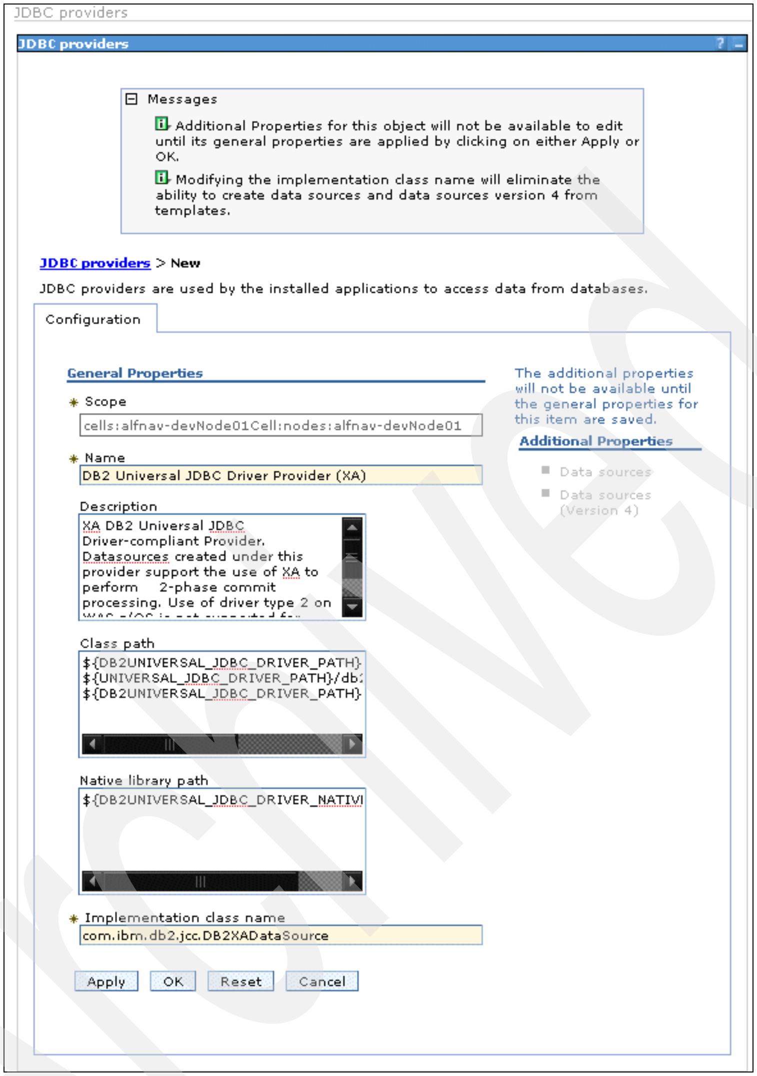
Step 1: Select the database type: DB2

Step 2: Select the provider type: DB2 Universal JDBC Driver Provider

Step 3: Select the implementation type: XA data source

Figure A-9 Database, provider, and implementation type

4. On the following screen, accept the default inputs and click **OK**. The list of JDBC Providers will be displayed.



JDBC providers

JDBC providers

⊟ Messages

Additional Properties for this object will not be available to edit until its general properties are applied by clicking on either Apply or OK.

Modifying the implementation class name will eliminate the ability to create data sources and data sources version 4 from templates.

JDBC providers > New

JDBC providers are used by the installed applications to access data from databases.

Configuration

General Properties

* Scope
cells:alfnav-devNode01Cell:nodes:alfnav-devNode01

* Name
DB2 Universal JDBC Driver Provider (XA)

Description
XA DB2 Universal JDBC Driver-compliant Provider. Datasources created under this provider support the use of XA to perform 2-phase commit processing. Use of driver type 2 on WAS z/OS is not supported for

Class path
```
${DB2UNIVERSAL_JDBC_DRIVER_PATH}
${UNIVERSAL_JDBC_DRIVER_PATH}/db2
${DB2UNIVERSAL_JDBC_DRIVER_PATH}
```

Native library path
```
${DB2UNIVERSAL_JDBC_DRIVER_NATIVE
```

* Implementation class name
com.ibm.db2.jcc.DB2XADataSource

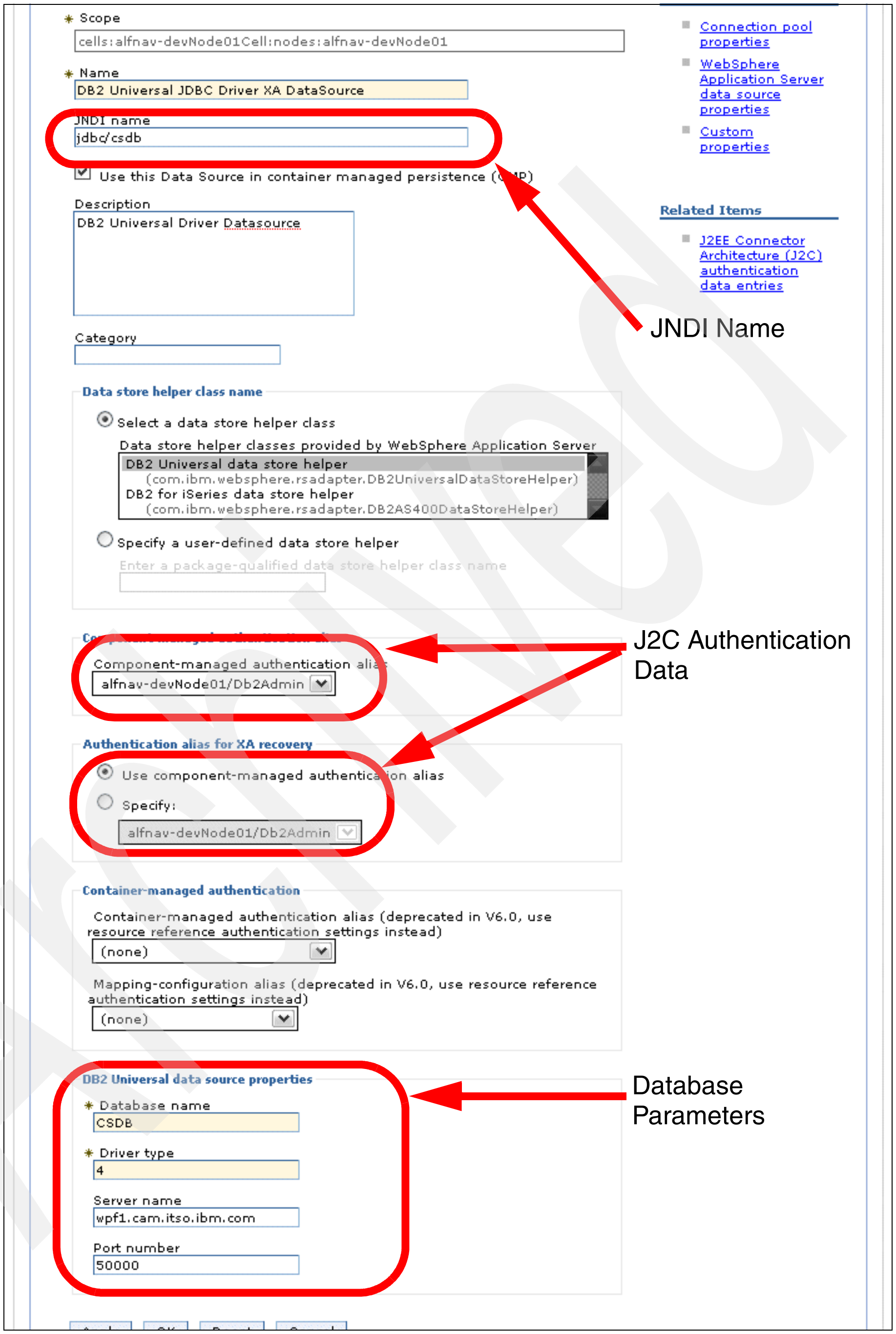
The additional properties will not be available until the general properties for this item are saved.

Additional Properties

- Data sources
- Data sources (Version 4)

Figure A-10 JDBC provider settings for DB2

5. Click the newly created JDBC provider; on the following screen, click the **Data Sources** link under the **Additional Properties** section.
6. Click **New**. Set the JNDI Name to `jdbc/csdb`. For the authentication alias, select the J2C authentication data that was created earlier.



* Scope
cells:alfnav-devNode01Cell:nodes:alfnav-devNode01

* Name
DB2 Universal JDBC Driver XA DataSource

JNDI name
jdbc/csdb

☑ Use this Data Source in container managed persistence (CMP)

Description
DB2 Universal Driver Datasource

Category

Data store helper class name

● Select a data store helper class

Data store helper classes provided by WebSphere Application Server
DB2 Universal data store helper
(com.ibm.websphere.rsadapter.DB2UniversalDataStoreHelper)
DB2 for iSeries data store helper
(com.ibm.websphere.rsadapter.DB2AS400DataStoreHelper)

○ Specify a user-defined data store helper

Enter a package-qualified data store helper class name

Component-managed authentication alias

Component-managed authentication alias
alfnav-devNode01/Db2Admin

Authentication alias for XA recovery

● Use component-managed authentication alias

○ Specify:
alfnav-devNode01/Db2Admin

Container-managed authentication

Container-managed authentication alias (deprecated in V6.0, use resource reference authentication settings instead)
(none)

Mapping-configuration alias (deprecated in V6.0, use resource reference authentication settings instead)
(none)

DB2 Universal data source properties

* Database name
CSDB

* Driver type
4

Server name
wpf1.cam.itso.ibm.com

Port number
50000

- Connection pool properties
- WebSphere Application Server data source properties
- Custom properties

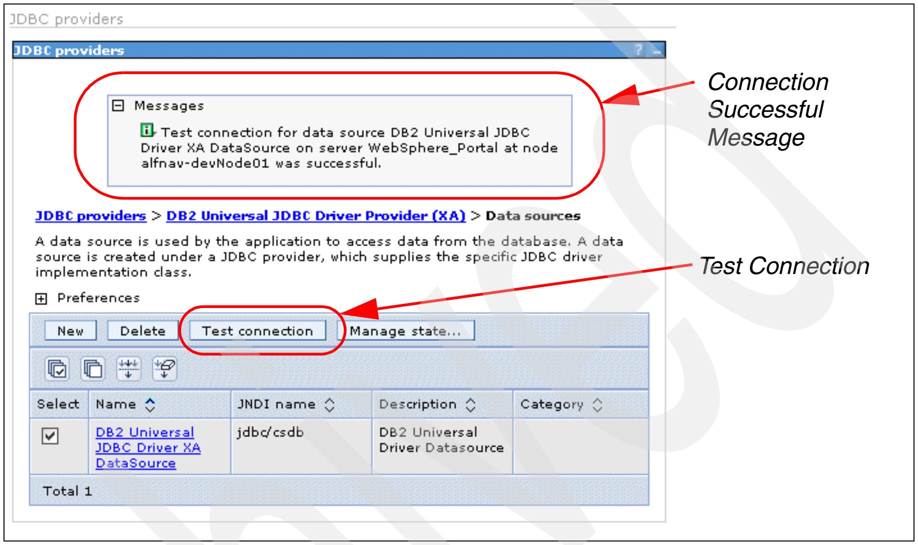
Related Items

- J2EE Connector Architecture (J2C) authentication data entries

Figure A-11 Data source settings

7. Click **OK**. On the following screen, click the **Save** link at the top of the screen and the **Save** button on the following screen.

8. To test whether the connection created is valid, check the box next to the data source and click the **Test Connection** button. If the connection is valid, a successful connection message will be displayed as shown Figure A-12.



JDBC providers

JDBC providers

⊟ Messages

Test connection for data source DB2 Universal JDBC Driver XA DataSource on server WebSphere_Portal at node alfnav-devNode01 was successful.

JDBC providers > DB2 Universal JDBC Driver Provider (XA) > Data sources

A data source is used by the application to access data from the database. A data source is created under a JDBC provider, which supplies the specific JDBC driver implementation class.

⊞ Preferences

Select	Name	JNDI name	Description	Category
☑	DB2 Universal JDBC Driver XA DataSource	jdbc/csdb	DB2 Universal Driver Datasource	
Total 1				

Connection Successful Message

Test Connection

Figure A-12 Connection successful

Configure the project to use the database as a data source

With the database, data, and data source created, the application can now be configured to use the database as a data source. Rather than changing the data sources of the models, the configuration has been changed.

1. Open the **RedbookCS** → **WebContent** → **WEB-INF** → **config** → **service_mappings** → **mappings.xml** file.

2. Uncomment the Use Production Data Services (DB, Domino and WS) section and comment the Use Test Data Services (File) section as shown.

Example A-1 Mapping.xml file

```
<!--
    Use Production Data Services (DB, Domino and WS)
-->
    <ForService name="redbook/cs/data/db/CustomerDBProvider">
        <UseService name="redbook/cs/data/db/CustomerDBProvider" />
    </ForService>
    <ForService name="redbook/cs/data/db/OrderDBProvider">
        <UseService name="redbook/cs/data/db/OrderDBProvider" />
```

```
</ForService>
<ForService name="redbook/cs/data/db/ProductDBProvider">
    <UseService name="redbook/cs/data/db/ProductDBProvider" />
</ForService>
<ForService name="redbook/cs/data/ProductDataProvider">
    <UseService name="redbook/cs/data/ProductDataProvider" />
</ForService>

<!--
Use Test Data Services (File)

<ForService name="redbook/cs/data/db/CustomerDBProvider">
<UseService name="redbook/cs/data/file/CustomerFileProvider" />
</ForService>
<ForService name="redbook/cs/data/db/OrderDBProvider">
    <UseService name="redbook/cs/data/file/OrderFileProvider" />
</ForService>
<ForService name="redbook/cs/data/db/ProductDBProvider">
<UseService name="redbook/cs/data/file/ProductFileProvider" />
</ForService>
<ForService name="redbook/cs/data/ProductDataProvider">
<UseService name="redbook/cs/data/file/ProductFileProvider" />
</ForService>-->
```

Upon editing the mapping.xml file, the application is now ready to be run with the Domino database, DB2 Database, and Web Service as the backend data services.

Import and deploy the web service

When displaying the product tooltip, the application actually uses information from both the Domino database and a web service, depending on the product selected. To deploy the web service for the application, perform the following steps.

1. Create a project as shown in Chapter 3 called `RedbookCSProductsWS`.
2. Click **Yes** to “Deploy Your Project Now” when prompted.
3. After the project has been deployed, right-click the project and select **Import** → **WebSphere Portlet Factory Archive**.
4. Click the **Browse** button and select the RedbookCSProductWS.zip file.
5. Refresh and save the project.

The web service is now ready to be called by the application.

Import and deploy the project

With the databases and services set up, the project can now be set up. To deploy the code, create a project as shown in Chapter 3. Once the project is created, perform the following steps:

1. Right-click the project and select **Import** → **WebSphere Portlet Factory Archive**.
2. Click the **Browse** button and select the ITSO_CustomerSelfServiceApplication.zip file.
3. Refresh your project.
4. Right-click the project and select **Build Portlet Factory WAR** → **Build Portlet War** to deploy the portlets to the portal.

