System Administrator’s Guide
First Edition (January 2007)

This edition applies to version 6, release 2, modification 1 of IBM Maximo and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Guide

Audience

This guide helps system administrators, network administrators, and database managers set up and configure IBM® Maximo®, including managing the Application Server.

Related Documentation

The Help system is the primary source of procedural topics for using each Maximo application. The User’s and Administrator’s guides expand on the Help, providing conceptual information about subjects not addressed in Help.

You can find more information regarding IBM Maximo in the following documents:

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<tr>
<th>Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Maximo Finance Manager’s Guide</td>
<td>Describes how IBM Maximo completes financial transactions and how to set up general ledger accounts.</td>
</tr>
<tr>
<td>IBM Maximo Installation Guide</td>
<td>Describes how to install and configure the following software:</td>
</tr>
<tr>
<td></td>
<td>▼ Application server</td>
</tr>
<tr>
<td></td>
<td>▼ IBM Maximo</td>
</tr>
<tr>
<td></td>
<td>▼ Actuate®</td>
</tr>
<tr>
<td>IBM Maximo Multisite Administrator’s Guide</td>
<td>Describes how to configure IBM Maximo for a Multisite implementation.</td>
</tr>
<tr>
<td>IBM Maximo Online Help</td>
<td>Provides step-by-step procedures for IBM Maximo applications.</td>
</tr>
<tr>
<td>IBM Maximo Reconciliation Module Implementation Guide</td>
<td>Describes how to use the IBM Maximo Reconciliation module to reconcile the two types of information that IBM Maximo maintains about information technology (IT) assets: IT asset data and deployed asset data.</td>
</tr>
<tr>
<td>IBM Maximo Report Administration and Development Guide</td>
<td>Describes how to use Actuate to design and administer IBM Maximo reports.</td>
</tr>
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</table>
IBM Maximo users with a valid Annual Customer Support Plan (ACSP) can obtain product support online at Support Online:

    support.mro.com.

Support Online includes information about product releases, software patches, and documentation updates. To find the most current version of a document, see the Knowledge Base on this site.
Maximo Overview

IBM Maximo is based on Web architecture and consists of several component servers. You access Maximo applications using the Internet Explorer® browser.

Maximo Components

IBM Maximo consists of multiple software servers. Depending on the size of your implementation you can either install the servers on the same physical machine, or on separate server machines. A Maximo implementation consists of the following servers:

- Maximo Database Server
- Maximo Application Server
- Actuate Report Server

Application Server

IBM Maximo is built using J2EE technology, which requires a commercial application server. Maximo uses the BEA WebLogic® or the IBM WebSphere® application server.

These servers run Maximo applications using JSP™, XML, and Maximo application-specific business components.

Maximo renders the UI via XML, which lets you create common data formats and share the format and data. The XML code contains tags that reference each control in the UI. The attribute values passed to controls in each XML tag determine the controls’ look and behavior.

The XML code is stored in the database, not within files. When accessing an application within Maximo, the application server loads the XML from the database. Then, based on the tags, the application server renders the UI code sent to the client (Internet Explorer). Because the database stores the UI data, any localizable text such as field labels, messages, and dialogs are also stored in the database.

The Maximo application also installs the Active Portal, which lets you use the Web to access reports in your Encyclopedia volume and the Management Console. This Web-based capability lets you deploy and test reports on an Encyclopedia volume. You access reports using the Internet Explorer browser to access the Encyclopedia volume through Active Portal.
Actuate Server

The Actuate Information Delivery Solution lets you create, manage, and deliver reports.

Install the Actuate iServer on a separate server on the network to provide:

- A server-based system to generate, manage, and deliver interactive, actionable electronic reports
- Data in multiple formats including DHTML, PDF, XLS
- Open-security folder integration to leverage existing e-business platform security service

Database Server

IBM Maximo supports:

- IBM DB2® Universal Database 8.2.7
- Oracle® 9.2.0.6 (9i), or 10.1.0.3 (Standard or Enterprise Edition)
- Microsoft® SQL Server 2000, Service Pack 4

System Requirements

Requirements for IBM Maximo depend on your operating system, database platform, and site configuration. See your IBM Maximo Installation Guide for minimum and recommended configurations for the components used in running Maximo, including Actuate.
Typical Maximo Network Configuration

Workstation
- Administrative machine
- Internet Explorer 6.0

Application Servers
- Application Server
  - Maximo applications
  - BEA WebLogic
  - IBM WebSphere
- Actuate Server
  - iServer
  - Actuate Integration

Database Server
- Database: DB2, Oracle, or SQL Server

Maximo Overview
These terms have special meaning in Maximo.

For example, a utility company owns several power plants, three water treatment plants, and two water distribution system.

- **System-Level** refers to the entire company.

- The **Organizations** of a company are grouped into power plants, water treatment, and water distribution facilities.

- Each Organization has several **Sites**, which track inventory separately.

---

### Creating Maximo Settings

You create settings used throughout the Maximo applications, including System, Organization, Site, and Security settings.
System Settings

You configure System-wide settings to create and activate Organizations, and must define at least one item in each of these steps.

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Configuration</td>
<td>Provides options for configuring your Maximo database:</td>
</tr>
<tr>
<td>Sets</td>
<td>Lets you create:</td>
</tr>
<tr>
<td></td>
<td>▼ Item Sets: groups of items that are shared between Organizations to enable things such as inventory sharing.</td>
</tr>
<tr>
<td></td>
<td>In this part of the application, you name and define Sets. You do not add items here.</td>
</tr>
<tr>
<td></td>
<td>▼ Company Sets: groups of vendors that are shared between Organizations.</td>
</tr>
<tr>
<td></td>
<td>In this part of the application, you name and define Sets. You do not add vendor companies here.</td>
</tr>
<tr>
<td>Currency Codes</td>
<td>Lets you define the currencies you and your vendors use. Define codes and descriptions in this part of Maximo, and define exchange rates later, if applicable.</td>
</tr>
<tr>
<td>Organizations</td>
<td>Lets you define Organizations and Sites. Many Organizations and Sites within them can share a single Maximo database. You must have at least one Organization and one Site to use Maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ Autonumber Setup</td>
</tr>
<tr>
<td></td>
<td>This action lets you specify autonumber seeds and prefixes for record IDs that are unique at the System level.</td>
</tr>
</tbody>
</table>

Organization Settings

These applications let you configure Organization-wide settings and create Sites. Several of the following Organization options have defaults; verify that they correspond to your business rules.

<table>
<thead>
<tr>
<th>Application</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chart of Accounts</td>
<td>Defining General Ledger Accounts and configuring rules surrounding General Ledger Account code validation</td>
</tr>
<tr>
<td>Exchange Rates</td>
<td>Configuring and administering exchange rates for currencies you and your vendors use</td>
</tr>
</tbody>
</table>
**Creating Maximo Settings**

<table>
<thead>
<tr>
<th>Application</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendars</td>
<td>Defining calendars, holidays, shifts, and work periods for your company. This data is used for scheduling in other areas within Maximo.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tab in the Organizations application</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addresses</td>
<td>Configuring addresses for your company</td>
</tr>
<tr>
<td>Site Setup</td>
<td>Creating Sites. You must have at least one Site to use Maximo. You can set additional administrative options for each Site in a different part of the application.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action in the Organizations application</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Order Options</td>
<td>Configuring the options that your Organization uses for work orders (examples: prompts for failure and downtime, rules for editing)</td>
</tr>
<tr>
<td>Inventory Options</td>
<td>Configuring the options that your Organization uses for Inventory (examples: breakpoints, negative balances, reorder rules)</td>
</tr>
<tr>
<td>Drilldown Options</td>
<td>Configuring the appearance of drill-down menus</td>
</tr>
<tr>
<td>Safety Plan Options</td>
<td>Specifying that Maximo displays the hazards of a work asset in the Select Hazards dialog box</td>
</tr>
<tr>
<td>PO Options</td>
<td>Configuring purchase order options for your Organization (example: how purchase requisitions are converted to purchase orders)</td>
</tr>
<tr>
<td>Contract Options</td>
<td>Associating terms and conditions with contract types</td>
</tr>
<tr>
<td>Tax Options</td>
<td>Configuring tax options for your Organization, including how multiple taxes are calculated</td>
</tr>
<tr>
<td>PO Labor Options</td>
<td>Configuring options for the rules of your organization for outside labor costs including reporting of actuals and requirements for Purchase Orders</td>
</tr>
<tr>
<td>Labor Options</td>
<td>Configuring options for the rules of your organization for labor costs including reporting of actuals and requirements for purchase orders</td>
</tr>
<tr>
<td>Workflow Options</td>
<td>Configuring options for your Organization’s rules for Workflow processes including reporting of automated generation of work orders and purchase orders</td>
</tr>
<tr>
<td>Autonumber Setup</td>
<td>Configuring auto-numbering for items that are numbered at the Organization level, such as assets, to facilitate moves from one Site to another. For example, you can configure starting numbers and prefixes.</td>
</tr>
</tbody>
</table>
Site Settings

You can configure Site-level settings for Maximo. Most options have defaults; verify that they correspond to your business rules. You control many additional options from individual applications.

<table>
<thead>
<tr>
<th>Action in the Organizations application</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Order Options</td>
<td>Configuring the Site-level settings for work orders (example: numbering for tasks).</td>
</tr>
<tr>
<td>Inventory Options</td>
<td>Configuring the Site-level settings for inventory (example: how costs are calculated at issue).</td>
</tr>
<tr>
<td>PM Options</td>
<td>Configuring how your Sites schedule Planned Maintenance (example: scheduling by priority or frequency, or how far in advance to generate work orders).</td>
</tr>
<tr>
<td>SLA Options</td>
<td>Setting SLA options.</td>
</tr>
<tr>
<td>E-Commerce Setup</td>
<td>If you are implementing the IBM Maximo e-commerce Adapter, configure vendor information for your Sites and the vendors they do business with through e-commerce.</td>
</tr>
<tr>
<td>Autonumber Setup</td>
<td>Configuring auto-numbering for items that are numbered at the Site level, such as work orders. For example, you can configure starting numbers and prefixes. By default, Sites inherit auto-numbering from the parent Organization. You can change the default.</td>
</tr>
</tbody>
</table>

NOTE The majority of Maximo functions at the Site level, so you control most Site-specific configuration within individual Maximo applications, for example, work orders and purchasing.

Security

This topic contains the definitions of the User community for Maximo and their levels of access. For more information about Groups and Users settings, see Chapter 2, "Maximo Security," on page 2-1.

Groups A group defines levels of access to Maximo applications and data.

Users A user record defines how Maximo looks and behaves for this user. The record must have an associated person record; you can maintain both from the Users application.

A user must be a member of at least one group to access Maximo applications. Users need not be given access to any Sites in their groups to access data in System-level applications.
Applications store data at different levels in a multisite implementation. The following table lists which applications and functions are defined at each Multisite level:

<table>
<thead>
<tr>
<th>Multisite Level</th>
<th>Applications or functions</th>
</tr>
</thead>
</table>
| **System** or database — A System is a single instance of a Maximo database. A single System can contain one or more Sets, Organizations, and Sites. | ▼ Attached Document Library  
▼ Bulletin Board  
▼ Classifications  
▼ Communication Templates  
▼ Computers  
▼ Cron Task Setup  
▼ Currency Codes  
▼ Deployed Assets  
▼ Escalations  
▼ Incidents  
▼ Job Plans  
▼ KPIs  
▼ Master PM  
▼ Meters  
▼ Meter Groups  
▼ Network Devices  
▼ Network Printers  
▼ People  
▼ Person Groups  
▼ Problems  
▼ Reconciliation  
▼ Reports  
▼ Security Groups  
▼ Service Level Agreements  
▼ Service Requests  
▼ Solutions  
▼ Ticket Templates  
▼ Units of Measurement  
▼ Users  
▼ Workflow |
| **Set** — Sets exist below the System level, but above the Organization level, to allow multiple Organizations to share company and item data. Each Organization can have only one Company Set and one Item Set, but each Set can be shared by more than one Organization. | ▼ Condition Codes  
▼ Commodity Codes  
▼ Company Masters  
▼ Conversion values (Order Units/Issue Units)  
▼ Item Master  
▼ Service Groups  
▼ Service Items  
▼ Tools |
### Understanding Maximo Applications and Multisite

<table>
<thead>
<tr>
<th>Multisite Level</th>
<th>Applications or functions</th>
</tr>
</thead>
</table>
| **Organization** — An Organization identifies a unique legal entity. A large corporation might have different Organizations for different companies, or group all the facilities that exist in a continent or country into an Organization. There can be many Organizations within a single Maximo database. | ▼ Calendars  
▼ Chart of Accounts (GL Account codes)  
▼ Companies  
▼ Crafts  
▼ Exchange Rates  
▼ Failure Codes  
▼ Hazards  
▼ Labor  
▼ Labor Rate Contracts  
▼ Labor Reporting  
▼ Lease/Rental Contracts  
▼ Master Contracts  
▼ Purchase Contracts  
▼ Qualifications  
▼ Tax codes  
▼ Terms and Conditions  
▼ Warranty Contracts |
| **Site** — A Site identifies a work location, such as a plant or facility. | ▼ Activities  
▼ Assets  
▼ Assignment Manager  
▼ Changes  
▼ Condition Monitoring  
▼ Desktop Requisitions  
▼ Inventory  
▼ Invoices  
▼ Issues and Transfers  
▼ Labor Reporting  
▼ Locations  
▼ Lock Out/Tag Out  
▼ Precautions  
▼ Preventive Maintenance  
▼ Purchase Orders  
▼ Purchase Requisitions  
▼ Quick Reporting  
▼ Receiving  
▼ Releases  
▼ Request for Quotation  
▼ Routes  
▼ Safety Plans  
▼ Stocked Tools  
▼ Storerooms  
▼ Work Order Tracking |
This chapter discusses the Maximo security features and services.

- Adding and Managing Users
- Security Groups
- User Security Profiles

Before implementing the security infrastructure for your organization in Maximo, create a strategy for building security profiles.

Adding and Managing Users

The Maximo Security module lets you manage users, access rights, passwords, and display a hierarchical view of the users’ security profiles. The profile, sorted by Site, provides a list of authorizations and settings users have after all their security groups are combined.

A newly installed Maximo database contains the following default user IDs, which are members of the specified security group:

<table>
<thead>
<tr>
<th>User ID</th>
<th>User Name</th>
<th>Description</th>
<th>Security Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXADMIN</td>
<td>maxadmin</td>
<td>▼ Limited access to the database</td>
<td>MAXADMIN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▼ System access to create users and groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>▼ After creating users and groups, this user can add Sets, currencies,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organizations, and General Ledger accounts</td>
<td></td>
</tr>
<tr>
<td>MAXREG</td>
<td>maxreg</td>
<td>User ID to create self-registered users</td>
<td>MAXREG</td>
</tr>
<tr>
<td>MXINTADM</td>
<td>mxintadm</td>
<td>User ID used by integration objects</td>
<td>MAXADMIN</td>
</tr>
</tbody>
</table>

The default password for each user ID is the same as the User ID (for example, maxadmin is both the User ID and default password).

**NOTE** User names and passwords are case sensitive. The default user names and passwords are lowercase.
Changing the Default User Passwords

As a best practice, change the passwords for the default user IDs.

To change the default passwords, complete the following steps:

1. Open the Users application.

2. From the List tab, select the user whose password you want to change.

3. From the Select Action menu, select **Change Passwords**. The Change Passwords dialog box appears.

4. Enter the new password in the **New Password** field.

5. Re-enter the password in the **Confirm New Password** field.

6. Click **OK**.

When you change the password of either the maxadmin or maxreg user, you also change the password associated with that user in the maximo.properties file.

1. Navigate to MAXIMO\applications\maximo\properties.

2. Open the maximo.properties file using a text editor.

3. Search for the appropriate property and modify it as needed:
   - mxe.db.user for the database log in name
   - mxe.system.reguser for self-registering new users

4. Save your changes.

**NOTE** Any time you modify the maximo.properties file, build and deploy a new maximo.ear file.
Changing Default User IDs

You can change the default user names for the default user IDs by editing the maximo.properties file.

To modify the user ID in the maximo.properties file, complete the following steps:

1. Navigate to MAXIMO\applications\maximo\properties.
2. Open the maximo.properties file using a text editor.
3. Search for the appropriate property and modify it as needed:
   ▼ mxe.db.password for the database login password
   ▼ mxe.system.regpassword for the self-registering new users
4. Save your changes.

**NOTE** Any time you modify the maximo.properties file, build and deploy a new maximo.ear file.

Administrative Users

In Maximo, the difference between administrators and users is flexible. You can grant any Maximo user access to any system or application function; there are no restrictions. For simplicity, these definitions are used:

<table>
<thead>
<tr>
<th>User Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative user</td>
<td>▼ Full or restricted access to the Security Groups and Users application</td>
</tr>
<tr>
<td></td>
<td>▼ Responsible for implementing and maintaining security services (adding users, building profiles) or general Site administration</td>
</tr>
<tr>
<td>Regular user</td>
<td>Logs into the system to use Maximo.</td>
</tr>
</tbody>
</table>

System Users

System user IDs such as MAXADMIN and MAXREG are required for Maximo to run properly; you cannot delete them. MAXADMIN and MAXREG are included in the sample Maximo database provided.

To create a system user, check the **System Account?** box in the User tab of the Users application.

To delete a system user, clear the checkbox, click **Save**, and delete the user.
Regardless of the size of your organization, some administrative users require access to specific administrative applications:

- Application Designer
- Calendars
- Chart of Accounts
- Classifications
- Cron Task Setup
- Currency Codes
- Database Configuration
- Domains
- Exchange Rates
- Integration
- Organizations
- Security Groups
- Sets
- Users
- Workflow Designer

**NOTE** Some sites might assign administrative functions to regular users such as supervisors or line managers, for example in IT asset management and service desk operations. They are not considered administrative users of Maximo.

### Using the Default Insert Site

You assign each new user a default insert Site for inserting records. The security architecture lets users log in once and view records they have access to, spanning Sites and Organizations.

**NOTE** Users can change their default insert Site to a different Site that they have access to, using the Profile link in the Maximo navigation bar.

Suppose you are managing a group of users with these security settings:

- Access to the Assets application
- Access to multiple Sites
- Bedford is the default insert Site
- Query Uses Default Insert Site setting is enabled

When they log into the Assets application, they only see asset records from the Bedford Site. If Query Uses Default Insert Site is disabled, they see asset records for all Sites they have been granted access to in their profiles.

**NOTE** Query Uses Default Insert Site is a filter that shows users only records from their default insert Site. To let users view records for all Sites they have access to, clear this setting or clear the filter.
People and Labor

People and Labor are also personal records. You create a person record using the People application, or it is sometimes automatically generated.

A person record:

» Must exist for every individual before you can create other records. When you create a user or labor record, you choose a person record to associate with it.

» Contains personal, employee, and workplace information about an individual, including:

- Name, employee status, and address
- Job title, code, department, supervisor, and E-mail address
- Person’s work Site, location, time zone, ship and bill to address, and language
- Workflow, work order, significant dates, and procurement card information

**NOTE**  When users share the same Maximo database in different time zones, include the user’s time zone to ensure the correct date/time stamp appears on modified records.

The records required depend on the user’s function.

<table>
<thead>
<tr>
<th>User’s Function</th>
<th>Types of Records Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractor to whom you assign work</td>
<td>▼ Person</td>
</tr>
<tr>
<td></td>
<td>▼ Labor</td>
</tr>
<tr>
<td>Manager who approves purchase orders, but to whom you do not assign work</td>
<td>▼ Person</td>
</tr>
</tbody>
</table>

Managing Users

Maximo adds new users to a default security group, DEFLTREG, which you can configure with limited authorizations and privileges.

The User Name:

» Defaults to the User ID you entered when creating users.
» Is the user’s login name for Maximo.
» Is case-sensitive.

The User ID must be unique for all User records in Maximo. To remember it easily, you can change the User Name to an employee number or e-mail address.

You specify users’ default insert Sites and storerooms.
When adding or updating users, you assign them to one or more security groups. The combination of groups determines users’ profiles (set of authorizations and privileges across Sites and Organizations).

The Security Profile tab shows the user’s profile after Maximo combines all the user’s security groups. Sorted by Site, the profile is an expandable tree structure of the user’s virtual profile:

Maximo updates these tables when you create a user.

<table>
<thead>
<tr>
<th>Database Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXUSER</td>
<td>Updates new user data.</td>
</tr>
<tr>
<td>PERSON</td>
<td>Updates new person data (if Maximo creates a person record for the new user).</td>
</tr>
<tr>
<td>PHONE</td>
<td>Stores all user phone information including home, work, cell, pager, and so on, and indicates which number to call first (primary).</td>
</tr>
<tr>
<td>EMAIL</td>
<td>Stores all user E-mail addresses including home, work, and alternates and indicates which address to send an e-mail message first (primary).</td>
</tr>
<tr>
<td>GROUPUSER</td>
<td>Updates relationships between security groups and users.</td>
</tr>
<tr>
<td>USERPURGL</td>
<td>(Optional) Stores the default purchasing General Ledger account for new users.</td>
</tr>
</tbody>
</table>
Adding and Managing Users

**Users Menu**

Use this menu to change these user actions:

- **Workflow**
- **Change Status**
- **View History**
- **Database Access (you can hide this option)**
- **Change Password**
- **Set Password Hint**
- **Set Security Profile**
- **Authorize Group Reassignment**
- **Security Controls**
- **Change Person**
- **Duplicate User**
- **Delete User**

**Workflow**

In the Security Groups application, you can configure the Users application to use Workflow to process self-registered Maximo users. If you enable Workflow, these options are available:

- **Start/Continue Workflow**
- **Stop Workflow**
- **View Workflow History**
- **View Workflow Map**

For more information about Workflow, refer to the *IBM Maximo Workflow Implementation Guide*. 

<table>
<thead>
<tr>
<th>Database Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRPREASSIGNAUTH</td>
<td>(Optional) Stores the name of the user as a person with authority to add and remove new users to a security group.</td>
</tr>
<tr>
<td>MAXUSERSTATUS</td>
<td>Shows the user's current status such as Active or Blocked, and stores history of user status modifications.</td>
</tr>
<tr>
<td>PASSWORDHISTORY</td>
<td>Stores the user's current password, and stores history of password modifications. Information in the Password column is encrypted, but other columns such as USERID and DATE are not (if you enabled Password Duration).</td>
</tr>
</tbody>
</table>
Adding and Managing Users

Change Status

Use this action to change the status of one or more users.

For example, select a group of users from the List tab and update their status simultaneously.

<table>
<thead>
<tr>
<th>User Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>Active users of Maximo.</td>
</tr>
<tr>
<td>Inactive</td>
<td>Inactive user record. Administrators can change the status to Inactive.</td>
</tr>
<tr>
<td>Blocked</td>
<td>Only Maximo can block user records, for example, when users enter too many incorrect passwords during login.</td>
</tr>
<tr>
<td>Deleted</td>
<td>Maximo deletes user records, but retains basic information.</td>
</tr>
<tr>
<td></td>
<td>Deleted users do not appear in the Maximo UI.</td>
</tr>
<tr>
<td>Newly Self-Registered (NEWREG)</td>
<td>The MAXVAR variable sets this status. When set, new self-registered users are routed into a Workflow process for approval. This status cannot be manually selected.</td>
</tr>
</tbody>
</table>

If you change a user’s status to inactive during their current work session, this change goes into effect immediately. Their status is inactive with the next action they try to perform.

For example, if you change user Joe Smith’s status to inactive while he is logged in, the next time he attempts to save changes or access another application, he is logged out. If he attempts to log in again, a message tells him his user ID is inactive.

There is a dynamic relationship between Person, User, and Labor status:

- Setting a Person’s status to inactive sets that person’s User and Labor status (if not already inactive) to inactive.
- Setting a Person’s status to active does not affect the status of the person’s Labor or User records.
- Inactive Person records cannot be assigned to active User records.

View History

This action displays a date and time stamp whenever administrative users change the user’s status.

- For example, an administrative user changes a user’s status to inactive. The administrator's name appears in the Changed By field.
- The Change Status action lets administrative users change the status for a selected group of users using the Maximo search capabilities.
Database Access

This action lets you create, update, or delete a native database user ID; this action is the only place in Maximo where you can do so. Users who work with reporting tools or require access to database tables require a database user ID. Maximo can also use database user IDs that a database administrator creates using SQL or native database tools.

**NOTE**

You cannot use Maximo to create an operating system ID for databases that require one on the database server.

When creating or updating a database user ID, you must explicitly grant users access to the Maximo tables. You grant this access by clicking the Object Name search icon and selecting a table object. You also specify the level of access (Read, Insert, Update, or Delete).

To delete database user IDs, click **Drop Database User**.

**NOTE**

Before you can create database users with the Database Access action, you run a script to enable the Database Access action. This script lets Maximo give database access to Maximo users in the Security Groups application. You run the script when you first install Maximo (before you create the Maximo instance).

To enable the Database Access action:

1. Open the createMAXIMOES.sql script in `<c:\maximo\tools\maximo\EN` in a text editor.

2. Uncomment these lines (these lines are standard grants Maximo requires to create users):

   - `grant create user to MAXIMO;`
   - `grant drop user to MAXIMO;`
   - `grant create session to MAXIMO with ADMIN OPTION;`
   - `grant alter user to MAXIMO;`

   **NOTE** In the grants above, MAXIMO represents the user defined in maximo.properties as mxe.db.user.

3. Open a SQL editor and run the lines in step 2 so Maximo can create database users.

   During installation, the createMAXIMOES.sql script provides these standard grants:

   - `create user maximo identified by maximo;`
   - `alter user maximo default tablespace maximo quota unlimited on maximo;`
   - `alter user maximo temporary tablespace temp;`
   - `grant create trigger to maximo;`
   - `grant create session to maximo;`
Adding and Managing Users

- grant create sequence to maximo;
- grant create synonym to maximo;
- grant create table to maximo;
- grant create view to maximo;
- grant create procedure to maximo;
- grant alter session to maximo;
- grant execute on ctxsys.ctx_ddl to maximo;

Change Password

This action:

- Lets administrative users limit passwords for regular user IDs and for database user IDs.

By default, when you create users or when a person self-registers, Maximo sets the FORCEEXPIRATION flag in the MAXUSER table to 1 (Yes). This setting forces users to change their passwords after they log in the first time.

To avoid forcing users to change their passwords after initial login, disable the forced expiration feature. You disable this feature by clearing the **Password Should Expire After First Log On** box in the Change Passwords dialog box (default = checked).

- Lets you synchronize passwords for regular user IDs and database user IDs by checking the **Synchronize Passwords** box (default = clear).

If you lack a database administrator, but an administrator occasionally must access the Maximo tables and columns to create reports, you want to synchronize passwords.

The format of a synchronized database password is limited by what the database supports, but does not have to adhere to the Maximo password criteria. For example, you cannot create a database password with special characters (Maximo supports this feature, but Oracle and SQL Server do not).

Set Password Hint

This action lets administrators force users to specify a password hint question (default = Maiden name of mother).

Users who forget passwords and call administration for help must provide correct answers to verify their identity. Then the administrator can reset the password.

You can specify additional password hint questions by adding new values to the PWHINTQUESTION domain ID in the Configuration > Domains application.
Adding and Managing Users

Set Security Profile

This action lets you update some profile settings for a group of users returned in a result set using the search criteria on the List tab. You can, for example, add or delete security groups for a set of users simultaneously.

The **User Count** field displays the number of users in your result set. The Group Action box displays these options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add</td>
<td>Adds all groups selected in the dialog box to the result set of users.</td>
</tr>
<tr>
<td>Remove</td>
<td>Deletes all groups selected in the dialog box from the result set of users.</td>
</tr>
<tr>
<td>Replace</td>
<td>Replaces all security groups for users in the result set with the groups selected in the dialog box.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Checkbox</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit (select for Default Insert Site, Storeroom Site, and Default Storeroom)</td>
<td>Lets you update the default insert Site and storeroom values for the same set of users.</td>
</tr>
<tr>
<td>Use Default Insert Site as a Display Filter?</td>
<td>Lets you filter the records displayed to users, who can only view records from the default Site. If cleared, Maximo displays records in all Sites and Organizations the user has access to.</td>
</tr>
</tbody>
</table>

The confirmation message displays only the number of records updated.

For example, if you added the BEDFORDSITE security group to a result set of 20 users and 3 of those users already belong to the group, the following message would appear:

BEDFORDSITE group added to 17 of 20 users.

Authorize Group Reassignment

This action lets you give a user the authority to assign or remove users to one or more security groups. You specify the groups in the Authorize Group Reassignment dialog box.

For example, administrative users with access to the Security Groups application can create a security group. The administrative users must first be given Authorize Group Reassignment authority before adding users to the security group.
Adding and Managing Users

Security Controls

This action lets you specify these System-wide security defaults:

▼ Default security group assigned to new users (Default =DEFLTREG)

You can enter any security group in the Default Group for New Users field to be the default registration group for new users.

▼ Default user status for self-registered users (Default =NEWREG)

The security status you assign to self-registered users determines whether Maximo enables a Workflow process for new, self-registered users.

In the New User Defaults section of the Security Controls dialog box, you can specify a self-registration user status:

<table>
<thead>
<tr>
<th>Status</th>
<th>User can log in</th>
<th>Workflow is enabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWREG</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>ACTIVE</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>INACTIVE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You can assign the ACTIVE status as the default for user self-registration, for example, to let self-registered users immediately use Maximo.

You cannot assign the NEWREG status to new users that you create through the Users application. NEWREG is reserved for users that are created through self-registration.

Users placed in the new user default group acquire the application access and permissions configured for that group.

**NOTE** Administrative users can create new users, but are not authorized to delete DEFLTREG from a user's security profile.

You cannot delete this group because it is the default group for self-registered users (as defined by NEWUSERGROUP in the Maximo variable table, MAXVARS).

To have delete permission for users within a group, open your user record and add the group to your Authorize Group Reassignment list.

▼ Enable or disable login tracking

You can enable login tracking and specify the number of login attempts before Maximo blocks users from logging in. Users with blocked IDs must contact a system administrator to reset the status to Active.

The Maximo login tracking capabilities are:

- Track historical data on who has attempted to login to Maximo.
- Trace issues or problems back to a logged-in user.
- Provide statistical analysis of user login history.
### Password requirements

You can configure password settings in the Security Controls dialog box. Defaults are based on values in the MAXVARS table.

<table>
<thead>
<tr>
<th>Password Setting</th>
<th>Description</th>
<th>Value in the MAXVARS table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password Lasts this Number of Days</td>
<td>Specifies the number of days a password is in effect before it must be modified.</td>
<td>PASSWORDDURATION</td>
</tr>
<tr>
<td>Days Before Password Expires to Warn User</td>
<td>Specifies when to notify users that a password is about to expire. The value in days is subtracted from the PASSWORDDURATION setting.</td>
<td>PASSWORDWARNING</td>
</tr>
<tr>
<td>Days Before Previously Used Password Can Be Used Again</td>
<td>Specifies the number of days that must pass before users can reuse a changed or expired password.</td>
<td>PASSWORDTHRESHOLD</td>
</tr>
<tr>
<td>Minimum Password Length</td>
<td>Specifies the minimum length of a password (1–35 characters).</td>
<td>PASSWORDMINLENGTH</td>
</tr>
<tr>
<td>Numeric Character Required?</td>
<td>Specifies whether a password must contain at least one numeric character.</td>
<td>PASSWORDNUM</td>
</tr>
<tr>
<td>Special Character Required?</td>
<td>Specifies whether a password must contain at least one special character.</td>
<td>PASSWORDCHAR</td>
</tr>
</tbody>
</table>

▼ Valid values:
- ampersand &
- angle brackets < >
- asterisk *
- at sign @
- backslash \
- braces {}
- brackets []
- caret ^
- colon :
- dollar sign $
- exclamation point !
- greater than sign >
- less than sign <
- number sign #
- parenthesis ()
- percent %
- pipe |
- plus sign +
- question mark ?
- semicolon ;
- slash mark /
- underscore _
A message appears under these conditions:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>If users enter incorrect user IDs or passwords</td>
<td>User ID and password are not valid. Please try again.</td>
</tr>
<tr>
<td>If both these conditions are true:</td>
<td>You User ID has been blocked from the system. Please contact your System Administrator.</td>
</tr>
<tr>
<td>▼ Login tracking is enabled</td>
<td>You User ID is not currently active. Please contact your System Administrator.</td>
</tr>
<tr>
<td>▼ The threshold for login attempts is exceeded</td>
<td>You User ID is not currently active. Please contact your System Administrator.</td>
</tr>
<tr>
<td>If inactive users attempt to log in</td>
<td>You User ID is not currently active. Please contact your System Administrator.</td>
</tr>
</tbody>
</table>

**Change Person**

This action lets you select a different person record to associate with a selected user record. You cannot assign a person to multiple users.

**Duplicate User**

This action lets you rapidly create multiple user records by duplicating some data from an existing user record.

You can enter an existing Person ID as the new user ID. If you enter a new user ID, you can create a Person ID or associate the user ID with an existing Person ID.

When you duplicate a record, Maximo populates these visible and hidden fields. This table indicates where the field data defaults from.

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Table.Column Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>User</td>
<td>MAXUSER.USERID</td>
<td>Enter a unique value for the new user.</td>
</tr>
<tr>
<td>Password</td>
<td>MAXUSER.PASSWORDINPUT</td>
<td>Enter a password for the new user ID.</td>
</tr>
<tr>
<td>Type</td>
<td>MAXUSER.TYPE</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>User Name</td>
<td>MAXUSER.LOGINID</td>
<td>Defaults to user value. Use this name to log into Maximo.</td>
</tr>
<tr>
<td>Confirm Password</td>
<td>MAXUSER.PASSWORDCHECK</td>
<td>Verify user password by reentering a second time.</td>
</tr>
<tr>
<td>Status (User)</td>
<td>MAXUSER.STATUS</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>Person</td>
<td>MAXUSER.PERSONID</td>
<td>Does not default. Select an existing person or create one.</td>
</tr>
<tr>
<td>Status (Person)</td>
<td>PERSON.STATUS</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>First Name</td>
<td>PERSON.FIRSTNAME</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Last Name</td>
<td>PERSON.LASTNAME</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Supervisor</td>
<td>PERSON.SUPERVISOR</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Workflow Delegate</td>
<td>PERSON.DELEGATE</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Field Name</td>
<td>Table.Column Name</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Primary E-mail</td>
<td>EMAIL.EMAILADDRESS</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Display Name</td>
<td>PERSON.DISPLAYNAME</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Primary Phone</td>
<td>PHONE.PHONENUM</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Phone Number Type</td>
<td>PHONE.TYPE</td>
<td>Defaults based on Person record. The user’s primary phone type (for example, work).</td>
</tr>
<tr>
<td>Address</td>
<td>PERSON.STREET</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>City</td>
<td>PERSON.CITY</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>State/Province</td>
<td>PERSON.STATEPROVINCE</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Zip/Postal Code</td>
<td>PERSON.POSTALCODE</td>
<td>Defaults based on Person record.</td>
</tr>
<tr>
<td>Memo</td>
<td>MAXUSER.MEMO</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>Default Insert Site</td>
<td>MAXUSER.DEFSITE</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>Storeroom Site</td>
<td>MAXUSER.STOREROOMSITE</td>
<td>Defaults from duplicated user. (Storeroom location)</td>
</tr>
<tr>
<td>Default Storeroom</td>
<td>MAXUSER.DEFSTOREROOM</td>
<td>Defaults from duplicated user. (default storeroom)</td>
</tr>
<tr>
<td>Language</td>
<td>PERSON.LANGUAGE</td>
<td>Defaults from new person.</td>
</tr>
<tr>
<td>Locale</td>
<td>PERSON.LOCALE</td>
<td>Defaults from new person.</td>
</tr>
<tr>
<td>Time Zone</td>
<td>PERSON.TIMEZONE</td>
<td>Defaults from new person.</td>
</tr>
<tr>
<td>Uses Default Insert Site as a Display Filter?</td>
<td>MAXUSER.QUERYWITHSITE</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>System Account?</td>
<td>MAXUSER.SYSUSER</td>
<td>Defaults from duplicated user. Identifies whether this user is a system user that cannot be deleted.</td>
</tr>
<tr>
<td>Password Expiration Date</td>
<td>MAXUSER.PWEXPIRATION</td>
<td>Defaults from duplicated user.</td>
</tr>
<tr>
<td>Non-displayed Fields</td>
<td>MAXUSER.FORCEEEXPIRATION</td>
<td>Default = Y.</td>
</tr>
<tr>
<td></td>
<td>PERSON.WFMAILELECTION</td>
<td>Default = Never.</td>
</tr>
<tr>
<td></td>
<td>PERSON.TRANSEMAILECTION</td>
<td>Default = Always.</td>
</tr>
<tr>
<td></td>
<td>PERSON.ACCEPTINGWFEMAIL</td>
<td>Default = Y.</td>
</tr>
</tbody>
</table>
Delete User

This action lets you delete Maximo users from the system, including the users’ Login IDs. Maximo deletes all user records associated with user IDs, except the one in the MAXUSER table, whose status changes to Deleted.

NOTE
To prevent a user from logging in, you can change the user’s status from Active to Inactive using the Change Status action.

If the user you are deleting also has a database user ID, you can delete it at the same time.

You cannot delete a user ID if:

- The user’s Person ID is named directly on an assignment for an active Workflow process.
- The user ID is the "run as user ID" for an active cron task instance.
- The user has a system account and is responsible for running Maximo.

Maximo deletes the user record and that person can no longer log in. You cannot reuse the user ID, which Maximo retains in a history list.

User Self-Registration

New users can self-register from the Welcome to Maximo login page by clicking the register now link. They register quickly with minimal information.

This sequence describes the self-registration process.

1. Maximo assigns self-registered users to a default security group (DEFLTREG). The registration requests of self-registered users are routed to an administrator via a Workflow process (if enabled) for approval.

2. The administrator assigns approved self-registered users to appropriate security groups and notifies users that they can use Maximo. Rejected users are instructed to contact their supervisor for assistance.

NOTE
Administrative users can designate and configure any security group to replace the default group in the Security Groups or Users application. You make this change by updating the Default Group for New Users field in the Security Controls dialog box.

You can, for example, configure the access rights and privileges of the default group for self-registered users to reflect the business rules of your company.

3. Approved users are instructed to complete the registration process by entering more information in the My Profile menu bar item.
4 Users create a self-registration request, providing this information:

<table>
<thead>
<tr>
<th>Required</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name</td>
<td>Supervisor</td>
</tr>
<tr>
<td>Last Name</td>
<td>Default Insert Site</td>
</tr>
<tr>
<td>User ID</td>
<td>Default Storeroom</td>
</tr>
<tr>
<td>Password</td>
<td>Primary Phone</td>
</tr>
<tr>
<td>Confirm Password</td>
<td>Language</td>
</tr>
<tr>
<td>Primary E-mail</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>Time Zone</td>
</tr>
</tbody>
</table>

5 Maximo creates Person and User records for users, and defaults additional registration information which is hidden from users.

<table>
<thead>
<tr>
<th>Hidden Field</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Status</td>
<td>Based on the REGSTATUS setting in the MAXVARS table</td>
</tr>
<tr>
<td>Person ID</td>
<td>User ID</td>
</tr>
<tr>
<td>User Name</td>
<td>User ID</td>
</tr>
<tr>
<td>Force Password Expiration</td>
<td>Y for users created through the Users application or via self-registration, and when an administrator manually modifies a user's password</td>
</tr>
<tr>
<td>Query with Site</td>
<td>Y</td>
</tr>
<tr>
<td>Person Status</td>
<td>Active</td>
</tr>
<tr>
<td>Transaction Notifications</td>
<td>Never</td>
</tr>
<tr>
<td>Workflow Notifications</td>
<td>Process</td>
</tr>
<tr>
<td>Accepting Workflow E-mail</td>
<td>Y</td>
</tr>
</tbody>
</table>
Security Groups

Security groups let administrative users manage user authorizations and access rights to Sites, applications, storerooms, labor, General Ledger components, and other aspects of your organization.

Users added to security groups acquire the configured attributes of that group. For example:

<table>
<thead>
<tr>
<th>Implementation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>Create one security group that provides the rights and privileges needed for each type of user in your organization.</td>
</tr>
<tr>
<td>Complex</td>
<td>Design a strategy for creating security groups and assigning users that reflect the security requirements and business rules of your organization and is easy to maintain.</td>
</tr>
<tr>
<td>Multinational, global enterprise</td>
<td>Create an implementation team and a strategic plan for building security profiles that meet the needs of users in multiple organizations worldwide.</td>
</tr>
</tbody>
</table>

You assign users to one or more groups, which can have differing levels of access. Depending on the combination of security groups, users can view all the data within a company independent of their Site and Organization. You can combine security groups to create a virtual profile for each user that is meets the security requirements of almost any organization.

A Maximo database contains these default security groups:

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXADMIN</td>
<td>Members (including default users MAXADMIN and MXINTADM) have enough access to Maximo to create users and groups.</td>
</tr>
<tr>
<td>MAXREG</td>
<td>Contains one default user called MAXREG that is used for self-registration of new users.</td>
</tr>
<tr>
<td></td>
<td>Provides self-registered users enough access to complete a self-registration form.</td>
</tr>
<tr>
<td>DEFLTREG</td>
<td>Default group for new users.</td>
</tr>
</tbody>
</table>

**NOTE**

A system administrator can configure a different default security group for self-registered users, or can increase the privileges of the default group.

By default, the DEFLTREG security group has limited access to Maximo.
Administrators must expressly grant access rights to applications through security groups. For Maximo to function properly, each new security group includes access to the following applications:

- READ and SAVE access to the Change Password application
- READ access to the Start Center application

New users must have these grants in at least one of their assigned security groups to log into Maximo and to change passwords.

If these grants are not required, the administrator can remove them from security groups. For example, the administrator can keep grants in groups controlling application access, but remove them from groups controlling Site, labor, and other access.

**NOTE** Modifications in security group permissions take effect the next time the user logs in.

When you create a security group, Maximo creates a record in MAXGROUP.

Database tables store the group settings:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Database Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Access</td>
<td>SITEAUTH and MAXGROUP</td>
</tr>
<tr>
<td>Application Authorizations</td>
<td>APPLICATIONAUTH</td>
</tr>
<tr>
<td>Purchasing Limits</td>
<td>MAXGROUP</td>
</tr>
<tr>
<td>Invoice Tolerances</td>
<td>MAXGROUP</td>
</tr>
<tr>
<td>Start Centers</td>
<td>MAXGROUP</td>
</tr>
<tr>
<td>General Ledger Component</td>
<td>GLAUTH and MAXGROUP</td>
</tr>
<tr>
<td>Authorizations</td>
<td></td>
</tr>
<tr>
<td>Labor Authorizations</td>
<td>LABORAUTH and MAXGROUP</td>
</tr>
<tr>
<td>Storeroom Authorizations</td>
<td>LOCAUTH and MAXGROUP</td>
</tr>
<tr>
<td>Group Restrictions</td>
<td>GROUPRESTRICTION</td>
</tr>
<tr>
<td>Users</td>
<td>GROUPUSER</td>
</tr>
</tbody>
</table>
Security Groups

Security Group Types

When you create security groups, you select a group type, using the Independent of Other Groups? option:

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>The access rights and grants in this group cannot be combined with the rights and grants from other groups.</td>
</tr>
<tr>
<td>Non-independent</td>
<td>The access rights and grants in this group are combined with the rights and grants from other non-independent groups that are common to a given user.</td>
</tr>
<tr>
<td>(default)</td>
<td></td>
</tr>
</tbody>
</table>

For more information about how these types behave, see "Combining and Merging Security Group Types," on page 2-25.

Security Groups Tabs

The Security Groups application contains tabs that let you create, search, and configure settings for security groups.

<table>
<thead>
<tr>
<th>Tab</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>List</td>
<td>Displays a list of security groups created for your system. For each group, you can view:</td>
</tr>
<tr>
<td></td>
<td>▼ Whether the group is authorized for all Sites, storerooms, and labor.</td>
</tr>
<tr>
<td></td>
<td>▼ Whether the group is independent of other groups.</td>
</tr>
<tr>
<td></td>
<td>For more information about searching, see &quot;Advanced Searches,&quot; on page 2-21.</td>
</tr>
<tr>
<td>Group</td>
<td>Displays the name and description of the group, start center template ID, and the Independent of Other Groups? check box. The check box indicates whether the attributes of this group can be combined with other groups.</td>
</tr>
<tr>
<td>Sites</td>
<td>Displays Sites explicitly authorized for this group. To authorize this group automatically for all Sites and Organizations, check the box (the table window becomes read-only).</td>
</tr>
<tr>
<td>Applications</td>
<td>Displays the applications assigned to this group with the appropriate level of access (typically Read, Insert, Save, and Delete). The bottom pane shows all options available for the application.</td>
</tr>
<tr>
<td>Storerooms</td>
<td>Displays the storerooms assigned to this group, including their names, descriptions, and Site locations. To authorize this group automatically for all storerooms, check the box (the table window becomes read-only).</td>
</tr>
</tbody>
</table>
Security Groups

<table>
<thead>
<tr>
<th>Tab</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>Displays the labor authorizations for this group. The bottom of the screen displays individual labor records with labor codes, display names, and Organizations. Checkboxes let you authorize specific sets of labor, including:</td>
</tr>
<tr>
<td></td>
<td>▼ Authorize Group for All Labor? (If selected, the other checkboxes and table window record become read-only.)</td>
</tr>
<tr>
<td></td>
<td>▼ Authorize Group for Labor in Their Same Crew?</td>
</tr>
<tr>
<td></td>
<td>▼ Authorize Group for Labor in Their Same Person Group?</td>
</tr>
<tr>
<td></td>
<td>▼ Authorize Group for Labor They Supervise?</td>
</tr>
<tr>
<td></td>
<td>▼ Authorize Group for Their Own Labor?</td>
</tr>
<tr>
<td>GL Components</td>
<td>Displays General Ledger component types that the group has the authorization to change using the Select GL Account dialog box. Maximo builds this list dynamically from the GLCCONFIGURE table. To authorize this group automatically to change all GL component types, check the box (the table window becomes read-only). You modify and configure GL components using Database Configuration.</td>
</tr>
<tr>
<td>Limits and Tolerances</td>
<td>Displays approval limits and tolerances in base currency for the members of the group at an Organization level.</td>
</tr>
<tr>
<td></td>
<td>▼ Enter approval limits for purchase requisitions, purchase orders, material receipts, invoices, and contracts.</td>
</tr>
<tr>
<td></td>
<td>▼ Enter upper and lower tolerances in base currency amounts or percentages for invoices, taxes, and services.</td>
</tr>
<tr>
<td></td>
<td>▼ Add null values for unlimited limits and tolerances.</td>
</tr>
<tr>
<td>Restrictions</td>
<td>Displays restrictions in the form of SQL statements that let you further grant or restrict access to the Maximo features, functions, and data.</td>
</tr>
<tr>
<td></td>
<td>For example, you can specify a table entity like MAXGROUP, then place a restriction of GROUPNAME=‘TESTGROUP.’ Group members can access the Security Groups application, but only manipulate the group called TESTGROUP.</td>
</tr>
<tr>
<td>Users</td>
<td>Displays information about group members, including user name, display name, and user status and type. Users can be members of groups but have an inactive status.</td>
</tr>
</tbody>
</table>

**Advanced Searches**

For advanced searches of your security groups, use these options in Advanced Search under the List tab:

▼ More Search Fields

This dialog box provides a template of searchable fields related to these security group categories: Group Information, Sites, Applications, Labor, and Limits.

- To search for particular records, enter field values in the template.
- To filter searches, enter more values or search criteria in the template.
The field values of the template map to Maximo TABLE.COLUMN data:

<table>
<thead>
<tr>
<th>Field Name</th>
<th>TABLE.COLUMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>MAXGROUP.GROUPNAME</td>
</tr>
<tr>
<td>Description</td>
<td>MAXGROUP.DESCRIPTION</td>
</tr>
<tr>
<td>User</td>
<td>GROUPUSER.USERID</td>
</tr>
<tr>
<td>Site</td>
<td>SITEAUTH.SITEID</td>
</tr>
<tr>
<td>Application</td>
<td>APPLICATIONAUTH.APP</td>
</tr>
<tr>
<td>Option</td>
<td>APPLICATIONAUTH.OPTIONAME</td>
</tr>
<tr>
<td>Storeroom</td>
<td>LOCAUTH.LOCATION</td>
</tr>
<tr>
<td>PO Limit</td>
<td>MAXGROUP.POLIMIT</td>
</tr>
<tr>
<td>PR Limit</td>
<td>MAXGROUP.PRLIMIT</td>
</tr>
<tr>
<td>MR Limit</td>
<td>MAXGROUP.MRLIMIT</td>
</tr>
<tr>
<td>Invoice Limit</td>
<td>MAXGROUP.INVOICELIMIT</td>
</tr>
<tr>
<td>Contract Limit</td>
<td>MAXGROUP.CONTRACTLIMIT</td>
</tr>
<tr>
<td>Labor</td>
<td>LABORAUTH.LABORCODE</td>
</tr>
<tr>
<td>Independent of Other Groups?</td>
<td>MAXGROUP.INDEPENDENT</td>
</tr>
<tr>
<td>Authorize Group for All Sites?</td>
<td>MAXGROUP.AUTHALLSITES</td>
</tr>
<tr>
<td>Authorize Group for All Storerooms?</td>
<td>MAXGROUP.AUTHALLSTOREROOMS</td>
</tr>
<tr>
<td>Authorize Group to change All GL Component Types?</td>
<td>MAXGROUP.AUTHALLGLS</td>
</tr>
<tr>
<td>Authorize Group for All Labor?</td>
<td>MAXGROUP.AUTHLABORALL</td>
</tr>
<tr>
<td>Authorize Group for Their Own Labor?</td>
<td>MAXGROUP.AUTHLABORSELF</td>
</tr>
<tr>
<td>Authorize Group for Labor in Their Same Crew?</td>
<td>MAXGROUP.AUTHLABORCREW</td>
</tr>
<tr>
<td>Authorize Group for Labor They Supervise?</td>
<td>MAXGROUP.AUTHLABORSUPER</td>
</tr>
<tr>
<td>Authorize Group for Labor in Their Same Person Group?</td>
<td>MAXGROUP.AUTHPERSONGROUP</td>
</tr>
<tr>
<td>Start Center Template</td>
<td>MAXGROUP.SCTEMPLATEID</td>
</tr>
<tr>
<td>Organization</td>
<td>MAXGROUP.LIMITORGRID</td>
</tr>
<tr>
<td>GL Component</td>
<td>GLAUTH.GLACCOUNTFIELD</td>
</tr>
</tbody>
</table>
WHERE clause

This dialog box lets you search the Maximo database for particular records by entering a standard SQL WHERE clause statement. For example:

GROUPNAME="MAXREG"

To display the record for the Self-Registration security group, click Find.

View Search Tips

This dialog box displays Help for Advanced Search, including More Search Fields and WHERE clause.

Security Groups Actions

This menu lets you perform group-specific functions such as duplicating and deleting security groups. You can also use the Security Controls action to enable System-wide login tracking and specify password requirements.

Overriding Password Duration

This action lets you update the Maximo defaults for password duration and password expiration warning for a selected group.

Setting Security Controls

This action lets you specify System-wide defaults for these types of security controls:

- Default security group for new users
- Default user status for self-registered users
- Tracking user login attempts
- Specifying password configuration settings, including:
  - Number of days you can use a password before expiration
  - Number of days before password expiration to notify users of its expiration
  - Number of days that must pass before you can reuse a previously expired password
  - Minimum length of a password
  - Whether a password must contain a numeric character
  - Whether a password must contain a special character

For more information about security controls, see "Security Controls," on page 2-12.
Duplicate Group

This action opens a new record under the Group tab that duplicates the header information. Specify a new group name, description, and whether the group is independent.

Maximo duplicates this information:

- Sites
- Authorizations for Applications, Storerooms, Labor, and GL Components
- Limits and tolerances
- Group restrictions

**NOTE** Users are not duplicated into the new group. You must specifically give yourself group reassignment authority (Users > Select Action > Authorize Group Reassignment) to add members to the new group.

Delete Group

This action lets you delete a selected group unless:

- It has members.
- It is specified as the default group for self-registered users in the MAXVARS table (NEWUSERGROUP).

User Security Profiles

A profile is a virtual view of a user’s authorizations, privileges, and settings within Maximo. Users inherit the access rights and privileges associated with assigned security groups. Maximo builds and maintains a profile for all users in the system that actively tracks a user’s membership in groups.

The Users application has a Security Profile tab that displays a hierarchical view of a user’s profiles by Site. Click each Site within a user’s profile to display information about a user’s access and rights within the Site for:

- Applications
- Approval Limits
- General Ledger Components
- Labor
- Restrictions
- Storerooms
- Tolerances

By default, new users do not have access to the Maximo applications and database. Administrative users with access to the Users and Security Groups applications can create security groups and assign users to them.

Security groups have attributes or settings that let you define Sites, applications, menu options, and other rights that users can acquire through group membership. Assign users to one or many groups, which can have differing levels of access, to build a security profile.
The business rules of your organization determine how you combine the various security groups to build an individual user’s profile. For example, the security profiles for a member of a maintenance crew and the purchasing manager of your company might be different.

You build a profile by assigning users to groups in the Security Groups application. The profile represents the totality of a user’s access rights and privileges based on the combination of all the user’s assigned groups.

You can configure a group to specify one or more of these types of settings:

- Site Access
- Authorizations for Applications, Storerooms, Labor, and GL Components
- Purchasing Limits
- Invoice Tolerances
- Start Centers
- Group Restrictions

Maximo grants or restricts a user’s application access by checking the user’s profile (the combination of all groups) to determine the user’s maximum level of access. If a user does not have access to the Purchasing application, for example, that application does not appear.

Within an application, you can restrict the Select Action options that appear for a user. For example, give administrative users access to the Users application to create and manage user groups, but not the ability to grant database access.

**NOTE**

Group restrictions override access rights granted when combining groups.

The concept of combined security groups and a derived security profile lets administrators manage the security infrastructure within or across Organizations.

### Combining and Merging Security Group Types

You can assign users to both independent and non-independent groups. For definitions of security group types, see "Security Group Types," on page 2-20.

Depending on the types of groups users belong to, Maximo generates the profiles by combining, merging, or combining and merging a user’s security groups:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merge (independent groups)</td>
<td>Merges the settings/Sites for all independent groups.</td>
</tr>
<tr>
<td>Combine (non-independent groups)</td>
<td>Combines the settings/Sites of non-independent groups with the settings/Sites of other non-independent groups.</td>
</tr>
<tr>
<td>Merge and combine (both types of groups)</td>
<td>Merges all independent groups with the settings/Sites results set derived from combining all non-independent groups.</td>
</tr>
</tbody>
</table>

To exclude a group from combining its settings/Sites with other groups, make it an independent group. The settings for an independent group only apply to Sites specified for that group.
Security settings in the Users and Security Groups applications are at the System level, except Approval Limits and Tolerances, which are Organization level settings.

Assigning Applications to Groups

The level of the application (System, Set, Organization, or Site) controls the impact and availability of applications and options, and the amount of data users see:

<table>
<thead>
<tr>
<th>Application Level</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>System-wide</td>
<td>If you give users access to a System-level application, like Currency, any modifications a user makes in that application have a System-wide impact. If you add EURO as a currency, it is available for all Organizations and Sites.</td>
</tr>
<tr>
<td>Organization</td>
<td>If you modify an application at the Organization level, that modification applies to all Sites in the Organization.</td>
</tr>
<tr>
<td>Site</td>
<td>If a user makes modifications within a Site-level application, like Assets, modifications are limited to that Site.</td>
</tr>
</tbody>
</table>

For example, Site-level applications display data for specific Sites; Organization-level applications display data for all Sites within an Organization.
## System-level applications

<table>
<thead>
<tr>
<th>Administration</th>
<th>Integration</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulletin Board</td>
<td>Integration Interfaces</td>
<td>People</td>
</tr>
<tr>
<td>Classifications</td>
<td>External Objects</td>
<td>Person Groups</td>
</tr>
<tr>
<td>Communication Templates</td>
<td>External Systems</td>
<td>Service Desk</td>
</tr>
<tr>
<td>Organizations</td>
<td>Security</td>
<td>Service Requests</td>
</tr>
<tr>
<td>Report Administration</td>
<td>Users</td>
<td>Incidents</td>
</tr>
<tr>
<td>Sets</td>
<td>Security Groups</td>
<td>Problems</td>
</tr>
</tbody>
</table>

## Configuration

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Contracts</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Designer</td>
<td>Master Contracts</td>
<td>Activities</td>
</tr>
<tr>
<td>Cron Task Setup</td>
<td>Purchase Contracts</td>
<td>Service Management</td>
</tr>
<tr>
<td>Database Configuration</td>
<td>Lease/Rental Contracts</td>
<td>Service Level Agreements</td>
</tr>
<tr>
<td>Domains</td>
<td>Labor Rate Contracts</td>
<td>Service Requests</td>
</tr>
<tr>
<td>E-mail Listener</td>
<td>Warranty Contracts</td>
<td>Create Service Request</td>
</tr>
<tr>
<td>Escalations</td>
<td>Terms and Conditions</td>
<td>View Service Requests</td>
</tr>
<tr>
<td>Workflow</td>
<td>Planning</td>
<td>Search Solutions</td>
</tr>
</tbody>
</table>

## Financial

<table>
<thead>
<tr>
<th>Financial</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency Codes</td>
<td>Ticket Templates</td>
</tr>
<tr>
<td></td>
<td>KPI Manager</td>
</tr>
<tr>
<td></td>
<td>Report Administration</td>
</tr>
</tbody>
</table>

## Set-level applications

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Service Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Master</td>
<td>Service Groups</td>
</tr>
<tr>
<td>Condition Codes</td>
<td></td>
</tr>
<tr>
<td>Service Items</td>
<td></td>
</tr>
<tr>
<td>Stocked Tools</td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td></td>
</tr>
</tbody>
</table>

## Organization-level applications

<table>
<thead>
<tr>
<th>Administration</th>
<th>Preventive Maintenance</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendars</td>
<td>Master PM</td>
<td>Hazards</td>
</tr>
</tbody>
</table>
When you build security profiles from independent groups, which are merged rather than combined, users’ authorizations and privileges are cumulative.

For example, two independent groups provide read access to the Work Order Tracking application at the Nashua Site and read, insert, and save access to Work Order Tracking at the Bedford Site. After adding access and authorizations, users can:

- Read work orders at the Nashua Site, and
Read, insert, and save work orders at the Bedford Site.

These non-independent groups are combined, for example, for Joe Smith:

<table>
<thead>
<tr>
<th>Group Names</th>
<th>Group Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Group 1</td>
<td>Bedford</td>
</tr>
<tr>
<td>Site Group 2</td>
<td>Nashua, Beverly</td>
</tr>
<tr>
<td>Application Group 1</td>
<td>▼ Work Orders (Read)</td>
</tr>
<tr>
<td></td>
<td>▼ Purchasing (Read, Insert, Save, All Actions)</td>
</tr>
<tr>
<td>Application Group 2</td>
<td>▼ Work Orders (Read, Insert, Save, Delete, All Actions)</td>
</tr>
<tr>
<td></td>
<td>▼ Assets (Read, Insert, Save, Delete, All Actions)</td>
</tr>
<tr>
<td></td>
<td>▼ Locations (Read, Insert, Save, Delete, All Actions)</td>
</tr>
<tr>
<td></td>
<td>▼ Purchasing (Read)</td>
</tr>
</tbody>
</table>

Here is Joe Smith’s security profile after Maximo combines the application and Site access granted by his membership in the non-independent groups.
Joe Smith’s Security Profile, which Maximo builds from his membership in Application Groups 1 and 2 and Site Groups 1 and 2, gives him access to Purchase Orders (Read, Insert, Save, All Actions) and Locations, Assets and Work Orders (Read, Insert, Save, Delete, and All Actions) in the Bedford, Nashua, and Beverly sites.
Suppose Josh Brown is the Maintenance Supervisor for the Nashua and Bedford Sites of ACME Corporation, and he is a member of independent and non-independent groups. The independent groups, for example, provide Read access to some applications at other Sites within the Organization.

This table and diagram show Josh Brown’s security profile, which is a combination of independent and non-independent groups.

<table>
<thead>
<tr>
<th>Group Names</th>
<th>Group Settings</th>
<th>Independent?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nashua Site</td>
<td>Nashua</td>
<td>N</td>
</tr>
<tr>
<td>Bedford Site</td>
<td>Bedford</td>
<td>N</td>
</tr>
<tr>
<td>Maintenance_Apps_All</td>
<td>Locations, Assets, Work Orders, and Inventory (Read, Insert, Save, Delete, All Actions)</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Purchase Orders (Read)</td>
<td></td>
</tr>
<tr>
<td>Bedford Storeroom</td>
<td>Bedford</td>
<td>N</td>
</tr>
<tr>
<td>Nashua Storeroom</td>
<td>Nashua</td>
<td>N</td>
</tr>
<tr>
<td>Maintenance_Apps_Sites</td>
<td>Locations, Assets, Work Orders, Inventory, and Purchase Orders (Read)</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Nashua, Bedford, Needham, Beverly, and Providence Sites</td>
<td></td>
</tr>
</tbody>
</table>
Example: Security profile with non-independent and independent groups

Josh Brown, Maintenance Supervisor for the Nashua and Bedford sites of ACME Corp, also requires Read access to maintenance applications at the Needham, Beverly, and Providence sites.

Josh Brown’s Security Profile, which Maximo builds from his membership from a collection of non-independent (for Nashua and Bedford) and independent groups (for Nashua, Bedford, Needham, Beverly, and Providence), gives him full access rights (Read, Insert, Save, Delete, and All Actions) for maintenance applications in Nashua and Bedford, but Read only access to maintenance applications in Needham, Beverly, and Providence. His storeroom access is limited to the Nashua and Bedford sites.
Josh Brown’s security profile gives him full access rights to Work Orders, Assets, Locations, and Inventory within the Sites that he supervises. He has read-only rights to the same applications in Sites where he does not supervise.

**Rules for Combining and Merging Groups**

When combining or merging groups to create a user’s profile, Maximo checks whether there any rules that affect security settings and authorizations.

**Password Duration and Warning**

You set these values using the Security Controls action from the Users or Security Groups application. Password Duration and Password Warning are Site-independent. Maximo applies the greatest value (in days) from the user’s groups. For example:

<table>
<thead>
<tr>
<th>Group</th>
<th>Password Duration</th>
<th>Password Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>60</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Resulting profile</td>
<td>90</td>
<td>10</td>
</tr>
</tbody>
</table>

**Sites**

The Authorize Group for all Sites check box gives any members of this group access to all Sites in the System. Otherwise, Maximo tracks which unique Sites a user has access to via group membership and the accumulation of Sites is included in the user’s profile. This check box is located on the Sites tab of the Security Groups application.

**Application Authorization**

Authorizations depend on security group type:

<table>
<thead>
<tr>
<th>Group Type</th>
<th>Application Authorizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Authorizations apply exclusively to Sites or Organizations associated with the group.</td>
</tr>
<tr>
<td>Non-independent</td>
<td>Authorizations for all non-independent groups apply to the accumulation of Sites specified for all non-independent groups.</td>
</tr>
</tbody>
</table>

Access to the administrative applications, Users, and Security Groups, is Site-independent when you do not specify a Site. You can modify Site administration by specifying a Site or Sites for the group that grants access to the administrative applications.

The accumulation of all unique application authorization records across security groups becomes the access list of Application Authorizations in the user’s profile.

Maximo populates the Action and Go To Menus with all options and applications granted to a user, regardless of Site or Organization. You can grant a user the Change Status action for purchase orders in Bedford, but not Nashua, and the action appears in the user’s Bedford and Nashua records.

In the preceding example, if the user attempts to change the purchase order status for a Nashua record, a message appears denying authorization to the Site or Organization of the record, even if you granted the user the ability to read purchase order records in Nashua.
User Security Profiles

If a profile contains application authorizations but no Sites, the user can access the applications but not view or insert records, except for the Users and Security Groups applications.

To view a list of all Maximo applications sorted by level, either System, Organization, Site, or Set, see the Maximo applications tables on page 2-27.

Storeroom Authorization

Authorizations depend on security group type:

<table>
<thead>
<tr>
<th>Group Type</th>
<th>Application Authorizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Authorizations apply exclusively to Sites or Organizations associated with the group.</td>
</tr>
<tr>
<td>Non-independent</td>
<td>Authorizations for all non-independent groups apply to the accumulation of Sites specified for all non-independent groups.</td>
</tr>
</tbody>
</table>

The Storerooms tab for Security Groups lets you authorize a group for all the storerooms for all Sites associated with that group.

If any of the user’s groups grants access to all or specific storerooms at a given Site, the profile reflects the maximum amount of storeroom access:

<table>
<thead>
<tr>
<th>Group</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>All storerooms at a given Site</td>
</tr>
<tr>
<td>B</td>
<td>Only one storeroom at that Site</td>
</tr>
</tbody>
</table>

**Resulting profile**

All storerooms at that Site

**Note**

A user must have access to a storeroom and its Site before Maximo adds the storeroom authorization to the profile.

You can give a user access to the Users and Security Groups applications, but not to storeroom records. In this example, the user has access to the administrative applications that let the user check the security group boxes that authorize access to all storerooms, but not add specific storerooms records using the **New Row** button.

The accumulation of all unique storeroom authorization records across security groups becomes the access list of Storeroom Authorizations in the user’s profile.

Labor Authorization

The Labor tab in the Security Groups application lets you authorize a group and users who belong to the group, for these labor types:

- All labor in an Organization
- All labor in the same crew as the user
- All labor in the same Person Group as the user
- All labor that the user supervises
- Only the user’s own labor records
Individual labor records listed in the table window (LABORAUTH table)

If any of the user’s groups grants access to all or specific labor options, the user’s profile reflects the maximum amount of labor access.

The ORGID access for the Labor application depends on the Sites granted to the user’s security groups. If a group has access to a certain Site, the group has access to that Site’s Organization.

**NOTE**

A user must have access to all or a subset of labor and a Site in Organization of the labor before Maximo adds the labor authorization to the user’s profile.

You can give a user access to the Users and Security Groups applications but not grant that user access to labor records. In this example, the user has access to the administrative applications that let the user check the security group boxes that authorize access to all labor, but not add specific labor records using the **New Row** button.

The accumulation of all unique labor authorizations across security groups becomes the complete list of Labor options available in the user’s profile.

Labor is an Organization-level application. Any user who has access to Labor via a security group can view data for all Sites in an Organization. They can view data regardless of the Site access granted by the group.

**GL Components**

This tab lets you authorize a group to modify some or all of the General Ledger components for Sites and their Organizations. You grant this authorization by selecting individual components or selecting the **Authorize Group to Change All GL Component Types?** check box.

If any of the user’s groups grants authorization to modify components, the user’s profile reflects the maximum amount of GL component authorization.

<table>
<thead>
<tr>
<th>Group</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Modify one GL component</td>
</tr>
<tr>
<td>B</td>
<td>Modify all GL components</td>
</tr>
<tr>
<td><strong>Resulting profile</strong></td>
<td><strong>Modify all GL components</strong></td>
</tr>
</tbody>
</table>

If you do not check the **Authorize Group to Change All GL Components?** box and do not authorize individual components for the group, a user cannot modify GL components.

**Approval Limits and Tolerances**

This tab lets you specify the limits and tolerances of a group.

You can specify these approval limits:

- Purchase Requisitions (PR)
- Purchase Orders (PO)
- Material Receipts (MR)
- Invoice
- Contract

The accumulation of all unique limits and tolerance authorizations across security groups becomes the complete list of limits and tolerance authorizations available in the user’s profile. The limits and tolerances you
specify for a group are at the Organization level, but users inherit authorizations for only the Sites they have access to.

**Example 1 - PR Limits**

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>PR Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>$5,000</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

**Resulting profile** $10,000 for all Sites the user can access if they are in the same Organization

**Example 2 - PR Limits**

If the security profile grants User 1 access to two different Organizations with different limits and tolerances, the user inherits the appropriate limits and tolerances for each Site the user has access to in each Organization.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>PR Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>$5,000 for Sites in the Eagle NA Organization</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>$10,000 for Sites in the Eagle SA Organization</td>
</tr>
</tbody>
</table>

**Resulting profile** ▼ $5,000 for Sites the user has access to in Eagle NA, and ▼ $10,000 for Sites the user has access to in Eagle SA

You can specify the tolerances of a group (an upper and lower value and an upper and lower percent for each type):

▼ Invoice
▼ Tax
▼ Service

**Example - Approval Limits**

If the user’s groups give different approval limit values for the same limit, the user’s profile reflects the highest value.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Invoice Approval Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Black</td>
<td>A</td>
<td>$1,000</td>
</tr>
<tr>
<td>Joe Black</td>
<td>B</td>
<td>$5,000</td>
</tr>
</tbody>
</table>

**Resulting profile** $5,000
Example - Invoice Amount Tolerance

If different values exist for the same tolerance type, user’s profile reflects the higher value.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Upper Invoice Amount Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Black</td>
<td>A</td>
<td>$10</td>
</tr>
<tr>
<td>Joe Black</td>
<td>B</td>
<td>$15</td>
</tr>
</tbody>
</table>

Resulting profile $15

Example - Tolerances or Limits in Different Organizations

If different values exist for the same tolerance type but the groups that grant the tolerance amount have Sites in different Organizations, the user’s profile reflects the higher value for Sites within the same Organization.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Upper Invoice Amount Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Black</td>
<td>A</td>
<td>$10 for Sites in EagleNA</td>
</tr>
<tr>
<td>Joe Black</td>
<td>B</td>
<td>$15 for Sites in Eagle SA</td>
</tr>
</tbody>
</table>

Resulting profile ▼ $10 for Sites the user has access to in Eagle NA, and ▼ $15 for Sites the user has access to in Eagle SA

Restrictions

Group restrictions apply exclusively to the Sites associated with that group. This tab lets you use a SQL expression tool to restrict the access of a group to table data.

