

**Intel®**

# **Deployment Manager 3.1**

by VERITAS OpForce™

**User's Guide**

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25 September 2003

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# Preface

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Intel® Deployment Manager by VERITAS OpForce™ automates administrative tasks involved with controlling, provisioning, and updating Intel Server Chassis and Server Compute Blades within sophisticated, heterogeneous IT environments. These tasks include discovering and recording hardware and software inventory, tracking software licenses, provisioning blade servers, setting up networks and storage, and setting up administrative and user access.

Traditionally, each of these IT administration activities is handled by different functional groups within an organization. As each task is completed, there is a hand-off to another group who then starts the next set of activities, and so on, until servers, networking, storage, operating systems, and applications are ready for specific use. Intel Deployment Manager closes the gaps in the way computers, networks, and storage are managed today and helps you eliminate the manual hand-off between groups within the enterprise by automating and streamlining IT administration activities.

## About this Document

This guide describes the initial setup of Intel Deployment Manager, the Intel Deployment Manager user interface, and procedures for IT management tasks on Intel Server Chassis and blade servers.

## Audience

This guide is intended for use by system engineers, system administrators, network engineers, network administrators, data center operators, and IT and system engineers.

## What's in this Guide?

This guide includes the following sections:

- ◆ *Introduction to Intel Deployment Manager* introduces the product by describing its functions within the IT environment, and by describing key concepts used throughout the guide.
- ◆ *VERITAS OpForce Enterprise Edition* describes the VERITAS OpForce Enterprise Edition and tells you how to upgrade.
- ◆ *Getting Started* describes how to initially configure Intel Deployment Manager, and how to log in to the user interface.
- ◆ *Workflows* provides a look at some basic tasks that can be performed.
- ◆ *Users, Roles, and Access Policies* describes how to set users, roles, and access policies to control user permissions and capabilities for accessing various components of the user interface.
- ◆ *Automatic Detection* provides information about automatic hardware and OS (Operating System) discovery.
- ◆ *Using Snapshots* describes how to save snapshots and the various actions that you can perform with snapshots.
- ◆ *Configuring Devices* provides procedures for configuring computing devices that are managed by Intel Deployment Manager.
- ◆ *Intel Server Chassis and Server Compute Blades* shows you how to prepare an Intel Server Chassis and Server Compute Blades for management by Intel Deployment Manager, and provides management procedures for the blade servers.
- ◆ *Managing Computing Devices* describes the tasks that you can perform using the maintenance, power, and console menus.
- ◆ *Using Software* describes how to create and deploy applications, patches, scripts, utilities, and other types of software on blades.
- ◆ *Creating and Scheduling Jobs* describes how you can add and use jobs using client-side scripts on blades.
- ◆ *Applying Licenses* describes how to track application and operating system licenses for provisioned managed servers.
- ◆ *Organizing Networks* describes how to set up networks to be managed by Intel Deployment Manager.
- ◆ *Workspaces* describes actions that can be performed using workspaces. A *workspace* is a collection of all the resources that you can use.
- ◆ *Using System Storage* describes how to add and allocate storage to store snapshots and software.

- ◆ *Drivers and Plug-ins* describes how to use drivers to enable device-specific functionality.
- ◆ *Custom Log and Events* describes the types of events logged, and how to view the events in the custom log.
- ◆ *Appendix A: System States* provides of system states for servers.
- ◆ *Appendix B: Constraints and the Constraints Editor* describes constraints, how to use the constraints editor, and how you can apply constraints to snapshots and computing devices.
- ◆ *Appendix C: Third Party Software License Agreements* lists all of the third-party software license agreements.

## Related Documents

The Intel Deployment Manager documentation set includes this guide and the:

- ◆ *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation Guide for Red Hat Linux\**
- ◆ *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation guide for Windows\**
- ◆ *Online Help*

## Conventions

Typeface	Usage	Examples
monospace	Computer output, files, directories, account names, roles, permissions, events, event types, workspaces, software elements such as command options, function names, and parameters	Read tunables from the <code>/etc/vx/tunefstab</code> file. You must have the Full Control permission.
<b>monospace (bold)</b>	User input	<code># mount - vxfs /h/filesys</code>
<i>italic</i>	New terms, book titles, emphasis, variables replaced with a name or value	See the <i>User's Guide</i> for details. The variable <code>vxfs_ninode</code> determines the value of...
<b>Palatino (Bold)</b>	GUI objects (buttons, labels, categories, field names, selections)	Click <b>OK</b> . Enter the IP address in the <b>IP Address</b> field.

Symbol	Usage	Examples
\$	Bourne/Korn/Bash shell prompt	
#	Superuser prompt (all shells)	
\	Continued input on the following line; you do not type this character	<code># mount - vxfs \ /h/filesys</code>
[ ]	In a command synopsis, brackets indicates an optional argument	<code>ls [ -a ]</code>
	In a command synopsis, a vertical bar separates mutually exclusive arguments	<code>mount [ suid nosuid ]</code>
blue text	Indicates an active hypertext link. In PDF and HTML files, click on links to move to the specified location	<a href="http://www.veritas.com">http://www.veritas.com</a>

# Introduction to Intel Deployment Manager

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This chapter provides an introduction to Intel® Deployment Manager by VERITAS OpForce™, and presents key concepts.

## Introduction

Intel Deployment Manager enables you to optimize the utilization of your existing IT infrastructure by implementing on-demand computing services. With Intel Deployment Manager, you can easily perform any of the following operations:

- ◆ Auto-discover your Intel Server Compute Blades in the bare-metal state (no OS available), as well as in the deployed state.
- ◆ Create server pools that can be shared among multiple network segments.
- ◆ Rapidly deploy and provision servers in a multi-network environment.
- ◆ Create system snapshots that contain a complete software environment (OS, applications, network settings and personalization information) for your servers.
- ◆ Manage your server snapshots with built-in powerful cataloging and profiling capabilities.
- ◆ Remotely access and manage your Intel Server Chassis and Intel Server Compute Blades.
- ◆ Deploy applications, OS patches, and quickly upgrade BIOS, Firmware, and RAID configurations on multiple systems.
- ◆ Standardize on an integrated provisioning tool for your Linux\* and Windows\* environments.