Installing the application theme

Included in the ITSO Theme for WebSphere Portal 6.0 directory of the downloaded files is a theme specifically made for this book. If you would like to use the theme for the application, perform the following steps:

1. Create a new directory, such as "ITSO," in the <WebSphere Profile Root>\installedApps\<node name>\wps.ear\themes\html
2. Unzip the Express_ITSO.zip files into the newly created directory (for example, WebSphere Profile Root>\installedapps\<node name>\wps.ear\themes\html\ITSO>)
3. Log in to the portal.
4. Select **Administration** → **Portal User Interface** → **Themes and Skins**.
5. Click the **Add New Theme** button. Enter `ITSO` for its name and provide the directory name used in Step 1 for the theme directory name.

With the theme created, the pages and portlets for the application can now be deployed.

Creating the pages for the CSA application

To complete running and deploying the application, create the labels/pages and add the portlets to the respective pages as identified in Table A-2 to run the application.

Table A-2 Labels, Pages, and Portlets to Add

Page/Label/ Portlet	Location	Name
Label	Content Root → Home	Customer Self Service Application (Set the Theme to the ITSO theme created previously and the Navigation Type to DoubleTopNav)
Page	Content Root → Home → Customer Self Service Application	Customer Information
Page	Content Root → Home → Customer Self Service Application	Orders
Page	Content Root → Home → Customer Self Service Application	Shopping
Portlet	Content Root → Home → Customer Self Service Application → Customer Information	CSA - Customer Information
Portlet	Content Root → Home → Customer Self Service Application → Orders	CSA - Order List
Portlet	Content Root → Home → Customer Self Service Application → Orders	CSA - Order Details
Portlet	Content Root → Home → Customer Self Service Application → Shopping	CSA - Shopping Portlet

B

Creating a Web service using WebSphere Portlet Factory

WebSphere Portlet Factory offers the possibility of creating a Web Service without adding additional development efforts. Any Data Provider in a project can be exposed as a Web Service by creating the WSDL for any Service Definition that contains. This action is possible because WebSphere Portlet Factory uses a SOA architecture for the definition of Data Services: service definition, operations, and input/output messages.

In this appendix we demonstrate how easy it is to create a Web Service using WebSphere Portlet Factory, and deploy it, and how to access the WSDL to invoke the service from external applications.

We illustrate the concept using our sample application, ITSO Renovations. It is outside of the scope of the main application because it is an additional WebSphere Portlet Factory project to hold the external web service that is accessed by ITSO Renovations.

WebSphere Portlet Factory exposes Data Services as external Web Services

Data Services in WebSphere Portlet Factory are defined using Service Definition and Service Operation builders. The interface of these operations is based on XML and the structure is defined using XSD. We can easily recognize that the architecture is matching the main concepts of SOA, so you can imagine that the step to expose a Service Definition as a Web Service is almost direct.

Figure B-1 shows the relation between the Web Service concepts and the builders in WebSphere Portlet Factory.

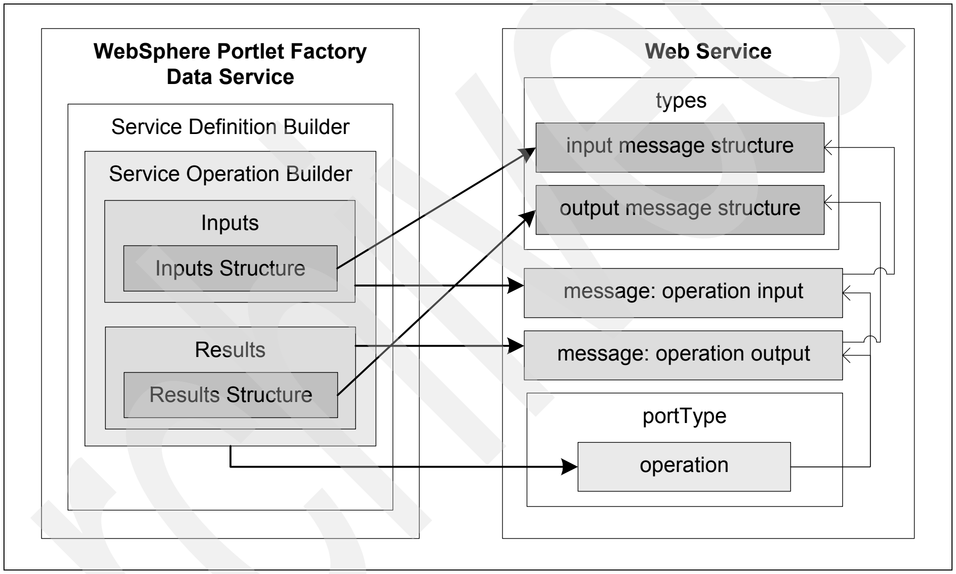


Figure B-1 Relationship of Data Service to Web Service

We can see a clear relationship between a Data Service and a Web Service that actually makes possible and simple to expose an existing Service Definition as Web Service. WebSphere Portlet Factory allows you to automate generation of the web service and WSDL via a simple configuration checkbox in the Service Definition builder named Generate WSDL.

Figure B-2 the architectural overview for applications exposing Service Definitions as Web Services.

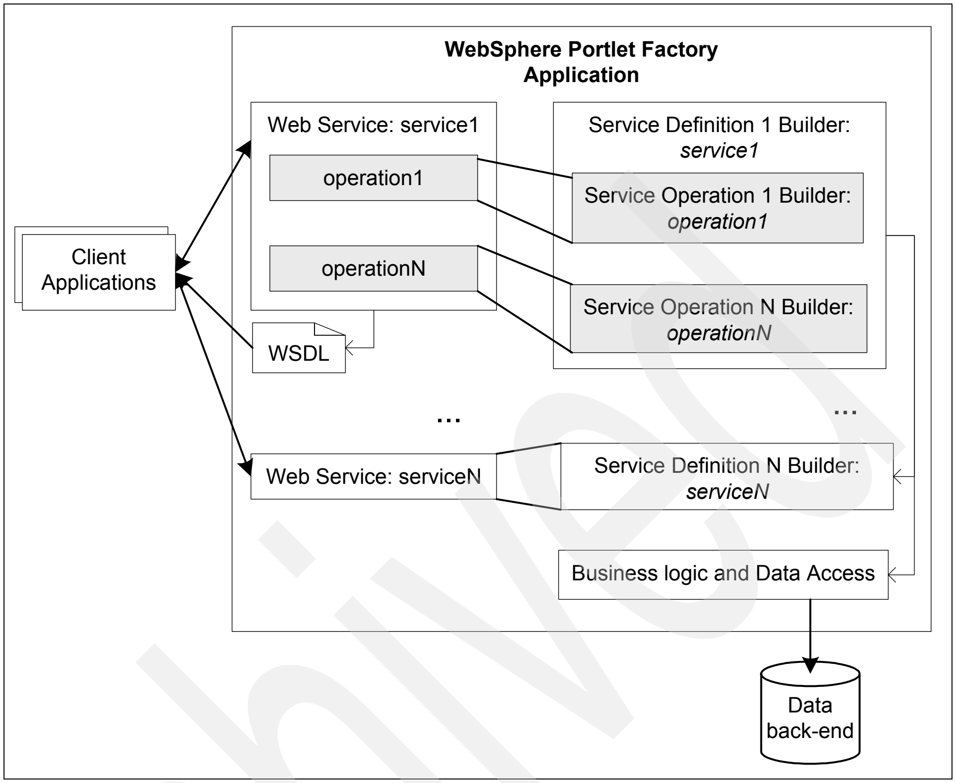

WebSphere Portlet Factory Application
Web Service: service1
operation1
operationN
Service Definition 1 Builder: service1
Service Operation 1 Builder: operation1
Service Operation N Builder: operationN
Client Applications
WSDL
...
...
Web Service: serviceN
Service Definition N Builder: serviceN
Business logic and Data Access
Data back-end

Figure B-2 Overview of an application exposing Web Services

Since there is no special functionality to add when creating the Web Service, an existing web application like ITSO Renovations can expose some of its data services as a Web Service additionally to the main purpose of the web application. This allows you to integrate other client applications with the back ends that the web application is accessing.

The other approach is to use WebSphere Portlet Factory to only create Web Services without writing any line of code: you can create Data Provider models and expose them as Web Services. At the end it will be a web application without presentation layer and containing only these services. This is the way we have created our external web service for ITSO Renovations, because it is fast and does not require implementation efforts.

Implementation of the Product Web Service in ITSO Renovations application

ITSO Renovations is accessing external web services to retrieve product details from external organizations. These services are already available and extant in some locations; you only need to access the WSDL and discover what the available functionality is that they offer. In our example we do not have such external services, so we have decided to implement a simple one to illustrate how WebSphere Portlet Factory can access external web services. (This concept was first mentioned in 5.4, “Data Service for external web services access” on page 190.)

We could have used any development environment or framework for the implementation of the Web Service but we decided to use WebSphere Portlet Factory and show the additional value that this technique offers to the developer.

The scenario we are describing is illustrated in Figure B-3.

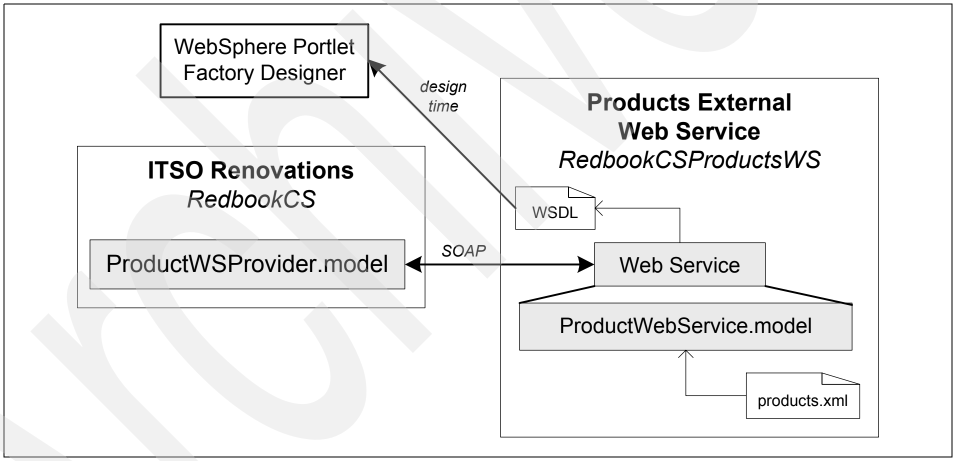


Figure B-3 Design products external Web Service

The external organization delivers some products via ITSO Renovations and the information is kept in internal systems of that organization. It offers a Web Service interface that ITSO Renovations can access. The Web Service hides the data sources in the external organization. In our simple case, we have implemented the web service of this external organization for illustration purposes and we have defined the following pre-conditions:

- Product information is kept in local XML files within the web application of the new Web Service. Actually, we use the same local XML Data Service we have used in ITSO Renovations (copy of the implementation): only the Product data domain ProductFileProvider.

- The interface of the web service matches the expected one in ITSO Renovations, so we do not need additional transformations in the Data Service that is accessing it. This is not the usual case because external organizations have their own web services with proprietary interfaces, but for the purpose of this example it is enough to illustrate the main concept.

Follow these steps to implement the Product Web Service:

1. Create a new WebSphere Portlet Factory project called RedbookCSProductsWS. It will contain only the Product Web Service accessing the local XML files.
2. Copy the following resources from the ITSO Renovations application into the new project:
   - \WebContent\redbook\cs\images\products\*.jpg
   - \WebContent\WEB-INF\resources\redbook\cs\xsd\product.xsd

     Remove <Product> elements with Id from 1 to 10. The rest of the products are those we want to have as external.
   - \WebContent\WEB-INF\resources\redbook\cs\xml\data\products.xml

   Paths are relative to the project location and the target location is the same in RedbookCSProductsWS.

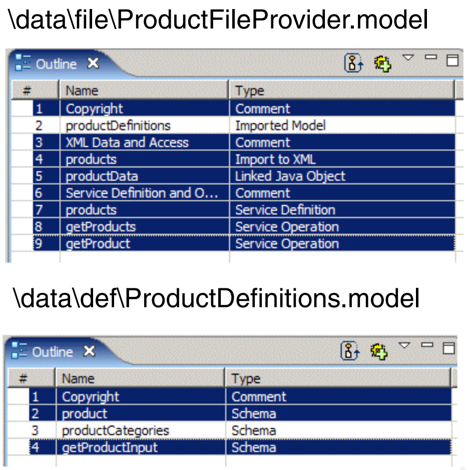
   These files contain the product details and will be accessed by the Web Service implementation. Images are part of the serveable content and will be accessed directly by the client applications (ITSO Renovations in our case).
3. Create a new model called ProductWebService.model in the folder:

   \models\redbook\cs\ws

   Copy the following source code to access the products.xml file:

   \WebContent\WEB-INF\work\source\com\ibm\redbook\cs\data\DataContants.java

   \WebContent\WEB-INF\work\source\com\ibm\redbook\cs\data\file\ProductData.java
4. Copy the builders shown in Figure B-4 from ITSO Renovations (RedbookCS) and paste them into the new model.



\data\file\ProductFileProvider.model

Outline

#	Name	Type
1	Copyright	Comment
2	productDefinitions	Imported Model
3	XML Data and Access	Comment
4	products	Import to XML
5	productData	Linked Java Object
6	Service Definition and O...	Comment
7	products	Service Definition
8	getProducts	Service Operation
9	getProduct	Service Operation

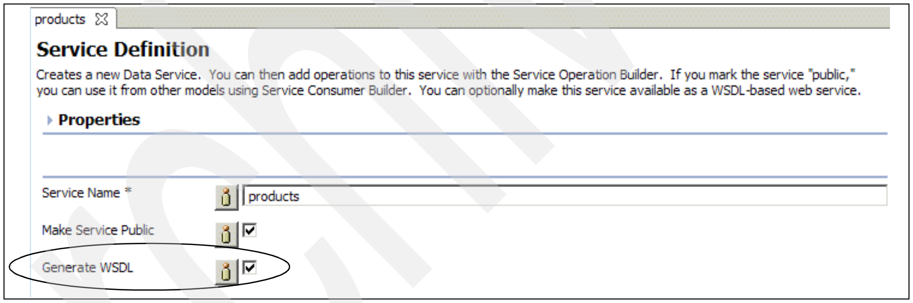
\data\def\ProductDefinitions.model

Outline

#	Name	Type
1	Copyright	Comment
2	product	Schema
3	productCategories	Schema
4	getProductInput	Schema

Figure B-4 Builders for the new ProductWebService.model

5. Activate Generate WSDL in the Service Definition. This is the most important action that makes the service available as a Web Service.



products

Service Definition

Creates a new Data Service. You can then add operations to this service with the Service Operation Builder. If you mark the service "public," you can use it from other models using Service Consumer Builder. You can optionally make this service available as a WSDL-based web service.

Properties

Service Name * products

Make Service Public ☑

Generate WSDL ☑

Figure B-5 Service Definition builder: Generate WSDL to expose as Web Service

6. When this project is deployed, you have the Web Service available. In the next section we show you how to access the WSDL.

We have seen that the implementation in our case is very simple. We have reused the local XML File Data Service for products from the main application and make it public as a Web Service.