If a group contains more than one restriction for an entity (table/view), Maximo concatenates the restrictions using the AND operator.

The accumulation of all group restrictions across security groups becomes the complete list of restrictions available in the user’s profile. Based on group combinations, Maximo builds the user’s access and authorizations, then appends any restrictions you create for a group.

Group restrictions supersede access and authorizations granted by the user’s profile.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Access to People</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Full</td>
</tr>
<tr>
<td>1</td>
<td>B</td>
<td>Restricted (via Group Restrictions)</td>
</tr>
</tbody>
</table>

Resulting profile Restricted
Site Administration

Administrative users with access to the Users and Security Groups applications, require the ability to manage:

- Groups related to specific Sites
- Maximo users who reside in one or more Sites

Administrators must be familiar with the rules governing the following when planning the security infrastructure for their organizations:

- rules governing Site administration
- features of the Users application
- features of the Security Groups application

User Site Administration

Administrators with access to the Users application for a specific Site (for example, Bedford), can manage (create users, configure password settings, and so on) all users whose security profiles specify that Site.

**NOTE** Users with access to the Users application without any Sites specified in their security profiles can manage all users in all Sites.

Here are three sample users and their security settings:

<table>
<thead>
<tr>
<th>User ID</th>
<th>Application Access</th>
<th>Site Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson</td>
<td>Users and Security Groups</td>
<td>Bedford</td>
</tr>
<tr>
<td>Winston</td>
<td>N/A</td>
<td>Bedford</td>
</tr>
<tr>
<td>Smith</td>
<td>N/A</td>
<td>Nashua</td>
</tr>
</tbody>
</table>

Wilson (the administrative user) can:

1. Manage Winston, but not Smith.
2. Manage all users who are in the Bedford Site.
3. Add security groups to users where the group has Bedford specified as a Site.
Determining a user’s Site access for management purposes can come from independent or non-independent groups:

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Specified Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson</td>
<td>Group or combination of groups</td>
<td>None</td>
</tr>
<tr>
<td>Wilson</td>
<td>Independent group</td>
<td>One</td>
</tr>
</tbody>
</table>

**Resulting profile**

Access to manage all users.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Specified Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson</td>
<td>Group or combination of groups</td>
<td>None</td>
</tr>
<tr>
<td>Wilson</td>
<td>Other groups (independent or non-independent)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Resulting profile**

Access to manage all users.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Specified Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilson</td>
<td>Independent group</td>
<td>One</td>
</tr>
</tbody>
</table>

**Resulting profile**

Access to users from the one Site.

If Wilson has access to multiple Sites, but you only want him to manage users from one Site, assign him to an independent group with just the Users application and the specific Site.

**Group Site Administration**

Administrators with access to the Security Groups application for a specific Site can manage all groups whose security profiles specify that Site.

**NOTE**

Users with access to the Security Groups application without any specified Sites in their profile can manage groups that also have no Site specified.

Consider this logic and use caution when planning for Site administration and giving individuals the administrative privileges to manage security groups for one or more Sites within an Organization.

Wilson’s security profile contains:

- ▼ Access to the Security Groups application.

- ▼ Access to the Bedford Site, via an independent group that grants access to Security Groups, or in a separate non-independent group.
User Security Profiles

Therefore, Wilson can:

▼ Create groups for the Bedford Site.

▼ Add or remove users, whether or not the users already have the Bedford Site specified in their security profile, from groups that have the Bedford Site.

▼ Modify any groups with the Bedford Site, but not all Sites or no Sites.

Wilson cannot:

▼ Create groups for the Bedford Site that have access to all Sites (Enabling the Authorize Group for All Sites? flag).

▼ Modify any groups, including adding or removing users that have enabled the Authorize Group for All Sites? setting or that have no Sites.

Basic Rules for the Users and Groups Applications

▼ If the Administrative user is in a group that has this application (Users or Groups) and all Sites, everything is allowed.

▼ If the Administrative user is in an independent group that has this application (Users or Groups) and no Sites, everything is allowed.

▼ If the Administrative user is in a non-independent group that has all Sites, everything is allowed.

If the Administrative user does not have everything allowed, then access is allowed as follows:

▼ For the Users application, the user to be maintained has all Sites or no Sites, or has a Site that is allowed for the Administrative user.

▼ For the Security Groups application, the group to be maintained has no Sites, or has a Site that is allowed for the Administrative user.

Building Security Profiles: Examples

These examples illustrate some approaches for constructing security profiles for small to larger organizations.

Example 1

▼ Worker Group
▼ Management Group

Simple profiles constructed from a collection of security groups that contains sufficient application and Site access rights and privileges for all workers and management in the XYZ company.

The profiles’ construction shows how you can combine groups to restrict access to applications and limits and tolerances. The worker security profile, for example, does not provide access to Purchase Requisitions and Financials and does not provide a purchase limit.
Example 1 – Single Organization with Worker and Management Security Profiles

Example: Single organization with security groups that provide sufficient application, site and storeroom access and privileges for all users in XYZ company.

Worker and Management Groups for XYZ company

Worker Group

<table>
<thead>
<tr>
<th>Sites</th>
<th>Inventory</th>
<th>Assets</th>
<th>Labor Reporting</th>
<th>Work Orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ All sites</td>
<td>✅ Read</td>
<td>✅ Read</td>
<td>✅ Read</td>
<td>✅ Read</td>
</tr>
<tr>
<td>✅ All storerooms</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
</tr>
<tr>
<td></td>
<td>✅ Save</td>
<td>✅ Save</td>
<td>✅ Save</td>
<td>✅ Save</td>
</tr>
<tr>
<td></td>
<td>✅ Delete</td>
<td>✅ Delete</td>
<td>✅ Delete</td>
<td>✅ Delete</td>
</tr>
<tr>
<td></td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
</tr>
</tbody>
</table>

Management Group

<table>
<thead>
<tr>
<th>Sites</th>
<th>Inventory</th>
<th>Work Orders</th>
<th>Labor Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ All sites</td>
<td>✅ Read</td>
<td>✅ Read</td>
<td>✅ Read</td>
</tr>
<tr>
<td>✅ All storerooms</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
</tr>
<tr>
<td></td>
<td>✅ Save</td>
<td>✅ Save</td>
<td>✅ Save</td>
</tr>
<tr>
<td></td>
<td>✅ Delete</td>
<td>✅ Delete</td>
<td>✅ Delete</td>
</tr>
<tr>
<td></td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
</tr>
</tbody>
</table>

Purchasing Limit

<table>
<thead>
<tr>
<th>Assets</th>
<th>Purchase Requisitions</th>
<th>Financials</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅ Read</td>
<td>✅ Read</td>
<td>✅ Read</td>
</tr>
<tr>
<td>✅ Insert</td>
<td>✅ Insert</td>
<td>✅ Insert</td>
</tr>
<tr>
<td>✅ Save</td>
<td>✅ Save</td>
<td>✅ Save</td>
</tr>
<tr>
<td>✅ Delete</td>
<td>✅ Delete</td>
<td>✅ Delete</td>
</tr>
<tr>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
<td>✅ All Actions</td>
</tr>
</tbody>
</table>

Security Profile for all Workers

<table>
<thead>
<tr>
<th>Application Access</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Assets</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Work Orders</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Labor Reporting</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Storerooms</td>
<td>✅ All storerooms</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Security Profile for all Management

<table>
<thead>
<tr>
<th>Application Access</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Assets</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Financials</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Work Orders</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Labor Reporting</td>
<td>✅ All sites</td>
</tr>
<tr>
<td>Storerooms</td>
<td>✅ All storerooms</td>
</tr>
<tr>
<td>Purchase Requisitions</td>
<td>✅ All Actions</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchasing Limit</td>
<td>✅ $10,000</td>
</tr>
</tbody>
</table>
Example 2

This sample Organization uses a mix of non-independent security groups, a type of group picklist, dedicated to individual security categories such as application access, Site access, storeroom access, and approval limits.

The application groups, for example, are for specific functional areas within the company such as Maintenance and Purchasing.

When you add users to a related set of security groups, Maximo builds security profiles for these users that provide the access rights and privileges they require to perform their job responsibilities within a specific functional area of the organization.
Example 2 – Single Organization with Mixed Security Groups

Example: Single organization with a mix of non-independent security groups dedicated to individual group categories like application, site and storeroom access. Security profiles reflect functional areas within the company, like Maintenance and Purchasing, as you add users to groups that provide the required access and privileges needed to perform specific job responsibilities.

Mixed Non-Independent Security Groups for XYZ Company

<table>
<thead>
<tr>
<th>Maintenance Application Group</th>
<th>Purchasing Application Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Work Orders</strong></td>
<td><strong>Purchase Orders</strong></td>
</tr>
<tr>
<td><strong>Assets</strong></td>
<td>Read</td>
</tr>
<tr>
<td><strong>Locations</strong></td>
<td>Insert</td>
</tr>
<tr>
<td>✓ Read</td>
<td>Save</td>
</tr>
<tr>
<td>✓ Insert</td>
<td>All Actions</td>
</tr>
<tr>
<td>✓ Save</td>
<td>Inventory</td>
</tr>
<tr>
<td>✓ Delete</td>
<td></td>
</tr>
<tr>
<td>✓ All Actions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sites Group</th>
<th>Storerooms Group</th>
<th>Purchasing Approval Limits Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Bedford</td>
<td>✓ Bedford</td>
<td>PR $10,000</td>
</tr>
<tr>
<td>✓ Nashua</td>
<td>✓ Nashua</td>
<td>PO $10,000</td>
</tr>
<tr>
<td>✓ Needham</td>
<td>✓ Needham</td>
<td>Invoices $10,000</td>
</tr>
</tbody>
</table>

Security Profile for Maintenance Users

 ✓ Maintenance users

<table>
<thead>
<tr>
<th>Maintenance Application Access</th>
<th>Storerooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Orders</td>
<td>➕ Bedford</td>
</tr>
<tr>
<td>Assets</td>
<td>➕ Nashua</td>
</tr>
<tr>
<td>Locations</td>
<td>➕ Needham</td>
</tr>
<tr>
<td>✓ Read</td>
<td>Sites</td>
</tr>
<tr>
<td>✓ Insert</td>
<td>➕ Bedford</td>
</tr>
<tr>
<td>✓ Save</td>
<td>➕ Nashua</td>
</tr>
<tr>
<td>✓ Delete</td>
<td>➕ Needham</td>
</tr>
<tr>
<td>✓ All Actions</td>
<td></td>
</tr>
</tbody>
</table>

Security Profile for Purchasing Users

 ✓ Purchasing users

<table>
<thead>
<tr>
<th>Purchasing Application Access</th>
<th>Purchasing Approval Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase Orders</td>
<td>PR $10,000</td>
</tr>
<tr>
<td>Work Orders</td>
<td>PO $10,000</td>
</tr>
<tr>
<td>Inventory</td>
<td>Invoices $10,000</td>
</tr>
<tr>
<td>➕ Read</td>
<td>Sites</td>
</tr>
<tr>
<td>➕ Insert</td>
<td>➕ Bedford</td>
</tr>
<tr>
<td>➕ Save</td>
<td>➕ Nashua</td>
</tr>
<tr>
<td>➕ All Actions</td>
<td>➕ Needham</td>
</tr>
</tbody>
</table>
Example 3

This sample contains a single Organization and independent security groups. The Organization employs Site administration so each Site group is limited to an individual Site within the Organization.

To provide read-only application access at a different Site for an employee, add the user to that Site group and to an application access group that provides read-only access to certain applications.

In this example, the user works in Nashua and has the most privileges and broadest range of application access. To provide access to Bedford and still maintain Site administration, add the user to the Bedford Site group and the read-only application group.

Example 3 – Single Organization with Independent Security Groups using Site Administration
Example 4

This profile is built from independent and non-independent groups. The user’s membership in one independent Site and read-only application group provides restricted, read-only access to several applications at remote Sites.

Membership in the non-independent groups provides sufficient application access rights and approval limits to perform the user’s job responsibilities at the user’s primary work Site.

Example 4 – One Organization with Independent and Non-Independent Security Groups

---

**Example**: Single organization that practices site administration with independent and non-independent security groups. The independent group provides the user with read-only application access at several remote sites. The non-independent groups provide the user with all the application access and approval limits he needs to perform his job responsibilities at his primary site.

---

### Independent and Non-independent Security Groups for XYZ Company

<table>
<thead>
<tr>
<th>Independent Group</th>
<th>Non-independent Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application and Sites Group</strong></td>
<td><strong>Nashua Application Group</strong></td>
</tr>
<tr>
<td>- Work Orders</td>
<td>- Work Orders</td>
</tr>
<tr>
<td>- Assets</td>
<td>- Purchasing</td>
</tr>
<tr>
<td>- Locations</td>
<td>- Read</td>
</tr>
<tr>
<td>- Read</td>
<td>- Insert</td>
</tr>
<tr>
<td>- Bedford</td>
<td>- Save</td>
</tr>
<tr>
<td>- Needham</td>
<td>- Inventory</td>
</tr>
<tr>
<td>- Beverly</td>
<td>- Read</td>
</tr>
</tbody>
</table>

### Nashua Approval Limits

- Invoice = $10,000
- PO = $10,000
- PR = $10,000

---

### Security Profile for Joe User

Joe User

<table>
<thead>
<tr>
<th>Bedford, Beverly, Needham Application Access</th>
<th>Nashua Application Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Work Orders</td>
<td>- Work Orders</td>
</tr>
<tr>
<td>- Assets</td>
<td>- Purchasing</td>
</tr>
<tr>
<td>- Locations</td>
<td>- Read</td>
</tr>
<tr>
<td>- Read</td>
<td>- Insert</td>
</tr>
<tr>
<td>- Bedford</td>
<td>- Save</td>
</tr>
<tr>
<td>- Needham</td>
<td>- Inventory</td>
</tr>
<tr>
<td>- Beverly</td>
<td>- Read</td>
</tr>
</tbody>
</table>

---

**Nashua Site Group**

- Nashua
Example 5

This profile is for a user in a multi-Organization implementation (EagleNA and EagleSA) and is a member of these security groups:

- Three non-independent security groups, including a cross-Organization Site group, give the user the same application access and approval limits at separate Sites within different Organizations (EagleNA/EagleSA).

- One independent Site and read-only application access group that provides application access for several Sites within a single Organization (EagleNA).

This example illustrates how user access to Organization-level and System-level applications applies to all Sites within an Organization and within the System.
Example 5 – Multi-Organization with Independent and Non-Independent Security Groups

Example: Multi-organizational Maximo implementation that uses independent and non-independent security groups to provide the user with read-only access to certain applications at several sites in one organization (EagleNA) and more robust application access at two other sites that reside in separate organizations (EagleNA and EagleSA). This example also includes some system and organizational-level applications, like Currency and Exchange Rates, that provide system-wide (all sites) and organization-wide (all sites in an organization) access.

Independent and Non-independent Security Groups for EagleNA and EagleSA in the Flying Eagles Company

<table>
<thead>
<tr>
<th>App-Access and EagleNA Sites Group</th>
<th>Multi-Org App-Access Group</th>
<th>Approval Limits Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Orders</td>
<td>Sites</td>
<td>Purchasing</td>
</tr>
<tr>
<td>Assets</td>
<td>✔ Bedford</td>
<td>✔ Read</td>
</tr>
<tr>
<td>Locations</td>
<td>✔ Needham</td>
<td>✔ Insert</td>
</tr>
<tr>
<td>✔ Read</td>
<td>✔ Save</td>
<td>✔ Save</td>
</tr>
<tr>
<td>* = System level application</td>
<td>* Currency</td>
<td></td>
</tr>
<tr>
<td>+ Chart of Accounts</td>
<td>+ Exchange Rates</td>
<td></td>
</tr>
<tr>
<td>✔ Read</td>
<td>✔ Insert</td>
<td>✔ Read</td>
</tr>
<tr>
<td>✔ Save</td>
<td>✔ Save</td>
<td></td>
</tr>
<tr>
<td>✔ Delete</td>
<td>✔ Save</td>
<td></td>
</tr>
<tr>
<td>✔ All Actions</td>
<td>✔ Delete</td>
<td></td>
</tr>
<tr>
<td>✔ All Actions</td>
<td>✔ All Actions</td>
<td></td>
</tr>
</tbody>
</table>

Non-independent Groups

EagleNA/EagleSA Sites Group

- Nashua (EagleNA)
- Consite (EagleSA)

Security Profile for Joe User

Joe User

<table>
<thead>
<tr>
<th>Bedford, Beverly, Needham Application Access</th>
<th>Consite and Nashua Application Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Orders</td>
<td>Currency Organizations</td>
</tr>
<tr>
<td>Assets</td>
<td>✔ Read</td>
</tr>
<tr>
<td>Locations</td>
<td>✔ Insert</td>
</tr>
<tr>
<td>✔ Read</td>
<td>✔ Save</td>
</tr>
<tr>
<td>✔ Save</td>
<td>✔ Delete</td>
</tr>
<tr>
<td>✔ Delete</td>
<td>✔ All Actions</td>
</tr>
<tr>
<td>✔ All Actions</td>
<td>✔ Invoice = $10,000</td>
</tr>
<tr>
<td>✔ PO = $10,000</td>
<td>✔ PR = $10,000</td>
</tr>
<tr>
<td>✔ Purchasing</td>
<td>✔ Inventory</td>
</tr>
<tr>
<td>✔ Read</td>
<td>✔ Read</td>
</tr>
<tr>
<td>✔ Insert</td>
<td>✔ Insert</td>
</tr>
<tr>
<td>✔ Save</td>
<td>✔ Save</td>
</tr>
<tr>
<td>✔ Delete</td>
<td>✔ Delete</td>
</tr>
<tr>
<td>✔ All Actions</td>
<td>✔ All Actions</td>
</tr>
</tbody>
</table>

These business rules apply to applications flagged with these symbols:

* System-level application whose authorization automatically applies to all Sites in the System.

+ Organization-level application whose authorization automatically applies to all Sites in the Organization.
NOTE  If a Sites group contains Sites from two Organizations and you combine non-independent groups, any Organization-level applications within the security profile are available to the users across all Sites spanning both Organizations.
This chapter discusses the following security mechanisms:

- Authorization
- Application Server Security
- Configuring Maximo
- Synchronization
- Encryption
- Single Sign On

Authorization

Maximo determines where users can go and what they can do. This process is called *authorization*.

The process is as follows:

1. You place users in security groups.
2. The combination of these groups represents users’ security profiles.
3. Users acquire the authorizations and rights of the security groups they belong to.
4. Users’ security profiles determine their maximum rights and privileges.

Application Access

Users have four types of access to an application:

- Read
- Insert
- Save
- Delete

You can grant users specific options within an application. For example, you can grant managers rights to read work order histories, costs and warranties, but *not* to insert work orders or service requests.

**Note** You must minimally grant users read access to applications. You must configure each application for read access so administrative users can select additional application access options.
Authorization

All applications and their corresponding access options appear in the SIGOPTION table, which contains these types of column information:

- Application Option Description
- Application Option Name
- Visible
- Also Grants
- Also Revokes
- Prerequisite

The Visible setting (Y or N) indicates whether you can select the option from the Applications authorization tab in the Security Groups application. If an option is not visible, it is granted with another option. These standard Maximo options are not visible:

- Clear
- Bookmark
- Next
- Previous
- Viewhist
- Drilldown

For example, when you select READ, Maximo grants the invisible CLEAR, BOOKMARK, NEXT, PREVIOUS, VIEWHIST, and DRILLDOWN options. The READ option alone does not provide useful functionality.

The Also Grants, Also Revokes, and Prerequisite values indicate inter-relationships between options.

Example

- If you select the INSERT option for an application, Maximo Also Grants the SAVE option.

- If you deselect the SAVE option, Maximo Also Revokes the INSERT, DUPLICATE, and DELETE options.
Standard access options are typically associated with Prerequisite, Also Grants, and Also Revokes options:

<table>
<thead>
<tr>
<th>Standard Prerequisite</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Options</td>
<td>Read</td>
</tr>
<tr>
<td>Duplicate</td>
<td>Insert</td>
</tr>
<tr>
<td>Delete</td>
<td>Save</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Also Grants</th>
<th>Also Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert</td>
<td>Save</td>
</tr>
<tr>
<td>Read</td>
<td>Clear, Bookmark, Next, Previous, Viewhist, Drilldown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Also Revokes</th>
<th>Also Revokes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read</td>
<td>All Options</td>
</tr>
<tr>
<td>Save</td>
<td>Insert, Duplicate</td>
</tr>
<tr>
<td>Insert</td>
<td>Duplicate</td>
</tr>
</tbody>
</table>

**NOTE** These inter-relationships are generally true, but individual applications sometimes vary. To view option access information for a specific application, use a SQL editor to search the SIGOPTION table.

**Group Access**

The application access of a group is linked to its Site access. You can give a group access to:

- All Sites
- Specific Sites
- No Sites

With Security Groups, you can set access to Storerooms, Labor, General Ledger Components, and Approval Limits and Tolerances. When creating a security group, these quick pick options are available on different tabs:

- Access to all storeroms
- Access to all GL segments
- Access to all Sites
- Access to all labor
- Access to all labor in your crew
- Access to all labor in your person group
- Access to all labor you supervise
- Access to your own labor

**Users**

After setting up application access and group access, you grant individual users access to Maximo. This process is discussed in the Security chapter.
Authentication

Saying who you are is identification, and proving it is authentication. There are different ways to authenticate Maximo users, but they all share a common trait. Authentication is always provided by a user ID and password.

You can authenticate Maximo users through:

- Native Maximo Authentication
- Application Server Authentication

Native Maximo Authentication

The following procedure is the most common way to authenticate application access.

1. At the Maximo Web client login screen, users enter a Login ID (in the User Name field) and password.

2. Maximo security services validate users’ credentials against the Maximo database. This validation uses Java™ encryption to check the user in the Maximo schema/database.

3. Maximo checks users' security profiles. Based on the authorizations they contain, Maximo grants users access to the Maximo applications.

Maximo Authentication and Authorization Scenarios
Maximo security services load at system startup, and perform these actions:

- Verify Login ID (blocked or inactive).
- Authenticate Login ID and updates password history (if configured).
- Establish user’s default insert Site, Organization, and Person ID.
- Establish the user’s language, locale, time zone, and Start Center ID.
- Look for any Workflow assignments in the user’s inbox (if Workflow processes are enabled).

**Application Server Authentication**

Maximo is built using J2EE technology, which requires a commercial application server. Maximo uses the BEA WebLogic or the IBM WebSphere application server.

You can use application server security with an external authentication mechanism, such as an LDAP (Lightweight Directory Access Protocol) server, to authenticate users. LDAP is a set of protocols for accessing information directories.
Managing Security Roles

Use these roles to manage Maximo security.

<table>
<thead>
<tr>
<th>Application server</th>
<th>Security role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEA WebLogic</td>
<td>Supports both Global and Scoped roles.</td>
<td>Global - applies to all resources within a security realm (that is the entire Server domain).&lt;br&gt;By default, BEA WebLogic uses Scoped roles. You can change to Global roles using the Administration Console.</td>
</tr>
<tr>
<td>WebSphere</td>
<td>Supports only Scoped roles.</td>
<td>Map the Scoped roles to individual non-nested groups.&lt;br&gt;WebSphere cannot authenticate users in nested Groups.</td>
</tr>
</tbody>
</table>
For more information about BEA WebLogic, see:

- http://e-docs.bea.com/wls/docs81/secwlres/secroles.html#1217798
- http://e-docs.bea.com/wls/docs81/secwlres/types.html#1213777

WebSphere: for more information see:


**Application Server Security**

This section applies to both BEA WebLogic and WebSphere. Before configuring Maximo for application server security:

- review the following Considerations
- review the "Preliminary Tasks," on page 3-8
- configure the application server security, either BEA WebLogic on page 3-8 or WebSphere on page 3-12.

**Considerations**

1. The application server is configured to authenticate against an LDAP server user registry.

   Maximo supports integration with Microsoft Active Directory LDAP server, and lets you move LDAP server data into Maximo database tables.

2. Add and delete users and groups from the LDAP server, but provide authorization from Maximo.

3. Configure all Maximo application-specific authorization rules for users and groups using Maximo security module applications. In Maximo, disable:
   - Password Information in Start Center
   - Change Password application
   - Self-Registration
   - Users application
   - Security Groups are limited to Administrators assigning Maximo permissions restrictions

4. LDAP server users and groups are moved into Maximo database tables to identify users as Maximo users, and provide user details in Maximo applications.

   Users and groups deleted from the LDAP server are not deleted from Maximo database tables; audits might exist for users or groups.

5. If user accounts are disabled from LDAP server, it takes several minutes for the application server to expire the user’s cached information. The time it takes for cached information to expire depends on cache expiration settings.

6. Before users can access Maximo:
**Application Server Security**

a  The application server authentication must be passed.

b  Users’ identities must exist in Maximo database tables.

c  Users must have authorization for the application.

7  Application servers use Roles to identify users and groups with access to Maximo. All roles configured in an application are mapped to users or groups using application server-specific deployment descriptors or application server-provided administrative tools.

By default, Maximo includes a security role, maximouser, mapped to the maximousers group, which identifies users with access to Maximo. You can change this role mapping to any users or groups in the LDAP server.

**Preliminary Tasks**

This section applies to both BEA WebLogic and WebSphere. These tasks fall outside the Maximo environment. Before configuring Maximo to use Application Server and LDAP security, you must:

▼  Create the User Directory.

▼  Install and configure Active Directory.

▼  Create an Organizational Unit (OU) for Maximo.

▼  Create a group called maximousers, under the Maximo OU.

▼  Create administrative users in the Maximo Active Directory, and assign them to an OU. Maximo requires these administrative users.

  ■  MAXADMIN
  ■  MAXREG
  ■  MXINTADM

▼  Assign these administrative users to the maximousers group.

**Configuring BEA WebLogic Security for Active Directory**

Before configuring Maximo to use BEA WebLogic and LDAP security:

1  Log in to the BEA WebLogic Server Console.

2  In the left pane, navigate to the Security > Realms > myrealm > Providers > Authentication folder.

3  Click **ActiveDirectoryAuthenticator**.
On the General tab, set the **Control Flag** field to **REQUIRED**. Click **Apply**.

On the Active Directory tab, modify these fields:

- **Host** - Enter the machine name or IP address of the LDAP server.
- **Principal** - Example:
  
  \[
  CN=Administrator,CN=Users,DC=Eagle,DC=maximo,DC=com
  \]

- **Credential** - Enter a password.

On the Users tab, make these modifications:

- In the **User Base DN** field, select an OU containing your users (example: MAXUSERS):
  
  \[
  ou=MAXUSERS,dc=eagle,dc=maximo,dc=com
  \]

  **NOTE** If you do not use Active Directory, skip this step.

- In the **User Name Attribute** field, enter:
  
  \[
  sAMAccountName
  \]

- In the **User From Name Filter** field, enter:
  
  \[
  (\&(sAMAccountName=%u)(objectclass=user))
  \]
7 Click **Apply** and continue.

8 On the Groups tab, edit the **Group Base DN** field. Point to the same OU as in the previous step:

   ou=MAXUSERS,dc=eagle,dc=maximo,dc=com

   Click **Apply**.

   Do not edit the Membership or Details tabs.

9 From the left pane of the BEA WebLogic Server Console, click **DefaultAuthenticator**.

10 On the General tab, set the **Control Flag** to **SUFFICIENT**. Click **Apply**.

   This setting lets administrators access BEA WebLogic using the BEA WebLogic account.

11 To verify that the users are synchronized to BEA WebLogic, go to **Security > Realms > myrealm > Users**.

   Check for errors and make sure the users you created in the Active Directory OU appear as BEA WebLogic users. If errors appear return to "Preliminary Tasks," on page 3-8, then rework this procedure.
To verify that the groups are synchronized to BEA WebLogic, go to Security > Realms > myrealm > Groups.

The groups you created in the Active Directory OU appear as BEA WebLogic groups:

13 Start the BEA WebLogic application server.

**NOTE** If the changes do not take effect immediately, try:

- clicking **Accept** twice
- restarting the BEA WebLogic server
Configuring WebSphere Security for Active Directory

Before configuring Maximo to use IBM WebSphere and LDAP security:

1. Login to the WebSphere Console.

2. In the left pane, navigate to the Security > Global security folder.

   On the Configuration tab, under the User Registries heading, click LDAP.

3. On the Configuration tab, edit these fields:
   - In the Server user ID field, enter the user ID that runs the WebSphere Distributed Application Server for security purposes. For example:
     `<principal>cn=devadmin,cn=users,dc=maximodev,dc=mro,dc=com</principal>`
   - In the Server user password field, enter a password.
   - In the Type field, enter Active Directory.
   - In the Host field, enter the machine name or IP address of the LDAP Server.
   - In the Base distinguished name (DN) field, enter Distinguished name of the directory service which indicates the starting point for LDAP searches in directory service. For example:
     `<basedn>ou=Bedford,dc=maximodev,dc=mro,dc=com</basedn>`
   - In the Bind distinguished name (DN) field, enter a distinguished name for the application server, which is used to bind to the directory service. For example:
     `<principal>cn=devadmin,cn=users,dc=maximodev,dc=mro,dc=com</principal>`
   - Enter a bind password
   - Click Apply.

4. On the Configuration tab, under the Additional Properties heading, click Advanced Lightweight Directory Access Protocol (LDAP) user registry settings. Edit these fields:
   - **NOTE** If you do not use Active Directory, skip this step.
   - In the User filter field, enter:
     `(&(!sAMAccountName=%u)(objectCategory=person)(objectClass=user))`
   - In the User ID map field, enter:
     `sAMAccountName`
   - Click OK.

5. Return to the Configuration tab, edit the following fields:
In the **Enable global security** field – check box.

In the **Enforce Java 2 security** field– uncheck box.

In the **Active User Registry** field, select Lightweight Directory Access Protocol (LDAP) user registry.

Click **OK**.

6 If validation occurs, click **Save** under the message box to save the configuration changes.

7 Complete the tasks in "Configuring Maximo," on page 3-16, then return to this procedure.

8 In the left pane, navigate to the Applications > Enterprise Applications folder. Click **Maximo**.

9 On the Configuration tab, under the Additional Properties heading, click **Map security roles to users/groups**.

10 Select maximouser, then do one of the following:

   ▼ click **Look up users** if you want to give individual users access to the Maximo application.

   ▼ click **Look up groups** if you want to give groups and users in groups access to the Maximo application.

11 For the Search String, do one of the following:

   ▼ for individual users, search on **max** for maximouser or *** for all users. Move Maximo users from the Available list to the Selected list by clicking the >> button.

   ▼ for groups, search on **max** for maximouser groups or ** for all users. Move Maximo user groups from the Available list to the Selected list by clicking the >> button.

This step authenticates users into the system. Click **OK** upon completion.

12 Click **OK** again.

13 Click **Save** under the message box to save the Enterprise Application configuration changes.

14 Click **Save** again to save the Enterprise Application configuration changes.

15 Click **OK** to synchronize changes with nodes.

16 In the left pane, navigate to the Servers> Application servers folder. Click **maximoserver** and start the server.
Synchronization

Synchronization keeps data in Maximo up-to-date with data in Active Directory. It is important to note that information moves in one direction only — from Active Directory to Maximo.

▼ First you create users and groups in Active Directory.

▼ When you synchronize users and groups created in Active Directory with Maximo, they become Maximo users and Maximo security groups.

In the following procedure, you set up a cron task to synchronize data.

1 Log into Maximo as an administrative user. Open the Cron Task Setup application.

2 Set the LDAPSYNC cron task to **Active**. Set a schedule.

   ![Cron Task Setup](image)

   Let the cron-task to run, to synchronize all the users and groups from LDAP Directory Server into Maximo database tables.

   **NOTE** If synchronization fails, the ldapsync.xml file settings are incorrect. Edit the file to correct the settings, then rebuild and redeploy the Maximo EAR file.

3 Verify that this screen opens when you log into Maximo.

   ![Connect to Catamount](image)
Data Mappings

The LDAP server maintains an attribute list for each user or group. Each attribute has an associated data type, which you can query the server to see. The LDAPSYNC cron task only supports string or character data retrieval from the LDAP server.

The data mappings in ldapsync.xml map LDAP attributes to Maximo table columns. For the LDAPSYNC cron task to create a database record, all the required columns must contain data. If all the required column data cannot be obtained from the LDAP Server, you must specify default values.

To fill in default values for columns the value must be enclosed inside {} brackets; for example, {ABC} fills in the value ABC in the column. Note the value is case sensitive.

The synchronization task also supports special substitute values to generate unique IDs and system dates automatically. To generate unique ID for a column, use the notation {:uniqueid} and to generate system date use the notation {:sysdate}.

Synchronization Tips

This section contains synchronization tips. As stated before, information moves in only one direction — from Active Directory to Maximo.

Deleting users and groups
Deleting Users and Security Groups on the Active Directory server does not delete them in Maximo. This restriction is for audit purposes of clients in regulated industries.

Disabling user accounts
Disabling a user account in Active Directory does not disable it in Maximo. You must manually disable it in Maximo.

If synchronization fails
If fields do not synchronize Active Directory to Maximo:

1. Check the ldapsync.xml file for typographical errors. If there are no errors in the file, continue with step 2.

2. Enable the attributes in the LDAP global catalog. You can install the Active Directory schema snap-in to set up an LDAP global catalog.

Renaming groups or users
Renaming a group or user in Active Directory does not rename it in Maximo. Maximo cannot identify the object if the primary name of the object has changed, so a new object is created instead.

Instead of renaming a group or user, delete it and create a new one.

Full name differs from user logon name
The application server synchronizes on cn (common name), which is the Full Name field in Active Directory.

To synchronize from the User logon name and log in to Maximo, the user name attribute must be correctly mapped in ldapsync.xml and the application server.
To configure Maximo to use application server security:

1 To enable application server authentication, edit maximo.properties, located in the `<Maximo root>\applications\maximo\properties` folder.

Uncomment `mxe.useAppServerSecurity`. Change the value to true. When it looks like this example, save your changes.

```java
// Enable the following setting if MAXIMO application is configured to use
// Application Server provided security. The default is to use MAXIMO security
// and the value is false. Setting this value to true implies that the
// MAXIMO security should be disabled. MAXIMO application would not work correctly
// if this setting is set to true and MAXIMO application is not configured to
// use Application Server security. The default value is false, if not set.

mxe.useAppServerSecurity=true
```

2 To enable application server login, edit the `web.xml` file, in this folder: `<Maximo root>\applications\maximo\maximouiweb \webmodule\WEB-INF`

Set the `useAppServerSecurity` environment entry to true, as in this example:

```xml
<env-entry>
    <description>Indicates whether to use Application Server security or not</description>
    <env-entry-name>useAppServerSecurity</env-entry-name>
    <env-entry-value>true</env-entry-value>
</env-entry>
```
3 In the same **web.xml** file, uncomment these lines:

```xml
<!--
  <security-constraint>
    <web-resource-collection>
      <web-resource-name>MAXIMO UI pages</web-resource-name>
      <description>pages accessible by authorised users</description>
      <url-pattern>/*</url-pattern>
      <http-method>GET</http-method>
      <http-method>POST</http-method>
    </web-resource-collection>
    <auth-constraint>
      <description>Roles that have access to MAXIMO UI</description>
      <role-name>maximouser</role-name>
    </auth-constraint>
    <user-data-constraint>
      <description>data transmission guarantee</description>
      <transport-guarantee>NONE</transport-guarantee>
    </user-data-constraint>
  </security-constraint>

  <login-config>
    <auth-method>BASIC</auth-method>
    <realm-name>MAXIMO Web Application Realm</realm-name>
  </login-config>
-->
```

4 In the same **web.xml** file, change the welcome screen to direct traffic into the `webclient/login/login.jsp`, not to index.html:

```xml
<!-- The welcome-file-list contains an ordered list of welcome files
   elements. -->
 <welcome-file-list>
   <!-- The welcome-file element contains file name to use as a default
   welcome file, such as index.html -->
   <welcome-file>/webclient/login/login.jsp</welcome-file>
 </welcome-file-list>
```

5 Modify the **ldapsynch.xml** file in the `<Maximo root>\applications\Maximo\properties` folder, to synchronize the Directory Server users and group data into Maximo database tables.
Modify these parameters, using this information.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Definition or Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;host&gt;</td>
<td>The machine name or IP address of the LDAP server</td>
</tr>
<tr>
<td>&lt;port&gt;</td>
<td>for example: 389 The standard port number for Directory Server is 389</td>
</tr>
<tr>
<td>&lt;principal&gt;</td>
<td>for example: CN=Administrator,CN=Users,DC=eagle,DC=maximo,DC=com</td>
</tr>
<tr>
<td>&lt;credential&gt;</td>
<td>enter a password</td>
</tr>
<tr>
<td>&lt;user&gt;&lt;basedn&gt;</td>
<td>for example: OU=MAXUSERS,DC=eagle, DC=maximo,DC=com</td>
</tr>
<tr>
<td>&lt;group&gt;&lt;basedn&gt;</td>
<td>for example: OU=MAXUSERS,DC=eagle, DC=maximo,DC=com</td>
</tr>
<tr>
<td>&lt;filter&gt;</td>
<td>(&amp;(objectCategory=person)(objectClass=user))</td>
</tr>
<tr>
<td>&lt;attributes&gt;</td>
<td>&lt;sAMAccountName&gt;</td>
</tr>
<tr>
<td>&lt;attribute&gt;</td>
<td>&lt;sAMAccountName&gt;</td>
</tr>
<tr>
<td>&lt;datamap&gt;</td>
<td>MAXUSER.USERID is mapped to sAMAccountName from Directory Server.</td>
</tr>
<tr>
<td>&lt;table name=&quot;Maximo table&quot;&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Maximo is enabled to use application server security.

6 Build the Maximo EAR file:

- Open a Command Prompt.
- Change directory to your \Maximo\deployment folder, for example:
  
  C:\Maximo\deployment
- Type `buildmaximoear`. Press Enter.

7 Deploy the EAR file in the appropriate application server.

- For BEA WebLogic, see "Deploying EAR Files," on page 25-9.
- For WebSphere, see "Deploying EAR Files," on page 27-13.
Modify your Actuate Reporting Server to use Application Server Security:

a Open the rsse_maximo.properties file in the following directory:

\<Actuate_home>\iserver\bin\com\actatue\ExternalText\

b Set the ldap.enabled property to true:

ldap.enabled=true

c Modify the rsse_maximo.properties file by using the settings in the ldapsynch.xml file that you modified in step 5. Refer to the following table:

<table>
<thead>
<tr>
<th>rsse_maximo.property</th>
<th>ldapsynch.xml</th>
</tr>
</thead>
<tbody>
<tr>
<td>ldap.context.factory</td>
<td>com.sun.jndi.ldap.LdapCtxFactory</td>
</tr>
<tr>
<td>ldap.provider.url</td>
<td>ldap://&lt;server host&gt;:&lt;port number&gt;</td>
</tr>
<tr>
<td></td>
<td>where</td>
</tr>
<tr>
<td></td>
<td>▼ &lt;server host&gt; is the name of the LDAP server.</td>
</tr>
<tr>
<td></td>
<td>▼ &lt;port number&gt; is the port number of the LDAP server.</td>
</tr>
<tr>
<td>ldap.user.basedn</td>
<td>user.basedn</td>
</tr>
</tbody>
</table>

d Save and close the rsse_maximo.properties file.

e Stop the Process Management Daemon (PMD) Service.

f Restart the PMD Service.

NOTE For information about starting the PMD Service, refer to your IBM Maximo Installation Guide.

g Log in to Management Console as Administrator or through an administrator account. Verify that you can access your reports in Maximo.
Maximo utilizes the data types, Crypto, and CryptoX, for encrypting passwords and other types of confidential information.

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Data Stored</th>
<th>Algorithm</th>
</tr>
</thead>
</table>
| CryptoX   | User passwords                  | ▼ One-way encryption  
|           |                                 | ▼ Stores password in encrypted format (cannot be decrypted or displayed)  
|           |                                 | ▼ Internally, Maximo uses the encrypted version |
| Crypto    | Information you want to decrypt for display | ▼ Two-way encryption  
|           |                                 | ▼ Information can be decrypted and displayed to users |

Maximo uses the Sun™ Java Cryptography Extension (JCE) to perform encryption. This technology can utilize variables (for example, Provider, Mode, Padding, Key, and Spec) to transform the input data into encrypted data. By default, Maximo uses the DESede algorithm and its defaults for the other values. Crypto and CryptoX use the DESede encryption algorithm.

### Modifying Encryption Settings

In the maximo.properties file, you can configure encryption data types options to be consistent with industry and government guidelines:

- Key
- Mode
- Padding
- Spec

<table>
<thead>
<tr>
<th>Encryption Property Name</th>
<th>Settings for JCE and DESede</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.security.crypto.key</td>
<td>Length must be a multiple of 24</td>
</tr>
<tr>
<td>mxe.security.cryptox.key</td>
<td></td>
</tr>
<tr>
<td>mxe.security.crypto.mode</td>
<td>CBC: Cipher Block Chaining Mode</td>
</tr>
<tr>
<td>mxe.security.cryptox.mode</td>
<td>CFB: Cipher Feedback Mode</td>
</tr>
<tr>
<td></td>
<td>ECB: Electronic Codebook Mode</td>
</tr>
<tr>
<td></td>
<td>OFB: Output Feedback Mode</td>
</tr>
<tr>
<td></td>
<td>PCBC: Propagating Cipher Block Chaining</td>
</tr>
<tr>
<td>mxe.security.crypto.padding</td>
<td>NoPadding</td>
</tr>
<tr>
<td>mxe.security.cryptox.padding</td>
<td>PKCS5Padding</td>
</tr>
</tbody>
</table>
Using Encryption

You can encrypt files to provide additional security. The following files reside in the `<Maximo root>\applications\Maximo\properties` folder.

<table>
<thead>
<tr>
<th>Files you can encrypt</th>
<th>Properties you can encrypt</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximo.properties</td>
<td>▼ mxe.db.password</td>
</tr>
<tr>
<td></td>
<td>▼ mxe.system.regpassword</td>
</tr>
<tr>
<td></td>
<td>▼ mxe.report.bo.rptServerLogonPass</td>
</tr>
</tbody>
</table>

Located in additionalmaximo.properties by default — you must copy it into maximo.properties before you can encrypt it.

<table>
<thead>
<tr>
<th>ldapsync.xml</th>
<th>The credential attribute. For example:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;credential&gt;&lt;password&lt;/credential&gt;</td>
</tr>
</tbody>
</table>

When you encrypt a file, it leaves behind the unencrypted original. For security purposes, store the unencrypted original somewhere outside the Maximo file structure.

1. Use a text editor to modify maximo.properties or ldapsync.xml.
2. Open a command shell and navigate to `<Maximo root>\tools\maximo` folder.
3. Type `encryptproperties` to run the batch file. The old files are renamed with an `_orig` extension:
   ▼ maximo.properties_orig
   ▼ ldapsync.xml_orig
4. Confirm that the new file contains an encryption string at the very end.
5. Store the unencrypted originals—the ones with the `_orig` extension—somewhere outside the Maximo file structure.
Encrypting Additional Properties

You can encrypt additional properties — in addition to the ones listed in the preceding topic.

1. Open encrypt.properties in a text editor.
2. Add the additional properties you want to encrypt.
3. Run the encryption procedure listed in the preceding topic.

**NOTE** The additional encrypted properties must be decrypted wherever they are used in the application. Your development team is responsible for this customizing.

Editing Encrypted Files

If you want to edit a file that you already encrypted, follow this process:

- Delete the encrypted maximo.properties and ldapsycn.xml files.
- Restore the unencrypted originals back into the `<Maximo root>\applications\Maximo\properties` folder.
- Remove the _orig extensions from both files.
- Make your changes, then re-encrypt the files.

Single Sign On

Single sign on (SSO) is an authentication process that permits a user to enter one name and password in order to access multiple applications. When a user authenticates with the server, the single sign on application authenticates the user to access all of the applications that they have been given rights to on the server. This authentication eliminates the need to enter multiple passwords when the user switches applications during a particular session.

**NOTE** IBM Corporation has developed Maximo with the flexibility to integrate with SSO systems, but we do not provide software or support for an SSO system.

Maximo can participate in an SSO environment when you enable application server authentication. Both BEA WebLogic and IBM WebSphere support an SSO environment. Various vendors provide SSO platforms that are compatible with BEA WebLogic and IBM WebSphere.

Configuration for a single sign on system depends on your implementation. For more information about how to configure your SSO environment so that Maximo can participate, see the documentation for your SSO platform and your application server.

**NOTE** In order for Maximo reports to function, you must also configure your report server to support an SSO environment.
You use the Database Configuration application to create or modify the objects and attributes that Maximo applications use, and customize the database.

The settings specified in the Microsoft Windows Control Panel can affect how Maximo formats numbers, currencies, dates, and time. You can specify the settings for each client machine using the Regional and Language options of the Control Panel.

NOTE The Database Configuration Help contains information that is not included in this chapter.

Data Dictionary

The structure of a relational database is stored in the Data Dictionary of the database.

CAUTION User error can corrupt the Maximo data dictionary. The only way to recover is to restore from a backup. Back up your data often.

Database structure lets you interpret data, and to see patterns and trends. When you know how your data is structured, it makes it easier to retrieve.

<table>
<thead>
<tr>
<th>Table Name</th>
<th>List includes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXOBJECT</td>
<td>All Maximo objects. Links an object to its table or view.</td>
</tr>
<tr>
<td>MAXTABLE</td>
<td>All Maximo tables.</td>
</tr>
<tr>
<td>MAXVIEW</td>
<td>All Maximo views.</td>
</tr>
<tr>
<td>MAXATTRIBUTE</td>
<td>All attributes of an object. A table or view attribute depends on the attributes of the object.</td>
</tr>
<tr>
<td>MAXVIEWCOLUMN</td>
<td>All view columns.</td>
</tr>
<tr>
<td>MAXRELATIONSHIP</td>
<td>All relationships defined on objects.</td>
</tr>
<tr>
<td>MAXSEQUENCE</td>
<td>All sequences used in Maximo. In SQL Server, the sequences are internally generated from this table, but Oracle and IBM DB2 use database sequence generators.</td>
</tr>
<tr>
<td>MAXSYSINDEXES</td>
<td>All indexes used in Maximo.</td>
</tr>
</tbody>
</table>
Reserved Words for IBM DB2 Version 8.2

For the most current list, refer to the IBM Web site and search for “reserved words.”

**NOTE** In addition to these reserved words, IBM DB2 uses system-generated names beginning with "SYS_" for implicitly generated schema objects and subobjects. IBM discourages you from using this prefix in the names you explicitly provide to your schema objects and subobjects to avoid possible conflict in name resolution.

Attributes whose input values must be verified as not being a reserved word are checked against the native database. If the check generates an error, Maximo concludes that it is a reserved word.

<table>
<thead>
<tr>
<th>RESERVED WORD</th>
<th>EXTERNAL WORD</th>
<th>YIELDING WORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD</td>
<td>EXTERNAL</td>
<td>PARAMETER</td>
</tr>
<tr>
<td>AFTER</td>
<td>FENCED</td>
<td>PART</td>
</tr>
<tr>
<td>ALIAS</td>
<td>FETCH</td>
<td>PARTITION</td>
</tr>
<tr>
<td>ALL</td>
<td>FIELDPROC</td>
<td>PATH</td>
</tr>
<tr>
<td>ALLOCATE</td>
<td>FILE</td>
<td>PIECESIZE</td>
</tr>
<tr>
<td>ALLOW</td>
<td>FINAL</td>
<td>PLAN</td>
</tr>
<tr>
<td>ALTER</td>
<td>FOR</td>
<td>POSITION</td>
</tr>
<tr>
<td>AND</td>
<td>FOREIGN</td>
<td>PRECISION</td>
</tr>
<tr>
<td>ANY</td>
<td>FREE</td>
<td>PREPARE</td>
</tr>
<tr>
<td>APPLICATION</td>
<td>FROM</td>
<td>PRIMARY</td>
</tr>
<tr>
<td>AS</td>
<td>FULL</td>
<td>PRIQTY</td>
</tr>
<tr>
<td>ASSOCIATE</td>
<td>FUNCTION</td>
<td>PRIVILEGES</td>
</tr>
<tr>
<td>ASUETIME</td>
<td>GENERAL</td>
<td>PROCEDURE</td>
</tr>
<tr>
<td>AUDIT</td>
<td>GENERATED</td>
<td>PROGRAM</td>
</tr>
<tr>
<td>AUTHORIZATION</td>
<td>GET</td>
<td>PSID</td>
</tr>
<tr>
<td>AUX</td>
<td>GLOBAL</td>
<td>QUERYNO</td>
</tr>
<tr>
<td>AUXILIARY</td>
<td>GO</td>
<td>READ</td>
</tr>
<tr>
<td>BEFORE</td>
<td>GOTO</td>
<td>READS</td>
</tr>
<tr>
<td>BEGIN</td>
<td>GRANT</td>
<td>RECOVERY</td>
</tr>
<tr>
<td>BETWEEN</td>
<td>GRAPHIC</td>
<td>REFERENCES</td>
</tr>
<tr>
<td>BINARY</td>
<td>GROUP</td>
<td>REFERENCING</td>
</tr>
<tr>
<td>BUFFERPOOL</td>
<td>HANDLER</td>
<td>RELEASE</td>
</tr>
<tr>
<td>BY</td>
<td>HAVING</td>
<td>RENAME</td>
</tr>
<tr>
<td>CACHE</td>
<td>HOLD</td>
<td>REPEAT</td>
</tr>
<tr>
<td>CALL</td>
<td>HOUR</td>
<td>RESET</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>-------</td>
</tr>
<tr>
<td>CALLED</td>
<td>HOURS</td>
<td>RESIGNAL</td>
</tr>
<tr>
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### Reserved Words for Oracle Version 9.2

For the latest list, see the Oracle Web site and search for "reserved words."

**NOTE**
In addition to these reserved words, Oracle uses system-generated names beginning with "SYS_" for implicitly generated schema objects and subobjects. Oracle discourages you from using this prefix in the names you explicitly provide to your schema objects and subobjects to avoid possible conflict in name resolution.

Attributes whose input values must be verified as not being a reserved word are checked against the native database. If the check generates an error, Maximo concludes that it is a reserved word.

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* These words are also ANSI-reserved.
Reserved Words for SQL Server

Microsoft SQL Server™ 2000 uses reserved keywords for defining, manipulating, and accessing databases. They are part of the grammar used by SQL Server to parse and understand Transact-SQL statements and batches.

Although it is syntactically possible to use SQL Server reserved keywords as identifiers and object names in Transact-SQL scripts, this can be done only using delimited identifiers.


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<td>FROM</td>
<td>REFERENCES</td>
</tr>
<tr>
<td>BULK</td>
<td>FULL</td>
<td>REPETITION</td>
</tr>
<tr>
<td>BY</td>
<td>FUNCTION</td>
<td>RESTORE</td>
</tr>
<tr>
<td>CASCADE</td>
<td>GOTO</td>
<td>RESTRICT</td>
</tr>
<tr>
<td>CASE</td>
<td>GRANT</td>
<td>RETURN</td>
</tr>
<tr>
<td>CHECK</td>
<td>GROUP</td>
<td>REVOKE</td>
</tr>
<tr>
<td>CHECKPOINT</td>
<td>HAVING</td>
<td>RIGHT</td>
</tr>
<tr>
<td>CLOSE</td>
<td>HOLDLOCK</td>
<td>ROLLBACK</td>
</tr>
<tr>
<td>CLUSTERED</td>
<td>IDENTITY</td>
<td>ROWCOUNT</td>
</tr>
<tr>
<td>COALESCE</td>
<td>IDENTITY_INSERT</td>
<td>ROWGUIDCOL</td>
</tr>
<tr>
<td>COLLATE</td>
<td>IDENTITYCOL</td>
<td>RULE</td>
</tr>
<tr>
<td>COLUMN</td>
<td>IF</td>
<td>SAVE</td>
</tr>
<tr>
<td>COMMIT</td>
<td>IN</td>
<td>SCHEMA</td>
</tr>
<tr>
<td>COMPUTE</td>
<td>INDEX</td>
<td>SELECT</td>
</tr>
</tbody>
</table>
Reserved Words for SQL Server

<table>
<thead>
<tr>
<th>CONSTRAINT</th>
<th>INNER</th>
<th>SESSION_USER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTAINS</td>
<td>INSERT</td>
<td>SET</td>
</tr>
<tr>
<td>CONTAINSTABLE</td>
<td>INTERSECT</td>
<td>SETUSER</td>
</tr>
<tr>
<td>CONTINUE</td>
<td>INTO</td>
<td>SHUTDOWN</td>
</tr>
<tr>
<td>CONVERT</td>
<td>IS</td>
<td>SOME</td>
</tr>
<tr>
<td>CREATE</td>
<td>JOIN</td>
<td>STATISTICS</td>
</tr>
<tr>
<td>CROSS</td>
<td>KEY</td>
<td>SYSTEM_USER</td>
</tr>
<tr>
<td>CURRENT</td>
<td>KILL</td>
<td>TABLE</td>
</tr>
<tr>
<td>CURRENT_DATE</td>
<td>LEFT</td>
<td>TEXTSIZE</td>
</tr>
<tr>
<td>CURRENT_TIME</td>
<td>LIKE</td>
<td>THEN</td>
</tr>
<tr>
<td>CURRENT_TIMESTAMP</td>
<td>LINENO</td>
<td>TO</td>
</tr>
<tr>
<td>CURRENT_USER</td>
<td>LOAD</td>
<td>TOP</td>
</tr>
<tr>
<td>CURSOR</td>
<td>NATIONAL</td>
<td>TRAN</td>
</tr>
<tr>
<td>DATABASE</td>
<td>NOCHECK</td>
<td>TRANSACTION</td>
</tr>
<tr>
<td>DBCC</td>
<td>NONCLUSTERED</td>
<td>TRIGGER</td>
</tr>
<tr>
<td>DEALLOCATE</td>
<td>NOT</td>
<td>TRUNCATE</td>
</tr>
<tr>
<td>DECLARE</td>
<td>NULL</td>
<td>TSEQUAL</td>
</tr>
<tr>
<td>DEFAULT</td>
<td>NULLIF</td>
<td>UNION</td>
</tr>
<tr>
<td>DELETE</td>
<td>OF</td>
<td>UNIQUE</td>
</tr>
<tr>
<td>DENY</td>
<td>OFF</td>
<td>UPDATE</td>
</tr>
<tr>
<td>DESC</td>
<td>OFFSETS</td>
<td>UPDATETEXT</td>
</tr>
<tr>
<td>DISK</td>
<td>ON</td>
<td>USE</td>
</tr>
<tr>
<td>DISTINCT</td>
<td>OPEN</td>
<td>USER</td>
</tr>
<tr>
<td>DISTRIBUTED</td>
<td>OPENDATASOURCE</td>
<td>VALUES</td>
</tr>
<tr>
<td>DOUBLE VARYING</td>
<td>OPENQUERY</td>
<td></td>
</tr>
<tr>
<td>DROP</td>
<td>OPENROWSET</td>
<td>VIEW</td>
</tr>
<tr>
<td>DUMMY</td>
<td>OPENXML</td>
<td>WAITFOR</td>
</tr>
<tr>
<td>DUMP</td>
<td>OPTION</td>
<td>WHEN</td>
</tr>
<tr>
<td>ELSE</td>
<td>OR</td>
<td>WHERE</td>
</tr>
<tr>
<td>END</td>
<td>ORDER</td>
<td>WHILE</td>
</tr>
<tr>
<td>ERRlvl</td>
<td>OUTER</td>
<td>WITH</td>
</tr>
<tr>
<td>ESCAPE</td>
<td>OVER</td>
<td>Writetext</td>
</tr>
</tbody>
</table>
The Database Configuration Menu

The following actions are available from the Select Action menu of the Database Configuration application.

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delete Object</td>
<td>Marks the object for deletion. Objects are not deleted until you apply configuration changes.</td>
</tr>
<tr>
<td>Apply Configuration Changes</td>
<td>Changes are written to a secondary table until you apply them. You apply changes by shutting down the application server and running configdb from the command line. For instructions, see &quot;Configuring the Database,&quot; on page 4-25.</td>
</tr>
<tr>
<td>Discard Configuration Changes</td>
<td>Discards changes that are not applied. The content of the Configuration objects, which holds the changes until they are applied, is cleared and reloaded with active Metadata values.</td>
</tr>
<tr>
<td>Delete Backup Tables</td>
<td>If applicable, the dialog box presents a list of backed up objects. You can select backup objects to delete, but cannot reconfigure the database until all are deleted.</td>
</tr>
<tr>
<td>Update Statistics</td>
<td>Improves database performance by reorganizing indexes.</td>
</tr>
<tr>
<td>Refresh Index Tables</td>
<td>Checks the database indexes and reloads into the Maximo index metadata.</td>
</tr>
<tr>
<td>Field Length and Format</td>
<td>Used to view or change the amount field format (length and decimal precision) and the Integer and Smallint fields.</td>
</tr>
<tr>
<td>GL Account Configuration</td>
<td>Specifies the General Ledger account code format, including component field lengths and types, and Delimiters.</td>
</tr>
<tr>
<td>Manage eSig Actions</td>
<td>Enables eSignature on actions within an application. Lists applications and associated actions.</td>
</tr>
<tr>
<td>Add to Bookmarks</td>
<td>Lets you access the current record later from the List tab.</td>
</tr>
<tr>
<td>Run Reports</td>
<td>Lists the available reports. Select a report title and set parameters, then click Submit.</td>
</tr>
</tbody>
</table>

The Object Tab

An object is a self-contained software entity that consists of both data and functions for manipulating data. Every Maximo application is associated with an object.

When you use the Database Configuration application, you interact at the business object level. Internally, the application determines the actions to take on the tables to support the business objects’ needs.

A database table stores several objects; each has different business rules. For example, the TICKET table defines Incident, Problem, and Ticket business objects.
In addition, a business object can span more than one database table. Views represent objects that span multiple tables. For more information about views, see "Creating Views," on page 4-18.

With the business object layer, the system tables that you must not modify are hidden from the UI (you can look at them, however). Some tables contain modifiable columns, which display the appropriate attributes to correspond to those columns.

The Object tab lets you configure individual database objects.

Creating or Modifying an Object

An object is a self-contained software entity that consists of both data and functions for manipulating data. An object can be associated with a table or a view; they can be persistent or non-persistent. You can create user-defined objects in addition to existing Maximo objects (typically for custom applications). You specify the number of columns and their attribute definitions.

You should use an abbreviation of your organization as a prefix to any new object or attribute name, for example, ACME_EXTRATABLE or ACME_MEMOFIELD. This prefix prevents accidentally choosing a database reserved word and prevents conflicts with new standard names in an upgrade.

1. On the Maximo tool bar, click New Object, or select an object from the List tab.
2. Enter a name in the Object field. Enter a description.
3. To use Views, click the lookup and select a value in the Extends Object field.

When you tab out, View? becomes checked. If the view joins two tables, you can enter the name for the second one under Join To Object.
The Object Tab

4 Complete the appropriate fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description / Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level*</td>
<td>Click the lookup and select a value. For definitions of these terms, see &quot;Site and Organization Types,&quot; on page 4-38.</td>
</tr>
<tr>
<td>Main Object?*</td>
<td>To make the object a main object for Workflow, check this box.</td>
</tr>
<tr>
<td>Persistent?</td>
<td>If the object is persistent, three attributes are automatically created: ID, description, and rowstamp (if selected). If the object is non-persistent, nothing is added for attributes, but you cannot configure the database without creating at least one attribute for the object.</td>
</tr>
<tr>
<td>Storage Partition*</td>
<td>If applicable to your database, click <strong>Detail</strong> and select a storage partition for the object. A database storage partition is the physical location where a database object is located on a disk. Database storage partitions are called tablespaces in IBM DB2 and Oracle, and called segments in Microsoft SQL Server. The database administrator must configure the value list <strong>DBSTORAGEPARTITION</strong> to include a valid list of tablespaces/segments available to Maximo. (For example, avoid creating objects in the SYSTEM tablespace.)</td>
</tr>
<tr>
<td>User Defined?</td>
<td>The object is a regular Maximo object (User Defined = 0) or an administrator created object (User Defined = 1). If the <strong>User Defined?</strong> check box is checked, the value in the <strong>Imported</strong> field indicates how the object was defined: ▼ <strong>Imported = 0</strong> — the object was defined using the Database Configuration application. ▼ <strong>Imported = 1</strong> — the object was not defined using Database Configuration.</td>
</tr>
<tr>
<td>Unique Column</td>
<td>The name of the attribute that will be created as a unique identifier on a persistent object. This value is used in indexing.</td>
</tr>
</tbody>
</table>
The Object Tab

*Fields you can modify in existing Maximo objects

5 Click **Save Object**.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description / Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Table</td>
<td>To enable this object for multiple languages, specify a value. The convention is $L_{&lt;tablename&gt;}$. For information about multiple language implementations, see Appendix A, &quot;Configuring Maximo With Multiple Languages,&quot; on page A-1.</td>
</tr>
<tr>
<td>View (in the View section)</td>
<td>Select the View check box. You can edit the View Where, Join to Object, View Select, Automatically Select, and View From fields. For information about views, see &quot;Creating Views,&quot; on page 4-18.</td>
</tr>
<tr>
<td>Audit Enabled? (in the Audit section)*</td>
<td>Check to enable electronic audit records. You can: ▼ Edit the default Audit Table name and the E-audit filter field. ▼ Enter the E-signature filter field regardless of the Audit setting. For information about these features, see &quot;Electronic Signatures and Audit Records,&quot; on page 4-28.</td>
</tr>
<tr>
<td>Text Search Enabled?*</td>
<td>Select to enable text search on the object. You can use this with text search on attributes.</td>
</tr>
</tbody>
</table>

*Fields you can modify in existing Maximo objects

Deleting User-Defined Objects

You cannot delete Maximo objects from the database, but you can delete user-defined objects. Deleting objects also deletes associated indexes and relationships.

1 Select the object from the List tab.

2 Choose **Select Actions > Delete Object**.
The Attributes Tab

A message explains that any data in the object will be deleted and asks whether to continue. The **Status** field reads “To Be Deleted.”

3 Configure the database. For instructions, see "Configuring the Database," on page 4-25.

**NOTE** If the object is imported, only the Maximo Metadata is deleted. The base table is not deleted. The metadata exists in Maximo (maxattribute, and so on) and in the DBMS (Oracle metadata, for example).

**Saving Changes to the Database**

You save changes, but they do not take effect until you configure the database. You can finish modifying all relevant tabs, then configure the database.

Saving stores your changes in temporary database configuration objects but does not implement them in the database. Before configuring the database, you can close and reopen the Database Configuration application without losing saved changes.

A secondary table stores pending changes, which also appear in the **Status** field. You cannot query on **Status**.

<table>
<thead>
<tr>
<th>List</th>
<th>Object</th>
<th>Attributes</th>
<th>Index</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Advanced Search</th>
<th>Save Query</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>1-20 of 744</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>Object</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>To Be Added</th>
<th>ADDRESS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>To Be Changed</th>
<th>ADDRESS</th>
</tr>
</thead>
</table>

| To Be Changed | CALENDAR |

**The Attributes Tab**

Each database record contains multiple attributes. For example, the ASSET object contains ASSETID, DESCRIPTION, and GLACCOUNT. You can use the Attributes tab to modify existing attributes or add attributes to the database record.

**Maximo Data Types**

Every attribute has an associated data type.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALN</td>
<td>Alphanumeric characters, mixed case. Maximum length depends on the database.</td>
</tr>
</tbody>
</table>

- Oracle = 4000 characters
- SQL Server = 8000 characters
- IBM DB2 = 32672 characters
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMOUNT</td>
<td>Decimal number, used for currency</td>
</tr>
<tr>
<td>BLOB</td>
<td>Binary Large Object. Stores JPEGs, movies, or PDFs in single records inside the database instead of in external files.</td>
</tr>
<tr>
<td>CLOB</td>
<td>Character Large Object.</td>
</tr>
<tr>
<td>CRYPTO</td>
<td>Encrypted binary. Encrypts data on the screen and in the database. Used for passwords.</td>
</tr>
<tr>
<td>CRYPTOX</td>
<td>Encrypted binary (one-way). Encrypts data in the database, but leaves it readable on the screen. Used for password hints.</td>
</tr>
<tr>
<td>DATE</td>
<td>Date only, no time</td>
</tr>
<tr>
<td>DATETIME</td>
<td>Date and time</td>
</tr>
<tr>
<td>DECIMAL</td>
<td>Decimal number. A number including an integer and a fraction that consists of a fixed number of digits called the scale.</td>
</tr>
<tr>
<td>DURATION</td>
<td>Displays as 1:30 = 1.5 hours</td>
</tr>
<tr>
<td>FLOAT</td>
<td>Floating number. Numbers with fractional portions with variable precision.</td>
</tr>
<tr>
<td>GL</td>
<td>General Ledger account. An ALN that Maximo uses for GL Accounts. Use this type for GL Accounts.</td>
</tr>
<tr>
<td>INTEGER</td>
<td>Integer number</td>
</tr>
<tr>
<td>LONGALN</td>
<td>Long Alphanumeric. Oracle LONG is a character type whose max length = (2**31)-1, but in Maximo, only 32767.</td>
</tr>
<tr>
<td>LOWER</td>
<td>Lowercase characters</td>
</tr>
<tr>
<td>SMALLINT</td>
<td>Small integer</td>
</tr>
<tr>
<td>TIME</td>
<td>Time only</td>
</tr>
<tr>
<td>UPPER</td>
<td>Uppercase characters</td>
</tr>
<tr>
<td>YORN</td>
<td>Yes or No (1 or 0 in the database)</td>
</tr>
</tbody>
</table>

**NOTE** In Maximo LONGALN is used only for non-persistent Long Description attributes. The corresponding native column in the database is defined as CLOB.
Modifying Attributes

Before modifying an attribute, verify whether it was created by IBM Corporation or someone at your site (the User Defined? box is checked). You cannot delete attributes created by IBM Corporation.

Attributes created by IBM Corporation have more restrictions on modifications than user-defined attributes. Some restrictions depend on whether text search is enabled for the object, or on the data type.

For example, certain data types have a set value for the length, scale, dates, or integers. The Memo field is a regular ALN and you can make it anything you want.

The rules governing modifications are complex, and vary by attribute.

1. Click the Attributes tab > View Details icon.

2. Go to the relevant row of the table window and change the attribute definition as needed. Attribute definitions include those definitions in the previous figure.

   See Field Help (Alt+F1) for information on the attribute definitions. Some are read-only, depending on values in other fields.

3. Save your changes.

4. Shut down the Maximo Application Server. Configure the database and restart Maximo. For instructions, see "Configuring the Database," on page 4-25.
NOTE If you plan to install IBM Maximo Asset Navigator, do not exceed the field lengths for the following columns. Otherwise, data synchronization might fail.

<table>
<thead>
<tr>
<th>Table.Column</th>
<th>Maximum Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>item.itemnum</td>
<td>60</td>
</tr>
<tr>
<td>item.description</td>
<td>250</td>
</tr>
<tr>
<td>item.stocktype</td>
<td>20</td>
</tr>
<tr>
<td>asset.eqnum</td>
<td>15</td>
</tr>
<tr>
<td>sset.description</td>
<td>50</td>
</tr>
<tr>
<td>asset.location</td>
<td>40</td>
</tr>
<tr>
<td>inventory.modelnum</td>
<td>60</td>
</tr>
<tr>
<td>inventory.manufacturer</td>
<td>40</td>
</tr>
</tbody>
</table>

Adding Attributes to Maximo Objects

You should use an abbreviation of your organization as a prefix to any new object or attribute name, for example, ACME_EXTRATABLE or ACME_MEMOFIELD. This practice prevents accidentally choosing a database reserved word and prevents conflicts with new standard names in an upgrade.

NOTE New attributes are accessible in the UI by first adding them to the respective application using the Application Designer functionality of Maximo. Application Designer is found under Configuration module of Maximo.

1. Select the object from the List tab.
2. Click the Attributes tab > **New Row**.
3. Enter a name.
4. (Optional) Add information to the **Description** field.
5. Select a data **Type** from the lookup list.
6. Continue modifying fields as needed. Use the field help if necessary. Some fields are read-only, depending on values in other fields.
7. Save your modifications. The status of the object is “To Be Changed” until you configure the database. For instructions, see "Configuring the Database," on page 4-25.
Deleting User-Defined Attributes from the Database

You can delete attributes from user-defined objects, and user-defined attributes from Maximo objects.

**NOTE** Before deleting a user-defined attribute, use the Indexes tab to see whether an index uses the attribute. If so, delete the index. You can recreate the index without the attribute you deleted.

1. Select the object from the List tab.
2. Click the Attributes tab.
3. In the Attributes table window, click the appropriate row.
4. Click the **Mark Row for Delete** button.
   
   The **Status** field in the table window displays “Delete.”
5. Save the record.
6. Configure the database. For instructions, see "Configuring the Database," on page 4-25.

Creating Views

Tables can contain many columns and rows. Relevant information includes:

- Only some of the columns
- Only rows that satisfy a certain condition
- Some columns of one table and some columns of a related table

To filter data, you can create a view: a subset of a database that an application can process. It might contain parts of one or more tables.

