

Introduction to IBM Integration Bus (IIB)



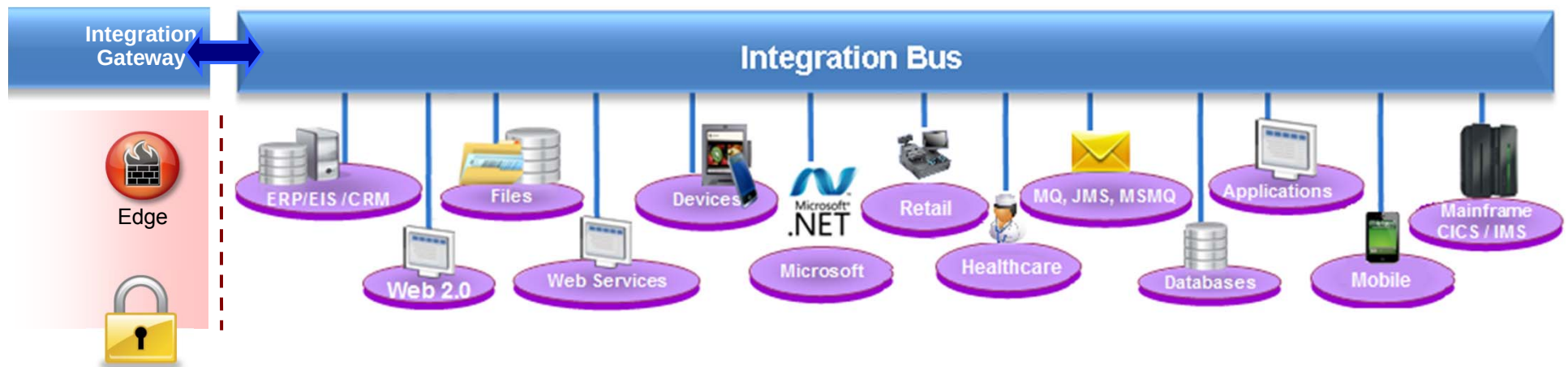
Agenda

- What is IIB (Message Broker)?
- Programming Concepts
 - Message Flows
 - Nodes
 - Message Model
- Product Overview
 - Components
 - Architecture
 - IIB on z/OS
- What's new in Message Broker V8
- What's new in IBM Integration Bus V9

Introducing IBM Integration Bus

■ IBM's Strategic Integration Technology

- Single engineered product for .NET, Java and fully heterogeneous integration scenarios
- DataPower continues to evolve as IBM's integration gateway



■ A Natural Evolution for WebSphere Message Broker users

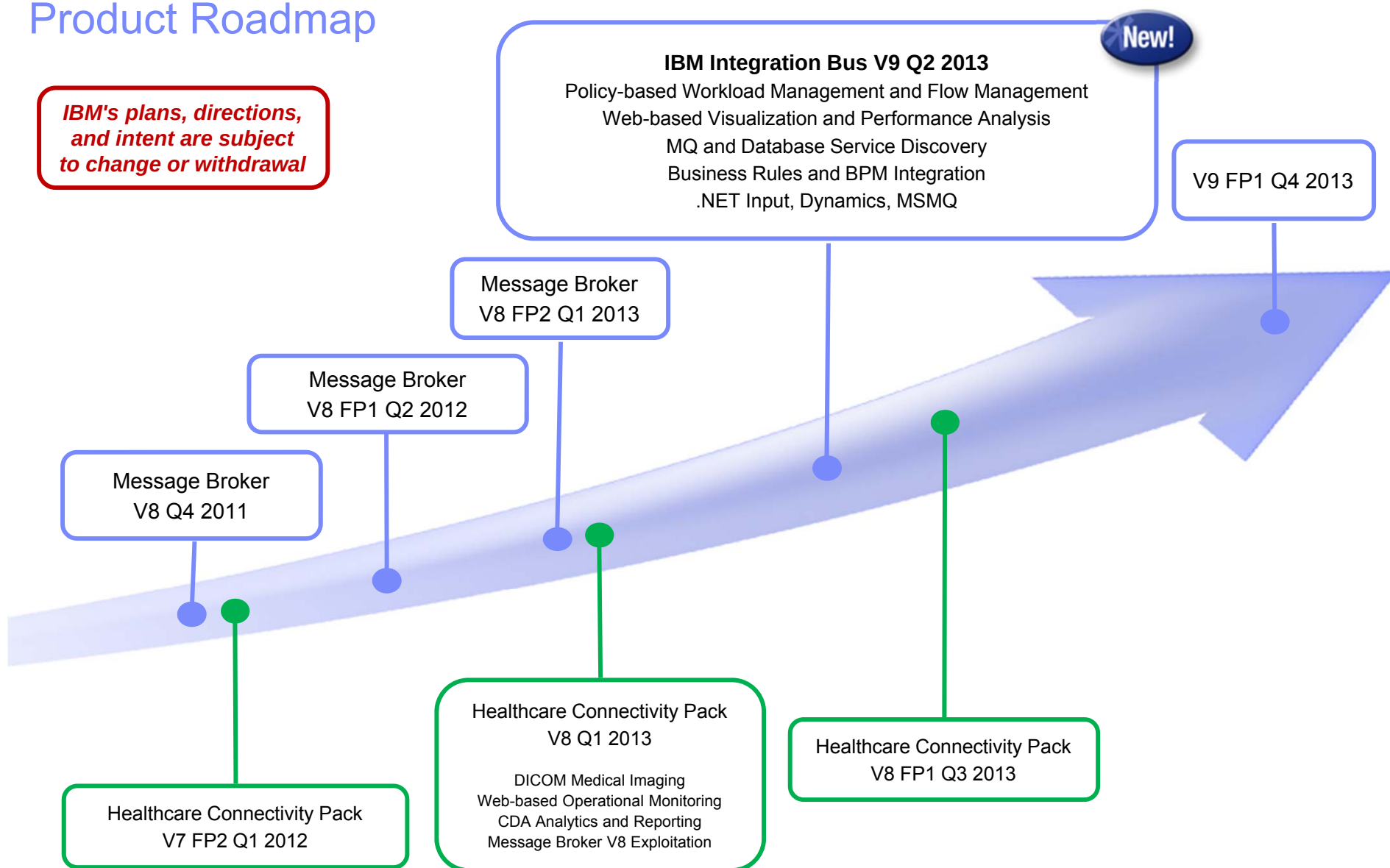
- Significant innovation and evolution of WMB technology base
- New features for Policy-based WLM, BPM integration, Business rules and .NET

■ Designed to incorporate WebSphere Enterprise Service Bus use cases

- Capabilities of WESB are folded in to IBM Integration Bus over time
- Conversion tools for initial use cases built in to IIB from day one
- WESB technology remains in market, supported. Migrate to Integration Bus when ready

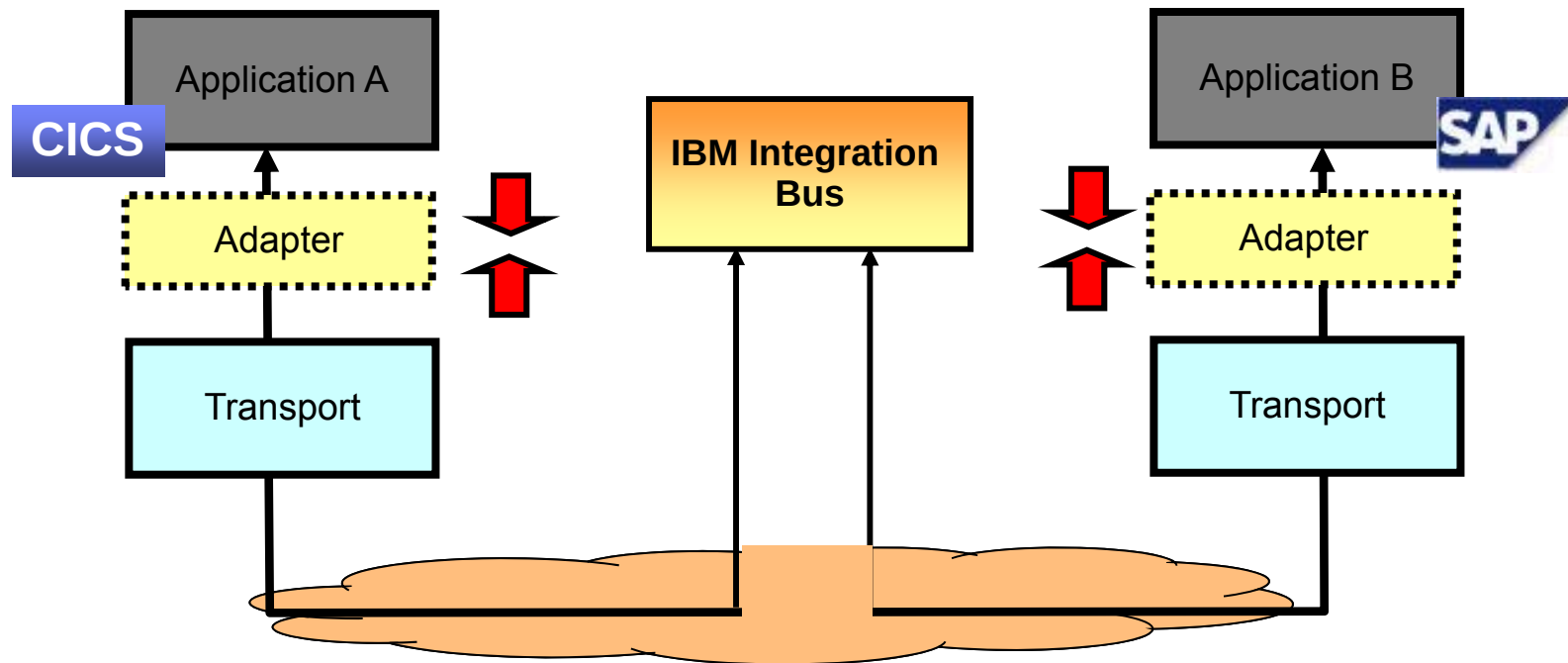
Product Roadmap

*IBM's plans, directions,
and intent are subject
to change or withdrawal*



What is an “Enterprise Service Bus (ESB)”?

"Gartner estimates that up to 30% of the cost of implementing an application is related to the development of the interfaces"
(Gartner, January 2000)

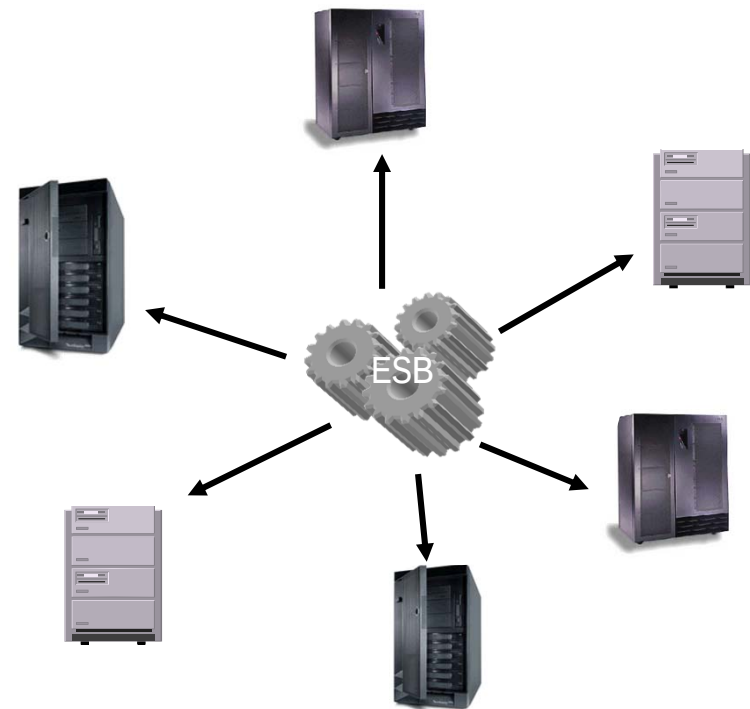


- The “Broker” (or “hub” or “gateway” or ...) is central and the intermediary between the applications
- It typically has responsibility for routing and transforming data between the applications
- A Broker must be polyvalent with support for multiple data formats and protocols, extremely reliable and scalable

Business value of an ESB

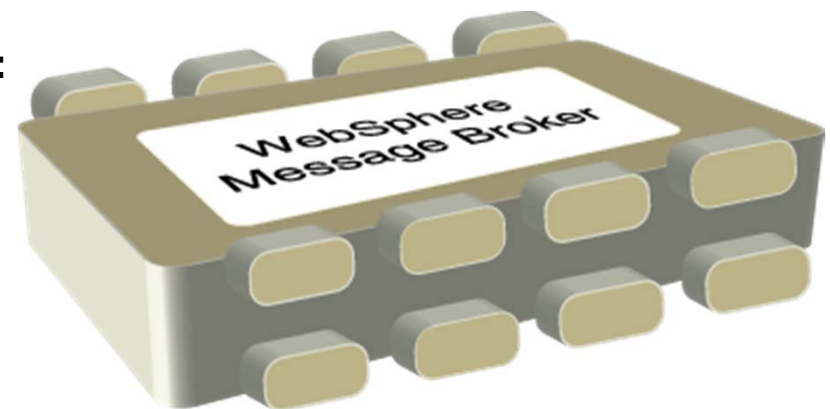
- Traditional communications
 - Point to point
 - Each application must adapt the data to its particular need
 - The number of transformations grows exponentially $n*(n-1)$
- Communications with a ESB
 - Hub 'n spoke logic
 - Maintenance can be centralised
 - Promotes reutilisation

(Note: although an ESB appears architecturally as a single middle point, scalability and high-availability requirements imply that multiple physical hubs are required)



What is IBM Integration Bus?

- **IBM Integration Bus enables “universal connectivity” by integrating protocols, message formats and mediation patterns**
 - Emphasis on application re-use
- **Fits naturally with WebSphere MQ**
 - Robust, scalable architecture
 - Optimized for high throughput
 - Flexible broker topologies
- **Three programming constructs are used:**
 - Message Flows
 - Nodes
 - Message Models



IBM Integration Bus (formerly WMB)...

- **Routes, Transforms, Augments** “messages”
- Supports **multi-format** (XML, SOAP, fixed, variable length, tagged, SWIFT, IDOC, etc.)
- Accepts **multi-protocol** (HTTP, JMS, MQ, SOAP, TCP/IP, local files, FTP, etc.)
- Offers full **database** support (DB2, Oracle, Informix, Microsoft SQL Server, Sybase, etc.)
- Supports common **ERP** and **EIS** interfaces (CICS, IMS, SAP, PeopleSoft, Siebel, etc.)
- Provides a drag ‘n drop **visual development** based upon Eclipse, supporting a variety of **development languages** (Java, eSQL, XSLT, PHP, .Net, etc.)
- Offers a **scalable, high-performance, resilient, low-latency** “execution container”
- Provides **transactional** (2PC) support (MQ, DB2)
- Supports Point-To-Point, Pub/Sub, Event, Synchronous and Asynchronous message processing styles
- Includes full life-cycle tooling (development, administration, runtime)
- Is extensible with open parser, node & administration interfaces
- Supports all major hardware and O/S platforms

Application Connectivity



- **Protocols**

- e.g. MQ, TCP/IP, HTTP, File system, FTP, SMTP etc.

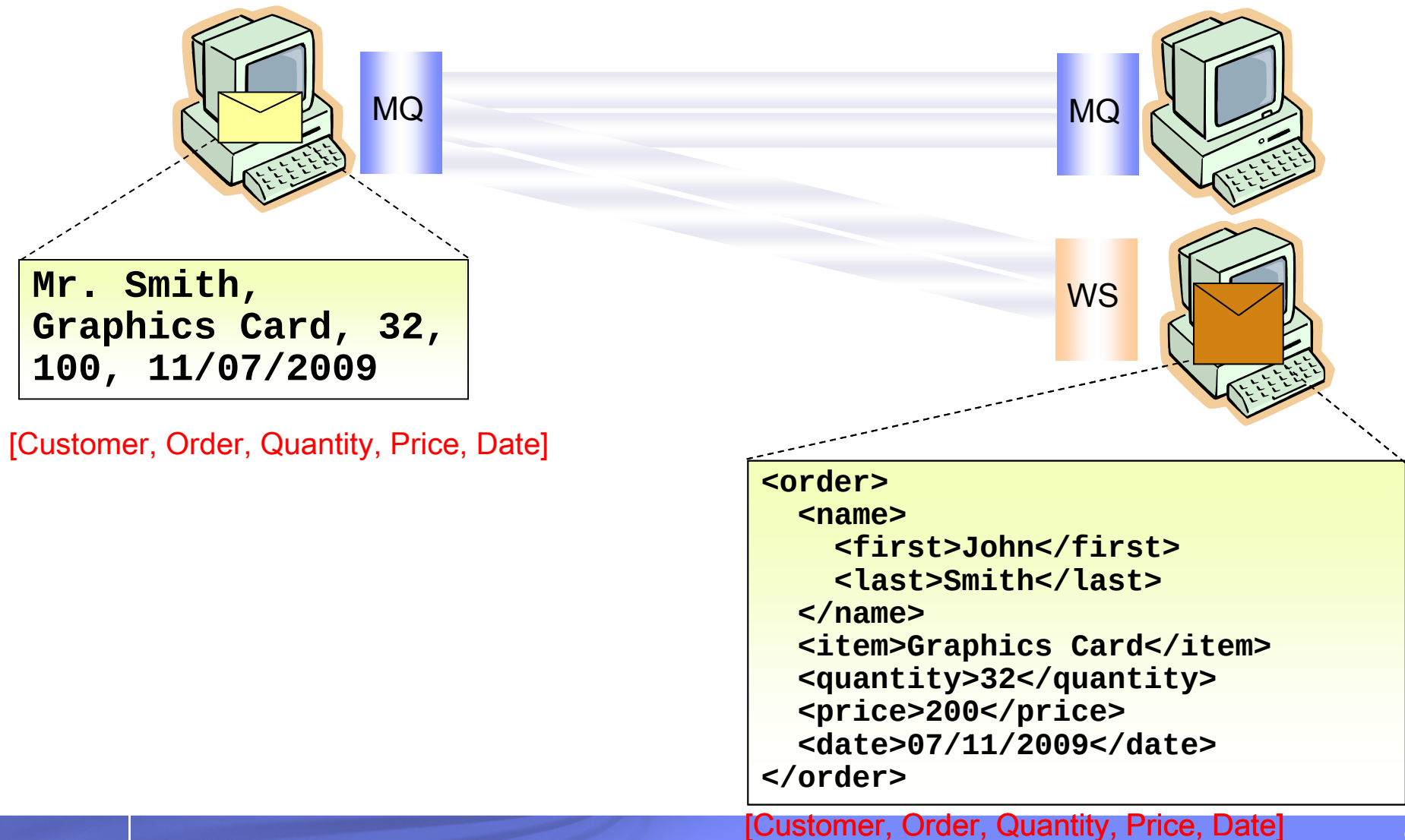
- **Message Formats**

- e.g. Binary (C/COBOL), XML, Industry (SWIFT, EDI, HL7), User-defined

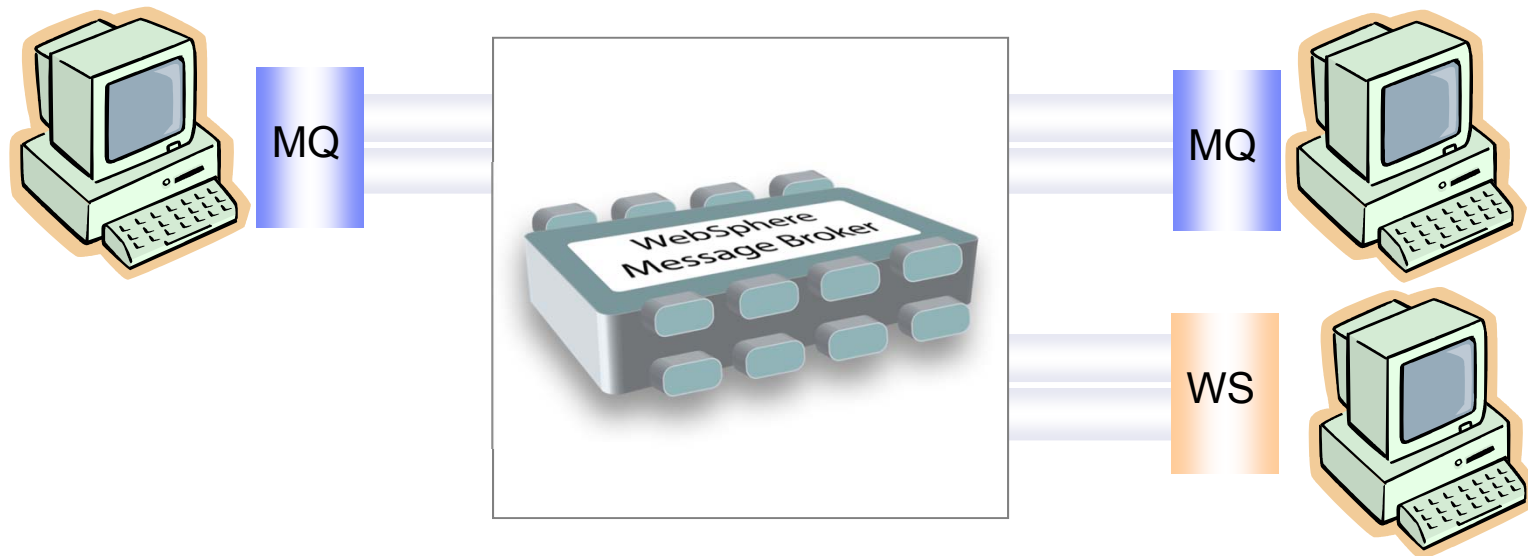
- **Mediation Patterns**

- e.g. Route, Transform, Enrich, Filter, Monitor, Distribute, Decompose, Correlate, Fire and Forget, Request/Reply, Publish/Subscribe, Aggregation, Fan-in, Complex Event Processing