The only important action that actually creates the Web Service is the selection of the **Generate WSDL** input in the Service Definition builder. You can activate this option for any Service Definition in your project regardless of whether or not you have the presentation builders. It is required that the service is public and generating the WSDL makes it public not only within the application, but also externally.

Deploying and using the Web Service

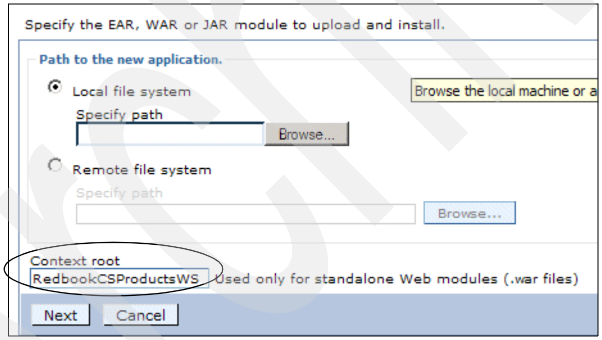
There are no special requirements when deploying the application that contains Web Services. This is a normal WebSphere Portlet Factory application like we have seen for ITSO Renovations.

There is only an additional issue related with the classpath when building the WAR file for the web application and installing it from the WebSphere Application Server (WAS) Administration Console. By default it is configured to use first the parent class loader for the application and this must be changed to use it last to load the classes from the WAR file (especially the Axis libraries used for Web Services). Perform the following steps to build the WAR file, deploy it and change the class loader settings for our sample application:

1. Build the deployment WAR for the RedbookCSProductsWS project by selecting **Builder Portlet Factory WAR** → **Build Deployment WAR**.

   Save the created WAR file in your file system.

2. Open the WAS Administration Console and Install a New Application. Use as input the previous WAR file. The context root is the name of the web application: RedbookCSProductsWS. Accept all defaults since there are no special requirements.



Specify the EAR, WAR or JAR module to upload and install.

Path to the new application.

● Local file system

Specify path

Browse the local machine or a

○ Remote file system

Specify path

Context root

RedbookCSProductsWS

Used only for standalone Web modules (.war files)

Figure B-6 Install new Application from the WAS administration console

3. The web application is installed and can be started from the list of Enterprise Applications.

4. Change the class loader mode to Parent Last:

   a. Find the application RedbookCSProductsWS from the list of Enterprise Applications and open it (click the link).

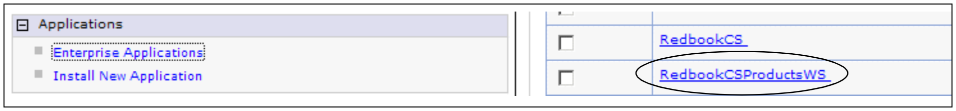


Figure B-7 List of Enterprise Applications

b. Select from Web Modules the WAR file RedbookCSProductsWS.war.

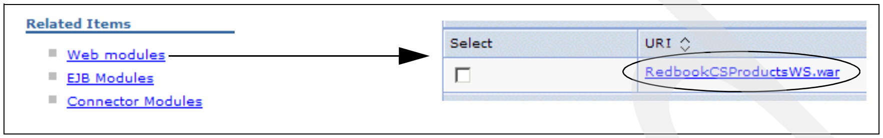
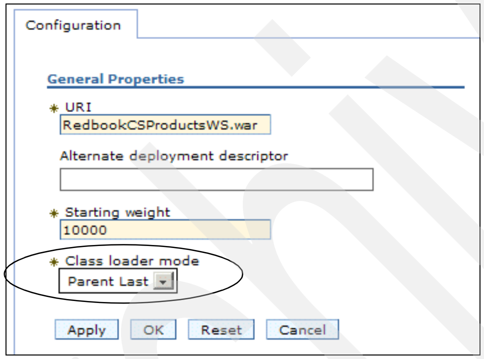


Figure B-8 Select the WAR file from the Web Modules

c. Change the class loader mode to Parent Last.



* URI: RedbookCSProductsWS.war

Alternate deployment descriptor:

* Starting weight: 10000

* Class loader mode: Parent Last

Figure B-9 Class Loader mode in the configuration of the Web Module

d. Apply, save changes and restart the server.

If the application is installed from the WebSphere Portlet Factory Designer, this issue is not a problem because when deploying the WAR the right class loader mode is set.

For security reasons, you may want to protect access to web services via J2EE security-constraint on the AxisServlet in web.xml and you may want to also protect access to /webengine for running models directly from a browser via security-constraint, if the web application will be for serving web services only and not used directly by browsers.

Once the application is deployed, the Service Definition builders that generate WSDL are accessible as Web Services. Any other application can use it and invoke the operations defined in the service. If you have a WebSphere Portlet Factory application that is accessing the Web Service, you can use the Web

Service Call builder as described in 5.4, “Data Service for external web services access” on page 190.

The WSDL of the Web Service is available under the following address:

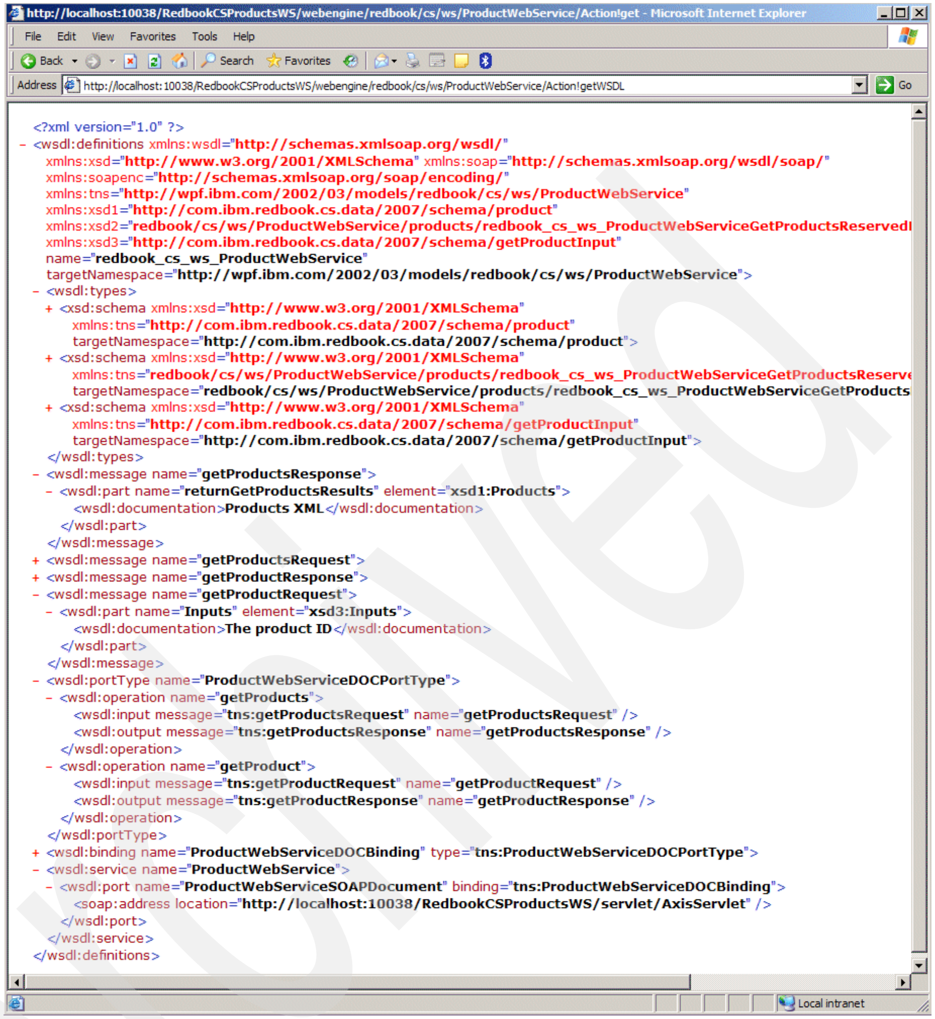
http://localhost:10038/<application_name>/webengine
/<path_web_service_model>/Action!getWSDL

- <application_name>: This is the application name that contains the web service.
- <path_web_service_model>: The path where the model containing the web service is located (without the \models folder, see our example).

In our sample application this is the URL when deployed in the localhost machine:

http://localhost:10038/**RedbookCSProductsWS**/webengine
/redbook/cs/ws/ProductWebService/Action!getWSDL

The resulting WSDL where you can find the schemas, messages, and operations defined as Service Definition of the Data Provider model is shown in Figure B-10.



http://localhost:10038/RedbookCSProductsWS/webengine/redbook/cs/ws/ProductWebService/Action!get - Microsoft Internet Explorer

Address http://localhost:10038/RedbookCSProductsWS/webengine/redbook/cs/ws/ProductWebService/Action!getWSDL

```
  <?xml version="1.0" ?>
- <wsdl:definitions xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
    xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
    xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
    xmlns:tns="http://wpf.ibm.com/2002/03/models/redbook/cs/ws/ProductWebService"
    xmlns:xsd1="http://com.ibm.redbook.cs.data/2007/schema/product"
    xmlns:xsd2="redbook/cs/ws/ProductWebService/products/redbook_cs_ws_ProductWebServiceGetProductsReservedI
    xmlns:xsd3="http://com.ibm.redbook.cs.data/2007/schema/getProductInput"
    name="redbook_cs_ws_ProductWebService"
    targetNamespace="http://wpf.ibm.com/2002/03/models/redbook/cs/ws/ProductWebService">
  - <wsdl:types>
    + <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
        xmlns:tns="http://com.ibm.redbook.cs.data/2007/schema/product"
        targetNamespace="http://com.ibm.redbook.cs.data/2007/schema/product">
    + <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
        xmlns:tns="redbook/cs/ws/ProductWebService/products/redbook_cs_ws_ProductWebServiceGetProductsReserve
        targetNamespace="redbook/cs/ws/ProductWebService/products/redbook_cs_ws_ProductWebServiceGetProducts
    + <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
        xmlns:tns="http://com.ibm.redbook.cs.data/2007/schema/getProductInput"
        targetNamespace="http://com.ibm.redbook.cs.data/2007/schema/getProductInput">
    </wsdl:types>
  - <wsdl:message name="getProductsResponse">
    - <wsdl:part name="returnGetProductsResults" element="xsd1:Products">
        <wsdl:documentation>Products XML</wsdl:documentation>
      </wsdl:part>
    </wsdl:message>
  + <wsdl:message name="getProductsRequest">
  + <wsdl:message name="getProductResponse">
  - <wsdl:message name="getProductRequest">
    - <wsdl:part name="Inputs" element="xsd3:Inputs">
        <wsdl:documentation>The product ID</wsdl:documentation>
      </wsdl:part>
    </wsdl:message>
  - <wsdl:portType name="ProductWebServiceDOCPortType">
    - <wsdl:operation name="getProducts">
        <wsdl:input message="tns:getProductsRequest" name="getProductsRequest" />
        <wsdl:output message="tns:getProductsResponse" name="getProductsResponse" />
      </wsdl:operation>
    - <wsdl:operation name="getProduct">
        <wsdl:input message="tns:getProductRequest" name="getProductRequest" />
        <wsdl:output message="tns:getProductResponse" name="getProductResponse" />
      </wsdl:operation>
    </wsdl:portType>
  + <wsdl:binding name="ProductWebServiceDOCBinding" type="tns:ProductWebServiceDOCPortType">
  - <wsdl:service name="ProductWebService">
    - <wsdl:port name="ProductWebServiceSOAPDocument" binding="tns:ProductWebServiceDOCBinding">
        <soap:address location="http://localhost:10038/RedbookCSProductsWS/servlet/AxisServlet" />
      </wsdl:port>
    </wsdl:service>
  </wsdl:definitions>
```

Figure B-10 WSDL for Product Web Service

Testing the Web Service

The Data Service can be tested using the mechanisms we have seen throughout the book, in particular in Chapter 5, “Creating Data Services: Access to back-end systems” on page 105. There is no special test support by WebSphere Portlet Factory to test the invocation of the Web Service; you can just create another Service Definition that it is accessing it using the Web Service Call builder. It is also recommended to check that the WSDL is available as described in the previous section.

Conclusion

We have seen in this appendix how easy it is to create a Web Service using WebSphere Portlet Factory. We can conclude that any public Service Definition can be exposed as a Web Service selecting the option: **Generate WSDL**. It will generate a WSDL of the service definition and it will be registered and accessible in the application server where it is deployed.

C

Remote deployment

This appendix describes how to deploy the WebSphere Portlet Factory Development WAR file to a remote application server.

Overview

Remote deployment of the WebSphere Portlet Factory Development WAR file is useful when you do not have an application server instance available on the same machine as the WebSphere Portlet Factory Designer, but you still want a mechanism for testing models without deploying them to a portal server. When testing models in this way, you run the models as standalone servlets via the Development WAR file, even if the models contain a portlet adapter builder and would normally be run as portlets inside a portlet container.

Note that in order to remotely deploy, you must be able to map a drive to the machine that is running the application server. If you can't do this, and you still want to preview your models as standalone servlets, then you will need to use a local application server. Otherwise you will need to run your models as portlets on a portal server in order to test them.

Remote deployment procedure

To deploy the WebSphere Portlet Factory Development WAR file to a remote server, follow these steps:

1. Map a drive to the remote server that is running the application server. To do this, select **Map Network Drive** from the **Tools** menu of the Windows® Explorer menu (Figure C-1).

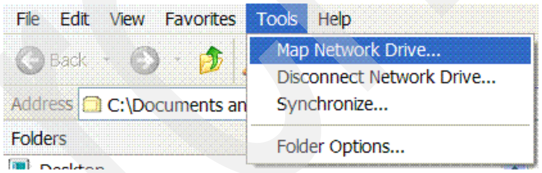
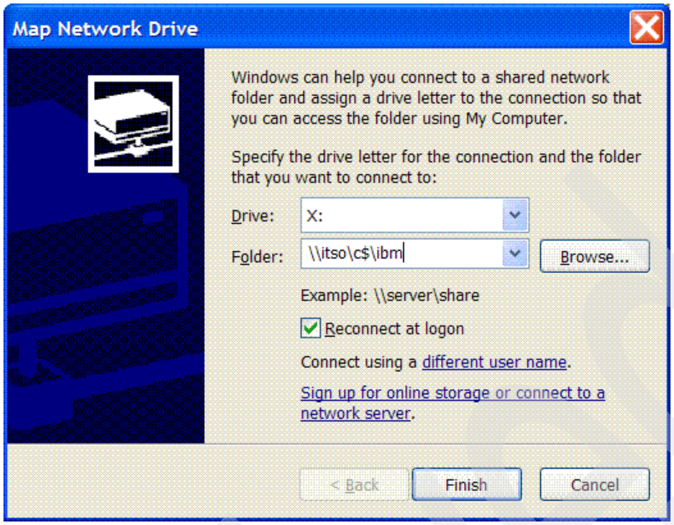


Figure C-1 Mapping a drive

This will open the Map Network Drive dialog. Select a drive letter that you would like to use to access the mapped drive, and then type in the path you would like to map to (this would usually be the root of the server which is running the application server, although you can also map to a subdirectory on the mapped server). We will map to the ibm directory on the remote server, as shown in Figure C-2. Press the **Finish** button when you are done.



