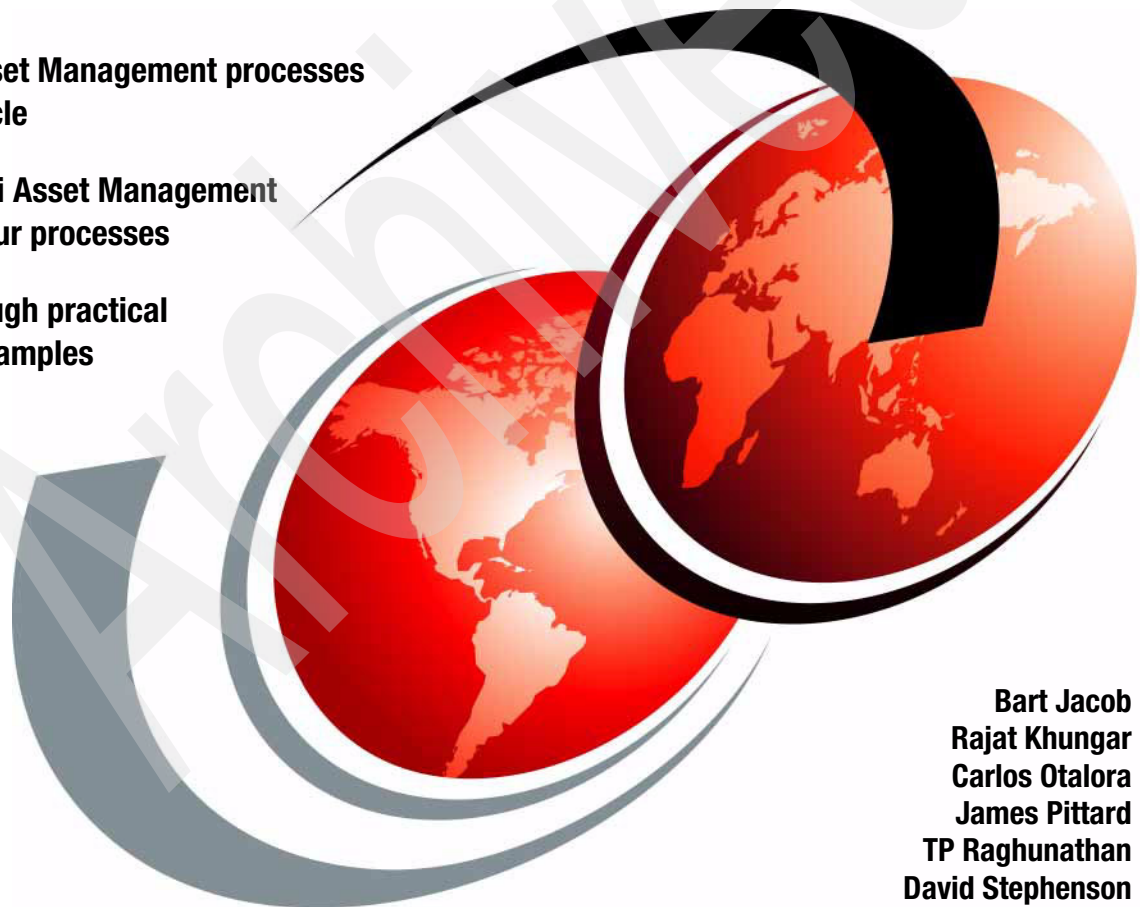


IT Asset Management Processes using Tivoli Asset Management for IT

Review Asset Management processes
and life cycle

Apply Tivoli Asset Management
for IT to your processes

Learn through practical
process examples



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International Technical Support Organization

IT Asset Management Processes using Tivoli Asset Manager for IT

July 2008

Archived

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

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Contents

Figures	vii
Notices	ix
Trademarks	x
Preface	xi
The team that wrote this book	xi
Become a published author	xiv
Comments welcome	xiv
Chapter 1. Managing assets in the business of IT	1
Chapter 2. ITIL and PRM-IT overview	5
2.1 ITIL	6
2.1.1 Service Strategy	7
2.1.2 Service Design	7
2.1.3 Service Transition	8
2.1.4 Service Operation	9
2.1.5 Continual Service Improvement	9
2.2 PRM-IT	9
2.2.1 The context and scope of PRM-IT	11
2.2.2 PRM-IT processes related to IT asset management	13
2.3 IT asset management and ITIL CMDB	14
2.3.1 Asset repositories	15
2.3.2 CMDBs	15
Chapter 3. Overview of Tivoli Asset Management for IT	19
3.1 Management disciplines	22
3.2 The Tivoli Asset Management for IT license	24
3.2.1 Related process automation engine licenses	25
3.3 Phasing in the process automation engine for IT management disciplines	27
3.4 Tivoli Asset Management for IT applications	29
3.4.1 Discovery applications	29
3.4.2 Conversion applications	32
3.4.3 Reconciliation applications	34
Chapter 4. Asset life cycle	39
4.1 Asset management life cycle processes	40
4.1.1 Planning phase	42

4.1.2	Acquiring (procurement) phase	44
4.1.3	Deployment phase	45
4.1.4	Management phase	46
4.1.5	Retirement phase	48
4.1.6	Reporting	51
Chapter 5.	Process implementation	53
5.1	Roles, responsibilities, and restrictions	54
5.1.1	Delineating groups by application functions	54
5.1.2	Creating groups for each site	55
5.2	Asset management entities	55
5.2.1	Item Masters	56
5.2.2	Storerooms	59
5.2.3	Accounting in Locations versus Storerooms	60
5.2.4	Using the Receiving application	63
5.2.5	Items versus assets	66
5.2.6	Item assembly structures	66
5.2.7	Desktop Requisition templates	68
5.2.8	Multiple views of software	68
5.2.9	Autonumbering of asset numbers	69
5.2.10	Classifications	71
Chapter 6.	Initial data load	81
6.1	Considerations	82
6.1.1	Assessing data	82
6.1.2	Master data management	82
6.1.3	Federated asset data	83
6.1.4	Pooling or assigning assets process considerations	84
6.1.5	Identifying roles and responsibilities	86
6.1.6	Audit controls	86
6.1.7	Event management	86
6.1.8	Barriers to implementation	87
6.2	IBM Tivoli Integration Composer V7.1	88
6.2.1	Requirements	88
6.2.2	Tivoli Integration adapters	89
6.2.3	Setup	90
6.2.4	Troubleshooting Tivoli Integration Composer	109
Chapter 7.	Procuring software	113
7.1	Procurement flow	114
7.2	Entering an order	116
7.2.1	Ordering a license versus ordering a product	116
7.2.2	Ordering installation media	117
7.2.3	Ordering pre-installed hardware	117

7.2.4 Ordering a license versus ordering an item	118
7.3 Entering orders into Asset Management for IT	121
7.4 Receiving.	122
7.5 Reviewing software configuration	125
7.6 Delegating purchase order closure	125
7.7 Storing software package and license key in Secure Software Library.	126
7.8 Updating the Secure Software Library registry	127
7.9 Recording the software license	128
7.10 Purchase request and software availability	128
7.11 Allocating the software license	128
7.12 Tax implications.	129
7.13 Procuring licenses for a work order.	130
Chapter 8. Asset reconciliation	133
8.1 Roles	135
8.2 Linking assets	135
8.2.1 Inventory tracking and counts	137
8.2.2 Actionable alternatives	138
8.2.3 Matching data	141
8.2.4 Redundancy	142
8.2.5 User input	143
8.2.6 Service desk input.	143
8.2.7 Duplicates	143
8.2.8 Unmatched data	144
8.3 Using Asset Link results	148
8.3.1 Discovering location	148
8.3.2 Discovering person assignments	150
8.3.3 Assets managing themselves	151
8.4 Initial loads of authorized inventory from discovered information	151
8.5 Software conversion	152
8.6 Relationship of Item Master to software product.	154
8.6.1 Item assembly structures	156
8.6.2 Bundling discovered products.	157
8.6.3 Third-party discovery tools and bundling	157
8.7 CCMDB and Tivoli Asset Management for IT	158
8.7.1 Linking procurement records with CIs.	160
Chapter 9. Tracking software inventory	163
9.1 Tracking software installation locations.	164
9.2 Software details.	164
9.3 License pools	164
9.4 Software costs in inventory	165
9.4.1 Inventory transactions applicable to licenses	166

9.5 Inventory accounts applicable to software	167
9.6 Using inventory for compliance	168
9.7 Order and Issue Units	171
9.8 Charge-backs	172
Chapter 10. Planning and refresh	175
10.1 Planning as an organizational capability	176
10.1.1 Information requirements	179
10.1.2 Tools to assist planners	180
Chapter 11. Retirement process	181
11.1 Performing retirement tasks with job plans	182
11.2 Changing the status of an asset	183
11.3 Monitoring software license compliance and disposal	190
Related publications	193
IBM Redbooks	193
Other publications	193
Online resources	194
How to get Redbooks	194
Help from IBM	194
Index	195

Figures

2-1	Managing IT and interactions with external agents	11
2-2	Process categories of PRM-IT	12
3-1	Menu structure of Tivoli Asset Management for IT	21
3-2	Modules associated with Tivoli's process automation engine	22
3-3	Applications available with each module	27
3-4	Menus for discovery applications	30
3-5	Menus for conversion applications	32
3-6	Reconciliation application menus	35
4-1	IT asset management life cycle	40
5-1	Standard desktop computer Item Master	57
5-2	PO charged to Operating Location	61
5-3	Application Designer	64
5-4	Edit dialogs icon	65
5-5	Specifications for an asset	76
5-6	Searching for specification values	77
5-7	Use in Description Generation? and Use in Specification? options	79
6-1	Federated asset data	84
6-2	Maximo database connection settings	91
6-3	Disabling software updates	92
6-4	Integration Composer logon	93
6-5	Integration Composer main menu	93
6-6	Hardware software data source	95
6-7	Importing schema	96
6-8	Hardware software schema file name	96
6-9	Classes after import	97
6-10	MAXIMO data source	98
6-11	Completed mapping	99
7-1	Procurement process	114
7-2	Receiving software process	123
8-1	Authorized versus discovered assets	134
8-2	Reconciliation - overlapping sets of data	136
8-3	Asset details panel	139
8-4	Asset reconciliation results	140
8-5	Filtering for reconciliation	153
8-6	Start center with reconciliation view	154
10-1	Example refresh policy	177
11-1	List of assets	184
11-2	Asset in NOT READY status	185

11-3 Change Status dialog	186
11-4 Asset in OPERATING status.	187
11-5 Changing the status to DECOMMISSIONED	188
11-6 Asset in DECOMMISSIONED status	189

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Preface

As IT organizations are under pressure to increase their effectiveness, while reducing costs, many are applying traditional processes and tools that have been used for enterprise asset management to their IT assets. The IBM® Tivoli® Maximo® Asset Management product, rebranded after the acquisition of MRO by IBM, is an example of an industry leading tool for managing enterprise assets.

The IBM Tivoli Asset Management for IT product is based on the same foundation as Maximo Asset Management and provides additional capabilities targeted for the management of IT assets (both hardware and software).

This IBM Redbooks® publication describes current industry trends and thought leadership on IT asset management and describes how the IBM Tivoli Asset Management for IT V7.1 product can help implement and support IT asset management processes.

This book is not intended to teach readers about Tivoli Asset Management for IT V7.1, but rather assumes they are familiar with Maximo Asset Management and can access Asset Management for IT V7.1 documentation.

This book does provide high-level overviews, using product-specific terminology, describing how the product capabilities can enhance the implementation and automation of common IT asset management processes.

The team that wrote this book

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



Figure 1 l to r - David Stephenson, TP Raghunathan, James Pittard, Bart Jacob, Rajat Khungar, Carlos Otalora

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James Pittard has extensive experience with Maximo and Tivoli's process automation engine implementations on customer sites, especially implementations for IT asset and service management. He is currently working for IBM as a developer, focusing on managing license procurement, distributions, and compliance.

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Managing assets in the business of IT

As with other business units today, information technology (IT) organizations are required to run efficiently, be accountable and provide support, and add value to a company's core business. Aside from all other aspects of IT operations, IT assets and their management are increasingly coming under focus.

Some of the benefits of focused IT asset management include:

- ▶ Addressing IT cost management challenges and helping to reduce total cost of ownership (TCO) by providing greater visibility for end-to-end IT asset management
- ▶ Providing solutions that enable clients to measure the usage of shared IT resources for resource accounting, charge-back billing, IT cost management, cost reduction, and optimization
- ▶ Simplifying the growing complexity of license compliance
- ▶ Integrating IT asset management with extensive IT service management capabilities, providing clients with world-class end-to-end processes

The discipline of IT asset management is borrowing the practices and processes of enterprise asset management. One of the leading software solutions for enterprise asset management is Maximo Asset Management. Maximo Asset Management is now an IBM offering and has been adapted and enhanced to

support IT asset management. The IT asset management version of the Maximo Asset Management product is called IBM Tivoli Asset Management for IT and is the primary focus of this book.

IBM Maximo Asset Management and Asset Management for IT provide a computerized asset maintenance system that offers asset management, work management, materials management, and purchasing capabilities to help companies maximize productivity and extend the life of their assets.

IBM Maximo Asset Management and Asset Management for IT enable a company to create a strategy for maintenance, repair, and operations related to both Enterprise Asset Management® (EAM) and Information Technology Asset Management.

The Tivoli Asset Management for IT product is configured to meet the needs of enterprises managing their information technology assets. Functionally, Asset Management for IT stores and maintains data about a company's assets, facilities, and inventory. This information can be used to help schedule maintenance work, track asset status, manage inventory and resources, and analyze costs.

Aside from traditional hardware assets (servers, clients, networking components, and so on), Tivoli Asset Management for IT provides functions to help track and manage software assets by tracking contracts and licenses. Software license management is a key point of focus in many companies looking to limit their legal exposure due to noncompliance. In addition, tracking the software that is actually in use, companies can negotiate improved contracts for the software they are using, eliminate or reduce the number of licenses for software that is not being used, and make support more efficient by helping ensure consistency in software and software versions being used across the enterprise.

Some of the key benefits and uses of a Maximo-based solution include:

- ▶ Improve the availability and performance of their assets while decreasing operating costs and without increasing liabilities.
- ▶ Recording service requests and all related records and communications from the initial request to problem resolution.
- ▶ Tracking work orders and failures to better schedule preventive maintenance.
- ▶ Track information technology assets and their configurations across a network.
- ▶ Track inventory use to find optimum stock levels. The goal is to maximize availability of items for upcoming work, while also reducing unnecessary inventory and associated carrying costs.

- ▶ Track purchasing of inventory stores and materials for work orders. To assist in creating budgets, you can use Maximo to track costs for labor, materials, services, assets, and tools used to complete work orders.

An installation of Tivoli Asset Management for IT consists of several components that work together:

- ▶ Relational database
- ▶ Application server software
- ▶ Tivoli Asset Management for IT software including Tivoli's process automation engine (formerly known as Maximo base services) that provide:
 - System administration applications for initial setup, configuration, and security
 - User applications specifically addressing asset management
 - Business Intelligence and Reporting Tools (BIRT), an open source reporting tool

The Tivoli's process automation engine, on which Tivoli Asset Management for IT is built, provides a variety of capabilities including a workflow engine, which can automate processes that are repetitive or that occur at regular intervals.

Maximo applications are grouped into modules. The applications in a module have similar purposes; for example, applications related to purchasing are grouped together. Some applications, such as Work Order Tracking, function individually, while others create records designed to be used in conjunction with records created in other applications.

Depending on user job descriptions and security permissions, they may have access to some or all of the Maximo modules and applications.

ITIL and PRM-IT overview

This chapter provides an overview of the IT Infrastructure Library® (ITIL) and the IBM Process Reference Model for IT™ (PRM-IT), both of which are in place to help define IT processes such as those related to asset management and to make them consistent and repeatable.

2.1 ITIL

ITIL is a public framework that describes best practice in IT service management. It provides a framework for the governance of IT and focuses on the continual measurement and improvement of the quality of IT service, from both a business and a customer perspective. This focus is a major factor in ITIL's worldwide success and has contributed to its prolific usage and to the key benefits obtained by those organizations deploying the techniques and processes throughout their organizations. These benefits include the following:

- ▶ Increased user and customer satisfaction with IT services
- ▶ Improved service availability, directly leading to increased business profits and revenue
- ▶ Financial savings from reduced rework, lost time, and improved resource management and usage
- ▶ Improved time-to-market for new products and services
- ▶ Improved decision making and optimized risk

ITIL was published between 1989 and 1995 by Her Majesty's Stationery Office (HMSO) in the U.K. on behalf of the Central Communications and Telecommunications Agency (CCTA) - now subsumed within the Office of Government Commerce (OGC). Its early use was principally confined to the U.K. and the Netherlands. A second version of ITIL was published as a set of revised books between 2000 and 2004.

The initial version of ITIL consisted of a library of 31 associated books covering all aspects of IT service provision. This initial version was then revised and replaced by seven, more closely connected and consistent books (ITIL V2) consolidated within an overall framework. This second version became universally accepted and is now used in many countries by thousands of organizations as the basis for effective IT service provision. In 2007, ITIL V2 was superseded by an enhanced and consolidated third version of ITIL, consisting of five core books covering the service life cycle, together with the official introduction.

The five core books cover each stage of the service life cycle, from the initial definition and analysis of business requirements in Service Strategy and Service Design, through migration into the live environment within Service Transition, to live operation and improvement in Service Operation and Continual Service Improvement.

A sixth book, the *Official Introduction to the ITIL Service Lifecycle*, offers an overview of the five books and an introduction to IT service management as a whole.

Note: You can access the official ITIL Web site at:

<http://www.itil-officialsite.com/>

The contents of the five core books are outlined in the following sections.

2.1.1 Service Strategy

The *Service Strategy* book provides guidance to all IT service providers and their customers to help them operate and thrive in the long term by building a clear Service Strategy. The strategy includes:

- ▶ The services that should be offered
- ▶ Who the services should be offered to
- ▶ How the internal and external marketplaces for these services should be developed
- ▶ The existing and potential competition in these marketplaces, and the objectives that differentiate the value of what customers do or how they do it
- ▶ How customers and stakeholders perceive and measure value, and how this value is created
- ▶ How customers make service sourcing decisions with respect to the use of different types of service providers
- ▶ How robust business cases are created to secure strategic investment in service assets and service management capabilities
- ▶ How the allocation of available resources can be tuned to optimal effect across the portfolio of services
- ▶ How service performance is measured

2.1.2 Service Design

As described in volume 2 of the ITIL series, Service Design is a stage within the overall service life cycle and is an important element within the business change process. The main goals and objectives of Service Design are to:

- ▶ Design services to meet agreed business outcomes
- ▶ Design processes to support the service life cycle

- ▶ Identify and manage risks
- ▶ Design secure and resilient IT infrastructures, environments, applications, and data and information resources and capability
- ▶ Design measurement methods and metrics
- ▶ Produce and maintain plans, processes, policies, standards, architectures, frameworks, and documents to support the design of quality IT solutions
- ▶ Develop skills and capabilities within IT
- ▶ Contribute to the overall improvement in IT service quality

2.1.3 Service Transition

The role of Service Transition is to deliver services required by a business for operational use. The Service Transition process does so by receiving the Service Design package from the Service Design stage and delivering to the Service Operation stage every necessary element required for ongoing operation and support of that service. If business circumstances, assumptions, or requirements have changed since design, modifications may well be required during the Service Transition stage in order to deliver the required service.

Service Transition is supported by underlying principles that facilitate effective and efficient use of new or changed services. Key principles include:

- ▶ Understanding all services, their utility, and warranties. To transition a service effectively, it is essential to know its nature and purpose in terms of the outcomes or removed business constraints (utilities) and the assurances that the utilities will be delivered (warranties).
- ▶ Establishing a formal policy and common framework for implementation of all required changes. Consistency and comprehensiveness ensure that no services, stakeholders, occasions, and so on are omitted and thus cause service failures.
- ▶ Supporting knowledge transfer, decision support, and reuse of processes, systems, and other elements. Effective Service Transition is delivered by involving all relevant parties, ensuring appropriate knowledge is available and that work done is reusable in future similar circumstances.
- ▶ Anticipating and managing course corrections. Being proactive and determining likely course correction requirements, and when elements of a service do need to be adjusted is undertaken logically and is fully documented.
- ▶ Ensuring involvement of Service Transition and Service Transition requirements throughout the service life cycle.

2.1.4 Service Operation

As described in volume 4 of the ITIL series, the purpose of Service Operation is to deliver agreed levels of service to users and customers and to manage the applications, technology, and infrastructure that support delivery of services.

It is only during this stage of the life cycle that services actually deliver value to the business, and it is the responsibility of Service Operation staff to ensure that this value is delivered.

It is important for Service Operation to balance conflicting goals:

- ▶ Internal IT view versus external business view
- ▶ Stability versus responsiveness
- ▶ Quality of service versus cost of service
- ▶ Reactive versus proactive activities.

2.1.5 Continual Service Improvement

Continual Service Improvement (CSI) is concerned with maintaining value for customers through the continual evaluation and improvement of the quality of services and the overall maturity of the IT Service Management (ITSM) service life cycle and underlying processes.

CSI combines principles, practices, and methods from quality management, change management, and capability improvement, working to improve each stage in the service life cycle, as well as the current services, processes, and related activities and technology.

2.2 PRM-IT

The IBM Process Reference Model for IT is a powerful management tool for investigating and identifying areas for IT improvement. It also provides a proven starting point for the design and implementation of new and upgraded IT management capabilities. This common model equips IT consultants, architects, and specialists with a full range of methods and techniques to help customers enhance their IT management.

With the Process Reference Model for IT (PRM-IT) and IBM Service Management solutions, organizations can take advantage of a comprehensive and rigorously engineered process model that describes the inner workings of all

IT processes and their relationships. As such, PRM-IT can improve control, enhance processes, and better align IT with business goals and priorities.

IT management is a standardized set of activities that can be measured and improved upon over time. Process frameworks are valuable tools, having already been proven effective in many other business domains such as manufacturing, accounting, and customer service.

To optimize organizational routines, it is necessary to identify and document the processes involved and their associated activities:

- ▶ Where they start and stop
- ▶ What they include and exclude
- ▶ How they interact with one another
- ▶ What resources are being allocated
- ▶ Whether the investment in those resources is paying off

A process model for IT management provides a frame of reference against which an organization can assess its performance.

PRM-IT extends IT management process frameworks beyond operational efficiency to investment optimization. From a portfolio perspective, PRM-IT provides a reference process framework for managing the investment of people and resources in business technology initiatives intended materially to increase profitable revenue growth while recognizing the reality of multisourced service provision.

PRM-IT is an integrated collection of the processes involved in using IT to assist businesses in carrying out many or all of their fundamental purposes. It describes, at a generic level, the activities performed so that IT provides value to the stakeholding business or businesses.

For most businesses, this use of IT is a means to improve the business processes that underpin their value propositions to the industry segments they serve. For others, IT services have been major value propositions in their own right. As the reach and range of IT-based solutions and services have extended and become pervasive, these two uses of IT have converged. Accordingly, as IT exploitation becomes synonymous with business success, the basis of this model is to describe IT as a business and to apply the same business process description techniques to it as those applied to any other part of the business.

2.2.1 The context and scope of PRM-IT

PRM-IT focuses on all potential activities shown in Figure 2-1 but also recognizes that many of its activities rely on interactions with other parties (that is, “external agents”).

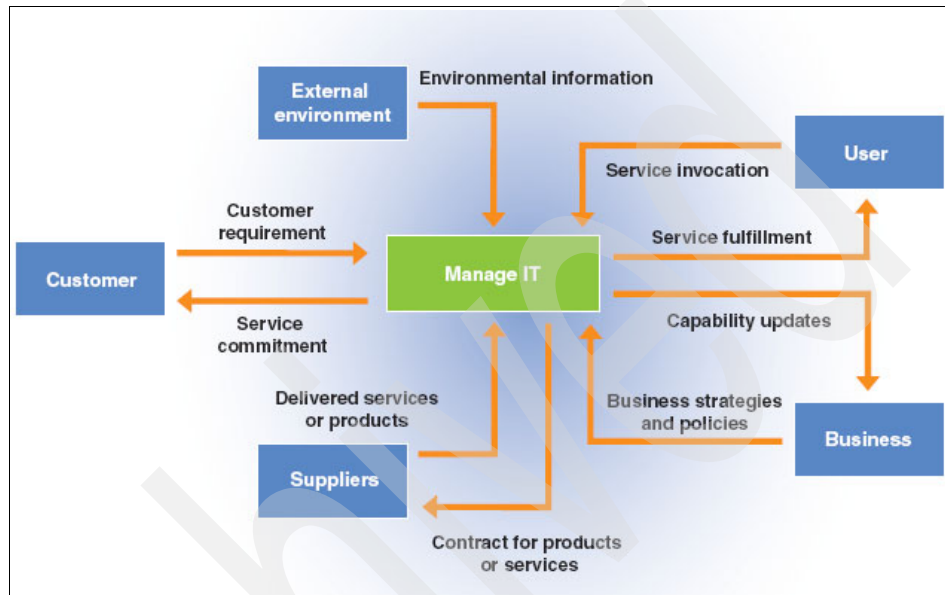


Figure 2-1 Managing IT and interactions with external agents

Process categories

PRM-IT presents a framework that uses eight process categories:

- ▶ IT governance and management system
- ▶ IT customer relationships
- ▶ IT direction
- ▶ Solution development
- ▶ Solution deployment
- ▶ IT operational services
- ▶ IT resilience
- ▶ IT administration

These categories are shown in Figure 2-2.

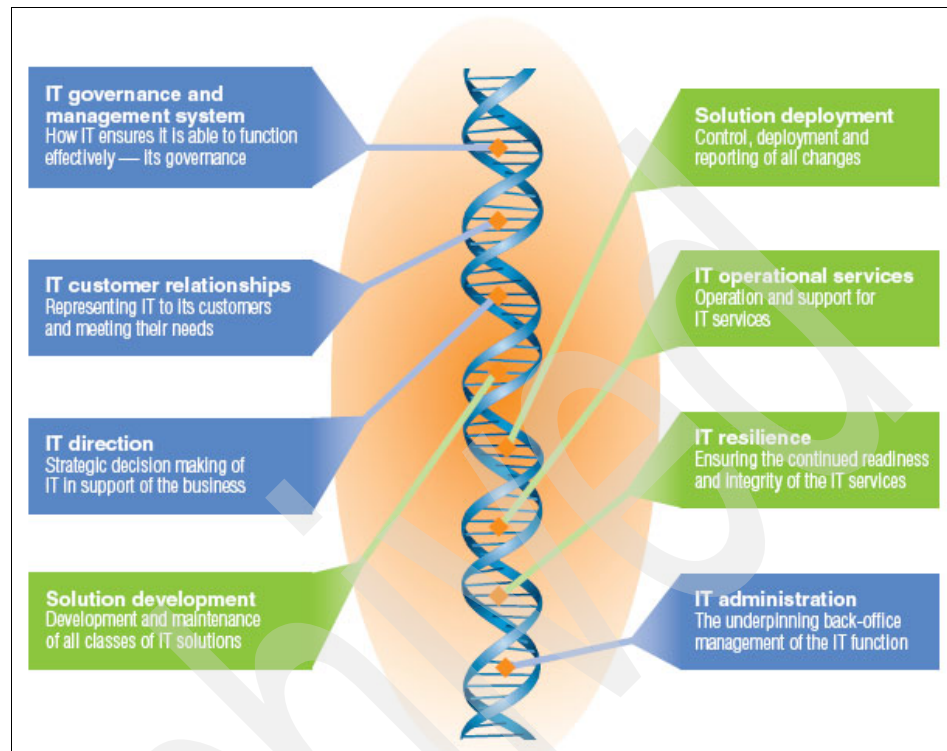


Figure 2-2 Process categories of PRM-IT

The categories shown in Figure 2-2 convey the following four concepts:

- ▶ The categories shown in green (that is, the bottom one on the left and the top three at right) describe the primary processes that produce and deliver the service needed by the IT customer.
- ▶ The primary activities follow a create - deploy - operate - maintain approach. This produces the following sequence:
 - Solution development
 - Solution deployment
 - IT operational services
 - IT resilience
- ▶ The categories shown in blue (see Figure 2-2 - the top three on the left and the bottom one at right) describe the supporting processes that facilitate the success of the primary processes.
- ▶ The supporting processes are best split into those that focus on the result that IT must achieve - namely, IT customer relationships and IT direction, and

those describing the underpinning setup and ongoing maintenance of the IT functional capability (IT governance and management system and IT administration).

PRM-IT contains a total of 41 processes, across the eight categories.

2.2.2 PRM-IT processes related to IT asset management

PRM-IT defines an asset management process. In addition many other processes are defined by PRM-IT that relate to asset management. Some of these processes are defined as follows:

- ▶ Asset management

To identify, collect, maintain and report inventory and financial information about IT assets throughout their life cycle.

- ▶ Change management

To control and manage requests for change (RFCs) to the IT environment, from inception through implementation. Basically, a change is anything that alters the status of a configuration item (CI). This typically includes anything that adds to, deletes from, or modifies the IT infrastructure.

A further definition of a change is the addition, modification, or removal of approved, supported, or baselined hardware, network, software, application, environment, system, desktop build, or associated documentation. An RFC is the means for documenting proposed changes and actual change activity in the environment. RFCs can be triggered for a wide variety of reasons, from a wide variety of sources. RFCs can be concerned with any part of the infrastructure or with any service or activity.

- ▶ Release management

To control the introduction of releases into the production environment and minimize risk associated with the changes.

- ▶ Configuration management

To maintain and provide accurate information about CIs and their relationships in a logical model. The definition of a configuration item is a component of the infrastructure that is to be under the control of configuration management. Primarily, this includes hardware, software, and related documentation. However, it may also include RFCs, SLAs, procedures, and other items that must be controlled. Information about CIs is kept in a configuration management database (CMDB).

2.3 IT asset management and ITIL CMDB

IT asset management repositories offer some of the capabilities of a configuration management database (CMDB) as defined by ITIL but lack specific critical functions needed to provide a service view in a CMDB. However, some early CMDB adopters started their initiatives with this tool set.

Members of asset management teams continue to be part of CMDB projects, and they want to maintain an accurate asset view to enable them to understand system costs and the impact of change on availability. This view includes what the asset is and where it is installed, as well as the financial and contractual information needed to keep accurate records for audits.

Early implementations of CMDB projects are not new to IT asset management users who may have customized their databases to be CMDBs. Many of the early CMDB initiatives used customized asset management repositories to correlate inventory tracking data with configuration items to create a comprehensive view of the asset.

This approach provided users with a narrow view of the potential impact and usefulness of a CMDB. IT asset management does not focus on managing the tracking of patches or software components - for example, an operating system's dynamic-link library (DLL), because the DLL typically does not have a "contract" associated with it. Nor does it emphasize relationships among software components, hardware components, or the same components at multiple levels. This approach is from a physical asset perspective.

Companies should not use IT asset management repositories as the starting point for CMDBs because of their core focus on the licensing and financial management of IT assets. However, IT asset management repositories should be considered key points of federation and potential uses of CMDB information. As enterprises move to more mature CMDB approaches, such as service configuration views, they need more robust capabilities, such as federation, reconciliation, mapping, visualization, and synchronization, that include relationship information beyond the components within a physical asset.

To understand the asset repository versus CMDB issue, it is helpful to clarify the differences between an asset repository and a CMDB.

2.3.1 Asset repositories

An IT asset management repository contains three types of data about components:

- ▶ Physical
- ▶ Financial
- ▶ Contractual

Asset management involves contract terms and conditions, asset costs, depreciation, vendor service levels, asset maintenance, and ownership and entitlements associated with PCs, network devices, servers, storage, or software components. Capturing and integrating physical, financial, and contractual data into a central repository enables the necessary functions to effectively manage a software and hardware asset portfolio. These repositories store relationships that reconcile physical, financial, and contractual data, but there is no relationship mapping across or among items that shows the impact of a change or does root-cause analysis. Instead, the relationships detail parent-child information, which enables the reconciliation or matching of physical, financial, and contractual information.

An IT asset management repository can generate information to support management functions, such as budgeting, planning, deployment, charge-back, software license compliance, software use patterns, lease management, and contract renegotiations. Integrating an IT asset management repository with other back-end systems (such as help desk, purchasing, human resources, and facilities management) can aid workflow and enable more efficient use of resources.

An IT asset management system is populated with inventory data, so users can reconcile a view of what is installed with purchase orders and contract details (for example, planned versus actual). Without inventory details, organizations cannot be certain that employees are adhering to standard purchasing processes or buying from negotiated contracts. Organizations that focus only on contract and cost issues typically base IT asset management in the finance department.

2.3.2 CMDBs

A CMDB creates a comprehensive service view. This view is made up of the necessary configuration details, which are usually isolated in standalone repositories or, worse, manually maintained in spreadsheets and Visio® diagrams. A CMDB federates multiple sources of configuration data and links to other sources to enable deeper views in context.

Therefore, a CMDB also needs to be reconciled, but this process involves more than just matching, which is the case for an asset repository. CMDB reconciliation checks for duplicates and matches trusted sources against other sources to ensure data currency. As the CMDB validates data and eliminates duplicates, it creates a consolidated view. This enables better decision making for long-term projects, such as rolling out a new application to an established set of servers, and short-term requirements, such as understanding the impact of rolling out a patch to a server that is part of a shared application server farm.

Because one of the common similarities between an asset repository and a CMDB is the need for current configuration data, early CMDB initiatives that focused on the impact of integrating discovery with the financial and contractual often leveraged asset repository tools that provided integration adapters for various inventory discovery tools. Because an IT asset management database takes a feed from the inventory tool, it is often mistakenly assumed that this data can be used to start a CMDB.

However, although inventory (configuration) data is useful, it is only a starting point. Most, if not all, early implementations focused on PCs. Those that included servers added manually defined and “massaged” data, which often lagged in real-time value or, worse, accuracy. Although an asset repository can show relationships, it typically illustrates parent-child relationships. For early adopters, this approach often met the needs for a focused project and adhered to the basics provided in the IT Infrastructure Library definition of a central, single repository. However, a critical piece was missing, which continues to be a challenge for asset vendors that are moving their solutions to include a CMDB - the ability to represent the discovered data in a peer-to-peer or hierarchical service view.

The relationships that these early repositories maintained were related to the previously mentioned physical, financial, and contractual categories. Although not fitting the definition of a true CMDB, an investment to perform data integration among inventory, financial, and contractual data within an asset repository is nonetheless worthwhile, even if it is under the guise of a CMDB initiative. In addition, the value of a CMDB is greater when it is used in dynamic environments with high-cost applications, such as a data center.

Asset repository versus CMDB

As described previously, the objectives and content of an asset repository and a CMDB are different, but the data that is stored is also similar. An asset repository is similar to a CMDB in the following ways:

- ▶ Both can integrate discovered inventory and configuration item data. Asset tools have created adapters for many discovery sources, such as the

Microsoft System Management Server (SMS). CMDBs and asset repositories can track history and changes to a discovered configuration item.

- ▶ Both tools are able to integrate data from more than one source.

An asset repository differs from a CMDB in these ways:

- ▶ Asset repositories can associate assets to employees, cost centers, locations and projects, and then correlate that data back to a contract or purchase order. CMDBs focus on configuration data with links to other sources for deeper context evaluation.
- ▶ Both CMDBs and asset repositories can represent relationships; however, asset repositories automate parent-child relationships, ranging from discovery to financial and contractual data. CMDBs, on the other hand, maintain and visualize all types of relationships necessary for a service view, including parent-child, peer-to-peer, and hierarchical. This can be maintained in spreadsheets. Asset management tools cannot build a graphical representation of peer-to-peer relationships that visually depict the components of “service,” which are composed of a specific set of configuration items.
- ▶ A CMDB can maintain a hyperlink to view change management history and other supporting data sources, such as process-run book documentation. Only mature IT asset management systems maintain hyperlinks beyond that to image versions of contracts. A CMDB is integrated with an IT asset management repository for access to data that does not have to be stored directly in the CMDB.
- ▶ An asset repository can track the cost of individual assets associated with supplying a service. A CMDB focuses on the configuration data associated with an asset and, more broadly, a set of assets that make up a service in a near real-time view.
- ▶ Reconciliation differs between CMDBs and asset repositories. Asset repositories match the three data sources (physical, financial, and contractual). In a CMDB, reconciliation provides the critical function of checking for and eliminating duplicate data from different sources. In addition, the CMDB reconciliation recognizes trusted sources for CMDB updates.

Important: The Tivoli Asset Management for IT product, which is based on Tivoli's process automation engine (formerly known as Maximo base services), is primarily designed to be an asset repository. However, IBM also has a CMDB product called CCMDB (Change and Configuration Management Database) that is also built on top of the Tivoli's process automation engine technology and utilizes the same database. Though the CCMDB data and asset management data use different sets of tables within the database, groundwork is laid for the integration of these sets of data to provide additional value.

Overview of Tivoli Asset Management for IT

Tivoli Asset Management for IT V7.1 is one of several products integrated on Tivoli's process automation engine. Tivoli's process automation engine used to be known as the base services capabilities of the Maximo Asset Management product. Since acquiring the Maximo product set, IBM has adapted and adopted the core functions to provide a consistent platform on which to implement critical service management applications such as Service Request Manager, Change and Configuration Management Database, Maximo Asset Management, and the Tivoli Asset Management for IT products.

Tivoli's process automation engine is based on a J2EE™ architecture. Its primary logic executes in an application server (either IBM WebSphere® Application Server or BEA WebLogic Server). It also utilizes a relational database (such as DB2®, Oracle®, or Microsoft SQL Server®).

Each product installed on top of Tivoli's process automation engine is enabled through its own license. Therefore, the single platform can provide support for various applications within the service management discipline. In addition, Tivoli's process automation engine can provide integration through the user interface and by sharing data as appropriate and meaningful.

The user interface for applications based on Tivoli's process automation engine is provided through a Web browser. The standard interface looks similar for all applications, with a standard set of menus. However, each application provides its own functions and adds menus and dialogs specific to the application. The user interface can also be customized by individual customers to provide their own look and feel.

Tivoli's process automation engine can be considered an application in itself, but we often refer to groups of functionality within Tivoli's process automation engine as "applications." A Go To menu in Tivoli's process automation engine enables a user to access the various applications. Different users see different subsets of this menu depending on their authorizations in Tivoli's process automation engine security and the licenses applied to the server.

When discussing modules, we are often referring to the way that applications are grouped on the Go To menu. For instance, as shown in Figure 3-1 on page 21, within the Asset Management for IT module of Tivoli's process automation engine is an Assets application, a Locations application, and several other applications.

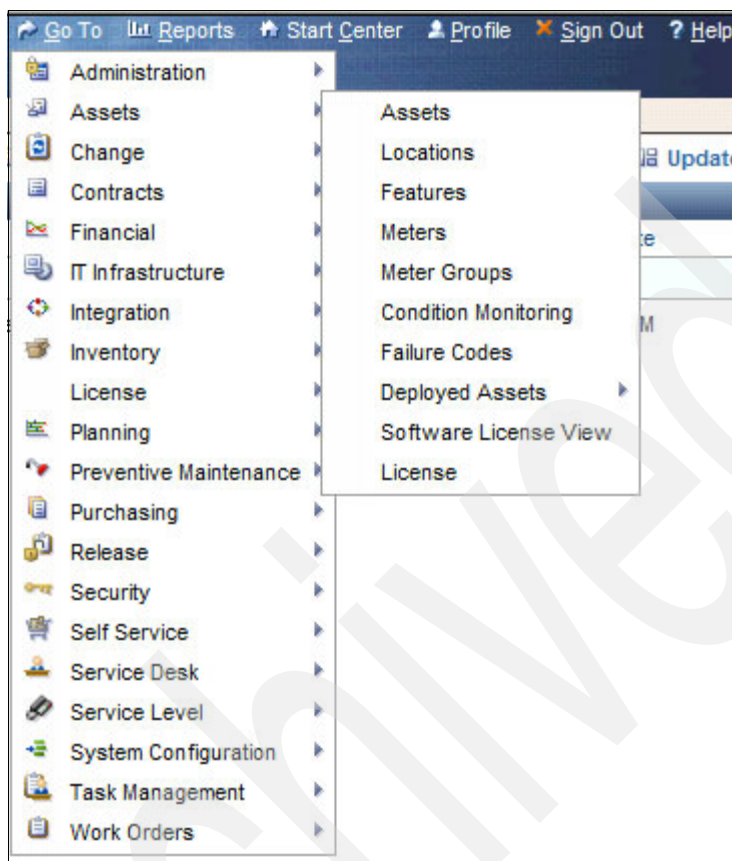


Figure 3-1 Menu structure of Tivoli Asset Management for IT

The Tivoli Asset Management for IT license enables access to a specific set of applications, but it also includes many applications from the services provided by Tivoli's process automation engine. Tivoli's process automation engine is the set of applications that come with all licensing packages and allow integration of the packages with each other and with external systems.