A view does not contain data. Instead, it is a definition that sits in the data dictionary, along with a database query that retrieves its data. Thus a view can contain data from more than one object, row, or attribute.

When you fetch the data from a view, the database pulls the necessary records based on the WHERE clause and returns the data.

Attributes are loaded when you create a view object.

**Purpose**

Since views are stored as named queries, you can use them to store frequently used, complex queries. Run the queries using the name of the view in a simple query.
The previous view is a subset of a table. Automatically Select is enabled. This setting applies the “choose all columns of the table” clause to all the columns of the single object. By default, the View Select and View From fields are blanked out.

The previous figure does not contain a WHERE clause and Automatically Select is disabled. Therefore the view is created from all columns specified in the View Select field using the FROM clause in the View From field.

View Select is optional; when it is not specified, all columns in both tables are included.

The View in the previous figure is created from the objects listed in the View From field: DEPLOYEDASSET, DPRCOMPUTER, and DPAMMANUARIANT.

In this example, the Extends Object is the primary table connected to the view. Space can become an issue; the length of a database query is ≤ 4000 characters.
Indexes Tab

Use the Indexes tab to create new indexes for the selected object, and to display or delete (drop) existing indexes.

**NOTE** With inherited objects, you can never use the Indexes tab.

Use indexes to optimize performance for fetching data. They provide pointers to locations of frequently accessed data. You can create an index on the columns in an object that you frequently query.

<table>
<thead>
<tr>
<th>Table window</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indexes</td>
<td>Shows indexes associated with the object</td>
</tr>
<tr>
<td>Columns</td>
<td>Shows the columns in the selected index</td>
</tr>
</tbody>
</table>

To view an existing index definition, select it from the Indexes table window. Database Configuration displays the columns included in the index in the Columns table window.

**NOTE** You cannot redefine existing indexes. You delete them and recreate their definitions.

The **Database Storage Partition** field lets you select a storage partition for an index.
Creating an Index

1. In the List tab, select the object for which you want to create an index.

2. Click the Indexes tab.

   **NOTE**  You can create indexes for audit objects; however, they should not be unique indexes.

3. Click **New Row** in the Indexes table window.

4. Enter a name.

5. To make the data in the indexed attributes unique, check the **Enforce Uniqueness** box.

6. If applicable to your database, click **Detail** in the **Storage Partition** field and select a storage partition for the index.

7. For SQL Server only (optional): check the **Clustered Index** box to create a clustered index.

   A clustered index determines the physical order of data in a table. It is analogous to a telephone directory, which arranges data by last name. Because it dictates the physical storage order of the data in the table, an object can contain only one clustered index.

   **NOTE**  On SQL Server, you cannot enable text searching for indexes.

8. To add an attribute to the index, click **New Row** in the Columns table window.

9. Use **Select Value** to add a column.

10. To make indexes in ascending order, check the **Ascending** box. The Columns table window displays the attribute you added. The order in which you add columns determines their sequence.

11. To add columns, click **New Row**.

12. Save the record.

13. Configure the database. For instructions, see "Configuring the Database," on page 4-25.
Indexes Tab

Deleting an Index

1  Use the List tab to select the relevant object, then click the Indexes tab.

2  From the Indexes table window, select the appropriate index.

3  Click the **Mark Row for Delete** button.

   The **Status** field in the table window displays “Delete.”

4  Save the record.

5  Configure the database. For instructions, see "Configuring the Database," on page 4-25.

Refreshing Index Tables

You can define indexes via the back end to test for improved performance before defining indexes as Maximo metadata. SQL Server can add indexes to an object depending on usage, and after building them, you can update the Maximo metadata. Then, refresh your index tables.

   The Refresh Index Tables action looks at the indexes defined on the native database, then loads the actual index into Maximo.

1  Choose **Select Action > Refresh Index Tables**.

2  To refresh the index metadata, click **OK**.
Database Relationships

Database relationships are associations between tables, which are like family relationships:

<table>
<thead>
<tr>
<th>Type of relationship</th>
<th>Description</th>
<th>Analogy</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-to-one</td>
<td>Both tables can have only one record on each side of the relationship.</td>
<td>Spouse + spouse</td>
</tr>
<tr>
<td></td>
<td>Each primary key value relates to only one (or no) record in the related table.</td>
<td>If you are married, you and your spouse each have one spouse.</td>
</tr>
<tr>
<td></td>
<td>Most one-to-one relationships are forced by business rules and do not flow naturally from the data. Without such a rule, you can usually combine both tables without breaking any normalization rules.</td>
<td></td>
</tr>
<tr>
<td>One-to-many</td>
<td>The primary key table contains only one record that relates to none, one, or many records in the related table.</td>
<td>You + parent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You have only one mother, but she might have several children.</td>
</tr>
<tr>
<td>Many-to-many</td>
<td>Each record in both tables can relate to any number of records (or no records) in the other table. These relationships require a third table, called an associate or linking table, because relational systems cannot directly accommodate the relationship.</td>
<td>Siblings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If you have several siblings, so do they.</td>
</tr>
</tbody>
</table>

Relationships Tab

Use this tab to define SQL for joins, to create relationships between parent and child objects. Use a JOIN to link data from multiple objects; in Maximo, the parent is the existing object and the child is the object you are creating.

For example, Parent = MAXUSER, Child = SITE, and Name = DEFSITE means maxuser exists and you want to get the Site for the user’s default Site:

```sql
siteid = :defsite
```

This means site.siteid = maxuser.defsite. When the SQL is executed, the value of the parent’s attribute replaces anything preceded by a colon.
Database Relationships

Relationship Tab

Creating a Relationship Between Parent and Child Objects

1. Use the List tab to select the appropriate parent table.
2. Click the Relationships tab.
3. Click New Row.
4. Enter a name in the Relationship field.
5. Create a WHERE clause.
7. (Optional) Enter Remarks.
8. Save the record.

NOTE: If the relationship involves a new table or column, configure the database. For instructions, see "Configuring the Database," on page 4-25.
Deleting a Relationship

1. Use the List tab to select the appropriate object. Click the Relationships tab.

2. Select the appropriate relationship.

3. Click the **Mark Row for Delete** button.

4. Save the record.

Configuring the Database

**WARNING** Always back up your data before configuring the database.

When modifying the database (examples: creating or deleting objects, attributes, or indexes), changes are stored in secondary tables and do not take effect until you configure the database. Maximo restores the backup tables as part of configuration.

You cannot configure the database if the schema owner differs from the database user, as in the following example:

\[
\begin{align*}
\text{mxe.db.schemaowner} &= \text{MAXIMO} \\
\text{mxe.db.user} &= \text{MAXIMO_USR}
\end{align*}
\]

If you have this problem, here is the fix:

- Modify `maximo.properties` so that the schema owner and database owner are the same
- Configure the database
- Modify `maximo.properties` to return the original settings

To configure the database, complete the following steps:

1. Shut down your application server and wait one minute before configuring the database. (The application server session timestamp updates every 60 seconds.) Otherwise, a message appears:

   "MXServer is running. It must be shut down to run ConfigureDB."

2. Open a command prompt and change directory to:

   `<Maximo home directory>\tools\maximo`  
   For example: `C:\maximo\tools\maximo`

3. Do one of the following:

   - To configure the database and restore backup tables, type `configdb`.
   - (Optional) To avoid restoring backup tables, edit the batch file (ConfigDB.bat file in the `\tools\maximo` folder):  

---

Database Configuration 4-25
Configuring the Database

NOTE

Be careful; sometimes the data in the temp tables (XX+tablename) must be modified before restoring.

a Remove the -r parameter.

b Save your changes.

c Return to the command prompt and type configdb.

To restore backup tables later, see "Restoring Backup Tables," on page 4-27.

4 If configuration errors occur, work directly in the database to resolve them. Consult the log files for troubleshooting:

<Maximo home directory>\tools\maximo\log

for example: C:\maximo\tools\maximo\log

5 After configuration completes, start the application server.

NOTE

If backup tables were created, delete them before reconfiguring the database.
Restoring Backup Tables

You need this procedure only if you avoided backing up files during configuration. See "Configuring the Database," on page 4-25.

1. Open a command prompt and change directory to:

   `<Maximo home directory>\tools\maximo`

2. Run `restorefrombackup`.

3. Start the application server.

Text Search

If an object is enabled for text search, Maximo provides full text search on its attributes.

<table>
<thead>
<tr>
<th>Type of search</th>
<th>Entry required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact match</td>
<td>=</td>
</tr>
<tr>
<td>Wildcard</td>
<td>% (example: %value%)</td>
</tr>
<tr>
<td>Full text</td>
<td>Any combination of the words in the text search</td>
</tr>
</tbody>
</table>

The Text Search dialog box is accessible from the **Search Type** field on the Attribute tab.

**NOTE**

Text search is only allowed for ALN fields, and is designed to search long descriptions or fields that are long data types.

Full text search is language-specific text search (not string search). Maximo indexes words, not parts of words. For example, the result is not 'part' if you search for 'par'.

Maximo also performs stem search. For example, searching for 'service' returns 'servicing' and 'serviced.'
You must flag text search on the object and appropriate attributes. For example, in the ASSET table, the **Description** and **Long Description** fields are text search-enabled.

## Electronic Signatures and Audit Records

These features provide an additional level of security control and auditing capability within Maximo.

The persons responsible for electronic records’ content can control system access:

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security Groups and Users</td>
<td>Controls the number of allowed login attempts and displays the users’ current login status</td>
</tr>
<tr>
<td>applications &gt; Security</td>
<td></td>
</tr>
<tr>
<td>Controls &gt; Login Tracking</td>
<td></td>
</tr>
<tr>
<td>Electronic signatures</td>
<td>Requires that the person saving a record, changing a record, or accessing a specific action is the person who logged in</td>
</tr>
<tr>
<td>Electronic audit records</td>
<td>Records and audits changes to records, keeps copies of the changes, producing an audit trail</td>
</tr>
</tbody>
</table>

### Electronic Signature

Provides unique identifiers of users who changed database records or performed actions. The Electronic Signature Authentication dialog box records Maximo user names and full user names.

The **full user name** corresponds to the **Displayname** attribute in the Person object. When you add a user in Maximo, you must associate a Person record. For example, two workers are named John Smith; their full names are John Allen Smith and John B. Smith.

After enabling electronic signature for a database attribute, the process works as follows:

- **When users try to save a change in a field that uses this database attribute,** or Maximo performs an implicit save (example: you click **OK** on the Change Status page in Work Order Tracking), Maximo displays the Electronic Signature Authentication dialog box (see the following section).

- **Users must complete appropriate fields in the Authentication dialog box,** choose **Select Actions > Manage eSig Actions** and **Save** (or another option).

All authentication attempts are saved in the LOGINTRACKING object, but authentication must be successful before Maximo saves the application data.
After enabling electronic signature for an action, the process works as follows:

▼ When users access the action, Maximo displays the Electronic Signature Authentication dialog box when users leave that page and dialog box.

▼ Users must complete appropriate fields in the Authentication dialog box, and authentication must be successful before continuing with the selected action.

During authentication, the LOGINTRACKING object records:

- User name (login ID).
- Full user name (the person’s display name).
- Date and time of the attempt.
- Whether the authentication was successful.
- Application name where the electronic signature was invoked.
- Reason for the change (as entered on the Electronic Signature Authentication dialog box).
- Unique transaction identifier.
- Key values columns for the record.

Electronic Audit Records

After enabling electronic audit records for a database attribute, the process works as follows:

▼ Each time users add, delete, or modify the value of an attribute using a Maximo application and saves the change, Maximo writes an audit record to the audit object corresponding to the regular database object.

▼ The audit record includes:

- Copy of the changed data.
- Maximo user name of the user who made the change.
- Identifier indicating whether the change was an insert, update, or delete.
- Current date and time of the transaction.
- Rowstamp.
- Unique e-Audit transaction ID.
- Unique e-Sig transaction ID if electronic signature is enabled.
- The key values columns for the record, even if those columns are not e-Audit enabled (example: the work order number is recorded even when another attribute in the WORKORDER object triggers the electronic audit).

Implementing Electronic Signatures and Audit Records

Using electronic signatures and audit records involves:

▼ Login Tracking
▼ Electronic Signature
▼ Electronic Audit

Define electronic signatures and audit records at the System level (when you enable them, they apply to all Organizations and Sites).
Electronic Signatures and Audit Records

Enabling Login Tracking

Login tracking lets you specify the number of allowed login attempts and block further attempted logins by a user who exceeds that number. It also lets you track the number of login attempts and view a user’s current login status.

**NOTE** You can use login tracking independently of electronic signature.

You must enable login tracking to use electronic signature.

1. Log in as an administrative user. Open the Security Groups application or the Users application.

2. Choose **Select Actions > Security Controls**.

3. Check the **Login Tracking?** box.

4. Specify the number of login attempts allowed (default = 3).

5. Click **OK**.

Enabling Electronic Signature and Electronic Audit Records on Database Attributes

You can enable these features independently of one another.

1. In Database Configuration, select the appropriate object.

2. On the Object tab, go to the **Audit** section.

3. To activate electronic audit records, check the **Audit Enabled** box.

   The **Audit Table** field defaults to A_ and the name of the selected database object (example: A_WORKFLOW). You can specify a different name.

4. On the Attributes tab, select the appropriate attribute.

5. In the Advanced table window, check the **E-signature Enabled?** box.
6 For each appropriate attribute, check the **Audit Enabled?** box.

Any transaction that involves this database attribute is recorded in the electronic audit object.

7 Choose **Select Actions > Manage eSig Actions**. Select the application and options for actions, then click OK.

8 Save the record.

9 Configure the database. For instructions, see "Configuring the Database," on page 4-25.

To refine the types of records subject to electronic signature and audit records using the e-Audit/e-Sig Filters, see "E-audit and E-signature Filters," on page 4-31.

### Enabling Electronic Signature for Accessing Specific Menu Items

1 Choose **Select Actions > Manage eSig Actions**.

2 Select the application, for example, Assignment Manager.

3 For the appropriate action, check the **E-signature Enabled?** box.

When you select **ESIG Enabled?**, it applies across all groups, to all users.

**NOTE** You can enable e-signature for all Signature Security menu items. However, a pop-up dialog is generated *only* when you change, update, or delete a record.

4 Save the record.

### E-audit and E-signature Filters

To refine the types of information that require these features, use the E-audit Filter and the E-signature Filter on the Audit section of the Object tab.
In the Attributes tab, enable the appropriate database columns for electronic signature and/or audit records.

In the Objects tab, select the database object. For example, to use these features on work orders only where TYPE = PM, enable the appropriate database columns in the WORKORDER object.

**NOTE** You can use the electronic signature filter on only the main object in an application. For example, in Work Order Tracking, you can use it only on the WORKORDER object.

In the E-audit Filter field, enter the WHERE clause that restricts the types of records to use for electronic audit records.

Enter only the part of the command following "Where," but precede it by a colon (:). The filter assumes the “Select * From OBJECTNAME” phrase when you specify the object in the Object field.

For example, to restrict audit records to work orders where TYPE = PM, specify WORKORDER in the Object field and enter this string in the E-audit Filter field:

```
:WORKTYPE = 'PM'
```

**NOTE** If you enable a table for e-audit but do not flag individual fields, the audit record contains only key field information.

In the E-signature Filter field, enter a WHERE clause that restricts the types of records to use for electronic signature.

Save the record.

Configure the database. For instructions, see "Configuring the Database," on page 4-25.
Creating a Drop-Down List for the Reason for Change Field

Electronic signatures are enforced by requiring users to complete fields in an Electronic Signature Authentication dialog box, which includes a Reason For Change field. See the Electronic Signature Authentication Dialog Box.

▼ To make the Reason For Change field let users enter free-form text, no further steps are required.

▼ To make the Reason For Change field require users to choose from a user defined value list, you must add values to the CHANGEREASON domain. See "Adding Values to the Reason For Change Domain," on page 4-34.

Electronic Signature Authentication

When users perform actions for which electronic signature is enabled, the Electronic Signature Authentication dialog box appears.

Users must complete required fields and click OK. Authentication must be successful before continuing.

By default, this dialog box includes:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Name (required)</td>
<td>Maximo login ID</td>
</tr>
<tr>
<td>full user name (unlabeled)</td>
<td>Read-only, from the DISPLAYNAME attribute in the PERSON object</td>
</tr>
<tr>
<td>Password (required)</td>
<td></td>
</tr>
<tr>
<td>Reason for Change*</td>
<td>Enter ≤ 50 characters</td>
</tr>
</tbody>
</table>

*Required by default. To customize the Maximo screens use the Application Designer.
Adding Values to the Reason For Change Domain

1. Open the **Domains** application.

2. Search for and open the **CHANGEREASON** domain.

3. Click **New Row** and enter text in the Value and Description columns for each value you want in your CHANGEREASON value list.

   For this value list only:
   - Users cannot see this, and these values are not written to the database.
   - The text you enter in the Description attribute (≤ 30 characters) is the value users see when they use the list.

   Suppose you want users to see a value list containing only Change to Record and Delete Record; enter:

   - **CHANGE** Change to Record
   - **DELETE** Deleted Record

   Users will not see **CHANGE** or **DELETE**.

4. Save the record.

   **NOTE** Do not assign this value list to a database object and attribute. The connection to the database for this value list is already present in Maximo.
General Ledger Account Configuration

Each General Ledger account code consists of several components (segments). In the Database Configuration application, you define the format of the account code. In the Chart of Accounts application, you specify the valid components for use in Maximo. For information about the Chart of Accounts application, see "Chart of Accounts," on page 7-1.

For easy identification, use Delimiters to separate components when they display. For example, use hyphens to separate components: 6100-400-SAF. Maximo writes delimiters to the database.

For any account code, you can:

- Define ≤ 20 components.
- Restrict the number of characters in a component field.
- Include a total of ≤ 254 characters/digits.

Component Sequence

Account components display in a sequential format, with the leftmost component in the string representing the highest level. For example, the MAXDEMO database includes:

- Component 1 = Cost Center
- Component 2 = Activity
- Component 3 = Resource
- Component 4 = Element

Since account components are concatenated, with the highest level at the left, account 6100-350-SAF is represented:

<table>
<thead>
<tr>
<th>component 1</th>
<th>component 2</th>
<th>component 3</th>
<th>component 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>6100</td>
<td>350</td>
<td>SAF</td>
<td></td>
</tr>
<tr>
<td>Cost Center</td>
<td>Activity</td>
<td>Resource</td>
<td>Element</td>
</tr>
</tbody>
</table>

Changing Component Values

Changing the length of the component values can result in invalid GLs. If you change the length, manually change the values to fit the new length.

For example, in maxdemo the cost center component length is 4, the resource and activity component lengths are both 3, and the element component is 10. When you add in the 3 delimiters, the length of the GL is 23.

If you change the cost center component length to 3 and the activity component length to 4, the total length remains 23 and no configuration is required. However, the GL is now invalid, because the cost center component length was shortened to 3 but has a four digit value (in this example) of 6000.
Required Versus Optional Components

<table>
<thead>
<tr>
<th>Type of component</th>
<th>Requires a value for the account to be fully defined</th>
<th>On-screen display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required</td>
<td>✓</td>
<td>Unknown values not specific to required components contain placeholder characters.</td>
</tr>
<tr>
<td>Optional</td>
<td></td>
<td>Any unknown optional components do not display.</td>
</tr>
</tbody>
</table>

In the DEMO database, the fourth component is optional (most account codes consist of the first three components).

- It does not require any characters.
- No accounts have been assigned to it in Chart of Accounts, so it does not appear as part of the GL Account.

Your General Ledger system has rules regarding whether an account is acceptable when partially defined.

- Fully defined (fully specified) account
  - Has no unknown values (placeholders) in required components
  - Example: 6100-350-SAF is fully defined

- Partially defined (partially specified) account
  - Contains placeholders in some required components
  - Example: 6100-??-SAF (the required Activity component is not specified and therefore contains placeholder characters)

Specifying the General Ledger Account Formats

- For a general discussion of account code formats"General Ledger Account Configuration," on page 4-35

- To create individual General Ledger accounts, see "Chart of Accounts," on page 7-1.

1. Choose Select Actions > GL Account Configuration.
2. Click New Row.
3 Complete the fields for each component (≤ 20 components).

Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Type</td>
<td>Characters are numeric (INTEGER) or alphanumeric (ALN).</td>
</tr>
<tr>
<td>Required?</td>
<td>You must enter optional components at the end of the sequence. If you enter a required component after an optional one, an error message appears when you save.</td>
</tr>
<tr>
<td>Screen Delimiter</td>
<td>Separates this component from the next one. Can be any keyboard character.</td>
</tr>
</tbody>
</table>

- You can use delimiters between some components and not others, and different delimiters between different components.
- The delimiter cannot be the same as the placeholder, and is always written to the database.

**NOTE** If you change the delimiter of the GL account after entering data, the data becomes invalid and you must manually update it.

<table>
<thead>
<tr>
<th>GL Order</th>
<th>Determines the sequence of the component in the account code.</th>
</tr>
</thead>
</table>
Maximo contains several SITEORGTYPES, in addition to the standard SYSTEM, SITE, ORG, and ORGSITE.

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition, Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM</td>
<td>A System-level object/object.</td>
</tr>
<tr>
<td></td>
<td>Its security restrictions are applied at the application/object level (in the specific System-level mboset).</td>
</tr>
<tr>
<td>SYSTEMORG</td>
<td>A System-level object with Organization as an optional value.</td>
</tr>
<tr>
<td></td>
<td>These applications are treated like System-level applications, but can ask the Profile for Orgs.</td>
</tr>
<tr>
<td></td>
<td>orgid is null or orgid = ...</td>
</tr>
<tr>
<td>SYSTEMSITE</td>
<td>A System-level object/object with Site as an optional value.</td>
</tr>
<tr>
<td></td>
<td>These are treated like System-level applications, but can ask the Profile for a list of Sites.</td>
</tr>
<tr>
<td></td>
<td>siteid is null or siteid = ...</td>
</tr>
<tr>
<td>SYSTEMORGSITE</td>
<td>A System-level object/object, but optionally the record could be linked to an Organization or a Site.</td>
</tr>
<tr>
<td></td>
<td>Used by the Job Plan application and other future System applications with an optional Orgs and/or Sites.</td>
</tr>
<tr>
<td></td>
<td>These are treated like System-level applications, but can ask the Profile for a list of Orgs or Sites.</td>
</tr>
<tr>
<td></td>
<td>(siteid in null or siteid = ...) and (orgid is null or orgid = ...)</td>
</tr>
<tr>
<td>SYSTEMAPPFILTER</td>
<td>Used for Users and Groups.</td>
</tr>
<tr>
<td></td>
<td>Treated like System-level applications, but can ask the Profile for a list of Sites and Organizations in the context of an application so the application can filter data. Filtering is required for Site-level administration of users and groups.</td>
</tr>
<tr>
<td>ORG</td>
<td>An Organization-level object/object.</td>
</tr>
<tr>
<td></td>
<td>The framework applies security for this type.</td>
</tr>
<tr>
<td></td>
<td>orgid = ...</td>
</tr>
</tbody>
</table>
### Site and Organization Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition, Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORGSITE</td>
<td>Treated like Organization-level applications but can ask the Profile for Sites.</td>
</tr>
<tr>
<td></td>
<td>(siteid is null or siteid = ...) and orgid = ...</td>
</tr>
<tr>
<td>ORGAPPFILTER</td>
<td>Used for Contracts so the Contract application can filter on its special object rather than using standard security.</td>
</tr>
<tr>
<td></td>
<td>This and other applications developed as this type are treated as System-level but can ask the Profile for a list of Sites in the context of an application so the application can filter data.</td>
</tr>
<tr>
<td>SITE</td>
<td>Site level object.</td>
</tr>
<tr>
<td></td>
<td>siteid = ...</td>
</tr>
<tr>
<td>SITEAPPFILTER</td>
<td>Site-level object with application filtering.</td>
</tr>
<tr>
<td></td>
<td>Reserved for future objects.</td>
</tr>
<tr>
<td>ITEMSET</td>
<td>Item Sets.</td>
</tr>
<tr>
<td></td>
<td>Framework adds the required security restriction. Itemsetid must exist in the user's insert Organization.</td>
</tr>
<tr>
<td>COMPANYSET</td>
<td>Company Set.</td>
</tr>
<tr>
<td></td>
<td>Framework adds the required security restriction. Companysetid must exist in the user's insert Organization.</td>
</tr>
</tbody>
</table>

### Security Issues

Security is applied to all SITEORG types. For certain SITEORG types, you can restrict the result set by appending a condition to the WHERE clause. For example, Site type could be:

"siteid=..."
SQLTimeout Setting (SQL Server only)

This setting in the MAXVARS table specifies the time to wait when retrieving query results before issuing a SQL timeout error. The default is 30 seconds.

Valid values:

0 = infinite wait for lock

any value from 1 to 1800 seconds

For example, to increase the timeout to 3 minutes (180 seconds), run this SQL command:

update maxvars set varvalue='180' where varname='SQLTIMEOUT';
Use this application:

- To create and view messages, in an electronic board, regarding critical problems and incidents
- To broadcast information throughout the enterprise

You can specify the date and time for messages to appear on the Bulletin Board, as well as a date and time for deletion.

The List and Bulletin Board tabs let you:

- Search Maximo for bulletin board records
- Create and post message records

**Viewing Messages**

You can view messages from:

<table>
<thead>
<tr>
<th>Start Center</th>
<th>The Bulletin Board area displays all Bulletin Board messages.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Maximo application</td>
<td>The Bulletin Board icon (in the navigation bar of each application) indicates whether you have messages.</td>
</tr>
</tbody>
</table>

- Click a message to display or collapse its details.

A list of messages displays, with the most recent message at the top, including the date and time they were posted.
Creating Messages

Only users granted Bulletin Board access can create and post messages. This restriction minimizes ticket creation and duplication.

1. On the Maximo toolbar, click **New Message**.

2. Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Date</td>
<td>The date and time for message appearance (Default = current date and time)</td>
</tr>
<tr>
<td>Expiration Date</td>
<td>The date and time for message removal</td>
</tr>
</tbody>
</table>

3. Click **Save Message**.

   See "Designating Audiences for Messages," on page 5-3.

Duplicating Messages

A duplicate contains the same values except for the **Message ID**, **Post Date**, and **Expiration Date** fields.

1. In the Bulletin Board application, display the appropriate message.

2. Choose **Select Action > Duplicate Message**.

3. Modify the values.

4. Click **Save Message**.
Deleting Messages

When you delete expired messages, they are removed from the Maximo database.

1. In the Bulletin Board application, display the appropriate record.

2. Choose Select Action > Delete Message. A confirmation appears.

3. Click Yes.

Designating Audiences for Messages

Messages can designate an audience (an Organization, Site, or person group). Otherwise, any Maximo user can view them.

1. In the Bulletin Board application, display the appropriate message.

2. Click a tab: Organizations, Sites, or Person Groups.

3. Determine the audience type:

<table>
<thead>
<tr>
<th>Type</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple audiences</td>
<td>a In the appropriate tab, click Select Organizations, Select Sites, or Select Groups.</td>
</tr>
<tr>
<td></td>
<td>The appropriate dialog box opens.</td>
</tr>
<tr>
<td></td>
<td>b Make selections.</td>
</tr>
<tr>
<td></td>
<td>c Click OK.</td>
</tr>
<tr>
<td>Single audience</td>
<td>a Click New Row in one of the tabs.</td>
</tr>
<tr>
<td></td>
<td>The Row Details open.</td>
</tr>
<tr>
<td></td>
<td>b Complete the fields.</td>
</tr>
</tbody>
</table>

4. Click Save Message.
Designating Audiences for Messages
Communication Templates

Use this application:

▼ To create and manage generic communication templates that Maximo users can leverage to standardize frequently used e-mail communications (notifications).

For example, service desk agents can create and send e-mail from the Service Requests, Incidents, and Problems applications, using standardized information from predefined communication templates.

Recipients can respond, and agents can view the 2-way dialog from the Communication Log.

▼ To create e-mail notifications for use with Workflow and escalation processes.

▼ To associate file attachments or document folders to templates. Maximo searches the template when a service desk user applies it to a ticket.

When communications are sent, Maximo attaches any files in associated document folders with the folders included in the template.

The application contains:

<table>
<thead>
<tr>
<th>Tab</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>List</td>
<td>Search Maximo for template records</td>
</tr>
<tr>
<td>Communication Template</td>
<td>Create, view, or modify a template</td>
</tr>
<tr>
<td>Recipients</td>
<td>Associate the recipient for a template</td>
</tr>
<tr>
<td>Attachments Folders</td>
<td>Associate attachment folders with a template</td>
</tr>
</tbody>
</table>
## Using Templates for Notifications

### Workflow

When Workflow administrators design a Workflow process including e-mail notifications, they can:

- Create the notification
- Apply a communication template and modify or complete the notification

For Workflow processes, create templates with role-based recipients. Maximo resolves the role (example: Purchasing Manager) to an individual, a person group, or e-mail address.

#### Example

Create a Workflow process for purchase requests (PRs):

1. A Maximo user submits a request for a laptop. The request enters the Workflow process and waits for approval from an immediate supervisor.

2. The supervisor approves the purchase requisition. Maximo routes the purchase requisition to Finance.

3. When approved, Maximo sets the status to approved and notifies the user of the approval.

You can create a template for purchase requisition approvals or rejections, which Maximo can send as the request flows through the Workflow process.

### Escalations

When you use the Escalations application to create an escalation, you can add one or more notifications. Maximo sends notifications when it finds records meeting the conditions an escalation point defines.

#### Example

A service desk agent does not complete assignments within six hours. Configure Maximo to escalate the assignment to the supervisor (by changing the owner via an action) and notify the supervisor.

### Notifications

E-Mail notifications include:

- Template ID
- Role or recipient name
- Subject
- Message

If information is sent repeatedly, create a template and attach it as a notification:

- On a node in a Workflow process
- On an escalation
Using Substitution Variables

When creating a template, you can leverage substitution variables in the **Subject** and **Message** fields in the e-mail notification. Maximo resolves the substitution variables that display in the Select Fields dialog box based on the Maximo business object you select in the **Applies To** field.

### Example

If the template applies to the object ASSET, the list of variables you can choose from are the column names from the database table/view and the relationship names related to the ASSET object.

When Maximo users apply templates and create notifications, Maximo replaces substitution variables from templates with corresponding values from records that generate notifications.

If the subject line of the template reads:

**Your Incident ID# is :TICKETID**

then the ticket number from the incident record replaces TICKETID.

<table>
<thead>
<tr>
<th>Type of notification</th>
<th>Description</th>
</tr>
</thead>
</table>
| Free-form             | ▼ Created without using a communication template  
                        ▼ Contain only a subset of the features available in a communication template  
                        Maximo generates a template ID for it, but you cannot reuse it as a template. |
| Template-based        | ▼ Created by applying a communication template  
                        ▼ Leverage all the features of a communication template, including attachments  
                        Maximo defaults the values in the **Role/Recipient**, **Subject**, and **Message** fields from the template. You cannot modify them using Workflow Designer or Escalations. |

---

Communication Templates
Example: Using substitution variables in the Message field

In the **Subject** or **Message** field, add a space before the substitution variable. Maximo replaces it with a colon and then the variable. The output is formatted correctly. If more text or other variables follow the variable in the **Subject** or **Message** field, you insert a space after the variable.

Your Incident #:TICKETID was opened on :REPORTDATE. The person assigned to work on your issue is :OWNER. You will be contacted on or before :TARGETSTART.

Please review these details and contact us if any information is incorrect.

Phone: :AFFECTEDPHONE

Problem Description: :DESCRIPTION

**NOTE** You can also use dot notation with relationships in substitution variables, such as: rel1. rel2. fieldname.

Templates Included in Maximo

These templates support notifications in the E-mail Listener Configuration, Escalations, Workflow Designer, Service Requests, Incidents, and Problems applications.

<table>
<thead>
<tr>
<th>Type of template</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>for the Maximo database</td>
<td>You can modify, but not delete these templates; their respective notification functionality requires them.</td>
</tr>
<tr>
<td>for the MAXDEMO database</td>
<td>You can modify or delete these templates.</td>
</tr>
<tr>
<td></td>
<td>Use these templates in your test environment to practice adding and managing templates.</td>
</tr>
</tbody>
</table>

For example, E-mail Listener uses several error notification templates. If Maximo encounters an error while staging inbound records, it sets the status of the record to ERROR and sends a notification to the system administrator. You specify the system administrator to send error notifications to in the E-Mail Listener application.

If you did not define an e-mail address, Maximo writes an error to Maximo.log if logging is enabled for this application. The type of error determines the error notification Maximo sends.
Creating a Template

When you create a template, choose a value in the **Accessible From** field to define from where in Maximo the template is accessible.

Possible values:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
</table>
| ALL       | ▼ Available to Maximo users from the Create Communication action in other applications  
            | ▼ Available for use with Workflow and escalation processes                   |
| APPS      | ▼ Available to Maximo users from the Create Communication action in other applications  
            | ▼ Not accessible from the Escalations and Workflow Designer applications     |
| ESCALATION| Available for use only with escalation functionality                        |
| WORKFLOW  | Available for use only with Workflow functionality                          |

You must change the status of a communication template to ACTIVE before it can be used in a Workflow or escalation process.

1. From the Communication Templates application, click **New Communication Template** on the Maximo toolbar. The new record displays, with a status of INACTIVE.

2. Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template</td>
<td>If empty, enter a name or identifier.</td>
</tr>
<tr>
<td>Long Description</td>
<td>For entering additional information</td>
</tr>
<tr>
<td>Applies To</td>
<td>▼ Type a value.</td>
</tr>
<tr>
<td></td>
<td>▼ Click <strong>Select Value</strong> to choose a Maximo business object.</td>
</tr>
<tr>
<td>Accessible From</td>
<td>▼ Type a value.</td>
</tr>
<tr>
<td></td>
<td>▼ Click <strong>Select Value</strong> to choose the applications where users can access the template.</td>
</tr>
</tbody>
</table>

3. (Optional) Attach files to the template.
Adding Recipients to a Template

4 Complete the details:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template Details table window &gt; Send From</td>
<td>Enter an e-mail address.</td>
</tr>
<tr>
<td>Reply To</td>
<td>Enter the e-mail address to reply to an address different from the sender’s.</td>
</tr>
</tbody>
</table>
| Subject, Message | ▼ Enter the subject or message.  
▼ To view a list of substitution variables and return one to the subject line, click Detail Menu. |

5 (Optional) To add recipients, use the Recipients tab.

NOTE Add at least one recipient if you are using the template for Workflow or escalation processes. If not, Maximo cannot send e-mail notifications.

6 (Optional) Associate attachment folders to the template.

7 Click Save Communication Template.

Adding Recipients to a Template

You can add recipients to communication templates. There are four types: Roles, Persons, Person Groups, and E-mails. You can add one or more recipients from each category, and you can add more than one types of recipient.

NOTE Add at least one recipient if you are using the template for Workflow or escalation processes. If not, Maximo cannot send e-mail notifications.

If you are using the template for tickets or work orders, you do not add a recipient.

1 From the Communication Templates application, open or create a communication template.

2 Click the Recipients tab.

3 Click Show Table. The table window expands.
Add recipients:

- For e-mail: To add a single recipient, click **New Row**. In the **E-Mail** field, enter an e-mail address. You cannot add multiple recipients for e-mail.

- To add a single recipient, click **New Row**. In the **Role**, **Person**, or **Person Group** field:
  - Enter a value or click **Detail Menu** and select a value.
  - To create recipients, go to the Roles, People, or Person Groups application. Click **OK**.

- To add multiple recipients, click **Select Roles**, **Select People**, or **Select Groups**. In the dialog box that opens, select recipients. Click **OK**.

Select **To**, **cc**, or **bcc** for each recipient.

For Person Groups: To avoid sending communications to the whole group, clear the **Broadcast?** option.

Maximo evaluates all group members’ calendars and sends the communication to the first available person according to the calendar and shift. If no one is available, Maximo sends the communication to the default person in the person group.

Click **Save Communication Template**. Recipients display in the Template Details table window on the Communication Template tab.

**Associating Attachments to a Template**

**Attaching files directly**

When users create communications based on this template, Maximo attaches this set of files.

1. From the Communication Templates application, open or create a communication template.

2. On the Communication Template tab, click **Attachments**. Select an option:
   - Add New Attachments > Add New File
   - Add New Attachments > Add New Web Page
   - Add from Library

Maximo displays the attachments in the Attachments table window.

3. Click **Save Communication Template**.
Modifying a Template

Associating document folders

Maximo resolves the contents at runtime and attaches folders when communications are sent.

1  From the Communication Templates application, open or create a template.

2  Click the Attachment Folders tab. The Maximo business object to which the template applies determines which document folders display in the Folders table window.

NOTE  These folders are defined in the originating application. For example, if your template applies to incidents, a Maximo user associated these document folders in the Incidents application.

3  Check the Send with Communication? box in the row of the document folders to associate with the template. When e-mail communications based on this template are sent, Maximo attaches any files that exist in the folders.

4  Click Save Communication Template.

Modifying a Template

Maximo does not require that you inactivate the template before modifying it.

1  From the Communication Templates application, display the appropriate template record.

2  Edit fields as needed.

3  When all edits are made, click Save Communication Template.
Changing a Template’s Status

Possible statuses:

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INACTIVE</td>
<td>The status of new templates When you no longer use a template, set its</td>
</tr>
<tr>
<td></td>
<td>status to INACTIVE or delete it.</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>When the template is ready, change the status to ACTIVE. Maximo users can</td>
</tr>
<tr>
<td></td>
<td>apply only ACTIVE templates to a ticket record.</td>
</tr>
</tbody>
</table>

1. From the Communication Templates application, display a template.
2. On the Maximo toolbar, click **Change Status**. The Change Status dialog box opens.
3. In the **Status** field, select a status from the list. Maximo displays the date and time of the change in the **Status Date** field.
4. Click **OK**.

Duplicating a Template

Maximo duplicates all information, but inserts a new template ID and sets the status to INACTIVE.

1. From the Communication Templates application, display the appropriate template.
2. Choose **Select Action > Duplicate Template**. Maximo displays the new template record.
3. On the Communication Template tab, if the **Template** field is empty, enter a value.
4. Modify the template.
5. Click **Save Communication Template**.
Duplicating a Template
Chart of Accounts

Use this application to:

▼ Create general ledger (GL) account codes and components
▼ Define financial periods
▼ Create default GL accounts

NOTE
The Chart of Accounts Help contains information on using menu items, and other topics not included in this chapter.

Tasks in other applications

First, specify the format of General Ledger account codes using the GL Account Configuration action in the Database Configuration application. The format includes the number and length of components, delimiters, and so on.

Define tax codes, rates, and dates using Purchasing Options > Tax Options in the Organizations application.

Appendix A in the IBM Maximo Finance Manager’s Guide includes a table listing the Maximo General Ledger database columns by application and table. It includes information such as whether an account must be fully defined for Maximo to validate it.

General Ledger Account Codes Overview

General Ledger account codes typically include components (segments) separated by delimiters.

Example

6000-200-350

Placeholder characters represent components without values.

Example

6000-???-350

You define the format of the code in Maximo:

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Configuration &gt; GL Account Configuration</td>
<td>Define the number, length, and data type of components, whether the components are required, and delimiters</td>
</tr>
</tbody>
</table>
Use Chart of Accounts to define components’ values, then link component values to create GL account codes for financial tracking.

Specify the validation rules for the codes Maximo users can enter: any combination of component values or only codes stored in Chart of Accounts.

**Standard Accounting Functions**

This application lets you create default GL accounts and resource codes for many standard accounting functions. You typically create accounts and resource codes within Maximo to correspond with accounts you use in your external accounting system.

See the General Ledger Accounts chapter in the *IBM Maximo Finance Manager's Guide*.

**Merging General Ledger Accounts**

In some instances, a GL account field might not be uniquely specified (example: a GL account for a location and another for an asset). Generating transactions such as work orders often requires choosing defined account component values, and Maximo invokes a set of rules to handle them.

GL accounts are merged component by component. Defined components supersede undefined components. Suppose the first components of two account codes are 6000 and ????; the merged first component is 6000.

See the *IBM Maximo Finance Manager's Guide*. 
GL Accounts Table Window

You can add or modify General Ledger accounts and account components, and create default accounts.

Typically, GL accounts are downloaded from the GL chart of accounts established in your accounting system. You can also create them in Maximo, at the Organization level. Each Organization has its own chart of accounts system.

The GL Component Maintenance dialog box lists all valid components listed on or added to the GL Accounts tab. See "Creating or Modifying a General Ledger Component Value," on page 7-5 before continuing.

Downloading Account Codes from an Accounting System

Maximo provides a generic financial application programming interface (API) and several product-specific APIs. These APIs allow Maximo to interface with financial software, such as Oracle and SAP®. You purchase product-specific APIs separately.

See your Maximo sales representative. Creating your own API for your financial system is possible.
Creating or Modifying General Ledger Account Codes

Create General Ledger account codes by linking established component values, which might have been downloaded from the accounting system.

1. Open the Chart of Accounts application.

2. In the Organizations list, select the appropriate Organization. Its associated GL accounts display in the GL Accounts table window.

**To modify...**

3. To modify a code:
   a. Find the appropriate one. To filter your search, click **Filter**.
   b. Click **View Details**. The Row Details open.

   **NOTE** You can edit the **GL Account Description**, **Type**, and **Active?** fields directly in the table window.

**To create...**

4. To create a code, click **New Row**. The Row Details open.

5. In the **GL Account** field, click **Select Value**.

   The **GL Account Code** field displays placeholder characters (example: ????) in all components. The **Segment** field value matches the highlighted component in the **GL Account** field.

   The GL Component Value column displays the first component values.

6. Select a value. It appears in the first component in the **GL Account** field. The values for the second component display.
7 Select a value for subsequent components until you have defined all required components.

**NOTE** You can navigate between lists of component values by selecting a component from the Segment list or clicking in the appropriate component in the GL Account field.

8 Click OK.

9 Enter or modify the description in the GL Account Description field. To enter additional information, click Long Description.

10 If your organization uses account type codes, enter a code in the Type column (default length = 3).

Type is a user-defined value. Most accounting systems at a minimum have type codes for assets, liabilities, expense, and income. (Type is not the data field type, for example, integer or alphanumeric.)

The Active? box is checked by default, meaning the account code can be used on new Maximo records.

11 (Optional) To prevent users from using this account code, clear the check box.

**NOTE** If you inactivate an existing code, existing Maximo records are not modified.

12 Click Save GL Account.

---

**Creating or Modifying a General Ledger Component Value**

You define valid component values for codes which appear in a list. For example, the GL Account code 6000-200-300 consists of 3 components, with values 6000, 200, and 300.

1 Open the Chart of Accounts application.

2 In the Organizations list, select the appropriate Organization.

3 Choose Select Actions > GL Component Maintenance.
In the Components table window, select the appropriate component. The GL Component Values table window displays existing values.

To modify...

5 To modify a value:
   a Click Filter to filter your search. Select a value.
   b Click View Details. The Row Details open.

To create...

6 To create a value:
   a Click New Row. The Row Details open.
   b In the GL Component Value field, enter a value.

   NOTE You specify the format of GL account codes using the GL Account Configuration action in Database Configuration. If the value does not fit the format, you receive an error message.

   Suppose the component requires integers with a maximum length of 4. You can enter 123, or 1223, but not A223 or 12345.

7 Complete or modify the Description field.

8 (Optional) To inactivate the component value, clear the Active? box. When this check box is empty, the value does not appear in the Select GL Account dialog box.

9 Click Close Details.

10 Click OK.
Inactivating Values

If you inactivate a component value, all GL account codes with that component value become inactive.

Suppose the value of an active Resource component is 888. You inactivate component value 888, close Chart of Accounts, and reopen it. The GL Accounts that use 888 for the Resource component are inactive.

**NOTE** When you inactivate a GL component value, no change is made to the GL accounts on existing records that use that value. Suppose a work order uses a cost center value of 6250, which you inactivate. The work order still uses cost center value 6250.

Reactivating Values

If you reactivate Resource component 888, Maximo asks whether to reactivate the corresponding account codes.

Updating the Database

Update your database, one Organization at a time, after modifying a default GL Account or resource code.

**CAUTION** Ensure that no one is using Maximo when you update the database.

1. Open the Chart of Accounts application.
2. In the Organizations table window, select the appropriate Organization.
3. Choose Select Actions > Update Database.
4 In the Update Database section, select the type of update, which determines the data that Chart of Accounts overwrites:

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overwrite Blank Accounts Only</td>
<td>Overwrites only affected GL Account fields that are currently blank.</td>
</tr>
<tr>
<td></td>
<td>Suppose you created an account code for the GL Account field of an existing item type.</td>
</tr>
<tr>
<td></td>
<td>The GL Account field of the item is overwritten only where it is blank, but not where a GL account was entered.</td>
</tr>
<tr>
<td>Overwrite Accounts With Old Defaults</td>
<td>Overwrites blank fields and GL account fields that have the previous GL account.</td>
</tr>
<tr>
<td></td>
<td>Suppose an item type had a GL account code associated with it in Chart of Accounts. This code was inserted on item records that used the item type. On some records, the account code was changed.</td>
</tr>
<tr>
<td></td>
<td>The records in which the account code was subsequently changed are not overwritten.</td>
</tr>
<tr>
<td>Overwrite All Accounts</td>
<td>Overwrites all relevant GL Account fields in Maximo records.</td>
</tr>
<tr>
<td></td>
<td>Suppose an item type has a GL account code associated with it in Chart of Accounts.</td>
</tr>
<tr>
<td></td>
<td>All blank GL Account fields for that item type and all existing GL Account fields for items of that type, including ones that were subsequently changed, are overwritten.</td>
</tr>
</tbody>
</table>

5 Click OK.

**NOTE** Historical records are not updated.

### Defining Financial Periods

**NOTE** For Maximo to validate the data against financial periods, ensure that the *Validate Financial Periods* box is checked in the Validation Options dialog box.

You must define at least one financial period. Maximo adds a financial period stamp to all transactions when they are generated. The transactions must occur during an open, valid financial period.

The requirements of the accounting system you use with Maximo determine the format of the period.

1 Open the Chart of Accounts application.

2 In the Organizations table window, select the appropriate Organization.

3 Choose *Select Actions > Financial Periods*. 
The Financial Periods dialog box displays the Organization's periods sequentially by date, with the most recent period at the top.

4. Click **New Row**. The Row Details open.

5. Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>Enter a name or number. The accounting system you use with Maximo might determine the format.</td>
</tr>
<tr>
<td>From</td>
<td>If no periods exist, Maximo inserts the current date. Default time = 12:00 a.m. If periods exist, Maximo inserts the date shown in the most recent period's To field. Enter a start date or click <strong>Select Date</strong>.</td>
</tr>
<tr>
<td>To</td>
<td>Enter the end date or click <strong>Select Date</strong>.</td>
</tr>
<tr>
<td>Accounting Close Date</td>
<td>(Optional) enter a closing date (the date after which no further transactions can be charged to the accounting period). Click <strong>Select Date and Time</strong>. Suppose an Accounting Period X is: 2/1/05 – 3/1/05, with an Accounting Close Date of 3/15/05. A transaction can be reported and charged until 3/14/05.</td>
</tr>
<tr>
<td>Actual Close Date</td>
<td>Do not complete this field now.</td>
</tr>
</tbody>
</table>

6. Click **Close Details**.

7. Click **OK**.
An authorized user might close financial periods.

1. Open the Financial Periods dialog box. Find the row with the financial period.

2. Enter a date in the **Actual Close Date** field. This date cannot precede the date in the **Accounting Close Date** field.

   When the cursor moves out of the field, Maximo inserts the user’s name in the **Closed By** field.

Maximo no longer accepts financial transactions that users attempt to log for closed periods.
Use this application with your project pricing system to track project costs and manage budgets. Using Work Order Tracking, you can assign and link work orders to projects.

After you assign the work order, the project name can appear in other Maximo applications but only in read-only format. To change the project or task that owns the work order, you use the Work Order Tracking application.

**Unhiding the Cost Management Action**

2. Select a group to grant access to Cost Management.
3. In the Applications tab, find Cost Management.
4. Enable the Read, Insert, Save, and Delete fields.
5. Save the record.

**NOTE** To use this application, use Application Designer to add the Project and Task fields to the Work Order tab in Work Order Tracking.
Creating or Modifying a Project

NOTE  To modify these settings, select the project from the List tab.

1 Click **New Project** on the Maximo tool bar.

2 Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Is Chargeable?</td>
<td>Lets you charge costs to the project (default = checked)</td>
</tr>
<tr>
<td>Parent Project</td>
<td>Enter a value or click <strong>Select Value</strong> to choose one.</td>
</tr>
<tr>
<td>Value</td>
<td>Enter the budget of the project.</td>
</tr>
<tr>
<td>Status</td>
<td>Enter a value or click <strong>Select Value</strong> to choose one. (Default = APPR)</td>
</tr>
</tbody>
</table>

**NOTE** If you modify the status of the project, update the status of each task manually.

3 To add tasks to the project, in the Tasks table window, click **New Row**. The Row Details open.

4 Enter a task identifier in the **Task** field.

5 Complete the remaining fields.

6 To modify tasks, click **View Details**.

7 Click **Save Project**.
Assigning a Work Order to a Project or Task

Ensure the following:

▼ The project or task is approved (its Status in Cost Management = APPR).
▼ The Is Chargeable? box must be checked.
▼ The Start Date must be today or later.

1 Create a project in Cost Management.
2 In Work Order Tracking, select the appropriate work order.
3 From the Work Order tab, click Select Value next to the Project field.
4 To select a project, click Select Record.
5 (Optional) To select a task:
   a Click Select Value next to the Task field.
   b Click Select Record.
6 Click Save Project.

Deleting a Project or Task

Before deleting a parent project or task, clear the Parent Project field on all child projects or tasks, or delete the child projects or tasks.

1 In Cost Management, display the appropriate record.
2 Choose Select Action > Delete Project.
Use this application to define currency codes and specify which codes can be used in Maximo. A currency code is a short, user-defined value that you create to represent a currency, for example, CND for the Canadian dollar.

First create a currency code, then specify the base currency and set up the exchange rate.

After establishing active currency codes:

- Use them wherever Currency fields appear (purchase requisitions, purchase orders, invoices, and companies).
- Use other applications for currency administration:
  - Organizations: specifies an Organization’s base currency.
  - Exchange Rates: specifies exchange rates between currencies.

**Currency Codes Tab**

Use this tab to define and manage currencies. When you enter purchasing records in a foreign currency, Maximo uses the current exchange rate to calculate the base cost in the currency of your company. Purchasing records include purchase requisitions, purchase orders, and invoices.
Creating a Currency Code

Maximo stores currency codes at the System (database) level. All Organizations can use them and add new ones.

1. Open Currency Codes.
2. Click New Row.
3. Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency Code</td>
<td>Enter the code value (example: CND = Canadian dollar)</td>
</tr>
<tr>
<td>Long Description</td>
<td>To enter additional information</td>
</tr>
<tr>
<td>Active?</td>
<td>Makes the currency available in Maximo (default = checked)</td>
</tr>
</tbody>
</table>

4. Click Save Currency Code.

Modifying a Currency Code

1. Open Currency Codes.
2. In the table window, find the row with the appropriate record.
   
   You can edit directly in the table window or click View Details to edit in the Row Details section.

3. You can only modify the description and the Active? check box value.
4. Click Save Currency Code.
Deleting a Currency Code Record

You cannot proceed if any of these conditions is true:

- The currency code is used in any Currency field on any record (unless the status is Closed or Cancelled).
- The currency is used in an active exchange rate in the Exchange Rates application.
- The currency is specified as an Organization’s base currency.
- The currency code is referenced in any of these tables (unless the records are flagged as History or Inactive):
  - PO
  - PR
  - COMPANY
  - INVOICE
  - MATRECTRANS
  - MATUSETRANS
  - SERVRETRANS
  - INVOICETRANS
  - RFQVENDOR

1. Open Currency Codes.

2. Find the row containing the currency code.

3. Click the Mark Row for Delete button. To cancel a deletion, click Unmark Row for Delete.

4. Click Save Currency.

Maximo deletes from the Exchange Rates application the rows that use the deleted currency code.
Sets

Use this application to create a framework for sharing item and vendor data across Organizations.

Maximo:

- Associates item and company records with a category called Sets.
- Stores item and company records at the Organization level.
- Stores Sets at the database level.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Set</td>
<td>Lets Organizations choose from a common set of items.</td>
</tr>
<tr>
<td></td>
<td>Unique identifiers are required:</td>
</tr>
<tr>
<td></td>
<td>- For each Item Set</td>
</tr>
<tr>
<td></td>
<td>- For each item in the Set</td>
</tr>
<tr>
<td></td>
<td>Items you create are cataloged into the Item Set associated with the same</td>
</tr>
<tr>
<td></td>
<td>Organization your default insert Site belongs to.</td>
</tr>
<tr>
<td>Company Set</td>
<td>Ensures that all Sites and Organizations use consistent names for vendor</td>
</tr>
<tr>
<td></td>
<td>businesses.</td>
</tr>
<tr>
<td></td>
<td>Lets you consolidate vendor reporting and share pricing information when</td>
</tr>
<tr>
<td></td>
<td>purchasing products or services, to negotiate the best prices with vendors.</td>
</tr>
</tbody>
</table>

Sets and Organizations

Before creating any Organization, create at least one Item Set and one Company Set.

- You must associate each Organization with exactly one Company Set and exactly one Item Set.
- You can create an unlimited number of Sets.
- Multiple Organizations can use the same Item Set or Company Set.
Sets and Organizations

Sets Application Table Windows

- **All Sets**: defines Sets.
- **Organizations using...**: displays the Sets associated with Organizations.

Creating a Set

1. Open the Sets application.

2. In the All Sets table window, click **New Row**. The Row Details open.

3. Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set</td>
<td>Enter a name. It must be unique for all types of Sets.</td>
</tr>
<tr>
<td>Long Description</td>
<td>To enter additional information</td>
</tr>
<tr>
<td>Type</td>
<td>Enter ITEM or COMPANY, or click ✅.</td>
</tr>
<tr>
<td>Automatically Add Companies to Company Master? (Company Sets only)</td>
<td>▼ Checked: Maximo creates a company master record whenever users add a company in the Companies application. Master records contain the default contact for a company, purchasing, e-commerce, payment details, and so on.</td>
</tr>
<tr>
<td></td>
<td>▼ Cleared: Users must add companies in the Company application.</td>
</tr>
</tbody>
</table>
4 **Click Save Sets.**

The Organizations Using table window does not contain any rows. Maximo adds rows to this table window when you assign the Set to an Organization in the Organizations application.

### Modifying a Set

1 **In the All Sets table window, find the row containing the appropriate record. To narrow your search, click Filter.**

2 **Click View Details.**

You can only modify:

- a Company Set’s description and type
- an Item Set’s description

3 **Click Save Sets.**

### Deleting a Set

If a Company Set or Item Set is associated with an Organization, you cannot delete it.

1 **Find the row containing the appropriate record.**

2 **Click Mark Row for Delete.**

- You can mark multiple rows.
- To cancel a deletion, click Unmark Row for Delete.

3 **Click Save Sets.**
Exchange Rates

Use this application to enter, view, and modify currency exchange rates.

When a user enters an amount in a foreign currency, Maximo finds the active exchange rate and calculates the cost in the base currency of your company.

Maximo stores exchange rates at the Organization level. Therefore, each Organization defines its own exchange rates. Currency codes are stored at the System level and are available to all Organizations.

Use other applications for currency administration:

- **Currency Codes**: defines currency codes
- **Organizations**: specifies an Organization’s base currency

Rules and Logic

2 Currencies

Defining exchange rates implies inverse relationships. When Maximo does not find defined rates for a given date, it verifies whether inverse relationships are defined and uses them to calculate rates.

For example, if the rate from currency A to B is 4.0, then the rate from currency B to A is 0.25 (if 1 A = 4 B, then 1 B = 0.25 A).

If you specify only an A to B rate, and the cost of a purchase order item is in currency B, users can specify currency A on a purchase order and Maximo converts to currency B.

3 Currencies

Maximo can calculate rates when two currencies are independently defined relative to a third.

For example, with these defined rates:

- A to C
- B and C

Maximo can calculate:

- A to B
- B to A

If 1 A = 2 C and 1 B = 4 C, then B is twice the value of A.
Entering Exchange Rates

Therefore, $1 \text{ B} = 2 \text{ A}$ and $1 \text{ A} = 0.5 \text{ B}$:

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A to C</td>
<td>2.0</td>
</tr>
<tr>
<td>B to C</td>
<td>4.0</td>
</tr>
<tr>
<td>A to B</td>
<td>0.50</td>
</tr>
<tr>
<td>B to A</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**NOTE** One currency must be the Base 1 currency.

**Entering Exchange Rates**

1. Open the Exchange Rates application.

2. In the Organizations table window, select an Organization. To narrow your search, click **Filter**.

The Exchange Rates table window displays all defined rates for the selected Organization.

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

3. Click **New Row**. The Row Details open.
4 Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convert from Currency</td>
<td>The currency to convert</td>
</tr>
<tr>
<td></td>
<td>▼ Enter a currency code.</td>
</tr>
<tr>
<td></td>
<td>▼ Click ✉.</td>
</tr>
<tr>
<td>Convert to Currency</td>
<td>The currency Maximo uses when users enter the currency listed in the Convert from Currency field</td>
</tr>
<tr>
<td></td>
<td>▼ Enter a currency code.</td>
</tr>
<tr>
<td></td>
<td>▼ Click ✉.</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>The multiplier Maximo uses when calculating a conversion:</td>
</tr>
<tr>
<td></td>
<td>(Convert From Currency) x (Exchange Rate) = Convert To Currency</td>
</tr>
<tr>
<td></td>
<td>It can have ≤ seven digits (default) after the decimal point.</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td>▼ Convert from Currency = Canadian dollar (CND) and</td>
</tr>
<tr>
<td></td>
<td>▼ Convert to Currency = U.S. dollar (USD) and</td>
</tr>
<tr>
<td></td>
<td>▼ Exchange Rate = .7500000</td>
</tr>
<tr>
<td></td>
<td>Maximo converts a value of $100 CND to $75 USD</td>
</tr>
<tr>
<td>Active Date</td>
<td>The start and end dates for this exchange rate</td>
</tr>
<tr>
<td>Expiration Date</td>
<td>▼ Enter a date.</td>
</tr>
<tr>
<td></td>
<td>▼ Click ✉.</td>
</tr>
</tbody>
</table>

5 Click Save Exchange.

Maximo inserts the row in the table, grouping it with other currency pairs of the same kind, if present.

Properties

▼ You can define multiple rates between the same two currencies (A to B, for example). Dates cannot overlap.

▼ On any given date, you can define only one exchange rate between two currencies (the date fields do not include time of day).

▼ If there is a gap between rate periods for a currency pair, for example, a month when no rate is specified, Maximo finds no exchange rate.
Modifying Exchange Rates

Exchange rates fluctuate. You can:

- Insert an exchange rate row in the table window
  Enter as many rows for a single currency as needed.
- Modify an existing rate
  Periodically modify rates that span significant date ranges.

1. In the Organizations table window, select the appropriate Organization.
2. In the Exchange Rates table window, find the appropriate row. To narrow your search, click Filter.
3. Click View Details. The Row Details open.
   **NOTE** You can edit some fields directly in the table window.
4. You can only modify the **Exchange Rate** and **Memo** fields, not the dates.
5. Click Save Exchange.

Deleting Exchange Rates

Unless the status is Closed or Cancelled, you cannot delete exchange rates if they are used on any of the following records:

- inventory records
- invoices
- labor records
- material requisitions
- purchase orders
- purchase requisitions

1. In the Organizations table window, select the appropriate Organization.
2. In the Exchange Rates table window, find the appropriate row. To narrow your search, click Filter.
3. Click Mark Row for Delete.
   - You can mark multiple rows.
   - To cancel a deletion, click Unmark Row for Delete.
4. Click Save Exchange.
Converting Foreign Currencies to Base Currencies

When you specify a foreign currency on a purchase requisition or purchase order, Maximo calculates three values:

- Total Cost, expressed in the foreign currency
- Total Base Cost, expressed in the base currency of your company (Base 1)
- Total Base 2 Cost, expressed in the second base currency of your company (Base 2)

Example

Your base currency is USD. Your second base currency is CND. You enter a purchase requisition for gaskets, to be ordered from a French company (using Euros).

1. On the PR tab, select EUR (Euros) in the Currency field.
2. On the PR Lines tab, enter:
   - Quantity: 25
   - Unit Cost: 1.23 (Euros)

Using the active exchange rates of 1.23059 USD and 1.5695 CND for the EUR, Maximo calculates and displays these values on the PR tab:

- Total Cost: $(25 \times 1.23 \text{ Euros}) = 30.75 \text{ (Euros)}$
- Total Base Cost: $30.75 \text{ Euros} \times 1.23059 \text{ (USD)} = 37.84 \text{ (USD)}$
- Total Base 2 Cost: $30.75 \text{ Euros} \times 1.5695 \text{ (CND)} = 48.26 \text{ (CND)}$

**Note**: Base 2 currencies are optional. If you configure only one base currency in Organizations, no fields appear for a second one.

Configuring Multiple Base Currencies

These guidelines ensure that all appropriate currencies and exchange rates are in the database and that all affected applications perform the correct calculations.

1. In the Currency Codes application, create records as needed for the currency codes to use for Bases 1 and 2.

   A Base 1 currency is established on installation. You can enter a currency record for Base 2. For example, create a currency record for Euros, to use for Base 2.

   **Note**: You can use an existing currency code as the Base 2 currency code.
Converting Foreign Currencies to Base Currencies

2 In the Exchange Rates application, open the record for the Base 1 currency code. In the exchange table window, enter the Base 2 Currency Code in the Convert To field.

For example, if French Francs (FF) is the Base 1 currency code and EUR is the Base 2 currency code:

   a Enter FF in the Convert From field.
   b Enter EUR in the Convert To field.
   c Enter active and expiration dates for EUR.

3 Enter rates for each transaction currency to be converted to the Base 2 currency code.

For example, if French Francs (FF) is the Base 1 currency code and EUR is the Base 2 currency code, and the transaction currency is DEM:

   a Retrieve the DEM record (so DEM is in the Convert From field).
   b Enter EUR in the Convert To field.
   c Enter valid active and expiration dates for EUR.

Maximo can now process transactions in two base currencies. You can create financial reports in both currencies.
Escalations

Use this application to monitor critical processes throughout your work site, complete tasks on time, and comply with Service Level Agreements (SLAs).

You can use escalations with any Maximo application. This chapter focuses on interacting with:

- **Service Desk applications**
  
  The service desk applications let you define SLAs (contracts between service providers and recipients).
  
  Escalations determine how your work site handles service requests, incidents, problems, and other service desk events, and ensure that service providers comply with SLAs by solving problems in a timely manner.

- **Information Technology (IT) Asset Management applications**
  
  ITAM uses escalations to monitor contracts, purchasing, and inventory.
  
  To avoid penalties or costly lease extensions, define an escalation to alert managers 30 days before a lease contract expires on leased IT assets.

- **Workflow processes**
  
  Escalate assignments when they expire in a recipient’s Inbox.
  
  Assignments appear in designated employees’ Inbox when you assign specific steps in a Workflow process. If not completed promptly, assignments expire. Upon expiration, escalate assignments to alternate users, to promote on-time task completion and prevent work backlogs.

**NOTE**

The Escalations Help contains information on using menu items, and other topics not included in this chapter.

For information on Service Desk, ITAM, or Workflow processes, see the Maximo Help.

### Escalation Components

**Escalation object**

Every escalation must apply to a Maximo Business Object (MBO).

A MBO (pronounced “may-bo”) is a unit of Java code that executes a specific Maximo function and acts on the Maximo database table of the same name. Example: the Purchase Order MBO creates, approves, and cancels purchase orders. It updates the Maximo PO table.
Escalation Components

When selecting an object for escalation, you can qualify the object by setting attribute values to define a filter. For example, you can build an escalation:

- To monitor Maximo invoices waiting approval for more than two days
- To notify the originator of the invoice that its status remains unapproved

To filter the invoice records to records that are entered or waiting for approval, this escalation:

1. Monitors the INVOICE object.
2. Uses the STATUS attribute as a filter.
3. Specifies values for the attribute: STATUS='ENTERED' or STATUS='WAPPR'.
4. Sets a schedule to check the object.

Escalation point

Use an escalation point to implement escalation through a combination of measurement, action, and notification. You can measure elapsed time against specific attributes of a selected Maximo object. In this example, one escalation point applies to one date-time attribute.

Actions

An action applies a modification to a Maximo object, and involves an update to an attribute or status. Use the Action application to define actions. You can associate multiple actions for each escalation point.

Notifications

Notifications are sent as e-mail messages:

<table>
<thead>
<tr>
<th>Type of notification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free-form</td>
<td>Define in the Escalations application</td>
</tr>
<tr>
<td></td>
<td>Store in the Communication Templates tables</td>
</tr>
<tr>
<td>Template-based</td>
<td>Define in the Communication Templates application</td>
</tr>
</tbody>
</table>

Example Incident Escalation

Suppose a Service Provider’s SLA states that all network-related incidents with a priority of “high” or “very high” are assigned within one hour of incident creation and resolved within four hours.

The network support group owns (default) all incident tickets related to network issues.

If incidents are not resolved within three hours, the Service Provider:

- Escalates priority to high,
- Passes ticket ownership to a Supervisor, and
- Sends an e-mail notification to people within the Organization regarding a danger of SLA non-compliance.
Escalation and SLA Integration

This flowchart shows the relationships among incident escalation components.

Escalation object

MAXIMO object and filter

+ Measure elapsed time for a change to a particular attribute

Event = 1 hour elapsed since incident report

Event to monitor for these records

Event = 3 hours elapsed since incident report

Escalation points

Action 1: Incident assigned to network support group

Notification 1

Action 2: Incident assigned to supervisor

Notification 2

Actions

Notifications

Cron Tasks

Use escalations with the Cron Task Setup application. A dedicated escalation cron task examines Maximo objects, identifies records for escalation in those objects, and executes actions and notifications against escalation records as needed. Administrative users can define polling time intervals or schedule condition evaluations.

Escalation and SLA Integration

Escalations help businesses comply with SLA commitments by proactively avoiding SLA violations:

▼ Each SLA has a one-to-one relationship with an escalation.

▼ Each commitment in an SLA maps to an escalation point in the corresponding escalation.

▼ After defining an SLA, you can define the corresponding escalation, and the SLA application populates escalation points (you can modify them).

▼ The SLA application contains an Escalation tab, providing a view into the corresponding escalation.

Understanding Escalations

The Maximo application server contains an escalation engine, which:

▼ Drives the escalation process

▼ Leverages the Maximo cron task functionality

▼ Tests all active escalation definitions at a set schedule
Escalation and SLA Integration

To test escalations, the engine:

- Retrieves escalation definitions from the Maximo database and constructs appropriate SQL statements.
- Maximo executes SQL statements against target objects for the escalation.
- Maximo examines the results.
- If Maximo retrieves records as a result, the engine performs actions and notifications associated with escalation definitions.

Creating an Example Escalation


You create two escalation points, with actions and notifications for each. You apply the escalation to the INCIDENT object.

You can use the MAXDEMO database to practice. It contains sample records for applications you can use for testing.

This flowchart shows the steps to create an escalation.
When creating escalations, use this sequence of nine tasks.

Use this example to gain experience with the Escalations application.

**Task 1: Define the Escalation's Header Attributes**

1. Open the Escalations application.

2. Click the New Escalation icon. The Escalations tab opens.

3. Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escalation</td>
<td>Clear the default and enter: ESC INC. This description indicates that the escalation applies to incidents.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Escalate incidents related to the network.</td>
</tr>
</tbody>
</table>
| Applies To  | Use the Select Value dialog box
- Enter: INCIDENT (indicates that the escalation targets records belonging to the Incidents application, and the Incident objects in the database) |
| Schedule    | Click Set Schedule.  
1. Select "every 5 minutes."
2. Polls for records that meet the criteria the escalation points define

**NOTE** To stop the polling at this interval, change the scheduling interval or deactivate the escalation.|

| Condition   | Enter: INTERNALPRIORITY > 5 AND COMMODITY='INFRASTR'  
- Use the SQL Expression Builder to enter this information (see the Help within the dialog for instructions).  
The escalation engine applies this SQL statement to INCIDENT records to obtain a subset of records. This condition retains only high-priority records that are not network-related.  
Since this escalation targets service desk agents and administrators, the internal priority associated with an incident is important.  
**NOTE** For this example, leave the Organization and Site fields blank. This escalation is System level, and targets incidents reported at any Site or Organization. |

**Task 2: Create Escalation Point A**

This tests whether more than 30 minutes elapsed since someone reported the incident. By setting an elapsed time interval of 30 minutes, service desk staff can initiate action within the 1-hour SLA time limit.

If the incident meets this condition, the escalation engine triggers the associated actions and notifications.
In the Escalation Points table window, click **New Row**. The Details table window opens.

2. Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elapsed Time Attribute</td>
<td>▼ REPORTDATE</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Elapsed Time Interval</td>
<td>30</td>
</tr>
<tr>
<td>Interval Unit of Measure</td>
<td>▼ MINUTES</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Escalation Point Condition</td>
<td>▼ STATUS='NEW'</td>
</tr>
<tr>
<td></td>
<td>▼ Use the SQL Expression Builder to enter this information (see the Help within the dialog for instructions).</td>
</tr>
<tr>
<td>Repeat</td>
<td>Leave the check box clear.</td>
</tr>
</tbody>
</table>

The escalation actions and notifications are triggered once for the escalation point.

