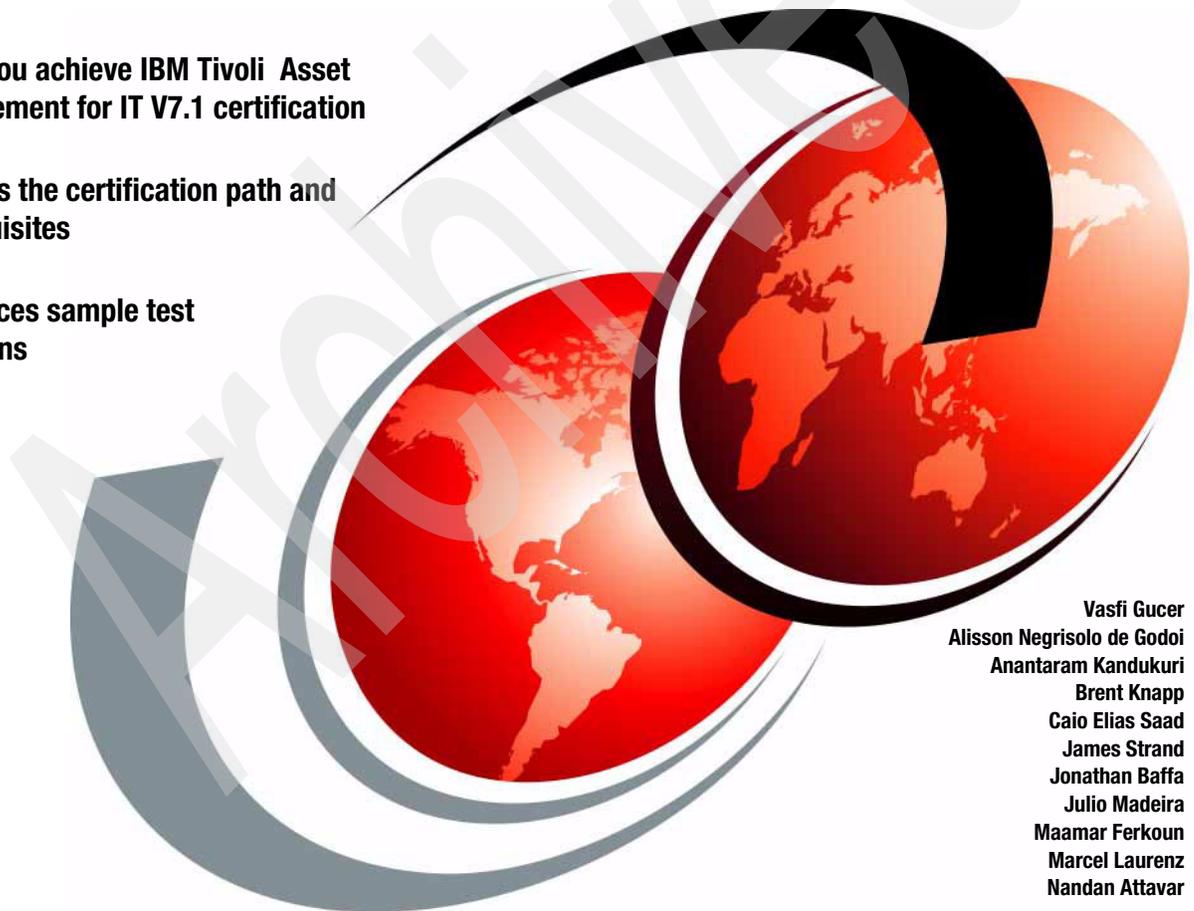


Certification Study Guide Series: IBM Tivoli Asset Management for IT V7.1

Helps you achieve IBM Tivoli Asset Management for IT V7.1 certification

Explains the certification path and prerequisites

Introduces sample test questions



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International Technical Support Organization

**Certification Study Guide Series: IBM Tivoli Asset
Management for IT V7.1**

August 2009

Archived

Note: Before using this information and the product it supports, read the information in “Notices” on page ix.

First Edition (August 2009)

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Preface

This IBM® Redbooks® publication is a study guide for IBM Tivoli® Asset Management for IT V7.1 and is aimed at individuals who want to get an IBM Professional Certification for this product.

The IBM Tivoli Asset Management for IT V7.1 certification exam, offered through the Professional Certification Program from IBM, is designed to validate the skills required of technical professionals who work in the implementation of the IBM Tivoli Asset Management for IT V7.1 product.

This book provides a combination of theory and practical experience needed for a general understanding of the subject matter. It also provides sample questions that will help in the evaluation of personal progress and provide familiarity with the types of questions that you will encounter in the exam.

This publication does not replace practical experience, and is not designed to be a stand-alone guide for any subject. Instead, it is an effective tool that, when combined with educational activities and experience, can be an extremely useful preparation guide for the exam.

For your convenience, we structure the chapters based on the sections of the Test 000-016: IBM Tivoli Asset Management for IT V7.1 Implementation, such as Assets, Inventory, and so on, so studying each chapter will help you prepare for one section of the exam.

Note that Test 000-017: Foundations of Tivoli Process Automation Engine is a prerequisite for IBM Certified Deployment Professional - IBM Tivoli Asset Management for IT V7.1 certification. To prepare for that test, refer to the IBM Redbooks publication *Certification Study Guide Series: Foundations of Tivoli Process Automation Engine*, SG24-7763.

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Certification overview

This chapter provides an overview of the skill required to become an IBM certified Advanced Technical Expert. The chapter offers a comprehensive review of specific topics that provide essential information for obtaining the certification.

This chapter contains the following topics:

- ▶ “IBM Professional Certification Program” on page 2
- ▶ “IBM Tivoli Software Professional Certification” on page 4
- ▶ “Test 000-016: IBM Tivoli Asset Management for IT V7.1 Implementation” on page 7
- ▶ “Suggested resources for study” on page 8

1.1 IBM Professional Certification Program

Having the right skills for the job is critical in the growing global marketplace. IBM Professional Certification, designed to validate skill and proficiency in the latest IBM solution and product technology, can help provide that competitive edge. The IBM Professional Certification Program Web site is available at:

<http://www.ibm.com/certify/index.shtml>

The IBM Professional Certification Program offers a business solution for skilled technical professionals seeking to demonstrate their expertise to the world.

In addition to demonstrating your skill and proficiency in the latest IBM technology and solutions, professional certification can help you excel at your job by giving you and your employer the confidence that your skills have been tested. You can deliver higher levels of service and technical expertise than non-certified employees and move on a faster career track. Professional certification puts your career in your control.

The certification requirements are difficult but not overwhelming. Certification is a rigorous process that differentiates you from everyone else.

The mission of the IBM Professional Certification Program is to:

- ▶ Provide a reliable, valid, and fair method of assessing skills and knowledge.
- ▶ Provide IBM with a method of building and validating the skills of individuals and organizations.
- ▶ Develop a loyal community of highly skilled certified professionals who recommend, sell, service, support, and use IBM products and solutions.

The IBM Professional Certification Program has developed certification role names to guide you in your professional development. The certification role names include IBM Certified Specialist, IBM Certified Solutions/Systems Expert, and IBM Certified Advanced Technical Expert for technical professionals who sell, service, and support IBM solutions. For technical professionals in application development, the certification roles include IBM Certified Developer Associate and IBM Certified Developer. An IBM Certified Instructor certifies the professional instructor.

The IBM Professional Certification Program provides a structured program leading to an internationally recognized qualification. The program is designed for flexibility by enabling you to select your role, prepare for and take tests at your own pace, and, in some cases, select from a choice of elective tests best suited to your abilities and needs. Some roles also offer a shortcut by giving credit for a certification obtained in other industry certification programs.

You can be a network administrator, systems integrator, network integrator, solution architect, solution developer, value-added reseller, technical coordinator, sales representative, or educational trainer. Regardless of your role, you can start charting your course through the IBM Professional Certification Program today.

1.1.1 Benefits of certification

Certification is a tool to help objectively measure the performance of a professional on a given job at a defined skill level. Therefore, it is beneficial for individuals who want to validate their own skills and performance levels, those of their employees, or both. For optimum benefit, the certification tests must reflect the critical tasks required for a job, the skill levels of each task, and the frequency a task must be performed. IBM prides itself in designing comprehensive, documented processes that ensure that IBM certification tests remain relevant to the work environment of potential certification candidates.

In addition to assessing job skills and performance levels, professional certification can also provide the following benefits:

- ▶ For employees:
 - Promotes recognition as an IBM certified professional
 - Creates advantages in interviews
 - Assists in salary increases, corporate advancement, or both
 - Increases self-esteem
 - Provides continuing professional benefits
- ▶ For employers:
 - Measures the effectiveness of training
 - Reduces course redundancy and unnecessary expenses
 - Provides objective benchmarks for validating skills
 - Facilitates long-range planning
 - Helps to manage professional development
 - Aids as a hiring tool
 - Contributes to competitive advantage
 - Increases productivity
 - Increases morale and loyalty
- ▶ For IBM Business Partners and consultants:
 - Provides independent validation of technical skills
 - Creates competitive advantage and business opportunities
 - Enhances prestige of the team
 - Contributes to meeting IBM requirements for various IBM Business Partner programs

Specific benefits can vary by country (or region) and role. In general, after you become certified, you should receive the following benefits:

- ▶ Industry recognition

Certification can accelerate your career potential by validating your professional competency and increasing your ability to provide solid, capable technical support.

- ▶ Program credentials

As a certified professional, you receive (through e-mail) your certificate of completion and the certification mark associated with your role for use in advertisements and business literature. You can also request a hardcopy certificate, which includes a wallet-size certificate.

IBM Professional Certification acknowledges the individual as a technical professional. The certification mark is for the exclusive use of the certified individual.

- ▶ Ongoing technical vitality

IBM certified professionals are included in mailings from the IBM Professional Certification Program.

1.2 IBM Tivoli Software Professional Certification

The IBM Tivoli Professional Certification program offers certification testing that sets the standard for qualified product consultants, administrators, architects, and partners.

The program also offers an internationally recognized qualification for technical professionals seeking to apply their expertise in today's complex business environment. The program is designed for those who implement, buy, sell, service, and support IBM Tivoli solutions and want to deliver higher levels of service and technical expertise.

Whether you are a Tivoli client, partner, or technical professional wanting to put your career on the fast track, you can start on the road to becoming a Tivoli Certified Professional today.

Benefits of Tivoli certification

Tivoli certification provides the following benefits:

- ▶ For the individual:

- IBM Certified certificate and use of logos on business cards
- Recognition of your technical skills by your peers and management

- Enhanced career opportunities
- Focus for your professional development
- ▶ For the IBM Business Partner:
 - Confidence in the skills of your employees
 - Enhanced partnership benefits from the IBM Business Partner program
 - Ability to bill your employees' services at higher rates
 - Strengthens proposals to customers
 - Deepens technical skills available to prospective customers
- ▶ For the customer:
 - Confidence in the services professionals handling your implementation
 - Ease of hiring competent employees to manage your Tivoli environment
 - Enhanced return on investment (ROI) through more thorough integration with Tivoli and third-party products
 - Ease of selecting a Tivoli Business Partner that meets your specific needs

Certification checklist

To pursue certification, follow the steps in this checklist:

1. Select the certification that you want to pursue.
2. Determine which test or tests are required by reading the certification role description.
3. Prepare for the test, using the following resources provided:
 - Test objectives
 - Recommended educational resources
 - Sample assessment test
 - Other reference materials
 - List of opportunities for gaining experience

Note: These resources are available from each certification description page, as well as from the test information page.

4. Register to take a test by contacting one of our worldwide testing vendors:
 - Prometric
 - Pearson Virtual University Enterprises (VUE)

Note: When providing your name and address to the testing vendor, be sure to specify your name exactly as you want it to appear on your certificate.

5. Take the test. Be sure to keep the Examination Score Report provided upon test completion as your record of taking the test.

Note: After taking a test, your test results and demographic data (including name, address, e-mail, and phone number) are sent from the testing vendor to IBM for processing (allow two to three days for transmittal and processing). After all the tests required for a certification are passed and received by IBM, your certificate is issued.

6. Repeat steps 3 on page 5 - 5 until all required tests are successfully completed for the certification role. If you must meet additional requirements (such as an *other vendor* certification or exam), follow the instructions on the certification description page to submit these requirements to IBM.
7. After you complete your certification requirements, you are sent an e-mail asking you to accept the terms of the IBM Certification Agreement before receiving the certificate.
8. Upon acceptance of the terms of the IBM Certification Agreement, an e-mail is sent to you containing the following electronic deliverables:
 - A Certification certificate in PDF format, which can be printed in either color or black and white
 - A set of graphic files of the IBM Professional Certification mark associated with the certification achieved
 - Guidelines for the use of the IBM Professional Certification mark
9. To avoid unnecessary delay in receiving your certificate, ensure that your current e-mail is on file by maintaining an up-to-date profile. If you do not have an e-mail address on file, your certificate is sent through postal mail.

Certificates are sent by e-mail. However, you may also contact IBM at the following e-mail address to request a paper copy of the certificate, including a laminated wallet-sized card:

<mailto:certify@us.ibm.com>

Note: IBM reserves the right to change or delete any portion of the program, including the terms and conditions of the IBM Certification Agreement, at any time without notice. Some certification roles offered through the IBM Professional Certification Program require recertification.

1.3 Test 000-016: IBM Tivoli Asset Management for IT V7.1 Implementation

This section describes the IBM Tivoli Asset Management for IT V7.1 Implementation certification test.

1.3.1 Job role description and target audience

An IBM Certified Deployment Professional - IBM Tivoli Asset Management for IT V7.1 is a technical professional responsible for planning, installation, configuration, operations, administration, and maintenance of a Tivoli Asset Management V7.1 solution. This individual is expected to perform these tasks with limited assistance from peers, product documentation, and support resources.

1.3.2 About the test

To be certified, you must select Test 016: IBM Tivoli Asset Management for IT V7.1 Implementation. Note the following information about the test:

- Approximate number of questions: 64
- Duration in minutes: 75
- Format: Multiple choice
- Required passing score: 65%

For the most updated objectives of the IBM Tivoli Asset Management for IT V7.1 Implementation certification test, refer to the following link:

<http://www.ibm.com/certify/tests/obj016.shtml>

Important: *Test 000-017: Foundations of Tivoli Process Automation Engine* is a prerequisite for IBM Certified Deployment Professional - IBM Tivoli Asset Management for IT V7.1 certification. To prepare for that test, refer to *Certification Study Guide Series: Foundations of Tivoli Process Automation Engine*, SG24-7763.

1.3.3 Receive your 15% discount when taking the test

You can receive a 15% discount on the IBM Certified Deployment Professional - Tivoli Asset Management for IT V7.1 certification exam, if taken at any Prometric testing center. Just remember to use the code 15T016.

1.4 Suggested resources for study

Courses and publications are offered to help you prepare for the certification tests.

1.4.1 Courses

Refer to the following link for a list of courses related to IBM Tivoli Asset Management for IT V7.1:

<http://www.ibm.com/certify/tests/edu016.shtml>

The courses are recommended, but not required, before taking a certification test. If you want to purchase Web-based training courses, or you are unable to locate a Web-based or classroom course at the time and location you want, contact one of our delivery management teams at:

▶ Americas:

<mailto:tivamedu@us.ibm.com>

▶ EMEA:

<mailto:tived@uk.ibm.com>

▶ AP:

<mailto:tivtrainingap@au1.ibm.com>

Note: Course offerings are continuously being added and updated. If you do not see the courses listed in your location, contact one of the previously listed delivery management teams.

1.4.2 Publications

Before taking Test 016: IBM Certified Deployment Professional - IBM Tivoli Asset Management for IT V7.1, we suggest that you review the following product documentation and IBM Redbooks publications.

Online publications

For online publications of IBM Tivoli Asset Management for IT V7.1, go to:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=/com.ibm.tamit.doc_7.1/tamit_welcome.htm

IBM Redbooks publications

Refer to the IBM Redbooks publications as a study resource:

- ▶ *Deployment Guide Series: Tivoli IT Asset Management Portfolio*, SG24-7602

This book provides information to assist in the deployment and initial configuration of IBM Tivoli Asset Management for IT, IBM Tivoli License Compliance Manager, and IBM Tivoli License Compliance Manager for z/OS®.

- ▶ *IT Asset Management Processes using Tivoli Asset Manager for IT*, SG24-7601

This book provides high-level overviews of Tivoli IT Asset Management Portfolio, using product-specific terminology, describing how the product capabilities can enhance the implementation and automation of common IT asset management processes.

- ▶ *Certification Study Guide Series: Foundations of Tivoli Process Automation Engine*, SG24-7763

This book is a study guide for Test 000-017: Foundations of Tivoli Process Automation Engine, which is a prerequisite for IBM Certified Deployment Professional - IBM Tivoli Asset Management for IT V7.1 certification.

Archived

Assets

This chapter covers the Assets module and its relationship with other modules such as Work Order, Classifications and Preventive Maintenance. This chapter also covers several of the most important features on the Assets module, such as rotation items, meters, asset status, locations, user's attributes and others.

This chapter contains the following topics:

- ▶ “Assets module” on page 12
- ▶ “Rotating assets and rotating items” on page 15
- ▶ “Meters” on page 21
- ▶ “Locations” on page 25
- ▶ “Classifications” on page 27
- ▶ “Database Configuration” on page 30
- ▶ “Application Designer” on page 33

2.1 Assets module

The Assets module is used to manage all the assets that have been purchased, and them through their entire asset life cycle.

To support maintenance of assets, the Assets module has the following applications:

- ▶ Assets

Assets is used to create, change, and keep asset records up-to-date as life span, life-to-date, status modifications, spare parts, and assembly structures.

- ▶ Locations

Location is the place where assets are operated, stored, or repaired. Generally locations are defined as a means of tracking assets, but if your company does not use asset records to track equipment, you may define a location as any facility for which you want to create a maintenance record.

- ▶ Meters

Meters keeps the record's life-to-date and history of the consumption of an asset. The meters can be of type *Continuous* (cumulative such kilometers and miles, hours of use, engine starts, fuel consumed), *Gauge* (fuel level, oil pressure and level, and noise level), and *Characteristic* (the condition of the the assets, for example vibrating, noise, color).

- ▶ Meter Groups

Meter Groups is the top-level of meter application, where you can group certain types of meters. As explained previously, the default groups can be Continuous, Gauge, and Characteristic.

- ▶ Condition Monitoring

Condition Monitoring tracks gauge and characteristics records of an asset.

- ▶ Failure Codes

Failure code is an element of a failure hierarchy. A failure consists of Problems, Causes and Remedies. An individual failure code can be used at more than one level of a failure hierarchy. For example *high temperature* could appear in one failure hierarchy as a Problem and in another as a Cause.

- ▶ Asset Management

To implement a software management policy, the supporting tools must be flexible and comprehensive. Asset Management includes hardware and software contracts; terms, conditions, and financials; software licenses; and installed software and installed hardware.

▶ License Optimization

This application identifies opportunities to consolidate or renegotiate licenses, and cost reduction through elimination of unneeded software

▶ Compliance Management

This application is for identification and elimination of compliance problems prior to a vendor audit and identification of installed software that is unlicensed or unauthorized.

▶ Planning for Upgrade

This application is for analysis of software for a hardware upgrade and determining additional license cost for increased capacity.

The Asset module applications can be launched from the Go To menu by selecting **Go To** → **Assets**.

The Assets application is responsible for the creation and maintenance of assets and an asset's related information such as costs, parent, statuses, location, vendor, maintenance and meters.

The Assets application enables the user to be able to create the asset hierarchy and the list of locations, such as sites, buildings and subassemblies.

The asset hierarchy is a good way to control the maintenance costs in different levels. It is by far the best way to manage a group or a specific asset.

After you open the Assets application, you see the following tabs:

- ▶ List, which is where you can search for Assets
- ▶ Asset, which is for assets maintenance such as create, update, and delete
- ▶ Spare Parts, which you use to create an asset hierarchy and all subparts of it
- ▶ Safety, which you use for maintenance of safety records of an asset
- ▶ Meters, which you use to track, insert, consult data related to the meter life-to-date of an asset
- ▶ Specifications, which is where you can make the maintenance of the specification of an asset record related to the Classifications application

As with most of the applications, the default main window is the List tab. If you are looking for a specific attribute on the List tab, or you use the More Search fields in the Advanced Fields, and the results contain only one asset, the Asset tab opens, as shown in Figure 2-1 on page 14.

Figure 2-1 Assets applications

When creating a new asset, certain default fields are filled automatically and are read-only to the user. Other fields are writable, but they become read-only after the first-save of the asset record. These are fields such as: Asset name, Parent, Location, Rotating Item, Condition Code and Asset Up?.

To change certain read-only fields, use the **Select Action** menu for a corresponding option to the related field.

Certain fields are required in order for the user to be able to save the record. These are fields such as Asset Name, Status, Site, Asset Up?, Change By, Changed Date, Last Changed Date, and Total Downtime. Any asset can be moved between sites and organizations, regardless of whether it is a rotating item.

When searching for a specific asset, there are many search options such as: attribute search, asset hierarchy, and classification description. You have many options in the More Search Fields options, as shown in Figure 2-2 on page 15.

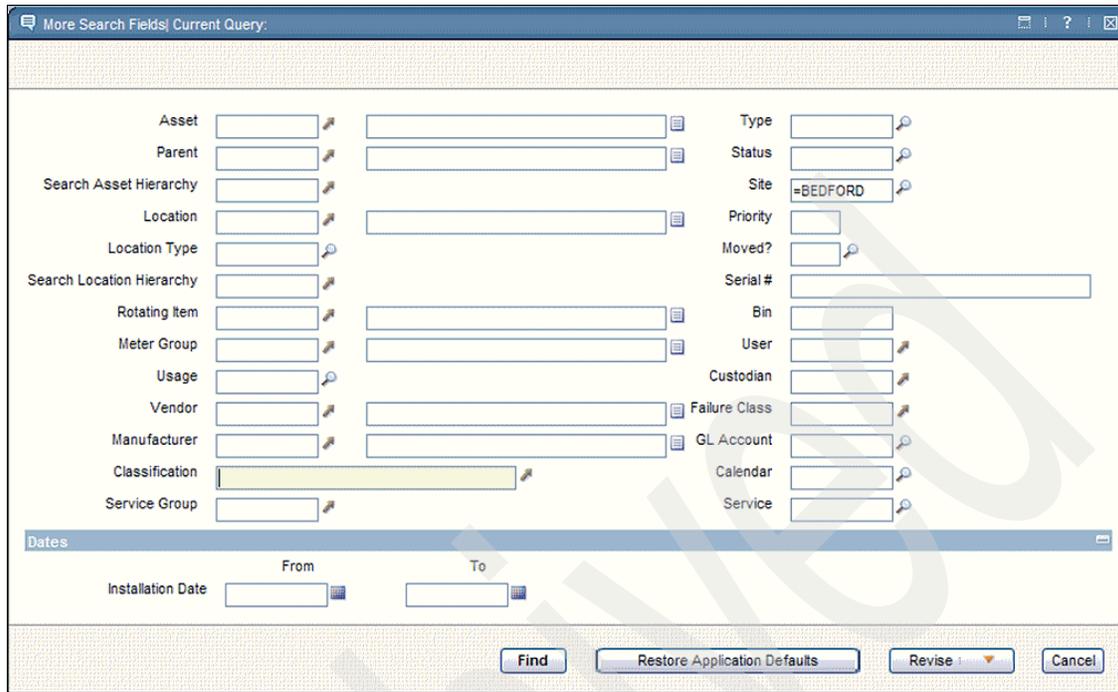


Figure 2-2 More Search Fields function on Assets application

To find all work orders related to a specific asset, use the asset Select Action menu, and then select **View** → **View Work Details**. This option shows all related records regarding work orders, preventive maintenance, routes, and collections.

You can add information to this view regarding children assets and ancestors, as shown in Figure 2-3.



Figure 2-3 More Views options

2.2 Rotating assets and rotating items

Rotating assets are interchangeable assets that are moved in and out of service as needed. The term is generally applied to assets that can be repaired or

refurbished rather than replaced, and can be used interchangeably at different locations or as subassemblies on different assets. Some examples of rotating assets might include pumps, motors, transmissions, laptops.

Rotating asset records also have a Rotating Item number to track the asset as it moves from a storeroom to an asset or location, to repair, and so forth. Having both an asset and item number lets you track identical assets both individually, via their unique asset numbers, and as a group, via their shared item number.

For example, a company might have fifty identical fire extinguishers (same manufacturer, same model), so all fifty have the same item number. However, each fire extinguisher has a unique history of when it was purchased, placed in the facility, inspected, used, and recharged, so each extinguisher has a unique asset number to let you track it individually.

To associate an rotating asset with a rotating item, use the Rotating Item field, as shown in Figure 2-4 on page 16.

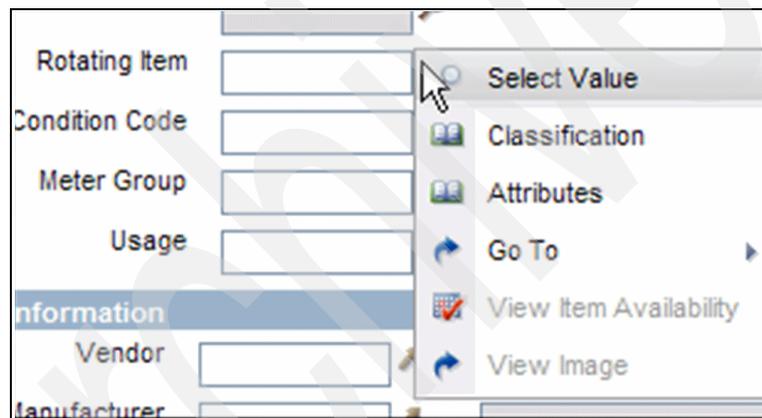


Figure 2-4 Rotating Item Field on Assets application

Rotating assets versus rotating items: Rotating assets are a special category of asset records, used to refer to any asset record that contains a value in the Rotating Item field. Rotating assets consist of multiple interchangeable assets, with each asset having the same item number and a different asset number.

These items are tracked both by their item numbers in the Inventory module and by their individual asset numbers in the Assets module. *The term rotating item is used when referring to inventory records and management, and the term rotating asset is used when referring to asset records and maintenance.*

To create a rotating item, you must add a valid rotating item from the Item Master application, as shown Figure 2-5 on page 17.

The screenshot shows the 'Item Master' application window. The title bar includes 'Return' and 'Return With Val'. The interface has a navigation bar with tabs for 'List', 'Item', 'Storerooms', 'Vendors', 'Specifications', and 'Item Assembly Structure'. The 'Item' tab is active. The main area contains a form with the following fields:

Item	RTWS002	Rotating Item WS 002	Attachments	
Item Set	ITMSTTRL		Status	ACTIVE
Commodity Group			Rotating?	<input checked="" type="checkbox"/>
Commodity Code			Condition Enabled?	<input type="checkbox"/>
Meter Group			Kit?	<input type="checkbox"/>
Meter			Outside?	<input type="checkbox"/>
Lot Type	NOLOT		Capitalized?	<input type="checkbox"/>
Maximum Quantity Issued			Inspect on Receipt?	<input type="checkbox"/>
Order Unit			Add as Spare Part?	<input type="checkbox"/>
Issue Unit			Attach to Parent Asset on Issue?	<input type="checkbox"/>
MSDS				

At the bottom, there is a footer bar with 'Alternate Items', 'Filter', and '1 - 1 of 1'.

Figure 2-5 Main fields from Item Master application

To create a valid item master, you must create a record with status of *Active* and with the *Rotating?* field check box selected. Then, you may add this item to your asset record, which results in your asset being configured as a rotating item.

When you move an asset for another location for repairs, you have limited types of locations that you can work with. Actually, when working with a non-rotating item, you may move this asset only for locations of type: Operating, Repair, Salvage, or Vendor. When working with a rotating item, this restriction is not applied anymore.

For a rotating item, you may use items (from the Item Master application) or tools (from the Tools application). You may not use service items, because service itself is not a unique and consumable material.

After you create a rotating item, the field Rotating Item becomes read-only. However, you may change it by using the **Select Action** menu and then selecting **Change Item Number**. The Change Item Number dialog opens, as shown in Figure 2-6 on page 18.

Change Item Number

Old Item FIRE-100

New Item

Condition Code

OK Cancel

Figure 2-6 Change Item Number

Having both an asset and item number allows you to track rotating assets individually, with their unique asset numbers, and also as a group, with their shared item number. Figure 2-7 shows the Rotating Item field in the Locations application.

Locations

Find:

List Location Assets History

Location*

Type*

Rotating Item

Meter Group

Calendar

Shift

Systems Filter

Figure 2-7 Rotating Item field on Locations application

To create a location, click **New Location**. The main fields will be ready to be populated. The status for new locations can be: Not Ready, Operating, or Decommissioned. By default, the initial status is Not Ready.

An asset can be moved between sites and organizations regardless of being a rotating item. The difference exists only when moving or swapping the assets.

2.2.1 Move/Modify Assets

See the icon of Move/Modify Assets in Figure 2-8.

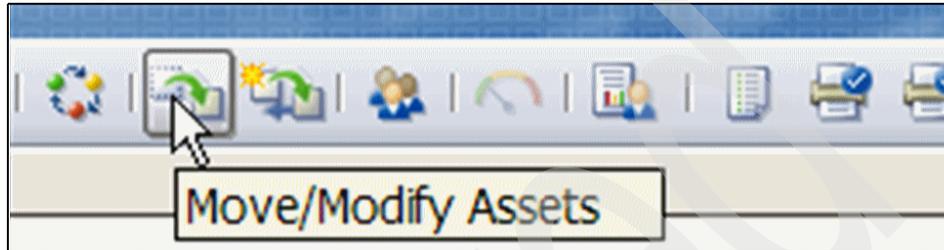


Figure 2-8 Move/Modify Assets

Use the Move/Modify function to move an asset from a non-inventory location to another non-inventory location or a storeroom. You can move assets within your current site, to another site within your organization, or to a site in a different organization of the company.

The Move/Modify Assets function allows you to move or modify assets individually or using the *Mass Move*. When you move multiple assets, you have to specify the same information for the assets. For example, you might specify the same location for the assets that you are moving.

Use Move/Modify Assets to perform the following tasks:

- ▶ Move assets grouped or not for a location, site, or bin.
- ▶ Work, create and update users and custodians.
- ▶ Modify a single or multiple assets attributes.

2.2.2 Swap Assets

See the icon of Swap Assets function in Figure 2-9.

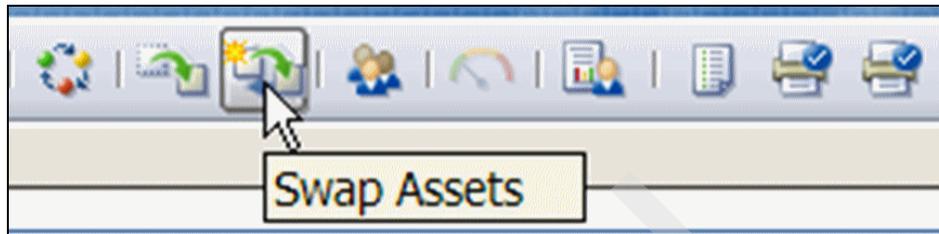


Figure 2-9 Swap Assets

To replace one asset with another one, you may use the **Swap Assets** action. For example, you might specify a different location for the asset that you want to swap out. You can swap any number of assets at once by using the Swap Assets dialog box. You cannot use the Swap Assets action to move rotating assets from inventory locations; you must issue or transfer rotating assets using the inventory applications.

Note the following information about swapping assets:

- ▶ If two assets share the same item set, you can swap both if they are defined as rotating item. You can swap them even if they are in different locations.
- ▶ If the replacing asset from another site or organization has the same asset identifier as an asset in your current site, IBM Tivoli Asset Management for IT prompts you to assign a new asset identifier to the replacing asset. Every asset within a site must have a unique identifier.
- ▶ The ability to swap assets to and from another site or organization depends upon your security authorization.

2.2.3 Move/Swap/Modify

When working with Move/Modify or Swap Assets, you can also perform a modification regarding the responsibility for this asset using the function *User and Custodians* that is available from other applications across Tivoli process automation engine platform such as:

- ▶ From Move/Modify Assets action in the Assets application.
- ▶ From Associate User and Custodians action in the Assets application.
- ▶ From the Move/Swap/Modify action in the Work Order Tracking application.

You use the Users and Custodians tab to associate an asset with a person as an user or as custodian or as both.

In IBM Tivoli Asset Management for IT, an asset can have multiple users, multiple custodians, or multiple users and custodians. If an asset does not have any users or custodians, anyone can create an incident or service request for it.

You may create a request with that asset only if you are an associated user or custodian for that asset. In the other applications, when a caller contacts a service desk agent, the agent can associate the caller with the ticket and then associate the appropriate assets with the ticket.

Figure 2-10 shows an example of Move/Swap/Modify.

The screenshot displays the 'Users and Custodians' tab in the 'Move/Swap/Modify' action. It features a table with the following columns: Person, User?, Custodian?, Primary?, Will be User?, Will be Custodian?, Will be Primary?, Remove?, and Add?. A single row is visible for the person 'WALL', where the 'Will be Primary?' checkbox is checked. Below the table is a 'Details' section with the following fields: Person* (WALL), Current User? (checkbox), Current Custodian? (checkbox), Current Primary? (checkbox), Will be User? (checkbox), Will be Custodian? (checkbox), Will be Primary? (checkbox checked), Modify? (checkbox), Add? (checkbox checked), Remove? (checkbox), Class (WORKORDER), and Record (1000). A 'New Row' button is located at the bottom right of the details section.

Figure 2-10 Move/Swap/Modify action in Work Order Tracking application

2.3 Meters

The Meters application is used to keep the records, life-to-date, and history of the consumption of an asset. The three types of meters are:

- ▶ Continuous, which is cumulative, such kilometers and miles, hours of use, engine starts, and fuel consumed
- ▶ Gauge, which can be, for example, fuel level, oil pressure and level, and noise level
- ▶ Characteristic, which are asset characteristics such as vibrating, noise, and color

2.3.1 Meters and meter groups

You can create meters and meter groups in the *Meters application* and then within the Item Master application, associate a meter to an item or a meter group

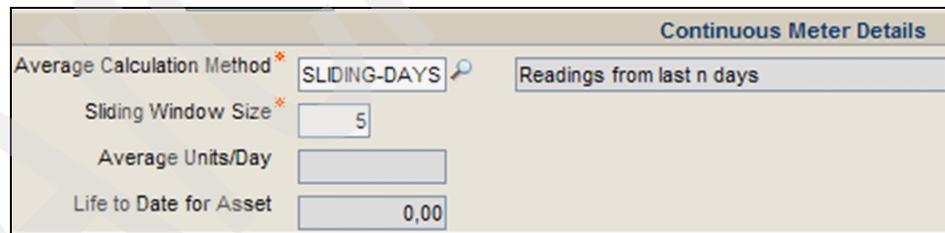
on a rotating item. As mentioned in 2.3, “Meters” on page 21, meters can be of three types: continuous (kilometers life-to-date, liters consumed), gauge (a temperature reading), and characteristic (a color, a vibration level, a sound level).

When you associate a continuous meter to an item and then issue the item to a work order, asset, or location, IBM Tivoli Asset Management for IT updates the associated asset or location record with the quantity that was issued and decreases the storeroom balance of that item. (This happens only when the meter on the item matches the meter on the asset or location.)

For example, you may have FUEL defined as a meter and GASOLINE as an item. Within Item Master, you can associate the meter FUEL to the item GASOLINE. When you issue fuel for an asset, such as a truck, IBM Tivoli Asset Management for IT decreases the balance of the fuel in the storeroom by the amount issued, and in the Assets application on the Meters tab, you can see that the amount of fuel issued to the truck increases by the issued amount. This approach allows you to track fuel consumption for that asset.

With MILES for example, you can track the life-to-date of a vehicle and its consumption average of miles that a vehicle are used by day or by month. To do that, when associating with an Asset, you have to specify an Average Calculation method of SLIDING-DAYS and specify the Sliding Window Size.

The two methods to calculate an average can be by using the last readings (sliding-readings) or by the last days (sliding-days). In both cases, you specify the quantity of days or the reading in the field Sliding Window Size, as shown in the example in Figure 2-11.



Continuous Meter Details	
Average Calculation Method*	SLIDING-DAYS <input type="button" value="Readings from last n days"/>
Sliding Window Size*	5
Average Units/Day	
Life to Date for Asset	0,00

Figure 2-11 Average Calculation Method on Assets application

The field Average Units/Day indicates the average in the period that is specified as the Sliding Window Size; the Life to Date for Asset field indicates the sum of all readings, such as the odometer of a car for example.

A *meter group* is a set of meters that you can apply to an asset record. In the case of a rotating item, IBM Tivoli Asset Management for IT automatically applies

any meter group that is associated with the rotating item to any assets that are created for that item.

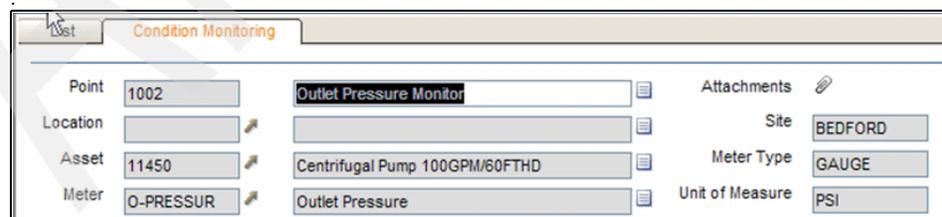
For example, a pump is a rotating item. On a pump, you might track meters such as inlet pressure, outlet pressure, and vibrations. These meters are common to all pumps. Instead of having to add these meters to each asset record created for this rotating item, you can instead create a meter group with this collection of pump-related meters and associate it with the rotating item. Each time you create an asset record for the pump, IBM Tivoli Asset Management for IT associates the meter group and its meters to the asset record so that you do not have to do so manually.

2.3.2 Condition monitoring

The *Condition Monitoring* application is used to create and view measurement point records for your assets and locations. A measurement point record defines the limits of acceptable meter readings for a characteristic or gauge type meter on an asset or location. You can generate preventive maintenance (PM) work orders or work orders with a specific job plan for assets or locations whose meter readings are outside acceptable limits.

Each measurement point is unique. You can compare similar measurement points on different assets or locations using meter readings. For example, you may use similar types of compressors in multiple locations, but you might have purchased the compressors from different vendors. If you have a pressure gauge on each of those compressors, you can generate reports that will allow you to compare the pressure readings on those compressors. This information helps you to determine whether the compressors from one vendor are more efficient than a similar compressor from another vendor. You may not use a meter name more than once on an asset or location record, but you can use the same meter name on multiple asset and location records.

Condition Monitoring tab is shown in Figure 2-12 on page 23.



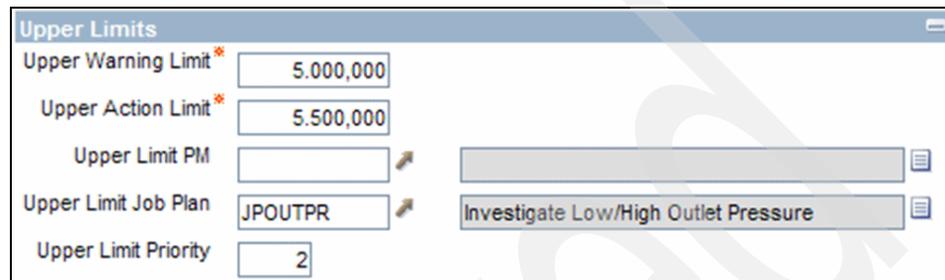
The screenshot shows the 'Condition Monitoring' application interface. It features a header with a 'List' button and the title 'Condition Monitoring'. Below the header, there are several input fields and buttons arranged in a grid-like structure. The fields are labeled as follows:

Point	1002	Outlet Pressure Monitor	Attachments	
Location			Site	BEDFORD
Asset	11450	Centrifugal Pump 100GPM/60FTHD	Meter Type	GAUGE
Meter	O-PRESSUR	Outlet Pressure	Unit of Measure	PSI

Figure 2-12 Condition Monitoring application main fields

Within those fields, you specify the *Point* of the monitoring condition by providing the asset name, meter to be monitored, its site, meter type, and the unit of measure.

Then, you have to specify the range by setting the *Upper Limits* and the *Lower Limits* as shown in Figure 2-13 and in Figure 2-14, respectively.

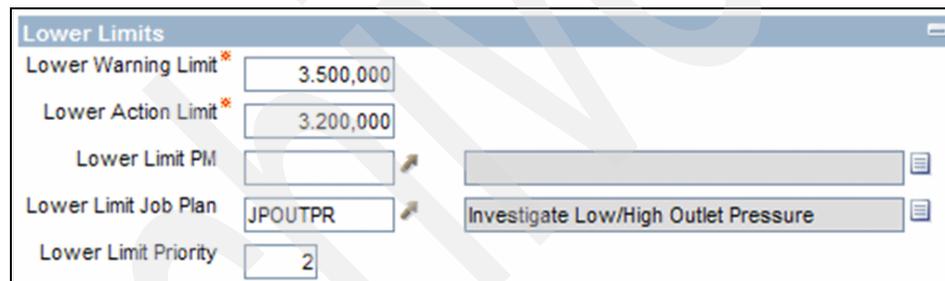


The screenshot shows the 'Upper Limits' configuration window. It contains the following fields and values:

Field	Value
Upper Warning Limit*	5.000,000
Upper Action Limit*	5.500,000
Upper Limit PM	[Empty]
Upper Limit Job Plan	JPOUTPR
Upper Limit Priority	2

There are also two dropdown menus on the right side of the window, both containing the text 'Investigate Low/High Outlet Pressure'.

Figure 2-13 Upper Limits section under Condition Monitoring application



The screenshot shows the 'Lower Limits' configuration window. It contains the following fields and values:

Field	Value
Lower Warning Limit*	3.500,000
Lower Action Limit*	3.200,000
Lower Limit PM	[Empty]
Lower Limit Job Plan	JPOUTPR
Lower Limit Priority	2

There are also two dropdown menus on the right side of the window, both containing the text 'Investigate Low/High Outlet Pressure'.