3.1 Management disciplines

One way to organize the sets of applications and modules that make up Tivoli Asset Management for IT and Tivoli's process automation engine is in terms of several traditional management disciplines, as shown in Figure 3-2.

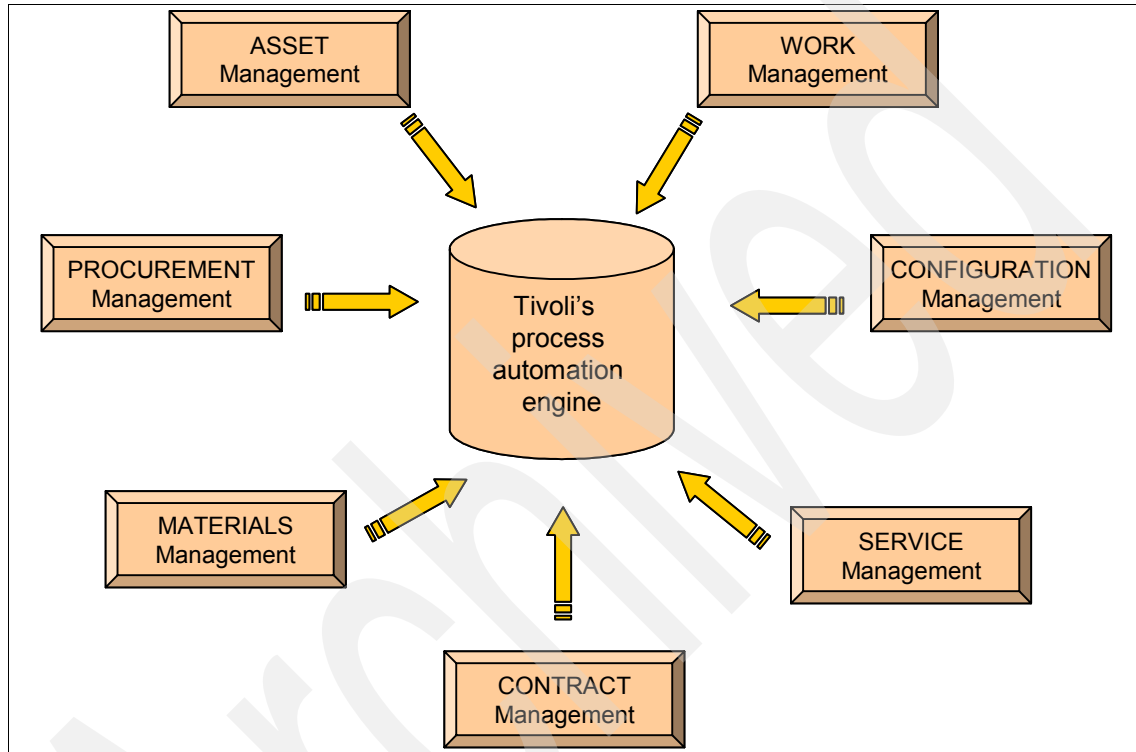


Figure 3-2 Modules associated with Tivoli's process automation engine

Each of these disciplines interacts with the others through the exchange of information and partial overlap of processes, but for the sake of discussion they can be considered separately. We briefly define each of these disciplines here.

Procurement management looks at how to improve efficiencies in procurement processes and in leveraging vendor relationships. Tivoli's process automation engine offers visibility into the processes by providing an integrated framework for procurement information. Control is usually achieved through integration with an external procurement system or ledger, and through configuration of Tivoli's process automation engine workflow features to automate and track repetitive tasks involving approvals.

Procurement management rests on good contracts management, the process through which vendors are approved and prices negotiated. Contracts management may also involve decisions about whether to lease or purchase assets, about labor negotiations, and about volume software agreements.

Once items are procured, assets may be managed through the disciplines of asset management or materials management. Asset management involves accounting for fixed assets, maintaining assets over their life cycle, and tracking asset costs in order to spot opportunities for increased efficiencies or savings. Materials management involves managing inventory and finding the best inventory balances to fulfill an organization's needs.

Work management is similar to project management in that it estimates and tracks the time and costs required to complete tasks. In fact, several integration packages are available to move information between Tivoli's process automation engine work management applications and enterprise project management tools. In addition to project management, work management includes preventive maintenance, recurring tasks required for regulatory compliance, or extending the life of assets, as well as work requests.

Work management is integrated with asset management in that the cost of the work performed can be rolled up into the total life cycle cost of the asset being maintained. It is integrated with materials management in that reservations for the materials needed for work can be automatically placed into the inventory applications, so that reordering can occur with sufficient lead time. Work management is integrated into contracts management in that labor contracts can be referenced, automatically referencing appropriate labor rates and incrementing balances. The workflow engine from Tivoli's process automation engine helps to automate repetitive tasks and approvals.

Service management augments work management by providing a central clearinghouse for requests from throughout an organization. A service catalog is a way of looking at the services that support organizations provide for customers in terms that both the support organization and the customers' understanding. Service catalogs may be integrated with operational-level agreements or service-level agreements to specify the particular levels of service to be expected and the costs for providing those levels. Service management emphasizes continually updating and improving services by looking at processes and root causes of problems.

Configuration management overlaps with asset management in that it requires a list of assets being tracked. But while configuration management focuses more on the relationships and dependencies between the configuration items that make up assets, asset management focuses on their financial details.

Some management disciplines are not covered in Tivoli's process automation engine. For instance, while Tivoli's process automation engine records double-entry transaction records related to each of the management disciplines previously mentioned, the platform cannot be substituted for a general ledger system. Instead, the platform provides tools for integration with ledger systems. Tivoli's process automation engine also provides only the most basic functionality for budget management, customer management, and application and other product development management, instead relying on the ability to flexibly integrate with external solutions.

Another management discipline not covered in Tivoli's process automation engine, of particular note for IT departments, is network management. Network devices may be discovered and fruitfully tied to authorized asset information within Tivoli's process automation engine. Also, events from network monitoring tools may be brought into Tivoli's process automation engine framework for uniform resolution from a work and service management. Visualization of dependencies for network equipment can be aided through Tivoli CCMDDB. However, visualization of network topology and performance, and configuration of infrastructure is best performed at this time through specialized network management tools outside of Tivoli's process automation engine.

3.2 The Tivoli Asset Management for IT license

Tivoli Asset Management for IT includes all of the Tivoli's process automation engine base services, plus several applications designed specifically to enhance an organization's ability to manage IT assets.

The Deployed Assets Module includes three applications that can also be accessed through Service Desk or Service Catalog licenses: Computers, Network Devices, Network Printers. These applications provide a uniform repository for information from various IT hardware and software discovery tools.

The Deployed Assets Module also includes several conversion applications available only under the Tivoli Asset Management for IT license (see 3.4.2, "Conversion applications" on page 32). The conversion applications enable customers to achieve consistent naming across discovery tools for the purposes of data mapping and uniform reporting and for reconciliation.

Two additional applications enable access to information imported from Tivoli License Compliance manager: the Software License view under the Assets module and the Software Contracts application under the Contracts module. These applications enable customers to tie Tivoli License Compliance Manager (TLCM) license data directly to the contracts capabilities available through the Tivoli Asset Management for IT or Maximo Asset Management licenses.

3.2.1 Related process automation engine licenses

Many IT organizations may want to look into purchasing other capabilities based on Tivoli's process automation engine in order to leverage the common information base. At the time of writing, several other license products are available for Tivoli's process automation engine that have various intersections with Tivoli Asset Management for IT:

- ▶ **CCMDB:** The ability to integrate with the Tivoli Application Dependency Discovery Manager (TADDM) tool.
- ▶ **SLA Manager:** Includes the Service Groups and Service Level Agreements applications. These applications support the ability to define service levels and track service-level compliance, and are integrated with the Service Desk application.
- ▶ **Service Catalog:** Includes applications that support the ability of customers to order services and of support organizations to fulfill them.
- ▶ **Service Desk:** These applications work together to give an ITIL approach to service management. Tivoli Asset Management for IT includes the Service Request Manager and the Self-Service Requisition applications as starters, but does not include the Incident and Problem Management applications. Tivoli Asset Management for IT also does not include the Solutions Catalog, a knowledge management application that helps to manage FAQs and the organizational history of problem diagnoses.
- ▶ **Maximo Asset Management:** Maximo Asset Management (used for enterprise asset management) includes many of the capabilities included with Tivoli Asset Management for IT, including the Contracts and Inventory modules, Purchasing, Work Management, and the Self-Service Requisition and Service Request Manager applications. In addition, Maximo Asset Management includes several applications not usually associated with work management for IT assets solutions: Hazards, Precautions, Lock Out/Tag Out, and Safety Plans.

Maximo Asset Management also includes the Asset Navigator, which provides visual configuration management for assets. Asset Navigator enables users to drill into exploded views of assets that are appropriate for mechanical parts and can integrate with vendor catalogs. The IT correlate to this application is the CCMDB, integrated with Tivoli Application Dependency Discovery Manager (TADDM), which allows navigation along relationship lines between application and service components.

- ▶ PMP applications: PMP stands for *process management platform*. Each of the PMP applications includes the ability to integrate through Business Process Execution Language (BPEL) to create and manage process requests among various tools across the enterprise.
 - Release PMP: The Release PMP application includes the Definitive Software Library application for managing installation configuration items. A Deployment application integrates with Tivoli Provisioning Manager so that installations can be initiated directly from Tivoli's process automation engine while retaining all the links to other information available through Tivoli's process automation engine. In addition, the Releases application enables organizations to track package dependencies and approvals.
 - The Change application may be available through CCMDB or through the Change and Corrective Action add-on to the Maximo Asset Management license. This application enables precedence among elements of job plans and the ability to assign specific workflows to tasks on the plan. The Change application in general provides a view into work orders with a focus on managing changes to infrastructure tracked as configuration items.
 - Linear Assets provides added functionality for managing assets such as highways or railroad tracks that must be tracked by features along the length of the asset (such as mile markers or intersections) in addition to tracking the asset itself. Very few IT assets require linear capabilities, with the possible exception of cabling.

Figure 3-3 shows the applications available with each module.

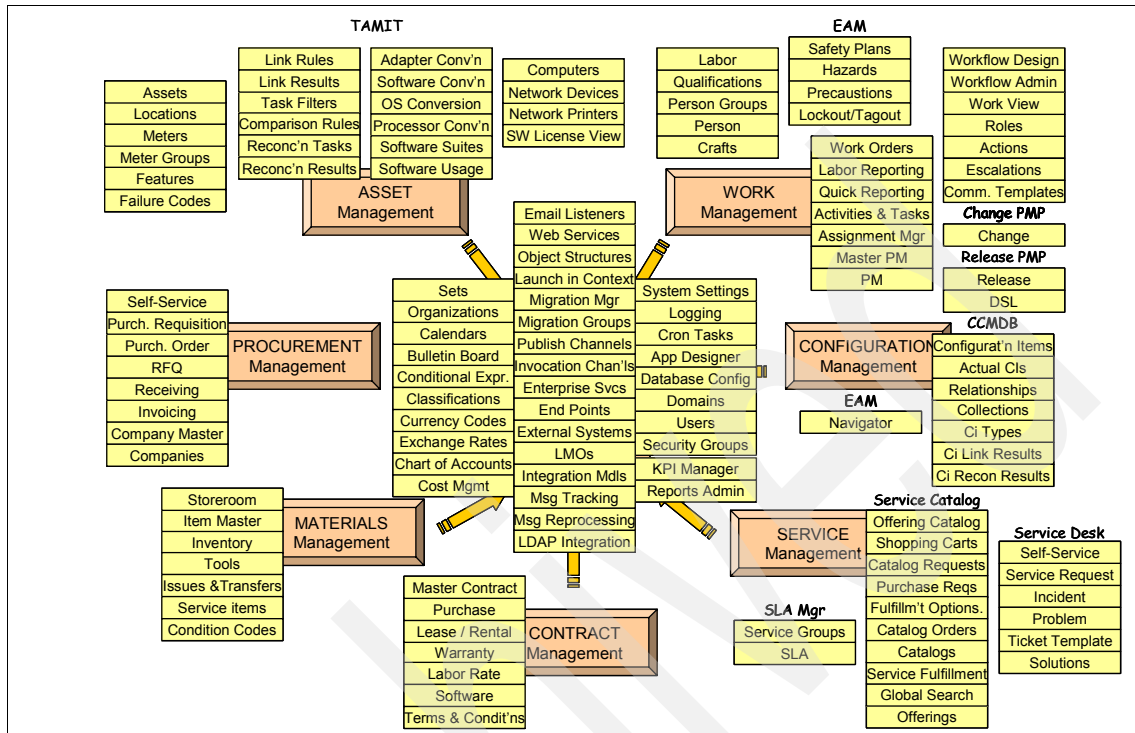


Figure 3-3 Applications available with each module

3.3 Phasing in the process automation engine for IT management disciplines

Many of Tivoli's process automation engine applications support the management disciplines. It is possible to use as many or as few applications as needed for your organization. Some organizations use asset management applications only, with procurement taking place in an external system.

IT departments seldom think in terms of materials management because IT equipment is seldom inventoried. It is common for computers and software to be ordered and deployed within days or hours. However, as the departments begin to actively manage their software licenses, they realize that materials management can accommodate the need to track license compliance and allocations.

Most IT departments have some form of ticketing or work tracking (or both) in place, possibly through a homegrown system. Tivoli's process automation engine makes it easy to link the service desk and work management to asset management through links to the asset database. It generally makes more sense for Tivoli's process automation engine to replace the existing systems than to integrate with them. However, if resource constraints or departmental buy-in dictate that the existing systems be kept for some time, an integration may make sense for the short term.

If an IT department decides to start using Tivoli's process automation engine for service and work management, we recommend you perform a process assessment along ITIL guidelines if possible prior to implementing the automation of processes through Tivoli's process automation engine. In general, Tivoli's process automation engine provides for the gradual maturation of processes by extending use of the framework; however, when switching systems, you have the opportunity to move into a more mature model of service provisioning.

IT departments may manage their own contracts, or a central authority for the business may manage contracts. IT departments managing their own contracts usually want to track only certain aspects of the contract in Tivoli's process automation engine, such as lease end dates and maintenance or warranty end dates. In this case, it may make more sense to simply add some fields to the asset records to track the attributes, rather than enter into full-blown contract management using Tivoli's process automation engine contracts applications.

If contracts are managed by a separate group specializing in contracts management, that group may have to be won over to using Tivoli's process automation engine in order to leverage the additional functionality available when current contracts information is integrated with the application through which asset management and the other management disciplines are performed. See the section on contracts management for an overview of those benefits.

All IT departments do some configuration management inasmuch as they look at dependencies before deploying new systems and applications. As the complexity of the enterprise increases, however, the benefits of automatic discovery of dependencies increases. The primary benefit of configuration management for IT within Tivoli's process automation engine is the ability to integrate change and release management processes with information available through the Tivoli automated discovery and provisioning tools.

A secondary benefit for Tivoli's process automation engine configuration management modules is the ability to track configurable relationships proactively on the authorized side, in conjunction with asset and materials management. If your organization must be able to look at total costs for an enterprise application, including configuration and maintenance for the various machines, maintenance for applications and licenses, and so forth, it is helpful to integrate this kind of information within Tivoli's process automation engine.

Likewise, if the organization wishes to make configuration information easily available to service desk analysts or technicians, integration within Tivoli's process automation engine can be helpful. Note, however, that the CCMDB and the Change and Release PMP tools are licensed separately, so the organization may have to wait until a convenient time to mature into these areas of management.

3.4 Tivoli Asset Management for IT applications

Tivoli's process automation engine applications specific to Tivoli Asset Management for IT can be divided into three groups:

- ▶ Discovery applications that show information from discovery tools
- ▶ Conversion applications that make that information uniform and presentable
- ▶ Reconciliation applications that automate the linkage of discovered information to its authorized and financial aspects in the assets and inventory applications

3.4.1 Discovery applications

Discovery applications display information from Tivoli and other automated discovery tools (see Figure 3-4 on page 30). The information can be brought into Tivoli's process automation engine using the IBM Tivoli Integration Composer (ITIC). As the information is discovered, it is brought into Tivoli's process automation engine and displayed in read-only applications. Active management of asset information takes place in the Assets and related applications, which refer to the read-only discovered data.

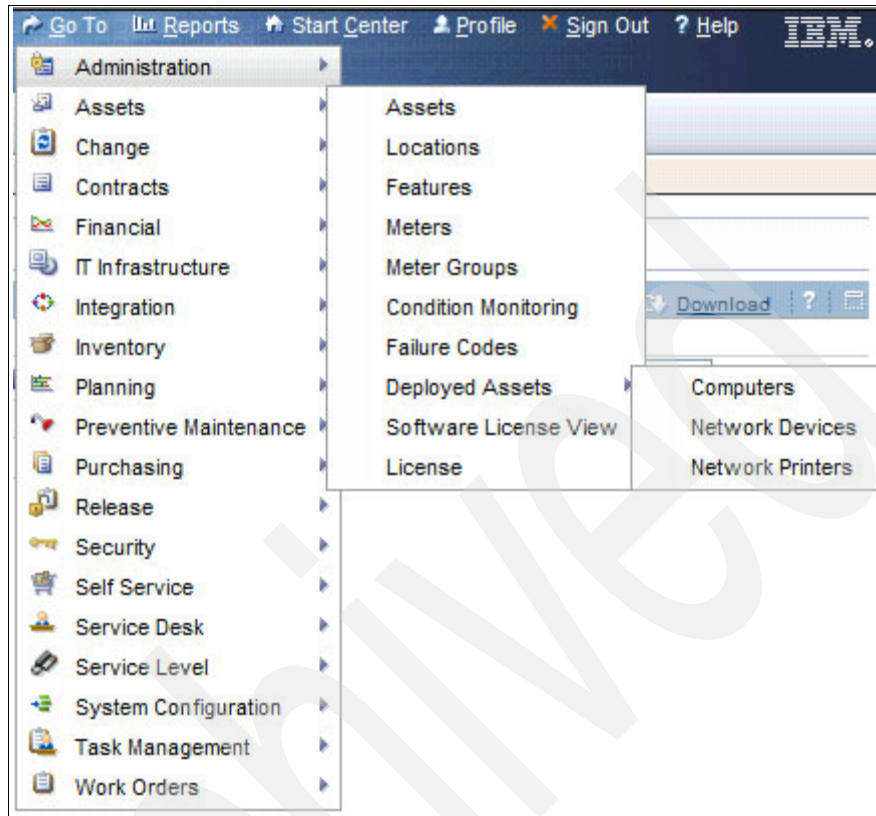


Figure 3-4 Menus for discovery applications

The discovery applications enable organizations to consolidate information from multiple discovery tools into a single repository. The uniform structure of the repository enables consolidated reporting and automated linking of the discovered information to financial and organizational information in the authorized assets applications.

The discovery applications display information that is only available from automated tools. For instance, a discovery tool can return the IP address and logon information for a device, but it cannot discover where the device is located physically, who it is assigned to, how much it cost, or what PO it was procured under.

Because discovered and authorized information has different sources and different domains, it is managed in different applications. Undiscoverable information is managed in the Assets application, along with associated Person, Locations, GL accounting, and other applications.

The Computers application shows all discoverable aspects of devices identified as computers by the discovery tool, including adapter cards, software usage and installation, RAM, BIOS, and other components, depending on the ability of the discovery tool to return this information.

For full computer information to be available, it is necessary to install agents on the clients to be discovered. Some discovery is also available through network-only tools. SNMP can return descriptions of assets and operating systems, according to the information entered into the SNMP catalogs by vendors and IT deployment personnel. Discovery of executables may also be available through shared drives.

The Network Printers application shows discoverable information about devices identified as network printers by the discovering application.

The Network Devices application is a catch-all for devices that have limited discovery information available. Such devices may include routers, switches, and hubs that are correctly categorized as network devices but may also include devices where only limited networking information such as a MAC or an IP address is discovered. When reconciling discovery information, some of the primary work is monitoring the Network Devices application to ensure that all devices are being properly reported.

The Software License View application reports discovered information brought specifically from Tivoli License Compliance Manager (TLCM). Installed software is listed in the Computers application, but TLCM includes additional information about license compliance for each application for which license information is configured in the TLCM application. This information is brought into Tivoli's process automation engine for reference from the Software Contracts application.

3.4.2 Conversion applications

Several of the Tivoli's process automation engine applications are designed to create uniform aliases or conversions for the strings provided by discovery tools for names of particular entities (see Figure 3-5). Creating uniform names makes it easier to search and report on discovered information, as well as to tie the information to authorized sources using reconciliation.

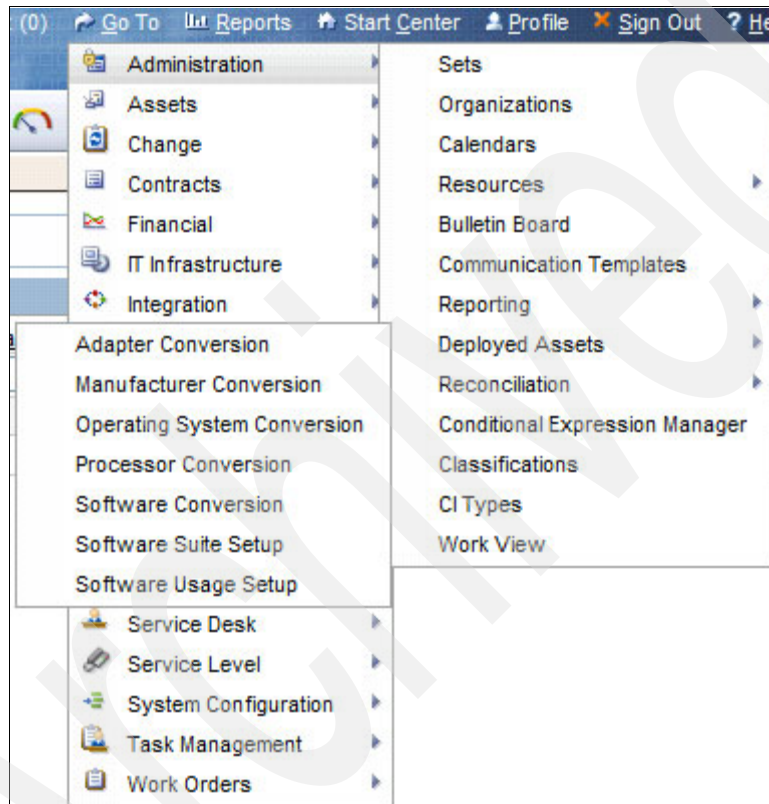


Figure 3-5 Menus for conversion applications

Tivoli's process automation engine provides the following conversion applications. The purpose of each application is to provide aliases for the strings brought in by discovery tools.

- ▶ Adapter Conversion
- ▶ Manufacturer Conversion
- ▶ Operating System Conversion
- ▶ Processor Conversion
- ▶ Software Conversion

- ▶ Software Suite Setup
- ▶ Software Usage Setup

Discovery tools use various sources for the information they provide. Their primary sources are the following:

- ▶ BIOS information, usually provided by vendors
- ▶ Headers of application libraries or the properties of executables, provided by the programmers of the applications and their installations
- ▶ SNMP information, usually provided by vendors
- ▶ Native package installation information, such as the Add/Remove program entries in Microsoft Windows®
- ▶ Executable file names, locations, and sizes

As secondary sources, discovery programs use their own catalogs and proprietary algorithms to resolve the previously listed information into uniform product-related information.

No formally accepted conventions exist between vendors and programmers about how to enter the primary data, and in some cases, it is simply not entered at all. Secondary data also varies in quality, with only the most common and high-profile applications being resolved with the greatest accuracy. In-house applications or custom deployments of existing applications usually cannot be resolved unless configuration is performed by discovery technicians.

IBM Tivoli tools discover IBM applications particularly well. IBM provides an open-format software catalog for reference by customers and discovery tools alike. The common catalog also enables direct correlation to procurement information provided by IBM. However, in-house procurement data usually lacks links to the IBM-provided system, so some conversion may be necessary to make this correlation.

Discovered data is usually plentiful and varied, and it is necessary to set priorities and target particular topics in the data for cleanup. Approaches for data cleanup can include standardizing installation and release procedures, standardizing configuration of the discovery tools in use, as well as using the conversion applications within Tivoli's process automation engine.

The manufacturer conversion may be of interest for organizations that are trying to monitor a particular manufacturer contract. Software conversions are most useful to organizations looking at licensing. Software Usage Setup is helpful for organizations trying to recover licenses by locating unused software.

Software Suite Setup is of particular interest to some organizations. These organizations track software that is licensed as suites but is reported as individual applications by the discovery tools in use. If the discovery tool recognizes suites as products, this conversion is not necessary.

The Operating System Conversion application may be useful for tracking OS versions and patch levels. While used less often than the other applications, the Adapter Conversion tool provides uniform reporting on adapter types.

The most common conversions in use among IT customers of previous versions of Tivoli's process automation engine are the software conversion tools. As part of their preparations for software license reconciliation, customers target several software products that must be reconciled against procurement data for licenses. Next they sample the discovered data to identify the strings returned by the discovery programs when the targeted software is present. Then they enter these strings into the Software Conversion application with an alias that corresponds to the line item description for an item in inventory, a contract line item description, or procurement line item descriptions. Based on this correspondence, customers can create a report that compares the number of licenses procured to the number of installed instances of the software.

3.4.3 Reconciliation applications

An excellent guide to implementing reconciliation accompanies the Tivoli Asset Management for IT product (see the *Reconciliation Module Implementation Guide*). Customers should consult that guide and the user's guide before implementing reconciliation.

In the Tivoli Asset Management for IT context, the word *reconciliation* applies to the process of matching deployed hardware and software data to procurement and asset or materials management data within Tivoli's process automation engine. The word *reconciliation* may also be used in the context of discovery products to refer to the process of matching raw discovered information with software product catalog information. Reconciliation in the context of the discovery product occurs before the information is brought into Tivoli's process automation engine.

The Reconciliation application menus are shown in Figure 3-6.

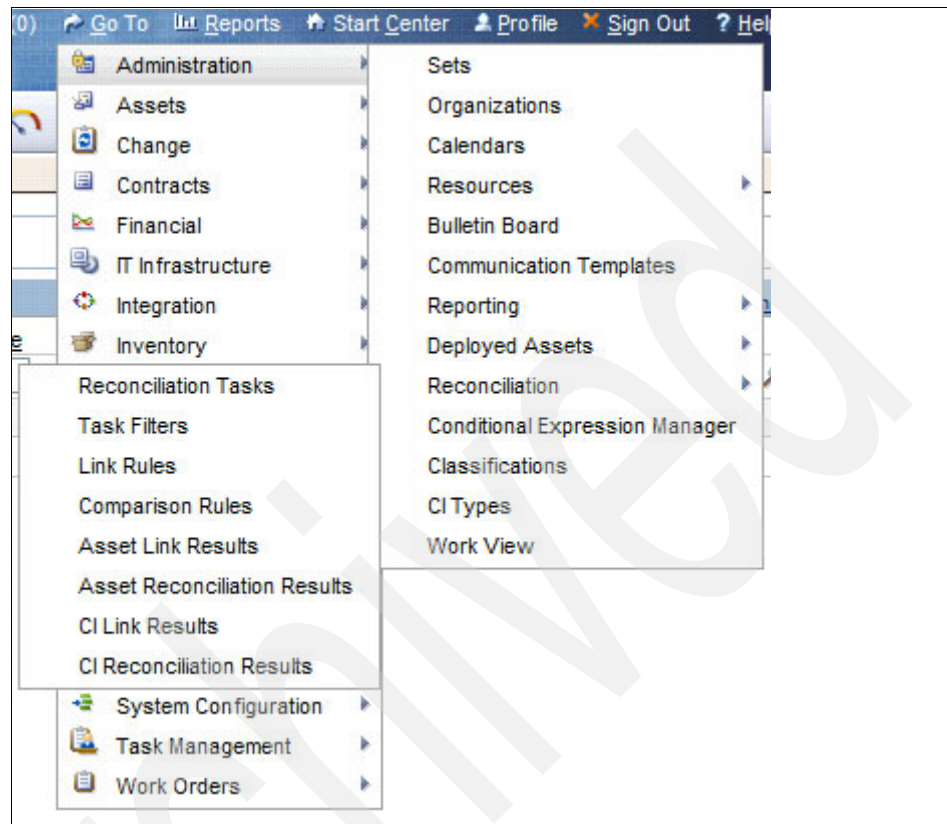


Figure 3-6 Reconciliation application menus

Note: The CI Link Results and CI Reconciliation Results applications are available only with the CCMDB license.

Reconciliation is another of Tivoli's process automation engine modules that can be implemented gradually. Customers may wish to target a limited group of assets for reconciliation at first, such as a lab or data center, and then expand gradually to include the entire organization. Limiting reconciliation tasks requires defining filters in the Task Filters application.

To effectively limit a reconciliation effort, a limitation must be present in discovered data similar to the limitation in the authorized data. For instance, within the authorized asset data, you can define a task filter against the lab

location, and within the computers data, you can define a task filter against a certain subnet discovered and reported in the IP properties for the computers.

Within the Link Rules application, you can establish the basis for reconciliation by identifying which top-level object in the authorized data to link to a top-level object in the discovered data. By “top-level” object, we usually mean computers, printers, or other devices.

Link rules are often based on unique identifiers. The attributes most commonly used to link authorized IT assets to deployed assets are a serial number or asset tag. A serial number is often included in receiving data as well as in the BIOS of computers. Asset tags may be applied at the time of receiving and tied with procurement information, as well as entered by hand into the BIOS.

Other possibilities for link rules by unique ID also include MAC address and machine name. For these links to be effective, the MAC address must be recorded in the authorized asset information at the time of receiving (it can often be scanned from bar codes), and the discovery tool in use must report the MAC address in cases where multiple MAC addresses are present (as when one or more NICs or wireless adapters - or both - are on the same device). Recording the MAC address is helpful because a MAC address is reported for networked equipment even when all other aspects of discovery have failed. Linking by machine name can also be effective when a uniform and universal process for naming machines is in place at the time of receipt.

The Link Rules application enables customers to link to specification attributes for particular classifications as well as to attributes defined directly on an object. If you have defined a Workstation Name specification only for assets classified as Desktop, Notebook, or Server, it is possible to define a Task Filter for those classifications and define a link rule directly to the Workstation Name specification.

We use the Reconciliation Tasks application to define a reconciliation task to test the Link Rules and Task Filters defined so far. Comparison results can also be defined for reconciliation tasks, but comparison results depend on reliable links, so the initial reconciliation appropriately looks at links only. To run the reconciliation, go to the Cron Tasks application and schedule the Reconciliation Task cron task, inputting the name of the reconciliation task you have defined.

When Cron Tasks runs, records are created for each possibility of match or lack thereof. You can view these records in the Asset Link Results application. You can accumulate links by running multiple reconciliation tasks defined with different link rules and task filters until all assets have been associated. You can first run a task that makes associations based on MAC addresses where that information has been populated for authorized asset information, then link on the serial number for the remainder of the assets.

Once links have been created, you may want to compare aspects of the linked machines using Comparison Rules, and then view the results through Asset Reconciliation Results. The Reconciliation Results Table holds results of comparison rule evaluations as well as messages about link failures due to duplicates or unmatched information.

Archived

Asset life cycle

Assets have life cycles, and an important function of any asset management process is to track an asset throughout its life cycle. The asset management process must not just track the asset, but it must help the business make the transition to and be prepared for the different phases of the life cycle.

The Tivoli Asset Management for IT product provides many key capabilities for doing just that. This chapter provides an overview of IT asset life cycles and a high-level summary of how various modules in Tivoli Asset Management for IT can be used to track, plan for, and successfully complete each phase of an asset's life cycle.

4.1 Asset management life cycle processes

The ability to track and manage hardware and software licenses through their entire life cycle is imperative. As shown in Figure 4-1, the asset management life cycle includes the following phases:

- ▶ Plan
- ▶ Acquire
- ▶ Deploy
- ▶ Manage
- ▶ Retire

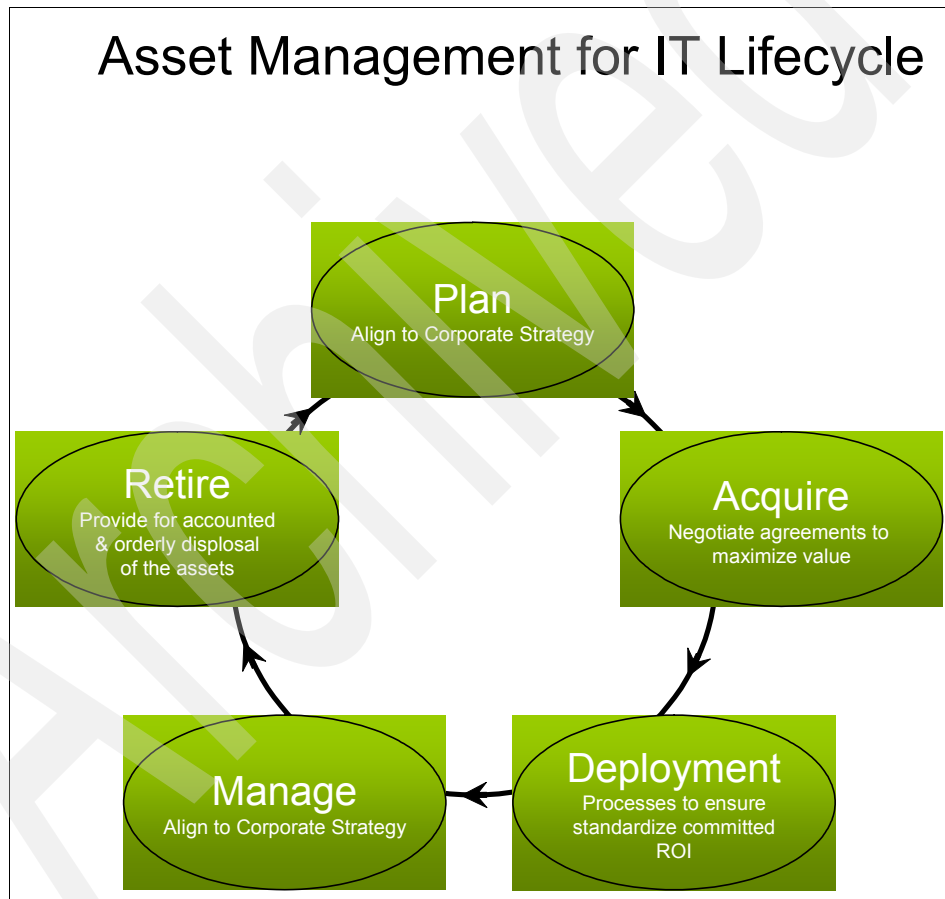


Figure 4-1 IT asset management life cycle

These phases are briefly described here with more details provided in the following sections.

► Planning

During the planning phase, a company formulates a budget and an associated schedule for hardware and software acquisitions. The technology refresh cycle indicates when existing assets must be replaced based on company policy. Stockrooms are used to keep and check inventory before a purchase is made. During the planning phase, corporate strategic goals must also be kept in mind.

► Acquiring

During the acquiring phase, assets are acquired, typically through purchase or lease. Critical information about the asset must be captured at this point for the asset management process. A purchase order (PO) approval process should be in place to expedite the control of purchasing. Asset records can be created from a PO, receipt of an asset into inventory, or directly from a vendor.

► Deployment

During the deployment phase, assets are assigned either to an employee, project, or business unit. The status of the asset is tracked as it moves throughout its life cycle. Employee information including location is typically received from the HR department. A system that enables communication with the user facilitates a smooth deployment. Ongoing reconciliation related to the user is also important: For instance, if a user moves to a new department or leaves the company, asset records related to the deployment of assets to that user must be updated. Links to a service desk application can also be critical. For instance, the requirement for a new asset to be deployed may be generated due to an event handled by the service desk. Likewise, once a deployment is agreed upon, a service desk ticket is generated for a technician to assist with or perform the deployment.

► Management

The manage phase includes the tracking of the asset and its ongoing care and feeding after it is deployed. In this phase, asset reconciliation between what is discovered versus what has been purchased occurs. Installs, Moves, Adds and Changes (IMAC) must be recorded. Integration with Change Management Processes such as requests for change (RFCs) may be implemented. During the manage phase, asset costs are managed through processes such as software license compliance, and monitoring stock rooms and software use.

► Retirement

During the retire phase, an asset reaches the end of its life. The asset can be disposed, auctioned, donated, sold to employees, or returned to the vendor when obtained through lease or rental.

4.1.1 Planning phase

During this phase the company is translating its strategic objectives into action. These plans may include introducing new services to the organization, such as a new financial system; HR system; and technology refresh of servers, mobile computers, or other software and hardware assets. Funding for these actions is allocated and prioritized during the planning process, and what is left is the execution phase. Tivoli Asset Management for IT provides several applications that support this capability. For example during the planning process, management must know the current configuration of assets within the organization and when their leases terminate. More specific examples of how information and processes provided by Tivoli Asset Management for IT are described in the sections that follow.

Terms and Conditions application

The Terms and Conditions application provides numerous capabilities for various roles in Tivoli Asset Management for IT, so it becomes a library for users acting in these roles to select. For example, when sending out a request for quotation (RFQ), the buyer may apply those terms and conditions the vendor must abide by in order to be awarded the contract. An organization may require the vendor provide a one-year warranty on all parts and labor, for instance. Payment terms can also be addressed and as well as any legal requirements. Certain service levels that must be maintained should also be listed in the Terms and Conditions application. These service levels are then translated through the Service Level Agreement application, the key performance indicators (KPIs) are managed, and escalations are initiated to ensure the appropriate service level is applied, maintained, and measured. The Contracts application also uses the Terms and Conditions application so the contract managers can ascertain the legal requirements for both the vendor and the organization.

Request for quotation (RFQ)

When a company is planning to make a purchase and vendors are competing for the business, the company generates an RFQ and sends it to various vendors. After the vendors respond, their prices are entered into the RFQ application by the purchasing department. When all the bids are in the system, the department responsible for awarding the purchasing contract can use this information as a factor in its decision.

Purchase/lease contracts

Purchase/lease contracts are established to make purchases and lease assets when the organization is going to stagger payments or make payments on a recurring basis and acquire assets on a periodic schedule. For example, suppose the organization is upgrading the blade servers, and payment terms of

20% of the overall purchase price will be paid at PO approval, 70% will be paid upon receipt of the assets, and the remaining 10% will be paid 60 days after receipt of the assets. A purchase contract can be created with a specific execution date. Through the use of Tivoli's process automation engine escalations and workflows, the application can check the start date to ascertain whether that date has been reached, initiate an action that changes the status of the purchase contract to approved, and send a notification to the contract and procurement manager to place the order for the items. This process then starts the acquisition phase of the assets life cycle.

Companies and Company Master application

These applications contain lists of vendors, manufacturers, and couriers that the company does business with. The Company Master is a library of these entities that enables procurement to centrally control the vendor list. When a new vendor, manufacturer, or courier is required, the company may have a formal process for adding them to its approved vendor list.

For example, a company may have certain requirements the vendor must meet before being placed in the catalog. As part of the planning cycle, procurement can update this list. Updating the list includes disqualifying vendors if they have not performed as specified in the terms and conditions of the contract or purchase order. Tivoli Asset Management for IT provides the capability to perform vendor analysis through the Inventory module or at the time of the purchase. If the vendor is not performing up to the expectations of the procurement manager, the procurement manager can disqualify the vendor from the Company Master application, which can then propagate down to all parts of the company that share this master application and use the vendor.

Supporting corporate strategy

As previously mentioned, a key part of the planning phase is to ensure that the asset plan supports corporate strategic initiatives. Setting a software asset strategy that makes sense for company business requirements may include such activities as these:

- ▶ Facilitating communication between IT departments, financial managers, and asset managers
- ▶ Assessing asset management practices with all key players involved
- ▶ Developing a comprehensive asset management strategy
- ▶ Training in ITIL goals and implementing ITIL objectives

The following Maximo reports may be used during this stage:

- ▶ Top software expenditures by product, agreement, and department or project
- ▶ High-level software compliance reports
- ▶ Candidates for license consolidation

Asset strategy culminates in developing a measurement program with key performance indicators (KPIs), some of which may be displayed in the Start Center dashboard. The following KPIs are related to software procurement:

- ▶ Time from requisition to install
- ▶ Average incidents after install by department and product
- ▶ Metrics related to the accuracy and availability of required information, such as whether software entitlements are properly stored and cataloged, or whether software licenses are tied to the POs with which they were procured.