Mediation Patterns – Routing and Transformation

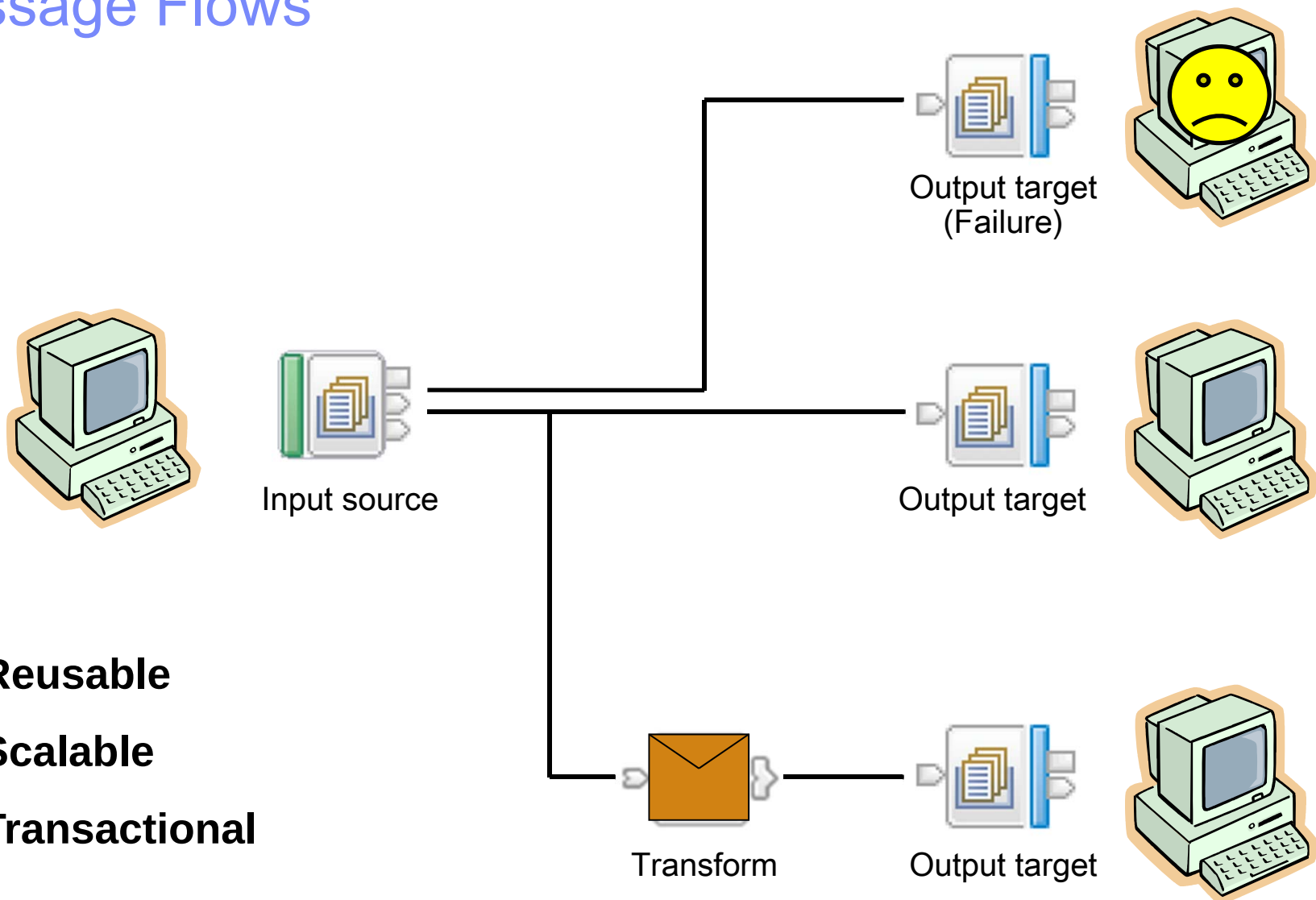


Application Connectivity with IIB



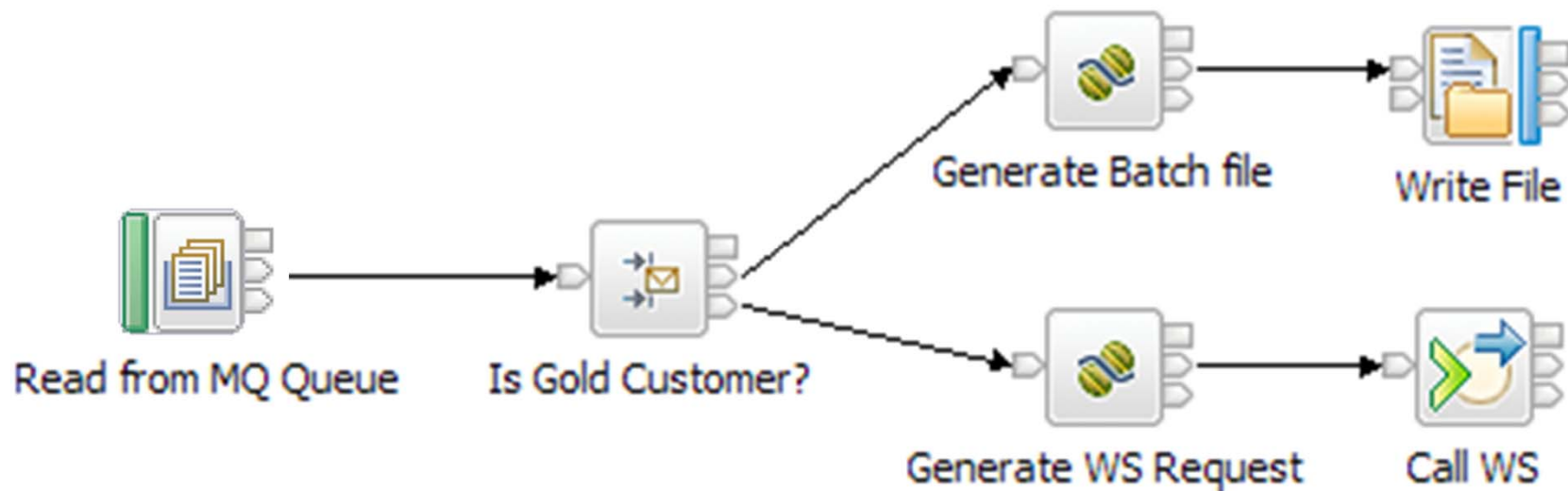
- IIB can act as an intermediary
- Flexible topologies

Message Flows



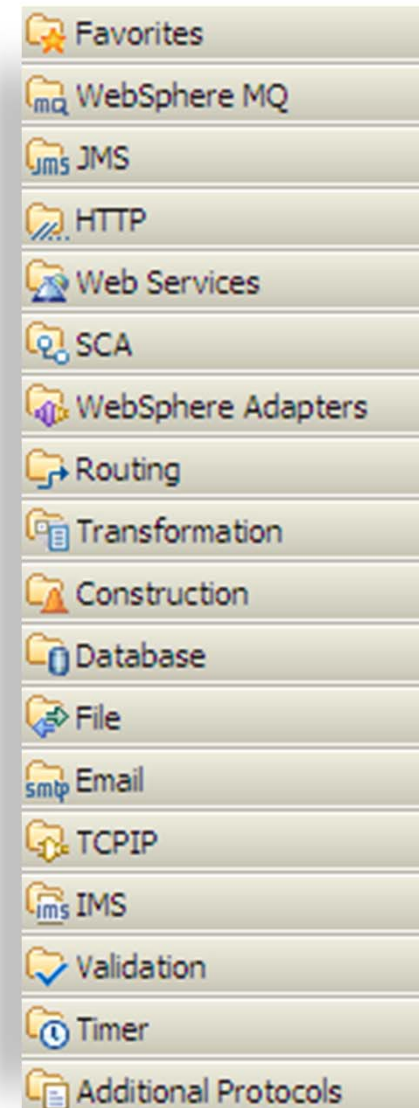
- **Reusable**
- **Scalable**
- **Transactional**

Message Flow Example



Nodes

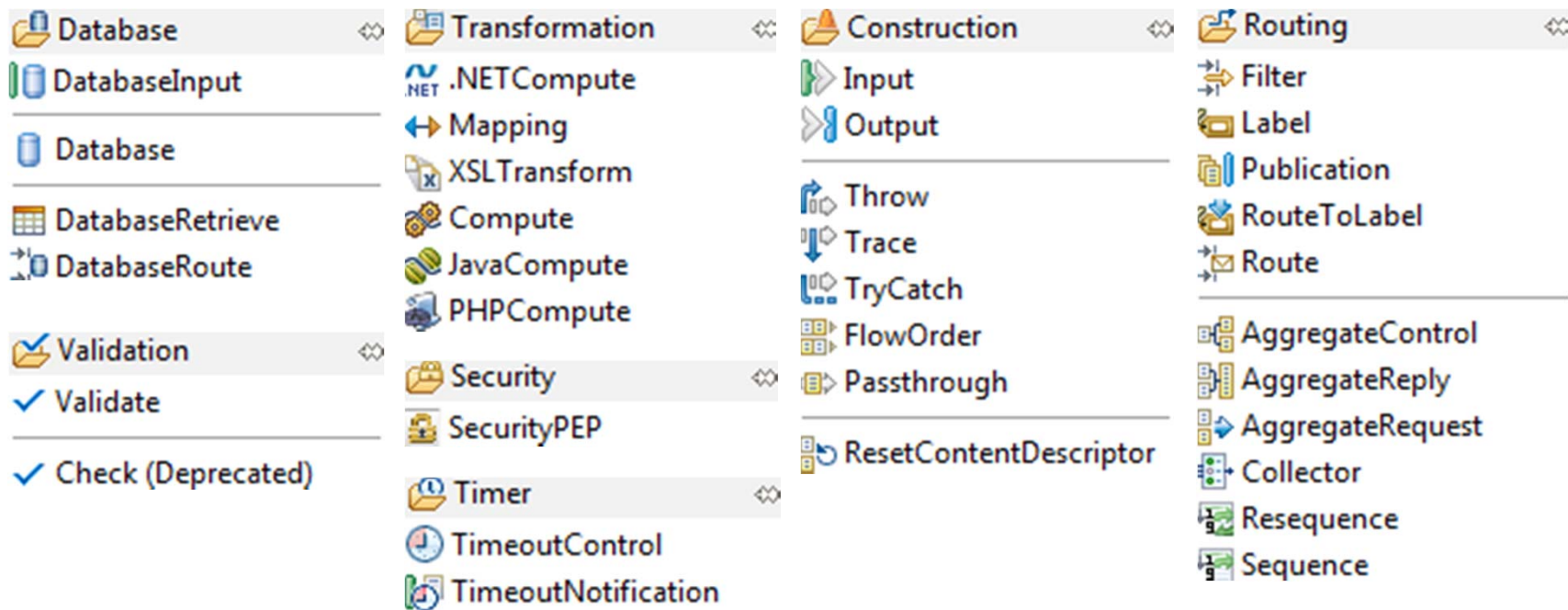
- **The building blocks of message flows**
- **Each node type performs a different (input, output or processing) action**
- **Many different node types**
 - Grouped into logical categories in the message flow editor



Lots of Nodes are Built in [1]

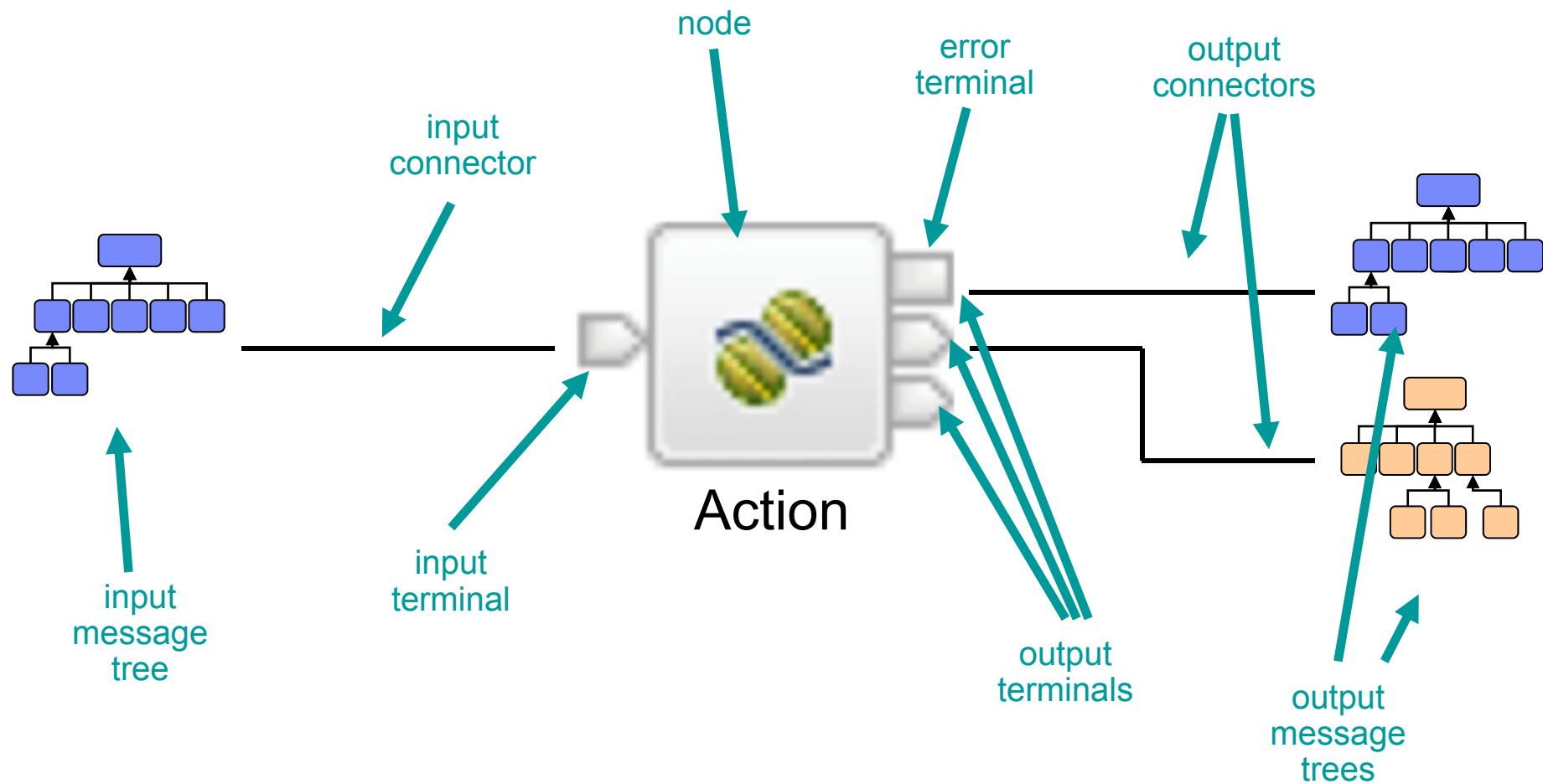
WebSphere MQ	Web Services	WebSphere Adapters	File
MQInput	SOAPInput	PeopleSoftInput	FileInput
MQOutput	SOAPReply	PeopleSoftRequest	FileOutput
MQReply	SOAPRequest		FileRead
MQGet	SOAPAsyncRequest	SAPInput	FTEInput
MQHeader	SOAPAsyncResponse	SAPRequest	FTEOutput
		SAPReply	
MQOptimizedFlow (De...	SOAPEnvelope	SiebelInput	CDInput
JMS	SOAPExtract	SiebelRequest	CDOOutput
JMSInput	RegistryLookup	JDEdwardsInput	Email
JMSOutput	EndpointLookup	JDEdwardsRequest	EmailInput
JMSReply	HTTP	TwineBallInput	EmailOutput
JMSReceive	HTTPInput	TwineBallRequest	
JMSHeader	HTTPReply		TCPIP
JMSMQTransform	HTTPRequest	SCA	TCPIPClientInput
MQJMSTransform	HTTPHeader	SCAInput	TCPIPClientOutput
IMS	HTTPAsyncRequest	SCAReply	TCPIPClientReceive
IMSRequest	HTTPAsyncResponse	SCARequest	
CORBA	CICS	SCAAsyncRequest	TCPIPServerInput
CORBAResponse	CICSRequest	SCAAsyncResponse	TCPIPServerOutput
			TCPIPServerReceive

Lots of Nodes are Built in [2]



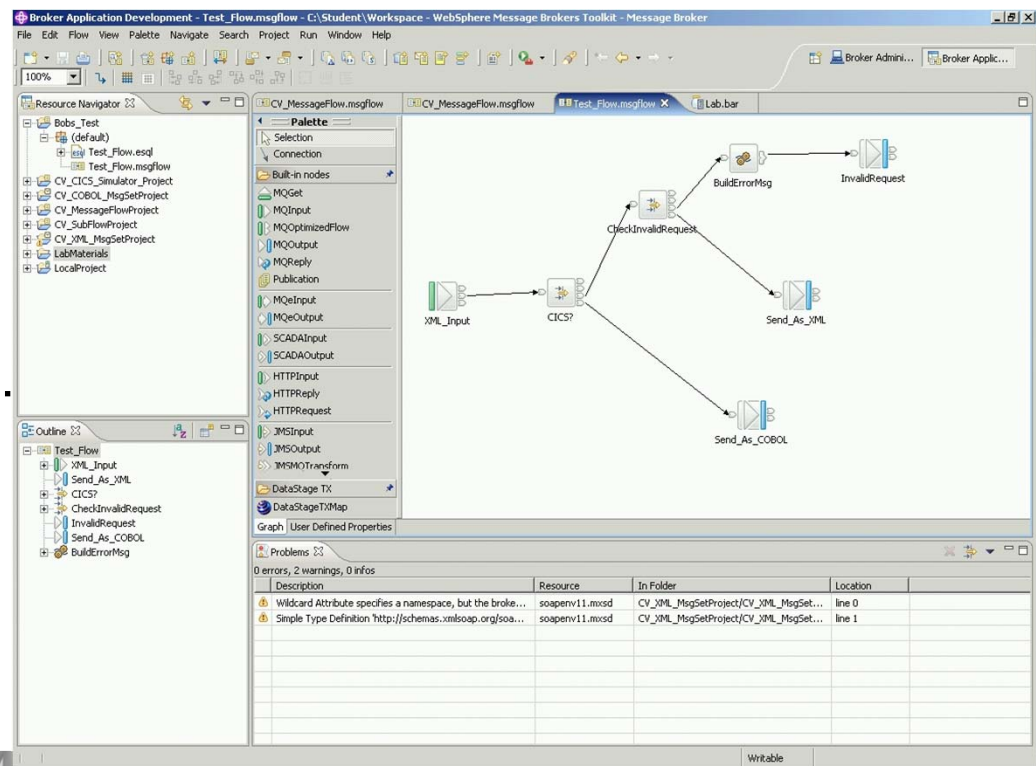
- Many other nodes available through product extensions and supportpacs
 - For example, WebSphere TX, Tibco RV, VSAM, QSAM
- Write your own User-Defined Nodes in C or Java

Node Terminology



The Integration Toolkit

- The GUI used for all ESB development tasks
-  based, standard interface for Windows or Linux (<http://www.eclipse.org/org/>)
- Provides various “perspectives” for different tasks to be performed
 - ▶ Message Flow Developer Perspective
 - ▶ Debug Perspective
 - ▶ Java Perspective
 - ▶ etc...
- Let's take a closer look at it.....



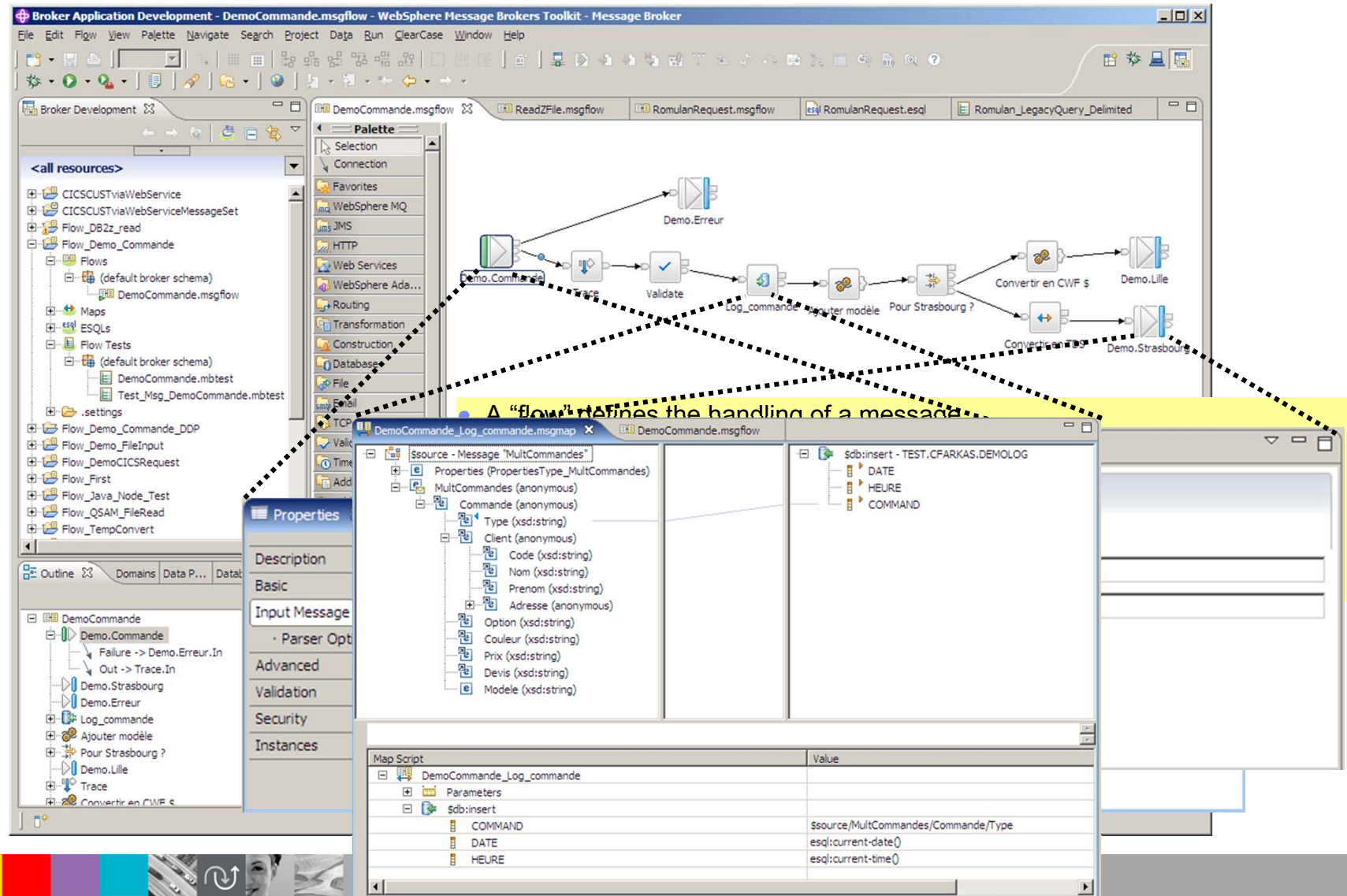
The Integration Toolkit tour

The screenshot displays the IBM Integration Toolkit (IIB) interface for developing message flows. The interface is divided into several panes:

- Navigator pane:** Located on the left, it shows a tree view of the project structure. The 'CollectorNodeSampleFlowProject' is selected, and its contents, including 'Flows', 'ESQLs', 'Flow Tests', and 'Broker Arch', are visible. A callout points to this pane with the label 'Navigator pane'.
- Editor pane:** The central area displays a message flow diagram. It starts with three input nodes (COLL_IN1, COLL_IN2, COLL_IN3) feeding into a 'COLL_NODE' (Collector Node). From 'COLL_NODE', the flow branches into two paths: one through 'COLL_TRACE1' and 'COLL_COMPUTE' to 'COLL_TRACE2' and 'COLL_OUT'; the other through 'COLL_COMP_EXPIRE' to 'COLL_EXPIRE'. A callout points to this pane with the label 'Editor pane'.
- Properties pane:** Located at the bottom right, it shows the 'Default Values for Message Flow Properties - CollectorNodeSample'. It includes fields for 'Version', 'Short description', and 'Long description'. A callout points to this pane with the label 'Properties'.
- Outline pane:** Located at the bottom left, it shows a list of 'Brokers' and 'Flows' under the 'MB7BROKER' project. A callout points to this pane with the label 'Outline pane'.

The top of the interface shows the 'Broker Application Development' window with a menu bar (File, Edit, Flow, View, Palette, Navigate, Search, Project, Run, Window, Help) and a toolbar. The 'CollectorNodeSample.msgflow' file is open in the main editor.

Integration Toolkit - Flow definition



Patterns

A pattern is a reusable solution that encapsulates a tested approach to solving a common architecture, design, or deployment task in a particular context.