Map Network Drive

Windows can help you connect to a shared network folder and assign a drive letter to the connection so that you can access the folder using My Computer.

Specify the drive letter for the connection and the folder that you want to connect to:

Drive: X:

Folder: \\itso\c$\ibm

Example: \\server\share

☑ Reconnect at logon

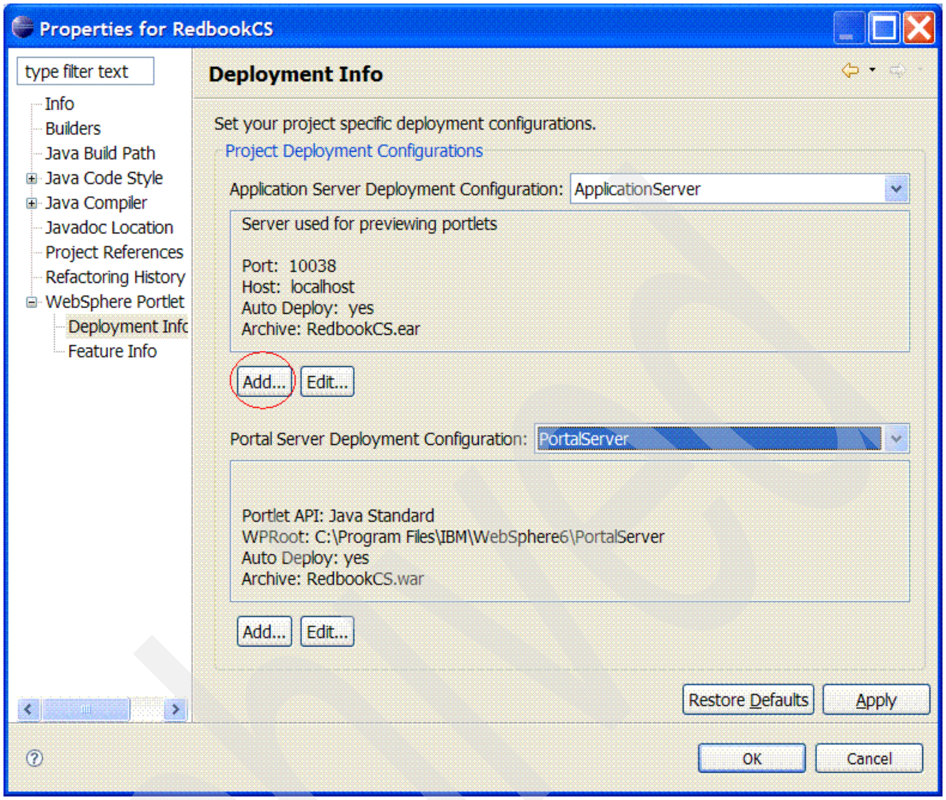
Connect using a different user name.

Sign up for online storage or connect to a network server.

Figure C-2 Completing mapping the drive

Note: If you are getting errors at this stage of the process, check the physical connectivity between your local machine and the remote server, as well as the validity of your credentials (username and password). If access restrictions are set up on the remote machine, you may only be able to map to certain directories.

2. You should now have a mapped drive to the remote server, which you can access through Windows explorer on your local machine. To deploy the WebSphere Portlet Factory development WAR to the remote server, open up a WebSphere Portlet Factory project (you can either create a new one or use the RedbookCS project discussed in this book) and open the project properties dialog (you can do this, for example, by right-clicking the RedbookCS folder in your IDE and selecting **Properties**).
3. In the properties dialog, select **Deployment Info** from the **WebSphere Portlet Factory** heading, and then click the **Add** button as shown in Figure C-3 to add a new deployment configuration.



Set your project specific deployment configurations.

Project Deployment Configurations

Application Server Deployment Configuration: ApplicationServer

Server used for previewing portlets

Port: 10038
Host: localhost
Auto Deploy: yes
Archive: RedbookCS.ear

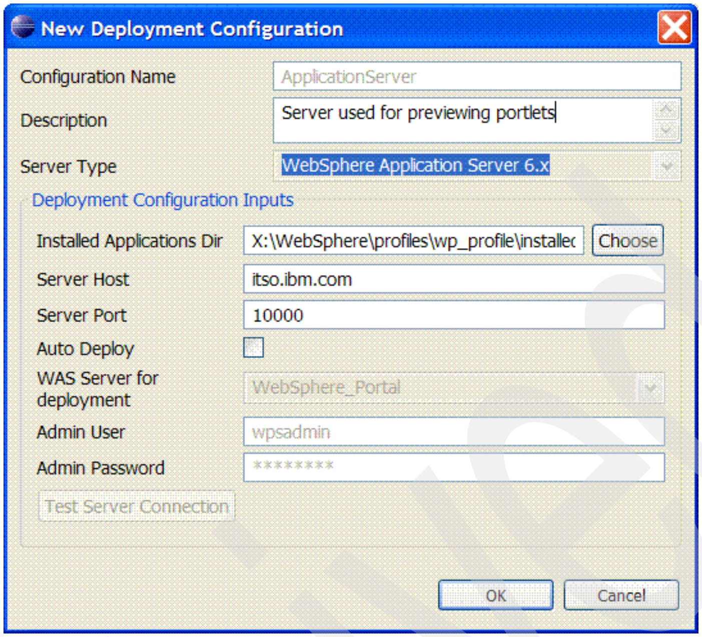
Portal Server Deployment Configuration: PortalServer

Portlet API: Java Standard
WPRoot: C:\Program Files\IBM\WebSphere6\PortalServer
Auto Deploy: yes
Archive: RedbookCS.war

Figure C-3 Creating a new Deployment Configuration

4. In the New Deployment Configuration dialog, enter a name and description for your new deployment configuration. We used “remoteApplicationServer” for the name, and “Remote application server used for development” for the description.

5. Fill out the remaining settings to correspond to your remote application server. The installed applications dir field will be the installedApps directory of portal on the mapped drive (we used `X:\WebSphere\profiles\wp_profile\installedApps\shaba`), and the server host field will be the hostname used to access the remote server in a Web browser (we used `itso.ibm.com`). Select “server1” for the WAS server for deployment dropdown. Deselect the auto deploy checkbox, because this function only works with locally deployed servers. Your settings should appear as shown in Figure C-4.



New Deployment Configuration

Configuration Name: ApplicationServer

Description: Server used for previewing portlets

Server Type: WebSphere Application Server 6.x

Deployment Configuration Inputs

Installed Applications Dir: X:\WebSphere\profiles\wp_profile\installec

Server Host: itso.ibm.com

Server Port: 10000

Auto Deploy: □

WAS Server for deployment: WebSphere_Portal

Admin User: wpsadmin

Admin Password: ********

Figure C-4 Settings for the Deployment Configuration

The newly created deployment configuration will automatically be selected in the Application Server Deployment Configuration drop down when you return to the Deployment Info screen.

6. Click **OK** on the Deployment Info screen to finalize your configuration changes. You will be prompted whether you would like to re-deploy your project; select **Yes**. This will create a deployable EAR file (which will contain the development WAR), which you will be able to install on the remote application server.
7. When this wizard has finished, an error will appear in the problems tab in the IDE, stating that the Factory Dev War does not exist on the remote server and the files could not be copied. This error is caused by the fact that the development WAR file needs to be installed manually via the WebSphere Admin Console.
8. To install the development WAR, first log in to the remote WebSphere administrative console in a Web browser (http://itso.ibm.com:10001/ibm/console in our case). If you don't know the URL for the administrative console, you can find it by running the Administrative console application from the WebSphere Application Server folder in your Start menu (see Figure C-5), and then checking the URL which is accessed in the browser.

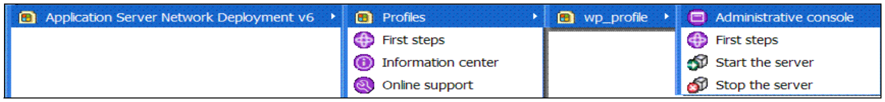


Figure C-5 Administrative console application from the WebSphere Application Server

Note that when logging in to the administrative console, you must log in as an administrator. We are using the wpsadmin account that we set up when we installed the server.

9. Once you have logged in to the administrative console, expand the **Applications** section and click on **Install New Application**, as shown in Figure C-6.

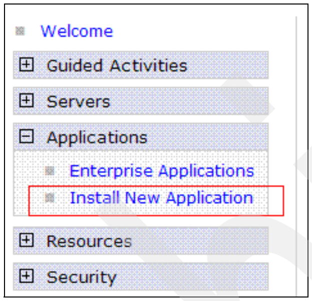
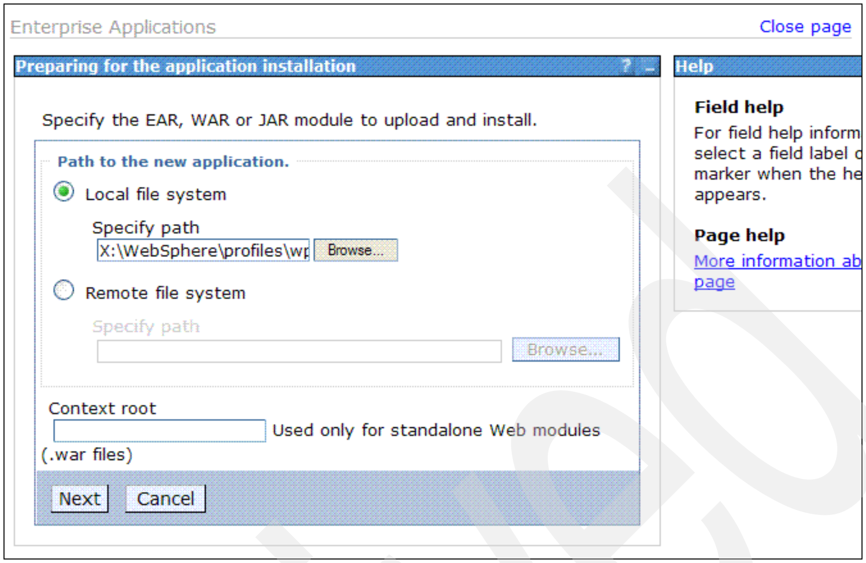


Figure C-6 expand the Applications section and click on Install New Application

10. Type in the path to the development EAR file you created earlier (which contains the development WAR), in the local file system field (see Figure B-7). This file will have been created in the installableApps directory of the remote server. (We used: `X:\WebSphere\profiles\wp_profile\installableApps\itso`). Click **Next** to continue.

f



Enterprise Applications

Preparing for the application installation

Specify the EAR, WAR or JAR module to upload and install.

Path to the new application.

● Local file system

Specify path

X:\WebSphere\profiles\wp

○ Remote file system

Specify path

Context root

Used only for standalone Web modules (.war files)

Field help

For field help inform select a field label c marker when the he appears.

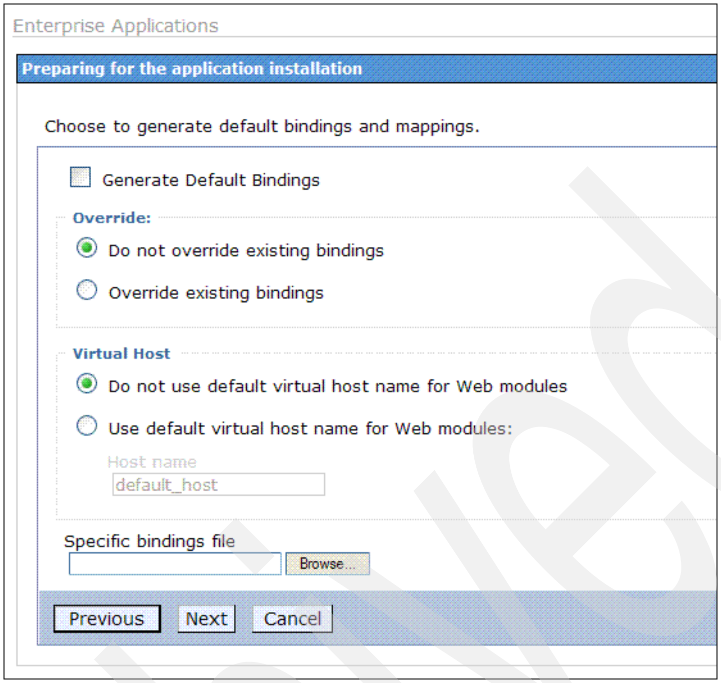
Page help

More information ab page

Figure C-7 Entering path to the new application

11. The next screen allows you to generate default bindings and mappings (see Figure C-8). Leave the default settings and click **Next**.

f



Enterprise Applications

Preparing for the application installation

Choose to generate default bindings and mappings.

□ Generate Default Bindings

Override:

● Do not override existing bindings

○ Override existing bindings

Virtual Host

● Do not use default virtual host name for Web modules

○ Use default virtual host name for Web modules:

Host name

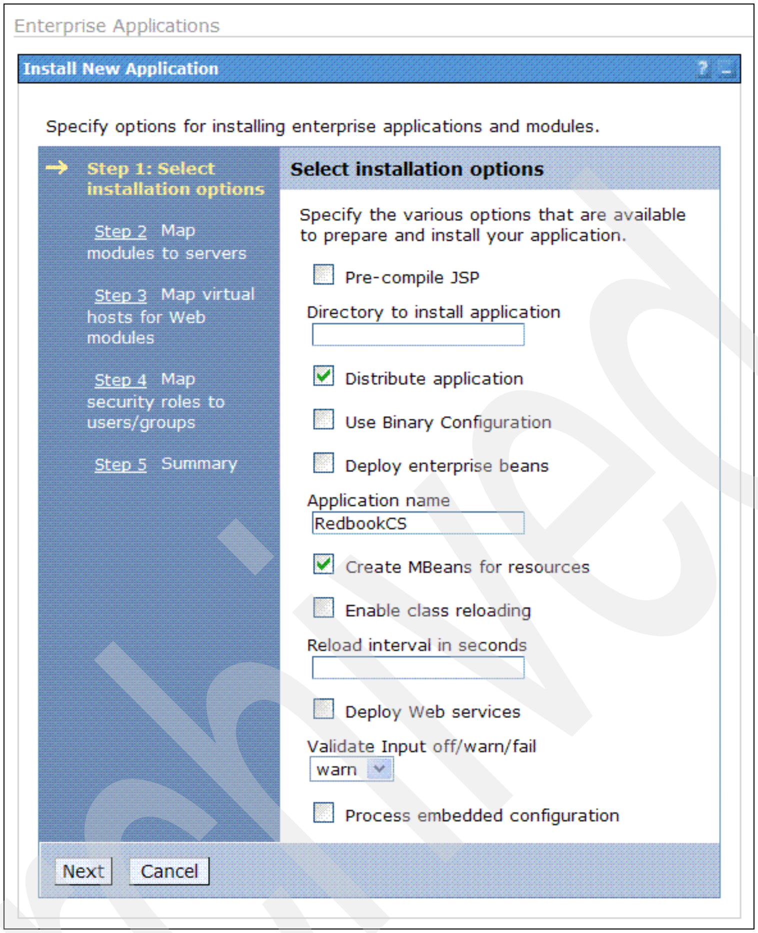
default_host

Specific bindings file

Figure C-8 Additional configuration settings

12. The next screen allows you to specify some basic deployment options (Figure C-9). Accept the defaults and click **Next** to continue.

f



Enterprise Applications

Install New Application

Specify options for installing enterprise applications and modules.