Figure 2-14 Lower Limits section under Condition Monitoring application

All measurements can be entered as part of a work order rather than directly against the measure point record in the Condition Monitoring application. When this is the case, a better approach is to set up a cron task to automate the generation of the work order when the limits have been exceeded.

Initially set the schedule on the cron task instance to run every 10 minutes. If you use an existing instance, check the OrgID and SiteID cron task parameters. To verify whether the cron task has been run, review the Cron Task History after the specified time. If the last measurement has exceeded its action limits, you will find that a work order was generated.

There are two main differences between measurement points for characteristics meters and for continuous meters. When an upper or lower limit exceeds its limit for a characteristics meter, a preventive maintenance (PM) item is generated.

When you are working with a continuous meter, a work order can be generated manually or with a cron task as described previously.

2.4 Locations

The *Locations* application is a site-level application and is generally defined as a place where assets are operated, stored, or repaired. Generally locations are defined as a means of tracking assets, but if your company does not use asset records to track equipment, you may define a location as any facility (or portion of a facility) for which you want to create a maintenance record.

You use the Locations application to add, view, modify, and delete location records for assets, and organize these locations into logical hierarchical or network systems. Use systems of locations for specifying the location for assets.

Asset records provide the groundwork for gathering and tracking valuable information about the history of assets, including asset performance at specific sites, and as an asset is moved from location to location. When you organize your locations into systems, you can quickly find a location and then identify the assets at a specific location.

You may also use the Locations application to create repair locations, courier locations, salvage locations, vendor locations, and labor locations. To add a new location in the system, you must have at least the following information:

- ▶ Location ID, which is the ID for the new location, such as BLD901 for Building 901
- ▶ Type, which specifies the type of this location in order to ease the process of identifying where the asset is and the reason. The Type can be: Holding, Repair, Operating, Salvage, Labor, Courier, Vendor, and Syslevel.
- ▶ Site, which is the name of the site where this location belongs
- ▶ Status, which is the current status of the location

Figure 2-15 shows an example of a location.

The screenshot displays the 'Locations' application interface. At the top, there is a navigation bar with 'Locations' and various utility links. Below this is a search and action bar. The main content area is divided into several sections:

- Location Details:** A form for editing location 'ADDR2001'. Fields include: Location (ADDR2001), Address Unit (#2001 Oak St. - W560), Site (BEDFORD), Type (OPERATING), Rotating Item, Meter Group, Calendar, Shift, Priority, Failure Class, GL Account (6290-300-??), Internal Labor Account, Attachments, Status (OPERATING), Service Address, Bill to Address, and Ship to Address.
- Systems:** A table showing systems associated with the location. It has columns for System, Description, and Network. The table contains two rows: GEO (Geographical System) and SANITARY (Sanitary System).
- Parent of ADDR2001 in the GEO System:** A table showing the parent location. It has columns for Parent, Description, and Item. The table contains one row: BLK2000 (2000 Block, Oak St. - W560).
- Children of ADDR2001 in the GEO System:** A table showing child locations. It has columns for Location, Description, and Item. The table is empty, with a message: "...No rows to display...".

Figure 2-15 Locations application

The following common terms are used when discussing location hierarchies:

- ▶ *Hierarchy* is any system of places ranked one above another. Each parent location can have many child locations, but each child location can have only one parent location.
- ▶ *Location* is typically a place where assets operate, but includes any building, place, or position that contains assets, or where maintenance work might have to be performed.
- ▶ *Network* is any system of interconnected locations. Unlike hierarchies, in a network each location can have multiple parents and children.
- ▶ *Operating location* is the place where equipment operates.

- ▶ *Primary system* is the default hierarchy of locations. Each site is allowed to have only one primary system. Your primary system must be hierarchical; that is, there must be a single top-level location that is the parent of all other locations in the system. If assets in different locations are part of an asset hierarchy, their locations must exist in the primary system.
- ▶ *Site* is a work location, such as a plant or facility. A site belongs to a single organization.
- ▶ *System* is a grouping of locations, organized into either hierarchical or network relationships. A hierarchical system could define location relationships of a plant, having a plant site as a parent to plant buildings, which are parents of sublocations within the building areas. A network system could define the location relationships of a system of pipes or ducts, where certain locations feed back to others.

When you create a location, at least one location of type *Operating* is required.

2.5 Classifications

Classification is the capability to specify or apply hierarchy for assets, locations, and other items.

If an asset is a rotating item, the classification is determined from its rotating item. If the attribute values are updated on the rotating item, they are also changed on all rotating assets that belong to this rotating item.

Classification can be used to structure records into organized hierarchies. Using classifications helps you easily locate records and ensure that records are not duplicated unintentionally.

Your system administrator creates one or more different classification hierarchies by using the Classifications application. By default, Classifications allow you to classify and search the following types of records: Classification, Parent Classification, and Classification Path. These can optionally be grouped by Organization, Site, or both.

You can access the *Classifications application* from the Go To menu by selecting **Go To** → **Administration** → **Classifications**.

The Classification application has the fields shown in Figure 2-16.

The screenshot shows the 'Classifications' application interface. At the top, there is a navigation bar with 'List' and 'Classifications' tabs. Below the navigation bar, there are several form fields for classification details:

- Classification: PUMP
- Classification Path: PUMP
- Parent Classification: (empty)
- Organization: Pump
- Site: PUMP
- Use Classification?:
- Generate Description?:

Below the form fields, there are three main sections:

Use With

Use With Object	Description	Top Level?
ASSET	Use with Assets	<input type="checkbox"/>
ITEM	Use with Items	<input type="checkbox"/>
LOCATIONS	Use with Locations	<input type="checkbox"/>
WORKORDER	Use with Work Orders	<input type="checkbox"/>

Children

Classification	Classification Desc	Generate Description?	Use Classification?	Organization	Site
CNTRFGL	Centrifugal	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
RECPRCTN	Reciprocating	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
ROTARY	Rotary	<input type="checkbox"/>	<input checked="" type="checkbox"/>		

Attributes

Attribute	Description	Section	Domain	Data Type	Unit of Measure
...No rows to display...					

Figure 2-16 Classifications application

The main window contains three sections:

- ▶ *Use With*, which lists the application that this classification will be used with, such as assets, item, location and work order.
- ▶ *Children*, which is a node list that is being used by classification.
- ▶ *Attribute*, which provides asset attribute identification.

The fields above the sections are displayed in applications that use classification such as Assets, Locations, Item Master, Job Plans, Work Orders, Ticket Template and more.

All classification attributes are related to the application listed in the Use With section, as shown in the Figure 2-17.

Use With Object	Description	Top Level?
ASSET	Use with Assets	<input type="checkbox"/>
ITEM	Use with Items	<input type="checkbox"/>
LOCATIONS	Use with Locations	<input type="checkbox"/>
WORKORDER	Use with Work Orders	<input type="checkbox"/>

Figure 2-17 Use With section on Classifications application

Figure 2-18 shows the main fields of Classification on the Assets application.

Attribute	Description	Data Type	Alphanumeric Value
SIZE	Size	NUMERIC	
STAGE	Stage	ALN	3
CAPACITY	Capacity	NUMERIC	
TTLHD	Total Head	NUMERIC	
NPSH	NPSH	ALN	
SPEED	Speed	NUMERIC	
DRIVER	Driver	ALN	

Figure 2-18 Classification main fields

A good example of using classification is when you have an asset from IT and that asset has characteristics such as memory size, disk size and processor speed as shown in Figure 2-19 on page 30.

Attribute	Description	Data Type	Alphanumeric Value	Numeric Value	Unit of Measure
▶ RAMSIZE	MEMORY SIZE	NUMERIC		512,0	MBYTE
▶ DISKSIZE	DISK SIZE	NUMERIC		40,0	GBYTE
▶ PROSPEED	PROCESSOR SPEED	NUMERIC		2,2	GHZ
▼ RAMSIZE	MEMORY SIZE	NUMERIC		256,0	MBYTE

Details	
Attribute*	RAMSIZE MEMORY SIZE
Data Type	NUMERIC
Unit of Measure	MBYTE
Section	2

Figure 2-19 Attributes for an asset using classification

Also in Figure 2-19, you see an example of two instances of the same attribute MEMORY SIZE for the same Asset. It is possible only because we are using one resource named Section. The Section is the resource used when the system administrator has to add the same attribute/specification twice for the same asset, otherwise it is not possible.

2.6 Database Configuration

Database Configuration is the application responsible for the major configuration that a System Administrator can do, including attributes and indexes.

In the following example, we show how many changes can be made by using Database Configuration:

1. In the Service Request application, open a request, then click **Detail Menu** in the Asset field and then click **Select Value**. The window shown in Figure 2-20 on page 31 opens.

Also refer to Chapter 9, “Service Requests” on page 177.

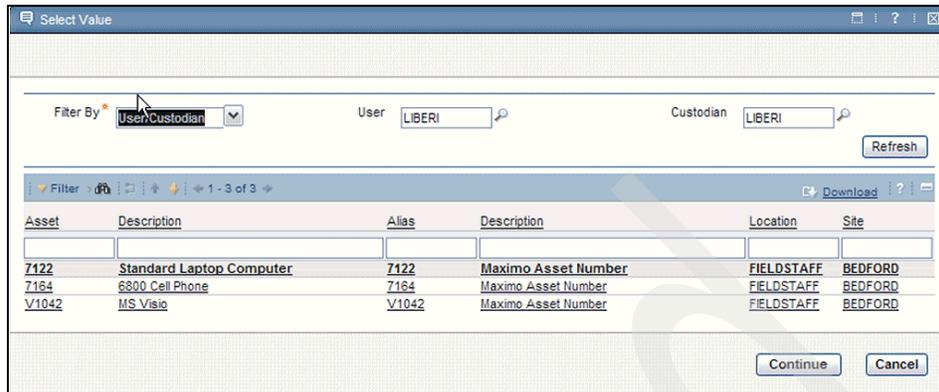


Figure 2-20 Asset Select Value menu

- On the Filter By field, press ALT+F1 to see the field properties, as shown in Figure 2-21.



Figure 2-21 Field Help displaying the field's properties

Here, the *Table* is the database configuration object and *Column* is the attribute.

With the information in the example, you can check the database properties in the Database Configuration application.

- Select **Go To** → **System Configuration** → **Platform Configuration** → **Database Configuration**.

The Database Configuration is displayed on the List tab.

4. Search for the object **SR** and open it in the Attribute tab, as shown in Figure 2-22.

The screenshot shows the 'Attributes' tab in a database configuration tool. At the top, the 'Object' is set to 'SR'. Below this is a table of attributes:

Status	Attribute	Description	Type	Length	Scale	Required?
	assetfilterby					
	ASSETFILTERBY	Asset Filter By(all,user/custodia,public)	UPPER	14	0	<input checked="" type="checkbox"/>

Below the table is the 'Details' section for the selected attribute 'ASSETFILTERBY':

Attribute	ASSETFILTERBY	Title	Filter By
Description	Asset Filter By(all,user/custodia,public)	Class	psdi.app.ticket.FkTKAssetFilterBy
Type	UPPER	Domain	ASSETFILTERBY
Length	14	Default Value	{USERCUST}
Scale	0	Alias	ASSETFILTERBY
Required?	<input checked="" type="checkbox"/>	Status	

Below the details is the 'Advanced' section with various configuration options:

Entity		Persistent?	<input type="checkbox"/>	Audit Enabled?	<input type="checkbox"/>
Column		Must Be?	<input type="checkbox"/>	Multilanguage Supported?	<input type="checkbox"/>
Same as Object		Positive?	<input type="checkbox"/>	Multilanguage in Use?	<input type="checkbox"/>
Same as Attribute		User Defined?	<input type="checkbox"/>	E-signature Enabled?	<input type="checkbox"/>
Autonumber		Can Autonumber?	<input type="checkbox"/>	Primary Column	
Search Type	NONE	Long Description Owner?	<input type="checkbox"/>	Attribute #	80
Localizable?	<input type="checkbox"/>	Sequence Name		Next Sequence Number	

Figure 2-22 Attributes tab on the Database Configuration

In this window, you may change several configurations such as:

- ▶ Description
- ▶ Type
- ▶ Length
- ▶ Title
- ▶ Class
- ▶ Domain
- ▶ Default Value
- ▶ Alias

Depending on the business requirements, you may change the Default Value to the most used option. This kind of change can also be performed for other fields and other applications.

2.7 Application Designer

With a significant focus on configuration tools such as *Application Designer* for modifying the user interface and Database Configuration for adding features such as new tables and columns, IBM Tivoli Asset Management for IT helps you more easily tailor the software without custom programming. In some cases, the creation of new fields is required, however sometimes simply displaying hidden fields in the user interface is the answer.

To access the Application Designer, select **Go To** → **System Configuration** → **Platform Configuration** → **Application Designer**. The List tab of Application Designer is displayed. When an application is selected (assets for example) the window shown in Figure 2-23 opens.

The screenshot displays the Application Designer interface for the 'ASSET' application. The main window is titled 'Application Designer' and includes a toolbar with various icons. The 'Applications' tab is active, showing the 'ASSET' application selected. The 'Main Object' is also set to 'ASSET'. Below this, there are tabs for 'List', 'Asset', 'Spare Parts', 'Safety', 'Meters', and 'Specifications'. The 'List' tab is currently selected. The interface is divided into several sections:

- section... (top):** Contains fields for 'Asset', 'Status', 'Site', and 'Type'. There is also a green box labeled 'Attachments' with a 'Moved?' checkbox.
- Details (middle):** Contains fields for 'Parent', 'Maintain Hierarchy?', 'Location', 'Bin', 'Rotating Item', 'Condition Code', 'Meter Group', 'Usage', 'Calendar', 'Shift', 'Priority', 'Serial #', 'Failure Class', 'Item Type', and 'Tool Rate'.
- Linear Referencing Details (bottom):** Contains fields for 'Direction', 'LRM', 'Start Measure', and 'End Measure'.

Figure 2-23 Application Designer main window.

In the Application Designer, you may add fields to an application. For example, you may add GL Account field on an existing application, such as Assets. So, in this example, on the Application Designer you would have to add the **Asset Object GL** account attribute, and the **GLNAVIGATOR** lookup fields.

Inventory

This chapter describes the Inventory module in IBM Tivoli Asset Management for IT. It goes through the initial setup required and covers all the applications included in the module.

This chapter contains the following topics:

- ▶ “Inventory module” on page 36
- ▶ “Initial setup” on page 36
- ▶ “Inventory applications” on page 42

3.1 Inventory module

The Inventory module is used to manage spare parts inventory. The business goal is to find a balance of inventory stock, allowing maintenance work to be performed with minimum delays if materials are unavailable, but without keeping unnecessary or seldom used item in stock.

In summary, it works to balance two conflicting objectives:

- ▶ Maximizing the availability of items for upcoming work tasks.
- ▶ Reducing excess inventory balances and related carrying costs.

The Inventory module consists of the following applications:

- ▶ Item Master
- ▶ Service Items
- ▶ Tools
- ▶ Stocked Tools
- ▶ Inventory
- ▶ Issues and Transfers

3.2 Initial setup

This section describes the initial settings that must be set up before you start using the applications to create and manage items.

3.2.1 Units of measure and conversion

Before you create item records, define all units of measure and the conversion values for those units.

To configure the units of measure, access the Select Action menu (shown in Figure 3-1 on page 37) that is available in the following applications:

- ▶ Item Master
- ▶ Service Items
- ▶ Tools
- ▶ Stocked Tools
- ▶ Inventory

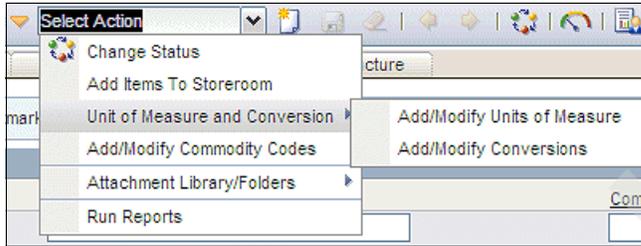


Figure 3-1 Unit of Measure and Conversion selection

Add or modify units of measure

A unit of measure describes the increment that you order or issue, or the item or tool that you transfer, or service you order.

The three attributes for defining a unit of measure are: *Unit of Measure*, *Description*, and *Abbreviation*. However, only two of them, *Description* and *Abbreviation*, are editable after the unit of measure is created.

Figure 3-2 shows how to create the unit of measure.

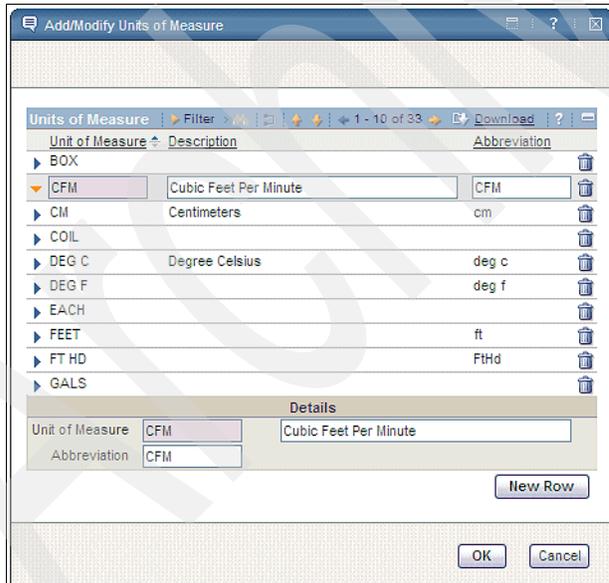


Figure 3-2 Add/Modify Unit of Measure window

Add or modify conversions

A conversion factor is a numeric value that is applied to relate one unit of measure to another (ratio).

The four attributes that should be defined when creating a conversion factor are *From Unit of Measure*, *To Unit of Measure*, *Conversion Factor*, and *Item Number*. All of them are required, except for the *Item Number*. This last attribute should be used when the conversion is directly associated to the item. For example, a CASE for one item may be 24 and for another item it might be 36. However, the numbers 24 and 36 represent the quantity within the case and not the issue unit. If you receive a case of 24 gaskets, but you issue them in sets of four, then the conversion ratio for CASE in this example would be 6. You can assign the conversion of a CASE of 24 gaskets to be 6, and associate it to the item gaskets.

Figure 3-3 shows the window for creating and modifying conversion factors.

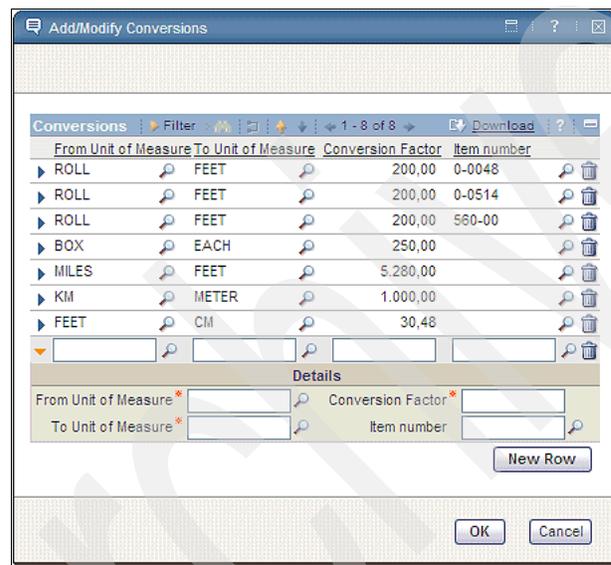


Figure 3-3 Add/Modify Conversions

3.2.2 Commodity groups and commodity codes

A commodity identifies a product category. Some companies organize their purchasing departments by commodity. Purchasing managers may create budgets, create and manage purchase orders, and manage vendor relationships based on commodities.

You may create commodity group and commodity code records in the system that can be applied to item, company, purchasing, and contract records. When you associate a commodity group and commodity code with an item record, users (for example planners or purchasing agents) are then able to search for items by commodity code.

A commodity group can have multiple commodity codes associated to it, and a commodity code can only belong to a single commodity group. Also, commodity codes are defined at the level of the item set, and commodity group names must be unique for the item set.

To configure the commodity groups and codes, access the Select Action menu shown in Figure 3-4 and that is available in the following applications:

- ▶ Item Master
- ▶ Service Items
- ▶ Tools
- ▶ Companies
- ▶ Purchase Orders

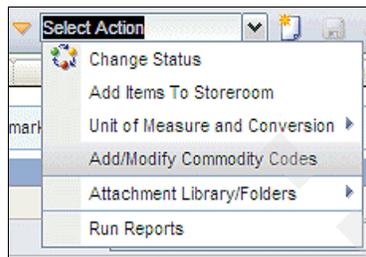


Figure 3-4 Add/Modify Commodity Codes selection

3.2.3 Item sets

Item sets are Inventory items and materials, service items, and tools are created as part of an item set. An item set consists of an ID that identifies a list of items that can be shared by one or more organizations. Only one item set can be specified for an organization, but more than one organization may use the same item set. Items and tools can be transferred between organizations that share the same item set.

Note: Sets are in a level between system and organization.

When you create item records, all item identifiers must be unique within an item set. Everywhere that an item ID is referenced on a record there is also an item set ID.

Item sets are created in the Sets application, which you can access by selecting **Go To → Administration → Sets**.

Note: The Sets application enables you to create two types of sets: *Item Sets* and *Company Sets*.

3.2.4 Organizations settings

This section describes the inventory options that can be setup from the Organizations application. From the Start Center, select **Go To** → **Administration** → **Organizations**. From the Select Action menu, you may select Inventory Defaults, Reorder, or Inventory Costs, as shown in Figure 3-5, to open their associated dialog windows.

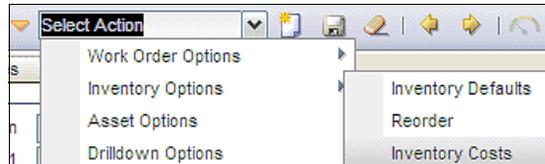


Figure 3-5 Inventory Options action menu

Inventory Defaults

In this dialog, you may set up the values for the *ABC analysis*, which is explained in 3.3.5, “Inventory” on page 51, and specify whether the system will allow users to issue or transfer items with a negative current balance or negative available balance, as shown in Figure 3-6.

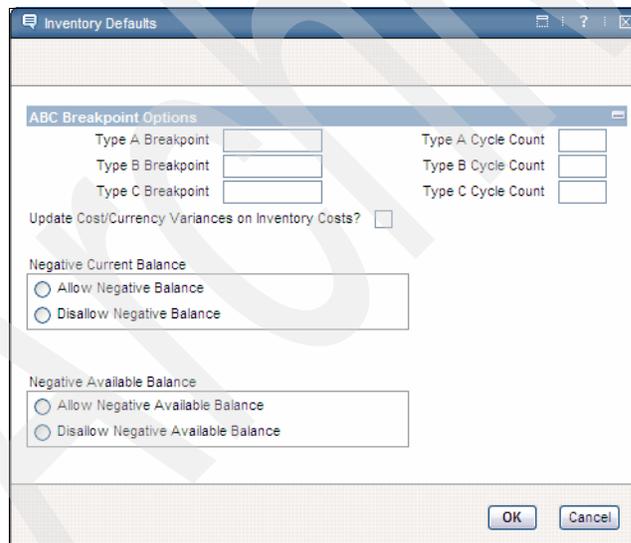


Figure 3-6 Inventory Defaults dialog

Reorder

In this dialog, you set up how the external and internal requests should be created when reordering items. Limiting the number of reorder lines per PO/PR,

is also possible (see Figure 3-7). Limiting the number means, for example, that IBM Tivoli Asset Management for IT will create a second PO/PR for the same supplier, with remaining lines. These settings applies to all requests and orders.

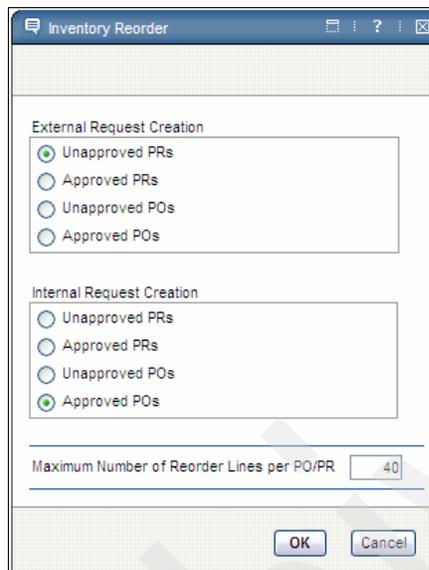


Figure 3-7 Inventory Reorder dialog

Inventory costs

The Inventory costing model is part of the initial setup and can be set in the Organizations application. The dialog is shown in Figure 3-8 on page 42.

Two options must be set:

- ▶ *Issue Cost* specifies whether the system uses standard cost (the default) or average cost when an item is issued.
- ▶ *Non Capitalized Rotating* specifies whether the system uses issue cost (the default) or asset cost when a non-capitalized rotating asset is issued.

Note: The issue costing model settings are applied only to the selected site.

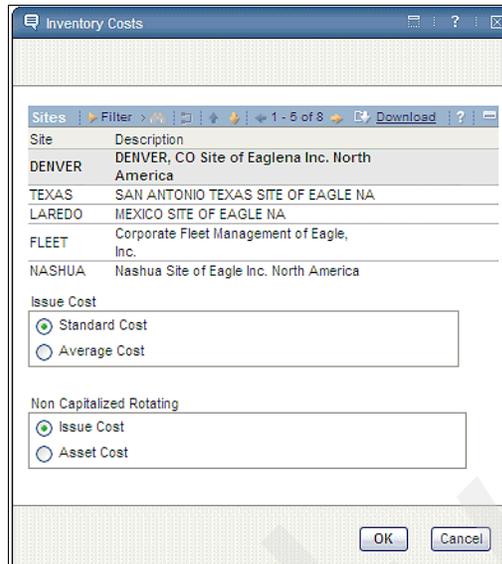


Figure 3-8 Inventory Costs dialog

3.3 Inventory applications

This section describes each application included in this module.

3.3.1 Item Master

The Item Master application is used to define items that will be stocked in your storerooms.

When you create an item record, you define the possible attributes of the item (such as commodity codes, order and issue units, whether the item is lotted, rotating, or condition-enabled), along with any alternate items that you can use in an item's place and a list of the condition codes you want applied to the item.

To access the application, select **Go To** → **Inventory** → **Item Master**.

Item Master tabs

The Item Master application has the following tabs.

- ▶ List

Use this tab to search for item records. Although you may also use it to change status of multiple items, the tab has no other special action.

► Item

This tab is the main tab of the application. Use it to enter, view, or modify items. The two required fields for new items are: *Item* identifier and *Lot Type* (although Lot Type is not required for rotating items).

In this tab, you may also specify the main attributes for the items, such as commodity codes, meter, order and issue units, whether the item is rotating, kit, lotted or condition-enabled, and other attributes.

Use the alternate sub tab to define items that can be used in place of other items. Use the Condition Codes sub tab to add condition codes that you want applied to the item. For more information, see 3.3.7, “Condition Codes” on page 56.

Note: The alternate item relationship is not automatically reciprocated when you insert an alternate item to the current item record. If you want two items to be alternate to each other, each record should specify the other item as an alternate.

Note the following important concepts regarding the Item tab:

– Rotating item

A *rotating item* is a special category of item record, used to indicate items that can be used interchangeably as a replacement for a like item, such as fire extinguishers, motors, or pumps, but that are repaired or refurbished when they are removed from service. Rotating items can be managed like any other item record; they can be stocked in storerooms, issued and transferred, reordered and so forth. For example, if you have to create a maintenance schedule for a rotating item, you must create an asset record, mark it as rotating, and refer to the item. For more details about how rotating assets works, refer to Chapter 2, “Assets” on page 11.

Note: An item cannot be both a spare part and a rotating item because rotating item are maintained, and spare parts items are consumed or used once.

– Item kit

An *item kit* is a collection of items that can be issued as a single unit comprising of a parent item record and associated child item records. Item records contains a *Kit?* check box, which indicates that the item will act as the *virtual container* for all other items contained within the kit.

Note: Item kits cannot be lotted, rotating, or condition-enabled.

► Storerooms

Use this tab to view a read-only list that has information about storerooms that stock the item. Examples are the costs and the balance for each storeroom.

To add item to a storeroom, select **Select Action** → **Add items to Storeroom**, as Figure 3-9 shows. This action is accessible in all the tabs of the Item Master application.

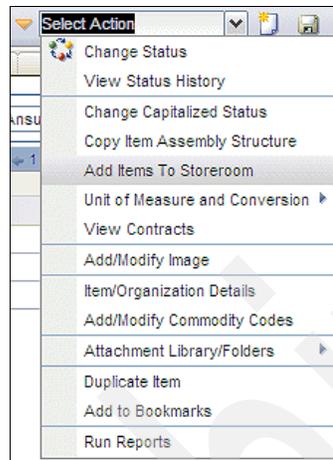


Figure 3-9 Add Items to Storeroom action

► Vendors

Use this tab to enter, view, modify, or delete information about vendors and manufacturers for an item. The list can include vendors that you have previously ordered from, and vendors that you have not purchased the item from. You may use the vendor data to compare prices and delivery information.

► Specifications

Use this tab to classify an item, and add, view, modify, or delete specifications that give details about the attributes of the item.

► Item Assembly Structure

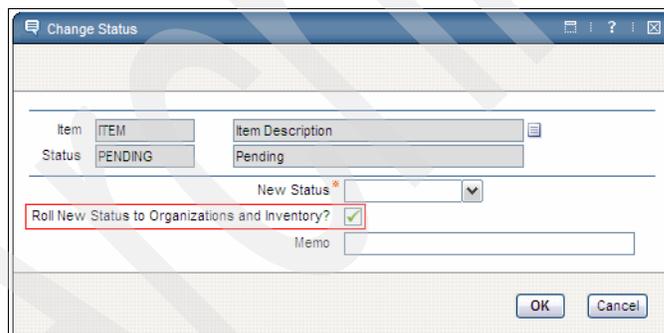
Use this tab to enter, view, or modify an *item assembly structure (IAS)*. An IAS is a list of individual items and subassemblies that are required when you build an asset or define the requirements of a location. Rather than specify item components each time you enter an individual asset or a location, you create an item assembly structure as a template. You may use an IAS as a template when building multiple asset assembly structures and their related location systems.

Item status

Item status can have the following values:

- ▶ Active
Items in this status can be selected and used in the other applications.
- ▶ Pending
This status is the default value for new records. These items cannot be used anywhere outside Item Master and Inventory applications.
- ▶ Pending Obsolescence
Item can be used up from storerooms, but no balance replenishment is allowed.
- ▶ Obsolete
Items are permanently unavailable for use.
- ▶ Planning
These items can be referenced in work order plans, POs and PRs, but they cannot have financial transactions created against them.

When changing the status of an item, you may roll new status to Organizations and Inventory. This step can be done by selecting the check box shown in Figure 3-10.



The screenshot shows a 'Change Status' dialog box with the following fields and controls:

- Item: ITEM
- Item Description: Pending
- Status: PENDING
- New Status: Pending (dropdown menu)
- Roll New Status to Organizations and Inventory?
- Memo: (empty text field)
- Buttons: OK, Cancel

Figure 3-10 Item change status dialog

3.3.2 Service Items

The *Service Items* application is used to define and manage purchased service by creating service item records and maintaining a list of vendors that supply the service item.

Service items are defined at the item set level and cannot be received into inventory or stored in a storeroom. They are always categorized as direct issue items and you can reorder a service item by using the Reorder Direct Issue Items/Svcs action available from the Select Action menu.

Examples of service items could be: janitorial invoices, telephone bills and elevator repair service.

Note: Service items can be requested or ordered through the Desktop Requisitions, Purchase Requisitions or Purchase Order applications and the line type must be set to **Standard Service** in order to request a service item.

To access the application, select **Go To** → **Inventory** → **Service Items**.

Service Items tabs

The Service Items application has the following tabs:

- ▶ List

Use this tab to search for service records. Although you may use it to change the status of multiple service items, the tab has no other special action.

- ▶ Service

This tab is the main tab of the application. Use it to enter, view, or modify service items. This tab has only one required field, which is the Service Item identifier.

Other main attributes, such as commodity codes, whether an inspection is required, and others can also be specified in this tab.

Use the Vendor sub tab to maintain a list of vendors that supply the service item. For each vendor, you may specify and track the last price for that service and the promised lead time from the vendor for this service item.

- ▶ Specifications

Use this tab to classify an service item and add, view, modify, or delete specifications that give details about the attributes of the service item.

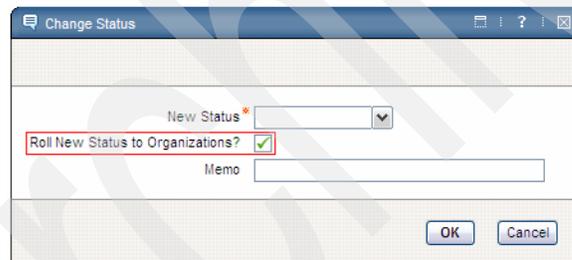
Service Item status

The Service Items application has the same status values as the Item Master application.

The status values can be:

- ▶ Active
These items can be selected and used in the other applications.
- ▶ Pending
This status is the default value for new records. These items cannot be used in other applications.
- ▶ Pending Obsolescence
These items can be depleted from storerooms, but no balance replenishment is allowed.
- ▶ Obsolete
Items permanently unavailable for use.
- ▶ Planning
These items can be referenced in work order plans, POs and PRs, but they cannot have financial transactions created against them.

When changing the status of an service item, you may roll new status to Organizations. This can be done by selecting the check box shown in Figure 3-11.



The screenshot shows a 'Change Status' dialog box. It features a title bar with the text 'Change Status' and standard window icons. The main area contains a 'New Status' dropdown menu, a checkbox labeled 'Roll New Status to Organizations?' which is checked, and a 'Memo' text field. At the bottom right, there are 'OK' and 'Cancel' buttons.

Figure 3-11 Service item change status dialog

3.3.3 Tools

The *Tools* application is used to manage information about the tools used to perform work. Tools are typically non-consumable items for which you charge an hourly rate for their use. Examples of tools include air compressors, nail guns, calibration equipment, and heavy equipment such as cranes and excavators.

You catalog these tools in an item set, which can then be shared by the organizations using that item set. You can add these tools to storerooms, and use them on job plans and work orders. When you use a tool on a work order,

IBM Tivoli Asset Management for IT can reserve the tool in the specified storeroom. You also can issue, receive, and transfer tools from storerooms.

When you create a tool record, you are defining the main attributes of the tool (such as commodity codes, issue unit, whether the tool is lotted, or rotating), along with any alternate tools that can be used in its place and a list of the qualifications necessary for a person to use the tool. All tools are marked as capitalized.

To access the application, select **Go To** → **Inventory** → **Tools**.

Tools tabs

The Tools application has the following tabs:

- ▶ List

Use this tab to search for tools records. Although you may use it to change status of multiple tools, the tab has no other special action.

- ▶ Tool

This tab is the main tab of the application. Use it to enter, view, or modify tools. The two required fields for new tools are the *Tool* identifier and the *Lot Type* (although Lot Type is not required for rotating tools).

Other main attributes, such as commodity codes, issue unit, whether the tool is lotted or rotating, and others can also be specified in this tab.

Use the alternate sub tab to define tools that can be used in its place.

Note: The alternate tool relationship is not automatically reciprocated when you insert an alternate tool to the current tool record. If you want two tools to be alternate to each other, each record should specify the other tool as an alternate.

Use the Required Qualifications sub tab to define a list of qualifications necessary for a person to use the tool.

- ▶ Storerooms

Use this tab to view a read-only list with information about storerooms that stock the current balance for each storeroom.

To add a tool to a storeroom, select **Select Action** → **Add Tools to Storeroom**, as Figure 3-12 on page 49 shows. This action is accessible in each tab of the Tools application.

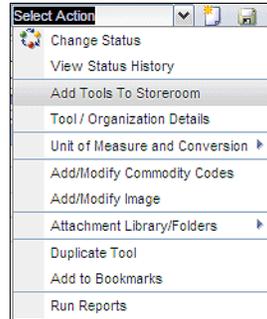


Figure 3-12 Add tools to Storeroom action

- ▶ Vendors
Use this tab to maintain a list of vendors that supply the tool. For each vendor, you may specify and track the last price for that tool, the promised lead time from the vendor, its Web page, and other relevant information.
- ▶ Specifications
Use this tab to classify a tool, and add, view, modify, or delete specifications that give details about the attributes of the tool.

Tools status

The Tools application has the same status values as the Item Master application. The status values can be:

- ▶ Active
This status indicates that these tools can be selected and used in the other applications.
- ▶ Pending
This status is the default value for new records. These tools cannot be used in other applications.
- ▶ Pending Obsolescence
This status means the tool can be depleted from storerooms, but no balance replenishment is allowed.
- ▶ Obsolete
This status means the tools are permanently unavailable for use.
- ▶ Planning
This status means these tools can be referenced in work order plans, POs and PRs, but they cannot have financial transactions created against them.

When you change the status of a tool, rolling a new status to Organizations and Inventory is possible by selecting the check box shown in Figure 3-13.

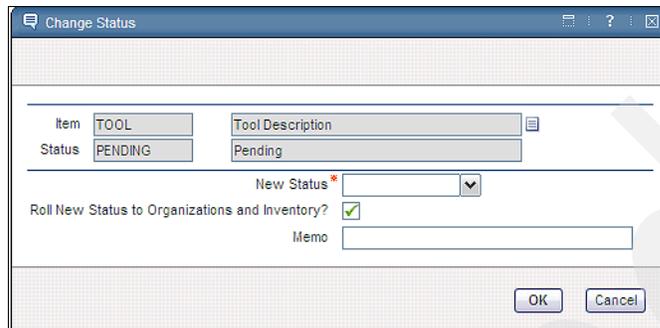


Figure 3-13 Tools change status dialog

Note: You may select a tool to use it in the work plan if its status is *Active*. However, to reserve the tool for use, it must be available in a storeroom.

3.3.4 Stocked tools

The *Stocked Tools* application is used to manage existing tools in storerooms, although creating new tool records by using it is not possible.

Note: To create new tool records, use the Tools application.

Examples of using the Stocked Tools application include tracking tool balances down to the bin and lot level for a storeroom, tracking vendors that supply a tool, and reordering details such as price and lead time for orders. You may also view rotating assets that list the tool as the rotating item on the asset, and also assets that list the tool as a spare part.

Note: Different from the previous applications, the Stocked Tools application manages tool inventory at the site level.

To access the application, select **Go To** → **Inventory** → **Stocked Tools**.

Stocked tools tabs

The Stocked Tools application has the following tabs:

- ▶ List
Use this tab to search for tools and storerooms records. Although you may use it to change status of multiple tools, the tab has no other special action.
- ▶ Stocked Tool
Use this tab to view and modify information about the tools used for maintenance work. You can also view the main tool attributes and other information such as balance summary and issue history.

Use the Balances sub tab to either add a new bin with current balance and physical count, or manage existing bins for this tool by adjusting balances, physical counts, and reconciling balance data.
- ▶ Vendors
Use this tab to maintain a list of vendors that supply the tool. For each vendor, you may specify and track the last price for that tool, the promised lead time from the vendor, its Web page, and other relevant information.
- ▶ Rotating Tool Assets
Use this tab to identify and track rotating assets associated with a rotating tool record.
- ▶ Where Used
Use this tab to list all assets to which a tool is listed as a subassembly or spare part.

3.3.5 Inventory

An inventory is a listing of all items, materials, and rotating assets that are stored in your storerooms. With IBM Tivoli Asset Management for IT you create item records in the Item Master application, and you create storeroom records in the Storerooms application, but you manage your inventory in the Inventory application.

Inventory records refer to an item/location combination, usually an item at a storeroom location. Items are added to storerooms by using the Add Item to Storeroom action in the Item Master application.

By using the Inventory application, you can track item balances down to the bin and lot level for a storeroom, and track item costs by using condition codes. You may track vendors that supply an item, and reorder details such as price and lead time for orders. You can view rotating assets that list a rotating item record, and view assets that list the item as a spare part.

Note: The Inventory application tracks items and materials in storerooms, which are at the site level. Therefore, the Inventory application is managed at the site level.

From the Inventory application, you may also issue and transfer items, assemble and disassemble kits, and change the balances and costs.

Note: When you assemble or disassemble kits, the Inventory application automatically change the balances for the items that are being used in this kit.

To modify the balances and costs, select **Inventory Adjustments** from the Select Action menu, and then select any of the actions shown Figure 3-14.

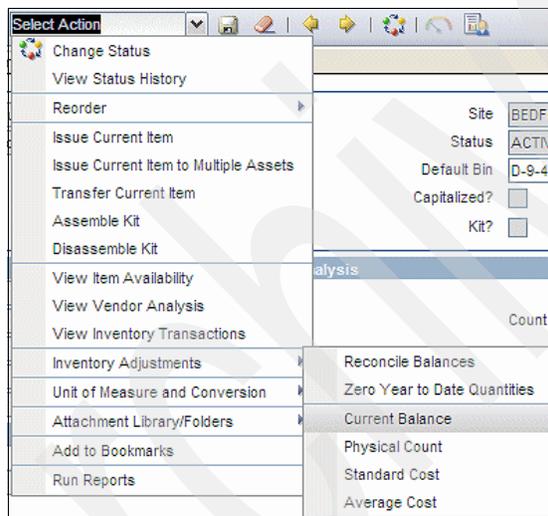


Figure 3-14 Current Balance action menu

To access the application, select **Go To** → **Inventory** → **Inventory**.

Inventory tabs

The Inventory application has the following tabs:

► List

Use this tab to search for item/location combination records. Although you may also use it to change status of multiple items, the tab has no other special action.

► Inventory

Use this tab to enter, view, or modify item balances, costs, balances, bins and lots, and to view storeroom locations where the item is stocked.

The three required fields in this tab are:

- Stock Category field specifies whether the item is a stocked (STK), non-stocked (NS), or a special order (SP) item.
- Issue Unit field specifies standard quantity by which the item is issued from the storeroom, such as each or roll.
- Count Frequency field specifies the number of days between an audit or count of an inventory item.