Checked = repeatedly triggers actions and notifications for the same escalation point.

3. Click **Save Escalation**.

**Task 3: Add the First Action for Escalation Point A**

This action assigns ticket ownership to the Maintenance group.

1. From the Actions subtab, click **New Row**. The Actions table window opens.

2. In the **Actions** field, click **Detail Menu** and select **Go to Actions**. The Actions application opens.

3. Click **New Action** in the toolbar. The Action tab opens.

4. Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Clear the default. Enter: INC OWN.</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Assign incident to an owner group.</td>
</tr>
<tr>
<td>Object</td>
<td>INCIDENT</td>
</tr>
<tr>
<td>Type</td>
<td>SETVALUE</td>
</tr>
<tr>
<td>Value</td>
<td>'MAINT' (include single quotation marks)</td>
</tr>
<tr>
<td>Parameter/Attribute</td>
<td>OWNERGROUP</td>
</tr>
</tbody>
</table>

5. Click **Save Action**.
6 In the top-right corner of the Actions application, click **Return with Value**.

You return to the Escalations application, and the first row in the Actions tab contains the INC OWN action.

7 Click **Save Escalation**.

**Task 4: Add the Second Action for Escalation Point A**

This action sets Service Group for the incident record to IT.

1 From the Actions tab, click **New Row**. The Actions table window opens.

2 In the **Actions** field, click **Detail Menu** and select **Go to Actions**. The Actions application opens.

3 Click **New Action** in the toolbar. The Action tab opens.

4 Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>INC SETSVCGRP</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Set Service Group of Incident.</td>
</tr>
<tr>
<td>Object</td>
<td>INCIDENT</td>
</tr>
<tr>
<td>Type</td>
<td>SETVALUE</td>
</tr>
<tr>
<td>Value</td>
<td>'IT' (include single quotation marks)</td>
</tr>
<tr>
<td>Parameter/Attribute</td>
<td>COMMODITYGROUP</td>
</tr>
</tbody>
</table>

5 Click **Save Action**.

6 In the top-right corner of the Actions application, click **Return with Value**. You return to the Escalations application. The first row on the Actions subtab contains the INC SETSVCGRP action.

INC OWN executes, then INC SETSVCGRP. The numbers in the Actions tab Sequence column indicate the order in which the actions run.

7 Click **Save Escalation**.

**Task 5: Add a Notification for Escalation Point A**

Notifications are sent as e-mail messages. Add a notification in Escalations and save it in the Communication Templates table:

1 On the Notifications tab, click **New Row**. The notification table window opens.

2 Click **Detail Menu** next to Templates, and select **Go to Communication Templates**. The Communication Templates application opens.
Escalation and SLA Integration

3 Click **New Communication Template** in the toolbar. The Communication Template tab opens.

4 Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template</td>
<td>INC OWNGRP</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Notification to owner group of incident.</td>
</tr>
<tr>
<td>Applies To</td>
<td>▼ INCIDENT</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Accessible From</td>
<td>ALL (default)</td>
</tr>
<tr>
<td>Send From (Template Details area)</td>
<td><a href="mailto:maxadmin@mro.com">maxadmin@mro.com</a> (or another valid e-mail account)</td>
</tr>
<tr>
<td>Subject</td>
<td>Incident has been queued.</td>
</tr>
<tr>
<td>Message</td>
<td>Incident :ticketid has been queued. Its internal priority is :internalpriority.</td>
</tr>
</tbody>
</table>

5 Click the Recipients tab.

6 Click **Show Table** to open the Person Groups for Communication Template table window.

7 Click **Select Groups**. The Select Person Groups dialog box opens. You are sending a notification to the maintenance group.

8 Select MAINT. Click **OK**.

9 In the Person Groups for Communication Template table window, check the **To?** box.

10 Click **Save Communication Template**.

11 In the top-right corner of the Communication Templates application, click **Return with Value**.

You return to the Escalations application. The Notifications tab lists the notification.

12 Click **Save Escalation**.

**Task 6: Create Escalation Point B**

You must:

- Test the incident records selected through the application of the Escalation header condition, and

- Identify all records entered and assigned by escalations more than three hours ago that remain unresolved, and
Create a condition to check elapsed time. It tests whether, three hours after being reported to the service desk, any incidents remain In Progress, Queued, or Pending. If so, escalate these incidents.

1 In the Escalations Points table window, click **New Row**. The Details table window opens.

2 Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elapsed Time Attribute</td>
<td>▼ REPORTDATE</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Elapsed Time Interval</td>
<td>180</td>
</tr>
<tr>
<td>Interval Unit of Measure</td>
<td>▼ MINUTES</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Escalation Point</td>
<td>▼ STATUS='INPROG' OR STATUS='QUEUED' OR STATUS='PENDING'</td>
</tr>
<tr>
<td>Condition</td>
<td>▼ Use the SQL Expression Builder to enter this information (see the Help within the dialog for instructions).</td>
</tr>
<tr>
<td>Repeat</td>
<td>N (default)</td>
</tr>
</tbody>
</table>

3 Click **Save Escalation**.

**Task 7: Add an Action for Escalation Point B**

This action sets the status of the incident record to INC CHGPRT.

1 From the Actions subtab, click **New Row**. The Actions table window opens.

2 In the **Actions** field, click **Detail Menu** and select **Go to Actions**. The Actions application opens.

3 Click **New Action** in the toolbar. The Action tab tab opens.

4 Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>INC CHGPRT</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Change priority to high.</td>
</tr>
<tr>
<td>Object</td>
<td>INCIDENT</td>
</tr>
<tr>
<td>Type</td>
<td>SETVALUE</td>
</tr>
<tr>
<td>Value</td>
<td>1</td>
</tr>
<tr>
<td>Parameter/Attribute</td>
<td>INTERNALPRIORITY</td>
</tr>
</tbody>
</table>

5 Click **Save Action**.

6 In the top-right corner of the Actions application, click **Return with Value**.
You return to the Escalations application, and the first row in the Actions tab contains the INC CHGPR action.

7 Click **Save Escalation**.

**Task 8: Add Notifications for Escalation Point B**

1 On the Notifications tab, click **New Row**.

2 Click **Detail Menu** next to Templates, and select **Go to Communication Templates**. The Communication Templates application opens.

3 Click **New Communication Template** in the toolbar.

4 Enter these values:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Template</td>
<td>INC RES</td>
</tr>
<tr>
<td>Description</td>
<td>Enter: Notification to resolve incident.</td>
</tr>
<tr>
<td>Applies To</td>
<td>▼ INCIDENT</td>
</tr>
<tr>
<td></td>
<td>▼ Use the Select Value dialog box</td>
</tr>
<tr>
<td>Accessible From</td>
<td>ALL (default)</td>
</tr>
<tr>
<td>Send From (Template Details area)</td>
<td><a href="mailto:maxadmin@mro.com">maxadmin@mro.com</a> (or another valid e-mail account)</td>
</tr>
<tr>
<td>Subject</td>
<td>Incident :ticketid requires immediate attention.</td>
</tr>
<tr>
<td>Message</td>
<td>Incident :ticketid has remained in status :status for the last three hours. It requires immediate attention. Its internal priority has been increased to :internalpriority.</td>
</tr>
</tbody>
</table>

5 Click the Recipients tab.

6 Click **Show Table** to open the Persons for Communication Template table window.

7 Click **Select People**. The Select People dialog box opens. You are sending a notification to John Hunter, the service desk supervisor.

8 Select HUNTER. Click **OK**.

9 In the Persons for Communication Template table window, check the **To?** box.

10 Click **Save Communication Template**.
11 In the top-right corner of the Communication Templates application, click **Return with Value**.

You return to the Escalations application. The Notifications tab lists the notification.

12 Click **Save Escalation**.

**Task 9: Validate and Activate the Escalation**

Ensure there are no SQL errors in the condition fields:

1 Choose **Select Action > Validate**.

   a If Maximo informs you that the validation failed, click **Maximize** to expand the Validation Results table window to view the errors.

   b If the error is against the SQL statements you entered in the **Condition** field in the header, or in the **Escalation Point Condition** field in an escalation point, correct the statements and re-validate the escalation.

2 Click **Save Escalation**.

3 Choose **Select Action > Activate/Deactivate Escalation**. Maximo displays a message stating that escalation ESC INC is activated.

This flowchart shows the steps of the SLA escalation example.
Enabling Logging for Escalations

Conditions for the Preceding Example

- The procedure describes only the logical sequence of steps required to create and enable an escalation. Maximo triggers an escalation only when the escalation engine finds records that match the conditions defined in the escalation record.

- To test the escalation:
  - Use the Incidents application and create incident records that can be used to meet the conditions identified in this escalation.
  - Use the Incidents application and create incident records that Maximo can identify through this escalation.
  - You can use the MAXDEMO database to practice. It contains sample records for applications you can use for testing.

- To receive notifications based on this escalation, enter valid e-mail addresses for your Site.

**NOTE**
Open the maximo.properties file, in the `<Maximo root> applications\Maximo \properties folder. Ensure the mail.smtp.host value is set. It is the name of the host running the SMTP server. Your network administrator can provide this address. If you make modifications, you must rebuild the EAR file.

For information on editing this file, see "The Maximo.Properties File," on page B-1.

Enabling Logging for Escalations

Time drives escalations, and log files let you check whether escalation actions run according to schedule.

To enable logging on the escalation cron task, notification messages, and action messages, you must modify the logging.properties file. Default location: `<Maximo_root> applications\Maximo \properties` where `<Maximo_root>` is the folder where you installed Maximo.

1. Append these examples to your local file:

```
# Enable crontask for ESCALATION
log4j.logger.Maximo.crontask.ESCALATION=DEBUG, A2

# Enable the following for Notification messages on logger
log4j.logger.Maximo.service.SYSTEM.COMMTEMPLATE=INFO, A2

# Enable the following for Action messages on logger
log4j.logger.Maximo.service.SYSTEM.ACTION=INFO, A2
```

2. Save the modifications.
3    Rebuild the EAR file and restart the application server. For instructions, see "Building EAR Files," on page 25-8.

Sample Escalation Log Messages

NOTE You must first enable logging.

Escalation Start and Finish

These messages indicate the escalation's start and finish, including its name and time of execution.


These statements appear in the log file if you place this statement in the properties file:

    log4j.logger.Maximo.crontask.ESCALATION=DEBUG, A2

SQL Statements Constructed and Executed

The escalation engine constructs and executes these SQL statements, which appear after the started escalation statement and before the finished escalation statement.

    select * from escalation    where crontaskname= 'ESCALATION' and
    instancename= 'ESC INCID'

    (ESCALATION):select * from escalation    where crontaskname= 'ESCALATION' and
    instancename= 'ESC INCID'

    (ESCREFPOINT):select * from escrefpoint    where escalation = 'ESC INCID'

    (ESCREFPOINT):select * from escrefpoint    where escalation = 'ESC INCID'

    select * from incident    where internalpriority>5 and
    status='NEW'

    select * from incident    where internalpriority>5 and
    status='NEW'

These statements appear in the log file if you place this statement in the properties file:

    log4j.logger.Maximo.sql=INFO, A2
Enabling Logging for Escalations

Escalation Engine Identifies Action Group

Maximo logs these messages soon after an escalation begins and the associated actions are being executed.

The action group '1004' had member actions 'INC QUE' (queue incident) and 'INC SETOWN' (set owner of the incident).


These statements appear in the log file if you place this statement in the properties file:

log4j.logger.Maximo.service.SYSTEM.ACTION=INFO, A2

Actions Completed

Maximo logs these messages soon after an escalation begins and the associated actions end. You can write additional statements into the log file, including the subject and body of the notification.

19 Jul 2004 14:40:45:867 [INFO] Sending Email from a communication template

This message and other associated communication template statements appear in the log file if you place this statement in the properties file:

log4j.logger.Maximo.service.SYSTEM.COMMTEMPLATE=INFO, A2
Escalations Included in Maximo

**NOTE** You must activate these escalations.

This escalation changes the status to the status of the target invoice when invoices generated from a payment schedule reach a due date:

<table>
<thead>
<tr>
<th>Escalation</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVDUE</td>
<td>Invoice</td>
</tr>
</tbody>
</table>

These escalations change a status of a contract to approved when its start date is reached:

<table>
<thead>
<tr>
<th>Escalation</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSTRCTREFF</td>
<td>Master Contracts</td>
</tr>
<tr>
<td>LEACTREFF</td>
<td>Lease Contracts</td>
</tr>
<tr>
<td>WARCTREFF</td>
<td>Warranty Contracts</td>
</tr>
<tr>
<td>PURCTREFF</td>
<td>Purchasing Contracts</td>
</tr>
<tr>
<td>LABCTREFF</td>
<td>Labor Contracts</td>
</tr>
</tbody>
</table>
E-mail Listener

Service desk implementations use the E-mail Listener Configuration application to receive and process service requests (SRs) via e-mail. E-mail Listener can monitor multiple e-mail accounts to retrieve messages. The application supports embedded and normal message attachments.

**NOTE**

E-Mail Listener cannot process encrypted or digitally signed e-mail messages. Inform users of this limitation.

Configure E-mail Listener to check each account at a set interval. The listener identifies new SRs and updates to existing SRs, based on the subject line of the message.

E-mail Listener includes a customizable Workflow process that creates and updates SRs. The communication log captures all incoming communications E-Mail Listener receives.

Storing Attachments

E-mail Listener stores attachments from incoming e-mail on the Maximo server. You can view attachments via the Communication Log subtab in the Service Request application.

The mail server can control attachment size. Contact your mail server administrator regarding these controls, and to determine the file types allowed on E-mail Listener’s mail server. Communicate this information to E-mail Listener users.

Attached Documents

Use the Maximo Attached Documents application to attach Word documents, PDF files, URLs, diagrams, pictures, and other types of documents to individual Maximo records. For information about the Attached Documents features, see "Attached Documents Administration and Configuration," on page 22-1.

Attached Documents Example

Suppose Sally tries to print a file and receives an indecipherable error message. She sends an e-mail and screenshot describing the problem to help@support.com, the company site for service desk e-mail requests. The
E-mail Listener Configuration application retrieves Sally's message and creates an SR with identifier 123.

Frank, a service desk agent, reviews SR #123, searches the knowledge base and finds a solution. He opens the Communications Log containing Sally's initial e-mail, creates a communication with the solution, and sends it to her.

All details of the interaction between Frank and Sally are stored in the Communications Log for SR #123.

Components

E-Mail Listener's components comprise:

<table>
<thead>
<tr>
<th>Component</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail Listener Configuration</td>
<td>The application used to create, modify, and delete E-mail Listener configurations.</td>
</tr>
<tr>
<td>NOTE Prerequisite: configure mail servers and e-mail accounts.</td>
<td></td>
</tr>
<tr>
<td>E-mail Listener cron task</td>
<td>Component that executes continuously on the Maximo application server and leverages the Maximo cron task infrastructure. This component encapsulates a staging process which processes inbound e-mail through a staging table.</td>
</tr>
</tbody>
</table>

Relationship Among Components
Each E-mail Listener configuration is associated with the E-mail cron task and a specific cron task instance. Each instance is created for each E-mail Listener configuration when that configuration is activated for the first time. For information about the Cron Task Setup application, see "Cron Task Setup," on page 16-1.

The polling frequency is associated with the individual cron task instance.

E-mail Listener supports POP3 and IMAP protocols. These protocols use the JavaMail API, which provides a platform- and protocol-independent framework to build mail and messaging applications.
How E-Mail Listener Works

These events occur when the mail server receives an incoming e-mail:

1. Mail server polling

2. E-mail staging, including:
   - extracting e-mail content, including attachments
   - storing content in staging tables and attached documents
   - launching e-mail processing Workflow process

3. Workflow processing, indicating whether the e-mail message is a new or updated SR:
   - New: create an SR and communication log
   - Updated: update the SR and create a communication log

**High Level Overview**

**NOTE** There is no automatic e-mail response to an incoming e-mail. The service desk agent can send a response, or you can build a different Workflow process for E-mail Listener.
Polling

The Mail Server polling actions include these events:

▼ Polls the mail server at a specific frequency. See the E-mail Listener Help to use the Date Selector to set the schedule.

The **Schedule** field (5 m = 5 minutes) determines the polling frequency.

<table>
<thead>
<tr>
<th>E-mail Processing Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule</td>
</tr>
</tbody>
</table>

▼ For any e-mail marked as read on the mail server, determine whether to delete the e-mail.

■ Yes: mark the e-mail as deleted on the mail server.

■ No: keep the e-mail on the mail server.

The e-mail deletion rules you define depend upon how the mail server manages the e-mail account. Configure deletion rules in the E-mail Deletion section of the application.

**Configure deletion rules in the E-Mail Deletion section**

▼ For new e-mails on the mail server:

1. Extract the header and message body for each e-mail.

2. Extract any attachments.

3. Move to e-mail staging.

4. Mark e-mail as Read on the mail server.
Customizing E-Mail Listener

Staging

Maximo stages e-mail messages to save all information required to process the e-mail and initiate Workflow processing.

A Maximo staging table stores the attributes of an incoming e-mail message, including recipients (To, CC, BC), sender, subject, and message content.

This creates a record; the Workflow process determines how to process it.

Workflow

Use Workflow processes to create a set of steps to guide records for your business process.

Maximo installs an Inbound E-mail Processing (IBEP) Workflow; you can modify it or create a process. See the Workflow Designer Help. From Maximo, select Configuration > Workflow > Workflow Designer; click Help.

The IBEP Workflow checks whether the e-mail is associated with an existing request.

- No: create an SR and Communication log entry.
- Yes: create a Communication log entry.

**NOTE** The IBEP Workflow does not generate outbound e-mail notifications.

Customizing E-Mail Listener

The base implementation provides defaults for each listener configuration. You can customize E-mail Listener by specifying the Object Key Delimiter and providing your own Preprocessor implementation.

Object Key Delimiter

The **Object Key Delimiter** value identifies the incoming e-mail as an existing SR. To change the default (##):

1. Replace the value with other characters.

   There are no restrictions, but the delimiter must be unique. You should choose infrequently used characters or symbols for delimiters.

2. Place the delimiter before and after the SR ID (example: SR 1009 is represented as ##1009##).

Object Key Identifier

The ID of the record is called the Object Key Identifier, which can be a sequence generated by Maximo (example: 1001, 1002, and so on).
Preprocessor

The default Preprocessor value is psdi.common.emailstnr.Preprocessor. This Java class:

- Executes on the server when the listener recognizes a new e-mail.
- Parses the Subject line based on the Object Key Delimiter’s value, and adds a value to the Object Key column in the E-mail Listener staging table.

The preprocessor indicates whether the e-mail is a new or updated SR:

- The Preprocessor class extracts the substring bounded by the delimiter characters.
- The preprocessor stores recognized substrings in the Object Key column of the staging table. If no substring is recognized, the column is empty.

Customization Scenario

Other characters can represent the Object Key Delimiter. Suppose + is the delimiter, and a user sends an e-mail with this subject line: “+1003+ Having problems with printer + network.”

The base preprocessor cannot identify the substring because the delimiter symbol occurs multiple times within the subject line.

To customize the preprocessor implementation:

1. Place the class file in the Maximo business objects folder.
2. Modify the buildmaximoea.xml file in the <Maximo_root>\deployment folder.
4. Verify that the business objects folder is included in the businessobject.jar file.
Customizing the Preprocessor

The base Preprocessor Java class implements a standard Java interface called the LSNRPreprocessor. Custom preprocessor implementations must include an implementation of the LSNRPreprocessor interface.

The preprocessor interface provided with Maximo includes these public methods:

- Boolean isNewEmail (String del, String subject)
- String getObjectKey (String del, String subject)

In the custom Java class, implement both methods. Each accepts two parameters:

- delimiter string
- subject line string

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Base preprocessor implementation</th>
<th>Custom implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>isNewEmail()</td>
<td>Returns a Boolean value indicating whether the e-mail is for a new or existing SR.</td>
<td>Checks whether the Object Key Delimiter string occurs exactly twice in the subject line string.</td>
<td>Might provide different logic to determine the new or existing SR.</td>
</tr>
<tr>
<td>getObjectKey()</td>
<td>▼ Returns a string that represents the SR ID, or ▼ Returns null, if no ID is found.</td>
<td>Extracts the substring between the first and last occurrences of the delimiter string in the subject line.</td>
<td>Might provide different logic to determine the SR ID.</td>
</tr>
</tbody>
</table>

Java requires that you declare the custom implementation at the beginning of the file. Example:

```java
public class MyPreprocessor implements LSNRPreprocessor
```
Additional Tasks

See the E-Mail Listener Help for a description of the configuration process and instructions to activate a listener.

Errors

E-mail processing errors are written to the appropriate Maximo log file. Specify the Maximo log file on the server, and adjust the settings in the logging.properties file.

See "Bounced E-mail," on page 13-9.

Logging Properties File

NOTE Use logging E-mail Listener activity only for debugging, not in a production environment.

You can modify the logging.properties file to enable logging on E-mail Listener. Default location:

<Maximo_root> applications\maximo\properties

1 Open logging.properties and search for this string:

log4j.logger.maximo.crontask.EmailListnerCron=INFO

The string INFO indicates that the Maximo log records the maximum level of E-mail Listener data.

2 You can add one or both appenders:

<table>
<thead>
<tr>
<th>Appender</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Directs output to the console only</td>
</tr>
<tr>
<td>A2</td>
<td>Directs output to the log file only</td>
</tr>
</tbody>
</table>

NOTE After changing the logging.properties file, build a new maximo.ear file and restart the application server. For instructions, see "Building EAR Files," on page 25-8.

Bounced E-mail

Outbound e-mail that cannot be delivered is termed “bounced.” Large volumes of bounced e-mail create excess network traffic and affect E-mail Listener's ability to process legitimate SRs.

The mail server generates and returns “delivery failed” messages to the E-mail Listener account specified in the Send From field, and E-Mail Listener treats these messages as SRs.
Recommended deployment option:

1. Create a dedicated e-mail account for bounced e-mail notifications to preserve the integrity of the primary E-mail Listener account.

2. Base any outbound e-mail notification on Communication Templates where the **Send From** field in the template specifies the dedicated bounced e-mail account.

An e-mail is generated and sent to that address.

A Java stack trace appends to the message, providing a snapshot of the threads and monitors in a JVM.

These communication templates are applied to e-mail sent to administrators to generate error-handling e-mails:

<table>
<thead>
<tr>
<th>Template</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSNRINVM</td>
<td>Whenever the inbound e-mail contains an empty subject line.</td>
</tr>
<tr>
<td>LSNRERROR</td>
<td>Whenever errors encountered during inbound e-mail staging.</td>
</tr>
<tr>
<td>LSNRCFGERR</td>
<td>Whenever a configuration error is encountered. Configuration errors includes incorrect values or parameters specified for an E-mail Listener configuration.</td>
</tr>
<tr>
<td>LSNRMAILER</td>
<td>Whenever there is an error accessing and retrieving e-mail from the configured mail server.</td>
</tr>
<tr>
<td>LSNRINBF</td>
<td>Whenever the staging table entry for an inbound e-mail cannot be created.</td>
</tr>
<tr>
<td>LSNRCONNF</td>
<td>Whenever there is a mail server connection error.</td>
</tr>
</tbody>
</table>
Use the Calendars application to create and modify calendars associated with these Maximo records.

- Assets
- Labor
- Locations
- Organizations
- People
- preventive maintenance records
- Service Level Agreements (SLAs)
- Tools
- Work orders

Calendar records incorporate start and end dates, shift definitions, and non-working time. Holidays are examples of non-working time. Multiple records can reference a single calendar.

Typically you create calendars for Organizations, but you can also make them Site-specific. You might need multiple calendar definitions, for example:

- Corporate Calendar – includes standard shifts and holidays
- Asset Calendar – working time calendar for asset UPTIME

**Exceptions to the Standard Calendar**

Calendars are shared entities that set the standards for shifts and holidays, for example.

Information for individuals, such as vacation days, sick leave, personal time, and overtime, is not stored on the main calendar record. Use these applications and icons to enter exceptions to the standard calendar:

<table>
<thead>
<tr>
<th>Application</th>
<th>Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>Modify Person Availability</td>
</tr>
<tr>
<td>Assignment Manager</td>
<td>Modify Availability</td>
</tr>
</tbody>
</table>

Maximo combines the standard calendar assignments and the exceptions to determine a person’s availability for a given day, shift, and so on.
Shift Patterns

A shift defines working time without being date-specific. Choose the working days for the week, then designate the start and end times for work. For example, create a shift called First, with these properties:

- working days are Monday through Friday
- work starts at 7:00 a.m.
- work ends at 3:00 p.m.
- work hours for the day total 8

You can create special shift definitions that are atypical for your work Site (example: a Saturday night or Holiday shift).

Once a shift is defined, you can apply it to a calendar. After creating a calendar, you can use it on person, location, asset, and other records to specify working time.

### Sample shift patterns

<table>
<thead>
<tr>
<th>Start day</th>
<th>Sample shift patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>Seven days</td>
</tr>
<tr>
<td>Monday</td>
<td>Multiple of seven, for example, 14, 21, and so on</td>
</tr>
<tr>
<td>rotates</td>
<td>Five days</td>
</tr>
</tbody>
</table>

If the number is not a multiple of 7, the pattern does not repeat on the same days of the week. For example, with a 15-day pattern of ten days on and five days off, the second instance of the shift starts on a different day than the first.

For all these cases, use the same procedure in the Define Patterns dialog box.

Creating a Calendar

1. Open the Calendars application. Maximo displays the List tab.

2. Your default insert Site must be in the Organization you want to create the calendar for. To verify or change the default:
   
   a. In the Maximo Bar, select **Profile > Default Information**. The **Default Insert Site** field displays the current default.

   b. To select a different Site, click Select Value.

   c. Click OK.
3 Click the **New Calendar** icon.

4 Complete these fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calendar</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Calendar Description</td>
<td>Enter a description.</td>
</tr>
<tr>
<td></td>
<td>To enter additional information, click Long Description.</td>
</tr>
<tr>
<td>Start Date, End Date</td>
<td>Enter dates using the date selector.</td>
</tr>
</tbody>
</table>

5 Click **Save Calendar**.

To add shifts, see "Defining a Shift and Pattern," on page 14-4.

To add holidays and other non-working time, see "Defining Non-Working Time," on page 14-7.

### Modifying a Calendar

1 From the List tab in the Calendars application, select a calendar. It opens on the Calendar tab.

2 Choose **Select Actions > Define/Apply Shifts**.

3 In the Shifts table window, click in the row containing the shift.

4 Click **Define Pattern**. Modify the shift pattern.

5 Click **OK**.

6 In the Shifts table window, check the box in the row containing the shift.
Deleting a Calendar

7 Click **Apply Shifts**.

8 Click **OK**. The calendar reflects your changes.

### Deleting a Calendar

If a calendar is used on any of the following records, you cannot delete it:

- an asset record
- an asset status
- a personal calendar
- a service level agreement
- a preventive maintenance record
- a job plan
- a location
- a work order

1 From the List tab in the Calendars application, select a calendar. You can delete only one calendar at a time.

2 Choose **Select Actions > Delete Calendar**.

3 At the confirmation message, click **Yes**.

### Duplicating a Calendar

You can duplicate a calendar and modify the duplicate.

1 From the List tab in the Calendars application, select a calendar. It opens on the Calendar tab.

2 Choose **Select Actions > Duplicate Calendar**. The duplicate calendar opens.

3 In the **Calendar** field, enter a name.

4 Modify the description in the **Calendar Description** field.

5 Click **Save Calendar**.

**NOTE** After saving the calendar, you can modify shift and non-working time information.

### Defining a Shift and Pattern

1 From the List tab in the Calendars application, select a calendar.

2 Choose **Select Actions > Define/Apply Shifts**. The Define/Apply Shifts dialog box opens.
Applying a Shift to a Calendar

3 In the Shifts table window, click **New Row**.

For information about shifts, see "Shift Patterns," on page 14-2.

4 Complete these fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Shift Description</td>
<td>Enter a description.</td>
</tr>
<tr>
<td>Start Day</td>
<td>Enter a day to begin the pattern, or click Select Value.</td>
</tr>
<tr>
<td>Days in Pattern</td>
<td>Enter the number of days.</td>
</tr>
</tbody>
</table>

5 Click **Define Pattern**. The dialog box displays the days in the pattern.

6 In the Shift Pattern table window, enter a start time, end time, and work hours for each day in the pattern. For instructions, see "Defining the Hours in a Shift," on page 14-6.

7 Click **OK**. The details display in the Shift Pattern table window.

Applying a Shift to a Calendar

1 In the Shifts table window, check the boxes of one or more shifts.

2 Click **Apply Shifts**.
Applying a Shift to a Calendar

3 To select start and end dates, select an option:

<table>
<thead>
<tr>
<th>Option</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entire Calendar</td>
<td>The start and end dates reflect the dates specified for the calendar, but they are read-only.</td>
</tr>
<tr>
<td>Selected Dates</td>
<td>Maximo inserts the dates defined for the calendar. You can modify them only for a shorter period of time (as short as a single day).</td>
</tr>
</tbody>
</table>

4 Click OK.

Defining the Hours in a Shift

Specify hours for each day in the pattern.

1 Click Define Pattern. The Define Pattern dialog box opens.

2 Complete these fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Time, End Time</td>
<td>Enter start and end times (example: 10:00 AM and 6:00 PM).</td>
</tr>
<tr>
<td>Work Hours</td>
<td>Default = End Time – Start Time. You can enter a different value (example: work day = 8 hours, but only 7 are considered work hours).</td>
</tr>
</tbody>
</table>

3 Enter values for the remaining work days. To duplicate the values of a working day in succeeding rows, click Fill Out Work Days Data.

4 Click OK. The details appear in the Shift Pattern table window.
Defining Non-Working Time

You can define non-working time, such as holidays and shutdowns.

1 From the List tab in the Calendars application, select a calendar.

2 Choose Select Actions > Define/Apply Non-Working Time. The dialog box displays all the current non-working time.

3 Click New Row.

4 Complete these fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Enter a description. Example: Winter Shutdown Week.</td>
</tr>
<tr>
<td>Start Date, End Date</td>
<td>Enter start and end dates. For single-day events, the start and end dates are identical.</td>
</tr>
<tr>
<td>Type</td>
<td>Click ‼️. Select from the list, including OTHER.</td>
</tr>
</tbody>
</table>

5 Click Close Details.
Applying Non-Working Time to a Work Period

1. In the Define/Apply Non-Working Time dialog box, check the boxes of one or more non-working times.

2. Click Apply.

3. Click OK. The dialog box closes.

Maximo inserts 0.0 hours on the Calendar work periods for the days you specified.

For example, if the shift normally has eight hours of working time and you apply holiday non-working time, the calendar for that date displays 0 working hours.

Viewing and Modifying Work Periods

You can modify work periods for a given date.

1. From the Calendars application List tab, select a calendar.

2. On the date you want to modify, click the hours value (example: 8:00 hours).

Maximo displays all shift information for that calendar for that day, including non-working time.

3. Modify the available fields.

4. (Optional) Add a shift for that date:
   a. Click New Row.
   b. In the Shift field, click Select Value and select a shift.
   c. Enter values in the available fields.

5. Click OK. The calendar reflects the changes.

NOTE You can use the Work Periods tab to modify work periods, line by line in a table window.
You use the Classifications application to create detailed information about assets, locations, items, tickets, work orders, and solutions, so you can retrieve them later.

Base your classification structure on how you currently group things in your business.

Before Creating Classifications

First, determine the information you want to retrieve. You must group things so you can do real statistical analysis later. To know how many customers complained about problem A versus problem B, you must classify problem A differently from problem B.

**NOTE** Only create classifications if you intend to use them to retrieve information.

**Recommendation**

Begin by breaking things into top-level categories such as:

- IT Assets
- Production Assets
- Facility Assets
- Fleet Assets

Work slowly from the top levels into the details. For example, under Fleet Assets, there are 18-wheel trucks and sales fleet cars, or you can categorize by maintenance group units.

You can use a visual tree control to classify things and search for classified things. You can create unlimited classification levels.

**Best Practice**

Build classifications top down, from Parent to Child levels. Do not try to create entire branches. Instead, work slowly from the top levels into the details.
Using Classifications

Classification Standards

Maximo does not provide standard classifications. However, you can apply industry standards when creating classifications.

For example, standard VMRS codes exist for vehicle or fleet maintenance, and any mechanic who uses them knows that an oil change is code 42-3-2.

You should base your classifications for information technology assets on the United Nations Standard Product and Services Classification (UNSPC) codes.

Contact the IBM professional services group or industry solutions group regarding material they compiled for creating classification standards.

Using Classifications

Maximo users can search classification structures and definitions of attributes to retrieve information.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classifications</td>
<td>Define at the System, Site, or Organization level.</td>
</tr>
<tr>
<td>Items</td>
<td>Define at the System level only.</td>
</tr>
</tbody>
</table>

Service Management Examples

Example 1

A service desk organization creates a 4-level classification structure to categorize tickets and work orders. This classification structure helps diagnose issues, categorize work orders, enhance reporting and other activities.

Example 2

A user contacts the service desk, requesting a Windows XP installation. A service request and change record are created. The change record is classified as NEW SW REQUEST>OPERATING SYSTEM>WINDOWS XP.

Defining Classifications

Define classifications so the Maximo search capability can find them.

What You Can Classify

▼ You can use attributes to classify and search for asset, item, and location records.

▼ You cannot use attributes to classify solution, ticket, or work order records.
Classification Structure

The structure consists of Parent/Child relationships between individual nodes.

In this example, Operating System represents an individual node with a unique identifying number 2010202, and resides at the end of the classification path 2\201\20102\2010202.

Another view of the classification structure is provided through the Select Parent Classification directory structure.

Select Parent Classification Directory Structure
Attributes

Each classification node contains a list of attributes (characteristics of a classification object).

<table>
<thead>
<tr>
<th>Classification</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>▼ Horsepower</td>
</tr>
<tr>
<td></td>
<td>▼ Tire size</td>
</tr>
<tr>
<td></td>
<td>▼ Exterior color</td>
</tr>
</tbody>
</table>

Associate the attributes with the truck.

Sections

You can break attributes into sections. Sections are groupings of attributes, allowing the same attribute to be used multiple times.

Example

You define a pipe in Maximo as an asset.

▼ The pipe is 80 feet (~25 m) long.
▼ It contains ten sections of equivalent length.
▼ Its interior diameter tapers from one end to the other.

Because of the taper, the walls of the pipe must be thicker at the narrow end to withstand the higher pressure.

Each section has a different average interior diameter and wall thickness, so the attribute is the interior diameter.

Integrating Classifications with Other Maximo Applications

▼ You can create classifications for activities, assets, changes, incidents, items, locations, problems, releases, service requests, solutions, and work orders.

▼ You can search for classifications:

■ Use any application that contains an Asset, Location, Item, Ticket, Work Order, or Solution field.

For example, from a work order, you can search for pump related items or toner cartridge related solutions.

■ Use the advanced search option on the List tab from the following applications:

▼ Activities
▼ Assets
▼ Changes
Creating Classifications

For example, you can use the List tab to generate a results set of work order records based on a classification.

You can use attributes to search for an asset, item, or location (example: search for a blue car). You cannot use attributes to search for solutions, tickets, or work orders.

Creating Classifications

1. On the Maximo tool bar, click the **New Classification** icon.

2. From the **Classification** field:
   - Create a classification and enter a description.
   - Click **Select Value** in the **Classification** field and select a classification.

3. (Optional) To select a Parent Classification, click **Select Value** in the **Parent Classification** field to view a list of valid parent classifications.

4. (Optional) Select an Organization and a Site.

5. (Optional) To generate a description, check the **Generate Description?** box.

   When this option is selected, the parent and child build descriptions for assets, locations, and item master records, based on class descriptions.

6. (Optional) To use the classification in the generated description, check the **Use Classification?** box.

7. Check the appropriate **Use With** boxes (example: **Assets**) to associate the classification with specific Maximo applications.

8. From the Children table, do one of the following:
   - Enter a classification. If the classification does not exist, you can add one and enter a description.
   - Click the Select Value button in the **Classification** field to view a list of valid classifications. Use the Filter By area to limit your search list as necessary. Click **OK**.
   - Select an Organization and a Site. Children inherit Organizations and Sites from their parents.
Creating Classifications

- Check the Generate Description? box and the appropriate Use With boxes (example: Assets?).

9 You can add attributes by inserting rows and completing fields in the Attributes table window. See Field Help (F1) for field descriptions.

**NOTE** These attributes apply to parents, but not to children.

For the Attribute, Domain, and Unit of Measure fields:

- You can use the Select Value button to select from existing values.
- You can create new values, just as with the Classification fields. You cannot create new values for the Data Type field.

10 Save the record.

Adding and Modifying Classifications

Define the list of valid words used to build classifications.

1 Go to the List tab or the Classifications tab.

2 Choose Select Actions > Add/Modify Properties > Classification.

Adding classifications

1 Click New Row.

2 Enter a classification name. Different Organizations can share classification names, but at the Site level, names must be unique.

3 Enter a classification description.

4 Enter a Site in the Site field or an Organization in the Organization field, as needed.
Creating Classifications

5 Repeat this process as you add each classification.

6 Click OK to save the classifications.

Modifying classifications

1 To find a classification:
   ▼ Page through the list of classifications.
   ▼ Enter a classification in the Filter area, and press <Enter>.

2 Modify Description, the only editable field.

3 Click OK.

Deleting Classifications

1 Select a classification.

2 Choose Select Action > Delete Classification.

NOTE If the classification is in use, you cannot delete it.

3 Click Yes.

Adding and Modifying Attributes

Using the Add/Modify Attributes dialog box helps you quickly add or modify attributes and maintain standards. For example, you can ensure that an attribute (example: horsepower) is the same wherever you use it.

1 Go to the Classifications tab.

2 Choose Select Action > Add/Modify Properties > Attributes.
Creating Classifications

Adding attributes

1. Click **New Row**.
2. Enter an attribute name, which must be unique for that specification template.
3. Enter a description of the attribute.
4. Enter a value in the **Unit of Measure** field, or click **Select Value** to view a list of valid units of measure.
5. Enter a type in the **Data Type** field, or click **Select Value** to view a list of valid data types.
6. (Optional) Enter a domain in the **Domain** field, or click **Select Value** to view a list of valid domains.
7. (Optional) Enter a prefix in the **Prefix** field.
8. (Optional) Complete the **Site** and **Organization** fields.
9. Repeat this process as you add each attribute.
10. Click **OK**.

Modifying attributes

1. To find an attribute:
   - Page through the list of attributes.
   - Enter an attribute in the Filter area, and press **<Enter>**.
2. Modify the appropriate fields.
3. Click **OK**.
Deleting attributes

1. Select an attribute.
2. Click the Mark Row for Delete button.

**NOTE** If the attribute is in use, you cannot delete it.
3. Repeat this process for each attribute you delete.
4. Click Yes.

Adding and Modifying Units of Measurement

You can use the Add/Modify Units of Measure dialog box to add and/or modify units of measure quickly:

To open it:

1. Go to the Classifications tab.
2. Choose Select Actions > Add/Modify Properties > Units of Measure.

Adding units of measure

1. Click New Row.
2. Enter a unit of measure name, which must be unique.
3. Enter a description of the unit of measure.
4. Enter an abbreviation for the unit of measure in the Abbreviation field.
5. Repeat this process as you add each unit of measurement.
6. Click OK.

Modifying units of measure

1. To find a unit of measure:
   - Page through the list of units of measure.
   - Enter a unit of measure in the Filter area, and press <Enter>.
2. Modify the appropriate fields.
3. Repeat this process for any other units of measure you want to modify.
4. Click OK.

Deleting units of measure

1. Select a unit of measure.
2. Click the Mark Row for Delete button.

**NOTE** If the unit of measure is in use, you cannot delete it.
3. Repeat this process for each unit of measure you delete.
4. Click OK.
The server performs cron tasks a set number of times, following a schedule, without user interaction. Use this application to create, modify, and delete cron tasks, instances, parameter values, statuses, and schedules.

**NOTE** Creating cron tasks requires programming resources to create custom class files.

### Cron Tasks Included with Maximo

This set of scheduled jobs runs as part of the Maximo server.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReorderCronTask</td>
<td>Reorder cron task&lt;br&gt;Determines the rules or parameters for scheduled reordering, direct issue, and inventory items.</td>
</tr>
<tr>
<td>PMWoGenCronTask</td>
<td>Preventive maintenance work order generation&lt;br&gt;Runs and generates scheduled work orders for planned maintenance.</td>
</tr>
<tr>
<td>KPICronTask</td>
<td>Generates Key Performance Indicators.</td>
</tr>
<tr>
<td>LDAPSYNC</td>
<td>LDAP sync&lt;br&gt;Synchronizes information stored in external directory servers for user authentication.</td>
</tr>
<tr>
<td>ESCALATION</td>
<td>Escalations&lt;br&gt;Escalation processes ensure that people complete critical tasks on time.</td>
</tr>
<tr>
<td>LSNRRCRON</td>
<td>E-mail Listener&lt;br&gt;Executes continuously on the Maximo application server and processes inbound e-mail through a staging table.</td>
</tr>
<tr>
<td>JMSQSEQCONSUMER</td>
<td>Used by the Enterprise Adapter for polling the queue.</td>
</tr>
<tr>
<td>IFACETABLECONSUMER</td>
<td>Used by the Enterprise Adapter for polling interface tables.</td>
</tr>
</tbody>
</table>
### Cron Tasks Included with Maximo

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SwSuiteCronTask</td>
<td>SwSuite</td>
</tr>
<tr>
<td></td>
<td>Inspects the software titles collected in Deployed Asset, and determines</td>
</tr>
<tr>
<td></td>
<td>whether the set of titles defined in the Deployed Asset Software Suite</td>
</tr>
<tr>
<td></td>
<td>application are present.</td>
</tr>
<tr>
<td></td>
<td>If so, the Suite displays when inspecting that node for software discovered.</td>
</tr>
<tr>
<td>ReconciliationCronTask</td>
<td>Reconciliation</td>
</tr>
<tr>
<td></td>
<td>Runs reconciliation Tasks (consisting of Link and Comparison rules) to</td>
</tr>
<tr>
<td></td>
<td>determine how assets are performing relative to the discovered data in</td>
</tr>
<tr>
<td></td>
<td>Deployed Asset.</td>
</tr>
<tr>
<td></td>
<td>Outputs from this task:</td>
</tr>
<tr>
<td></td>
<td>▼ RECONLINK table that links assets to their counterpart assets</td>
</tr>
<tr>
<td></td>
<td>▼ RecociliationResults table that lists the differences between</td>
</tr>
<tr>
<td></td>
<td>compared and Deployed Assets.</td>
</tr>
<tr>
<td>MeasurePointWoGenCronTask</td>
<td>Generates work orders when meter readings or measurements reach a</td>
</tr>
<tr>
<td></td>
<td>condition defined in the Condition Monitoring application.</td>
</tr>
<tr>
<td>BBCron</td>
<td>Periodically updates the count for the number of bulletin board postings.</td>
</tr>
</tbody>
</table>

**NOTE** All cron tasks are set to FULL access level, except ESCALATIONS and LSNRCRON (READONLY). See page 16-7.

### Viewing Hidden Cron Tasks

READONLY tasks are hidden. You can view their parameters:

1. Go to Configuration. Select the Cron Task Setup application.
2. From the List tab, delete FULL from the **Access** field.
3. Press **Enter**. Tasks display on the List tab.

### ReorderCronTask

For the central storeroom:

- Reorders can occur every day.
- You might require workers to use agreements.
- E-mail notifications go to purchasing@company.com.
For other storerooms:

- Reorders can occur every Friday.
- Agreements are not required.
- E-mail notifications go to the supervisors in charge of each storeroom.

You can duplicate the rules of the central storeroom and modify the schedule to create the reorder cron tasks (or instances) for other storerooms.

**Cron Task Definitions and Instances**

Cron tasks have a definition (name, class name, access level, and description).

This sample CRONTASKDEF table is populated with MAXDEMO data.

<table>
<thead>
<tr>
<th>CRONTASKNAME</th>
<th>CLASSNAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RecorderCron</td>
<td>psdi.app.inventory</td>
<td>Recorder Cron</td>
</tr>
<tr>
<td>PMWoGenCron</td>
<td>psdi.app.prm.PMWoGenCron</td>
<td>PMWoGen Cron</td>
</tr>
<tr>
<td>ActuateUpdateCron</td>
<td>psdi.app.repos.ActuateUpdateCron</td>
<td>Actuate Update Cron</td>
</tr>
<tr>
<td>KPIcron</td>
<td>psdi.app.kpi.KPICron</td>
<td>KPI Cron Task</td>
</tr>
<tr>
<td>LDAPSync</td>
<td>psdi.security.ldaps.LDAPSyncCron</td>
<td>Synchronizes Users and Groups from Directory Server</td>
</tr>
<tr>
<td>Escalation</td>
<td>psdi.app.escalation.engine.EscalationCron</td>
<td>Performs Escalations</td>
</tr>
<tr>
<td>LSNSync</td>
<td>psdi.1.eai.mailer.LSNSyncCron</td>
<td>Cron task for E-mail List</td>
</tr>
<tr>
<td>JMSQEOConsumer</td>
<td>psdi.kea.jms.jmsQueueCron</td>
<td>JMS Sequential Queue Consumer</td>
</tr>
<tr>
<td>IFACETABLECONSUMER</td>
<td>psdi.kea.intertables.RecToCronTask</td>
<td>Interface Table Polling Task</td>
</tr>
<tr>
<td>SwSuiteCron</td>
<td>psdi.app.idasset.SwSuiteCron</td>
<td>SwSuite Cron Task</td>
</tr>
<tr>
<td>ReconciliationCron</td>
<td>psdi.app.reconcileengine.ReconciliationCron</td>
<td>Reconciliation Cron Task</td>
</tr>
<tr>
<td>MeasurePointWoGenCron</td>
<td>psdi.app.measurement.MeasurePointWoGenCron</td>
<td>Measure Point WoGen Cron Task</td>
</tr>
</tbody>
</table>

You can create multiple instances for each definition. Each instance has an entry in the CRONTASKINSTANCE table. The attributes of the instance include:

- Set schedule string (defines the schedule for this instance)
- Description
- Flag indicating whether the instance is active
- Datetime field indicating the date and time the load/reload of the cron task is requested (not displayed to users)
- Run as User ID

This sample CRONTASKINSTANCE table is populated with MAXDEMO data.

<table>
<thead>
<tr>
<th>CRONTASKNAME</th>
<th>INSTANCENAME</th>
<th>RELOADRELOADEDTIME</th>
<th>SCHEDULE</th>
<th>ACTIVE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDAPSync</td>
<td>LDAPSync1</td>
<td></td>
<td>5m^************</td>
<td>0 Active Directory Sync</td>
<td></td>
</tr>
<tr>
<td>KPIcron</td>
<td>KPIcronREALTIME</td>
<td></td>
<td>1h^***********</td>
<td>0 KPI Cron Task Instance will run KPI that are not real</td>
<td></td>
</tr>
<tr>
<td>JMSQEOConsumer</td>
<td>SEOGOUT</td>
<td></td>
<td>30c^***********</td>
<td>0 Sequential Queue Out Consumer</td>
<td></td>
</tr>
<tr>
<td>JMSQEOConsumer</td>
<td>SEOQIN</td>
<td></td>
<td>30c^***********</td>
<td>0 Sequential Queue In Consumer</td>
<td></td>
</tr>
<tr>
<td>SwSuiteCron</td>
<td>SwSuiteCron1</td>
<td></td>
<td>1h^***********</td>
<td>0 SwSuite Cron Task</td>
<td></td>
</tr>
<tr>
<td>ReconciliationCron</td>
<td>ReconciliationCron1</td>
<td></td>
<td>1h^************</td>
<td>0 Reconciliation Task</td>
<td></td>
</tr>
<tr>
<td>Escalation</td>
<td>ESCLEASTDUE</td>
<td>11/22/2004 13:33:08 PM</td>
<td>24h^************</td>
<td>0 Notify the current owner and their manager 90</td>
<td></td>
</tr>
<tr>
<td>KPIcron</td>
<td>kpiest</td>
<td>11/22/2004 21:00:02 PM</td>
<td>1d,0.0.0.<strong>,</strong></td>
<td>0 KPI Cron Task Cron Task will run KPI before</td>
<td></td>
</tr>
</tbody>
</table>
Instances share the same set of parameters (see the next section) but each has its own set of values and schedule. For example, the Reorder definition contains the parameter storeroom. You can modify the frequency in these instances:

- “ReorderBedford” runs daily for the central storeroom.
- “ReorderLondon” runs weekly for a remote storeroom.

See the database tables CRONTASKDEF, CRONTASKINSTANCE, and CRONTASKPARAM.

## Cron Task Parameters

The cron task class file lists parameters. Parameter tables store parameter values for cron task instances.

When you create an instance, Maximo retrieves parameter names from the cron task class file. For each parameter, Maximo adds a row to the parameter table for this instance.

When instances are initialized and their parameters modified, they dynamically obtain the modifications from the database.

This sample CRONTASKPARAMETER table is populated with data for the ReorderCron cron task.

<table>
<thead>
<tr>
<th>CRONTASKNAME</th>
<th>INSTANCENAME</th>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>directissue</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>emailto</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>ignore reorderpoint</td>
<td>0</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>leadtime</td>
<td>0</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>logfile</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>storeroom</td>
<td>Nashua</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>NA</td>
<td>useagreement</td>
<td>1</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>directissue</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>emailto</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>ignore reorderpoint</td>
<td>0</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>leadtime</td>
<td>0</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>logfile</td>
<td></td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>storeroom</td>
<td>Central, Bedford</td>
</tr>
<tr>
<td>ReorderCronTask</td>
<td>SA</td>
<td>useagreement</td>
<td>1</td>
</tr>
</tbody>
</table>
Setting a Schedule

You can select date and time intervals and preview the schedule’s first 20 occurrences.

<table>
<thead>
<tr>
<th>Sample schedule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>Every 5 minutes</td>
</tr>
<tr>
<td>Complex</td>
<td>The fourth Friday of the month at 8:30 PM, every month</td>
</tr>
</tbody>
</table>

1. Display the appropriate instance.

2. Click 

The Set Schedule dialog box opens.

3. Complete the fields. To specify times, enter the time, a space, and AM or PM (example: 2:00 AM).

4. Click Preview to see the first 20 occurrences of this interval. Maximo runs this schedule until the associated record is deactivated or deleted.

5. Click OK.

A string representing the schedule displays.

```
Schedule 1d,0,0,0,0,0,0
```
Disabling Cron Tasks

**CAUTION** Do not modify the string directly in the **Schedule** field. Use the Set Schedule dialog box.

6 Click **Save**.

7 Choose **Select Action > Reload Request**. Click **OK**.

### Disabling Cron Tasks

In a multi-server environment, you might disable an instance on one or more servers or server clusters.

The ReorderCronTask and the PMWoGenCronTask are process-intensive. If the Maximo server is also the corporate print server, you can choose to disable these two cron tasks to reduce the workload of the server.

You can prohibit all or a selected set of instances from running by modifying the maximo.properties file. (in the `<Maximo root>\applications\Maximo\properties` folder).

In this example, the **ReorderCronTask01** instance of the reorder cron task is set not to run:

```java
// Cron Task Manager property.
//-------------------------------------------------------------
-----------------
//Exclude the listed cron task instances from being loaded by this server.
//use ALL for not running any cron task.
//mxe.crontask.donotrun=ALL
//Or specify the cron task instance by crontaskname.instancename
mxe.crontask.donotrun=ReorderCronTask.ReorderCronTask01
```

If you modify maximo.properties, rebuild and redeploy the EAR file. For instructions, see "Building EAR Files," on page 25-8.

### Creating Cron Tasks

You can create cron tasks to meet specific business needs.

**NOTE** First, your software developer must create a class file outside the Maximo environment, package it into an EAR file, then deploy the EAR file in the Maximo application server. See the Developer's center on the Support online Web site.

1 Go to Configuration. Select the Cron Task Setup application.
2 On the Maximo tool bar, click **New Cron Task Definition**.

3 Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cron Task</td>
<td>Enter a name.</td>
</tr>
</tbody>
</table>
| Class        | Enter a name (case-sensitive) for the class file your developer created. Example:  
|              | psdi.app.dpldasset.SwSuiteCronTask                                          |
| Access Level | Enter a value:                                                              |
|             | ▼ FULL (default) You can modify all instance information.                    |
|             | ▼ MODIFYONLY You can modify parameters and the schedule, but cannot delete instances except on initial entry. |
|             | ▼ READONLY You cannot make modifications. Use this level when cron task modifications might prevent Maximo from working properly. |

4 Click **Save**.

**NOTE** Maximo cannot run the cron task until you create at least one instance and set its status to Active. See "Creating Cron Task Instances," on page 16-8.
Creating Cron Task Instances

Some System cron tasks include instances. To run application-related cron tasks, you first create an instance, schedule, and parameters.

You can create numerous instances for a single cron task, and modify these tasks as needed. Example: Create an instance to run daily for a central storeroom and another weekly for a remote storeroom.

When you create instances, cron tasks import a group of associated parameters from the definition of the task. You cannot add parameters, but you can modify parameters and schedules.

1 Go to Configuration. Select the Cron Task Setup application.

2 From the List Tab, select the appropriate cron task definition.

3 From the Cron Task tab:
   - To duplicate an instance, click **Duplicate**.
   - Click **New Row**.

4 Enter a name.

5 Click **OK**. Select a date/time interval. Click **OK**.
   A string representing the schedule displays.

   ![Schedule](image)

   **CAUTION** Do not modify the string directly in the **Schedule** field. Use the Set Schedule dialog box.

   **NOTE** By default, instances run using the administrative user specified in the maximo.properties file. To run instances System-wide, this account is required; it has access to all Sites.

6 (Optional) Modify the account in the **Run as User** field. Select one with the permissions to perform the functions of the task.

7 Check the **Active?** box.
8 In the Cron Task Parameters section, enter a value for each parameter in the Value column.

Mouse-over descriptions to view the text.

9 Click Save.

10 Choose Select Action > Reload Request.

11 Select the instance. Click OK. Active instances display.

---

### Modifying Cron Tasks

You connect to the server that is configured to run the instance. You can reschedule cron tasks and modify parameter values without stopping and restarting the server.

<table>
<thead>
<tr>
<th>Modification</th>
<th>Restart required</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter values</td>
<td>✓</td>
<td>Dynamically updates from the database</td>
</tr>
<tr>
<td>Schedule</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Run as User</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Active?</td>
<td>✓</td>
<td>When you save the record, a reload request issues.</td>
</tr>
</tbody>
</table>

1 Go to Configuration. Select the Cron Task Setup application.

2 From the List tab, select the cron task with the appropriate instance. The Cron Task tab opens.

3 Make modifications. Save the record.

4 (Optional) Select Action > Reload Request. Active instances display.

---

### Deleting Cron Tasks

**NOTE** Prohibited from deletion:

- Cron tasks and instances with READONLY or MODIFYONLY access levels, even if there are no definitions or instances.
- A cron task definition with instances.
- Active instances.
- Parameters.
Deleting Cron Tasks

Use the Cron Task Setup application to delete instances and cron tasks.

Instances

1. Display the appropriate instance.
2. Click the Delete icon.
3. Save the record.

Cron Tasks

1. Display the appropriate definition.
2. Choose Select Action > Delete Cron Task. A confirmation appears.
3. Click Yes.
Domains

Some Maximo fields are associated with value lists, called domains, from which users select appropriate values. Use this application to add or modify domains.

Adding Alphanumeric Domains

This domain produces a list of values.

1. Open the Domains application.

2. Click Add New Domain at the bottom of the Domains table window and select Add New ALN Domain. The following dialog box opens.
Adding Numeric Domains

3 Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Data Type</td>
<td>▼ Enter a valid data type (UPPER, LOWER, ALN, LONGALN)</td>
</tr>
<tr>
<td></td>
<td>▼ Click $\mathcal{F}$.</td>
</tr>
<tr>
<td>Length</td>
<td>Enter a length less than or equal to the length of the field that uses the domain.</td>
</tr>
</tbody>
</table>

Example: If you add a domain for a field in the Assets application whose length = 12, enter 12.

Since you can use a domain with multiple fields, the length you enter must be less than or equal to the length of the shortest field that uses the domain. Example: to use the domain with fields of lengths 8, 10, and 12, enter a length of 8 or less for the domain.

**NOTE** If you enter a length greater than the field the domain is used in, you cannot assign the domain to the attribute in Database Configuration. Alternatively, in Database Configuration, you can modify the length of the field that uses the domain.

4 Click New Row.

5 Complete the Value and Description fields.

6 (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

7 To add values, click New Row. Otherwise, click Close Details.

8 Click OK.

You must attach the domain to the object/attribute the domain will be used with, and perform other tasks. See "Additional Tasks," on page 17-14.

Adding Numeric Domains

This domain produces a list of values.

1 Open the Domains application.

2 Click Add New Domain at the bottom of the Domains table window and select Add New NUMERIC Domain. The following dialog box opens.
3  Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Data Type</td>
<td>▼ Enter a valid data type (FLOAT, SMALLINT, INTEGER, DURATION, DECIMAL, or</td>
</tr>
<tr>
<td></td>
<td>AMOUNT)</td>
</tr>
<tr>
<td></td>
<td>▼ Click .</td>
</tr>
<tr>
<td>Length</td>
<td>If this field is modifiable (depends on data type), enter a length less than</td>
</tr>
<tr>
<td></td>
<td>or equal to the length of the field that uses the domain.</td>
</tr>
<tr>
<td></td>
<td>Example: If you add a domain for a field in the Assets application whose</td>
</tr>
<tr>
<td></td>
<td>length = 12, enter 12.</td>
</tr>
<tr>
<td></td>
<td>Since you can use a domain with multiple fields, the length you enter must</td>
</tr>
<tr>
<td></td>
<td>be less than or equal to the length of the shortest field that uses the</td>
</tr>
<tr>
<td></td>
<td>domain.</td>
</tr>
<tr>
<td></td>
<td>Example: to use the domain with fields of lengths 8, 10, and 12, enter a</td>
</tr>
<tr>
<td></td>
<td>length of 8 or less for the domain.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
</tr>
<tr>
<td></td>
<td>If you enter a length greater than the field the domain is used in, you</td>
</tr>
<tr>
<td></td>
<td>cannot assign the domain to the attribute in Database Configuration.</td>
</tr>
<tr>
<td></td>
<td>Alternatively, in Database Configuration, you can modify the length of the</td>
</tr>
<tr>
<td></td>
<td>field that uses the domain.</td>
</tr>
<tr>
<td>Scale (DECIMAL type only)</td>
<td>Enter a value (default = 2).</td>
</tr>
</tbody>
</table>

4  Click **New Row**.

5  Complete the **Value** and **Description** fields.
Adding Numeric Range Domains

6  (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

7  To add values, click New Row. Otherwise, click Close Details.

8  Click OK.

You must associate the domain to the object/attribute to use the domain with, and perform other tasks. See "Additional Tasks," on page 17-14.

**NOTE** Numeric range domains do not support lookups.

Adding Numeric Range Domains

This domain produces a list of values you define by entering a range.

For example, you can enter a range from 1 to 12 rather than 12 values in the dialog box. A choice of 12 values is available to users.

Rules for Creating Ranges

- The **Range Minimum** value or **Range Maximum** value can be null. They cannot both be null.

<table>
<thead>
<tr>
<th>Null value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both</td>
<td>Any number is permitted; there is no need to create this domain.</td>
</tr>
<tr>
<td>Range Minimum</td>
<td>The minimum is - infinity (negative of Java’s largest number).</td>
</tr>
<tr>
<td>Range Maximum</td>
<td>The maximum is infinity (Java’s largest number).</td>
</tr>
</tbody>
</table>

- If the interval is null, it means the number must be between the minimum and maximum. If either the **Range Minimum** value or the **Range Maximum** value is null, it is open-ended.

- If the interval is specified and the **Range Minimum** value or the **Range Maximum** value is null, the interval works its way from the number specified.

Example: if the **Range Maximum** value is 100, the **Range Minimum** value is null, and the interval is 10, 90 and -1000 are valid numbers.

- The **Range Minimum** value must be smaller than or equal to the **Range Maximum** value.

**NOTE** Overlapping segments are allowed. This support multiple valid intervals in a range.

1  Open the Domains application.

2  Click **Add New Domain** at the bottom of the Domains table window and select **Add New NUMERIC RANGE Domain**. The following dialog box opens.
3 Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain</td>
<td>Enter a name.</td>
</tr>
<tr>
<td>Data Type</td>
<td>▼ Enter a valid data type (FLOAT, SMALLINT, INTEGER, DURATION, DECIMAL, or AMOUNT)</td>
</tr>
<tr>
<td></td>
<td>▼ Click *</td>
</tr>
<tr>
<td>Length</td>
<td>If this field is modifiable (depends on data type), enter a length less than or equal to the length of the field that uses the domain. Example: If you add a domain for a field in the Assets application whose length = 12, enter 12. Since you can use a domain with multiple fields, the length you enter must be less than or equal to the length of the shortest field that uses the domain. Example: to use the domain with fields of lengths 8, 10, and 12, enter a length of 8 or less for the domain. <strong>NOTE</strong> If you enter a length greater than the field the domain is used in, you cannot assign the domain to the attribute in Database Configuration. Alternatively, in Database Configuration, you can modify the length of the field that uses the domain.</td>
</tr>
<tr>
<td>Scale</td>
<td>Enter a value (default = 2).</td>
</tr>
</tbody>
</table>

4 Click New Row.
5 In the **Range Segment** field, enter the number of segments (minimum = 1).

To define a continuous range of values (including ranges with constant intervals between values, such as 10), enter 1.

Examples of ranges with one segment:

- 1, 2, 3, 4, 5
- 10, 20, 30, 40, 50

Define separate segments for ranges that are more precise at low measurements than at high measurements:

- 0, .2, .4, .6, .8
- 1, 2, 3, 4, 5, 6, 7, 8, 9
- 10, 15, 20, 25, 30, 35, 40, 45, 50

When the domain is associated with a field, Maximo users see the entire set of values in a continuous list:

- 0, .2, .4, .6, .8, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50

6 Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range Minimum</td>
<td>Enter the lowest value in the range. (Example: 10 in the range 10 – 50.)</td>
</tr>
<tr>
<td>Range Maximum</td>
<td>Enter the highest value in the range. (Example: 50 in the range 10 – 50.)</td>
</tr>
<tr>
<td>Interval</td>
<td>Enter the interval between the values to appear in the list. (Example: 10 in the range 10 – 50.)</td>
</tr>
</tbody>
</table>

7 (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

8 To add ranges for additional segments, click **New Row**. Otherwise, click **Close Details**.

9 Click **OK**.

You must associate the domain to the object/attribute to use the domain with, and perform other tasks. See "Additional Tasks," on page 17-14.
Adding Table Domains

This domain produces a dynamic set of values. These values are derived by specifying attributes of an object in the database.

Table domains draw values dynamically from a database column.

1. Open the Domains application.

2. Click **Add New Domain** at the bottom of the Domains table window and select **Add New Table Domain**. The following dialog box opens.

3. In the **Domain** field, enter a name.

4. Enter a description.

5. Click **New Row**. The Row Details open.
6  Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object</td>
<td>▼ Enter the name of the object containing the attribute from which you are creating the domain. Example: to obtain values from the ASSET object, enter ASSET.</td>
</tr>
<tr>
<td>List WHERE clause</td>
<td>Enter the part of the clause that specifies the values to select based on the validation WHERE clause. Example: To select asset records that begin with the numbers 114, enter: assetnum like '114%.'</td>
</tr>
<tr>
<td>Validation WHERE clause</td>
<td>Enter the part of the clause that when queried against the object in the Object field, returns at least one record if the value to be validated by this domain is considered valid. Usually, the clause involves a bind variable for the field that uses this domain for validation. Example: for a field named Z (attribute Z) to contain values from the assetnum field in the Assets application, enter: :z = assetnum.</td>
</tr>
<tr>
<td>Error Message Group</td>
<td>Enter the group name of the message to display when domain validation fails. A Maximo message = a group and key value pair in the MAXMESSAGES table.</td>
</tr>
<tr>
<td>Error Message Key</td>
<td>Enter the key of the message to display when domain validation fails.</td>
</tr>
</tbody>
</table>

7  (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

8  To add rows, click New Row. Otherwise, click Close Details.

9  Click OK.

You must attach the domain to the object/attribute the domain will be used with, and perform other tasks. See "Additional Tasks," on page 17-14.
Adding Crossover Domains

A Crossover domain does not produce a list, but retrieves a value from another record. You program Maximo to bring it from one field to another, typically from one application to another.

For example, if people exist in the People application, and you add users in the Users application, many fields populate when you enter person IDs. Fields from the People application display in the Users application.

You can use an existing Maximo field, or create one, and design the field to be populated with data from a another field in another application.

1 Open the Domains application.

2 Click Add New Domain at the bottom of the Domains table window and select Add New CROSSOVER Domain. The following dialog box opens.

3 In the Domain field, enter a name.

4 Enter a description.

5 In the CROSSOVER Domain table window, click New Row. The Row Details open.
Adding Crossover Domains

6 Complete the fields:

- **Object**
- **List WHERE clause**
- **Validation WHERE clause**
- **Error Message Group**
- **Error Message Key**

See "Adding Table Domains," on page 17-7.

7 (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

8 Click **Close Details**.

9 In the Crossover Fields table window, click **New Row**. The Row Details open.

10 Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Field</td>
<td>Enter the field to retrieve data from. Click $\rho$. Select an attribute for the object entered in the Object field.</td>
</tr>
<tr>
<td>Destination Field</td>
<td>Enter the field where the data will be populated.</td>
</tr>
<tr>
<td>Copy if Null?</td>
<td>Default = empty, to prevent overwriting data with no data from a null field.</td>
</tr>
</tbody>
</table>

If your business rules require that fields always contain a value, select the box.
11 Click Close Details.

12 Click OK.

You must attach the domain to the object/attribute the domain will be used with, and perform other tasks. See "Additional Tasks," on page 17-14.

Adding Synonym Values

Synonyms are Maximo reserved domains that you cannot add or delete. You can add synonym values.

**CAUTION**

Adding synonym values specific to Sites can invalidate existing data.

One type of SYNONYM domain is work order status. The values that reflect status include:

- APPR (Approved)
- CAN (Canceled)
- CLOSE (Closed)
- COMP (Completed)
- WAPPR (Waiting on Approval)

Each status includes:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Value</td>
<td>▼ Used by the Maximo business rules</td>
</tr>
<tr>
<td></td>
<td>▼ Must be unique</td>
</tr>
<tr>
<td></td>
<td>▼ You cannot add internal values.</td>
</tr>
<tr>
<td>Value, Description</td>
<td>▼ What users see and choose from</td>
</tr>
<tr>
<td></td>
<td>▼ Synonym of the internal value</td>
</tr>
<tr>
<td></td>
<td>▼ You can add a synonym.</td>
</tr>
</tbody>
</table>

Suppose your company requires two people to approve a work order. You can add synonym values for the internal WAPPR value, then present two different values to users (example: WAPPRMAN and WAPPRVP), representing approvals at the manager and vice president level.

1 Open the Domains application.

2 Find the appropriate SYNONYM domain.

3 Click **Properties**. The following dialog box opens.
Adding Synonym Values

The table window displays the current values.

4  Click **New Row**.
5 Complete the fields:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Value</td>
<td>Enter the appropriate internal value. Example: in the WOSTATUS domain, to create a synonym for WAPPR called WAIT, enter the internal value WAPPR.</td>
</tr>
<tr>
<td>Value</td>
<td>Enter the synonym that users will see. Example: WAIT.</td>
</tr>
<tr>
<td>Description</td>
<td>Differentiate the synonym from the internal value.</td>
</tr>
<tr>
<td>Default?</td>
<td>Check the box for Maximo to use the synonym value by default. You can define one default per internal value. Example: Make WAIT the default.</td>
</tr>
</tbody>
</table>

6 (Optional) To apply domains to the Site or Organization level, do so carefully. See "Organizations and Sites," on page 17-14.

**CAUTION** Adding synonym values specific to Sites can invalidate existing data.

If you create a synonym value and specify a Site or Organization, then click **OK**, Maximo inserts rows for the other values, including the Site or Organization you specified.

For example, the internal values that reflect the MRTYPE domain include RECURRING, STANDARD, and TRANSFER.

You create a synonym value, REGULAR, with the internal value of STANDARD, and specify Organization B. When you click **OK**, Maximo creates the additional synonym values RECURRING and TRANSFER with Organization B specified.

7 Click **New Row** to add synonyms, or click **Close Details**.

8 Click **OK**.

You must attach the domain to the object/attribute the domain will be used with, and perform other tasks. See "Additional Tasks," on page 17-14.
Organizations and Sites

Maximo uses many domains in its applications, and stores domains (default) at the System level. If you apply domains to the Organization or Site level (by entering appropriate values in the Organization and Site fields), do so carefully:

**CAUTION** Leave the Organization and Site fields empty for all values (users in all Organizations and Sites can access them) or specify an Organization or Site for all values (users in the specified Organizations or Sites can access them).

If you disregard the preceding caution, complicated outcomes can result. For example:

<table>
<thead>
<tr>
<th>Value</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>A</td>
</tr>
<tr>
<td>BLUE</td>
<td>B</td>
</tr>
<tr>
<td>RED</td>
<td></td>
</tr>
</tbody>
</table>

Result

- ⊳ Records in Organization A can only access GREEN.
- ⊳ Records in Organization B can only access BLUE.
- ⊳ Records in other Organizations can only access RED.