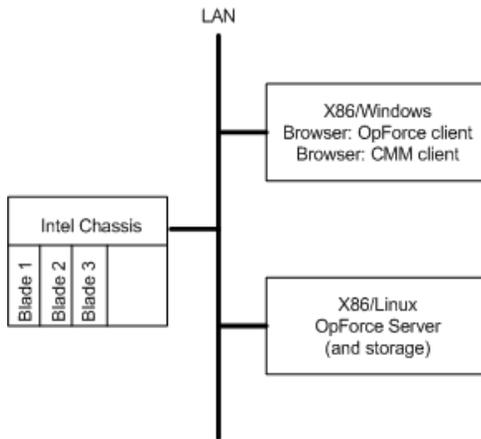
In addition, Intel Deployment Manager provides you with a hardware inventory of your Intel Server Chassis and Intel Server Compute Blades, reports, and detailed event logs. Moreover, its role-based administration capabilities allow you to divide and compartmentalize server management tasks among your system administrators.

The Intel Deployment Manager server runs on Linux and Windows platforms, and supports deployment, provisioning and configuration of Intel Server Compute Blades.

## Intel Deployment Manager

In a simple, single-network configuration, your Intel Deployment Manager environment might look something like that shown in the following figure. In this case, the Intel Deployment Manager server is on the same LAN as the Intel Server Chassis and Intel Server Compute Blades it manages.

### Intel Deployment Manager Implementation



The Intel Deployment Manager server can run on either an x86 Linux or x86 Windows system. See the Prerequisites chapter in the *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation Guide for Red Hat Linux* or the *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation guide for Windows* for specific information about supported platforms and releases.

Optionally, you might set up a separate storage server to store snapshots. The storage is made available to Intel Deployment Manager through NFS or a Windows share.

# Key Concepts

This section provides an overview of some key concepts, features, and terminology used by Intel Deployment Manager.

## Network Boot Protocols

*Network Boot Protocols* enable the server to obtain network personalization information and a boot image over the network. Intel Deployment Manager supports the Preboot eXecution Environment (PXE) DHCP.

When a server starts up it requires configuration information as it loads an image into RAM. The server does not initially contain networking information, such as the IP address, subnet mask, or domain name. Each of these items, typically referred to as *Network Personalization*, must be supplied before the OS can use TCP/IP.

## Bare Metal Server Discovery

*Bare Metal Server Discovery* refers to the discovery of new Intel Server Compute Blades that do not have an available operating system.

See “[Intel Server Chassis and Server Compute Blades](#)” on page 107 for additional information.

## Admin State

A server is considered to be in an ADMIN State if it is under the control of *ActiveOS*. Valid operations for servers in the ADMIN State include:

- ◆ Save Snapshot
- ◆ Provision Server
- ◆ Startup
- ◆ Load Server
- ◆ Load & Startup
- ◆ Deploy Software
- ◆ Reboot to Admin State
- ◆ Reset
- ◆ Rediscover Asset Attributes
- ◆ Reconnect
- ◆ Console > Open

## ActiveOS

The *ActiveOS* is a self-contained “memory resident” OS used by Intel Deployment Manager to perform automatic hardware attribute and OS detection, as well as snapshot deployment and capture. For IA32 and other x86 architecture-based servers ActiveOS is a Linux-based OS.

The ActiveOS collects various hardware attributes from the server, such as system-type, CPU-speed, motherboard, chipset, number and size of hard disks, memory, and network card parameters. Some of these attributes are determined by examining the system’s SMBIOS. Others are determined by examining the NICs and hard disks attached to the system.

## Blade Server Asset

A *blade server asset* refers to an Intel Deployment Manager object that represents a physical server. An Intel Server Compute Blade that is running ActiveOS in memory (not running a disk OS) is a blade server asset. For Intel Deployment Manager, the term *server asset* can be used interchangeably with *blade server asset*—they refer to the same thing.

## Server

*Server* refers to an Intel Deployment Manager object that represents a virtual server. In the user interface, when you provision a server, you are defining a virtual server template with a snapshot name, hardware attributes, and personalization information (that is, hostname and network information). After the snapshot has been copied to the server and that server has booted the disk OS with the personalized information, you have a server that is considered provisioned or deployed in the selected network

## ITAP Agent

An Intel Deployment Manager *ITAP Agent* is installed on the server after it is re-booted. The ITAP agent enables the following operations:

- establishes communication with the Intel Deployment Manager server
- deploys software package(s)
- allows remote access
- executes scripts
- performs hardware attribute detection
- performs network personalization

## Snapshot

A *snapshot* is a comprehensive software package containing:

- The software environment that is deployed on a server asset. This includes the OS, applications, and the data stored on the blade server's hard disks.
- A set of meta-information (attributes) needed to successfully and reliably deploy a snapshot on a server asset. Attributes include: hard disk type, number of hard disks, size of each hard disk, hard disk partition map, master boot record, BIOS, firmware information, and RAID settings.

## Incremental Snapshot

An *incremental snapshot* contains the changes since the last full or incremental snapshot of a server asset. A full snapshot that provides a base is required before you can perform incremental snapshots.

## Constraints

*Constraints* are a set of rules or expressions that describe where and how you can use an object.

## Storage

A storage area is the network location or share where snapshots and other objects are saved.

## Workspace

An arbitrary collection or group of Intel Deployment Manager objects or resources. You can assign an object to a workspace, as well as control access to any workspace.

## Network

A representation of a real network of computers. Components include objects such as IP address, mask, gateway, domain name, and so on.

## Personalization

The process of giving a unique hostname and network identity to each Intel Server Compute Blade that is being provisioned.

## Provisioning

The process of specifying a snapshot and personalization information for a server asset so that the server can be provisioned for its intended use.

## **Software Deployment**

The process of running code or a script to deploy software on a server.

This chapter describes the VERITAS OpForce Enterprise Edition and tells you how to upgrade to it.

## Enterprise Edition

Intel Deployment Manager by VERITAS OpForce focuses specifically on the management of Intel Server Chassis and Intel Server Compute Blades. Other OpForce features are available only in the Enterprise Edition.