Use the Inventory Balances sub tab to specify the storage information for the items and the balances, and other information such as expiration date.

Note: If the expiration date is not provided, you may provide the shelf life (in days), and then the system will calculate the expiration date.

Use the ABC Analysis sub tab to quickly identify which inventory items represent your company's greatest investment in terms of monetary value and turnover rate. This approach helps ensure that crucial inventory does not fall below minimum levels, and helps keep current balance figures for a item reconciled with the actual count. The ABC type value for an item is determined by running an ABC Analysis report, which multiplies the current year-to-date (YTD) issued quantity by the last cost of the item. The items are then sorted in descending order of the currency value reached by this calculation. The type is set to A, B, or C based on a percentage you (system administrator) set in the Inventory Defaults dialog box in the Organizations application.

► Reorder Details

Use this tab to enter, view, or modify reorder details for inventory items, such as the reorder point, lead time, and issue units of an item.

You may enter or view information about one or more vendors for an item, and information about multiple manufacturers or models for each vendor.

The Reorder Point (ROP) is the point at which items should be reordered so that their number does not fall below the number designated as safety stock during the lead time for the order. Ideally the calculation of the ROP is based on the following variables:

- *Safety Stock* is the minimum number of the item that you must have available at all times.

- *Lead Time* is the amount of time between placing an order and delivery of the items.
 - *Economic Order Quantity* is the number of an item that should be reordered at one time, usually based on the vendor's price for a particular quantity ordered. For example, buying a case of an item might cost less per item than buying the item individually.
- ▶ Rotating Asset
- Use this tab to identify and track rotating assets associated with a rotating item record.
- You may assign an inventory item number to assets so that they can be stocked and reordered as necessary. A rotating asset is generally repaired rather than replaced, and it can be rotated between different plant locations or different parent assets.
- ▶ Where Used
- This tab lists assets on which the item is used. If you use the Spare Parts tab (in the Assets application) to associate the item with an asset, The assets are automatically copied to the Where Used tab.

3.3.6 Issues and Transfers

The *Issues and Transfers* application is used to manage the movement of inventory items out of the storerooms. You issue an item when it is moving out of a storeroom to be used. You transfer an item when it is moving between storerooms.

Note: Because the Inventory and Storerooms applications are at the site level, Issues and Transfers are also managed at the site level.

To access the application, select **Go To → Inventory → Issues and Transfers**.

Issues and Transfers tabs

The Issues and Transfers application has the following tabs:

- ▶ List
- Use this tab to search for location records.
- ▶ Issue
- Use this tab to issue items and tools from a storeroom directly to a work order, asset, location, or against a general ledger account. You may also use

this tab to return items and tools to a storeroom. When you issue an item or tool, the balance is updated in the storeroom.

To issue an item previously reserved for the selected storeroom, use the Select Reserved Items dialog. You may also issue a non-reserved item by selecting the **New Row**, and return previously issued items by using the Select Items for Return dialog.

Note: When returning an item, if you cannot find a prior issue transaction for it, you may return it by creating an issue transaction of type RETURN.

An option exists to change the reservations for each storeroom; use the **Add/Modify Reservations** from the Select Action menu. You may create, modify and delete the reservations. For more details, see Figure 3-15.

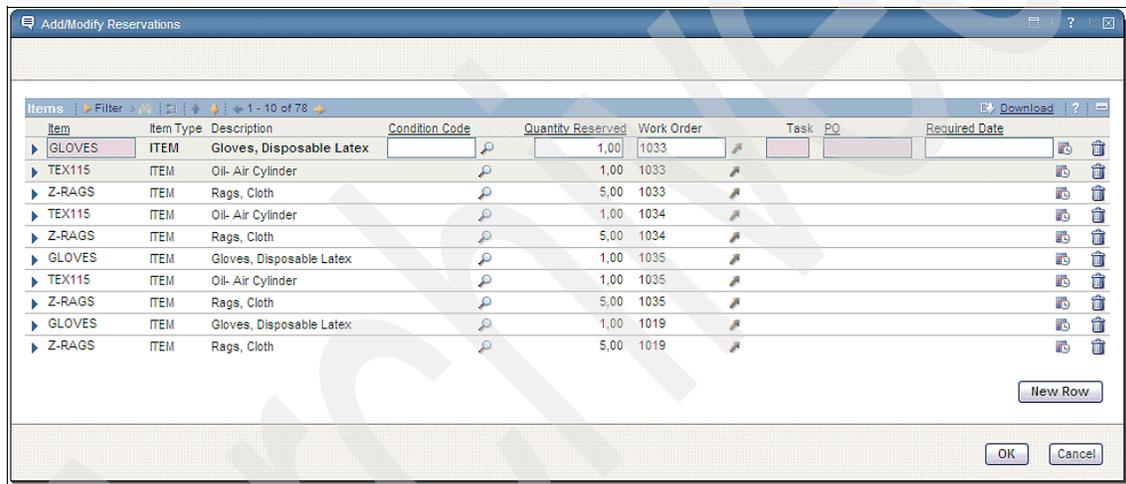


Figure 3-15 Add/Modify Reservations dialog

- ▶ **Transfer Out**
Use this tab to transfer items and tools out of your storeroom to either a location (courier, labor, storeroom) within a site or to a courier if transferring across sites or organizations.
- ▶ **Transfer In**
Use this tab to transfer items or tools into your storeroom from another location (courier, labor, storeroom) within a site or from a courier if the transfer was across sites or organizations.

3.3.7 Condition Codes

The *Condition Codes* application is used to build the master list of condition codes for a particular item set.

A condition code enables you to specify that an item record has a different value depending on the physical condition of an item. For example, an item that has been damaged, worn, used, or rebuilt would not have the same value as a new item. A condition code has a rate associated with it, which can be used to calculate the value of non-new inventory items. For example, you might create two conditions for an item:

- ▶ New, which is the value of the item at 100%
- ▶ Used, which is the value of the item at 50% of the full value

To access the application, select **Go To** → **Inventory** → **Condition Codes**.

Note: Condition Codes are defined at the Item Set level. Item Sets exist below the System level, but above the Organization level so that Organizations can share data.

3.3.8 Storerooms

The *Storerooms* application is used to add and maintain information about storeroom locations, view items that are stocked in a storeroom, and define the GL account codes to be associated with a storeroom.

A storeroom is a location that contains inventory items. Storerooms have general ledger account codes associated with them to help track inventory costs.

Note: Storerooms are defined at the site level.

To access the application, select **Go To** → **Inventory** → **Storerooms**.

Storerooms tabs

The Storerooms application has the following tabs:

- ▶ List
Use this tab to search for storerooms records.
- ▶ Storeroom
Use this tab to create, modify and delete storeroom locations, define the general ledger account (GL Account) codes to be associated with the

storeroom, define the lead time calculation for items in a storeroom, and optionally flag the storeroom to function as an internal supplier to other storerooms.

When you create a new storeroom, specify information for the following account data fields:

- GL Control Account field is the default GL account applied to items in this storeroom. It tracks cost on every inventory transaction made with the storeroom.
- Cost Adjustment Account field is the account that tracks changes in either the average price or the standard price from manual inventory price adjustments.
- Receipt Variance Account field is the debit account to track the differences between the inventory standard cost and the receipt cost (specific to the storeroom) for any items in the associated storeroom location.
- Purchase Variance Account field is the account used to track fluctuations in purchase costs for items (or the variance between PO and original Last and Standard price).
- Shrinkage Account field is the credit account used when manually adjusting the inventory quantity.
- Invoice Variance Account field is the debit account used to track variances in the price, expressed in the vendor's currency, between receipt and invoice for this storeroom.
- Currency Variance Account field is the account containing the differences between the PO price and the invoice price that result from changes in the exchange rate.
- Tool Control Account is the default debit account for capitalized tools.
- Use in PO/PR? field specifies whether this storeroom can be used to supply and reserve inventory items and tools for use with internal purchase requisitions and internal purchase orders. If the check box is selected, you may order and reserve items or tools from this storeroom on internal POs and PRs. If the check box is cleared (the default), this storeroom cannot be used to supply items or tools internally.

► **Items**

Use this tab to view a read-only list of items associated with a specific storeroom. To view items from the Storerooms application, you must first either add the items to a storeroom using the Item Master application or they must be received, transferred, or returned to a storeroom.

Archived

Contracts

This chapter introduces the IBM Tivoli Asset Management for IT Contracts module.

This chapter explains the functions of the IBM Tivoli Asset Management for IT contracts provided in the standard installation. This chapter also summarizes what you must know to create, implement, and maintain the Contracts module in IBM Tivoli Asset Management for IT.

This chapter contains the following topics:

- ▶ “Contract module applications” on page 60
- ▶ “Contract status” on page 62
- ▶ “Working with contracts” on page 63
- ▶ “Using terms and conditions” on page 69

4.1 Contract module applications

To meet your company requirements, contracts are used to define a certain relation between your company and all kinds of vendors, service providers or even internal departments.

The *Contracts module* was designed to meet this requirements and therefore it has been divided into the following applications:

- ▶ Labor Contract

A *Labor Contract* is a way to define the rates that will be paid for craft and skill combinations, as well as rates to be paid to specific laborers. You can set up a labor rate to create invoices for all approved labor transactions within a specified time period, for example every month. Labor Contracts are created in the *Labor Rate Contracts application*. The Labor Contracts can also cover the Labor records for external or contracted labor identified by the vendor Labor records.

- ▶ Lease/Rental Contracts

A *Lease Contract* is an agreement to lease one or more assets from a vendor. Lease Contracts specify lease period, payment schedules, and other conditions of the contract. IBM Tivoli Asset Management for IT can generate invoices based on the payment schedule intervals. This type of agreement might involve more than two parties, because one vendor might sell the assets and another might hold the lease. Lease Contracts are created in the Lease/Rental Contracts application.

A *Rental Contract* is similar to a Lease Contract. Rental Contracts specify the time period for the rental, payment schedules, and other conditions of the contract, such as in percentage of total amount due. Unlike a Lease, a Rental Contract can be terminated at will, and does not include a buy-out option in the terms of the contract. Rental Contracts are created in the Lease/Rental Contracts application.

Note: The Lease/Rental Contracts application can also be used to define overall terms and conditions of an agreement between vendor and customer regarding one or more rotating assets.

- ▶ Master Contract

A *Master Contract* defines the relationship with a vendor and contains the terms and conditions that apply to the contracts created and listed under it. Master contracts are created in the Master Contracts application.

The application is used to associate many contract types for a particular vendor. For example, a master contract might list rental contracts for tools or equipment, purchase contracts for materials, a labor rate contract, and a warranty on parts and labor.

► Purchase Contract

A *Purchase Contract* specifies the terms and conditions for a purchase. Purchase Contracts are created in the *Purchase Application* and provide detailed Information about a contract's contact information or shipping and financial terms. Furthermore this type of contract can be used for creating price, blanket, or purchase types (refer to Figure on page 68 for more details).

Note: The Purchase Contract allows you to specify the maximum amount per contractor or contract.

► Warranty Contract

A *Warranty Contract* is created in conjunction with the purchase of an asset and generally has no cost associated with it. This contract contains the details of what is covered by the warranty. If a Warranty Contract is purchased, it is considered an extended warranty by IBM Tivoli Asset Management for IT. Warranty Contracts are created in the *Warranty Contracts application*. You also use a Warranty Contract to create a *Service Contract*. A Service Contract indicates that an outside service provider maintains one or more assets. Payment for the service can be made with a single fee or schedule set of payments.

► Software Contract

Note: The Software Contract type is available only in IBM Tivoli Asset Management for IT, not in IBM Maximo Asset Management.

A *Software Contract* is a license to associate a particular Software Contract to the vendor and define terms and conditions for the relationship with the vendor. You use the *Software Contracts application* to create, view, and modify Software Contracts. On the contract, you may specify items or services provided, costs, shipping and handling, expected delivery times, financial terms, and vendor information. You may associate contract line items with a software license. You may also associate people or specific assets with a software contract. When you use a standard Software Contract, the system requires a purchase order, but does not specify a maximum amount that you can spend. Before you can approve a Software Contract, you must specify a vendor, and you must have at least one authorized site.

4.2 Contract status

Contract status can have the following values:

- ▶ APPR (Approved)
From this status, you can change the status to Canceled (CAN), Closed (CLOSE), Suspended (SUSPND), or Expired (EXPIRED).
- ▶ CAN (Canceled or Terminated)
See “Deleting contracts” on page 67 for more information.
- ▶ CLOSE (Closed)
See “Deleting contracts” on page 67 for more information.
- ▶ DRAFT (Draft)
In this status you can edit everything according to the properties for this type of contract. From this status, you can change to Waiting on Approval (WAPPR), APPR, CLOSE, or CAN.
- ▶ EXPIRD (Expired)
See “Deleting contracts” on page 67 for more information.
- ▶ PNDREV (Pending Revision)
This status indicates the contract is a new revision of an existing contract. This is similar to draft, but you can only edit specified fields.
- ▶ REVISED (Revised)
The system applies a Revised status when a more current revision is approved. You cannot modify anything on this contract or change the status to any other status.
- ▶ SUSPND (Suspended)
See “Deleting contracts” on page 67 for more information.
- ▶ WAPPR (Waiting on Approval)
When a contract is waiting for approval, you can modify anything (according to properties). You can change WAPPR to DRAFT, APPR, CLOSE, or CAN.
- ▶ WSTART (Waiting to Start)
The system applies this status when you choose APPR and the start date is in the future. You may change this status to APPR

4.3 Working with contracts

To support the daily asset management business, you have to be familiar with maintaining the required contracts. At this stage, the contract is already negotiated and signed by all parties. The Contract module is the place to store the details and to maintain the changes, but it is not the application to negotiate the content of the contract.

This section guides you through the details of maintaining the Contract module.

4.3.1 Creating contracts

When you create a new contract, choose a contract type from the list in 4.1, “Contract module applications” on page 60.

All contracts you create are defined at the organizational level, so that the purpose of each contract type has been defined. In addition, you can use the Organization application to define further contract types of your own.

How to create a contract

To create a new contract, use **Go To** → **Contracts** and select a contract type.

Figure 4-1 on page 64 shows you how to open the Contracts module to select the different kinds of contracts.

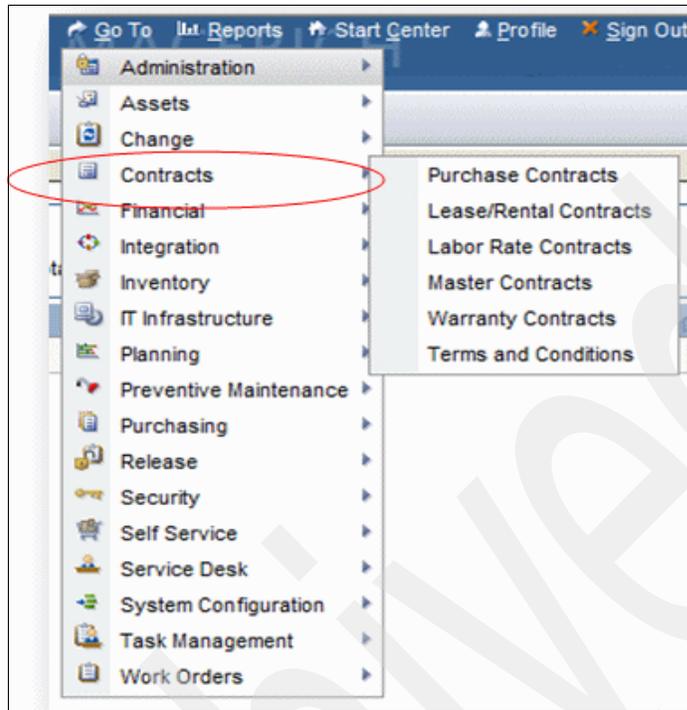


Figure 4-1 Start the Contracts module and choose the type

When you start creating a new contract in IBM Tivoli Asset Management for IT, you include the following general information about the contract:

- ▶ Contract Identifier and Description
- ▶ Contract Type
- ▶ Status
- ▶ Vendor Reference number and details about the vendor
- ▶ Buyer
- ▶ Start Date and End Date
- ▶ Total Cost or Maximum Amount
- ▶ Contract lines
- ▶ Terms and Conditions

In addition, you indicate properties that are specific to each contract type.

How to create a Master Contract

A Master Contract is a way to associate many contract types together for the same vendor and define terms and conditions for the relationship with the vendor. A Master Contract lists all contracts that you have with a particular vendor. Master Contracts are created in the *Master Contracts application*.

Tip: Keep in mind that when you create a Master Contract, certain fields such as total cost are for your reference only and have to be updated manually.

A Master Contract can be associated with the following types of contracts:

- ▶ Purchase Contracts
- ▶ Lease Contracts
- ▶ Warranty on assets

The following introduction guides you through the creation process:

1. To create a new Master Contract use **Go to** → **Contracts** → **Master Contracts**.
2. Fill in the description and select the company.
3. Select one or more sites from the Select Action menu.
4. Before finalizing the Master Contract, the contract has to be authorized. Choose **Select Action** → **Authorize Site**.

If you have changed the status of the Master Contract to APPR, an error message displays, as shown in Figure 4-2.

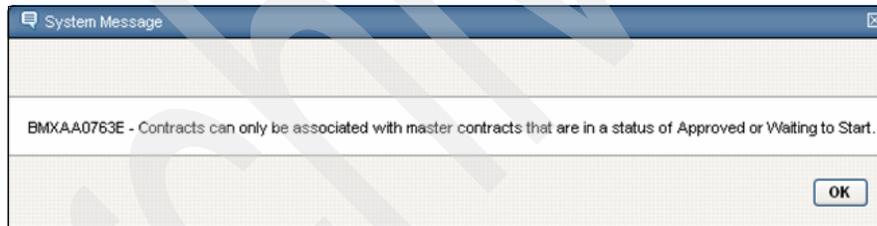


Figure 4-2 Example, when not changing the status for the Master Contract

Click **OK**. The status of the contract has to be approved. Therefore, click the **Change Status** button to change the status to **APPR**.

Now you may associate further underlying contract to your Master Contract.

5. Choose **Select Action** → **Create Associated Contract** and select the type of contract.
6. Save the contract. You are now able to add more contracts to the same Master Contract.

Note: Associated contracts can only be created when the status of the Master Contract has been set to APPR or WSTART.

The newly created Master Contract has the status Draft. The contract must be approved and cannot be changed after.

Figure 4-3 shows the status values to be added to the Master Contract.

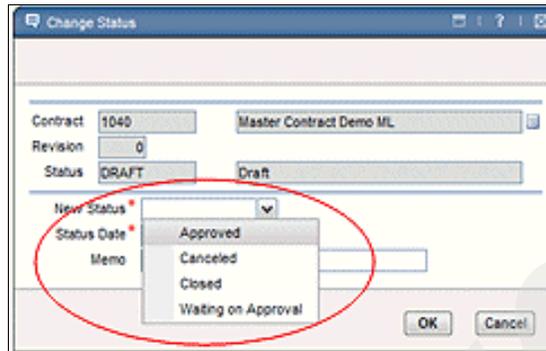


Figure 4-3 Approve Master Contract

Revising contracts

After you have changed the status of a contract to APPR (Approved), the only field that can be edited on the contract is the Status field. You cannot *un-approve* a contract. If you have to modify the contract, you must use the **Revise Contract** action.

Note: A contract can be changed only by creating a revision of the existing contract.

The Revise Contract action is available for contracts with a status of APPR that do not already have an existing revision (that is, a revision with a status of PNDREV (Pending Revision)). The Revise Contract action creates a copy of the current contract. IBM Tivoli Asset Management for IT copies all of the information from the original contract, including contract lines, terms and conditions, associated service level agreements, commodities, and authorized sites. To separate both contracts, the contract description for the revised contract has to be added.

The contract number is the same as the original contract, and the value in the Revision field is the revision number of the original contract plus one. For example, the original contract has a revision number of zero, so the first revision has a revision number of 1 ($0+1=1$). The status of the revision is PNDREV. The status of the original contract does not change when you create a revision. The original contract is available for use and can have new transactions created against it. When you change the status of the revision from PNDREV to APPR, IBM Tivoli Asset Management for IT changes the status of the original contract

from APPR to REVISD (Revised) and that version of the contract becomes a history record.

Note: If you approve a contract revision whose Start Date is in the future, IBM Tivoli Asset Management for IT changes the revision status to WSTART (Waiting to Start) and the original contract does not change status from APPR to REVISD.

IBM Tivoli Asset Management for IT includes escalations that check for contracts in a status of WSTART whose start date is the current date and automatically changes the status of the contract to APPR. You can use the View Revision History action to view every revision that has been made to the current contract via the revision process. The Contract Details table window displays every version of the contract. IBM Tivoli Asset Management for IT displays the most current revisions first. The Contract Line Details table window displays contract lines that have been changed or added in the version of the contract that is highlighted in the Contract Details table window and the previous version of the contract. Each changed line is followed by the previous version of that line, so that you can see the changes.

Tip: During a database search for a contract record, the contract that has the highest revision number is the most recent version of the contract.

Deleting contracts

IBM Tivoli Asset Management for IT does not offer the option to delete a contract. You are supposed to keep the contract for reference purposes, even after it is no longer in use.

The status of the contract can be set as:

▶ **SUSPND (Suspended)**

The contract cannot be edited. You can change a contract's status from SUSPND to APPR, CAN, or CLOSE.

▶ **EXPIRD (Expired)**

The end date (End Date field) of the contract has passed without the contract being renewed. The contract cannot be edited, but a revision can be created against an expired contract. You cannot change a contract's status from EXPIRD to any other status.

▶ **CAN (Canceled)**

You cannot cancel a Lease/Rental Contract or Purchase Contract if it has any outstanding scheduled payments or approved purchase orders against it. IBM Tivoli Asset Management for IT notifies you if unapproved purchase

orders exist against a contract. Unapproved purchase orders cannot have their status changed to approved after the contract is cancelled. Cancelling a Lease/Rental Contract or Warranty Contract cancels any outstanding scheduled payments for the contract. You can only cancel a Master Contract if all of its associated contracts are closed or cancelled. When you change a contract's status to CAN, the contract becomes a history record and cannot be edited.

► **CLOSE (Closed)**

You cannot close a Lease/Rental Contract or Purchase Contract if it has any outstanding scheduled payments or approved purchase orders against it. IBM Tivoli Asset Management for IT notifies you if unapproved purchase orders exist against a contract. Unapproved purchase orders cannot have their status changed to approved after the contract is closed. Closing a Lease/Rental Contractor Warranty Contract cancels any outstanding scheduled payments for the contract. You can only close a Master Contract if all of its associated contracts are closed or cancelled. When you change a contract's status to CLOSE, the contract becomes a history record and cannot be edited.

Example: Purchase Contract

Because the Purchase Contract allows many more configuration options than other contracts, we discuss it in more detail in this section. (An overview of the contract types is given in 4.1, "Contract module applications" on page 60.)

After you have created and specified the basic information for your Purchase Contract, you are allowed to add several more records to this particular contract. You may add records to the Contract Lines tab in the Purchase Contracts application to review and modify the lines on a contract (see Figure 4-4).

Item	Description	Quantity	Order Unit	Unit Cost	Line Cost
6800	6800 Cell Phone	1.00	EACH	129.99	129.99
3600	3600 Cell Phone	1.00	EACH	89.99	89.99
752	752 Cell Phone	1.00	EACH	49.99	49.99

Figure 4-4 Purchase Contract - Contract Lines

Using this tab, you also may create a payment schedule, add vendor items, or standard services:

▶ **Payment Schedule**

Click **Payment Schedule** to open the Payment Schedules dialog box and create a schedule of payments for contract line items. You create a schedule at the line item level. The schedule can be created when the contract is approved.

▶ **Vendor Items**

Click **Vendor Items** to open the Vendor Items dialog box and select items supplied by that vendor. This dialog box is accessible from multiple applications.

Note: When adding new Contract Lines, you can specify whether to allow certain changes to an associated PR or PO:

- ▶ **Change Quantity on Use?** If this check box is selected, you may modify the line quantity on an associated PR or PO.
- ▶ **Change Price on Use?** If this check box is selected, you may modify the line price on an associated PR or PO.

4.4 Using terms and conditions

Terms and conditions are requirements that are defined for contracts and purchasing records, often by a legal department. You use the *Terms and Conditions application* to enter and maintain a library of terms and conditions that can be added to a purchasing record or contract. These terms can contain information such as liability concerns, shipping and handling details, or delivery time expectations. The terms entered in the Terms and Conditions application are available from the Terms and Conditions tabs in Purchasing and Contract applications. From the tabs, you can select a term from the library to associate with that purchasing or contract record.

4.4.1 Working with terms and conditions

You use the *Terms and Conditions application* to create and maintain a library of terms and conditions that describe the legal obligations between a contract buyer and a seller.

Terms and conditions are created on the organizational level and appear on records in the following applications:

- ▶ All contracts (Contracts module)
- ▶ Invoices
- ▶ Purchase Requisitions
- ▶ Purchase Orders
- ▶ Requests for Quotation

Tip: If the **Editable on Use?** check box is selected for a term, you can edit the term after it has been copied to a record.

Creating new terms and conditions

To create new terms and conditions, you have two options. You may create terms and condition available for either:

- ▶ All contracts based on the library
- ▶ A single contract based on the contract only

To create terms and conditions, use **Go to** → **Contracts** → **Terms and Conditions**, and then fill in the appropriate information: (see 4.3.1, “Creating contracts” on page 63)

- ▶ Specify Liability concerns
- ▶ Specify Shipping and handling details
- ▶ Specify delivery time expectations

Then, click **Save**. Refer to 4.3.1, “Creating contracts” on page 63.

The terms and conditions in the library can be added to a contract from the Terms and Conditions tab of the individual applications. You may also create terms with the **New Row** button on the Terms and Conditions tab, but terms created in this manner are saved to the record and are not added to the library.

Figure 4-5 shows how to create Terms and Condition by clicking the **New Row** button.

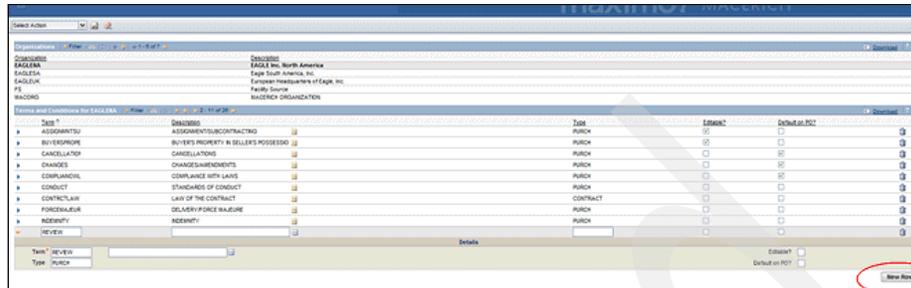


Figure 4-5 Create Terms and Condition by clicking New Row

Updating terms and conditions

You may modify an existing term in the Terms and Conditions application at any time. Modifying a term will not update existing contracts or purchasing documents that reference the term. For your own benefit, review the Terms and Conditions Library and make the changes when applying them to the purchase order or contract.

Deleting terms and conditions

You may delete a term from the library at any time by using the **Mark Row for Delete** button next to the term. This does not remove the term from any contract or purchasing document.

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Purchasing

The Purchasing module is one of the applications devoted to financial and purchasing functions. The Purchasing module tracks requests for and purchases of materials and services, receipt of the purchases, and invoices for the purchases.

This chapter contains the following topics:

- ▶ “Purchasing module” on page 74
- ▶ “Company records” on page 79
- ▶ “Companies application” on page 84
- ▶ “Purchase Requisitions application” on page 87
- ▶ “Purchase Orders application” on page 89
- ▶ “Receiving application” on page 93
- ▶ “Request for Quotations application” on page 96
- ▶ “Invoices application” on page 99

5.1 Purchasing module

The Purchasing module consists of the following applications:

- ▶ Companies

This application is for managing records for manufacturers, vendors, and other companies that do business with you. Any value appearing in a Company or Vendor field in a IBM Tivoli Asset Management for IT record should have a company record associated with it. Company masters are used for the purpose of defining companies that belong to a company set that can be shared by one or more organizations.

- ▶ Company master

This application is used to create *company master records* that belong to a particular company set.

- ▶ Invoices

This application is used to record invoices and match against purchase orders (POs) and receipts for approval. You use the *Receiving application* to record the receipt of ordered items and materials. You use the *Invoices application* to record invoices received from vendors, which can be matched to POs. You can also manage scheduled payments for a contract in the Invoices application.

- ▶ Purchase Orders

This application is used to purchase materials or services from an internal supplier or an external vendor. You use the *Purchase Orders application* to create and manage purchase orders for items, materials, services, tools, and so forth. Purchase orders created automatically in the inventory reorder process are also visible in the Purchase Orders application.

- ▶ Purchase Requisitions

This application is used to request the ordering of materials or services. You use the *Company Master* and *Companies applications* to create records for the vendors that provide you with goods and contract labor, other service providers, and asset manufacturers. Any value appearing in a Company or Vendor field on a IBM Tivoli Asset Management for IT record should have a company record associated with it.

- ▶ Receiving

This application is used to receive materials into inventory and record the receipt of services. You use the Receiving application to record the receipt of ordered items and materials. When you receive items, IBM Tivoli Asset Management for IT increases balances in the Inventory application or issues direct issue items directly to an asset, location, or work order.

You may use the Receive Rotating Items action to create records in the Assets application for rotating assets.

- ▶ Request for Quotation

This application is used to request and manage vendor quotations for prices and delivery information for goods and services.

- ▶ Terms and Conditions

This application is used to enter and maintain a library of terms and conditions to be used on contracts and purchasing documents. These terms can contain information such as liability concerns, shipping and handling details, or delivery time expectations.

5.1.1 Purchasing and Inventory

The Purchasing module works closely with the Inventory module to maintain balances of items and materials in company storerooms.

Note: Refer to Chapter 3, “Inventory” on page 35 for more information about Inventory module.

When you reorder items either manually (using one of the reorder actions in the Inventory application), or automatically, IBM Tivoli Asset Management for IT automatically creates one or more of the following types of purchasing records for the reorder.

- ▶ Unapproved purchase requisitions (PRs)
- ▶ Approved purchase requisitions (PRs)
- ▶ Unapproved purchase orders (POs)
- ▶ Approved purchase orders (POs)

5.1.2 Internal versus external purchases

To centralize purchasing, all inventory purchasing can be done through a central storeroom, and all other storerooms can purchase their stock from that central storeroom.

IBM Tivoli Asset Management for IT supports this type of purchasing by allowing you to create two types of purchase requisitions and purchase orders. Both purchase requisition (PR) and purchase order (PO) records contain a check box, labeled *Internal?*.

This check box is in the Vendor section of the record, which is used to indicate if the PR/PO is an internal or external purchase, as follows:

- ▶ Internal PR/PO

This is requesting the transfer of materials from another company storeroom. When making internal purchases, select the **Internal?** check box and enter Storeroom and Storeroom Site information.

- ▶ External PR/PO

This is requesting the purchase of the necessary materials or services from an outside vendor. When creating external PRs/POs, leave the **Internal?** check box empty and enter company information.

5.1.3 Line Types

Purchase requisitions (PRs) and purchase orders (POs) list each item or service to be purchased on a separate line. Each PR or PO line must have a Line Type specified for it.

IBM Tivoli Asset Management for IT allows you to select from the following default Line Types:

- ▶ ITEM

This type is the default. Use it to order inventory items, that is items that have item records created for them in the *Item Master application*.

- ▶ MATERIAL

Use it to order items or materials on a one time basis, that is items that do not have item records created for them in the Item Master application. You must enter a description, quantity, cost, and charge value. The charge value can be a work order, location, asset, or GL Account code.

- ▶ SERVICE

Use it to order services on a one time basis, that is services that do not have records created for them in the *Service Items application*. Services require a description, line cost, and charge value. The charge value can be a work order, location, asset, or GL Account code.

- ▶ STDSERVICE

Use it to order standard service items, that is services that have records created for them in the Service Items application.

- ▶ TOOL

Use it to order tools, that is tools that have records created for them in the *Tools application*.

- ▶ SPORDER

Use it to special order items or materials AND create an item record in the Item Master application for the item. Note that the SPORDER type has to be turned on under PO options using the *Organizations application*.

5.1.4 Commodity codes

Commodity codes can be defined and managed by choosing **Select Action** → **Add/Modify Commodity Codes** in any of the following applications:

- ▶ Companies
- ▶ Item Master
- ▶ Purchase Orders
- ▶ Service Items
- ▶ Tools

Classifying items and services with commodity groups and commodity codes provides a way for you to analyze spending by item type. After you have defined commodities, you may associate them with company, contract, and item records. You may also associate commodities with individual PR or PO lines for items, service items, or tools that do not have commodity codes assigned to them, including special order materials or services.

Note: Commodity group or commodity code information added to a PR Line or PO Line is not copied to item records.

5.1.5 Purchasing and contracts

The Purchasing module works closely with the *Contracts module* to define the specific financial relationship between buyer and seller.

Company records and contracts are both defined at the Organization level, whereas most purchasing is done at the Site level. When you enter a contract in one of the contracts applications, you must select the **Authorize Sites** action to authorize each site that you want to be able to use the contract.

Contracts module is discussed in detail in Chapter 4, “Contracts” on page 59.

Creating purchasing records from contracts

Purchasing records can be created in the Contracts module. You create purchase orders in three ways:

- ▶ Directly from the Purchase Orders application
- ▶ From purchase requisitions (PRs)
- ▶ From requests for quotations (RFQs)

Types of purchase orders include:

- ▶ **CHG (Change)**
A change order is a duplicate purchase order generated from an approved purchase order. If you must change an approved PO that has no receipts, you might prefer to do so by creating a change order. The change order preserves the audit trail by retaining the original PO while you make the necessary changes to the change order PO.
- ▶ **PARTS (Parts)**
This type indicates that the purchase order is for work order parts.
- ▶ **REL (Release)**
IBM Tivoli Asset Management for IT creates a release type PO when you use the Create Release PO action available in the Purchase Contracts application. A blanket release is a purchase order that you generate from a purchase contract. Your system administrator can set IBM Tivoli Asset Management for IT so it automatically approves REL type POs generated from valid contracts.
- ▶ **SERV (Service)**
This type indicates that the purchase order is for services.
- ▶ **STD (Standard)**
This type is the default for POs created in the Purchase Orders application.

Distributing costs on purchase orders

In the system, you can distribute the costs of a purchase record line item across multiple GL accounts. For example, if your department ordered and received a new laser printer that the packaging department will also use, you may specify two GL accounts for the printer, one for each department's GL. A PO line item must meet the following conditions if you want to distribute its costs:

- ▶ The PO line item is a direct issue item or service.
- ▶ None of its items or services have been received.
- ▶ The PO's type is REL (Release), CHG (Change), or STD (Standard).
- ▶ The PO's status is WAPPR (Waiting for Approval).
- ▶ None of the service lines are prorated.

5.2 Company records

A company master record in IBM Tivoli Asset Management for IT represents a vendor from whom you purchase goods or services, asset manufacturers, and other companies that you do business with. A company record contains organization specific information about a vendor, such as contact names and addresses. If a company has multiple locations, you may create separate records for each branch location and associate them with a parent company record.

Note: Company information must be entered in the Companies application before other applications, such as Inventory and Purchasing, can access it.

5.2.1 Multisite and company records

Company records are at the Organization level. This means that key fields for new records must be unique for the organization, but may duplicate record IDs used by other organizations and these records can only be viewed by users who have security permission to the organization and the application.

Company master records are created at the Company Set level so that the records can be shared by more than one organization. Item records for items, services, and tools are defined at the Item Set level, so that the records can be shared by one or more organizations and items and tools can be transferred between organizations and sites that share the same Item Set. Other item-related data such as commodities, condition codes, and conversion values between order units and issue units are also defined at the Item Set level.

5.2.2 Currency codes

You use the *Currency Codes application* to define and manage currencies. A currency code is a short, user-defined value that you create to represent a currency, for example, CND for the Canadian dollar. Figure 5-1 on page 80 shows the Currency Codes application.

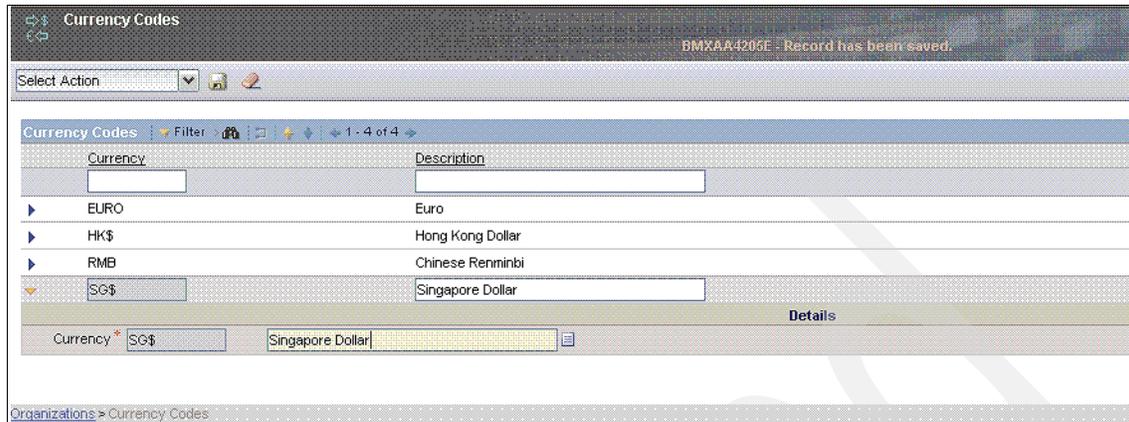


Figure 5-1 Currency Codes application

When you enter purchasing records in a foreign currency, the system uses the current exchange rate to calculate the base cost in the currency of your company. Purchasing records include purchase requisitions, purchase orders, and invoices.

The Currency Codes application stores currency codes at the system level. All organizations can view and use the defined currency codes and add new ones as necessary.

After you establish an active currency code, you may use that currency code where a Currency field appears, such as in the Purchase Requisitions, Purchase Orders, Invoices, and Companies applications.

Although you use the Currency Codes application to define currencies, you use the following applications to manage other aspects of currency administration:

- ▶ Organizations application to specify the base currency for an organization.
- ▶ Exchange Rates application to specify exchange rates between currencies for defined periods

Although currency codes are defined at the System level, other financial information (exchange rates, tax codes, General Ledger accounts, financial periods, and so forth) is defined at the Organization level. You also create contracts (master, labor rate, lease/rental, purchase, and warranty type contracts) and vendor records, and define terms and conditions for contracts and purchasing at the Organization level.

When a user enters an amount in a foreign currency, for example on a purchase requisition, purchase order, or invoice, the application finds the active exchange

rate for that currency to calculate the cost in the organization's base currency. If the application does not find the exchange rate between two currencies explicitly defined, it will use specific rules and logic to calculate the exchange rate from other exchange rates, if they exist.

5.2.3 Exchange rates

You use the *Exchange Rates application* to enter, view, and modify exchange rates for converting currencies. The exchange rate is the multiplier used to convert the currency in the Convert from Currency field to the currency in the Convert to Currency field. For example, an exchange rate of 1.7 from British pounds to U.S. dollars means that the value in British pounds is multiplied by 1.7 to calculate the value in U. S. dollars.

When a user enters an amount in a foreign currency, for example on a purchase requisition, purchase order, or invoice, the application finds the active exchange rate for that currency to calculate the cost in the organization's base currency. If the application does not find the exchange rate between two currencies explicitly defined, it will use specific rules and logic to calculate the exchange rate from other exchange rates, if they exist.

The application stores exchange rates at the organization level. Therefore, each organization defines and maintains its own exchange rates.

The Exchange Rates application contains two table windows:

- ▶ Organizations window is used to select the organization for which you want to enter or modify exchange rates.
- ▶ Exchange Rates window is used to enter and modify exchange rates for the selected organization for specific periods of time.

Although you use Exchange Rates application to define exchange rates between currencies, you use the following applications to manage other aspects of currency administration:

- ▶ Currency Codes application is used to define the currency codes.
- ▶ Organizations application is used to specify the base currency for an organization.

The application stores exchange rates at the organization level. Therefore, each organization defines and maintains its own exchange rates.

Converting a foreign currency value to base currency

When you specify a foreign currency on a purchase requisition (PR) or purchase order (PO), the system calculates two values:

- ▶ Total Cost, expressed in the foreign currency
- ▶ Total Base Cost, expressed in the base currency (your company's currency)

Example: Conversion

Your base currency is US\$ (U.S. dollars). You enter a PR for gaskets, to be ordered from a French company. On the PR tab, you select **EUR** (euro) in the Currency field. On the PR Lines tab you enter the following values:

- ▶ Quantity: 25
- ▶ Unit Cost: 3.14 (in euro)

Using the active exchange rate of 1.17726 for the EUR, the system calculates two values and displays them on the PR tab:

- ▶ Total Cost: $(25 \times 3.14 \text{ euro}) = 78.50$ (in EUR)
- ▶ Total Base Cost: $(78.50 \text{ euro} \times 1.17726 \text{ exchange rate}) = 92.41$ (U.S. dollars)

Tax options

You use the Tax Options dialog box in the Organizations application to specify default tax GL accounts and to define tax codes for the system to use in calculating the amount of tax that is due on a PR, RFQ, PO, or invoice. You may define up to five tax types, each of which can have any number of tax codes. The system uses tax type and tax code as follows:

- ▶ A *tax type* corresponds to a kind of tax, for example, to a federal, state, or city sales tax. Another tax type might be a special tax for handling hazardous material.
- ▶ A *tax code* represents a particular tax rate, such as MA for the Massachusetts sales tax of 5%. Thus, one tax type might include tax codes for all state or provincial sales taxes.

Tax Options are set at the Organization level.

Note: Paid Tax GL Account field is for taxes paid to the vendor and is only used in the Invoice application. Unpaid Tax GL Account field is for taxes not yet paid to the government and is only used in the Invoice application.