After specifying Organizations and Sites for values, records in specified Organizations and Sites will no longer see values that have no Organization/Site specified.

**Additional Tasks**

After adding domains, additional tasks might be required, depending on the domain and how you want Maximo to display it. You can assign a domain to an attribute in the Classifications application, or use the Database Configuration application to assign the domain.

In the Classifications application, you associate a domain with an attribute in the Attributes table window; no further configuration is needed.

Otherwise, you must:

- ⊳ Associate the domain with an attribute. Use the Database Configuration application.

**NOTE** When you configure the database, Maximo does not validate the value you insert as the default field value. For example, you could have an Organization called EAGLENA, where the only acceptable domain value is CREW4.
Deleting Domains

You could make the crewid attribute required in the Preventive Maintenance application, give it the default value of CREW2, and configure the database without error.

The error, such as "CREW2 is not a valid value," appears only when you return to the Preventive Maintenance application to insert a record.

Configure the Database. See "Configuring the Database," on page 4-25.

Use the Application Designer to modify the UI as needed. For example, if you added an alphanumeric domain, add the drop-down list button. New crossover fields might require new fields in the receiving application.

Deleting Domains

You cannot delete a SYNONYM domain. If the domain is not assigned to a Maximo attribute, you can delete other types of domains,

1. Open the Domains application.

2. In the Domains table window, find the appropriate domain. Click Mark Row for Delete. Maximo displays a warning message and asks whether to continue.

3. Click Yes.

To cancel a deletion, click Undo Delete.

4. Click Save Domain.

NOTE Deleting a domain does not affect values that are inserted on Maximo records. For example, if a user inserts a value in a field using a value list, that value remains on the record even if the domain is later disassociated from the attribute and deleted.
The Deployed Assets Administration module in Maximo provides applications that let administrators control how Maximo displays data about information technology (IT) assets.

Asset discovery tools, such as IBM Tivoli® Configuration Manager (or another tool such as Maximo Discovery or Microsoft SMS) collect the data Maximo displays. Asset discovery tools scan computers, network devices, and network printers belonging to your organization, and record hardware and software data about those assets.

IBM Maximo Integration Composer aggregates the data and migrates it into the Maximo database.

After importing the data into Maximo, you can search the Maximo database and view details about hardware and software. You use the applications in the Maximo Deployed Assets module to view this data:

▼ Computers

This application displays data about individual computers deployed in your organization. The discovery tool determines the data collected, which generally includes:

- Software installed, including applications, suites, operating systems, and files
- Storage devices, such as hard disks, floppy drives, USB removable storage, and logical drives
- CPUs
- Media adapters, such as sound and video cards
- Communication devices, such as modems and network adapters
- Network settings for TCP/IP and IPX protocols
- Image devices, such as printers and scanners
- Displays and monitors
- User data

▼ Network Devices

This application displays information about deployed network devices such as routers, switches, and hubs.
Conversion Applications

- Network Printers
  - Displays data about deployed network printers
  - Includes only network-based printers. Information about printers installed locally on specific computers displays in the Computers application on the Image Devices tab.

The Deployed Assets Administration module includes:

- Conversion applications that let Maximo convert inconsistent names used by discovery tools to standard naming conventions
- A Software Suite Setup application that aggregates applications into application suites
- A Software Usage Setup application that controls how Maximo displays data about software usage frequency

Conversion Applications

Because of variable hardware and software naming conventions, data collected by discovery tools for display in the Deployed Assets module is often inconsistent. For example, a computer is described as Computer Type 4 or Computer Type IV.

Some asset discovery tools include version numbers in product names (example: Maximo 4.1 or 5.2). Your organization can track instances of Maximo without specifying version numbers.

Conversion applications let administrators review the names assigned to imported data and configure conversions for variations in software, hardware, or manufacturer names to use standard naming conventions. Conversion applications are found in the Maximo Deployed Assets Administration module.

Conversion applications are available for:

- Manufacturers
- CPUs
- Media (such as video and sound cards) and network adapters
- Operating systems
- Software application names

Each record in a conversion application specifies a target name and variants, which Maximo converts to target names when data displays.

Maximo applies conversions when asset data for computers, network devices, and network printers is requested. Maximo displays converted data in Deployed Assets module applications and uses it in reports generated for them.
Creating Conversion Records

Integration Composer creates a conversion record when data is imported into Maximo.

When adapter, manufacturer, processor, operating system, and software application data is imported into Maximo, Integration Composer checks whether a variant exists. If none is found, Integration Composer creates conversion records with target and variant names identical to the names of deployed assets.

Integration Composer identifies conversion records it creates as not reviewed, because an administrator has not reviewed the records.

When records display in the conversion application, the Reviewed? check box on the <application> Conversion tab is cleared, and the Reviewed? column on the List tab displays an N.

Recommendation

Use the filter feature in Maximo to retrieve imported records, which display an N in the Reviewed? column. Review sets of conversion records against your naming conventions. Modify them or check the Reviewed? box. Reviews ensure that Maximo displays imported asset data using your naming conventions. Reviews also ensure that when you review the next set, you evaluate only the most recently imported records.

NOTE

Maximo converts asset names that match variants, regardless of whether the conversion record is reviewed.

An administrator manually creates a conversion record using the Maximo conversion applications.

Although conversion records created by Integration Composer are identified as not reviewed, by default Maximo identifies conversions created through conversion applications as reviewed (the Reviewed? box is checked). After saving records, the Reviewed? column in the table window on the List tab displays a Y.

Conversion records in Maximo must contain at least one variant, and one variant must be identical to the target name. If you do not add a variant when creating a conversion record, Maximo creates a variant identical to the target name when you save the record.

After creating a conversion record, you can add variants to it as needed. Observe these rules when adding conversion records, and variants to a conversion record:

- A name cannot exist in more than one conversion record in an application, as a variant or target name.

- Variants and target names are case-sensitive.
Deleting Conversion Records

You can use the conversion application to delete conversion records or to delete variants from a version record.

Rules for Deleting Conversion Records and Variants

- If you delete a conversion record, Maximo deletes all variants associated with it.
- If any record in the Deployed Assets module refers to the target name, you cannot delete a conversion record.
- If any record in the Deployed Assets module refers to any variant of the target name, you cannot delete a conversion record.
- If any record in the Deployed Assets module applications refers to the variant, you cannot delete a variant from a conversion record.
- You cannot delete the variant that is identical to the target name on a conversion record.

Initial Implementation Options

To manage imported names:

- You can import the asset data and let Integration Composer create conversion records. For each adapter, manufacturer, operating system, processor, or software name, Integration Composer creates a conversion record with a target name and a variant identical to the deployed asset name and also marks the record as not reviewed.

You can use the appropriate conversion application to search for all conversion records marked as not reviewed and modify and review these records.

- Administrators can create conversion records using the appropriate conversion application. Maximo marks records created in the conversion application as reviewed.

Software Suite Setup Application

Asset discovery tools typically scan computers for individual software applications, not application suites.

Administrators can use the Maximo Software Suite Setup application in the Deployed Assets Administration module:

- To define software applications belonging to software suites
- To control how software suites display in the Deployed Assets module > Computers application
Maximo displays software applications defined as software suites in the Computers application > Software tab > Suites subtab.

**Required Components of a Software Suite**

When you define a suite, the Software Suite Setup application lets you specify one or more applications.

- Maximo identifies suites only if all required applications exist.
- If no applications are required, any application listed in the suite is sufficient to identify it.

For tracking purposes, include all applications that are components of a suite in its definition, even if they are not required. The Software Suite Setup application easily identifies which software applications are components of the suite.

**Software Suite Versions**

Defining suite versions is optional. However, you must specify these parameters for each component.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Version Low</td>
<td>▼ The lowest acceptable version number</td>
</tr>
<tr>
<td></td>
<td>▼ Must be less than or equal to the value in the <strong>Required Version High</strong> field</td>
</tr>
<tr>
<td>Required Version High</td>
<td>The highest acceptable version number</td>
</tr>
</tbody>
</table>

Any version number within this range is a component.

**Software Suite Identification Cron Task**

Suite identification is a background process. Create a cron task in the Maximo Cron Task Setup application to schedule suite identification. When the cron task executes, Maximo uses the definitions in the Software Suite Setup application to identify suites and update suite data.

Additions, changes, and deletions made to suite setup records do not affect suite data displayed in the Computers application until the cron task executes.

**Software Usage Setup Application**

Asset discovery tools often collect data about the frequency of application use. Maximo displays frequency data in the Computers application > Software tab > Applications and Suites subtabs.

Asset discovery tools determine how usage frequency is calculated. Typically frequency calculations are based on the number of times an application is used in the time frame the tool specifies. Some tools collect data from the...
Windows Add/Remove Programs feature, which counts the number of times an application is used during the last 30-day period.

The Software Usage Setup application lets administrators define how Maximo displays frequency data that discovery tools collect. For each tool, an administrator can specify a range of usage counts and assign that range a textual description. Maximo displays this description on the Software tab in the Computers application.

**Example**

<table>
<thead>
<tr>
<th>Range</th>
<th>Textual description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–20 times</td>
<td>Frequently</td>
</tr>
<tr>
<td>0–4 times</td>
<td>Rarely</td>
</tr>
</tbody>
</table>

Administrators specify low (Range From) and high (Range To) ends of the range. Range values depend on the values discovery tools use for frequency counts. See the documentation provided for specific discovery tools.

**Rules for Range Field Values**

- The value in the **Range To** field must be greater than or equal to the value in the **Range From** field.
- You must specify values for both fields.
- If you create a series of ranges for a discovery tool, the values specified for one row cannot overlap the values specified for another. If these values overlap, Maximo displays an error message.

Incorrect:

<table>
<thead>
<tr>
<th>Range From</th>
<th>Range To</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Correct:

<table>
<thead>
<tr>
<th>Range From</th>
<th>Range To</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>20</td>
</tr>
</tbody>
</table>

Maximo provides usage frequency data for suites, based on the component with the highest usage count. For example, you use the word processing application more often than the other applications in your office application suite. Maximo would use the usage count for the word processing application to determine the usage count for the entire office suite.
When you are configuring software usage ranges, include all ranges your discovery tool provides.

**Site and Organization Data**

Most asset discovery tools do not provide scanned data about Sites and Organizations. To differentiate computers, network devices, and network printers by Sites and/or Organizations, administrators must:

- Set these values in Integration Composer.
- Verify that Site and Organization values in Integration Composer mapping are valid (no additional validation is performed on this data)

Site and Organization data is optional. Administrative users can assign a Site and Organization to make data available in the Deployed Assets applications and the Reconciliation module.

The standard UI for the Deployed Assets applications has a **Site** field but not an **Organization** field. Since Sites are specific to Organizations, the Organization can be determined based on the Site. If Site data is displayed in Maximo, the standard Maximo rules govern how Site data displays.
The Reconciliation Module’s applications let you compare information technology (IT) asset data in these Maximo modules:

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
<td>Maximo maintains asset records for purchased or leased IT assets in the Assets application.</td>
</tr>
<tr>
<td></td>
<td>Create these records in the Assets application or using the Receive Rotating Items action in the Receiving application.</td>
</tr>
<tr>
<td></td>
<td>When configuring Maximo, administrators designate IT assets by creating a Maximo variable (MAXVAR), ITASSET, equal to the class structure identifier (CLASSSTRUCTUREID) of the top-level IT classification.</td>
</tr>
<tr>
<td></td>
<td>Any asset with that identifier or lower which has not been moved is an IT asset.</td>
</tr>
<tr>
<td>Deployed Assets</td>
<td>These applications maintain and display data collected from assets installed in your organization.</td>
</tr>
<tr>
<td></td>
<td>Asset discovery tools scan computers, network devices, and network printers deployed in your organization and record information about the hardware and software installed on those assets. Asset tools include IBM Tivoli Configuration Manager, or another tool such as Maximo Discovery or Microsoft SMS.</td>
</tr>
<tr>
<td></td>
<td>Integration Composer aggregates the data and migrates it into the Maximo database.</td>
</tr>
</tbody>
</table>

You configure a process that reconciles IT asset data and deployed asset data.

The reconciliation identifies successful matches and discrepancies between IT assets and deployed assets. Your organization can determine whether the IT assets deployed comply with corporate plans and whether modifications over the life cycle of an asset comply with corporate policies.

Causes of discrepancies include:

- Incorrect data entry
- Reconfigured assets
- Retired assets
- Theft
- Unauthorized use of hardware and software in the enterprise

The IBM Maximo Reconciliation Module Implementation Guide explains the reconciliation process and how to create reconciliation tasks.
Maximo reconciles IT assets and deployed assets by performing a rule-based comparison an administrative user defines.

<table>
<thead>
<tr>
<th>Task</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Optional) Define a subset of assets or deployed assets to reconcile when Maximo executes a reconciliation task. If you do not define a task filter, Maximo evaluates all top-level IT assets against deployed assets. Task filters apply only to link rules. Configure a deployed asset task filter for a specific site, Boston. The task evaluates all top-level IT assets, but evaluates deployed assets only at the Boston site. Configure an asset task filter for a specific site, Boston. The task evaluates top-level IT assets only at the Boston site, but evaluates all deployed assets.</td>
</tr>
<tr>
<td>2</td>
<td>Define relationships between top-level IT assets and computers, network printers, or network devices in deployed assets. Define the basis of the comparison by identifying top-level objects and attributes in IT assets to link to specific attributes in deployed assets. Link rules are generally based on serial numbers or asset tags. Results: Successful link Listed in Link Results application Failed link Listed in Reconciliation Results application Occurs when Maximo finds no link or finds multiple links between a top-level IT asset and a deployed asset.</td>
</tr>
<tr>
<td>3</td>
<td>(Optional) Define comparison rules to identify objects or attributes of a child or parent in IT assets. When Maximo executes a reconciliation task, it compares these objects and attributes with those on deployed assets. Maximo applies comparison rules only after establishing successful links between IT assets and deployed assets. You can configure a comparison rule to compare applications on computers in IT assets with those on deployed assets.</td>
</tr>
</tbody>
</table>
### Scheduling Reconciliation Tasks

Use caution when scheduling reconciliation tasks because they process data imported from external sources. Coordinate the timing of data migration and reconciliation processes.

<table>
<thead>
<tr>
<th>Task</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Define a reconciliation task. Reconciliation task records combine task filters (optional), one or more link rules, and one or more comparison rules (optional) into specific job tasks. Maximo executes these job tasks using the Cron Task Setup application. Specify how Maximo displays results for comparison rule evaluations: All results Failed reconciliations Successful reconciliations If you do not define a task filter, Maximo compares all top-level IT assets with all deployed assets. Task filters apply only to link rules, not comparison rules.</td>
<td>Reconciliation Tasks</td>
</tr>
<tr>
<td>5 Schedule the execution of reconciliation tasks using the Maximo Cron Task Setup application in the Configuration module.</td>
<td>Cron Task Setup</td>
</tr>
<tr>
<td>6 View the results of the reconciliation in Maximo or in reports Maximo generates. <strong>Link Results</strong> – Displays all successful one-to-one links between top-level IT assets and computers, network printers, or network devices in deployed assets. <strong>Reconciliation Results</strong> Link Failures – Displays link failures that occur when Maximo does not find one-to-one links between top-level IT assets and assets specified in link rules. Failures occur when the reconciliation finds no links or multiple links. Comparison Rule Results – Authorized users can view results from comparison rule reconciliations. Based on parameters configured in Reconciliation Tasks, Maximo displays a set of results: All results Failed reconciliations Successful reconciliations Maximo also displays reconciliation results in the Assets application &gt; Asset tab &gt; Select Action &gt; Asset Details.</td>
<td>Link Results Reconciliation Results</td>
</tr>
</tbody>
</table>
Scheduling Reconciliation Tasks

For example, do not attempt to reconcile deployed assets against IT assets before importing deployed asset data. Scheduling affects data reliability and the allocation of computer resources.

Data Reliability

Data might be unreliable:

- If Maximo executes a reconciliation task before Integration Composer imports deployed asset data into Maximo. To ensure that reconciliations execute against the most current deployed asset information, schedule reconciliations to occur after importing Integration Composer deployed asset data.

If you have defined software suites, schedule cron tasks that process application suites to run before the reconciliation cron task. This sequence ensures that application suites are properly identified before reconciliation.

Use this sequence of events to ensure data reliability:

1. Collect data about deployed assets using an asset discovery tool.
2. Import collected data into Maximo using Integration Composer.
   - **NOTE** If you use the Deployed Assets Administration modules to standardize naming conventions, configure application suites, or define software usage display options, implement any modifications required to the Deployed Assets Administration applications before continuing.
3. Execute cron tasks that identify application suites.
4. Execute cron tasks that process reconciliation tasks.

- If Integration Composer and a reconciliation task are processed simultaneously.

Maximo does not prevent reconciliation tasks from being executed at the same time as an Integration Composer migration. Maximo does not warn users that flawed data might result from simultaneous processing.

Administrative users must configure schedules that ensure the processes are not executed simultaneously.

- If multiple reconciliation tasks are processed that include overlapping data.

You can configure multiple cron task instances to run reconciliation tasks. If different reconciliation tasks are configured to process overlapping sets of IT assets and/or deployed assets, the results are unpredictable.
To maintain database integrity, perform backups and other tasks on a regular basis.

**Backing Up and Restoring the Database**

Backup procedures depend on the size of your database and the type of operation you are running. These procedures are recommendations.

You can back up any type of archive media:

<table>
<thead>
<tr>
<th>Media</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard disk drive</td>
<td><em>(Recommended)</em> Lets you restore your system quickly</td>
</tr>
<tr>
<td>Tape drive</td>
<td>▼ Slower, but you can keep multiple tapes of backups</td>
</tr>
<tr>
<td></td>
<td>▼ Usually includes backup software; see the drive software documentation</td>
</tr>
<tr>
<td>CDs, DVDs, diskettes</td>
<td>Limited capacity, but is useful for smaller databases, archive files, or specific executables.</td>
</tr>
</tbody>
</table>

▼ Store backups in a different location from your production database and application files.

▼ Schedule and regularly perform system and database backups.
# Types of Backups

Refer to your database platform documentation for specific commands and procedures to perform backups.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Backup</strong></td>
<td>Completely duplicates the Maximo software. Allows you to restore your entire system to its original state, including customized applications and reports.</td>
<td>As needed, when you modify software or reports.</td>
</tr>
</tbody>
</table>

Include the following folders and any subfolders below them.

- Maximo (on the application server)
- Actuate (on the report server)
- Maximo options installed in other folders

**CAUTION** On LAN systems, perform system backups with all users logged out of Maximo.

<table>
<thead>
<tr>
<th>Database Backups</th>
<th>Duplicates only the databases.</th>
<th>▼ Daily to ensure full recovery of data no more than one day old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>▼ After long data entry sessions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▼ At the end of accounting and reporting periods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▼ Before any critical event, such as an outage or plant turnaround</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▼ Before and after configuring the database</td>
</tr>
</tbody>
</table>
Types of Database Backups

Refer to your database platform documentation for specific commands and procedures to perform backups.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offline Backups (Standard)</td>
<td>Perform offline database backups with all users logged out of Maximo and the database server down.</td>
</tr>
</tbody>
</table>

**CAUTION** Duplicates of the database made while the server is up and users are connected might result in unrecoverable backups.

2. Perform backups.

Online Backups

You can perform backups without bringing the database server down, letting users continue using the software during the backup. This process is more time-consuming, but can be useful to minimize downtime in 24-hour operations.

Restoring System and Database Backups

Refer to your database platform documentation for specific commands and procedures to restore your database from a backup.

Before performing your restoration procedure, you must test the process in a test environment, even if your backup procedure appears to be working properly.

Updating Database Statistics

To enhance performance, regularly update your database statistics. Refer to your database platform documentation for procedures.

DBMS_STATS Package (Oracle)

The DBMS_STATS package in Oracle optimizes statistics on your database. Maximo benefits from cost-based optimization because it builds many queries dynamically, depending on user input. With the cost-based optimizer, Oracle determines which indexes to use based on the distribution of data.

**NOTE** Oracle 9i and 10g documentation recommends against using ANALYZE to collect statistics for the Cost Based Optimizer. Use DBMS_STATS instead.

If your database is large, run the Oracle update statistics. You can use a database-specific command, or you can execute Update Statistics from the Actions menu in Database Configuration, which calls dbms_stats.gather_table_stats with cascade true. For example:
Updating Database Statistics

```
dbms_stats.gather_table_stats (ownname => 'MAXIMO', tabname => 'ASSET', cascade => true)
```

Oracle has two optimizer modes:

- cost-based
- rule-based

By default, the optimizer mode is set to CHOOSE. To determine the mode in effect, select from the v$parameter table:

```
select value from v$parameter where name='optimizer_mode';
```

If the mode is CHOOSE, you use the rule-based optimizer unless statistics exist (they do not if you never analyzed your tables).

**Update Statistics (SQL Server)**

Perform the Update Statistics procedure to ensure that selectivity factors are updated when there are significant changes to an index.

**Recommendation**

Perform this procedure daily, especially if large amounts of data are inserted, updated, or deleted. You can execute Update Statistics from the Actions menu in Database Configuration, or use a database-specific command.
Maximo includes a Maximo database update utility (updatedb). You **must** run updatedb under the following circumstances:

- After you have installed Maximo application patches
- After you have installed any Maximo options, for example, any IBM Maximo Mobile applications or IBM Maximo Industry Solutions.

After installing patches or options, your Maximo application version will be different from your Maximo database version. In order for Maximo to function properly, the Maximo application and Maximo database versions must match.

When you start the Maximo Application Server (MXServer) Maximo compares the Maximo application version to the Maximo database version. If Maximo detects a discrepancy, the MXServer stops processing and Maximo prompts you to run the Maximo updatedb utility. The upgrade script and class files executed during the database update revise the version references in the Maximo database, synchronizing the Maximo application and database versions.

### Updating the Database for Core Maximo

Updating the Maximo application and database components involves the following steps:

1. Download and apply the Maximo application patch
2. Run updatedb.bat to update the database

### Applying Maximo Application Patches

Maximo application patches are available for download on the Support Site at http://support.mro.com. For complete patch installation instructions, refer to the *IBM Maximo Release Notes*.

### Running the Updatedb Utility

After applying the Maximo application patch, you must run the Maximo updatedb utility. The Maximo updatedb utility executes update files in the following order:

- Class files (.class)
- Script files (including .sql, .ora and .sqs)
- Screen files (.mxs)
- Message Files (.msg)

**NOTE** Maximo class files are located in the Maximo\tools\maximo\classes\psdi\script\en directory. Script files are located in the Maximo\tools\maximo\en directory.
Updating the Database for Maximo Options

1 From a command prompt, change directory to:

```
<root_maximo>\tools\maximo\n```

For example: `c:\Maximo\tools\maximo\`

2 At the prompt, type `updatedb.bat` and press Enter.

If you encounter problems during the Maximo update process, Maximo logs errors to the `Maximo\tools\maximo\logs\Update+Timestamp.log` file. You can examine the logs to determine the source of update errors.

Successfully completing a database patch update revises the database build version in the MAXVARS table.

Updating the Database for Maximo Options

All Maximo options use the `a_customer.xml` file and the `product_description.xml` files in the update process. These files are located in the `maximo\properties\product` folder. Each of these `.xml` files contains the following information:

- `Dbmaxvarname` – database maxvar name for the Maximo option
- `Dbscripts` – script directory name where Maximo product script files are located
- `Dbversion` – current Maximo option version
- `Lastdbversion` – last Maximo release version
- `Extensions` – class file extension information for Maximo option

The first file run by the updatedb utility is the `a_customer.xml` file. Next, the update utility runs each of the `product_description.xml` files in alphabetical order.

The Maximo updatedb utility is configured to execute scripts based on the values specified in each of your `.xml` files. The scripts representing each successive Maximo update version up to and including the referenced `dbversion` value script are run during your database update process. Upon completion, your `dbversion` value is updated to the most current script version value.

Updatedb and Customer Extensions

When you execute `updatedb.bat`, you receive the following message:

```
Product {Industry solution name} has extensions but a_customer.xml file does not exist. Do you want to continue (Y/N)?
```

- If you type Y, the updatedb process continues.
- If you type N, the updatedb process stops.
Maximo uses the a_customer.xml file to reference any Maximo classes that have been customized. Because this file is the first to be executed by the updatedb utility, the changes you reference in the product script files are the first to be applied. All your Maximo options will then incorporate the customizations before the updatedb utility executes the product_description.xml scripts.

If you incorporate class extensions in any of your Maximo options, you must create the a_customer.xml file. All modified class files and scripts must be referenced in the following format:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<product>
  <name>Customer Product</name>
  <version>
    <major>6</major>
    <minor>0</minor>
    <patch>0</patch>
    <build>999</build>
  </version>
  <dbmaxvarname>DBCUST</dbmaxvarname>
  <dbscripts>cust</dbscripts>
  <dbversion>V600-01</dbversion>
  <lastdbversion>V520-20</lastdbversion>
  <extensions>
    <mboset objectname='PO'>psdi.app.cust.POSet</mboset>
    <mbo objectname='PO'> psdi.app.cust.PO</mbo>
  </extensions>
</product>
```

In this example, the updatedb utility executes the scripts representing each successive Maximo update version up to and including the referenced V600_01 script. The altered `<mboset objectname>` and `<mbo objectname>` entries indicate the purchase order classes have been extended.
The product_description.xml file identifies each Maximo option installed on your system. For each Maximo Industry Solution that you have installed, create a separate <productname>.xml file in order to deploy the EAR files successfully. Create new <productname>.xml files in the new maximo\properties\product directory.

The following is an example of a product description file:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<product>
  <name>IT and Service Management Extension</name>
  <version>
    <major>6</major>
    <minor>0</minor>
    <patch>0</patch>
    <build>999</build>
  </version>
  <dbmaxvarname>DBITSME</dbmaxvarname>
  <dbscripts>itsme</dbscripts>
  <dbversion>V600-01</dbversion>
  <lastdbversion>V520-20</lastdbversion>
  <depends>newproduct</depends>
  <extensions>
    <mbo set objectname='objectname' class='classname'></mbo>
    <mbo objectname='objectname' class='classname'></mbo>
    <field objectname='objectname' attributename='attributename' class='classname'></field>
    <service servicename='servicename' class='classname'></service>
    <bean presentation='appname' controlid='id' class='beanclassname'></bean>
    <class extends='classname' class='classname'></class>
  </extensions>
</product>
```
Setting Default Vendors

You can set default vendors for items that users order in Desktop Requisitions. Maximo stores this data at the Organization level.

For example, you can specify a default vendor for some non-stocked items. The buyer can change the vendor.

**NOTE** Primary vendor is another type of default vendor you use with the reorder process in Purchase Orders and Purchase Requisitions. You specify it in the **Primary Vendor** field on the Reorder Details tab in Inventory.

If no primary vendor is specified for an item, the reorder process checks whether a default vendor is specified and takes that value if it exists. Maximo stores the primary vendor data at the Site/Storeroom level.

1. Open the Item Master application.
2. Display the appropriate item record.
3. Click the Vendors tab.
4. In the Vendors table window, click the Details icon for the appropriate vendor. (You can insert a new row and add another vendor.)
5. Check the **Default Vendor** field.
6. Save the record.

**NOTE** You can also set the default vendor in the Inventory application using the Reorder Details tab.

When a user requisitions this item in Desktop Requisitions, and the **Store Location** field is empty, then the default vendor appears in the **Vendor** field.

**Autonumbering for Special Order Items**

Special order items are items that you do not stock in inventory, so they have no inventory item numbers. You must order them by description, which is generally sufficient for ordering and tracking.
Configuring Automatic Reordering

You can generate item numbers for them, at the Organization level.

1. Open the Organizations application.

2. Select the appropriate Organization.

3. Choose **Select Action > Purchasing Options > PO Options**.

   The PO Options dialog box opens.

4. Check the **Allow the Generation of Special Order Items?** box.

5. Click **OK**.

6. Click **Save Organization**.

Configuring Automatic Reordering

In the Inventory application, you reorder storeroom items by choosing **Select Actions > Reorder**. You can run this process automatically.

Use the Cron Task Setup application to specify the schedule and these parameters. For information about the Cron Task Setup application, see "Cron Task Setup," on page 16-1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ignorereorderpoint</td>
<td>Whether reorder cron task ignores the reorder point of the storeroom.</td>
</tr>
<tr>
<td></td>
<td>1 = true; 0 = false</td>
</tr>
<tr>
<td>logfile</td>
<td>The complete path of the log file for reorder cron task result, or stdout = system standard output, stderr = system standard error.</td>
</tr>
<tr>
<td></td>
<td>If not specified, the file specified by mxe.msgLogFile is used.</td>
</tr>
<tr>
<td>emailto</td>
<td>The e-mail address where the reorder result is sent. Results for each storeroom are sent as individual e-mails.</td>
</tr>
<tr>
<td></td>
<td>The mxe.adminEmail and mail.smtp.host properties must be specified to receive e-mail.</td>
</tr>
<tr>
<td>directissue</td>
<td>A list of Sites (semicolon-separated Site IDs) for which the reorder cron task processes direct issue items.</td>
</tr>
<tr>
<td></td>
<td>If it is an empty string, direct order items are not reordered for any Site. For example: site1;site2</td>
</tr>
<tr>
<td>useagreement</td>
<td>Whether reorder cron task considers agreements.</td>
</tr>
<tr>
<td></td>
<td>1 = true; 0 = false</td>
</tr>
</tbody>
</table>
E-Commerce Capability Using Maximo

To engage in e-commerce transactions, your Organization and the supplier must be e-commerce enabled.

E-commerce suppliers have their catalog available at the IBM Corporation Operations Center or an external Web site. The supplier and buyer might approve relationships and create accounts with each other.

Users generate requisitions using Desktop Requisitions and Purchase Requisitions, which include searching and requisitioning screens.

You can configure your Site to generate approved purchase orders automatically from requisitions, and route them directly to e-commerce enabled suppliers.

Route requisitions through a Workflow process to purchasing agents or other appointed individuals in your organization.

Approved purchase orders are sent to suppliers via Open Applications Group (OAG) XML transactions. Further transactions and notifications regarding the status of the purchase order are handled electronically.

**NOTE**

Use the Security Groups application to grant Desktop Requisition or work order users access to Search Catalogs.

### Buyer-initiated Transactions

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO Transaction</td>
<td>Sends the purchase order to the supplier. Is the first transaction sent to the supplier.</td>
</tr>
<tr>
<td>Cancel PO</td>
<td>Sends the purchase order cancellation notice to the supplier.</td>
</tr>
</tbody>
</table>
Supplier-initiated Transactions

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledge PO</td>
<td>Confirms the supplier received the purchase order. Is the first transaction</td>
</tr>
<tr>
<td></td>
<td>received from the supplier.</td>
</tr>
<tr>
<td>Vendor Order Status</td>
<td>Is generated after the supplier reviews the purchase order information.</td>
</tr>
<tr>
<td></td>
<td>Relays any issues related to the order to the buyer and requisitioner.</td>
</tr>
<tr>
<td>Advance Ship Notice</td>
<td>Provides information detailing intents to transport specific quantities of</td>
</tr>
<tr>
<td>(ASN)</td>
<td>items from a supplier to a single destination.</td>
</tr>
<tr>
<td>Invoice</td>
<td>Provides invoicing information on items shipped.</td>
</tr>
</tbody>
</table>

For supplier companies you regularly do business with, create a company record in Maximo and complete its E-commerce Details section. See the Companies Help.

Purchasing agents can create a Person record in Maximo, to have the ability to receive transaction e-mail notifications, like Vendor Order Status or Advance Ship Notice. Administrative users can create this record for them.

Requisitioners can receive these notifications if they select the TRANSEMAILELECTION in the Profile Page of Desktop Requisitions.
Receiving Electronic Invoices

You can configure the ability to receive electronic invoices and (optional) to have the receipt of the invoice initiate a Workflow process.

1. Go to the Companies application. Display the company record.

2. In the E-Commerce Details section of the Company tab, check the E-Commerce Enabled box. See Companies Help.

3. Check the Vendor Sends Invoice box.

NOTE: If the E-Commerce Enabled box is checked, but the Vendor Sends Invoice box is not, the company must send manual invoices.

When an electronic invoice is received, it creates a record in the Invoices application, populating the INVOICE and INVOICELINE tables.
You use the Attached Documents application in Maximo to attach various documents to individual Maximo records.

This chapter has two sections:

- Administration — describes how to manage Attached Documents in Maximo.
- Configuration — describes how to configure your Attached Documents system, including editing properties files and configuring the Web server.

**NOTE**

Configuring Attached Documents requires you to integrate the physical location of a stored document file with the location specified in Maximo.

You can configure Maximo to store attached document files on the same machine as the Application Server running Maximo, or on other machines. This chapter provides instructions and examples for both.

### Maximo Attached Documents Administration

In Maximo, you create a **document library** and organize documents into **folders**. The Maximo database includes:

<table>
<thead>
<tr>
<th>Folder</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachments</td>
<td>text files</td>
</tr>
<tr>
<td>Diagrams</td>
<td>flow charts or part diagrams</td>
</tr>
<tr>
<td>Images</td>
<td>graphic images, like pictures of assets</td>
</tr>
</tbody>
</table>

You can also create additional folders, or organize the folders into functional categories such as permits, part sheets, photographs, procedures, drawings, and so on.

Administrators maintain the library, create new folders as needed, and specify the folders available for each Maximo application. You can attach a document to a record even when the document is outside the document library.

To create a document library:

- **copy the file to the Attached Documents repository**
specifying a network path to the file, then attach the copy or the link to Maximo records.

**NOTE** The Help provides user and administrative procedures.

### Managing Document Folders

Maximo automatically associates a new document folder with the application you created it from. Security is required to access this feature.

1. Open any application that has Attached Documents actions.

2. From the Select Action menu, choose **Attachment Library/Folders > Manage Folders**.

3. Click **Add a New Document Folder**.

4. Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Folder</td>
<td>Enter a folder name, for example, permits, drawings, and schematics</td>
</tr>
<tr>
<td>Document Folder</td>
<td>Describe the folder</td>
</tr>
<tr>
<td>Default File Path</td>
<td>The full path where the physical files are stored. This path can be a mapped drive on a separate file server.</td>
</tr>
</tbody>
</table>

5. Click **OK** to save changes and return to the application tab.
Associating Document Folders With Maximo Applications

You must associate document folders with an application before you can attach documents in those folders. Security is required to access this feature.

**NOTE** By default, the folders titled attachments, images, and diagrams are included with every application that uses attached documents.

1. Open any application that has Attached Documents actions.

2. From the Select Action menu, choose **Attachment Library/Folders > Associate Folders**.

3. Click **New Row**.

4. In the **Document Folder** field, enter a value or click **Select Value** to choose from the list. The **Document Folder Description** and **Application** fields contain default values.

5. Click **OK** to save changes.

Managing the Document Library

Documents can be stored in a local or remote server.

Add a File Attachment or a URL to the Library

1. Open any application that has Attached Documents actions.

2. From the Select Action menu, choose **Attachment Library/Folders > Manage Library**.

To add a file attachment

3. Click **Add a Document to the Library > Add New File**.
Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Folder</td>
<td>Enter a folder name or select one from the drop down menu</td>
</tr>
<tr>
<td>Specify a file</td>
<td>Enter the file path or Browse... to select a file.</td>
</tr>
<tr>
<td>Name the document</td>
<td>Enter a file name</td>
</tr>
<tr>
<td>Description</td>
<td>Enter a description</td>
</tr>
<tr>
<td>Copy document to the default location set by your administrator (recommended)?</td>
<td>Checked by default. To prevent the document from being uploaded to the network, clear the check box.</td>
</tr>
<tr>
<td>Print document with work pack?</td>
<td>Checked by default. To prevent the document from being printed with a work pack, clear the check box.</td>
</tr>
</tbody>
</table>

To add a URL

Click Add a Document to the Library > Add New Web Page.

Complete the fields. Note the following:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Folder</td>
<td>Enter a folder name or select one from the drop down menu</td>
</tr>
</tbody>
</table>
You can attach documents from the document library.

They can attach documents outside the library by clicking the paperclip icon in the header section of a record.

The IBM Maximo User’s Guide and the Maximo Help system discuss Attached Documents from the user’s perspective.

### Printing Workpacks in a UNIX Environment

To print workpacks in a UNIX® environment, change this setting:

1. From the Tools menu in Internet Explorer®, choose Internet Options.

2. On the Security tab, click Custom Level.

3. Under the “Initialize and script ActiveX controls not marked as safe” setting, click Enable.

4. Click OK to return to the Security tab, and click OK again.
Attached Documents Configuration

The doc links folder must be on the machine running Maximo, and not on the deployment machine.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Doclinks file path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>▼ &lt;Maximo root &gt; equals c:\maximo</td>
</tr>
<tr>
<td></td>
<td>▼ the installation program creates a directory called doclinks</td>
</tr>
<tr>
<td></td>
<td>▼ the file path is c:\maximo\doclinks</td>
</tr>
<tr>
<td>UNIX</td>
<td>▼ &lt;Maximo root &gt; equals /home/mxadmin/maximo</td>
</tr>
<tr>
<td></td>
<td>▼ the installation program creates a directory called doclinks</td>
</tr>
<tr>
<td></td>
<td>▼ the file path is /home/mxadmin/maximo/doclinks.</td>
</tr>
</tbody>
</table>

In this figure Maximo is configured to store attached document files on the same machine as the Application Server running Maximo.

**Single Machine Configuration**

Use the following directory structure for storing documents. The “default” directory is where Maximo copies attached document files when you do not specify a file path for a document folder. For more information, see “Managing Document Folders,” on page 22-2.
Attached Documents Configuration

Document Storage Directory

```
<Maximo Root>
  doclinks
  attachments
  default
  diagrams
  images
```

Alternative Configurations

Here are some alternative Attached Documents configurations.

<table>
<thead>
<tr>
<th>Configuration Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Dual Machines, Local HTTP Server – Windows and UNIX,&quot; on page 22-8</td>
<td>▼ Store document files on a different machine than the Application Server machine</td>
</tr>
<tr>
<td></td>
<td>▼ The document HTTP server is on the Application Server machine running Maximo.</td>
</tr>
<tr>
<td>&quot;Dual Machines, One Dedicated HTTP Server – Windows and UNIX,&quot; on page 22-17</td>
<td>▼ Store document files on a different machine than the Application Server machine running Maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ The HTTP server is on the machine storing the document files.</td>
</tr>
<tr>
<td>&quot;Multiple Machines, Multiple HTTP Servers – Windows and UNIX,&quot; on page 22-23</td>
<td>▼ Store document files on different machines, with each folder associated with a different machine (and possibly managed by a different group).</td>
</tr>
<tr>
<td></td>
<td>For example, store diagrams, images, and attachments on separate machines.</td>
</tr>
<tr>
<td></td>
<td>▼ Each machine storing documents has its own HTTP server.</td>
</tr>
</tbody>
</table>

General Considerations

▼ The workstations from which you access attached documents must have the relevant applications installed on them. For example, to view a Word document, a workstation must have Microsoft Word installed on it.

▼ After you modify the doclink.properties file, build and deploy a new maximo.ear file.
Dual Machines, Local HTTP Server – Windows and UNIX

The Dual Machines, Local HTTP Server scenario has the following configuration and conventions:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Configuration</th>
<th>Conventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>▼ You store document files on a different machine than the Application Server machine running Maximo.</td>
<td>▼ H is a mapped drive on the Application Server machine running Maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ The HTTP server is on the Application Server machine</td>
<td>▼ D is a physical drive on the machine storing the documents.</td>
</tr>
<tr>
<td></td>
<td>▼ You map a drive on the Application Server machine to point to the physical drive on the Document File Server machine.</td>
<td>▼ Maintain case consistency throughout.</td>
</tr>
<tr>
<td>UNIX</td>
<td>▼ You store document files on a different machine than the Application Server machine running Maximo.</td>
<td>▼ /d01 is the NFS mount point on the Application Server machine for the filesystem /home on the document storage machine.</td>
</tr>
<tr>
<td></td>
<td>▼ The HTTP server is on the Application Server machine</td>
<td>▼ Maintain case consistency throughout.</td>
</tr>
<tr>
<td></td>
<td>▼ You NFS mount the file system containing the document files from the Document File Server machine onto the Application Server machine.</td>
<td></td>
</tr>
</tbody>
</table>

Dual Machine Configuration with Local HTTP Server

Creating Attached Documents Directories

1. Create a `doclinks` directory on the machine storing the document files.
   For example:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Doclinks directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>D:\doclinks</td>
</tr>
</tbody>
</table>
2 Share the drive so users can connect to it.

3 Create the following subdirectories under doclinks:

- attachments
- default
- diagrams
- images

4 **BEA WebLogic only.** Create another subdirectory under doclinks named:

WEB-INF

5 **BEA WebLogic only.** Go to the doclinks directory created in step 1.

6 Copy the web.xml file from the deployment folder into the WEB-INF directory you created in Step 4.

**CAUTION** Maximo contains several additional web.xml files. Make sure you copy the correct one.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory and subdirectories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Maximo creates the directory when the doclinks folder is created by the UI.</td>
</tr>
<tr>
<td>UNIX</td>
<td>If you created additional attached document folders in Maximo, then create subdirectories for them, as well.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Platform</th>
<th>Deployment folder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>&lt;Maximo_root&gt;</code>\deployment</td>
</tr>
<tr>
<td>UNIX</td>
<td><code>&lt;Maximo_root&gt;/deployment</code></td>
</tr>
</tbody>
</table>

The file contains mime-mapping information, which you can customize. For more information, see "Mime Mappings (BEA WebLogic Only)," on page 22-31.
7 Verify the directory structure.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Your directory structure on drive D on the machine storing the documents looks like this example:</td>
</tr>
<tr>
<td></td>
<td>Drive D</td>
</tr>
<tr>
<td></td>
<td>doclinks</td>
</tr>
<tr>
<td></td>
<td>attachments</td>
</tr>
<tr>
<td></td>
<td>default</td>
</tr>
<tr>
<td></td>
<td>diagrams</td>
</tr>
<tr>
<td></td>
<td>images</td>
</tr>
<tr>
<td></td>
<td>WEB-INF (WebLogic only)</td>
</tr>
<tr>
<td>UNIX</td>
<td>Your directory structure under /home on the machine storing the documents looks like this example:</td>
</tr>
<tr>
<td></td>
<td>doclinks</td>
</tr>
<tr>
<td></td>
<td>attachments</td>
</tr>
<tr>
<td></td>
<td>default</td>
</tr>
<tr>
<td></td>
<td>diagrams</td>
</tr>
<tr>
<td></td>
<td>images</td>
</tr>
<tr>
<td></td>
<td>WEB-INF (WebLogic only)</td>
</tr>
</tbody>
</table>

8 On the Application Server machine running Maximo, perform this action:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Map drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Map drive H to physical drive D on the machine storing the documents</td>
</tr>
<tr>
<td>UNIX</td>
<td>Configure /d01 to be the NFS mount point for the /home filesystem on the machine that stores the document files.</td>
</tr>
</tbody>
</table>

Editing the Doclink.properties File

Specify the properties for your Attached Documents configuration.

1 Go to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>&lt;Maximo Root&gt; applications\maximo\properties</td>
</tr>
<tr>
<td>UNIX</td>
<td>&lt;Maximo Root&gt; applications/maximo/properties</td>
</tr>
</tbody>
</table>

2 Open doclink.properties in a text editor.
3. Edit the file as described in the following steps.

**Maximum Allowable File Size**

4. Specify a maximum size for files copied to Attached Documents Library folders. The default value is 10 MB.

   a. Go to the first section of the properties file, Maximum Size for Upload File.

   b. Under Set Value, find the `mxe.doclink.maxfilesize` parameter.

   c. Replace 10 with the desired value in megabytes (20 = 20 MB). If you want an unlimited file size, specify 0.

**Default Directory File Path**

5. Specify the default directory in which to place copied documents.

   a. Go to the second section of the properties file, Default Directory Path for Folders with No Default Path.

   b. At the bottom of the section, under Set Value, find the following parameter: `mxe.doclink.doctypes.defpath`

   c. Specify the default directory file path:

```
<table>
<thead>
<tr>
<th>Platform</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>mxe.doclink.doctypes.defpath = H:\\doclinks\default</code></td>
</tr>
<tr>
<td></td>
<td>In Windows, path statements require double backslashes ().</td>
</tr>
<tr>
<td>UNIX</td>
<td><code>mxe.doclink.doctypes.defpath = /d01/doclinks/default</code></td>
</tr>
</tbody>
</table>
```

**Translation Statement**

Associate the attached document file location with the HTTP server that serves them.

   a. Go to the third section of the file, Translation of Specified Filepaths of Folders to URLs.

   At the bottom of the section, under Set Value, there are translation statements for each of four operating system/application server combinations.

   b. Find the statement applicable to your system:

```
<table>
<thead>
<tr>
<th>Platform server and statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows WebSphere</td>
</tr>
<tr>
<td>C&lt;PATH&gt;\doclinks = http://&lt;servername or IP&gt;/</td>
</tr>
<tr>
<td>Windows BEA WebLogic</td>
</tr>
<tr>
<td>C&lt;PATH&gt;\doclinks = http://&lt;servername or IP&gt;:&lt;port number&gt;/DOCLINKS</td>
</tr>
<tr>
<td>UNIX WebSphere</td>
</tr>
<tr>
<td>/home/mxadmin/doclinks = http://&lt;servername or IP&gt;/</td>
</tr>
<tr>
<td>UNIX BEA WebLogic</td>
</tr>
<tr>
<td>/home/mxadmin/doclinks = http://&lt;servername or IP&gt;:&lt;port number&gt;/doclinks</td>
</tr>
</tbody>
</table>
```
Attached Documents Configuration

The translation works as follows:

- `<Value specified in the file path of an Attached Documents folder> = <URL of where the file will be served from>`
- `Maximo reads the string on the left side of the equal sign, and replaces it with the string on the right side to build the URL to that document.`

**c** Edit the statement and specify the mapped drive.

- In Windows the mapped drive is H, the servername (hostname) is maxhost, and the port number for the Application Server (BEA WebLogic only) is 7001.
- In UNIX the NFS mounted filesystem is /d01, the servername (hostname) is maxhost, and the port number for the Application Server (BEA WebLogic only) is 7001.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Application server and statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>H&lt;PATH&gt;\doclinks = <a href="http://maxhost/">http://maxhost/</a></td>
</tr>
<tr>
<td>WebSphere</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>H&lt;PATH&gt;\doclinks = <a href="http://maxhost:7001/doclinks">http://maxhost:7001/doclinks</a></td>
</tr>
<tr>
<td>BEA WebLogic</td>
<td></td>
</tr>
<tr>
<td>UNIX</td>
<td>/d01/doclinks = <a href="http://maxhost/">http://maxhost/</a></td>
</tr>
<tr>
<td>WebSphere</td>
<td></td>
</tr>
<tr>
<td>UNIX BEA</td>
<td>/d01/doclinks = <a href="http://maxhost:7001/doclinks">http://maxhost:7001/doclinks</a></td>
</tr>
<tr>
<td>WebLogic</td>
<td></td>
</tr>
</tbody>
</table>

**d** Make sure the translation statement line you edited is uncommented (delete the beginning # symbol, if present)—and that all other translation statements are commented out (add a beginning # symbol, if needed).

**6** Save and close the file.

Configuring the Application Server for Attached Documents

If you are using BEA WebLogic, perform the tasks in the following section. If you are using WebSphere, go to the WebSphere section (page 22-14).

**BEA WebLogic**

Creating a Web application in the Application Server

1. Stop the application server.

2. Backup the config.xml file in the domain in which you want to configure the Web application.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>&lt;BEA WebLogic root&gt;\user_projects\domains\&lt;domain_name&gt;</code></td>
</tr>
</tbody>
</table>
For example, when you installed Maximo, the domain in which you created MAXIMOSERVER was mydomain.

3 Start the application server.

4 Use Internet Explorer to login to the Administration Console by specifying the following URL:

http://<hostname>:<port>/console

where <hostname> is the name of the machine and <port> is the port number of the Application Server.

5 In the left pane, under the Deployments node, click Web Application Modules. The right frame refreshes.

6 Delete the existing Web application named doclinks if one exists on your system.

7 In the right pane, click Deploy a new Web Application Module. The right pane refreshes.

8 Navigate to the location of the doclinks directory on the mapped drive.

9 Click the radio button to select the doclinks directory, then click Target Module at the bottom of the screen.

10 If you have more than one server, select the server on which you want to deploy your new Web Application module, then click Continue.

11 Review your choices.

The name must be the root directory name where the documents are stored. Since you selected it in step 8, doclinks is the default. The name is case sensitive.
12 Click **Deploy**. The Web application you created appears in the Web Application tree in the left pane.

13 Skip the following section on WebSphere and go to "Editing Default File Paths in Maximo," on page 22-15.

---

### WebSphere

**Editing the httpd.conf File on the Application Server Machine**

In WebSphere, Attached Documents uses the IBM HTTP server to display attached documents. You must edit the httpd.conf file to specify the root of the \doclinks folder to be the home directory of the WebSphere HTTP server.

Complete the following steps:

1. Navigate to the location of the httpd.conf file for the IBM HTTP Server. The default installation location is:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>C:\IBM HTTP Server\conf\httpd.conf</td>
</tr>
<tr>
<td>UNIX</td>
<td>/home/IBMHTTPD/conf/httpd.conf</td>
</tr>
</tbody>
</table>

2. Back up the httpd.conf file.

3. Open the httpd.conf file in a text editor.

4. Find the section that begins with the following line:

   ```
   # This should be changed to whatever you set
   # DocumentRoot to.
   ``

   The Directory line value varies depending on whether you already edited the file during the installation of Maximo. If you have not edited this file, the value is a string ending in /htdocs. If you did edit this file during the Maximo installation, it appears as the following:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>&lt;Directory &quot;C:\maximo\doclinks&quot;&gt;</td>
</tr>
<tr>
<td>UNIX</td>
<td>&lt;Directory &quot;/home/mxadmin/maximo/doclinks&quot;&gt;</td>
</tr>
</tbody>
</table>

5. Edit this Directory line to specify the doclinks directory you created:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>&lt;Directory &quot;H:\doclinks&quot;&gt;</td>
</tr>
<tr>
<td>UNIX</td>
<td>&lt;Directory &quot;/d01/doclinks&quot;&gt;</td>
</tr>
</tbody>
</table>

   ```

   **NOTE** Use forward slashes (/) in the path statement.

6. Find the section that begins with the following lines (tip: search on DocumentRoot):
# DocumentRoot: The directory out of which you will serve your documents. By default, all requests are taken from this directory, but symbolic links and aliases may be used to point to other locations.

The Directory line value varies depending on whether you already edited the file during the installation of Maximo. If you have not edited this file, the value is a string ending in /htdocs. If you did edit this file during the Maximo installation, it appears as the following:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>DocumentRoot &quot;C:\maximo\doclinks&quot;</td>
</tr>
<tr>
<td>UNIX</td>
<td>DocumentRoot &quot;/home/mxadmin/maximo/doclinks&quot;</td>
</tr>
</tbody>
</table>

7 Edit this DocumentRoot line to specify the doclinks directory you created:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>DocumentRoot &quot;H:\doclinks&quot;</td>
</tr>
<tr>
<td>UNIX</td>
<td>DocumentRoot &quot;d01/doclinks&quot;</td>
</tr>
</tbody>
</table>

8 Save and Close the file.

**Editing Default File Paths in Maximo**

Because you modified the location of the doclinks directory, you then edit the specified file paths in Maximo. Complete the following steps.

1 Sign in to Maximo. You must have rights to edit file paths in Attached Documents.

2 Open an application that uses Attached Documents.

3 From the Select Action menu, choose **Attachment Library/Folders > Manage Folders**.

4 Click the Details icon next to the document folder whose file path you want to change. This displays the details area at the bottom of the page.
5 In the **Default File Path** field, edit the path to specify the new location of the associated directory. Enter the full path using the mapped drive letter.

Change the file paths for the attachments, diagrams, and images folders to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>File paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>H:\doclinks\attachments</td>
</tr>
<tr>
<td></td>
<td>H:\doclinks\diagrams</td>
</tr>
<tr>
<td></td>
<td>H:\doclinks\images</td>
</tr>
<tr>
<td>UNIX</td>
<td>/d01/doclinks/attachments</td>
</tr>
<tr>
<td></td>
<td>/d01/doclinks/diagrams</td>
</tr>
<tr>
<td></td>
<td>/d01/doclinks/images</td>
</tr>
</tbody>
</table>

**NOTE** If you create additional attached document folders, you also edit their file paths.

6 Click **OK**.

**Additional Configuration Steps**

Because you edited the doclink.properties file you build and deploy a new Maximo EAR file.

- For information about building a new maximo.ear file, see "Building EAR Files," on page 25-8.

- Refer to the appropriate Managing the Application Server chapter for information on deploying the new EAR file into your Application Server.

<table>
<thead>
<tr>
<th>BEA WebLogic</th>
<th>WebSphere</th>
</tr>
</thead>
</table>
Because you edited the httpd.conf file, you restart the HTTP server.

BEA WebLogic

Restart the Application Server.

Dual Machines, One Dedicated HTTP Server – Windows and UNIX

The Dual Machines, One Dedicated HTTP Server scenario has the following configuration and conventions:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Configuration</th>
<th>Conventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>▼ You store document files on a different machine than the Application Server machine running Maximo.</td>
<td>▼ H is a mapped drive on the Application Server machine running Maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ The HTTP server (such as Apache, MS-IIS, or any other Web server) is on the machine storing the document files.</td>
<td>▼ D is a physical drive on the machine storing the documents, running an HTTP server.</td>
</tr>
<tr>
<td></td>
<td>▼ You map a drive on the Application Server machine to point to the physical drive on the Document File/HTTP server machine.</td>
<td>▼ Maintain case consistency throughout.</td>
</tr>
<tr>
<td>UNIX</td>
<td>▼ You store document files on a different machine than the Application Server machine running Maximo.</td>
<td>▼ /d01 is an NFS mount point on the Application Server machine for the filesystem /home on the HTTP server machine.</td>
</tr>
<tr>
<td></td>
<td>▼ The HTTP server (such as Apache, MS-IIS, or any other Web server) is on the machine storing the document files.</td>
<td>▼ Maintain case consistency throughout.</td>
</tr>
<tr>
<td></td>
<td>▼ You NFS mount the filesystem containing the attached document files from the Document File/HTTP Server machine onto the Application Server machine.</td>
<td></td>
</tr>
</tbody>
</table>
Creating Attached Documents Directories

1. Create a `doclinks` directory on the machine storing the document files. For example:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Doclinks directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>D:\doclinks</td>
</tr>
<tr>
<td>UNIX</td>
<td>/home/doclinks</td>
</tr>
</tbody>
</table>

2. Create the following subdirectories under `doclinks`:

   - attachments
   - default
   - diagrams
   - images

   **NOTE** If you created additional attached document folders in Maximo, then create subdirectories for them, as well.
3 Verify the directory structure.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Your directory structure on drive D of the HTTP server looks like the following tree:</td>
</tr>
<tr>
<td></td>
<td><img src="drive-D_tree.png" alt="Diagram of Windows directory structure" /></td>
</tr>
<tr>
<td>UNIX</td>
<td>Your directory structure under /home on the machine storing the documents looks like the following tree:</td>
</tr>
<tr>
<td></td>
<td><img src="home_tree.png" alt="Diagram of UNIX directory structure" /></td>
</tr>
</tbody>
</table>

4 On the Application Server machine running Maximo, perform the following tasks:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Map drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Map drive H to physical drive D on the machine storing the documents.</td>
</tr>
<tr>
<td>UNIX</td>
<td>Configure /d01 to be the NFS mount point for the /home filesystem on the HTTP server machine storing the document files.</td>
</tr>
</tbody>
</table>

**Editing the Doclink.properties File**

Specify the properties for your Attached Documents configuration.

1 Go to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>&lt;Maximo Root&gt; applications\maximo\properties</td>
</tr>
<tr>
<td>UNIX</td>
<td>&lt;Maximo Root&gt; applications/maximo/properties</td>
</tr>
</tbody>
</table>
**Attached Documents Configuration**

2. Open `doclink.properties` in a text editor.

3. Edit the file as described in the following steps.

**Maximum Allowable File Size**

4. Specify a maximum allowable file size for files copied to Attached Documents Library folders. The default value is 10 MB.
   
a. Go to the first section of the properties file, Maximum Size for Upload File.

b. Under Set Value, find the `mxe.doclink.maxfilesize` parameter.

c. Replace 10 with the desired value in megabytes (20 = 20 MB). If you want an unlimited file size, specify 0.

**Default Directory File Path**

5. Specify the default directory in which to place copied documents.

a. Go to the second section of the properties file, Default Directory Path for Folders with No Default Path:

b. At the bottom of the section, under Set Value, find the following parameter: `mxe.doclink.doctypes.defpath`

c. Specify the default directory file path:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>mxe.doclink.doctypes.defpath = H:\\doclinks\\default</code></td>
</tr>
<tr>
<td></td>
<td>In Windows, path statements require double backslashes (<code>\</code>).</td>
</tr>
<tr>
<td>UNIX</td>
<td><code>mxe.doclink.doctypes.defpath = /d01/doclinks/default</code></td>
</tr>
</tbody>
</table>

**Translation Statement**

Associate the location of the attached document files with the HTTP server that serves them.

a. Go to the third section of the file, Translation of Specified Filepaths of Folders to URLs:

At the bottom of the section, under Set Value, there are translation statements for each of four operating system/application server combinations.

b. Find the statement applicable to your system:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Application server and statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>C&lt;PATH&gt;\\doclinks = http://&lt;servername or IP&gt;/</code></td>
</tr>
<tr>
<td>UNIX</td>
<td><code>/home/mxadmin/doclinks = http://&lt;servername or IP&gt;/</code></td>
</tr>
</tbody>
</table>

The translation works as follows:

\[ <\text{Value specified in the file path of an Attached Documents folder}> = <\text{URL of where the file will be served from}> \]
Maximo reads the string on the left side of the equal sign, and replaces it with the string on the right side to build the URL to that document.

c Edit the statement and specify the mapped drive.

- In Windows the mapped drive is H, and the HTTP servername (hostname) is dochost.
- In UNIX the NFS mounted filesystem is /d01, and the HTTP servername (hostname) is dochost.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Translation statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>H&lt;PATH&gt;\doclinks = <a href="http://dochost/">http://dochost/</a></td>
</tr>
<tr>
<td>UNIX</td>
<td>/d01/doclinks = <a href="http://dochost/">http://dochost/</a></td>
</tr>
</tbody>
</table>

d Uncomment the translation statement line that you edited (delete the beginning # symbol, if present).

e Ensure that all other translation statements are commented out (add a beginning # symbol, if needed).

6 Save and close the file.

Setting Up the HTTP Server for Attached Documents

The Dual Machine, Dedicated HTTP Server scenario relies on an HTTP server that is independent of Maximo. The choice of the HTTP server application to be used to serve the documents is based on your preference.

This section covers the general concept of configuring the HTTP server to serve documents for Maximo. Refer to the configuration documentation for your HTTP server application for more specific instructions.

For example:

- **(Windows)** In Apache, you edit the httpd.conf file to use d:\doclinks as its default home page documents directory.

- **(UNIX)** In Apache, you edit the httpd.conf file to use /home/doclinks as its default home page documents directory.

Editing Default File Paths in Maximo

Because you have changed the location of the doclinks directory, you then edit the specified file paths in Maximo. Complete the following steps.

1 Sign in to Maximo. You must have rights to edit file paths in Attached Documents.

2 Open an application that uses Attached Documents.

3 From the Select Action menu, choose Attachment Library/Folders > Manage Folders.
Click the Details icon next to the document folder whose file path you want to change. This displays the details area at the bottom of the page.

In the **Default File Path** field, edit the path to specify the new location of the associated directory. Enter the full path using the mapped drive letter.

Change the file paths for the attachments, diagrams, and images folders to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>File paths</th>
</tr>
</thead>
</table>
| Windows  | H:\doclinks\attachments  
           | H:\doclinks\diagrams  
           | H:\doclinks\images |
| UNIX     | /d01/doclinks/attachments  
           | /d01/doclinks/diagrams  
           | /d01/doclinks/images |

**NOTE** If you created additional attached document folders, you must also edit their file paths.

Click **Done** after editing each file path. Click **OK** to return to the Attached Documents table window.

**Additional Configuration Steps**

## Multiple Machines, Multiple HTTP Servers – Windows and UNIX

The Multiple Machines, Multiple HTTP Servers scenario has the following configuration and conventions:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Configuration</th>
<th>Conventions</th>
</tr>
</thead>
</table>
| Windows  | ▼ You store document files on different machines than the Application Server machine running Maximo.  
▼ You store the document files for each Attached Documents folder in Maximo on a different machine.  
▼ An HTTP server (such as Apache, MS-IIS, or any other Web server) is on each machine storing the document files.  
▼ For each folder in Maximo, you map a drive on the Application Server machine to point to the physical drive on the corresponding Document File/HTTP Server machine. | ▼ Three HTTP server machines store document files: machines A, B, and C.  
▼ Server A stores the document files for the attachments folder in Maximo, as well as document files for which no file path is specified.  
▼ Server B stores the document files for the diagrams folder.  
▼ Server C stores the document files for the images folder.  
▼ D is the physical drive on each machine storing the documents, running an HTTP server.  
▼ H, I, and J are mapped drives on the Application Server machine running Maximo. They correspond to the drive D on the HTTP servers A, B, and C, respectively.  
▼ Maintain case consistency throughout. | |
| UNIX     | ▼ You store document files on different machines than the Application Server machine running Maximo.  
▼ You store the document files for each Attached Documents folder in Maximo on a different machine.  
▼ An HTTP server (such as Apache or any other Web server) is on each machine storing the document files.  
▼ For each folder in Maximo, you NFS mount the filesystem containing the document files on the Document File/HTTP Server machine onto the Application Server machine. | ▼ Three HTTP server machines store document files: machines A, B, and C.  
▼ Server A stores the document files for the attachments folder in Maximo, as well as document files for which no file path is specified.  
▼ Server B stores the document files for the diagrams folder.  
▼ Server C stores the document files for the images folder.  
▼ /d01, /d02, and /d03 are the NFS mount points on the Application Server machine for the filesystem /home on each of the HTTP server machines.  
▼ Maintain case consistency throughout. | |
Creating Attached Documents Directories

Complete steps 1 and 2 on the HTTP server machines that store the documents:

1. Create a **doclinks** directory on *each* server machine:
   
   D:\doclinks

2. Create subdirectories under doclinks for each server machine as follows:

   - **Server A**: doclinks\**attachments**
   - **Server A**: doclinks\**default**
Attached Documents Configuration

Server B: doclinks\**diagrams**
Server C: doclinks\**images**

For example, your directory structure on drive D of HTTP server A looks like the following tree:

```
    d o c l i n k s
    ├── a t t a c h m e n t s
    │    └── d e f a u l t
```

Complete steps 3 through 5 on the Application Server machine running Maximo.

3  Map drive H to physical drive D on server machine A.
4  Map drive I to physical drive D on server machine B.
5  Map drive J to physical drive D on server machine C.

Creating Attached Documents Directories

1  Create a **doclinks** directory on the machine storing the document files. For example:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Doclinks directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>D:\doclinks</td>
</tr>
<tr>
<td>UNIX</td>
<td>/home/doclinks</td>
</tr>
</tbody>
</table>

2  Create subdirectories under doclinks for each server machine as follows:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Doclinks subdirectories</th>
</tr>
</thead>
</table>
| Windows  | Server A: doclinks\**attachments**  
            Server A: doclinks\**default**  
            Server B: doclinks\**diagrams**  
            Server C: doclinks\**images**  |
| UNIX     | Server A: /home/doclinks/**attachments**  
            Server A: /home/doclinks/**default**  
            Server B: /home/doclinks/**diagrams**  
            Server C: /home/doclinks/**images**  |
3 Verify the directory structure.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>For example, your directory structure on drive D of HTTP server A looks like the following tree:</td>
</tr>
</tbody>
</table>

```
   doclinks
     |
     |
   attachments
     |
     |
   default
```

UNIX For example, your directory structure on HTTP server A looks like the following tree:

```
/home
  |
  |
  doclinks
  |
  |
  attachments
  |
  |
  default
```

4 On the Application Server machine running Maximo, perform the following tasks:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Map drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>▼ Map drive H to physical drive D on server machine A.</td>
</tr>
<tr>
<td></td>
<td>▼ Map drive I to physical drive D on server machine B.</td>
</tr>
<tr>
<td></td>
<td>▼ Map drive J to physical drive D on server machine C.</td>
</tr>
<tr>
<td>UNIX</td>
<td>1 Configure <code>/d01</code> to be the NFS mount point for the <code>/home</code> filesystem on server machine A.</td>
</tr>
<tr>
<td></td>
<td>2 Configure <code>/d02</code> to be the NFS mount point for the <code>/home</code> filesystem on server machine B.</td>
</tr>
<tr>
<td></td>
<td>Configure <code>/d03</code> to be the NFS mount point for the <code>/home</code> filesystem on server machine C.</td>
</tr>
</tbody>
</table>

**Editing the Doclink.properties File**

Specify the properties for your Attached Documents configuration.

1 Go to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td><code>&lt;Maximo Root&gt; applications\maximo\properties</code></td>
</tr>
</tbody>
</table>
2. Open `doclink.properties` in a text editor.

3. Edit the file as described in the following steps.

### Maximum Allowable File Size

4. Specify a maximum allowable file size for files copied to Attached Documents Library folders. The default value is 10 MB. To change this value, complete the following steps:

   a. Go to the first section of the properties file, Maximum Size for Upload File.

   b. Under Set Value, find the `mxe.doclink.maxfilesize` parameter.

   c. Replace 10 with the desired value in megabytes (20 = 20 MB). If you want an unlimited file size, specify 0.

### Default Directory File Path

5. Specify the default directory in which to place copied documents.

   a. Go to the second section of the properties file, Default Directory Path for Folders with No Default Path:

   b. At the bottom of the section, under Set Value, find the following parameter: `mxe.doclink.doctypes.defpath`

   c. Specify the default directory file path:

### Translation Statement

6. Associate the location of the attached document files with the HTTP server that serves them.

   a. Go to the third section of the file, Translation of Specified Filepaths of Folders to URLs:

      At the bottom of the section, under Set Value, there are translation statements for each of four operating system/application server combinations.

   b. Find the statement applicable to your system:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Application server and statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>C&lt;PATH&gt;\doclinks = http://&lt;servername or IP&gt;/</td>
</tr>
<tr>
<td>UNIX</td>
<td>/home/mxadmin/doclinks = http://&lt;servername or IP&gt;/</td>
</tr>
</tbody>
</table>
The translation works as follows:

1. `<Value specified in the file path of an Attached Documents folder> = <URL of where the file will be served from>`
   - Maximo reads the string on the left side of the equal sign, and replaces it with the string on the right side to build the URL to that document.

2. **c** Edit the statement and specify the mapped drives. This scenario requires three translation statements, one for each folder and the server that stores its documents.
   - In Windows, the machine names for servers A, B, and C are dochostA, dochostB, and dochostC, respectively. Edit the statement and insert two more as follows:
   - In UNIX, the host names for servers A, B, and C are dochostA, dochostB, and dochostC, respectively. Edit the statement and insert two more as follows:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Translation statements</th>
</tr>
</thead>
</table>
| Windows  | H<PATH>\doclinks = http://dochostA/  
           | I<PATH>\doclinks = http://dochostB/  
           | J<PATH>\doclinks = http://dochostC/  |
| UNIX     | /d01/mxadmin/doclinks = http://dochostA/  
           | /d02/mxadmin/doclinks = http://dochostB/  
           | /d03/mxadmin/doclinks = http://dochostC/  |

3. **d** Uncomment the translation statement line that you edited (delete the beginning # symbol, if present).

4. **e** Ensure that all other translation statements are commented out (add a beginning # symbol, if needed).

5. **7** Save and close the file.

**Setting Up the HTTP Server for Attached Documents**

The Multiple Machines, Multiple HTTP Servers scenario relies on HTTP servers that are independent of Maximo. The choice of the HTTP server application to be used to serve the documents is based on your preference.

This section covers the general concept of configuring the HTTP server to serve documents for Maximo. Refer to the configuration documentation for your HTTP server application for more specific instructions.

For example:

- **(Windows)** In Apache, you edit the httpd.conf file to use d:\doclinks as its default home page documents directory.

- **(Windows)** In MS-IIS you can create a virtual folder named doclinks and point it to the d:\doclinks directory on the same machine. You can also point the MS-IIS default home page directory directly to d:\doclinks.
In Apache, you edit the httpd.conf file to use /home/doclinks as its default home page documents directory.

**Editing Default File Paths in Maximo**

Because you have changed the location of the doclinks directory, you edit the specified file paths in Maximo. The attachments, diagrams, and images file paths must point to drives H, I, and J respectively. Complete the following steps.

1. Sign in to Maximo. You must have rights to edit file paths in Attached Documents.
2. Open an application that uses Attached Documents.
3. From the Select Action menu, choose **Attachment Library/Folders**. Maximo displays the Attachments Library/Folders menu.
4. Click **Manage Folders**. Maximo displays the Manage Folders dialog box.
5. Click the Details icon next to the document folder whose file path you want to change. This displays the details area at the bottom of the page.

6. In the **Default File Path** field, edit the path to specify the new location of the associated directory. Enter the full path using the mapped drive letter.

   Change the file paths for the attachments, diagrams, and images folders to:

   - H:\doclinks\attachments
   - I:\doclinks\diagrams
   - J:\doclinks\images

   **NOTE** If you created additional attached document folders, you also edit their file paths.
Attached Documents Configuration

7 Click Done after editing each file path. Click OK to return to the Attached Documents table window.

Editing Default File Paths in Maximo

Because you have changed the location of the doclinks directory, you edit the specified file paths in Maximo. Complete the following steps.

1 Sign in to Maximo. You must have rights to edit file paths in Attached Documents.

2 Open an application that uses Attached Documents.

3 From the Select Action menu, choose Attachment Library/Folders > Manage Folders.

4 Click the Details icon next to the document folder whose file path you want to change. This displays the details area at the bottom of the page.

5 In the Default File Path field, edit the path to specify the new location of the associated directory. Enter the full path using the mapped drive letter.

Change the file paths for the attachments, diagrams, and images folders to:

<table>
<thead>
<tr>
<th>Platform</th>
<th>File paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>H:\doclinks\attachments</td>
</tr>
<tr>
<td></td>
<td>I:\doclinks\diagrams</td>
</tr>
<tr>
<td></td>
<td>J:\doclinks\images</td>
</tr>
<tr>
<td>UNIX</td>
<td>/d01/doclinks/attachments</td>
</tr>
<tr>
<td></td>
<td>/d02/doclinks/diagrams</td>
</tr>
<tr>
<td></td>
<td>/d03/doclinks/images</td>
</tr>
</tbody>
</table>
NOTE If you created additional attached document folders, you also edit their file paths.

6 Click Done after editing each file path. Click OK to return to the Attached Documents table window.

Additional Configuration Steps


Mime Mappings (BEA WebLogic Only)

A Multi-Purpose Internet Mail Extensions (MIME) mapping associates a file name extension with a data file type (text, audio, image). These properties allow you to map a MIME type to a file name extension.

When you created a doclinks\WEB-INF directory, you copied a web.xml file into it. If you have trouble viewing certain document file types, review these steps:

1. If you change this web.xml file (or if you tried unsuccessfully to open some attached documents before copying down this file), go to Internet Explorer, choose Tools/Internet Options. On the General tab, under Temporary Internet Files, delete Cookies and delete Files.

   NOTE Your browser might not be able to display some document types without special plug-ins—for example, some CAD diagrams. If you have such documents, check with your vendor to find out what plug-ins are required and how to get them. Plug-ins generally can be downloaded from a Web site. If needed, the plug-ins must be installed on every client machine used to view and print those kinds of attached documents.

2. If you have problems viewing certain types of documents, look at the mime-mapping sections of the web.xml file.

   The file contains a series of mime-mapping parameters corresponding to various kinds of document applications. For example, there is a parameter for "doc" documents. This parameter corresponds to Microsoft Word documents and appears as:

   <mime-mapping>
   <extension>
   doc
   </extension>
   <mime-type>
   application/msword
   </mime-type>
   </mime-mapping>

   Note the <extension> is "doc" and the <mime-type> is "application/msword"

   This web.xml file accommodates most of the file types you need. If you later find that you have other types of documents that do not open for viewing as attached documents, edit this file as follows:
Attached Documents Configuration

a  Copy a mime-mapping section in the file.

b  Paste it back into the file.

c  Change the appropriate application parameter lines in the copy to
refer to the relevant application’s extension and mime-type.

You can find the mime-type for an application by running Regedit,
咣avigating to the HKEY_CLASSES_ROOT folder, expanding it, and
cliking the application extension. The mime-type appears on the Content
Type line, under Data. For example, for PDF documents, the mime-type is
“application/pdf”

NOTE After you edit the web.xml file, you rebuild the Maximo EAR file. For details,

Document Management System (DMS) Setup

If you have a document management system (DMS), you can integrate it with
the Maximo Attached Documents feature.

Refer to the IBM Maximo Enterprise Suite Developer Reference Guide for
general instructions on customizing Maximo software. Integrating a DMS
requires code changes and programming skills.

Displaying Additional Fields in the Attached Documents Tree

You might want to display additional information about a document when
Maximo lists the attachment in the documents tree. For example, in addition
to the Name and Description of a document, you might want to display
whether it is a file or URL.

You can add any fields from the DOCLINKS and/or DOCINFO tables.

To add extra fields to documents displayed in the Attached Document tree,
complete the following steps:

1  Go to the Maximo\resources\resources\defaults folder.

2  Open the jspsettings.txt file.

3  Find the following parameter line:

   LINKDOCSDrillDownFieldList=docinfo.description

   This line specifies the fields to show in addition to the name of the
document. The default is for the Description field to be displayed. The
syntax is Table.Column.

4  Add additional fields as needed in the following syntax:

   LINKDOCSDrillDownFieldList=docinfo.description,
doclins.somefield,docinfo.somefield
where `somefield` is whatever field you want displayed—in this example, one field from the DOCLINKS table and one from the DOCINFO table.

The comma is the separator. Do **not** insert any spaces before or after the separator.

For example, to display the description and type of the document (whether it is a file or URL), you would edit the line as follows:

```
LINKDOCSDrillDownFieldList=docinfo.description, doclinks.urltype
```

5. Save the changes.

**NOTE** The changes do not take effect until you build and deploy a new Maximo EAR file.
This chapter addresses miscellaneous configuration topics. The instructions assume you are familiar with viewing, inserting, and modifying records with a SQL editor.

- Changing the Automatic Timeout Periods
- Assignment Manager MAXVARS Settings
- Displaying the Workflow Map
- Internet Explorer Settings
- Editing Regional Settings
- Specify Tax Options
- Java Virtual Machine

**NOTE** Whenever you edit files located under the `<Maximo root>` directory, you rebuild and redeploy the relevant EAR files. For more information, see "Multiple Maximo Configurations," on page 24-1.

### Changing the Automatic Timeout Periods

Maximo users are shut off after 30 minutes of inactivity. You can change this default value by editing the web.xml file in:

```xml
<Maximo_root>\applications\maximo\maximouiweb\webmodule\WEB-INF\web.xml
```

Find the session-config section and change the session-timeout element to a different value. For example, replacing 30 with 60 would increase the timeout period from 30 minutes to 60 minutes.
Assignment Manager MAXVARS Settings

Assignment Manager has three “dispatch” functions: Start, Interrupt, and Finish. By default, Maximo begins recording labor actuals when the assignment status changes from ASSIGNED to STARTED. By default, Maximo stops recording labor actuals when the status changes to either INTERRUPT or COMPLETE.

If you do not want Maximo to create labor actuals automatically:

1. Open your SQL editor and connect to the database as the schema owner (for example, Maximo).

2. View the current setting:

   SELECT * FROM MAXVARS WHERE VARNAME='LABTRANSONDISPATCH';

3. Run the following statement:

   UPDATE MAXVARS SET VARVALUE='0' WHERE VARNAME='LABTRANSONDISPATCH';

Displaying the Workflow Map

If the Maximo Application Server is installed on a UNIX server that does not run X-Windows Manager, users cannot view their Workflow maps. Contact Maximo Support for further information.

Internet Explorer Settings

Follow the instructions in this section to edit your Internet Explorer settings.

1. Through your Control Panel, select Internet Options.
On the **General** tab, click **Settings**.

3 Select **Every visit to the page**, then click **OK**.

**E-Commerce Configuration**

If your company is e-commerce enabled:

1 Click **Tools/Internet Options**.

2 Go to the **Privacy** tab and click **Advanced**.

3 Check the **Override automatic cookie handling** option.

4 Under Third Party Cookies, click **Accept**.

5 Click **OK**, then restart the browser.
Editing Regional Settings

Formatting information:

▼ can be modified in the Windows Control Panel by selecting the Regional and Language options icon.

▼ is stored in the Windows registry or the [Intl] section of WIN.INI.

NOTE Formatting changes affects all Windows applications, not just Maximo.

Specify Tax Options

Tax Options are set at the Organization level, and Maximo uses:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tax type</td>
<td>For example, federal, state, or city sales taxes are tax types.</td>
</tr>
<tr>
<td>tax code</td>
<td>This data is more specific. For example, the Massachusetts sales tax code is 5%.</td>
</tr>
</tbody>
</table>

1 In the Organizations application, select the Organization for which you want to specify tax options.

2 From the Select Action menu, select **Purchasing Options > Tax Options**

3 Click the Tax Type 1 tab.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>For example, State and provincial sales taxes.</td>
</tr>
<tr>
<td>Paid Tax GL Account</td>
<td>(Optional) Enter the appropriate General Ledger account. This account is for taxes paid to the vendor and is only used in the Invoices application.</td>
</tr>
<tr>
<td>Unpaid Tax GL Account</td>
<td>(Optional) Enter the appropriate General Ledger account. This account is for taxes paid to the vendor and is only used in the Invoices application.</td>
</tr>
<tr>
<td>Add Tax 1 Amount To Vendor Price</td>
<td>You can add the tax amount to the vendor price for:</td>
</tr>
<tr>
<td></td>
<td>▼ no items (the default)</td>
</tr>
<tr>
<td></td>
<td>▼ all items</td>
</tr>
<tr>
<td></td>
<td>▼ Issue on Receipt Items Only</td>
</tr>
</tbody>
</table>
In the Tax Options table window, click **New Row**. The Row Details open.

**Field** | **Description**
---|---
Tax Code and Description | Enter a tax code and description. For example, MA and Massachusetts Sales Tax.
Tax Rate | Enter the percentage tax rate, for example, 5.00 for 5%.
Effective Date | You can modify the default.
Paid and Unpaid Tax GL Accounts | Enter as needed.
Date Changed | Enter the current date.

Close the Details section.

Click the Tax Type 2 tab and enter a description for Tax Type 2. For example, city sales tax.

Fill in as appropriate the same fields as you did for Tax Type 1.

If Tax 2 is a compound tax, select the Tax 1 check box in the **Calculate Tax 2 Based on Price +** section. For more information, see "Calculating Compound Taxes," on page 23-5.

Repeat these procedures for Tax Types 3, 4, and 5 as required by your financial system. Note for succeeding tax types, you can include any of the preceding taxes in the tax calculation.

Click **OK**.

**Calculating Compound Taxes**

A compound tax is determined by multiplying the tax rate by the sum of the cost of the item plus Tax 1.

The “Calculate Tax on Price +” section allows you to include taxes from preceding tax types in this calculation. This section appears on every Tax Type tab except for Tax Type 1. To designate that a tax is calculated on the price of goods including another tax, select the appropriate check boxes.

For example, on the Tax Type 3 tab, you can include taxes from Tax Types 1 and/or 2 in calculating the Type 3 tax.
Settings for Printing Workpacks in a UNIX Environment

If you run Maximo in a UNIX environment and want to print workpacks, change a setting in Internet Explorer.

1. From the Tools menu in Internet Explorer, choose Internet Options.
2. On the Security tab, click Custom Level.
3. Under the “Initialize and script ActiveX controls not marked as safe” setting, click Enable.
4. Click OK to return to the Security tab and click OK again.

Java Virtual Machine

The Workflow Designer application requires the existence of a Java Virtual Machine (JVM) on the administrative workstation.

If you install a Microsoft service pack, the client machine no longer contains a Microsoft VM—and therefore no longer includes JVM functionality. For more information, see:


NOTE You can use Java plug-in version 1.3 or 1.4.

Refer to the Support Knowledge Base document M03423 for additional information and instructions on installing the JVM.

For Client Machines Without Internet Access

For security reasons, some client machines are not connected to the Internet. On these client machines, follow this procedure to allow the plug-in to install. This procedure lets you view the BEA WebLogic console.

1. Download the plug-in executable in the webclient\controls\wfcanvas folder. The default location is:
   
   <Maximo root>\applications\maximo\maximouiweb\webmodule\webclient\controls\wfcanvas

2. Open wfdesign.xml in a text editor like Notepad. The default location of this file is <Maximo root>\resources\presentations

   Locate the following code:

   
   <wfcanvas id="workflowdesignerapplet" archive="/webclient/controls/wfcanvas/control.jar" code="psdi.webclient.applet.wfcanvas.applet.WorkflowApplet" nodedatasrc="nodes_table" actiondatasrc="actions_table" />
3 Add the following text after "actions_table" in the line above.

```
codebase="./webclient/controls/wfcanvas/j2re-1_4_2_04-windows-
i586-p-iftw.exe"
classid="clsid:8AD9C840-044E-11D1-B3E9-00805F499D93"
```

where j2re-1_4_2_04-windows-i586-p-iftw.exe is the name of the plug-in executable.

4 Reimport `wfdesign.xml` through the browser, using the import/export tool bar buttons in the Application Designer.
This chapter includes two topics:

▼ **Overview of Maximo Architecture** – provides background information on the components that comprise Maximo, including the Enterprise Application Archive files.

▼ **Multiple Maximo Configurations** – provides examples of two Maximo configurations, along with information on which files to edit to implement those configurations.

### Overview of Maximo Architecture

Maximo uses an application server to provide access to the business components of the Maximo application and to the Maximo Web application.

**MAXIMOSERVER** is the default name for the Application Server running Maximo. This server was created during Maximo installation.

### Running Maximo in an Application Server

1. When you install Maximo, you install files to a Maximo directory.
   
   The Maximo application consists of three EAR files:

   ▼ `maximo.ear` – for the Maximo application.

   ▼ `maximohelp.ear` – for the Maximo Help application.

   ▼ `acweb.ear` – for the Actuate Active Portal.

2. To run Maximo:
   
   ▼ Build the EAR files, which is done during installation.

   ▼ Deploy the EAR files in an Application Server

   ▼ Rebuild the EAR files if you have any configuration changes.
This figure shows a single Application Server running Maximo. The Application Server is named MAXIMOSERVER and it runs within BEA WebLogic or IBM WebSphere. MAXIMOSERVER contains three EAR files.

The next section describes the EAR files and their associated WAR files.
The Maximo Enterprise Application Archive (EAR) Files

**EAR** files are archives that contain all the required files to run an application.

Maximo uses the following three EAR files. Each contains one or more Web application modules (.war extension):

- **maximo.ear**
  - maximouiweb.war
  - mboweb.war
  - meaweb.war
- **maximohelp.ear**
  - Maximohelp.war
- **acweb.war**
  - acweb.war

<table>
<thead>
<tr>
<th>WAR files</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximouiweb.war</td>
<td>Contains the Maximo UI-related JavaServer Pages™ (.jsp files), Java classes, static HTML files, and static image files. The buildmaximoear.xml file has information about the files in this module. This Web application uses the configuration details in the <strong>web.xml</strong> file, located in the <code>&lt;Maximo root&gt;\applications\Maximo\Maximouiweb\webmodule\WEB-INF</code> folder. This file also specifies the URL to access Maximo Help.</td>
</tr>
<tr>
<td>mboweb.war</td>
<td>Contains the Maximo business objects, Java classes, and dependent third-party Java classes. The build.xml file has information about all the files that are included for this module.</td>
</tr>
<tr>
<td>meaweb.war</td>
<td>The IBM Maximo Enterprise Adapter (MEA) lets Maximo exchange data with other enterprise systems. Users create and maintain data in one system and the MEA transfers it, which eliminates duplicate processing.</td>
</tr>
<tr>
<td>maximohelp.war</td>
<td>Provides the Maximo Help pages. The buildhelpear.xml file has information about all the files in this module.</td>
</tr>
<tr>
<td>acweb.ear</td>
<td>An Actuate Active Portal application packaged as <strong>acweb.war</strong>. The web.xml file, located in the <code>&lt;Maximo Root&gt;\applications\activeportal\WEB-INF</code> folder, has configuration details about the Actuate iServer.</td>
</tr>
</tbody>
</table>

**NOTE** For details on building and deploying EAR files, see:

- "Building EAR Files," on page 25-8
- "Building EAR Files," on page 26-8
- "Deploying EAR Files," on page 25-9
- "Deploying EAR Files," on page 26-9
Multiple Maximo Configuration Scenarios

You can use multiple Application Servers to provide load balancing, so that large numbers of users can access Maximo. For more information on this topic, see "Load Balancing Multiple Maximo Application Servers," on page 27-15.

This section provides an overview of two scenarios:

- **Multiple Maximo instances deployed in a single Application Server.**

  In this scenario, multiple Maximo instances are run on a single Application Server. Each Maximo instance can be configured identically, or all could be configured differently. You must make sure that each Maximo instance has a unique Context name within the Application Server.

  IBM Corporation recommends the following scenario, because Maximo continues to function even if one application server stops running.

- **Multiple Maximo instances deployed in multiple Application Servers.**

  In this scenario, Maximo instances are run on different Application Servers, either on the same physical server or different physical servers. Each Maximo instance can be configured identically, or all can be configured differently. Deploy a different EAR file for each Maximo instance that is configured differently.

**Actuate Considerations**

If you configure Actuate to support multiple Maximo instances, consider the following:

- Each Maximo instance should have its own acweb.ear file.

- Configure the following:

  1. Set the multi server flag in maximo.properties to "yes"
  2. Set the flag in rsse_maximo.properties to "true"
  3. Configure both the rsse_properties and the rsse_localhost.properties file for each Maximo instance
  4. Rename the actuatei18ntext.properties file to actuatei18ntext_<rsseAlias setting in maximo.properties>.properties for each Maximo instance

The following diagram shows multiple Maximo instances deployed in a single Application Server. These instances share one iServer. Each maximo instance:

- has its own acweb.ear, rsse_localhost.properties, and actuatei18ntext_<localhost>.properties file
Multiple Maximo Configuration Scenarios

- can be set up to point to a unique rpt folder in the encyclopedia.

**Multiple Maximo instances deployed in a single application server**

![Diagram of Maximo instances and Help considerations]

**Maximo Help Considerations**

If you have Help in multiple languages, all languages would be in one EAR file. Maximo knows what language the user is using and displays Help.
appropriately. Maximo Help can also be accessed directly through a Web server, using the URL of the location of Help on the Web server.

Example of Multiple Maximo Instances Deployed in Multiple Application Servers

The following figure depicts two Maximo instances deployed in two Application Servers on one physical machine.

Multiple Maximo instances deployed in multiple application servers

NOTE

In the example, one Maximo instance is deployed in Application Server A, running on port 8080, with Context name /Maximo1. Another Maximo instance is deployed in Application Server B, running on port 9090, with context name /Maximo2.

Each Maximo application is deployed using different EAR files—Maximo1.ear and Maximo2.ear. Each Maximo application can be configured to use the same or a different database (not shown). Both Maximo applications are sharing the same Maximo Help and the same Actuate iServer.
Modifying a Maximo Application

There are three areas you can modify:

- Context
- Maximo.properties settings
- Help settings

Maximo is packaged into EAR files based on installation directory files. One approach is to copy the root Maximo installation directory, change the appropriate files, then build new EAR files based on this directory.

Context

The context name lets you access the Web application within the Application Server. To edit context names:

For the Maximo application

Go to the `<Maximo_root>\applications\maximo\META-INF` folder and edit the `<context-root>/maximo<context-root>` parameter in both these files:

- `application.xml`
- `deployment-application.xml`

For Maximo Help

Go to `<Maximo_root>\applications\maximohelp\META-INF` and edit the `<context-root>/maximohelp<context-root>` parameter in both these files:

- `application.xml`
- `deployment-application.xml`

**NOTE** After editing, rebuild the Maximo Help EAR file. For instructions, see "Building EAR Files," on page 25-8.

For example, the following figure shows the lines in the file that could be edited:

```
| - | The MBO_WEB_APP_CONTEXT and the MAXIMUI_WEB_APP_CONTEXT must be unique within the instance of the Application Server. The MAXIMUI_WEB_APP_CONTEXT is what is used to access MAXIMO using the URL http://hostname:port/maximo
| - | ![Edit these parameters](image)
```

**NOTE** Underscores (_) are nonstandard network characters. Do not use underscores in context names, server names, or DNS names.
# Maximo.properties Settings

Edit the maximo.properties file located in the `<Maximo root>\applications\Maximo\properties` folder.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.name</td>
<td>If you deploy multiple Maximo applications on the same physical machine, you <strong>must</strong> change the mxe.name parameter.</td>
</tr>
<tr>
<td></td>
<td>In the MXServer.properties section, set the mxe.hostname property to the name of the machine and port hosting Maximo server.</td>
</tr>
<tr>
<td>mxe.db.url</td>
<td>The database Maximo connects to:</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to an IBM DB2 database, set it to:</td>
</tr>
<tr>
<td></td>
<td>mxe.db.url=jdbc:db2://localhost:50000/dbalias</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to an Oracle database, set it to:</td>
</tr>
<tr>
<td></td>
<td>mxe.db.url=jdbc:oracle:thin:@hostname:port:SID</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to Microsoft SQL Server database, set it to:</td>
</tr>
<tr>
<td></td>
<td>mxe.db.url=jdbc:inetdae7a:hostname:port?database=dbname&amp;language=us_en&amp;nowrnings=true\</td>
</tr>
<tr>
<td>mxe.db.schemaowner</td>
<td>The schema owner Maximo connects to:</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to an IBM DB2 database, type the schema owner name. For IBM DB2, the default owner name is maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to an Oracle database, type the schema owner name. For Oracle, the default owner name is maximo.</td>
</tr>
<tr>
<td></td>
<td>▼ To connect to a Microsoft SQL Server database, type <strong>dbo</strong>.</td>
</tr>
<tr>
<td>mxe.adminuserid</td>
<td>The Maximo Administrator user name and password</td>
</tr>
<tr>
<td>mxe.db.user</td>
<td>The login user name</td>
</tr>
<tr>
<td>mxe.db.password</td>
<td>The login password</td>
</tr>
<tr>
<td>mxe.system.reguser</td>
<td>The database administration account used to add new users</td>
</tr>
<tr>
<td>mxe.system.regpassword</td>
<td>The database administration password used to add new users</td>
</tr>
<tr>
<td>mxe.report.actuate.reportserver</td>
<td>The name of the report server within the Actuate encyclopedia. This server is also referred to as the Volume.</td>
</tr>
<tr>
<td>mxe.report.actuate.portalHost</td>
<td>The URL of the Active Portal, including the port number and folder. By default, the folder name is acweb.</td>
</tr>
<tr>
<td></td>
<td>An example is <a href="http://production:7001/acweb">http://production:7001/acweb</a></td>
</tr>
<tr>
<td>mxe.report.actuate.iServer</td>
<td>The URL of the Report iServer, including the port number. An example is: <a href="http://production:8000">http://production:8000</a></td>
</tr>
</tbody>
</table>
### Additional Actuate Edits

Configure these files, located in `<Maximo Root>\Actuate\iServer\etc`.

**rsse_localhost.properties**

The configuration file for the Maximo-Actuate RSSE. For every Maximo server, there should be a unique `rsse_localhost.properties` file. However, if there is just one Maximo server to one report server, you *do not* need `rsse_localhost.properties`.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.report.actuate.db.connectstring</td>
<td>Used by the Actuate encyclopedia to access the database, and must reference the same database to which the Maximo application is connected. The connectstring is the tnsnames.ora alias of the sid.</td>
</tr>
<tr>
<td>mxe.report.actuate.rootEncycFolder</td>
<td>By default, this folder is rpt, and contains all the subfolders, reports and queries for the maximo report encyclopedia.</td>
</tr>
<tr>
<td>mxe.report.actuate.rsseAlias</td>
<td>The RSSE alias name sets the rsse properties file in the Actuate\iServer\etc directory. For example, if your alias is set at production, the rsse properties file is set to rsse_production.properties.</td>
</tr>
<tr>
<td>mxe.report.actuate.multiServer</td>
<td>When you have multiple Maximo instances connecting to the Actuate server, set the multiServer flat to yes.</td>
</tr>
</tbody>
</table>

**rsse_maximo.properties**

This properties file details the names of Actuate Roles used in the encyclopedia. Default roles are included in this file, and should not be changed, unless the client creates new or different administrative roles.

- **NOTE** Only one `rsse_maximo.properties` file should be used, no matter how many maximo servers are configured to use the Report Server.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximo.host =</td>
<td>The IP Address of the Server running Maximo.</td>
</tr>
<tr>
<td>RMI Registry Port =</td>
<td>The RMI Registry Port for Maximo. The default used is 1099.</td>
</tr>
<tr>
<td>maximo.servername =</td>
<td>The mxe.name specified in the beginning of the maximo.properties file.</td>
</tr>
</tbody>
</table>

---

**rsse.internalrole.all=all**

The Actuate Role used for Maximo end users. All is the default role used for end users to execute and run reports.

**rsse.internalrole.administrator=MAXADMIN**

The Administrative Group in Maximo. Members can sign into the Maximo Management Console to add and delete reports, and set user or group privileges and archive polices.

To sign into the Management Console, the administrative user would log in as their `username@RSSE Alias name`. This insures that the rsse connects to the correct application server (rpt folder).
To let Actuate Query files pull column labels from the Maximo database, edit the `Actuate18ntext.properties` file located in the following two directories:

```plaintext
- <maximo_home>/applications/activeportal/WEB-INF/classes/com/actuate/ExternalText/
- <Actuate_home>/iserver/bin/com/actuate/ExternalText/
```

For each Maximo instance, create a unique `actuate18ntext.properties` file. To do so, rename the existing one to `actuate18ntext_<rsseAlias setting in maximo.properties>.properties`.

If there is just one Maximo server to one report server, do not rename `actuate18ntext.properties`.

**Actuate18ntext.properties file:**

- Uncomment lines pertaining to your database connectivity
- Edit lines to reflect the appropriate values

**If connecting to an IBM DB2 database:**

1. Uncomment these lines:
   ```plaintext
   actuate.externText.JDBCDriverName=com.ibm.db2.jcc.DB2Driver
   actuate.externText.JDBCConnectionURL=jdbc:db2://localhost:50000/dbalias
   ```
2. Replace `dbalias` with the alias of your database.

**Parameter | Explanation**
--- | ---
rsse.internalrole.operator=SYSADM | The System Administrator has responsibilities for installing, configuring, and maintaining the report iServer

**Parameter | Explanation**
--- | ---
actuate.externText.JDBCDriverName | The Actuate externalized text JDBC thin driver name. The default is: oracle.jdbc.driver.OracleDriver
actuate.externText.JDBCConnectionURL | The Actuate externalized text JDBC connection. The default is: jdbc:oracle:thin:@dbserver:1521:sid
actuate.externText.JDBCConnectionURL | jdbc:inetdae7a:<hostname>:<port>?database=dbname&language=us_english&nowarnings=true
actuate.externText.username | The Actuate externalized text username. The default is maximo.
actuate.externText.password | The Actuate externalized text password. The default is maximo.
Modifying a Maximo Application

If connecting to an Oracle database:

1. Uncomment these lines:
   
   ```
   actuate.externText.JDBCDriverName=oracle.jdbc.driver.OracleDriver
   actuate.externText.JDBCConnectionURL=jdbc:oracle:thin:@localhost:1521:MAX1
   ```

2. Replace `localhost` and `MAX1` with the appropriate database and SID name respectively.

If connecting to a Microsoft SQL Server database:

1. Uncomment these lines:
   
   ```
   actuate.externText.JDBCDriverName=com.inet.tds.TdsDriver
   actuate.externText.JDBCConnectionURL=jdbc:inetdae7a:<hostname>:<port>?database=dbname&language=us_english&nowarnings=true
   ```

2. Replace `<hostname>` with the machine name or IP address of the server hosting your database; `<port>` with 1433 (default); `dbname` with your SQL Server database name.

Help Settings

The Maximo UI module is associated with a Maximo Help application, using a URL in the web.xml file located in the `<Maximo root>\applications\Maximo\Maximouiweb\webmodule\WEB-INF` folder. Here is an example of the Help section.

```xml
<env-entry>
   <description>URL of the root of MAXIMO Application Help</description>
   <env-entry-name>helpurl</env-entry-name>
   <env-entry-type>java.lang.String</env-entry-type>
   <env-entry-value>/Maximohelp</env-entry-value>
</env-entry>
```

Instead of `/Maximohelp` in the previous example, you might enter a URL to a customized version of Help:

```
http://<hostname>:<port>/custommaxhelp
```

where `<hostname>` and `<port>` are the machine name (or IP address) and port number of the server. For example:

```
<env-entry-value>http://maxhost:9001/custommaxhelp</env-entry-value>
```
Managing the BEA WebLogic Application Server in Windows

The BEA WebLogic Application Server uses Maximo business components to create the Maximo Web Application. You can run multiple BEA WebLogic Application Servers simultaneously.

"Multiple Maximo Configurations," on page 24-1 discusses Maximo architecture and might help you understand this chapter.

This chapter discusses:

- WebLogic Application Server
- Configuring Maximo in the Application Server
- Building EAR Files
- Starting the Application Server as a Windows Service
- Configuring Maximo in Multiple Application Servers
- Configuring Multiple Application Servers to Start as Windows Services
- Load Balancing Multiple Application Servers

BEA provides extensive documentation on configuring BEA WebLogic Server 8.1.4.

http://edocs.bea.com/platform/docs81/index.html

The URL for the Administration Guide is:

http://edocs.bea.com/wls/docs81/adminguide/index.html
WebLogic Application Server

During installation, you configured an administration server named MAXIMOSERVER in the domain “mydomain.”

Starting the Application Server

Most production environments run the Application Server as a service. There are three ways to start the Application Server:

<table>
<thead>
<tr>
<th>From the Program menu</th>
<th>From the command prompt</th>
<th>When running as a service</th>
</tr>
</thead>
</table>
| Choose Start > Programs > BEA WebLogic Platform 8.1 > User Projects > <domain_name> > Start Server. | 1 Open a command prompt and change directory to: bea\user_projects\domains\ <domain_name> 

2 Type startweblogic. 

To eliminate user name and password requirements, see "Editing the Startup Scripts," on page 25-12. | 1 From the Start menu, choose Settings > Control Panel > Administrative Tools > Services. 

2 Right-click the BEA service and choose Start. To start as a service, see "Starting the Application Server as a Windows Service," on page 25-14. |

Starting the Administration Console

You use the BEA WebLogic Administration Console to manage the Application Servers.

1 Make sure the BEA WebLogic Application Server is running.

2 In Internet Explorer, type http://<hostname>:port/console. The default port number for MAXIMOSERVER is 7001.

3 Enter the BEA WebLogic user name and password. The Administration Console opens with the welcome screen.
Stopping the Application Server

There are three ways to stop the Application Server:

<table>
<thead>
<tr>
<th>From the command prompt</th>
<th>When running as a service</th>
<th>From the Administration console</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Go to the command prompt running the Application Server.</td>
<td>1 From the Start menu, choose Settings &gt; Control Panel &gt; Administrative Tools &gt; Services.</td>
<td>1 Open the Administration Console.</td>
</tr>
<tr>
<td>2 Press Ctrl + C.</td>
<td>2 Right-click the BEA service and choose Stop.</td>
<td>2 In the left pane, expand the Servers node.</td>
</tr>
<tr>
<td>3 Enter Y when prompted, and press Enter.</td>
<td></td>
<td>3 Right-click the server you want to stop and choose “Start/stop this server...”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 In the right pane, click Graceful shutdown of this server...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Confirm your choice. Click Yes to stop the server.</td>
</tr>
</tbody>
</table>

Configuring Maximo in the Application Server

This section lets you configure new Application Servers, in addition to the one you created during the Maximo installation. For example, you might want to create separate Application Servers for production, test, and training environments.

Perform these procedures for each Application Server you set up.

- Creating the Application Server
- Building the EAR Files
- Deploying the EAR Files
- Creating a Startup Script (if you create a server in a pre-existing domain)
- Editing the Startup Script
- Starting the Application Server

**NOTE** Throughout this section, we use **MAXSERV** as the name of the server configured to run Maximo. Substitute another name as appropriate.
Configuring Maximo in the Application Server

Development Mode versus Production Mode

In "Creating the Application Server," on page 25-4 you select a BEA WebLogic start-up mode. Use this table to guide you:

<table>
<thead>
<tr>
<th>Use Development mode</th>
<th>Use Production mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>when developing applications</td>
<td>after applications are completed</td>
</tr>
<tr>
<td>when security is relaxed</td>
<td>when you need full security</td>
</tr>
<tr>
<td>to auto deploy applications</td>
<td>when using clusters or other advanced features</td>
</tr>
<tr>
<td>when deploying applications on the Administration Server</td>
<td>when deploying applications on Managed Servers, and using Administration Servers to manage the domain</td>
</tr>
</tbody>
</table>

Creating the Application Server

This chapter describes three Application Server configurations:

<table>
<thead>
<tr>
<th>Application Server configuration</th>
<th>go to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Application Server in a new domain</td>
<td>&quot;New Domain Using the Configuration Wizard,&quot; on page 25-4</td>
</tr>
<tr>
<td>One Application Server in an existing domain</td>
<td>&quot;Same Domain as MAXIMOSERVER,&quot; on page 25-7</td>
</tr>
<tr>
<td>Multiple Application Servers in one domain</td>
<td>&quot;Configuring Maximo in Multiple Application Servers,&quot; on page 25-16</td>
</tr>
</tbody>
</table>

New Domain Using the Configuration Wizard

Use the BEA WebLogic Configuration Wizard to create a domain and an Application Server within the domain.

1. From the Start menu, choose Programs > BEA WebLogic Platform 8.1 > Configuration Wizard.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Create or Extend a Configuration</td>
<td>Select Create a new WebLogic Configuration and click Next.</td>
</tr>
<tr>
<td>3 Select a Configuration template</td>
<td>In the left pane, select the Basic WebLogic Server Domain template, and click Next.</td>
</tr>
<tr>
<td>4 Choose Express or Custom</td>
<td>Select the Custom option and click Next.</td>
</tr>
<tr>
<td>5 Configure the Administration</td>
<td>Enter a server name and a listen port (for this example, enter MAXSERV as the server name and 8001 for the port) and click Next.</td>
</tr>
<tr>
<td>6 Managed Servers, Clusters,</td>
<td>Select No and click Next.</td>
</tr>
<tr>
<td>and Machines Options</td>
<td></td>
</tr>
</tbody>
</table>
Configuring Maximo in the Application Server

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Database (JDBC) Options</td>
</tr>
</tbody>
</table>
| 8      | Messaging (JMS) Options | Do you use the IBM Maximo Enterprise Adapter (MEA)?  
  ▼ If yes, go to the next step.  
  ▼ If no, select No and click Next. **Go directly to step 22.** |
| 9      | Messaging (JMS) Options (the same screen) | In the **Name** field, enter **MEA connection factory**  
  In the **JNDI** field, enter **jms/mro/int/qcf/intqcf**  
  Accept the default values in all other fields and click **Next**. |
| 10     | Configure JMS Destination Keys | Do nothing and click **Next**. |
| 11     | Configure JMS Templates | Do nothing and click **Next**. |
| 12     | Configure JMS Files Stores | Click **Add**. Enter these values then click **Next**. |
|        | Name | Listen Address | Synchronous write policy |
|        | mxintsqinserver | C:\Maximo\mststore | Disabled |
|        | mxintsqoutfile | C:\Maximo\mststore | Disabled |
|        | mxintcqinserver | C:\Maximo\mststore | Disabled |
| 13     | Configure JMS Server | Click **Add** and enter these values. |
|        | Name | Store |
|        | mxintsqinserver | mxintsqinserver |
|        | mxintsqoutserver | mxintsqoutfile |
|        | mxintcqinserver | mxintcqinserver |
|        | Name | Store |
|        | mxintsqinserver | mxintsqinserver |
|        | mxintsqoutserver | mxintsqoutfile |
|        | mxintcqinserver | mxintcqinserver |
|        | Name | Store |
|        | mxintsqinserver | mxintsqinserver |
|        | mxintsqoutserver | mxintsqoutfile |
|        | mxintcqinserver | mxintcqinserver |
|        | Accept the default values in all other fields and click **Next**. |
| 14     | Assign JMS Servers to BEA WebLogic Servers | Assign all the JMS servers in the left pane to the BEA WebLogic server in the right pane by clicking the right arrow button, then click **Next**. |
| 15     | Configure JMS Topics | Do nothing and click **Next**. |
| 16     | Configure JMS Queues | Tab one (mxintsqinserver). **NOTE:** Change all three tabs.  
  ▼ In the **Name** field, enter **mxintsqin**.  
  ▼ In the **JNDI Name** field, enter **jms/mro/int/queues/sqin**.  
  ▼ In the **Store enabled** field, select **true**.  
  ▼ In the **Template** field, leave the default of **Unspecified**. |
### Configuring Maximo in the Application Server

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Configure JMS Queues Tab two (mxintsquotserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the Name field, enter <em>mxintsquot</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the JNDI Name field, enter <em>jms/mro/int/queues/sqout</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the Store enabled field, select <em>true</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the Template field, leave the default of <em>Unspecified</em>.</td>
</tr>
<tr>
<td>18</td>
<td>Configure JMS Queues Tab three (mxintcqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the Name field, enter <em>mxintcqin</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the JNDI Name field, enter <em>jms/mro/int/queues/cqin</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the Store enabled field, select <em>true</em>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the Template field, leave the default of <em>Unspecified</em>.</td>
</tr>
<tr>
<td></td>
<td>When you finish all three tabs, click <strong>Next</strong>.</td>
</tr>
<tr>
<td>19</td>
<td>Applications and Services Targeting Options Select Yes and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>20</td>
<td>Target Services to Servers or Clusters Select All and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>21</td>
<td>Configure Administrative Username and Password Enter a user name and password (and verify the password), and select <em>No</em> in the Configure additional users, groups, and global rules portion. Click <strong>Next</strong>.</td>
</tr>
<tr>
<td>22</td>
<td>Configure Windows Options Select whether you want to Create a Start Menu shortcut and to Install Administrative Server as a Windows Service, then click <strong>Next</strong>.</td>
</tr>
<tr>
<td>23</td>
<td>Build Start Menu Entries Accept the defaults and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>24</td>
<td>Configure Server Start Mode and Java SDK Select a BEA WebLogic Configuration Startup Mode (either Development or Production), then choose the <strong>Sun SDK</strong>. Click <strong>Next</strong>.</td>
</tr>
<tr>
<td></td>
<td>For more information, see &quot;Development Mode versus Production Mode,&quot; on page 25-4.</td>
</tr>
<tr>
<td>25</td>
<td>Create BEA WebLogic Configuration Select the directory in which you want to create a BEA WebLogic configuration, then click <strong>Create</strong>.</td>
</tr>
<tr>
<td>26</td>
<td>Creating Configuration When the Configuration completes, click <strong>Done</strong>.</td>
</tr>
</tbody>
</table>

### Start BEA WebLogic

To continue configuring Maximo, start the BEA WebLogic Application Server and the Administration Console for the new domain.

1. To start the server, click Start > Programs > BEA WebLogic Platform 8.1 > User Projects > MAXSERV > Start Server.

2. To start the Administration Console, enter this URL:

   http://<hostname>:/8001/console
Configuring Maximo in the Application Server

NOTE Skip the next procedure and go to "Building EAR Files," on page 25-8.

Same Domain as MAXIMOSERVER

To create the Application Server in the same domain as MAXIMOSERVER, complete these steps.

1. Start MAXIMOSERVER (page 25-2) and open the Administration Console (page 25-2).

2. In the Administration Console’s left pane, right-click Servers and choose Configure a new Server.

3. In the Configuration > General tab, specify these properties:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>for example, MAXSERV</td>
</tr>
<tr>
<td>Machine</td>
<td>the default, “(none)”</td>
</tr>
<tr>
<td>Cluster</td>
<td>the default, “(none)”</td>
</tr>
<tr>
<td>Listen Address</td>
<td>leave this field empty</td>
</tr>
<tr>
<td>Listen Port Enabled</td>
<td>the default (box checked)</td>
</tr>
<tr>
<td>Listen port</td>
<td>the port number to access Maximo, for example, 7050</td>
</tr>
<tr>
<td>SSL Listen Port Enabled</td>
<td>the default, unchecked</td>
</tr>
<tr>
<td>Client Cert Proxy Enabled</td>
<td>the default, unchecked</td>
</tr>
<tr>
<td>Java Compiler</td>
<td>javac</td>
</tr>
</tbody>
</table>

4. Click Create. The new server is created.
Building EAR Files

You build Enterprise Application Archive (EAR) files before deploying applications in an Application Server.

**NOTE**
To build EAR files in a UNIX environment, see "Building EAR Files," on page 25-8.

The three EAR files are:

- maximo.ear – for the Maximo application.
- maximohelp.ear – for the Maximo Help application.
- acweb.ear – for the Actuate Active Portal.

Running the Build Scripts

1. Open a Command Prompt.
2. Go to C:\Maximo\deployment
3. Run the appropriate script:

<table>
<thead>
<tr>
<th>Script</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>buildmaximoear (Windows)</td>
<td>Creates a maximo.ear file</td>
</tr>
<tr>
<td>buildhelpear</td>
<td>Creates a maximohelp.ear file</td>
</tr>
<tr>
<td>buildacwebear</td>
<td>Creates an acweb.ear file</td>
</tr>
</tbody>
</table>

4. These scripts take several minutes to run.

The command prompt or terminal window then displays a BUILD SUCCESSFUL line.

Rebuilding EAR files

You rebuild and redeploy EAR files whenever you:

- Modify .xml files (Maximo.ear).
- Modify custom class files (Maximo.ear).
- Modify html Help topics (Maximohelp.ear).
- Modify settings in the maximo.properties file (Maximo.ear).
- Add functionality to Maximo, such as Desktop Requisitions (Maximo.ear, Maximohelp.ear).

**NOTE**
If you are rebuilding EAR files, make a backup copy first.
Deploying EAR Files

This chapter describes creating new Application Servers. However, deploying EAR files into existing Application Servers—redeploying—is a task you perform whenever you customize Maximo.

Redeploying EAR files

If you are redeploying an EAR file into an existing Application Server, first remove the old one.

1. In the Administration Console, open the Deployments node.
2. Right-click an application, for example MAXIMO, and choose Delete.
3. Click Yes to confirm.

To redeploy, continue with these steps:

Deploying Ear Files Into the Application Server

1. Login to the BEA WebLogic administration console.

   http://<hostname>:<port>/console

2. In the left pane, under the Deployments node, click Applications.
3. In the right pane, click Deploy a new Application.
4. Navigate to the maximo.ear file, using the Location folder structure. The default location is <maximoroot>\deployment\default folder.

5. Select maximo.ear.
   - Single server environment — click Continue and go to Step 7.
   - Multiple server environment — click Target Application.
6. Select the server, then click Continue.
Building EAR Files

7 The Deploy an Application screen opens.

Enter a name for the application represented by the EAR file. The default is the file name of the EAR file, for example maximo.

8 Click Deploy.

The application you deployed appears in the left pane, under Applications.

Deploying the Maximo Help EAR

To deploy Maximo Help EAR repeat the previous procedure, with these exceptions:

- Select maximohelp.ear from the build directory (step 5).
- Name the application maximohelp (the default) or another name of your choosing (step 7).

Deploying the Acweb EAR

To deploy acweb EAR repeat the previous procedure, with these exceptions:

- Select acweb.ear from the build directory (step 5).
- Name the application acweb (the default) or another name of your choosing (step 7).
Multiple Maximo Applications in a Single Application Server

You can have multiple Maximo applications in a single Application Server. For example, you might want to deploy two Maximo applications into the same Application Server—Dev for development and Test for testing.

To use the following general steps to deploy multiple Maximo applications into an Application Server, see Chapter 24, "Multiple Maximo Configurations," on page 24-1.

1. Determine the configuration you want.
2. Edit the maximo.properties files as needed.
3. Determine which EAR files to build.
   - buildmaximoear.cmd
   - buildhelpear.cmd
   - buildacwebear.cmd
4. Edit the build files as needed.
5. Build the EAR files.
6. Deploy the EAR files.

Creating a Startup Script

- Complete this section only if you created the server in a pre-existing domain. For more information, see "Same Domain as MAXIMOSERVER," on page 25-7.

- If you used the Configuration Wizard to create a standalone server, skip this procedure and go to Editing the Startup Script.

**NOTE** To have the Application Server start as a service, see "Starting the Application Server as a Windows Service," on page 25-14.

1. Go to bea\user_projects\domains\<domain_name>.
2. Copy `startWebLogic.cmd` into the same folder and rename it to reflect the Application Server you created. For example: startMAXSERV.cmd.
3. Go to Editing the Startup Script.
Building EAR Files

**Editing the Startup Scripts**

Certain steps depend on whether you created a domain or used an existing domain.

**NOTE** To have the Application Server start as a service, see "Starting the Application Server as a Windows Service," on page 25-14.

1. Locate the startup script:

```
<table>
<thead>
<tr>
<th>Domain type</th>
<th>Startup script</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>The startup script is the <code>startWebLogic.cmd</code> file in the folder you specified as the domain name. For example, if you created a domain named maxdomain, it is in:</td>
</tr>
<tr>
<td></td>
<td><code>bea\user_projects\domains\maxdomain</code></td>
</tr>
<tr>
<td>Pre-existing</td>
<td>find the new startup script you created, for example <code>startMAXSERV.cmd</code>.</td>
</tr>
</tbody>
</table>
```

2. Open the startup script in a text editor.

```
<table>
<thead>
<tr>
<th>Domain type</th>
<th>Startup script</th>
</tr>
</thead>
<tbody>
<tr>
<td>New</td>
<td>The <code>SERVER_NAME=</code> parameter in <code>startWebLogic.cmd</code> already has the name of the new server.</td>
</tr>
<tr>
<td>Pre-existing</td>
<td>Search for the <code>SERVER_NAME=</code> parameter and replace the existing name with the name of the new server. For example, replace <code>MAXIMOSERVER</code> with <code>MAXSERV</code>.</td>
</tr>
</tbody>
</table>

**NOTE** The server name is case sensitive.
```

3. If you want to eliminate user name and password requirements for BEA WebLogic, create a `boot.properties` file (or this file might exist on your system). This stores the username and password in an encrypted format.

Place two lines in a text file:

```
username=username
password=password
```

The values:

- must match an existing user account in the Authentication provider for the default security realm
- must belong to a role that has permission to start and stop a server.

Save the file as `boot.properties` in the root directory of the domain (for example: `C:\bea\user_projects\domains\mydomain`).

For more information, see:

`http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles`
4 Directly below the WLS_PW= parameter, create a MEM_ARGS= parameter. Set these values to specify minimum and maximum memory.

```
set MEM_ARGS=-Xms128m -Xmx1024m -XX:MaxPermSize=128m
```

5 Save and close the file.

**Modifying the Class Path (Oracle)**

The commEnv.cmd file (in bea\weblogic81\common\bin) is called by the startup scripts, and must include oraclethin.jar in the Classpath.

Complete the following steps *only* if you are using an Oracle database:

1 Copy the oraclethin.jar that is packaged in Maximo under applications\maximo\lib folder to bea\weblogic81\server\lib folder.

2 Open the commEnv.cmd file in a text editor.

3 Search for WEBLOGIC_CLASSPATH=%JAVA_HOME%, and modify the weblogic classpath as shown in the following example:

```
WEBLOGIC_CLASSPATH=%JAVA_HOME%/lib/tools.jar;%WL_HOME%/lib/oraclethin.jar;%WL_HOME%/server/lib/weblogic_sp.jar;%WL_HOME%/server/lib/weblogic.jar
```

**NOTE** Place the oraclethin.jar before the weblogic.jar files.

4 Save and close the file.

**Starting the Application Server**

To start the Application Server you just created, follow the steps in "WebLogic Application Server," on page 25-2.

**NOTE** If you want the Application Server to start as a service, see "Starting the Application Server as a Windows Service," on page 25-14.

**Accessing Maximo**

1 Start the Application Server (see page 25-2).

2 Open Internet Explorer and type:

```
http://<hostname>:<port>/maximo
```

where <hostname> is the name of the machine and <port> is the port number of the Application Server.

For MAXSERV, the default port number at installation is 7001.
Starting the Application Server as a Windows Service

You can configure Application Servers to start as services.

- If you used the Administration Console to create a server in an existing domain, go to "Creating Service Scripts," on page 25-14.

- If you created a server using the Configuration Wizard, go to "Editing the Install Service Script," on page 25-14.

If you installed Oracle and BEA WebLogic on the same machine, you must make the BEA service dependant on the Oracle service.

Creating Service Scripts

1. Go to the bea\user_projects\domains\<domain_name> folder.

2. Copy the existing installService.cmd and uninstallService.cmd files and paste them in the same folder.

3. Rename the copied files to reflect the new server. For example, installMAXSERVService.cmd and uninstallMAXSERVService.cmd.

4. Edit both files by searching for the SERVER_NAME= parameter and changing it to reflect the name of the new server. For example: SERVER_NAME=MAXSERV.

5. Save and close the files.

Editing the Install Service Script

The steps in this section assume you created a server using the Configuration Wizard and that the scripts are installService.cmd and uninstallService.cmd.

1. Locate the install service script:

   bea\user_projects\domains\<domain_name>

2. Open the installService.cmd file (or custom one, for example, installMAXSERVService.cmd) in a text editor.

3. Search for the WLS_PW= parameter and enter the BEA WebLogic password after the equal sign.

4. Search for the MEM_ARGS= parameter. Modify as shown:

   set MEM_ARGS=-Xms128m -Xmx1024m -XX:MaxPermSize=128m

5. Save and close the file.
Running the Install Service Script

1. Open a command prompt and change directory to:
   
   `bea\user_projects\domains\<domain_name>`
   
   where `<domain_name>` is the domain folder for the Application Server.

2. Run the script. For example:
   
   `installService.cmd`
   
   If you created a second install service script, use that one. For example:
   
   `installMAXSERVService.cmd`

3. After installing the service, remove the password from this file to ensure password protection.

Starting the Service

- Restart the machine—or:

- Go to Control Panel > Administrative Tools > Services. Right-click the name of the service (begins with “beasvc”) and choose Start.

Removing the Application Server as a Service

1. Open a command prompt and change directory to:
   
   `bea\user_projects\domains\<domain_name>`
   
   where `<domain_name>` is the domain folder for the Application Server.

2. Run the script. For example:
   
   `uninstallService.cmd`
   
   If you created a custom install service script, use that one. For example:
   
   `uninstallMAXSERVService.cmd`
Configuring Maximo in Multiple Application Servers

This section lets you set up multiple Application Servers to run Maximo, so you can run separate servers for development, production, training, and so on.

For background information, see “Multiple Maximo Configurations,” on page 24-1.

**NOTE** Using multiple Application Servers to load balance is a special case and is described later in this chapter (page 25-25).

**Guidelines**

- Designate one Application Server to be the **Admin Server**.
- Designate the rest of the Application Servers as **Managed Servers**.
- Use the Admin Server to configure all the Managed Servers.

**Configuring the Multiple Application Servers**

In this procedure, you perform the following tasks:

- Set up an admin server and three managed Application Servers on a machine named **maxhost**.
- Name the domain: **multimaxdomain**.
- Name the admin server: **AdminMAXSERV**.
- Name the managed servers: **MngdMAXSERV1**, **MngdMAXSERV2**, and **MngdMAXSERV3**.

1. From the Start menu, choose Programs > BEA WebLogic Platform 8.1 > Configuration Wizard.

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>Create or Extend a Configuration</td>
</tr>
<tr>
<td>3</td>
<td>Select a Configuration template</td>
</tr>
<tr>
<td>4</td>
<td>Choose Express or Custom Configuration</td>
</tr>
<tr>
<td>5</td>
<td>Configure the Administration Server</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen</td>
<td>Action</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6 Managed Servers, Clusters, and Machines Options</td>
<td>Select Yes and click Next.</td>
</tr>
<tr>
<td>7 Configure Managed Servers</td>
<td>Click Add and create the first managed server:</td>
</tr>
<tr>
<td></td>
<td>▼ Name – MngdMAXSERV1</td>
</tr>
<tr>
<td></td>
<td>▼ Listen Port – for example, 8020</td>
</tr>
<tr>
<td>8 Configure Managed Servers (same screen)</td>
<td>Click Add and create the second managed server:</td>
</tr>
<tr>
<td></td>
<td>▼ Name – MngdMAXSERV2</td>
</tr>
<tr>
<td></td>
<td>▼ Listen Port – for example, 8030</td>
</tr>
<tr>
<td>9 Configure Managed Servers (same screen)</td>
<td>Click Add and create the third managed server:</td>
</tr>
<tr>
<td></td>
<td>▼ Name – MngdMAXSERV3</td>
</tr>
<tr>
<td></td>
<td>▼ Listen Port – for example, 8040</td>
</tr>
<tr>
<td></td>
<td>Click Next.</td>
</tr>
<tr>
<td>10 Configure Clusters</td>
<td>Make no changes and click Next.</td>
</tr>
<tr>
<td>11 Configure Machines</td>
<td>Make no changes and click Next.</td>
</tr>
<tr>
<td>12 Database (JDBC) Options</td>
<td>Select No and click Next.</td>
</tr>
<tr>
<td>13 Messaging (JMS) Options</td>
<td>Do you use the IBM Maximo Enterprise Adapter (MEA)?</td>
</tr>
<tr>
<td></td>
<td>▼ If yes, go to the next step.</td>
</tr>
<tr>
<td></td>
<td>▼ If no, select No and click Next. Go directly to step 27.</td>
</tr>
<tr>
<td>14 Messaging (JMS) Options (the same screen)</td>
<td>In the Name field, enter MEA connection factory</td>
</tr>
<tr>
<td></td>
<td>In the JNDI field, enter jms/mro/int/qcf/intqcf</td>
</tr>
<tr>
<td></td>
<td>Accept the default values in all other fields and click Next.</td>
</tr>
<tr>
<td>15 Configure JMS Destination Keys</td>
<td>Do nothing and click Next.</td>
</tr>
<tr>
<td>16 Configure JMS Templates</td>
<td>Do nothing and click Next.</td>
</tr>
<tr>
<td>17 Configure JMS Files Stores</td>
<td>Click Add. Enter these values then click Next.</td>
</tr>
<tr>
<td>Name</td>
<td>Listen Address</td>
</tr>
<tr>
<td>mxintsqinfie</td>
<td>C:\Maximo\jmsstore</td>
</tr>
<tr>
<td>mxintsqoutfile</td>
<td>C:\Maximo\jmsstore</td>
</tr>
<tr>
<td>mxintcqinfie</td>
<td>C:\Maximo\jmsstore</td>
</tr>
</tbody>
</table>
### Configuring Maximo in Multiple Application Servers

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>18</strong> Configure JMS Server</td>
<td>Click <strong>Add</strong> and enter these values.</td>
</tr>
<tr>
<td><strong>19</strong> Assign JMS Servers to BEA WebLogic Servers</td>
<td>Assign all the JMS servers in the left pane to the BEA WebLogic server in the right pane by clicking the right arrow button, then click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>20</strong> Configure JMS Topics</td>
<td>Do nothing and click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>21</strong> Configure JMS Queues</td>
<td>Tab one (mxintsqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> Change all three tabs.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>22</strong> Configure JMS Queues</td>
<td>Tab two (mxintsqoutserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>23</strong> Configure JMS Queues</td>
<td>Tab three (mxintcqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintcqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/cqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>24</strong> Applications and Services Targeting Options</td>
<td>Select Yes and click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>25</strong> Target Services to Servers or Clusters</td>
<td>Select All and click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>
Editing the Startup Scripts

**NOTE** If you want the multiple Application Servers to start as services, see "Configuring Multiple Application Servers to Start as Windows Services," on page 25-22.

To edit the startup scripts, complete these steps:

1. If you are working in Production mode and do not want to be prompted for the BEA WebLogic user name and password, create a boot.properties file (or this file may exist on your system). This stores the username and password in an encrypted format.

   Place these two lines in a text file:

   ```
   username=username
   password=password
   ```

   The username and password values must meet the following criteria:

   ▼ Match an existing user account in the Authentication provider for the default security realm

   ▼ Must belong to a role that has permission to start and stop a server

   If you save the file as `boot.properties` and locate it in the root directory of the domain (for example: `C:\bea\user_projects\domains\multimaxdomain`), the server automatically uses this file during its subsequent startup cycles.

   The first time you use this file to start a server, the server reads the file and then overwrites it with an encrypted version of the username and password.

   For more information, refer to the BEA documentation Web site at:
Configuring Maximo in Multiple Application Servers

http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles

2  Go to the location of the startup scripts:

bea\user_projects\domains\<domain_name>

where <domain_name> is the name of the domain you created for the multiple Application Servers. For example:

C:\bea\user_projects\domains\multimaxdomain

3  Open the startManagedWebLogic.cmd file in a text editor.

4  If you do not want to be prompted for the BEA WebLogic user name and password, search for the WLS_USER= and WLS_PW= parameters and enter the same values used in step 3.

5  Set the MEM_ARGS= parameter to include the values shown below:

   set MEM_ARGS=-Xms128m  -Xmx1024m  -XX:MaxPermSize=128m

   These values are case sensitive. They specify minimum and maximum memory.

6  Save and close the file.

Oracle Database Consideration

The commEnv.cmd file (in bea\weblogic81\common\bin) is called by the above startup scripts. Under Oracle, commEnv.cmd must include oraclethin.jar in the Classpath.

If you did not edit this file when installing Maximo, see "Modifying the Class Path (Oracle)," on page 25-13.

Starting the Admin Server and Administration Console

To continue configuring Maximo in the multiple Application Servers, you start the Admin Server and the Administration Console.

Admin Server

▼ From the Start menu, choose Programs > BEA WebLogic Platform 8.1 > User Projects > multimaxdomain > Start Server.

   OR

▼ From a command prompt, change directory to the multimaxdomain folder and run startWebLogic.cmd.

Administration Console

In our example, the Admin Server runs on port 8010 and the hostname is maxhost. Enter this URL:

http://maxhost:8010/console
Configuring the Managed Servers

Use the Administration Console running from the Admin Server to configure the Managed Servers. Complete these steps.


Starting the Managed Servers and Accessing Maximo

1. Stop all Application Servers in the domain, including the Admin Server used to configure the managed servers.

2. Start the Admin Server as described earlier (page 25-20).
   When you see “…Server started in RUNNING mode” at the bottom of the prompt window, the server is running.

3. Open a command prompt and change directory to the location of the domain for the multiple Application Servers. For example:
c:\bea\user_projects\domains\multimaxdomain

4. Start one of the Managed Servers with these command line arguments:
   startManagedWebLogic.cmd  <Managed Server Name>  <Admin Server URL>
   
   where:
   
   ▼ <Managed Server Name> is the name of the Managed Server to be started, for example MngdMAXSERV1.
   
   ▼ <Admin Server URL> is the URL for the Admin Server, which is of the form:
   
   http://<hostname>:\<port>
   
   where <hostname> is the name of the machine and <port> is the port number of the Admin Server.

   In our example, the Admin Server is running on a machine named maxhost, on port 8010. You would enter these command line arguments:
   
   startManagedWebLogic.cmd MngdMAXSERV1 http://maxhost:8010

5. Repeat steps 3 and 4 for each additional Managed Server.

Accessing Maximo on the Managed Server

In our example, MngdMAXSERV1 runs on port 8020. If the host name is maxhost, you would enter this URL:

http://maxhost:8020/maximo
Configuring Multiple Application Servers to Start as Windows Services

This section assumes you have configured multiple Application Servers as described in the previous section, "Configuring Maximo in Multiple Application Servers," on page 25-16. Using multiple servers allows you to run separate servers for development, production, training, and so on.

The example used in the previous section are used here, as well:

- machine name: maxhost
- domain name: multimaxdomain
- admin server: AdminMAXSERV, port 8010
- managed servers: MngdMAXSERV1, MngdMAXSERV2, MngdMAXSERV3, ports 8020, 8030, 8040, respectively

Creating and Editing Service Scripts

Create and edit scripts for the Admin Server and the Managed Servers.

Admin Server

1. Go to the bea\user_projects\domains\mydomain folder.

2. Open the installService.cmd file in a text editor.

3. Search for -password:"%WLS_PW%". It is the next to last parameter in the file.

4. Add a space after the closing quotation mark and insert the depend parameter:

   -depend:"DatabaseService"

   where DatabaseService is the service name (not the display name) of your Oracle or SQL Server service.

   For example:

   -depend:"OracleServiceMaximo"

   where Maximo is the name of the database instance.

**NOTE** To find the name of the service, open the Services application (in Control Panel/Administrative Tools), right-click the database service, and choose Properties.

5. Save and close the file.
Managed Servers

Complete these steps to create a custom installSvc.cmd file for the domain running the multiple Application Servers:

1. Go to the bea\user_projects\domains\mydomain folder.
2. Open the installService.cmd file in a text editor.
3. Search for `-password:"%WLS_PW%"`. It is the next to last parameter in the file.
4. Add a space after the closing quotation mark and insert this parameter:
   `-depend:"beasvc %DOMAIN_NAME%_%ADMINSERVER_NAME%"
5. Save and close the file.

Custom uninstallService.cmd files for Managed Servers

Complete these steps to create custom uninstall service scripts for the Managed Servers:

1. Go to the domain folder for the multiple Application Servers you created. For example:
   C:\bea\user_projects\domains\multimaxdomain
2. Copy the uninstallService.cmd file and paste it in the same folder.
3. Rename the copy to reflect one of the managed servers. For example: uninstallMngdMAXSERV1Service
4. Open the file in a text editor.
5. In the SERVER_NAME= parameter, replace the existing value with the name of the Managed Server. For example:
   set SERVER_NAME=MngdMAXSERV1
6. Save and close the file.
7. Repeat these steps for the other Managed Servers.
Configuring Multiple Application Servers to Start as Windows Services

Installing the Service

1. Open a command prompt and go to:
   C:\bea\user_projects\domains\multimaxdomain

2. To install the Admin Server service, run:
   installService.cmd.

3. Install each Managed Server service by running the appropriate custom install service script. For example, run:
   installMngdMAXSERV1Service.cmd
   installMngdMAXSERV2Service.cmd
   installMngdMAXSERV3Service.cmd

4. After installing the services, remove the passwords from all of the scripts to ensure password protection.

Starting the Services

- Restart the machine—or:
- Go to the Services list from the Control Panel, right-click the names of the services (begins with “beasvc”) and choose Start.

Removing Services

1. From a command prompt, change directory to where you created the uninstall service scripts.

2. Run the uninstall script you created. For example:
   uninstallMngdMAXSERV1Service.cmd

3. To remove the Admin Server service, run the uninstall script:
   uninstallService.cmd
Load Balancing Multiple Application Servers

This section provides an overview, as well as specific procedures, for load balancing Maximo with multiple Application Servers. The methods described here use the BEA WebLogic Application Server with a Web server and plug-in.

Load balancing spreads the load across many servers, so that large numbers of clients can access the Maximo system. On multi processor machines, you can load balance across many instances of Application Servers configured with Maximo running on the same physical server.

This BEA Web site (current at time of printing) provides additional information on load balancing:

http://edocs.bea.com/wls/docs81/adminguide/index.html

This diagram depicts an example of load balancing architecture where:

- A Web server with a plug-in performs the load balancing. Multiple Maximo clients communicate with the Web server.
- The Web server distributes client requests to one of four Application Servers configured with Maximo. These four Application Servers are called Managed Application Servers.
- Each Application Server communicates with the same database.
Configuring the Multiple Application Servers for Load Balancing

When you configure multiple Application Servers for load balancing, you configure managed servers in a Cluster. The initial steps are similar to setting up multiple Application Servers. You use the Configuration Wizard to configure a domain for clustering.

To help illustrate the procedure, consider a slight modification of the earlier scenario:

- You want to set up an admin server and three managed Application Servers in a cluster on a machine named maxhost.

- Name the domain: clustermaxdomain.

- Name the admin server and assign it a port as follows:
  - AdminMAXSERV, (for example) port 9010

- Name the managed servers and assign ports as follows:
  - ClstrMAXSERV1, (for example) port 9020
  - ClstrMAXSERV2, (for example) port 9030
  - ClstrMAXSERV3, (for example) port 9040
  - Redirector, (for example) port 9050

1. From the Start menu, choose Programs > BEA WebLogic Platform 8.1 > Configuration Wizard.

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<th>Action</th>
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</thead>
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<tr>
<td>2</td>
<td>Create or Extend a Configuration Select Create a new WebLogic Configuration and click Next.</td>
</tr>
<tr>
<td>3</td>
<td>Select a Configuration template In the left pane, select the Basic WebLogic Server Domain template, and click Next.</td>
</tr>
<tr>
<td>4</td>
<td>Choose Express or Custom Configuration Select the Custom option and click Next.</td>
</tr>
<tr>
<td>5</td>
<td>Configure the Administration Server Fill in these fields, then click Next.</td>
</tr>
<tr>
<td>-</td>
<td>Name – AdminMAXSERV</td>
</tr>
<tr>
<td>-</td>
<td>Listen Address – All Local Addresses</td>
</tr>
<tr>
<td>-</td>
<td>Listen Port – for example, 9010</td>
</tr>
<tr>
<td>6</td>
<td>Managed Servers, Clusters, and Machines Options Select Yes and click Next.</td>
</tr>
<tr>
<td>Screen</td>
<td>Action</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>7</td>
<td>Configure Managed Servers Enter these values to add four managed servers.</td>
</tr>
<tr>
<td></td>
<td>Click <strong>Add</strong> before adding each new server, and click <strong>Next</strong> when you finish.</td>
</tr>
<tr>
<td></td>
<td><strong>Name</strong></td>
</tr>
<tr>
<td></td>
<td>ClstrMAXSERV1</td>
</tr>
<tr>
<td></td>
<td>ClstrMAXSERV2</td>
</tr>
<tr>
<td></td>
<td>ClstrMAXSERV3</td>
</tr>
<tr>
<td></td>
<td>Redirector</td>
</tr>
<tr>
<td>8</td>
<td>Configure Clusters Click <strong>Add</strong> and enter these values, then click <strong>Next</strong>:</td>
</tr>
<tr>
<td></td>
<td>▼ Name – for example, domainmaxcluster</td>
</tr>
<tr>
<td></td>
<td>▼ Multicast address – accept the default value</td>
</tr>
<tr>
<td></td>
<td>▼ Multicast port – accept the default value</td>
</tr>
<tr>
<td>9</td>
<td>Assign Servers to Clusters NOTE: Do not assign the redirector server to the cluster.</td>
</tr>
<tr>
<td></td>
<td>Assign the other three servers in the left pane to the cluster by clicking the right arrow button, then click <strong>Next</strong>.</td>
</tr>
<tr>
<td>10</td>
<td>Configure Machines If you have other servers add them. If not, click <strong>Next</strong>.</td>
</tr>
<tr>
<td>11</td>
<td>Database (JDBC) Options Select No and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>12</td>
<td>Messaging (JMS) Options Do you use the IBM Maximo Enterprise Adapter (MEA)?</td>
</tr>
<tr>
<td></td>
<td>▼ If yes, go to the next step.</td>
</tr>
<tr>
<td></td>
<td>▼ If no, select No and click Next. <strong>Go directly to step 27</strong>.</td>
</tr>
<tr>
<td>13</td>
<td>Messaging (JMS) Options (the same screen) In the <strong>Name</strong> field, enter <strong>MEA connection factory</strong></td>
</tr>
<tr>
<td></td>
<td>In the <strong>JNDI</strong> field, enter <strong>jms/mro/int/qcf/intqcf</strong></td>
</tr>
<tr>
<td></td>
<td>Accept the default values in all other fields and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>14</td>
<td>Configure JMS Destination Keys Do nothing and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>15</td>
<td>Configure JMS Templates Do nothing and click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>
Load Balancing Multiple Application Servers

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>16 Configure JMS Files Stores</strong></td>
<td>Click <strong>Add</strong>. Enter these values then click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Listen Address</th>
<th>Synchronous write policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxintsqinfile</td>
<td>C: \Maximo\jmsstore</td>
<td>Disabled</td>
</tr>
<tr>
<td>mxintsqoutfile</td>
<td>C: \Maximo\jmsstore</td>
<td>Disabled</td>
</tr>
<tr>
<td>mxintcqinfile</td>
<td>C: \Maximo\jmsstore</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

| **17 Configure JMS Server** | Click **Add** and enter these values. |

<table>
<thead>
<tr>
<th>Name</th>
<th>Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxintsqinserver</td>
<td>mxintsqinfile</td>
</tr>
<tr>
<td>mxintsqoutserver</td>
<td>mxintsqoutfile</td>
</tr>
<tr>
<td>mxintcqinserver</td>
<td>mxintcqinfile</td>
</tr>
</tbody>
</table>

Accept the default values in all other fields and click **Next**.

**18 Assign JMS Servers to BEA WebLogic Servers** Assign all the JMS servers in the left pane to the BEA WebLogic server in the right pane by clicking the right arrow button, then click **Next**.

**19 Configure JMS Topics** Do nothing and click **Next**.

**20 Configure JMS Queues** Tab one (mxintsqinserver). Click Add and enter these values:

- In the **Name** field, enter **mxintsqin**.
- In the **JNDI Name** field, enter **jms/mro/int/queues/sqin**.
- In the **Store enabled** field, select **true**.
- In the **Template** field, leave the default of **Unspecified**.

**21 Configure JMS Queues** Tab two (mxintsqoutserver). Click Add and enter these values:

- In the **Name** field, enter **mxintsqout**.
- In the **JNDI Name** field, enter **jms/mro/int/queues/sqout**.
- In the **Store enabled** field, select **true**.
- In the **Template** field, leave the default of **Unspecified**.
<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>22</strong> Configure JMS Queues</td>
<td>Tab three (mxintcqsinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintcqsinserver</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/cqins</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td></td>
<td>When you finish all three tabs, click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>

| **23** Applications and Services Targeting Options | Select Yes and click **Next**. |
| **24** Target Services to Servers or Clusters | Select All and click **Next**. |
| **25** Configure Administrative Username and Password | Enter a user name and password (and verify the password), and select **No** in the Configure additional users, groups, and global rules portion. Click **Next**. |
| **26** Configure Windows Options | Select whether you want to Create a Start Menu shortcut and to Install Administrative Server as a Windows Service, then click **Next**. |
| **27** Build Start Menu Entries | Accept the defaults and click **Next**. |
| **28** Configure Server Start Mode and Java SDK | Select a BEA WebLogic Configuration Startup Mode (either Development or Production), then choose the **Sun SDK**. Click **Next**. |
| | For more information, see "Development Mode versus Production Mode," on page 25-4. |
| **29** Create BEA WebLogic Configuration | Enter **clustermaxdomain** in the **Configuration Name** field. Click **Create**. |
| **30** Creating Configuration | When the Configuration completes, click **Done**. |

**Editing the Startup Scripts**

1. If you work in Production mode and do not want to be prompted for the BEA WebLogic user name and password, create a boot.properties file (or this file may exist on your system). This stores the username and password in an encrypted format.

   Place these two lines in a text file:

   ```
   username=username
   password=password
   ```
The username and password values must meet the following criteria:

- Match an existing user account in the Authentication provider for the default security realm
- Must belong to a role that has permission to start and stop a server

If you save the file as `boot.properties` and locate it in the root directory of the domain (for example: `C:\bea\user_projects\domains\clusterdomain`), the server automatically uses this file during its subsequent startup cycles.

The first time you use this file to start a sever, the server reads the file and then overwrites it with an encrypted version of the username and password. For more information, refer to the BEA documentation Web site at:

http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles

2 Go to the location of the startup scripts:

`bea\user_projects\domains\<domain_name>`

where `<domain_name>` is the name of the domain you created for the multiple Application Servers. For example:

`C:\bea\user_projects\domains\clustermxdomain`

3 Open the `startManagedWebLogic.cmd` file in a text editor.

4 If you do not want to be prompted for the WebLogic user name and password, search for the `WLS_USER=` and `WLS_PW=` parameters and enter the same values used in step 3.

5 Search for the `MEM_ARGS=` parameter. Edit this line to include the values shown below:

```
set MEM_ARGS=-Xms128m -Xmx1024m -XX:MaxPermSize=128m
```

These values are case sensitive. They specify minimum and maximum memory.

6 Save and close the file.

**Oracle Database Consideration**

The `commEnv.cmd` file (in `bea\weblogic81\common\bin`) is called by the above startup scripts. Under Oracle, `commEnv.cmd` must include `oraclethin.jar` in the Classpath.

If you did not edit this file when you installed Maximo, refer to "Modifying the Class Path (Oracle)," on page 25-13.
Starting the Admin Server and Administration Console

To continue configuring Maximo in the multiple Application Servers, you start the Admin Server and the Administration Console.

Admin Server

▼ From the Start menu, choose Programs > BEA WebLogic Platform 8.1 > User Projects > multimaxdomain > Start Server.

OR

▼ From a command prompt, change directory to the multimaxdomain folder and run startWebLogic.cmd.

Administration Console

In our example, the Admin Server runs on port 9010 and the hostname is maxhost. Enter this URL:

http://maxhost:9010/console
Configure the HTTP Cluster Servlet

Setup the HTTP cluster servlet within BEA WebLogic. This lets BEA WebLogic redirect requests to the Application Servers and perform load balancing.

1. Verify that a separate, non-clustered Managed Server exists to host the HTTP Cluster Servlet. In "Configuring the Multiple Application Servers for Load Balancing," on page 25-26, a server called Redirector was created to perform this task.

2. Use a text editor to open the web.xml file, located in the <Maximo root>\appserver\weblogic\clusterweb\WEB-INF folder. Edit the web.xml file as follows:

   Look for the servlet named HttpClusterServlet. Edit the WeblogicCluster parameter value and specify a list of all Managed Server addresses and port numbers, separated by a pipe (|) character.

   The syntax for this parameter value is as follows:

   `<Managed Server IP Address>:<HTTP port>:<HTTPS port>|<Managed Server2 IP Address>:<HTTP port>:<HTTPS port>|<Managed Server3 IP Address>:<HTTP port>:<HTTPS port>`

   where `<Managed Server IP Address>` is the IP address of the Managed server and the `<HTTP port>` is the port where you are running the Managed Server. If you are using a SSL security configuration you use the `<HTTPS port>` entry. If you are not using a SSL security configuration, this value can be omitted.

   This example is an unedited HttpClusterServlet section. The line that must be modified is indicated by italics.

   `<servlet>
   <servlet-name>HttpClusterServlet</servlet-name>
   <servlet-class>weblogic.servlet.proxy.HttpClusterServlet</servlet-class>
   <init-param>
   <param-name>WebLogicCluster</param-name>
   </init-param>
   </servlet>`

   This example shows the `<init-param>` part edited for a particular configuration of three Managed Servers, with the edited portion in bold:

   `<init-param>
   <param-name>WebLogicCluster</param-name>
   <param-value>`172.22.15.14:9020 | 172.22.15.14:9030 | 172.22.15.14:9040`</param-value>
   </init-param>`
Save the web.xml file.

3 From the BEA WebLogic Administration Console, click the Web Applications Module node in the left pane.

   In the right pane, click Deploy a new Web Application Module.

4 Navigate to the clusterweb folder, as shown here:

   ![Deploy a Web Application Module](image)

   Select the archive for this Web application module

   Select the file path that represents your archive or exploded archive directory.

   Note: Only valid file paths are shown below. If you do not find what you are looking for, you should upload your file(s) and/or confirm your Web application module contains valid descriptors.

   Location: Production \C\Maximo\appserver\weblogic

   ![clusterweb]

   Target Module

5 Click Target Module.

6 Select the Redirector server for deployment, as shown here:

   ![Deploy a Web Application Module](image)

   Select targets for this Web application module

   Select the servers and/or clusters on which you want to deploy your new Web Application module.

   **Independent Servers**
   - Admin
   - Redirector

   **Clusters**
   - MXCluster
     - All servers in the cluster
     - Part of the cluster
       - MXServer1
       - MXServer2

   ![Continue]

7 Click Continue. The screen refreshes and you can review your choices or make changes.
Load Balancing Multiple Application Servers

8 Click **Deploy** and make sure that the status message reads “Success.”

9 Restart the Admin Server.

10 To access the Administration console, use this URL:

\[
http://<\text{machinename}>:<\text{port}>/console
\]

where `<machinename>` is the name of the machine and `<port>` is the port number where the Admin Server is started.

Refer to this BEA Web site for general information on load balancing in a cluster:

http://e-docs.bea.com/wls/docs81/cluster/load_balancing.html#1026940

Deploying Maximo in the Clustered Servers

1 Login to the Admin Server’s Administration console, with the username/password you selected in the Configuration Wizard.

2 In the navigation tree, expand the **Servers** and **Clusters** nodes and observe that the servers you created with the Wizard are listed in both places.

3 Expand the **Deployments** node and click the **Applications** node, then choose **Deploy a new Application**.

4 Deploy the EAR files as described in “Deploying EAR Files,” on page 25-9.

**NOTE** When you select targets for the application, deploy the EAR files into the cluster as shown here.
Starting the Servers and Accessing Maximo

Start the servers and access Maximo by completing these steps:

1. Restart the Admin Server.
2. Start the Redirector server.
3. Start all the Managed Servers as described in "Starting the Managed Servers and Accessing Maximo," on page 25-21.
4. To access Maximo, use this URL:

   \[
   \text{http://<machinename>:<port>/maximo}
   \]

   *where* `<machinename>` is the name of the machine running the Redirector Server and `<port>` is the port number of the Redirector Server.

   The Redirector Server redirects the request to the appropriate available Managed Server in the Cluster.

   **NOTE** You can access a Managed Server individually by using its machine name and port number.

Optimizing Performance of Maximo in the Application Server

For BEA WebLogic performance tuning guidelines, see:

http://e-docs.bea.com/wls/docs81/perform/index.html

Refer to the Support Online Knowledge Base for specific information on tuning topics such as:

- **Startup Mode**
- **Java Virtual Machine Tuning**
- **Application Server Scalability**
- **Queues & Threads**
Optimizing the Performance of Maximo in the Application Server

The following guidelines help to optimize the performance of Maximo in the Application Server.

▼ In your particular environment, you might want to spread the load from all your users across many different physical servers. This implementation allows Maximo to scale to large numbers of concurrent users and provides redundancy in your system, in case of hardware or software failures. For more information, see "Load Balancing Multiple Application Servers," on page 25-25.

▼ The Application Server by default uses the Java Virtual Machine (JVM), provided by Sun Microsystems™. The garbage collector in this JVM runs several times a minute, and when it runs all users are stopped from interacting with the Maximo system. This process is not noticeable by the users, as long as these pauses are small. Under heavy load, these pauses can start to impact the performance of the system.

To counteract this problem, you should have no more than 100 Concurrent Users placed on a single instance of the Application Server. When this threshold is reached, we suggest that you start more instances of the Application Server. These instances can be on the same physical machine (if there is CPU and memory capacity), or on a physically separate server. For more information, see "Load Balancing Multiple Application Servers," on page 25-25.

▼ You should coordinate the Date/Time settings between the Application Server and the Database Server. This is because the Date/Time lookup comes from the host machine of the Application Server, but Date/Time fields such as 'Reported Date' and 'Status Date' come from the host machine of the Database Server.

NOTE If you change the Date/Time settings in the host machine of the database server, restart the Application Server.
Managing the BEA WebLogic Application Server - UNIX

The BEA WebLogic application server uses Maximo business components to create the Maximo Web Application. You can run multiple BEA WebLogic application servers simultaneously.

"Multiple Maximo Configurations," on page 24-1 overviews Maximo architecture and might help you understand this chapter.

This chapter includes the following topics:

- Configuring Maximo in the Application Server
- Starting the Application Server
- Building EAR Files
- Accessing the Administration Console
- Stopping the Application Server
- Load Balancing Multiple Application Servers

BEA provides extensive documentation on configuring BEA WebLogic Server 8.1.4.

http://edocs.bea.com/platform/docs81/index.html

The URL for the Administration Guide is:

http://edocs.bea.com/wls/docs81/adminguide/index.html
Configuring Maximo in the Application Server

This section lets you configure new Application Servers, in addition to the one you created during the Maximo installation. For example, you might want to create separate Application Servers for production, test, and training environments.

**NOTE** Throughout this section, we use **MAXSERV** as the name of the server we configure to run Maximo. Substitute another name as appropriate.

### Development Mode versus Production Mode

In "Creating the Application Server," on page 26-2 you select a BEA WebLogic start-up mode. Use this table to guide you:

<table>
<thead>
<tr>
<th>Use Development mode</th>
<th>Use Production mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>when developing applications</td>
<td>after applications are completed</td>
</tr>
<tr>
<td>when security is relaxed</td>
<td>when you need full security</td>
</tr>
<tr>
<td>to auto deploy applications</td>
<td>when using clusters or other advanced features</td>
</tr>
<tr>
<td>when deploying applications on the Administration Server</td>
<td>when deploying applications on Managed Servers, and using Administration Servers to manage the domain</td>
</tr>
</tbody>
</table>

### Creating the Application Server

1. From a terminal window, change directory to:
   ```
   <BEA WebLogic Root>/weblogic81/common/bin
   ```

2. Run the following script:
   ```
   ./quickstart.sh
   ```

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 WebLogic QuickStart</td>
<td>Select Create a new domain configuration, or extend an existing one.</td>
</tr>
<tr>
<td>4 Create or Extend a Configuration</td>
<td>Select Create a new WebLogic Configuration and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>5 Select a Configuration template</td>
<td>In the left pane, select the Basic WebLogic Server Domain template, and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>6 Choose Express or Custom Configuration</td>
<td>Select the Custom option and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>7 Configure the Administration Server</td>
<td>Enter a server name and a listen port (for this example, enter MAXSERV as the server name and 8001 for the port) and click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>
### Configuring Maximo in the Application Server

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8</strong> Managed Servers, Clusters, and Machines Options</td>
<td>Select No and click Next.</td>
</tr>
<tr>
<td><strong>9</strong> Database (JDBC) Options</td>
<td>Select No and click Next.</td>
</tr>
<tr>
<td><strong>10</strong> Messaging (JMS) Options</td>
<td>Do you use the IBM Maximo Enterprise Adapter (MEA)?</td>
</tr>
<tr>
<td></td>
<td>▼ If yes, go to the next step.</td>
</tr>
<tr>
<td></td>
<td>▼ If no, select No and click Next. <strong>Go directly to step 24.</strong></td>
</tr>
<tr>
<td><strong>11</strong> Messaging (JMS) Options (the same screen)</td>
<td>In the <strong>Name</strong> field, enter <strong>MEA connection factory</strong></td>
</tr>
<tr>
<td></td>
<td>In the <strong>JNDI</strong> field, enter <strong>jms/mro/int/qcf/intqcf</strong></td>
</tr>
<tr>
<td></td>
<td>Accept the default values in all other fields and click Next.</td>
</tr>
<tr>
<td><strong>12</strong> Configure JMS Destination Keys</td>
<td>Do nothing and click Next.</td>
</tr>
<tr>
<td><strong>13</strong> Configure JMS Templates</td>
<td>Do nothing and click Next.</td>
</tr>
<tr>
<td><strong>14</strong> Configure JMS Files Stores</td>
<td>Click Add. Enter these values then click Next.</td>
</tr>
<tr>
<td><strong>Name</strong></td>
<td><strong>Listen Address</strong></td>
</tr>
<tr>
<td>mxintsqinfile</td>
<td><code>&lt;WebLogic Root&gt;\msstore</code></td>
</tr>
<tr>
<td>mxintsqoutfile</td>
<td><code>&lt;WebLogic Root&gt;\msstore</code></td>
</tr>
<tr>
<td>mxintcqinfile</td>
<td><code>&lt;WebLogic Root&gt;\msstore</code></td>
</tr>
<tr>
<td><strong>15</strong> Configure JMS Server</td>
<td>Click Add and enter these values.</td>
</tr>
<tr>
<td><strong>Name</strong></td>
<td><strong>Store</strong></td>
</tr>
<tr>
<td>mxintsqinserver</td>
<td>mxintsqinfile</td>
</tr>
<tr>
<td>mxintsqoutserver</td>
<td>mxintsqoutfile</td>
</tr>
<tr>
<td>mxintcqinserver</td>
<td>mxintcqinfile</td>
</tr>
<tr>
<td><strong>16</strong> Assign JMS Servers to BEA WebLogic Servers</td>
<td>Assign all the JMS servers in the left pane to the BEA WebLogic server in the right pane by clicking the right arrow button, then click Next.</td>
</tr>
<tr>
<td><strong>17</strong> Configure JMS Topics</td>
<td>Do nothing and click Next.</td>
</tr>
<tr>
<td>Screen</td>
<td>Action</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>18 Configure JMS Queues</td>
<td>Tab one (mxintsqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td>NOTE: Change all three tabs.</td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td>19 Configure JMS Queues</td>
<td>Tab two (mxintsqoutserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td>20 Configure JMS Queues</td>
<td>Tab three (mxintcqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintcqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/cqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td></td>
<td>When you finish all three tabs, click <strong>Next</strong>.</td>
</tr>
<tr>
<td>21 Applications and Services Targeting Options</td>
<td>Select Yes and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>22 Target Services to Servers or Clusters</td>
<td>Select All and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>23 Configure Administrative Username and Password</td>
<td>Enter a user name and password (and verify the password), and select <strong>No</strong> in the Configure additional users, groups, and global rules portion. Click <strong>Next</strong>.</td>
</tr>
<tr>
<td>24 Configure Server Start Mode and Java SDK</td>
<td>Select a BEA WebLogic Configuration Startup Mode (either Development or Production), then choose the <strong>Sun SDK</strong>. Click <strong>Next</strong>.</td>
</tr>
<tr>
<td></td>
<td>For more information, see &quot;Development Mode versus Production Mode,&quot; on page 26-2.</td>
</tr>
<tr>
<td>25 Create BEA WebLogic Configuration</td>
<td>Select the directory in which you want to create a BEA WebLogic configuration. Enter a domain name in the <strong>Configuration</strong> field, then click <strong>Create</strong>.</td>
</tr>
<tr>
<td>26 Creating Configuration</td>
<td>When the Configuration completes, click <strong>Done</strong>.</td>
</tr>
</tbody>
</table>
Editing the Startup Scripts

1. Go to the location of the startup script. For example, if you created a domain named maxdomain, the location is:

   `<BEA WebLogic Root>/user_projects/domains/maxdomain`

2. If you do not want to be prompted for the BEA WebLogic user name and password, create a `boot.properties` file in the above directory.

   Place the following two lines for an existing user in a text file:

   ```
   username=<username>
   password=<password>
   ```

   The `<username>` and `<password>` values must meet the following criteria:

   - Match an existing user account in the Authentication provider for the default security realm
   - Must belong to a role that has permission to start and stop a server

3. Save the file as `boot.properties` in the root directory of the domain (in this example: `<BEA WebLogic Root>/user_projects/domains/maxdomain`). The server automatically uses this file during its subsequent startup cycles.

   The first time you use this file to start a server, the server reads the file and then overwrites it with an encrypted version of the username and password.

   For more information, refer to the BEA documentation Web site at:

   `http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles`

Modifying the Class Path

The `commEnv.sh` file (in `<BEA WebLogic Root>/weblogic81/common/bin`) is called by the startup scripts. For the Oracle database, `commEnv.sh` must include `oraclethin.jar` in the Classpath. If you did not edit this file when you installed Maximo, use the following procedures.

1. Copy the `oraclethin.jar` file that is packaged in Maximo under the `applications\maximo\lib` directory on the Windows machine where you installed Maximo to the `<BEA WebLogic Root>/weblogic81/server/lib` directory on the UNIX server.

   **NOTE** `<BEA WebLogic Root>/weblogic81` corresponds to `${WL_HOME}`, used in the CLASSPATH statement in step 3.

2. Open the `commEnv.sh` file in a text editor.

3. Search for `WEBLOGIC_CLASSPATH="$JAVA_HOME`, and modify the weblogic classpath as shown in the following example; the text in bold represents the part you edit:
WEBLOGIC_CLASSPATH="${JAVA_HOME}/lib/tools.jar
${CLASSPATHSEP}${WL_HOME}/server/lib/oraclethin.jar
${CLASSPATHSEP}${WL_HOME}/server/lib/weblogic_sp.jar
${CLASSPATHSEP}${WL_HOME}/server/lib/weblogic.jar"
export WEBLOGIC_CLASSPATH

NOTE Place the oraclethin.jar before the weblogic jar files.

4 Search for the MEM_ARGS= section of the file and set the values according to the SDK you selected during the BEA WebLogic installation, as shown below:

HP and Sun
MEM_ARGS="-Xms512m  -Xmx1024m  -XX:MaxPermSize=256m"
IBM
MEM_ARGS="-Xms512m  -Xmx1024m"

These values are case sensitive. They specify minimum and maximum memory.

5 Save and close the file.

To continue configuring Maximo in the server, start the BEA WebLogic application server and access the Administration Console for the new domain as described in the sections that follow.

Starting the Application Server

To start the Application Server, you run a startup script. The startup script in each domain is startWebLogic.sh.

During installation, you configured an Application Server server named MAXIMOSERVER in the domain “mydomain.” Its startup script is the startWebLogic.sh file in mydomain.

In the examples in the preceding section, you created an Application Server named MAXSERV in the domain “maxdomain.” Its startup script is the startWebLogic.sh file in maxdomain.

To start the Application Server, complete the following steps:

1 Open a terminal window and change directory to:

<BEA WebLogic Root>/user_projects/domains/<domain_name>

where <BEA WebLogic Root> is your BEA WebLogic application directory and <domain_name> is the name of the domain.

For example, to start MAXIMOSERVER if the BEA WebLogic root is /mxadmin/bea814 and the domain name for the Application Server is mydomain, change directory to:

/mxadmin/bea814/user_projects/domains/mydomain

To start MAXSERV, change directory to:

/mxadmin/bea814/user_projects/domains/maxdomain
2 Run the startup script.

./startWebLogic.sh

- If you are using Development mode, you do not have to type username and password each time you start MAXIMOSERVER (startWebLogic.sh).

- If you are using Production mode, enter the BEA WebLogic user name and password you specified when you created the domain. Both user name and password are case sensitive.

**NOTE**

You can create or edit the boot.properties file to add user name and password information. This file eliminates the need to enter this information every time you start BEA WebLogic. For more information, see "Editing the Startup Scripts," on page 26-5.

When you see a “...Server started in RUNNING mode” line at the bottom of the terminal window, the server is running.

**Terminal Window Output Showing the Server Has Started in RUNNING Mode**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Jun 05 13:47:12:894</td>
<td>[INFO] Bound rmi://LOCSUN02/MxServer_LOCSUN02_P1S</td>
</tr>
<tr>
<td>15 Jun 05 13:47:12:895</td>
<td>[INFO] RMI Listening on port 33100</td>
</tr>
<tr>
<td>Jun 15, 2005 1:47:13 PM EDT</td>
<td>&lt;Notice&gt; &lt;WeblogicServer&gt; &lt;BEA-000355&gt; &lt;Thread 'ListenThread.Default' listening on port 9999, ip address <em>.</em>&gt;</td>
</tr>
<tr>
<td>Jun 15, 2005 1:47:13 PM EDT</td>
<td>&lt;Notice&gt; &lt;WeblogicServer&gt; &lt;BEA-000360&gt; &lt;Server started in RUNNING mode&gt;</td>
</tr>
</tbody>
</table>

**Accessing the Administration Console**

The Administration Console is used to manage the BEA WebLogic domain and application servers. Before you can access the Administration Console, the BEA WebLogic application server must first be running. On any Windows machine, the Administrative Console requires the Java Virtual Machine (JVM), provided by Sun Microsystems.

**NOTE**

When you installed Maximo and BEA WebLogic, you configured a standalone server named MAXIMOSERVER in the domain “mydomain.”

To access the Administration Console:

1 Make sure the BEA WebLogic application server is running. If you need more information, see "Starting the Application Server," on page 26-6.

2 Open Internet Explorer and type:

http://<hostname>:<port>/console

where <hostname> is the name of the machine and <port> is the port number of the Administration Server for the domain.
The default port number for MAXIMOSERVER is 7001.

For the MAXSERV Application Server example used in this chapter, the specified port was 8001.

3 Enter the BEA WebLogic user name and password you specified when you created the domain. Both user name and password are case sensitive.

The Administration Console opens with the Welcome to BEA WebLogic Server Home screen.

Stopping the Application Server

To stop the Application Server, complete the following steps:

1 Open the Administration Console.

2 In the left pane, expand the Servers node.

3 Right-click the server you want to stop and choose “Start/stop this server...”

4 In the right pane, click Graceful shutdown of this server...

5 You are asked to confirm your choice. Click Yes to stop the server.

The Administration Console sends a command to stop the specified server.

Building EAR Files

In a UNIX environment, you still need a Windows machine to host Maximo and to build the EAR files. To deploy the EAR files into the WebLogic application server, you browse to the <Maximo_root>\deployment\default folder on the Windows machine.

The three EAR files are:

<table>
<thead>
<tr>
<th>EAR File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximo.ear</td>
<td>for the Maximo application</td>
</tr>
<tr>
<td>maximohelp.ear</td>
<td>for the Maximo Help application</td>
</tr>
<tr>
<td>acweb.ear</td>
<td>for the Actuate Active Portal</td>
</tr>
</tbody>
</table>

Rebuilding EAR files

You rebuild and redeploy EAR files whenever you:

- Modify .xml files (Maximo.ear).
- Modify custom class files (Maximo.ear).
- Modify html Help topics (Maximohelp.ear).
- Modify settings in the maximo.properties file (Maximo.ear).
Add functionality to Maximo, such as Desktop Requisitions (Maximo.ear, Maximohelp.ear).

**NOTE** Make a backup copy before rebuilding EAR files.

### Running the Build Scripts

1. Open a terminal window.
2. Go to the deployment folder: /mxadmin/maximo
3. Run the appropriate script:

<table>
<thead>
<tr>
<th>Script</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>./buildmaximoear.sh</td>
<td>Creates a <strong>maximo.ear</strong> file</td>
</tr>
<tr>
<td>./buildhelpear.sh</td>
<td>Creates a <strong>maximohelp.ear</strong> file</td>
</tr>
<tr>
<td>./buildacwebear.sh</td>
<td>Creates an <strong>acweb.ear</strong> file</td>
</tr>
</tbody>
</table>

4. These scripts take several minutes to run, then displays BUILD SUCCESSFUL.

### Deploying EAR Files

This chapter describes creating new Application Servers. However, deploying EAR files into existing Application Servers—redeploying—is a task you perform whenever you customize Maximo.

**Redeploying EAR files**

If you are redeploying an EAR file into an existing Application Server, first remove the old one.

1. In the Administration Console, open the Deployments node.
2. Right-click an application, for example MAXIMO, and choose Delete.
3. Click Yes to confirm.

To redeploy, continue below:

**Deploying Ear Files Into the Application Server**

To deploy the Maximo EAR file, complete the following steps:

1. Login to the BEA WebLogic administration console, at:

   http://<hostname>[:<port>]/console

2. In the left pane, under the Deployments node, click **Applications**.
3. In the right pane, click **Deploy a new Application**.
4 In the Note text in this panel, click **upload your files**.

The Upload and Install an Application or Module panel opens.

5 Click **Browse**, navigate to the maximo.ear file, and select it. By default these files are in the `<Maximo Root>/deployment/default` directory.

6 Click **Upload**.

You are returned to the Deploy a New Application panel, which now lists the Maximo EAR file you have uploaded.

7 Select maximo.ear.

   ▼ If you have a single server environment, the only option is to click **Continue** and skip to Step 9.

   ▼ If you have a multiple server environment, click **Target Application**.

8 Select the server into which you want to deploy the EAR file, then click **Continue**.

9 The Deploy an Application panel returns, allowing you to review your choices.

At the bottom of this screen, enter a name for the application represented by the EAR file. The default is the file name of the EAR file, for example **maximo**. The application name must be unique if you are adding multiple applications.

10 Click **Deploy**.

   ▼ If the deployment fails, click the link to review an error message.

   ▼ The application you deployed appears in the left pane, under Applications.
Deploying the Maximo Help EAR File

To deploy the Maximo Help EAR file, repeat the previous procedure, with the following exceptions:

- upload the maximohelp.ear file (steps 4 - 6),
- select maximohelp.ear (step 7), and
- name the application maximohelp (the default) or another name of your choosing (step 9).

Deploying the Acweb EAR File

To deploy the acweb EAR file, repeat the previous procedure, with the following exceptions:

- upload the acweb.ear file (steps 4 - 6),
- select acweb.ear (step 7), and
- name the application acweb (the default) or another name of your choosing (step 9).

Accessing Maximo

To access Maximo, complete the following steps:

1. Start the Application Server (see page 26-6).
2. Open Internet Explorer and type:

   http://<hostname>:<port>/maximo

   where <hostname> is the name of the machine and <port> is the port number of the Application Server.

   For MAXIMOSERVER (set up during the initial Maximo installation), the default port number is 7001.

   For MAXSERV, the example used in this chapter, the port number is 8001.

Load Balancing Multiple Application Servers

This section describes how to load balance Maximo with multiple Application Servers.

Load balancing spreads the load across many servers, so that large numbers of clients can access the Maximo system. On multi processor machines, you can load balance across many instances of Application Servers configured with Maximo running on the same physical server.

This BEA Web site (current at time of printing) provides additional information on load balancing:

   http://edocs.bea.com/wls/docs81/adminguide/index.html
Load Balancing Multiple Application Servers

This diagram depicts an example of load balancing architecture where:

- A Web server with a plug-in performs the load balancing. Multiple Maximo clients communicate with the Web server.

- The Web server distributes client requests to one of four Application Servers configured with Maximo. These four Application Servers are called Managed Application Servers.

- Each Application Server communicates with the same database.

Configuring the Multiple Application Servers for Load Balancing

To help illustrate the procedure, consider the following scenario:

- You want to set up an admin server and three managed Application Servers in a Cluster on a machine named maxhost.

- Name the domain: clustermaxdomain

- Name the admin server and assign it a port as follows:

  AdminMAXSERV, (for example) port 9010

- Name the managed servers and assign ports as follows:

  ClstrMAXSERV1, (for example) port 9020
  ClstrMAXSERV2, (for example) port 9030
  ClstrMAXSERV3, (for example) port 9040
  Redirector, (for example) port 9050
To configure the Application Servers for load balancing, complete the following steps:

1. From a terminal window, change directory to:

   `<BEA WebLogic Root>/weblogic81/common/bin`

2. Run the following script:

   `./quickstart.sh`

<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>WebLogic QuickStart Select Create a new domain configuration, or extend an existing one.</td>
</tr>
<tr>
<td>4</td>
<td>Create or Extend a Configuration Select Create a new WebLogic Configuration and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>5</td>
<td>Select a Configuration Template In the left pane, select the Basic WebLogic Server Domain template, and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>6</td>
<td>Choose Express or Custom Configuration Select Custom and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>7</td>
<td>Configure the Administration Server Fill in these fields, then click <strong>Next</strong>. ▼ Name – AdminMAXSERV ▼ Listen Address – All Local Addresses ▼ Listen Port – for example, 9010</td>
</tr>
<tr>
<td>8</td>
<td>Managed Servers, Clusters, and Machines Options Select Yes and click <strong>Next</strong>.</td>
</tr>
<tr>
<td>9</td>
<td>Configure Managed Servers Enter these values to add four managed servers. Click <strong>Add</strong> before adding each new server, and click <strong>Next</strong> when you finish.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Listen Address</th>
<th>Listen Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClstrMAXSERV1</td>
<td>All Local Addresses</td>
<td>for example, 9020</td>
</tr>
<tr>
<td>ClstrMAXSERV2</td>
<td>All Local Addresses</td>
<td>for example, 9030</td>
</tr>
<tr>
<td>ClstrMAXSERV3</td>
<td>All Local Addresses</td>
<td>for example, 9040</td>
</tr>
<tr>
<td>Redirect</td>
<td>All Local Addresses</td>
<td>for example, 9050</td>
</tr>
</tbody>
</table>
### Configure Clusters

Click **Add** and enter these values, then click **Next**:

- **Name** – for example, maxcluster
- **Multicast address** – accept the default value
- **Multicast port** – accept the default value

**NOTE:** Do not assign the redirector server to the cluster.

### Assign Servers to Clusters

Assign the other three servers in the left pane to the cluster by clicking the right arrow button, then click **Next**.

### Configure Machines

If you have other servers add them. If not, click **Next**.

### Database (JDBC) Options

Select **No** and click **Next**.

### Messaging (JMS) Options

Do you use the IBM Maximo Enterprise Adapter (MEA)?

- **If yes**, go to the next step.
- **If no**, select **No** and click **Next**. **Go directly to step 28.**

### Messaging (JMS) Options (the same screen)

- In the **Name** field, enter **MEA connection factory**
- In the **JNDI** field, enter **jms/mro/int/qcf/intqcf**

Accept the default values in all other fields and click **Next**.

### Configure JMS Destination Keys

Do nothing and click **Next**.

### Configure JMS Templates

Do nothing and click **Next**.

### Configure JMS Files Stores

Click **Add**. Enter these values then click **Next**.

<table>
<thead>
<tr>
<th>Name</th>
<th>Listen Address</th>
<th>Synchronous write policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxintsqinfile</td>
<td><code>&lt;WebLogic Root&gt;.jmsstore</code></td>
<td>Disabled</td>
</tr>
<tr>
<td>mxintsqoutfile</td>
<td><code>&lt;WebLogic Root&gt;.jmsstore</code></td>
<td>Disabled</td>
</tr>
<tr>
<td>mxintcqinfile</td>
<td><code>&lt;WebLogic Root&gt;.jmsstore</code></td>
<td>Disabled</td>
</tr>
</tbody>
</table>

### Configure JMS Server

Click **Add** and enter these values.

<table>
<thead>
<tr>
<th>Name</th>
<th>Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxintsqinserver</td>
<td>mxintsqinfile</td>
</tr>
<tr>
<td>mxintsqoutserver</td>
<td>mxintsqoutfile</td>
</tr>
<tr>
<td>mxintcqinserver</td>
<td>mxintcqinfile</td>
</tr>
</tbody>
</table>

Accept the default values in all other fields and click **Next**.
<table>
<thead>
<tr>
<th>Screen</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20</strong> Assign JMS Servers to BEA WebLogic Servers</td>
<td>Assign all the JMS servers in the left pane to the BEA WebLogic server in the right pane by clicking the right arrow button, then click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>21</strong> Configure JMS Topics</td>
<td>Do nothing and click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>22</strong> Configure JMS Queues</td>
<td>Tab one (mxintsqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>23</strong> Configure JMS Queues</td>
<td>Tab two (mxintsqoutserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintsqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/sqout</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>24</strong> Configure JMS Queues</td>
<td>Tab three (mxintcqinserver). Click Add and enter these values:</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Name</strong> field, enter <strong>mxintcqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>JNDI Name</strong> field, enter <strong>jms/mro/int/queues/cqin</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Store enabled</strong> field, select <strong>true</strong>.</td>
</tr>
<tr>
<td></td>
<td>▼ In the <strong>Template</strong> field, leave the default of <strong>Unspecified</strong>.</td>
</tr>
<tr>
<td><strong>25</strong> Applications and Services Targeting Options</td>
<td>Select Yes and click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>26</strong> Target Services to Servers or Clusters</td>
<td>Select All and click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>27</strong> Configure Administrative Username and Password</td>
<td>Enter a user name and password (and verify the password), and select No in the Configure additional users, groups, and global rules portion. Click <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>28</strong> Configure Server Start Mode and Java SDK</td>
<td>Select a BEA WebLogic Configuration Startup Mode (either Development or Production), then choose the <strong>Sun SDK</strong>. Click <strong>Next</strong>. For more information, see &quot;Development Mode versus Production Mode,&quot; on page 26-2.</td>
</tr>
<tr>
<td><strong>29</strong> Create BEA WebLogic Configuration</td>
<td>Enter <strong>clustermaxdomain</strong> in the <strong>Configuration Name</strong> field. Click <strong>Create</strong>.</td>
</tr>
</tbody>
</table>
Editing the Startup Scripts

Complete the following steps:

1. Go to the location of the startup script, which is the root directory for the domain you created. For example:

   `<BEA WebLogic Root>/user_projects/domains/clustermaxdomain`

2. If you do not want to be prompted for the BEA WebLogic user name and password, create a boot.properties file in the above directory.

   Place the following two lines for an existing user in a text file:

   ```
   username=<username>
   password=<password>
   ```

   The `<username>` and `<password>` values must meet the following criteria:

   - Match an existing user account in the Authentication provider for the default security realm
   - Must belong to a role that has permission to start and stop a server

3. Save the file as `boot.properties` and locate it in the root directory of the domain (in this example: `<BEA WebLogic Root>/user_projects/domains/clustermaxdomain`). The server automatically uses this file during its subsequent startup cycles.

   The first time you use this file to start a sever, the server reads the file and then overwrites it with an encrypted version of the username and password.

   For more information, refer to the BEA documentation Web site at:

   [http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles](http://e-docs.bea.com/wls/docs81/ConsoleHelp/startstop.html#BootIdentityFiles)

**Oracle Database Consideration**

The `commEnv.sh` file (in `<BEA WebLogic Root>/weblogic81/common/bin`) is called by the startup scripts. For the Oracle database, `commEnv.sh` must include `oraclethin.jar` in the Classpath. If you did not edit this file when you installed Maximo, use the following procedures.

**Modifying the Class Path**

1. Copy the `oraclethin.jar` file that is packaged in Maximo under the applications\maximo\lib directory on the Windows machine where you installed Maximo to the `<BEA WebLogic Root>/weblogic81/server/lib` directory on the UNIX server.

   **NOTE**  
   `<BEA WebLogic Root>/weblogic81` corresponds to `${WL_HOME}`, used in the CLASSPATH statement in step 3.

2. Open the `commEnv.sh` file in a text editor.
3 Search for \texttt{WEBLOGIC\_CLASSPATH="\$\{JAVA\_HOME\}/lib/tools.jar \\
 \$\{CLASSPATHSEP\}$\{WL\_HOME\}/server/lib/oraclethin.jar \\
 \$\{CLASSPATHSEP\}$\{WL\_HOME\}/server/lib/weblogic_sp.jar \\
 \$\{CLASSPATHSEP\}$\{WL\_HOME\}/server/lib/weblogic.jar"}

\texttt{export WEBLOGIC\_CLASSPATH}

\textbf{NOTE} \quad \text{Place the oraclethin.jar \textit{before} the weblogic jar files.}

4 Search for the \texttt{MEM\_ARGS=} section of the file and set the values according to the SDK you selected during the BEA WebLogic installation, as shown below:

\textbf{HP)}

\texttt{MEM\_ARGS="-Xms512m -Xmx1024m -XX:MaxPermSize=256m"}

\textbf{Sun)}

\texttt{MEM\_ARGS="-Xms512m -Xmx1024m -XX:MaxPermSize=256m"}

\textbf{IBM)}

\texttt{MEM\_ARGS="-Xms512m -Xmx1024m"}

These values are case sensitive. They specify minimum and maximum memory.

5 Save and close the file.

\section*{Starting the Admin Server and Administration Console}

To continue with configuring Maximo in the clustered Application Servers, start the Admin Server and access the Administration Console.

You start the Admin Server the way you start any Application Server (page 26-6). In the example used here, you would do the following:

\begin{itemize}
  \item From a terminal window, change directory to the clusteredmaxdomain directory and run \texttt{startWebLogic.sh}.
  \item You use the port number of the Admin Server to access the Administration Console.
  \item In our example, the Admin Server, AdminMAXSERV, runs on port 9010 and the hostname is maxhost. You would enter the following URL:
  \end{itemize}

\texttt{http://maxhost:9010/console}
Configuring the Web Server Plug-in for Load Balancing

With Maximo, you must configure load balancing for servlets and JSPs. This task can be accomplished with a Web server plug-in provided by BEA for the appropriate Web server, or with separate load balancing hardware. The procedure varies according to your choice.

Refer to the following BEA Web site for general information on load balancing in a cluster for servlets and JSPs:

http://e-docs.bea.com/wls/docs81/cluster/load_balancing.html#1026940

Use the Apache Web server.

Refer to the following site for specific information on configuring the Apache plug-in:

http://edocs.bea.com/wls/docs81/plugins/index.html

**NOTE:** Make sure you have installed the appropriate version of the Web server for the plug-in.

Deploying Maximo in the Clustered Servers

1. Login to the Administration console on the Admin Server, with the username/password you selected in the Configuration Wizard.

2. Expand the **Servers** and **Clusters** nodes and observe that the servers you created with the Wizard are listed in both places.

3. Expand the **Deployments** node and click the **Applications** node, then choose **Deploy a new Application**.

4. Deploy the EAR files as described in "Deploying EAR Files," on page 26-9.
Starting the Servers and Accessing Maximo

Start the servers and access Maximo by completing the following steps:

1. Restart the Admin Server.

2. Open a terminal window and change directory to the location of the domain for the multiple Application Servers. For example: `<BEA WebLogic Root>/user_projects/domains/clustermaxdomain`

3. Start one of the Managed Servers with the following command line arguments:

   ```
   .//startManagedWebLogic.sh <Managed Server Name> <Admin Server URL>
   ```

   where:

   - `<Managed Server Name>` is the name of the Managed Server to be started, for example ClstrMAXSERV1.
   - `<Admin Server URL>` is the URL for the Admin Server, which is of the form:

     ```
     http://<hostname>:<port>
     ```

     where `<hostname>` is the name of the machine and `<port>` is the port number of the Admin Server.

   In our example, the Admin Server is running on a machine named maxhost, on port 9010. You would enter the following command line arguments:

   ```
   .//startManagedWebLogic.sh ClstrMAXSERV1 http://maxhost:9010
   ```

4. Repeat steps 2 and 3 for each additional Managed Server, including the Redirector Server.

5. To access Maximo, go to a Web browser and specify the following URL:

   ```
   http://<machinename>:<port>/maximo
   ```

   where `<machinename>` is the name of the machine running the Redirector Server and `<port>` is the port number of the Redirector Server.

   The Redirector Server can redirect the request to the appropriate available Managed Server in the Cluster.

**NOTE** You can access a Managed Server individually by using its machine name and port number.
Optimizing Performance of Maximo in the Application Server

For BEA WebLogic performance tuning guidelines, see:

http://e-docs.bea.com/wls/docs81/perform/index.html

Refer to the Support Online Knowledge Base for specific information on tuning topics such as:

- Startup Mode
- Java Virtual Machine Tuning
- Application Server Scalability
- Queues & Threads
Maximo uses the IBM WebSphere Application Server to provide access to the Maximo business components and Web-based applications. Chapter 23, “Multiple Maximo Configurations” overviews the Maximo architecture, and is a precursor to this chapter.

This chapter includes these topics:

- Overview
- Starting and Stopping the WebSphere 6.0 Application Server
- Starting the Administrative Console
- Starting and Stopping the Maximo Application Server
- Configuring the Maximo Application Server to Run as a Service
- Configuring the Node Agent to Run as a Service
- Configuring the Maximo Application Server in WebSphere 6.0
- Load Balancing Multiple Maximo Application Servers
- Optimizing Performance of Maximo in the Application Server

Overview

IBM provides comprehensive information on running and administering WebSphere at this URL:

http://publib.boulder.ibm.com/infocenter/ws60help/index.jsp

WebSphere Network Deployment

The Network Deployment is based on the concept of cells, nodes, and servers.

This diagram illustrates a Network Deployment configuration of the WebSphere Application Server with the following components:

- a cell with two nodes
- a Deployment Manager
- an Administrative Console
- clustered Maximo application servers
- the IBM HTTP Server with plug-in
Starting and Stopping the WebSphere 6.0 Application Server

An administrative server named MAXIMOSERVER was created during installation.

Verify that the following are configured and installed:

- WebSphere 6.0 Network Deployment (ND) software
- WebSphere 6.0.0.2 fixpack
- A Deployment Manager profile and at least one Custom profile
1 Start the Node Agent process. From a command prompt, navigate to IBM\WebSphere\AppServer\profiles\Custom_name\bin and type `startNode`.

2 Start the IBM WebSphere Network Deployment software from the Services window or at a command prompt.

   To start as a service, open the Control Panel and go to Administrative Tools > Services. Right-click “IBM WebSphere Application Server V6 - <machine name> CellManager01” and click Start.

   To start from a command prompt, navigate to IBM\WebSphere\AppServer\profiles\Deployment_Manager_profile_name\bin and type `startManager`.

3 To start the Administrative Console, open a browser window and enter the following URL:

   http://<machine_name>:9060/ibm/console

   Where <machine_name> is the host name of the WebSphere Application Server and 9060 is the default port number for the Administrative Console.

4 Enter an administrative user ID and password to login, if one is required. See “Securing the Administrative Console” on page 27-5 for information on creating a user ID and password.

5 From the Administrative Console’s navigation pane, click Servers > Application Servers.

6 Select the check box next to MAXIMOSERVER, the name of the WebSphere Application Server.

7 Click Start. Notice that the icon in the Status column changes to , or running.

8 To stop the WebSphere Application Server, click Stop. Notice that the icon in the Status column changes to , or stopped.
Starting the Administrative Console

Starting the Administrative Console

Before you start the Administrative console, verify that these server processes are running.

Open the Control Panel and go to Administrative Tools > Component Services.

Starting and stopping IBM server processes as services

<table>
<thead>
<tr>
<th>Server Name</th>
<th>Right-click...</th>
<th>To Start, select...</th>
<th>To Stop, select...</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP Server</td>
<td>IBM HTTP Server 6.0</td>
<td>Start</td>
<td>Stop</td>
</tr>
<tr>
<td>Deployment Manager</td>
<td>IBM WebSphere Application Server V6 - &lt;machine name&gt;</td>
<td>CellManager01</td>
<td>Start</td>
</tr>
<tr>
<td>Node Agent</td>
<td>IBM WebSphere Application Server V6 - nodeagent</td>
<td>Start</td>
<td>Stop</td>
</tr>
</tbody>
</table>

Alternatively, you can start the same processes from a command prompt. The following table lists the programs you run to Start or Stop the server processes from a command prompt.

Starting and stopping IBM server processes from a command prompt

<table>
<thead>
<tr>
<th>Server Name</th>
<th>Go To...</th>
<th>To Start, type...</th>
<th>To Stop, type...</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP Server</td>
<td>\IBM HTTP Server\bin</td>
<td>apache -k start</td>
<td>apache -k stop</td>
</tr>
<tr>
<td>Deployment Manager</td>
<td>IBM\WebSphere\AppServer \profiles\Dmgr01\bin</td>
<td>startManager</td>
<td>stopManager</td>
</tr>
<tr>
<td>Node Agent</td>
<td>IBM\WebSphere\AppServer \profiles\Custom01\bin</td>
<td>startNode</td>
<td>stopNode</td>
</tr>
</tbody>
</table>

Starting Servers from the Program menu

You can start the following servers from the Program menu:

Deployment manager

From the Windows task bar, choose:

Start > Programs > IBM WebSphere > Application Server Network Deployment V6 > Profiles > Dmgr01

IBM HTTP server

From the Windows task bar, choose:

Start > Programs > IBM HTTP Server 6.0
Starting the Administrative Console

After you verify the server processes, start the Administrative Console

1. Open a browser window, and enter the following URL:

   http://<machine_name>:9060/ibm/console

   Where <machine_name> is the host name of the WebSphere Application Server and 9060 is the default port number for the Administrative Console.

2. Enter a user ID to login. Until you enable security, you can login with any user ID. The user ID does not have to be a valid system user.

Securing the Administrative Console

You can secure the Administrative Console so that only authenticated users can use it.

1. Before you can secure the console, you first activate WebSphere global security. To understand your security options, refer to WebSphere Security Fundamentals, an IBM Redpaper written by Peter Kovari.

2. Identify users (or groups) that are defined in the active user registry.

3. Assign roles to users, to determine the actions they can perform.

You can add users, groups, and roles by selecting the following menu paths:

   ▼ System Administration > Console settings > Console Users
   ▼ System Administration > Console settings > Console Groups

You can assign these roles:

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor</td>
<td>Allows you to view the WebSphere configuration and current state</td>
</tr>
<tr>
<td>Configurator</td>
<td>Monitor rights plus the ability to change the WebSphere configuration</td>
</tr>
<tr>
<td>Operator</td>
<td>Monitor rights plus the ability to change the runtime state, such as starting and stopping services</td>
</tr>
<tr>
<td>Administrator</td>
<td>Operator and Configurator rights</td>
</tr>
</tbody>
</table>

After you change the configuration:

▼ restart all the application servers

▼ make sure administrative users have the appropriate administrative role and login credentials
Starting and Stopping the Maximo Application Server

1. Open a browser window and enter the following URL:
   \[http://<machine_name>:9060/ibm/console\]

2. Enter an administrative user ID and password to login, if one is required.

3. From the Administrative Console’s navigation pane, click **Servers > Application Servers**.

4. Select the check box next to MAXIMOSERVER, the name of the Maximo application server.

5. Click **Start**.

6. To stop the Maximo application server, click **Stop**.

7. (Optional) Open the Control Panel and click **Administrative Tools > Component Services**. In the Services window, right-click “IBM WebSphere Application Server V6 - maximoserver,” and select **Start** or **Stop**.

Configuring the Maximo Application Server to Run as a Service

If you want to start the Maximo application server as a service, make sure this fix pack is installed:

\[\text{IBM WebSphere Application Server Fix Pack 1}\]

**NOTE**

After you configure services for a WebSphere Application Server (for example, nodeagent, maximoserver, and so on), you start the application server using the Component Services window. You access the Component Services window by selecting Control Panel > Administrative Tasks > Component Services.

If you must change server parameters (for example, JVM, HTTP port number, virtual host, and so on) use the WebSphere Administrative Console. After making changes, you can stop the application server using Component Services or the Administrative Console. However, you start the application server using Component Services.

1. Start the WebSphere 6.0 Administrative Console by opening a browser window and entering the following URL:
   \[http://<machine_name>:9060/ibm/console\]

2. Enter an administrative user ID and password.

3. Click **Servers > Application Servers** in the navigation pane.
Configuring the Maximo Application Server to Run as a Service

4 In the Application Servers pane, select MAXIMOSERVER and click Start. This action creates a server log folder used by the WASService command (see Step 8).

5 Select MAXIMOSERVER, and click Stop.

6 Open a command prompt window.

7 Navigate to the bin folder where you installed the Maximo application server. For example:

   <C:/>IBM/WebSphere/AppServer/bin

8 Run the WASService command with the following parameters:

   ▼ serverName – name of Maximo application server, for example, MAXIMOSERVER

   ▼ profilePath – the profile directory of the server, for example, <D:/IBM/WebSphere/AppServer/profiles/MAXIMOSERVER

   ▼ wasHome – home folder for MAXIMOSERVER, for example, <D:/IBM/WebSphere/AppServer/profiles

   ▼ logRoot – folder location of MAXIMOSERVER log file, for example, <D:/IBM/WebSphere/AppServer/logs/MAXIMOSERVER

   ▼ logFile – log file name for MAXIMOSERVER (startServer.log)

   ▼ restart – restarts the existing service automatically if the service fails when set to true

Enter the WASService command using the following syntax:

   WASService -add MAXIMOSERVER -servername MAXIMOSERVER
   -profilePath "<D:/IBM/WebSphere/AppServer/profiles/MAXIMOSERVER"
   -wasHome "<D:/IBM/WebSphere/AppServer"
   -logRoot "<D:/IBM/WebSphere/AppServer/logs/MAXIMOSERVER"
   -logFile "<D:/IBM/WebSphere/AppServer/logs/MAXIMOSERVER/startServer.log" -restart true

9 Press <Enter> after you type the WASService command, and you will see a confirmation message like the following example:

   “IBM WebSphere Application Server V6 – MAXIMOSERVER service successfully added”

10 Open a Services window and double-click MAXIMOSERVER. Then perform the following actions:

   a Change the Startup type field value to “Automatic.”

   b Click Start to start the service.

   c Click OK.
Configuring the Node Agent to Run as a Service

A node agent is a server running on every host computer in the deployed network. It performs administrative functions like:

- file transfer services
- configuration synchronization
- performance monitoring.

To configure the Node Agent to run as a service:

1. Start the WebSphere 6.0 Administrative Console by opening a browser window and entering the following URL:

   http://<machine_name>:9060/ibm/console

2. Enter an administrative user ID and password.

3. Click **System Administration** in the navigation pane.

4. In the System Administration pane, select the name of the Node Agent (for example, nodeagent), and click **Start**.

5. Before you run the WASService command, select nodeagent in the Administration pane, and click **Stop**.

6. Open a command prompt window.

7. Navigate to the bin folder where you installed the Node Agent. For example:

   <D:\IBM\WebSphere\AppServer\bin

8. Run the WASService command with the following parameters:

   - `servername` – name of the Node Agent (nodeagent)
   - `profilePath` – the profile directory of the server, for example, <D:\IBM\WebSphere\AppServer\profiles\MAXIMOSERVER
   - `wasHome` – home folder for MAXIMOSERVER, for example, <D:\IBM\WebSphere\AppServer\profiles
   - `logRoot` – folder location of Node Agent log file, for example, <D:\IBM\WebSphere\AppServer\logs\NodeAgent
   - `LogFile` – log file name for the Node Agent (startServer.log)
   - `restart` – restarts the existing service automatically if the service fails when set to true
Enter the WASService command using the following syntax:

```bash
WASService -add NodeAgent -serverName nodeagent -profilePath "People\IBM\WebSphere\AppServer\profiles\MAXIMOSERVER" 
-wasHome "People\IBM\WebSphere\AppServer" 
-logRoot "People\IBM\WebSphere\AppServer\logs\nodeagent" 
-logFile "People\IBM\WebSphere\AppServer\logs\nodeagent\ 
startServer.log" -restart true
```

Press `<Enter>` after you type the WASService command, and you will see a confirmation message like the following example:

“IBM WebSphere Application Server V6 – NodeAgent service successfully added”

Open a Services window and double-click NodeAgent. Do the following:

- Change the **Startup type** field value to “Automatic.”
- Click **Start** to start the service.
- Click **OK**.

### Configuring the Maximo Application Server in WebSphere 6.0

This section describes configuring Maximo in the WebSphere Application Server. You can configure one or more Maximo application servers in addition to the one you created during the Maximo installation.

Chapter 23, “Multiple Maximo Configurations,” discusses different Maximo configurations.

**NOTE** Throughout this section **MAXIMO_SERVER** is the application server running Maximo. Substitute another name if appropriate. For example, if you are setting up multiple application servers, you might want to use MAXIMO_SERVER2, and so forth.

### Preconfiguration Steps

These tasks are required before adding and configuring a new Maximo application server:

1. Make sure that the WebSphere Application Server, V6.0 is successfully installed. (See page 27-3)
2. Start the Node Agent. (See page 27-4)
3. Start the Network Deployment Manager. (See page 27-6)
4. Start the Administrative Console. (See page 27-4)
Creating the Maximo Application Server

1. To start the Administrative Console, open a browser window and enter the following URL:

   http://<machine_name>:9060/ibm/console

2. Enter an administrative user ID and password.

3. Click **Servers > Application Servers** in the navigation pane.

4. Click **New** in the Application Servers pane.

5. To create an application server from a server template, complete the following steps:

   a. Accept the default setting for Select Node, type “MAXIMO_SERVER” in the **Server name** field and click Next.

   b. Accept the default server template and click Next. Generate Unique Http Ports

   c. Accept the default, which is to generate unique port numbers, and click Next.

   d. Click Finish to finish creating the application server.

6. Click **Save** to update the master configuration.

Identifying Log Files

From the Administrative Console, you can configure these log files:

- Diagnostic Trace
- JVM Logs
- Process Logs
- IBM Service Logs

1. Click **Troubleshooting > Logs and Trace** in the navigation pane.

2. Click **MAXIMO_SERVER** in the Logging and Tracing pane to display the list of logs available for **MAXIMO_SERVER**.

3. Click a log, for example, Diagnostic Trace or JVM Logs, to display configuration and runtime information.

You can view or edit information for these log files:

<table>
<thead>
<tr>
<th>Log Type</th>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Trace</td>
<td>trace.log</td>
<td>View and modify the properties of the diagnostic trace service.</td>
</tr>
<tr>
<td>JVM Logs</td>
<td>SystemOut.log and SystemErr.log</td>
<td>View and modify the settings for the Java Virtual Machine (JVM) logs.</td>
</tr>
</tbody>
</table>
Configuring the Maximo Application Server in WebSphere 6.0

4 Click the Configuration tab to display log information. For example, in the JVM Logs Configuration tab, the "$(SERVER_LOG_ROOT)" parameter points to the folder location of the log file, for example:

$(SERVER_LOG_ROOT)\SystemOut.log

where "$(SERVER_LOG_ROOT)" is equal to
\IBM\WebSphere\AppServer\profiles\profile_name\logs\maximo_server

NOTE "$(SERVER_LOG_ROOT)" can point to the log folder based on the server you choose.

Specifying JVM Memory Settings

This section describes how to set the initial and maximum JVM memory size in megabytes.

**NOTE** Do not set the Java heap size to exceed the memory (RAM) of your server.

1 Click **Servers > Application Servers** in the navigation pane.

2 Click the MAXIMO_SERVER link in the Application Servers pane.

3 Under Server Infrastructure, click **Java and Process Management**.

4 Click **Process Definition**.

5 Under Additional Properties, click **Java Virtual Machine**.

6 Set the Initial Heap Size to **512** and the Maximum Heap Size to **1024**, then click **OK**.

7 Click **Save** in the Messages pane to save changes to the master configuration.

8 Click **Save** again.

Identifying the HTTP Transfer Port Numbers

For future configurations, note the HTTP port numbers of the MAXIMO_SERVER Web container.

1 Click **Servers > Application Servers** in the navigation pane.

2 Click **MAXIMO_SERVER** in the Application Servers pane.

3 In the Configuration tab, click **Web Container Settings**.

<table>
<thead>
<tr>
<th>Log Type</th>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Logs</td>
<td>native_stderr.log and</td>
<td>View and modify setting for specifying the files to which standard out and</td>
</tr>
<tr>
<td></td>
<td>native_stdout.log</td>
<td>standard error streams write.</td>
</tr>
<tr>
<td>IBM Service Logs</td>
<td>activity.log</td>
<td>Configure the IBM service log, also known as the activity log.</td>
</tr>
</tbody>
</table>

Managing the WebSphere 6.0 Application Server in Windows 27-11
4 Click Web container transport chains.

```
<table>
<thead>
<tr>
<th>Select</th>
<th>Name</th>
<th>Enabled</th>
<th>Host</th>
<th>Port</th>
<th>SSL Enabled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WCIboundAdmin</td>
<td>Enabled</td>
<td>*</td>
<td>9070</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>WCIboundAdminSecure</td>
<td>Enabled</td>
<td>*</td>
<td>9081</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>WCIboundDefault</td>
<td>Enabled</td>
<td>*</td>
<td>9088</td>
<td>Disabled</td>
</tr>
<tr>
<td></td>
<td>WCIboundDefaultSecure</td>
<td>Enabled</td>
<td>*</td>
<td>9481</td>
<td>Enabled</td>
</tr>
<tr>
<td></td>
<td>Total 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

5 Record the default server port number (9088, in this example) for future reference.

**Creating the Virtual Host**

A virtual host lets a single host machine resemble multiple host machines. Each virtual host has a logical name and a list of one or more domain names system (DNS) aliases by which it is known.

1 Click Environment > Virtual Hosts in the navigation pane.

2 Click New in the Virtual Hosts pane.

3 In the General Properties section of the Configuration tab, specify the name of the virtual host for. For example, type:

   MAXIMO_SERVER_host

4 Click OK, then click Save to save your changes to the master configuration.

5 Click Save again.

6 Click MAXIMO_SERVER_host.

7 In the Additional Properties section of the Configuration tab, click Host Aliases.

8 Click New.

For new virtual hosts, the default host name can be * to allow any value.

Change the port number to the IBM HTTP Server alias, for example, 80. Make sure that the IBM HTTP Server runs on this port and that the Web container uses any subsequent ports, such as 9081. The HTTP Server plug-in always uses the first port in this list.
9 Click **OK**, then click **Save** to save your changes to the master configuration.

10 Click **Save** again.

## Building EAR files

1 Open a Command Prompt.

2 Go to C:\Maximo\deployment

3 Run the appropriate script:

<table>
<thead>
<tr>
<th>Script</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>buildmaximoear (Windows)</td>
<td>Creates a <strong>maximo.ear</strong> file</td>
</tr>
<tr>
<td>buildhelpear</td>
<td>Creates a <strong>maximohelp.ear</strong> file</td>
</tr>
<tr>
<td>buildacwebear</td>
<td>Creates an <strong>acweb.ear</strong> file</td>
</tr>
</tbody>
</table>

4 These scripts take several minutes to run.

The command prompt or terminal window then displays a BUILD SUCCESSFUL line.

## Deploying EAR Files

Now that you have created and configured the Maximo application server (MAXIMO_SERVER), you deploy your enterprise applications within the MAXIMO_SERVER container.

Before you complete the following steps, verify that the Deployment Manager and the node agent are both started.

1 Open a browser window and enter the following URL:

   http://<machine_name>:9060/ibm/console

2 Enter an administrative user ID and password to login.

3 Click **Applications > Install New Applications** in the navigation pane.

4 Select the appropriate file system (local or remote), then click **Browse**.

5 Navigate to your `<Maximo root>\deployment\default` folder.

6 Select **maximo.ear** and click **Open** in the dialog box, then click **Next**.
In the “Preparing for the application installation” screen, select the following then click **Next**:

- Generate Default Bindings
- Do not specify unique prefix
- Do not override existing bindings
- Use default virtual host name for Web modules (use the host created in “Creating the Virtual Host” on page 27-13).

The Install New Application screen displays, which contains nine Steps. Use the following table to guide you:

**Steps to install the new application**

<table>
<thead>
<tr>
<th>Steps</th>
<th>User actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Accept the default settings and click <strong>Next</strong>.</td>
</tr>
</tbody>
</table>
| Step 2 | ▼ Select all Modules.  
▼ From the "Servers and Clusters" list, select both MAXIMO_SERVER and the webserver.  
▼ Click **Apply**, then click **Next**. |
| Step 3 | Accept the default settings and click **Next**. |
| Step 4 | Accept the default settings and click **Next**. |
| Step 5 | Accept the default settings and click **Next**. |
| Step 6 | ▼ Select all Modules.  
▼ For each module select MAXIMO_SERVER_HOST from the virtual host list.  
▼ Click **Next**. |
| Step 7 | Accept the default settings and click **Next**. |
| Step 8 | Accept the default settings and click **Next**. |
| Step 9 | Review your settings, then click **Finish**. |

In the pane showing “Application Maximo installed successfully,” click **Save to Master Configuration**.

Click **Save** again.

To deploy the remaining EAR files, use the above procedure as your basis but make the following changes:

- substitute the appropriate EAR file and application name
- note that for the remaining EAR files, only four "specify option" steps are required, instead of nine steps to install maximo.ear
- accept the default value all four steps

<table>
<thead>
<tr>
<th>EAR File</th>
<th>Application Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximohelp.ear</td>
<td>MAXIMOHELP</td>
</tr>
</tbody>
</table>
Starting the Maximo Application Server

Start the Maximo application server (MAXIMO_SERVER) from the Administrative Console:

1. Restart the IBM HTTP Server to take the plug-in configuration updates. Only restart the server if you access Maximo through the IBM HTTP Server.

2. Enter the following URL:

   http://<machine_name>:<9060>/admin

3. Enter an administrative user ID and password to login.

4. Click Servers > Application Servers in the navigation pane.

5. In the Application Servers pane, check the box next to MAXIMO_SERVER.

6. Click Start.

7. (Optional) Start the Maximo application server as a service by opening the Control Panel and going to Administrative Tools > Component Services. Right-click “IBM WebSphere Application Server V6 - maximo_server,” and select Start.

Load Balancing Multiple Maximo Application Servers

Load balancing spreads the load across many servers, so that large numbers of clients can access the Maximo system.

This site provides information on WebSphere 6.0.x software issues:

http://publib.boulder.ibm.com/infocenter/ws60help/index.jsp

Load Balancing Procedure for WebSphere 6.0

Use MAXIMO_SERVER as the template for creating Clustered servers.

1. Start the Deployment Manager as a service or launch the process from a command prompt. To start as a service, open the Control Panel and go to Administrative Tools > Component Services. In the Services window, right-click “IBM WebSphere Application Server V6 - CellManager,” and select Start.

2. Alternatively, you can start the WebSphere Network Deployment Manager (dmgr) as follows:
Load Balancing Multiple Maximo Application Servers

1. From a command prompt, navigate to:
   \IBM\WebSphere\AppServer\profiles\dmgr_name\bin

2. Type the following command:
   startManager

3. To start the Node Agent as service, open the Services window as described in Step 1. Right-click “IBM WebSphere Application Server V6 - nodeagent,” and select Start.

4. Alternatively, you can start the Node Agent as follows:
   a. From a command prompt, navigate to:
      \IBM\WebSphere\AppServer\profiles\custom_name\bin
   b. Type the following command:
      startNode

5. When the Node is running, you can access the Administrative Console by opening a browser window and entering the following address:
   http://<machine_name>:9060/ibm/console

Creating a Cluster and Cluster Members

1. Open the Administrative Console.

2. Click Servers > Clusters in the navigation pane.

3. Click New in the Server Cluster pane.

4. In Step 1 of the Enter Basic Cluster Information panel, perform the following actions:
   a. Type MAXIMOCLUSTER in the Cluster name field.
   b. Select the Prefer local box.
   c. Select Do not include an existing server in this cluster button.
   d. Click Next.

5. In Step 2 of the Create New Clustered Servers panel, perform the following actions:
   a. Type MAXIMO_SERVER1 in the Member name field.
   b. Accept the defaults in the Select Node and Weight fields.
   c. Select Generate Unique Http Ports.
   d. Select the Existing application server button, and choose MAXIMO_SERVER from the drop down list.
To create a clustered server, repeat the actions you performed in Step 5, using MAXIMO_SERVER2 as the server name.

**Note**
You do not have to perform step 5-d when you create additional clustered servers, because MAXIMO_SERVER2 automatically defaults to the template you selected for MAXIMO_SERVER1.

Repeat Step 5 to create additional clustered servers.

7 Click **Next**.

8 Click **Finish** to create the cluster and clustered servers.

9 Click **Save**.

10 Select **Synchronize changes with Nodes**, then click **Save** again.

### Update Virtual Hosts

This procedure describes how to verify port numbers used by the clustered servers. It also explains how to update the virtual host with the port number information.

A virtual host enables a single host machine to resemble multiple host machines. Each virtual host has a logical name and a list of one or more DNS aliases by which it is known.

1 To verify port numbers of the clustered application servers, perform the following actions:
   
   a In the navigation pane, click **Servers > Application Servers**.

   b In the Application Servers panel, click **MAXIMO_SERVER1**

   c Under the Communication heading, click **Ports**.

   d Note the **WC_defaulthost** port for use in Step 3 below (for example, step 3-h requires a WC_defaulthost port.)

2 Repeat Step 1 for MAXIMO_SERVER2 and any other clustered servers you have created.

3 In the navigation pane, click **Environment > Virtual Hosts**.

   Complete the following actions:

   a Click **New** to add a new virtual host for the cluster, then enter MAXIMOCLOUDER_HOST for the Name.

   b Click **Apply**.

   c Click **Host Aliases** under Additional Properties.
Load Balancing Multiple Maximo Application Servers

\[d\] Click **New** in the Host Alias panel to add Host name and port number values to the host aliases list.

\[e\] Enter the following:

Host Name: *

Port: **80** (same as port number for the IBM HTTP Server)

\[f\] Click **OK**.

\[g\] Click **Host Aliases**, then click **New**.

\[h\] Enter the following:

Host Name: *

Port: **9081** (same as port number for MAXIMO_SERVER1)

\[i\] Click **OK**.

\[j\] Click **Host Aliases**, then click **New**.

\[k\] Enter the following:

Host Name: *

Port: **9082** (same as port number for MAXIMO_SERVER2)

\[l\] Click **OK**.

\[m\] Repeat Step 3 for any additional clustered servers.

4 To save the configuration, complete the following actions:

\[a\] Click **Save**.

\[b\] Check **Synchronize changes with Nodes**.

\[c\] Click **Save**.

**Deploy Maximo to the Cluster**

Now that you have created and configured the MAXIMOCLUSTER, you deploy your enterprise applications within the cluster.

1 In the navigation pane, click Applications > Install New Applications.

2 Depending whether the browser that you are using is on the same machine where you have installed Maximo (Local) or not, select the appropriate option and navigate to where the EAR files reside (/maximo/deployment/default).

3 Select maximo.ear, then click **Open** in the dialog box.
4 In the “Preparing for the application installation” screen, select the following options:

- Overwrite default bindings
- Do not specify unique prefix for beans
- Do not override existing bindings
- Use default virtual host name for Web modules, and enter MAXIMOCLUSTER_host.

5 In the Install New Application window, accept the following default settings:

<table>
<thead>
<tr>
<th>Distribute Application</th>
<th>Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Name</td>
<td>Maximo</td>
</tr>
<tr>
<td>Deploy enterprise beans</td>
<td>Enable</td>
</tr>
<tr>
<td>Create mBeans for Resources</td>
<td>Enable</td>
</tr>
</tbody>
</table>

6 Click **Next**.

7 In Step 2, "Map modules to servers," you map Web modules to the MAXIMO cluster. Complete the following actions:

   a From the Clusters and Servers box, select the **MAXIMO** cluster and webserver.
   
   b Check all module box.
   
   c Click **Apply**.

8 In Steps 3, 4, and 5, accept the defaults and click **Next**.

9 In Step 6, complete the following actions:

   a Select all items from the Web module column.
   
   b For each Web module, select **MAXIMOCLUSTER_host** from the Virtual host list.
   
   c Click **Next**.

10 In Steps 7 and 8, accept the defaults and click **Next**.

**NOTE** If you are a MEA customer, there is an additional step. Just accept the default and click **Next**.

11 In the final step, review your settings then click **Finish**.

   The deployment process takes several minutes to complete.

12 In the confirmation page, when you see the message “Application Maximo installed successfully,” perform the following actions:

   a Click **Save to Master Configuration**.
Optimizing Performance of Maximo in the Application Server

b Select Synchronize changes with Nodes.

c Click Save.

Start the MAXIMO Cluster and IBM HTTP Server

1 In the navigation pane, click Servers > Clusters.

2 Select MAXIMOCLUSTER, then click Ripplestart.

3 Next, you can start the IBM HTTP server as a service by opening the Control Panel and going to Administrative Tools > Component Services. In the Services window, right-click “IBM HTTP Server... ,” and select Start.

4 Alternatively, you can start the IBM HTTP server by navigating to the \HTTPServer folder and typing:

   apache -k start

5 To access the cluster, open HTTP://<node name>:<port>/maximo

   where <port> is the port number of the IBM HTTP server.

Optimizing Performance of Maximo in the Application Server

Refer to the Support Online Knowledge Base for these topics:

▼ Startup Mode

▼ Java Virtual Machine Tuning

▼ Application Server Scalability

▼ Queues & Threads
Managing the WebSphere 6.0 Application Server in UNIX

Maximo uses the IBM WebSphere Application Server to access the Maximo business components and Web-based applications. Chapter 23, “Multiple Maximo Configurations” overviews the Maximo architecture, and is a precursor to this chapter.