4.1.2 Acquiring (procurement) phase

The procurement team can utilize Tivoli Asset Management for IT to generate a purchase order with reference to the contract. This PO may be put in a workflow that performs certain checks based on the defined business process, to ensure the appropriate levels of approvals are accomplished prior to the PO being sent to the vendor for execution.

Upon receiving the PO, the vendor executes the PO and sends the assets to the specified address in the PO. Once the items arrive at the shipping address, they are inspected and tagged (that is, asset numbers are assigned). Once the asset number is assigned, the company has an instance for that asset. For example, the company creates a PO to lease ten mobile computers. The PO references the mobile computers by item number and orders a quantity of ten. After completing the receipt process, the company has ten mobile computer assets all referencing that item number.

The company can continue monitoring the stock levels of certain assets as a part of the acquisition process. For example, the company has an enterprisewide agreement with Microsoft covering Vista and Office products. The agreement for the first year was for 1000 licenses. The company has options for how to account for these licenses. They can treat the licenses as spare parts and track the number of licenses issued. The Inventory application can provide a list of all assets that have Microsoft Vista or Microsoft Office (or both) installed.

Tivoli Asset Management for IT, through the automatic reordering process, monitors the reorder point established for the particular item. If the reorder level has been reached, Tivoli Asset Management for IT generates either an approved

or unapproved purchase requisition (PR) or an approved or unapproved PO, depending on the type of the vendor (that is, internal or external). Tivoli Asset Management for IT can automatically place a PR or PO generated from the reorder process in a workflow to ensure the defined acquisition cycle is followed.

4.1.3 Deployment phase

The deployment of an asset can be initiated through various means. For example, the request may come from the service management disciplines. That is, it may come from a user through a self-service request for a new asset to be installed or for an existing asset to be replaced. It may come from external sources that are integrated with Tivoli Asset Management for IT through the use of the integration framework, formerly known as the Maximo Enterprise Adapter. For example, an external purchasing system request generates a service request for a new asset in Tivoli Asset Management for IT.

The deployment of an asset can be triggered through incidents or a problem management process. For example, a network card on a server has repeatedly failed, and problem management has identified the issue. The problem team may raise a change request for the replacement of the network card. The change request identifies the asset and potential services that may be impacted as well as back-out plans and risks associated with making the change.

The change manager identifies all the tasks, labor, material, services, and tools required to accomplish the change. During the planning phase of the deployment, asset managers check the storerooms for the quantity of the type of assets that will fulfill the request. Once the asset managers have identified the asset, they can view the availability of the asset and look across all of the storerooms where that asset has been authorized. They can also view Purchase Requests, Purchase Orders, and Contracts that have been generated to replenish the storeroom stocks.

If the asset is available, the asset manager selects the storeroom, and the individual responsible for the storeroom issues the asset. After this, the asset manager approves the change. When the change is approved, the available balance of the asset is reduced by the quantity specified in the change request. If the available balance results in a negative balance, Tivoli Asset Management for IT prevents the asset manager from approving the change request. However, this option can be adjusted according to a company's business requirement.

Furthermore, the deployment of the asset may involve numerous moves of the asset - such as removal from a storeroom to a staging area, from the staging area to configuration, from configuration to deployment, and from deployment to the user.

When the asset reaches the user location, the asset is accounted for through numerous applications, primarily the Assets application, which holds the current configuration. The Inventory application provides a list of assets that are associated with the asset number if the asset is considered a rotating item. Or if the Inventory application lists the asset as an item used as a spare part, it is considered a spare part. If the asset is considered a leased asset, the asset leased contract holds all the asset details, including the warranty start date and end date. If the asset is an activity, a change, release, or work order is generated against the asset. Tivoli Asset Management for IT notifies the role creating those entities that the asset is under warranty.

4.1.4 Management phase

The service management processes generally provide the capabilities for maintaining assets. Any one of the Service Request, Incident, Problem, Change and Release applications may generate an IMAC (Install, Move, Add or Change) to the current configuration of the asset.

For example, suppose a user cannot connect to the e-mail service. This issue can have numerous causes, and in our scenario, the service desk starts receiving requests regarding the outage. The service desk generates a global incident record against the e-mail server, providing that service and all the service requests to that global incident ticket. Service desk personnel can post a bulletin to all the users, reporting that the service is down and providing the expected time the service is to be available.

As mentioned previously, during the management phase, reconciliation between the actual assets (physically found in the environment) and the “deployed assets” (those with records already in Tivoli Asset Management for IT, based on the acquire phase) often requires mapping of data from another application (such as a discovery tool) to the data stored in the Tivoli Asset Management for IT database.

A record of the asset is maintained in the Asset table, which has numerous relationships to other tables for maintaining configuration information, contract information, and procurement information. These tables form the authorized view of the asset. Another set of tables holds the physical view - that is, the actual software and hardware configuration as detected by network discovery tools, such as Altiris, Microsoft SMS, Radia, and various Tivoli discovery tools.

These tables are populated by using the IBM Tivoli Integration Composer (ITIC). In its simplest form, the Integration Composer is simply a mapping tool. It enables users of the tool to map data schemas and do data-type conversions. However, the client has an option to purchase adapters, which are prebuilt adapters based on the base schema of the source and target products. Available adapters include the following:

- ▶ Altiris Inventory Solution
- ▶ Centennial Discovery
- ▶ IBM Tivoli Configuration Manager
- ▶ Maximo Deployed Assets
- ▶ Maximo Discovery
- ▶ Microsoft SMS

To map the data, the user must identify two database connection strings: one for the source database and one for the target database. So for example, the target database is Maximo Deployed Assets - for example, MAXPROD1 for the Maximo production database. The source database may be, for example, the IBM Tivoli Configuration Manager. Once the connection strings are established, the database can be viewed either by data or by structure. The major difference is that when browsing by data, ITIC provides a view of the first ten records found in the data structure, whereas browsing by structure does not return any data. Connection string information as well as mapping information is stored in the Tivoli Asset Management for IT database.

Once the data source and target are identified, they are used to create a mapping. When the mapping is created, the adapter is imported based on the source data structure. Any errors in the mapping are highlighted in red, and a Show Errors option can be used to detect errors as well. If no errors or adjustments must be made, the mapping is saved. When executed, it pulls data from the source and places it in the target. Integration Composer can be scheduled to run by a scheduling tool with a batch file, such as Microsoft Windows Task Manager, or the mapping can be run using a manual process.

Depending on company requirements, the discovered data may become the baseline authorized inventory. Tivoli Asset Management for IT provides Asset Initialization, an add-on solution. The solution uses Integration Composer to map deployed assets to the Asset table and related tables. However, the prerequisites for accomplishing this mapping are the following:

- ▶ The company and site structure must be defined in Tivoli Asset Management for IT.
- ▶ If the deployed asset location is captured by the discovery tool and the company wants to map that location within Tivoli Asset Management for IT, a system called deployed asset should be created and the entire location structure must be created.

- ▶ The classification in Tivoli Asset Management for IT must be set up. The quick start or accelerator can provide a baseline classification to start.
- ▶ Asset records for each type of discovered asset must be set up.
- ▶ The standard software-naming conversions in the Software Conversion application must be set up. Or you can use the Maximo Enterprise Adapter or Maximo Data Loader to populate these objects.
- ▶ Depending on the discovery tool you use, you have to redeploy your agents to capture the company, site, and location data that Tivoli Asset Management for IT requires, or you can somehow segment that data and adjust the Maximo Enterprise Adapter to pick up the correct company, site, and location.
- ▶ IBM Tivoli Integration Composer must be configured to utilize the mapping and adjust the maximoasset.properties if necessary.
- ▶ The mapping must be run.
- ▶ The conversion tables must be reviewed and the variants adjusted as necessary.

One concern when using the Asset Initialization add-on to form a baseline is proving software compliance issues.

The reconciliation process is then used to compare assets to deployed assets. At the simplest level, the company can compare assets to deployed assets using a link rule. A link rule establishes a common link between the two tables - the Asset table and Deployed Asset table. For example, a common link can be a serial number.

The link rule is referenced by a reconciliation task. The reconciliation task is then associated to an instance of the reconciliation crontask located in the Crontask Setup application. A *crontask* 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 applications. When using a link rule, the Reconciliation Results application provides information to the asset manager that a deployed asset was found with no matching asset or that an asset record was found with no matching deployed asset.

4.1.5 Retirement phase

As organizations replace IT equipment that no longer meets their needs, they face a challenge: the “end-of-use dilemma.” End-of-use planning must be integral to any IT program. Deciding what to do with older or surplus equipment taken out of service may lack the appeal of acquiring and deploying new gear, but the disposition process presents an important opportunity - as well as risks. By

thinking ahead, companies can minimize or eliminate risks associated with the disposition of IT equipment and maximize upside possibilities.

The risks inherent in the disposition of IT equipment can be significant if not handled properly. Data security tops the list. Surplus equipment may contain customer account information or other proprietary data that must be secured, erased, and destroyed.

Environment concerns also are critically important. IT equipment often contains heavy metals and other hazardous substances and must be refurbished or recycled properly. Careless handling can endanger people and the environment and expose the organization to legal liability and damaging publicity.

Loss of asset value also poses a significant risk. Even near the end of its life cycle, much IT equipment is still usable. Fast action can reduce holding costs and return maximum value to the bottom line.

Managers responsible for the asset disposal process must answer a number of questions, including the following:

- ▶ Can the company afford the resources to inventory, store, ship, and market reusable gear and to properly manage the disposition of the rest?
- ▶ Can the company avoid diverting time and money to a process that, while important, is not its core competency?

A professional asset disposal program provides a golden opportunity to find value in older equipment and enhance the organization's reputation for environmental care and management skill.

When equipment is leased, asset disposal services typically become the responsibility of the lessor, an important advantage. Asset disposal outsourcing and equipment leasing programs are strategic approaches that can reduce risk and free the enterprise to focus on its core business.

Data security is also an issue related to asset retirement. Common sense and force of law demand that we safeguard data from criminals, competitors, and the idly curious. News about identity theft, coupled with a series of widely publicized database breaches and data disappearances involving major financial institutions and data brokers has focused the concerns of citizens and lawmakers. Multiple laws governing information privacy and security are now in effect.

Just as with IT equipment currently in use, "retired" disk drives and chips may contain customer account and personal information, proprietary intellectual property, and embedded access credentials that could expose the enterprise to unauthorized entry, sabotage, identity theft, and corporate espionage.

Secure disposition of retired equipment requires chain of custody and control processes as the hardware is inventoried, stored, shipped, and evaluated for resale or disposition. Physical storage devices must be destroyed or thoroughly erased to ensure information stays out of the wrong hands.

Computers contain valuable recyclable resources, such as gold, silver, palladium, and platinum, as well as other useful metals such as aluminum and copper. Recycling these resources can help shrink the waste stream, conserve natural resources, and at the same time, capture value for the organization. In addition to these valuable materials, e-waste contains harmful elements such as lead, cadmium, mercury, chromium, and halogen-based flame retardants. Careless or irresponsible disposition of IT equipment can lead to litigation and can pose a threat to an organization's reputation.

Few organizations are adequately staffed or trained to evaluate the condition and appraise the value of used equipment, refurbish and test it, and then take it to market. Surplus equipment may sometimes be marketed to employee purchase plans, donated to nongovernment organizations (NGOs), or returned to the vendor in the case of leased or rented assets. However, these alternatives do not free the organization from responsibility for ensuring the quality and performance of these programs; nor do they obviate security concerns.

Additional considerations

Resolving other issues is part of the disposal process:

- ▶ **Software licensing**

Software licenses generally extend only to the original purchaser. Thus software-controlled equipment must be stripped of its original software and then reloaded with newly licensed operating systems and programs before reuse.

- ▶ **Tax implications**

Residual value harvested from surplus equipment may affect the amount of depreciation reported to taxing authorities. Resale and recycling income must be accounted for as revenue. These complications can be avoided when equipment is leased rather than purchased.

- ▶ **Internal logistics, costs, and competencies**

As noted previously, few organizations possess the in-house capabilities to inventory, store, secure, ship, and process hundreds or thousands of surplus IT equipment items. Creating these skills requires hiring and training staff, developing processes, and obtaining warehouse and processing facilities. Many organizations may find that the effort required to manage disposition of the equipment and implementing its disposition may not pay off.

4.1.6 Reporting

For all phases of the asset management life cycle, the ability to create reports or otherwise view the status of various assets is important.

Tivoli Asset Management for IT has a powerful reporting engine that enables administrators to schedule large batch reports, which can be automatically e-mailed to multiple recipients. Reports can be created in multiple formats such as PDF, DHTML, and XML, and revisions of past report output can be archived. Tivoli Asset Management for IT includes e-spreadsheet functionality that clients can use to create and generate on-the-fly reports and queries that may be exported to multiple formats.

The Tivoli Asset Management for IT powerful reporting tool gives the user the ability to define and display key performance indicators (KPIs) that are active monitoring measurements that explain what is happening in the business environment. KPIs are available through the user interface, so users can quickly see how their day-to-day activities affect the KPI performance. KPIs can be displayed graphically and are color coded according to customized targeted values or benchmarks.

Process implementation

This chapter covers a variety of topics related to using Tivoli Asset Management for IT to support processes in general. Later chapters address specific processes, but certain capabilities and functions are common to any process you want to support with Asset Management for IT.

5.1 Roles, responsibilities, and restrictions

In any process, it is important to ensure that steps are performed only by those who are authorized to do so. The following sections describe how groups can be defined to simplify the process of authorizing individual users to perform specific actions affecting the assets for which they are responsible.

5.1.1 Delineating groups by application functions

It may be easier to manage a large number of complex security roles if the security roles are delineated by groups of functionality rather than by organizational role. Looking at an organizational role, it is not immediately apparent to an unfamiliar administrator what functionality is included, whereas groups based on application functionality are immediately apparent.

This principle will become more important as customers begin to introduce complex conditional expressions into their applications, using the functionality available in the Maximo platform as of Version 7.1.

For example, the customer can create security groups along the lines of organizational roles, such as “Software Asset Manager,” “Financial Analyst,” and “IT Technician.” It is not immediately apparent whether people assigned to these roles can create an Asset record.

If, however, a security group, such as “Create Asset,” is created, it is clear that people in that group can create asset records. The security administrator can add permissions needed for creating assets, such as viewing person records, using the Issues, Transfers, and Inventory applications, viewing Item Masters, and perhaps adding to or changing classifications.

If related permissions are not grouped in this way, it is easy to omit some of them when assigning permissions. In the previous example based on organizational roles, it is necessary to document or remember that anyone who is granted the right to create assets must also be able to view person records. Looking at the Financial Analyst role, it is possible to see that viewing person records is granted to the security group; however, it is not readily apparent that the privilege was granted so that users in the group could associate assets with users and custodians. In the groups delineated by process components, this is immediately apparent.

As conditional expressions are added on the object, application, attribute, and control levels, the combinations of permissions and functionality can become quite complex. A report may show conditional functionality that can be reported in the database, but conditional functionality embedded in the application cannot

be as easily reported. To manage this complexity, it is necessary to create clearly defined security groups and document what each security group has access to, using the long description if needed for additional detail.

5.1.2 Creating groups for each site

If your system includes multiple sites, it may be easiest to grant access to the sites using separate groups for each site. For each site, create a security group that grants access to that site. For convenience, also create a group with access to all sites. These groups can be used in conjunction with the functional groups to grant permissions in a way that is easy to maintain. Groups that grant site permissions must be marked as “independent of other groups.”

Creating groups solely for access to different sites means that it is not necessary to duplicate process-related groups on a per-site basis. For example, it is not necessary to create two groups such as Create assets-Bedford and Create assets-Nashua because a user who is part of the Create asset group and the Site-Bedford group can create assets at the Bedford site.

5.2 Asset management entities

Different types of assets are often managed and accounted for differently, depending on the policies and business requirements for the organization. This section identifies various ways to handle assets and provides guidance to help you decide which method might be best for the various IT asset types in your organization.

At the heart of asset management are the records kept for assets. Keeping asset records throughout the asset life cycle is required for sound financial processes. For instance, it may be necessary to know the details of an asset's procurement at the time of its disposal. Throughout its life, the asset must be accounted for in terms of who is responsible for it, where it is, and what it is connected to.

Maximo offers several ways to track assets.

- ▶ As an item

With items, we are tracking financial elements and material quantity and consumption, but not individually serializing each item. Items are associated with an Item Master and can be stored in a Storeroom.

- ▶ As an asset

With assets, we individually serialize each item. We track financial elements, material quantity, location, consumption, cost, and total cost of ownership.

Assets can be associated with an Item Master and can be stored in a Storeroom. Asset records typically track physical associations to other assets and items.

- ▶ As a location

Some crossover exists between assets and stationary asset locations used for location reference. A prevalent IT example is a patch panel. Most would agree that a panel closet is a location, but what about the panel itself? Some organizations choose to show a panel as a location and show the attachment of assets by moving them to that location.

- ▶ As a CI

With configuration items (CIs), we track comprehensive, detailed information about an object including a variety of configurable relationships to other elements in the infrastructure. CIs can represent the configuration properties of items, assets, and locations. CIs can also be grouped into collections along with assets and locations. CIs are available through CCMDB, a separate product that utilizes Tivoli's process automation engine and integrates with the Tivoli Asset Management for IT.

- ▶ As a linear asset

Linear asset records are used to manage assets such as roads, which must be tracked as a single asset but require features such as mileposts distinguished along their length. Fiber optic cabling is probably the only example of an IT asset that is best managed through linear assets. Linear Asset Manager is a separate product available on Tivoli's process automation engine.

In the sections that follow, we look in depth at each of these ways of managing assets and when they should be used.

5.2.1 Item Masters

An Item Master in Tivoli Asset Management for IT can be thought of as a specification for ordering and tracking an asset.

Sometimes Item Masters are referred to simply as items. This usage can be confusing because the word *item* is sometimes used for a line item on a PO or contract and sometimes used for the received asset tracked in the Assets application. Item Masters may be referenced on a line item in the procurement applications.

Authorizing the procurement of an item usually means authorizing one or more vendors from which to purchase the item. The Item entity is within the domain of

authorized information because it is used for orders, reservations, and financial transactions.

In general, Item Masters should be defined only to the point that describes what it takes to replace the item. For instance, if one desktop computer is replaceable by any of a set of other desktop computers, it can simply be called Standard Desktop Computer rather than calling it by its model number. The actual part numbers and model numbers for desktop computers from vendors can be tracked on the Vendors tab of the Item Master application (see Figure 5-1), but they are all grouped under the Standard Desktop Computer item to show that any of the vendors can supply roughly equivalent merchandise.

The screenshot displays the 'Software Item' application in a web browser. The 'Vendors' tab is active, showing a table of vendors for item 'D700' (Standard Desktop Computer). The table has columns for Vendor, Manufacturer, Model, Catalog #, Last Price, Last Order Date, and Order Unit. Below the table, the 'Details' section provides a form to edit vendor information, including fields for Vendor, Manufacturer, Model, Catalog #, Promised Lead Time (Days), Tax Code, Currency, Default Vendor?, Disqualified Vendor?, Last Price, Last Order Date, Order Unit, Catalog Web Page, Organization, and Site.

Vendor	Manufacturer	Model	Catalog #	Last Price	Last Order Date	Order Unit
COMPUSA	DELL	D700		1,450.00	6/17/04	EACH
COMPDEP	DATACHIP			1,400.00	7/7/04	EACH
ACME				1,000.00	9/17/04	EACH

Details

Vendor: COMPUSA
 Manufacturer: DELL
 Model: D700
 Catalog #:
 Promised Lead Time (Days): 0
 Tax Code: PA
 Currency: USD
 Default Vendor? ☐
 Disqualified Vendor? ☐
 Last Price: 1,450.00
 Last Order Date: 6/17/04
 Order Unit: EACH
 Catalog Web Page:
 Organization: EAGLENA
 Site: BEDFORD

Figure 5-1 Standard desktop computer Item Master

The process of defining items in many ways mirrors the process that an organization must go through in standardizing its IT offerings. Most nascent IT organizations are confronted by requests for nonstandard equipment and software from their users. To keep the users happy, they give them what they want. As the IT organization grows, however, it realizes that it is better able to serve its customers through standard offerings. Creating standard offerings as a basis for security, support, and upgradeability requires IT departments to enforce standards on which items can be ordered. Defining the Item Masters defines what can be ordered.

It can also be helpful to group replaceable assets in terms of generic items when tracking them in inventory. Some items must be tracked, but they do not have to be tracked on a serial-number basis in the Assets application.

For IT hardware, an Item Master often has a one-to-one relationship with a manufacturer's model number. For instance, an IBM ThinkPad T60p with certain specifications can be an item in the Item Master application because the manufacturer and model are part of the information that must be specified to vendors when ordering the ThinkPad.

Additional Item Master records must be created when any of the following is true:

- ▶ The item must be specified on its own line in a contract or purchase order, differentiated from other contract or procurement line items.
- ▶ The item fills a specific user need. For instance, Ergonomic keyboard can be differentiated from Standard keyboard.
- ▶ The item has a new defining characteristic. For instance, if Standard desktop has been defined with 1 GB of RAM, and the CAD group needs 3 GB of RAM for their machines, a new Item Master of Engineering desktop must be defined, even if both kinds of desktops are Lenovo ThinkCentres.
- ▶ If some items of the same kind are capitalized and others are not, two Item Masters must be created, one for the capitalized and one for the noncapitalized groups. Creating separate capitalized and noncapitalized items allows them to be tracked separately through inventory.
- ▶ For software, Item Masters should specify the licensing for the software as closely as possible. It is also possible to group items into License Pool storerooms in inventory or into virtual License Pool locations as assets, but defining Item Masters in terms of licenses has advantages on the procedure side because with software, the license is actually the item that is purchased.

Item Master records serve several groups with slightly different interests:

- ▶ The user or manager who is placing the order. For these users, the Item Master must show exactly the item being procured in language the user understands.
- ▶ The procurement department who is processing the order. For these users, the item must fit within an authorized use for the business and must be orderable from an authorized vendor.
- ▶ The asset manager. For these users, the item must be something that can be tracked as a standard implementation and counted in a meaningful way.

- ▶ The vendor. The vendor sees the description transmitted on the PO line, which is most often the Item Master description. The description must be clear enough for the vendor to understand what is being ordered.
- ▶ The receiving clerk or inspector. These users must match the packing slip or bill of lading to the PO lines and to the materials in the package being received.

5.2.2 Storerooms

When managing physical items in inventory, Storerooms represent the physical place where the items are kept in bins. Typically a storeroom clerk issues items to workers that request them.

IT asset managers usually do not manage inventory in storerooms because IT equipment and software usually turns over quickly. A computer is ordered for a particular user or a particular use, and it is immediately put to use when it is received. When the computer is taken out of use, it is because it is broken or because the equipment has become obsolete.

However, in several cases, IT managers may want to use Storerooms. First, a Storeroom is used for equipment when it is initially received and kept in a lab for imaging, testing, or installation. The lab can be referred to as a *Storeroom*.

Second, Storerooms can be used for IT equipment that is sent for repair. A single Storeroom can be used for all equipment being repaired, or separate Storerooms may be used for equipment that is sent to vendors versus equipment being repaired in-house.

Storerooms carry accounting codes called *clearing accounts*. The clearing account is by default debited when equipment is put into a Storeroom and credited when the equipment leaves. Thus, in a situation where an IT department charges other departments back for equipment as it is used, issuing and receiving items from one or more IT department Storerooms automatically generates appropriate general ledger transactions for charging back equipment.

Storerooms can also be used for equipment that is waiting for disposal. In some organizations, equipment cannot be physically disposed of before accounting processes have taken place to remove the assets from the fixed asset books. Equipment waiting for disposal is properly accounted for by putting it in a Storeroom.

Virtual Storerooms can be created when an IT department does not want to track exactly where items are located. For instance, if equipment is being disposed of, maybe it is stored in a closet on the third floor or in a shed out back - no one

cares. In this case, a virtual Storeroom representing the state of the equipment can be designated.

5.2.3 Accounting in Locations versus Storerooms

Operating Locations can be used in much the same way as Storerooms in Tivoli's process automation engine. IT technicians may prefer to think in terms of Operating Locations only because the language of inventory may be foreign to them.

Operating Locations carry accounting codes just as Storerooms do, but no charge transactions are created when moving assets between Operating Locations. Another kind of transaction appears in the Asset Transactions table (assettrans) showing simply that the asset was moved.

Asset transactions can show a move from one GL account to another, but they do not show cost. The Inventory application tracks a standard cost, an average cost, and the cost of the last receipt for Item Masters. If your organization wants to implement charge-back according to any of these models, it is advisable to use Storerooms rather than Operating Locations.

If GL account validation is active when an asset is moved to an Operating Location, the GL accounts from the asset and location are merged to ensure that the resulting account is valid. This check is performed as a means of preparing for a combination of asset and location to be used on work orders and POs, and not because a charge is taking place.

Assets and locations carry GL accounts as a convenience to the user. For example, if computer hardware is tracked under a particular resource code, the GL component representing the code can be configured on the asset. If a certain department resides at a location, the department's cost center can be configured on the location. The merged codes then reflect the resource code and cost center but may require additional information, such as a project code, to be complete.

The GL Account field is not shown by default on the Asset record. You can show the field by altering the application presentation with the Application Designer.

Charging POs to Operating Locations

If you want to receive a rotating item directly into an Operating Location, you must take certain steps when setting up a PO. The location must be entered in the Charge To area of the PO line instead of being entered in a Storeroom (see Figure 5-2). If a GL account is assigned to the location, the account is automatically filled in the GL Debit Account in the same Charge To section.

The screenshot displays the 'Purchase Orders' application window. The 'PO Lines' section shows a table with the following data:

Line	Item	Description	Quantity	Order Unit	Unit Cost	Line Cost	Tax	Distributed ?
2	ACCESS 2002	Database software for the desktop	100.00	EACH	99.00	9,900.00	0.00	

Below the table, the 'Line Item' details for Line 2 are shown. The 'Charge To' section is highlighted, and the 'Location' field is circled. The 'Location' field contains 'OFF302', the 'Asset' field contains 'A7802', and the 'GL Debit Account' field contains '6220-300-???'. The 'Receipt Required?' checkbox is checked.

Figure 5-2 PO charged to Operating Location

If the Location field contains a single asset, that asset is automatically filled in the Asset field in the Charge To section. A Location may contain a single asset when the location represents an office, and the asset is the computer in the office. In this case, the merged GL account from the asset and location is populated in the GL Debit Account field in the Charge To section.

When the Location field in the Charge To section is filled in, the Issue on receipt? check box is automatically checked. At receipt, a transfer transaction is created that automatically assigns created assets to the location. Note that this applies to

all assets on a line. If the PO line is for 100 desktop computers, all 100 resulting assets are transferred to the location cited.

Filling in the Location and Asset fields overwrites the GL Account field, so it is necessary to first fill in the Location or Asset field, and then the GL Account field.

Whether a GL Debit Account is merged or derived from the Location and Asset fields, the GL Debit Account field may not be complete. GL Debit Account fields containing question marks (for example, 6220-300-???) may lack one or more components. If GL validation is turned on, it may be necessary to fill in more accounting information than is available from the Location and Asset fields by typing it in or using the GL Builder dialog.

If the Attach to Parent Asset on Issue? field is checked on the Item Master record, the asset shows up in the Subassemblies table of the Spare Parts tab on the Asset record when it is issued to the asset from the Inventory or Issues & Transfers applications. The Attach to Parent Asset on Issue? setting does not affect the way PO lines are handled on receipt. If a rotating item with this setting is on a PO line charged to an asset and a location, when the item goes through the Receive Rotating Assets dialog in the Receiving application, it is created as a new asset at the location shown but not as a child asset of the asset shown. To make it a child record, you have to look up the new asset and configure it as a child to the appropriate asset. The parent-child configuration is not performed automatically in this case because charging to an asset is not the same as issuing to an asset.

Non-rotating items can be charged to Operating Locations as well, but because the items are not serialized as assets, they are not moved to an Operating Location. Nonserialized items can be tracked in Storerooms but not in Operating Locations.

Non-rotating items can also be charged to assets. If the Attach as Spare Part? field is checked on the Item Master and Issue on Receipt? is checked on the PO line, when the item is received it shows up on the Spare Parts tab of the asset with a quantity of zero. The quantity on the asset must be adjusted to show the quantity actually received. The quantity is not carried to the asset because, again, *charging* to the asset in a PO may have a different meaning than actually *issuing* to the asset. We discuss cases where software may be configured as spare parts on assets in subsequent sections.

5.2.4 Using the Receiving application

Several aspects of the Receiving application can be confusing to newcomers. We clarify these aspects in this section.

Locating received assets

After you receive an asset, the question “Where did it go?” naturally arises. The list of assets created at receipt is not shown in the Receiving application because many asset records may exist for every material receipt record. Because the material receipt record already contains many attributes, the size of the window is not large enough to show the asset records. Also, in most situations other than system testing, the person receiving an item is not actually the one who accesses asset records. In small organizations that are using Tivoli's process automation engine for IT only, the person who receives the item may be the one who accesses asset records - for example, an IT technician enters a receiving record and then immediately configures the asset.

You can find the assets you just received by searching for all the assets received against that PO, but unfortunately, the Asset application's Advanced Search does not contain a PO field. You can, however, add one by following these few steps:

1. Go to the Database Configuration application and look up the Asset object. Click the **Relationships** tab and click the **New Row** button. Enter a relationship with the properties listed in Table 5-1.

Table 5-1 Relationship properties

Property	Value
Relationship	ASSETTRANSCREATED
Where Clause	assetnum=:assetnum and siteid=:siteid and transtype = 'CREATED'
Child Object	ASSETTRANS
Remarks	Relationship to assettrans to find PO number from record created at receipt. May return zero or one records.

You do not have to run configdb.bat after adding or making changes to relationships.

2. Go to the Application Designer application and look up the Asset application. Before you make any changes, click the **Export** button (see Figure 5-3).

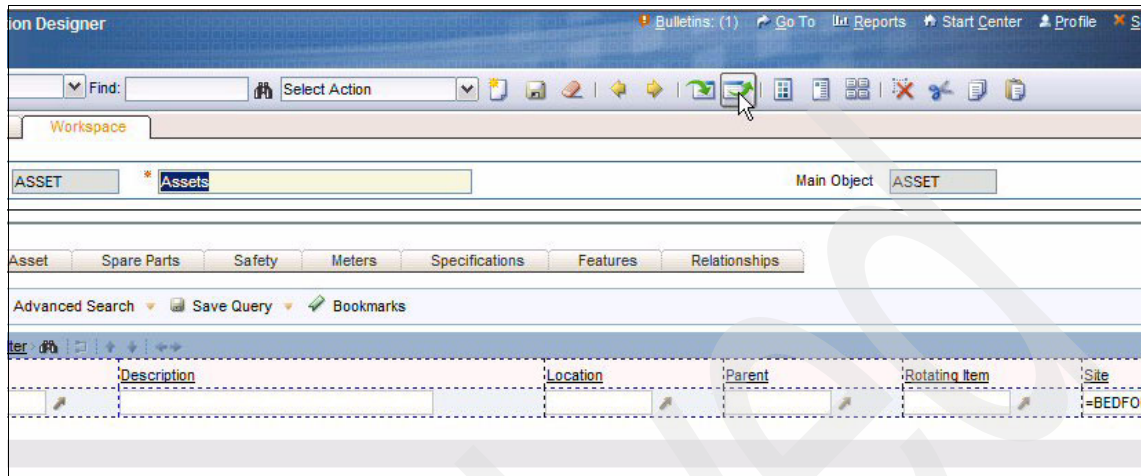


Figure 5-3 Application Designer

A new browser window displays the xml representation of the asset. Click **File** → **Save As**, and choose a location.

It is a good practice to have a common place and a naming convention for presentation xml backups. Naming the files asset.xml, asset2.xml, copy of asset.xml, and so forth does not work. A coherent naming convention includes the date in the file name along with the change being made, such as:

Z:\share\backups\presentations\asset2008-02-28BeforeAddingPo.xml

- Now that you have your backup, you are ready to make changes. Click the **Edit dialogs** icon in the toolbar (see Figure 5-4).

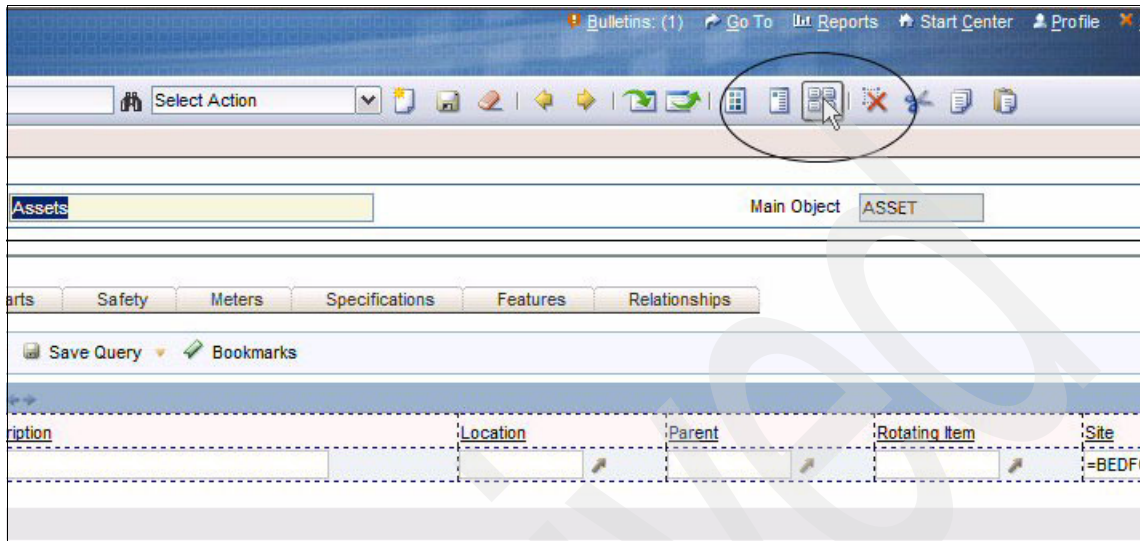


Figure 5-4 Edit dialogs icon

- Scroll through the dialog names until you find Searchmore, which is the Advanced Search dialog. Click the name, and a dialog is displayed that you can edit just like the base window for asset.

Note: For instructions on using the Application Designer application, refer to the *Application Designer Quick Start Guide* available at

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.itmaxam.doc/62_mx_AD_ug.pdf

- Add a new text box to the dialog. Select the text box, call up the properties, and enter the values shown in Table 5-2.

Table 5-2 Searchmore properties

Property	Value
Label	PO
Attribute	ASSETTRANSCREATED.PONUM
Menu Type	NORMAL
Go To Applications	PO

6. Save the record, and go to the Asset application to check your work. You need not log out or restart the server after making changes in the Application Designer.
7. Test your new search field by searching for a known PO number.

The same relationship can be used to display several other attributes of the Asset Transactions record from its creation:

- DATEMOVED - Creation Date
- ENTERBY - Asset Entered By

5.2.5 Items versus assets

This section provides help in deciding when you should use an item and when you should use an asset to portray a particular commodity or piece of equipment.

Rotating items are associated with asset records, whereas non-rotating items are strictly tracked on a nonserialized basis in inventory and attached to assets as spare parts.

When you create an Item Master record, you must choose whether it is a rotating or non-rotating item by checking or unchecking the appropriate box. When rotating items are received, an additional step is required in the Receiving application; you specify asset numbers and serial numbers for each item received.

If your organization does not use the Receiving application in Tivoli Asset Management for IT, you may enter Item Master records directly into Storerooms. You can do this in the Item Master application, the Storerooms application, or the Inventory application.

5.2.6 Item assembly structures

A bundled set of items can be shown in Tivoli Asset Management for IT as an item assembly structure. You use an item assembly structure when you are procuring several items on a single PO line, which you want to track separately after receipt.

If a user is buying a shrink-wrapped Microsoft Office 2003 bundle, two items can be created, one for the install medium and one for the license, and both assigned to the parent item on the Item Assembly Structure tab. The two child items are required if you want to track the license and the install medium separately in inventory.

Item assembly structures may be used in several contexts with regard to software:

- ▶ Hardware bundled with software

For creating templates consisting of an asset and several standard software licenses or products. The templates can be applied to rotating hardware assets using the Apply Item Assembly Structure menu item to show that the standard software has been installed on the asset. This model may be helpful for modeling procurement of pre-imaged hardware.

- ▶ Kits

For creating kits of software licenses stored in a License Pool storeroom. Item assembly structures flagged as kits can be assembled as kits in the Inventory application and issued as a single unit. This functionality may be useful for modeling the installation of standard software images drawing from varying inventories of software licenses. The individual items that make up a kit are considered part of the kit and are not tracked separately in inventory once they have been assembled into a kit. Balances for an item record do not include any instances of that item that have been assembled into a kit.

- ▶ License bundles

For separate licenses bought as a bundle. The bundled licenses may be separate and distinct in the sense that they refer to different products with different entitlement scope and capacity definitions, but they are grouped in order to closely resemble the line items present on vendor contracts and purchase orders. The Microsoft platform and CAL licenses are an example of this kind of bundling, where licenses with dissimilar capacity and scope are bundled as a single orderable item.

- ▶ Licenses bundled with services

In some cases vendor line items may include services or installation media with software licenses. These line items must be split into different items within Maximo for separate tracking. In such a case a top-level item can be created that corresponds to the vendor line item, and the items created for inventory tracking are put into the item assembly structure.

Support or maintenance subscriptions for software are modeled as software, maintenance, service, or warranty contracts in Tivoli Asset Management for IT, not as Item Masters themselves. For instance, you may order and receive this Item Master:

Access Gateway Standard Edition - 1 Concurrent User with 1yr
Subscription Advantage

When the item is received, the Item Master itself can be received into inventory and tracked to keep a count of the concurrent user licenses available and to

manage charge-backs between organizations. In addition, at the time of receipt, a Software Contract of type Subscription must be set up to track recurring payments and provide notifications before renewal. The contract can refer to the original Item Master as one of its line items.

Note that in this case, the software contract is used to show *what is ordered*, where some software contracts such as volume agreements are used to agree on prices for ordering. A volume pricing agreement can be used to create a PO, whereas this support contract is used only to show items that have already been received.

5.2.7 Desktop Requisition templates

For users placing orders, their main concern is knowing exactly what they are getting. Here is an example of an Item Master description created for users:

```
PROJECT PROFESSIONAL 2007 LICENSE ONLY(CD & BOOK SOLD SEPARATELY)
This is a non-receivable item. Purchase of this item provides right
to use only. Order installation through IT Services.
```

Because this kind of item description does not lend itself to subsequent ordering and inventory, you may want to use templates in the Desktop Requisition application to provide user-friendly descriptions. Templates can be created for one or more commonly ordered Item Masters so that users have no doubt about what they are getting.

A single orderable template may include several Item Masters, and those Item Masters may include item assembly structures. Whether the various items are fulfilled by buying from an external vendor or from existing inventory is transparent to the user.

5.2.8 Multiple views of software

Software is tracked in various entities in Tivoli Asset Management for IT according to the business processes from which it is being considered (see Table 5-3).

Table 5-3 Different application perspectives

Perspective on software	Application
Install programs, product documentation, and software entitlement documentation	CIs in Definitive Software Library (DSL) repositories
Software deployment packages	CIs

Perspective on software	Application
Software installations	CIIs, Assets, Spare Parts
Software signatures	Software Product Catalog
Discovered software installations	Actual CIIs if discovered through Tivoli Application Dependency Discovery Manager; otherwise, Deployed Assets
Software licenses, materials, and services being ordered or inventoried	Item Master
Software license compliance	Tivoli License Compliance Manager, Tivoli License Compliance Manager for z/OS®

Coordinating these various records, their statuses, and their links is one of the primary challenges of the people responsible for the software management life cycles. In many cases the records cannot be generated or matched automatically, but Tivoli Asset Management for IT assists in the creation of related records and links between them.

Item Masters and software products

Authorized software items (Item Masters) usually are a subset of the catalog of discovered software items. When an item is authorized for purchase, it means the following:

- ▶ The vendor has been approved, and possibly a vendor contract is in place.
- ▶ A commodity code has been assigned.
- ▶ The item has been classified.
- ▶ The licensing for the item has been analyzed.
- ▶ The order and issue units for the item have been set appropriately to the license.

5.2.9 Autonumbering of asset numbers

Autonumbering always generates a little more discussion than it probably deserves. The facility for configuring autonumbers is quite flexible in Maximo, but there is always a demand for something a little different.

It is difficult to change autonumbered keys once records have been inserted, so we recommend your plans take this into consideration.