Some businesses require that taxes be reflected in the total price of some or all purchased goods and services. Adding this procurement cost to the item price increases a stocked item's average cost.

If an item is issued directly to a work order, general ledger (GL) account, location, or asset, taxes are added to the cost of the individual item.

Loaded Cost field indicates the total cost of the item, including taxes and service costs. IBM Tivoli Asset Management for IT enables you to define the category of line items to which you can add taxes:

- ▶ No items option means taxes are not added, and are not reflected in the cost fields of the Inventory or Work Orders applications.
- ▶ All items option means taxes are added to all line items on the invoice. Adding taxes to the item price increases a stocked (inventory) item's average cost.

5.2.4 Company records versus company master records

Company master records define the records that belong to a Company Set. Company Sets exist below the System level, but above the Organization level so that organizations can share data. Each organization is associated with a Company Set.

If your company has implemented a Multisite configuration that includes multiple organizations, using Company Sets allows your organizations to share master company data on the records created in the Company Masters application, and record organization specific data, for example contacts and branches, on the records in the Companies application.

When creating a complex Multisite implementation, create company records in the following order:

1. Create one or more Company Sets in the administrative Sets application.
2. Create company master records in the Company Master application.
3. Add company master records to one or more organizations.
4. Use the Companies application to add organization specific data to the company records.
5. If appropriate, create company branch records and associate them with a parent company record to create a hierarchy.
6. If your company's Multisite implementation consists of a single organization, your system administrator can configure your Company Set so that records created in the Companies application are automatically added to the Company Masters application.

5.2.5 Company records and contracts

Before you can create contract records, you must first create company records for each vendor or company that will be listed on a contract.

To view a read-only list of contracts associated with a company record, choose **Select Action** → **View Contracts** of the Companies application.

5.2.6 Company records and purchasing

Before you can create purchasing records (PRs, RFQs, or POs) you must first create company records for each vendor or company that will be listed on a purchasing record.

5.3 Companies application

The *Companies application*, located in the Purchasing module, maintains detailed information about vendors, manufacturers, and other companies. Vendors can have parent companies or multiple vendor locations for a single company.

Company information must be entered in the Companies application before other modules, such as Inventory and Purchasing, can access it.

To access the Companies application, click the application link on your Start Center, or select **Go To** → **Purchasing** → **Companies**.

The Companies application contains the following tabs:

- ▶ List
Use this tab to search IBM Tivoli Asset Management for IT for company records.
- ▶ Company
Use this tab to enter, view, and modify information about vendors, manufacturers, and other companies.
- ▶ Contacts
Use this tab to enter, view, and modify contact information for multiple contacts.

- ▶ Addresses

Use this tab to enter, view, and modify information about a single contact, company mailing address, and remit to information for a company.

- ▶ Branches

Use this tab to enter, view, and modify information about multiple locations for the company.

5.3.1 Manage companies

Use the Company tab to enter information about a company, including purchasing and payment information, and information about whether the vendor is enabled for e-commerce through IBM Tivoli Asset Management for IT. See Figure 5-2.

The screenshot shows the 'Companies' interface with the 'Company' tab selected. The main form displays details for 'ABC Bearing Co.' with ID 'A0001'. It includes fields for 'Parent', 'Customer #', 'Home Page' (www.abcbearingcorp1.com), 'Currency' (USD), 'Tax Code', 'Tax Exempt Code', 'Tax Exempt Number', 'Pay Tax to Vendor?' (checked), 'Disqualified Vendor?' (unchecked), 'Freight Terms', 'FOB Point', 'Ship Via', 'Registration #', 'Inspection Required?' (unchecked), 'Payment on Receipt?' (unchecked), 'Expiration Date of Insurance', 'Company Type', 'Organization' (EAGLENA), and 'Use Parent Remit To?' (unchecked). There are also sections for 'Purchasing Details' and 'Payment Details' with various input fields.

Figure 5-2 Company tab

You may categorize companies by type for reporting purposes. IBM Tivoli Asset Management for IT uses three defaults for company types:

- ▶ Courier type is the transit company.
- ▶ Manufacturer type is the manufacturer of items or assets.
- ▶ Vendor type is the vendor of items or assets.
- ▶ AP Control Account type is the credit account used when the invoice is paid.
- ▶ RBNI Account type is the account for receipts that have not been invoiced.
- ▶ Suspense Account type is the credit account used when invoice is approved.

Note: When selecting a company type, the default GL accounts for that company type are automatically displayed in the AP Control Account, RBNI Account, and the Suspense Account fields. To set up default company GL accounts for a particular company type, use the Company Related Accounts dialog box in the Chart of Accounts application.

If your company decides to no longer do business with a vendor, you can mark the record to indicate that the vendor is disqualified. After you disqualify a vendor, you can no longer create new PRs, POs, RFQs, or invoices for the vendor.

Note: A disqualified vendor affects only those records created after you disqualified the vendor.

If the Company is a Parent Company and has Branches you can add Branches here. See Figure 5-3.

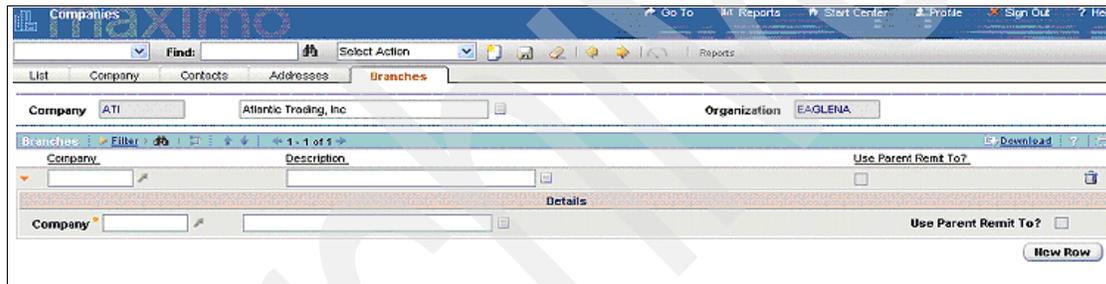


Figure 5-3 Branches tab

Your company may purchase products or services through a national vendor with local offices. You may have locations in different cities, each of which purchases from the local office of the vendor. You can create branch records for a vendor company and track purchasing either at the branch level, or with the vendor as a whole.

For example, each plant location might purchase office supplies at the local office of a national chain, and do their shipping with the local office of an international shipping company. By entering company branches into the system, you can track purchases for each plant location in its branch record, as well as the total purchases for all plant locations in the parent vendor record.

Selecting the **Use Parent Remit To?** field in the Company tab allows users to purchase from a local branch office while still submitting invoices to the parent company.

Note: The company that is a branch has to be entered in, as a company to be in the Value List. Only one level of the Parent/Branch hierarchy is allowed.

5.3.2 Deleting a company

Company records that have been referenced in other applications (such as purchase orders, invoices, contracts) may not be deleted. Also, company records that have associated branch records may not be deleted. To delete a company record with associated branch records, you must first sever all the branch associations with that company record.

5.4 Purchase Requisitions application

To access the Purchase Requisitions application, click the application link on your Start Center, or select **Go To** → **Purchasing** → **Purchase Requisitions**.

The Purchase Requisitions application contains the following tabs:

- ▶ List
Use this tab to search for PR records.
- ▶ PR
Use this tab to enter, view, or modify purchase requisitions.
- ▶ PR Lines
Use this tab to enter, view, or modify line items for a purchase requisition. A line can be an item or material from inventory, an item or material not from inventory, or a service.
- ▶ Ship To/Bill To
Use this tab to enter, view, or modify shipping information that will be used as a default on each line, and billing information for the entire order.
- ▶ Terms and Conditions
Use this tab to add, view, or delete terms and conditions that have been associated with the record.

5.4.1 Manage purchase requisitions

In this section, we discuss how to manage your purchase requisitions, such as creating a new purchase requisitions or viewing or changing the status of existing purchase requisitions.

Create requisition

To create a new purchase requisition, select the **New** icon at the top of the window. IBM Tivoli Asset Management for IT automatically numbers the purchase requisition, so a window opens with the next available number. The requisition defaults to 'WAPPR status when created, as shown in Figure 5-4.

The screenshot displays the 'Purchase Requisitions' application window. At the top, there is a navigation bar with options like 'Web Replay', 'Bulletins (0)', 'Go To', 'My Reports', 'Start Center', 'Profile', 'Sign Out', and 'Help'. Below this is a search bar with 'Find:' and a 'Select Action' dropdown. The main content area is divided into several sections: 'List' (with 'PR' selected), 'PR Lines', 'Ship To / Bill To', 'Terms and Conditions', and 'Specifications'. The current requisition is identified as 'PR * 1016' at 'Site BEDFORD' with a 'Status WAPPR'. The 'Details' section includes fields for 'Priority' (0), 'Requested By' (MAXADMIN), 'Supervisor', 'Contract Reference', 'Contract Type', and 'Contract Revision'. The 'Dates' section shows 'Status Date' and 'Requested Date' as '6/1/09 12:38 PM'. The 'Costs' section shows 'Pretax Total', 'Total Tax', 'Total Cost', 'Currency' (USD), and 'Total Base Cost', all set to '0.00'. The 'Vendor' section includes checkboxes for 'No Vendor?' and 'Internal?', and various text fields for 'Company', 'Address', 'City', 'State/Province', 'ZIP/Postal Code', 'Contact', 'Customer #', 'Phone', 'Storeroom', 'Storeroom Site', 'Freight Terms', 'Payment Terms', 'Ship Via', 'FOB Point', 'Pay Tax to Vendor?', 'Pay on Receipt?', and 'Inspection Required?'.

Figure 5-4 Create requisition

Purchase requisition status

The Waiting on Approval (WAPPR) status is assigned to a purchase requisition when it is created; certain default fields are read-only. Status values are:

- ▶ **WAPPR (Waiting on Approval):**
This is the status that a purchase requisition is assigned when it is created. Some default fields are read-only.
- ▶ **APPR (Approved):**
This status is available only if your business rules require approvals. The default configuration does not require approvals for PRs and PR line items that your transfer to POs.

▶ CLOSE (Closed):

This status indicates that all PR line items have been assigned to one or more purchase orders. All fields are read-only; and the record can no longer be modified.

Note: If you try to close a PR and a line item has not yet been assigned, IBM Tivoli Asset Management for IT displays a message. IBM Tivoli Asset Management for IT can be set to automatically close PRs after you transfer all the line items to POs, RFQs, or contracts.

▶ CAN (Canceled):

This status is available if the current PR status is APPR and if none of its line items have been assigned to a purchase order, so all fields are read-only.

5.5 Purchase Orders application

You may use a number of methods to create a purchase order:

- ▶ From a purchase requisition (PR)
- ▶ In the Purchase Requisition application
- ▶ In the Purchase Orders application
- ▶ From a *request for quotation (RFQ)* in the Request for Quotation application
- ▶ Using the Inventory Reorder actions in the Inventory application
- ▶ In the Purchase Contracts application by creating a release

The Purchase Orders application also allows you to generate an internal PO against another storeroom. You can think of a storeroom-to-storeroom purchase as a *transfer order* or an *internal PO* because IBM Tivoli Asset Management for IT uses the Purchase Orders and Issues and Transfers applications to track these types of item movements. You also use Purchase Contracts application to create change orders.

To access the Purchase Order application, click the application link on your Start Center, or select **Go To** → **Purchasing** → **Purchase Orders**.

The Purchase Orders application contains the following tabs:

- ▶ List
Use this tab to search PR records.
- ▶ PO
Use this tab to enter, view, or modify purchase Orders.
- ▶ PO Lines
Use this tab to enter, view, or modify line items for a purchase Order. A line can be an item or material from inventory, an item or material not from inventory, or a service.
- ▶ Ship To/Bill To
Use this tab to enter, view, or modify shipping information that will be used as a default on each line, and billing information for the entire order.
- ▶ Terms and Conditions
Use this tab to add, view, or delete terms and conditions that have been associated with the record.

5.5.1 Manage purchase orders

A purchase order can list items or services for one vendor or supplier only. You can combine multiple purchase requisitions for the same vendor on a single PO.

Create a purchase order

To create a new purchase order, select the **New** icon at the top of the window, as shown in Figure 5-5 on page 91.

Figure 5-5 New purchase order

IBM Tivoli Asset Management for IT auto-numbers purchase orders and thus a window opens with the next available number. The purchase order defaults to WAPPR status when created.

Note that from the Select Action tab you have the option to View History. The three categories of history provided on a purchase order are:

- ▶ Status
- ▶ Vendor Status Information
- ▶ Advance Ship Notification Information

Purchase order status

Changing statuses on purchase orders affects field functionality and access to various action pages. The purchase order can have the following status values:

- ▶ WAPPR (Waiting on Approval)

This status is the default for a PO when you create it. Some default fields are read-only in this status.

- ▶ INPRG (In Progress)

This status indicates that a PO still needs to be modified before it can be Approved.

- ▶ APPR (Approved)

This status is available only if the current PO status is Waiting on Approval (WAPPR) or In Progress (INPRG). All fields are read only. To approve a PO,

you must have a monetary approval limit equal to or greater than the total cost of the PO.

▶ CAN (Canceled)

This status is available if the current PO status is Waiting on Approval (WAPPR) or Approved (APPR). You cannot cancel an approved PO if any of the following conditions exist:

- One or more PO lines items has been received.
- The supplier sent notification of delivery of items in an ASN transaction.
- The supplier has rejected the PO cancellation.

▶ CLOSE (Closed)

This status indicates that all of the POs line items have been received. After a PO is closed, it is stored as a history record and cannot be modified.

Purchase order types

IBM Tivoli Asset Management for IT uses the following types of purchase orders:

▶ CHG (Change)

A *change order* is a duplicate purchase order generated from an approved purchase order. If you must change an approved PO that has no receipts, you might prefer to do so by creating a change order. The change order preserves the audit trail by retaining the original PO while you make the necessary changes to the change order PO.

▶ PARTS (Parts)

This type indicates that the purchase order is for work order parts.

▶ REL (Release)

IBM Tivoli Asset Management for IT creates a release type PO when you select the **Create Release PO** action available in the Purchase Contracts application. A *blanket release* is a purchase order that you generate from a purchase contract. Your system purchasing administrator can set IBM Tivoli Asset Management for IT so it automatically approves REL type POs generated from valid contracts. Release type POs cannot be duplicated using the Duplicate Purchase Order action. They also cannot be changed to a change (CHG) type PO.

▶ SERV (Service)

This type indicates that the purchase order is for services.

▶ STD (Standard)

This type is the default for purchase orders created in the Purchase Orders application. When creating a purchase order, STD, SERV, and PARTS are the only selectable values.

5.6 Receiving application

You use the *Receiving application* to receive materials and services from purchase orders. You may search for and receive existing PO line items from the Select Ordered Items and the Select Ordered Services dialog boxes, accessible from the Material Receipts and Service Receipts tabs, or manually enter received items on the Receipts tabs. If you have Invoice Management, you may use the invoice claim number or other invoice fields to search for items or services.

To access the Receiving application, click the application link on your Start Center, or select **Go To** → **Purchasing** → **Receiving**. See Figure 5-6.

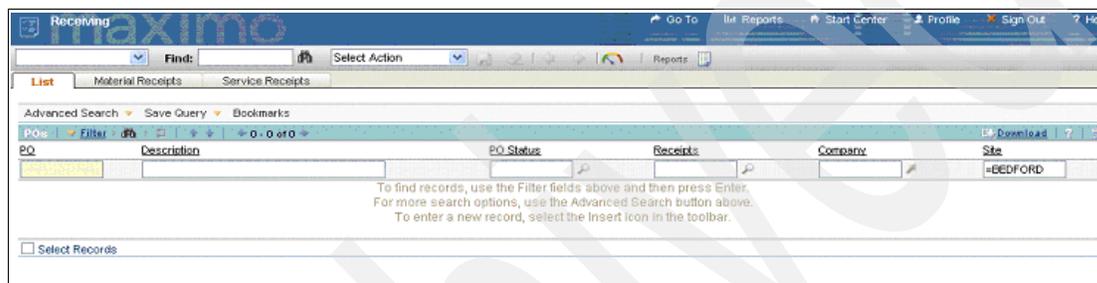


Figure 5-6 Receiving application

The Receiving application contains the following tabs:

- ▶ **List**
Use this tab to search for receipt records in IBM Tivoli Asset Management for IT. Use more fields for a specific search and fewer fields for a general search.
 - ▶ **Material Receipts**
Use this tab to add, view, or modify materials received on a PO.
 - ▶ **Service Receipts**
Use this tab to add, view, or modify services received on a PO.
- The Receiving application allows both materials and services to be received and recorded in the database when they are delivered to a site.
- ▶ **Material receipts**
This tab refers to data associated with items used for work done on-site by your company's employees, for example, quantities and lot numbers. When inventory items are received against a purchase order, the quantities in Inventory are updated, and an inventory transaction is generated.

You can also receive materials not tracked in Inventory, but which require a purchase order. Record the data associated with material receipts on the Material Receipts tab.

► Service receipts

This tab refers to the data associated with any service provided by a vendor or contractor, such as repairs to assets. The service may be performed on or off site. You specify service purchases either in terms of a quantity and a unit cost, or as a single lump sum amount.

In a large enterprise, you might have a centralized purchasing department for several sites. Each individual site receives its own materials and services. The *Receiving application* allows both materials and services to be received and recorded in the database when they are delivered to a site.

Material receipts refers to data, such as quantities and lot numbers, associated with items used for work done on site by your employees. When you receive inventory items against a purchase order, the quantities are updated in Inventory and an inventory transaction is generated.

You can also receive materials not tracked in Inventory, but which require a purchase order. For example, a catered lunch or a new desk is not stored in Inventory or tracked by an item number. You would, however, track their costs on purchase orders and receipts.

Record the data associated with material receipts on the Material Receipts tab.

Service receipts refers to data associated with any service, such as repairs to assets, provided by a vendor or contractor. The service can be performed on or off site. You specify service purchases either in terms of a quantity and a unit cost, or as a single lump sum amount. Use the same terms on the receipt transaction as those terms used on the service PO. Record service receipts on the Service Receipts tab. Whichever terms you use on the service PO must be the same on the corresponding receipt transaction, which you record on the Service Receipts tab.

You might have to change information when recording the receipt of materials. Change the receiving information before you save the receipt record. For example, if you want to record a partial shipment, change the number in the Quantity field.

In the Receiving application, on the List tab, select the PO for which you want to receive material. To create receipts, the status of the PO must be either In Progress or Approved. On the Material Receipts tab, click Select Ordered Items. In the Select Ordered Items dialog box, select the check box for each line you

want to receive. To select all of the items on the PO, select the check box in the table header.

In the Material Receipts table window, click **View Details** on the material receipt line you want to change. Change material receipt lines information as necessary. After you save the receipt, the fields on the Material Receipts tab become read-only. If you are receiving a line item that is not a rotating item, but is damaged, receive the full shipment amount and then return the rejected quantity. Use the Select Items for Return dialog box to return materials.

When an inspection is required upon receipt of an item or service, the following statuses describe where in the inspection process the line item is. Use the Change Inspection Status dialog box to change the inspection status of an item.

The status values can be:

▶ **WINSP (Waiting for Inspection)**

This status indicates that the line item is in the process of being received, but has not yet been entered into inventory. The line item is in a holding location, where it stays until an inspection is completed. After inspection, the line item converts to either **WASSET** or **COMP** status, depending on whether it is a rotating item.

▶ **WASSET (Waiting for Serialization)**

This status indicates that the line item is a rotating item that is waiting to have an asset number assigned to it. If the line item requires inspection, the inspection has already taken place if its status is **WASSET**. The item is still in the holding location; it has not yet been sent to its appropriate storeroom or direct issue location. After the item has been serialized in the Receive Rotating Items dialog box, its status will be **COMP**.

▶ **COMP (Complete)**

This status indicates that the line item has been received, and if necessary, inspected and serialized. When the status of the line item changes to **COMP**, a transfer transaction is created. The transaction transfers the item to its appropriate storeroom or direct issue location. If the line item is not rotating and does not require inspection, its status is **COMP** upon receipt.

5.6.1 Rotating items

A rotating item is an individual serialized asset that you define with a common item number, such as a pump or mobile computer. You designate an item as rotating because it shares properties of both items and assets. A rotating item can have inventory value and issue cost, like an item. However, a rotating item cannot be consumed, rather, it is maintained like an asset. For example, you

have ten mobile computers of the same model that share the same attributes, and they all have the common item number ABCT23. However, you want to be able to track each as an individual asset, so you flag the items as rotating when you create them.

After creating an item and adding it to a storeroom, you can either use the Assets application to create the asset records for an item you want to track, or create a purchase order for the rotating item and serialize it when you receive it. When you have associated an asset to a rotating item, balances can be displayed and tracked for this item. A rotating item is tracked both by its item number in Inventory records and by its unique asset number in Assets records.

Note: An item cannot be both a spare part and a rotating item, because rotating items are generally maintained not consumed (or just used once). For example, you can keep gaskets available as spare parts for use on multiple pieces of equipment, but you cannot classify the gaskets themselves as rotating items because they are used once and then thrown away.

Each rotating item goes into Inventory with an item number. The rotating item is also tracked in the Assets application with an asset number.

To enter line items for rotating items on the Material Receipts tab, use the Receive Rotating Items dialog box. You can enter asset identifiers for specific rotating assets, or auto-number all of the rotating items.

Note: If the item requires inspection, its status is WINSP (Waiting for Inspection). If the item does not require inspection, its status is WASSET (Waiting for Serialization).

5.7 Request for Quotations application

Use the *Request for Quotations application* to create requests for quotations and store the quotations so you can assess which vendor best meets your requirements. See Figure 5-7 on page 97.

Figure 5-7 Request for Quotations application

A request for quotation (RFQ) is a request that you send out to one or more potential suppliers. To list a vendor on the RFQ, the vendor must have a record in the Companies application. In the RFQ application, you can specify line items, required delivery dates, and other conditions you want the vendor to meet for the delivery of an item or service.

You may create an RFQ for any of the following circumstances:

- ▶ The stock count of a stocked item drops below a certain level and you must place another bulk order.
- ▶ A requisition is received for an item or service that requires a quotation each time because of item price or other requirements.
- ▶ Someone at your site requests a quote for an item or service. It can be for a normally stocked item or for an item not normally ordered, such as a special order or non-stocked item.
- ▶ You have to do commodity bulk buying for a certain period of time. This is typically for many items with common commodity codes. The quotation might not be copied to a PO immediately, but the pricing is set.
- ▶ When you receive the quotations from the vendors, you enter them into the Request for Quotations application one at a time. At the end of the process, you review the quotations and award one quotation for each RFQ line. The quotations are then converted to one or more purchase orders or contracts, depending on the procurement flow within your organization.

Changing status on RFQs affects field functionality and access to various actions. The RFQ status values are as follows:

▶ INPRG (In Progress)

This status is the default when you create an RFQ. The RFQ should remain in INPRG status until you have entered all RFQ information and RFQ lines. In this status, you may modify most tabs and fields on the RFQ, with the exception of the Quotation Lines table. The RFQ must be saved as INPRG prior to changing to another status. To allow you to edit the RFQ, its status is always INPRG unless the RFQ is completed or closed.

▶ READY (Ready to be Sent)

This status indicates that RFQ is ready to be sent out to the vendors. In this status, you do not have the ability to change the RFQ—all tabs are read-only.

▶ SENT (Sent to the Vendor)

This status indicates the RFQ has been sent to vendors. The SENT status causes fields on the RFQ and RFQ Lines tabs to be read-only although fields on the Vendors tab can be modified. You can also modify the Quotations and Terms and Conditions tabs.

▶ COMP (Completed)

This status indicates when all quotations have been received from vendors. In this status all fields except the fields on the Quotation Lines and Terms and Conditions tabs are read-only.

▶ CANCEL (Cancelled)

This status indicates a canceled RFQ. Use the CANCEL status to cancel a current RFQ, or a selected set of RFQs. You can only cancel an RFQ if there have not been any quotations awarded (for example, the CANCEL status is not available after a quotation has been converted to a PO). A canceled RFQ is stored as a history record and cannot be modified.

▶ CLOSE (Closed)

This status indicates a closed RFQ; the RFQ's quotation lines have been awarded, and it is stored as a history record and cannot be modified.

Note: When you create an RFQ, the system automatically sets its status to INPRG (In Progress). You can change the status of the RFQ as it moves along in its quotation cycle.

5.8 Invoices application

You use the *Invoices application* to record vendor invoices as you receive them. An invoice is a bill from a vendor for delivered products or services. Figure 5-8 shows the Invoices application.

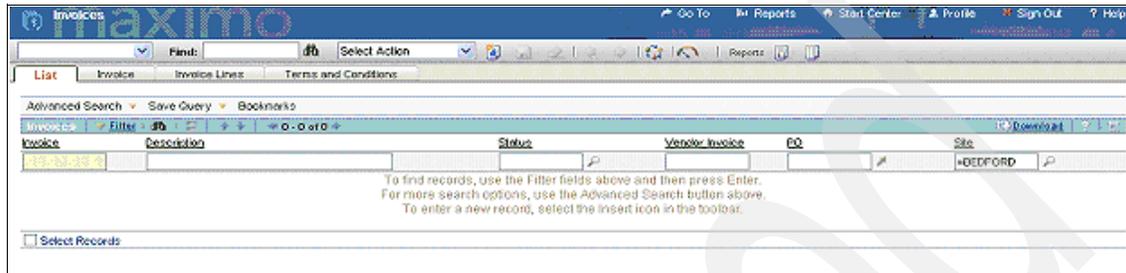


Figure 5-8 Invoices application

The Invoices application enables you to record invoices, and debit and credit notes from vendors, and match invoice details against purchase orders (POs) and receipts. You may also create invoices for which there are no receipts.

As you enter invoices, you can match the invoice information against purchase orders and receipts of materials and services, so that the invoice can be approved and routed to Accounts Payable.

The following fields are required for creating invoices:

- ▶ Invoice Number
- ▶ Type
- ▶ Entered Date
- ▶ Entered BY
- ▶ Company
- ▶ Currency

The invoice you create in IBM Tivoli Asset Management for IT can represent one of the following invoice types:

- ▶ An invoice related to a single purchase order.
You enter information such as the invoice number, corresponding PO number, any receipts recorded for the PO, and information specific to the invoice.
- ▶ An invoice related to many purchase orders for a single vendor.
You enter general invoice data on the Invoice tab, including the vendor, then list the related POs on the Invoice Lines tab.
- ▶ An invoice without a related purchase order.
Typically, such an invoice represents a bill for which no purchase requisition or purchase order exists. You simply enter invoice-specific information. This method can be appropriate if, for example, you receive an invoice for rent or a phone bill.

5.8.1 Invoice types

You may create the following types of invoices:

- ▶ Invoice
This is the default type. It indicates a payment to a vendor.
- ▶ Credit
When the invoice type is credit, you can enter a negative value for an invoice quantity. This is usually used for returned items.
- ▶ Debit
This type indicates a charge to your company from a vendor, for example additional charges not listed on a invoice

To access the Invoices application, click the application link on your Start Center, or select **Go To** → **Purchasing** → **Invoices**.

5.8.2 Invoice status

Changing statuses on invoices affects field functionality and access to various action pages. The invoice status can have the following values:

- ▶ SCHED (Scheduled)

This status indicates that the invoice is part of a payment schedule, set up for a specific contract. Invoices with this status can be created only from the Contracts applications.

An invoice with this status can be changed to any status except ENTERED.

- ▶ WAPPR (Waiting on Approval)

This status is only available if the current invoice status is ENTERED or HOLD. Use this status to indicate that invoice information has been entered and the invoice is now ready for review and approval by the appropriate level of staff. An invoice waiting for approval can be edited.

- ▶ ENTERED (Entered)

This status is the default when you create an invoice. A newly entered invoice has certain fields that are completed by default; some of them are read-only. An invoice with the status of ENTERED can be edited. After the status of an invoice is changed from ENTERED in the Change Status dialog box, the ENTERED status is no longer available.

- ▶ APPR (Approved)

This status is available only if the current invoice status is ENTERED, WAPPR, or HOLD. If you change the status directly to PAID without first approving the invoice, the system automatically validates the invoice for approval criteria. An approved invoice is stored as a history record; for invoices in history, you can only change the Check Code, Check Number, and Paid fields.

- ▶ HOLD (Hold)

This status is available only if the current invoice status is ENTERED or WAPPR. If the invoice should not yet be approved or paid, you can change the invoice to HOLD status. For example, if you have received an invoice but not yet received the items or if there is a discrepancy between the invoice and receipts, you can place the invoice on HOLD status. An invoice on hold can be edited.

▶ PAID (Paid)

This status is available only if the current invoice status is ENTERED, WAPPR, APPR, or HOLD. If you change the status directly to PAID without first approving the invoice, the system automatically approves the invoice. A paid invoice is stored as a history record and cannot be modified.

▶ CANCEL (Cancel)

This status is available only on the Change Status dialog box if the current invoice status is ENTERED, WAPPR, or HOLD. You cannot cancel an approved invoice. A canceled invoice is stored as a history record and cannot be modified.

5.8.3 Approving an invoice

Before an invoice can be approved, the system checks that it meets the following conditions:

1. If the invoice will be paid in foreign currency (as indicated in the Currency field), there must be an active exchange rate for that currency (in the Currency application) on the date of approval. If not, the invoice cannot be approved. (If the exchange rate has changed since you created the invoice, the system updates the Total Base Cost field upon approval.)
2. The prices on the invoice must fall within a specified range of the prices on the purchase order (PO). Your system administrator can define the amount by which the invoice price can vary from the PO price and still be approved in the Limits and Tolerances tab in the Security Groups application.
3. Limits must be set on how large a purchase request, purchase order, material requisition, invoice, and contract the group can approve. Use the Limits and Tolerances tab in the Security Groups application to set limits.

Tolerance levels for the group regarding how much some purchasing amounts (invoices, taxes, and services) can vary from an initial agreement must also be set. Again, use the Limits and Tolerances tab, which contains the following sections:

- Organization section is for specifying the organization for which you want to set limits and tolerances.
- Limits section is for setting group approval limits on how large the monetary amount can be on a purchase request, purchase order, material requisition, invoice, and contract.
- Invoice Tolerance section is for specifying how large a variance the group can accept on an invoice amount.

- Tax Tolerance section is for specifying how large a variance the group can accept on a tax amount.
 - Service Tolerance section is for specifying how large a variance the group can accept on a service amount.
4. Standard service costs added to the invoice (such as freight charges or installation fees) must also fall within set limits (also set in the Limits and Tolerances tab in the Security Groups application).
 5. Line items that must be received before invoice approval (items that have the Receipt Required check box selected on the Invoice Lines tab) are checked to ensure that the receipts have been entered into the system.

After these conditions are met, the system calculates any price differences between the invoice and the PO. Price differences can be the result of a change in the active exchange rate, or the result of a difference between what the vendor charged and the original PO price, or both. Price differences are handled in one of two ways:

- ▶ For issue on receipt items (that is, those items not purchased for inventory), the price difference is always applied to the work order, location, equipment, or GL account specified on the PO or Invoice Lines tab.
- ▶ For inventory items, the Average Cost field is updated.

5.8.4 Create an invoice that contains multiple vendors

You may enter company branches into the system and associate multiple company records with a parent record. You may then use the remit-to information of the parent company on an invoice. When you create an invoice specifying a parent company, the look-up list from the PO field contains all the purchase orders for the parent company and its branch companies.

If the PO field in the Invoices application contains a purchase order, the lines of the invoice include the lines from the current PO only. If the PO has company information, the vendor information from the parent company does not overwrite the vendor information of the PO.

Creating an invoice that contains multiple vendors is a three-part process:

1. Create a company record for each branch and associate it with the parent record.
2. Create purchase orders for the parent and branch companies associated with the parent company.
3. Create an invoice that references the parent company.

5.8.5 Add taxes to the cost of an Invoice Line Item

Certain businesses require that taxes be reflected in the total price of some or all purchased goods and services. Adding this procurement cost to the item price increases a stocked item's average cost. If an item is issued directly to a work order, general ledger (GL) account, location, or asset, taxes are added to the cost of the individual item.

The Loaded Cost field indicates the total cost of the item, including taxes and service costs.

IBM Tivoli Asset Management for IT enables you to define the category of line items to which you can add taxes:

- ▶ No items option indicates that taxes are not added, and are not reflected in the cost fields of the Inventory or Work Orders applications.
- ▶ All items option indicates that taxes are added to all line items on the invoice. Adding taxes to the item price increases a stocked (inventory) item's average cost.
- ▶ Issue-on-receipt items only option indicates that taxes are added to only those items that, upon receipt, are directly issued to a work order, GL account, location, or piece of equipment. This option avoids increasing the average cost of stocked items.

Resources

In this chapter, we introduce how resource records are used, managed, and assigned within Tivoli process automation engine records, to be used in IT Asset Management processes. The Resources module is used to create Tivoli process automation engine records for workers, both internal and external, and other people whose names or IDs might be listed on Tivoli process automation engine records.

This chapter contains the following topics:

- ▶ “Resources module” on page 106
- ▶ “Labor” on page 106
- ▶ “Qualifications” on page 113
- ▶ “People” on page 117
- ▶ “Person Group” on page 119
- ▶ “Crafts” on page 121

6.1 Resources module

The *Resources module* consists of the following applications:

- ▶ Labor
Use this application to create and manage records for all employees and contractors who will be performing work on tickets or work orders.
- ▶ Qualifications
Use this application to create and manage certificate and qualification records that employees have earned through training or educational programs. You can associate qualifications with labor records to verify that workers are qualified to perform specialized work.
- ▶ People
Use this application to create and manage records for people whose names may appear anywhere on a IBM Tivoli Asset Management for IT record.
- ▶ Person Group
Use this application to create groups of person records. IBM Tivoli Asset Management for IT uses person groups when performing automated tasks that will perform the same process or task for multiple people of the same type.
- ▶ Crafts
Use this application to create and manage craft records, defining define skill levels, standard rates, and premium pay codes for crafts. You can associate labor records with one or more crafts to indicate their various job skills.

6.2 Labor

A labor record represents an employee or contract laborer. Labor records are created for workers who spend time working on tickets or work orders, where you want to track either their work hours or the cost for the time they spend working.

You use the *Labor application* to create, modify, view, and delete labor records for employees and contractors. You can provide personal information and work-related information about a laborer such as regular and premium hours worked, and overtime refused. In addition, you can also specify crafts, skill levels, pay rates, qualifications and certifications associated with a labor record.

To use Assignment Manager to schedule and dispatch work, labor records must have a calendar and shift specified. Click the **Show/Manage Values** button next

to the Calendar field to access the Calendars dialog box where you may enter, view, or modify this information for a labor record.

Labor records for contract labor can be associated with labor rate contracts. You use the *Labor Rate Contracts application* to create records for labor rate contracts. If the rate for the laborer is specified by a contract, the Contract field will contain a value.

You may associate labor records to crafts in either the Labor application or the Craft application.

A single laborer might have many different job skills. The Crafts table window on a labor record allows you to list multiple crafts and skill levels for a laborer.

Person records contain general personal information, and other information needed on Tivoli process automation engine records for non-labor records, such as workflow and purchasing information. Labor records also contain personal information, but they are primarily designed to store information about the worker, for example craft, skill level, hours worked, certifications, and so forth.

A person record does not require any other resource records. Labor records however, cannot be created without a corresponding person record. When you create new labor records, if you do not specify a value in the Person field, IBM Tivoli Asset Management for IT prompts you to create a matching person record for the labor record.

The personal information (name, address, and so forth) in the People application is stored in database columns that are shared with the Labor application. The data in these fields can be entered or modified from either application.

Although you can list labor records on job plans and work orders, you have more flexibility if you list craft records instead. Activities, tasks, and work orders can be assigned to individual laborers using the Assignment Manager application.

Time spent working on a work order can be recorded while work is being performed using the *Timer*, or after work has been completed using the Labor Reporting application. When you enter a labor code in a transaction in the Labor Reporting application, IBM Tivoli Asset Management for IT copies data from the labor record to the labor transaction. If a laborer has more than one craft, skill level, or rate listed on the labor record, you must indicate which craft, skill level, rate, or contract applies to the hours you are reporting.

To access the Labor application, click the application link on your Start Center, or select **Go To** → **Administration** → **Resources** → **Labor**.

The Labor application (shown in Figure 6-1) contains the following tabs:

► List

Use this tab to search IBM Tivoli Asset Management for IT for labor records.

► Labor

Use this tab to add, view, and modify data on labor records for employees and contractors, including personal information, year-to-date hours, and procurement card information.

► Crafts

Use this tab to add, view, modify, and delete crafts, skill levels, and premium pay codes.

► Qualifications

Use this tab to add, view, modify, and update qualifications and certifications for labor records.

The screenshot shows the Labor application interface with the following data:

Field	Value
Labor	ADAMS
Person*	ADAMS
Work Site	
Work Location	
Labor Inventory Site	
Labor Inventory Location	
Organization	EAGLENA
Status	ACTIVE
Work Type	
Crew	
Supervisor	
Attachments	

Personal

Field	Value
First Name	Hank
Last Name	Adams
Display Name	Hank Adams
Address	100 Bedford Road
City	Burlington
State/Province	MA
ZIP/Postal Code	01730
Primary Phone	781-335-9267
Primary E-mail	hankly14@hotmail.com
Workflow E-mail Notification	PROCESS
Notice of E-commerce Exceptions*	NEVER
Workflow Delegate	BOUDREAU
Default Location to Service Request?	<input checked="" type="checkbox"/>
Calendar	
Shift	
Language	EN
Locale	en_US
Time Zone	US/Arizona

YTD Hours

Field	Value
Regular Hours	0:00
Premium Hours	0:00
Overtime Refused*	0:00

Procurement Card

Field	Value
Card #	
Card Type	
Verification Value	
Expiration Date	

Figure 6-1 Labor application

You create records for laborers and contractors in the Labor application. Labor records cannot be created without a corresponding person record. When you create new labor records if you do not specify a value in the PERSON field, IBM Tivoli Asset Management for IT prompts you to create a matching person record for the labor record.

A labor record can have one of the following status values:

▶ **ACTIVE**

This status is the default for new records. A labor record must be active to be assigned to a work order.

▶ **INACTIVE**

Inactive labor records do not appear in select value lists. Labor records with a status of INACTIVE cannot be associated with new Tivoli process automation engine records.

When a worker or contractor is no longer employed, that person should no longer be listed as someone who is available to be assigned work. *Do not delete that person's labor record* because it is listed on existing Tivoli process automation engine records.

You can change the status of a labor record to INACTIVE using the Change Status action available from the toolbar and the Select Action menu. The status of labor records cannot be changed to INACTIVE if any of the following statements is true:

- ▶ The labor ID is listed on a work plan for a work order that is in any status except CLOSED or CAN.
- ▶ The labor ID is listed on an assignment for a work order that is in any status except CLOSED or CAN.
- ▶ The labor ID is listed on a job plan record.

Note: The status of user and person records associated with labor records is not automatically changed when a labor's status changes to INACTIVE. The status of these records must be changed in the User and People applications.

A status change to INACTIVE is not permanent. The labor record's status can be changed back to ACTIVE, for example if historical labor actuals had to be recorded.

You may associate a labor record with one or more crafts from either the Labor application or the Crafts application. In the Labor application, you associate a labor with a craft by creating a new row in the Crafts table window on the Crafts tab. IBM Tivoli Asset Management for IT then copies the premium pay codes for that craft to the Premium Pay for table window.

If a laborer performs work that required special training, you can note that person's qualifications on his or her labor record. You add, view, extend, or renew qualifications and certifications on the Qualifications tab of a labor record.

You may also use the Qualifications tab to note general training that might not be job-related, for example a new employee orientation that covers general company procedures, or first-aid certifications.

Note: After you save a qualification you cannot delete it.

If you are creating labor records with similar employees, for example several contract laborers with the same skills hired from the same vendor, you can simplify the record creation process by using the Duplicate Labor action available from the Select Action menu.

Crafts listed on a labor record can be deleted by clicking the **Mark Row for Delete** button for the row. You must click **Save** for the deletion to take effect. When a craft record is deleted from a labor record, the associated rows in the Premium Pay table window are also deleted from the labor record. Crafts may not be deleted from a labor record if any of the following statements is true:

- ▶ If the labor record is referenced on an assignment record for a work order that is in any status except CLOSED or CAN (cancelled), the craft referenced on the assignment may not be deleted.
- ▶ If the labor record is referenced on a work plan for a work order that is in any status except CLOSED or CAN (cancelled), the default craft for the labor may not be deleted.
- ▶ If the listed craft is the *Default Craft For Labor*, it may not be deleted.

Note: If the listed craft is the Default Craft For Labor it can only be deleted if it is the only craft listed for the labor record.

Labor records can be deleted by using the Delete Labor action available from the Select Action menu.

Important: Any labor record that is listed on Tivoli process automation engine records should have its status changed to INACTIVE rather than be deleted. Deleting labor records is not a good practice.

Labor records may not be deleted if any of the following statements is true:

- ▶ The labor ID is listed on a work plan for a work order that is in any status except CLOSED or CAN.
- ▶ The labor ID is listed on an assignment for a work order that is in any status except CLOSED or CAN.

- ▶ The labor ID is listed on a job plan record.
- ▶ The labor ID is listed as a labor transaction for work order that is in any status except CLOSED or CAN.

You use the *Calendars application* (located in the Administration module) to create and modify calendars and shifts that you can associate with the labor records. See Figure 6-2. A calendar specifies the days when work is performed and includes non-work days, for example weekends or holidays. A shift specifies the hours when work is performed. One or more shifts can be associated with a given calendar.