→ **Step 1: Select installation options**

Step 2 Map modules to servers

Step 3 Map virtual hosts for Web modules

Step 4 Map security roles to users/groups

Step 5 Summary

Select installation options

Specify the various options that are available to prepare and install your application.

□ Pre-compile JSP

Directory to install application

☑ Distribute application

□ Use Binary Configuration

□ Deploy enterprise beans

Application name: RedbookCS

☑ Create MBeans for resources

□ Enable class reloading

Reload interval in seconds

□ Deploy Web services

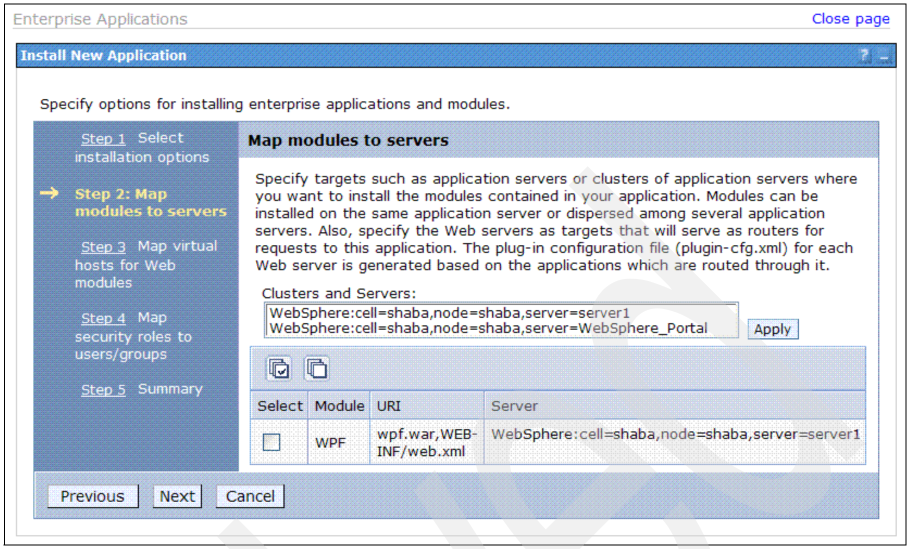
Validate Input off/warn/fail: warn

□ Process embedded configuration

Figure C-9 Specify some basic deployment options

13. The next screen allows you to map modules to servers (Figure C-10). By default, modules will be installed on the server from which you are using the administrative console. Accept the defaults and click **Next** to continue.

f



Enterprise Applications

Close page

Install New Application

Specify options for installing enterprise applications and modules.

Step 1 Select installation options

→ **Step 2: Map modules to servers**

Step 3 Map virtual hosts for Web modules

Step 4 Map security roles to users/groups

Step 5 Summary

Map modules to servers

Specify targets such as application servers or clusters of application servers where you want to install the modules contained in your application. Modules can be installed on the same application server or dispersed among several application servers. Also, specify the Web servers as targets that will serve as routers for requests to this application. The plug-in configuration file (plugin-cfg.xml) for each Web server is generated based on the applications which are routed through it.

Clusters and Servers:

WebSphere:cell=shaba,node=shaba,server=server1
WebSphere:cell=shaba,node=shaba,server=WebSphere_Portal

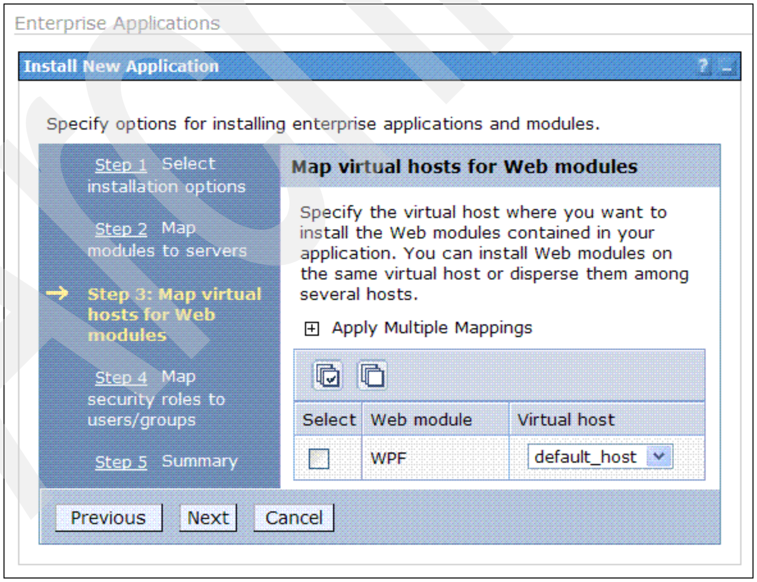
Apply

Select	Module	URI	Server
☐	WPF	wpf.war,WEB-INF/web.xml	WebSphere:cell=shaba,node=shaba,server=server1

Figure C-10 Mapping modules to servers

14. The next screen allows you to specify virtual host mappings (Figure C-11). The virtual server default_host is used by default; accept these settings by clicking **Next**.

f



Enterprise Applications

Install New Application

Specify options for installing enterprise applications and modules.

Step 1 Select installation options

Step 2 Map modules to servers

→ **Step 3: Map virtual hosts for Web modules**

Step 4 Map security roles to users/groups

Step 5 Summary

Map virtual hosts for Web modules

Specify the virtual host where you want to install the Web modules contained in your application. You can install Web modules on the same virtual host or disperse them among several hosts.

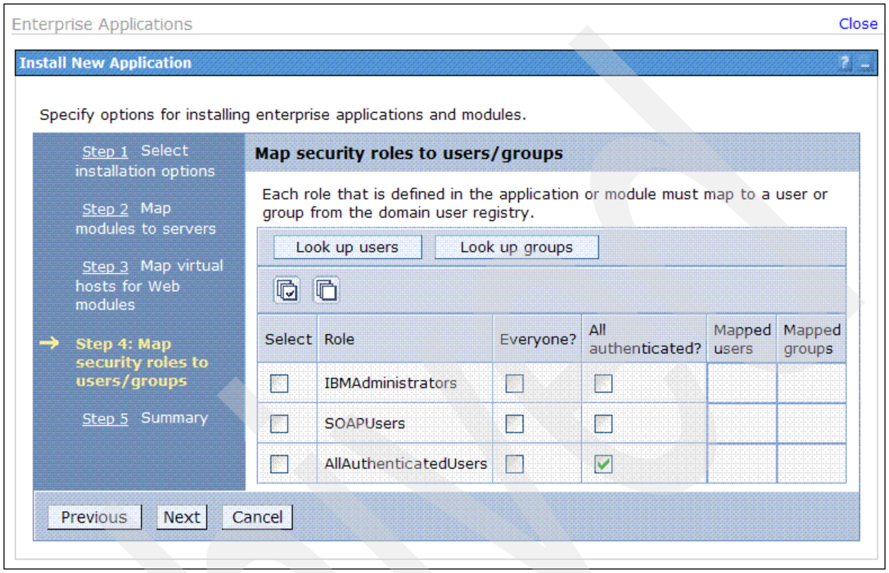
⊞ Apply Multiple Mappings

Select	Web module	Virtual host
☐	WPF	default_host

Figure C-11 Specify virtual host mappings

15. The next screen allows you to map security roles to users and groups (Figure C-12). By default, the AllAuthenticatedUsers role maps to all authenticated users, which is sufficient for this scenario. Accept the defaults by clicking **Next** to continue.

f



Enterprise Applications

Close

Install New Application

Specify options for installing enterprise applications and modules.

Step 1 Select installation options

Step 2 Map modules to servers

Step 3 Map virtual hosts for Web modules

→ **Step 4: Map security roles to users/groups**

Step 5 Summary

Map security roles to users/groups

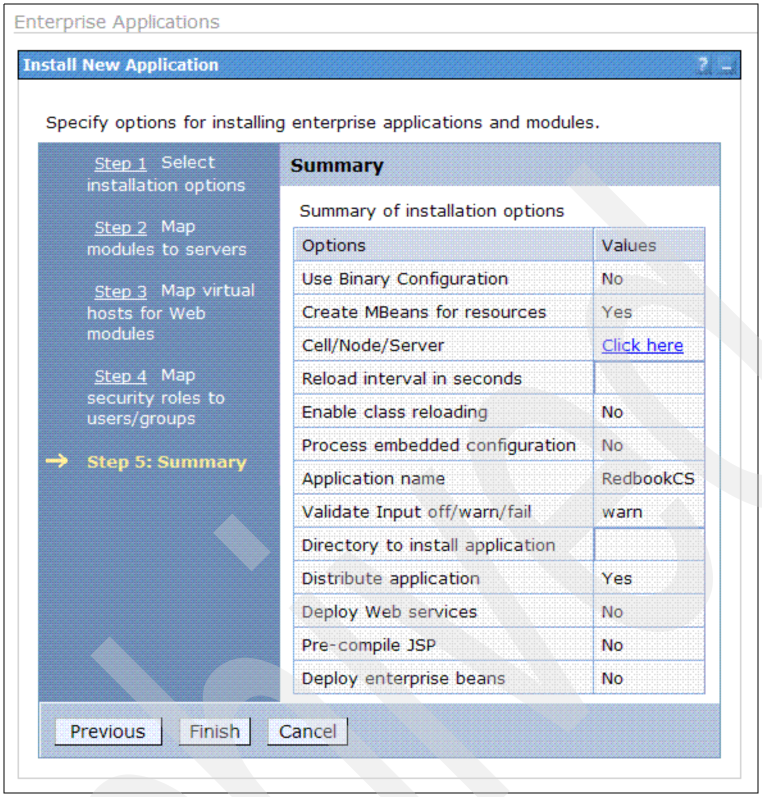
Each role that is defined in the application or module must map to a user or group from the domain user registry.

Select	Role	Everyone?	All authenticated?	Mapped users	Mapped groups
□	IBMAdministrators	□	□		
□	SOAPUsers	□	□		
□	AllAuthenticatedUsers	□	☑		

Figure C-12 This screen allows you to map security roles to users and groups

16. The final screen asks you to confirm all of the settings you have just entered (Figure C-13). Click **Finish** to being the installation process. The installation process could take several minutes, depending on the speed of your machine.

f



Enterprise Applications

Install New Application

Specify options for installing enterprise applications and modules.

Step 1 Select installation options
Step 2 Map modules to servers
Step 3 Map virtual hosts for Web modules
Step 4 Map security roles to users/groups
→ Step 5: Summary

Summary

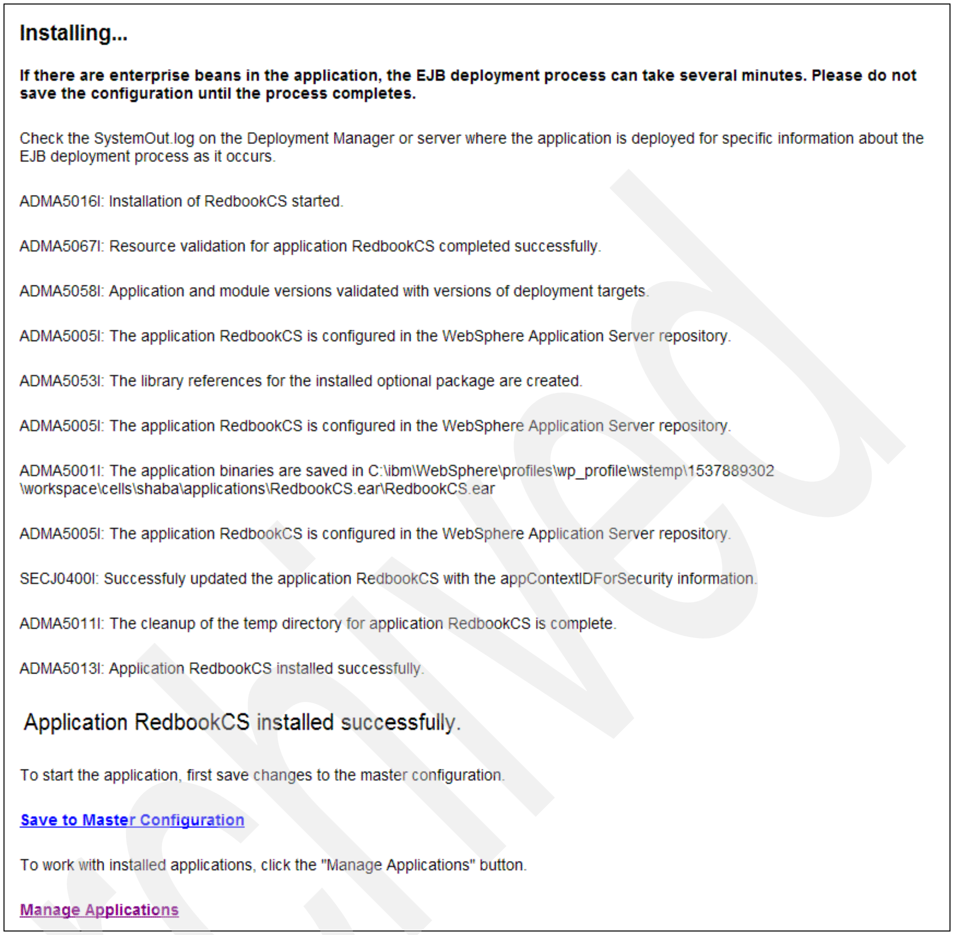
Summary of installation options

Options	Values
Use Binary Configuration	No
Create MBeans for resources	Yes
Cell/Node/Server	Click here
Reload interval in seconds	
Enable class reloading	No
Process embedded configuration	No
Application name	RedbookCS
Validate Input off/warn/fail	warn
Directory to install application	
Distribute application	Yes
Deploy Web services	No
Pre-compile JSP	No
Deploy enterprise beans	No

Figure C-13 Confirm all of the settings you have just entered

17. You should see a success screen similar to that shown in Figure C-14. Click the **Save to master configuration** link at the bottom of the page.

f



Installing...

If there are enterprise beans in the application, the EJB deployment process can take several minutes. Please do not save the configuration until the process completes.

Check the SystemOut.log on the Deployment Manager or server where the application is deployed for specific information about the EJB deployment process as it occurs.

```
ADMA5016I: Installation of RedbookCS started.

ADMA5067I: Resource validation for application RedbookCS completed successfully.

ADMA5058I: Application and module versions validated with versions of deployment targets.

ADMA5005I: The application RedbookCS is configured in the WebSphere Application Server repository.

ADMA5053I: The library references for the installed optional package are created.

ADMA5005I: The application RedbookCS is configured in the WebSphere Application Server repository.

ADMA5001I: The application binaries are saved in C:\ibm\WebSphere\profiles\wp_profile\wstemp\1537889302
\workspace\cells\shaba\applications\RedbookCS.ear\RedbookCS.ear

ADMA5005I: The application RedbookCS is configured in the WebSphere Application Server repository.

SECJ0400I: Successfuly updated the application RedbookCS with the appContextIDForSecurity information.

ADMA5011I: The cleanup of the temp directory for application RedbookCS is complete.

ADMA5013I: Application RedbookCS installed successfully.
```

Application RedbookCS installed successfully.