The following qualities define a good autonumbering system:

- The numbers sort alphabetically as well as numerically.

Taken as numbers, 111 is greater than 2, but taken as text, 2 is greater than 111.

The trick here is to start with a number that contains sufficient digits to ensure that you will not have to add another digit to cover all your items. If you start with 1000000, you can use all numbers up to 9999999 and still sort alphabetically.

A good rule of thumb is to start with a number that is four times as big as the greatest number of records you can imagine for the object, and then add a zero to it. You need the extra numbers because some are wasted when loading records en masse and when deleting mistakes.

- The numbers do not start with zero.

When you export records to a csv (comma separated variable) or another delimited format and then open them in a tool such as Excel®, leading zeros may be removed under some conditions. It happens more than you probably think, and if it happens in a key field, the resulting errors can be significant.

This problem is easy to prevent by starting the numbers with a text prefix or with numbers other than zero. Text prefixes are configurable within Tivoli's process automation engine. If you start with 1000000 and count up, you do not need a text prefix. Starting with 1000000 is usually easier than typing a text prefix 999,999 times for the lower numbers.

- The numbers are consistent throughout the system.

It is possible to define asset numbers differently for each organization, but it is easier to design reports and programming around numbers that are consistent throughout the system.

Several customers have asked whether they can autonumber assets across organizations so that no duplicates occur among the organizations. This is possible through a back-end hack on the autokey table. Back-end hacks are not supported, but we know of instances where they have been used with success.

The autokey table usually looks similar to Table 5-4.

Table 5-4 Sample autokey table

Prefix	Seed	Orgid	Siteid	Autokeyname	Setid	Langcode
	1000	ORG1		ASSETNUM		EN
	1000	ORG2		ASSETNUM		EN

Prefix	Seed	Orgid	Siteid	Autokeyname	Setid	Langcode
	1000	ORG3		ASSETNUM		EN

When autonumbering across organizations, you want to use a single entry that is not organization specific and has a suitable seed (see Table 5-5).

Table 5-5 Autonumbering across organizations

Prefix	Seed	Orgid	Siteid	Autokeyname	Setid	Langcode
	1000000			ASSETNUM		EN

You have to use SQL to get the entry to look as it does in Table 5-5. The organization-specific entries are added when you add organizations; thus, if any additional organizations are added, the autokey entries must be removed. In addition, it may no longer be possible to edit the autokey entry through the dialog in the Organizations application.

5.2.10 Classifications

You can develop a system of classifications in Tivoli's process automation engine for many objects, including assets and items, work orders, tickets, and CIs. In general, you should set up classifications to show commodities that serve or support a common function, purpose, or task. Of particular interest to Tivoli Asset Management for IT users is the hierarchy for assets and items because it is best to decide on the hierarchy as much as possible prior to loading the baseline of asset records. Developing a useful system of classifications can help make your Tivoli process automation engine implementation successful.

The majority of IT assets have Item Master records assigned to them. Assets with an Item Master assigned to them inherit their classification from the item.

A coherent classification hierarchy is helpful when doing the following:

- ▶ Searching for records
 - Finding records when other information is missing
 - Listing products in the same classification or higher classifications
- ▶ Reporting
 - Comparing costs for different options
 - Analyzing expenditures
 - Comparing features of similar assets
 - Summary reporting at the appropriate level of granularity

- Specifying attributes that apply only to particular kinds of assets

Keep these benefits in mind when creating the classification hierarchy because doing so often involves more work than anticipated.

We recommend you decide on your general approach to the hierarchy and the majority of the classifications before loading data. The hierarchy determines whether data specific to particular classes of assets is to be loaded into specifications or into attributes on the Asset and Item Master records. Also, you may have to complete several steps of back-end manipulations when redoing a classification hierarchy once large numbers of records have been associated with the hierarchy records.

An intuitive way to think about and set up a hierarchy involves assigning four levels as shown in Table 5-6.

Table 5-6 *Setting up a classification hierarchy*

Hierarchy	Entry
Noun Group	IT equipment
Noun	
Modifier	
Characteristic	

Using this scheme in Tivoli's process automation engine, Noun Group, Noun, and Modifier are classifications, and Characteristic is a specification.

IT top-level asset classifications

You must set the top-level classifications for assets and CIs before the reconciliation engine can return results. Follow these steps to set these two classifications:

1. Go to the Organizations application and choose **System Settings** from the Select Action menu.
2. In the IT Options section, drill to the top-level classification for assets and then for CIs (if you are using CIs).

The reconciliation engine returns only assets that are classified, and whose classifications fall beneath these named classifications in the hierarchy.

3. Define a single top-level classification for each asset that will undergo reconciliation, and make sure that all asset classifications to be reconciled fall under it.

Classifications and commodity codes

Two fields on the item that relate to classifications are Commodity Group and Commodity Code. The fields hold values required by some organizations' purchasing systems to track commodities.

Some organizations already use United Nations Standard Products and Services Classification (UNSPSC) or National Institute of Governmental Purchasing (NIGP) codes to track commodities requiring these valid commodity code values to be present in the Commodity Code field, so it may seem redundant to classify the item as well. This requirement, however, provides an opportunity to adopt a classification scheme that may work better than the one required by the purchasing department.

The needs of an IT department for classifications may differ considerably from the needs of the purchasing department. However, if your organization does decide that the classification and the commodity codes should be identical, one or two crossover domains can be configured to automatically enter the commodity code when the classification is entered.

Standard classification schemes

Several classification schemes have been developed to reduce the time required for organizations to classify commodities and to provide standards across organizations.

Even if your organization chooses a standard classification scheme, it is likely that the organization will want to use a subset of the available codes. Using a subset of the codes that is applicable to the equipment at hand makes it possible to describe the equipment at the required level of granularity. Codes can also be added as needed for Tivoli's process automation engine hierarchy.

UNSPSC

The United Nations Standard Products and Services Classification (UNSPSC) was created when the United Nations Development Program and Dun & Bradstreet merged their separate commodity classification codes into a single open system. The UNSPSC code is the first coding system to classify both products and services for use throughout the global marketplace.

UNSPSC uses an eight-digit code to specifically define supply chain items (for example, a computer notebook has the unique code 43211503). The majority of ITAM assets can be found under the "Computer Equipment" and "Software" classifications, for example:

- ▶ 43200000 - Components for information technology, broadcasting, or telecommunications
- ▶ 43210000 - Computer equipment and accessories

- ▶ 43220000 - Data voice, multimedia network equipment, or platforms and accessories
- ▶ 43230000 - Software

The current version of the UNSPSC specification is maintained at:

<http://www.unspsc.org/CodeDownloadExpand.asp?PageID=4&MenuLoc=1>

The specification at this Web site is the source of the data to be loaded into Maximo for most Asset Management for IT customers. A PDF version is available for free, and an Excel version is available for purchase.

UNSPSC is a hierarchical classification of five levels. Each level contains a two-character numerical value and a textual description as follows:

- ▶ XX Segment - The logical aggregation of families for analytical purposes
- ▶ XX Family - A commonly recognized group of inter-related commodity categories
- ▶ XX Class - A group of commodities sharing a common use or function
- ▶ XX Commodity - A group of substitutable products or services
- ▶ XX Business Function - The function performed by an organization in support of the commodity

For example, pen refills are classified in UNSPSC with the 44121903 code. The hierarchy of the 44121903 code is described in Table 5-7.

Table 5-7 UNSPSC hierarchy

Hierarchy	Category number and name
Segment	44 Office equipment, accessories, and supplies
Family	12 Office supplies
Class	19 Ink and lead refills
Commodity	03 Pen refills

NIGP

The National Institute of Governmental Purchasing (NIGP) code set is a proprietary hierarchy of commodity codes maintained by Periscope (see Table 5-8 on page 75). Subsets of this system have been purchased and adopted by various state government agencies in the U.S., as well as in other countries.

Table 5-8 NIGP commodity and service code samples

Code structure	Code	Description
Three-digit (class) code	620	Office supplies: erasers, inks, leads, pens, pencils, etc.
Five-digit (class-item) code	620-80	Pens (general writing types): ballpoint, nylon tip, etc.
Seven-digit (class-item-group) code	620-80-21	Pens, ballpoint, retractable, refillable, all plastic barrel with metal pocket clip
Eleven-digit (class-item-group-detail) code	620-80-21-035-4	Fine point, black ink, 12/box
	620-80-21-045-3	Fine point, blue ink, 12/box
	620-80-21-065-1	Fine point, green ink, 12/box
	620-80-21-075-0	Fine point, red ink, 12/box
	620-80-21-095-8	Medium point, black ink, 12/box
	620-80-21-105-5	Medium point, blue ink, 12/box

Note: The URL for the Periscope Web site is:

<http://www.nigp.com>

Hierarchy path

The same classification can exist in multiple parts of the hierarchy. For instance, a cable can be found under IT Equipment, Electrical Equipment, Electronics, Automotive Equipment, and other categories. Because the hierarchical context is important, Tivoli's process automation engine uniquely identifies not just the classification but its place in the hierarchy.

To present the position of the classification within the hierarchy in a single field on the window, Tivoli's process automation engine provides a virtual field hierarchy path that shows the key codes for the hierarchy from the top-level classification to the specific classification for an item. For example:

ITAM_ALT \ COMP_EQU \ COMPUTER \ DESKTOP

If the UNSPSC codes are used, this field might appear as follows:

43000000 \ 43210000 \ 43210500 \ 43210503

The numbers are less intuitive to a user unfamiliar with the specifics of the UNSPSC hierarchy than the sample ITAM_ALT classification with its meaningful keys. If your organization is setting up a relatively simple hierarchy, it might be favorable to adopt one with meaningful keys for this reason.

Specifications

Specifications are defined in the Attributes table on the main tab of the Classifications application. In Table 5-8 on page 75, the specifications are DISKSIZE, PROSPEED, AND RAMSIZE.

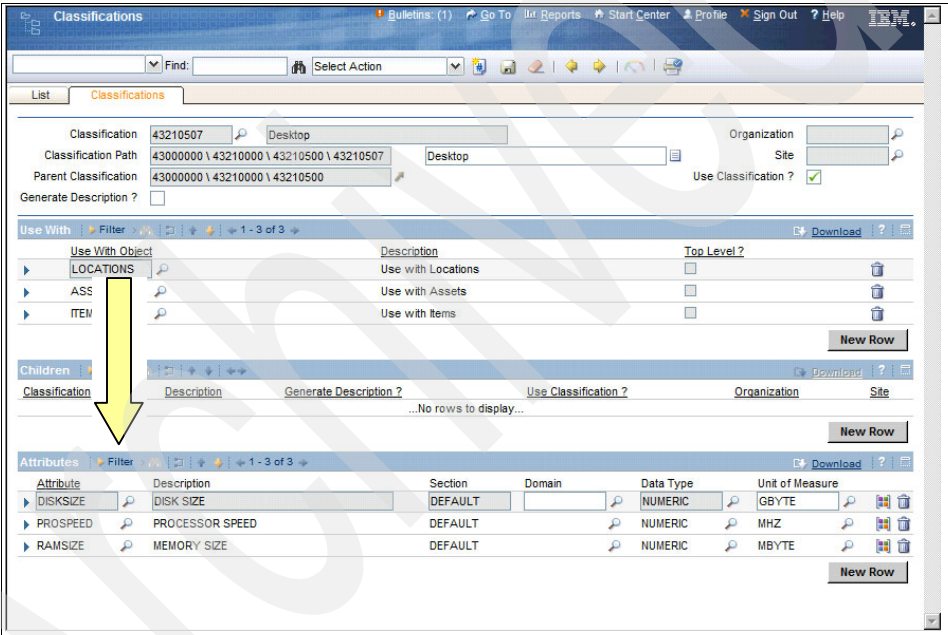


Figure 5-5 Specifications for an asset

Because the fields in the Section column are part of the key for specifications, it is helpful to supply values for them. In Table 5-8 on page 75, the fields in Section are set to DEFAULT. If you are not using the Section attribute for a specific setting, you can set a default value for CLASSSPEC.SECTION in the database configuration.

You can search for specification values in the Classification Search dialog. When you select a classification that has specification attributes assigned to it, the attributes appear to the right of the classification tree. You can enter values in the

Search Value field, and when you click the **Refine** button, the list of assets displayed in the lower panel of the dialog are restricted to those with the specification you entered (see Figure 5-6).

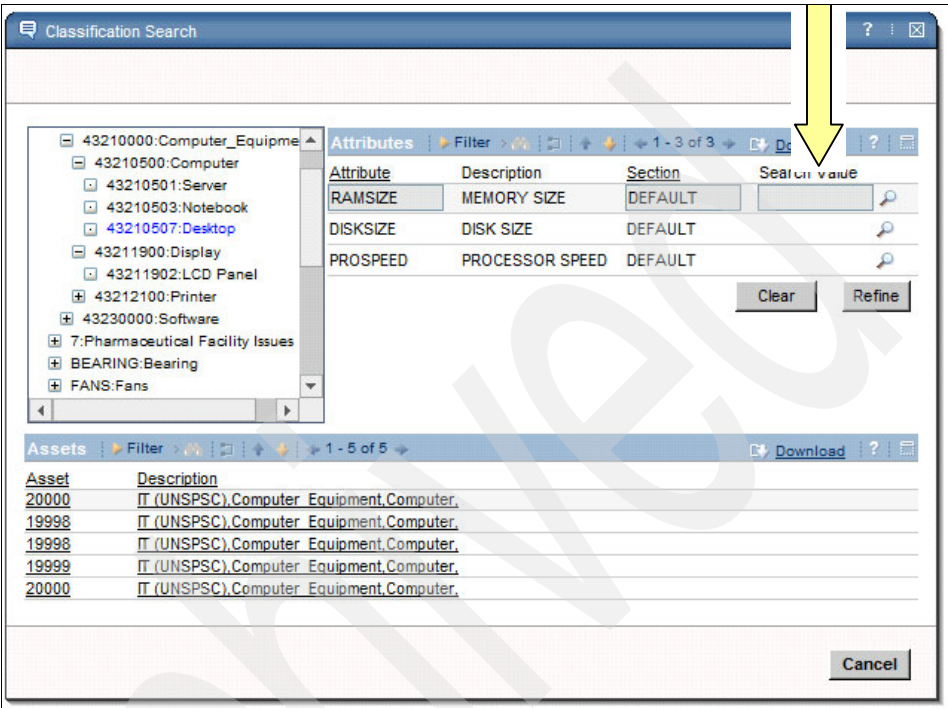


Figure 5-6 Searching for specification values

Note: Performing a classification search is different from displaying a list of all assets with the given specification on the List tab of the Asset application.

Specifications are inherited from Item Master to asset. The specification values for an item can be overridden after the item is assigned to an asset. However, you should carefully monitor this practice. If the specification is truly a defining characteristic of the item, perhaps another item should be created with the new specification value.

Where classifications stop and specifications start

Because classifications in a sense become part of the structure of the data, we do not recommend you tie other attributes to them. For instance, if a third-party pricing structure depends on whether router is a high-end router or a low-end router, you might think that you should create two classifications: IT / Network /

Router / High-end router and IT / Network / Router / Low-end router. This works unless the contract changes and the criteria for pricing network equipment are redefined.

A better approach than entering two classifications is to stop the classification hierarchy at Router and define a Pricing specification that lists the pricing attributes possible for routers. Setting up the specification this way accomplishes the following:

- ▶ The same Pricing specification can be used for various classifications of network equipment. Thus, reporting on pricing in general can be accomplished through the list of values in that field.
- ▶ You can change the hierarchy without changing pricing lookups. If pricing lookups are based on the classification, references to class structure IDs or hierarchy paths have to be hard-coded. Instead, even on a reorganization of the hierarchy, the lookup values are not changed.
- ▶ You can change the pricing structure without changing the classification hierarchy.
- ▶ You can configure a domain for the specification so that only the pricing attributes for routers, for example, appear in the list. Even if you use the same specification for different classifications, it is possible (though not necessary) to configure a different domain for each one.

Standard descriptions from specifications

Tivoli's process automation engine can be configured to generate standard descriptions using the classification name and/or the specification values given for a particular item or asset in a way similar to how vendors often generate their descriptions. Consider this example:

XPS630 Intel Core2 Extreme QX6850, Genuine Windows Vista Premium, 1 GB, 120 GB

The example consists of an item number and several specifications: model number, processor type, OS, RAM size, and hard disk size.

To activate the description generation feature for a classification, check the Generate description? check box for the classification in the Classifications application. To use the bottom-level classification as the first word in the description, check the Use classification? check box in the same section.

To designate whether a particular specification should be used in the description, click the multi-colored button next to the trash can icon in the Attributes section of the Classification window. Checking the Use in Description Generation? check box results in the specification being included in descriptions. Checking Use in

Specifications? determines whether that specification attribute applies to the object listed at all. See Figure 5-7.

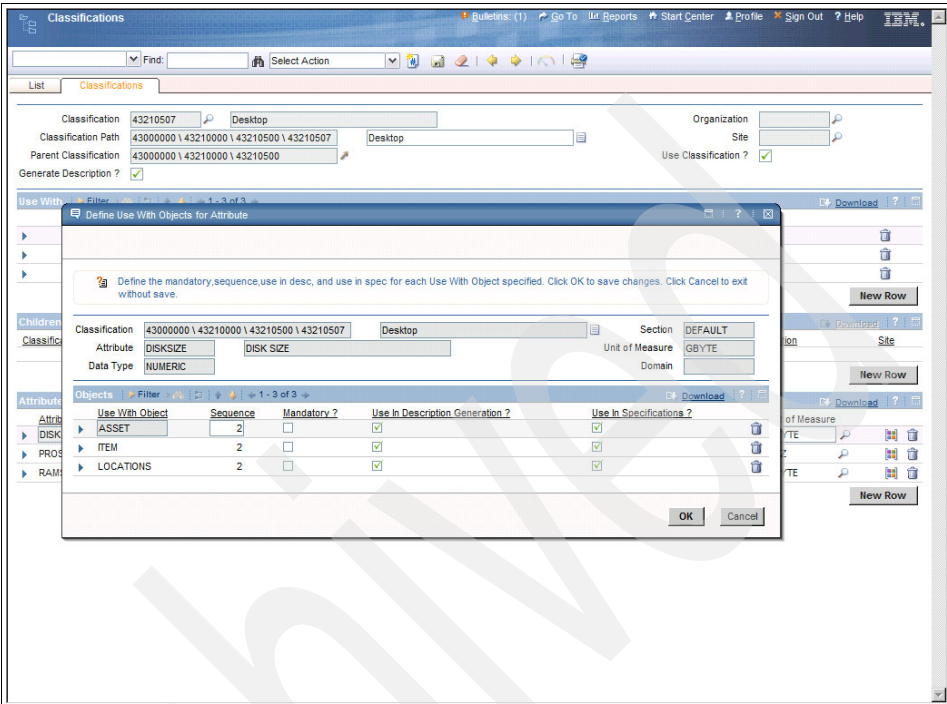


Figure 5-7 Use in Description Generation? and Use in Specification? options

The description generation feature is helpful in creating meaningful, standard descriptions. The descriptions are presented in reports and are easy to search. Having standard descriptions that include important specification values solves the limitation of not being able to display a list of search results by specification on the List tab of applications. However, if your organization deals exclusively with a select group of vendors for select merchandise, it may be easier to adopt the vendors' terminology for orderable items than to build your own system.

Initial data load

This chapter discusses issues you encounter when setting up an initial data load for your IT asset management environment. Data loads, particularly for asset management, are driven by an organizational desire for process improvements.

We also introduce the IBM Tivoli Integration Composer. This software transfers software license and hardware and software data to Tivoli Asset Management for IT and is an appropriate choice for organizations requiring the integration of Tivoli Asset Management for IT and Tivoli License Compliance Manager (TLCM) data.

6.1 Considerations

You should consider the following issues when making the initial data load:

- ▶ Assessment of data for completeness
- ▶ Master data management issues, including how data is updated, refreshed, consumed, and archived
- ▶ Primary key management for reconciliation
- ▶ Considerations related to pooling or assigning assets
- ▶ Identification of roles and responsibilities, and considerations regarding skill gaps
- ▶ Audit controls
- ▶ Event management

These issues are discussed in the sections that follow.

6.1.1 Assessing data

Data and information are key process drivers in a modern IT-dependent business. Along with process, people, and tools, data can be used as part of an asset management process, and data and changes in data can also be used as a work initiator. For this reason, the quality of the data and its accuracy must be managed carefully.

During the asset management solution design, your data must be assessed for completeness, and test cases must be developed and executed to verify data accuracy and reliability.

6.1.2 Master data management

Master data management is an information management discipline. Master data management is concerned with the effective use of data and retaining the usefulness of the data as business information. Issues common in data management are the following:

- ▶ Maintaining a single point of update for data integrity
- ▶ Moving and copying the data to where it is to be consumed while maintaining its integrity

From an asset management tools perspective, master data management should include identification and definition of the tools responsible for data items and evaluating how the data items are updated, verified, and reconciled.

An issue specific to the management of software licenses is where to maintain license details. Financial data for adding or procuring licenses is often kept in a procurement or requisition system - for example, Tivoli Maximo Asset Management (TLCM). Details regarding the type of licenses and who they are assigned to may be kept in another tool with another relational database - for example, IBM Tivoli License Compliance Manager. You should gather data dictionaries and schema diagrams to assist in understanding the data contained by each application or data source.

When using Maximo Asset Management and TLCM, an objective is the integration of the data between the tools.

Data quality

To maintain data quality, your data should be tagged or an audit trail of changes established so the changes to the data can be tracked and any inconsistencies traced back to their origin for rectification. For example, in a multitool environment, perhaps common with many mergers and acquisitions, two tools may perform similar functions. The data should be tagged with the data source so that any inconsistencies can be quickly tracked back to the correct source tool. Other situations where you might find a need to manage data with tagging is in multivendor environments, especially when managing hardware. Each vendor typically has its own tools for managing its hardware.

6.1.3 Federated asset data

Asset data for your organization may currently exist in multiple locations. Managing the relationships and primary keys between these islands of data is required.

Primary key management

Management of primary keys and their relationships is important to asset management because robust management enables you to join data across multiple sources. Consider the typical business with IT data spread across the enterprise in different locations and formats, such as spreadsheets, relational databases from disparate vendors, and existing applications and accounting systems.

In the situation illustrated in Figure 6-1 on page 84, the asset attributes can be federated, or they can reside in different locations and in different formats. To bring the federation back to a single view of the asset, managing the primary, or

“identifying” keys, and a linkage capability is essential to gathering each piece of data for the asset to enable sufficient process benefits.

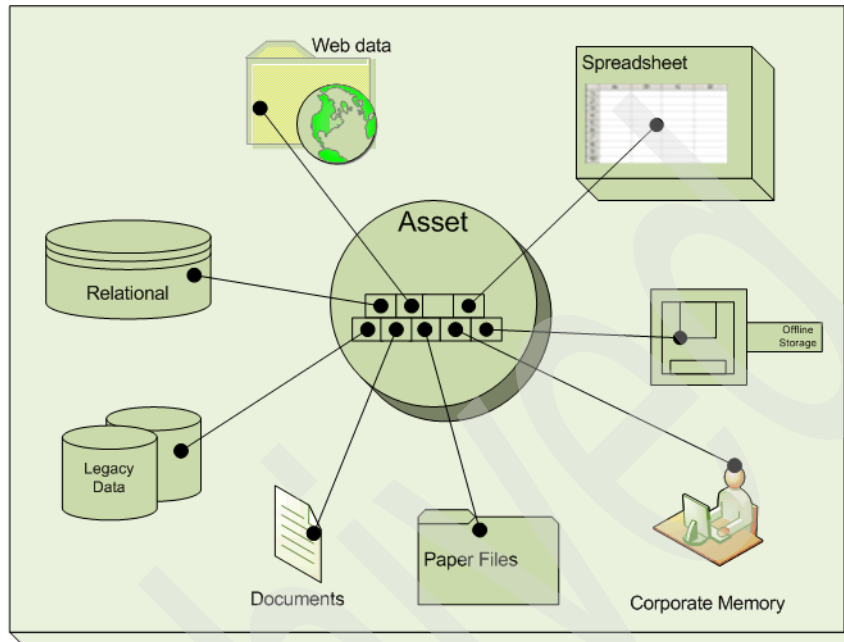


Figure 6-1 Federated asset data

Primary key generation in TLMCM

IBM Tivoli License Compliance Manager (ITLCM) has a number of primary key-generating methods, including the following:

- ▶ None
- ▶ Combination of manufacturer, hardware model, and hardware serial numbers
- ▶ Primary MAC address of the first interface

Depending on your environment, you can select one of these methods. Due to the virtualization of networks, and security-conscious network administration, we recommend the using the manufacturer, model, and serial number identifiers as an effective key-generating method in most ITLCM environments.

6.1.4 Pooling or assigning assets process considerations

When working with assets, you make decisions regarding the control of assets; these decisions have a direct bearing on the cost of running your asset management solution. One of these decisions is whether to pool (or group) similar assets to perform bulk operations, or whether to expend individual effort

to assign assets. You must weigh the cost of performing the assignment against other criteria such as accounting for high-value assets.

Note: Pooling an asset groups similar assets together. Assigning assets involves a more detailed relationship - for example, assets assigned to an individual.

For example, pooling an asset may assign it to a warehouse pending deployment to a user. Once deployed, the asset is moved from the warehouse and linked to a department. The assets are still pooled or grouped at this level of operation.

Should you have a business process that requires operations at a different level - for example, updating software by user - you have to modify your process to capture additional data to assign the asset to an individual user.

Privacy implications of assignment

In some jurisdictions, assigning the asset to an individual may create additional costs to the business by requiring the business to comply with data handling or privacy laws. Such laws come into play when individually identifiable or private data is generated by the assignment of the asset to the individual. Special consideration should be taken as to the storage location and exportability of this data.

High-value assets

You may decide to track high-value assets differently from assets of a lower value. We recommend you acquire information as to the value of the assets versus the costs of additional controls.

Note: These estimates typically require specific expertise in security and risk management.

An executive's mobile computer is an example of a high-value IT asset. These mobile computers typically store highly valuable data, requiring encryption software to be active on the hard drive. Your asset management solution must take into account the capture and storage of data so that it shows the assignment of the asset as a high-value asset. In addition, you must consider the process of storing the values for the current encryption setting configuration items.

6.1.5 Identifying roles and responsibilities

Your data load implementation should include clear roles and responsibilities. When dealing with a complex environment with dispersed operational activities, the management functions and processes are often based on existing skills.

Typically, effectively dealing with these issues leads to the construction of a diverse asset management team with skills in utilizing and connecting to a wide range of data sources.

Cataloging data and publishing it

With the growth of information repositories in your environment, you might consider using a librarian to catalog and publish the data repositories and metadata. Cataloging the data enhances efficiency in your workflow construction because the sources of data can be quickly identified.

6.1.6 Audit controls

Auditing is usually a calendar-driven event, whereby an audit is scoped, the risk is analyzed, and then the audit is executed according to a regular time interval. Such features as the following should be built into your data load function:

- ▶ Logs or archives
- ▶ Data change authorizations
- ▶ Source code management

These features assist an auditor in forming an opinion as to the accuracy of your asset management process and thereby increase confidence in the accuracy of asset data in financial reports.

In some jurisdictions, it is legally required that you be able to track changes to the data element and the authorized changer level for data used in the construction of statutory financial reports.

6.1.7 Event management

An event is something that happens to one of your assets. Due to the cost of event management and its near real-time nature, event management is traditionally used only for critical IT events, such as losing access to a critical application or server.

Event management can be an effective part of the asset management process if the event management resources are configured for minimal resource utilization.

An example of minimal resource utilization is checking a data load each day and producing reports only when a problem requires human intervention.

Other minimalist approaches include creating periodic summaries and grouping - for example, reporting on the aggregates of a reconciliation process. This approach implies data-driven event management, where the change in the data initiates the start of another process.

6.1.8 Barriers to implementation

A number of barriers to a successful initial data load may be present in your organization, such as the following:

- ▶ Lack of internal resources
- ▶ Fear of extended outages
- ▶ Lack of expertise
- ▶ Lack of knowledge of solution potential

Internal resources

Internal resources are an organizational capability that enable related process execution. Should you have insufficient internal resources, you may want to consider external resources.

Extended outages

An organization may have a recent history of extended outages. This history may make the organization reluctant to permit the infrastructure changes required to implement the initial data loads.

Strategies that you can employ to mitigate fear of outages include the running of test programs or limited scope pilots.

Lack of expertise

Initial data loads require a level of knowledge of information systems and data management that may not be common. A strategy you can employ is to form a team of generalists supported by one or two specialists with deep, narrow expertise.

Lack of knowledge of solution potential

The organization may not have an understanding of the potential of the solution to contribute to the business. This understanding can be off set by education and other such activities.

6.2 IBM Tivoli Integration Composer V7.1

As mentioned previously, Tivoli Integration Composer transfers software license and hardware and software data to Tivoli Asset Management for IT. In this section we describe how you can get started with TlCM and its related adapter. We also cover how you can set up mappings for moving data from TlCM into Maximo.

Note: The Tivoli Integration Composer was formerly known as Fusion.

6.2.1 Requirements

The following prerequisites must be met to set up the Tivoli Integration Composer and TlCM adapter:

- ▶ Network connectivity between the TlCM administration database and the Maximo database.
- ▶ An installed instance of:
 - IBM Tivoli Change and Configuration Management Database V7.1 (CCMDB), which includes the Maximo database
 - IBM Tivoli Asset Management for IT V7.1
- ▶ Integration Composer V7.1 requires:
 - At least 3 GB memory
 - Disk space of 70 MB
 - IBM Java™ SDK V5.0 Service Release 5
- ▶ A dedicated server is required for running the Integration Composer application and Java components. Integration Composer requires one of the following operating systems:
 - Microsoft Windows 2003 with Service Pack 2
 - IBM AIX® V5.3, Maintenance Release 6
 - Red Hat Enterprise Linux® 4 on Intel®
- ▶ One or more source and target databases of the following releases:
 - IBM DB2 Universal Database™ V9.1 with Fix Pack 2 (installed by the Tivoli middleware installer)
 - IBM DB2 Universal Database V8.2 with Fix Pack 14
 - Oracle Database 9i Release 2
 - Oracle Database 10g Release 1

- Oracle Database 10g Release 2
- Microsoft SQL Server 2005 Standard Edition
- Microsoft SQL Server 2005 Enterprise Edition
- ▶ A browser to display Integration Composer help information.
- ▶ The database name, user ID, password, and the database vendor type for both the Maximo database and the Tivoli License Compliance Manager database.

Note: Integration Composer V7.1 only works with IBM Tivoli Change and Configuration Management Database V7.1.

The Integration Composer connects to data sources with a type 4 Java driver or an API. The connectivity options that ship with the Integration Composer include:

- ▶ IBM DB2 JDBC™ driver.
- ▶ i-net OPTA JDBC Driver for Microsoft SQL Server 7/2000/2005.
- ▶ Oracle JDBC Thin driver. This driver supports Oracle 10g and earlier versions (including 8.0, 8i, and 9i).
- ▶ IBM Configuration Discovery and Tracking API.

6.2.2 Tivoli Integration adapters

Tivoli Integration Composer adapters contain mappings for data sources and schemas for a number of operational management systems.

IBM provides the following Tivoli Integration adapters for purchase:

- ▶ Altiris Inventory Solution
- ▶ Centennial Discovery
- ▶ Maximo Discovery
- ▶ Microsoft SMS
- ▶ Tivoli Application Dependency Discovery Manager
- ▶ Tivoli Configuration Manager
- ▶ Tivoli License Compliance Manager
- ▶ Tivoli License Compliance Manager for z/OS
- ▶ Tivoli Provisioning Manager
- ▶ IBM Tivoli Network Manager IP Edition

In addition, Integration Composer also enables you to create your own adapters.

The IBM Maximo Integration adapter for TLCM includes mappings for:

- ▶ Software license data mapping
- ▶ Deployed assets data mapping

6.2.3 Setup

To set up the software, a multistep installation and configuration process is required. The installation steps include:

1. Meeting the prerequisites and corequisites as discussed previously in 6.2.1, “Requirements” on page 88.
2. Installing the Integration Composer software.
3. Managing the data source.
4. Defining a new schema.
5. Completing the mapping process.

Prerequisites

You require database logon information for both your source and target databases. Check your Maximo properties file for the correct user name; it is usually the user name of the database schema owner.

Example 6-1 shows the variables containing the maximo user name `mx.db.user` and password `mx.db.password` required for the Integration Composer.

Example 6-1 maximo.properties file containing the database user ID and password

```
as defined via sp_addsrvrolemember.  
// For DB2 this is an O/S user.  
mx.db.user=maximo  
  
// Database login password -- depends on driver, e.g. sometimes it's  
passwd=  
// For DB2, this is the O/S password.  
mx.db.password=yourpwd
```

Installing Tivoli Integration Composer

Follow these steps to install the Integration Composer:

1. Start the installer and select your installation language preferences. The installer is a Java application.

2. Enter your Maximo database connectivity settings. Figure 6-2 shows the settings for the installation in our lab environment. These settings can be found in your maximo.properties file.

IBM Tivoli Integration Composer

Database Login Information

The following information is needed to connect to the database. Please enter all of the database information requested below.

At this time, you may choose to skip this step and enter the Database information manually by editing the fusion.properties file.

Database Server Name:	ferway.itsc.austin.ibm.com
Port Number:	50000
Database Name:	maximo
Database Username:	maximo
Database/Schema Owner:	maximd

InstallAnywhere by Macrovision

Figure 6-2 Maximo database connection settings

3. Disable software updates for performance reasons as shown in Figure 6-3. If software updates are disabled, the Integration Composer inserts and deletes records but does not perform updates.

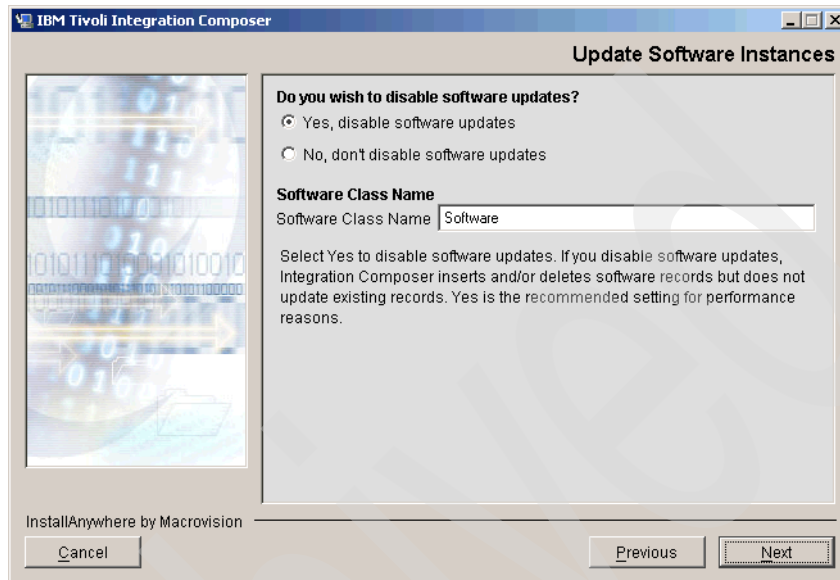


Figure 6-3 Disabling software updates

The installer then completes the installation.

Note: The Integration Composer is updated by the Power Update Client utility. The client requires Internet connectivity to perform the update, which is not available from many production servers. If this is the case for your environment, copy the integration Composer directory PowerUpdateClient and contents to a server or mobile computer with Internet connectivity, and run the update client update.exe. You can then copy the directory back and restart the update.

Starting the Integration Composer

Follow these steps to start the Integration Composer:

1. Select **Start** → **All Programs** → **IBM Tivoli** → **Integration Composer** → **IBM Tivoli integration Composer**.

The logon window displays, as shown in Figure 6-4. Note that the user name and password required is the Maximo database user and password. A common user error here is not using the information from the database logon.

2. Click the **Login** button.

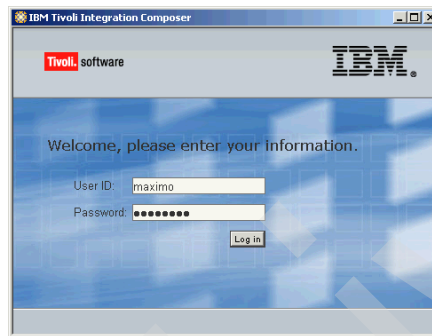


Figure 6-4 Integration Composer logon

The main menu then displays. Note the functional separation of Data Source, Mapping, and Data Schema in the main menu, as shown in Figure 6-5.

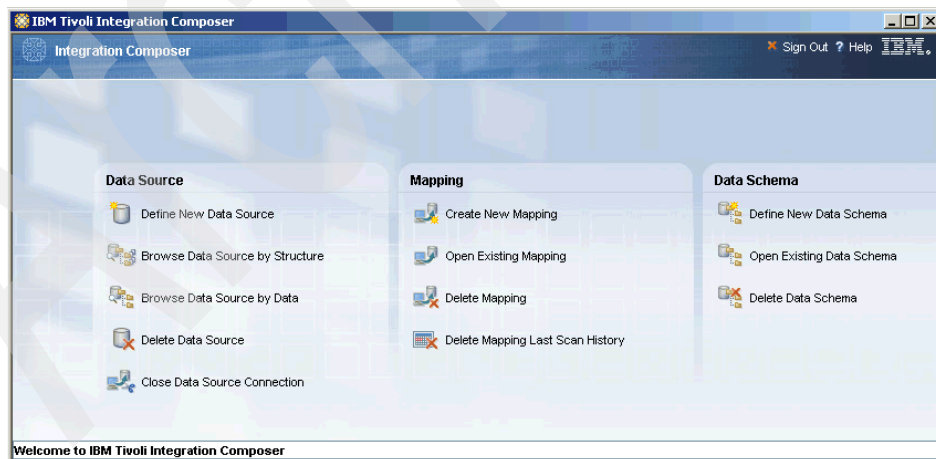


Figure 6-5 Integration Composer main menu

Defining a new schema

Defining a new schema is the next process. You require the schema files for IBM Tivoli License Compliance Manager:

- ▶ Hardware and software inventory
 - TLCM23INV.schm
 - TLCM23INVtoDPA71.fsn
- ▶ License
 - SWLICENSE71.schm
 - TLCM23LIC.schm
 - TLCM23LICtoSWLIC71.fsn

Importing the hardware and software inventory schema

To import the hardware and software inventory schema, follow these steps.

1. Select **Data Schema** → **Define New Data Schema**.
You are prompted to enter a data schema name.
2. Enter IBM Tivoli License Compliance Manager V2.3 Hardware Software.

3. For the data source enter TLMA. This represents the TLCM administration database. Fill in the connection method specific to your environment; your entries will be similar to those shown in Figure 6-6.

The screenshot shows the 'Define a New Data Schema' dialog box in the IBM Tivoli Integration Composer. The 'Connection Information' tab is selected, showing fields for 'Connection Method' (IBM DB2 JDBC Driver), 'Host Name' (mu.itsc.austin.ibm.com), 'Host Port' (50000), 'Database' (TLMA), 'User Name' (db2admin), 'Password' (masked with asterisks), and 'Table Owner' (adm). Navigation buttons include 'Back', 'Next', 'Clear', 'Test Connection', 'Finish', and 'Cancel'. A status bar at the bottom indicates '1 mappings(s) successfully deleted.'

Field	Value
Connection Method	IBM DB2 JDBC Driver
Host Name	mu.itsc.austin.ibm.com
Host Port	50000
Database	TLMA
User Name	db2admin
Password	*****
Table Owner	adm

Figure 6-6 Hardware software data source

Note: The default table owner for TLCM is adm. Remember to test your connection settings with the **Test Connection** button.

4. Click **Finish**.

A New Root Class and a list of ITLM administration database tables is displayed as shown in Figure 6-7.

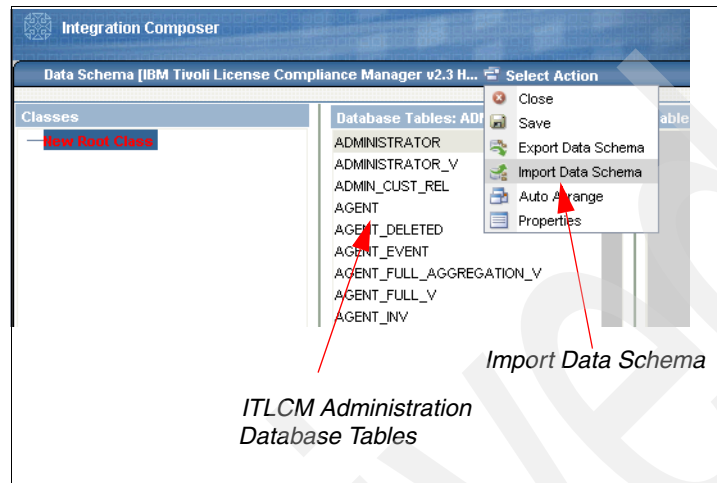


Figure 6-7 Importing schema

5. Copy your data mappings and schema files into the \data\dataschema subdirectory.
6. Next, choose **Select Action** → **Import Data Schema**.
7. Select the TLCM23INC.schm schema file as in Figure 6-8.