Calendar	Company Work Calendar for Equipment Uptime						Organization
COMPANY1							EAGLENA
Start Date*							End Date*
12/31/99							12/31/09
← June → 2009 →							Today is: Friday, June 5, 2009
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
	1	2	3	4	5	6	
	16:00 hours	16:00 hours	16:00 hours	16:00 hours	16:00 hours		
7	8	9	10	11	12	13	
	16:00 hours	16:00 hours	16:00 hours	16:00 hours	16:00 hours		
14	15	16	17	18	19	20	
	16:00 hours	16:00 hours	16:00 hours	16:00 hours	16:00 hours		
21	22	23	24	25	26	27	
	16:00 hours	16:00 hours	16:00 hours	16:00 hours	16:00 hours		
28	29	30					
	16:00 hours	16:00 hours					

Figure 6-2 Calendar application

A single calendar can be referenced by any number of person, asset, or other records. A calendar record is defined by:

- ▶ Start and end date
- ▶ Shift definitions
- ▶ Non-working time you apply to it

Non-working time includes holidays and any other type of non-working time you want to define. Applying shifts and non-working time to a calendar generates the work periods for the calendar.

A calendar specifies the days when work is performed and includes non-work days, for example weekends or holidays. A shift specifies the hours when work is performed. One or more shifts can be associated with a given calendar.

Calendars are created in the Calendars application. You can enter a calendar on a labor record to specify the work days for a laborer. You can enter a shift to specify the work hours for the laborer.

Note: To indicate when a laborer's availability does not match that person's calendar, use the **Modify Person Availability** action in the *People* application.

To assign a calendar to labor within the Labor application:

1. Display the labor record to which you want to assign a calendar.
2. In the Calendar field, enter a value or click the **Detail Menu** to select an option and retrieve a value. See Figure 6-3.
3. In the Shift field, enter a value or click **Select Value** and click **Save Labor**.

The screenshot shows the 'Labor' application interface for a laborer named Hank Adams. The 'Personal' section contains various fields for personal information, including First Name (Hank), Last Name (Adams), Address (100 Bedford Road, Burlington, MA), and Contact Information (Primary Phone: 781-335-9267, Primary E-mail: hanky14@hotmail.com). The 'Calendar' field is highlighted with a red circle. Other fields in the 'Personal' section include Workflow E-mail Notification (PROCESS), Notice of E-commerce Exceptions (NEVER), Workflow Delegate (BOUDREAU), and Default Location to Service Request? (checked). The 'YTD Hours' section shows Regular Hours (0:00), Premium Hours (0:00), and Overtime Refused (0:00). The 'Procurement Card' section shows Card #, Card Type, Verification Value, and Expiration Date.

Figure 6-3 Calendar field

Another important feature within the Labor module is the option to set year-to-date hours to zero. This option is available from within the Select Action menu.

To use the option *Zero Year to Date Hours* from within the Labor application:

1. Display the record whose year-to-date hours you want to reset.
2. Choose **Select Action** → **Zero Year to Date Hours** (Figure 6-4). The Zero Year to Date Hours dialog box opens.
3. Select one or more types of hours to reset by selecting the appropriate check boxes.
4. Click **OK**.

You use the Zero Year to Date Hours action in the Labor application to reset the year-to-date fields to zero. Typically, you would only use this option at the end of the fiscal year.

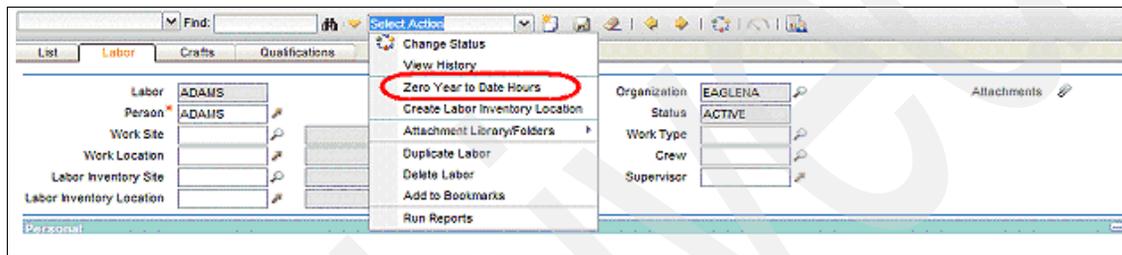


Figure 6-4 Zero Year to Date Hours action

6.3 Qualifications

A qualification is an indication of a particular job skill or specialized training. A qualification is often, but not necessarily, indicated by a license or certificate, signifying proficiency in a particular skill or skills. Some certificates have expiration dates and those who hold the certificates must renew the certificates periodically.

You use the *Qualifications application* to create records of qualifications and certification requirements for qualifications. After you have created qualification records, you may associate them with labor records in the Qualifications or Labor applications. You may also view qualifications associated with a particular labor code and can renew and change the status of their qualifications.

You list qualifications on a labor record to show that the worker has completed general or specific training.

Examples of qualifications can include:

- ▶ First aid training

- ▶ Safety certifications
- ▶ Journeyman Welder
- ▶ Forklift Operator's License
- ▶ Master Electrician's License
- ▶ Journeyman Plumber Certification
- ▶ Heavy Asset Operator's License

To access the Qualifications application (Figure 6-5), click the application link on your Start Center, or select **Go To** → **Administration** → **Resources** → **Qualifications**.

The Qualifications application contains the following tabs:

- ▶ **List**
Use this tab to search IBM Tivoli Asset Management for IT for Qualification records.
- ▶ **Qualification**
Use this tab to create, view, or modify a certificate or qualification.
- ▶ **Associated Labor**
Use this tab to add, view, modify, or delete the association between labor codes and the qualification. Note that after a qualification is associated with a labor code, the qualification may not be deleted.

Figure 6-5 Qualification application

You use the Qualifications application to create, view, modify, and manage qualification and certification records. If certification is required for a qualification, select the **Certification Required?** check box in the Certificate Information

section of the qualification record. Any craft and skill levels that are required for the qualification can be listed in the Required Craft and Skills Levels table window. For example, a 7018 Welder's certificate would only be issued to a laborer who is a journeyman welder. Tools that require the qualification or certification can be listed in the Tools that Require This Qualification table window.

Existing qualifications can be extended or renewed by using the **Extend/Renew Qualification** button, located on the qualification row. See Figure 6-6.

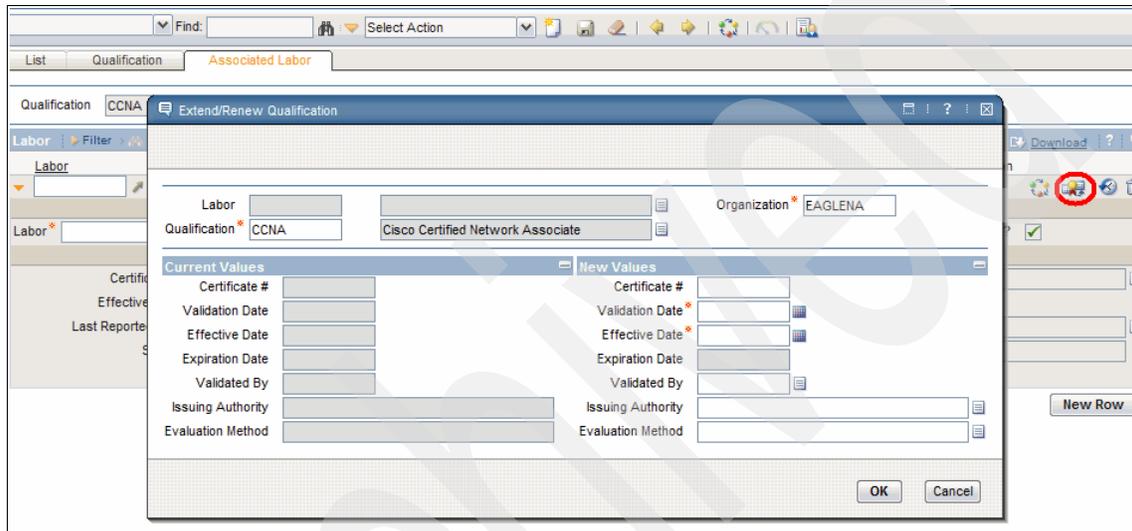


Figure 6-6 *Extend/Renew Qualification button*

Saved qualifications cannot be deleted, but they can have their status changed to inactive by using the **Change Qualification Status** button, located on the qualification row. See Figure 6-7 on page 116.

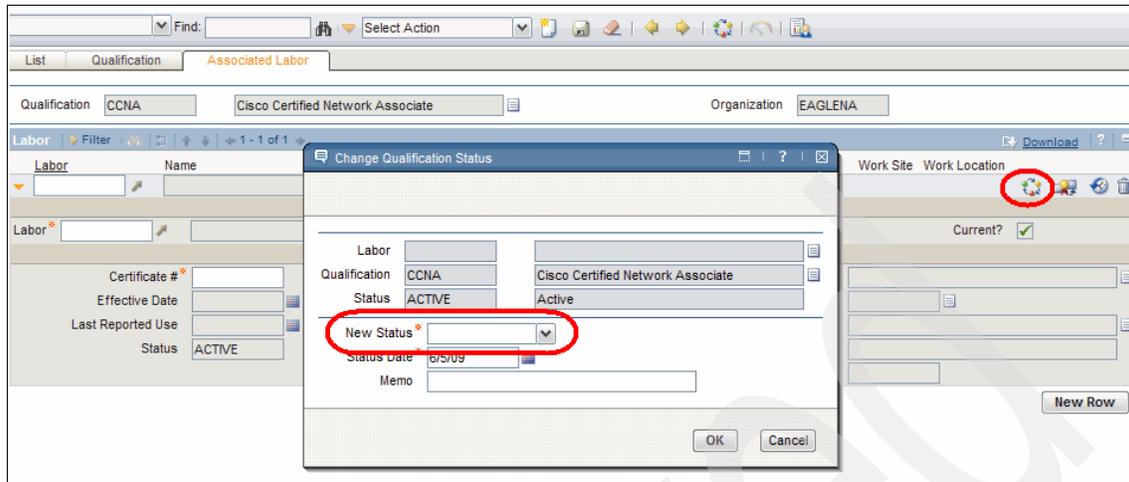


Figure 6-7 Change Qualification Status

To view the status and renewal history for a qualification, click the **View Qualification Status History** button located on the qualification row.

You may associate a qualification with a labor record from either the Qualifications application or the Labor application. In the Qualifications application, you associate a qualification with a labor record by creating new rows in the Labor table window on the Associated Labor tab.

► **ACTIVE**

This status is the default for new records. A qualification record must be active to be associated with a labor record.

► **INACTIVE**

Inactive qualification records do not appear in select value lists. Qualification records with a status of INACTIVE cannot be associated with labor records.

A Qualification may not be made INACTIVE if it is referenced by an entry in either of the following tables:

- LaborQUAL (in ACTIVE Status)
- TOOLQUAL

Qualification records may be deleted by selecting **Delete Qualification** from the Select Action menu. A qualification record cannot be deleted if it is listed on a labor record or on a tool record. IBM Tivoli Asset Management for IT displays a message if the qualification cannot be deleted.

6.4 People

A person record is a record of an individual who might appear somewhere on a Tivoli process automation engine record, for example, in a Reported By or Affected Person field on a service request, as a SUPERVISOR on a labor record, or as the value in a Ship To or Bill To Attention field on a purchasing record.

You use the People application to create, modify, view, and delete records for individuals. This application stores personal and official information about individuals, such as Tivoli process automation engine users, laborers, asset owners, supervisors, and individuals who receive Workflow notifications.

Any individual who will be assigned records as part of a workflow process must have a record created in the People application.

Tip: As a best practice, workflow assignments should be made to a person group rather than an individual.

If workflow processes are created that make assignments to person records, the following fields on the person record should contain a value:

- ▶ Supervisor
- ▶ Primary E-mail
- ▶ Primary Calendar
- ▶ Primary Shift
- ▶ Workflow E-mail Notification

You use the Workflow Delegate, Delegate From and Delegate To fields to indicate time periods when a workflow process should route assignments to a designated alternate, for example when a worker is on vacation.

To access the *People application*, click the application link on your Start Center, or select **Go To** → **Administration** → **Resources** → **People**.

The People application contains the following tabs:

- ▶ List
Use this tab to search for person records.
- ▶ Person
Use this tab to add, view, or modify person records.

To create a new person record, click the **New Person** button in the toolbar. At a minimum, you must provide a Person code and then save the record. Almost

every field on the People record is optional. To maximize your searching capabilities, also provide a FIRST NAME, LAST NAME, and PERSON'S SITE. See Figure 6-8.

Figure 6-8 Create a new person record

A person record can have one of the following status value:

- ▶ **ACTIVE**

This status is the default for new records. A person record must be active to be assigned to a labor record or a user record.

- ▶ **INACTIVE**

Inactive person records do not appear in select value lists. Person records with a status of INACTIVE cannot be assigned to new labor records or new user records.

You can change the status of a person record using the CHANGE STATUS action available from the toolbar and the Select Action menu. The status of a person record may not be changed to INACTIVE if any of the following statements is true:

- ▶ The person ID is listed as a SUPERVISOR on other person records.
- ▶ The person ID is listed as a SUPERVISOR on a job plan record.
- ▶ The person ID is listed as a CUSTODIAN or a USER for an asset or location.

- ▶ The person ID is listed on a ticket record as an OWNER.
- ▶ The person ID is listed on a communications template or a ticket template.
- ▶ The person ID is listed as a SHIP TO or a BILL TO contact on a purchasing record.
- ▶ The person ID is listed as a member of a person group.
- ▶ The person ID is listed on an assignment or notification on an active record in a workflow.

Person records can be deleted using the Delete Person action available from the Select Action menu.

Person records *may not be deleted* if the person ID is listed:

- ▶ On a user record
- ▶ On a labor record
- ▶ As a SUPERVISOR on other person records
- ▶ As a SUPERVISOR on a job plan record
- ▶ As a CUSTODIAN or a USER on an asset or location
- ▶ On a ticket record as an OWNER
- ▶ On a communications template or a ticket template
- ▶ As a SHIP TO or BILL TO contact on a purchasing record
- ▶ As a member of a person group
- ▶ On an assignment or notification on an active record in a workflow

6.5 Person Group

A *Person Group* is a list of individuals who may have similar job responsibilities, levels of authority, and security clearances. After you define person groups, responsibility for records such as work orders, tickets, and purchasing records can be assigned to a group rather than an individual. This is useful for records that are time-sensitive because IBM Tivoli Asset Management for IT can determine which member of a group to route a record to based on the person's calendar and shift.

A person group also can receive a record routed by a Workflow process. If Tivoli process automation engine routes a record such as a purchase order or a work order to a person group, everyone in the group can receive the record unless the workflow process is configured to send it only to the member whose calendar shows availability.

To access the Person Groups application, click the application link on your Start Center, or select **Go To** → **Administration** → **Resources** → **Person Groups**.

The Person Groups application (Figure 6-9) has the following tabs:

- ▶ List
Use this tab to search Tivoli process automation engine for person group records.
- ▶ Person Group
Use this tab to create, view, or modify person groups.

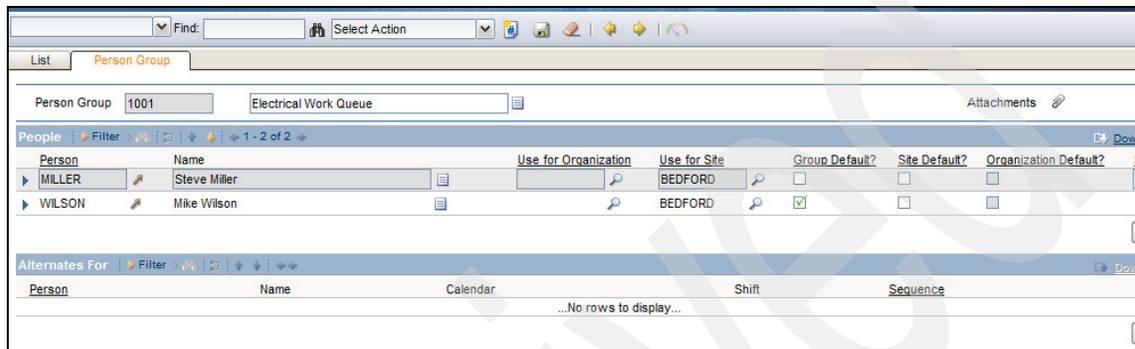


Figure 6-9 Person Groups application

You use the *Person Groups application* to create, view, modify, and manage person group records. You associate person records with a person group by creating new rows in the People table window. You use the Alternatives For Table table window to list which person or persons should receive workflow notifications if the person listed in the People table window is unavailable.

If you are creating person group records with similar member lists you can simplify the record creation process by using the Duplicate Person Group action available from the Select Action menu. After a group has been duplicated, you may then add or delete members from the new group as needed.

Person group records can be deleted by using the Delete Person Group action available from the Select Action menu. Person group records *may not be deleted* if the person group ID is listed on:

- ▶ A work order that is in any status except CLOSED or CAN.
- ▶ A ticket that is in any status except CLOSED or CAN.
- ▶ Any activities on a ticket template that has a status of ACTIVE.
- ▶ A communications template or a ticket template.
- ▶ A service group as the CONTACT GROUP.
- ▶ A preventive maintenance (PM) record.
- ▶ A job plan record.
- ▶ An assignment or notification on an active workflow process.
- ▶ An Organization record as the site.

6.6 Crafts

You use the *Crafts application* to define skill levels, standard rates, and premium pay codes for crafts. You can associate labor records with one or more crafts to indicate their various job skills. The craft code typically reflects the type of work done by employees and contractors. A craft represents an occupation or trade, and typically the craft name reflects the type of work done by members of the trade. If pay rates differ based on expertise you can create multiple skill levels and assign different pay rates to each skill level. For example, to make a distinction between a junior and senior level mechanic, you do not have to create two separate craft records. You can create a single craft record of MECHANIC and create two skill levels (JUNIOR and SENIOR) within the MECHANIC craft.

Each skill level within a craft can have different standard pay rates. You may also establish standards rates for external vendors (with or without labor contracts) for crafts and for skill levels within a craft. The Crafts application also lets you create and manage premium pay codes for premium pay rates. You have to define premium pay codes before IBM Tivoli Asset Management for IT allows you to associate them with a craft. Any number of premium pay types and rates can be established for each craft record. Premium pay can be calculated as a multiplier, an increment, or as an hourly amount.

You can associate a labor record with a craft from either the Labor application or the Crafts application.

A single laborer might have many different job skills. The Crafts table window on a labor record allows you to list multiple crafts and skill levels for a laborer.

You break the association between a labor record and a craft by deleting the labor record from the Associated Labor table window. When you do this, you are not deleting the labor record from the database, only removing the relationship between that labor record and the craft.

As with job plans, you may choose to list crafts instead of laborers when creating work plans on work orders. This approach allows the work order to be assigned to any available laborer in the craft, on any shift.

A craft represents an occupation or trade. The members of a craft have the same job skills and can be assigned to perform a specific type of work on a ticket or work order. Crafts may include contract laborers. Examples of crafts include mechanics, electricians, plumbers, and so forth.

Person groups are a way to group individuals by job responsibilities as opposed to craft skills, for example supervisors or managers. The members of a person group can be assigned to perform similar types of tasks as part of an escalation

or a Workflow process, for example approving status changes for records. Person groups might include individuals with different job skills, job titles, or from different departments within a company.

You may also use the Person Groups application to create groups of individuals who do not share job skills or responsibilities, but might work as a team on a project. For example, a safety review team might include members from several departments, crafts, or skill levels.

To access the Crafts application, click the application link on your Start Center, or select **Go To** → **Administration** → **Resources** → **Crafts**.

The *Crafts application* (shown in Figure 6-10) contains the following tabs:

- ▶ **List**
Use this tab to search Tivoli process automation engine database for craft records.
- ▶ **Craft**
Use this tab to create, view, modify, or delete craft records.
- ▶ **Associated Labor**
Use this tab to add, view, modify, or delete the association between labor cords and crafts.

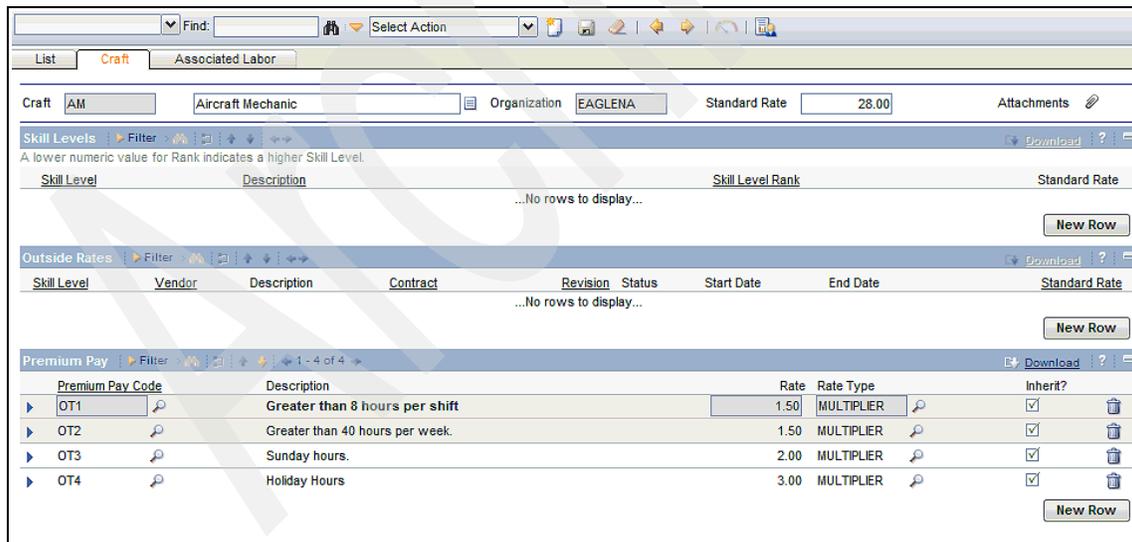


Figure 6-10 Crafts application

You use the Crafts application to create, view, modify, and manage craft records. You can add one or more skill levels to a craft as a way to indicate which craft members have more experience. You add skill levels by creating new rows in the Skill Levels table window. Skill levels are defined by an administrator in the *Domains application*.

You use the Outside Rates table window to record and view the standard rates charged by vendors for contract labor for the craft and skill level.

Note: Outside rates that are associated with a labor rate contract cannot be modified after the contract has been approved.

The Craft tab can also be used to define skill levels and specify standard rates for crafts. Premium pay codes associated with each craft are also displayed in this tab. Standard rates for crafts can be based on skill levels, external vendors, and premium pay codes.

Note: The standard rate established for a craft is irrespective of the skill level.

You use the Premium Pay table window to list premiums paid in addition to standard rates, for example premiums paid for working particular shifts, for working on holidays, or for possessing a particular qualification or certification. You create, view, modify and delete premium pay codes from a master list of premium pay codes using the **Manage Premium Pay Codes** action in the Select Action menu.

If the **Apply to New Crafts?** check box is selected for a pay code (Figure 6-11), IBM Tivoli Asset Management for IT automatically copies the pay code to a new craft record when the record is saved. You may provide additional premium pay codes to a craft by creating new rows in the Premium Pay table window.



Premium Pay Code		Details	
Premium Pay Code	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Apply to New Crafts?
Rate	0.00	<input type="checkbox"/>	<input checked="" type="checkbox"/> Inherit Rate from Craft?
Rate Type	<input type="text"/>		

Figure 6-11 Apply to New Crafts? check box

Having specified a rate in the Rate field, if you select the **Inherit** check box, the value in the Rate field will revert to the standard rate and the Rate field becomes read-only. To set a rate exclusively for this labor code, enter a rate in the Rate field and do not select the Inherit check box.

You may associate a labor record with a craft from either the Labor application or the Crafts application. In the Crafts application, you associate labor with a craft

by creating new rows in the Associated Labor table window on the Associated Labor tab.

If you are creating craft records with similar skill levels and pay codes, you may simplify the record-creation process by using the *Duplicate Craft action*, which is available from the Select Action menu. When you duplicate a craft record, IBM Tivoli Asset Management for IT copies the values listed on the record (skill levels, pay codes, laborers, and so forth).

You can break the association between a labor record and a craft by clicking the **Mark Row For Delete** button for the labor in the Associated Labor table window. You must click **Save** for the deletion to take effect. When you delete a labor record from the Associated Labor table window, you are not deleting the labor record from the database, only removing the relationship between that labor record and the craft.

Work Management

This chapter describes IBM Tivoli Asset Management for IT Work Management concepts and capabilities to help you achieve the objectives of the certification. Work Management focuses in planning and executing work orders.

This chapter contains the following topics:

- ▶ “Work orders” on page 126
- ▶ “Work order flow control” on page 136
- ▶ “Plan labor and crafts” on page 139
- ▶ “Failure class” on page 142

7.1 Work orders

Work orders are used to plan, review, and approve work for assets and locations. When you create a work order, you initiate the maintenance process and create a historical record of work being performed. To access the main application to manage work orders, select **Go To** → **Work Orders** → **Work Order Tracking**.

7.1.1 Work order status

A work order can have a set of status settings that best describe the actions that are performed or are waiting to be performed. By default, the meaning and behavior of a status are provided by IBM Tivoli Asset Management for IT and they are described in the following list. However, they can be set and customized to consider the customer requirements. IBM Tivoli Asset Management for IT provides the following work order status values:

- ▶ **WAPR (Waiting on Approval)**
This initial status is where the work order is planned. It allows the setting of job plans and work plans; does not allow entering actual information.
- ▶ **WMATL (Waiting on Material)**
This status indicates waiting for material purchase or acquisition.
- ▶ **WPCOND (Waiting on Plant Conditions)**
This status indicates waiting for plant conditions to approve.
- ▶ **APPR (Approved)**
This status indicates that the work plan is approved. Does not allow changing planned information, like job plan, safety plan and work plan for labor, tasks, materials and services.
- ▶ **INPRG (In Progress)**
This status indicates that the work order is being executed.
- ▶ **COMP (Completed)**
This status indicates that the work order was executed. This status allows you to edit certain information before closing the work order.
- ▶ **CAN (Canceled)**
This status indicates that the work order is not be executed for a particular reason. It does not allow any editing.
- ▶ **CLOSE (Closed)**
This status indicates the work order is closed and does not permit editing.

An action in the Work Order Tracking application allows the editing of history information about work orders when they are in the closed status. The Edit History Work Order action enables certain information to be edited, including tasks. In this mode, labors, materials, services, and tools are not allowed to be edited.

The limits to change work order data, considering work order status, are provided by default in IBM Tivoli Asset Management for IT, however they can be edited by using the Edit Rules action in the Organizations application.

Note: A work order is created and planned in the Waiting on Approval status. After work is started, it enters in Progress status. When the work order is done, it is Completed and can be Closed.

7.1.2 Work plans

A work plan describes the labor, materials, tools, services, and tasks necessary to complete a work order. Selecting a job plan to a work order, modifying the work plan to the requirements, or creating a work plan manually are possible.

The Plan tab in the Work Order Tracking application provides all the definitions necessary to create a work plan. You may define tasks and flow sequence for tasks, and request labor, materials, services, and tools.

To add, remove, and modify a work plan regarding labor, materials, services, and tools, the work order has to be in the WAPR status. However, to add, remove, or update tasks, the work order cannot be in the CAN or CLOSE status.

Tasks also define their own status, which is not necessarily defined the same as in the work order. A task can be edited considering the work order status and its status. A task can be removed only if it is at the WAPR status. If any labor is reported for a task, the status is automatically changed to APPR, not allowing its removal.

Figure 7-1 on page 128 shows an example about a work plan. It defines a series of tasks to be performed. Also, it has two planned laborers to do the work.

Sequence	Task	Summary	Estimated Duration	Status	Owner
10	Check pump operation.		0:00	APPR	
20	Replace impeller, shaft, seal and housing		0:00	APPR	
30	Check for leaks.		0:00	APPR	
40	Inspect main disconnect and all electrical		0:00	APPR	
50	Clean contactors and contactor compartm		0:00	APPR	
60	Inspect floats.		0:00	APPR	

Task	Craft	Skill Level	Vendor	Quantity	Labor	Regular Hours
MECH	FIRSTCLASS			1		20:00
ELECT	FIRSTCLASS			1		10:00

Figure 7-1 Work plan example for rebuilding a feedwater pump

Note: After a work order is canceled or closed, the Work Order Tracking application does not allow any modifications to it; however the action Edit History Work Orders enables a user to modify data and tasks from closed work orders.

7.1.3 Job plans

A job plan is a detailed description of work to be performed for a work order. It can be copied to PM records, routes, and directly to work orders. To open the Job Plans application, select **Go To** → **Planning** → **Job Plans**.

Job plans generally contain tasks (procedures), along with lists of estimated labor, labor hours, materials, services, and tools required for the work. It is basically a template used for work planning.

This application provides two tabs to manage a plan:

- ▶ Job Plan

Use this tab to create, modify and delete a job plan record. In this tab it is also possible to specify the tasks, flow control, and flow action. This tab also enables you to plan labor, materials, services, and tools.

- ▶ Work Assets

Use this tab to add work assets that a job plan relates to.

Figure 7-2 defines an example of a job plan for pump services, which defines tasks. Figure 7-1 on page 128 shows a work plan based on this job plan.

The screenshot displays a software interface for managing job plans. At the top, there are four tabs: 'List', 'Job Plan' (selected), 'Work Assets', and 'Specifications'. Below the tabs, the 'Job Plan' field contains 'JP11430' and the 'Description' field contains 'Centrifugal Pump Service- 12 Month'. The 'Organization' is 'EAGLENA' and the 'Site' is 'BE'. The 'Details' section includes fields for 'Status' (ACTIVE), 'Template Type' (Maintenance), 'Duration' (3:00), 'Classification', 'Class Description', and 'Launch Entry Name'. On the right side of the details, there are fields for 'Default WO Class', 'WO Priority' (8), 'Interruptible?' (checkbox), 'Flow Controlled?' (checkbox), 'Suspend Flow Control?' (checkbox), 'Flow Action', and 'Flow Action Assist?' (checkbox). Below the details is a 'Job Plan Tasks' section with a table showing the following tasks:

Sequence	Task	Description	Nested Job Plan
▶	10	Check pump operation.	
▶	20	Check pump float switch.	
▶	30	Check housing for leaks.	
▶	40	Replace mechanical seal.	

Figure 7-2 Job plan example for pump service

Defining a job plan in a work order implies copying all the content from a job plan to a work plan. It serves as a template for the work plan. After a job plan becomes a work plan on a work order, you can modify the work plan without affecting its original job plan. You may also modify a job plan without affecting already generated work plans.

To select a job plan in a work order, select **Go To** → **Work Orders** → **Work Order Tracking application**, and then select a work order. In the Job Plan field, filter the desired job plan.

The work assets defined in a job plan enables you to filter a job plan considering the same work assets used by the work order. Figure 7-3 shows this filter option, enabled by the first check box: Show Job Plans for the Work Order's Asset and Location Only.

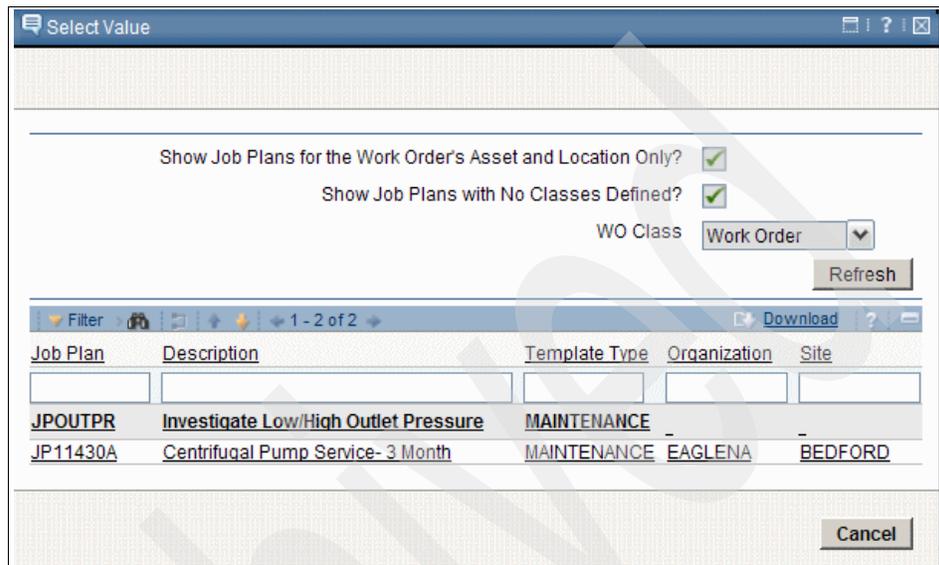


Figure 7-3 Work order job plan filter

Note: A work plan can be defined manually or can be created by a job plan. Changes made to a work order work plan does not affect its job plan.

Create a job plan from a work plan

When you manage work orders, an action is available to create a job plan from an already-created work plan. The Create a Job Plan from a Work Plan action is located in the Work Order Tracking application and performs this task. The only information required to provide is a new name for the job plan that is being created.

Figure 7-4 on page 131 shows an example of creating a job plan from the current work order. The work plan used in this example is from the work order previously presented in Figure 7-4 on page 131 and in Figure 7-1 on page 128.

Figure 7-4 Create a job plan from a work plan

Creating a job plan from a work plan reuses the following information:

- ▶ Work order data, such as responsibilities, priorities, flow control
- ▶ Work assets, such as work order asset and location
- ▶ Tasks and flow control sequence
- ▶ Planned labor, material, services and tools

Figure 7-5 shows the job plan example created by the action executed in Figure 7-4.

Sequence	Task	Description	Nested Job Plan
10		Check pump operation.	
20		Check pump float switch.	
30		Check housing for leaks.	
40		Replace mechanical seal.	

Figure 7-5 Job plan created from work plan

Figure 7-6 displays the work assets of the job plan created from the work plan by the action described in Figure 7-4 on page 131. This action reuses the asset and location information from the work order.

Location	Asset	Item	Asset/Location/Item Description	Safety Plan	Default
BR430	11430		Centrifugal Pump 100GPM/60FT HD		<input checked="" type="checkbox"/>
BR430			Condensate Return Pump-Centrifugal/100GPM/60FTHD		<input checked="" type="checkbox"/>

Figure 7-6 Job plan created from a work plan

Note: The Work Order Tracking application can create a job plan from a work plan using the Create Job Plan from Work Plan action.

7.1.4 The Move/Swap/Modify actions

In a work order, IBM Tivoli Asset Management for IT now supports asset move and swap, attributes modifications, and users and custodians assignments. The Move/Swap/Modify action is used to plan and execute these changes to assets, locations, and configuration items. This action is located in the Work Order Tracking application when you select **Go To** → **Work Orders** → **Work Order Tracking**.

The changes can be saved as a plan or can be executed immediately. If they are saved as a plan, they are automatically executed when the work order is changed to the completed status. Otherwise, if it is executed immediately, the changes are done and the Move/Swap/Modify dialog is closed. Click **Execute Now** button or **Save as Plan** button to choose between these two options.

Move action

Use the Move/Swap tab to move or swap an asset. If the check box for swapping is not enabled, a move can be planned or executed. When you move an asset, the following fields are available, which define where the asset is going to be moved out to:

- ▶ Move To Parent
- ▶ Move To Location
- ▶ Move To Bin

You may select more than one asset to be moved by a work order.

Figure 7-7 shows an example of moving an asset from SHIPPING location to the AIR105 location.

Asset	Parent	Location	Bin	Move To Parent	Move To Location
12600		SHIPPING			AIR105

Mass Move

To Site:

To Location:

To Parent:

To Bin:

Figure 7-7 Work order to move the asset 12600 from SHIPPING location to the AIR105 location

Swap action

The Swap action is located on the Move/Swap tab. If the swap check box is selected, the action executes an asset swap rather than a move. On any single work order, you must choose *either* move or swap, but *not both* move and swap. Swaps are assumed to just be swapping one thing for another. Attributes cannot be modified.

When swapping, assets continue to have the options to move to a parent, move to a location, and move to a bin. An additional piece of information, the Replacement Asset field, enables you to select the asset that replaces the current one. You may select a list of assets for swapping in a single work order.

Note: The Move/Swap tab allows either moving or swapping assets. The move function uses new location information; in addition, the swap function uses new locations and replacement assets information.

Modify action

The Modify tab allows changes to asset or location attributes. To enable changing an attribute from one of these objects, you must specify and classify this attribute in the Specifications tab, available from each application that defines these objects.

Figure 7-8 on page 134 shows an example of modifying the alternate name of the asset 11230, which is classified as a Motor.

Move/Swap		Modify	Users and Custodians	
Asset		Location	Configuration Item	
Assets Filter > [Icons] 1 - 3 of 3				
Asset			Description	
1002			Fire Extinguisher	
1005			Fire Extinguisher	
11230			Motors	
Asset Specifications Filter > [Icons] 1 - 1 of 1				
<input checked="" type="checkbox"/> Attribute	Description	Section	Data Type	Alphanumeric Value
<input checked="" type="checkbox"/> ALT NAME	Alternate Name		ALN	
Planned Modifications Filter > [Icons] 1 - 1 of 1				
Asset	Attribute	Data Type	Old Value	New Value
11230	ALT NAME	ALN		Energy Generator

Figure 7-8 Modifying the asset alternative name attribute to Energy Generator

Attribute modifications are not allowed for the assets that are being swapped. Defined locations and configuration items (CIs) are still allowed to have attribute modifications even during a swap.

Note: Modify action can change an attribute value from an asset, location, or configuration item.

The Users and Custodians tab

While performing move, swap, or modify actions, you may define users and custodians for assets and locations selected. The Users and Custodians tab in the Move/Swap/Modify action enables this functionality.

Figure 7-9 on page 135 shows an example of changing the custodian of asset 1002 to Wilson.

Move/Swap		Modify		Users and Custodians		
Asset		Location				
Assets Filter 1 - 3 of 4						
Asset		Description				
1002		Fire Extinguisher				
1005		Fire Extinguisher				
11230		Motors				
Users and Custodians Filter 1 - 1 of 1						
Person	User?	Custodian?	Primary?	Will be User?	Will be Custodian?	Will be Primary?
WILSON	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 7-9 Example of changing an asset custodian

Note: The Users and Custodians tab associates person to assets and locations.

7.1.5 Work order ownership

Work orders enable you to define an owner or an owner group to track responsibility of the current work that is being done. An owner is not necessarily the same person that is going to execute a work order. An owner performs an administrative task that assures the execution of the work order.

The Work Order Tracking application provides, on the Work Order tab, the Responsibility area where you may view the owner and the owner group for the current work order. The Owner and the Owner Group fields are ready-only. To select an owner, select either one of the following actions:

- ▶ Select Owner action enables selection of a person or a person group from a list to take ownership of the current work order.
- ▶ Take Ownership action assigns the logged-in user as the owner of the current work order.

Note: Both actions are used to designate ownership for work orders.

Figure 7-10 on page 136 shows an example of the window to select an owner by using the Select Owner action.

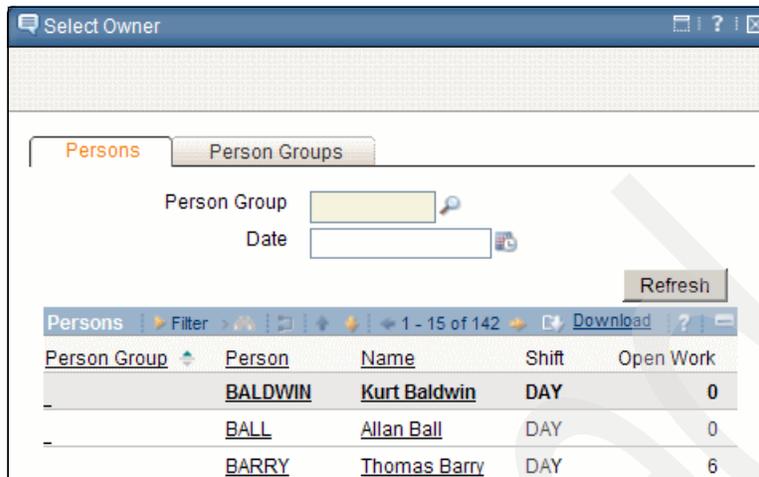


Figure 7-10 Select Owner action

7.2 Work order flow control

Tasks are part of work plans and help to divide work orders into steps to structure, organize, and report activities according to the work that is being executed. A work plan and a job plan are used to define tasks.

Tasks define status and sequences that indicate the current phase of the work order. Tasks can automatically flow through their sequences considering work order status and task status. For more information about work plans, refer to 7.1.2, “Work plans” on page 127 and 7.1.3, “Job plans” on page 128.

7.2.1 Process flow

A process flow denotes, for sequencing purposes, when a work order and its tasks start and complete. It is defined in work types, which can be associated in work orders. Process flow enables the processes to automatically start and complete considering the work order status.

Work types can be managed in the Organization application, located at **Go To** → **Administration** → **Organization**. To access Work Type action, select a valid organization, and in the Action menu, select **Work Order Options** → **Work Type**.

Figure 7-11 shows an example of a work type that defines the process flow to start when the work order is in progress and to end when it is completed.

The screenshot shows the 'Work Type' configuration window. At the top, there is a table listing several work types. The selected work type is 'WORKORDEF' with 'AUTO' as the Work Type and 'Automatic Work Order' as the Description. Below the table, the 'Details' section shows the configuration for the selected work type: Work Order Class is 'WORKORDEF', Work Type is 'AUTO', and Type is 'NONE'. The 'Process Flow' section shows 'Start Status' set to 'INPRG' and 'Complete Status' set to 'COMP'.

Work Order Class	Work Type	Description	Type	Downtime Prompt?	Failu
CHANGE	MINOR	Minor Change	NONE	<input type="checkbox"/>	<input type="checkbox"/>
CHANGE	SIG	Significant Change	NONE	<input type="checkbox"/>	<input type="checkbox"/>
RELEASE	DELTA	Delta Release	NONE	<input type="checkbox"/>	<input type="checkbox"/>
RELEASE	FULL	Full Release	NONE	<input type="checkbox"/>	<input type="checkbox"/>
WORKORDEF	AUTO	Automatic Work Order	NONE	<input type="checkbox"/>	<input type="checkbox"/>

Details

Work Order Class*: WORKORDEF
 Work Type*: AUTO
 Type*: NONE

Process Flow

Start Status*: INPRG
 Complete Status*: COMP

Figure 7-11 Example of a work type to start process flow control when work order status is in progress

Note: A process flow, whose definition is set by work types, is used by work orders to automatically start a flow control.