Pattern example

The screenshot displays the WebSphere Message Broker Toolkit interface. The main window shows the 'Summary for pattern instance CarlMQRR'. The left pane, titled 'Patterns', shows a tree view of the project structure. A red box highlights the 'CarlMQRR' folder, which contains 'Project References', 'Pattern Configuration', and 'CarlMQRR_Flows'. The 'CarlMQRR_Flows' folder is further expanded, showing a list of flows: 'CarlRRRequest.msgflow', 'CarlRRRequestProcessor.msgflow', 'CarlRRResponse.msgflow', and 'CarlRRResponseProcessor.msgflow'. A red arrow points from the 'CarlRRRequest.msgflow' file to a yellow callout box that says 'That's it! Working flow generated!'. The main window also displays the 'Flow generation' section, which states: 'This pattern application has generated an instance of the Message Correlator for WebSphere MQ: request-response without persistence pattern which ensures that MQ response messages are reliably returned to the correct client. Project CarlMQRR_Flows has been created. This project includes the following message flows: CarlRRRequest, CarlRRResponse, CarlRRRequestProcessor, and CarlRRResponseProcessor.' The 'Tasks to complete' section lists the required queue managers and queues: 'Input queue: CarlRRIN', 'Store queue: CarlRRSTORE', and 'Response queue: CarlRRRESPONSE'.

Pattern Parameters

Broker Application Development - CarlMQRR/Pattern Configuration/CarlMQRR_summary.html - WebSphere Message Broker Toolkit - Message Broker - C:\w...

File Edit Navigate Search Project Run Window Help

Broker Dev Patterns E

*CarlMQRR - Pattern CarlMQRR_summary.htm CarlRRRequest.msgflow

Summary for pattern instance CarlMQRR

To complete pattern instance CarlMQRR, review the actions in this summary file.

Flow generation

This pattern application has generated an instance of the Message Correlator for WebSphere MQ: request-response without persistence pattern which ensures that MQ response messages are reliably returned to the correct client. Project CarlMQRR_Flows has been created. This project includes the following message flows:

- CarlRRRequest
- CarlRRResponse
- CarlRRRequestProcessor
- CarlRRResponseProcessor

Tasks to complete

The following queue managers and queues must exist before you can run the pattern instance. If the queue managers or queues do not exist, create them.

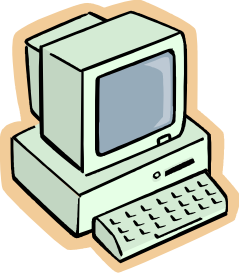
Broker queues on the broker queue manager:

- Input queue: CarlRRIN
- Store queue: CarlRRSTORE
- Response queue: CarlRRRESPONSE

Other queues:

CarlMQRR/Pattern Configuration/CarlMQRR_summary.html (2 of 20 projects showing)

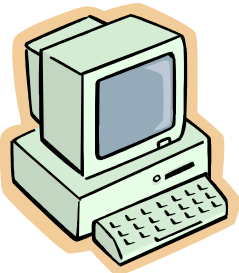
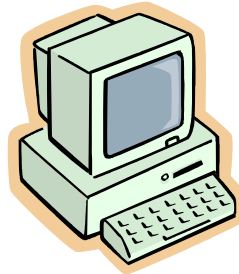
Message Modeling



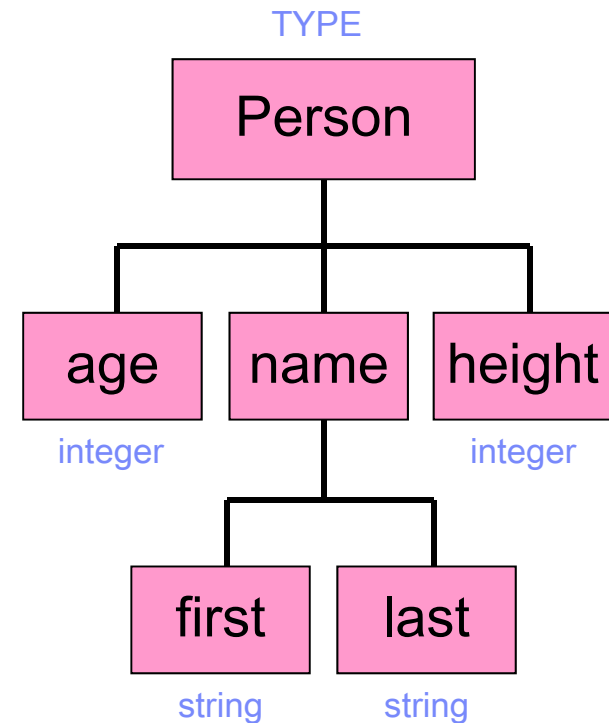
```
<Person age='32' height='172'>  
  <name>  
    <first>Fred</first>  
    <last>Smith</last>  
  </name>  
</Person>
```

```
struct {  
  int height;  
  int age;  
  char firstname[24];  
  char lastname[24];  
} Person;
```

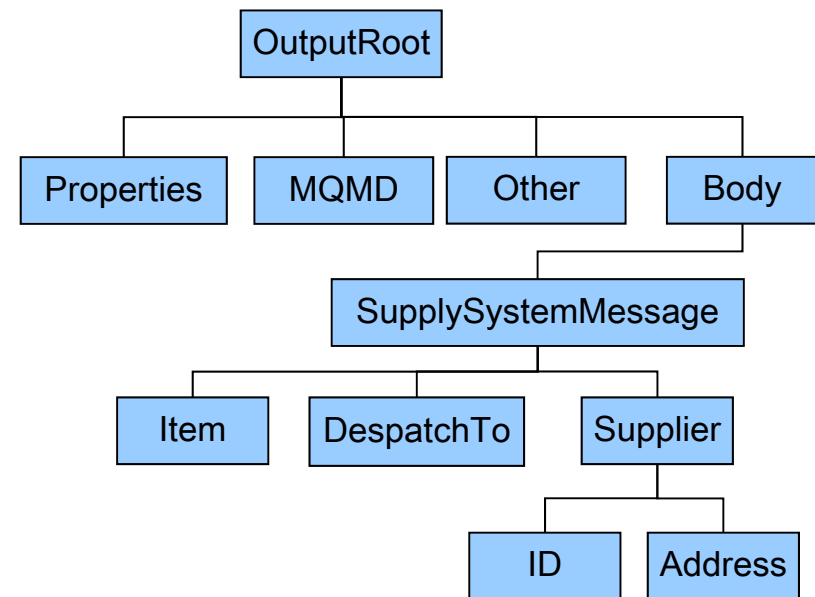
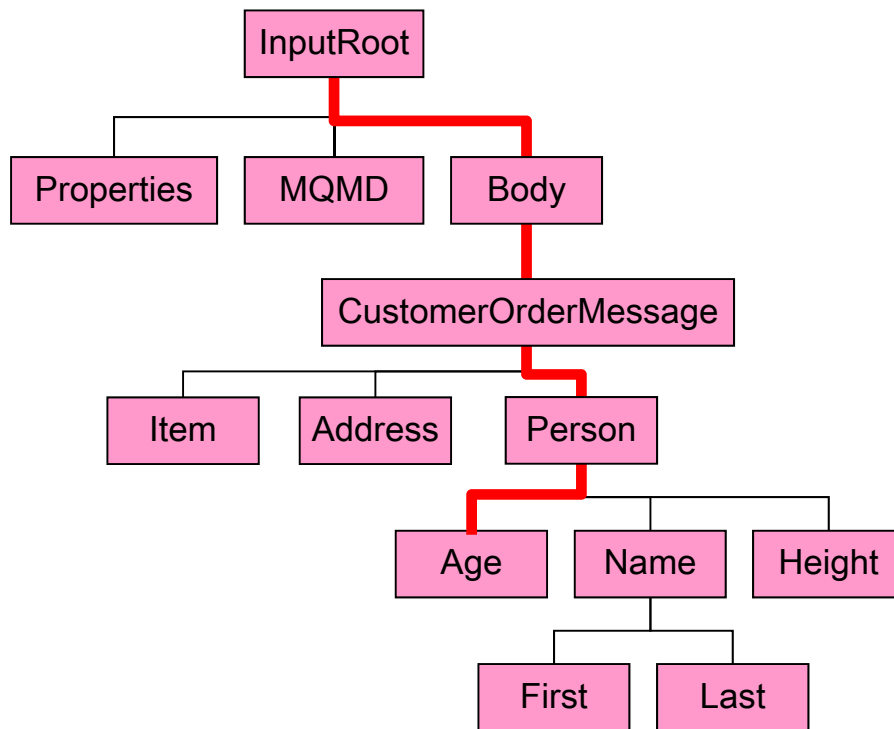
172	32	Fred	Smith
-----	----	------	-------



PER + 172 + 32 + Fred Smith



The Logical Message Model - Addressing

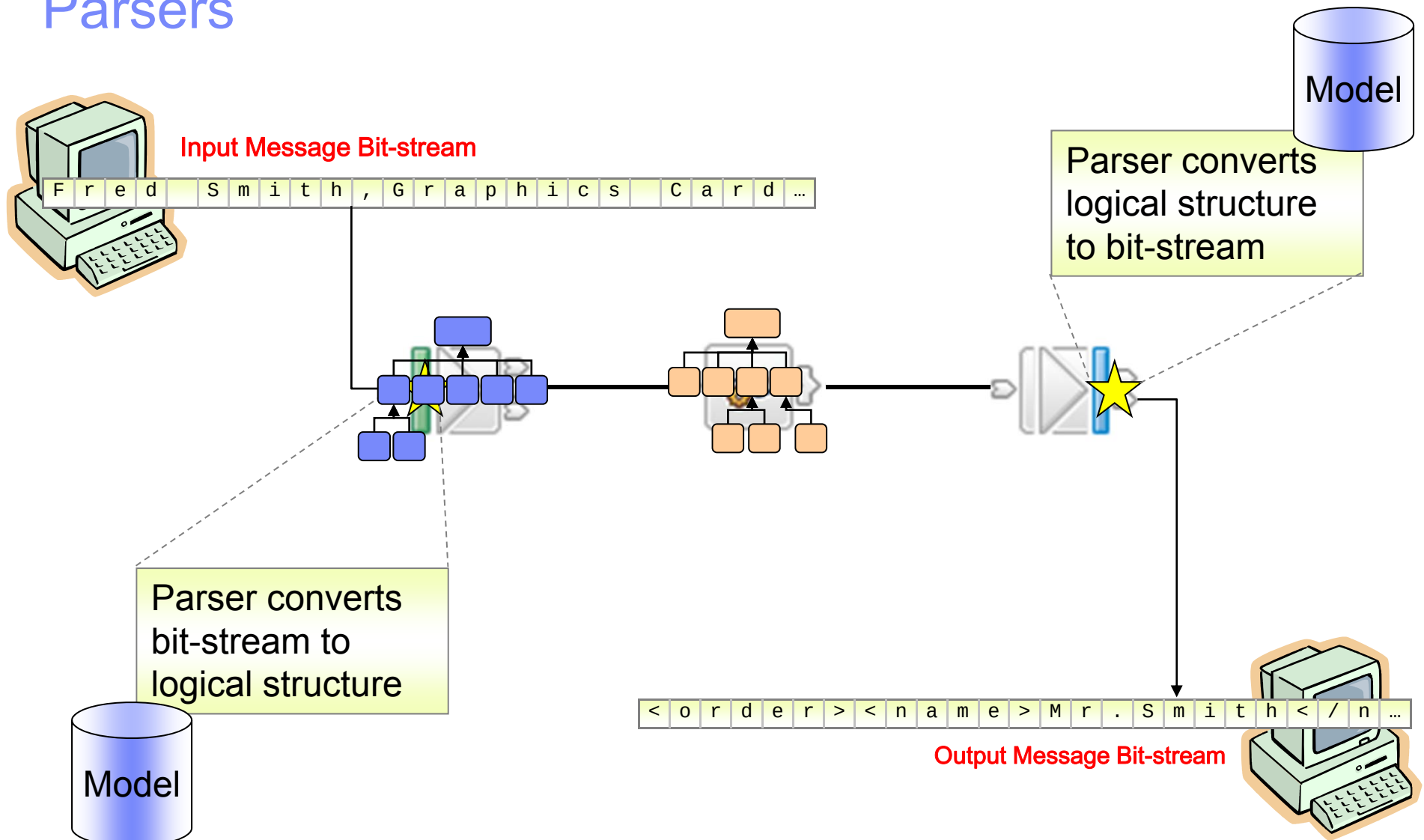


InputRoot.Body.CustomerOrderMessage.Person.Age

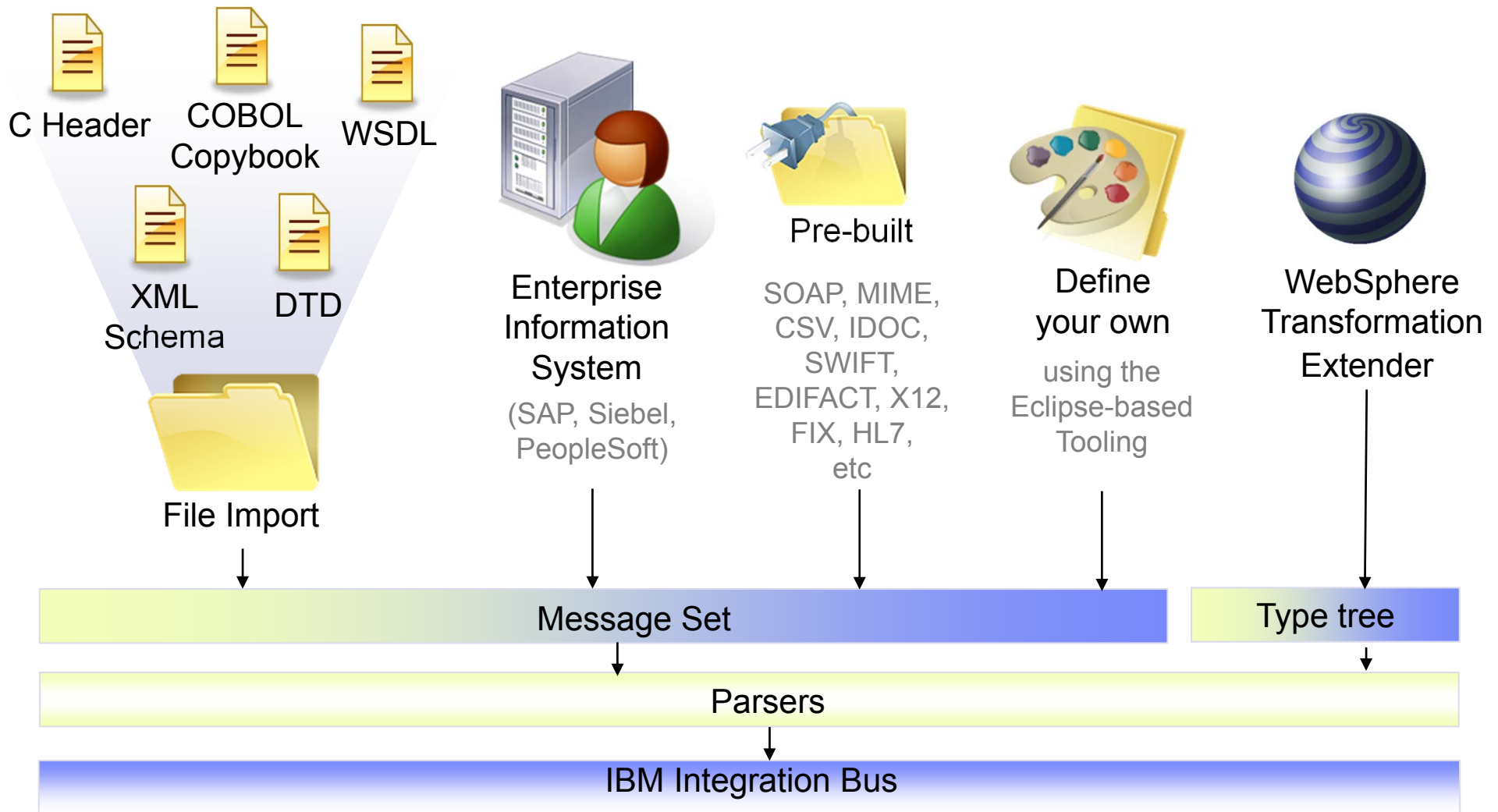
Examples:

- Update NAMESDB with the value of *InputRoot.Body.CustomerOrderMessage.Person.Name.Last*
- Set the output message *OutputRoot.Body.SupplySystemMessage.DespatchTo* field to be the value of the input message *InputRoot.Body.CustomerOrderMessage.Address*

Parsers

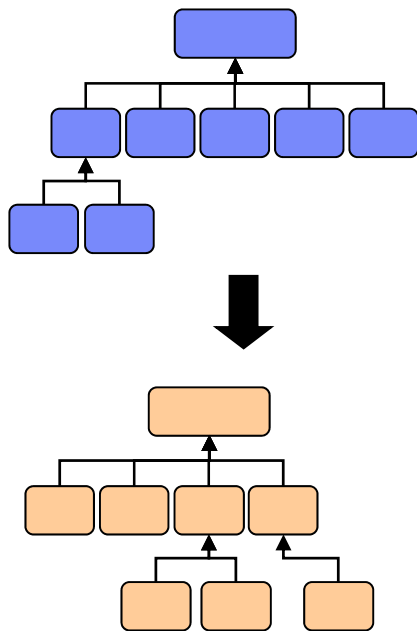


Creating Message Models



Message Transformation

- The conversion of one message format into another



Compute

- Describe powerful transformations quickly
- Uses SQL-based language (ESQL)



JavaCompute

- Uses Java programming language
- Ability to use XPath



PHPCompute

- Transform using PHP scripts
- PHP 5.2 compliant



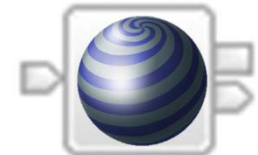
Mapping

- Graphical, easy to use
- Drag and Drop fields, apply functions



XSL Transform

- Convert XML to anything
- Uses standard XSL Style sheets



WTX Map

- Run a WebSphere Transformation Extender map

Examples of Message Addressing



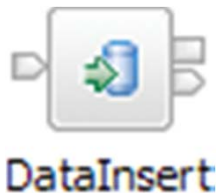
```
public class jcn extends MbJavaComputeNode {
    public void evaluate(MbMessageAssembly assembly) throws MbException {
        ...
        String lastName =
            (String)assembly.getMessage().evaluateXPath("/Body/Order/Name/Last");
        ...
    }
}
```



Route Node Properties - Route

Filter table*

Filter pattern	Routing output terminal
\$Body/Order/Price > 1000	BigSpenders
\$Body/Order/Price < 200	Cheapskates



```
IF Body.Order.Date < '2008/01/01' THEN
    INSERT INTO Database.OldOrders (LastName,Item,Quantity)
    VALUES (Body.Order.Name.Last,
            Body.Order.Item,
            Body.Order.Quantity);
ENDIF;
```

Development

The screenshot displays the IBM Message Brokers Toolkit for WebSphere Studio. On the left, the CVS Repository Explorer shows a project structure with various files and folders. The main window is titled 'Flow Debug - Message Brokers Toolkit for WebSphere Studio - Message Broker'. It features a 'Flow Debug' pane on the left showing a message flow diagram with nodes like 'NatStock.NatStockQuery', 'OrderReq', and '3004'. The 'Flow Debug Message' pane on the right shows a detailed view of a message, including properties like 'Customer' (CUSTNO = C9000, FNAME = Carl, LNAME = Farkas, ADDRESS1 = rue de la Paix, ADDRESS2 = Top floor, CITY = WebSphere City, ZIP = 1234, PHONE = +33 123 456 789, EMAIL = john.doe@alehouse.com, REGNO = ABC 1234) and 'Parts' (PART, PART, PART, PART, PART, TotalPrice = 60.50, OrderNo = C9000_216a58c8-fae3-46bf-be5e-3dee09cbc582). The bottom pane shows a message flow diagram with nodes like 'PARTS_SUM_IN', 'Total Price', 'Inject order', 'Map to Legacy', 'PARTS_SUM_OUT', 'PARTS_SUM_FAILURE', and 'Trace'.

- When “drag ‘n drop” development with the standard nodes isn’t sufficient, programming can be done typically with eSQL (procedural language based upon the SQL99 standard), Java, PHP, .Net, XSLT or additional add-on extensions such as WTX
- Custom nodes can also be developed either in Java or C++
- Toolkit supports tracing and interactive debugging
- Team development and administration is supported by scripting and/or standard market plugin extensions to the IIB Toolkit, eg. CVS, ClearCase, PVCS, TeamCode, etc.

eSQL



DataInsert

```

IF Root.XML.Person.Taille > 183 THEN
INSERT INTO Database.MesGrandsCopains
    (Name,Height,Age)
VALUES (Body.Person.Nom,
        Body.Person.Taille,
        Body.Person.Age);
ENDIF;

```



Compute

```

IF (Body.Person.Name = 'Carl') THEN
    OutputRoot.Properties.MessageFormat = 'XML';
ELSE IF (Body.Person.Name = 'Rudi')
    OutputRoot.Properties.MessageFormat = 'CWF';
ELSE IF (Body.Person.Name = 'Saad')
    OutputRoot.Properties.MessageFormat = 'TDS';
ENDIF;

```

Data types

INTEGER
 FLOAT
 DECIMAL
 STRING
 DATETIME
 BOOLEAN
 REFERENCE
 NULL
 ...

Operators

- + * /
 ||
 AND OR NOT
 = <> > >= < <=
 IN BETWEEN
 LIKE
 IS EXISTS
 ...

StatementsBasic

DECLARE
 SET
 IF ENDIF
 WHILE

Tree

MOVE
 CREATE
 DETACH
 ATTACH

Database

INSERT
 DELETE
 UPDATE
 PASSTHRU
 EVAL
 Node
 PROPAGATE
 RETURN
 THROW
 ...

FunctionsString

LENGTH
 TRIM LTRIM RTRIM
 OVERLAY
 POSITION
 SUBSTRING
 UCASE LCASE

Numeric

ABS
 BITAND NOT (X)OR
 MOD ROUND
 SQRT
 TRUNCATE
 EXTRACT

Datetime

EXTRACT
 CURRENTDATE
 CURRENTTIME

Field

BITSTREAM
 CARDINALITY
 FIELDTYPE
 SAMEFIELD

Complex

CAST
 SELECT
 ...

Java Compute Node

- Support for Java as IIB transformation language (Java Compute Node)
 - Complete support for Java JSE v7 integrated into IIB
 - Java classes deployed in the IIB Broker ARchive with the flow (.BAR)
 - “Wizards” used to simplify the development
 - Classes provided for XPATH message tree navigation
 -  zAAP support for IIB on z/OS!