In addition to Intel Server Chassis and Intel Server Compute Blades, the VERITAS OpForce Enterprise Edition can manage most of the devices shown in the figure “[OpForce Enterprise Edition Managed Data Center](#)” on page 9, as well as the network itself. VERITAS OpForce Enterprise Edition features include:

- ◆ Intel, Dell, Compaq, and Sun server chassis management
- ◆ Intel® Server Compute Blades, and Dell, Compaq, and Sun blade management
- ◆ support for managing the provisioning of IA32 and other x86 architecture non-blade servers, Linux, Windows, IBM® PPC/AIX®, and Sun® SPARC®/Solaris™ servers
- ◆ the VERITAS OpForce server can run on a Sun Solaris, Linux, or Windows platform
- ◆ support for manual addition of managed and unmanaged assets
- ◆ VLAN Switches: Cisco IOS® and CatOS switch management
- ◆ F5 BigIP® load balancer management
- ◆ BayTech™ Remote Power Controller management (remote power management through the Intel Server Chassis is supported in Intel Deployment Manager by VERITAS OpForce)
- ◆ discovery of servers through PXE, RARP or bootp requests
- ◆ live server discovery
- ◆ Remote Desktop Access (access to the KVM on Intel Server Chassis is supported Intel Deployment Manager by VERITAS OpForce)

- ◆ ability to add, import, and export scripts (Intel Deployment Manager by VERITAS OpForce comes with two canned scripts (start/stop multiple servers—these scripts can be modified to perform any operation available in the Enterprise Edition)
- ◆ Provisioning SDK/API

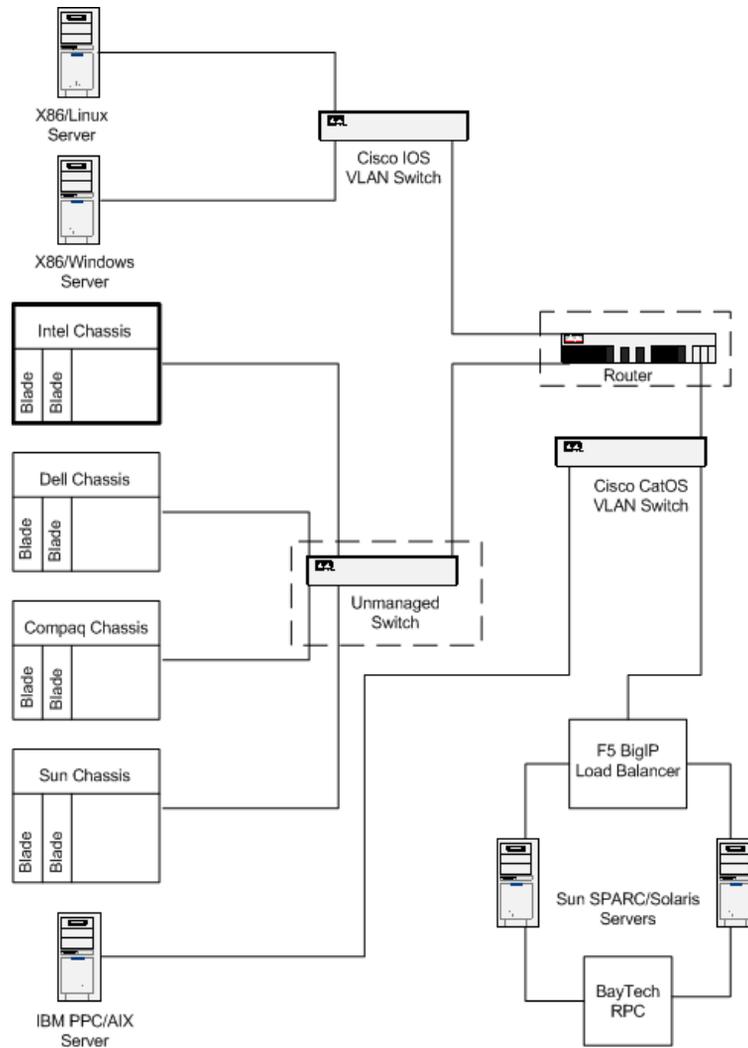
---

**Note** Routers are not managed by the VERITAS OpForce Enterprise Edition. You can choose whether or not to manage a switch. The devices enclosed in dotted-line boxes in the figure are not managed by Intel Deployment Manager Enterprise Edition.

---

The following figure illustrates a data center infrastructure managed by OpForce.

## OpForce Enterprise Edition Managed Data Center



## How to Upgrade to the Enterprise Edition

Contact VERITAS Software Corporation for information about upgrading to the VERITAS OpForce Enterprise Edition, or go to:

<http://www.veritas.com/products/category/ProductDetail.jhtml?productId=itautomation>.

You will receive one or two product keys when upgrading to VERITAS OpForce Enterprise Edition. Enter the product key(s) as follows:

1. Click **Settings**
2. Click the **Product Keys** tab.
3. Click **Action** > **Add**, and enter the product key.
4. Repeat [step 2](#) if you have received two product keys (the keys can be entered in any order).
5. Logout, then log back in to OpForce.

This chapter describes how to get started using Intel Deployment Manager. It briefly describes installation requirements, how to obtain a product key, how to log in to the administration console (user interface), and how to perform initial setup tasks. It includes the following topics:

- ◆ “[Installing Intel Deployment Manager](#)” on page 11
- ◆ “[Licensing Intel Deployment Manager](#)” on page 12
- ◆ “[Logging into Intel Deployment Manager](#)” on page 12
- ◆ “[Administration Console](#)” on page 13
  - “[Header](#)” on page 14
  - “[Navigation Area](#)” on page 14
  - “[Display Area](#)” on page 14
- ◆ “[Setting Up Intel Deployment Manager](#)” on page 15
  - “[Setup Wizard](#)” on page 16

## Installing Intel Deployment Manager

Select an appropriate system to install the Intel Deployment Manager server on. In a simple setup (as illustrated in the figure “[Intel Deployment Manager Implementation](#)” on page 2,) the Intel Deployment Manager server should be on the same LAN as the Intel Server Chassis and blade servers.

- ◆ If you want to install Intel Deployment Manager on a Windows system see *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation guide for Windows* for system requirements and the installation procedure.
- ◆ If you want to install Intel Deployment Manager on a Red Hat Linux system see *Intel® Deployment Manager 3.1 by VERITAS OpForce™ Installation Guide for Red Hat Linux* for system requirements and the installation procedure.

## Licensing Intel Deployment Manager

An Intel Deployment Manager product key is required for each platform Intel Deployment Manager runs on: Windows or Red Hat Linux. This product key is required to log in to Intel Deployment Manager for the first time.

To get a product key to manage Intel Server Chassis and any number of Intel compute blade servers, go to <http://www.veritas.com/opforcelicense> and provide your contact information. A product key will be emailed to you within a few minutes.

## Logging into Intel Deployment Manager

You can use one of the following web browsers to display the administration console:

- Internet Explorer 5.0 (or higher)
- Netscape 6.2.3 (or higher)
- Mozilla 1.0 (or higher)

To log in to the administration console:

1. Bring up your browser and enter the URL for the Intel Deployment Manager server. Use the fully qualified domain name or IP address. For example:  
**`http://Intel_Deployment_Manager_server.yourcompany.com`**.