7.2.2 Flow control

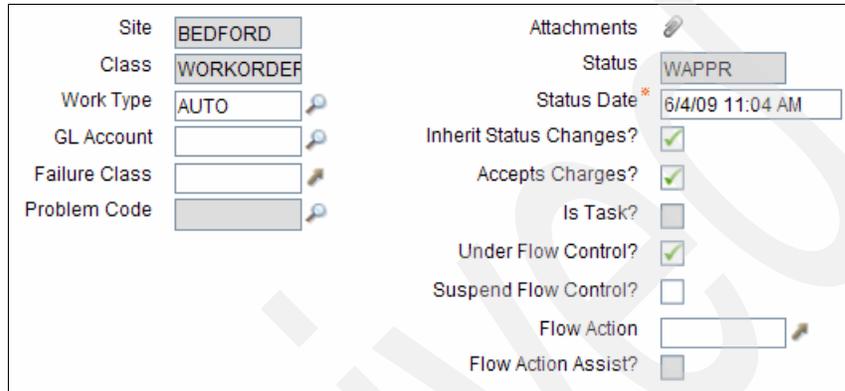
Flow control enables a task sequence to be executed automatically. Tasks flow sequences are used to indicate the steps necessary to complete a work order following a structured plan.

The Predecessors field, located in each task, is used to define the task predecessors that enable tasks to start in a planned sequence. This field determines all predecessors tasks that have to end their flow before starting the flow of the next tasks.

A task flow control is controlled by the Under Flow Control check box, which enables the task to change its status considering the sequence defined. This check box is located in the work order level and in the tasks level. The option for flow control has to be enabled in the work order level to allow activation in the

tasks level. After it is enabled in the work order level, all of the tasks enable theirs automatically, including the new ones. You may to disable this option separately for each task.

Figure 7-12 shows an example of a work order that enables flow control in the work order level. The work type automatically starts the flow sequence when the status is changed to INPRG (in progress).



The screenshot shows a work order configuration form with the following fields and options:

Site	BEDFORD	Attachments	
Class	WORKORDEF	Status	WAPPR
Work Type	AUTO	Status Date*	6/4/09 11:04 AM
GL Account		Inherit Status Changes?	<input checked="" type="checkbox"/>
Failure Class		Accepts Charges?	<input checked="" type="checkbox"/>
Problem Code		Is Task?	<input type="checkbox"/>
		Under Flow Control?	<input checked="" type="checkbox"/>
		Suspend Flow Control?	<input type="checkbox"/>
		Flow Action	
		Flow Action Assist?	<input type="checkbox"/>

Figure 7-12 Work order that enables flow control and automatically starts it

When the work order, shown in Figure 7-12, changes its status to INPRG, its tasks automatically start their sequence flow. The first task in the sequence changes its status to INPRG; the other tasks continue with the same status.

When the current task changes its status to completed, the next task changes its status to in progress. As the work type defines the end of the process in the completed status, the work order is completed when all tasks are completed.

By default, if a work type is not defined, and to facilitate flow control use, the work order starts the process flow when it is INPRG, and ends when it is in the COMP (completed) status.

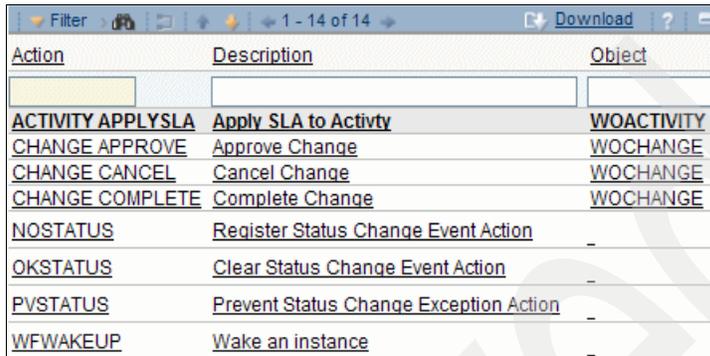
Note: Work orders can automatically start tasks flow control considering the work type defined. Tasks can automatically follow their sequences when the work order is under flow control.

7.2.3 Flow action

Work order flow action functionality is used to execute actions when the work order is started with process flow control. The action to be fired is selected in the Flow Action field, located in the Work Order tab and in each task definition.

The Flow Action Assist check box suppresses the automatic firing of the selected action. Figure 7-12 on page 138 shows these fields.

Figure 7-13 shows examples of actions that can be executed.



Action	Description	Object
<u>ACTIVITY APPLYSLA</u>	<u>Apply SLA to Activity</u>	<u>WOACTIVITY</u>
<u>CHANGE APPROVE</u>	<u>Approve Change</u>	<u>WOCHANGE</u>
<u>CHANGE CANCEL</u>	<u>Cancel Change</u>	<u>WOCHANGE</u>
<u>CHANGE COMPLETE</u>	<u>Complete Change</u>	<u>WOCHANGE</u>
<u>NOSTATUS</u>	<u>Register Status Change Event Action</u>	-
<u>OKSTATUS</u>	<u>Clear Status Change Event Action</u>	-
<u>PVSTATUS</u>	<u>Prevent Status Change Exception Action</u>	-
<u>WFWAKEUP</u>	<u>Wake an instance</u>	-

Figure 7-13 Flow action examples

By default, if a work type is not defined and to facilitate flow action use, a work order starts the process flow when its status is changed to INPRG. When a work order process control starts, the selected action is fired.

Note: The flow action functionality executes an action when the work order is started through process flow control and the Flow Action field has an action selected.

7.3 Plan labor and crafts

A work order might require different tasks to be performed and, with that, might require the services of different laborers or crafts. IBM Tivoli Asset Management for IT creates a separated requirement for each task or labor listed on a work plan. For example, if two mechanics are required for a task, two requirements are created. Similarly, if two different crafts are required for a task, IBM Tivoli Asset Management for IT creates one requirement for each craft.

The Labor application is used to define labor and relate skills, whose definition is provided by the Crafts application. To learn more about managing labor and crafts, refer to Chapter 6, “Resources” on page 105.

7.3.1 Work plans

A work plan is commonly used to add labor and crafts requirements to a work order. The Job Plan application provides a method to apply planned labors consistently; the Work Order Tracking application provides a direct method to plan labor in a work plan. Planning information can be applied to a work order before it achieves the approved status. More references about these applications are described in the 7.1, “Work orders” on page 126.

When planning labor, you may define the task it associates with. It enables a work plan to associate a craft or a person to execute a specific task. A craft is a generic method to plan a labor because it specifies the necessary skills to accomplish work. In the planning phase, crafts are better suited because they do not require a specific person.

Figure 7-14 shows an example of planned labor to perform the maintenance in a pump system. It requires a mechanic apprentice and a specific person to accomplish the task 10.

Sequence	Task	Description	Nested Job Plan
	10	Maintenance Pump System	

Task	Craft	Skill Level	Labor	Quantity
10	MECH	APPRENTICE		1
10			WILSON	1

Details	
Organization *	EAGLENA
Site	
Task	10
Labor	
Craft	MECH
Skill Level	APPRENTICE
	Mechanic Apprentice

Figure 7-14 Planned labor for maintenance

Note: Labor and crafts can be planned in a work plan through the Job Plan application or the Work Order Tracking application. The Job Plan application is used to apply planned labor more consistently.

7.3.2 Activities and Tasks application

The *Activities and Tasks application* is used to plan, review, and manage activities and tasks. To open this application, select **Go To** → **Work Orders** → **Activities and Tasks**. In this application, you may list all activities and tasks from work orders, and consequently plan and report labor, materials, tools, and services for them.

Figure 7-15 shows an example of the task 10 created to replace a keyboard.

The screenshot displays the 'Activities and Tasks' application interface. At the top, there are navigation tabs: 'List', 'Activities and Tasks', 'Resources', 'Related Records', and 'Log'. The 'Activities and Tasks' tab is active, showing a task entry for 'Task 10' with the name 'Replace Keyboard'. Below this, there are tabs for 'Plans' and 'Actuals'. The 'Plans' tab is selected, showing details for 'Activity T1003' and 'Job Plan'. The task name 'Replace Keyboard' is also visible in this section. To the right, there are input fields for 'Supervisor', 'Lead', and 'Person Group'. Below this, there are tabs for 'Labor', 'Materials', 'Services', and 'Tools'. The 'Labor' tab is selected, showing a table with columns: 'Task', 'Craft', 'Skill Level', 'Vendor', 'Quantity', 'Labor', and 'Regular Hours'. The table contains one row with 'HARDWARE' as the craft and '1' as the quantity. Below the table, there is a 'Details' section with input fields for 'Task', 'Vendor', 'Regular Hours', 'Craft' (set to 'HARDWARE'), 'Labor Contract', 'Quantity' (set to '1'), 'Skill Level', and 'Labor'.

Figure 7-15 Using the Activities and Tasks application to plan labor, materials, services, and tools

Note: The Activities and Tasks application enables you to plan and report labor and crafts for tasks.

7.4 Failure class

Failure class identifies failure hierarchies which helps you to track the failures that affect assets and operating locations. Using this information can help you to take preventive measures and to analyze failure trends. This classification can be related in assets and locations when it is necessary to report work done on them.

The Failure Codes application is used to create failure classes, whose structure defines failure hierarchies. To open this application, select **Go To** → **Assets** → **Failure Codes**.

7.4.1 Hierarchy

The Failure Codes tab in the Failure Codes application is used to build, view, modify, and delete failure hierarchies. A failure hierarchy is an organized set of data about problems, causes, and remedies related to assets and operating location failures. The failures hierarchies classify possible failures for assets and operating locations when building work orders.

A failure class is defined by the following hierarchy:

- ▶ Problems, which define problems for the failure class
- ▶ Causes, which define causes for each problem
- ▶ Remedies, which define remedies for each cause

Figure 7-16 on page 143 shows an example of a failure class hierarchy for pump failures. Four related problems are shown. For the stopped problem, three causes are described. One remedy is defined for the breaker tripped cause.

List		Failure Codes	
Failure Class	PUMPS	Pump Failures	Organization EAGLENA
Problems Filter 1 - 4 of 4 Download			
Failure Code	Description		
▶ LEAK	Leaking		
▶ STOPPED	Stopped		
▶ LOWVOL	Low Volume		
▶ LOWPRES	Low Pressure		
New			
Causes for STOPPED Filter 1 - 3 of 3 Download			
Failure Code	Description		
▶ BREAKTRP	Breaker Tripped		
▶ MOTRFAIL	Motor Failed		
▶ PUMPJAM	Pump Jammed		
New			
Remedies for BREAKTRP Filter 1 - 1 of 1 Download			
Failure Code	Description		
▶ RESET	Reset Breaker		

Figure 7-16 Example of a failure hierarchy for pump failures

Note: A failure hierarchy is defined by a failure class, which can be described by problems, causes and remedies.

7.4.2 Assets and locations failure class

The Assets and the Locations applications, which are respectively opened by selecting **Go To** → **Assets** → **Assets** and **Go To** → **Assets** → **Locations**, can define a failure class for assets and locations, respectively. This enables a work order to define a problem cause considering the failure class of its working assets.

Figure 7-17 on page 144 shows an example of the Centrifugal Pump asset that defines the Pumps failure class, previously described in the Figure 7-16.

List	Asset	Spare Parts	Safety	Meters	Specifications		
Asset	11430	Centrifugal Pump 100GPM/60FT HD		Site	BEDFORD	Attachments	
Status	OPERATING			Type		Moved?	<input type="checkbox"/>
Details							
Parent	11400	Boiler- 50,000 Lb/Hr/ Gas Fired/ Water Tu		Calendar	COMPANY1		
Maintain Hierarchy?	<input type="checkbox"/>			Shift			
Location	BR430	Condensate Return Pump- Centrifugal/10		Priority	2		
Bin				Serial #	377-9A		
Rotating Item	PUMP100	Centrifugal Pump 100 GPM, 60 FT-HD		Failure Class	PUMPS		

Figure 7-17 Example of the Centrifugal Pump asset that defines the Pumps as failure class

7.4.3 Work order problem code

A work order may reuse the information of a failure class related in an asset or location to be filled in the Failure Class field, which is located in the Work Order Tracking application. This information is filled automatically when selecting an asset or a location whose failure class is defined; you may fill it manually.

The failure class information enables the Work Order Tracking application to select a problem code, which gives more options to track and classify a work order. The values provided for the Problem Code field are those that are related in the first level of the failure class previously selected in the Failure Class field.

Figure 7-18 shows an example of a work order that relates the Centrifugal Pump asset described in Figure 7-17. When this asset is selected, the failure class information is provided, enabling you to select a problem code for the work order. In this case, the problem code selected is STOPPED.

List	Work Order	Plans	Related Records	Actuals	Safety Plan	Log	Failure
Work Order*	1225			Site	BEDFORD		
Location	BR430	Condensate Return Pump- Centrifugal/10		Class	WORKORDEF		
Asset	11430	Centrifugal Pump 100GPM/60FT HD		Work Type			
Configuration Item				GL Account	6210-339-???		
Parent WO				Failure Class	PUMPS		
Classification				Problem Code	STOPPED		

Figure 7-18 Example of a work order that relates a failure class followed by its problem code

Work order can use failure class information to classify its problem code.

Asset reconciliation

Asset reconciliation is the capability of reconciling the differences between a physical inventory of what actually exists and what we believe exists in the database accounting system.

This chapter contains the following topics:

- ▶ “Introduction” on page 146
- ▶ “Importing the deployed assets data” on page 149
- ▶ “Reconciliation module applications” on page 154
- ▶ “Reconciliation setup” on page 156
- ▶ “Create a link rule” on page 156
- ▶ “Create comparison rules” on page 159
- ▶ “Set up a software conversion procedure” on page 162
- ▶ “Create a task filter” on page 164
- ▶ “Search for and examine deployed assets records” on page 166
- ▶ “Review asset reconciliation results” on page 168
- ▶ “Create and schedule a reconciliation cron task” on page 175

8.1 Introduction

Asset reconciliation is an important part of asset management. It is the capability of reconciling the differences between a physical inventory of what actually exists and the database accounting system of what we believe exists. This reconciliation is important for support reasons and, perhaps, even more important for financial and compliance management.

The Tivoli Asset Management for IT reconciliation process compares *should-be* with *as-is* asset configurations and reconciles them to give the user a clearer picture of IT assets. As a result, organizations can more easily view discrepancies in real time for more effective software compliance and hardware standardization efforts.

Simple business rules establish *authorized* versus *deployed configurations*, as shown in Figure 8-1, and also the relationships among associated assets. The result is a unique set of comparison views, reports, and powerful key performance indicators (KPIs) that monitor the health of the entire IT infrastructure.

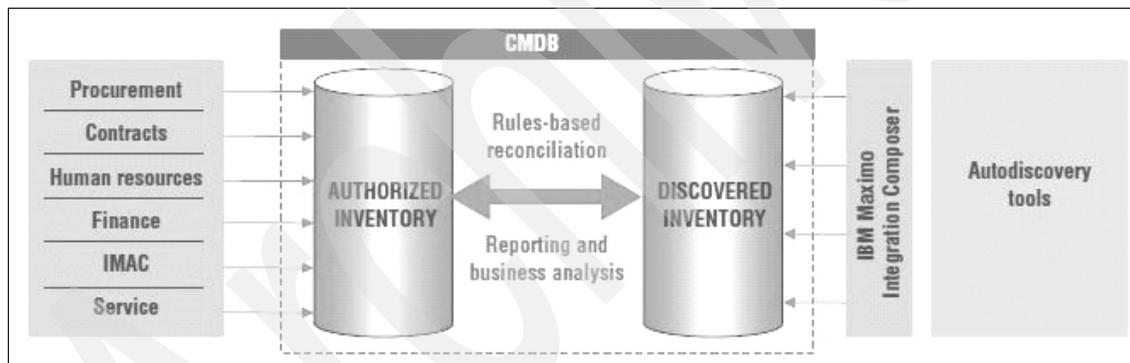


Figure 8-1 Authorized versus discovered assets

8.1.1 Assets and Deployed Assets modules

The *Reconciliation* module applications enable you to compare two kinds of IT asset information stored in the system database. These two distinct sets of data are maintained in two application modules:

- ▶ Assets module

In the Assets module application, you create and maintain data for purchased or leased IT assets. You create these records in the Assets application or when you use the Receive Rotating Items action in the Receiving application.

An IT asset is an asset with a class structure identifier that belongs to the top-level IT classification used in your enterprise.

▶ Deployed Assets module

In the Deployed Assets module application, you create and maintain data collected directly from assets actually installed in your enterprise. To gather this data, discovery tools (such as Microsoft SMS or IBM Tivoli Configuration Manager) scan computers, network devices, and network printers deployed in your enterprise and record information about the hardware and software installed on those assets. An integration tool, such as IBM Tivoli Integration Composer, imports the collected data into the Tivoli process automation engine database. You view this data in the Deployed Assets module applications: Computers, Network Devices, and Network Printers.

Important: In this document, the term *authorized asset* refers to information technology assets maintained in the Assets applications. The term *deployed asset* refers to asset data maintained in the Deployed Assets module applications.

The reconciliation process identifies successful matches, and discrepancies and variances between the two sets of data in the Assets module and the Deployed Assets module, as seen in Figure 8-1 on page 146. You can use the results of a reconciliation to determine whether the objects actually deployed comply with corporate plans and whether the changes over the life cycle of an object are in compliance with corporate policies.

Discrepancies might be caused by a variety of factors, including:

- ▶ Incorrect data entry
- ▶ Reconfigured equipment
- ▶ Retired equipment
- ▶ Theft
- ▶ Unauthorized use of hardware and software in the enterprise

Reconciliation is a process of looking at the overlap of sets of data, as shown in Figure 8-2 on page 148. You look at three sets of records as you go through the data:

- ▶ Records that match
- ▶ Records found in the authorized set of data but not found in the inventory
- ▶ Machines found in the inventory but not in the authorized data

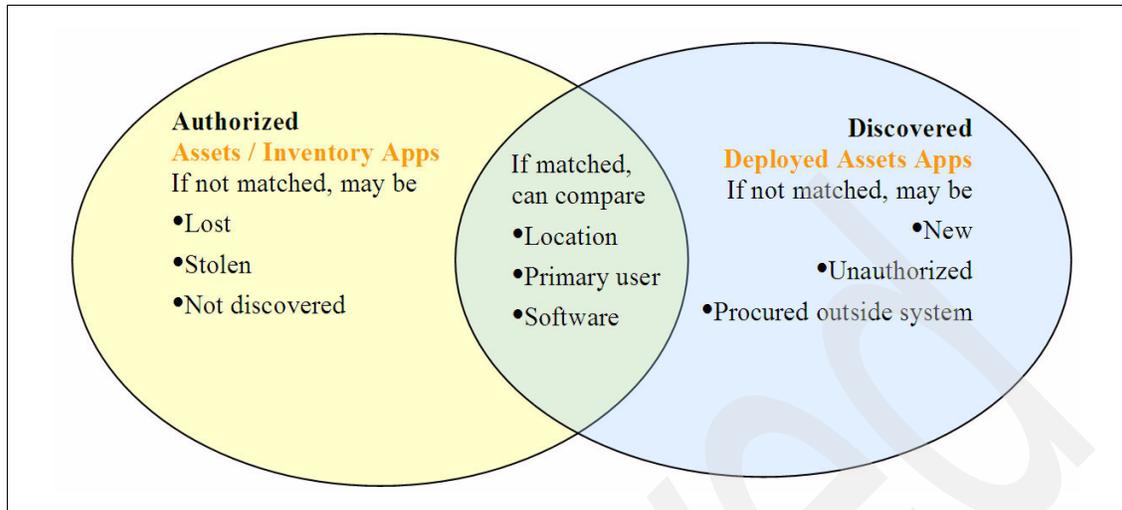


Figure 8-2 Authorized versus discovered

8.1.2 Assets module asset structure

To fully understand the reconciliation process, you should understand the asset structure and classification hierarchy used for IT assets, and understand how those structures differ from the structure for deployed assets.

IT assets maintained in the Asset module participate in two separate structural hierarchies: the *asset hierarchy* and the *classification hierarchy*.

Asset hierarchy

Parent and child assets are organized into a logical hierarchy or tree. Any asset for which a parent attribute exists is a child asset. The top-level asset of the tree is called the *ancestor* and is available through the Ancestor attribute of the Asset object. The site of a child IT asset is always the same as the site of the top-level parent asset.

Classification hierarchy

To distinguish IT assets from other types of assets for purposes of reconciliation, administrators define a top-level IT asset class in the Organizations application in Tivoli Asset Management for IT or Service Request Manager. Any asset that has a classification that occurs in the hierarchy below the top-level IT asset class is an IT asset for purposes of reconciliation.

When evaluating reconciliation tasks, the system processes only assets that belong to the IT asset classification hierarchy. In some cases, children of a

top-level IT asset might not belong to the IT asset classification hierarchy and consequently will not be included in IT assets when a reconciliation task is executed.

Moved assets

Reconciliation processes only assets where the moved flag is set to false. If the moved flag for an IT asset is set to true, the asset is not included in reconciliation results.

8.1.3 Deployed Assets module asset structure

Deployed assets have a well-defined hierarchical object structure. The top-level deployed asset is always one of the following three types: computer, network printer, or network device. Fourteen types of objects are children of a computer. A computer can exist without any instances of children. A computer can have multiple child instances. One type of child object can be associated with a network device, but a network device can exist without any child instances. Network printers do not have child objects.

8.2 Importing the deployed assets data

In this section we discuss importing the deployed assets data.

Deployed asset discovery applications

Deployed asset discovery is accomplished by using applications such as Microsoft SMS and IBM Tivoli Application Dependency Discovery Manager.

These applications discover configurations and interdependencies across the following components and services:

- ▶ Application components, such as Web servers, application servers, and databases
- ▶ System components, such as hosts, operating systems, load balancers, and database servers
- ▶ Network components, such as routers, switches, and firewalls
- ▶ Services, such as DNS and LDAP services

We can think of the IT world as being divided into two parts: the authorized world and the physical world. The physical world is being monitored through any number of discovery tools that are tracking hardware and software configurations throughout the enterprise.

Integration Composer application

Integration Composer is an integration tool that enables you to import data from a source to a target database. With Integration Composer, an enterprise can aggregate data collected by discovery tools and integrate it into a target database, creating a central repository for enterprise IT asset management, reporting, and decision support.

To gather data, a discovery tool, such as IBM Tivoli Configuration Manager or Microsoft SMS, scans computers, network devices, and network printers deployed in an enterprise and records information about the hardware and software installed on those assets.

Before you import data from an external data source into the target database, you use Integration Composer to create a mapping to transform data from the source format to the target format. A *mapping* is a set of expressions that tell Integration Composer how to create data in the target by using information from a source. For each property that you want to import, you define an expression that specifies how to transform the data for that property when Integration Composer imports the data from the source into the target. When you execute a mapping, Integration Composer transforms the collected data and imports it into the target.

Integration Composer connects to data sources using either Java Database Connectivity (JDBC™) technology-enabled drivers or an application programming interface (API).

Integration Composer user Interface

The Integration Composer user interface enables you to define data sources, browse source data, define data schemas, and create mappings to transform and import data.

Use the interface to perform the following tasks:

- ▶ Designate a data source and establish a connection to that data source.
- ▶ Create new mappings that define how to change data and transfer it from a source data source to the target database.
- ▶ Use existing mappings to migrate data into a target database.
- ▶ Customize existing mappings to meet integration requirements.
- ▶ Create new data schemas to use with Integration Composer.

Integration Composer repository

The Integration Composer repository resides in the Tivoli process automation engine database and contains the following Integration Composer data:

- ▶ Metadata for data schemas delivered with Integration Composer (This metadata defines the structure of the data.)
- ▶ Metadata for data schemas that users create in Integration Composer (Data source definitions that provide database connection parameters.)
- ▶ Mappings that define how to transform data and migrate it from a source to a target.
- ▶ The time stamp of the most recent scan for top-level objects in the source data, if such a last-scan time stamp exists.

IBM Tivoli Integration adapters

To facilitate data migration, IBM offers IBM Tivoli integration adapters to transform and import data provided by commonly used asset- and system-management tools, such as Tivoli Application Dependency Discovery Manager. Each integration adapter is designed for a specific discovery tool.

Integration adapters consist of a set of files to facilitate importing data and documentation to explain how to use the files to set up the adapter. Files provided depend on the discovery tool integration requirements.

In most cases an adapter includes either a data schema file (identified with the .schm extension) that you can import into Integration Composer to create a data schema or scripts that you can run against the Tivoli process automation engine database to create a data schema. Some data schemas for commonly used discovery tools are installed with Integration Composer, and the additional scripts are not necessary. Occasionally adapters include additional scripts or properties files that are required to integrate discovered data.

An adapter always includes one or more files (identified with an .fsm extension) that contain predefined mapping expressions for transforming data from the format of the source data to the format of the target Tivoli process automation engine database. You can import an adapter mapping into Integration Composer, modify it to suit your business needs, and execute the mapping to import data into the target database.

IBM provides integration adapters for the following discovery tools:

- ▶ Altiris Inventory Solution
- ▶ Centennial Discovery
- ▶ Maximo Discovery
- ▶ Microsoft SMS

- ▶ Tivoli Network Manager IP Edition (formerly Netcool/Precision for IP Networks)
- ▶ Tivoli Application Dependency Discovery Manager
- ▶ Tivoli Configuration Manager
- ▶ Tivoli License Compliance Manager
- ▶ Tivoli License Compliance Manager for z/OS
- ▶ Tivoli Provisioning Manager

To integrate data from other discovery tools, you may use the Create Data Schema feature in Integration Composer to create a data schema for the discovery tool. After creating the data schema, you can create a mapping based on the new data schema and use the mapping to import data into the target database.

Tivoli Integration Composer connects asset inventory and discovery tools, aggregating data into one central repository, as shown in Figure 8-3.

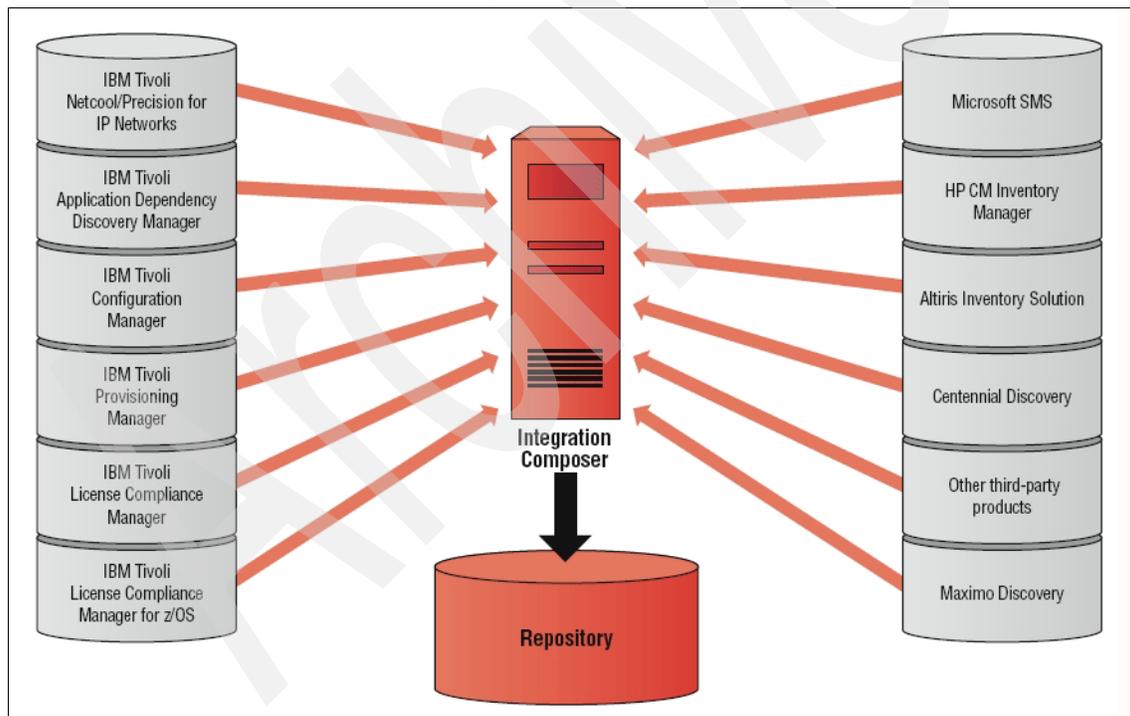


Figure 8-3 Integration composer

Integration Composer data schemas

A data schema defines data contents and relationships. Integration Composer interprets data and transforms it to the format required for the Tivoli process automation engine database, based on structures defined in data schemas.

When installed, Integration Composer provides the following data schemas:

- ▶ Data schemas that are required for commonly used discovery tools, such as Microsoft SMS and Altiris Inventory Solution
- ▶ A data schema for the most frequently used target, the Deployed Assets tables in the Tivoli process automation engine database (This data schema is identified as Deployed Assets 7.1.)

Two data schemas are used for the IT asset initialization process, which lets you create a baseline set of IT assets when you first implement IT asset management.

These schemas are only used for the initialization process:

- ▶ Maximo Assets 7.1
- ▶ Source - Deployed Assets 7.1

Mappings

To migrate data from an external data source into a target database, you create a mapping that defines how to transform data from the source format to the target format. A mapping is a set of expressions that tell Integration Composer how to create data in the target using information from a source. For each property that you want to import, you define an expression in the target data schema that specifies how to transform the data for that property when Integration Composer imports the data from the source into the target.

To facilitate data migration, IBM offers IBM Tivoli integration adapters to transform and import data provided by various asset- and systems-management tools. The adapters provide predefined mapping expressions that enable you to transform data and transfer it from a database created by a discovery tool into the Tivoli process automation engine database. You can import an adapter mapping into Integration Composer and modify it to suit your business needs. Then, you can execute the mapping to import data into the target. IBM provides an implementation guide for each integration adapter that explains how to install the adapter and use it to import data.

To create an Integration Composer mapping, specify the following parameters:

- ▶ Source data source
- ▶ Target data source
- ▶ Mapping name

After you create a mapping, you can import a mapping supplied with an IBM Tivoli integration adapter and use the predefined mapping expressions in the adapter, create new mapping expressions, or modify existing expressions by using the features in the Integration Composer Mapping window. When you install Integration Composer, you should import the mappings that you want to use.

Mapping execution

To execute an Integration Composer mapping, you must run a script located in the bin directory of the Integration Composer installation directory.

As Integration Composer executes a mapping, for each object in the source and target, it creates Java source code and compiles the source code. When Integration Composer completes a top-level object, including all its children and reference classes, it commits the data for that object to the database.

If you stop and then restart mapping execution and if a last scan date exists for the source, Integration Composer begins where it left off and moves only objects that were not previously committed to the database.

8.3 Reconciliation module applications

You use *Reconciliation module* applications to configure a behind-the-scenes process that reconciles objects from one data set (Data Set 1) with objects in another data set (Data Set 2). Typically, Data Set 1 contains information about authorized asset objects, which is data that you maintain in the Assets application. Data Set 2 typically contains information maintained in the Deployed Assets database tables.

The Reconciliation module includes the following six applications.

- ▶ Reconciliation Tasks application

This application combines one or more link rules and, if necessary, a task filter, and one or more comparison rules into a reconciliation task. You may also specify how the system reports results for comparison rule evaluations: all results, failed reconciliations, or successful reconciliations.

- ▶ Task Filters application

This application defines a subset of either Data Set 1 or Data Set 2 to reconcile. If you do not define a task filter for a reconciliation task, the system compares all top-level authorized IT asset objects with all deployed asset objects when it processes the reconciliation task.

▶ Link Rules application

This application establishes a link between a top-level object in Data Set 1 and a top-level object in Data Set 2. A link rule establishes the basis of the comparison by identifying the object and attribute in Data Set 1 to link to a specific attribute of the object in Data Set 2.

▶ Comparison Rules application

This application defines how to compare objects or attributes of a child or parent object in Data Set 1 with a child or parent in Data Set 2 when the system executes a reconciliation task. Comparison rules are optional components of a reconciliation task, and a task can include more than one comparison rule. The system applies comparison rules only after a link rule establishes a successful link between an object from Data Set 1 and an object from Data Set 2. The system lists results for comparison rule reconciliations in the Asset Reconciliation Results application.

▶ Asset Link Results application

This application lists successful one-to-one links between a top-level object in Data Set 1 and a top-level object in Data Set 2.

▶ Asset Reconciliation Results application

This application lists two kinds of results:

– Link rule failures

A link failure occurs when the system processes a link rule and does not find a successful one-to-one link between the object in Data Set 1 and the object in Data Set 2. Link failures occur when the reconciliation process finds no links or finds multiple links.

– Comparison rule results

Authorized users can view results from comparison rule evaluations. Based on parameters defined in the evaluations. Based on parameters defined in the Reconciliation Tasks application, the system provides one of the following result sets:

- All results, both successful and failed matches between Data Set 1 and Data Set 2
- Instances where the object from Data Set 1 failed to reconcile against the object from Data Set 2
- Instances where the object from Data Set 1 successfully matched the object from Data Set 2

8.4 Reconciliation setup

To define the parameters for a reconciliation, you create a reconciliation task that combines the elements required for a reconciliation into a specific task. A reconciliation task consists of three possible components:

- ▶ A task filter (optional)
- ▶ One or more link rules (required)
- ▶ One or more comparison rules (optional)

You use the Reconciliation module applications to create these components. After you create a reconciliation task, you use the Cron Task Setup application to create a schedule for running the reconciliation.

The two basic types of reconciliations that you can perform are:

- ▶ Attributes equality

This type compares an attribute or attributes of a child or parent object in Data Set 1 with a specific attribute or attributes of a child or parent object in Data Set 2.

For example, you can evaluate authorized asset records for computer systems authorized assets matches the RAM actually installed on computers in deployed assets.

- ▶ Matches found

This type specifies the ratio of object instances in Data Set 1 to object instances in Data Set 2 to look for in the comparison.

For example, you can compare authorized asset records for computers at a specific site with deployed asset records to determine whether a specific software application is actually installed as expected on computers that are actually deployed. In other words, the authorized asset records indicate that you have the software installed on certain computers.

8.5 Create a link rule

The reconciliation process is used to compare the Asset to the Deployed Asset. At the simplest level, the organization can compare Assets to Deployed Asset using a link rule. A link rule establishes a common link between the two tables, for example the Asset table has a column for the Serial Number of the Asset. The Deployed Asset table also has a Serial Number field. Because serial numbers are somewhat unique, they are a good candidate for a link rule.

The link rule is referenced on a reconciliation task. The reconciliation task is then associated to an instance of the reconciliation cron task located in the *Cron Task Setup application*. A cron task is simply a schedule of when the reconciliation task should be run. The results of the reconciliation task are written to the Reconciliation Results and the Link Results application. The Reconciliation Results, when using a link rule, will inform the Asset Manager that a deployed asset was found that had no matching asset, or an asset record was found that had no matching deployed asset.

Link Rules application

Use the Link Rules application to create, view, modify, duplicate, and delete link rules. A link rule is a required component of a reconciliation task. When the system processes a reconciliation task, a link rule establishes the basis for reconciliation by identifying a top-level object and attribute in one data set to link to a specific attribute of a top-level object in another data set.

Link rules are often based on unique identifiers. The attribute most commonly used to link assets and deployed assets is a serial number or asset tag.

After you create a link rule, you use the *Reconciliation Tasks application* to associate the rule with a specific reconciliation task, and the system includes the link rule each time it executes the reconciliation task. When the system executes the reconciliation task, it evaluates each link rule and attempts to match the object and attribute in the first data set with the object and attribute in the second data set.

Link rule components

A link rule consists of the following components:

- ▶ Link name
This unique name (specified in the Link field) identifies the link rule.
- ▶ Description (optional)
This is a brief description of the link rule.
- ▶ Data sets
In the Type of Reconciliation table window, you specify values for Data Set 1 and Data Set 2 that determine what data to reconcile.
- ▶ Link clauses
In the Link Clauses table window, you must specify at least one clause that defines a relation (or link) between a top-level object in Data Set 1 and a top-level object in Data Set 2. Each link clause identifies an object and attribute in Data Set 1 to link to a specific attribute in Data Set 2 when the system executes a reconciliation task.

You can create link rule records from the List tab or from the Link Rule tab in the Link Rules application.

Before you can save a link rule, the following requirements must be met:

- ▶ You must assign a unique link rule name.
- ▶ You must define data set specifications for Data Set 1 and Data Set 2 that indicate what data to reconcile.
- ▶ You must create at least one link rule clause.
- ▶ Clauses must be valid expressions. When you save a link rule, the application uses the following rules to determine whether clauses are valid expressions. If the application determines that a clause is not valid, it displays an error message and does not save the link rule.
- ▶ Each open parenthesis must have a corresponding close parenthesis.
- ▶ The number in the Sequence field must be unique.

Note: If you enter sequence numbers in random order, the application sorts the clauses and displays them in ascending numerical order when you save the record.

All rows except the row with the highest sequence number must have a value specified in the Sequence Operator field.

The row with the highest sequence number must not have a sequence operator. After the application sorts the clauses, this is the last row in the table window.

Modifying link rules

You use the Link Rule tab in the Link Rules application to modify an existing link rule. You can change the data in the description field or in existing fields in link clauses. You cannot change the name of the link rule in the Link field. You cannot change the data sets selected in the Data Set 1 and Data Set 2 fields.

When you save a modified link clause, the application evaluates the link rule to determine whether the clauses are valid expressions; if a clause is not valid, the application displays an error message and does not save the modified link rule.

Duplicating link rules

To duplicate an existing link rule, select **Duplicate Link Rule** from the Select Action menu on the Link Rule tab in the Link Rules application. You may use this procedure to create a new link rule based on an existing one. After you duplicate the link rule, the application clears the Link field, and you must enter a new name for the duplicated link rule.

Deleting link rules

To delete a link rule, select **Delete Link Rule** from the Select Action menu on the Link Rule tab in the Link Rules application. Use this procedure if you want to discontinue using the link rule defined in the link rule record.

You cannot delete a link rule if it is associated with a task defined in the Reconciliation Tasks application. If you attempt to delete a link rule associated with a task, the application displays an error message.

8.6 Create comparison rules

A comparison rule is an optional component of a reconciliation task. It defines how to compare objects or attributes of a child or parent object in one data set with a child or parent object in another data set when the system executes a reconciliation task. For example, you can define a comparison rule to compare software on computers in authorized assets with software on computers in deployed assets. A task can include more than one comparison rule.

To create a comparison rule, you must define Data Set 1 and Data Set 2. Then, you define the comparison rule. You can define a filter for Data Set 1 or Data Set 2 to limit your comparison to a subset of either data set.

The two basic types of comparison rules are:

- ▶ **Attributes equality**
This type compares an attribute or attributes of a child or parent object in Data Set 1 with a specific attribute or attributes of a child or parent object in Data Set 2.
- ▶ **Matches found**
This type specifies the ratio of object instances in Data Set 1 to object instances in Data Set 2 to look for in the comparison.

After you create a comparison rule, you use the Reconciliation Tasks application to associate the rule with a specific reconciliation task, and the system includes the comparison rule each time it executes the reconciliation task. When the system runs a reconciliation task, it processes link rules first. The link rule specifies the top-level object and attribute in one data set to match with a specific attribute of a top-level object in another data set. When the system processes a reconciliation task, it processes comparison rules in the task only if the link rule successfully links an object in Data Set 1 with an object in Data Set 2.

When defining a reconciliation task in the Reconciliation Tasks application, you specify how to report comparison results by selecting from the following options:

- ▶ All results, both successful and failed matches
- ▶ Instances where the object from Data Set 1 failed to reconcile against the object from Data Set 2
- ▶ Instances where the object from Data Set 1 successfully matched the object from Data Set 2

When the system executes a reconciliation task, the system lists results of comparison rule evaluations in the Asset Reconciliation Results application.

Comparison Rules application

You use the Comparison Rules application to perform the following actions:

- ▶ Create a new comparison rule.
- ▶ Delete a comparison rule.
- ▶ Duplicate a comparison rule.
- ▶ Modify an existing comparison rule.

The Comparison Rules application has the following tabs:

- ▶ List
Use this tab to search for comparison rules.
- ▶ Comparison Rule
Use this tab to define new comparison rules and to view, edit, and delete existing comparison rules.

The Comparison Rule tab includes the following subtabs:

- Data Set 1 Filter subtab
Use this tab to define one or more filter clauses that specify a subset of Data Set 1 objects to reconcile against Data Set 2 objects when you use a comparison rule.
- Data Set 2 Filter subtab
Use this tab to define one or more filter clauses that specify a subset of Data Set 2 objects to reconcile against Data Set 1 objects when you use a comparison rule.
- Matches Found subtab
Use this tab to define one or more matches found clauses that specify the acceptable ratio of Data Set 1 object instances to Data Set 2 object

instances in the comparison after the system applies the data set filter or filters.

- Attributes Equality subtab

Use this tab to define one or more attributes equality clauses that define how to compare the specific attribute or attributes of a child or parent object in Data Set 1 with specific attribute or attributes of a child or parent object in Data Set 2 when the system processes a comparison rule.

Comparison rule components

Comparison rules are composed of the following components:

- ▶ Comparison name (required)

This unique name (specified in the Comparison field) identifies the comparison rule.

- ▶ Description (optional)

This is a brief description of the comparison rule.

- ▶ Data sets

In the Type of Reconciliation table window, you specify values for Data Set 1 and Data Set 2 that determine what data to reconcile.

- ▶ Data Set 1 filter clause or clauses

Although a Data Set 1 filter is optional, if you include matches found clauses, you must have a Data Set 1 filter, a Data Set 2 filter, or both.

- ▶ Data Set 2 filter clause or clauses

Although a Data Set 2 filter is optional, if you include matches found clauses, you must have a Data Set 1 filter, a Data Set 2 filter, or both.

The two types of comparison rules are:

- Attributes equality

Use this type to define how to compare the specific attribute or attributes of a child or parent from Data Set 1 with specific attribute or attributes of a child or parent in Data Set 2.