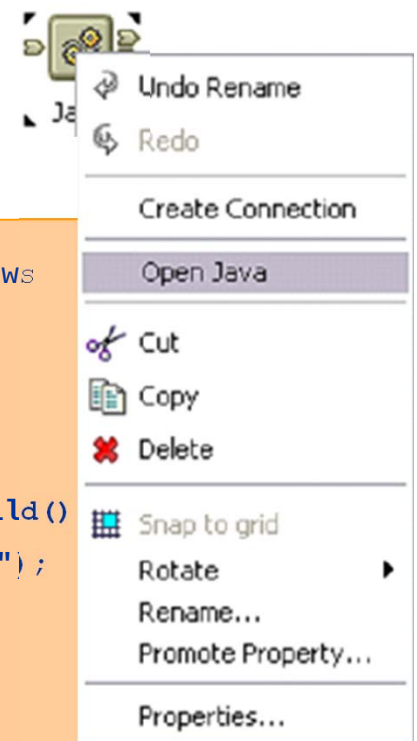
```
public class CarlJNode extends MbJavaComputeNode {
    public void evaluate(MbMessageAssembly inAssembly, MbInputTerminal inTerm) throws
        MbException {
        :
        MbMessage outMessage = new MbMessage(inAssembly.getMessage());

        // Add user code below

        MbElement cadet =
            outMessage.getRootElement().getLastChild().getFirstChild().getLastChild()

        rc = cadet.createElementAfter(MbElement.TYPE_NAME, "NewElm", "mon truc chouette");

        // End of user code
        MbMessageAssembly outAssembly =
            new MbMessageAssembly(inAssembly, outMessage);
        getOutputTerminal("out").propagate(outAssembly);
        outMessage.clearMessage();
    }
}
```



Other integrated transformation options...

- Standard XML Transformations via XSLT
- PHP (Hypertext pre-processor) support

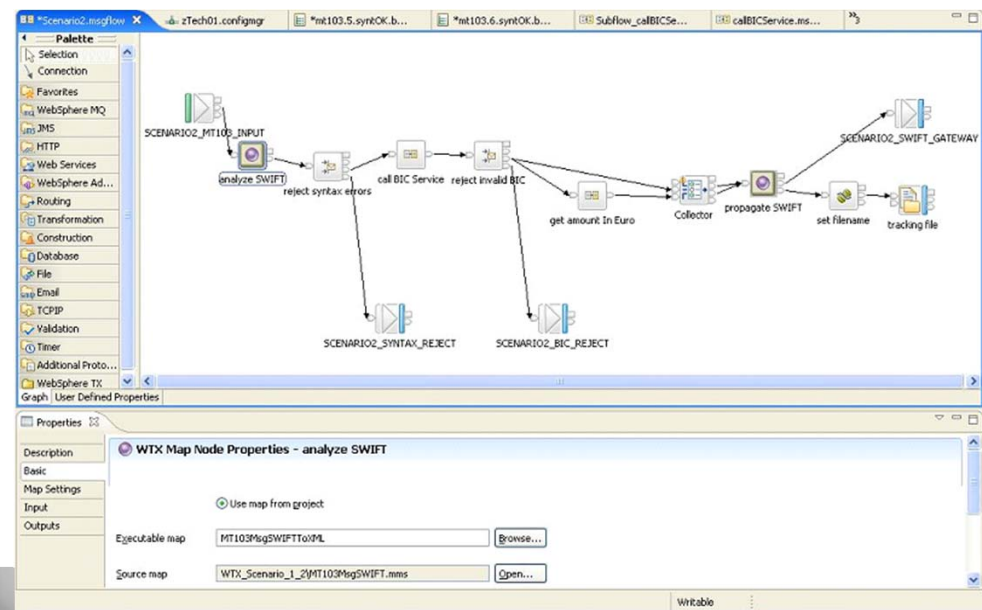
```
$message->a->b->c = $input_body->Message;
```

```
for ($index = 0; $index < $output_root->Menu->Food->count; $index++) {
    $item = $output_root->Menu->Food[$index];
}
```

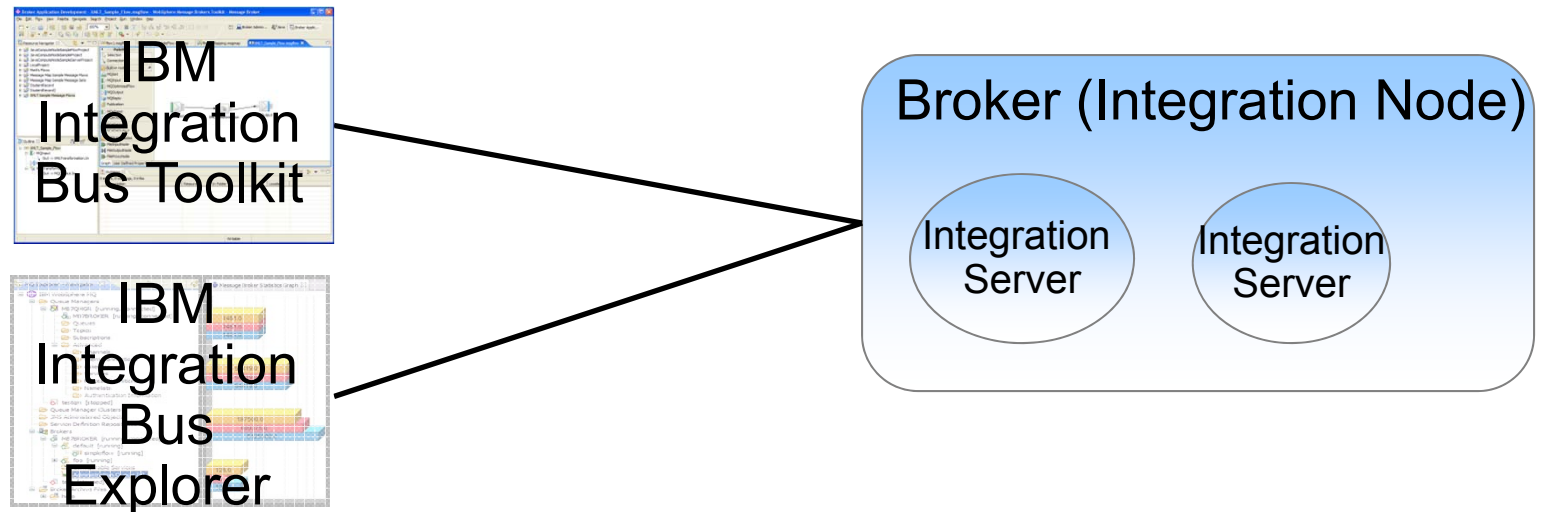
- WebSphere Transformation Extender (WTX) integration - for bulk transformations

- ✓ Full Development-time integration into toolkit
- ✓ Full Runtime integration
 - Invoke WTX parser
 - WTX mapping

- .Net integration with IIB v8 (Windows platforms only)



Architected for High Performance and Scalability



- **IBM Integration Bus Toolkit**

- Development and Test Environment
- Built on Rational Application Developer

- **IBM Integration Bus Explorer**

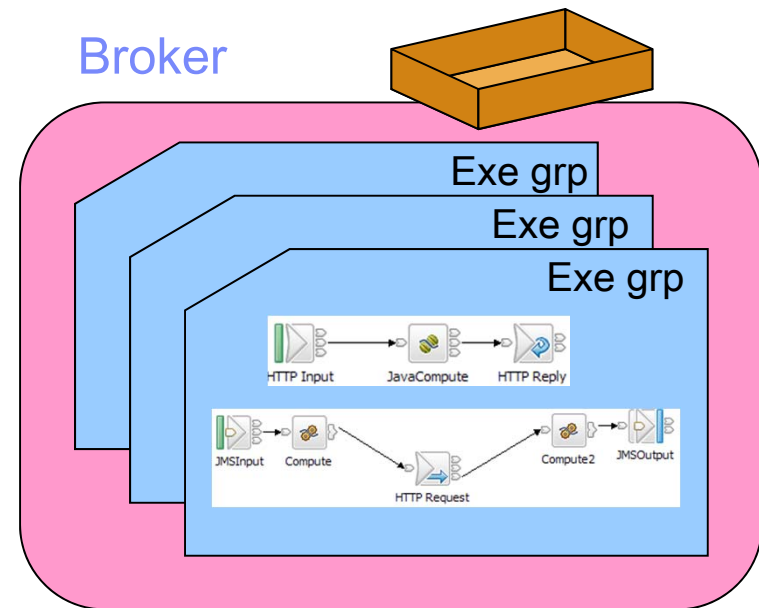
- Advanced Administration Tool
- Built on MQ Explorer

- **Broker (Integration Server)**

- Standalone runtime environment that runs message flows
- Execution groups for isolation and scalability
- Many different platforms
- Builds on an MQ queue manager

Components – Broker Runtime

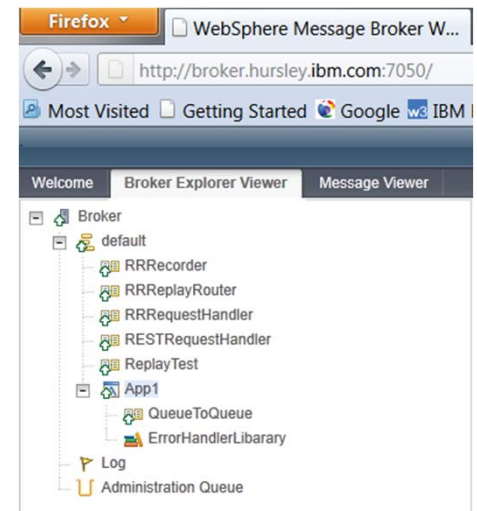
- Runs message flow processing logic
- Made up of one or more 'integration server' processes that can run multiple message flows each
 - Provides isolation and scalability
- Available on Windows, z/OS, AIX, HP, Solaris, Linux (Intel, zSeries)
- Requires a local MQ Queue Manager



IIB Administration

IBM Integration Bus Administration

- IBM Integration Bus offers a wide variety of flexible administration tools
 - ▶ This reflects its underlying nature as a production strength tool
 - ▶ 3rd party administration tools are also available (BMC, CA, IBM Tivoli...) for integrating into a corporate administration
- ✓ IBM Integration Explorer is the visual (GUI) interface for casual administration
 - Eclipse based plugin for WMQ Explorer
 - Available on Linux and Windows
- ✓ Lightweight Web Administration for zero-footprint visual administration
 - Supports IE, Firefox, Safari, Chrome....
- ✓ A full Command Line interface is also available
 - Consistent interface on all platforms
 - Useful for administration from scripting environments
 - SDSF commands also provided for IIB on z/OS
- ✓ The IIB Java API is the underlying administration API
 - Available to any administrator to develop routines
 - A solid base for corporate, repeatable, controlled administration
- ✓ REST-based administration interface supporting HTTP clients
 - Compatible with Java API



The Integration Explorer

The screenshot displays the WebSphere MQ Explorer - Eclipse SDK interface. The main window is titled "WebSphere MQ Explorer - Content" and shows a tree view of the IBM WebSphere MQ configuration. The tree includes Queue Managers (MB7QMGR), Queue Manager Clusters, JMS Administered Objects, Service Definition Repositories, and Brokers (MB7BROKER). A context menu is open over the "default" queue manager, showing options like "Rename", "Stop All Flows", "Remove All", "Trace Nodes All Flows", "User Trace All Flows", "JVM Debug Port", "Statistics All Flows", and "DataPower All Flows".

The "Properties" pane on the right shows the "Property" tab for the selected queue manager. It lists various properties such as "Accessible By", "Defined In ConfigManager", "Employed", "Last Completion Code", "Last Update User", "Long Description", "Name", "Number Of Subcomponents", "Parent", "Processor Architecture", "VM Debug Port", and "LowDependencies".

The "WebSphere MQ Explorer - IBM WebSphere MQ" window shows a detailed view of the "default" queue manager. It includes a tree view of the queue manager's components, such as "Queue Manager Clusters", "JMS Administered Objects", "Brokers", "AggregationExecutionGroup", "FanIn", "FanOut", "RequestReplyApp", "default", "V6.Compute.esqTransform", "V6.Filter.filterFirst", "V6.Scenario.robin100labels", "V6.Scenario.xsltTransformSample", "V6.XsltCompute.xsltCompute", "V6.Scenario.xsltTransformSample", "V6.XsltCompute.xsltCompute", "PagerExecutionGroup", "PagerMessageSets", "SurfWatch", "TextMessenger", "Broker Resources", and "WMQ Explorer Tests Data".

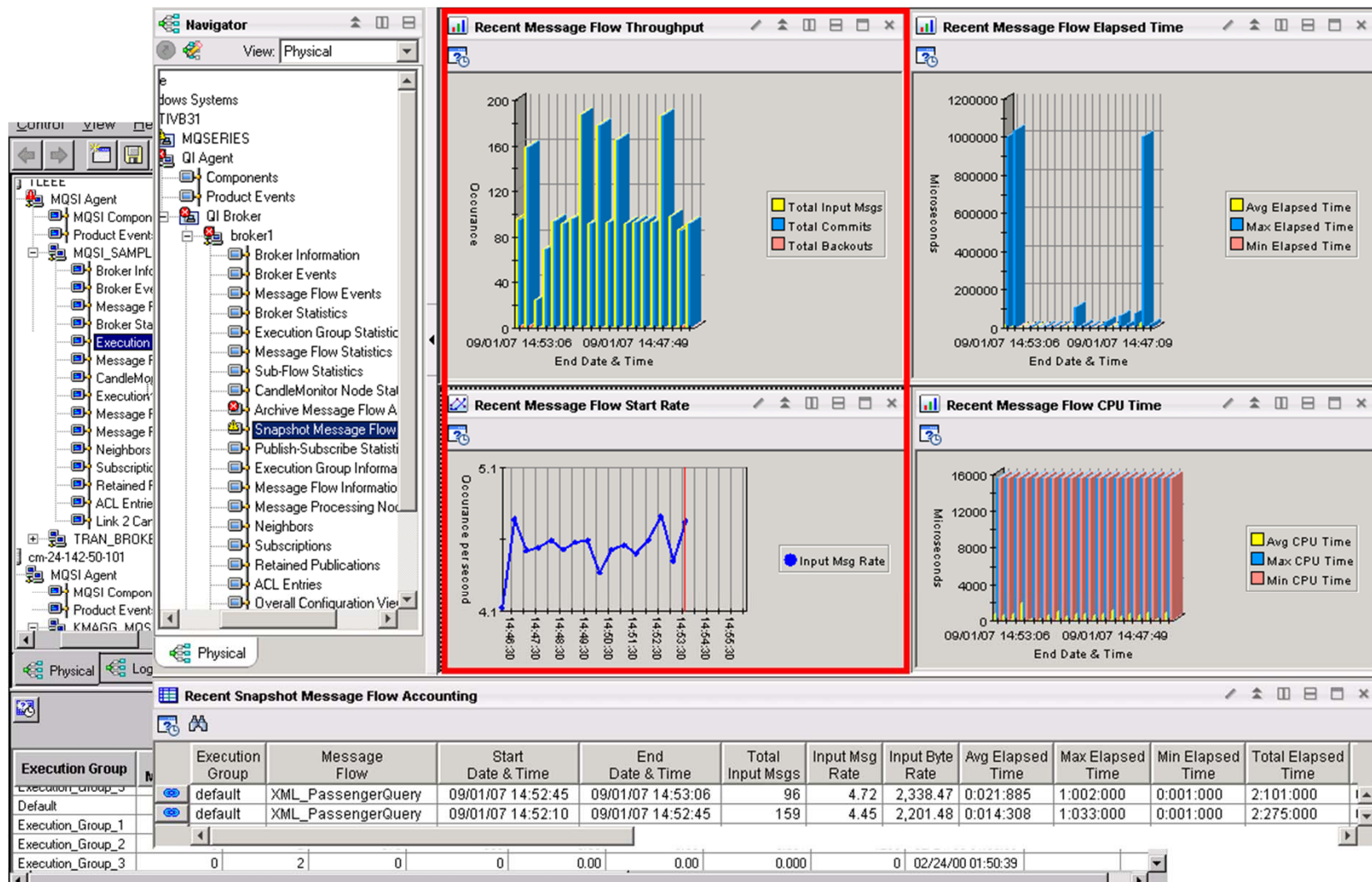
The "Message Broker Statistics Graph" window shows a 3D bar chart comparing the performance of the "default" queue manager across three categories: CountOfInvocations, MaximumCPUTime, and TotalCPUTime. The chart compares the "FilterNode-Filter" (blue), "MQOutputNode-MQOutput" (red), and "MQInputNode-MQInput" (yellow) components.

Category	FilterNode-Filter	MQOutputNode-MQOutput	MQInputNode-MQInput
CountOfInvocations	140.0	140.0	140.0
MaximumCPUTime	15625.0	15625.0	0.1
TotalCPUTime	78125.0	15625.0	0.1

The "WebSphere MQ Explorer - IBM WebSphere MQ" window also includes a table showing the event log for the "default" queue manager. The table has columns for Label, Type, TotalElapsedTime, MaximumElapsedTime, MinimumElapsedTime, TotalCPUTime, MaximumCPUTime, and MinimumCPUTime.

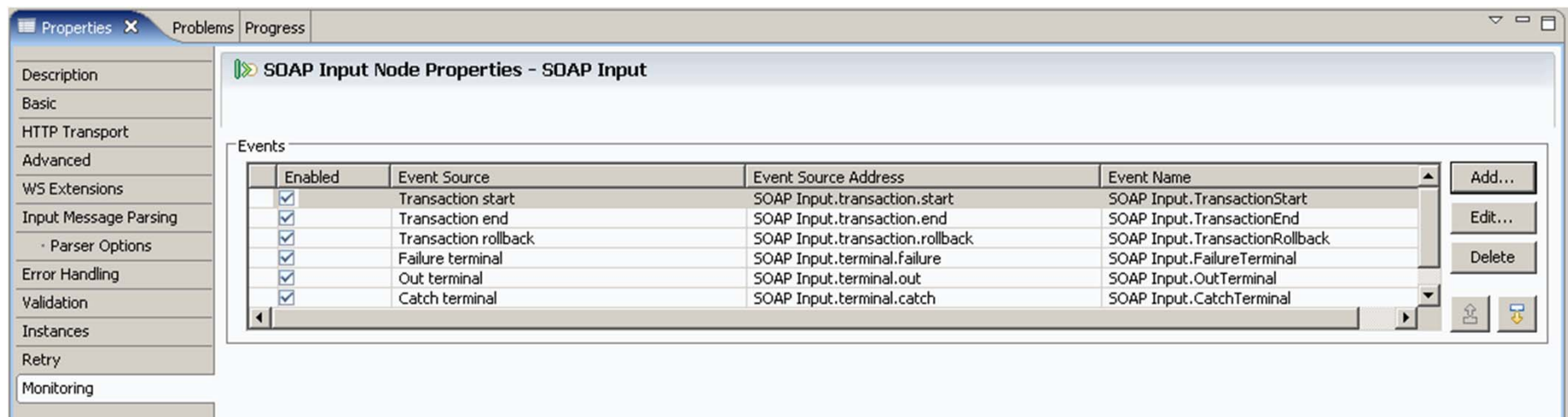
Label	Type	TotalElapsedTime	MaximumElapsedTime	MinimumElapsedTime	TotalCPUTime	MaximumCPUTime	MinimumCPUTime
Filter	FilterNode	89000	3000	1000	78125	15625	15625
MQOutput	MQOutputNode	1006000	77000	1000	15625	15625	15625
MQInput	MQInputNode	297000	51000	1000	0	0	0

Industrial strength administration – OMEGAMON XE



IBM Integration Bus business monitoring

- A message flow can be configured to emit events through Monitor Properties on each node
- Events are available for transaction start, transaction end, transaction rollback for Input nodes, and for a message passing into or out of any terminal on any node
- Each event can be manually added – then they can be enabled or disabled.
 - ▶ Events can also be defined by the administrator using a monitoring profile
- These Events are for functional & business monitoring, eg. KPIs
 - ▶ The entire message or selected fields can be included in the event
- Events are published to a WebSphere MQ topic
- Any subscribed application will receive the events
 - ▶ Any 3rd party subscriber can make use of the events, for example WebSphere Business Monitor, via an IBM-supplied program that converts them to industry-standard CBE format



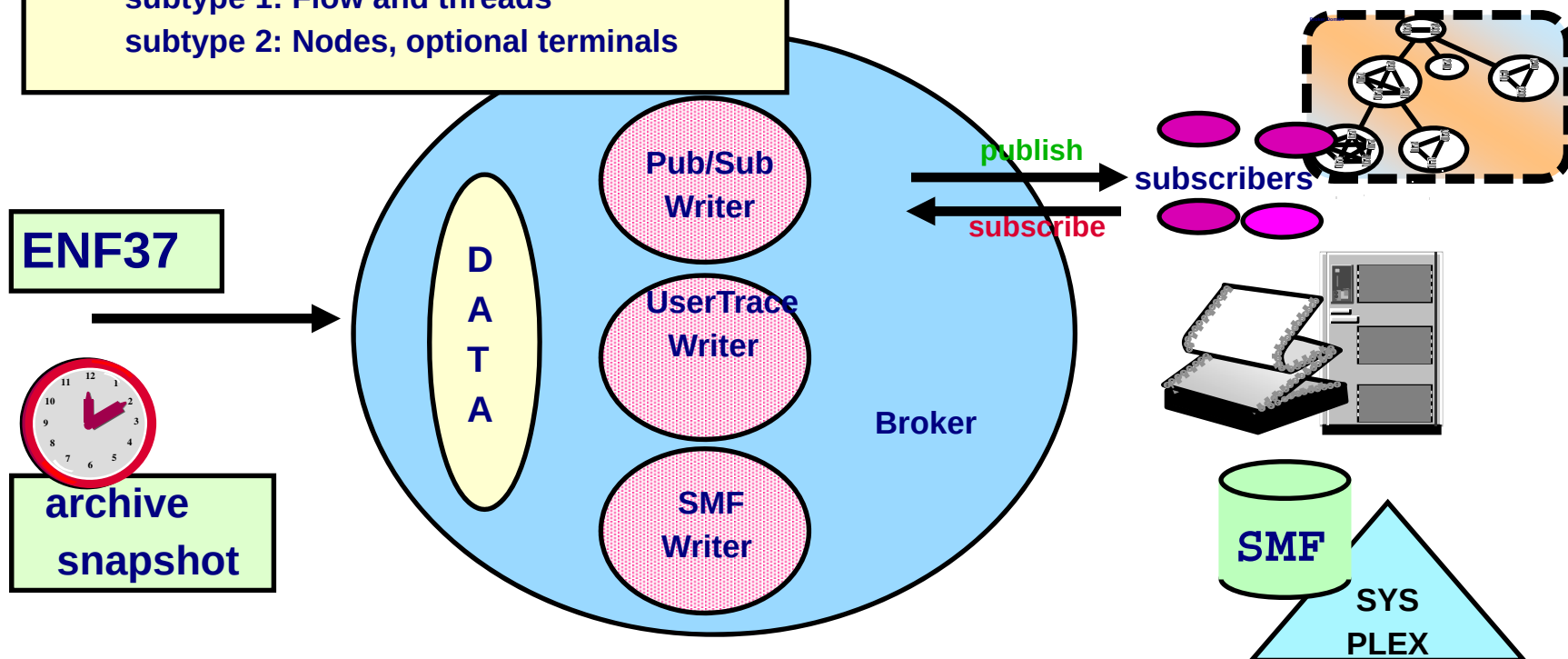
Statistics – technical monitoring

Possible outputs

- MQ(XML) by Publish/Subscribe
- UserTrace
 - BIP2380/2381/2382/2383 Messages
- z/OS SMF
 - Type 117
 - subtype 1: Flow and threads
 - subtype 2: Nodes, optional terminals