---

**Note** If you reassigned the Intel Deployment Manager web server port numbers during the installation process, you need to specify the port number in the URL. For example:

**`http://Intel_Deployment_Manager_server.yourcompany.com:8080`**

---

2. If you have not yet licensed Intel Deployment Manager, the **Product Key** page is displayed. You can enter the product key and click **Add and Done**. Then, the Intel Deployment Manager login screen is displayed.

---

**Note** When adding the product keys, you can avoid typos by copying and pasting the provided key string.

---

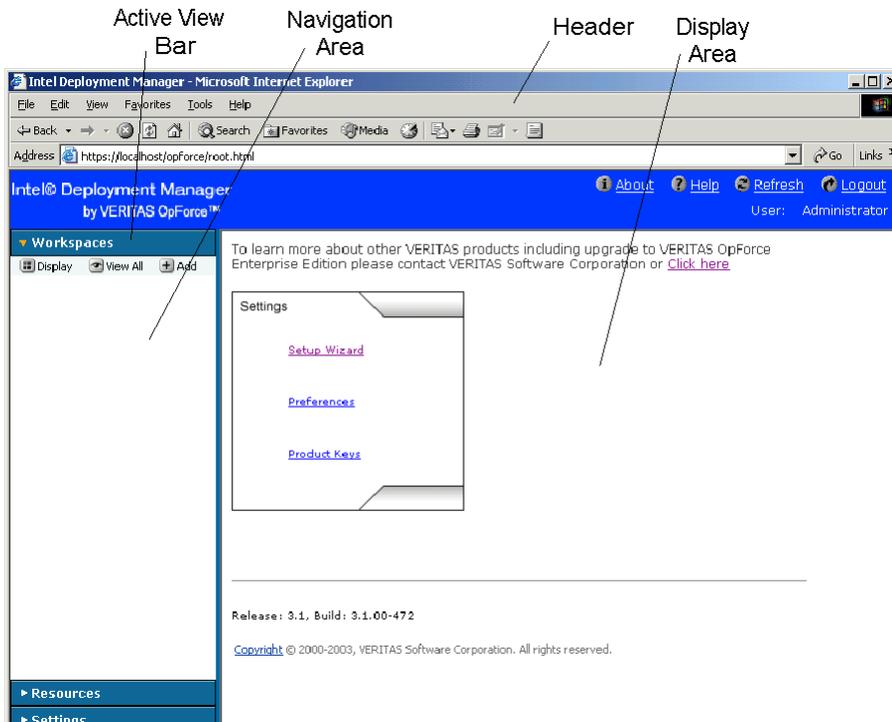
3. If a security certificate is presented, accept the certificate for an HTTPS secure session.

4. Log in with a valid user ID and password. The user ID and password are case-sensitive.
  - If you are using default authentication you can log in as Administrator. The default password is sysadmin. You should change the Administrator password right away to maintain security.
  - If you are using LDAP (Lightweight Directory Access Protocol) server for authentication, enter the LDAP user ID and password. Contact your system administrator if you do not have an LDAP user ID and password.
5. The administration console appears upon successful login.

## Administration Console

The administration console is divided into the following areas: the Header, Navigation Area, and Display Area. In the following figure, the administration console is shown with the **Resources** section open.

Intel Deployment Manager Administration Console



## Header

The Header section of the Administration Console displays the Intel Deployment Manager logo and the **About**, **Help**, **Refresh**, and **Logout** buttons. When you click the Intel Deployment Manager logo, it takes you to the main page. The user name that you used when logging in is also displayed in the header.

## Navigation Area

The Navigation Area displays three sections: **Workspaces**, **Resources**, and **Settings**. All Intel Deployment Manager components and their respective tasks are divided among these three categories.

The **Workspaces** category defines the various work areas that can be used by different users. Every workspace also holds all the resources assigned to it.

The **Resources** category consists of all the resources that are administered and managed by Intel Deployment Manager. These resources should also be accessible by the user, depending on their permissions. You can also assign or unassign resources to various workspaces using the **Actions** menu within **Resources**.

The **Settings** category allows you to customize Intel Deployment Manager to your requirements. You can

- ◆ add or delete users and storage
- ◆ define user roles and access policies
- ◆ load and unload drivers
- ◆ set preferences
- ◆ view the custom log, task manager, and the Intel Deployment Manager product keys

## Display Area

The Display Area contains primary category tabs across the top of the area, such as **Discovered**, **Server Assets**, and **Chassis Assets**. The menu bar, positioned below the primary category tabs, displays various menus depending on the component you are working with. Selecting an option from one of these menus displays a dialog that enables you to perform an action on system elements, like changing or updating settings.

Tables appear in the Display Area after you click a system component in the Navigation Area. You can sort tables by clicking on the column headers. See the chapter, “[Using Tables](#)” on page 17 for detailed information about manipulating tables.

## Setting Up Intel Deployment Manager

The following are tasks you should perform when initially setting up Intel Deployment Manager.

1. Add a Network. See [“Add/Edit Network”](#) on page 158.
2. Set up storage for snapshots and software. See [“Using System Storage”](#) on page 169.
3. Define ranges of IP addresses for use by Intel Deployment Manager during provisioning of Intel Server Compute Blades. See [“IP Lists”](#) on page 161.
4. Prepare the Intel Server Chassis and Server Compute Blades for discovery by Intel Deployment Manager. See [“Preparing an Intel Server Chassis”](#) on page 108.
5. Accept the Intel Server Compute Blades, and power-cycle them so that Intel Deployment Manager can start managing them. (See [“Accepting Intel Server Compute Blades”](#) on page 115.) When you refresh the page, you’ll see the server status change to UPDATE DONE.
6. Take full snapshots of your Intel Server Compute Blades or import existing snapshots. See [“Save Snapshot of a Computing Device”](#) on page 28 and [“Creating a Snapshot for a Windows Server”](#) on page 117.
7. Provision servers using your snapshots. See [“Provisioning Servers”](#) on page 30.

Optionally, you can perform other setup tasks such as:

- ◆ Setting up workspaces. See [“Workspaces”](#) on page 165.
- ◆ Setting up users, user roles and access policies. See [“Users, Roles, and Access Policies”](#) on page 53.
- ◆ Setting up OpScripts and jobs. See [“Creating and Scheduling Jobs”](#) on page 141.
- ◆ Set up server templates for use in provisioning. See [“Server Templates”](#) on page 45.