- Matches found

Use this type to define the ratio of object instances in Data Set 1 to object instances in Data Set 2 that you want to look for in the comparison.

Duplicating comparison rules

To duplicate existing comparison rules, select **Duplicate Comparison Rule** from the Select Action menu on the Comparison Rule tab. You can use this procedure to create a new comparison rule based on an existing one.

After you duplicate the comparison rule, the application clears the Comparison field, and you must enter a new name for the duplicated comparison rule.

Deleting comparison rules

To delete comparison rules, select **Delete Comparison Rule** from the Select Action menu on the Comparison Rule tab. You delete comparison rules if you want to discontinue using the rule defined in the comparison rule record.

When you delete a comparison rule, the application deletes all Data Set 1 filter, Data Set 2 filter, matches found, and attributes equality clauses associated with the rule.

You cannot delete a comparison rule if it is associated with a reconciliation task defined in the Reconciliation Tasks application. If you attempt to delete a comparison rule associated with a reconciliation task, the application displays an error message.

8.7 Set up a software conversion procedure

Because the discovery tools that are collecting deployed asset data do not always use consistent naming conventions, IBM Tivoli Asset Management for IT includes a *Deployed Assets Administration submodule*. This submodule includes conversion applications that enable you to standardize naming conventions and control how IBM Tivoli Asset Management for IT displays deployed asset data.

Records in these conversion applications specify one or more variations of a name, and the target name that the variants should be translated into when Integration Composer imports data into Tivoli process automation engine. IBM Tivoli Asset Management for IT uses the target name when it displays imported data in the Deployed Assets applications or in reports.

The submodule also includes a *Software Suite Setup application* that you use to assemble software applications into software application suites, and a *Software Usage Setup application* that you use to control how to display data about software usage frequency.

Deployed Assets Administration submodule includes the following applications:

- ▶ **Adapter Conversion**

Use this application to specify the translation of adapter names, both media adapters (such as video and sound cards) and network adapters.

- ▶ **Manufacturer Conversion**

Use this application to specify the translation of manufacturer names.

- ▶ Operating System Conversion
Use this application to specify the translation of operating system names.
- ▶ Processor Conversion
Use this application to specify the translation of processor names.
- ▶ Software Conversion
Use this application to specify the translation of software application names.
- ▶ Software Suite Setup
Use this application to define which software applications belong to a software suite.
- ▶ Software Usage Setup
Use this application to define how IBM Tivoli Asset Management for IT displays software usage frequency information collected by an asset discovery tool.

Software Conversion application

The *Software Conversion application* determines how to display software application data in reports and in the Computers application in the Deployed Assets module.

To gather this data, discovery tools scan computers, network devices, and network printers deployed in your enterprise and record information about the hardware and software installed on those assets. An integration tool, such as Integration Composer, imports the collected information into the database.

Software conversions are necessary because the discovery tools that collect software data do not use consistent hardware and software naming conventions, therefore the data collected can include various names assigned to the same software application.

For example, when describing software applications, discovery tools often include version and release numbers in the software application name, such as IBM Tivoli Configuration Manager 4.2 or IBM Tivoli Configuration Manager 4.2.3. Your enterprise might want to track only instances of IBM Tivoli Configuration Manager without specifying a version number.

The Software Conversion application helps you standardize software names and aggregate different software names, which reduces the number of software application names displayed.

Each software conversion record specifies a target software name and a variant or a set of variants. The variants are variations of the name that are translated to the target name when software data for deployed assets is displayed.

You can also use the Software Conversion application to specify whether a software application is authorized or prohibited in your enterprise. The Compliance Setting field on a software conversion record indicates whether the software application is authorized or prohibited. The system uses this information to generate software compliance reports.

Software conversions and software suites

Software conversions apply only to individual software applications, not application suites.

The Software Conversion application and the Software Suite Setup application are interrelated. You cannot add software as a component of a software suite unless that software exists as a software conversion record.

The target software name in a software conversion record is also the software name used when that software is a component in a software suite. Changes made in the Software Conversion application affect the Software Suites Setup application.

If you change a software conversion record that is associated with a software suite setup record, the system allows you to apply the name change to both applications in one procedure performed from the Software Conversion application.

8.8 Create a task filter

A task filter record specifies a subset of either Data Set 1 or Data Set 2 that you want to evaluate when you execute a reconciliation task. A task filter is an optional component of a reconciliation task that you can use to limit the scope of a reconciliation task. You use the Task Filters application to define task filters.

You can define a task filter for deployed assets based on a specific site such as Boston. A reconciliation task using this task filter selects deployed assets only at the Boston site for evaluation. Using the link rule or rules in the task, the system compares the selected deployed assets with all top-level authorized IT assets to determine whether a link exists.

You can define a task filter for authorized IT assets based on a specific site such as Boston. A reconciliation task using this task filter selects top-level authorized

assets only at the Boston site for evaluation. Using the link rule or rules in the task, the system compares the selected authorized IT assets with all deployed assets to determine whether there is a link.

After you create a task filter, you use the Reconciliation Tasks application to associate the filter with a specific reconciliation task, and the system applies the task filter each time the reconciliation task is run. Creating a task filter for a reconciliation task is optional. If you do not define a task filter for a reconciliation task, the system compares all top-level authorized asset objects with all top-level deployed asset objects.

Task Filters application

You use the Reconciliation module Task Filters application to perform the following actions:

- ▶ Create a new task filter.
- ▶ Delete a task filter.
- ▶ Duplicate a task filter.
- ▶ Modify an existing task filter.

The Task Filters application has the following tabs:

- ▶ List
Use this tab to search for task filters.
- ▶ Task Filter
Use this tab to define new task filters and view, edit, and delete existing filters.

Task filter components

A task filter includes the following components:

- ▶ Filter name
This unique name (specified in the Filter field) identifies the task filter.
- ▶ Description (optional)
This is a brief description of the task filter.
- ▶ Filter type
Specified in the Filter Type field, the type selected determines which set of objects the filter applies to. You can select either asset or deployed asset.
- ▶ Filter clause or clauses
In the Task Filter Clauses table window, you define at least one clause that specifies an attribute and a value for the task filter. You can create multiple attribute clauses for a task filter.

If you create multiple clauses that specify different attributes, the system processes the clauses using logical AND between the clauses. For example, if you define a task filter for deployed assets based on the site and system role attributes, the system selects only deployed assets for the specified site and the specified system role; both criteria must be met.

If you create multiple clauses for the same attribute, the system processes the clauses using logical OR between clauses. For example, if you create a task filter for authorized assets with two filter clauses for Site, one for Boston and one for New York, the system selects records that have either Boston or New York as a site.

To specify an attribute, you select from a predefined value list. The values in the list depend on the value that you select for the Filter Type field.

Creating task filters

You may create task filters from the List tab or from the Task Filter tab in the Task Filters application.

Each task filter record specifies a subset of objects that you want to evaluate when you execute a reconciliation task. The type that you select in the Filter Type field determines which set of objects the filter applies to. You can select either Asset or Deployed Asset, but not both. You must define one or more task filter clauses to specify how objects are selected for the filter.

8.9 Search for and examine deployed assets records

The Deployed Assets module contains three applications that let you view hardware and software data collected by an asset discovery tool and imported into IBM Tivoli Asset Management for IT with Integration Composer. Tivoli process automation engine automatically creates the records in the Deployed Assets applications when you import data. The Deployed Assets module consists of the following applications:

- ▶ **Computers**
Displays data about specific computers deployed at your company.
- ▶ **Network Devices**
Displays information about deployed network devices such as routers, switches, and hubs.
- ▶ **Network Printers**
Displays information about deployed network printers.

Computers application

Use the *Computers application* to view information about the hardware and software that is installed on the computers that are deployed throughout your enterprise.

Data displayed in the Computers application includes tabs with specific information about the computer itself, and the computer's software, storage devices, processors, media adapters (such as sound and video cards), communication devices (such as modems and network adapters), network settings for TCP/IP and IPX™, image devices (such as printers and scanners), displays, and users.

You can use this application to view information about deployed computers, but you cannot use it to create computer records. Computer records displayed in the Computers application are read-only; you cannot edit them. You may use this application to delete computer records from the database, but you cannot delete a component, such as a processor, from a computer record.

Note: If you want to see an asset's last discovered configuration, you may use the Computers application, which lists the configuration and includes all the software, network adapters, software suite, operating systems, hardware configuration (to include drive size and remaining space), and more depending on what the discovery tool captures.

Data displayed in this application varies depending on the discovery tool used to collect the data. Certain data fields in the Computers application might be empty, which indicates that the discovery tool did not collect the data or that administrators did not map the data for import into the database

Network Devices application

Use the *Network Devices application* to view information about deployed network devices such as routers, switches, and hubs. Data displayed in this application is data collected from network devices and their network device cards.

You may use this application to view information about deployed network devices, but you cannot use it to create network device records. Records displayed in the Network Devices application are read-only; you cannot edit them. You can use this application to delete network device records from the database, but you cannot delete a component, such as a device card, from a network device record.

Data displayed in this application varies depending on the discovery tool used to collect the data. Certain data fields in the Network Devices application might be

empty, which indicates that the discovery tool did not collect the data or that administrators did not map the data for import into the database.

Network Printers application

Use the *Network Printers application* to view information about the network printers that are deployed throughout your enterprise. Data displayed in this application is data that is collected from network printers.

You may use this application to view information about deployed network printers, but you cannot use it to create network printer records. Records displayed in the Network Printers application are read-only; you cannot edit them. You can use this application to delete network printer records from the database.

Only network-based printers are included in this application; for information about printers installed locally on specific computers, refer to the Computers application. On the Image Devices tab in the Computers application, you can view information about locally installed printers.

Data displayed in this application varies depending on the discovery tool used to collect the data. Certain data fields in the Network Printers application might be empty, which indicates that the discovery tool did not collect the data or that administrators did not map the data for import into the database.

8.10 Review asset reconciliation results

When the system processes a reconciliation task, it produces results from link rule evaluations and, if the task included one or more comparison rules, comparison rule evaluations. The Reconciliation module includes two applications for viewing the results of a reconciliation: *Asset Link Results* and *Asset Reconciliation Results*.

Asset Link Results application

You use the *Asset Link Results application* in the Reconciliation module to view results generated when the system executes a reconciliation task that compares two different sets of data. Each reconciliation task contains one or more link rules that establish the basis of a reconciliation by identifying a top-level object and attribute in Data Set 1 (typically authorized asset data) to match with a specific attribute of a top-level object in Data Set 2 (typically deployed asset data). If the system processes a link rule and finds a one-to-one link between a top-level authorized asset and a deployed asset, it creates a link result record that you can view in the Asset Link Results application.

When the system processes a reconciliation task, link rules sometimes successfully identify a link between objects, and sometimes they do not. The Asset Link Results application lists the successful links.

The Asset Link Results application has the following tabs:

- ▶ List
Use this tab to search for link results.
- ▶ Asset Link Result
Use this tab to view and delete asset link results.

You use the Asset Link Results application to perform the following actions:

- ▶ View link results.
- ▶ Delete link results.

Viewing link results

To view link result records, open the Asset Link Results application in the Reconciliation module. The application lists the successful links.

For each object in the list, the application displays the following information about the most recent link:

- ▶ Rule Name is the name of the rule that generated the result. You can use the Detail Menu in this field to navigate to the Link Rules application.
- ▶ Link Date is the date and time the link result record was created.

The Authorized Asset Information area displays the following information about the authorized asset:

- ▶ Asset is the authorized asset object. You can use the Detail Menu in this field to perform the following actions:
 - View classifications for the object.
 - View attributes of the object.
 - Navigate to the Assets application.
- ▶ Description of the authorized asset.
- ▶ The Deployed Asset Information area displays the following information about the deployed asset:
 - Deployed Asset is the deployed asset object.
 - Node is the instance of the deployed asset (computer, network printer, or network device).

Deleting link results

You use the Asset Link Results application to delete link results.

On the List tab, you may delete selected asset link results or all asset link results in the table window. Use the Select Records check box to select individual records to delete or clear the check box to delete all records in the table window. If appropriate, you may apply a filter to search for selected link results and then delete all link results found.

You may also delete a record from the Asset Link Result tab by selecting the record that you want to delete and then selecting **Delete Asset Link Result(s)** from the Select Action menu.

Asset Reconciliation Results application

You use the *Asset Reconciliation Results application* to view and manage result records produced when the system runs a reconciliation task. In this application, you can view and manage two types of results:

- ▶ Link Rule Failures

A link failure occurs when the system processes a link rule and does not find a successful one-to-one link between the object in Data Set 1 and the object in Data Set 2. Link failures occur when the reconciliation process finds no links or finds multiple links.

- ▶ Comparison Rule Results

The system produces comparison rule results when it processes a comparison rule. The specific kind of comparison rule data depends on a parameter set in the Reconciliation Tasks application, which lets you select one of the following options for comparison results when you define a reconciliation task:

- All results, both successful and failed matches
- Instances where the object from Data Set 1 failed to reconcile against the object from Data Set 2
- Instances where the object from Data Set 1 successfully matched the object from Data Set 2

If you want to view only link rule failure or comparison rule results, you can use the advanced search features to display only link results or comparison results.

You may also use the reconciliation results application to record information about how you resolve discrepancies between Data Set 1 and Data Set 2. If you evaluate a discrepancy and resolve it, you can mark a result record resolved. You may also enter information about how you resolved the issue or an explanation about why the discrepancy exists in the Comments field on the reconciliation result tab.

Use the Asset Reconciliation Results application to perform the following actions:

- ▶ View reconciliation results.
- ▶ Mark reconciliation results resolved.
- ▶ Delete reconciliation results.

The Reconciliation Results application has the following tabs:

- ▶ List
Use this tab to search for reconciliation results.
- ▶ Asset Reconciliation Result
Use this tab to view and delete reconciliation results, to mark results resolved, and to add comments about how you resolved discrepancies.

You use the Asset Reconciliation Result tab in the Asset Reconciliation Results application to view reconciliation results. The application displays the following information for each reconciliation result record:

- ▶ Reconciliation Task
This is the unique identifier of the reconciliation task that produced the result. To view additional details about the task, use the Detail Menu in this field to navigate to the Reconciliation Tasks application.
- ▶ Result Type
This is the type of result displayed (either link rule failures or comparison rule results).
- ▶ Rule Name
This is the name of the rule that generated the result. If multiple link rules exist and the system found no matches for any of the cascading link rules, the field is blank. You may use the Detail Menu in this field to navigate to the Link Rules application or the Comparison Rules application.
- ▶ Created Date
This is the date and time the reconciliation result record was created.
- ▶ Message
The message describes the result of the reconciliation.
- ▶ Resolved?
This check box specifies whether discrepancies found by this comparison rule have been resolved. You can edit this field.
- ▶ Comments
Comments describe how discrepancies were resolved. You can edit this field.

▶ Top-Level Asset

This is a unique identifier of the top-level authorized asset that the system compared to the deployed asset. To view more details about the asset, you can use the Detail Menu in this field to navigate to the Assets application.

▶ Deployed Asset

This is a unique database identifier of the deployed asset. You use the Detail Menu in this field to perform the following actions:

- Navigate to the Computers application.
- Navigate to the Network Devices application.
- Navigate to the Network Printers application.

The Deployed Asset Information table window displays the following information about the object evaluated;

- Deployed Asset Object is a unique identifier for the deployed asset object.
- Deployed Asset Attribute is the attribute that was evaluated.
- Deployed Asset Value is the value for the attribute.
- Deployed Asset Unit of Measure is a unit of measurement for the attribute.
- Deployed Asset Key field is a key field for the object.
- Deployed Asset Key value is the value of the key field for the object.

▶ Node

This is the instance of the deployed asset (computer, network printer, or network device).

The Authorized Asset Information table window displays the following information about the object evaluated:

- Asset Object is the authorized asset object.
- Asset Attribute is the attribute of the object.
- Asset Value is the value for the attribute.
- Asset Unit of Measure is the unit of measurement for the attribute.
- Top Level Site is the site of the top-level object evaluated.

▶ Asset

This is the unique identifier for the object. You can use the Detail Menu in this field to perform the following actions:

- View Classifications.
- View Attributes.
- Navigate to the Assets application.

In certain cases, fields displayed on the reconciliation result tab are empty. For example, the system might not be able to determine a value based on the rule definition. In some cases, multiple operations that are performed on different

objects fail to produce results. The system displays the maximum amount of unambiguous information available.

Viewing Comparison Rule Result messages

The results that the Asset Reconciliation Results application displays for comparison rule evaluations depend on the parameter you select in the Comparison Results field when you define a reconciliation task in the Reconciliation Tasks application. You can choose either all results, successful comparison results, or failed comparison results.

If you want to view only link rule failures, you can use the advanced search feature on the List tab to display only link results or comparison results.

Marking Asset Reconciliation Results resolved

You use the Asset Reconciliation Results application in the Reconciliation module to mark reconciliation results resolved after you review and resolve discrepancies between authorized asset data and deployed asset data. When you mark a result as resolved, you can also record information about how you resolved the discrepancies in the Comments field on the Asset Reconciliation Result tab.

In the table window on the Asset Reconciliation Results application List tab, you can mark selected reconciliation results resolved or mark all reconciliation results resolved. Use the Select Records check box to select individual records to resolve, or clear the check box to mark all records resolved.

Resolving results on the List tab

To mark asset reconciliation results resolved from the List tab, use either option:

- ▶ To mark all reconciliation results retrieved in the table window as resolved (if your result set is 200 or more rows):
 - a. Choose **Select Action** → **Mark Result(s) Resolved**. The application displays a confirmation dialog box asking you to confirm that you want to mark all rows as resolved.
 - b. On the confirmation dialog box, click **Yes**. The application marks all reconciliation results in the table window as resolved.
- ▶ To mark selected reconciliation results as resolved (*only if* your result set is less than 200 rows):
 - a. Select specific reconciliation result records by enabling the **Select Records** check box at the bottom of the List tab table window. The application displays a Select Row check box next to each row in the table window.
 - b. In the List table window, enable the **Select Row** check box for each record that you want to mark resolved.

- c. Choose **Select Action** → **Mark Result(s) Resolved**. The application displays a confirmation dialog box asking you to confirm that you want to resolve selected rows.
- d. Click **Yes** to confirm. The application marks the selected reconciliation results resolved.

Resolving results on the Asset Reconciliation Result tab

To mark reconciliation results as resolved from the Asset Reconciliation Result tab, complete the following steps:

1. In the Asset Reconciliation Results application, display the reconciliation result that you want to mark as resolved.
2. Use one of the following options:
 - Choose **Select Action** → **Mark Result(s) Resolved**. The application displays a confirmation dialog box asking you to confirm that you want to mark the record as resolved. Click **Yes** to confirm. The application marks the reconciliation result record resolved.
 - Select the **Resolved?** check box.
3. If appropriate, in the Comments field, enter a comment to describe the resolution of the discrepancies.
4. When you finish viewing the result, click the **Save** icon to save the comment.

Deleting Reconciliation Results

You use the Asset Reconciliation Results application to delete reconciliation results.

On the List tab you can delete selected reconciliation results or all reconciliation results in the table window. Use the Select Records check box to select individual records to delete or clear the check box to delete all records in the table window. If appropriate, you can apply a filter to search for selected reconciliation results and then delete all reconciliation results found.

You can also delete a record from the Asset Reconciliation Result tab by selecting the record that you want to delete and then choosing **Select Action** → **Delete Asset Reconciliation Result(s)**.

The Asset Reconciliation Results application displays both comparison results and link rule failure results. If you want to delete only link rule failure results or comparison rule results or a subset of these, use the advanced search feature to set up a filter that selects a specific set of results to display in the table window on the List tab. You can then delete all results in the table window or select specific results and delete them.

8.11 Create and schedule a reconciliation cron task

In this section we discuss how to create and schedule a reconciliation cron task.

Discover and import asset data before creating cron tasks

Because reconciliation tasks process data imported from external sources, you must exercise caution when scheduling reconciliation tasks. The timing of data migration must be carefully coordinated with the reconciliation process; for example, you should not attempt to reconcile deployed assets against authorized assets if you have not yet imported deployed asset data into the Tivoli process automation engine database.

Scheduling is an important consideration because it affects the reliability of the data and the data might be unreliable if any of the following conditions exist:

- ▶ The system executes a reconciliation task before Integration Composer imports data. To ensure that the system compares data about authorized assets with the most current data collected about your deployed assets, you should schedule reconciliations to occur after Integration Composer imports data collected by discovery tools.
- ▶ Integration Composer imports data and the system processes a reconciliation task simultaneously. Flawed data might result if an Integration Composer migration and a reconciliation task occur simultaneously. The two processes must never overlap, and you must schedule migrations and reconciliation tasks so that the system does not execute the two processes at the same time.
- ▶ The system processes multiple reconciliation tasks that include overlapping data. Administrators can set up multiple cron task instances to run reconciliation tasks. If different reconciliation tasks are set up to process overlapping sets of data, the results are unpredictable.

To ensure data reliability, use the following sequence of events:

1. Collect data about equipment deployed in your enterprise using a discovery tool, such as Tivoli Application Dependency Discovery Manager.
2. Use Integration Composer to import the collected data into the Tivoli process automation engine database.
3. Create a cron task that schedules the reconciliation tasks to run.

Creating and scheduling a reconciliation cron task

You define reconciliation tasks in the Reconciliation module applications, but you set up the schedule for running the task in the *Cron Task Setup application*. A reconciliation task record combines the components required for a reconciliation into a specific job task that the system runs based on the schedule that you set up in the Cron Task Setup application. Before you can run the reconciliation process, you must define a cron task to set up a schedule for running the reconciliation task. The name that you enter in the Reconciliation Task field for the reconciliation task is the parameter in the cron task that identifies which reconciliation task to process.

Note: The cron task must point to the following class:

```
psdi.app.recontask.engine.ReconCronTask
```

Because the reconciliation process demands a large amount of server resources, run reconciliations at a time when the server is least busy, such as late evening.

When you schedule a reconciliation task in the Cron Task Setup application, you must use the name specified in the Reconciliation Task field in the Reconciliation Tasks application to set up the cron task. The system lets you schedule cron tasks for multiple reconciliation tasks. You cannot delete reconciliation task records that are associated with a cron task.

When the system executes a reconciliation task, it lists results in the Asset Link Results application and in the Asset Reconciliation Results application.

Note: You must exercise caution when scheduling reconciliation tasks.

Service Requests

This chapter contains information regarding service requests and their use and configuration within IBM Tivoli Asset Management for IT.

After it is configured, the application can process service requests in several ways including agent-entered, Web-based, or through an e-mail listener.

This chapter contains the following topics:

- ▶ “Service Requests application” on page 178
- ▶ “Self-Service” on page 182

9.1 Service Requests application

A service request is used for reporting an issue, requesting information, or a change to a service. The *Service Requests application* allows a service desk agent to manage service requests from internal or external users as well as enter new service requests.

9.1.1 Out-of-the-box functionality

The Service Requests module and its related modules such as self-service have been enabled with standard functionality that is already configured (referred to as *out-of-the-box*). For example, when a Service Desk agent selects an owner or owner group, the status for the Service Request automatically changes from NEW to QUEUED. However, this type of functionality may be configured to fit the customer requirements.

The service request can have the following status values:

▶ NEW

A service request has been created. You cannot revert to this status after it has been changed.

▶ QUEUED

Service request ownership has been given to a person or a group. Ownership assignment can be made manually or might be made automatically through workflow, a service level agreement, or other escalation process.

▶ INPROG

The service request is in progress. Someone is working on this service request. The first time a service request reaches this status, the system populates the Actual Start field, if it is empty.

▶ PENDING

A service request is pending an action (for example, waiting for a vendor or user callback, or waiting for parts).

► RESOLVED

The service request has been resolved. Information has been gathered and routed, service has been restored or a solution has been provided. The first time a service request reaches this status, the system populates the Actual Finish field, if it is empty.

If necessary, you may reopen a service request and change the status from RESOLVED to INPROG.

► CLOSE

The service request is closed. The service request is now a historical record. When a record is closed, you cannot change the status. You can, however, edit certain parts of the record.

Furthermore, many business processes utilize service requests as their initial contact with the customer and then create and associate subsequent records to fulfill the customer requirements. See Figure 9-1.

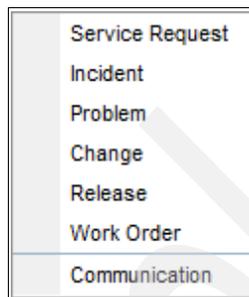


Figure 9-1 Service Request Create Menu

Note: Service requests exist at the system level.

9.1.2 Creating a service request

Within the Service Requests application select the **New Record** icon to begin creating a service request. The only required field when creating a service request is the ID.

9.1.3 Owners and Person Groups

When a Service Desk agent is using the Service Requests application to assign to the appropriate owner or owner group the agent may select from either a *person* or *person group*, which might or might not be a group of workers. The

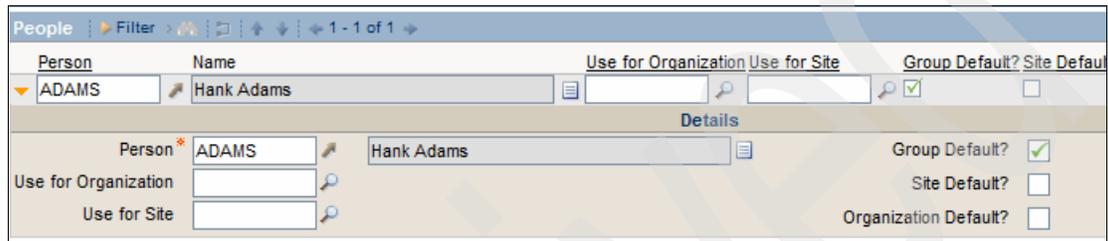
agent may select the ownership from either the Select Action menu or the toolbar. See Figure 9-2.



A screenshot of a web interface showing two input fields. The first field is labeled "Owner" and contains the text "MAXADMIN". The second field is labeled "Owner Group" and is currently empty.

Figure 9-2 Service request owner

When creating a person group, the user or administrator selects people and then orders their assignment sequence. The first person in the person group is the selected as the group default, as seen in Figure 9-3.

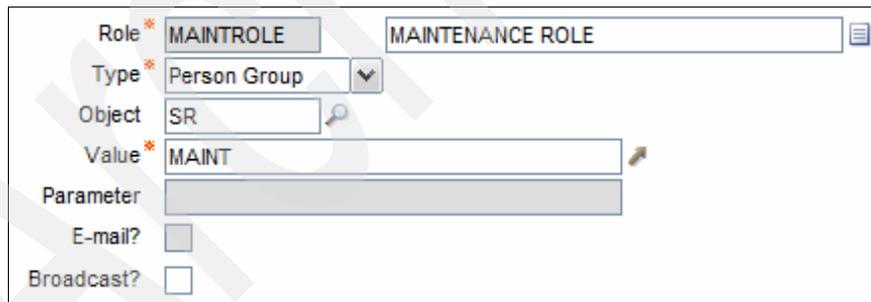


A screenshot of a web interface showing a table of people. The table has columns for "Person", "Name", "Use for Organization", "Use for Site", "Group Default?", and "Site Default?". The first row shows "ADAMS" as the person, "Hank Adams" as the name, and "Group Default?" checked. Below the table is a "Details" section for the selected person, showing "Person*" as "ADAMS", "Name" as "Hank Adams", and "Group Default?" checked. There are also checkboxes for "Site Default?" and "Organization Default?".

Figure 9-3 Person group default assignment

Person groups may be used for assignment on work orders, service requests or tickets, and also roles for use within workflow.

Figure 9-4 shows the configuration of a person group in a new role.



A screenshot of a web interface showing the configuration of a role. The fields are: "Role*" with "MAINTROLE" and "MAINTENANCE ROLE" (with a list icon), "Type*" with a dropdown menu showing "Person Group", "Object" with "SR" and a search icon, "Value*" with "MAINT" and a search icon, "Parameter" with an empty field, "E-mail?" with an unchecked checkbox, and "Broadcast?" with an unchecked checkbox.

Figure 9-4 Role configuration with a person group

Note: Person groups can be associated to roles for ease of assignment.

9.1.4 Ticket templates

The *Ticket Templates application* allows you to create and manage predefined templates for common high-volume service requests, incidents, or problems.

To open the Ticket Templates application, select **Go To** → **Service Desk** → **Ticket Templates**.

When creating a ticket template the two required fields are Template ID and Class. The Template ID is the unique identifier for a particular template, and Class is used to determine the type of ticket record that the template will be applied to, such as service request, incident, or problem.

9.1.5 Applying a ticket template to a service request

To apply a ticket template to a service request, perform the following steps:

1. Select the record from the List tab and then use the Select Action menu to choose **Apply Service Request Template**, as shown in Figure 9-5.

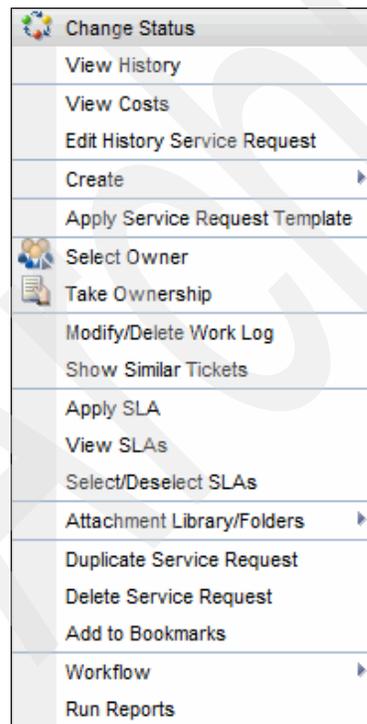


Figure 9-5 Select Action menu for service request

2. Select the template you want to apply, as shown in Figure 9-6.

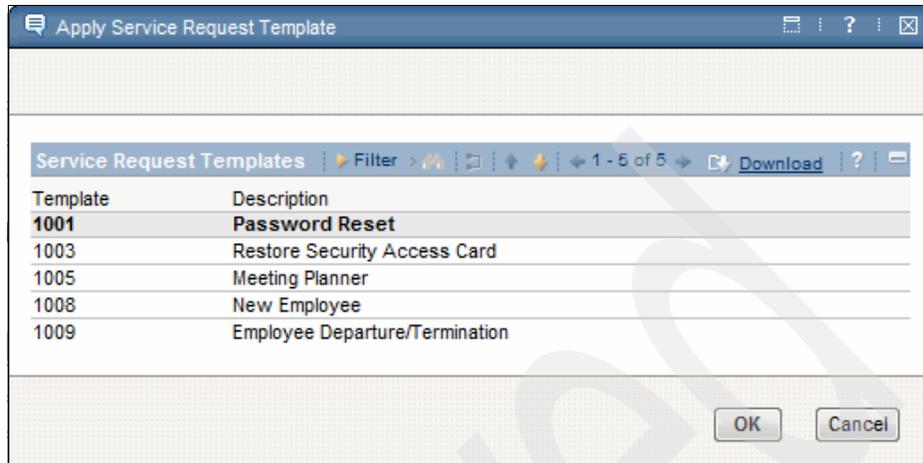


Figure 9-6 Apply Service Request Template

9.2 Self-Service

IBM Tivoli Asset Management for IT offers several methods for allowing users to enter service requests without having to contact an agent. These include creating and managing requests from within the *Self-Service module*, and the use of the e-mail listener to generate service requests from an e-mail.

9.2.1 Create Service Request

To access the *Create Service Request application*, select **Go To** → **Self Service** → **Service Requests** → **Create Service Request**.

Within the Create Service Request application, the logged-in user's person record details are automatically populated on the request. A user may submit a request on behalf of another user, as shown in Figure 9-7.

Create Service Request

Reported By: MWILSON

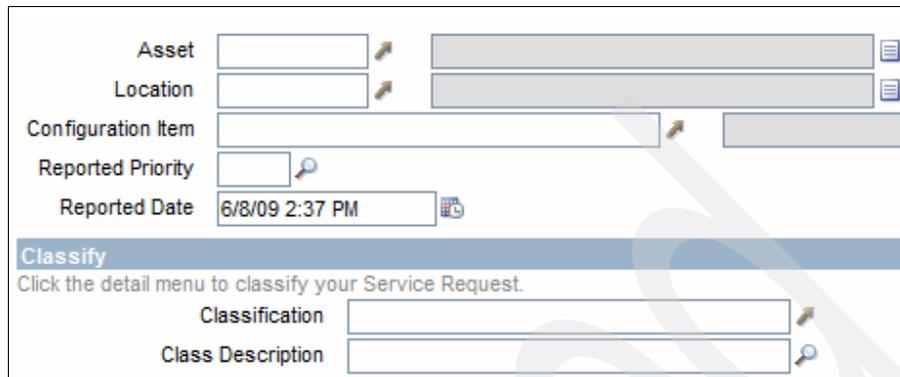
Phone: 480-999-9999

E-mail: mwilson@us.ibm.com

Affected User: JBAFFA

Figure 9-7 Self-Service showing Reported By user and Affected User

Within the self service request are several additional fields including asset, location, priority, and classification. See Figure 9-8.



The screenshot shows a web form for classifying a service request. It includes the following fields and controls:

- Asset:** A text input field with a pencil icon for editing.
- Location:** A text input field with a pencil icon for editing.
- Configuration Item:** A text input field with a pencil icon for editing.
- Reported Priority:** A dropdown menu with a magnifying glass icon for search.
- Reported Date:** A date and time input field showing "6/8/09 2:37 PM" with a calendar icon.
- Classify Section:** A blue header bar with the text "Classify" and "Click the detail menu to classify your Service Request."
- Classification:** A dropdown menu with a pencil icon for editing.
- Class Description:** A text input field with a magnifying glass icon for search.

Figure 9-8 Service Request Classification

Note: Service desk agents can use classification to compare and verify whether other similar service requests have been created.

9.2.2 View Service Request

To access the *View Service Requests* application, select **Go To** → **Self Service** → **Service Requests** → **View Service Requests**.

Within the View Service Requests application, users may filter and view their own service requests. Also, a user may update the communication log for a service request, as shown in Figure 9-9 on page 184.

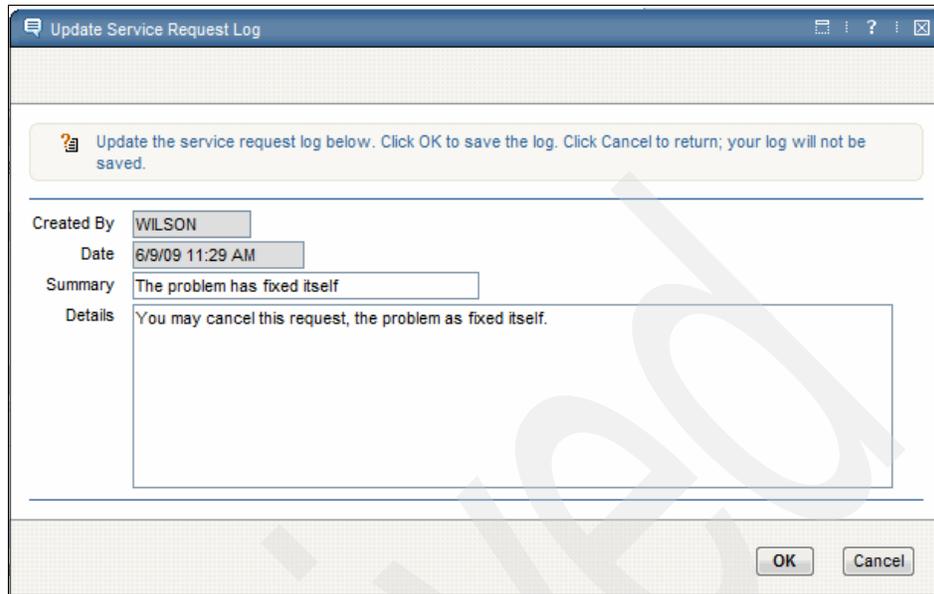


Figure 9-9 Update Service Request Log

9.2.3 E-mail Listeners

To access the *E-mail Listeners* application, select **Go To** → **System Configuration** → **Platform Configuration** → **E-mail Listeners**.

The E-mail Listener application is used to receive and process requests submitted through e-mail. Multiple e-mail listeners may be configured on different mailboxes to process all types of requests such as for different departments within an organization.

When configuring an e-mail listener, an administrator has to provide details such as the e-mail address, mail server, protocol, and its processing frequency, as shown in Figure 9-10 and Figure 9-11 on page 185.

E-mail Address *	support@ibm.com
E-mail Password *	●●●●●●●●
Mail Server *	
E-mail Folder *	INBOX
Administrator E-mail	noc@us.ibm.com

Figure 9-10 E-mail Listener details

E-mail Processing Frequency	
Schedule*	5m,*****
Cron Task Name	LSNR1CRON
Cron Task Instance	LSNR1003
Last Run Time	

Figure 9-11 E-mail Processing Frequency

Archived

Archived

Other configuration options

After the installation is complete, several tasks need to be completed before you can enable the users to start using the system. Several other tasks, which help to maintain and tune the system, have to be carried out by a system administrator.

This chapter contains the following topics:

- ▶ “Security settings” on page 188
- ▶ “Logging application” on page 189
- ▶ “Log files” on page 190
- ▶ “Database configuration” on page 191
- ▶ “System properties” on page 194
- ▶ “Electronic audit signatures” on page 196
- ▶ “Actions” on page 197
- ▶ “Roles” on page 199
- ▶ “Person and person groups” on page 202
- ▶ “Cron task setup” on page 202
- ▶ “System performance issues and guidelines” on page 203

10.1 Security settings

Before configuring the system for WebSphere Application Server or WebLogic Server security, review the following considerations:

- ▶ The application server is configured to authenticate against an LDAP server user registry.
- ▶ The system supports integration with Microsoft Active Directory® or IBM Tivoli Directory Server, and lets you move LDAP server data into the application database tables.

10.1.1 Synchronization

Synchronization keeps data in the system current with data in the LDAP directory server. How data synchronization occurs depends on whether you use WebSphere Application Server or WebLogic Server:

- ▶ For WebSphere Application Server, a data synchronization between LDAP repositories and the system is governed by the federated repositories, which, in turn, are managed by Virtual Member Manager and the VMMSYNC cron task.
- ▶ For WebLogic Server, a data synchronization between LDAP repositories and the system is managed by the LDAPSYNC cron task.

10.1.2 Application server security

For application server security, two types of security files are used:

- ▶ Global Security files
- ▶ Application server security files

Global security files

The global security files are:

- ▶ `ibm\SMP\maximo\applications\maximo\properties\maximo.properties`
- ▶ `ibm\SMP\maximo\applications\maximo\maximouiweb\webmodule\WEB-INF\Web.xml`
- ▶ `ibm\SMP\maximo\applications\maximo\mboweb\webmodule\WEB-INF\Web.xml`

To configure the system to use application server security, follow these steps:

1. In the system properties file, add the property `mxe.useAppServerSecurity`. Set the value of the property to 1 and save the file.
2. In the `applications\maximo\maximouiweb\webmodule\WEB-INF\Web.xml` file, uncomment the lines shown in Example 10-1.

Example 10-1 Web.xml with uncommented lines

```
<!--  
<login-config>  
<auth-method>BASIC</auth-method>  
<realm-name>MAXIMO Web Application Realm</realm-name>  
</login-
```

Application server security files

To be able to configure application server security, the following files must be modified in the application's home directory:

```
... \maximouiweb\webmodule\WEB-INF\Web.xml  
.... \properties\maximo.properties  
.... \maximo\mboweb\webmodule\WEB-INF\Web.xml
```

10.2 Logging application

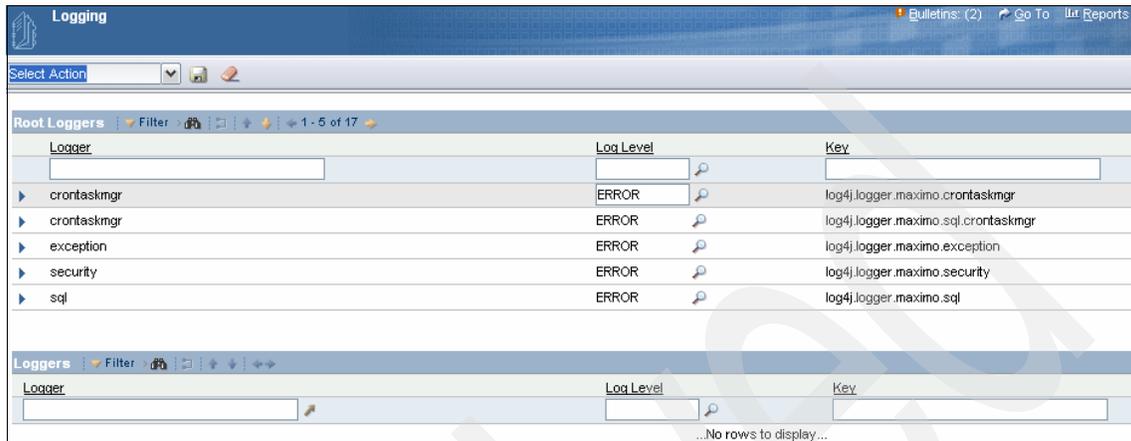
You use the *Logging application* to manage log settings and configure log files. The application is part of the System Configuration module of the product.

The Logging application enables you to:

- ▶ Create loggers that are components in the product that prepare log statements to be written to console or log file.
- ▶ Associate the appropriate log level with each logger.
- ▶ De-activate loggers except root loggers.
- ▶ Configure appenders that represent a console or log files to which log statements are written.
- ▶ Specify an appropriate file name for an appender.
- ▶ Specify a log file size for an appender.
- ▶ Associate a logger with multiple appenders.
- ▶ Associate an appender with multiple loggers.

The Logging application contains two table panels. See Figure 10-1.

- ▶ Root Loggers is for defining the basic loggers of the product.
- ▶ Loggers is for defining the child loggers that extend from a basic logger.



The screenshot shows the 'Logging' application interface. At the top, there is a 'Select Action' dropdown menu. Below it, there are two table panels. The first panel is titled 'Root Loggers' and contains a table with three columns: 'Logger', 'Log Level', and 'Key'. The second panel is titled 'Loggers' and contains a table with three columns: 'Logger', 'Log Level', and 'Key'. Both tables have search icons next to the 'Log Level' and 'Key' columns. The 'Root Loggers' table has five rows of data, and the 'Loggers' table is currently empty, showing a message at the bottom: '...No rows to display...'