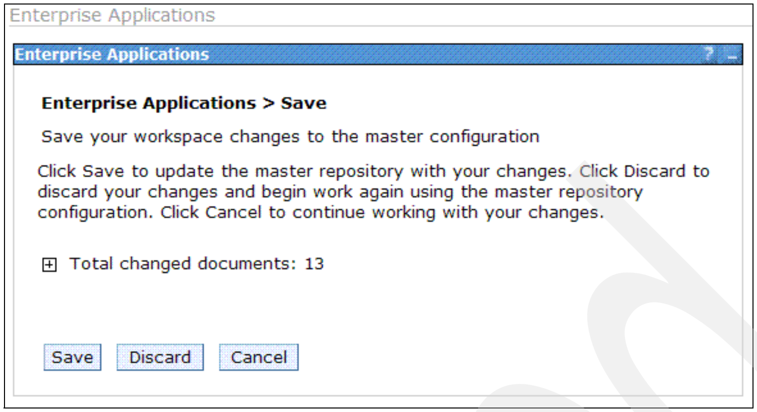
To start the application, first save changes to the master configuration.

To work with installed applications, click the "Manage Applications" button.

Figure C-14 Successful installation procedure

18. A confirmation screen will appear (Figure C-15). Click **Save** to complete the process.

f


Enterprise Applications

Enterprise Applications

Enterprise Applications > Save

Save your workspace changes to the master configuration

Click Save to update the master repository with your changes. Click Discard to discard your changes and begin work again using the master repository configuration. Click Cancel to continue working with your changes.

Figure C-15 Confirmation screen

19.Once installed, you need to start the application on the server. To do this, click the Enterprise Applications link as shown in Figure C-16. This will bring up a list of installed applications on the right of the screen.

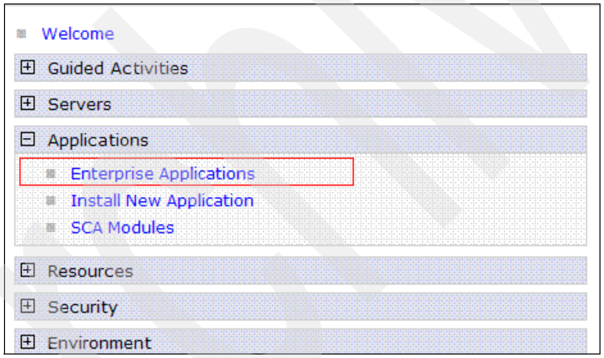
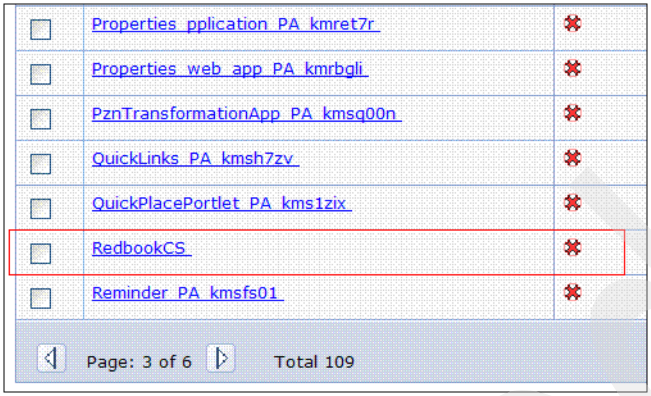


Figure C-16 Starting the application server

20.Scroll through the list of the applications to find the RedbookCS application. It will have a red cross next to it, indicating that the application is stopped (Figure C-17).

f

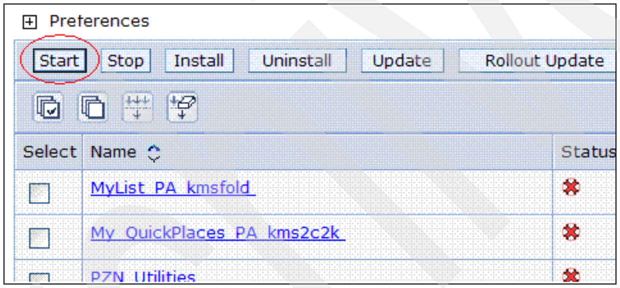


□	Properties pplication PA kmret7r	✖
□	Properties web app PA kmrbgli	✖
□	PznTransformationApp PA kmsq00n	✖
□	QuickLinks PA kmsh7zv	✖
□	QuickPlacePortlet PA kms1zix	✖
□	RedbookCS	✖
□	Reminder PA kmsfs01	✖

Figure C-17 RedbookCS application

21. Click the checkbox to the left of the RedbookCS application and press the start button, as shown in Figure C-18.

f

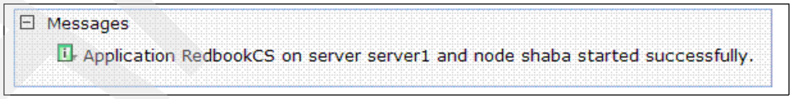


Select	Name	Status
□	MyList PA kmsfold	✖
□	My QuickPlaces PA kms2c2k	✖
□	PZN Utilities	✖

Figure C-18 Once selected, press the start button

22. Once the application has started, a success message will appear at the top of the screen (see Figure C-19).

f



Messages

Application RedbookCS on server server1 and node shaba started successfully.

Figure C-19 Success message

You will now be able to automatically refresh the application from your IDE. You can do this by right-clicking your project root folder (RedbookCS) in the IDE and selecting **Refresh Portlet Factory WAR** → **Refresh Development WAR**, or by previewing your application by pressing the play button on the toolbar in your IDE (Figure C-20). Note that you don't have to install the application again – you only have to install the application once. Once you refresh your project, the error that was thrown after you initially set up the deployment configuration will be removed. (Note: Depending on your workspace settings, this might not happen right away. To ensure that your workspace is updated, select **Project** → **Clean** from the menu bar in your IDE, and then select the RedbookCS project.)

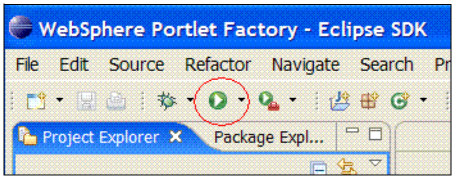

WebSphere Portlet Factory - Eclipse SDK
File Edit Source Refactor Navigate Search Pr
Project Explorer
Package Expl...

Figure C-20 Refreshing the application

You now have a remotely deployed WebSphere Portlet Factory development WAR, which you can refresh directly from your IDE. You can test your application by using the play button on the toolbar.

Advantages and disadvantages

The main advantage of using remote deployment is that you don't need to have an application server instance running on the same machine as the WebSphere Portlet Factory Designer. This frees up system resources and can result in generally faster development times, particularly on slower development machines. Also, using a remote application server for deployment allows multiple developers to preview their applications using the same server. This guarantees that everyone is testing under the same conditions, and makes administering the test environment much easier.

Unfortunately, there are disadvantages to remote deployment as well. Having multiple developers deploy to the same server can lead to disorganized installedApps and installableApps directories, particularly if there are no standards in place for how projects should be deployed. Similarly, if one developer breaks something on the server, then it will be broken for everyone (and if the server crashes, it will also be down for everyone). Remote deployment can also be slower in some cases, such as when connection speeds are low, the remote server is slow, or large files are being deployed, although this is usually not the case.

D

Configuring the RAD Unified Test Environment

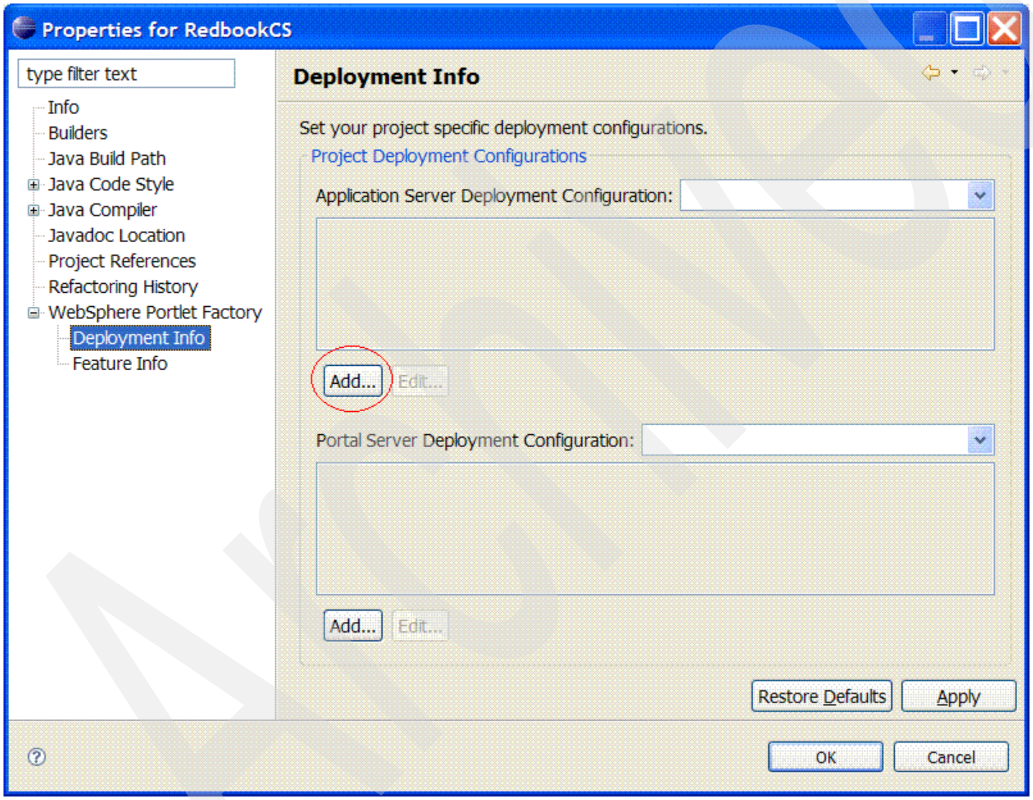
This appendix builds on the discussion in Chapter 3, “Creating projects” on page 39 to address specific issues required for configuring the Rational Application Developer (RAD) Unified Test Environment for Portlet Factory Development.

Important: This appendix should be used in conjunction with Chapter 3, “Creating projects” on page 39, as much of the information builds directly upon what was included in this earlier chapter.

Setting up deployment configurations using RAD with an Embedded Test Environment

If you are using RAD with an Embedded Test Environment, follow these steps:

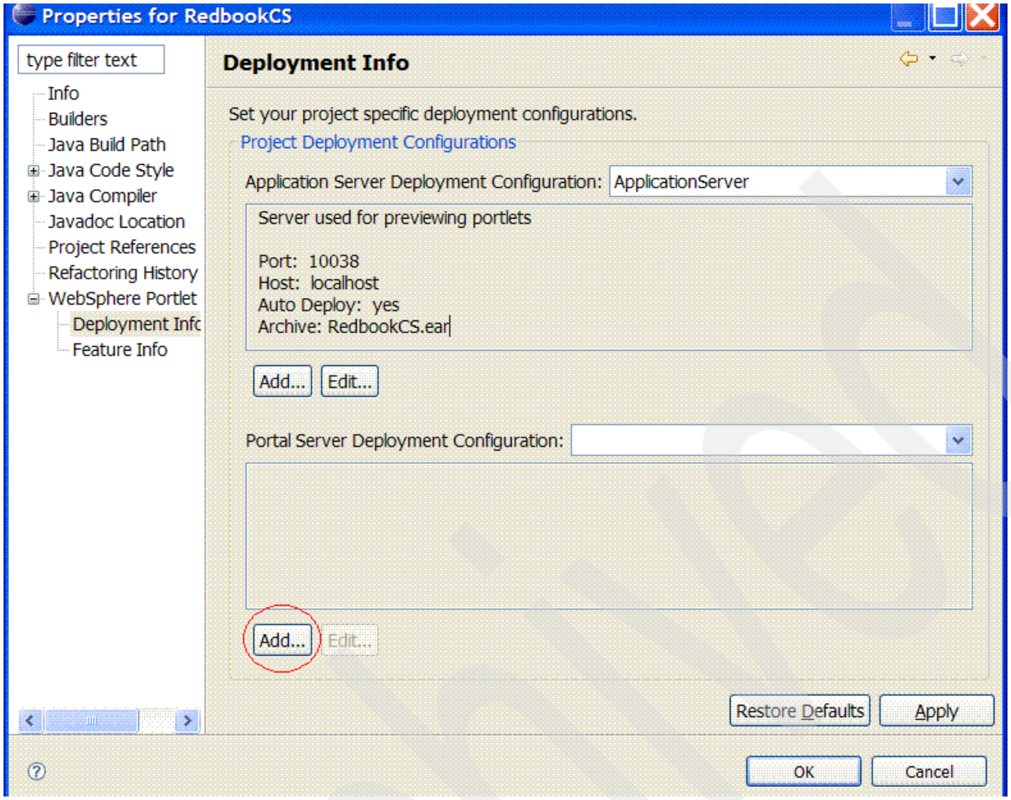
1. Open up the project properties dialog by clicking the root folder in your WebSphere Portlet Factory project (RedbookCS) and then selecting **Properties** from the Project menu.
2. Select **Deployment Info** from the Websphere Portlet Factory section, as shown Figure D-1.



Set your project specific deployment configurations.

Figure D-1 Properties window

3. You will need to add an Application Server Deployment Configuration or a Portal Server Deployment Configuration, but not both. Since we will be running portlets, we will add a Portal Server Deployment Configuration.
4. Click the **Add** button below the Portal Server Deployment Configuration section as shown Figure D-2.



Deployment Info

Set your project specific deployment configurations.

Project Deployment Configurations

Application Server Deployment Configuration: ApplicationServer

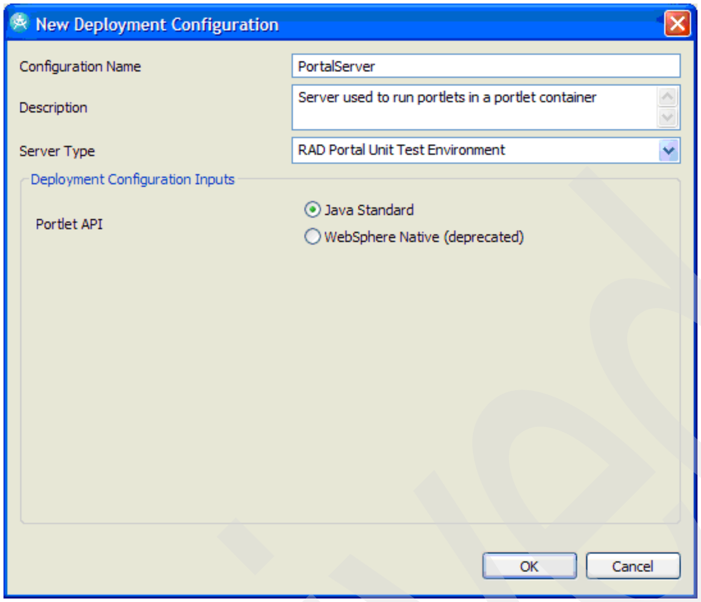
Server used for previewing portlets

Port: 10038
Host: localhost
Auto Deploy: yes
Archive: RedbookCS.ear

Portal Server Deployment Configuration:

Figure D-2 Portal Server deployment configuration

5. When the Portal Server Configuration dialog appears, give your configuration a name (don't use spaces). We used "PortalServer".
6. Write a description for the configuration. We used "Server used to run portlets in a portlet container."
7. In the Server Type dialog, choose **RAD Portal Unit Test Environment**. Choosing an option from this dropdown will display additional options at the bottom of the dialog.
8. On this screen you can choose a Portlet API for your portlet. WebSphere Portlet Factory supports both Java Standard Portlets (JSR-168 compliant portlets) and WebSphere Native Portlets (WebSphere Portlet API portlets). Make sure "Java Standard" is selected.
9. The deployment configuration dialog should now appear similar to Figure D-3.