For specific information about working with Intel Server Chassis and Intel Server Compute Blades, see [“Intel Server Chassis and Server Compute Blades”](#) on page 107.

## Setup Wizard

You can use the Setup Wizard to guide you through some of the basic Intel Deployment Manager configuration such as adding a workspace, users, user roles, access policies, network, IP list and a storage device. Additional information about operations that can be performed from the Setup Wizard is available from online help.

To use the Setup Wizard from the administration console: Click the **Setup Wizard** icon in the Display Area on the main page upon login. (You can also click on the upper-left corner of the administration console header to return to the main page that contains the Setup Wizard icon.)

This chapter includes the following topics:

- ◆ “[Table Options](#)” on page 18
- ◆ “[Active Filters](#)” on page 20
- ◆ “[Sorting Table Columns](#)” on page 21
- ◆ “[Export Table Data](#)” on page 22

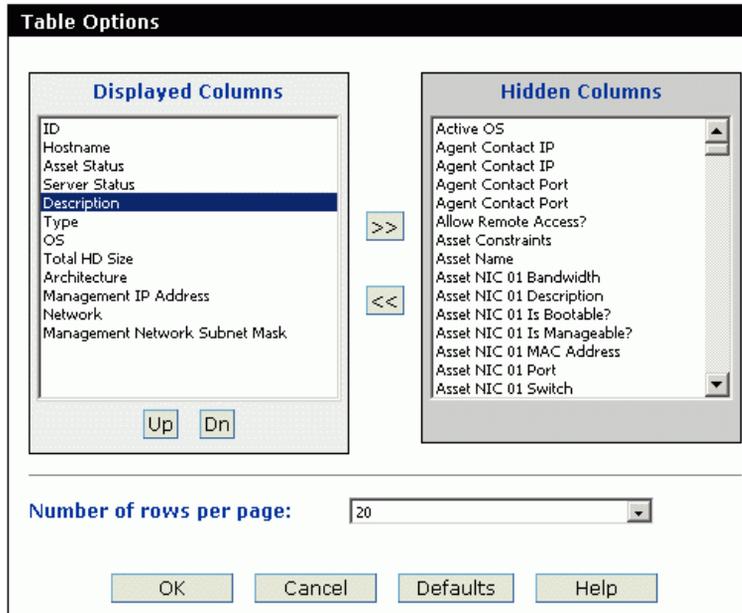
In the Display Area of the administration console you can view in table format the details of an item selected from the Navigation Area.

The tables can be customized according to your requirements. You can select the columns you want displayed, and decide the sort order of the table.

## Table Options

You can use the **Table Options** dialog to set the number of columns and the order of the columns displayed in a table, or to display or hide table columns. You can also set the number of rows to display per screen page. The changes you make to the table are preserved for your login user ID even after you log out.

Table Options



To set table options:

1. Click **Table > Options**.
2. In **Displayed Columns** or **Hidden Columns**, click the column field you want to move.
3. Click the arrow (>>) or (<<) that points in the direction you want to move the field. The selected field now appears in the other column, displayed or hidden.
4. If you want to change the position of a displayed field:
  - In **Displayed Columns**, select the column you want to position. Click the **Up** or **Dn** buttons to move the column to the desired position.
  - Select a column from the **Hidden Columns** section and move it to the **Displayed Columns** section. Notice that the newly displayed column appears at the bottom of the list in the **Displayed Columns** section. If necessary, click the **Up** or **Dn** buttons to move the column to the desired position.
5. Select the number of rows to display per screen page from the drop-down list in the **Number of Rows per Page** field. The default is 20.
6. Click **OK**. The change is reflected in the table, and stays that way until you revise the columns again.

---

**Note** You can click the **Defaults** button to restore Table Options to default settings.

---

## Active Filters

When any table (for example, a table for computing devices, snapshots, users, and so on) is displayed in the Display Area, you can apply an active filter. *Active Filters* provide a way to define and save a specific set of filter values.

Active Filters

**Active Filters**

Editing Default Filter

Select Active Filter Load Delete

Existing Filters:  
Architecture Equals "x86" Remove All Expressions

Select Column to Filter

- ID
- Hostname
- Asset Status
- Server Status
- Description
- Type
- OS
- Total HD Size

Filtering Column: **Architecture**

Start Expression: Equals Choose Value: x86

Save this Filter as:

Make Global:

OK Cancel Defaults Help

To set or edit an active filter:

1. If you want to edit an existing active filter, select it from the **Editing filter name** drop-down list. If the field is not displayed, no existing active filters are available.
2. Select a column to filter from the **Select Column to Filter** drop-down list. The name of the selected column is displayed in the **Filtering Column** field.
3. From the **Start Expression** drop-down list, select an operator to use when filtering. Note that the operators available depend upon the column being filtered.

4. If the operator you selected in the **Start Expression** field has pre-defined values, you can select a value from the **Choose Value** drop-down list.  
  
For example, if you selected the **Architecture** column to filter, and an **Equals** start expression, you could choose **x86** from the **Choose Value** field. Thus, your active filter would apply to all systems with an architecture equal to x86.
5. Repeat Steps [step 2](#), [step 3](#), and [step 4](#) for each column you want to filter. All of the columns you have selected to filter are listed under **Existing Filters**.
6. If you want to save this active filter for future use, enter a unique name for the filter in the **Save this filter as** field. For example, **x86filter**.
7. Click the **Make Global** checkbox if you want this active filter to be available to all users. Leave it unchecked if you want this filter to be available only for your user login ID.
8. Click **OK**.
9. Scroll horizontally so you can view the far right side of the current table. From the **Select Active Filter** drop-down list, select the active filter you want to use. The table data is then filtered based on the active filter you selected.

## Sorting Table Columns

All tables include sorting mechanisms and customization options. Tables are sorted by columns, by default, in ascending order. You can sort the order of the rows in the table based on any of the column headers. The following steps for sorting tables, are common to all tables available in the Display Area of the administration console:

1. Click an underlined column header in the table.
2. To sort data in descending order, click the underlined column header a second time. The sort preference is preserved when you exit from the table.

For example, in the following figure, the downward arrow (next to **Task ID**) shows that the table is sorted in the descending order of the computing device IDs.