Logger	Log Level	Key
▶ crontaskmgr	ERROR	log4j.logger.maximo.crontaskmgr
▶ crontaskmgr	ERROR	log4j.logger.maximo.sql.crontaskmgr
▶ exception	ERROR	log4j.logger.maximo.exception
▶ security	ERROR	log4j.logger.maximo.security
▶ sql	ERROR	log4j.logger.maximo.sql

Logger	Log Level	Key

...No rows to display...

Figure 10-1 Logging application

Note: You can apply logging changes to the application server without interrupting users by selecting **Apply Settings** from the Select Action menu. This step has no effect on the existing user sessions.

10.3 Log files

The application server keeps log files of connections, exceptions, and other failures discovered by the application server in real time. These logs are often helpful in diagnosing errors, in particular EAR (Enterprise ARchive) files and other back-end operations, such as database connections. As an example, if performance is slow, the administrator can start by reviewing these log files:

- ▶ `systemerr.log`
This file logs connections, exceptions, and other failures experienced by the WebSphere Application Server in its day-to-day running.
- ▶ `systemout.log`
This file also logs connections, exceptions, and other failures experienced by the WebSphere application server.

- ▶ `native_stdout`
This file logs verbose garbage collection information. This log is helpful in the diagnosis of memory and garbage collection issues
- ▶ `maximoserver.log`
In WebLogic, this file logs connections, exceptions, and other failures experienced by the application server in its day-to-day running. This log is often helpful in the diagnosis of issues.
- ▶ `Maximo.log`
This file logs IBM Tivoli Asset Management for IT output, based on settings in the Logging application/`logging.properties` and System Properties:
 - Applications: This log file can be influenced by logging levels and types of information from the E-mail listener and the System Properties applications.
 - Files: This log can also be influenced by both the `maximo.properties` and `logging.properties` files.

10.4 Database configuration

Database configuration is based on objects. A one-to-one correlation exists between each object and each existing table. Behind the scenes, the business object fetches the columns of the corresponding table and presents them to you as attributes of the object.

Use the *Database Configuration application* to create or modify the objects and attributes in the database used by applications. Some of the things you can do are:

- ▶ Change attributes definitions.
- ▶ Associate domains to attributes.
- ▶ Create new user defined objects.
- ▶ Add new attributes to existing objects.
- ▶ Create and drop indexes.
- ▶ Create views to look at data from a single, or multiple, objects.
- ▶ Specify GL account formats.
- ▶ Set the field length and format for certain fields.
- ▶ Update statistics on indexes to improve database performance.
- ▶ Configure the system with multiple languages.
- ▶ Set up electronic signatures and electronic audit records.

When modifying the database (examples: creating or deleting objects, attributes, or indexes), changes are stored in the secondary tables and do not take effect

until you configure the database. The product restores the backup tables as part of configuration.

The two ways to configure the database are:

- ▶ Command-line mode
- ▶ Admin Mode

Considerations for command-line mode

You must shut down the application server to configure the database in command-line mode. Command-line mode also requires an information technology administrator user who has control over the application server.

Considerations for Admin Mode

To configure the database in Admin Mode, you must have administrator login security authorizations, which permits you to log in when the server is in Admin Mode. This level has five login sessions when Admin Mode is set to ON. You grant these authorizations in the Security Groups application.

The following other considerations apply to Admin Mode:

- ▶ No requirement to shut down the application server.
- ▶ Admin mode blocks users from the product applications.
- ▶ Admin mode suspends cron tasks.
- ▶ Admin mode does not allow remote connectivity.
- ▶ Admin mode disables event listeners.

Note: When configuring the database in Admin Mode, ensure that all users are logged off. In the case of deploying the EAR file or applying a fixpack, the application has to be taken offline.

Configuring the database in admin mode

To configure the database in Admin Mode, follow these steps:

1. From the Select Action menu, select **Manage Admin Mode**.
2. In the Turn Admin Mode ON dialog box, if necessary, modify the values in the following two fields. The default value is 5 for each field:
 - Number of Administrative Sessions Allowed
 - Number of Minutes for User Logout

See Figure 10-2 on page 193)

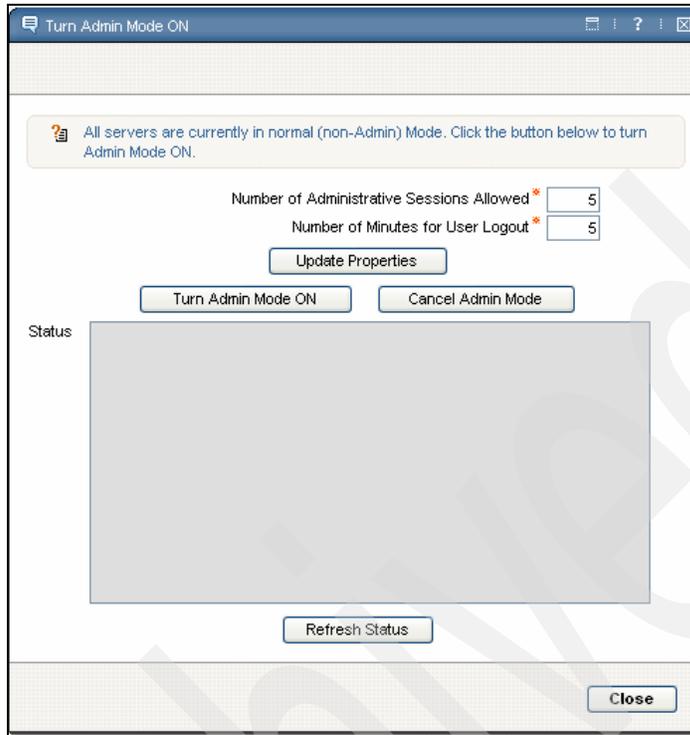


Figure 10-2 Admin Mode

3. If you modify these fields, click **Update Properties** for the parameters to take effect.
4. Click **Turn Admin Mode ON**.
5. In the Electronic Signature Authentication dialog box, type the appropriate value in the Reason for Change field.
6. Click **OK**. A dialog box opens to indicate that Admin Mode is starting.
7. Click **OK**.
8. Throughout the configuration process, click **Refresh Status** to view the messages that the configuration process writes in the Status window.
9. If you decide to cancel the configuration, click **Cancel Admin Mode**.
10. Wait until Admin Mode is turned ON before performing this step. Then, click the List tab. From the Select Action menu, select **Apply Configuration Changes** to configure the database and automatically restore backup tables.
11. To turn off Admin Mode, choose **Select Action** → **Admin Mode**, and then click **Turn Admin Mode Off**.

10.5 System properties

You use the *System Properties application* to manage system properties and their values used by various product components. The application is part of the System Configuration module of the product. This application hosts the majority of the application's properties.

The System Properties application enables you to:

- ▶ Add a new system property.
- ▶ Modify an existing property.
- ▶ Delete an existing property.
- ▶ Encrypt the value associated with the property.
- ▶ Associate a domain with the property.
- ▶ Specify the data type for specific properties.
- ▶ Apply properties and their values to the product dynamically.
- ▶ Restore original out-of-the-box values that are shipped with the product.

The System Properties application contains two table panels:

- ▶ Global Properties is for defining system-wide properties of the product.
- ▶ Instance Properties is for defining instance-specific properties of the product.

Note: Properties defined in the `maximo.properties` file will be read first, after starting the application server

Another characteristic of the System Properties application is the *Live Refresh*, which allows you to determine whether a new value for a system property can be applied and take effect immediately throughout the product. You do not have to shut down the application when applying a change to `maximo.properties` files.

System property types

The two types of system properties are:

- ▶ Global

This property exists only at a system-wide level, which means that the property is applicable to all product server instances (such as an application server) working with a common database. For example, the system property `mxe.logging.rootfolder` is a global property whose value is a directory on the hard disk of the server machine where the product's log files reside.

- ▶ Instance

This instance property is defined and associated with a specific product server instance. For example, you can configure the system property `mxe.crontask.donotrun` to be an instance-specific property. You do this by associating the `mxe.crontask.donotrun` system property with a specific server (for example, `MXServer1`) and a value applicable only to that server (for example, a value of `BBCron`). As a result of this configuration, the Bulletin Board cron task (`BBCron`) is not executed on `MXServer1`, but it can execute in another product instance, such as `MXServer2`.

10.5.1 Security levels

This characteristic determines whether this property can be retrieved before establishing an authenticated connection to the product. There are three levels of security:

- ▶ PUBLIC

The property and its value are accessed by unauthenticated client sessions.

- ▶ SECURE

The property and its value are accessed by authenticated client sessions.

- ▶ PRIVATE

The property and its value are accessed only within the product business object framework.

Note: If a `maximo.properties` file exists and contains the same property name but a different value that the database is aware of, the value maintained in the database will be overridden by the settings in `maximo.properties` file.

10.5.2 Attached documents properties

You may configure attached documents properties to meet your requirements. You might have to configure attached documents either in the System Properties application or the `maximo.properties` file.

The attached documents properties are:

- ▶ `mxe.doclink.doctypes.defpath`
This property is the default path for the `doclinks` folder on the application server computer where the physical documents that are attached to a system record are stored.
- ▶ `mxe.doclink.path1` - `mxe.doclink.path10`
Use these to specify the HTTP server path (from `path1` to `path10`) to link documents that are attached to records.

If you are configuring attached documents, you have to modify:

- ▶ The `httpd.conf` file for the WebSphere application server
- ▶ The `Web.xml` for the WebLogic application server

Refer to 10.11.5, “Attached documents” on page 206.

10.6 Electronic audit signatures

You can enable electronic signature and electronic audit records independently of each other. Typically, however, they are used together:

- ▶ The *Electronic Auditing* function writes audit records to the database tables when you modify an audited attribute.
- ▶ The *Electronic Signature* function records the person that made the modification

After enabling electronic audit records for a database attribute, the process is:

- ▶ Each time a user adds, deletes, or modifies the value of an attribute using a system application, and then saves the change, an audit record is written to the audit object corresponding to the regular database object.
- ▶ The audit record includes:
 - Copy of the changed data
 - User name of the user who made the change
 - Identifier indicating whether the change was an insert, update, or delete

- Current date and time of the transaction
- Rowstamp
- Unique e-Audit transaction ID
- Unique e-Sig transaction ID if electronic signature is enabled
- The key values columns for the record, even if those columns are not enabled for electronic audit (e-Audit), for example, the work order number is recorded even when another attribute in the WORKORDER object triggers the electronic audit

Note: Audit records are written in the selected database table name preceded by A_ (which is the letter A followed by an underscore character).

10.7 Actions

Actions are scheduled events that occur when a record leaves a workflow node. The *Actions application* is used to create and manage actions and action groups. Actions and action groups can be used with escalation, service level agreement (SLA) and workflow processes. An action group contains multiple actions that are initiated or processed in sequence.

10.7.1 Working with action records

You can use the Actions application to create and manage actions and action groups. Actions and action groups can be used with escalation, service level agreement (SLA), and workflow processes.

An action is an event that is triggered when the escalation engine finds records that meet the conditions defined by an escalation point, SLA, or workflow process. You can create actions that initiate an application action, change the status of a record, run a custom class or a specified executable program, or set the value of a field on a record.

You use the *Actions application* to create and manage both individual action records and action group records. An action group contains multiple actions that are initiated or processed in sequence.

Workflow processes use actions to move records through a process and to trigger events, for example, status changes. Creating records in the Actions application lets you define actions once, then reuse them when creating multiple Workflow processes.

Understanding actions and escalations

An *escalation* is a mechanism for monitoring time-sensitive records automatically, which can take actions or send notifications when a record reaches a defined escalation point. You create the *actions* that are associated with an escalation record in the *Actions application*.

Note: Actions can be triggered by escalations, and escalations can trigger workflow processes.

Creating action records

You can create several types of actions by using the *Actions application*. When you create an action record, you specify an action type to help determine what kind of action to take when the action is encountered in a process.

Note: The Type and Action fields are required in order to create an action.

Action types

An action can be one of the following types:

► APPACTION

This type specifies that an application action be initiated. The type requires values in the Object and Value fields. When creating an APPACTION type action, you specify one of the following actions if it is available for the specified object:

- Apply SLA: Apply the specified service level agreement.
- Create Change: Create a change work order.
- Create Incident: Create an incident ticket.
- Create Problem: Create a problem ticket.
- Create Release: Create a release work order.
- Create SR: Create a service request ticket.
- Create WO: Create a work order.
- WF Accept: Accept the record and route it to the positive path in the workflow process. Also known as workflow auto-accept).
- WF Escalate: Escalate the record in the Workflow process and reassign the assignment to its escalation role.

- WF Initiate: Initiate a Workflow process. This option requires a value in the Parameter/Attribute field.
- WF Reject: Reject the record and route it to the negative path in the workflow process. Also known as workflow auto-reject.
- ▶ **CHANGESTATUS**
This type specifies that the status of a record will change. The type requires a value in the Object field and status in the Value field.
- ▶ **CUSTOM**
This type specifies that a custom class file should run. The type requires a value in the Object field and the name and path of a class file in the Value field.
- ▶ **EXECUTABLE**
This type specifies that a program on the server should run. The type requires the name of a program file in the Value field.
- ▶ **GROUP**
This type specifies that the system should run the sequence of actions that you specify in the Members table window.
- ▶ **SETVALUE**
This type specifies that the system should set the value of a specified field. The type requires values in the Object, Value, and Parameter/Attribute fields.

10.8 Roles

You use the *Roles application* to create, modify, view, and delete role records that can be used as part of a communication template, escalation, SLA, or workflow process. When a role is used within a process, the system can determine the correct individual or individuals that the process is routed to, based on information with the role record.

A *role* is a function or position in a business. A role can represent a specific job title, for example, a department manager, or an assigned duty, for example, a watch officer. You may also use a role to represent a specific person or a group of people. Role settings can be used with:

- ▶ Communications templates
- ▶ Escalations
- ▶ Service level agreements (SLA)
- ▶ Workflow processes

10.8.1 Understanding roles and workflow

Workflow Inbox assignments and workflow notifications are always made to roles. All role records point to one or more person IDs or to a table and column in the database that represent a person. When a role is encountered in a workflow process, it resolves the role to a person group or individual person record.

Using role records instead of person records for assignments and notifications enables you to create more generic workflow processes that require less maintenance as individuals move in and out of different roles within your company.

Understanding role types

You use a role to represent different functions or positions. When you create role records, specify a role type to help determine how to resolve the role when it is encountered in a process.

You can create the following types of roles (see Figure 10-3 on page 201):

▶ **CUSTOM**

Use this role when you want to use a custom class file that resolves to one or more people. Custom class files are Java programs written to perform specific data management processes. The record is routed to one or more people based on the data returned by the custom class program.

▶ **DATASET**

Use this role to route a record that is based on a specific field on a record, or a field on a related record or child record. Specify a value in the Object field when creating DATASET type roles. The record is routed to one or more people, based on the field that you specify in the Value field. Examples of fields that can be used with a DATASET type role include Affected User, Reported By, Supervisor, Work Group, and so forth.

▶ **EMAILADDRESS**

Use this role to send e-mail notifications to one or more e-mail addresses. Because e-mail addresses might or might not represent individuals who have person records, these addresses can be used for notifications, but not for assignments.

► PERSONGROUP

Use this role to route a record to one or all members of a person group. You use the Person Groups application to create person groups. Note:

- If the Broadcast check box is selected, assignments and notifications are sent to all members of the group.
- If the Broadcast check box is cleared (the default), the assignment or notification is not routed to all members of the group. Instead, the assignment or notification is routed to the first available group member based on that person's calendar and shift, or to the individual who is the group default assignee. For more detail about how the assignee is determined, see 10.9, "Person and person groups" on page 202.

► PERSON

Use this role to route a record to a specific individual. You use the People application to create person records.

► USERDATA

Use this role to route a record based on a specific field within the person record of the logged in user.

Notes:

- Three fields are required in the Roles application: Role, Type, and Value.
- For the Value field to be valid, *person*, *person group* or *e-mail address* has to be specified.

Figure 10-3 shows the Roles application.

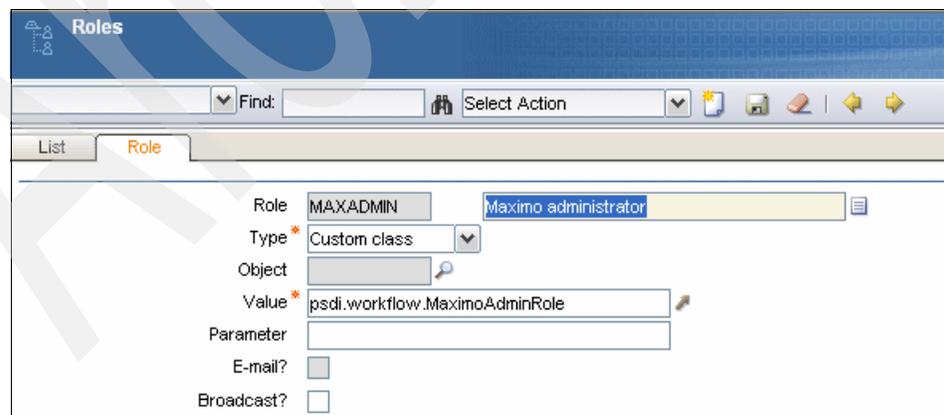


Figure 10-3 Roles application

10.9 Person and person groups

Use the Person Groups application to create, view, and modify person groups. A person group consists of people, who might or might not be workers. The only required field is the *Group* field. After you have created these groups, you can designate a person group as any of the following options:

- ▶ Workgroup
- ▶ Owner group on a work order
- ▶ Owner group on a ticket

A Person Group can also be the recipient of a document routed by a workflow process. If a document is routed to a Person Group, everyone in the group receives it unless you configure the process to send it to the individual whose calendar indicates that they are available.

When creating new Person Groups, note that the first person assigned to the group is automatically selected as the default group.

Assigning a Person to a Person Group would require you to specify the Person and the Sequence. The sequence representing the numerical value, which indicates (to the workflow) the assignment sequence for this person.

10.10 Cron task setup

You use the *Cron Task Setup application* to add cron tasks, cron task instances, remove cron tasks or their instances, and to modify cron task parameters. You may also change the status by using the **Active?** status check box, or adjust the schedule of a cron task. Cron tasks can be rescheduled and parameter values can be changed without stopping and restarting the server.

Notes:

- ▶ WebSphere Application Server: Data synchronization between LDAP repositories and the system is governed by the federated repositories which, in turn, are managed by the Virtual Manager and the VMMSYNC cron task.
- ▶ WebLogic Server: Data synchronization between LDAP repositories and the system is managed by the LDAPSYNC cron task.

10.11 System performance issues and guidelines

This section offers tips and tricks to tailor the system performance to your requirements.

10.11.1 Factors in system performance

System performance depends on more than the IBM Tivoli Asset Management for IT itself and the database. The network architecture also affects performance. The application server configuration can hurt or improve performance. The way that you deploy the application across servers affects the way the application performs. Many other factors can also be considered for improving the user experience of system performance.

Better performance can be gained from examining the following factors:

- ▶ Application server configuration
- ▶ Scheduled tasks (cron tasks)
- ▶ Reporting
- ▶ Integration with other systems with the Maximo Enterprise Adapter
- ▶ Network issues
- ▶ Bandwidth
- ▶ Load balancing
- ▶ Database tuning
- ▶ SQL tuning
- ▶ Client workstation configuration
- ▶ Miscellaneous performance improvement tips
- ▶ Troubleshooting

10.11.2 Configuration issues

Even with fewer than 50 users, the basic application configuration can become overloaded by using hardware consuming tasks. For example, running scheduled jobs (cron tasks) or running reports both require considerable memory and processing power.

When processing power and memory are overtaxed, the user who is using the application from a browser can experience reduced performance. If the basic configuration is performing poorly, you might need to deploy the advanced enterprise configuration.

In the basic configuration, even if the application server process runs on a 64-bit computer, performance can be slow. Although a 64-bit computer allows greater

memory utilization, the server process suffers from Java garbage collection pauses because of large heap space, and slow performance.

10.11.3 Performance and system maintenance troubleshooting

The following are some considerations regarding system maintenance:

- ▶ Define a fixed maintenance window to perform routine maintenance on your deployment. Inform your users of the maintenance schedule by using the Bulletin Board within IBM Tivoli Asset Management for IT.
- ▶ Perform load-balancing tasks on your servers, and reassess your thread counts and socket and memory settings in your application deployment, on a regular basis. Consult the WebSphere Application Server and WebLogic Server documentation for further information.
- ▶ Adjust thread counts to improve performance. Application servers use threads to listen for and process requests from the browser. A thread represents a work item or task. Application servers (WebSphere Application Server and BEA WebLogic Server) have default settings for number of threads. WebSphere Application Server has a default minimum thread size of five. A WebLogic Server has a default thread count of 25 (when started in production mode). You can, and often should, revise these values to improve system performance. To optimize performance, try to determine the correct number of threads.

If the thread count is too high, you have too many simultaneous requests on the processor level, and servicing the requests becomes inefficient. If the thread count is too low, the processor is not fully utilized. The queue grows and the workload accumulates. The correct number of threads varies from site to site, but an optimal number of threads can often be found in the range of 40 - 55. The number depends on the volume of front-end transactions (user load) and back-end transactions (nonuser load).

- ▶ Use the WebSphere Application Server and WebLogic Server monitoring features to set and monitor thread usage and queue times for your application servers.
- ▶ To buffer database growth and performance, implement indexes to speed up search requests within common used modules, for example, Purchasing and Work Order Tracking modules. A database administrator can monitor growth and sizing, and tune the database accordingly.
- ▶ Frequently consult IBM Asset Management user groups and knowledge bases for issues and tips about tuning, performance, and best practices.
- ▶ Conduct regular audits and database integrity checks to find any backend database malpractices or possible bugs and errors.

- ▶ Before implementing any application change, ensure you have a change management procedure and release management protocol in place. Also ensure that change requests are approved by senior management and that they match your business processes. Change requests are best released in phases in the deployment: for example, first the development environment, then training, then acceptance, and only then to the production environment. Use tools such as the Migration Manager to maintain identical deployment platforms.
- ▶ Review updates and new patch releases in development environments before attempting to implement these changes in acceptance and production environments.
- ▶ If you are experiencing technical issues with the IBM Tivoli Asset Management for IT, copy the Tivoli process automation engine database and restore it in a test environment. From there, enable debugging by using the Logging application. Avoid running the Logging application in the production environment; logging can hinder the performance of the application server.
- ▶ Monitor for processes and applications that are not responding. They use memory and can affect the performance of the client workstation. A workstation can have unresponsive processes or applications that the user might be unaware of. Use system tools, such as the Windows® Task Manager, to check for and stopped processes and applications.
- ▶ Use one active network link only. If a user has both an active wireless network link and an active LAN link, system performance issues can result. Limit users to one active network link.

Note: To tune the IBM Tivoli Asset Management for IT V7.1 for better performance, review the SQL statements periodically in the QUERY and KPIMAIN tables.

10.11.4 Loading and looping of MBOs in memory

MBO stands for Maximo Business Object. All objects in Maximo (Tivoli process automation engine) are represented as MBOs. These objects have their definitions (including parent-child relationships) in the meta data of the Tivoli Process Automation Engine database.

You can learn whether an application or an MBOset is loading a large number of objects (MBOs, for example) into the MBOset and, in turn, into memory. Enable the following property in the `maximo.properties` file to display MBO creation:

```
mxedb.fetchResultLogLimit=200
```

Note: The `mxe.db.fetchResultLogLimit` allows you to identify the memory usage.

After you enable this property (by uncommenting it), the application server writes a stack trace for each MBOset, which generates a multiple of 200 MBOs.

Analyze the stack trace to determine where the objects are being created. You can then take the necessary steps to reduce the object creation if it was an unwanted event. Using this setting does not cause the server to stop creating these objects. It only displays (on the console or in the logging file) where these objects are created. Increase this parameter to 5,000 or 10,000 to avoid printing logs unnecessarily.

Note: You can also configure the garbage collection for analysis while tuning the Web application server.

10.11.5 Attached documents

Most IBM Service Management applications have Attachments Library/Folder actions you access from the Select Action menu. There also is an Attachments icon and Attachments hyperlink displayed on the application page. The application highlights this icon and activates this hyperlink when the record has documents attached to it. Additional actions are available by clicking **Attachments**.

The *Attached Documents feature* lets you attach relevant information to a record (or to a task on a record) in the form of a file or Uniform Resource Locator (URL) address. These attached documents can be located on your company's network, on the Internet, or in a Document Management System (DMS) and might include text files, spreadsheets, images, or Web pages.

The Attached Documents feature allows you to:

- ▶ Attach a copy of a document to a record, for example an owner's manual could be attached to an asset.
- ▶ Attach individual documents to records, for example attaching a permit to a work order.
- ▶ Attach an image to a record, for example attach a photo to a service request, to view documents attached to a record, or to related records.
- ▶ Print one or more documents attached to a record.
- ▶ Manage the Library of documents available to be attached to records.

Types of attachments

The Attached Documents feature includes two kinds of attachments:

- ▶ Direct Attachments

These documents are attached directly to an application record. For example, in the Work Order Tracking application, all documents attached to the work order are direct attachments. When working with Attached Documents, you may attach, view, modify, and print documents that are part of the current record's document collection.

- ▶ Referential Attachments

These documents are attached to other application records, which are associated with the current record. For example, a work order record might also display document collections for the asset and location associated with the work order. You may view and print documents that are referential attachments, but you cannot add or modify attachments to related document collections.

Attached documents administrative actions

If Attached documents is enabled for an application, three actions appear when you choose **Select Action** → **Attachment/Library Folders** menu:

- ▶ Manage Library

Select this option to register new documents to the Library and manage the document properties of existing documents in the Library.

- ▶ Manage Folders

Select this option to create document folders and set a default file location for storing documents associated with each folder.

- ▶ Associate Folders

Select this option to associate existing document folders with the current application.

Attaching documents

You can attach documents to records (and to task rows within a record) using either of the following methods:

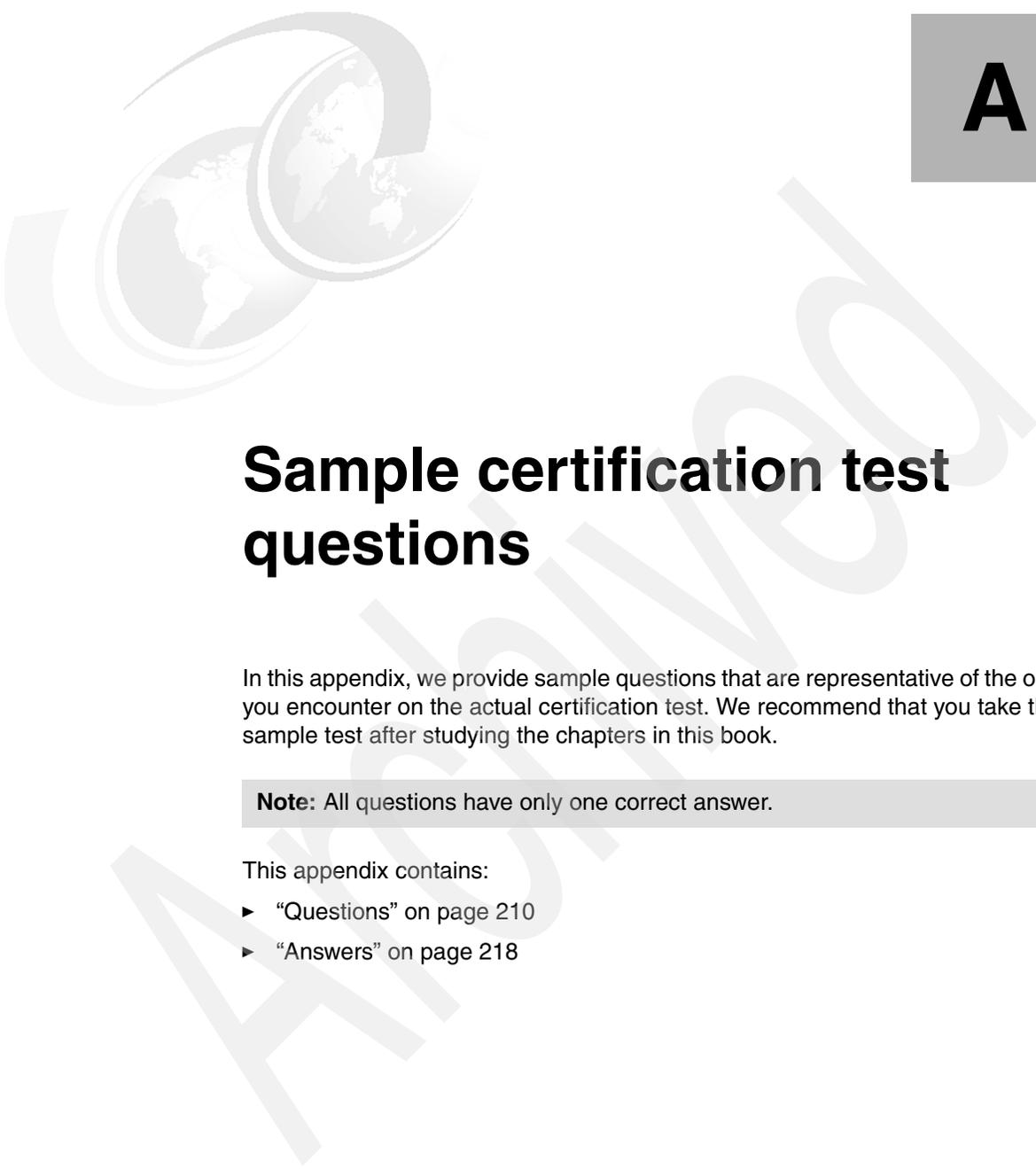
- ▶ First, create a document Library using the Attachment/Library Folders **Manage Library** action, then attach documents to records using the **Add From Library** option available from the Attachments menu.
- ▶ Attach a document using either the **Add New File** or **Add New Web Page** option available from the Attachments menu. Documents can also be added to the Library with these actions.

You may configure the system to connect to a Document Management System (DMS). This option is hidden by default. After enabled, documents that physically reside in a DMS can be registered to the library.

Attached documents configuration

The system uses an IBM WebSphere Application Server or BEA WebLogic server. Using one of these application servers, you can configure the Attached Documents action on a single computer or on multiple computers.

The computers which you access attached documents from must have the relevant applications installed on them. For example, to view a Microsoft Word document, a workstation must have Word installed on it.



Sample certification test questions

In this appendix, we provide sample questions that are representative of the ones you encounter on the actual certification test. We recommend that you take this sample test after studying the chapters in this book.

Note: All questions have only one correct answer.

This appendix contains:

- ▶ “Questions” on page 210
- ▶ “Answers” on page 218

Questions

The following questions can assist you in studying for the certification test:

1. Network devices records cannot be created manually if a discovery tool is used to identify the devices deployed in the network. How does the discovery tool identify each asset node in the network?
 - a. By using the Network Device Serial Number
 - b. By using the AssetTag
 - c. By using the network address
 - d. By using the MAC binding
2. A collection can contain configuration items, assets, and locations in any combination; you can add and delete members of the collection. Which of the following statements is correct?
 - i. You can delete a Configuration Item (CI), asset, or location from its respective application if it is part of a collection.
 - ii. You cannot delete a CI, asset, or location from its respective application if it is part of a collection.
 - iii. When a collection is active, other applications can use the Return with Value function to select it.
 - iv. When a collection is active, other applications cannot use the Return with Value function to select it.
 - a. i and ii
 - b. ii and iii
 - c. i and iii
 - d. ii and iv
3. Related to Configuration Items (CI) and Actual Configuration Items, which of the following statements is correct?
 - i. A CI is any component of an IT infrastructure that is under the control of configuration management.
 - ii. An actual CI is a part of IT infrastructure, which can be created using the Actual Configuration Item application.
 - iii. All actual CI in an IT infrastructure can be discovered using discovery tools and configuration composer.
 - iv. Actual CI can be deleted or duplicated using Select Action options in Actual CI application.

- a. i and ii
 - b. ii and iii
 - c. i and iii
 - d. ii and iv
4. On selection of Negative Current Balances in inventory defaults, IBM Tivoli Asset Management for IT allows you to do which of the following actions?
- a. Issue or transfer items from inventory at Bin level.
 - b. Issue or transfer items from inventory at Store level.
 - c. Issue or transfer items from Inventory GL Account.
 - d. Issue or transfer items from Inventory and allows negative available balances.
 - e. None of the above
5. For service items, what does the Reorder Direct Issue of items and services that are listed in approved work order mean?
- a. PO is created on the vendor automatically.
 - b. Items and services are issued without receiving into inventory.
 - c. PR is generated automatically.
 - d. Generates Reorder report and notifies to user.
 - e. None of the above
6. IT Item lead time calculations in the Storeroom application uses which of the following choices?
- a. Recent lead time weight in percent from the most recent receipt of the order
 - b. Average lead time in days for all previous receipts of the orders
 - c. Last supply lead time from vendor
 - d. A calculation is not used because current purchase order lead time replaces last supply lead time from vendor.
 - e. None of the above
7. If your management wants to hire IT services from an external agency, introduce a new contract term, and include this new term in all types of future contracts, where do you define this new term?
- a. You add it to each new contract that you create.
 - b. You add it to the Terms and Conditions application's library.

- c. You add it in the Organization application and define it as default term for all contracts.
 - d. You add it as a default term at your organization under your user ID.
 - e. None of the above
8. If an IT vendor breaches a warranty contract on an IT asset, is it possible to claim penalty clause for breaching from vendor?
- a. Yes, in the Properties tab by checking process claim check box.
 - b. No, in the Properties tab there is no option to claim in the Contracts application.
 - c. No, claims cannot be done in IBM Tivoli Asset Management for IT contracts.
 - d. None of the above
9. Is it possible to define any condition to terminate a contract earlier? If so, which options are (or option is) available in IBM Tivoli Asset Management for IT?
- a. Yes, with prior agreed notice period in days.
 - b. Yes, with prior agreed notice period in days and penalty claim combination.
 - c. No, it is not possible to impose any conditions on early termination.
 - d. No, it is not possible to terminate with agreed notice period in days and penalty claim combination.
10. IBM Tivoli Asset Management for IT supports which of the following IT Vendor Analysis Data Calculations attributes?
- i. Promised Lead Time
 - ii. Percent on Time
 - iii. Percent of Rejected
 - iv. Payment Terms
 - v. Discount terms
 - vi. All of the above
- a. i, ii, and iii
 - b. i, ii, iii, and iv
 - c. i and ii
 - d. vi

11. For an IT service vendor's services Invoice line, how do you include allocated or prorated standard service costs to the Invoice line level?
 - a. Define the percentage of Standard Service Costs at the organization level. At the Invoice Service Line, those standard service costs are automatically reflected.
 - b. Standard service costs cannot be included at the Invoice line level.
 - c. Select Line type as standard service, check the appropriate service check box and enter prorated costs at each Invoice line.
 - d. These standard service costs cannot be captured directly at the Invoice line level, prorated or allocated standard service costs should be defined at the purchase order. You must copy those line costs to the Invoice lines.
12. If an IT item goes through material inspection and it is accepted in the Receiving application, how does the Receiving application's data come into the Inventory application?
 - a. By manually entering it in the Inventory application.
 - b. By using the Select Action option in the Receiving application to generate an inventory transaction.
 - c. The system automatically generates the Inventory transaction.
 - d. The method depends on how the System Administrator has configured IBM Tivoli Asset Management for IT.
13. An IT resource certification has expired, but you have re-validated the certification for more three years. How would you update it in IBM Tivoli Asset Management for IT?
 - a. Using the Crafts application's update certification details.
 - b. Using the Qualification application's update certification details under the associate Labor tab.
 - c. Using the People application update certification details.
 - d. The method depends on how the System Administrator has configured IBM Tivoli Asset Management for IT.
 - e. None of the above
14. Where do you configure persons to be paid premium payments in IBM Tivoli Asset Management for IT?
 - a. In the People application. Use Manage Premium Pay codes and apply premium pays.
 - b. In the Labor application. Use Manage Premium Pay codes and apply premium pays.

- c. In the Crafts application. Use Manage Premium Pay codes and apply premium pays.
 - d. The location depends on how the System Administrator has configured IBM Tivoli Asset Management for IT.
 - e. None of the above.
15. Where do you assign shifts and calendar for an IT resource person who offers application support?
- a. In the People application, assign calendar and shifts to IT people.
 - b. In the Labor application, using calendar and shifts are assigned to an IT resource.
 - c. Using the Calendar application, assign calendar to the whole organization. Organization calendar will be applicable automatically to all IT resources.
 - d. The location depends on how the System Administrator has configured IBM Tivoli Asset Management for IT.
 - e. None of the above
16. A high priority service request was assigned to an IT Support Engineer to fix a problem related with the monitor of a desktop system. Because monitors are not covered under warranty, after the Root Cause Analysis the monitor's display card was found not to be working. A display card is not available in the central or local stores. Which of the following steps should the IT Support Engineer perform?
- a. Inform the service requestor about the display card problem and ask the requestor to inform the purchasing department to procure the display card.
 - b. Check the monitor to verify that the display card is not working; look for a spare monitor in the stores. If not found, set aside this current work order and start on another work order.
 - c. Inform the purchasing department to procure the display card and wait for its receipt. Work order status shows "In Progress." Do not update the manager with the information (assumes the purchase request will be automatically forwarded to manager for approval). Do not update the work log.
 - d. Determine if the spare monitor is available in stores. If yes, replace the monitor. If not, create a direct issue purchase requisition from the work order and informs the manager to approve the purchase requisition. Now, the work order status indicates "Waiting for Material" and the IT Support Engineer updates the work log.

17. To install software on a computer, you may have to upgrade its RAM, install OS, create a server, configure server, install the software, and check whether the installation is working properly. Which is the best approach for an IT Support Engineer.
- Create work order with separate tasks and set up work process flow with finish to start relationship between tasks.
 - Create parent and child work orders and assign them to different IT Support Engineers.
 - Create separate work orders and assign them to different IT Support Engineers.
 - Create a single work order and create each activity as its tasks.
18. A software suite was developed in-house and during performance testing phase, a service request was raised by test engineer to monitor test server's load bearing capacity by running a custom software which creates concurrent user logins. What steps will IT Service Engineer would do in the Work Order Tracking application?
- Create a work order and update the log whenever the server comes down.
 - Create a work order using the Select Action options "Report Downtime" of the server and update the logs.
 - Create separate work orders in the case that the server comes down, and update the logs whenever server comes down.
 - Create the parent work order and create the tasks as child work orders, to track each child work order.
19. Which statements are relevant to asset reconciliation?
- Match the Authorized sets and Deployed asset of data, find differences where they exist, and investigate the differences.
 - The reconciliation process can be used by and affects several roles within the organization, such as Service Desk, Configuration Management and Asset Manager.
 - Hardware reconciliation must occur before reliable software reconciliation can take place.
 - Reconciliation logic uses mutually exclusive sets of data in task filters, otherwise the results would be difficult to interpret.
- i and ii
 - i and iii
 - i, ii, and iii
 - All of the above

20. Which statement contributes to the reconciliation discrepancies?
- a. Actual missing assets
 - b. Decommissioned assets
 - c. Deployed assets
 - d. MAC address range
 - e. IP/subnet
21. How can you use Software Conversion application to reconcile a software asset?
- a. Licensed and upgraded versions.
 - b. Deployed Assets.
 - c. Compliance Setting and Reviewed Fields.
 - d. Discovery tool.
 - e. None of the above
22. How does the Service Request application facilitate users to do self-service?
- a. By using Show Similar Tickets function
 - b. From the List tab window of Service Request
 - c. In View History
 - d. By using built-in Discovery tool
 - e. None of the above
23. If the SLA Applied field is checked, which fields are applicable on the Service Request window?
- a. Reported and Internal Priority fields
 - b. Target Contact, Start and Finish Date fields
 - c. Reported and Affected Date fields
 - d. Actual Contact, Start and Finish Date fields
 - e. None of the above

24. In the Service Request application, a user can select owner from which of the following areas?
- a. Only Person
 - b. Only Person Group
 - c. Either a Person or Person Group
 - d. Depends on how System Administrator has configured the Service Request application
 - e. None of the above
25. Which application does not use the Role application records?
- a. Communication Templates
 - b. Escalations
 - c. Service Level Agreements (SLA)
 - d. Work Flow Process
 - e. Labor
26. Which activity does not require users to log off when the system is restarted?
- a. Deploying an EAR file
 - b. Offline Database backup
 - c. Database configuration
 - d. Patch, hot fix, installation
 - e. Activate Report Usage Log clean up cron task
27. Which fields are mandatory in the Action application?
- a. Object and Attribute fields
 - b. Type and Accessible From fields
 - c. No Mandatory fields in the Action application
 - d. None of the above

Answers

The correct answers to the sample questions in this appendix are:

1. b
2. b
3. c
4. a
5. b
6. a
7. b
8. a
9. b
10. b
11. c
12. c
13. b
14. c
15. b
16. d
17. a
18. a
19. d
20. a
21. c
22. a
23. a
24. d
25. e
26. e
27. b

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

IBM Redbooks

For information about ordering these publications, see “How to get Redbooks” on page 220. Note that some of the documents referenced here may be available in softcopy only.

- ▶ *IT Asset Management Processes using Tivoli Asset Manager for IT*, SG24-7601
- ▶ *Deployment Guide Series: Tivoli IT Asset Management Portfolio*, SG24-7602
- ▶ *Certification Study Guide Series: IBM Maximo Asset Management V7.1*, SG24-7761
- ▶ *Certification Study Guide Series: Foundations of Tivoli Process Automation Engine*, SG24-7763

Online resources

These Web sites are also relevant as further information sources:

- ▶ IBM Professional Certification Program Web site
<http://www.ibm.com/certify/index.shtml>
- ▶ Test 016 objectives:
<http://www.ibm.com/certify/tests/obj016.shtml>
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