✓ Reporting Scope

- Flow
- Execution Group
- Broker
- Domain



Statistics –MQ(XML) format

```
<psc>
<Command>Publish</Command>
<PubOpt>RetainPub</PubOpt>
<Topic>$SYS/Broker/MQ02BRK/StatisticsAccounting/Archive/default/XMLflow</Topic>
</psc>
```

```
<WMQIStatisticsAccounting RecordType="Archive" RecordCode="StatsSettingsModified">
```

```
<MessageFlow BrokerLabel="MQ02BRK" BrokerUUID="7d951e31-f200-0000-0080-efe1b9d849dc"
MessageFlowName="XMLflow" StartDate="2003-01-17" StartTime="14:44:14.550824"
TotalInputMessages="1" TotalSizeOfInputMessages="367"TotalNumberOfBackouts="0" />
```

```
<Threads Number="1">
<ThreadStatistics Number="0" TotalNumberOfInputMessages="0" TotalElapsedTime="0" ...
  MinimumSizeOfInputMessages="0" />
</Threads>
```

```
<Nodes Number="3">
<NodeStatistics Label="FAILQueue" Type="MQOutput" TotalElapsedTime="0"
MaximumElapsedTime="0" NumberOfInputTerminals="1" NumberOfOutputTerminals="2">
```

```
<TerminalStatistics Label="failure" Type="Output" CountOfInvocations="0" />
<TerminalStatistics Label="in" Type="Input" CountOfInvocations="0" />
<TerminalStatistics Label="out" Type="Output" CountOfInvocations="0" />
```

```
</NodeStatistics>...
</Nodes>
```

```
</WMQIStatisticsAccounting>
```

Accounting and statistics: Example output – User Trace

.../wmqi/<broker>/log/<broker>/agent.userTrace.bin.0

```
BIP2380I: WMQI message flow statistics. ProcessID='196767', Key='3',
Type='SnapShot', Reason='Snapshot', BrokerLabel='MQ01BRK',
BrokerUUID='a0a1a981-f000-0000-0080-9f945b3d6b5b',
ExecutionGroupName='PubSubGrp', MaximumElapsedTime='20457211',
MinimumElapsedTime='20457211', TotalNumberOfBackouts='0'.
```

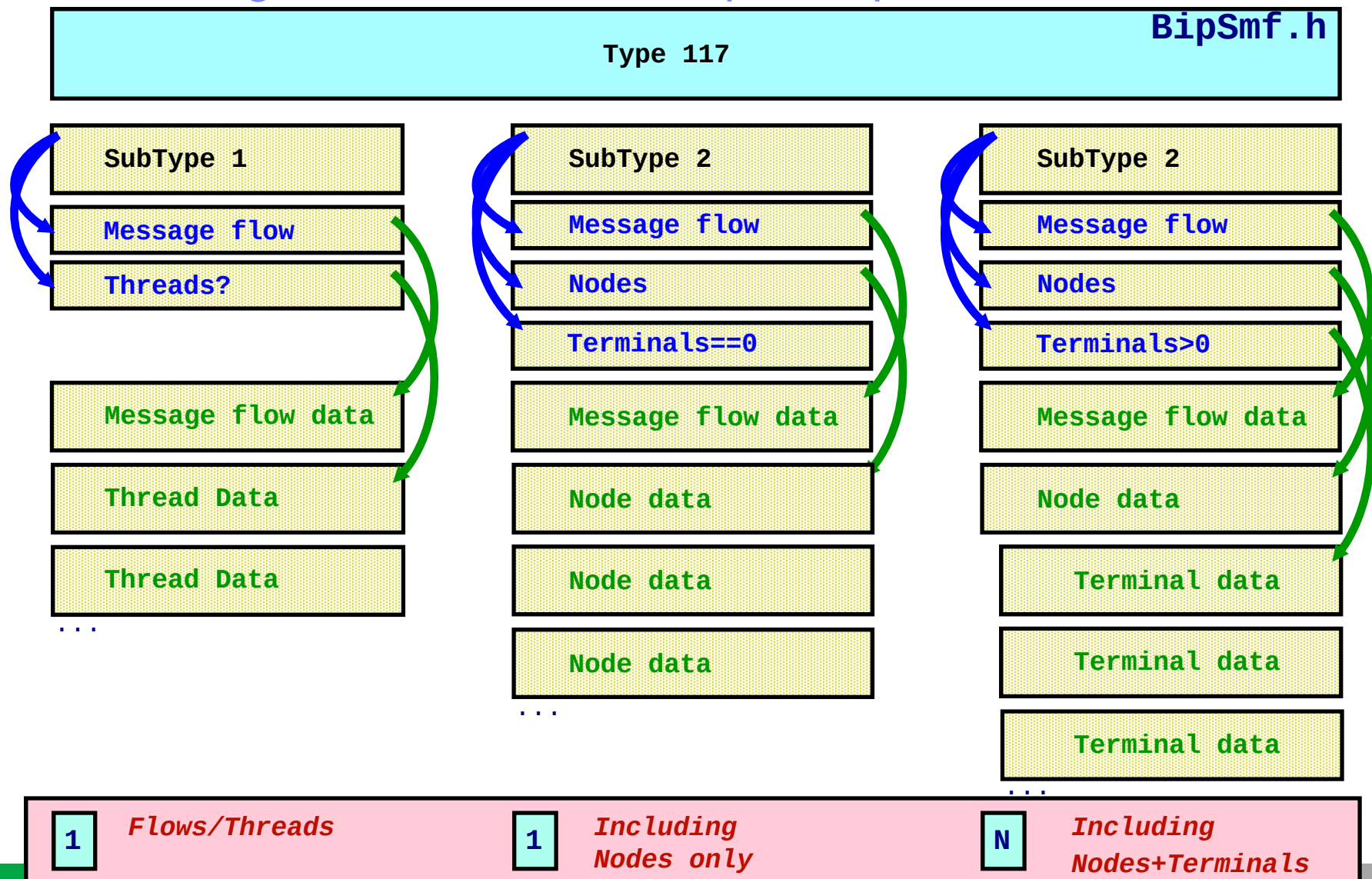
...

Statistical information for message flow 'PubSubTest' in broker 'MQ01BRK'.
This is an information message produced by WMQI statistics.

```
BIP2381I: WMQI thread statistics. ProcessID...
Key='3', Number='0', TotalNumberOfInputMessages='1',
TotalElapsedTime='20457211', TotalCPUTime='395405',
CPUTimeWaitingForInputMessage='10425',
ElapsedTimeWaitingForInputMessage='3302147', TotalSizeOfInputMessages='690',
MaximumSizeOfInputMessages='690',
```

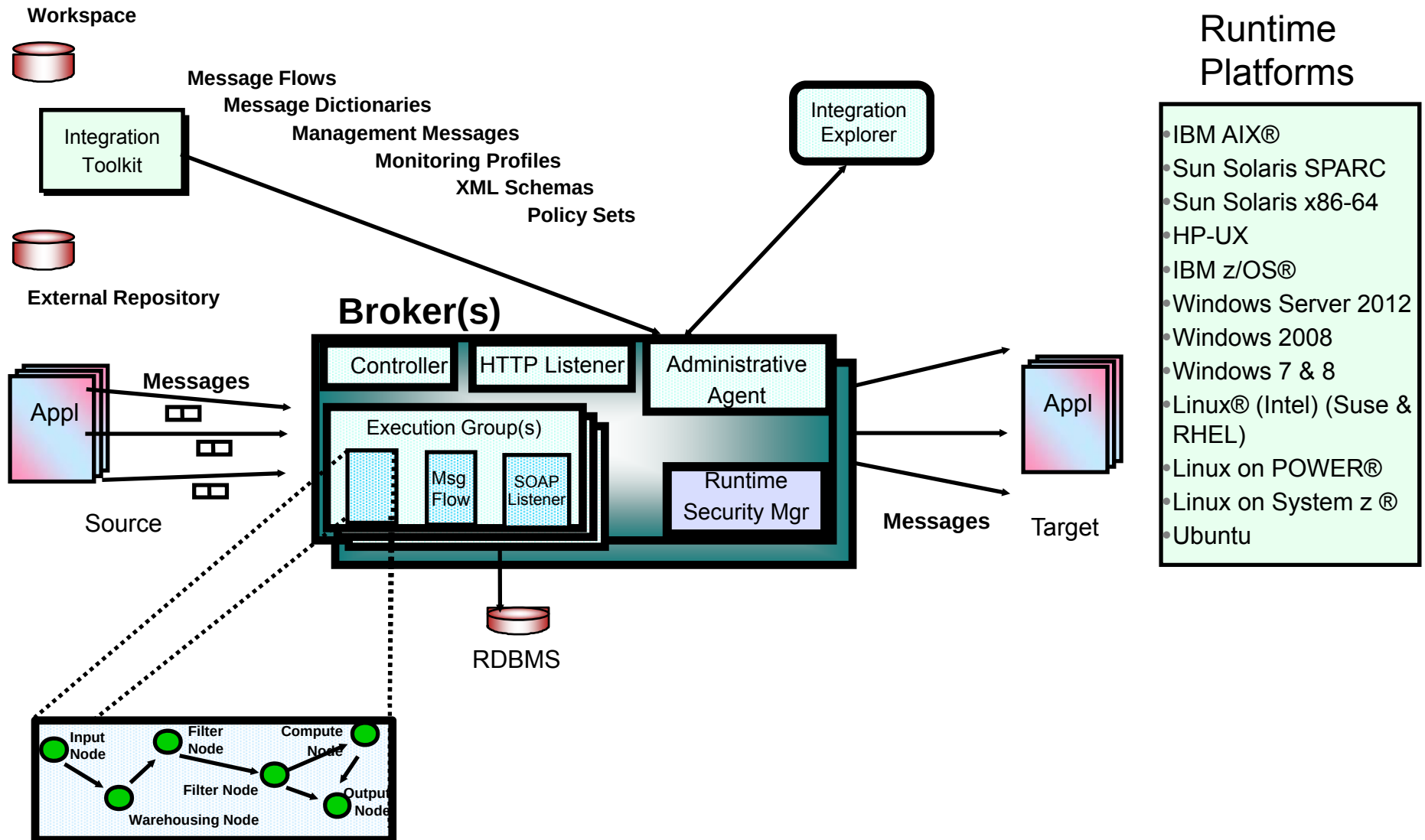
```
BIP2382I: WMQI node statistics. ProcessID=..., Key='3', Label='', Type=' ',
TotalElapsedTime='0', MaximumElapsedTime='0', MinimumElapsedTime='0',
TotalCPUTime='0', MaximumCPUTime='0', MinimumCPUTime='0',
NumberOfOutputTerminals='1'.
```

Accounting and statistics: Example output – z/OS SMF Record



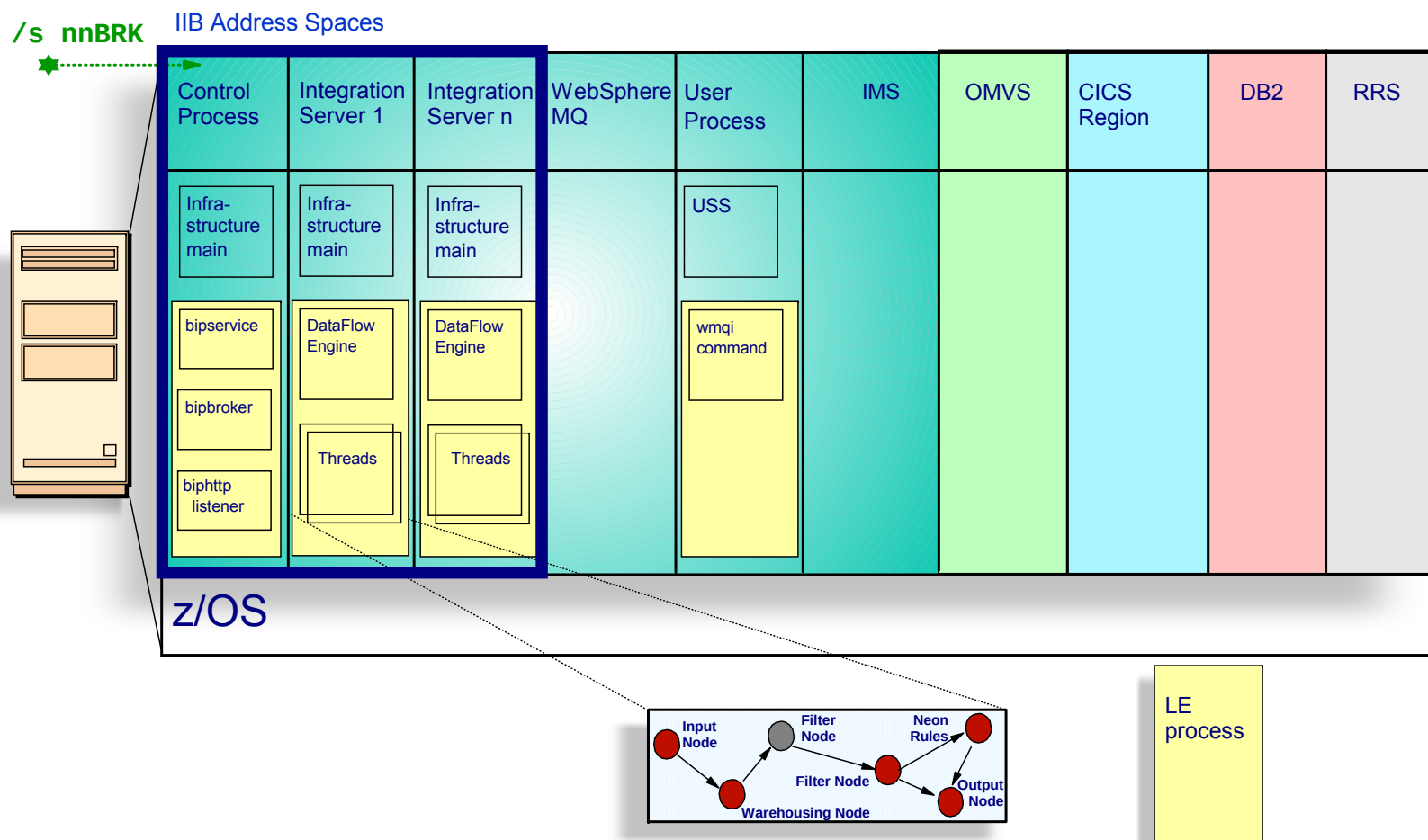
IIB Architecture

IBM Integration Bus System Architecture



IIB on z/OS

Broker on z/OS



The Broker address spaces

Top Screenshot: SDSF ULOG CONSOLE IBMUSER

USER	JOBNAME	ASID	PID	PPID	STATE	START	CT_SECS
CSQ1BRK	CSQ1BRK	0042	50397221	1	1WI---	06.08.29	14.33
CSQ1BRK	CSQ1BRK	0042	65574	50397221	HRI---	06.08.31	14.33
CSQ1BRK	CSQ1BRK	0042	65575	65574	HRI---	06.08.50	14.33
CSQ1BRK	CSQ1BRK	0043	50397224	1	1W----	06.09.26	100.50

Bottom Screenshot: IBMUSER @ P390: />ps -ef ! grep CSQ1BRK

USER	JOBNAME	ASID	PID	PPID	STATE	START	CT_SECS
CSQ1BRK	CSQ1BRK	0042	50397221	1	1WI---	06.08.29	14.33
CSQ1BRK	CSQ1BRK	0042	65574	50397221	HRI---	06.08.31	14.33
CSQ1BRK	CSQ1BRK	0042	65575	65574	HRI---	06.08.50	14.33
CSQ1BRK	CSQ1BRK	0043	50397224	1	1W----	06.09.26	100.50

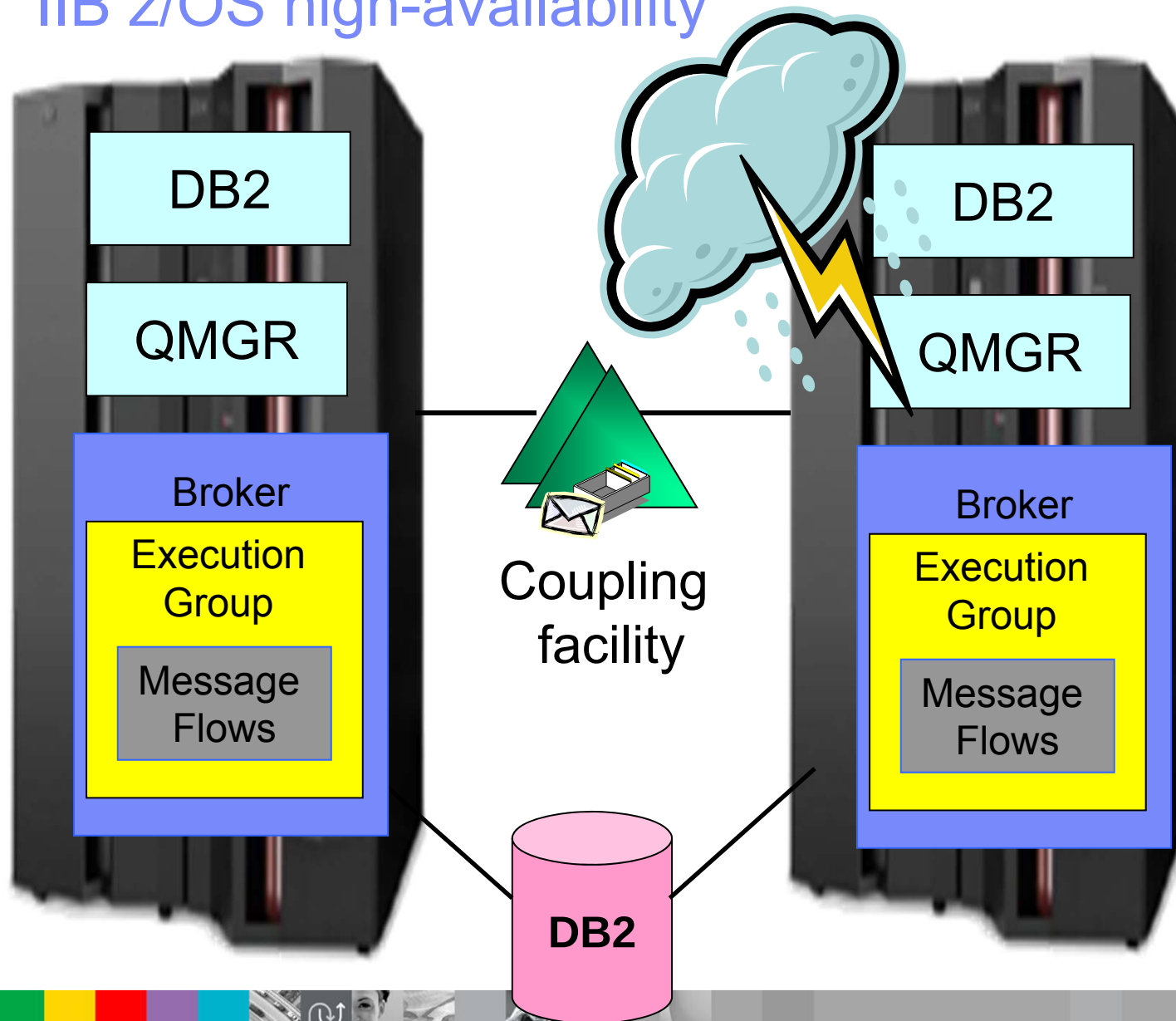
What's different on z/OS?

- The Broker is essentially identical on all platforms as far as the facilities and any APIs.
 - ▶ Almost all flows run “as-is” regardless of the platform
- IIB z/OS does benefit, however, from a few z/OS-specific nodes for better exploiting z/OS:
 - ▶ VSAM nodes for direct access to VSAM datasets
 - ▶ QSAM nodes for direct access to QSAM datasets
- IIB z/OS also leverages several other z/OS-exclusive features...
 - ▶ z/OS is the only platform that can offer the highest levels of **scalability and high-availability** by taking full advantage of the z/OS Parallel Sysplex and WebSphere MQ **Shared Queue** technology
 - ▶ IIB uses z/OS **ARM** feature used to auto (re-)start in case of failure
 - ▶ z/OS **RRS** is used to ensure IIB transactionality
 - ▶ IIB z/OS takes advantage of **WLM** and corporate business goals can be assigned to Execution Groups
 - ▶ IIB z/OS makes full use of **SMF** for performance monitoring



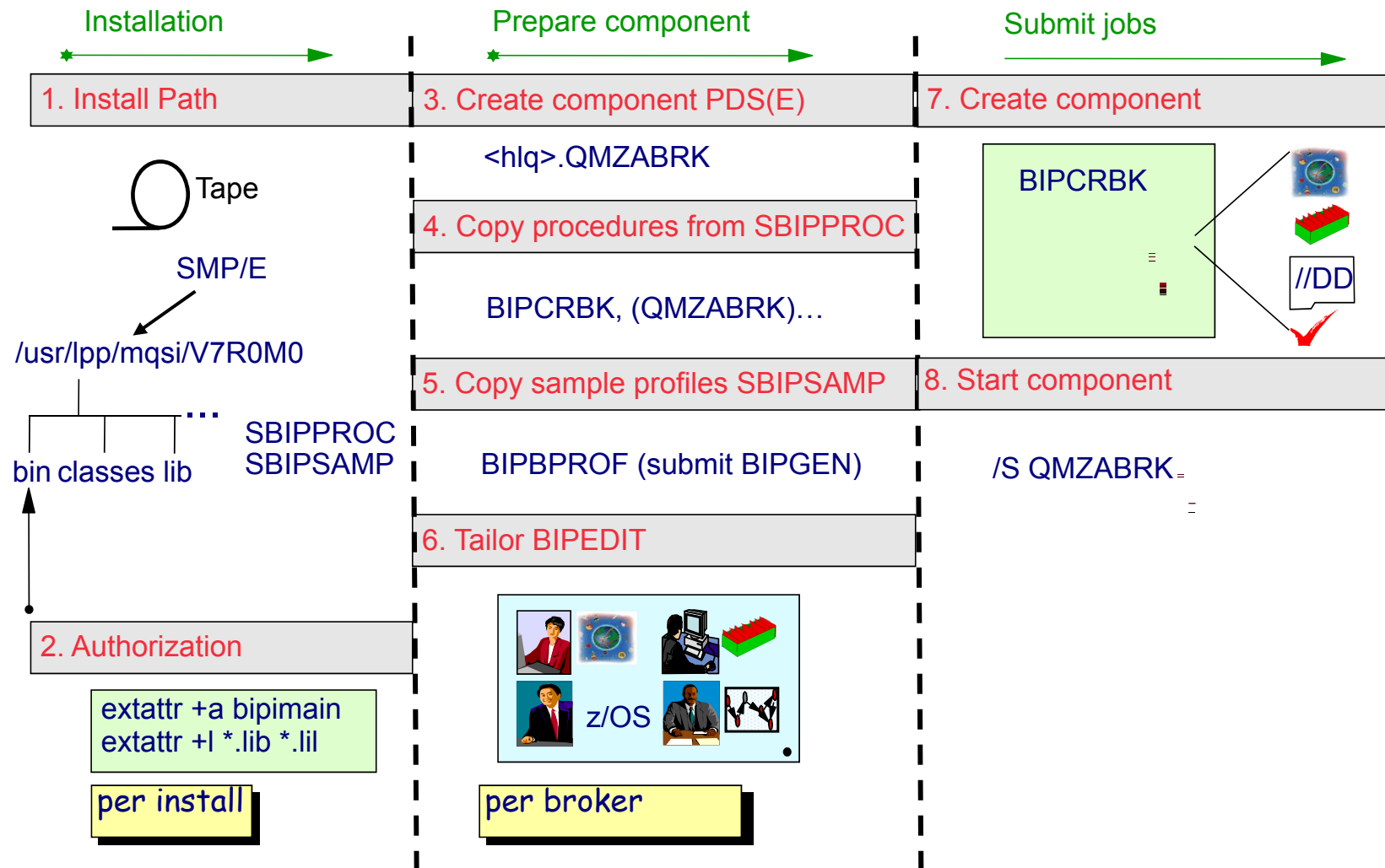
Customers choose to run the Broker on z/OS typically when interfacing with host data and/or when they require the best QOS only found on z/OS