## Sorting Tables

<input type="checkbox"/>	Name ▲ [1]	Description	LDAP Group
<input type="checkbox"/>	<a href="#">Developers</a>	All Developers	
<input type="checkbox"/>	<a href="#">Everyone</a>	Every authorized user	
<input type="checkbox"/>	<a href="#">Lab 160298</a>	Lab 160298	
<input type="checkbox"/>	<a href="#">Lab Managers</a>	Lab Managers	
<input type="checkbox"/>	<a href="#">Production 1</a>	Production Level 1	
<input type="checkbox"/>	<a href="#">Production 2</a>	Production Level 2	
<input type="checkbox"/>	<a href="#">Production 3</a>	Production Level 3	
<input type="checkbox"/>	<a href="#">Sysadmin</a>	Elemental system administrators	%server.role.sysadmingroup%
<input type="checkbox"/>	<a href="#">Tester</a>	All Testers	
<input type="checkbox"/>	<a href="#">Test Managers</a>	Test Managers	
<input type="checkbox"/>	<a href="#">Unix Systems Admin</a>	Unix Systems Admins	

## Multiple Sorting of Table Columns

Multiple sorting allows you to sort the data in a table based on more than one column. To sort multiple columns, press the CTRL key and click the column header.

## Export Table Data

---

**Note** This procedure applies only for users of Internet Explorer on Windows systems.

---

The **Export Data** option in the tables allows you to export the table data into CSV (Comma Separated Values) to be used with applications such as Excel.

To save the exported data in a readable format, you need to associate an application with the selected file type.

1. Click **Start > Settings > Control Panel**.
2. Double-click **Folder Options**.
3. Click the **File Type** tab.

4. Scroll down the list to extension **CSV**. Click **Advanced**.

---

**Note** If Microsoft Excel is not installed on your desktop, the CSV extension is not available.

---

5. Click **New** to add the CSV extension.
6. The **Edit File Type** window is displayed. Check the **Confirm open after download** option.
7. Click **New**.
8. The **New Action Window** is displayed.
9. In the **Action** field, type **open**.
10. Click **Browse** to associate an application with this action.
11. Select **notepad.exe**.

Click **OK**. Close all windows.



This chapter includes the following topics:

- ◆ “[Saving a Snapshot of a Computing Device](#)” on page 26
  - “[Add Network](#)” on page 26
  - “[Discover and Accept a Computing Device](#)” on page 27
  - “[Save Snapshot of a Computing Device](#)” on page 28
- ◆ “[Provisioning Servers](#)” on page 30
  - “[Provision a Server](#)” on page 31
  - “[Provision Servers Using a Server Template](#)” on page 36
  - “[Provision Unmanaged Server](#)” on page 40
- ◆ “[Start Up a Server](#)” on page 42

Saving snapshots and provisioning servers are two of the primary capabilities offered by Intel Deployment Manager. This chapter describes some basic workflows related to these tasks. Each workflow is complete within itself, but might have a dependency on a previous workflow. The workflows are normally performed in the order listed in this chapter.

In order to perform these tasks, you must log in to the administration console as Administrator.

## Saving a Snapshot of a Computing Device

You can save the snapshot of a computing device whenever it has an image that you would like to save. The saved image can be propagated to other computing devices, depending on various constraints.

The following is an overview of the steps required to save a snapshot of a computing device:

1. Add a Network. See “Add Network” on page 26.
2. Discover and accept a computing device. See “Discover and Accept a Computing Device” on page 27.
3. Add and allocate system storage. See “[Storage Devices](#)” on page 170 for information about adding and allocating system storage.
4. Save a snapshot of a computing device. See “Save Snapshot of a Computing Device” on page 28.

### Add Network

Adding a network enables you to define a network topology that can be used to provision computing and network devices. In order to provision any computing or network device, you must first add a network.

To add a network:

1. Click **Resources > Networks**. The **Displaying All Networks** table is displayed.
2. Click **Actions > Add**. The **Add Network** dialog is displayed.
3. Enter the following information:
  - **Name** - Enter a name, a unique identifier, for the new network that you are creating. Do *not* exceed 32 characters or use any special characters.
  - **Network IP Address** - Enter the base IP address of the network
  - **Subnet Mask** - Enter the subnet mask to determine the subnet this managed network belongs to. A mask determines the subnet an IP address belongs to.
  - **Default Gateway** - Enter the IP address of the default gateway that this network should use.
  - **Domain Name Servers** - List all IP addresses for the Domain Name Servers.
  - **Accept Discovered Assets** - Check this option if this network should be used when automatically determining the network when accepting a discovered computing device.

- **New IP Exclusion Range** - Add a new IP exclusion range. For example, 192.168.7.189 : 192.168.7.185. Click **Add Range**.
- **IP Exclusion Range** - Allows you to block a range of IP addresses. Once blocked, that IP address range is not used when assigning IP addresses to newly discovered assets. To delete a range, select it and click **Delete Range**.

For example, in a given network, if a particular IP address is in use by an external server then you can exclude it using the IP exclusion range.

An IP address range excluded from a network is automatically excluded from its IP list. But the IP addresses excluded from an IP list are not excluded from its network.

- **Assigned to Workspace** - Select the workspace that this IP list should belong to.
4. Click **OK** to add the network. You can click **Cancel** if you decide not to add the network.

## Discover and Accept a Computing Device

See “[Intel Server Chassis and Server Compute Blades](#)” on page 107 for information about discovering and accepting Intel chassis and Intel Blade servers.

A computing device must be booted from the network to be discovered. Before you can perform any actions on a computing device, you must accept it. To accept a DISCOVERED computing device:

1. Click **Resources > Computing Devices**.

The **Accepted** page is displayed with the **Displaying All Accepted Servers** table. All accepted computing devices are listed. If you have not accepted any computing devices the **Displaying All Servers** table is empty.

2. Click the **Discovered** tab. The **Displaying All Discovered Servers** table is displayed.
3. Select the computing device you want to accept.
4. Click **Accept**.
5. The verification dialog is displayed. Click **Yes** if want to accept the selected asset.

After accepting the asset it is no longer listed under the **Discovered** tab, but it is displayed under the **Accepted** tab. The status changes to **UPDATING**, and type changes to **Partial**.

The computing device needs to be manually rebooted. After rebooting, the type changes to **Managed**, and you should see **Shell Accessphrase** as the command prompt on the computing device console.

6. Click the **Accepted** tab. The accepted asset is now listed in the **Displaying All Servers** table.

In the **Displaying All Servers** table, the **Server Status** of the computing device should display UPDATE DONE.