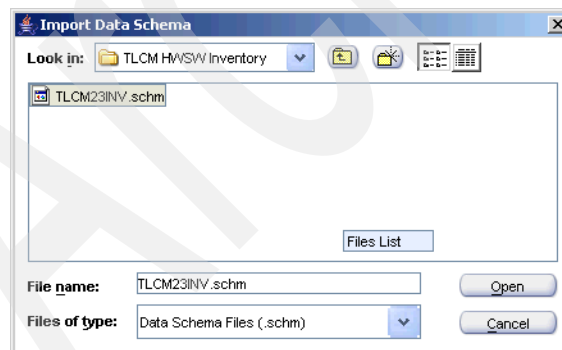


Figure 6-8 Hardware software schema file name

8. Click **Open**.

9. You experience a pause while the file is parsed, followed by the Import finished dialog being displayed. Click **OK** to dismiss the dialog.

A new node for Computer is created on successful import, and the mappings between the Maximo classes and the source data are displayed for you to browse as in Figure 6-9.

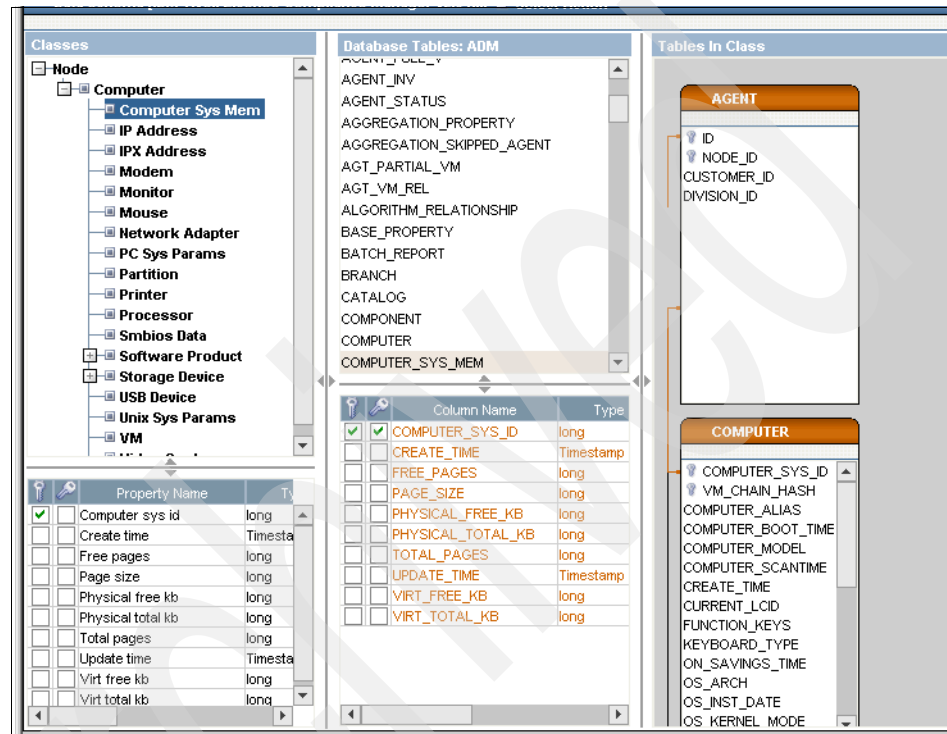


Figure 6-9 Classes after import

10. Choose **Select Action** → **Save** and then **Select Action** → **Close**.

At this point, you have created a data source for the ITLCM administration database and imported the data mappings for ITLCM into Maximo. Thus, you have specified where Maximo sources the data from for the schema. The next step is to configure where to place the data in Maximo.

Configuring target data sources

In this step, you create a target data source that uses the Maximo database. This data source is used as a target in a later step.

From the Integration Composer, perform the following steps:

1. **Select Data Source** → **Define New Data Source**.
2. Select **Deployed Assets 7.1** from the list of schemas and click **Next**.

Note: If you do not see the Deployed Assets schema, import it by choosing **Select Action** → **Import** and load the file TLCM23INVtoDPA71.fsn.

3. Name your data source MAXIMO.
4. Enter the Connection Information for your Maximo installation, similar to the entries shown in Figure 6-10.

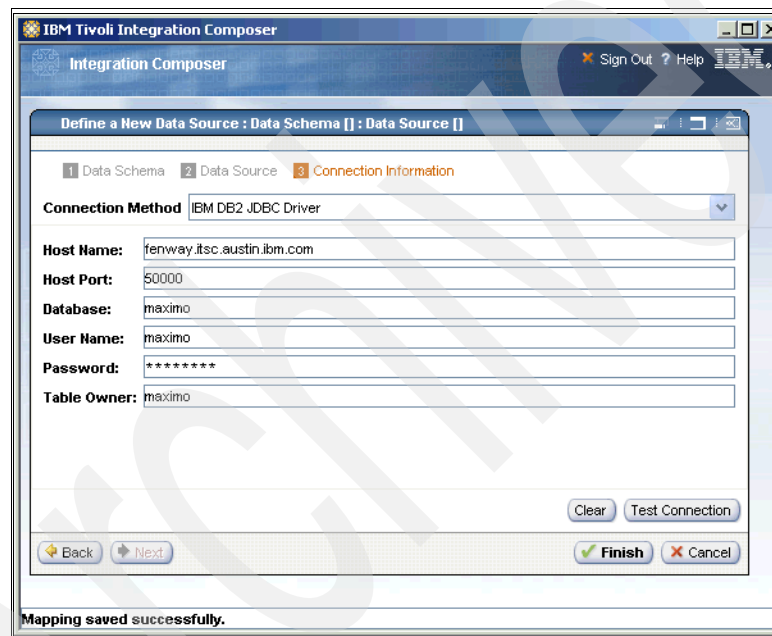


Figure 6-10 MAXIMO data source

Configuring the hardware software target

This step tells Maximo where the data from ITLCM should be placed.

From the main Integration Composer menu, perform the following steps:

1. Select **Create New Mapping**.
2. Set Source to TLMA (the data source previously defined when we imported the schema).
3. Set Target to MAXIMO.

4. Define the Mapping Name as IBM Tivoli License Compliance Manager 2.3 HW SW.
5. Click **Next**.

The Connection Information is populated for TLMA if required, and you may need to add the password at this point.

6. Add the password if required and Test Connection. Click **Finish**. You may have to configure a password for the MAXIMO data source.

The mapping should now display the Source TLMA with the node class and the Target MAXIMO with the Deployed Asset Class, as shown in Figure 6-11.

The screenshot shows the 'Mapping: TLMA_to_MAXIMO' window. The 'Source: TLMA' section displays a tree view with 'Node' expanded, showing 'Computer' with 'Computer sys id: 51646340'. The 'Computer' table lists attributes: Key, Relation, Name, Type, Length, and Value. The 'Target: MAXIMO' section displays 'Deployed Asset' with a 'Mapping Class' dropdown. The 'Deployed Asset' table lists attributes: Key, Relation, Name, Type, Length, and Value. At the bottom, there are 'Clear All' and 'Expression Builder' buttons.

Key	Relation	Name	Type	Length	Value
		Computer sys id	long	19	5164634095
	FK	Node id	long	19	13
		Vm chain hash	String	24	
		Computer alias	String	255	GAMA
		Computer boot time	Timestamp	30	2008-01-16
		Computer model	String	128	8187T8U
		Computer scantime	Timestamp	30	2008-02-08
		Create time	Timestamp	30	2008-02-08
		Current lcid	String	64	0409

Key	Relation	Name	Type	Length	Value
	GV	Nodeid	int	22	
		Assetclass	String	32	
		Domainname	String	128	

Figure 6-11 Completed mapping

The source connection is displayed at the top of the window; the target is displayed below that. Because the actual values are displayed, you can verify the mapping has the correct data before you commit the mapping.

Note: You can verify a mapping completes correctly by choosing **Select Action** → **Show Errors** to display any problems.

7. Choose **Select Action** → **Save** and **Select Action** → **Close**
8. Confirm the close if required.

At this point, you are ready to load the ITLCM into Maximo

You can run the mapping using two different ways:

- ▶ From the command line.
- ▶ From Integration Composer. When you open the mapping, an execute facility is available from the Open Existing mapping

Note: We recommend you use the command line to execute your jobs because it enables you to obtain detailed feedback.

Command-line execution

To run the mapping from the command line: From the desktop where you installed the Integration Composer, choose **Start** → **All Programs** → **Command Prompt**.

The \bin directory contains the commandLine.bat batch file, which is a template for running a mapping. Example 6-2 shows the batch file.

Example 6-2 C:\Integration Composer\bin\commandLine.bat

```
@echo off

if '%FSNINITRUN%' == '' call init.bat

@echo off
@echo Fusion will now start.
@echo off
set MAPPINGNAME=%1
set REPOSITORYUSER=%2
set REPOSITORYPWD=%3
set SOURCEUSER=%4
set SOURCEPWD=%5
set TARGETUSER=%6
set TARGETPWD=%7

REM =====
REM CHECK THE COMMAND LINE OPTIONS
REM =====
if '%MAPPINGNAME%' == '' goto error1
if '%REPOSITORYUSER%' == '' goto error2
```

```

if '%REPOSITORYPWD%' == '' goto error3
if '%SOURCEUSER%' == '' goto error4
if '%SOURCEPWD%' == '' goto error5
if '%TARGETUSER%' == '' goto error6
if '%TARGETPWD%' == '' goto error7

REM =====
REM INVOKE FUSIONX
REM =====
cd /D %WORKAREA%

REM change 1536M to the amount of virtual RAM you would like to
allocate to the application
java -Xmx1536M -Xms16M -Xss1M -Dcom.collation.home="%COLLATION_HOME%"
-Dinstall.root="%FSNDATADIR%" -Dinstall.genrules="%FSNGENRULES%"
com.mro.fusion.engine.EngineMain %MAPPINGNAME% %REPOSITORYUSER%
%REPOSITORYPWD% %SOURCEUSER% %SOURCEPWD% %TARGETUSER% %TARGETPWD%

goto exit

REM =====
REM ERROR PROCESSING
REM =====
:error1
echo The [mappingName] was not specified.
goto usage
:error2
echo The [repositoryUser] was not specified.
goto usage
:error3
echo The [repositoryPwd] was not specified.
goto usage
:error4
echo The [sourceUser] was not specified.
goto usage
:error5
echo The [sourcePwd] was not specified.
goto usage
:error6
echo The [targetUser] was not specified.
goto usage
:error7
echo The [targetPwd] was not specified.

```

```

goto usage

REM =====
REM USAGE
REM =====
:usage
echo _____
echo Usage:
echo EngineMain [mappingName] [repositoryUser] [repositoryPwd]
[sourceUser] [sourcePwd] [targetUser] [targetPwd]
echo where:
echo mappingName - The name of the predefined mapping; i.e., SMS
2.0
echo repositoryUser - The login user name of the Fusion repository
echo repositoryPwd - The login password of the Fusion repository
echo sourceUser - The login user name of the source data source
echo sourcePwd - The login password of the source data source
echo targetUser - The login user name of the target data source
echo targetPwd - The login password of the target data source
goto exit

:exit
@echo Fusion has finished.
pause

```

Creating a new file for your job

To create a file, follow these steps:

1. From the command line, create a copy of the batch file.

```
copy commandLine.bat run_TLMA_to_MAXIMO.bat
```
2. Edit the new batch file run_TLMA_to_MAXIMO.bat and add the seven database parameters:
 - MAPPINGNAME=
 - REPOSITORYUSER=
 - REPOSITORYPWD=
 - SOURCEUSER=
 - SOURCEPWD=
 - TARGETUSER=
 - TARGETPWD=

Note: REPOSITORYUSER is the ITIC database user. Six of the seven database parameters are database user names or passwords, not application user names or passwords.

Because this is a batch file, avoid using spaces when entering the parameters.

3. Set the JVM™ to the minimum you require.
4. For automated job execution, remove the **pause** command on the last line.

Note: java -Xmx1536M is probably too much for this process. At 1.5 GB, the Java Virtual Machine sometimes does not start in Microsoft Windows. To make the JVM start up more reliably, drop the memory requirement to 1 GB.

The completed batch file should look similar to Example 6-3.

Example 6-3 run_TLMA_to_MAXIMO.bat

```
@echo off

if '%FSNINITRUN%' == '' call init.bat

@echo off
@echo Fusion will now start.
@echo off
set MAPPINGNAME=TLMA_to_MAXIMO
set REPOSITORYUSER=maximo
set REPOSITORYPWD=yourpwd
set SOURCEUSER=db2admin
set SOURCEPWD=yourpwd
set TARGETUSER=maximo
set TARGETPWD=yourpwd

REM =====
REM CHECK THE COMMAND LINE OPTIONS
REM =====
if '%MAPPINGNAME%' == '' goto error1
if '%REPOSITORYUSER%' == '' goto error2
if '%REPOSITORYPWD%' == '' goto error3
if '%SOURCEUSER%' == '' goto error4
if '%SOURCEPWD%' == '' goto error5
if '%TARGETUSER%' == '' goto error6
```

```

if '%TARGETPWD%' == '' goto error7

REM =====
REM INVOKE FUSIONX
REM =====
cd /D %WORKAREA%

REM change 1536M to the amount of virtual RAM you would like to
allocate to the application
java -Xmx1024M -Xms16M -Xss1M -Dcom.collation.home="%COLLATION_HOME%"
-Dinstall.root="%FSNDATADIR%" -Dinstall.genrules="%FSNGENRULES%"
com.mro.fusion.engine.EngineMain %MAPPINGNAME% %REPOSITORYUSER%
%REPOSITORYPWD% %SOURCEUSER% %SOURCEPWD% %TARGETUSER% %TARGETPWD%

goto exit

REM =====
REM ERROR PROCESSING
REM =====
:error1
echo The [mappingName] was not specified.
goto usage
:error2
echo The [repositoryUser] was not specified.
goto usage
:error3
echo The [repositoryPwd] was not specified.
goto usage
:error4
echo The [sourceUser] was not specified.
goto usage
:error5
echo The [sourcePwd] was not specified.
goto usage
:error6
echo The [targetUser] was not specified.
goto usage
:error7
echo The [targetPwd] was not specified.
goto usage

REM =====
REM USAGE

```



```

REM =====
:usage
echo _____
echo Usage:
echo EngineMain [mappingName] [repositoryUser] [repositoryPwd]
[sourceUser] [sourcePwd] [targetUser] [targetPwd]
echo where:
echo mappingName - The name of the predefined mapping; i.e., SMS
2.0
echo repositoryUser - The login user name of the Fusion repository
echo repositoryPwd - The login password of the Fusion repository
echo sourceUser - The login user name of the source data source
echo sourcePwd - The login password of the source data source
echo targetUser - The login user name of the target data source
echo targetPwd - The login password of the target data source
goto exit

:exit
@echo Fusion has finished.
pause

```

Note: Every time the batch job runs, it executes a compile phase. This phase is typically insignificant in relation to the data transfer times.

The job output, including our check of the available Java Virtual Machine version before execution, is shown in Example 6-4.

Example 6-4 Job output

```

C:\INTEGR~1\bin>java -version
java version "1.5.0"
Java(TM) 2 Runtime Environment, Standard Edition (build
pwi32devifx-20070725 (SR
5a))
IBM J9 VM (build 2.3, J2RE 1.5.0 IBM J9 2.3 Windows Server 2003 x86-32
j9vmwi322
3-20070426 (JIT enabled)
J9VM - 20070420_12448_1HdSMR
JIT - 20070419_1806_r8
GC - 200704_19)
JCL - 20070725

```

```

C:\INTEGR~1\bin>run_TLMA_to_MAXIMO.bat
Fusion will now start.

```

```

IBM Tivoli Integration Composer 7.1.1 Build 8
13 Feb 2008 15:59:45:531 [INFO] IBM Tivoli Integration Composer 7.1.1
Build 8
Mapping: TLMA_to_MAXIMO
13 Feb 2008 15:59:45:546 [INFO] ObjectManager created. (This should
only happen once.)
Creating data source Fusion...13 Feb 2008 15:59:45:546 [INFO]
GlobalContext created. (This should only happen once.)
13 Feb 2008 15:59:45:546 [INFO] ResourceManager created. (This should
only happen once.) : 0 resource(s) loaded.
13 Feb 2008 15:59:45:937 [INFO] ResourceManager : Loading resource
labels : 311 resource(s) loaded.
13 Feb 2008 15:59:45:968 [INFO] ResourceManager : Loading resource
messages : 346 resource(s) loaded.
13 Feb 2008 15:59:45:968 [INFO] IBM Tivoli Integration Composer
database version: V7110-415 done
IBM Tivoli Integration Composer database version: V7110-415
Retrieving mapping definition TLMA_to_MAXIMO... done
Creating source data source TLMA... done
Connecting to source data source TLCMA...
13 Feb 2008 15:59:46:109 [INFO] ResourceManager : Loading resource file
C:\Integration Composer\data\properties\jdbcinfo.properties : 33
resource(s) loaded.
13 Feb 2008 15:59:46:156 [INFO] DataManager created. (This should only
happen once.)
Connecting to source data source TLMA... done
Creating target data source MAXIMO... done
Connecting to target data source MAXIMO...
Connecting to target data source MAXIMO... done
Retrieving mapping expressions... done
Retrieving mapping deciding classes... done
retrieving mapping expressions 115
finished mapping expressions 1
finished mapping expressions 2
finished mapping expressions 3
<lines removed for clarity>
finished mapping expressions 114
finished mapping expressions 115
done mapping expressions
translating mappings 28
finished mappings 1
finished mappings 2
finished mappings 3
<lines removed for clarity>
finished mappings 28

```

```

done mappings
retrieving deciding classes 28
finished deciding classes 1
<lines removed for clarity>
finished deciding classes 28
done deciding classes
generating source code 1
finished source code 1
done source code
generating target code 28
finished target code 1
finished target code 2
<lines removed for clarity>
done target code
retrieving file names to compile 28
finished file name 1
<lines removed for clarity>
done file names
Compiling 47 files 47
finished compiling 1
<lines removed for clarity>
done
REMOVELISTENER
13 Feb 2008 16:00:30:640 [INFO]
=====

      Start mapping execution
      Mapping: TLMA_to_MAXIMO
=====

=====

      Start mapping execution
      Mapping: TLMA_to_MAXIMO
=====

Deployed Asset: Assetclass:COMPUTER Domainname:WORKGROUP
Nodename:KCBDONX
13 Feb 2008 16:00:30:750 [INFO] MaxSequenceProvider created. (This
should only h
appen once.)
Deployed Asset: Assetclass:COMPUTER Domainname:WORKGROUP
Nodename:KCBC9ZP
Deployed Asset: Assetclass:COMPUTER Domainname:WORKGROUP
Nodename:KCBC9YB
Deployed Asset: Assetclass:COMPUTER Domainname:UNKNOWN Nodename:KPWWN28

```

```
*
Done
13 Feb 2008 16:00:31:750 [INFO]
=====
Mapping execution completed
Mapping: TLMA_to_MAXIMO
Execution time: 00:00:01
Errors: 0
=====

=====
Mapping execution completed
Mapping: TLMA_to_MAXIMO
Execution time: 00:00:01
Errors: 0
=====

Done
Mapping completed successfully.
Fusion has finished.
Press any key to continue . . .
```

Verifying the data

To verify your data load, open the Maximo Web interface and check that the asset data is populated: **Go To** → **Assets** → **Deployed Assets** → **Computers**.

Deleting mappings

To delete mappings, data sources, and data schemas from Tivoli Integration Composer, you must delete the components in this order:

1. Mappings
2. Data sources
3. Data schemas

6.2.4 Troubleshooting Tivoli Integration Composer

The purpose of IBM Tivoli Integration Composer (ITIC) is to provide an object-oriented, database-independent tool for moving data between database schemas.

ITIC can connect to any data source that supports JDBC, although it is primarily used for moving data from discovery tools to the Deployed Assets Module of Tivoli's process automation engine. Once ITIC is connected with the data source, you can fairly quickly create a schema to represent the data. It is then possible to map the schema to the schemas provided for deployed assets or the assets in Tivoli's process automation engine simply by dragging and dropping within the ITIC user interface or using fairly simple Java expressions.

With only a rudimentary knowledge of Java, you can write the expressions required for ITIC. The ITIC documentation includes descriptions of many functions that can be used within the expressions.

ITIC adapters are mappings developed and tested against out-of-the-box installations of several of the most popular discovery tools. It is quite helpful to install at least one adapter to obtain examples of the common usage of expressions in ITIC even if you are developing your own source schema. Installing an adapter involves importing a structured text file from the ITIC interface.

ITIC includes thorough documentation for each step in creating a mapping; you can refer to it if you encounter issues. Refer to *IBM Tivoli Integration Composer Administration Guide*, available at Tivoli software information center - Tivoli Asset Management for IT V7.1:

<http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp>

Common issues

The difficulties in creating a mapping fall into two categories: compile errors and runtime errors.

Compile errors

Each time an ITIC mapping is run, the engine compiles all the Java expressions entered by the user into class files to be run. ITIC can check the syntax of expressions entered through the user interface, but some problems do not show up until the files are compiled.

The best way to troubleshoot compile errors is to use an iterative approach to changing expressions. After making a few changes, save the mapping in the user interface, and then run it from the command line to make sure the mapping makes it through the compile phase. Do this process for each set of changes. If

a compile error occurs, you can more easily find the error among the few expressions you have just changed. You may have to look at the log to view the full text of the error. New compile errors only occur when a change has been made to the mappings.

Runtime errors

After the files are compiled, ITIC runs the mapping by issuing SQL statements to read the data from the source and then insert or update it in the target. The most common errors at this stage are SQL errors. The most common SQL errors are due to the absence of a required value or due to duplication of values across an index that should be unique.

Logging output

It is helpful to run ITIC mappings from the command line because it is easy to see the output from each of these phases.

It is also helpful to turn on logging, especially SQL logging. Instructions for configuring logging can be found in the logging.properties section in Appendix B, “Initialization Files,” of the *Integration Composer System Administration Guide*. SQL logging is especially helpful when debugging runtime errors and is turned on by using this setting:

```
log4j.logger.maximo.sql=INFO
```

Troubleshooting runtime errors

Different runtime errors occur during an initial load and during ongoing loads. The most common error that occurs during initial load is the omission of a required value or insertion of an inappropriate value from the expressions provided. The ITIC adapters have been well tested for initial runs, so the most likely place to look for the source of the error is any expression you have changed.

If inserted values are strings that are too long for the target, you may have to use an expression to truncate the values.

Ongoing loads with changing data are much more difficult for the ITIC development team to test in the lab, so it is important to monitor the feeds during the first couple weeks to ensure no errors occur.

The most likely errors for ongoing loads relate to attempts to update uniquely indexed attributes with duplicate data. This happens when one of the values

changes in the alternative primary keys for an object in an ITIC. For instance, the domain name of a network device is included in the key for the Deployed Assets object. A domain name does not frequently change for a device, but among 10,000 devices, you are likely to have a couple of domain names that have changed in the first month of deployment.

ITIC uses the alternate keys defined in the schemas to identify records. For each record, ITIC searches the target table to determine whether another record exists with the same values for the alternate key fields. If a record is found, it is updated with all the values outside of the primary and alternate keys. If it is not found, it is inserted as a new record. When a value in the key changes, ITIC regards it as a new record and inserts it rather than updating the existing record.

ITIC uses alternate keys rather than primary keys because the primary keys are generally sequential numbers generated at the time of insertion. The alternate keys should be values that do not change in the source and that will always derive from their mapping expressions in the same way.

If something changes that is part of an alternate key, it can cause two problems. First, if the change affects part of the key for a parent object such as a Deployed Asset, the record is not identified if it already exist and is loaded. Thus, duplicate records may be created for machines or other entities. We recommend you check for duplicate entries such as these during regular reconciliations against the Deployed Assets Module.

The second problem depends on the first. If a duplicate record is created for a machine, child records such as network adapters may try to create duplicate records for themselves. If this occurs, an error may be reported that a duplicate value is being inserted. ITIC checks for duplicate values using alternate keys, but for some child records, it adopts values from the parent. If the parent values have not changed, but a new parent is being inserted, ITIC assumes the child must be inserted as well. This error is actually helps you because it points out what would otherwise go unnoticed: a duplicate parent record that is being inserted.

Remapping changeable keys

Because domains can change, you can change the default expressions for Deployed Asset.Domainname in your mapping to a constant such as TLMC. An out-of-the-box expression may be similar to the following that takes the source's discovered domain name (PC Sys Params.Domain name) into account:

```
{
  String domain = 'PC Sys Params.Domain name';

  if ((domain == null) || domain.trim().equals("")) {
    domain = 'Unix Sys Params.Host name';
  }
```

```

    }

    return (domain != null) && !domain.trim().equals("") ? domain :
    "UNKNOWN";
}

```

You can change this to a simple default, using any string that presents well:

```
"TLCM"
```

Because you have just removed the expression that transfers the actual domain information, you may want to put that same expression in another unused field on the Deployed Assets object so that you can see the domain in ITIC. It does not matter that the domain changes in a field that is not in the alternate key because the correct record will be identified and the attribute updated.

Mapping to internal IDs

If you want to ensure a one-to-one mapping with TLCM records, eliminate the possibility of change in each of the attributes included in the alternate key and use the internal unique ID from the source in a single changing field. In the case of the Deployed Assets schema object, this process usually means setting all of the alternate key fields to literals except for nodename, which is mapped to the primary key from the source.

If the source has multiple fields in its primary key, they can be concatenated to form a nodename entry. If the source object has no apparent natural key, you can use the internal ID.

Using an internal ID makes the nodename that displays on the list page of each of the Deployed Assets Module applications a sequential number that has no meaning for users. To remedy this, you may want to replace the nodename on the list view of the Deployed Assets Module with fields that are nearly unique and that users can search - fields such as serial number in the Computers application.

We are using the alternate key for the Deployed Asset object as an example, but each object has an alternate key. It may be helpful to follow a similar procedure for each object that has changeable values included in the alternate key. For instance, for a Network Adapter, if one of the MAC addresses changes, depending on the source schema, the alternate key in the mapping may change. To avoid this, default one of the MAC addresses to MACADDRESS.

If a large number of assets (more than 10,000) are reporting and you expose new fields on the list page for searching, make sure that each of the fields that you expose has an index. Each field should be listed first in the index so that the results of searches return quickly. The indexes are shown on the Index tab for the "computer system" object in the Database Configuration application.

Procuring software

You can use Tivoli Asset Management for IT to procure software. You enter procurement records with reference to Item Masters as you would in any of Tivoli's process automation engine applications. With Tivoli Asset Management for IT, you can also enter references to draft or active licenses on procurement lines.

7.1 Procurement flow

The procurement applications offer various paths between the entities to accommodate different customers' processes (see Figure 7-1).

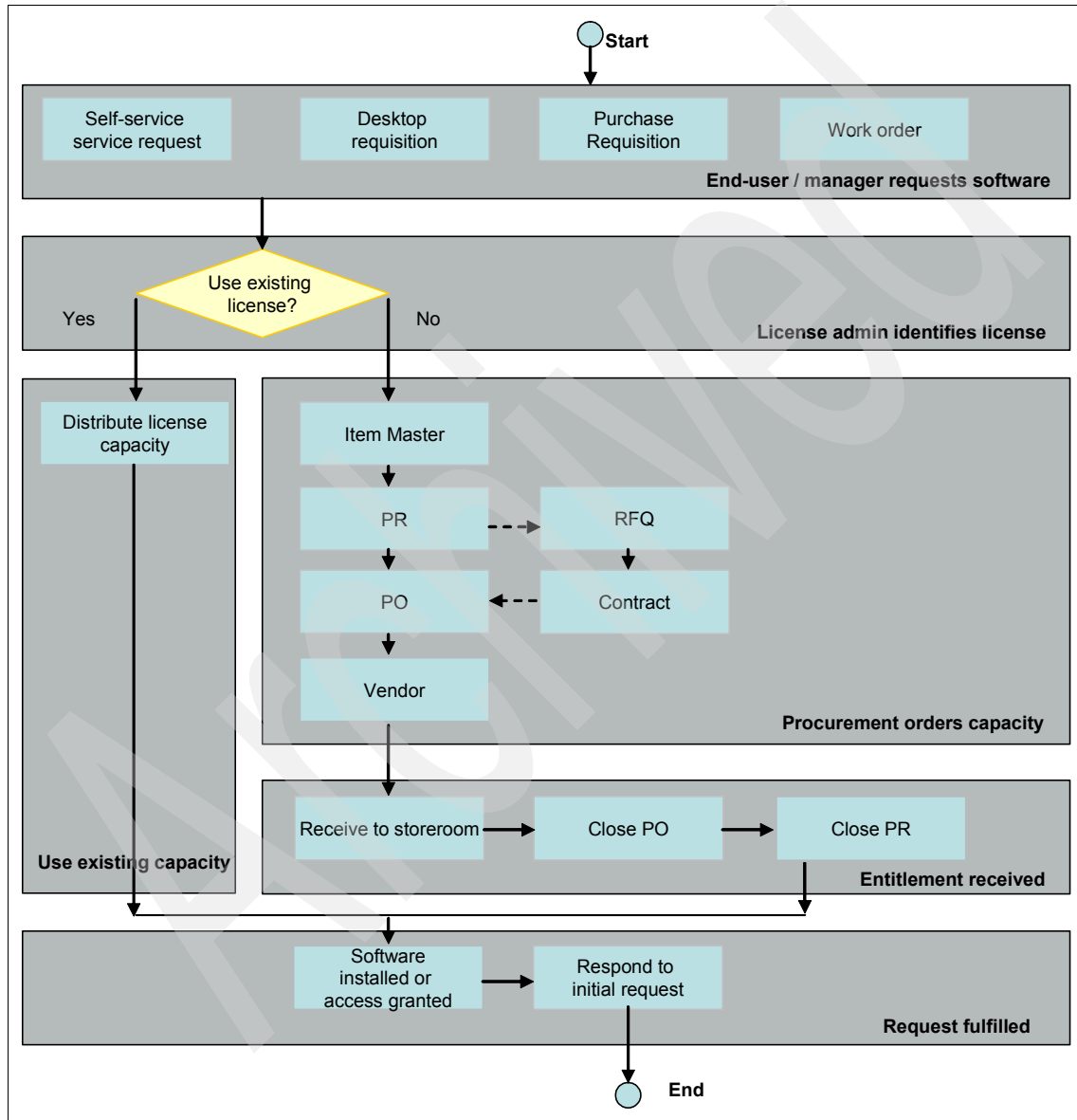


Figure 7-1 Procurement process

The paths for obtaining software through the procurement applications are as follows:

1. You can request use of software through one of several avenues:

- Self-service service request
- Desktop requisition
- Purchase requisition
- Work order

You can also contact the procurement or software asset manager, and that person can enter PR on your behalf.

2. Next the user, the software asset manager, license administrator, and procurement staff must clarify the needs of each individual. During this process, the license administrator determines whether a new license is required or whether the request can be fulfilled through existing capacity.

- If a new license or additional capacity is not required, the license administrator authorizes the new use of the existing license and creates a record of the new distribution of capacity and costs.
- If a new license is needed, the license administrator or software asset manager works with the vendor to determine what must be ordered. The license administrator or software asset manager creates a PR to procure the new license or additional capacity. This individual may create a draft license at this point and reference it in the PR.

3. Procurement staff creates an Item Master for licenses or media being ordered by following the process for item, commodity, and vendor approvals. The software asset manager may provide input as to whether multiple items are needed.

- Separate items are created for the same software if some of the software is capitalized and some is not.
- Separate software product-related items are grouped into an item assembly structure for software ordered as a bundle but licensed separately.
- If the item being ordered is a standard item that users can order, a desktop requisition template may be created.

The flow of the procurement process includes several possibilities. For instance, Tivoli Asset Management for IT options make it possible for the entry of a desktop requisition to automatically create an approved or unapproved PR or PO. Also, if the acquisition meets certain thresholds, an RFQ and contract may be required. Finally, the entitlement may be procured from another organization within the company.

4. When the license is received, the license administrator sets the status of the draft license (if any) to active. The PO is closed. The PR may also be closed if it has not been already.
5. Finally, the software is made available to the user through an installation or grant of access, possibly tracked through a work order. If a work order is referenced from a transfer, the transaction appears in the work order actuals and is added to the cost of the work order.

An installation may be performed as part of an image, as part of an installation package through a provisioning tool such as the Tivoli Provisioning Manager, as a network installation, or from a CD. The installer or software asset administrator responds to the initial request to ensure that users receive what they need.

7.2 Entering an order

The following sections describe the process of entering an order in the system.

7.2.1 Ordering a license versus ordering a product

When we state that a user “purchases a software product,” we mean that the user is purchasing or subscribing to the legal right to use or access the product, either for a period of time (subscription) or in perpetuity (purchase). While users may think “I am buying Microsoft Excel 2003,” they are actually buying a license for a particular version or release of the software.

A user’s misunderstanding about buying a product rather than a license originates from the practice of buying shrink-wrapped installation media along with the license at retail stores. In the case of shrink-wrapped software, however, the user is accurately buying a bundled set of at least two items: a license and an installation medium. Without the license, the customer is not entitled to install or use the product.

No matter what kind of license or what kind of product is ordered, procurement lines must specify a license in language that the vendor understands (so the vendor responds with the right entitlement). It may be sufficient to enter the software product name on procurement line items either in or out of the context of a volume agreement, as long as it is clear what is being ordered.

7.2.2 Ordering installation media

Installation media and downloads are important to track in case reinstallation or the completion of a full installation is necessary. Installation media are important to control in order to keep users from infringing on an organization's licenses through unauthorized installations. It therefore can be helpful to track installation media from the time of receipt until they are destroyed.

Installation media are different from licenses and must be tracked separately from the time of receiving. If they are bundled with a license during procurement, they can be added as items for tracking at receiving by applying an item assembly structure.

CDs and other installation media may be tracked as rotating assets for customers that have Tivoli Asset Management for IT. The media can be reserved and checked out as item materials for installations from the work order-related applications. Alternately, the media can be assigned to a technician for installation using the User and Custodians feature of the Asset application.

Organizations maintaining a Definitive Software Library (DSL) may maintain a variety of controlled repositories, including installation media, a file share, or a deployment product such as Tivoli Provisioning Manager or Tivoli Configuration Manager.

The Release Management process management platform includes a Definitive Software Library application in which users can configure CIs representing software installation applications into repositories. Customers with the Release Management process management platform need a way to receive software media, downloads, and licenses; create CIs corresponding to the software; and then track the media or downloads for use in changes and releases. In many cases software tracked as CIs is discovered as Actual CIs and “promoted” to CI records. In the case of installation programs, however, users can track the installation from the time of receipt.

7.2.3 Ordering pre-installed hardware

Operating system and application licenses may be procured along with hardware as part of an installed image. Planning and communication are required with the vendor on the exact makeup of the image, the process for change control, and whether additional installations are required after receipt. In some cases the vendor may accept an image from the customer to install as part of the services that the vendor offers. In other cases the image is standard and non-negotiable.

Licenses for installed software may be procured from the same vendor or from a separate one. In either case, the receiving organization must decide which

licenses it is going to pay for and track separately, and must adjust the items being ordered accordingly. At the time of receipt, separate items are required for the licenses and for the hardware.

7.2.4 Ordering a license versus ordering an item

PO lines must refer to the license as it is described by the vendor. The language of the PO line must match the vendor's language to the extent that the vendor can fulfill the order and that uninformed receiving personnel can locate the PO line that corresponds to packing slip information.

In this section, we provide several examples to clarify the ways that license bundles and additional capacity can be ordered. The examples we provide are of orderable software entries from the catalog that IBM employees use to procure software.

In the first and several other examples, the description includes details for the user that are not be transmitted on a PO. This kind of detail can be entered into the description of a Desktop Requisition template, while the item referred to in the template carries the description required by the vendor.

- ▶ PROJECT PROFESSIONAL 2007 LICENSE ONLY (CD & BOOK SOLD SEPARATELY). This is a non-receivable item. Purchase of this item provides right to use only. Purchase the appropriate CD for software installation.
- ▶ Windows Server® Standard 2003 R2 32-bit/x64 English Disk Kit Microsoft Volume License CD MLF.
- ▶ Advent Software Pre-packaged Test Files Package 1 includes 837 Professional, Institutional, Dental and 835 for HIPAA Transaction Verification. Single seat license for the SXG Transaction Set Viewer (www.adventsoftware.net).
- ▶ Acrobat® 3D V.8 - Universal English - Windows - Upgrade License - Clp-C 4.5 Level 4 -3D-3D.
- ▶ Cs3 Design Premium V.3 - Universal English - Windows - New License - Clp-C 4.5 Level 4.
- ▶ Autocad Lt 2008 Slm Cdcommercial New Slm.
- ▶ VMware Workstation 6.x for Windows operating systems. (Purchase if your host operating system is Windows.) Bundled with GOLD Support & Subscription (DELIVERED ELECTRONICALLY).
- ▶ VMware DRS 2 for 2 processors; additive licenses with Gold Support/Subscription.

In the case of VMWare, the description for the additive licenses differs completely from that for the initial installation.

In this VMWare example, an additive license includes a description that is different than the Item Master whose capacity will be incremented in inventory. In such a case, the correct Item Master can be entered on the PO line and the description overwritten on the PO (that is, the PO description does not affect the Item Master description).

- ▶ WinZip v11 Std Single-User CD. Full package. Not for ISSI download.
- ▶ Macintosh OS X 10.5 Retail-Int-Leopard.
- ▶ Office Comm Server Standard Client Access License 2007 Single Microsoft Volume License Device Client Access License Device Client Access License.

Several of the items from the previous examples refer to orders of additional capacity for existing licenses. In the case of the Microsoft volume license line items, a pool of software points is maintained, and the points are consumed by charge-back, either for a client access license (CAL) or for a single installation of the product.

- ▶ Windows Pro Remote Desktop License Single Microsoft Volume License User Client Access License User Client Access License.
- ▶ SQL Server Workgroup Edition 2005 Win32® Single Microsoft Volume License 5 Client.
- ▶ SQL Server Workgroup Edition 2005 Win32 Single Microsoft Volume License 1 Processor.
- ▶ Access Gateway 4.0 w/Adv Access Control Option Email Delivery.
- ▶ Access Gateway Standard Edition - 1 Concurrent User with 1yr Subscription Advantage.

In the case of the Access Gateway, licenses can be ordered per concurrent user, effectively adding to the Concurrent User capacity of the license being referenced.

The detail for the line records includes the information provided in Table 7-1. This entry is for a product covered by IBM Microsoft Select volume licensing and includes a point value.

Table 7-1 Line record details

Description	PROJECT PROFESSIONAL 2007 LICENSE ONLY (CD & BOOK SOLD SEPARATELY). This is a non-receivable item. Purchase of this item provides right to use only. Purchase the appropriate CD for software installation.
Quantity	1

Description	PROJECT PROFESSIONAL 2007 LICENSE ONLY (CD & BOOK SOLD SEPARATELY). This is a non-receivable item. Purchase of this item provides right to use only. Purchase the appropriate CD for software installation.
Web Catalog ID	117500000
Manufacturer	Microsoft Select
Mfg Part #	H30-01906
Retail Price	\$ (Amount)
Your Price	\$ (Amount)
Category	Project management
Media	License only
Additional Information	
Replaces Part Number	H30-00458
Language	Single language
Operating System	Non-specific
License Point Value	4
Licensing Pool	Applications
Version	2007
Product Family	Project Professional
License Program	SELECT
License Level	D
License Info	License Only. No installation disk kit or printed documentation included.

7.3 Entering orders into Asset Management for IT

Users can enter orders in multiple ways:

- ▶ Desktop requisition

Complex license items are encapsulated for users issuing desktop requisitions by requisition templates. If needed, the template can show a product name that the user understands, while the descriptions of items specified for the template can carry more technical license information in the vendor's language.

According to parameters set in Tivoli Asset Management for IT, a desktop requisition may automatically generate an approved or unapproved PR or PO record.

- ▶ Service request

Users may enter a service request describing what they want. The service desk analyst routes the request to procurement, g126

to the software license manager, or to the desktop installation group as appropriate. The owner of the ticket may need to clarify with the user exactly what is being ordered.