IIB z/OS high-availability

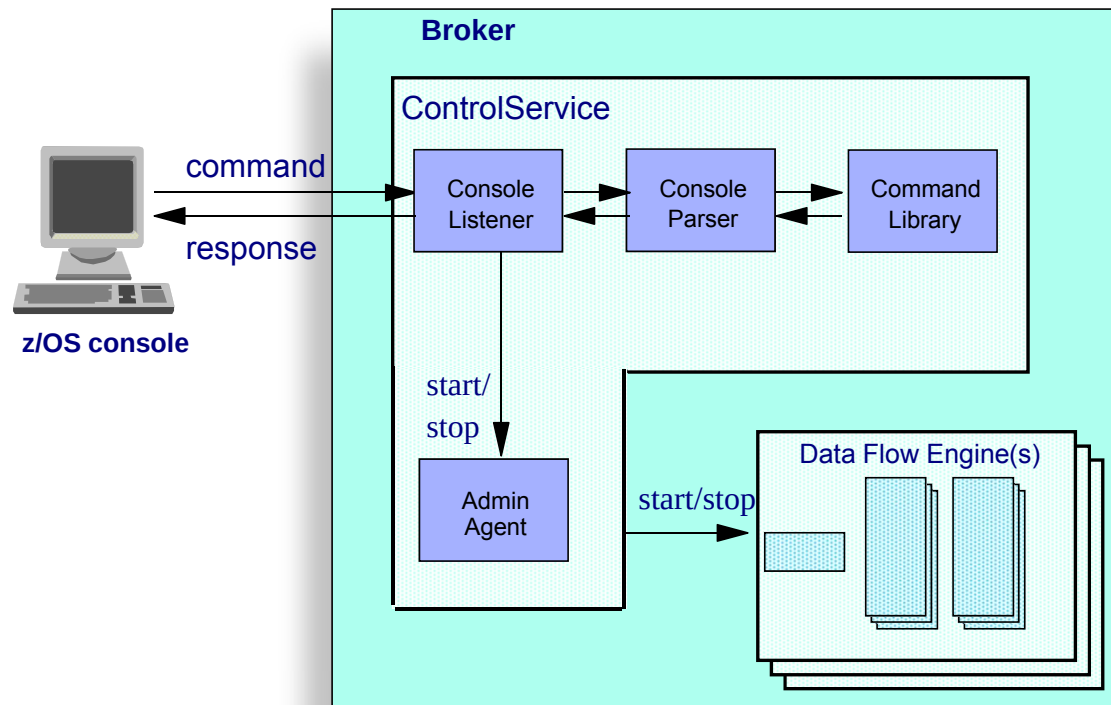


- ▶ Any Broker in the QSG can access messages
 - “Natural” load-balancing based upon availability
- ▶ Any Broker can recover messages in case of an outage
- ▶ z/OS ARM can restart any stopped component

IIB z/OS Installation and Customization



IIB SDSF console commands



Short	Long
SC	Start component
PC	Stop component
CT	Change trace
RT	Report trace
L	List
RE	Reload
CB	Change broker
CS	Change flow stats
RS	Report flow stats
DP	Deploy
CX	Change flow user exits
RX	Report flow user exits
RC	Reload security
CM	Change flow monitoring
RM	Report flow monitoring
CR	Change resource stats
RR	Report resource stats

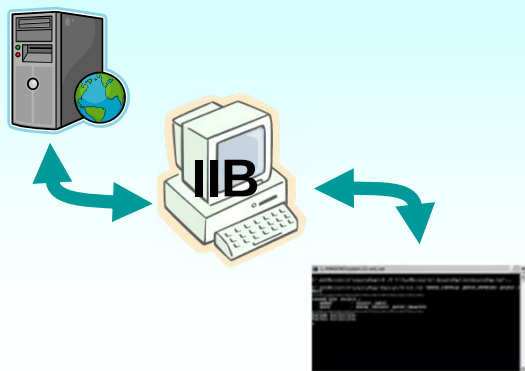
```

/F MQRBBRK, PC
/F MQRBBRK, cb l=/usr/lpp/wmqi/lil:/u/carlf/lil
/F MQRBBRK, SC
/F MQRBBRK, list e='default'
/F MQRBBRK, changeflowstats -a -e 'default' -o smf
  
```

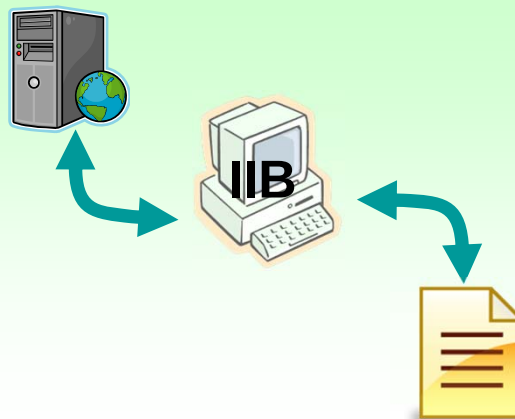
Start a broker	/S <Broker>
Stop a broker	/P <Broker>
Modify a broker	/F <Broker>,cmd

Key Usage Scenarios

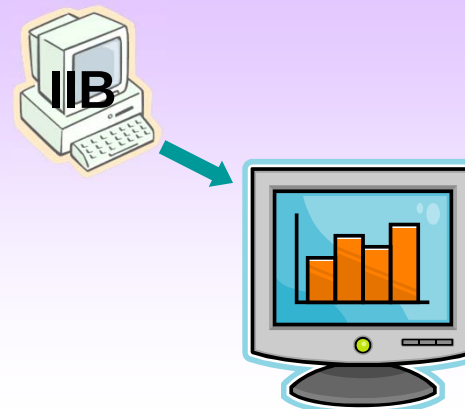
Extending the reach of existing applications



Moving Batch Into Online



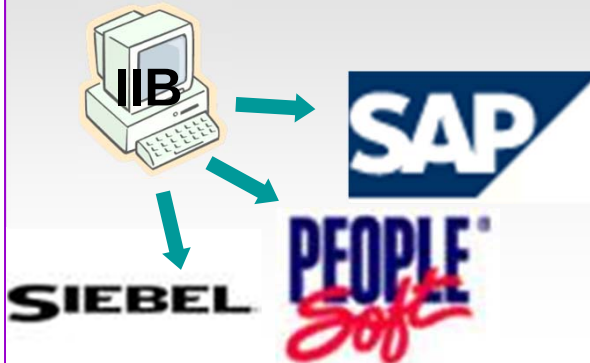
Business Monitoring



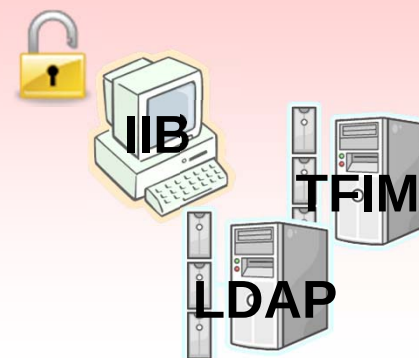
Making an Application Inventory and Governing Processing



Making the Most of Packaged Applications



Participating in a Secure Infrastructure



Additional updates in Version 8





Web Administration for Universal Access

▪ Web Administration Console

- Objective is to provide comprehensive web management interface
 - Focus on non-administrators to understand brokers & resources
- Supports all major browsers Firefox, IE, Opera, Safari, Chrome
- Designed as users as a complement MBExplorer
 - MB Administrators can users continue to use MB Explorer

▪ Easy to configure

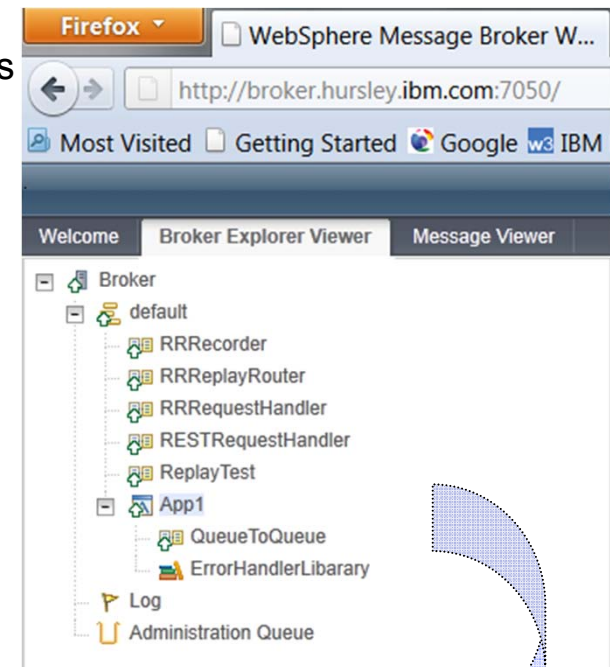
- No extra moving parts - uses internal HTTP listener to serve data
 - Web admin started by default on port 7050
- Can reconfigure to listen on user port or disable
 - SSL connector configured via `mqsichangeproperties`
- Role based access provides custom class user control
 - Default is read-only access to MB resources
 - More authority required to create, change or delete resources

▪ Using Web Admin

- Intuitive tree view shows hierarchy of MB resources
- View resource details with click or button
- Includes full suite of resources
 - Apps, Libs, Flows, Configurable services etc

▪ Web Admin & MB Explorer

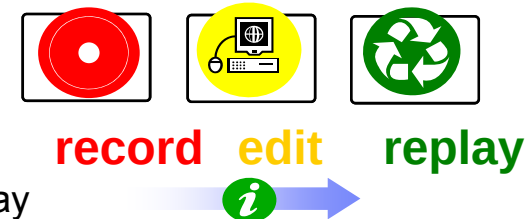
- MBX & web admin designed for concurrent use
- Web admin requires MB8 broker
- Explorer can manage both MB8 & MB7 brokers



View Details

Name	Value
Bar File Name	20110818_0407_20
Deploy Time	Thu Aug 18 16:08:43 BST 2011
Long Description	
Modification Time	Thu Aug 18 16:07:20 BST 2011
Name	App1
Running	true
Short Description	

Record & Replay



- **Enable Record, Edit and Replay of In-flight Data**

- Comprehensive audit of messages, web, ERP, file & other data
- Flexible topology: single or multiple brokers for recording, capture & replay

- **Data Recording, Capture & Store**

- Graphically configure binary, text, XML payload capture, including whole, partial & multi-field data
- Source data is currently limited to MB flows, including MB6.1, MB7 & MB8
 - Monitor tab or monitoring profiles identify captured events
- Capture events on *any broker*, local or remote
 - Any broker EG can be configured as capture agent
 - Configurable service identifies topic, target database
- Agent stores data in any supported broker database
 - Oracle, DB2, SQL Server, Sybase, Informix...

CD Input Node Properties - CD Input

Configure monitoring events

Enabled	Event Source	Event Source Address
☒	Transaction start	CD Input.transaction.Start
☒	Transaction end	CD Input.transaction.End
☒	Transaction rollback	CD Input.transaction.Rollback

- **Web Tooling to View, Query, Edit data**

- Friendly editors to view, query & edit payloads
 - Key data fields, including application data
- Independent web admin & capture for scalability
 - Configure multiple EG listeners for web

Welcome Broker Explorer Viewer Message Viewer

View Message Replay Message Edit/Replay Message Edit Message View Exception Delete Refresh Filter

Message ID	Correlation ID	Message Exception	Broker	Execution Group	Message Flow
c5743c50-ca64-11e0-ae70-7f0000010000-9		Y N	MB8BROKER	default	QueueToQueue
c5743c50-ca64-11e0-ae70-7f0000010000-9		Y N	MB8BROKER	default	QueueToQueue
c5743c50-ca64-11e0-ae70-7f0000010000-8		Y N	MB8BROKER	default	QueueToQueue

Filter Query

Start Time

End Time

Message ID

Advanced Filter Query

OK Cancel

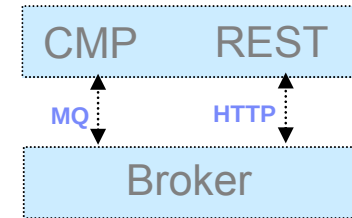
- **Replay for redelivery or flow reprocessing**

- Replay selected data to flows or applications
- MB admin configures logical destinations
 - Maps to physical protocol, e.g. MQ: {Qmgr, Q}
- User selects destinations from auto-populated drop-down list

Open Management with REST

■ REST based management API

- MB now supports HTTP/REST management API
 - Complements & compatible with existing CMP interface
- HTTP client can manage MB independent of CMP
 - Includes new interface for message record & replay



```
GET /admin/eg/MYEGNAME HTTP/1.1
From: machine@ibm.com
User-Agent: MyApp/1.0
```

■ URI for all MB Resources

- New ATOM data format for payload describes MB resources & related entities
- ATOM service documents & feeds map intuitively mapped to MB artefacts
- Provides very natural navigation of MB resources
 - e.g. Execution group document contains EG properties & per-message flow ATOM feed

```
HTTP/1.1 200 OK
Date: Sun, 1 Oct 2011 21:46:59 GMT
Content-Type: text/html
Content-Length: 426

<?xml version="1.0" encoding='utf-8'?>
<service xmlns=http://www.w3.org/2007/app xmlns:atom="http://www.w3.org/2005/Atom">
  <workspace>
    <atom:title>Execution group feeds</atom:title>
    <collection href="http://my.broker.com/admin/eg/MYEGNAME/resources" >
    </collection>
  </workspace>

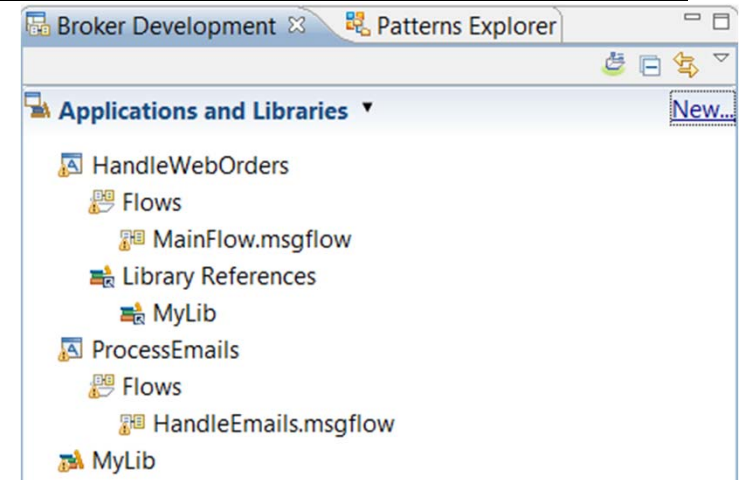
  <executiongroup description.long="" description.short="" ... >
  </executiongroup>
</service>
```

■ Fully open interface can be exploited by 3rd party tools

- HTTP REST/ATOM formats published & maintained for use by external users
- Enables widgets, mash-ups & other situational applications

Easy to Develop, Deploy & Manage

- **Streamlined AD, Deploy & Management**
 - New & migrated resources grouped into Apps & Libs
 - Encourages designing for reuse
 - Simplifies deployment & management
- **Apps & Libs contain all solution resources**
 - Apps contain solution specific resources
 - e.g. main processing flow, specific transformations
 - Libs contain common resources
 - e.g. data definitions, error routines...
 - Can reference other libraries
 - Apps & Libs created from migrated workspaces
 - Automatic migration from MB6.1 & MB7
- **Easy deployment**
 - Drag & drop apps to run them immediately
 - Simple to package with 1-click for each app
 - Override deployment properties for promotion
- **Consistent Operations**
 - AD artefacts are visible in runtime with same structure
 - MBTK, MBX, Web admin all reflect same structure
 - Can manage using apps e.g. start, stop, delete
 - Commands updated to refer to Apps & Libs e.g. `mqsilist`
 - Full lineage available, e.g. version, deploy date...



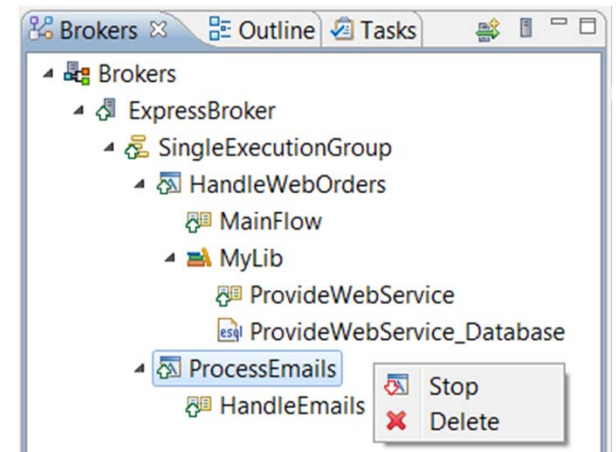
Prepare

Select deployable resources to include in the broker archive

- ☒ Applications
 ☐ Message flows, libraries and other message flow dependencies

Text filter:

- ☒ Applications
 - ☒ HandleWebOrders
 - ☒ ProcessEmails



Data Modeling – Why DFDL?

- Much of the data in the world resides in files, is not XML, is a mixture of textual and binary with custom syntax and encodings, and does not have a shareable description
 - But there has been no universal standard for modeling this data!
 - XML -> use XML Schema
 - RDBMS -> use database schema
 - Text/binary -> ??
 - Existing standards are too prescriptive: *“Put your data in this format!”*
 - Organizations including IBM evolved their own way of modeling text and binary data based on customer need.
 - IBM examples...
 - IBM® WebSphere® Message Broker: **MRM message set**
 - IBM WebSphere ESB: **Data Handlers**
 - IBM WebSphere Transformation Extender: **Type Trees**
 - IBM DataPower : **FFD**
 - IBM Cast Iron: **Flat File Schema**
 - Sterling B2B Integrator: **DDF and IDF files**
- ✓ ***DFDL: a universal, shareable, non-prescriptive description for general text & binary data formats***

Data Format Description Language (DFDL)



- A new **open** standard
 - From the Open Grid Forum (OGF)
 - <http://www.ogf.org/>
 - Version 1.0
 - ‘Proposed Recommendation’ status
- A way of **describing** data...
 - It is NOT a data format itself!
- A **powerful** modeling language ...
 - Text, binary and bit
 - Commercial record-oriented
 - Scientific and numeric
 - Modern and legacy
 - Industry standards
- While allowing **high performance** ...
 - You choose the right data format for the job
- Leverage **XML Schema** technology
 - Uses W3C XML Schema 1.0 subset & type system to describe the **logical** structure of the data
 - Uses XSDL annotations to describe the **physical** representation of the data
 - The result is a **DFDL schema**
- Both **read and write**
 - Parse and serialize data in described format from same DFDL schema
- Keep simple cases **simple**
- Annotations are **human readable**
- **Intelligent** parsing
 - Automatically resolve choice and optionality
- **Validation** of data when parsing and serializing

Easy Data Modelling with DFDL

- **Simple & powerful standard for data modelling**
 - New standard for binary, text & industry data formats
 - Logical structure with physical annotations
 - e.g. endian, ASCII/EBCDIC, padding, justify...
 - Data Format Description Language (DFDL)
 - For use in IBM and non-IBM products
 - forge.gridforum.org/projects/dfdl-wg
- **Built-in facilities to model data easily**
 - Quick wizards for (e.g.) CSV, record oriented data
 - Auto-model importers (e.g.) COBOL copybooks
 - DFDL editor for power users
 - Create logical model & physical refinements
- **Test parsing and test data generation**
 - Test whether sample data fits with DFDL definition
 - Parse trace provide success & error case explanation
 - Auto-generate test data for test & debug scenarios
- **All broker nodes can exploit new DFDL parser**
 - Configure as existing XML, JSON, MRM, MIME... parsers
 - Interacts with message tree in usual manner
 - Excellent performance characteristics
 - (e.g.) element type, size, structural complexity etc
 - Supports streaming, partial parsing etc...

The screenshot displays three components of the IBM DFDL toolset:

- Top Panel:** A table with columns A, B, C, D, and E. The data rows are:

	A	B	C	D	E
1	Year	Make	Model	Description	Price
2	2009	SK Inc	MBTk7	4293cc, V8	53880.00
3	2010	Hans On	DFDL	3000cc straight 6	31395.00
4	2010	AOD corp	MB8	4163cc, V8	51435.00

 An 'Export' button is visible. Below the table, a yellow sticky note shows the corresponding CSV output:


```
Year,Make,Model,Description,Price
2009,SK Inc,MBTk7,"4293cc, V8",53880.00
2010,Hans On,DFDL,3000cc straight 6,31395.00
2010,AOD corp,MB8,"4163cc, V8",51435.00
```
- Middle Panel:** A 'New Message Model' dialog box for 'Configure schema for CSV data'. It includes settings for 'Record settings' (End of record character: Carriage Return & Line Feed - %CR;%LF;), 'Blank records' (Skip a blank record), and 'Field settings' (Number of fields: 3). A checkbox 'The first record is a header' is checked.
- Bottom Panel:** A 'DFDL Test - Logical Instance' window showing a tree view of a message structure. The 'Data source' is '<From 'DFDL Test - Parse' view>' and the 'Message root' is 'Company (/MessageModelingLibrary_broker/Company.xsd)'. The tree view shows a 'Company' element containing an 'Employee' element with fields like EmpNo, Dept, EmpName, Address, Tel, Salary, and another 'Employee' element.

Easy Data Modelling with DFDL

- **Simple & powerful standard for data modelling**
 - New standard for binary, text & industry data formats
 - Logical structure with physical annotations
 - e.g. endian, ASCII/EBCDIC, padding, justify...
 - Data Format Description Language (DFDL)
 - For use in IBM and non-IBM products
 - <http://www.ogf.org/dfdl/>
- **Support more features of the DFDL specification**
 - Fields with length prefixes (eg, PL/1, ISO8583)
 - Default values for missing structures when serializing
- **More ways to create DFDL models**
 - Import from C header files
- **Usability enhancements to DFDL editor**
 - More copy/paste & keyboard shortcuts
 - Multiple object selection
- **Improved performance**
 - Continued improvement when parsing & writing
 - Big gains for text numbers and packed decimals

The screenshot displays the IBM DFDL editor interface. At the top, a table with columns A, B, C, D, and E shows car data. Below the table, a yellow sticky note displays the corresponding CSV output. The main window shows the 'Configure schema for CSV data' dialog, which allows users to set record settings (end of record character, blank records, and whether the first record is a header) and field settings (number of fields). At the bottom, the 'DFDL Test - Parse' window shows the results of parsing the input data, including the status and the parsed input characters.

	A	B	C	D	E
1	Year	Make	Model	Description	Price
2	2009	SK Inc	MBTk7	4293cc, V8	53880.00
3	2010	Hans On	DFDL	3000cc straight 6	31395.00
4	2010	AOD corp	MB8	4163cc, V8	51435.00

```

Year,Make,Model,Description,Price
2009,SK Inc,MBTk7,"4293cc, V8",53880.00
2010,Hans On,DFDL,"3000cc straight 6",31395.00
2010,AOD corp,MB8,"4163cc, V8",51435.00
  
```

Configure schema for CSV data
Provide settings for a new schema that will model CSV data.