New Deployment Configuration

Configuration Name: PortalServer

Description: Server used to run portlets in a portlet container

Server Type: RAD Portal Unit Test Environment

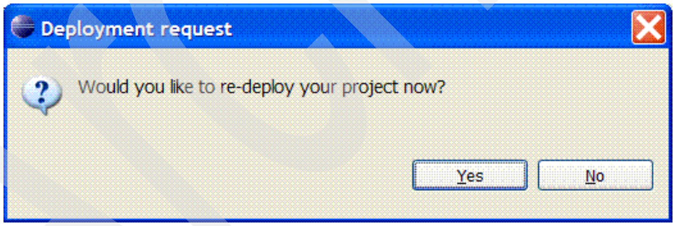
Deployment Configuration Inputs

Portlet API: ● Java Standard ○ WebSphere Native (deprecated)

Figure D-3 Deployment configuration dialog

10. Click **OK** when finished.

11. Click **OK** on the Deployment Info dialog to finish updating the deployment configuration. A dialog will appear (shown Figure D-4) asking you whether you would like to re-deploy your application. Click **Yes**.


Deployment request

Would you like to re-deploy your project now?

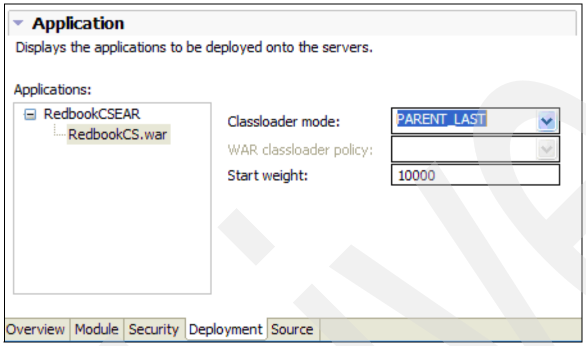
Figure D-4 Dialog for re-deploying application

You now have set up your deployment configuration and deployed your application to a WebSphere Portal Embedded Test Environment. To test your configuration, follow the steps in 3.5, “Testing” on page 57. Once you have completed this, note the following:

There are extra steps required to set up the project in the Embedded Test Environment before you can run the model.

If you are using RAD with an Embedded Test Environment, you will need to configure your project in your Embedded Test Environment. Follow these steps:

1. Right-click your project's EAR project and choose **Properties**.
2. Select **Targeted Runtimes**. Make sure your server instance is checked. Click **OK**.
3. In your project's EAR project, open the Deployment Descriptor for editing. Go to the Deployment tab and set the Classloader mode to PARENT_LAST for your project's WAR.



Application

Displays the applications to be deployed onto the servers.

Applications:

- RedbookCSEAR
  - RedbookCS.war

Classloader mode: PARENT_LAST

WAR classloader policy:

Start weight: 10000

Figure D-5 Deployment tab and set the Classloader mode to PARENT_LAST

4. Save your changes and close the Deployment Descriptor.
5. Right-click your project and rebuild the Portlet WAR again.
6. Right-click your project, select **Run As**, then select **Run on Server** from the sub-menu as shown in Figure D-6.

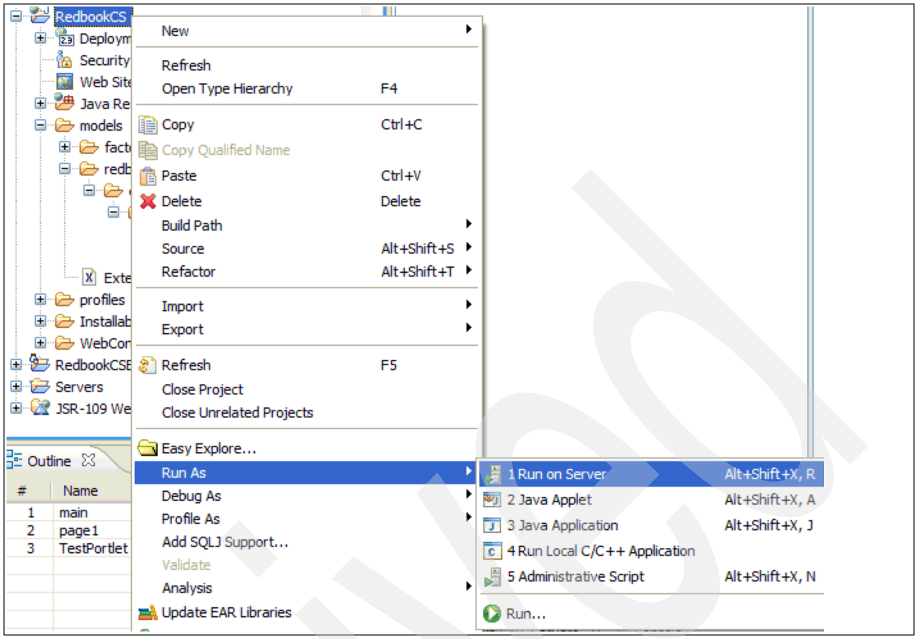
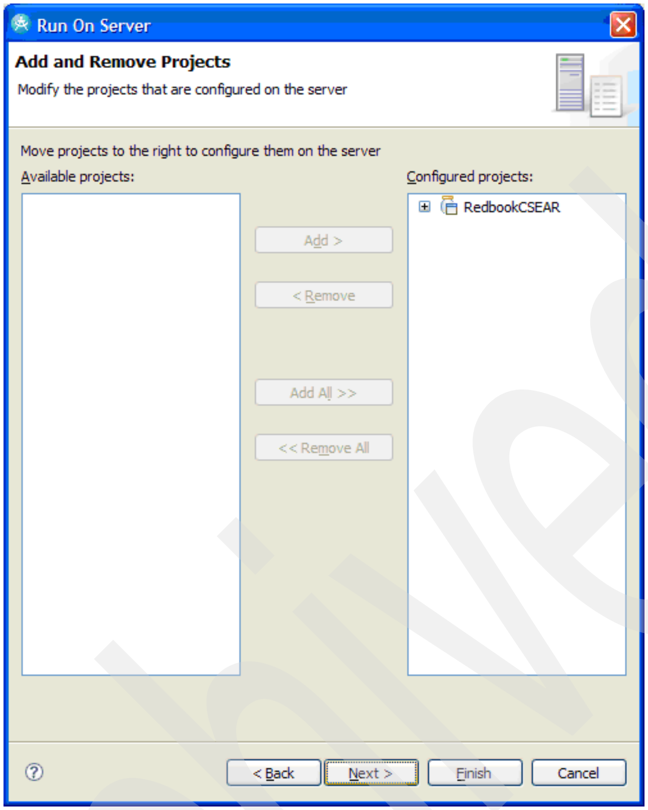


Figure D-6 Specifying how to run the project

7. In the Define a New Server window, select your WebSphere Portal instance and click **Next**.
8. In the next window, your project should show up in the Configured Projects column (Figure D-7). If it doesn't, add it and click **Next.**
9. Click **Finish** in the final window. Eventually, you will get a browser window showing your portlet. Once this is done, you will be able to run your model as described in 3.5, "Testing" on page 57.



Run On Server

Add and Remove Projects

Modify the projects that are configured on the server

Move projects to the right to configure them on the server

Available projects:

Configured projects:

RedbookCSEAR

Figure D-7 Running the project

Note: When using the Embedded Test Environment, you can skip the steps in “Previewing your portlets” on page 62 because the Embedded Test Environment has already allowed you to view the portlet. To see it again, simply repeat the Run on Server steps (steps 6 through 10).

Why do things seem "backwards" for the Embedded Test Environment? Because you can't successfully run the model standalone until you do at least one Run on Server after first deploying the project.

Important: It is important to republish after the re-deploy. Generally, Embedded Test Environment users will have to republish after re-deploying and before running the model, if the model was changed.

E

Considerations for WAS CE

This appendix describes the configuration of the Eclipse/WAS CE development environment in order to examine and run the Redbook application in WAS CE and includes the following topics:

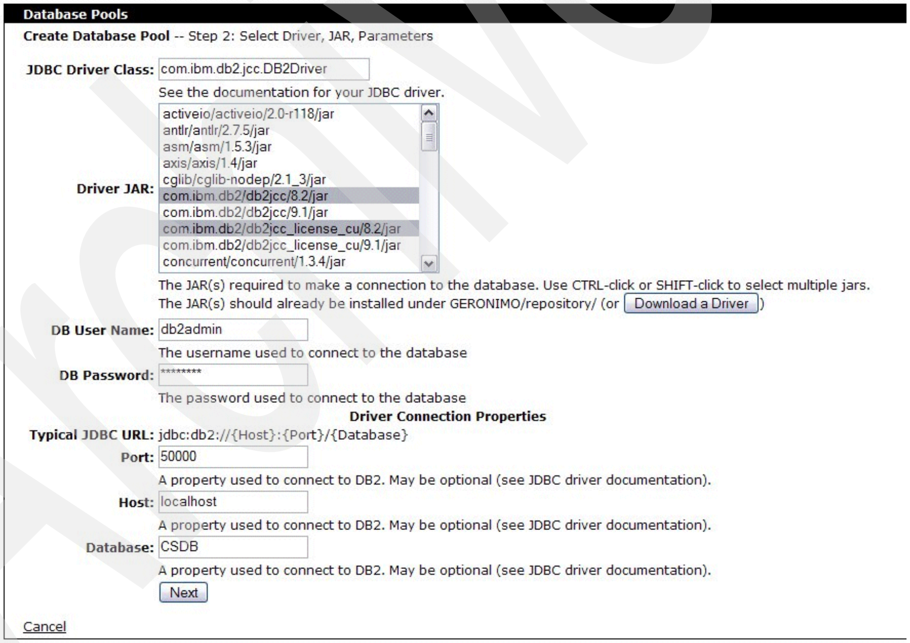
- Adding a database pool to the WAS CE server
- Modifying the development environment when deploying to WAS CE

Adding a database pool to the WAS CE server

Just as in a WebSphere development environment, you need to configure the application server to access the database server. In WAS CE, you do this by creating a “Database Pool,” which defines the JDBC driver and the database connection information. In WAS CE, the individual applications need to define the JNDI datasource and reference the database pool defined on the WAS CE server.

To add a database pool to the WAS CE server:

1. Open the Administrative Console for your WAS CE server instance.
2. Click on the Database Pools link in the Navigation Console panel.
3. In the resulting Database Pools panel, choose to add a new Database Pool with the “Using the geronimo database pool wizard” link.
4. Your configuration will be similar to the one shown in the figure below:



Database Pools

Create Database Pool -- Step 2: Select Driver, JAR, Parameters

JDBC Driver Class: com.ibm.db2.jcc.DB2Driver

See the documentation for your JDBC driver.

Driver JAR:
- activeio/activeio/2.0-r118/jar
- antlr/antlr/2.7.5/jar
- asm/asm/1.5.3/jar
- axis/axis/1.4/jar
- cglib/cglib-nodep/2.1_3/jar
- com.ibm.db2/db2jcc/8.2/jar
- com.ibm.db2/db2jcc/9.1/jar
- com.ibm.db2/db2jcc_license_cu/8.2/jar
- com.ibm.db2/db2jcc_license_cu/9.1/jar
- concurrent/concurrent/1.3.4/jar

The JAR(s) required to make a connection to the database. Use CTRL-click or SHIFT-click to select multiple jars.
The JAR(s) should already be installed under GERONIMO/repository/ (or Download a Driver)

DB User Name: db2admin

The username used to connect to the database

DB Password: ********

The password used to connect to the database

Driver Connection Properties

Typical JDBC URL: jdbc:db2://{Host}:{Port}/{Database}

Port: 50000

A property used to connect to DB2. May be optional (see JDBC driver documentation).

Host: localhost

A property used to connect to DB2. May be optional (see JDBC driver documentation).

Database: CSDB

A property used to connect to DB2. May be optional (see JDBC driver documentation).

Figure E-1 Database pool configuration

Once you have entered the database connection info, click, Next and test the connection. If the connection succeeds, click the deploy button. If it fails, confirm that the information you entered matches the actual server name, database name, and port number on which the database listens for requests. Also make sure that the JDBC driver you specify is appropriate for the database server to which you are connecting.

> **Note:** WAS CE includes the DB2 Universal JDBC Driver for DB2 8.2 and 9.1 as part of its distribution. If you are creating a database pool to a different RDBMS, you will need to deploy the JAR(s) for the JDBC driver as “Common Libs” before you can create the database pool.

Once you have the WAS CE database pool deployed, you can configure your project to use that database pool via a JNDI datasource defined in the project’s geronimo-web.xml and wasce.web.xml files.

Modifying the development environment when deploying to WAS CE

Developing the Redbook project in a WAS CE development environment requires that you configure the environment so that the application references the database pool you created in the WAS CE Administrative Console and that database provider models use indirect JNDI notation to that resource reference. (“java:comp/env/jdbc/csdb” instead of “jdbc/csdb”).

Modifying the project configuration files

In order for applications deployed to WAS CE to access the database pool, they need to define references to the database pool and declare that reference to be a JNDI datasource.You can create these references in the Portlet Factory Designer by modifying the following files:

- WEB-INF/geronimo-web.xml
- WEB-INF/bin/deployment/wasce.web.xml

Each of these files contains commented entries for the datasource configuration. Each of the file listings below reflect that the database pool name is, “csdb”. If your database pool name is something different, modify your files accordingly.

Example: E-1 Mapping of database pool to resource reference in geronimo-web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns="http://geronimo.apache.org/xml/ns/j2ee/web-1.1">
   <environment
      xmlns="http://geronimo.apache.org/xml/ns/deployment-1.1">
      <moduleId>
         <groupId>geronimo</groupId>
         <artifactId>pf_redbook</artifactId>
         <version>1</version>
         <type>war</type>
      </moduleId>
      <dependencies>
         <dependency>
            <groupId>console.dbpool</groupId>
            <artifactId>csdb</artifactId>
         </dependency>
         ...
      </dependencies>
      <inverse-classloading />
   </environment>
   <context-root>/pf_redbook</context-root>
   <resource-ref>
      <ref-name>jdbc/csdb</ref-name>
      <resource-link>csdb</resource-link>
   </resource-ref>
</web-app>
```

Example: E-2 Mapping of resource reference to be of type DataSource *in wasce.web.xml*

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE web-app PUBLIC "-//Sun Microsystems, Inc.//DTD Web
Application 2.3//EN" "http://java.sun.com/dtd/web-app_2_3.dtd">
<web-app>
  <display-name>WPF</display-name>
  <description>IBM WebSphere Portlet Factory</description>

   <resource-ref>
      <res-ref-name>jdbc/csdb</res-ref-name>
      <res-type>javax.sql.DataSource</res-type>
      <res-auth>Container</res-auth>
      <res-sharing-scope>Shareable</res-sharing-scope>
   </resource-ref>
...
```

Once you have modified and saved the geronimo-web.xml and wasce.web.xml files, re-deploy the development WAR by right-clicking on the project and choosing: Application Server WAR > Build WAR for Dev Testing.