- ▶ Work order

Materials entered into the Materials tab of work order tasks are requested in order to perform the work required. Hardware and software might be requested this way by technicians planning installations or changes. Depending on how the system is set up, the requests may result in requisitions being created and reservations being created in inventory. This applies to all work order-based applications, including change, release, and activity. Some kinds of license capacity are better suited to inventory-like counting than others. The software asset manager must monitor work order requests for software to determine the best way to fulfill them.

Users can effectively start the procurement process in Asset Management for IT from a variety of points according to the process in place for the organization and the integration of the Maximo procurement process with external accounting systems.

- ▶ Purchase request

Software asset manager most likely communicates requests to procurement using a purchase request. If the software asset manager receives the original purchase request from users, the software asset manager may issue a new request using vendor terminology, keeping the original request open until it is fulfilled.

- ▶ Purchase order

In a small organization or one utilizing PRs in an external system, Purchasing may enter a PO directly, either to be approved in Tivoli Asset Management for IT, or as a placeholder to anticipate the receipt that will eventually be completed in Tivoli Asset Management for IT.

- ▶ Software contract

Purchase orders and requests may originate from a contract.

In the procurement process the license manager may have to decide whether a new license is required or whether an existing one may be extended. Several questions come into play when making this decision:

- ▶ Is the license version-independent because of a subscription or a version-independent support agreement? If so, new licenses may not be needed for new versions.
- ▶ Can the end date of a license be extended?
- ▶ Can the capacity of a license be added to?
- ▶ Can the license be redistributed between users? between machines? between LPARS? between sites?

7.4 Receiving

In this section we cover the details of the receiving process. Receiving is the stage of the process in which the relationship between procurement data and other aspects of asset and configuration data can either be established or irrecoverably lost.

Figure 7-2 depicts the receiving process.

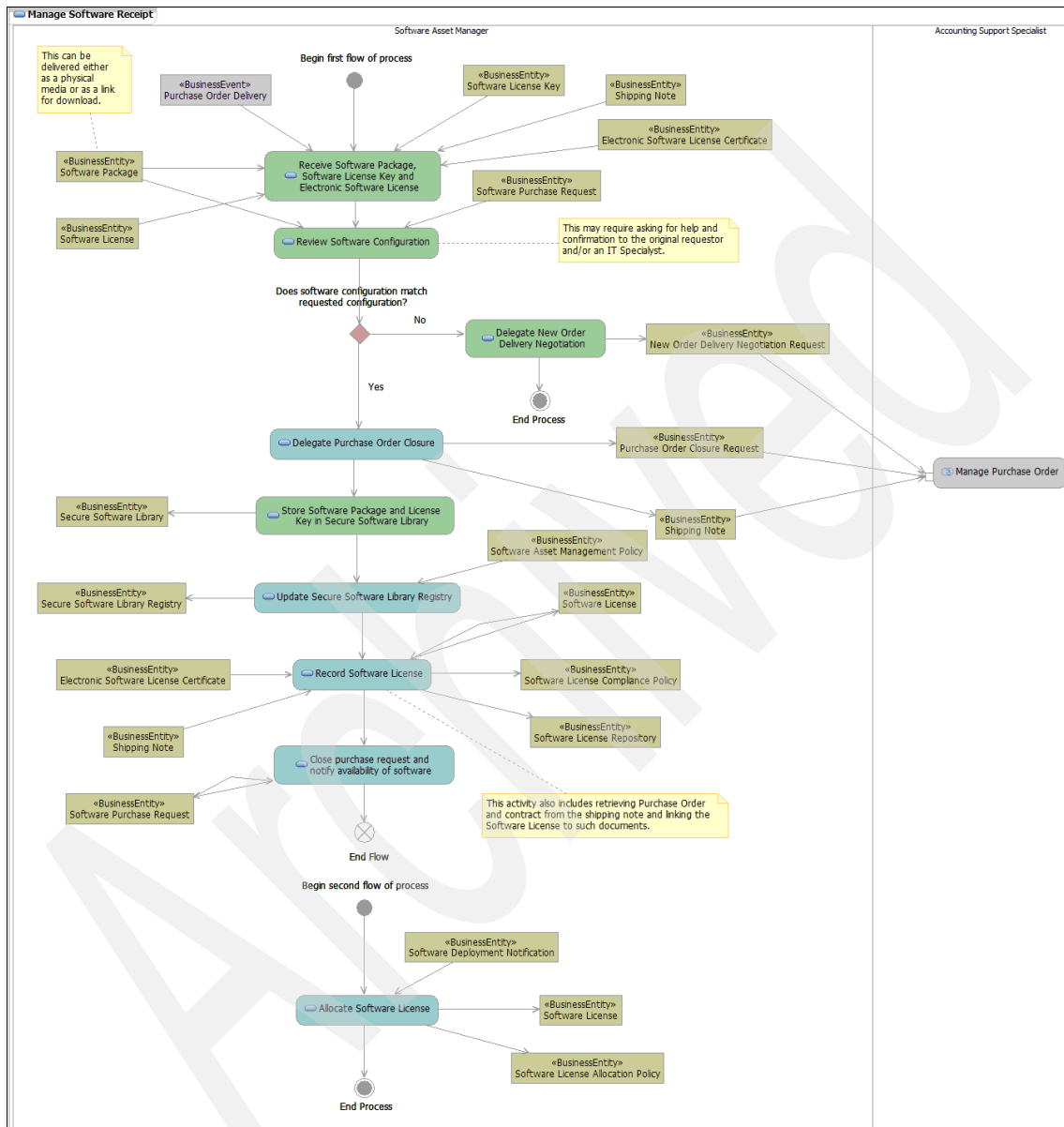


Figure 7-2 Receiving software process

As shown in the figures, the software asset manager gets the Software Package and possibly the Software License Key and the Electronic Software License Certificate. The last two business entities may be delivered within the Software Package or separately. If the Software Package is physical media, it is first received by a receiving clerk at the receiving dock and then delivered to the software asset manager; otherwise, the software vendor provides the software asset manager with a link for downloading the Software Package with a supplied user ID and password.

The receiving clerk's actions are not included in the diagram but are quite important to the process when physical media are received. The receiving clerk's actions are important because the receipt must be communicated to the software asset manager and application administrators. The receiving application is set up so that separate people can take part in receiving material goods: one receiving them and one inspecting them. Items that are marked as requiring inspection are flagged with a status of WINSP after the packing slip details are recorded.

After physical receipt at the docks, a process request can be generated by the receiver through a workflow or escalation. The workflow or escalation most likely looks at the classification of the item in WINSP status or the shipping address of the PO to determine the person or group to which to assign the process request.

Inspection of the item must occur before the receiving process is completed and the item is put into inventory. Because loading dock personnel usually lack sufficient knowledge of software to perform the inspection, a separate shipping address may be necessary in order to specify that IT receives the goods. The address can be the same as the one for other goods but includes a different ATTN: line, to alert dock personnel to keep these items in a separate holding area that is not subject to inventory. In other cases the goods can be delivered directly to an IT lab for inspection.

It is not best practice for dock personnel to receive the goods into a storeroom for later inspection by IT because at that point the goods have entered the payment and inventory processes.

The software asset manager can download entitlement records or license keys, while documentation and media are shipped physically. In this case the Apply Item Assembly Structure action in the Receive Rotating Assets dialog can be used to create separate item records for the separate items to be tracked.

7.5 Reviewing software configuration

The software asset manager reviews the Software Purchase Request and the documentation contained in the Software Package to verify that the delivered software configuration matches the request. In this activity, the software asset manager may ask the originator of the request or an IT System Specialist (or both) for help.

To inspect software that does not offer trial copies, it may be necessary to install it. If the software does not function as expected, or even if requirements have changed since the original request, the software can often be returned and appropriate software ordered in its place.

7.6 Delegating purchase order closure

Because the delivered IT assets match the content of the software purchase request, the software asset manager tells the accounting support specialist to close the corresponding purchase order, issuing a purchase order closure request and providing the shipping note.

If the software passes inspection, the software asset manager marks the software as inspected in the receiving application. If the accounting support specialist receives an invoice before all line items have been received, the accounting support specialist can make a partial payment. When all line items have been received and inspected and all payments processed, the PO can be closed.

Whether or not the PO is to be closed, the shipping note must be transmitted to accounting for documentation. In the case of downloaded goods, a printed confirmation e-mail or Web page may suffice as a shipping note. Some companies may print confirmations to PDF format and attach the files to the receipt record for improved routing and storage.

Proof of entitlement sometimes requires a shipping note, invoice, or bill of lading. A copy of the shipping documentation should be kept with the other license materials in the Definitive Software Library (DSL).

7.7 Storing software package and license key in Secure Software Library

The software asset manager stores the software package together with its software license key (if any) in the Secure Software Library. If multiple copies of the software package are required (the software asset manager contacts the originator of the corresponding software license to request this information), the software asset manager also ensures such copies are generated and stores them together with the master copy.

The format of the software package and the nature of the Secure Software Library (physical storage or electronic hard storage) determines whether physical media is secured in a physical store or whether files are uploaded to a software repository.

Proof of entitlement may require saving product packaging, including boxes and labels on shrink wrap, media, and media sleeves. A conservative approach dictates keeping all these materials in a secure place. Boxes may be flattened and kept in numbered folders along with the shipping documentation. Printed copies of confirmations can be included, or the files can be kept separately on a secure file system. Some or all of the materials can be scanned or printed to PDF format and attached to Asset Management for IT records as backup, in addition to or in lieu of off-site storage of copies of the entitlement records (assuming the Asset Management for IT system and attached files are backed up regularly).

A reference to the location of the physical and network files can be kept as a CI in the DSL if the customer has CCMDB, or as an asset record if the customer has Tivoli Asset Management for IT. The DSL is designed mostly for software installation media and files, but it may be convenient to keep entitlement materials in the same place if a small group of accountable people have access to the materials.

In many organizations, it is best for the software asset manager to have exclusive access to entitlement records. In this case it makes more sense to list the files as proofs of entitlement attached to the license record. When the license is transmitted to another department within the business, the proofs of entitlement should be transmitted as well.

The option of keeping entitlement materials as assets enables the records to be cataloged in Tivoli Asset Management for IT and linked to receiving records and software item assembly structures. Entitlement materials should be held as assets rather than tool assets because they cannot be reassigned without a charge-back.

7.8 Updating the Secure Software Library registry

The software asset manager updates the Secure Software Library registry, adding a record for the new Software Package and indicating its owner (depending on the Software Asset Management Policy) and possibly the Software License keys.

Securing software assets is important to safeguard the business investment as well as to ensure compliance. Several elements of the software may need to be secured and distributed at this stage of the process:

- **Installation programs**

A separate copy should be made of media and files needed for installations. The copy should be cataloged and checked out to installers so that the original copy can be retained with the license. If the license materials are maintained by the software asset manager, a copy can be checked into the DSL for general use and a reference kept in Maximo as a CI or an asset record.

- **Discovery signatures**

The best place and time to verify the software signature is in a lab before it is installed. If necessary the installation can then be augmented with distinctive files or registry entries to distinguish the software from other installations. If the software is a complex product, it must be configured in the discovery tool, the software knowledge base, or the Maximo software catalog. A process management request can be issued to the configuration management group at the time of receipt. It is necessary to identify the signature to define the license against the appropriate catalog entry.

- **Deployment packages**

In addition to the installer media and files provided by the manufacturer, an installation may be configured in a deployment tool such as TPM as a standalone installation, in a package with other software, or in a standard image. A process management request can be issued to the release management group at the time of receipt.

- **User documentation**

Physical copies of user documentation can be cataloged and kept in a cabinet for general use. Electronic copies can be posted to the intranet. Documentation packages can be tracked as CIs in the DSL or as assets for customers without CCMDb.

7.9 Recording the software license

The software asset manager records the software license into the software license repository. Recording the software license includes recording its software license compliance policy, referencing the purchase order, and the contract or general agreements (software license acquisition agreement or software license change agreement), if any, through which the software license was purchased. This activity also includes retrieving the purchase order and contract from the shipping note and linking the software license to them.

If an electronic certificate for software license is available, the software asset manager stores it (this may mean importing it into an IT asset management system), adding information required by the software vendor.

If customers have both Tivoli Asset Management for IT and CCMDB, it may be necessary at this stage to link the software items just received to CI records created to track them. The greater the length of time since receiving the software, the more difficult it is to link these records.

7.10 Purchase request and software availability

After delegating the closure of the purchase order and recording the software license in the software license repository, the software asset manager closes the software purchase request and notifies the originator of the request and the originator's business manager that the software package is available in the Secure Software Library. The purchase order is retrieved through its number reported in the shipping note. In addition, the software asset manager links the purchase order in the purchase order repository to the software license just recorded in the software license repository.

Recording the software license includes setting up appropriate charge-back records, but charge-back cannot properly begin until the user receives the software. If an IT department has a holistic service provisioning approach, the department can follow through with work orders for installation and the granting of access to the software.

7.11 Allocating the software license

The software asset manager allocates the software license purchased to fulfill the software purchase request. This means creating a software license allocation policy for the software license. The software license allocation policy defines the

group of computer systems where licensed products run for internal compliance (possibly the entire enterprise or units of its topology), plus in case of user restrictions, a group of users entitled to run the products. The lists of systems and users is indicated in the software deployment notification.

New hardware installations must be performed promptly to please users, but it may take discovery tools several days to report the inventory to Tivoli Asset Management for IT. New hardware installations that do not report through discovery are a source of discrepancies in reconciliation for software installed on them. An escalation is needed based on reconciliation, so that if newly acquired hardware assets do not report within a certain period, a notification is sent to the configuration management group.

The following escalation steps should be performed:

1. The discovery administrator inventories PC and verifies registration in Tivoli Asset Management for IT.
2. The hardware asset manager creates or promotes asset record.
3. Discovery through Tivoli Application Dependency Discovery Manager (TADDM) results in Actual CI records that may be promoted to CI and linked to the asset record or the software record (or both).

As with CIs, the longer the period of time between receiving the hardware and performing reconciliation, the more difficult it is to establish the link between discovered and authorized records.

7.12 Tax implications

Some U.S. states do not charge sales tax if software is downloaded. Managing whether software is downloaded and where it is downloaded can save millions of dollars in unnecessary taxes, as well as contribute to the ability to comply with tax laws.

In some cases, whether or not software is taxable may be fairly subtle. Factors that may dictate whether software and related training is taxable depend on determining whether:

- ▶ It is transmitted on a physical medium or whether the customer is entitled to a physical medium such as CD or document.
- ▶ It is prewritten or composed of prewritten components.
- ▶ It is prepackaged.
- ▶ It is customized on a one-time basis.

- ▶ Use is governed by a tear-open non-negotiable license agreement.
- ▶ It is installed by the customer.
- ▶ It fits the definition of an information service, where the information is the primary emphasis of the product.
- ▶ The customer owns the source code.

Savings of 5% to 8.25% are possible in the tax-exempt states. It may be necessary to work with the vendor to ensure that no physical media are exchanged in order to realize the savings.

Taxes are commonly applied by buyers according to delivery address and commodity code. Tax accruals may be made when the vendor does not charge sales tax appropriately. Different commodity codes may be set up for software licenses or software maintenance services that are physically delivered versus those that are electronically delivered.

If software is to be installed in multiple tax jurisdictions, multiple POs should be issued so the tax can be calculated and tracked accurately. Also, electronically delivered software should not be mixed with media-delivered software on a PO line. It may be helpful to specify the delivery method on the PO for the vendor. Separate documentation can be used to track the installations and adjust the tax amounts if issuing POs according to these guides is not possible.

As an example, tax-related data can consist of the following:

- ▶ Tax code entries for the states where a software download is tax-exempt. Even adding tax code entries for states that do not charge tax helps buyers (and their workflow routines) determine that tax data has been considered and set appropriately.
- ▶ A tax-exempt commodity code for software.
- ▶ A sample PO for downloaded software showing the 0% tax rate.

7.13 Procuring licenses for a work order

Maximo Asset Management work order and preventive maintenance functionality is integrated with inventory and procurement in the following ways:

- ▶ The materials, services, labor and tools needed to carry out a work order can be recorded on the work order or job plan.
- ▶ Materials, services, and tools can be reserved in inventory or procured ahead of time.

- ▶ Use of the materials, services, and tools is recorded in actuals on the work order as steps are completed.
- ▶ Corresponding general ledger transactions are created at the close of the work order.

Work order functionality applies to software licensing through any of the work order-based applications, including the Change and Release applications if the Change and Release PMP products are available. For instance, for a server administrator to carry out a change request involving the installation or upgrade of software, the administrator can assemble several needed items:

- ▶ The installation media or downloaded files for the installation. Installation media can be described as a tool in this context, because they are not consumed during the course of the work order and no costs are incurred in their use. Referring to them on a change record effectively tracks who has checked out the media from the library.
- ▶ The configuration data for the software. In the Change management option for CCMDB, the configuration data takes the form of a reference to one or more CIs. The Source CI represents the software to be installed, and the Target CI represents the machine where it is to be installed.
- ▶ A license for the software. Software represented in inventory can be listed in the material requirements for the change.

Asset reconciliation

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 (see Figure 8-1), as well as 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.

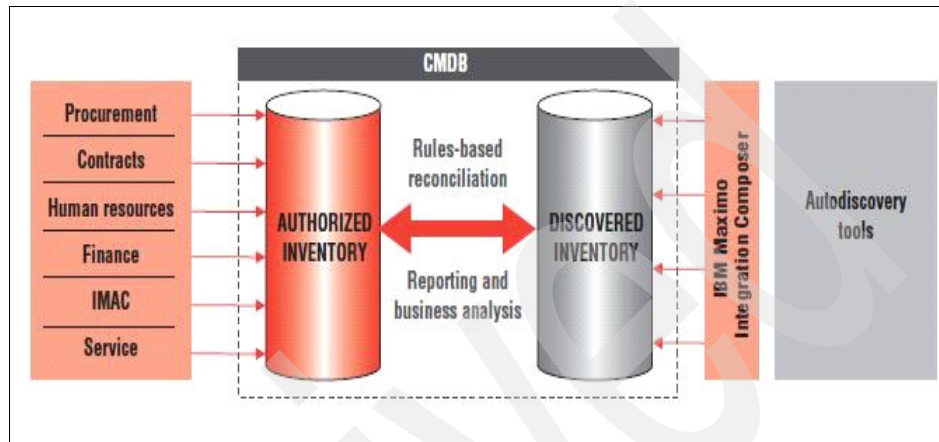


Figure 8-1 Authorized versus discovered assets

8.1 Roles

The reconciliation process can be used by and affects several roles within the organization, including these:

- ▶ **Service Desk**

This role requires a view of the asset hierarchy with specifications and the last scanned details of user-defined critical values to potentially resolve an issue the customer is reporting. For example, the user installed a new version of a JRE™ that caused the Expense Reporting tool to no longer function.

- ▶ **Configuration Management**

This role provides a view of the current configuration of the asset as it compares to the deployed asset-reported configuration. For example, this view can provide information as to the number of desktops that currently have installed Microsoft Windows 2000 Service Pack 4, or the number of servers that have DB2 Enterprise Server 8.2 Fix 5.

- ▶ **Asset Manager**

As the primary user of this application, this role generates a series of reconciliation reports that identify hardware and software compliance and configuration standards established by the organization. For example, checking for unauthorized software and sending out notifications to the asset custodian or user to remove the software can be accomplished through the use of reconciliation, escalations, actions, and communication templates. Hardware reconciliation is also important because it may have financial implications based on depreciation or the proper accounting of assets.

8.2 Linking assets

Reconciliation is the process of matching sets of information, finding differences where they exist, and investigating the differences.

Hardware reconciliation must occur before a reliable software reconciliation can take place. Without inventorying all your hardware first, you cannot possibly get reliable software counts.

If your organization has done a physical inventory, you are probably familiar with the process of reconciling the inventory against assets records. For various reasons, an inevitable discrepancy occurs between the sets of data each time an inventory is carried out. The process of reconciling authorized records from automated discovery tools is very similar. In fact, some organizations have

proposed loading physical inventory records into the Deployed Assets Module and using the reconciliation engine for reporting.

Organizations that use spreadsheets for asset management often rely on the individual managing the spreadsheet to remember the narrative history of individual assets. Around time for reconciliation, you ask questions about where an asset is, and the individual makes a comment such as, “Oh yes, assets whose names begin with ‘Q’ belong to the engineering department, and they only appear on Bob’s spreadsheet.” or “That is marked ‘unknown’ because the high school students we hired could not find it two years ago. I think it may be in the closet off the data center.”

This works when the scale of the organization permits it and while the individual remains with the organization. The method does not scale, however, and when the person leaves, the information is lost.

Tivoli’s process automation engine provides infrastructure for the systematic, repeatable, and scalable reconciliation of authorized and inventoried data. The infrastructure cannot do everything, though, and a coherent process must be followed on a regular basis to resolve discrepancies.

Reconciliation is a process of looking at the overlap of sets of data (see Figure 8-2). 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

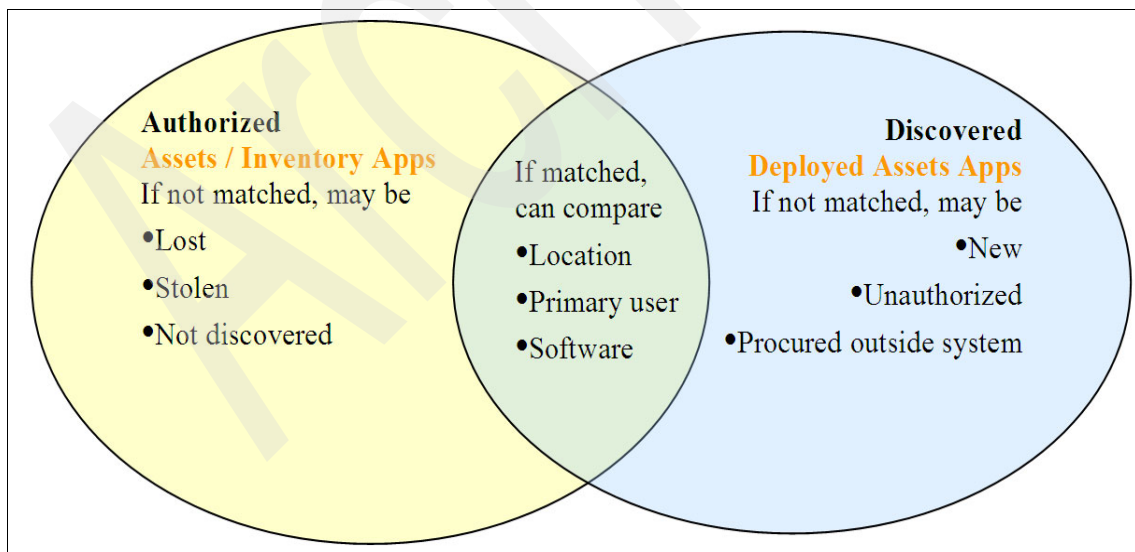


Figure 8-2 Reconciliation - overlapping sets of data

8.2.1 Inventory tracking and counts

Some assets do not necessarily have to be tracked individually, and in that case, duplication of a unique identifier is permissible, as long as the count of assets is the same or similar between the discovered and authorized records. Keyboards fit this category because of their low cost and interchangeability. Likewise, software whose licensing does not require unique identification within the organization is most effectively tracked using counts rather than unique identifiers.

Reconciliation by counts works like this: “We have 290 network devices on our books, and 300 were discovered. The extra ten were probably expensed with credit cards during off-hours network emergencies. This is a permissible margin of error, so we are okay with it.”

Compare this approach to painstakingly recording redundant identifiers for each device, comparing the identifiers individually between discovered and procurement records, and then tracking down each difference. It is easy to see how much time is saved. It is so much more work to track assets individually that avoiding the requirement to do so can be an effective motivation for employees to follow counts-based life cycle processes within permissible margins.

Tracking items by count is the domain of materials management or inventory tracking, as compared to asset tracking. In inventory tracking, the type of asset is tracked using Item Masters and classifications, but individual assets are not serialized or tracked. Counts are taken by storeroom and perhaps by lot or by bin. Counts and charges for items can be tracked though issuing the items to users or technicians, or by transferring items between storerooms, regardless of whether the items are tracked individually.

Tip: Each asset class should be evaluated to see if it is possible to track it by count rather than unique identifier. As long as it is permissible, tracking by counts is easier and more cost effective than individual tracking.

If in the decision process an asset class is marginal, it is best to at least record the serial number of those assets as they are received. That way, if the policy is changed after some time, it is easier to rebuild the link between the individual asset and its procurement record.

Tivoli's process automation engine offers several ways to track counts on the authorized side:

- In quantities for contract lines

This method is the simplest, especially if the data is already expressed in counts through contracts management activities.

- ▶ In inventory counts
Item Masters are received into inventory and created as assets only when individual tracking is required.
- ▶ In inventory counts
Individual assets are tracked, but reconciliation is achieved through counts by classification, person, or location.

When using any of these methods to maintain authorized counts, the reconciliation must be performed through reports rather than through the reconciliation engine. One of the reports included with Tivoli's process automation engine, the Software Reconciliation Report, takes this approach, comparing counts of items on contracts to counts of corresponding converted descriptions for software.

8.2.2 Actionable alternatives

The reconciliations application was created to lead administrators through the process of creating actionable records to aid in the reconciliation process, but Tivoli's process automation engine offers several alternatives that can be considered as well.

It is easy to compare Tivoli's process automation engine reconciliation functionality to a SQL statement. Link rules are similar to joins, and comparison rules are similar to criteria in a where clause. The link results and comparison results are similar to query output. If individuals in your organization understand SQL, it may be more straightforward to generate actionable data using SQL and reporting than to use the reconciliation engine.

The advantages of using the reconciliation applications are twofold. Reconciliation results are displayed in the out-of-the-box Assets application in the Asset Details dialog available through the Select Action menu. Link Results define the navigation provided by the clicking the **Deployed Asset Details** button

(see Figure 8-3), and Reconciliation Differences are displayed from the Asset Reconciliation Results records.

Asset Details

Asset19998IT (UNSPSC),Computer_Equipment,Computer,D

SiteBEDFORD

Linked Node ID85

Asset Specification

Filter

1 - 3 of 3

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Attribute	Description	Alt Value	Numeric Value	Unit of Measure
DISKSIZE	DISK SIZE		4.0	GBYTE
PROSPEED	PROCESSOR SPEED		266.0	PROSPEED
RAMSIZE	MEMORY SIZE		64.0	MBYTE

Reconciliation Differences

Filter

1 - 2 of 2

Download

Asset Attribute	Asset Value	Unit	DPA Attribute	Deployed Asset Value	Unit	Reconciliation Message	Reconciliation Date
						Matches found comparison has failed.	2/11/05 6:18 PM
0			1			Matches found comparison has failed.	1/18/08 12:35 PM

Deployed Asset Details

OK

Figure 8-3 Asset details panel

Escalations can be defined against the results without defining new objects. Escalations carry out workflow actions or create notifications based on query criteria defined in the escalation.

In Tivoli's process automation engine sample data, a reconciliation task SN-Bedford creates link records based on serial number matches between assets at the Bedford site and Deployed Assets records. In the Asset

Reconciliation Results window, records such as those shown in Figure 8-4 are displayed.

Reconciliation Task	Message	Asset	Deployed Asset	Created Date	Resolved?
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7000		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7200		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7300		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7400		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7500		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	A9000		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	90001		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	1867		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	1869		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7220		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7501		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7502		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7503		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7506		1/18/08 11:58 AM	☐
SN-Bedford	This ASSET has no matching DEPLOYED ASSE	7508		1/18/08 11:58 AM	☐
SN-Mclean	This ASSET has no matching DEPLOYED ASSE	A9001		1/18/08 12:19 PM	☐
SN-Mclean	This ASSET has no matching DEPLOYED ASSE	D912		1/18/08 12:19 PM	☐
DiskSpaceAvailable	No DEPLOYED ASSET(s) were retrieved by t		61	1/18/08 12:35 PM	☐
DiskSpaceAvailable	Matches found comparison has failed.		1	1/18/08 12:35 PM	☐
DiskSpaceAvailable	Matches found comparison has failed.		85	1/18/08 12:35 PM	☐

Figure 8-4 Asset reconciliation results

An escalation can key off the reconciliation task name and message text and notify the discovery administrator and or hardware asset manager that for some reason an authorized asset is not reporting through discovery. The notification could even include a link to the specific asset record in Tivoli Asset Management for IT to aid in the investigations.

You can create the same escalation without using the reconciliation applications by defining an escalation against the assets object with criteria similar to the following:

```
status != 'DECOMMISSIONED' and serialnum not in (select serialnumber
from deployedassets)
```

You can also build a report that lists all assets that do not have a matching serial number in deployed assets. A report might be most useful if all discovery records are reconciled on a monthly or other periodic basis, rather than on a one-by-one basis.

8.2.3 Matching data

It is important to match the data between what has been authorized to be deployed and what has been discovered in the environment. The following sections describe considerations related to data matching.

What constitutes a match?

The stringency of criteria for what constitutes a match depends on the requirements for compliance with various regulatory agencies or internal controls. Many organizations can tolerate duplicate serial numbers and lost equipment for years, with seemingly no repercussions. The data is to some degree wrong, but the discrepancies are permissible within an agreed-upon margin of error.

Many organizations are subject to a requirement for periodic physical inventory of assets, including IT assets. These organizations may be able to substitute electronic inventory of networked assets for the physical inventory in cases having a permissible margin of error.

The agreed-upon margin probably has to take cost and service dependencies into account. Misplacing a keyboard is a different scenario than misplacing a mainframe computer.

If a mainframe were missing, the entire business notices it immediately. If an asset continuously supports a host of dependencies, and if no current outages exist, it can be assumed that the asset is there regardless of whether it is discovered. This is the case for most in-service servers and network equipment. However, when the same equipment is out-of-service, it is possible it was stolen and thus requires close tracking.

Closeness of tracking may vary according to many factors:

- ▶ Cost of the asset
- ▶ Criticality of the asset
- ▶ Whether the asset is currently in service
- ▶ Kind of asset (its classification)
- ▶ Likelihood of theft
- ▶ Inventory requirements
- ▶ Difficulty and cost of maintaining reliable information
- ▶ Previous history of discrepancies

- ▶ Requirements for insurance replacement
- ▶ Requirements for warranty replacement
- ▶ Requirements for end-of-lease buyout
- ▶ Licensing requirements
- ▶ Configuration management needs
- ▶ Availability management needs (for spare parts)
- ▶ Capacity planning needs
- ▶ Records retention requirements
- ▶ Safety and security considerations
- ▶ Contract or SLA requirements
- ▶ Obsolescence of specific equipment or closeness to its retirement

8.2.4 Redundancy

It is often helpful to maintain redundant data in cases where discrepancies exist. If an authorized record and a discovered record both have unmatched serial numbers, but their asset tags agree, the two records probably refer to the same asset.

On the other hand, if two records have matches with disparate records by serial number, but the records have the same workstation name, it is highly likely that either the same workstation name was assigned to two different assets, or one asset replaced the other during a swap-out.

In both cases, you can save work by having two attributes of data that should match. If one of the attributes does not match, it can be assumed that the other was input mistakenly or changed during the asset's life cycle. The extra information may save the person doing reconciliation a trip to physically check on the asset, may point to a weakness in the asset-tracking process, or may permit the discrepancy to be resolved more quickly through a comparison of other attribute data.

Redundancy has a cost, however, in the effort required to maintain the extra information. Increased redundancy is worthwhile when the degree of permissible discrepancies is small, or when the effort required to resolve discrepancies is great. For instance, if an organization has IT equipment at remote sites, the equipment may be difficult to inventory physically because of distance.

Employees usually resent Inputting redundant data, so the reason for the input must be documented and explained for the process to be followed accurately on an ongoing basis.

In some cases it may be possible to automate the entry of redundant data at the time of receipt, when the asset is present in a lab environment. If a discovery client is installed as part of the process of initial deployment, and an initial

discovery is carried out and verified, some of the information from the discovery such as MAC address, network name, and serial number can be copied from the discovered record to the authorized record. Such a process can be configured using workflow or crossover domains (or both) in Tivoli Asset Management for IT.

8.2.5 User input

Some discovery tools can gather user input such as user name, location, and cost center. In Tivoli's process automation engine terminology, this input is "authorized" information from another source - the user, rather than IT services personnel. In contexts where the information is reliable, it can contribute to the redundancy and reliability of the authorized information.

8.2.6 Service desk input

If the service desk uses Tivoli's process automation engine, it can be part of its process to confirm authorized information. At each contact, the analyst asks the end-user to read the asset tag for the asset and confirm their name and relationship to the asset, the location, etc. After that, the analyst can refer to deployed asset information, in part for reference, and in part for verification of successful linking.

8.2.7 Duplicates

Unique identifiers are not reliable if they are not unique. If ten serial numbers are identical, you do not know which asset is which. Where uniqueness is required, duplicates must be considered of equal importance to records without matches.

However, as mentioned previously, some assets do not necessarily need to be tracked individually. In those cases duplication of an identifier that should be unique is permissible, as long as the count of assets by Item Master or classification is the same or similar between the discovered and authorized records.

If reports join sets of records on identifiers that include duplicates, counts of matches are artificially inflated by the presence of duplicates. If there are 300 authorized assets and 300 matches by serial in the deployed side, it could mean that one authorized asset matches 300 duplicate serial numbers on the deployed side (all of which indicate NA).

Duplicate checking must be performed on both the authorized and discovered sets of data in order to get good links. The reconciliation engine provides these

messages in the reconciliation results where it encounters duplicates for the configured criteria, depending on the leading set for the task:

- L05 - This CI links to more than one actual CI.
- L06 - This actual CI links to more than one CI.
- L09 - More than one actual CI links to this CI.
- L10 - More than one CI links to this actual CI.

Duplicate data can arise from several sources:

- ▶ Incorrect entry by vendors
- ▶ Incorrect entry by technicians because of typographical errors
- ▶ Incorrect entry by technicians as a way of circumventing required fields
- ▶ Actual duplicate records for the same asset, created by a second person who was unable to find the record created by the first person and thus created another record

Depending on the source of the error, the data and the process must be amended.

8.2.8 Unmatched data

Among the data that has been identified by your organization as requiring matches between unique identifiers, you eventually encounter unmatched data. Unmatched data can result in any of the following link failure messages in the reconciliation results:

- L01 - No Assets were retrieved in task <TASK_NAME>.
- L02 - No Deployed Assets were retrieved in task <TASK_NAME>.
- L03 - This Asset has no matching Deployed Asset.
- L04 - This Deployed Asset has no matching Asset.

When it is collected, the following information attributes can be helpful in identifying unmatched assets manually:

Manufacturer OS Processor type RAM Hard drive size	Can often be compared to procurement information because they are often included in vendor descriptions.
IP/subnet	Use the information to narrow down physical location if possible.
Most recent logon	Look up the person and match to deployed information, or contact them directly.

MAC address range	MAC address ranges are assigned to specific network card manufacturers, so that the manufacturer can be looked up on the internet from the MAC address. Network device manufacturers such as Cisco sometimes manufacture their own network interfaces.
-------------------	--

This table lists identifying information, so changes in any of this data for a given serial number or other unique identifier may indicate that an asset has been swapped out. It is possible to monitor changes in Tivoli's process automation engine by configuring an audit on the applicable object in the Database Configuration application. Then you can develop a report to show differences. (Refer to the *Tivoli Asset Management for IT System Administrator Guide* for more details.))

The way you proceed depends on which cause you consider to be most likely for the discrepancy. Causes for discrepancies can be broken into five main groups:

- ▶ Reconciliation logic errors
- ▶ Data entry errors
- ▶ Discovery failures
- ▶ Process omissions
- ▶ Actual missing assets

Reconciliation logic

It is easy to introduce errors into reconciliation logic in all but the simplest scenarios. When using Tivoli's process automation engine reconciliation engine, it is important to define mutually exclusive sets of data in task filters; otherwise, the results are difficult to interpret.

If you are using a case-sensitive database, it may help to experiment with using the case-insensitive option when configuring link rules.

Too-narrow task filters can be a cause of link failure messages. If it is feasible, reconciliation by unique identifiers should be carried out across the largest domain of information possible so that assets that have moved can still be found and matched. Subsequently specific task filters can be used to narrow the results in order to match unmatched records.

An asset or a deployed asset can appear only once in link results. If an asset has been associated incorrectly, it is necessary to delete the erroneous results in the link results application. Then you can re-run the appropriate reconciliation task to populate the correct result.

It is necessary to define a top-level classification before running a reconciliation cron task. If no top-level classification is defined, an error such as the following may appear in the log, and no links are generated:

```
{Date} Reconciliation cron task processing failed. This message will  
be repeated if the reconciliation cron task fails again when the  
cron task is run the next time.  
java.lang.NullPointerException at  
psdi.app.reontask.engine.TaskDefinition.performTask(TaskDefinition.  
java:106)  
...
```

Data entry errors

A certain percentage of data entry error is unavoidable. Redundancy is the best tool for checking and correcting such errors.

Several errors are common when entering serial numbers:

- ▶ Entering the letter “O” instead of a zero.
- ▶ Entering an uppercase “I” instead of a one.
- ▶ Omitting leading zeros, possibly because of inaccurate delimited-file conversions.
- ▶ Entering the wrong number of zeros in a string of zeros; for example, 530000678 instead of 5300000678.
- ▶ Entering hyphens or spaces inconsistently.
- ▶ Entering case inconsistently.

Databases and computer systems cannot reasonably equate values with these inconsistencies, whereas a human can quickly look at the data and make a determination on its equivalence. It is often helpful to produce reports of unmatched data from both the authorized and discovered domains and then ask an individual look through it to discern matches. When a match is found, the error must be corrected.

It usually pays off in the long run to fix the data at its source. If the data is being integrated with an external procurement system, it may be easier to change the data coming from discovery, possibly by updating the BIOS attribute of a machine to the correct value. If it is impossible to correct errors, it is best to put an explanation in the asset description or some other highly visible field.

Discovery failures

IT environments are changing continuously, and periodic failure of discovery tools to report is practically inevitable, although some tools can run for months without a problem.

The chain of information processing and transfer is long for discovery tools to Tivoli's process automation engine, and errors in configuration or processing can occur in multiple places:

- ▶ A client agent may fail to report because of one or more of the following reasons:
 - An installation error
 - An omission in process.
 - Scheduling errors.
 - Network errors
- ▶ Network configuration or permissions may be changed without corresponding updates to discovery configurations, resulting in some devices being missed.
- ▶ Processing agent information into the discovery database may fail, possibly because of unallowable characters in the results or unavailability of the database connection.
- ▶ Database replication may fail.
- ▶ Transfer of database information may be improperly filtered in ITIC.
- ▶ ITIC may have failed to run according to schedule due to scheduling errors, compile errors, or exceeding the maximum number of allowed errors (configurable).
- ▶ Results in deployed assets may not reflect the uniqueness of records in the source database because of errors in the IBM Tivoli Integration Composer (ITIC) configuration.

Delays in reporting

Because of the chain of events that must take place in order to get information to ITIC, a delay of several days is likely between initial deployment of assets or changes and reports of their discovery. Thus assets deployed during the delay period cannot be effectively reconciled against discovered data.

Non-reporting assets

After the initial discovery and reconciliation, reconciliation should take into account assets that have been discovered but, for some reason, have not reported for more than a certain number of days or weeks. Investigating non-reporting assets proactively is helpful because the longer the period from

when the problem occurred to the time of diagnosis, the more likely that information about the cause of the problem is not be available.

If discovery is your primary source of inventory data, proactively investigating failures to report is advised.

Process omissions

Process omissions on the authorized side usually result in missing authorized information. If someone fails to enter a receipt, no record of the asset may exist. If someone fails to enter the fact that an asset is placed in service, the record may be waiting with a status of “Not ready” and without location or person assignment. Each process omission must be addressed by tracing it to the individuals responsible and motivating them or changing the process according to their input.

Missing assets

Inevitably, some assets are actually missing because they are lost, stolen, or disposed of without documentation (see Chapter 11, “Retirement process” on page 181).

8.3 Using Asset Link results

Once the link is made between discovered and authorized data, you can compare the two sets of data. Questions such as the following can be answered:

- ▶ Has the asset been moved?
- ▶ Is the asset being used by someone new?
- ▶ Do we have licenses to cover the software installed there?

8.3.1 Discovering location

It is difficult to determine from discovered data whether an asset has moved. While automated discovery can sense a network location, it cannot discover the physical location of an asset. Tivoli's process automation engine has limited capability for correlating physical location with network location, but because asset managers highly value this information, we discuss the correlation in this section.

Various kinds of information give clues as to network locations:

► **Ports on smart switches**

If your organization uses smart switches that can be queried with SNMP, and the discovery tool you are using has the ability to query switches and track their ports, it may be possible to see which port the asset is connected to. A table of switches and ports can be built with a list of locations for each.