Record settings
End of record character: Carriage Return & Line Feed - %CR;%LF;
Blank records: Skip a blank record Select the record terminator.
☒ The first record is a header

Field settings
Number of fields: 3

DFDL Test - Parse: Runs the DFDL parser with the provided physical input data and
Status: Parsing completed: Thu Jun 14 12:06:05 BST 2012

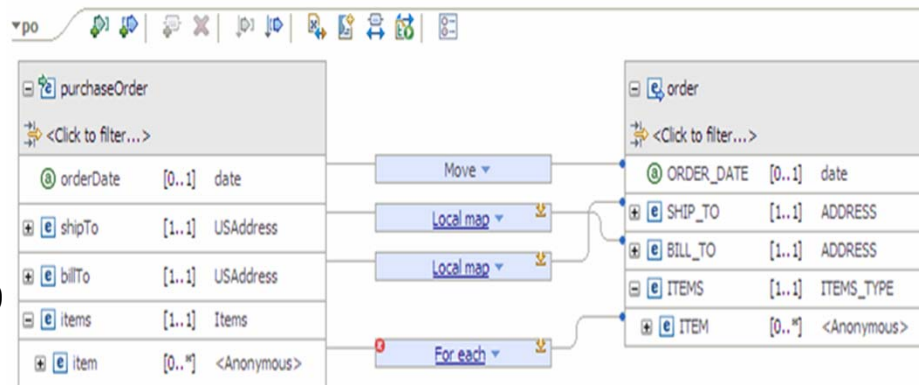
Input
Data: /ST_DFDL_CSV/TestData.txt

Parsed Input
Characters
1 Year,Make,Model,Description,Price
2 2009,SK Inc,MBTk7,"4293cc, V8",53880.00
3 2010,Hans On,DFDL,"3000cc, straight 6",313
4 2010,AOD corp,MB8,"4163cc, V8",51435.00

Graphical Transformations

■ IBM Graphical Data Mapper (GDM)

- Visually map and transform source to target data
 - Code-free, high performing & scalable
- GDM designed for whole IBM product set
 - e.g. Full map exchange with MDM Server V9
 - Mapping Script Language (MSL) format



■ Simple & powerful graphical mapping experience

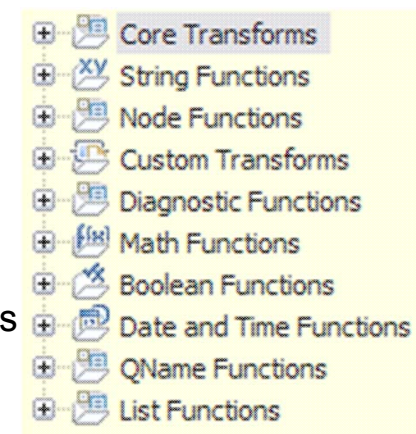
- Apply transformations to single and multiple elements
 - Conditionals (**if then else**), Loops (**for each**), Functions (**target = f(source)**) & more!
- Database mapping sources and targets for routing and enrichment scenarios
 - Broad database support (Oracle, DB2, SQL Server, Sybase, Informix...)
- Complements and supports existing transformation languages
 - Call user defined transformation in Java, SQL, XPath, .NET...

■ Simple deployment, high performing & scalable

- Maps can be deployed with solution BAR file or stand-alone
- JIT compile means technology advances improves existing, deployed solutions
 - Source deploy + runtime compilation = enhanced performance

■ Migration from pre-version 8 maps

- Existing maps developed before version 8 continue to work as-is
 - Existing maps opened in read-only mode for visualization & comprehension, cannot be modified
 - Automatic conversion of **.mfmap** format to MSL not currently built-in



JMS Receive Node and other JMS Enhancements



JMS Receive

- **New JMSReceive Node supports all JMS 1.1 Providers**
 - Process JMS messages in the middle of a message flow, c.f. MQGET node
 - Typical scenarios include request response, routing & augmentation
 - Works with any JMS 1.1 provider, MQ is default provider
- **JMS Receive node**
 - Works on JMS queues: receive paradigm is not applicable to topics!
 - Can be configured for destructive read or browse
- **Comprehensive & Flexible options**
 - Retrieve particular JMS with message properties
 - Per message customization
 - Many **LocalEnvironment** overrides!
 - Flexible data locations
 - Incoming & received message can be kept
- **Activity Logging**
 - All JMS nodes updated to provide activity logging
 - Allows operators to understand JMS operations without understanding detailed flow design
 - e.g. failed to open or start JMS session, message sent to destination
- **Other JMS Enhancements**
 - Allows generic session object to be overridden as queue or topic
 - **JMSDestinationList.DestinationList.Queue = topic|queue;**

JMS Receive Node Properties - JMS Receive

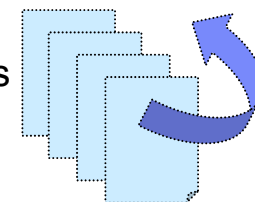
Settings for working with the message selectors. [More...](#)

Application property	
Timestamp	
Delivery mode	All ▼
Priority	
Message ID	
Redelivered	
Correlation ID	= '12'

Making it Easier to Understand Broker Behaviour

- **New Activity Logging Allows users to understand what a message flow is doing**
 - Complements current extensive product trace by providing end-user oriented trace
 - Can be used by developers, but target is operators and administrators
 - Doesn't require detailed product knowledge to understand behaviour
 - Provides qualitative measure of behaviour
- **End-user oriented with external resource lifecycle**
 - Focus on easily understood actions & resources
 - “GET message queue X”, “Update DB table Z”...
 - Complements quantitative resource statistics
- **Flow & resource logging**
 - User can observe all events for a given flow
 - e.g. “GET MQ message”, “Send IDOC to SAP”, “Commit transaction”...
 - Users can focus on individual resource manager if required
 - e.g. SAP connectivity lost, SAP IDOC processed
 - Use event filters to create custom activity log
 - e.g. capture all activity on JMS queue REQ1 and C:D node CDN1
 - Progressive implementation as with resource statistics, starting with JMS and C:D resources
- **Comprehensive Reporting Options**
 - Reporting via MB Explorer, log files and programmable management (CMP API)
 - Extensive filtering & search options, also includes save data to CSV file for later analysis
- **Log Rotation facilities**
 - Rotate resource log file when reaches using size or time interval

	Message...	Timestamp	Message Summary
i	BIP12001I	17-Jun-2011 10:10:50.85...	Connected to JMS provider 'WebSphere_MQ'
i	BIP12002I	17-Jun-2011 10:10:50.85...	Created a 'Transaction_None' session for JMS provider 'WebSphere_MQ'
i	BIP12004I	17-Jun-2011 10:10:50.93...	Created JMS producer for destination 'ASYNCREQUESTQ'
i	BIP12007I	17-Jun-2011 10:10:50.93...	Sent a JMS message to queue 'ASYNCREQUESTQ'
i	BIP12004I	17-Jun-2011 10:10:50.52...	Created JMS producer for destination 'ASYNCRECEIVEQ'
x	BIP12014E	17-Jun-2011 13:47:51.65...	Failed to send message to 'ASYNCRECEIVEQ'
i	BIP12001I	17-Jun-2011 13:47:54.99...	Connected to JMS provider 'WebSphere_MQ'
i	BIP12004I	17-Jun-2011 13:47:55.00...	Created JMS producer for destination 'ASYNCRECEIVEQ'



Dynamic Deployment of AD Artefacts

- **Allow sub-flows to be deployed independently of main flow**
 - Additional to existing build-time sub-flow; no performance impact
 - New “Route to sub-flow” allows dynamic addition of new/changed logic
 - Intuitive Drag and drop deploy & simple BAR file packaging
 - Sub-flow is fully visible as development artefact c.f. message flow



- **Independently deployable ESQL**
 - Particularly useful for dynamic transformation scenarios
 - Allows new/changed transformation without whole-flow redeploy
 - Intuitive Drag and drop deploy & simple BAR file packaging
- **Deploy Flow Stopped provides fine grained initialization control**
 - Important in “order-of-initialization” type scenarios
 - Allows operator to declare initial state for deployed flow resources
 - Manual: always needs to be started by user
 - Automatic: always started by broker
 - Maintained: remember
 - Persists over expected or unexpected restarts

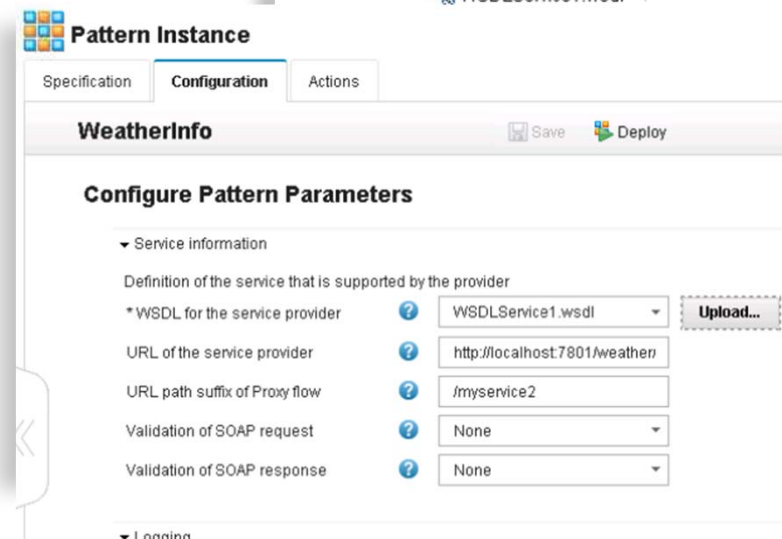
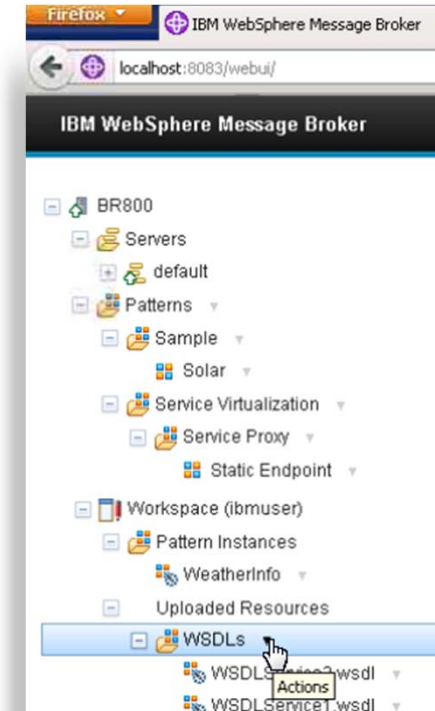


Start Mode	Maintained
Start additional instances when flow starts	Maintained
	Manual
	Automatic

- **Deployable Maps & Schemas**
 - Graphical maps & XSDs (XML and DFDL) can now be deployed independent of flow
 - Simplifies change management for incremental solutions
 - Just deploy changed artefacts rather than whole flow!

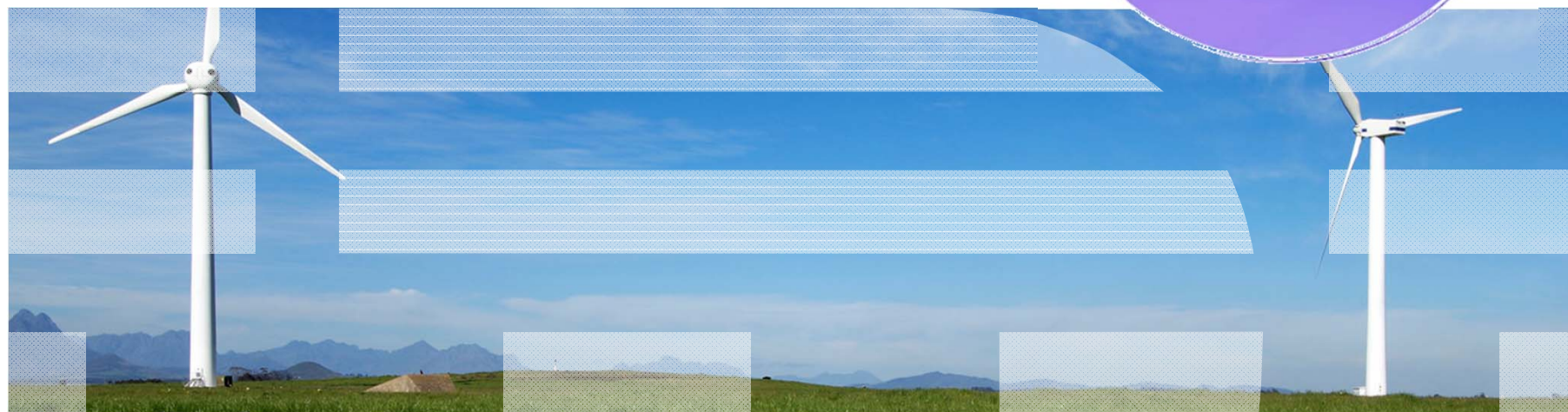
Web-based Patterns for Easy Solution Creation

- **Patterns Based Development**
 - Quickly create best practice solutions from pre-built templates
 - e.g. WS façades, message processing, file to queue...
 - IBM pre-supplied & User Defined Patterns
 - Create & share user patterns
 - Including community downloads
- **Web-based quick & simple pattern generation**
 - Allows end users to configure repeatable solutions
 - New tool aimed at web user
 - Configure and deploy patterns directly to broker
 - Role-based access & security for appropriate authorization
- **Complements existing tools**
 - Pre-built, user-defined and imported patterns
 - Design allows for future inclusion of user patterns
 1. Build .patternzip in MB Toolkit
 2. Import for web tool
 3. Configure and deploy
 - Exploits source deployment (see later)
 - Move from test to QA to production
- **Operational Management**
 - Manage patterns using standard MB tools
 - e.g. MBX, web UI, CMP...



IBM Integration Bus

What's New in Version 9



Migration from WebSphere Message Broker V6.1, V7 and V8

▪ Migration from WMB V6.1, V7 and V8

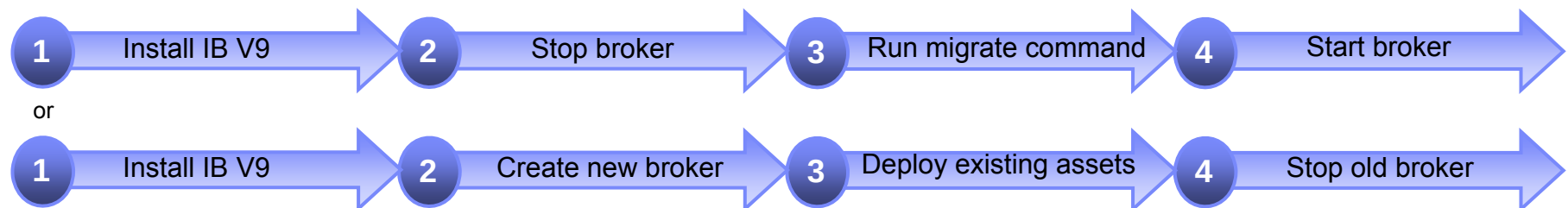
- All development assets (e.g. message flows, ESQL, DFDL, Java, Maps and XSLT) import directly
 - Right-click convert action for pre-V8 maps; some manual tasks may be required
- Migrate brokers using a single command, or create new brokers for phased migration
 - No broker redeployment necessary when using built-in migrate command
 - All existing BAR files can be deployed to IB V9 brokers without change

▪ Migration commands for in-place migration

- Includes migration of configuration data including broker databases, queues and registry
- Forwards and backwards migration of existing components, in situ
 - **mqsिमigratecomponents** command (includes **-t** option for rollback to V7 and V8)

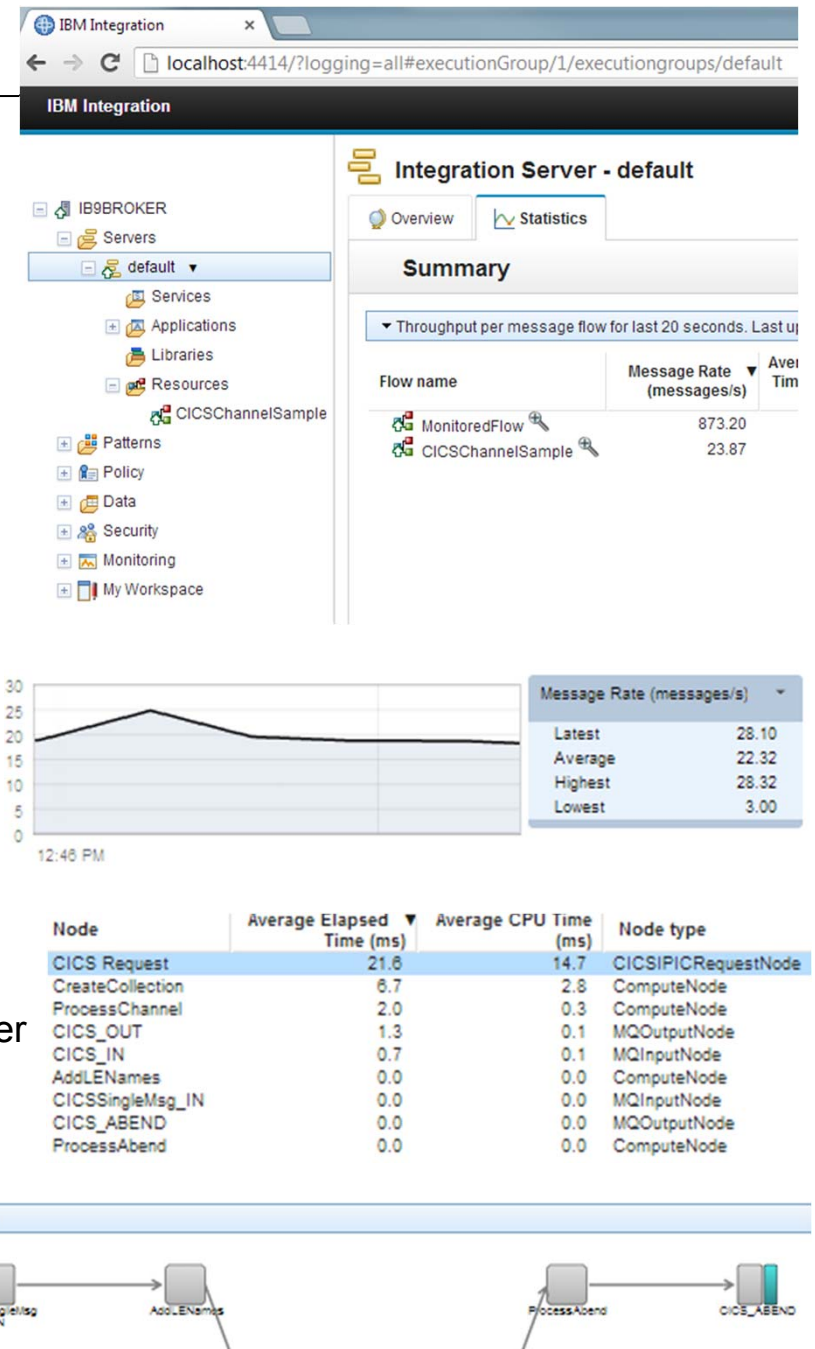
▪ Flexible co-existence options remove the need for additional hardware when migrating

- IB V9 co-exists on the same OS with all previous MB versions
- MQ V7.5.0.1 required for all IB V9 brokers
 - MQ V7.5.01 supported with V7 and V8 brokers for the purposes of V9 migration
 - For V6.1 migration, upgrade MQ and MB simultaneously



Web Visualisation and Analytics

- **A comprehensive tool for web management**
 - Manage all integration resources from zero-footprint client
 - Analyze integration performance in real-time
 - Supported on a variety of browsers: IE10, Firefox, Safari...
 - Complements MQ Explorer and WAS Admin consoles
- **Managing Integration Resources**
 - View top-level integration node properties
 - Add/remove/change integration servers
 - Start/Stop integration data flows
 - Role based access to control usage
 - Advanced options include data replay, policy & monitoring
 - Exploits underlying public REST/JSON API
- **Integration Performance Analysis**
 - Operational experience; no developer intervention required
 - New and existing flows can exploit without change
 - Many metrics of integration flow available in real-time
 - CPU & I/O time shown by default in integration analyzer
 - Other metrics include thread, data sizes, errors...
 - Flexible display includes data tables and flow profile
 - Drill down to understand detailed behaviour
 - Exploits underlying MQTT web sockets technology
 - Asynchronous notification at low CPU cost



IBM DFDL in IBM Integration Bus

- IIB v9 uses IBM DFDL v1.1 component
- DFDL domain and parser
 - Available in nodes, ESQL, Java, ...
 - Use instead of MRM CWF/TDS
 - More capable and higher performing
 - Adopts XMLNSC tree shape
- DFDL models
 - Schema files reside in IIB libraries
 - Not in Message Sets
- Tooling for creating DFDL models in IIBTK
- DFDL model debugger
 - Debug parsing & writing of data in IIBTK
 - No deploy to runtime necessary!
- DFDL schema deployed in BAR file
 - No dictionary file
- Migration from v8

The screenshot displays the 'New Message Model' configuration window for CSV data. It includes a table of sample data, a configuration panel for record and field settings, and a 'DFDL Test - Parse' results window showing the parsed input data.

	A	B	C	D	E
1	Year	Make	Model	Description	Price
2	2009	SK Inc	MBTk7	4293cc, V8	53880.00
3	2010	Hans On	DFDL	3000cc straight 6	31395.00
4	2010	AOD corp	MB8	4163cc, V8	51435.00

Configure schema for CSV data
Provide settings for a new schema that will model CSV data.

Record settings
End of record character: Carriage Return & Line Feed - %CR;%LF;
Blank records: Skip a blank record (selected) | Select the record terminator.
☒ The first record is a header

Field settings

DFDL Test - Parse: Runs the DFDL parser with the provided physical input data and
Status: Parsing completed: Thu Jun 14 12:06:05 BST 2012

Input
Data: /ST_DFDL_CSV/TestData.txt

Parsed Input
Characters

```
1 Year,Make,Model,Description,Price=
2 2009,SK Inc,MBTk7,"4293cc, V8",53880.00=
3 2010,Hans On,DFDL,"3000cc, straight 6",313
4 2010,AOD corp,MB8,"4163cc, V8",51435.00
```

MQ Input Node Properties - SAMPLE_ACE_RSSE

Description	Basic	Input Message Parsing	Parser Options	Advanced	Validation
Message domain	DFDL : For binary or text messages with a Data Format Description L				
Message model	<DFDL schema files in Applications and Libraries>				
Message	Transaction				
To open the DFDL schema file for the selected message, click here...					

DFDL Adoption

- IBM DFDL reusable component ships with:
 - IBM WebSphere Message Broker 8.0
 - IBM Integration Bus 9.0
 - IBM Rational® Performance Test Server 8.0.1
 - IBM Rational Test Virtualization Server 8.0.1
 - IBM Rational Test Workbench 8.0.1
 - IBM Rational Developer for System z 8.5
 - IBM InfoSphere® Master Data Management 11
- Further IBM products and appliances investigating adoption
- Open-source DFDL implementation in progress ‘Daffodil’
 - Available as an alpha release (parser only)
 - Partly funded by a major US government agency who are adopting DFDL as their standard way to parse text and binary data
- DFDL web community on GitHub for collaborative authoring of DFDL schemas for commercial and scientific data formats



DFDL Schemas Web Community

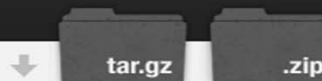
- Free public repository for DFDL models
- Hosted on the popular GitHub community website
- Unlimited read-only access
- Collaboration encouraged
- Evolving content



DFDL Schemas for Commercial and Scientific Data Formats

ISO8583

DFDL schemas for ISO8583



This GitHub repository hold DFDL schemas that model ISO8583 credit/debit card data. There are DFDL schemas for the two most popular release of the standard:

- ISO8583:1987
- ISO8583:1993 (coming soon)

This is a public repository that allows anybody to view the content. If you would like to contribute to this repository, email the address on the organisation home page.