## Save Snapshot of a Computing Device

To save a snapshot of a computing device:

1. Click **Resources > Computing Devices**.
2. Click **Blade Assets** or **Server Assets**. You can also save a snapshot from the **Accepted** section.
3. Select the device for which you want to save a snapshot.
4. Click **Snapshots > Save**. The **Save Snapshot** dialog is divided into the following sections:
  - **Basic**
  - **Constraints**
  - **Advanced**
5. Enter the following information in the **Basic** section:
  - **Name** - You can assign a snapshot name. Do not exceed 32 characters.
  - **OS** - Click the drop-down menu to select the operating system. You can select **Automatically Detect OS** to detect the OS of the computing device.
  - **Licenses** - Select the licenses required. When this snapshot is loaded on a server and the status of the server is UP, one license is used.
  - **Storage** - Select storage from the drop-down options. `No System Storage available` displays if you did not add any system storage.
  - **Comments** - Enter extra comments for the selected snapshot.
6. In the **Constraints** section, you can edit the applicable constraints for the snapshot. [“Constraints and the Constraints Editor”](#) on page 201
7. In the **Advanced** section, enter the following information:
  - **Custom save reboot Software** - You can specify that you want to reboot the server with the selected software. Any software which had the **Causes Reboot** option checked qualifies for this selection. If the software you select cannot cause a reboot then the operation will fail. Software is assigned the **Causes Reboot** functionality in the **Add Software** and/or **Edit Software** dialogs.

Sysprep is an example of Custom save reboot software. After the files are transferred, Sysprep can be used (added to Intel Deployment Manager as Software) to reboot the machine. This software must have the **Causes Reboot** option checked to be displayed in the **Custom Save Reboot Software** field before the custom snapshot action is performed. Upon executing the custom snapshot, Sysprep executes and prepares the server asset according to the information provided in the `sysprep.inf` file (part of the pre-save software).

- **Save reboot software arguments** - Enter additional arguments to pass to the custom reboot software.
- **Sector by Sector Save** - With this option you can choose whether to save the snapshot of the server's hard disk in file or sector mode. Click the drop-down menu to select from the following options:
  - **None** - If you select **None**, you have chosen not to save sector by sector. It will save in file mode.
  - **Partition Sector Save** - Select this option if the snapshot should be saved by storing sectors for each partition on each disk. Snapshots saved in this mode provide a complete backup of primary and logical partitions on the disks, excluding swap partitions and extended partitions (if they exist). Even sectors not used by the filesystem are saved using this option.
  - **Disk Sector Save** - Select this option if the snapshot should be saved by storing sectors for each disk. Snapshots saved in this mode provide a complete backup of the disks, including both partitioned and un-partitioned disk space. A snapshot saved this way cannot be used on server assets with different disk sizes or disk geometries. Even sectors not used by the filesystem are saved using this option.
- **Filesystem Check** - Click the drop-down options to select from the following options.
  - **None** - Select this option if you do not want to perform a filesystem check (for example, using `fsck`).
  - **Automatic** - Select this option if you want to perform an automatic filesystem check, if needed, when saving a snapshot.
  - **Force** - Select this option if you want to automatically perform a filesystem check each time a snapshot is saved.
- **Ignore FS Check Errors** - This option is unchecked by default. If you check this option filesystem errors are ignored and the partition is skipped.
- **Compression of Snapshot** - This option is checked by default. You can uncheck this option if you do not want to compress the snapshot while saving a snapshot. Compression of a snapshot will prolong the process of saving the snapshot, but saves space.

8. Click **Save**.

## Provisioning Servers

Provisioning a server is the process of placing a snapshot on a server. You can also personalize the server by adding server-specific information like networking information.

To provision a server:

1. Add a network. See “Add Network” on page 26.
2. Discover and accept a computing device. See “Discover and Accept a Computing Device” on page 27.
3. Add an IP list. See “Add/Edit IP List” on page 162.
4. Provision a server. See “Provision a Server” on page 31. If desired, you can provision a server, or multiple servers at the same time, by using a server template. See [“Provision Servers Using a Server Template”](#) on page 36.
5. Start up a server. See “Start Up a Server” on page 42.

## Provision a Server

To provision a server:

1. In the Navigation Area, click **Resources > Provisioned Resources**. The network and IP list that you added are listed under the **Provisioned Resources** component.
2. Click on the name of the network that you added. The server assets (computing devices) in this network are listed in the **Displaying All Servers** table.
3. Click **Actions > Provision Managed Server(s)**.
4. The **Provision Server(s)** dialog has four sections. In the **Basic** section enter the following information:
  - **Server Brand** - Select the brand of the server you want to provision.
  - **Server Type** - Select the type of server from the drop-down options.  
Selecting the brand and type of computing device provides information for subsequent selection boxes.
  - **Server Asset** - Select the server asset from the drop-down options. Only FREE server assets are displayed in the **Server Assets** drop-down list.

---

**Note** The **Any Server Asset** option enables you to provision more than one server using the **Quantity** field. When you select the **Any Server Asset**, Intel Deployment Manager chooses any FREE computing device that matches the snapshot requirements (constraints).

---

- **Operating System** - Select the operating system for this server from the drop-down options. This selection of the operating system acts as a filter when listing the snapshots.
- **Applications** - Select the applications required for this server from the drop-down options. This selection of the application acts as a filter when listing the server snapshot. It limits the snapshot with the given application.

---

**Note** Intel Deployment Manager determines what applications are on a snapshot when you create explicit application licenses for that snapshot.

---

- **Server Snapshot** - Select the server snapshot from the drop-down options. All accessible server snapshots are listed.
- **Quantity** - Enter the number of servers you want to provision. You can enter more than one only if you selected **Any Server Asset** in the **Server Asset** field.
- **Hostname(s)** - Enter the hostname(s) of the server(s) you want to provision. If you leave this field blank, the system assigns hostname(s) for the server(s).

To better control how hostnames are assigned for servers, you can use *%num%* and/or *%let%* variables in the hostname you enter. The variable *%num%* is replaced with a number that makes the hostname unique. For example, *redhat%num%* is translated into the hostname *redhat2* when the server is provisioned, where 2 was chosen by the system. The variable *%let%* is similar to *%num%* except that a letter is substituted instead of a number; that is a, b, c instead of 1, 2, 3.

5. In the **Management Options** section, enter the following information:

- **DNS Domain Name** - Enter the domain name to which this server belongs.
- **Domain Name Servers** - List all IP addresses for the Domain Name Servers. This field can be left blank.
- **Default Save Snapshot Name** - Enter the default name you want to assign to the snapshot when it is saved.

To save a snapshot of a provisioned resource, click **Snapshots > Save**.

If left blank, the server's current snapshot name will be used as the default save snapshot name.