The information from smart switches has the most potential for specifically locating assets, but most organizations do not invest in smart switches for the part of their network that machines connect to. Many other organizations do not permit SNMP traffic due to security concerns.

► **IP ranges**

If your organization has IP ranges assigned to different locations (such as buildings or floors), it is possible to build a table of the ranges and the locations they correspond to.

► **Subnets**

If your organization configures assets to specific subnets, and the subnet mask or slash notation is reported through discovery, you may be able map the subnet to locations.

Various challenges are associated with successfully using and maintaining these mappings. Even though they refer to physical locations and infrastructure, they change at a rate that makes them difficult to track and communicate centrally. The change is rapid enough that information obsolesces within weeks, but not within days. Thus training teams of network administrators in using Tivoli's process automation engine for that purpose is usually not warranted.

Moreover, the network administration team has significantly different goals and concerns than those of the asset management team. The possibility of mapping between facilities-oriented locations and network-oriented information often hangs on whether common ground can be found between the two groups as well as between the different sets of values. The mapping is most likely to occur in an organization where the network management team is already using Tivoli's process automation engine for ticketing and work management.

A facilities-oriented location hierarchy is usually not suitable for correlation with network layouts. Network resolution may go to the subnet level, and the subnet may not correspond exactly to a network location. If this is the case, new locations may have to be created on the authorized size, or existing locations organized into a new system specifically for this purpose.

It is likely that multiple facilities-oriented locations share a subnet, so it may be that the subnet cannot be mapped to a location at the most granular level in the

locations hierarchy. For example, the subnet could span an entire building, where the authorized locations show rooms or even desks. Here it may be necessary to build a report that compares networking information with any of the locations below a named location in a certain system hierarchy.

This report is a complex one to write, and it is not available out of the box. You must balance what you are getting from the report with the effort required to write the report. The report depends on authorized location information being maintained by sound processes that can be compared to a custom table of mappings to reported network values. If the information is available, it can tell you whether an asset has been moved.

If it is not necessary to track assets this closely or proactively; it may be easier to simply track down specific lost assets with the help of network administrators on a one-off basis.

8.3.2 Discovering person assignments

Many organizations start the process of reconciling person assignments by reporting on assets that are assigned to people who have become inactive. The person status may be brought into the system from an HR feed, and a report built accordingly. This takes care of the majority of the process of discovering person assignments, without looking at discovered information.

A more proactive approach may be required where tight security or compliance is necessary, or where licensing of important products is based on named users.

Two kinds of person information is available from discovery: logons and self-reported assignment information.

Your discovery tools may report the most recent logon, or it may report usage history, which is more useful. Importing usage history is not supported out-of-the-box in Tivoli's process automation engine until a future release, but it can be set up in a new application through a variety of methods.

To be useful, discovered logon information must be correlated to authorized person information. On a one-off basis, it is probably easiest to look up logons from a corporate mail system if it is available. To find a specific asset, you may be able to look at the last logon, track down the individuals, and enlist them in locating the asset. For proactive reporting purposes, however, a table of values must be created.

Maintaining a table of logons may mean instituting a process of requiring unique identification of a person at the time logons are created. Privacy concerns, as well as process hand-offs between HR and network staff, must be addressed.

8.3.3 Assets managing themselves

To achieve the person and location automations mentioned previously, the effort required is substantial compared to the information obtained. Most organizations do not manage their assets proactively. In fact, reports are not included out of the box because Tivoli's process automation engine designers assume that most organizations do not use them. Using such reports requires setting up several feeds from several sources, and in that context, a generic reporting capability is unlikely to be used.

The question of resolving locations and persons from discovered information often comes up in the context of IT organizations that are having trouble with their process for tracking assets. These groups may have lost control of asset information for some time and not know how to get it back in the face of unwilling staff and unwieldy process changes. These organizations want discovered information to "manage the assets for them."

However, as we have seen, proactive use of discovered information is most suited for organizations on the other end of the spectrum: organizations that have control of their assets and are seeking a more proactive control for security or compliance purposes.

No substitute exists for instituting a coherent process of entering and updating authorized information such as asset location, accounting information, and responsibility. Effort put into developing these processes for organizations that do not have them provides more compliance and cost savings than the effort devoted to creating interfaces and automation around discovery information.

8.4 Initial loads of authorized inventory from discovered information

Organizations that have no authorized inventory may consider importing discovered information as a baseline.

In this context, it is important to note that the only discovery information that overlaps with authorized information are those aspects that usually create the links between the two - such as serial number, asset tag, computer name, and possibly description. No link to purchasing, no assignment of responsibility, and no physical location information is available from discovery.

The only information that should be imported from discovery is that which will be managed going forward. It is not necessary to import all available information from discovery to the asset application - the information is already there in the

Deployed Assets Module where it can be reported on and referred to from the asset module and various processes.

Importing information from discovery to authorized assets en masse should be considered for organizations that have newly revamped their processes and require a base of authorized information that is already linked to discovery. These organizations can then work with this information going forward. The advantage of importing the information is that it provides reliable identifiers such as serial numbers, thereby eliminating time-consuming and possibly inaccurate keystrokes. The disadvantage of importing the information is that, within the context of a dysfunctional process, the information is misleading and tends to obsolesce. Personnel value information more if they have input it themselves.

Promoting discovered information is unquestionably helpful in the initial installation of an asset. In some cases discovery agents are installed in a lab as part of the initial image, and in some cases they are rolled out at first logon or as part of other network deployment strategies. In any case, at the time of initial discovery, it pays to have a process where the discovered information is matched with that from a procurement record (possibly by asset tag), and additional identifiers are automatically added from discovery for redundancy, eliminating some work and improving accuracy.

8.5 Software conversion

The software conversion application includes two additional fields that can be used as flags for processing (see Figure 8-5 on page 153). The Compliance Setting field is either Authorized or Prohibited. These values are used in Reconciliation Filters or reports to filter out target software. The Reviewed? field simply shows whether a new piece of software has been reviewed. Review of software includes answering these questions:

- ▶ Where did it come from?
- ▶ Is this a new string that describes a kind of software for which a variant has already been defined?
- ▶ Is it authorized to be installed in this environment?
- ▶ Does it link with procurement records? (If so, you may want to configure it to a variant that corresponds to the description of the Item Master.)

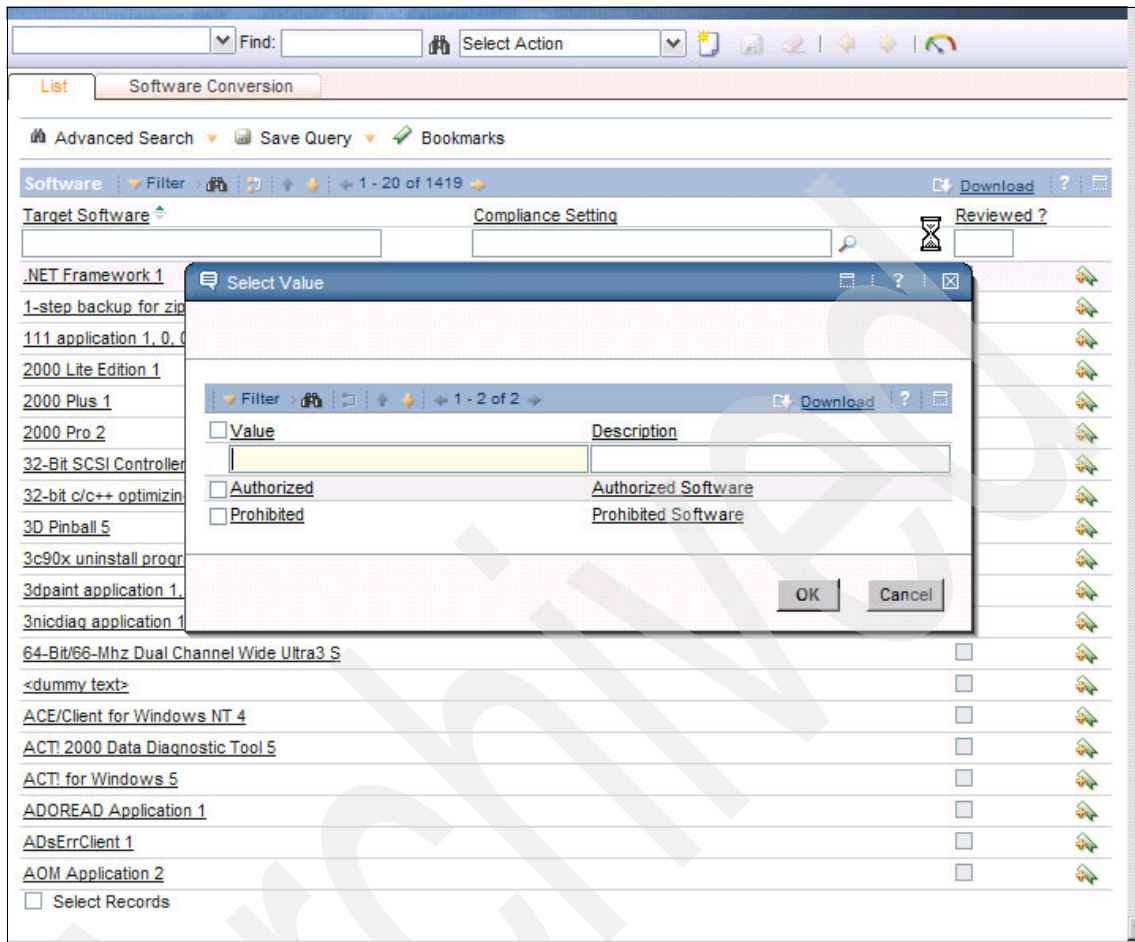


Figure 8-5 Filtering for reconciliation

Once a baseline has been established so that all software entries are marked as reviewed, new entries show up without the flag. One user used these entries to

create a result set query on the start center. At each logon, the user has quick access to the new software entries. See Figure 8-6.

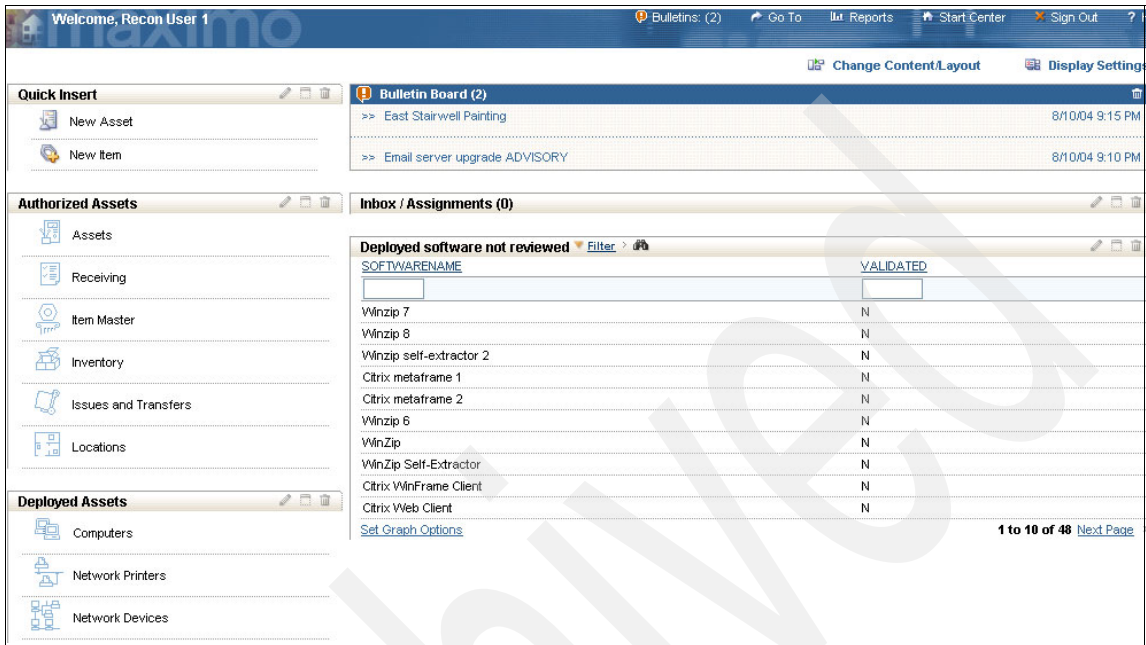


Figure 8-6 Start center with reconciliation view

8.6 Relationship of Item Master to software product

Establishing the relationship between the discovered software record and the transactions centered on Item Master is the challenge involved in tracing costs to installations.

In Tivoli Asset Management for IT without Tivoli License Compliance Manager, the primary relationship for software reconciliation is between the Item Master in inventory or assigned to an asset and the discovered software catalog in software variants and deployed assets. On the basis of this relationship, the customer can compare counts of software installations from discovered inventory either to authorized inventory or to relevant contract line items to determine license compliance for installation licenses. Determining compliance for licenses with other capacity units is not easily accomplished using this model.

Customers can maintain a relationship between the catalog of software products as they are discovered and Item Masters. The relationship depends on several factors:

► **Authorization for purchase**

Item Masters represent software items authorized for purchase, so they usually are a subset of the catalog of discovered software items. When an item is authorized for purchase, it means the following:

- The vendor has been approved, and a vendor contract is possibly in place.
- A commodity code has been assigned.
- The item has been classified.
- The licensing for the item has been analyzed.
- The order units for the item have been set appropriately.

► **Item sets**

Because Item Masters exist in item sets, and Maximo systems may have multiple item sets, multiple item records may match a single discovered software product. These records may differ in commodity code, classification, order units, and in the vendors approved for purchase.

► **Granularity of signatures**

If multiple licenses exist for a discovered product, an Item Master record may be configured for each license to show that a different license is being ordered. This situation can exist where sufficient information is not available in software signatures to distinguish between similar products for licensing purposes. This situation results in the same software catalog entry being entitled by different licenses and in requiring that different items must be ordered to procure the entitlements.

One example of such a situation is distinguishing between instances of software that differ in use but not in installed components, such as a development instance of DB2 versus a production instance. Deployed Software records can be marked according to their usage, but they are connected with a single software catalog. Another example is where signatures of third-party products have not been differentiated sufficiently to distinguish between an enterprise and a personal edition of the software.

► **Vendor's terms**

If multiple license records reference the same product, multiple Item Master records should be created only if the license records differ in terms that the vendor or manufacturer defines. Multiple Item Masters are not needed to show that different departments hold certain capacity.

8.6.1 Item assembly structures

Item Master records can be bundled into item assembly structures using Tivoli's process automation engine functionality. Item assembly structures may be used in several contexts with regard to software:

- ▶ **Hardware bundled with software**

Customers may create templates consisting of an asset and several standard software licenses or products (or both). The templates can be applied to rotating hardware assets using the Apply item assembly structure menu item to show that the standard software has been installed on the asset. This model may be helpful for modeling procurement of pre-imaged hardware or for OEM OS licenses that are procured along with hardware.

- ▶ **Kits**

Customers can create kits from software licenses stored in a license pool storeroom. Item assembly structures flagged as kits can be assembled as kits in the inventory application and issued as a single unit. This functionality may be useful for modeling the distribution of standard software images drawn from varying inventories of software licenses. The individual items that make up a kit are considered part of the kit and are not tracked separately in inventory once they have been assembled. Balances for an item record do not include any instances of the item that have been assembled into a kit.

- ▶ **License bundles**

For separate licenses bought as a bundle. The bundled licenses may be separate and distinct in the sense that they refer to different products with different entitlement scope and capacity definitions, but they are grouped to closely resemble the line items present on vendor contracts and purchase orders. The Microsoft "platform" and "CAL" licenses are an example of this kind of bundling, where licenses with dissimilar capacity and scope are bundled as a single orderable item. The Platform products are a single orderable bundle consisting of Microsoft Office, the Core CAL (Client Access License) Suite, and an OS upgrade. To reconcile license capacity against discovered information, it may be necessary to track the licenses as separate Item Masters in inventory. Products should be bundled in item assembly structures rather than in software variants when they consist of different discoverable products, especially if those products have different licensing metrics.

- ▶ **Licenses bundled with services**

In some cases vendor line items may include services or installation media with software licenses. These line items must be split into different items in Maximo for separate tracking. A top-level Item Master can be created that

corresponds to the vendor line item, and the Item Masters created for tracking in licenses or inventory are put into the item assembly structure.

8.6.2 Bundling discovered products

Tivoli License Compliance Manager (TLCM) refers to multiple products from a license only when pricing or constraints on use are defined in terms of an aggregate function of the pool of products. For instance, a usage-based license can be defined so that the sum of the usage high-water marks of several products cannot exceed the number stated in the license capacity. Another example of such a definition is the constraint that several related products can be installed on separate servers, but the maximum of the value units on any of the servers cannot exceed the number stated in the license capacity. Except for these relatively rare exceptions, license entitlement is defined in terms of a single product.

Sometimes when you procure a license, the use of several other products is included with the main product. For instance, you are entitled to use WebSphere Application Server when you buy Tivoli Asset Management for IT or other Tivoli's process automation engine-related products. In this case, WebSphere Application Server does not carry separate terms and conditions, scope or capacity units, other than the restriction that it be used only to serve Tivoli Asset Management for IT and related applications. WebSphere Application Server is entitled but is not tracked with its own license record. Instead, a relationship is set up in the discovery tool stating that a particular installed instance of WebSphere Application Server is included with Tivoli Asset Management for IT. TLCM or other discovery mechanisms in turn must resolve both products to the single entry in Tivoli Asset Management for IT to be matched with procurement data.

8.6.3 Third-party discovery tools and bundling

Most third-party discovery tools include some capability for recognizing bundles or offerings at the point that products are being resolved from their components. In the case of the IBM tools, the tool reads a common catalog to determine how to bundle the products. In the case of non-IBM tools, the tool may use the proprietary algorithms and tables of product offerings to determine which products are installed from the raw data of registry entries, other files, and discovered DLLs.

If the discovery tools being used have configurable bundling or product identification, a procedure can be developed to determine which products are to be configured in the discovery tool versus in the software catalog. Such a procedure often must be developed with input from application administrators, discovery tool administrators, deployment tool administrators, and license

administrators to ensure that products are identified with sufficient granularity to determine license compliance. Without teamwork and documented procedures, software probably will be misidentified because of multiple layers of bundling or assumptions on the part of the various parties.

8.7 CCMDB and Tivoli Asset Management for IT

This section provides information about the relationship between the Tivoli Change and Configuration Management Database (CCMDB) and Tivoli Asset Management for IT products.

Both CCMDB and Tivoli Asset Management for IT are designed to help you manage the components of your IT infrastructure, but in different ways. As its name implies, CCMDB emphasizes change and configuration management, whereas the emphasis of Tivoli Asset Management for IT is on asset management. A certain amount of overlap exists between these management disciplines, and to some extent, the modules unique to each product can be made to work for the other product. In this section, we discuss what you can manage with each set of functionality.

Asset management is mostly concerned with financial aspects and responsibility, whereas configuration management is concerned with relationships and dependencies between items. Both what is managed and how it is managed can differ between the disciplines.

Some items may have high visibility in asset management but little importance to configuration management, and vice versa. In asset management, the cost most likely determines the importance of an asset - either replacement cost or book cost. In configuration management, the number and kind of functional dependencies probably determines an asset's importance. A free software installation may be ignored by asset management but is integral to configuration management. Or a standalone punch-in device for employees must be tracked in asset management, but configuration management can effectively ignore the device.

On the discovery side, CCMDB relies on Tivoli Application Dependency Discovery Manager (TADDM) that reports asset inventory as well as dependencies between the configuration items to almost any desirable depth. Tivoli Asset Management for IT, on the other hand, includes a Deployed Asset Module designed to work with TLM, which specializes in license management, or with any discovery tool that your organization has in place. These general discovery tools usually show the software that is installed on a piece of hardware, but otherwise, they do not trace dependencies between the software components. The TADDM specialty is discovery of dependencies, whereas the

other tools may be more appropriate for resolving inventory in relatively nontechnical terms adapted for asset tracking.

IBM plans to continue to integrate its discovery tools in the years ahead and will enhance the ability to coordinate discovery tools with deployment tools such as Tivoli Provisioning Manager. With Tivoli Asset Management for IT V7.1 and CCMDB, you can leverage the shared Tivoli process automation engine to see all aspects of an item from different viewpoints.

The primary means provided in Tivoli's process automation engine for relating CIs and the asset management entities of Asset, Item, and Location, are links provided on the CI, available through the CI application. Similar links are provided on the work order-based applications (Work Order Tracking, Activities and Tasks, Changes, and Releases). In the work order applications, no necessarily direct relationship between the CIs and the asset management entities exists, although values can be filled in where a relationship has been configured on the CI.

No means for directly relating Deployed Assets entities from Tivoli Asset Management for IT to Actual CIs from CCMDB currently exists. The most effective way to manage the relationship between these discovered entities is through authorized entities, using reconciliation. CIs are reconciled to Actual CIs, and Deployed Assets are reconciled to Items or Assets. A relationship is maintained only between the Items or Assets and the authorized CIs and is implied through the reconciliation links to the discovered records. Whether the link is to item or asset depends on whether the asset is managed through the Assets application or Inventory application.

To the people responsible for managing these links, this sounds like a lot of work. If the requirement were to manage, reconcile, and link every record, it would take too much effort for anyone. However, each organization must strike a balance between the value of the information being managed and the cost of managing it.

Part of the reason for reconciling records before linking them is that it is assumed that fewer records must be manage after reconciliation. Your organization should discuss and document guidelines about the records that must be managed and how to manage them:

- ▶ Discovered assets usually hold a subset of information from the discovery tool, filtered by ITIC during transfer.
- ▶ Assets usually hold a subset of information from deployed assets, only consisting of equipment and software that is kept on fixed assets books or managed through procurement.
- ▶ Actual CIs hold a subset of records managed in TADDM, filtered during transfer.

- ▶ CIs hold a subset of Actual CIs consisting of only those items whose configuration must be actively managed.
- ▶ The links between CIs and Asset or Item only must be maintained for target items.

If your organization is small or just starting out with the management disciplines, it makes sense to limit the management of relationships between asset and configuration management entities to only a few target items, where such management is required. It might be needed in the following scenarios:

- ▶ Asset managers may want to look at the total cost of ownership of a software program or platform, as traced through its dependencies.
- ▶ IT technical managers may want access to financial data for context in making quick configuration management or capacity management decisions.
- ▶ Discovery administrators may want to compare data sets between TADDM and other discovery tools for reconciliation purposes. The extent to which this is required depends on the factors listed in 8.2.4, “Redundancy” on page 142.
- ▶ Change records are being used that reference both asset and CI records. Configuring the relationship in the CI application allows for auto-filling of the information about the ticket and work order-related applications.
- ▶ Configuration managers may want to trace asset moves and status from the CI.

8.7.1 Linking procurement records with CIs

It is easiest to create reliable links between discovered and authorized records soon after receiving the assets. If procurement, or at least receiving, is performed through Tivoli’s process automation engine, the inventory or asset record (or both) are tied to the procurement record. Unique information is recorded about the record such as serial number, machine name, MAC address, and asset tag.

Two paths can be followed for linking assets or inventory records to CIs. The CI can be created directly from an asset record, or it can be “promoted” from an Actual CI record after discovery takes place.

Technicians are more likely to prefer promotion of records because of the amount of detail that can be transferred automatically into the CI record. The main piece of unique or near-unique information that is in common between the asset record and the CI is the machine name. Once machines are matches, the software installed on the machines can be matched.

The machine name can be kept on the asset record as an added attribute or as a specification for IT classifications for networked assets. Technicians who

configure the asset network names probably have the asset physically in front of them, so they can read the serial number or asset tag, find the asset record created at receipt, and enter the name that they configure. A week or a month later, when the TADDM information is promoted to CI, an asset record is waiting to be linked to it. Periodic checking can be performed to ensure that all eligible asset and CI records are linked.

Different classification structures can be used for assets or Item Masters and for CIs. Synchronizing the asset classification structures to the common data model classifications can aid in linking records that are otherwise unidentifiable.

The CI includes two location fields. The Location field next to the Asset field on the CI window refers to the location of the asset named, if any, and is updated when the asset is moved. The CI Location field is provided in case a different location structure must be used for CIs and assets.

When you create an incident or change record, do you reference the asset or the CI or both? The answer to this question can depend on who is creating and reading the change record. A service desk analyst is most likely to have access to asset information through the serial number or tag reported by the user, whereas a change record is more likely to be created by a technician familiar with CI records. In either case, the missing information can be filled in before the record is marked complete. Configuring CI information provides a quick cross-reference for dependencies, and configuring asset information supplies a reference for financial aspects that can be used in transactions and total cost reporting. Configuring the relationship between the asset and CI in the CI application means that one can be auto-filled from the other in these referring applications.

If an asset is taken out of service, it may be transferred to a storeroom or moved to a designated Operating Location, and the status changed according to whether it is being disposed of or repaired. The change in location is reflected on the CI record, and the link to the asset can be used to check the status.

What does it mean to configure an Item Master to a CI? A single Item Master is configured to the CI, but that does not imply a one-to-one relationship between them. CIs are generally used to show instances, while Item Masters represent a catalog entry. The main reason for the link is to show how the CI can be replaced. If multiple Item Masters can be ordered as replacements, this information is provided in the Alternate Items section of the Item Master application (not on the CI). The Item Master can exist in various storerooms, lots, and bins in inventory, but because the CI record is only concerned with configuration, only the Item Master reference is needed. Locations and CI Locations are limited to Operating Locations and are used mostly in conjunction with asset references, not with Item Master references.

Tracking software inventory

Once software is received, it must be tracked. In Tivoli Asset Management for IT, inventory can be used in the absence of full license capabilities to track authorized software installations, some license details, and charge-backs. When customers add the capabilities of TLCM, many of these aspects are tracked on the license record.

Some software licenses types are more appropriate than others for management as inventory items. License capacity units that can be counted discretely as installations assigned to machines recorded as assets are easily managed in the Maximo Asset Management inventory application. Licenses with any other capacity units are properly managed only through the TLCM licenses object and accompanying compliance engine.

This section describes the software that must be tracked, and the limitations of tracking software using the inventory model.

9.1 Tracking software installation locations

For compliance, it is necessary to track where software is authorized to be installed for licenses with a scope of “install”. These licenses require a machine to be designated in the license.

Other license scopes with type of “install” do not specify where the software is installed, and for compliance it is important that the software not be installed on too many machines. In these cases, the organization may want to track which machines have been authorized for installations so it can enforce compliance internally. If an installation is discovered on an unauthorized machine, the software asset manager can ask that it be uninstalled.

In the Tivoli Asset Management for IT inventory model, whether software is represented by a rotating or non-rotating item, issuing the item to an asset implies that the software is installed on the asset. Virtual machines are also tracked as assets, so software can also be issued to a VM asset to indicate that it is installed there.

9.2 Software details

In the inventory model, several workarounds have been developed for tracking license details:

- ▶ License serial numbers (SNs) or CD keys may be tracked in the SNs or descriptions of rotating assets.
- ▶ License expiration dates may be tracked through lot expiration date.
- ▶ Bulk licenses may be grouped in bins.

When Tivoli License Compliance Manager (TLCM) is present, these details can be tracked on the license record.

9.3 License pools

The phrase *license pool* is used in a variety of contexts with different meanings:

- ▶ In some environments, license pool is a way of modeling common properties of licenses, including capacity type, whether the application can start without a license, multi-instance, quantity, threshold for warnings, the scope, and start and end dates. In many ways, the TLCM license object is similar to this concept of a license pool.

- ▶ In pooled licensing for AutoCAD and other products, a license pool on a license server provides licenses that are checked out when a product is started on a client workstation. When no licenses are available in the pool, no additional users can start the product. A license pool in this context basically defines the number of concurrent users of a locally installed product. Tivoli Asset Management for IT does not support the capability for disabling unlicensed products.
- ▶ In some systems, the License Pool field can indicate a broad category for software usage, such as “application” or “database”. In Tivoli Asset Management for IT, usage can be noted in the classification of the Item Master.
- ▶ In Tivoli Asset Management for IT discussions, license pools commonly mean virtual storerooms, which in turn commonly carry the GL accounts of IT or other departments. Issuing a license from the IT license pool to another department’s storeroom or to an asset creates charge transactions for charge-backs.

9.4 Software costs in inventory

In the inventory application, software is charged by default to the inventory control account for the storeroom when it is received in inventory. A separate account can also be configured for each item. This model is appropriate when storerooms are set up for the department that is financially responsible for the licenses, and it permits exceptions of the type “Dept A controls this license, but Dept B needs to be charged for it because of a prior agreement or a special project.”

Issuing the item to an asset or a work order can charge the software to the same account as the machine on which it is installed. This is effective if the GL of the department or project is configured in the GL of the asset.

Issuing the item to a work order can charge the software to the same account, which is often a project or department code, as the one configured on the work order.

A work order inherits account component defaults from the asset and or location (or both) on the work order, if any, as well as from the PR from which it is generated. The merging of the asset and location codes is helpful when the asset holds a project or resource component and the location holds a cost center component. The validation of the GL when merging the asset and location codes provides validation as to whether the combination of project and cost center are appropriate. The merging of the codes is a convenience because the full accounting for the work order can be specified independently. For workers who

find it easy to specify assets and locations but are confused by account codes, the capability of independently specifying the full accounting of the work order is helpful.

9.4.1 Inventory transactions applicable to licenses

The following kinds of transactions take place within inventory:

- ▶ Standard receipt adjustment
- ▶ Balance reconciliation
- ▶ Current balance adjustment
- ▶ Physical count adjustment
- ▶ Standard cost adjustment
- ▶ Average cost adjustment
- ▶ Capitalized cost adjustment
- ▶ Insertion of a new item
- ▶ Issues
- ▶ Transfers

Similar transactions might be needed for the TLM license model if, for instance, multiple cost attributes are supported.

A transaction similar to balance reconciliation or balance adjustment is required for manual changes to license capacity. Balance reconciliation sets the current balance to the physical count plus or minus any transactions that have occurred since the physical count. No transaction corresponds to a physical count adjustment for software, at least with reference to discovered software installations. However, you may need to adjust license capacity when you find licenses previously unknown or when correcting mistakes in previous entries.

If license costs are modeled as a unit price per unit of capacity, updates to capacity might require a recalculation of the cost per unit. For example, if a 20-user capacity license costs \$20,000 to procure, the standard cost for license capacity charged back to the users' departments is probably \$1,000 per user, regardless of the actual terms of the pricing agreement or POs used in procurement. If the number of users is adjusted due to the expiration of part of the capacity, the price per user might require recalculating. That price is then stored in the Standard Cost for the item in inventory.

Parallel to the inventory model, licenses inserted without a receipt (such as found licenses) must be tracked with non-financial transactions. While the link to procurement records is probably unavailable for found licenses, a standard cost per issue unit can still be established for charge-back purposes, and a GL account can be assigned to show financial responsibility. However, no debit and credit accounts can be assigned.

Issues result in transactions in the Material Use Transactions table, where Transfers result in transactions in the Material Receipts table.

Transfers between storerooms credit and debit the control accounts for the storerooms. If a transfer is to a labor or courier location, the control account for that location is likewise used. Transfers may be the result of an internal PO, in which case the GL debit account is specified on the PO.

Issues and transfers of licenses must take into account not just available capacity, but a nuanced understanding of whether the terms of the license permit the license capacity to be divided or reassigned. When license capacity is reassigned, the credit account for the department the license is transferred out of is the Clearing Account for that department. In inventory, the Clearing Account for the department is used for inter-site transfers. For capitalized items a capital account is used.

9.5 Inventory accounts applicable to software

Several inventory-related accounts can be established at the organization level in the chart of accounts, at the storeroom or location level, and at the level of the individual item in a storeroom. If the account is not set per item, the location-level account is used, and if the location-level account is not set, the org-level account is used. If only some components are present, the components may be merged. These accounts include those shown in Table 9-1.

Table 9-1 Inventory-related accounts

Account name	Purpose
Inventory Control account	Tracks the material issues and receipts for the inventory item. This account is debited upon receipt and credited upon issue of this item.
Shrinkage Cost account	Enables the balancing of adjustments, reconciliations, and physical cost adjustments.
Inventory Cost Adjustment account	Tracks changes in inventory standard, average or capital cost adjustments.
Inventory Resource code	Sets per Item Type at the Org level, and merges with InvCost.GLAccount.

The accounts listed in Table 9-2 are related to location only.

Table 9-2 Location-related accounts

Account name	Purpose
Receipts Price Variance	This account is useful when you use the standard cost, and the receipt price in another storeroom differs from the vendor cost or the standard cost in the issuing storeroom (Standard Receipt Adjustment). You can create this transaction as a secondary transaction to a material receipt transaction.
Invoice Variance	
Currency Variance	
Purchase Variance	When using a budget and you want to use commitment accounting, you can customize Maximo Asset Management to use this account to store differences between PO costs and invoice costs.

9.6 Using inventory for compliance

It is best to leave calculations of license compliance to specialized tools such as TLMC and not infer compliance from inventory.

One difficulty in using an inventory model for software is that licenses are subject to compliance-related rules in addition to the accounting rules enforced in inventory. The compliance-related rules do not follow the simple logic of issues and transfers. The following are examples:

- ▶ Software with a license having machine scope cannot be transferred to another machine. Therefore it is not appropriate for such software to be issued to any machine other than the one designated on the license.
- ▶ Software with a license having capacity units of Processor Value Units (PVUs) can be installed only on machines with appropriate capacity.
- ▶ Software licensed with capacity units of concurrent users cannot effectively be accounted for in terms of installations. In this case, the accounting involved in issuing the license to an asset is probably inappropriate because the charges are related directly to a machine that is shared among departments. The only case where this is appropriate is when a single department uses the

machine and software or a single department absorbs costs by mutual agreement with the other departments.

- Issuing a software item from inventory to show where the software is installed is misleading when the inventory balance is interpreted as an indication of excess remaining capacity in non-installation licenses.

Even for installation licenses, inventory balances can give misleading impressions if they are interpreted as an indicator of compliance. For example, the most common Microsoft installation licenses require the license to be assigned to both a machine and a primary user. Thus, compliance may require ensuring that neither the number of installed machines nor the number of users with access exceed the number of licenses. Because only the number of installations is easily discoverable, additional measures must be enforced at the time of installation to ensure compliance, such as checking the usage of the machine.

Whether a license is consumed on installation depends on the license type and the type of installation being performed. Table 9-3 lists examples.

Table 9-3 Licenses consumed on installation

License type	Installation	Implied consumption	Additional compliance
Generic	Microsoft Project on workstation	Consumption of single license	The individual with access to the computer or the individual's computer must be licensed.
Generic	Microsoft Project on file server	Consumption of multiple licenses	Each person (or that individual's workstation) with access to the files must be licensed.
Generic	Microsoft Project on terminal server	Consumption of multiple licenses	Each person (or that individual's workstation) with access to run the software must be licensed.

License type	Installation	Implied consumption	Additional compliance
Generic	Oracle Named User server installation	No consumption	Named Users are countable and may be reserved or charged back through inventory, but Named Users do not correspond to installations.
Generic	Citrix Systems client installation on workstation	Consumption of up to one user license	License consumption depends on the number of concurrent users measured in the Citrix server.
Processor Count Full-Capacity	SQL Server Enterprise	Consumption of CPU licenses according to CPUs on machine	This license type may have additional concurrent user limitations.
Processor Count Sub-Capacity	Adobe® ColdFusion® 8	Consumption of CPU licenses according to CPUs available to virtual machine	This license type may have additional concurrent user and document creation limitations.

In the inventory model, if it does not make sense to decrement the capacity of a license for an installation, it is possible to manually adjust the count of items in inventory to approximate license capacity. For instance, a license based on Named Users can be received into inventory and simply incremented or decremented each time an additional user is requested.

This procedure does not enable compliance checking, but it does leverage the existing inventory functionality so that work orders can reserve and consume the software as a material, automatically incrementing the balance and charging the appropriate GL codes. In this example, however, the count of items in inventory representing license capacity is thrown off by issuing the item to one or more assets to represent installation.

Showing software installations as spare parts issued to assets introduces serious compromises to the attempt to use inventory to track license capacity. In

a Tivoli Asset Management for IT-only scenario, we have several sound but incomplete scenarios for using inventory to track license compliance:

► **Installation licenses only**

Use inventory to track software subject to installation licenses only, and issue the software to a hardware asset to show installation. This may generate appropriate accounting transactions depending on the accounts assigned to assets and storerooms, and inventory balances will reflect outstanding installation capacity. A clear procedure must distinguish between licenses that can be managed this way and those that cannot, such as using a different branch of classification to distinguish those kinds of software that can be reconciled as installations.

► **Installations only**

Use inventory to track software subject to all kinds of licensing, but do not use inventory balances at all to determine compliance or charge-back. Use issues to hardware assets to show installations. This scenario may be appropriate for organizations that do not use charge-backs and that have no other mechanism for tracking authorized installations.

► **Countable capacity only**

Use inventory for all kinds of licenses, but do not issue to assets to show installations. Instead, issue to GLs, work orders, assets, and locations only for the purpose of creating charge-back transactions using the standard cost, average cost, or most recent cost features of inventory. This scenario might be appropriate in an environment where procurement is performed in Tivoli Asset Management for IT, but reconciliation is performed in CCMDB.

Although in general, we do not recommend tracking compliance through inventory, inventory can still be a useful tool for managing charge-backs and tracking authorized use of licenses.

9.7 Order and Issue Units

A procedure must be established to assign Issue Units depending on whether license capacity is countable and whether issue to an asset should decrement the unit. If possible, a standard item corresponding to the software must be created, and all extensions to license capacity for that software should use the same Item Master. For instance, the initial item might be this:

PROJECT PROFESSIONAL 2007 5-User LICENSE

A new item 0001 must be established for Project Professional 2007 Install License with an Order Unit of 5-User License and an issue unit of Install

License. The conversion between 5-User License and Install License is set up with the factor of 5. On the PO, item 0001 is referenced and the preceding description is entered on the line and saved. The order unit is entered as 5-User License with a quantity of one. Later the item is received into inventory with units of Install License and a quantity of 5.

Next, two single-user licenses for Project 2007 may be ordered. It has to be determined with some subtlety as to whether the 5-user license and the single-user license represent different counts of the same entitlement. If they do, the item 0001 is again referenced on the PO line, and the description is left as is. The order unit is set to Install License and the quantity set to 2. At receipt, two addition Install License units are added to inventory.

In this discussion we assume that the organization's system of charge-backs is based on license capacity. Other systems of charge-back are possible, as long as they apportion costs based on an agreed-upon system. In all cases, issue units should be created and set so that issuing the item to an asset, work order, or GL results in the correct cost transactions being recorded.

9.8 Charge-backs

Accounts may represent departments, projects, or other ways of tracking charges in the accounting system. In many organizations the IT department acts as an internal vendor or storeroom, ordering, receiving, and providing goods and services to the other parts of the business. The purpose of charging back the cost of IT services to the departments that use them is to assist in the alignment of expenditures to actual business needs. Whether IT absorbs charges or passes them on, the transactions can be tracked in the same way: as credits and debits to accounts.

The main obstacle to re-use of software licenses may be that departments have no easy way of charging each other when a license is transferred. A license is charged to a department at the time of procurement, so the department is reluctant to give it away in case it is ever needed, even if the department is not currently using it.

Charge-back of IT services is a good practice generally because of its tendency to enable tracking of expenses and to enable alignment of costs to business value. In addition, charge-back for software licenses can enable departments to be compensated for software licenses that are redistributed to other departments.

Charge-backs may occur when a license is procured, when it is distributed, when it is used, and when its associated software is installed or maintained. Many organizations such as IBM do not use charge-backs and simply track the charge at the initial procurement of a license. For such organizations, the GL debit account for the receipt of the license can be displayed on the license through a relationship, along with the PO number received along with the PO number it was received against. Costs of procurement must be managed through the PO and Receiving.

For distributions, certain methods of charge-backs may be more appropriate to certain types of license, but the methods do not necessarily follow the distributions of license capacity.

For use-based licenses, the basis of the charges may vary according to the use-based costs the IT organization incurs, or the basis of the charges may be interpreted as a leveled or set rate according to an agreement between IT and the departments being served. The IT department may apportion charges to other departments according to the proportion of use that each department incurs, to the proportion of users in each department, or to an agreed-upon percentage or set cost.

For installation licenses, Average Cost, Standard Cost, and Asset Cost charging methods are available in the Inventory application and can be configured as agreed upon for different sites.

No matter what system of charge-backs is used, the business probably wants to see breakdowns of costs by software product and by the machine where it is installed. Thus transactions must be traceable to installed asset and product.

Charges may occur on a one-time or recurring basis, and in both cases they result in credits and debits being applied to accounts. If recurring charges are divided and applied on a regular basis, the application may be able to provide tools that aid in the process of generating appropriate transactions.