Search or type a command



Explore Gist Blog Help



Repositories



Members

Find a Repository...



dfdlschemas.github.com

Web pages for DFDLSchemas organization

Last updated 2 days ago



ISO8583

DFDL schemas for ISO8583

Last updated 5 days ago



IBM4690-TLOG

DFDL schemas for Transaction Log data emitt

Last updated 5 days ago

Controlling Integrations with Policy

Integration Workload Management

- Provide intelligent mechanisms to control processing speed
- Most common scenario is to reduce back-end server load
- Design allows more policy-based processing over time
- Can be applied to new or existing integration data flows

Policy defines threshold limits and relevant actions

- Set thresholds for integration data flow throughput
- Specify actions at threshold, for example:
 - NOTIFY: Higher (or lower) than threshold generates publication
 - DELAY: Excessive workload will have latency added to shape throughput

Web Console used to manage WLM policy

- Sophisticated behaviour controllable by broker WLM policy
- Workload can be managed across classes of message flows (e.g. batch vs. online)
- Policies stored in local registry, and dynamically configurable
- Developer can also specify limits as integration data flow properties

Policies

Overview

WorkloadManagement

Values that you do not define on this page are inherited from the message flow, if they are.

Policy Name: BatchWorkloads

Targets and Limits

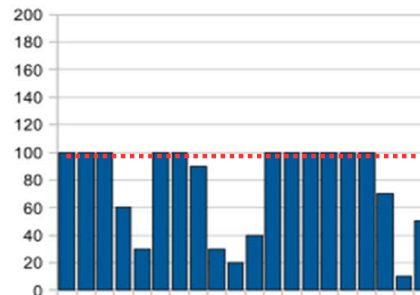
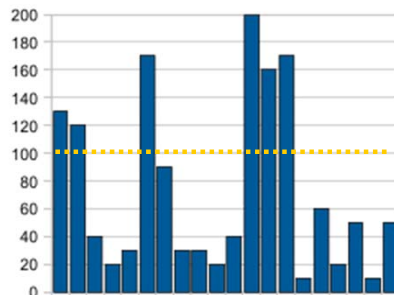
Notification Threshold: 100 messages

Maximum Rate: 300 messages

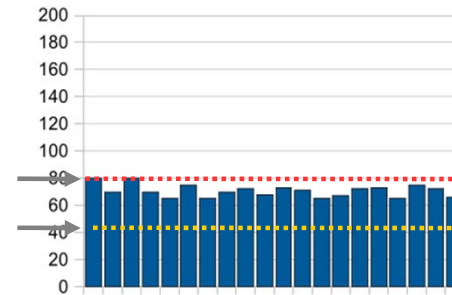
Additional Instances

Additional Instances: 1

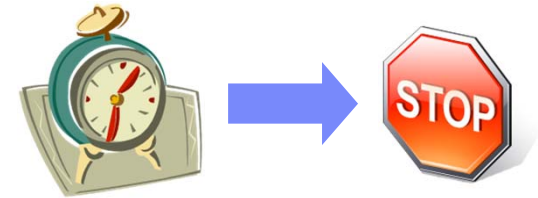
Start additional instances when flow starts: Yes



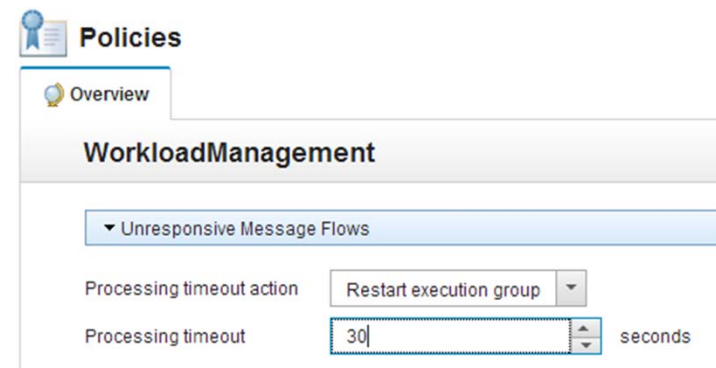
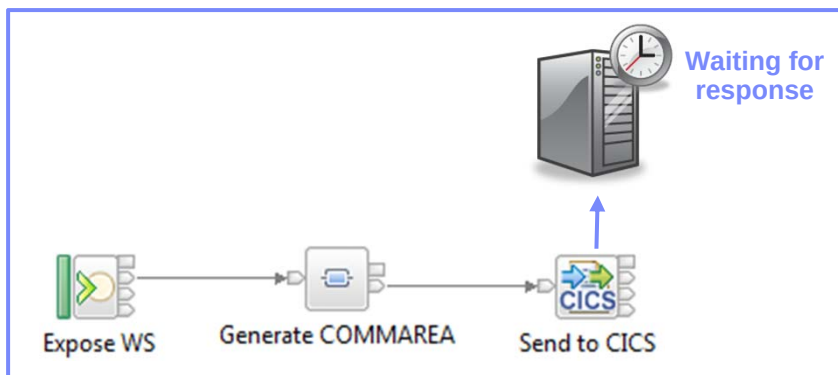
IBM Integration Bus V9



Managing Unresponsive Integration Flows



- **Target unresponsive flows through policy to improve overall system reliability**
 - Additional WLM option aimed at unresponsive integration flows
 - An integration flow can become unresponsive for multiple reasons
 - e.g. Waiting for external system, infinite loop, deadlock, malformed XML



- **Flexible configuration, actions and reporting options**
 - Specify threshold at which flows are considered unresponsive, e.g. 30 seconds for processing
 - Configured via WLM policy, or directly on the flow in the BAR file
 - Define action to trigger when flow considered unresponsive
 - Administrative notification through a new “timeout exceeded” event message
 - If flow eventually continues through to completion, a second event is published
 - Restart the integration server (execution group) on which the unresponsive flow is running
 - New command option to forcibly stop integrations manually: **mqsisistopmsgflow -f**



Decision Service

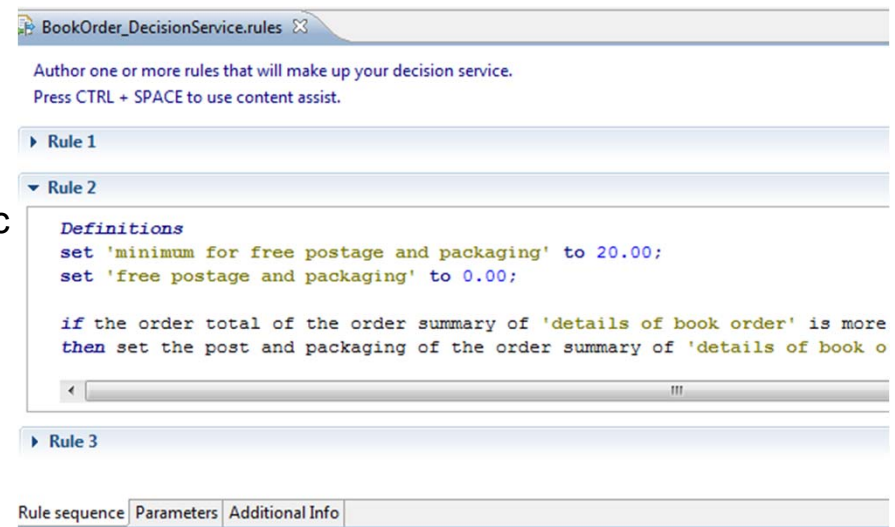
Understand and Act on In-flight data

■ Provide business insight during integration data flows

- e.g. intelligent decision making; score then action in-flight request based on a business rule
- User creates (e.g.) if-then-else rules using tool of choice (Excel, Word, Eclipse...)
- The bus acts on these rules in flow, e.g. for business level routing

■ New Decision Service node

- Identifies inputs to business rules from in-flight data
 - e.g. **details of book order** from request
 - e.g. **the item price** from key fields...
- Invokes built-in rule engine to perform business logic
 - Open interfaces for 3rd party and user engines
- Captures rules output for downstream processing
 - Business objects mapped back to in-flight data

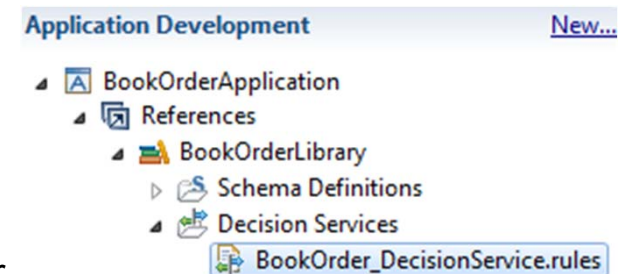


■ Create rules directly inside Integration Bus toolkit

- Significant rules authoring facility built-in
- Automatic package & deploy with integration assets
- Dynamically reconfigure business rule using configurable service policy
- Optionally refer to business rules on external ODM decision server
- Exploit separate full ODM Decision Center for BRMS scenarios

■ Embedded rules engine for high performance

- Rule is executed in the same OS process as integration data flow
 - Succeeds IAM9 Support Pac
- Rule update notification ensures consistent rule execution
- Optional governance of rules through remote ODM Decision Center



Graphical Transformations

■ IBM Graphical Data Mapper (GDM)

- Visually map and transform source to target data
- GDM designed for whole IBM product set, e.g.
 - Integration Bus V9, WebSphere Message Broker v8, DataPower
 - InfoSphere Master Data Management v10, Integration Designer v7.5/v8
 - Rational Application Developer for WebSphere Software v8.5
 - Rational Software Architect v8.5, RSA for WebSphere Software v8.5
 - Other products yet to announce
- Rich feature set and simplicity make this a good default transformation choice

■ Directly access stored procedures from within a map

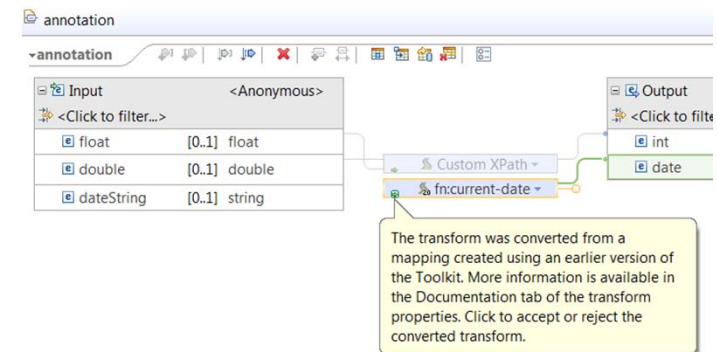
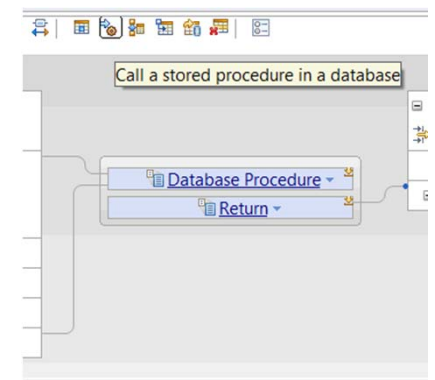
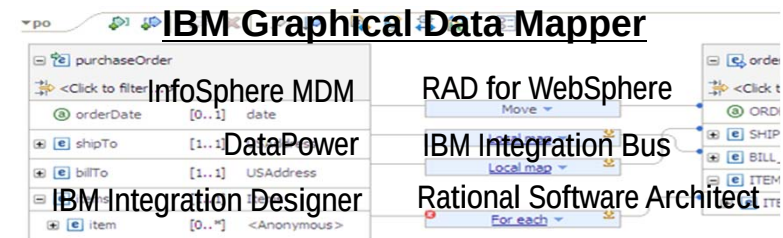
- Complements existing database select, insert, update, delete
- Incorporate user-defined database functions into your graphical transforms

■ Maps available to user patterns

- Graphical creation of flows which require transformation logic
 - e.g. new input or output messages
- Invocation of mapper when pattern instances are generated
- User guidance through HTML pattern help and task list
- Patterns to demonstrate include CRM account mapping

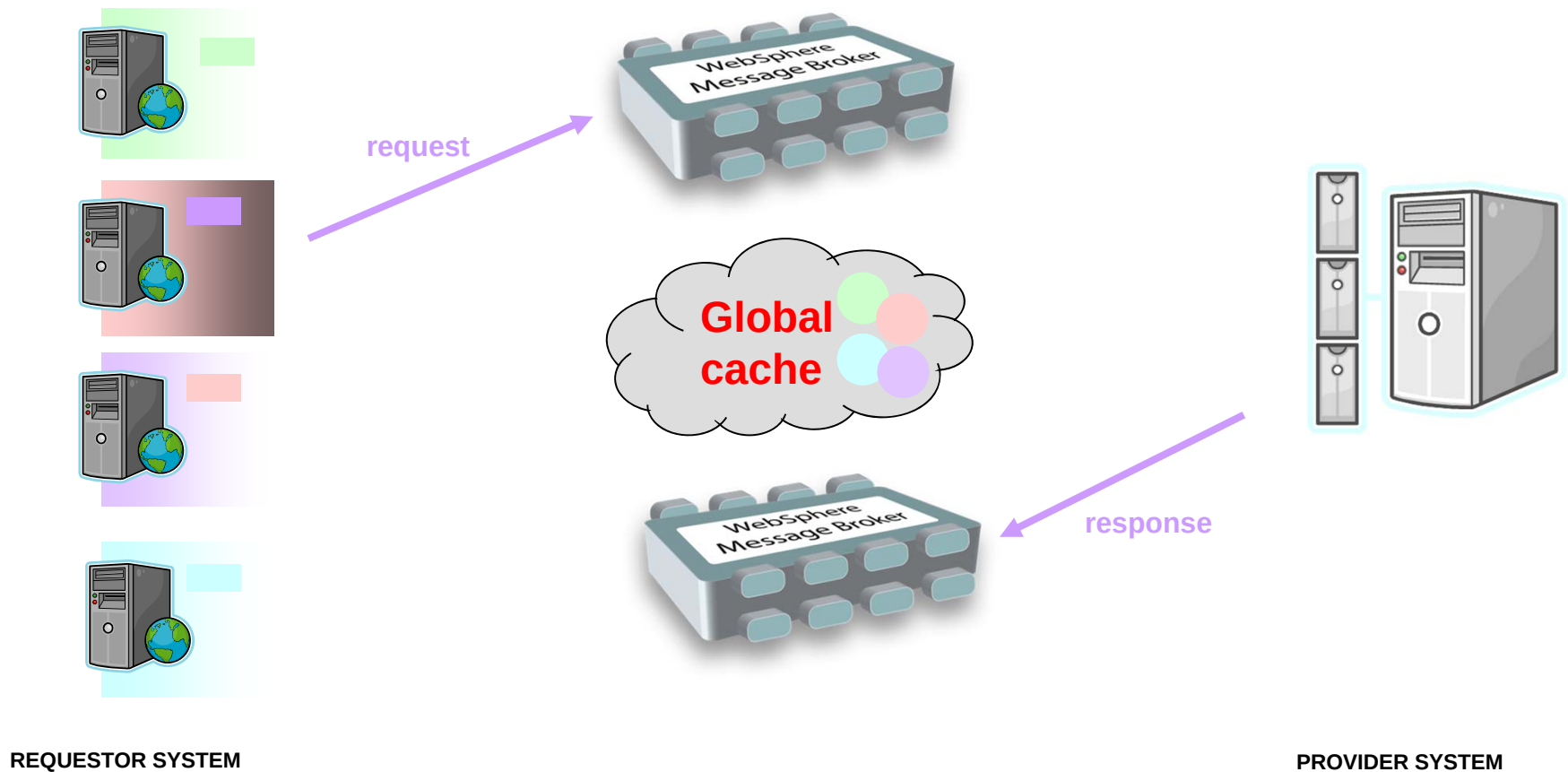
■ Migration of pre-V8 maps to IBM GDM

- Most sophisticated maps can now be converted in a single step
- Editor provides enhanced feedback about conversion to assist user understanding



Scenario 1 - Storing state for integrations

- With a global cache, each broker can handle replies – even when the request was processed by another broker.



Scenario 2 - Caching infrequently changing data

- With a global cache, the number of clients can increase while maintaining a predictable response time for each client.



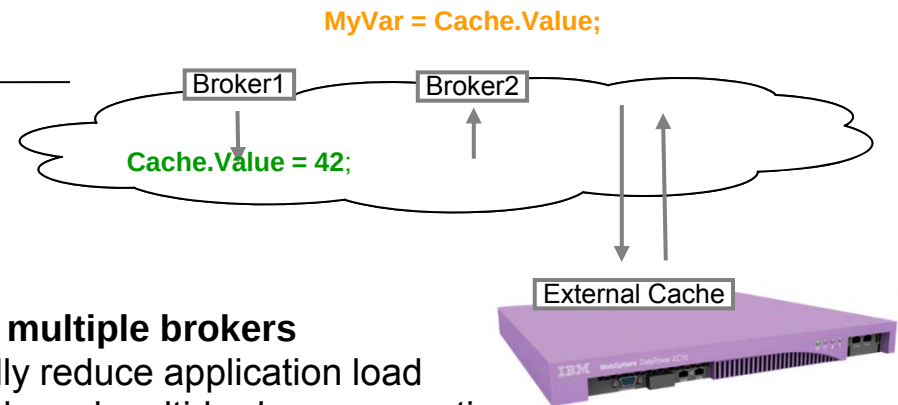
WebSphere eXtremeScale Overview

- **Elastic “In-Memory” Data Grid**
- **Virtualizes free memory within a grid of JVMs into a single logical space**
 - Accessible as partitioned, key addressable map by applications and subsystems
- **Provides fault tolerance through replication**
 - e.g. Primary/secondary stores with failover, voting etc...
- **Easy to Scale**
 - Add more JVMs dynamically while it's running without restart
- **Available as component or standalone software and hardware appliance**
 - Foundational technology used “under the covers” in Message Broker

WMB Global Cache in A Nutshell

- **WMB contains an embedded WebSphere eXtreme Scale grid**
 - WXS components are hosted within execution group processes
- **It works out of the box, with default settings, with no configuration**
 - You just have to switch it on!
- **The default scope of one cache is across one Broker**
 - Starts with multiple execution groups but easy to extend to multiple brokers
- **Advanced configuration available**
 - Execution group properties and Policy Profiles for more sophisticated topologies
- **MB developer has simple artefacts for working with the global cache**
 - Unaware of the underlying technology (WXS) or topology

Global Cache Enhancements



- **IB contains a built-in facility to share data between multiple brokers**
 - Improve mediation response times and dramatically reduce application load
 - Typical scenarios include multi-broker request-reply and multi-broker aggregation
 - Uses WebSphere Extreme Scale coherent cache technology
- **Support for external software and hardware caches**
 - Access separate eXtreme Scale and DataPower XC10 appliances from within the broker
 - Allows broker to interact with enterprise caching solution without embedding additional libraries
 - Cache access, activity log, resource statistics etc. just like embedded cache
 - Operationally configured using dynamic configurable service
 - New EG options to specify SSL connections to external WXS grids
 - Uses existing MB SSL infrastructure to configure certificates
- **Cache Expiry options**
 - New `getGlobalMap()` variant to set the time to live for data in the embedded global cache.

```
MbGlobalMap evictMap = MbGlobalMap.getGlobalMap("...", new MbGlobalMapSessionPolicy(30));  
evictMap.put("key", "val");
```
 - Specify a value in seconds. The default value is 0, which means data never gets automatically removed.
- **Programming and operational enhancements**
 - Insert and lookup map data using a wider range of Java object types for simplified programming logic
 - Support for highly available multi-instance configurations

Clients default to SSL:	☒
SSL protocol:	SSLv3
SSL key alias:	myKey

Improvements for our z/OS Users



- **IBM Integration Bus is a compelling choice for z/OS users**
 - Broad connectivity options to support processing of z/OS subsystems
 - WAS, CICS, IMS, DB2, File...
 - Makes use of z/OS specific features such as Sysplex, security, automatic restart and WLM
 - New IIB features demonstrate commitment to the z/OS platform
- **Standard Edition Pricing on z/OS**
 - New entry-level edition offers flexibility to fulfil either broad-capability or high-performance scenarios
- **Different users per execution group**
 - The userid associated with each execution group address space is now configurable on z/OS
 - The execution group exhibits that userid for all resource manager interactions (e.g. MQ, DB2)
 - Configurable via execution group profile; takes effect when an execution group is started
- **Co-ordinated transactions for CICS requests**
 - The CICSRequest node now supports broker coordinated transactions (one-phase commit)
 - Allows multiple requests to a CICS server to be handled as part of the same transaction
- **Activity log for CICS transactions**
 - Provides a high-level overview of the recent interactions between IBM Integration Bus and CICS
 - Includes CICS invocation successes, failures, abends, security, timeouts and transactional state

Other Features Our Users Requested

▪ Developer Edition

- Free edition of IB with all nodes available and no time limitations
- Throughput rate limited to 1TPS per integration flow
- Assistance through user community (e.g. mqseries.net)
 - No formal IBM support
- Simple to download, install and use
 - Single installation package contains ALL required software:
 - MQ 7.5, Integration Bus (Runtime, Toolkit, Explorer)
 - Available on Windows and Linux platforms



▪ DFDL may be used in standalone applications

- Strategic modelling technology now available as separable components
- Simple to configure: Install Integration Bus, copy DFDL libraries to appropriate location

▪ Flexible statistics output

- Performance statistics can now be directed to multiple destinations (publication, user trace, SMF)

▪ Sub-second timeout on Aggregation nodes

- More granular timeout values (ms) can now be specified on the aggregation nodes
- Allows for quicker timeouts when aggregating data from usually fast responding systems

▪ ODBC Database verification (Linux/UNIX)

- Broker environment, and ODBC connections defined both to the broker and in odbc.ini are verified
- Run at broker startup (or with the `mqsicvp` command) ensures early capture of potential problems

IBM Integration Bus V9 - Summary

- **IBM Integration Bus is IBM's Strategic Integration Technology**
 - Single engineered product for .NET, Java and fully heterogeneous integration scenarios
 - Unparalleled range of connectivity options and capabilities
 - Supports users' range of experience & needs
 - Industry leading performance in a broad range of scenarios

- **A strong feature set for V9 and beyond**
 - We are working on a significant number of features for the next evolution of Message Broker tech
 - More to come - this is not a definitive list!
 - Continuous delivery throughout 2013 and beyond; features rolled back as available
 - Builds on the continued success of V7 and V8 major engineering releases
 - Content heavily influenced by user requirements, participation and feedback

- **Diverse connectivity requirements**
 - Simple & Productive to make connectivity easy and powerful
 - Universal & Independent to connect everything you need in the way you want to manage it
 - Industry Specific & Relevant to help solve business problems
 - Dynamic & Intelligent to create flexible solutions that provide business insight
 - High Performing & Scalable to maximize hardware and grow with you

Demo