This chapter includes the following topics:

- Overview
- Starting and Stopping the WebSphere 6.0 Application Server
- Starting the Administrative Console
- Starting and Stopping the Maximo Application Server
- Configuring the Maximo Application Server in WebSphere 6.0
- Load Balancing Multiple Maximo Application Servers
- Load Balancing Procedure for WebSphere 6.0
- Optimizing Performance of Maximo in the Application Server

Overview

In its Info Center, IBM provides comprehensive information on running and administering WebSphere. You can access this information at the following URL:

http://publib.boulder.ibm.com/infocenter/ws60help/index.jsp

WebSphere Network Deployment

The Network Deployment is based on the concept of cells, nodes, and servers.

This diagram illustrates a Network Deployment configuration of the WebSphere Application Server with the following components:

- a cell with two nodes
- a Deployment Manager
- an Administrative Console
- clustered Maximo application servers
- the IBM HTTP Server with plug-in
Maximo application servers clustered in a WebSphere Network Deployment Configuration

Overview

Maximo application servers clustered in a WebSphere Network Deployment Configuration
Starting and Stopping the WebSphere 6.0 Application Server

An administrative server named MAXIMOSERVER was created during installation.

Verify that the following are configured and installed:

- WebSphere 6.0 Network Deployment (ND) software
- WebSphere 6.0.0.2 fixpack
- A Deployment Manager profile and at least one Custom profile

1. First start the node agent process. Open a terminal window and change directory to `/IBM/WebSphere/AppServer/profiles/Custom_name/bin`.

2. Type the following command and press Enter:
   
   ```
   ./startNode.sh
   ```

3. Change directory to `/IBM/WebSphere/AppServer/profiles/Dmgr_profile_name/bin`.

4. Type the following command and press Enter:
   
   ```
   ./startManager.sh
   ```

5. To start the Administrative Console, open a browser window and enter the following URL:

   ```
   http://<machine_name>:9060/ibm/console
   ```

   Where `<machine_name>` is the host name of the WebSphere Application Server and 9060 is the default port number for the Administrative Console.

6. Enter an administrative user ID and password to login, if one is required. For information about creating a user ID and password, see "Securing the Administrative Console," on page 28-4.

7. From the Administrative Console’s navigation pane, click **Servers > Application Servers**.

8. Select the check box next to MAXIMOSERVER, the name of the WebSphere Application Server.

9. Click **Start**. Notice that the icon in the Status column changes to ✅, or running.

   **NOTE** As you add new application servers to your cell, you see them listed and can start them from this page.

10. To stop the WebSphere Application Server, click **Stop**. Notice that the icon in the Status column changes to ⏸️, or stopped.
Starting the Administrative Console

Before you start the Administrative console, verify that these server processes are running. Use this table to guide you.

Starting and stopping IBM server processes from a terminal window

<table>
<thead>
<tr>
<th>Server Name</th>
<th>Go To...</th>
<th>To Start, type...</th>
<th>To Stop, type...</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP Server</td>
<td>/IBM HTTP Server/bin</td>
<td>apachectl start</td>
<td>apachectl stop</td>
</tr>
<tr>
<td>Deployment Manager</td>
<td>IBM/WebSphere/AppServer/profiles/Dmgr01/bin</td>
<td>startManager.sh</td>
<td>stopManager.sh</td>
</tr>
<tr>
<td>Node Agent</td>
<td>IBM/WebSphere/AppServer/profiles/Custom01/bin</td>
<td>startNode.sh</td>
<td>stopNode.sh</td>
</tr>
</tbody>
</table>

To start the Administrative Console, complete the following steps:

1. Open a browser window, and enter the following URL:

   http://<machine_name>:9060/ibm/console

   Where <machine_name> is the host name of the WebSphere Application Server and 9060 is the default port number for the Administrative Console.

2. Enter a user ID to login. Until you enable security, you can login with any user ID. The user ID does not have to be a valid system user.

Securing the Administrative Console

You can secure the Administrative Console so that only authenticated users can use it. Before you can secure the console, first activate WebSphere global security. To understand your security options and for help on designing a secure system, refer to WebSphere Security Fundamentals, an IBM Redpaper written by Peter Kovari.

Once you have enabled WebSphere global security, you perform several steps to secure the console. First you identify users (or groups) that are defined in the active user registry. After you decide which users you want to access the console, you can determine their level of access by assigning roles. The roles determine the administrative actions that a user can perform. After enabling security, a user must enter a valid administrator user ID and password to access the console.

You can add users, groups, and roles by selecting the following menu paths:

- System Administration > Console settings > Console Users
- System Administration > Console settings > Console Groups
Starting and Stopping the Maximo Application Server

You can assign the following roles to users:

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor</td>
<td>Allows you to view the WebSphere configuration and current state</td>
</tr>
<tr>
<td>Configurator</td>
<td>Monitor rights plus the ability to change the WebSphere configuration</td>
</tr>
<tr>
<td>Operator</td>
<td>Monitor rights plus the ability to change the runtime state.</td>
</tr>
<tr>
<td>Administrator</td>
<td>Operator and Configurator rights</td>
</tr>
</tbody>
</table>

After you change the configuration:

- restart all the application servers
- make sure administrative users have the appropriate administrative role and login credentials

Starting and Stopping the Maximo Application Server

1. Open a browser window and enter the following URL:

   http://<machine_name>:9060/ibm/console

2. Enter an administrative user ID and password to login, if one is required.

3. From the Administrative Console’s navigation pane, click Servers > Application Servers.

4. Select the check box next to MAXIMOSERVER, the name of the Maximo application server.

5. Click Start.

6. To stop the Maximo application server, click Stop.

Configuring the Maximo Application Server in WebSphere 6.0

This section describes configuring Maximo in the WebSphere Application Server. This procedure lets you configure one or more Maximo application servers in addition to the one you created during the Maximo installation.

Chapter 23, “Multiple Maximo Configurations,” discusses some examples of different Maximo configurations.

NOTE Throughout this section MAXIMO_SERVER is the application server running Maximo. Substitute another name if appropriate. For example, if you are setting up multiple application servers, you might want to use MAXIMO_SERVER2, and so forth.
Preconfiguration Steps

These tasks are required before adding and configuring a new Maximo application server:

1. Make sure that the WebSphere Application Server, V6.0 is successfully installed. (See page 28-3)

2. Start the Node Agent. (See page 28-4)

3. Start the Network Deployment Manager. (See page 28-4)

4. Start the Administrative Console. (See page 28-4)

Creating the Maximo Application Server

1. To start the Administrative Console, open a browser window and enter the following URL:

   http://<machine_name>:9060/ibm/console

2. Enter an administrative user ID and password.

3. Click Servers > Application Servers in the navigation pane.

4. Click New in the Application Servers pane.

5. To create an application server from a server template, complete the following:
   
   ▼ Step 1: Accept the default setting for Select Node, type “MAXIMO_SERVER” in the Server name field and click Next.
   
   ▼ Step 2: Accept the default server template and click Next. Generate Unique Http Ports
   
   ▼ Step 3: Accept the default, which is to generate unique port numbers, and click Next.
   
   ▼ Step 4: Click Finish to finish creating the application server.

6. Click Save to update the master configuration.
Identifying Log Files

From the Administrative Console, you can configure these log files:

- Diagnostic Trace
- JVM Logs
- Process Logs
- IBM Service Logs

To view or update log files, complete the following steps:

1. Click **Troubleshooting > Logs and Trace** in the navigation pane.
2. Click **MAXIMO_SERVER** in the Logging and Tracing pane to display the list of logs available for MAXIMO_SERVER.
3. Click a log, for example, Diagnostic Trace or JVM Logs, to display configuration and runtime information.

You can view or edit information for these log files:

<table>
<thead>
<tr>
<th>Log Type</th>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Trace</td>
<td>trace.log</td>
<td>View and modify the properties of the diagnostic trace service.</td>
</tr>
<tr>
<td>JVM Logs</td>
<td>SystemOut.log and SystemErr.log</td>
<td>View and modify the settings for the Java Virtual Machine (JVM) logs.</td>
</tr>
<tr>
<td>Process Logs</td>
<td>native_stderr.log and native_stdout.log</td>
<td>View and modify setting for specifying the files to which standard out and standard error streams write.</td>
</tr>
<tr>
<td>IBM Service Logs</td>
<td>activity.log</td>
<td>Configure the IBM service log, also known as the activity log.</td>
</tr>
</tbody>
</table>

4. Click the Configuration tab to display log information. For example, in the JVM Logs Configuration tab, the “$(SERVER_LOG_ROOT)” parameter points to the folder location of the log file, for example:

   `$SERVER_LOG_ROOT)/SystemOut.log`

   where “$(SERVER_LOG_ROOT)” is equal to `/IBM/WebSphere/AppServer/profiles/profile_name/logs/maximo_server`

   Note “$(SERVER_LOG_ROOT)” can point to the log folder based on the server you choose.

Specifying JVM Memory Settings

This section describes how to set the initial and maximum JVM memory size in megabytes.

**NOTE**  Do not set the Java heap size to exceed the memory (RAM) of your server.

1. Click **Servers > Application Servers** in the navigation pane.
2. Click the MAXIMO_SERVER link in the Application Servers pane.
3. Under Server Infrastructure, click **Java and Process Management**.
Configuring the Maximo Application Server in WebSphere 6.0

4  Click **Process Definition**.

5  Under Additional Properties, click **Java Virtual Machine**.

6  Set the Initial Heap Size to 512 and the Maximum Heap Size to 1024, then click **OK**.

7  **For Solaris™ only** — set Generic JVM arguments to the following value:

   -XX:MaxPermSize=256

8  Click **Save** in the Messages pane to save changes to the master configuration.

9  Click **Save** again.

**Identifying the HTTP Transfer Port Numbers**

For future configurations, note the HTTP port numbers of the MAXIMO_SERVER Web container.

1  Click **Servers > Application Servers** in the navigation pane.

2  Click **MAXIMO_SERVER** in the Application Servers pane.

3  In the Configuration tab, click **Web Container Settings**.

4  Click **Web container transport chains**.

5  Record the default server port number (9088, in this example) for future reference.

**Creating the Virtual Host**

A virtual host lets a single host machine resemble multiple host machines. Each virtual host has a logical name and a list of one or more domain names system (DNS) aliases by which it is known.
1. Click **Environment > Virtual Hosts** in the navigation pane.

2. Click **New** in the Virtual Hosts pane.

3. In the General Properties section of the Configuration tab, specify the name of the virtual host for the Maximo application server (MAXIMO_SERVER). For example, type:

   `MAXIMO_SERVER_host`

4. Click **OK**, then click **Save** to save your changes to the master configuration.

5. Click **Save** again.

6. Click **MAXIMO_SERVER_host**.

7. In the Additional Properties section of the Configuration tab, click **Host Aliases**.

8. Click **New**.

   For new virtual hosts, the default host name can be * to allow any value.

   Change the port number to the IBM HTTP Server alias, for example, 80. Make sure that the IBM HTTP Server runs on this port and that the Web container uses any subsequent ports, such as 9081. The HTTP Server plug-in always uses the *first* port in this list.

9. Click **OK**, then click **Save** to save your changes to the master configuration.

10. Click **Save** again.

### Building the EAR Files

In a UNIX environment, you still need a Windows machine to host Maximo and to build the EAR files.

The three EAR files are:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximo.ear</td>
<td>for the Maximo application</td>
</tr>
<tr>
<td>maximohelp.ear</td>
<td>for the Maximo Help application</td>
</tr>
<tr>
<td>acweb.ear</td>
<td>for the Actuate Active Portal</td>
</tr>
</tbody>
</table>

### Rebuilding EAR files

You rebuild and redeploy EAR files whenever you:

- Modify .xml files or custom class files (Maximo.ear).
- Modify html Help topics (Maximohelp.ear).
- Modify settings in the maximo.properties file (Maximo.ear).
Configuring the Maximo Application Server in WebSphere 6.0

Make a backup copy before rebuilding EAR files.

1. Open a terminal window.
2. Go to the deployment folder: /mxadmin/maximo
3. Run the appropriate script:

<table>
<thead>
<tr>
<th>Script</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>./buildmaximeoar.sh</td>
<td>Creates a maximo.ear file</td>
</tr>
<tr>
<td>./buildhelpear.sh</td>
<td>Creates a maximohelp.ear file</td>
</tr>
<tr>
<td>./buildacwebear.sh</td>
<td>Creates an acweb.ear file</td>
</tr>
</tbody>
</table>

4. These scripts take several minutes to run, then displays BUILD SUCCESSFUL.

Deploying EAR Files

In this chapter, you create new Application Servers. However, deploying EAR files into existing Application Servers—redeploying—is something you do whenever you customize Maximo.

Redeploying EAR files

If you are redeploying an EAR file into an existing Application Server, first remove the old one.

1. In the Administration Console, open the Deployments node.
2. Right-click an application, for example MAXIMO, and choose Delete.
3. Click Yes to confirm.

To redeploy, continue below:

Deploying Ear Files Into the Application Server

1. Login to the WebSphere administration console, at:
   
   http://<machine_name>:9060/ibm/console

2. Enter an administrative user ID and password to login.
3. Click Applications > Install New Applications in the navigation pane.
4. Select Remote file system, then click Browse.

   In a UNIX environment, a Windows system is required to host Maximo and to build the EAR files. This is the system you browse to.

5. Navigate to your <Maximo root>\deployment\default folder.
6. Select maximo.ear and click Open in the dialog box, then click Next.
In the "Preparing for the application installation" screen, select the following then click Next:

- Generate Default Bindings
- Do not specify unique prefix
- Do not override existing bindings
- Use default virtual host name for Web modules (use the host created in "Creating the Virtual Host," on page 28-8)

The Install New Application screen displays, which contains nine Steps. Use the following table to guide you:

### Steps to install the new application

<table>
<thead>
<tr>
<th>Steps number</th>
<th>User action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Accept the default settings and click Next.</td>
</tr>
</tbody>
</table>
| Step 2       | ▼ Select all Modules.  
               ▼ From the "Servers and Clusters" list, select both MAXIMO_SERVER and the webserver.  
               ▼ Click Apply, then click Next. |
| Step 3       | Accept the default settings and click Next. |
| Step 4       | Accept the default settings and click Next. |
| Step 5       | Accept the default settings and click Next. |
| Step 6       | ▼ Select all Modules.  
               ▼ For each module select MAXIMO_SERVER_HOST from the virtual host list.  
               ▼ Click Next. |
| Step 7       | Accept the default settings and click Next. |
| Step 8       | Accept the default settings and click Next. |
| Step 9       | Review your settings, then click Finish. |

In the pane showing “Application Maximo installed successfully,” click Save to Master Configuration.

Click Save again.

To deploy the remaining EAR files, use the above procedure as your basis but make the following changes:

- substitute the appropriate EAR file and application name, as shown in the table below
- note that for the remaining EAR files, only four "specify option" steps are required, instead of nine steps to install maximo.ear
- accept the default value all four steps
**Deploy the remaining EAR files**

<table>
<thead>
<tr>
<th>EAR File</th>
<th>Application Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>maximohelp.ear</td>
<td>MAXIMOHELP</td>
</tr>
<tr>
<td>acweb.ear</td>
<td>ACTUATE</td>
</tr>
</tbody>
</table>

**Starting the Maximo Application Server**

Start the Maximo application server (MAXIMO_SERVER) you just created:

1. Restart the IBM HTTP Server to take the plug-in configuration updates. Only restart the server if you access Maximo through the IBM HTTP Server.

2. To start the Administrative Console, open Internet Explorer and enter the following URL:

   http://<machine_name>:<9060>/admin

3. Enter an administrative user ID and password to login.

4. Click **Servers > Application Servers** in the navigation pane.

5. In the Application Servers pane, check the box next to **MAXIMO_SERVER**.

6. Click **Start**.

**Load Balancing Multiple Maximo Application Servers**

Load balancing spreads the load across many servers, so that large numbers of clients can access the Maximo system.

This site provides information on WebSphere 6.0.x software issues:

http://publib.boulder.ibm.com/infocenter/ws60help/index.jsp

**Load Balancing Procedure for WebSphere 6.0**

Use **MAXIMO_SERVER** as the template for creating clustered servers.

1. Start the WebSphere Network Deployment Manager (dmgr) as follows:

   a. From a terminal window, change directory to:

      /IBM/WebSphere/AppServer/profiles/dmgr_name/bin

   b. Type the following command and press Enter:

      ./startManager.sh
2 Start the Node Agent as follows:
   a From a terminal window, change directory to:
     
     /IBM/WebSphere/AppServer/profiles/Custom_name/bin
   b Type the following command:
     
     ./startNode.sh

3 When the Node is running, you can access the Administrative Console by opening a browser window and entering the following address:

   http://<machine_name>:9060/ibm/console

Creating a Cluster and Cluster Members

Complete the following steps to create a cluster and cluster members.

1 Open the Administrative Console.

2 Click Servers > Clusters in the navigation pane.

3 Click New in the Server Cluster pane.

4 In Step 1 of the Enter Basic Cluster Information panel, perform the following actions:
   a Type MAXIMOCLUSTER in the Cluster name field.
   b Select the Prefer local box.
   c Select Do not include an existing server in this cluster button.
   d Click Next.

5 In Step 2 of the Create New Clustered Servers panel, perform the following actions:
   a Type MAXIMO_SERVER1 in the Member name field.
   b Accept the defaults in the Select Node and Weight fields.
   c Select Generate Unique Http Ports.
   d Select the Existing application server button, and choose MAXIMO_SERVER from the drop down list.
   e Click Apply.

6 To create a clustered server, repeat the actions you performed in Step 5 using MAXIMO_SERVER2 as the server name.

NOTE You do not have to perform step 5d when you create additional clustered servers, because MAXIMO_SERVER2 automatically defaults to the template you selected for MAXIMO_SERVER1.
Load Balancing Multiple Maximo Application Servers

Repeat Step 5 to create additional clustered servers.

7 Click Next.

8 Click Finish to create the cluster and clustered servers.

9 Click Save.

10 Select Synchronize changes with Nodes, then click Save again.

Update Virtual Hosts

This procedure describes how to verify port numbers used by the clustered servers. It also explains how to update the virtual host with the port number information.

A virtual host enables a single host machine to resemble multiple host machines. Each virtual host has a logical name and a list of one or more DNS aliases by which it is known.

1 To verify port numbers of the clustered application servers, perform the following actions:

a In the navigation pane, click Servers > Application Servers.

b In the Application Servers panel, click MAXIMO_SERVER1.

c Under the Communication heading, click Ports.

d Note the WC_defaulthost port for use in Step 3 below (for example, step 3-h requires that you enter a WC_defaulthost port.)

2 Repeat Step 1 for MAXIMO_SERVER2 and any other clustered servers you have created.

3 In the navigation pane, click Environment > Virtual Hosts.

Complete the following actions:

a Click New to add a new virtual host for the cluster, then enter MAXIMOCLETTER_host for the Name.

b Click Apply.

c Click Host Aliases under Additional Properties.

d Click New in the Host Alias panel to add Host name and port number values to the host aliases list.

e Enter the following:

   Host Name: *

   Port: 80 (same as port number for the IBM HTTP Server)

f Click OK.
Load Balancing Multiple Maximo Application Servers

Click **Host Aliases**, then click **New**.

Enter the following:

- **Host Name:** *
- **Port:** 9081 (same as port number for MAXIMO_SERVER1)

Click **OK**.

Click **Host Aliases**, then click **New**.

Enter the following:

- **Host Name:** *
- **Port:** 9082 (same as port number for MAXIMO_SERVER2)

Click **OK**.

Repeat Step 3 for any additional clustered servers.

To save the configuration, complete the following actions:

- Click **Save**.
- Check **Synchronize changes with Nodes**.
- Click **Save**.

**Deploy Maximo to the Cluster**

Now that you have created and configured the MAXIMOCOMUSTER, deploy your enterprise applications within the cluster.

1. In the navigation pane, click **Applications > Install New Applications**.
2. Select **Remote file system**, then click **Browse**.
   
   **NOTE** In a UNIX environment, a Windows system is required to host Maximo and to build the EAR files. This is the system you browse to.

3. Navigate to your `<Maximo root>\deployment\default` folder.
4. Select maximo.ear, then click **Open** in the dialog box. This action displays the “Preparing for the application installation” panel.
5. In the “Preparing for the application installation” screen, select the following:
   - **Overwrite default bindings**
   - **Do not specify unique prefix for beans**
   - **Do not override existing bindings**
   - **Use default virtual host name for Web modules, and enter MAXIMOCOMUSTER_host**.
6 In the Install New Application window, accept the following default settings:

<table>
<thead>
<tr>
<th>Distributed Application</th>
<th>Enable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Name</td>
<td>Maximo</td>
</tr>
<tr>
<td>Deploy enterprise beans</td>
<td>Enable</td>
</tr>
<tr>
<td>Create mBeans for Resources</td>
<td>Enable</td>
</tr>
</tbody>
</table>

7 Click **Next**.

8 In Step 2, Map modules to application servers, you map Web modules to the MAXIMO cluster. Complete the following actions:

   a From the Clusters and Servers box, select the **MAXIMO** cluster and webserver.
   
   b Check all modules boxes.
   
   c Click **Apply**.

9 In Steps 3, 4, and 5, accept the defaults and click **Next**.

10 In Step 6, complete the following actions:

   a Select all items from the Web module column.
   
   b For each Web module, select **MAXIMOCLUSTER_host** from the Virtual host list.
   
   c Click **Next**.

11 In Steps 7 and 8, accept the defaults and click **Next**.

**NOTE** If you are a MEA customer, there is an additional step. Just accept the default and click **Next**.

12 In the final step, review your settings then click **Finish**.

   The deployment process takes several minutes to complete.

13 In the confirmation page, when you see the message “Application Maximo installed successfully,” perform the following actions:

   a Click **Save to Master Configuration**.
   
   b Select **Synchronize changes with Nodes**.
   
   c Click **Save**.
Start the MAXIMO Cluster and IBM HTTP Server

Complete the following steps:

1. In the navigation pane, click Servers > Clusters.

2. Select MAXIMOCLUSTER, then click Ripplestart.

3. Start the IBM HTTP server by navigating to the /HTTPServer folder and typing:

   apachectl start

4. To access the cluster, open HTTP://<node name>:<port>/maximo

   where <port> is the port number of the IBM HTTP server.

Optimizing Performance of Maximo in the Application Server

Refer to the Support Online Knowledge Base for these topics:

- Startup Mode
- Java Virtual Machine Tuning
- Application Server Scalability
- Queues & Threads
Maximo clients communicate to application servers using the Hypertext Transfer Protocol (HTTP). Maximo can also be configured to take advantage of the more secure protocol, Hypertext Transfer Protocol Secure (HTTPS).

If Maximo clients exist outside the corporate network, you can add a firewall or other security measure. Firewalls are configured to allow communication over HTTP (typically Port 80) or HTTPS (typically Port 443). The following information is generic and does not reflect any particular firewall brand.

Secure Socket Layer (SSL) Overview

Secure socket layer provides secure connections over a network connection by doing the following:

- allowing two applications to authenticate each other’s identity
- encrypting the data exchanged between the two applications

Authentication allows a server and optionally a client to verify the identity of the application on the other end of a network connection. Encryption makes data transmitted over the network intelligible only to the intended recipient.

IBM WebSphere and BEA WebLogic support SSL, and IBM Corporation has certified the SSL implementation with the Maximo-WebSphere and Maximo-BEA WebLogic integration.

Configuring Secure Socket Layer

To implement SSL, a Web server must have an associated certificate for each external interface (IP address) that accepts secure connections.

After you install the certificate on the Web server, replacing the “http” with “https” encrypts a session between the browser and server.

For example:

http://Maximo App Servername

should instead be entered as:

https://Maximo App Servername

The standard port for HTTPS is 443.
If a Proxy server or Firewall controls network traffic, this port and protocol must be opened. SSL comes with some additional overhead for encryption and decryption of data. Encryption and decryption can affect performance.

*Example of Maximo Using HTTP Over a Firewall*
A single database can contain data in multiple languages, which lets diverse users run Maximo in their native language. By default, multiple languages is enabled for:

- Data Dictionary tables
- the Company and Item objects
- Maximo messages

For information on running reports in multiple languages, refer to the Report Administration and Development Guide. This guide is available on the Documentation CD.

**NOTE**

The MAXATTRIBUTE table tells you which tables and columns are:

- multiple language supported (MLSUPPORTED=1)
- multiple language enabled (MLINUSE=1).

To view tables and columns enabled for multiple language, open a SQL editor and type:

```
select objectname,attributename from maxattribute where mlinuse= 1;
```

These tables and columns are multiple language enabled by default.

**Multiple Language Tables**

<table>
<thead>
<tr>
<th>TABLES</th>
<th>COLUMNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALNDOMAIN</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>COMPANIES</td>
<td>NAME_LONGDESCRIPTION</td>
</tr>
<tr>
<td>COMPANIES</td>
<td>NAME</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION_LONGDESCRIPTION</td>
</tr>
<tr>
<td>ITEM</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXAPPS</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXDOMAIN</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXSERVICE</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXMENU</td>
<td>HEADERDESCRIPTION</td>
</tr>
<tr>
<td>MAXMESSAGES</td>
<td>VALUE</td>
</tr>
<tr>
<td>MAXMESSAGES</td>
<td>BUTTONTEXT</td>
</tr>
</tbody>
</table>
Enabling Multiple Languages on Objects and Attributes

You can enable multiple languages on objects or attributes.

**Objects**

1. In the Database Configuration application, select the object (for example, ASSET or LOCATIONS) you want to enable for multiple languages.

2. In the Objects tab, specify a value for the **Language Table**. The convention is `L_<objectname>`.

3. Save the record.

   This procedure creates an object for the language object, and enables the **Is Language Table**.

**Attributes**

1. In the Database Configuration application, select the attribute you want to enable for multiple languages.

2. From the Attributes tab, verify that **Multilanguage Supported** is selected.

3. Select the **Multilanguage in Use** check box to identify the attributes you want to enable for multiple languages.

---

<table>
<thead>
<tr>
<th>TABLES</th>
<th>COLUMNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXOBJECTCFG</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXOBJECT</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXLABELS</td>
<td>VALUE</td>
</tr>
<tr>
<td>MAXMODULES</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>MAXATTRIBUTE</td>
<td>REMARKS</td>
</tr>
<tr>
<td>MAXATTRIBUTE</td>
<td>TITLE</td>
</tr>
<tr>
<td>MAXATTRIBUTECFG</td>
<td>REMARKS</td>
</tr>
<tr>
<td>MAXATTRIBUTECFG</td>
<td>TITLE</td>
</tr>
<tr>
<td>REPORT</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>REPORTLABEL</td>
<td>COLUMNWIDTH</td>
</tr>
<tr>
<td>REPORTLABEL</td>
<td>FONTNAME</td>
</tr>
<tr>
<td>REPORTLABEL</td>
<td>FONTSIZE</td>
</tr>
<tr>
<td>REPORTLABEL</td>
<td>LABELVALUE</td>
</tr>
<tr>
<td>SIGOPTION</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>SYNONYMDOMAIN</td>
<td>DESCRIPTION</td>
</tr>
</tbody>
</table>

Enabling multiple languages on an object or table creates a secondary table connection. For example, `L_ITEM` is the secondary table for the ITEM object.
Enabling Multiple Languages on Objects and Attributes

**NOTE** Most of the Maximo attributes do not support multiple languages. For example, description fields in ITEM and COMPANIES support multiple languages, while description fields in transaction applications like WO, PO, PR, RFQ, and INVOICE do not.

4 Configure the database. For more details, see "Configuring the Database," on page 4-25.

The language tables are empty until you populate them with data. Maximo provides a toolset to export and import all translatable strings via XML files. For more information, see the following section.

### Displaying Non-English Characters

Install additional language files if you find that foreign language characters do not display consistently in the Maximo UI.

Install the files only if you need them, because they require hard disk space and may slow performance when you enter text.

#### Additional Language Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Languages files installed</th>
<th>Disk space required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install files for East Asian languages</td>
<td>Chinese, Japanese, and Korean</td>
<td>230 MB</td>
</tr>
<tr>
<td>Install files for complex script and right-to-left languages (including Thai)</td>
<td>Arabic, Armenian, Georgian, Hebrew, the Indic languages, Thai, and Vietnamese</td>
<td>10 MB</td>
</tr>
</tbody>
</table>

**NOTE** Certain fonts do not support foreign language characters. Example: Veranda does not support East Asian characters.

1 From the Start menu, choose Settings > Control Panel > Regional and Language Options.

2 Click the Languages tab.

3 Select the files you want to install.
4  Click OK or Apply.

5  Reboot the machine.

**Multiple Language Utilities**

These utilities are used to:

- Populate multiple language tables and columns with translated string data using `exportlang.bat` and `importlang.bat`.

- Ensure consistency between translation strings, using the unique IDs match.

- Switch base languages, for example, changing the original base language English (EN) to French (FR) by using the `resetbaselang.bat` utility.
These utilities are located in the Maximo\Tools\Maximo folder.

Language Utilities

<table>
<thead>
<tr>
<th>Utility</th>
<th>Usage</th>
</tr>
</thead>
</table>

Running exportlang.bat

The export utility produces an XML file, containing strings of the base language and the languages selected for translation. Translation occurs through an automated translation system or manual edits to the XML file.

The XML tag includes:

- Table name
- Record identifier
- Text string of translatable field in base language
- Text string of translatable field in other languages

Each text field contains the column name, language code, and maxlength. Maxlength defines how many characters are permitted in a field. The base language is always included as a reference for the translator.

The exportlang.bat batch file supports these attributes:

- **-outfile <path and filename of xml file>** (defaults to export.xml if not specified)

- **-propfile <path to maximo.properties file>** (defaults to the .properties file of MAXIMO file structure)

- **-t [TABLENAME]:[COLUMNNAME1, COLUMNNAME2]**

- **-l <language code 1> -l <language code 2>**
Multiple Language Utilities

Example 1

This example is the most common usage of the exportlang.bat utility. Everything (all translatable values for all tables) is exported.

    exportlang.bat -outfile C:\TEMP\FR_ES.XML -l FR -l ES

Example 2

This example requires you to know which columns are translatable.

    exportlang.bat -outfile C:\TEMP\MAXATTRIBUTE.XML -t MAXATTRIBUTE:<column name> -l FR -l ES

Example 3

Here, the maximo.properties file resides in a different directory than the multiple language utilities. The file path is passed in the -propfile parameter.

    exportlang.bat -outfile C:\TEMP\MAXAPPS.XML -propfile C:\Maximo\applications\maximo\properties\maximo.properties -t MAXAPPS -l FR -l ES

You defined specific languages for inclusion in the exported XML file. If the –l switch is not specified; only the base language is included.

If the –l switch is not already in the database, the code creates an XML file with placeholders for that language. All language values are contained the literal “null” string.

Example of XML Code

    <?xml version="1.0" encoding="UTF-8"?>
    <DATABASE src="jdbc:oracle:thin:@localhost:1521:TGDB2">
    <TABLE name="MAXATTRIBUTE">
    <RECORD OBJECTNAME="ACCOUNTDEFAULTS" ATTRIBUTENAME="ACCOUNTDEFAULTSID">
    <TEXT column="REMARKS" lang="EN" maxlength="4000">Unique Identifier</TEXT>
    <TEXT column="REMARKS" lang="FR" maxlength="4000">null</TEXT>
    </RECORD>
    </TABLE>
    </DATABASE>
Running importlang.bat

Importlang.bat populates the corresponding Maximo multiple language table with data from the XML file. The import.bat batch file is used as follows:

- **-infile** <path and filename of xml file>
- **-propfile** <path to maximo.properties file>
- **-l** <language code 1> -l <language code 2>

**Example**

This example shows the most common importlang.bat usage.

```
importlang.bat -infile C:\temp\MAXATTRIBUTE.xml -l FR -l ES
```

Running deletelang.bat

Run this utility to delete a language from the database. You cannot delete the base language.

All table data is automatically removed from the corresponding multiple language tables.

**Example**

```
deletelang.bat -l FR
```

Running resetbaselang.bat

Run this utility to switch base languages. Example: from English (EN) to French (FR).

The language code is passed as a parameter, and resetbaselang.bat uses the import file language strings to populate the base language strings. This file deletes the current base language and imports a new language from the XML file.

To make the current base language a secondary language:

1. Export the base language.
2. Run the resetbaselang.bat utility.
3. Reimport the original base language.

**Example**

```
resetbaselang.bat -infile c:\temp\fr.xml -l FR
```
Importing a Secondary Language

Run the importlang.bat utility to import a secondary language on your Maximo system. For more information about the importlang.bat utility, see "Running importlang.bat," on page A-7.

Example

The following example shows how to add French as a secondary language on your system:

```
importlang -infile C:\temp\fr.xml -propfile C:\maximo62\applications\maximo\properties\maximo.properties -l FR
```

**NOTE**

If you do not define the -propfile parameter, the importlang.bat utility uses the maximo.properties file from your Maximo directory.

After you run the importlang.bat utility, the secondary language appears as a link option on the Maximo sign in page.

Tracking and Translating New Records in the Base Language

If your Maximo system has multiple language implementations, you must track and perform translations on new Maximo records. No auto-translation takes place and therefore, by default, Maximo stores your new records in the base language only.

To translate your Maximo records to the secondary language, choose one of the following two options:

- Translate each record in the localized Maximo application.

  **NOTE** Individual record translations should take place only on Maximo implementations that require only a small number of translations.

- Translate your Maximo records via the resultant XML file from the exportlang.bat utility.

Translation via the Maximo Application

To translate your Maximo records to the secondary language via the Maximo application, complete the following steps:

1. Sign in to your Maximo application which contains the secondary language implementation.

2. Open the respective Maximo application that houses the records in question. For example, from the Maximo Start Center select Go To > Inventory > Item Master.
3 Select each record that you want to edit. For example, in the Item Master application, type in an item number in the Item field and press Enter.

4 Change the record and click Save Item. Maximo saves the changes to Maximo secondary language ITEM table.

Translation via the exportlang.bat XML File

To translate your Maximo records to the secondary language via the XML file, complete the following steps:

1 Run the exportlang.bat utility against the table that contains the Maximo records that need translation. For more information about the exportlang.bat utility, see "Running exportlang.bat," on page A-5.

Example

The following example illustrates that this particular Maximo system uses English as the base language and French as the secondary language.

exportlang -outfile item.xml -t ITEM -l EN -l FR

The exportlang.bat utility exports English and French data from the ITEM and L_ITEM tables into the item.xml file.

2 Open your XML file and search for the string >null<. Records that contain the null string value are the records that require the secondary language entry.

Example

The following portion of item.xml file contains two lines for each ITEMNUM. The first entry is for the English base language environment. The second for the French secondary language environment.

```
<RECORD ITEMSETID="SET1" ITEMNUM="NewITEM1">
  <TEXT column="DESCRIPTION" lang="EN" maxlength="100">Item description entered in English</TEXT>
  <TEXT column="DESCRIPTION" lang="FR" maxlength="100">null</TEXT>
</RECORD>
```

Replace the null value with a French ITEMNUM description.

3 Run the importlang.bat utility to import the data from the altered XML file into the corresponding Maximo language tables. For more information about the importlang.bat utility, see "Running importlang.bat," on page A-7.

Example

In the following example, the importlang.bat utility imports English and French data from the modified item.xml file into the Maximo multiple language ITEM tables.

importlang -infile item.xml -t ITEM -l EN -l FR
If your Maximo system has multiple language implementations, you must track and perform translations on Maximo system table customizations.

Some Maximo system tables that you can customize include:

**Maximo System Table Examples**

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXATTRIBUTE</td>
<td>Stores information associated with individual Maximo object attributes.</td>
</tr>
<tr>
<td>MAXLABELS</td>
<td>Stores Maximo application labels that are associated with individual application fields.</td>
</tr>
<tr>
<td>MAXMENU</td>
<td>Stores Maximo menu values associated with individual Maximo applications.</td>
</tr>
<tr>
<td>MAXMESSAGES</td>
<td>Stores Maximo application messages that are associated with popup boxes and buttons.</td>
</tr>
</tbody>
</table>

No auto-translation takes place and therefore, by default, Maximo stores your system table customizations in the base language only. You translate your Maximo customizations via the XML file from the exportlang.bat utility.

**Translation via the exportlang.bat XML File**

To translate your customized Maximo table contents to the secondary language via the XML file, complete the following steps:

1. Run the exportlang.bat utility against the Maximo system table that contains the customizations that need translation. For more information about the exportlang.bat utility, see "Running exportlang.bat," on page A-5.

**Example**

The following example illustrates that this particular Maximo system uses English as the base language and French as the secondary language.

    exportlang -outfile maxlables.xml -t maxlabels -l EN -l FR

The exportlang.bat utility exports English and French data from the MAXLABELS table into the maxlabels.xml file.

**NOTE** If you have customized the MAXATTRIBUTE, MAXMENU and/or the MAXMESSAGES tables, reference the appropriate table name in the exportlang.bat utility parameter.
2  Open your XML file and search for the string >null<. Records that contain the null string value are the records that require the secondary language entry.

Example

The following portion of maxlabels.xml file contains two lines for each asset label. The first entry is for the English base language environment. The second for the French secondary language environment.

```xml
</RECORD><RECORD APP="ASSET" PROPERTY="label"
ID="new1_label_id">
<TEXT column="VALUE" lang="EN" maxlength="4000">A new label in English</TEXT>
<TEXT column="VALUE" lang="FR" maxlength="4000">null</TEXT>

You replace the null value with a French asset label.

3  Run the importlang.bat utility to import the data from the altered XML file into the corresponding Maximo table. For more information about the importlang.bat utility, see "Running importlang.bat," on page A-7.

Example

In the following example, the importlang.bat utility imports English and French data from the modified maxlabels.xml file into the MAXLABELS table.

`importlang -infile maxlabels.xml -t maxlabels -l EN -l FR`
Tracking and Translating Customizations in the Base Language
Maximo.properties is a configuration file, located in the <Maximo root> applications\Maximo\properties folder.

If you change this file, rebuild and redeploy the Maximo EAR file. For details, see:

▼ (Windows) "Building EAR Files," on page 25-8.
▼ (UNIX) "Building EAR Files," on page 26-8.

Maximo.Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.name</td>
<td>The application server binding the application server object to the RMI registry. The default name is MXServer.</td>
</tr>
<tr>
<td>mxe.hostname</td>
<td>Name of the machine and port hosting the application server. Used by Workflow to attach documents to email.</td>
</tr>
<tr>
<td>mxe.rmi.port</td>
<td>RMI communication port. If set at zero, RMI uses any available port. You can select another available port number.</td>
</tr>
<tr>
<td>mxe.allowLocalObjects</td>
<td>Set to true in production environments, to improve Maximo performance. Set to false for development work, or for custom Maximo applications. The default is false.</td>
</tr>
<tr>
<td>mxe.useAppServerSecurity</td>
<td>By default you use Maximo security, so the value is false. Set to true if you configure Maximo to use Application Server provided security.</td>
</tr>
<tr>
<td>mxe.MLCacheLazyLoad</td>
<td>By default, the multi-language metadata cache loads one object at a time. Set this flag to 1 to load all objects simultaneously for one language.</td>
</tr>
<tr>
<td>mxe.UserLicenseKey</td>
<td>The product enabler (license key) is used during installation. If the product enabler changes this value must be updated.</td>
</tr>
</tbody>
</table>
### Database Related Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.db.schemaowner (IBM DB2)</td>
<td>Owner of the database schema. For IBM DB2, the default owner name is maximo.</td>
</tr>
<tr>
<td>mxe.db.schemaowner (Oracle)</td>
<td>Owner of the database schema. For Oracle, the default owner name is maximo.</td>
</tr>
<tr>
<td>mxe.db.schemaowner (SQL Server)</td>
<td>Owner of the database schema. For SQL Server, the ownername must be dbo.</td>
</tr>
<tr>
<td>mxe.db.driver (IBM DB2)</td>
<td>The thin driver defined in mxe.db.driver. mxe.db.driver=com.ibm.db2.jcc.DB2Driver</td>
</tr>
<tr>
<td>mxe.db.driver (Oracle)</td>
<td>The thin driver defined in mxe.db.driver. For example: mxe.db.driver=oracle.jdbc.driver.OracleDriver</td>
</tr>
<tr>
<td>mxe.db.driver (SQL Server)</td>
<td>The thin driver defined in mxe.db.driver. For SQL Server, the driver name must be: mxe.db.driver=com.inet.tds.TdsDriver</td>
</tr>
<tr>
<td>mxe.db.url (IBM DB2)</td>
<td>The default URL is: mxe.db.url=jdbc:db2://localhost:50000/dbalias Where dbalias is the name of your database.</td>
</tr>
<tr>
<td>mxe.db.url (Oracle)</td>
<td>The default URL is: mxe.db.url=jdbc:oracle:thin:@dbserver:1521:sid where dbserver is the server name of your database server, 1521 is your default Oracle port number, and sid is your Oracle system identifier.</td>
</tr>
<tr>
<td>mxe.db.url (SQL Server)</td>
<td>The default is: server name, port number, database name defined as: mxe.db.url=jdbc:inetdae7a:servername:1433?database=databasename&amp;language=us_english&amp;nowarnings=true where you would substitute your database server name, and database name for the italicized values, and 1433 is your default SQL Server port number. NOTE: The string mxe.db.url=jdbc:inetdae can be followed by either 7 (supports Unicode) or 7a (supports ASCII). Currently, Maximo only supports ASCII for SQL Server.</td>
</tr>
<tr>
<td>mxe.db.user (IBM DB2)</td>
<td>Database user the server uses to attach to the database server. For IBM DB2, this user must be an O/S user.</td>
</tr>
</tbody>
</table>
### Database Related Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.db.user (Oracle)</td>
<td>Database user the server uses to attach to the database server. This user must be the schema owner. The default is maximo.</td>
</tr>
<tr>
<td>mxe.db.user (SQL Server)</td>
<td>Database user the server uses to attach to the database server. For SQL Server, this user must have a system administrator role as defined via sp_addsrvrolemember. For example: mxe.db.user = MAXIMO.</td>
</tr>
<tr>
<td>mxe.db.password</td>
<td>Password for the database user name.</td>
</tr>
<tr>
<td>mxe.db.initialConnections</td>
<td>Number of database connections to create when the Application Server is started. The default value is 15.</td>
</tr>
<tr>
<td>mxe.db.maxFreeConnections</td>
<td>Maximum number of free database connections available in the connection pool. The default value is 30.</td>
</tr>
<tr>
<td>mxe.db.minFreeConnections</td>
<td>Minimum number of free database connections needed in the connection pool in order for more connections to be allocated. The default value is 10.</td>
</tr>
<tr>
<td>mxe.db.newConnectionCount</td>
<td>Number of new connections to be created when the minimum free connections are available in the connection pool. The default value is 5.</td>
</tr>
<tr>
<td>mxe.db.transaction_isolation</td>
<td>The Maximo install sets the value to TRANSACTION_READ_COMMITTED. This value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.format.upper</td>
<td>This value defines the database uppercase function for Maximo. The default value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.format.date</td>
<td>This value tells Maximo the database date function. A value of &quot;none&quot; tells Maximo to pass through the date value. The default value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.format.time</td>
<td>This value tells Maximo the database time function. A value of &quot;none&quot; tells Maximo to pass through the time value. The default value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.format.timestamp</td>
<td>This value tells Maximo the database time stamp function. A value of &quot;none&quot; tells Maximo to pass through the time stamp value. The default value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.autocommit</td>
<td>This value sets the autocommit mode used for the Write connections. Can be either true or false. The default is false, and the default value cannot be edited.</td>
</tr>
<tr>
<td>mxe.db.systemdateformat (IBM DB2)</td>
<td>System date format. For IBM DB2, the value is current timestamp.</td>
</tr>
<tr>
<td>mxe.db.systemdateformat (Oracle)</td>
<td>System date format. For Oracle, the value is sysdate, and the default value cannot be edited.</td>
</tr>
</tbody>
</table>
### Workflow Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| `mxe.db.systemdateformat` (SQL Server) | System date format. For SQL Server, the value is `getdate()`.
| `mxe.db.format.nullvalue` (IBM DB2) | The database-specific format of the nullvalue function. For IBM DB2 the value is `COALESCE`, and the default value cannot be edited.
| `mxe.db.format.nullvalue` (Oracle) | The database-specific format of the nullvalue function. The value for Oracle is `NVL`, and the default value cannot be edited.
| `mxe.db.format.nullvalue` (SQL Server) | The database-specific format of the nullvalue function. The value for SQL Server must be set to `ISNULL`.
| `mxe.db.sqlserverPrefetchRows` (SQL Server only) | Setting to reduce lock contention. Optimal setting is 200 rows. Setting a value larger than 500 might degrade performance.
| `mxe.adminuserid` | The Maximo administrative user. Used by the server for administrative tasks and to run cron tasks. This user must have access to all Sites in Maximo.
| `mxe.system.reguser` | User registration login name for registering a new user. User name specified must have permission to create new users. This value is asked for during installation.
| `mxe.system.regpassword` | User registration login password. This value is asked for during installation.
| `mxe.adminEmail` | E-mail address used if the Maximo user has not specified an e-mail address in the labor record. This value is asked for during installation.
| `mail.smtp.host` | Name of the host running the SMTP server. This name is needed for facilities that make use of e-mail such as Workflow notifications, Actuate e-mailing, and any error message notifications. Your network administrator can provide this address.

---

You can also refer to the *IBM Maximo Workflow Implementation Guide* for additional information.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>mxe.workflow.admin</code></td>
<td>E-mail account of the Workflow administrator.</td>
</tr>
</tbody>
</table>
Reorder Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.reorder.previewtimeout</td>
<td>The reorder preview time out period (in minutes), which should be similar to the Web server session time out. The default value is 30 minutes.</td>
</tr>
</tbody>
</table>

Security Properties

Maxtype CRYPTO identifies attributes that can be encrypted and decrypted. Maxtype CRYPTOX identifies attributes that can be encrypted, but not decrypted. Each of these maxtypes has its own means of encryption, the parameters for which are defined in the properties file.

Parameters identified as mxe.security.crypto... are for the CRYPTO maxtype, and parameters identified as mxe.security.cryptox... are for the CRYPTOX maxtype.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.security.provider</td>
<td>The security provider is obtained from the policy file, which is normally com.sun.crypto.provider.SunJCE. To use a different provider, you can specify a value for this parameter.</td>
</tr>
<tr>
<td>mxe.security.crypto.mode</td>
<td>The following mode components are valid (OFB must use NoPadding):</td>
</tr>
<tr>
<td></td>
<td>CBC: Cipher Block Chaining Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>CFB: Cipher Feedback Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>OFB: Output Feedback Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>PCBC: Propagating Cipher Block Chaining, as defined by Kerberos V4.</td>
</tr>
<tr>
<td>mxe.security.crypto.padding</td>
<td>The following padding components are valid:</td>
</tr>
<tr>
<td></td>
<td>NoPadding: No padding.</td>
</tr>
<tr>
<td>mxe.security.crypto.key</td>
<td>Its length must be a multiple of 24.</td>
</tr>
<tr>
<td>mxe.security.crypto.spec</td>
<td>Its length must be a multiple of 8.</td>
</tr>
</tbody>
</table>
Debugging Properties

With release 6.2, Maximo the mbocount, logSQLTimeLimit and the fetchResultLogLimit logging utilities are enabled in the maximo.properties file by default. These utilities enable you to track the following possible Maximo performance issues while configuring an initial Maximo deployment:

- Excessive use of Maximo Business Objects
- Slow execution of SQL Statements
- High number of records returned in a query result

These features are for testing and debugging purposes. When you are satisfied with your Maximo deployment, you can turn off the Maximo performance logging. To disable the logging utilities, modify the maximo.properties file to the settings indicated in the following table.

NOTE In order for the configuration file changes to take effect, rebuild the Maximo EAR file and restart the application server.

### Property Name Description

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.metadb</td>
<td>Displays the number of mbo objects created by the server.</td>
</tr>
<tr>
<td></td>
<td>The default is YES.</td>
</tr>
<tr>
<td></td>
<td>To disable, edit the file to read <strong>mxe.metadb=NO</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>mxe.security.cryptox.mode</td>
<td>The following mode components are valid (OFB must use NoPadding):</td>
</tr>
<tr>
<td></td>
<td>CBC: Cipher Block Chaining Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>CFB: Cipher Feedback Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>ECB: Electronic Codebook Mode, as defined in The National Institute of</td>
</tr>
<tr>
<td></td>
<td>Standards and Technology (NIST) Federal Information Processing Standard</td>
</tr>
<tr>
<td></td>
<td>(FIPS) PUB 81, &quot;DES Modes of Operation,&quot; U.S. Department of Commerce, Dec</td>
</tr>
<tr>
<td></td>
<td>1980.</td>
</tr>
<tr>
<td></td>
<td>OFB: Output Feedback Mode, as defined in FIPS PUB 81.</td>
</tr>
<tr>
<td></td>
<td>PCBC: Propagating Cipher Block Chaining, as defined by Kerberos V4.</td>
</tr>
<tr>
<td>mxe.security.cryptox.padding</td>
<td>The following padding components are valid:</td>
</tr>
<tr>
<td></td>
<td>NoPadding: No padding.</td>
</tr>
<tr>
<td></td>
<td>PKCS5Padding: The padding scheme described in: RSA Laboratories,</td>
</tr>
<tr>
<td>mxe.security.cryptox.key</td>
<td>Its length must be a multiple of 24.</td>
</tr>
<tr>
<td>mxe.security.cryptox.spec</td>
<td>Its length must be a multiple of 8.</td>
</tr>
</tbody>
</table>
### Additional Debugging Parameter

If you decide to use this parameter, you must manually add it to maximo.properties.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.db.logSQLTimeLimit</td>
<td>Maximo logs the SQL statements that take longer than the specified time limit. The time is measured in milliseconds (thousandths of a second). The default is 1000 milliseconds. To disable, edit the file to read mxe.db.logSQLTimeLimit=0</td>
</tr>
<tr>
<td>mxe.db.fetchResultLogLimit</td>
<td>When this setting is enabled, a stack trace is printed in the maximo log for every business object set that fetches beyond the set limit of rows. The stack trace log is also repeated for every multiple of such fetches. The default is 200 rows. To disable, edit the file to read mxe.db.fetchResultLogLimit=0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.debug.spid=yes</td>
<td>Add this parameter if you want log files to include user names and process ID. This lets you trace SQL statements and blocks to specific users. For IBM DB2 database only: to trace users you need permission to access the SYSIBM.SYSDUMMY1 table. For Oracle database only: to trace users you need permission to access the v$session table. Go to &lt;Maximo root&gt; applications\Maximo\properties\logging.properties, and make sure log4j.maximo.sql=INFO.</td>
</tr>
</tbody>
</table>
Actuate Report Server Properties

### Property Name | Description
---|---
mxe.report.actuate.reportserver | This URL is the URL of the Report iServer including port number. **NOTE:** If you enter a machine name, the end user must enter that same machine name in their browser to access Maximo. If you enter an IP address, the end user must enter that same IP address to access Maximo.
mxe.report.actuate.portalHost | This URL is the URL of the active portal server, including port number and folder. For example, http://production:8090/acweb
mxe.report.actuate.iServer | This URL is the URL of the mxe.report.actuate.reportserver machine. For example: http://iServer:8000
mxe.report.actuate.db.connectstring (IBM DB2) | The alias defined for the IBM DB2 database.
mxe.report.actuate.db.connectstring (Oracle) | The Oracle connect string of the Actuate server that runs reports. This value is populated during the installation program.
mxe.report.actuate.db.connectstring (SQL Server) | The data source name of the Actuate server that runs reports. The default value is maximo.
mxe.report.actuate.rootEncycFolder | This value is the root name of the Actuate encyclopedia folder. For example, rpt.
mxe.report.actuate.rsseAlias | The alias name of the RSSE (Report Server Security Extension). RSSE allows you to direct your Actuate server to an external security system for all authentication and security information. The default is localhost.
mxe.report.actuate.multiServer | Set this flag to yes when you are in a multi server environment.

### Cron Task Manager Property

In this section, list the cron task instances which you do **not** want to run.

### Property Name | Description
---|---
mxe.crontask.donotrun | Use ALL to exclude all cron tasks from running. To exclude a specific cron task from running, specify the instance by crontaskname.instancename.
## E-Signature Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.esig.defaultuserid</td>
<td>Set this flag to true if you want the Esignature login dialog to default to the login ID. The default value is true.</td>
</tr>
</tbody>
</table>
Additional Maximo.Properties
File Descriptions

The additionalmaximo.properties file lets you add optional features to Maximo. This configuration file is located in the <Maximo root> applications\Maximo\properties folder.

Additional properties are kept separate so they are not lost when you import a new maximo.properties file.

CAUTION Importing a new maximo.properties overwrites your changes, so you have to use the following procedure to restore your changes.

Usage

To add any additional maximo properties:

1 Edit the properties you want to add. Example: to prevent multiple logins on the same user account, set:

   mxe.enableConcurrentCheck=true

2 Copy the edited sections from additionalmaximo.properties into maximo.properties.

3 Rebuild and redeploy your maximo.ear file. For details, see:

   ▼ (Windows) "Building EAR Files," on page 25-8.

   ▼ (UNIX) "Building EAR Files," on page 26-8.
## Additional Maximo Properties

<table>
<thead>
<tr>
<th>Property name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.db.logSQLPlan</td>
<td>Setting this property to <strong>true</strong> logs the execution plan for all SQL statements containing a full table scan.</td>
</tr>
<tr>
<td>(Oracle only)</td>
<td></td>
</tr>
<tr>
<td>▼ If you define mxe.db.sqlTableScanExclude (as shown in the next example under the Property name column) Maximo logs all the tables except for the ones you intentionally exclude.</td>
<td></td>
</tr>
<tr>
<td>▼ If you do not define mxe.db.sqlTableScanExclude, Maximo logs only the SQL statements that exceed the time limit set in mxe.dblogSQLTimeLimit.</td>
<td></td>
</tr>
<tr>
<td>mxe.db.sqlTableScanExclude=</td>
<td>You can define the table names which you want to exclude from the log. The table names must be UPPER case.</td>
</tr>
<tr>
<td>ACTION,MAXROLE,</td>
<td></td>
</tr>
<tr>
<td>SCCONFIG,MAXUSER</td>
<td></td>
</tr>
<tr>
<td>(Oracle only)</td>
<td></td>
</tr>
<tr>
<td>▼ If you define mxe.db.sqlTableScanExclude, Maximo will log all the tables except for the ones you list.</td>
<td></td>
</tr>
<tr>
<td>▼ If you do not define mxe.db.sqlTableScanExclude – but you do set mxe.db.logSQLPlan=true – Maximo logs only the SQL statements that exceed the time limit set in mxe.dblogSQLTimeLimit.</td>
<td></td>
</tr>
<tr>
<td>mxe.enableConcurrentCheck</td>
<td>Setting this property to <strong>true</strong> prevents multiple logins on the same user account.</td>
</tr>
<tr>
<td>mxe.dbmanager</td>
<td>This references the Java class of the Maximo database manager. The default value is psdi.server.DBManager.</td>
</tr>
<tr>
<td></td>
<td>If you have an Oracle database requiring proxy authentication, set this property to psdi.server.OracleProxyDBManager. This also requires you to:</td>
</tr>
<tr>
<td></td>
<td>▼ Specify the jdbc database connection string as the oci connection string</td>
</tr>
<tr>
<td></td>
<td>▼ Make the Oracle oci driver accessible to the Maximo Web component JVM</td>
</tr>
<tr>
<td>mxe.db.proxyauthentication.mode</td>
<td>The oracle proxy authentication mode is only valid when you are using Oracle Proxy DataBase Manager. Values include:</td>
</tr>
<tr>
<td></td>
<td>▼ 1 = username</td>
</tr>
<tr>
<td></td>
<td>▼ 2 = username + password</td>
</tr>
<tr>
<td></td>
<td>▼ 3 = distinguished name (DN)</td>
</tr>
<tr>
<td></td>
<td>▼ 4 = certificate</td>
</tr>
</tbody>
</table>
Security Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.security.crypto.algorithm</td>
<td>Algorithm is the basic type of encryption used by Maximo. Crypto properties are used for maximo datatype (maxtype) CRYPTO.</td>
</tr>
<tr>
<td></td>
<td>The mxe.security.crypto.algorithm property can override the algorithm default value (DESede).</td>
</tr>
<tr>
<td>mxe.security.crypto.modulus</td>
<td>Modulus is used only for the RSA algorithm. Crypto properties are used for maximo datatype (maxtype) CRYPTO.</td>
</tr>
<tr>
<td>mxe.security.cryptox.algorithm</td>
<td>Algorithm is the basic type of encryption used by Maximo. Cryptox properties are used for maxtype CRYPTOX (an undecryptable version of crypto).</td>
</tr>
<tr>
<td></td>
<td>The mxe.security.cryptox.algorithm property can override the algorithm default value (DESede).</td>
</tr>
<tr>
<td>mxe.security.cryptox.modulus</td>
<td>Modulus is used only for the RSA algorithm. Cryptox properties are used for maxtype CRYPTOX (an undecryptable version of crypto).</td>
</tr>
</tbody>
</table>

Additional encryption algorithms

The default encryption algorithm is DESede with Sun as the provider. However, some customers require a stronger algorithm for encryption.

For these customers, an alternate algorithm can be configured within the additional.properties file. Different properties can be configured for the CRYPTO and CRYPTOX data types.

The following table lists supported encryption algorithms:

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Provider</th>
<th>Additional comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES</td>
<td>Cryptix, Sun</td>
<td>For Sun, must use mode = ECB.</td>
</tr>
<tr>
<td>Blowfish</td>
<td>BouncyCastle, Cryptix</td>
<td></td>
</tr>
<tr>
<td>CAST5</td>
<td>Cryptix</td>
<td></td>
</tr>
<tr>
<td>DES</td>
<td>Cryptix, Sun</td>
<td></td>
</tr>
<tr>
<td>DESede</td>
<td>Cryptix, Sun</td>
<td></td>
</tr>
<tr>
<td>IDEA</td>
<td>Cryptix</td>
<td></td>
</tr>
<tr>
<td>MARS</td>
<td>Cryptix</td>
<td></td>
</tr>
<tr>
<td>PBEWithMD5AndDES</td>
<td>Sun</td>
<td>For Sun, must use CBC and PKCS5Padding; key must be 8 bytes long.</td>
</tr>
<tr>
<td>PBEWithSHA1AndDES</td>
<td>BouncyCastle</td>
<td></td>
</tr>
<tr>
<td>RC4</td>
<td>BouncyCastle, Cryptix</td>
<td></td>
</tr>
<tr>
<td>RC6</td>
<td>Cryptix</td>
<td></td>
</tr>
</tbody>
</table>
## Additional Maximo Properties

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Provider</th>
<th>Additional comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rijndael</td>
<td>Cryptix</td>
<td>Uses ECB and NoPadding (or empty string for mode and padding); spec is the private exponent, key is the public exponent.</td>
</tr>
<tr>
<td>RSA</td>
<td>BouncyCastle</td>
<td></td>
</tr>
<tr>
<td>Serpent</td>
<td>Cryptix</td>
<td>Spec length must be a multiple of 10.</td>
</tr>
<tr>
<td>SKIPJACK</td>
<td>Cryptix</td>
<td></td>
</tr>
<tr>
<td>Square</td>
<td>Cryptix</td>
<td></td>
</tr>
<tr>
<td>Twofish</td>
<td>Cryptix</td>
<td></td>
</tr>
</tbody>
</table>
### Maximo-BusinessObjects Integration Properties

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mxe.report.bo.db.connectstring</td>
<td>The Maximo database connection string (Oracle) or ODBC DSN (SQL Server) on the BusinessObjects™ Enterprise server.</td>
</tr>
<tr>
<td>Default: mxe.report.bo.db.connectstring=MAXIMO.</td>
<td></td>
</tr>
<tr>
<td>mxe.report.bo.db.databaseName</td>
<td>The database name for the Maximo database.</td>
</tr>
<tr>
<td>(SQL Server, only)</td>
<td>Default: MAXIMO</td>
</tr>
<tr>
<td>mxe.report.bo.serverURL</td>
<td>The URL of the BusinessObjects Enterprise server, including port number and folder. Maximo uses this URL to access the bocrystal.war Web application.</td>
</tr>
<tr>
<td>Default URL: <a href="http://BOserver:8080/bocrystal">http://BOserver:8080/bocrystal</a></td>
<td></td>
</tr>
<tr>
<td>mxe.report.bo.rootFolder</td>
<td>The BusinessObjects Enterprise root folder name.</td>
</tr>
<tr>
<td>Default: rpt.</td>
<td></td>
</tr>
<tr>
<td>mxe.report.bo.rptServerLogonName</td>
<td>The BusinessObjects Enterprise logon name. This user must have specific rights to any report you access from Maximo.</td>
</tr>
<tr>
<td>Default: maximo.</td>
<td></td>
</tr>
<tr>
<td>Default: maximo.</td>
<td></td>
</tr>
<tr>
<td>mxe.report.bo.cmsName</td>
<td>Unless you changed the name of the Central Management Server (CMS) when you installed BusinessObjects Enterprise, this property is the name of the server where you installed BusinessObjects Enterprise and the server port number. To verify the correct values, open the CMC Logon page and check the System field.</td>
</tr>
<tr>
<td>Default: CMS port number:6400.</td>
<td></td>
</tr>
<tr>
<td><strong>Administrative console</strong></td>
<td>A Web-based browser client that provides a Graphical User Interface (GUI) for administration. The administrator connects to the application using a Web browser client.</td>
</tr>
<tr>
<td><strong>Application Server</strong></td>
<td>An application server is the software that occupies the middle tier between the back-end database and the front-end browser-based clients. With respect to Maximo, application server has two meanings:</td>
</tr>
<tr>
<td></td>
<td>▼ The commercial application server product—for example, the WebSphere application server or the BEA WebLogic application server.</td>
</tr>
<tr>
<td></td>
<td>▼ The deployment unit you configure within WebSphere or BEA WebLogic to run an instance of the application. WebSphere names this unit “application server;” BEA WebLogic names this unit “server.” Within WebSphere or BEA WebLogic, you can configure multiple application servers.</td>
</tr>
<tr>
<td><strong>Application server profile</strong></td>
<td>The Application Server in the WebSphere Network Deployment product can run in a deployment manager cell as a managed node or on its own as a stand-alone Application Server. It does not provide clustering, workload management, or central administration capabilities. The Application Server has read-only access to the system files, which include command files and other core product files. System files are updated only by installing fix packs or products that extend WebSphere Application Server Network Deployment.</td>
</tr>
<tr>
<td><strong>Attached Documents</strong></td>
<td>Use the Maximo Attached Documents application to attach Word documents, PDF files, Web page URLs, diagrams, pictures, and other types of documents to individual Maximo records. See &quot;Attached Documents Administration and Configuration,&quot; on page 22-1.</td>
</tr>
<tr>
<td><strong>Attachment Types</strong></td>
<td>▼ Normal – any file type the mail server allows (examples: .bmp, .jpg, .pdf, .txt, or .dat).</td>
</tr>
<tr>
<td></td>
<td>▼ Embedded or Inline – a file copied into the body of the message (for example: a screen capture of an error message).</td>
</tr>
<tr>
<td><strong>Cell</strong></td>
<td>A grouping of nodes into a single administrative domain. In the application server configuration, a cell contains one node which can have multiple servers, but the configuration files for each server are stored and maintained individually. In a deployment manager configuration, a cell can consist of multiple nodes all administered from a single point. The Deployment Manager manages the central repository of configuration and application files which it synchronizes with local copies held on each of the nodes.</td>
</tr>
<tr>
<td><strong>Communication Log</strong></td>
<td>Stores details (including graphics) related to SRs.</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>The name by which a Web application is accessed within the Application Server. The one place a user actually enters a context name is in entering the</td>
</tr>
</tbody>
</table>
URL to access the Maximo user interface. For example, in the following URL, Maximo is the context name:

http://maxhost:7001/maximo

Cluster
A group of two or more BEA WebLogic servers running simultaneously and working together to provide increased scalability and reliability. You can set up multiple servers running the same instance of Maximo. A redirector server should be created to distribute the work load to the multiple servers.

Custom node profile
A custom node is an empty node until you add it to the deployment manager cell for customization. Use the administrative console of the deployment manager to create servers and clusters on the custom managed node. Consider the custom node as a production-ready shell, ready for customization to contain your production-level servers and applications.

Data Dictionary
The database stores metadata in the data dictionary area, which describes the objects, attributes, tables, columns, indexes, and other items that comprise a database.

Deployment manager profile
The deployment manager provides centralized administration of custom nodes, and provides basic clustering and cache support, including workload balancing.

Delimiters
In an incoming e-mail subject line, identifies new and existing requests. To change the default, modify the value of the Object Key Delimiter field.

Domain
Contains one or more servers and is the basic administrative unit. In a multiple server domain, one server must be configured as the Administration Server to host the Administration Console for that domain. In a single server domain the single server functions as the Administration Server by default. Server names within a domain must be unique.

EAR File
Enterprise Application Archive (EAR) file. An EAR file is an archive that contains all the files required to run an application based on J2EE™ specifications. EAR files consist of module archive files, such as WAR files and JAR files.

GL
General Ledger.

IBEP
(InBound E-mail Processing) A standard Workflow dedicated to processing e-mail records in the E-mail Listener staging table.

IBM HTTP Server
A Web server that you can use as a front end to WebSphere Application Servers via the Web server plug-in. This server is required if you use attached documents in Maximo.

IE Browser
Microsoft Internet Explorer Web browser.

IMAP
(Internet Message Access Protocol) A standard protocol for accessing e-mail from your local server; your Internet server receives and holds e-mail for you. Lets you (or your e-mail client) view only the heading and sender of the message and decide whether to download it.
<table>
<thead>
<tr>
<th>J2EE</th>
<th>Java 2 platform, Enterprise Edition (J2EE). J2EE is the specification developed by Sun for building distributed enterprise applications. An application based on J2EE can have various modules, such as Web applications and Enterprise Java Bean modules.</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAR File</td>
<td>Java ARchive (JAR) file. A platform-independent file format that aggregates many files into one. Multiple applets written in the Java programming language and their components can be bundled in a JAR file and downloaded to a browser in a single HTTP transition.</td>
</tr>
<tr>
<td>JavaMail</td>
<td>The Sun Microsystems Java-based mail management framework, part of the Maximo distribution.</td>
</tr>
<tr>
<td>JCE</td>
<td>The Sun Microsystems Java Cryptography Extension.</td>
</tr>
<tr>
<td>JSP file</td>
<td>JavaServer Page (JSP) is a technology for controlling the content or appearance of Web pages through the use of servlets. Servlets are programs that are specified in the page and run on the server to modify the page before it is sent to the user.</td>
</tr>
<tr>
<td>JVM</td>
<td>The Sun Microsystems Java Virtual Machine.</td>
</tr>
<tr>
<td>Metadata</td>
<td>Data that describes the structure of the data within the database. If you know how data is structured, you can retrieve it.</td>
</tr>
<tr>
<td>MBO</td>
<td>(Pronounced “may-bo”) A unit of Java code that executes a specific Maximo function and acts on the Maximo database table of the same name. Example: the Purchase Order MBO creates, approves, and cancels purchase orders. It updates the Maximo PO table.</td>
</tr>
<tr>
<td>Module</td>
<td>A self-contained software component, such as a WAR file that interacts with a larger unit. In Maximo, one or more modules comprise an EAR file.</td>
</tr>
<tr>
<td>Node Agents</td>
<td>Node agents are administrative agents that route administrative requests to servers.</td>
</tr>
<tr>
<td>Object</td>
<td>Objects can be tables or views. A database table stores several objects; each has different business rules. For example, a ticket table defines Incident, Problem, and Ticket business objects.</td>
</tr>
<tr>
<td>PO</td>
<td>Purchase order.</td>
</tr>
<tr>
<td>POP3</td>
<td>(Post Office Protocol 3) A protocol used for downloading e-mail messages from an e-mail server to your computer. A POP3 mail server stores all messages sent to your e-mail address until you log on to the server and download the messages.</td>
</tr>
<tr>
<td>Preprocessor</td>
<td>The Java component that parses the Subject line of any incoming e-mail.</td>
</tr>
<tr>
<td>Profile</td>
<td>A profile is a separate data partition that includes the files that define a runtime environment for an application server process.</td>
</tr>
<tr>
<td>Relationship</td>
<td>Associations between database objects.</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement.</td>
</tr>
<tr>
<td><strong>SR</strong></td>
<td>(Service Request) This record is a ticket you create to track and capture information and determine what further action is needed.</td>
</tr>
<tr>
<td><strong>SSO</strong></td>
<td>Single Sign On. Lets users authenticate with the directory once for all the applications allowed.</td>
</tr>
<tr>
<td><strong>View</strong></td>
<td>You can create a view to filter irrelevant data. It can contain parts of one or more tables.</td>
</tr>
<tr>
<td><strong>XML</strong></td>
<td>Extensible Markup Language.</td>
</tr>
<tr>
<td><strong>UI</strong></td>
<td>User interface.</td>
</tr>
<tr>
<td><strong>WAR File</strong></td>
<td>Web Application Archive (WAR) file. A WAR file is an archive that comprises Java servlets and classes, JavaServer Pages (JSP), and other resources.</td>
</tr>
<tr>
<td><strong>Web Application</strong></td>
<td>An application you view from a browser. Maximo comprises an integrated set of Web applications—the graphical user interface, the business components, the Help system and several Actuate reporting components. These applications are built using J2EE technology</td>
</tr>
<tr>
<td><strong>Web Server</strong></td>
<td>Software that provides access to Web applications or Web pages.</td>
</tr>
<tr>
<td><strong>Web Server plug in</strong></td>
<td>Provides the front-end for WebSphere Application Servers. The plug-in provides load balancing among WebSphere Application Server clusters.</td>
</tr>
</tbody>
</table>
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