Another product, IBM Tivoli Usage and Accounting Manager, helps with charge-backs. Tivoli Usage and Accounting Manager accurately assesses shared computing resource usage. With this product, you can understand your costs and track, allocate, and invoice by department, user, and many additional criteria. Its capabilities include the following:

- ▶ Collects, analyzes, and bills based on usage and costs of shared Microsoft Windows, UNIX®, Linux, IBM i5/OS®, and VMware computing resources.
- ▶ Delivers detailed information and reports about the intricate use of shared resources while masking the underlying complexity.

- ▶ Transforms raw IT data into business information for cost allocation that spans business units, cost centers, applications, and users.
- ▶ Consolidates a wide variety of usage data with Data Collectors and a powerful “business rules-driven” capability.
- ▶ Automates daily operations for easy administration.

Planning and refresh

Planning is an organizational capability critical to getting the most out of your IT assets. In this chapter, we discuss the planning process and provide a high-level overview of how Tivoli Asset Management for IT can help ensure its effectiveness. A key aspect of planning is refresh - that is, when will existing equipment be replaced (or refreshed) with newer technology.

10.1 Planning as an organizational capability

As IT expenditures increase over time, budgets tend to become the key focus, and the ability to deliver longer term capabilities suffers further.

Planning is an organizational capability critical to managing IT assets. The organization has to focus on building the ability to successfully plan for the future. In building planning as an organizational capability, the organization places particular emphasis on the following:

- ▶ Developing skills and expertise and strengthening the capacity of managers to lead and develop the organization.
- ▶ Improving the IT infrastructure and information management systems to support the organization's vision and goals.
- ▶ Building closer, more collaborative relationships with both internal and external stakeholders.
- ▶ Continuing to develop planning systems so that strategic priorities reinforce an integrated approach across the organization and are linked to the organization's objectives.

Planning should promote the vision and goals of the organization. Organizations must have powerful tools that provide strategic IT information for day-to-day operations and strategic planning. Planning enables business users to view a multitude of data and perform a rapid analysis without the need for complex database queries.

Figure 10-1 shows the refresh chart for a 10-year period. Assumptions about the refresh policy are shown along with the chart.

	A	B	C	D	E	F	G	H	I	J	K
1	Assumptions on Refresh Policy										
2		for all the baseline assets it will be 15% in the 1st, 20% in the 2nd, 25% in the 3rd year and 40% in the 4th year before. Calander year to be taken into account for this planning.									
3		for all the assets refreshed, the refresh will take place as follows - 10% of 1st year in the 3rd year, 35% of the 1st year in the 4th year and 55% of the first year in the 5th year and this will rollout every year.									
4		Baseline assets are 6000 in Nos.									
5		Refresh planning done for a period of 10 Years									
6											
7	Year ---->	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
8	BaseLine	900	1200	1500	2400						
9											
10	1st Re-refresh of 2008			90	315	495					
11	1st Re-refresh of 2009				120	420	660				
12	1st Re-refresh of 2010					150	525	825			
13	1st Re-refresh of 2011						240	840	1320		
14											
15	2nd Re-refresh 2010-12					9	32	49			
16	2nd Re-refresh 2010-12						32	110	173		
17	2nd Re-refresh 2010-12							50	173	272	
18	2nd Re-refresh 2011-13						12	42	66		
19	2nd Re-refresh 2011-13							42	147	231	
20	2nd Re-refresh 2011-13								66	231	363
21	2nd Re-refresh 2012-14							15	53	82	
22	2nd Re-refresh 2012-14								53	184	288
23	2nd Re-refresh 2012-14									83	289
24	2nd Re-refresh 2013-15								24	84	132
25	2nd Re-refresh 2013-15									84	294
26	2nd Re-refresh 2013-15										132
27											
28	3rd Re-refresh 2012-14							1	3	5	
29	3rd Re-refresh 2012-14								3	11	18
30	3rd Re-refresh 2012-14									5	17
31	3rd Re-refresh 2013-15								3	11	18
32	3rd Re-refresh 2013-15									11	39
33	3rd Re-refresh 2013-15										17
34	3rd Re-refresh 2014-16									5	18
35	3rd Re-refresh 2014-16										17
36	3rd Re-refresh 2013-15								1	4	7
37	3rd Re-refresh 2013-15									4	15
38	3rd Re-refresh 2013-15										7
39	3rd Re-refresh 2014-16									4	15
40	3rd Re-refresh 2014-16										15
41											
42	Total Refresh for the Year	900	1200	1590	2835	1074	1501	1974	2085	1311	1701
43	Year ---->	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017

Figure 10-1 Example refresh policy

An organization with an effective planning capability has the following advantages:

- ▶ Improved asset control - Automatically track assets with automated alerts.
- ▶ Better cost control - Perform powerful cost analysis to support purchasing decisions.
- ▶ Reduced waste - Cross-check usage and ownership details to avoid buying more than required.
- ▶ Lower risks - Eliminate doubts about license ownership and its compliance.

The following types of planning are generally used by organizations:

- Short-term planning

Short-term planning occurs on a year-to-year basis. Normally the data for this type of planning is based on last year's actual expenditures. Last year's budgeted variance is also taken into account for this kind of planning. Accordingly, a target is provided to reduce the expenditure or allocate extra funds. Finally, the data from long-term planning (such as technology refresh, upgrades, and so on) is taken into account, and budgets are provided for the current year.

- Ad-hoc planning

This type of planning occurs in the middle of the year. The data originates from the Service Management department when the downtime of some assets becomes a bottleneck to fulfilling the organizational vision and goals. When such assets are refreshed, their actual refresh plan (that is, the long-term plan) is automatically revised.

- Long-term planning

This planning occurs on a three- to five-year basis. The technology refresh and IT strategy of the organization are inputs into drafting this plan. Long-term planning becomes one of the inputs for the yearly budget plan. This plan also provides concerned departments with input for their respective budgets.

For example, an organization's IT strategy designates that desktops and mobile computers be refreshed after three years, printers and network equipment after four years, and servers and storage after five years. The planning tool provided by IT should provide the number of assets to be refreshed by organization, so the concerned departments know in advance when the refresh is planned to occur.

Thus, the finance department can plan to cover the capital expenditure required to provide the number of assets planned for refresh in the next three to five years. The procurement department can make plans with the manufacturer and thus issue the required POs. The inventory department can plan for shipment deliveries and storage, and the asset manager knows which assets are being retired and which assets are planned for delivery. The asset manager can plan for the disposal of the retired assets with help from HR or the finance department (depending on how the assets are to be disposed of - through an employee purchase plan or donations, by scrapping them, or by returning them to the vendor if the assets are leased or rented). Department heads understand when their departmental assets are due for refresh and can obtain periodic or on-demand reports on them.

Having a powerful asset management tool facilitates this scenario. When a critical asset is to be refreshed because of inputs from the service management department due to unacceptable downtime or poor services from the vendor, the change in the plan is immediately carried out throughout the organization. The finance, procurement, and inventory departments, the asset manager, and the department heads have access to the revised plan, and their budgets are accordingly updated. The asset management tool does this automatically if the workflow is integrated with the tool.

10.1.1 Information requirements

Proper planning requires accurate and timely information. The information used as input into the planning process can originate from a variety of resources, as described in the following sections.

Service management

One source of planning information is the service management process. The downtime of an asset is monitored by the service management department as a call for service is logged to the service management tool. The service management department maintains data on which assets are experiencing problems and whether an asset should be replaced, upgraded, or refreshed, based on the downtime data for the asset. This data is provided to the planning department, which facilitates creating plans for the current year's budget. The asset management tool helps update this information and distributes it to different departments to update the respective plan and resultant budgets for the coming years.

Information systems management tools

These tools are another source of data for planning. The tools that maintain data on assets - which departments owns them, when the refresh date is planned, and so on - can be passed on to the service management desk when a service ticket is logged. Based on this input, the IT department may recommend the asset be replaced, refreshed, or upgraded.

Financial systems and spreadsheets

Finance drives much of the planning process. Finance department staff provides budgets versus actuals, year-to-date expenditures, and so on. The organization must capitalize many procured assets to take advantage of depreciation benefits and other tax-related items. Hence close coordination must be in place with the finance department throughout the entire life cycle of an asset so that the correct financials are reflected on the organization's books.

Decision support systems

Based on data from the service management desk or the asset manager and the user, management can decide to refresh the asset in advance, even when the service management desk or the asset manager has not recommended the refresh. This decision takes business goals and IT strategy into account.

Reacting to external factors

One of the data sources for planning is information from external sources, which forces the asset manager or the service management desk to decide to refresh assets. For example, if a particular manufacturer or vendor has stopped production of a critical asset or discontinued support for it, the service management desk and the asset manager can decide either to refresh the asset or to use it in a noncritical application until it is sunset per policy.

10.1.2 Tools to assist planners

To plan for an IT infrastructure that corresponds to the business vision and goals, the planner should possess sound knowledge of the end-to-end asset management process. The planner must have the skills to understand different phases of the life cycle and the organizations and functions involved. This individual should have a working knowledge of how assets are handled financially as well. A comprehensive tool such as Tivoli Asset Management for IT, which provides linkage between financials and contracts, can be critical to the planner's success.

Retirement process

This chapter describes specific actions that you can implement with Tivoli Asset Management for IT to affect changes to asset records during the retirement phase. Refer to 4.1.5, “Retirement phase” on page 48, for an overview of this process.

Retirement of IT assets refers to de-installing, decommissioning, and disposing of an IT asset. Asset retirement may occur because a lease or license ends or because of technological obsolescence.

11.1 Performing retirement tasks with job plans

You can use the Job Plans application to create a job plan that lists all of the tasks related to decommissioning an asset. After you create a job plan, you can use it to create work orders in the Change, Release, or Work Order Tracking applications. Decommissioning an IT asset includes one or more of the following tasks:

► Locating an asset

You can use information contained on the asset record to physically locate an asset, including information in the following fields:

- **Location** - Locates stationery assets (for example, mainframes)
- **Parents** - Locates bundled assets or subassemblies
- **Bin** - Locates assets in a storeroom
- **Users** and **Custodians** - Locates mobile assets (for example, mobile computers)

► Reconfiguring an asset

If you must return a leased asset with the same configuration it had when it was received, you can create a job plan for the configuration. The job plan can contain necessary steps in the configuration process, such as installing or removing software or deleting sensitive or company confidential data.

► Reconciling your leased assets

Use the applications in the Deployed Assets and Reconciliation modules to reconcile your asset records in Maximo Asset Management with data discovered by an asset discovery tool.

► Shipping a leased asset back to the vendor

You can process leased assets being returned to a vendor in two ways:

- **Select Items for Return** button - Use the original purchase order to return leased items in the Receiving application by clicking this button.
- **Move/Modify Assets** - Use this action available in the Assets, Purchase Order, and Work Order Tracking applications to move leased assets to a Storeroom. Then use the Issues and Transfers application to return the items to the vendor by clicking the **Select Items for Return** button.

► Canceling an existing lease or rental agreement

You can use the Escalations application to create an escalation that automatically cancels a lease or rental agreement once a particular condition has been met - for example, when all assets on the lease have been returned, or the End Date on the contract has been reached.

- ▶ **Changing the status of an asset record to DECOMMISSIONED**
You use the Assets application to change the status of an asset record from OPERATING to DECOMMISSIONED.
- ▶ **Moving an asset to a salvage location**
You use the Move/Modify Assets action available in the Assets, Purchase Orders, and Work Order Tracking applications to move one or more assets to a salvage location. Depending on your business processes, this might involve a move to a new location (including a different site), to a new parent, or to a new bin in a storeroom.
- ▶ **Ordering a replacement**
You can use either the Desktop Requisitions application or the Purchase Requisitions application to requisition IT assets. You can also use the Escalations application to create an escalation that includes notifications when leases are about to expire. You can create escalations that extend or renew a lease or ones that cancel a lease and notify the appropriate parties that it is time to negotiate a new contract.

11.2 Changing the status of an asset

Assets have an associated status to designate whether or not they are operational. An asset record can have one of the following statuses:

- ▶ **NOT READY**
Default status for new asset records. Asset records can be created before assets have been received, installed, configured, inspected, or otherwise approved for their intended use.
- ▶ **OPERATING**
Asset has been received, installed, configured, inspected, or otherwise approved for use or operation.
- ▶ **DECOMMISSIONED**
Asset has been retired from service and moved to scrap or salvage.

Figure 11-1 shows a Tivoli Asset Management for IT window that displays a list of assets.

The screenshot shows a web browser window titled "Assets - Microsoft Internet Explorer". The address bar displays a URL from the IBM Tivoli Asset Management for IT system. The interface includes a navigation bar with tabs for "List", "Asset", "Spare Parts", "Safety", "Meters", "Specifications", "Features", and "Relationships". Below the navigation bar, there are search and filter options. The main content area displays a table of assets with columns for Asset ID, Description, Location, Parent, Rotating Item, and Site. The table lists various assets such as Electric Cart, Overhead Crane #1, Centrifugal Pump, Conveyor System, Bottom Sealing System, Electrical Service Pole, Standard Desktop Computer, Carton Escapement Assembly, Motor Starter, Elevator Rails And Drainpan Assembly, Chain Wash Assembly, Brake System- Overhead Crane #2, Freightliner, Hard Drive, Fire Extinguisher, Unix Server, and Standard Desktop Computer. Each asset entry includes its ID, description, location, parent ID (if applicable), rotating item ID (if applicable), and site name (BEDFORD). A "Select Records" checkbox is located at the bottom left of the table.

Asset	Description	Location	Parent	Rotating Item	Site
12300	Electric Cart	SHIPPING			BEDFORD
12200	Overhead Crane #1	SHIPPING			BEDFORD
11430	Centrifugal Pump 100GPM/60FT HD	BR430	11400	PUMP100	BEDFORD
12200	Conveyor System #2	SHIPPING			BEDFORD
13120	Bottom Sealing System	BPM3100			BEDFORD
52300	Electrical Service Pole #300/Wood/45 ft/	POLE300			BEDFORD
A8011	Standard Desktop Computer	HM5TOCK		D700	BEDFORD
13142	Carton Escapement Assembly #2	BPM3100	13140		BEDFORD
11211	Motor Starter- Size 2440v/3ph/60cy	BR210	11210		BEDFORD
13141	Elevator Rails And Drainpan Assembly	BPM3100	13140		BEDFORD
13143	Chain Wash Assembly	BPM3100	13140		BEDFORD
12510	Brake System- Overhead Crane #2	SHIPPING	12500		BEDFORD
61001	Freightliner #61001	FLTQAR			BEDFORD
1949	Hard Drive	HM5TOCK		HD4532	BEDFORD
1002	Fire Extinguisher	MOFLOOR2		FIRE-100	BEDFORD
A8007	Unix Server	COMP310		S700	BEDFORD
A8008	Unix Server	COMP310		S700	BEDFORD
A8009	Standard Desktop Computer	HM5TOCK		D700	BEDFORD
A8013	Standard Desktop Computer	HM5TOCK		D700	BEDFORD
A8014	Standard Desktop Computer	HM5TOCK		D700	BEDFORD

Figure 11-1 List of assets

Figure 11-2 shows an asset in NOT READY status.

The screenshot displays the 'Assets' web application interface within a Microsoft Internet Explorer browser. The address bar shows the URL: <http://kenmore.itsc.austin.ibm.com:9080/maximo/ui/?event=loadapp&value=asset&uisessionid=1203703331281>.

The main interface has a top navigation bar with tabs: List, Asset (selected), Spare Parts, Safety, Meters, Specifications, Features, and Relationships. Below this is a search bar with a 'Find:' label and a 'Select Action' dropdown.

The asset details are displayed in a form with the following fields:

- Asset: A8009
- Description: Standard Desktop Computer
- Site: BEDFORD
- Status: NOT READY
- Type: IT

The 'Details' section contains several fields for asset management:

- Parent: [Empty]
- Maintain Hierarchy?: ☐
- Location: HWSTOCK
- Bin: [Empty]
- Rotating Item: D700
- Condition Code: [Empty]
- Meter Group: [Empty]
- Usage: [Empty]
- IT Hardware Cage: [Empty]
- Standard Desktop Computer: [Empty]

The 'Purchase Information' section includes:

- Vendor: COMPDEP
- Manufacturer: DATACHIP
- Installation Date: [Empty]
- Purchase Price: 2,250.00
- Replacement Cost: 2,250.00
- PO: [Empty]
- Computer Depot: [Empty]
- Datachip Computer Corporation: [Empty]

The 'Costs' section shows:

- Total Cost: [Empty]
- YTD Cost: [Empty]
- Budgeted: [Empty]
- Inventory: [Empty]

The 'Downtime' section includes:

- Asset Up?: ☒
- Last Changed Date: 10/7/04 8:45 AM
- Total Downtime: 0:00

The 'Modified' section shows:

- Changed By: WILSON
- Changed Date: 10/7/04

Figure 11-2 Asset in NOT READY status

As shown in Figure 11-3, you can change the status to OPERATING.

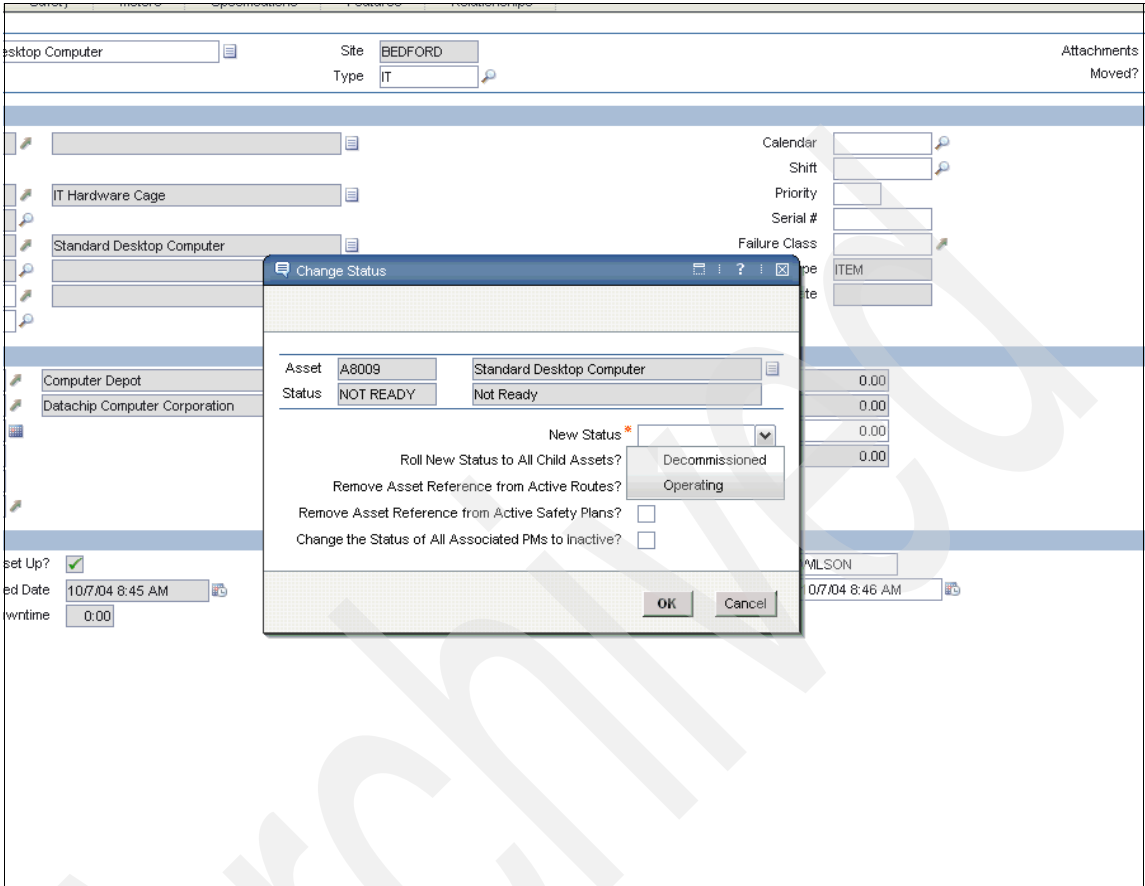


Figure 11-3 Change Status dialog

The asset status changes to OPERATING, as shown in Figure 11-5 on page 188.

The screenshot shows a web browser window titled "Assets - Microsoft Internet Explorer". The address bar displays a URL from the IBM Maximo system. The main content area is titled "Assets" and includes a search bar and a "Select Action" dropdown. Below this, there are tabs for "List", "Asset", "Spare Parts", "Safety", "Meters", "Specifications", "Features", and "Relationships". The "Asset" tab is active, showing details for asset A8009, which is a "Standard Desktop Computer" located at "BEDFORD" with a status of "OPERATING". The "Details" section includes fields for Parent, Location (HWPSTOCK), Bin (D700), Rotating Item (Standard Desktop Computer), Condition Code, Meter Group, and Usage. The "Purchase Information" section shows Vendor (COMPDEP), Manufacturer (DATACHIP), Installation Date, Purchase Price (2,250.00), Replacement Cost (2,250.00), and PO. The "Downtime" section shows "Asset Up?" with a checked checkbox. The "Costs" section shows "Total Cost", "YTD Cost", "Budgeted Cost", and "Inventory Cost".

Figure 11-4 Asset in OPERATING status

If an asset is going to be permanently retired from service, you can change its status to DECOMMISSIONED. Decommissioned assets do not appear in select value lists or in the drill down but are still maintained in the Tivoli Asset Management for IT database as historical records.

Before an asset record can be decommissioned, the following must be true:

- ▶ The asset cannot be referenced on any open work orders.
- ▶ The asset cannot be referenced on any open desktop requisitions, purchase requisitions, requests for quotation, or purchase orders.
- ▶ The asset cannot be referenced on any job plans.

Figure 11-5 shows changing an asset to DECOMMISSIONED status.

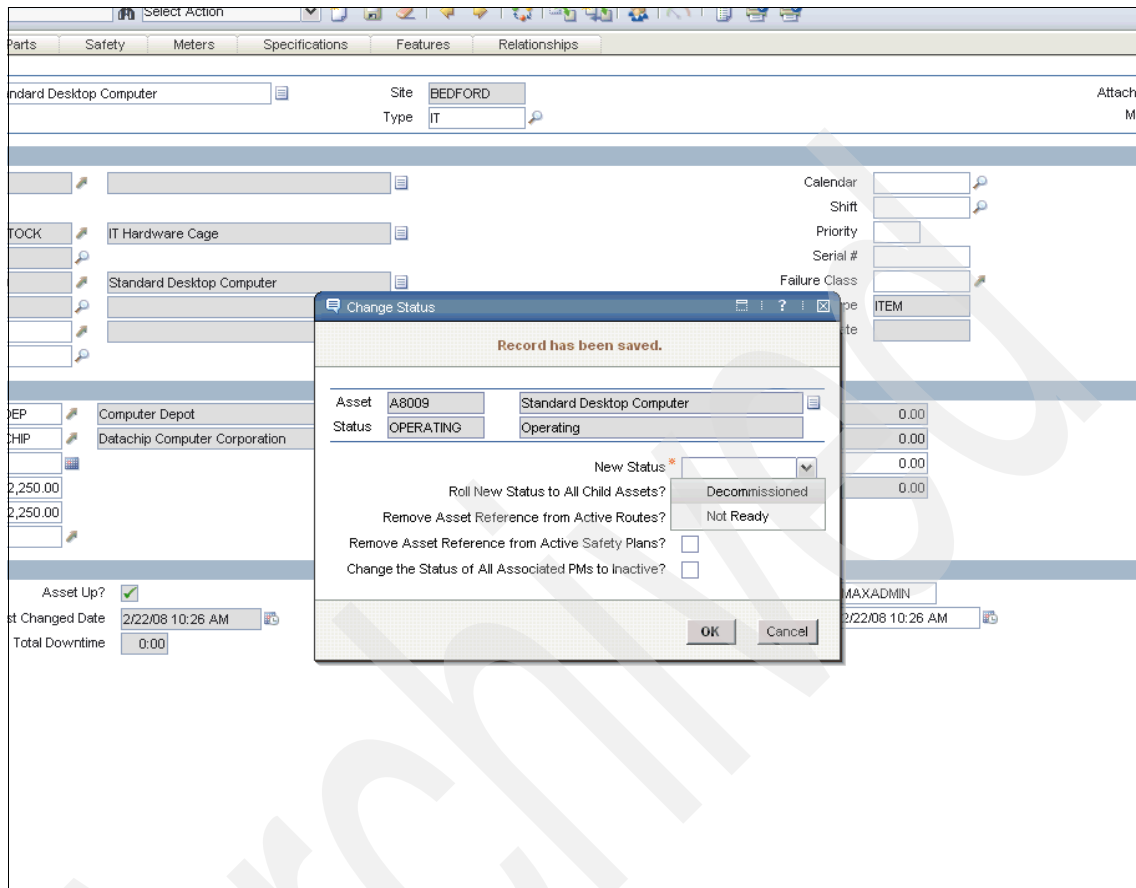


Figure 11-5 Changing the status to DECOMMISSIONED

The Change Status dialog box enables you to use the following options when decommissioning an asset:

► **Roll New Status to All Child Assets?**

Checked by default when you are changing the status of an asset to DECOMMISSIONED. Automatically changes the status of all child assets to DECOMMISSIONED.

► **Remove asset reference from active routes?**

Select this option to remove the asset record from all routes with a status of ACTIVE.

► **Remove asset reference from active safety plans?**

Select to remove the asset record from all safety plans with a status of ACTIVE.

► **Change status of all associated PMs to inactive?**

Select to change the status of all PMs associated with the asset record to INACTIVE.

Figure 11-6 shows the asset in DECOMMISSIONED status.

The screenshot displays the IBM Maximo Assets web application interface. The browser window title is "Assets - Microsoft Internet Explorer". The address bar shows the URL: <http://kenmore.itsc.austin.ibm.com:9080/maximo/ui?event=loadapp&value=asset&uisessionid=1203703331281>. The page has a blue header with the "Assets" logo and a message "Record has been saved." in the top right corner. Below the header is a navigation bar with tabs: "List", "Asset" (selected), "Spare Parts", "Safety", "Meters", "Specifications", "Features", and "Relationships". The main content area shows the details for asset "A8009", which is a "Standard Desktop Computer" located at "BEDFORD". The status is "DECOMMISSIONED" and the type is "IT". The "Details" section includes fields for Parent, Location (HWSTOCK), Bin, Rotating Item (D700), Condition Code, Meter Group, and Usage. The "Purchase Information" section shows Vendor (COMPDEP), Manufacturer (DATACHIP), Installation Date, Purchase Price (2,250.00), Replacement Cost (2,250.00), and PO. The "Costs" section shows Total Cost, YTD Cost, Budgeted, and Inventory. The "Downtime" section shows "Asset Up?" checked and "Last Changed Date" as 2/22/08 10:26 AM. The "Modified" section shows "Changed By" and "Changed Date".

Figure 11-6 Asset in DECOMMISSIONED status

Attention: You should select DECOMMISSIONED as the new status only if you intend the status change to be permanent.

Once an asset record has been changed to DECOMMISSIONED, the following actions are not allowed:

- ▶ Adding children, subassemblies, or spare parts
- ▶ Updating meter readings
- ▶ Modifying the Rotating Item or applying an item assembly structure
- ▶ Associating specifications or specification values
- ▶ Referencing the asset on new desktop requisitions, purchase requisitions, requests for quotation, or purchase order lines
- ▶ Issuing items that to be charged to the asset
- ▶ Creating work orders for the asset
- ▶ Adding the asset to job plans or preventive maintenance records

You can, however, still perform the following actions for a decommissioned asset:

- ▶ Returning items issued or charged to the asset
- ▶ Moving or modifying the asset record using the Move/Modify Assets action.
- ▶ Zeroing the Year to Date costs for the asset

11.3 Monitoring software license compliance and disposal

Software compliance monitoring and disposal are linked closely because the most cost-effective way to achieve compliance from a non-compliant state is to remove the non-compliant software if possible. In many cases additional payment to the license vendor is required, but uninstalling or replacing the software with viewers and inexpensive alternatives can always be considered as options.

Ongoing compliance monitoring involves several steps:

1. Discovery administrator reconciles hardware inventory.
2. Discovery administrator reconciles software signatures.
3. Compliance engine aggregates and matches discovered software and usage with license records.
4. License administrator reconciles a compliance report:
 - a. Identifies unlicensed software.
 - i. Verifies signatures with discovery administrator.
 - ii. Requests uninstall of unauthorized software.
 - iii. Issues PR for new license.

- b. Identifies non-compliant licenses.
 - i. Requests uninstall of unauthorized software.
 - ii. Requests revocation of rights for unauthorized usage.
 - iii. Issues PR for additional capacity.
- c. Identifies unused software.
 - i. Verifies signatures with discovery administrator.
 - ii. Issues requests (ticket or work order) for desktop or server support to uninstall unused software, possibly replacing it with a viewer.
- d. Reports compliance to vendors or manufacturers where needed.

Compliance reconciliations and charge-back adjustments are facilitated if reports are given to the license administrator when the following events occur:

- 1. Hardware is decommissioned.
 - a. Desktop or server support carry out disposal in accordance with environmental, governmental, organizational, and accounting guidelines
 - b. Hardware asset manager notifies fixed assets of the retirement of the capital item.
 - c. License administrator is notified of the retirement or reassignment of installed software.
- 2. Software is retired.
 - a. Software asset manager notifies fixed assets of the retirement of the capital item.
 - b. Payments for vendor support are discontinued.

Several reports may be useful in these adjustments:

- ▶ Hardware not reporting through discovery in two discovery cycles
- ▶ Hardware assets decommissioned in the last 60 days
- ▶ Software and usage counts linked to non-reporting and decommissioned hardware
- ▶ Unlicensed or non-compliant software
- ▶ Changes in capacity delta month to month

Archived

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 194. Note that some of the documents referenced here may be available in softcopy only.

- ▶ *Implementation Best Practices for IBM Tivoli License Manager*, SG24-7222
- ▶ *Problem Determination for WebSphere for z/OS*, SG24-6880
- ▶ *IBM Tivoli Asset Management for IT Portfolio Overview*, SG24-7376

Other publications

These publications are also relevant as further information sources:

- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Overview*, SC32-1503
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Administration*, SC32-1430
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Planning, Installation, and Configuration*, SC32-1431
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Commands*, SC32-1501
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Data Dictionary*, SC32-1432
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Problem Determination*, SC32-9102
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Catalog Management*, SC32-1434
- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Security Management*, SC32-1502

- ▶ *IBM Tivoli License Compliance Manager Version 2.3: Release Notes*, SC32-1429
- ▶ *IBM Tivoli License Compliance Manager for z/OS OS Administration Guide for Mainframe Components Version 4.2*, SC32-1575

Online resources

These Web sites are also relevant as further information sources:

- ▶ Tivoli software information center - Tivoli Asset Management for IT V7.1
<http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp>
- ▶ Tivoli software information center - IBM Tivoli License Compliance Manager V2.3
<http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=/com.ibm.itlm.doc/welcome.htm>
- ▶ IBM Service Management Software and Services
<http://www.ibm.com/software/tivoli/features/it-serv-mgmt/index.html>
- ▶ IBM IT Service Management documentation
<http://publib.boulder.ibm.com/infocenter/tivihelp/v10r1/index.jsp>

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Index

A

- acquire 40–41
- actionable alternatives 138
- adapter conversion 32
- ad-hoc planning 178
- agreed-upon system 172
- allocate software license 128
- Altiris 46, 89
- Application Designer application 64
- application server 19
- assembly structure 66, 115, 117, 124, 190
 - parent item 66
- assessment 82
- asset data 83–84, 86, 108
- asset link results 148
- asset management 1–3, 5, 13–16, 19–20, 23, 55, 81–86, 133, 175, 179–180
 - configuration management overlaps 23
- asset manager 43, 45, 54, 135, 178–180
- asset reconciliation 133
- asset record 28, 41, 48, 54, 71, 126–127, 182–183, 187–188
- asset repository 14–16, 18
 - common similarities 16
 - financial and contractual data 16
- asset table 46–48
- Asset Transactions table 60
- Assets application 20, 30
- audit controls 86
- authorization for purchase 155
- authorized asset
 - data 35
 - information 24, 36
- autonumbering 69

B

- barriers 87
- BIOS 31, 33, 36
- bundling discovered products 157
- Business Intelligence and Reporting Tools (BIRT) 3

C

- catalog data 86
- CCMDB 25, 126, 158
- Centennial 89
- Central Communications and Telecommunications Agency (CCTA) 6
- Change and Configuration Management Database (CCMD) 18–19, 88
 - Version 7.1 89
- change application 26
- change management 13
- charge-backs 172
- CI 117, 126–128, 144
- classification schemes 73
- classifications 71
- client access license (CAL) 119
- CMDB 13–15, 17
- CMDB initiative 14, 16
- CMDB issue 14
- CMDB product 18
- CMDB project 14
- CMDB update 17
- commodity code 69, 73, 130
 - proprietary hierarchy 74
- company master 43
- comparison rule 37
- compile errors 109
- compliance monitoring 190
- compliance setting 152
- compliance-related rule 168
- Computers application 31
- concurrent user 67, 119, 165, 168, 170
 - capacity units 168
- configuration item 13, 16, 23, 26, 85
 - specific set 17
- configuration items (CIs) 56
- configuration management 13, 135
 - database 13
 - group 127, 129
 - module 29
- Continual Service Improvement (CSI) 6, 9
- conversion application 24, 29, 32
- cron task 36
- customer relationships 11

D

- data management 82
- data quality 83
- data schema 47, 93, 96, 108
- data security 49
- data source 17, 47, 83, 180
 - functional separation 93
 - wide range 86
- data verification 108
- database breach 49
- decision support systems 180
- Definitive Software Library (DSL) 68, 117, 125
- deploy 40–41
- deployed assets data mapping 90
- Deployed Assets Module 24
- deployed assets object 111
- deployment packages 127
- desktop requisition 115, 121, 183, 187, 190
- Desktop Requisition template 118
- desktop requisition templates 68
- DHTML 51
- discovering location 148
- discovery application 29–30
- discovery failures 147
- discovery signatures 127
- discovery tool 24, 29–30, 32, 46–47, 127
 - consistent naming 24
 - individual applications 34
- disposition 50
- duplicates 143

E

- Electronic Software License Certificate 124
- e-mail as shipping note 125
- e-mail service 46
- Enterprise Asset Management (EAM) 1–2, 25
- enterprise asset management, software solution 1
- entitlement record 124, 126
- event management driven 86
- exclusive access 126
- extended outages 87
- external system 21, 122

F

- federated asset data 83
- financial systems 179

G

- GL account 165
- GL result 172
- goto usage 101, 104
- governance 6, 11
- granularity of signatures 155
- groups 55

H

- hardware reconciliation 135
- hierarchy path 75
- high-cost application 16
- high-value assets 85

I

- IBM Tivoli Integration Composer
 - database version 106
 - Version 7.1 88, 106
- individual item 67, 167
- information technology asset management 2
- in-house application 33
- in-house capability 50
- initial data 81, 87
- install, move, add or change (IMAC) 41, 46
- Integration Composer 29, 47–48, 81, 88–89
 - application 88
 - data schemas 108
 - directory Powerupdateclient 92
 - installing 90
- inventory application 23, 29, 44, 46, 54, 67, 163, 165, 173
- inventory schema 94
- Inventory Tracking 137
- IP address 30
- issue units 171
- issuing storeroom 168
- ITAM system 17
- item 55
- item assembly structures 66, 156
- Item Master 56, 154
- item sets 155
- items versus assets 66
- ITIL 6
- ITIL approach 25
- ITIL V2 6
- ITLCM environment 84

J

J2EE 19
Java virtual machine (JVM) 103, 105
JDBC 109
job plan 26, 130, 182
JVM startup 103

K

key performance indicators (KPIs) 44, 51, 134
kits 67

L

license bundles 67
license capacity 121, 163, 166, 170–171, 173
 standard cost 166
License Compliance Manager 31
license pool 164–165
life cycle 6–8, 13, 23, 39–41, 43, 179–180
 finance department 179
 phases 39
linear asset 26, 56
link rule 36, 48
 other possibilities 36
Link Rules application 36
linking assets 135
location 56, 60
logging output 110
long-term planning 178

M

MAC address 31, 36, 145
manage 40–41
management discipline 22, 24, 27
manufacturer conversion 32
matching data 141
Maximo Asset Management 25
Maximo database
 connectivity setting 91
 user 93
Maximo installation 98
Microsoft SMS 46–47, 89
missing assets 148

N

National Institute of Governmental Purchasing
(NIGP) 73–74
natural resource 50

network device 15, 24, 31
network printer 24, 31
NIGP 73
non-receivable item 68, 118–119
non-reporting assets 147
non-rotating items 62

O

O/S user 90
Office of Government Commerce (OGC) 6
Operating Locations 61
operating system conversion 32
operational services 12
ordering 117
org level item type 167
OS version 34
outcomes 8

P

parent-child relationship 16–17
PDF 51
PDF format 125
pdf version 74
person assignments 150
physical medium 124, 126, 130
plan 40–41
planning and refresh 175
PMP application 26
PO record 121
pooling 84–85
pre-written component 129
primary key management 83
PRM-IT 9
process implementation 53
process management platform (PMP) 26
process omissions 148
Process Reference Model for IT 9
processor conversion 32
procurement flow 114
procurement line
 item 116
 item description 34
procurement management 22
procurement records 160
publish 86
purchase order (PO) 15, 41, 43–44, 122, 125, 128,
182, 187
purchase request 122

purchase requisition (PR) 45, 115, 187, 190
Purchase Requisitions application 183
purchase/lease contracts 42

R

Radia 46
receiving 122
receiving application 63, 66
reconciliation 34
reconciliation application 29, 34–35
reconciliation logic 145
reconciliation process 48, 87, 133, 135
reconciliation result 48, 144
reconciliation task 35–36, 48
Redbooks Web site 194
 Contact us xiv
redundancy 142
release management 13
Release Management PMP 26, 29, 117, 131
reorder level 44
reporting 51
request 125
request for change (RFC) 41
request for quotation (RFQ) 42, 115
resilience 11–12
responsibilities 86
retire 40–41
retirement process 181
retrieving mapping
 definition tlma_to_maximo 106
 expression 106
roles 54, 86, 135
rotating item 62, 66, 190
runtime errors 110

S

Secure Software Library 126
serial number 36, 48
service catalog 25
service design 6–7
service desk 24–25, 28–29, 41, 46, 135, 143
service management 23, 179
service management processes 46
service operation 9
service request 121
service request manager 19
service strategy 6–7
service transition 8

short-term planning 178
shrink-wrapped software 116
SLA Manager 25
SNMP 31
software configuration 125
software contract 24, 122
software conversion 32, 152
software inventory 94, 163
software license 27, 40, 44, 50, 67, 69, 83, 121, 126–128, 130, 163, 172
 electronic certificate 128
 software license allocation policy 128
software license data mapping 90
software license key 124
software license view application 31
software package 125–127
software product
 catalog information 34
 name 116
software purchase request 125
software suite setup 33
software usage setup 33
solution development and deployment 11–12
source TLMA 99, 106
spare part 44, 69, 170, 190
specifications 77
storeroom 45, 59–60
surplus equipment 48, 50
System Management Server (SMS) 17

T

TADDM 160
target data sources 97
task filter 35
Task Filters application 35
tax implications 50, 129
terms and conditions 42
third-party discovery tools 157
Tivoli Asset Management 2–3, 18–19, 39, 42–45, 88, 180
Tivoli Integration Adapters 89
Tivoli License Compliance manager (TLCM) 24, 83, 88–89, 94
Tivoli Provisioning Manager 89
Tivoli's process automation engine 18, 71
TLCM 31
TLCM license
 data 24

object 164
top-level asset classifications 72
top-level object 36
tracking API 89
troubleshooting 109

U

unique identifier 36, 143–144
unmatched data 144
UNSPSC Code 73
user 25, 68, 116, 166
 standard item orderable 115

V

VM asset 164

W

WINSP status 124
work management 2, 23, 25, 28
work order 2, 26, 46, 115, 117, 121, 130, 165, 170,
172, 182, 187, 190
 actuals 116
 full accounting 165
 procuring licenses 130
 task 121
work order tracking 3
workflow construction 86
workflow engine 23
workflow feature 22
workflow routine 130
work-order request 121

X

XML 51

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As IT organizations are under pressure to increase their effectiveness, while reducing costs, many are applying traditional processes and tools that have been used for enterprise asset management to their IT assets. The IBM Tivoli Maximo Asset Management product, rebranded after the acquisition of MRO by IBM, is an example of an industry leading tool for managing enterprise assets.

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