Modifying the csapp.properties file

The JNDI name for the datasource used by the database provider models is driven by the JNDIName property in the project's WEB-INF/resources/redbook/cs/properties directory.

By default, this value is, "jdbc/csdb". Assuming you named your resource reference "jdbc/csdb", modify the JNDIName property to be: "java:comp/env/jdbc/csdb".

Applying the profile in designer

The only task remaining before you can work with the Redbook app in a WAS CE environment is to set Designer to use the "Development" profile when working with the database provider models.

To apply the Development profile in Designer:

1. Open one of the database provider models.
2. In Designer, click on the Applied Profiles tab.
3. From the Profile drop down list, select "Development" and click Apply.

Any errors in the model that were due to data not being available are cleared.

F

Execution processing

This appendix discusses the steps and architectural considerations related to execution processing.

Execution processing

The Portlet Factory runtime includes a thin controller layer that handles requests for web applications and portlets, generating them from their underlying WebApp abstraction prior to execution. When a request to execute a model is sent to the server, the main steps taken are as follows.

- Profile selection

  When an HTTP request is made, it is handled by the application server or portal server, which does any necessary authentication for the security realm. The request is then passed to the Factory controller, beginning the profile selection process. A profile is then selected for use during the generation process. r arbitrary piece of meta-data or logic implemented by the developer.

- WebApp creation

  During the second phase, the selected profiles is applied to a specific model, producing a WebApp. During this process, the generation Engine fetches the appropriate profile values from the selected profile(s), and then creates and caches the WebApp. If an instance of this WebApp already exists in cache, this entire step is skipped; the cached WebApp instance is used instead.

- Execution

  In the third phase, the WebApp is executed for the specific user. During the first step of the execution phase, instance data is created for the user's session. Second, a class is generated containing all of the methods and action lists, but only if this is the first use of this WebApp. Next, the application executes its logic, calling out to various web services and components. And, finally, the JSP page is compiled and delivered (Note: compilation occurs only if it is the first time this page is executed on the server or if it is the first time the page is executed for a given profile). Subsequent requests from the user directly interact with the generated session, unless the application needs to be regenerated again based on a user's actions.

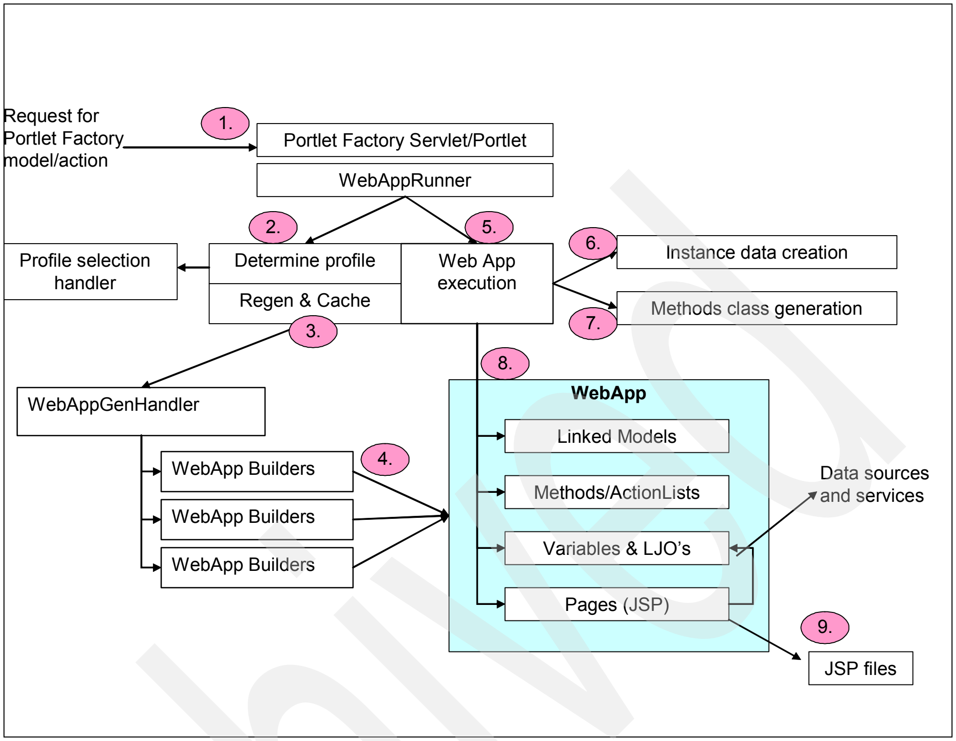


Figure F-1   Execution Flow: Initial Request

In Figure F-1, we see the flow for a request for an action in a model in the case where this model/profile combination has not yet been generated on this server. The request first is processed by the Portlet Factory servlet for a standalone web application or portlet adapter when running in a portal (step 1.) The processing then moves on to the Factory controller, also known as the "WebAppRunner". This controller first determines the model and profile associated with the request (step 2); it then looks for this combination in a cache. Since this is the first request for this combination, the WebApp is not found (step 3), and the generation process is kicked off. The generation engine executes, invoking builders to create the in-memory WebApp objects (step 4.) Once the WebApp has been created, application execution begins (step 5.) Since this is an initial request, the instance data for the WebApp must be created (step 6) - the instance data stores the runtime values of variables, and other per-session values such as the model instance's current page. Similarly, if the Java class that contains the method and action list implementations specified in the WebApp is not found, it is created at this point (step 7.) Once the instance data and methods class are made available, control is transferred to the action specified in the request (step 8), which presumably will result in a page being processed, either directly or indirectly. The abstract page name in the WebApp is then translated to the name of a JSP file. If this JSP file is non-existent or out-of-date, the page contents are written to this file, and then control is transferred to the JSP; if the hosting servlet engine has not yet generated the backing servlet for this JSP file, it will trigger a JSP compilation at this time (step 9.) The resulting markup is either send directly to the browser in the standalone web application case, or is aggregated into the containing portal page.

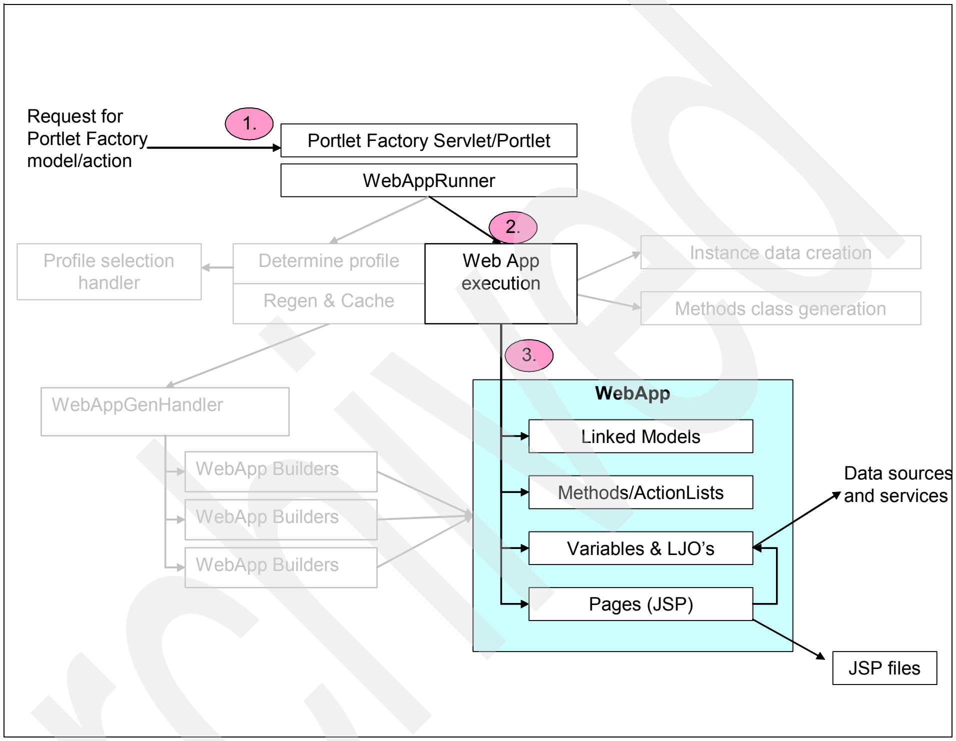


Figure F-2 Execution Flow: Subsequent Requests in Same Session

In Figure F-2, the flow is seen for a subsequent request to a model action. In this case, the controller sees that the correct WebApp has already been created, and skips the generation and instance data creation phases, transferring control directly to the generated application (steps 2 and 3.) The specified action is executed, eventually resulting in a JSP being run.

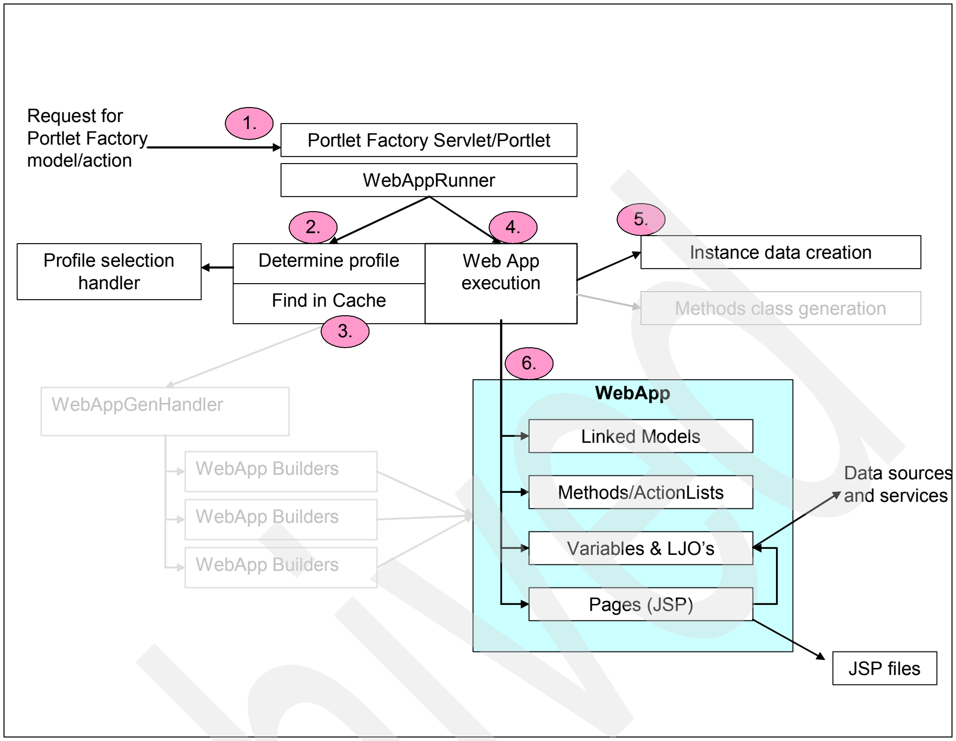


Figure F-3 Execution flow (Request processed for model/profile generated)

Figure F-3 shows the flow when a request is processed for a model/profile which has been generated, but which is the first request to this combination in the current user session. In this case generation can be skipped, since the indicated WebApp is found in the cache (steps 1-3) and control flows directly to the execution phase (step 4.) New instance data needs to be created in this case, since the model is not already in session (step 5.) From here, the action is directly executed. Since requests for this model have already been processed in another session, the methods class and JSP files are very likely in place and ready for direct execution. It is theoretically possible that this request is asking for a page which was not executed in any other session (e.g., an error page) - if so, the JSP will be written and compiled as above.

Execution: Portal action/render phases

When running in a portal, request processing is broken into two main phases: an action phase, in which a portlet action is executed without any page rendering being done, and the render phase, which happens whenever the portal page is re-drawn, and in which each portlet is asked to refresh its generated markup. Portlet Factory attempts to hide this detail from the developer: when you write code to handle an action, you can include calls to process a page, just as if you were handling a request in a standalone web application. When a Portlet Factory action executes in a portal's action phase, any calls to process a page do not attempt to execute the associated JSP; instead, a piece of instance data known as the "current page flag" is set with the name of the specified page, and processing continues from there. When the portlet is called in render mode, the portlet adapter transfers control to the current page for the associated model instance (calling the "main" action if no current page has been set.)

G

Additional material

This book refers to additional material that can be downloaded from the Internet as described here.

Locating the Web material

The Web material associated with this book is available in softcopy on the Internet from the IBM Redbooks Web server. Point your Web browser to:

`ftp://www.redbooks.ibm.com/redbooks/SG247525`

Alternatively, you can go to the IBM Redbooks Web site at:

ibm.com/redbooks

Select the **Additional materials** and open the directory that corresponds with the IBM Redbooks form number, SG247525.

Using the Web material

The additional Web material that accompanies this book includes the following files:

Table 12-1 The files contained as Additional Materal for this Redbook

File Name	Description
Chapter Builds Code.zip	Code used for each chapter
Database Schema Creation.zip	SQL code for creating the database schema
Domino Products Database.zip	Domino database used for storing the product information
ITSO Customer Self Service Application Code.zip	Final comprehensive code for the completed application
ITSO Theme for WebSphere Portal 6.0.zip	Code and Images used for creating the theme shown in ITSO Renovations sample
ProductsWebService.zip	Code for self contained Web Service

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

Online resources

These Web sites are also relevant as further information sources:

- Portlet Factory product documentation

  http://www.ibm.com/developerworks/websphere/zones/portal/portletfactory/proddoc.html
- Portlet Factory Samples: Miscellaneous Techniques

  http://www.ibm.com/developerworks/websphere/zones/portal/portletfactory/samples/misc.html
- Getting started with WebSphere Portlet Factory V6.0.1

  http://www.ibm.com/developerworks/websphere/library/techarticles/0704_wpf601/0704_wpf601.html

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Portal Application Development Using WebSphere Portlet Factory

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460 <-> 788 pages

Portal Application Development Using WebSphere Portlet Factory

Features and techniques for rapidly developing portlets

Step-by-step guidance for building a sample application

Best practices, hints, tips and troubleshooting

WebSphere Portlet Factory is a powerful and flexible tool for rapidly building portlets on top of a service-oriented architecture. It enables developers to quickly and easily leverage their company's core assets, automatically assembling them into custom, high-value portlets.

In this book, we show you specific techniques and a best practices approach for developing portlets using WebSphere Portlet Factory. Using a fictitious company scenario, we discuss how to build a Customer Self Service and Customer Representative application. Within this context, we cover the following topics:

- Installing and configuring the Portlet Factory development environment
- How to create and consume data services from SQL, Domino and a Web service
- Step-by-step guidance for creating the portlets and enabling inter-portlet communication
- Advanced UI design techniques, including the use of AJAX for type ahead functionality and working with the Dojo Builders
- Enabling the use of profiling
- Deployment production considerations
- Troubleshooting and debugging techniques

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