- **Default Gateway** - Enter the IP address of the default gateway that the server(s) should use.

If one of the server's NICs specifies a default gateway, this field is ignored. If this field is left blank, Intel Deployment Manager determines the default gateway for the server from the default gateway of the network for the first NIC that does not use DHCP.

- **Agent Contact IP** - Enter the IP address used to communicate with the ITAP agent running on the OS. If this field is left blank, an IP address is automatically assigned. The IP address is mapped to the IP address assigned to the bootable NIC of the provisioned server.
- **Agent Contact Port** - Enter the port used to communicate with the ITAP agent running on the OS. If this field is left blank, the default is 10001.
- **Miscellaneous Information** - This field is for you to enter any extra information that you might require regarding this server.
- **Enable Personalization** - Check this option to set up the networking information and the hostname for the server. If you do not check this option, after loading the snapshot, Intel Deployment Manager will not be able to manage the server.
- **Install Remote Access Software** - Check this option if you want to access this server remotely.
- **Hard Disk Surface Scan on Start Up** - Check this option if you want to perform a surface scan of the hard disk when a snapshot is loaded on the server. A surface scan ensures that the server's disks are in good shape before loading the snapshot. This improves reliability at the cost of increased startup time.

- **Resize Partition** - If you check this option, when saving the snapshot it proportionally resizes the partitions to fit the disk. Also, any unpartitioned space between disk partitions is removed when this option is enabled.
- **Extend Last Partition** - Check this option if you want to extend the last partition to the last sector of the hard drive.

For example, if a server snapshot is taken from a server with a certain disk size, enabling the **Extend Last Partition** feature allows you to deploy this snapshot on a server that has a larger disk size, and extends the last partition to use the remaining disk space on the new server.

If this option is checked when the snapshot is being restored, it does not guarantee that the last partition will be expanded.

If the last partition is saved in sector-by-sector mode, or if the last partition is FAT12/16 or a swap partition, the last partition will not be extended.

---

**Note** If both options, **Extend Last Partition** and **Resize Partition**, are selected, the **Resize Partition** option takes precedence.

---

- **Cross Network Checks** - By default the **Cross Networks Checks** option is checked. If you check this option, it verifies that the server asset can be automatically re-connected to the provisioning network. The automatic re-connection can be done only if either the network of the server asset and the server are the same.
- **Wait for Startup** - By default the **Wait for Startup** option is checked. If the option is checked, the server waits for the ITAP agent to startup. The server is then placed in the UP state. If the ITAP agent does not contact the elemental server after a period of time, the server is placed in the DISCONNECTED state. If the option is not checked, once the startup command is given, the server is placed in the DISCONNECTED state. It does not wait for the ITAP server to startup. After the ITAP server starts up, the server is eventually placed in the UP state.
- **IP Address Checks** - By default, this option is checked. If you uncheck this option, the Intel Deployment Manager server will not check or allocate the IP addresses associated with the server. This option supports the `Load Server Snapshot` action. You can specify an IP address for the server snapshot without requiring it to be a valid IP address.

6. In the **Access** section, enter the following information:

- **Protocol** - From the drop-down options, select a protocol for accessing the terminal of the selected server asset. The options listed are remote access applications that are supported on the target computing device.

Note that Hyper Text Transfer Protocol requires that a web server be installed on the target server asset.

- **IP Address** - Enter the IP address of the computing device whose system console you want to access.
- **Port** - Enter the port that is dedicated to the remote access application on the target computing device. The default ports associated with terminal protocols are:
  - Telnet Protocol - 23
  - Hyper Text Transfer Protocol - 80
  - Anonymous File Transfer Protocol - 21
- **Initial Window Size** - Set the size for the terminal's browser window.
- **Access via Console when in ActiveOS** - Check this option if you wish to access the server asset when it is in the ADMIN State.

7. In the **Constraints** section, you can edit the applicable constraints using the constraints editor. See [“Constraints and the Constraints Editor”](#) on page 201. You can enter the constraints that you want for the selected server. An error is displayed if incompatible constraints are assigned to this server.

8. In the **NIC 1** section, enter the following information:

- **Network Name** - The network this NIC is attached to is displayed.
- **IP Allocation Scheme** - Select from one of the following:
  - **External DHCP**- If you select this option the NIC uses an external DHCP server to determine its IP address.
  - **Static** - This option causes an IP address to be immediately allocated for this NIC. If you do not enter an IP address, a free IP address is allocated for you.
  - **Dynamic** - This radio button appears if a network is selected from the **Network Name** field. It causes allocation of the IP address to be delayed until the server is started up.

If you **Reboot to Admin State** a server with **Dynamic** set, the IP address is freed when the server is down. You are not allowed to enter an IP address, subnet mask, or default gateway for external DHCP and dynamic allocation schemes.

- **No IP Personalization**- The server is not personalized with an IP address.

**Caution** If the IP address is not personalized the server uses the IP address from the snapshot that was used to provision it. If this NIC is used to boot from the network, this can result in an address conflict with another system using the same IP address.

---

- **IP Address** - Enter the IP address(es) for your server(s). If this field is left blank, an IP address is allocated for you.
- **Subnet Mask** - Enter the subnet mask for this network.  
If the Subnet Mask field is left blank, the related management network's subnet mask will be used.
- **Default Gateway** - Enter the IP address for the default gateway. If this field is left blank, the server's default gateway is determined from the server's **Default Gateway** field.
- **NIC Asset ID** - Select from the drop-down list the ID of the server asset's NIC for this IP address to use.
- **Network Device Name** - Enter the network device name. If you select **Auto** then a name is automatically assigned for the network device. For most servers, **Auto** is the default.  
For example, you can enter `eth0` for Linux-based systems.
- **Domain Name Servers** - Enter the IP addresses for the Domain Name Servers. If you leave this field blank, the Domain Name Servers assigned to this server are used.

9. Click **Done** to provision the server(s).

## Provision Servers Using a Server Template

A server template provides a set of default values to be used when provisioning one or more servers. (See “[Server Templates](#)” on page 46 for information about creating server templates.) Given a server template, you can quickly provision servers.

There are several different ways to provision servers using a template. You can initiate provisioning with a template from the **Computing Devices** page, the **Provisioning Resources** page, or from an OpScript. Each of these methods is discussed below.

### Provision From Computing Devices Using a Template

Provisioning from the **Computing Devices** page assumes that you are provisioning dedicated (as opposed to auto-selected) server assets. You select the server assets to be provisioned before clicking the **Provision Server(s)** action.

To provision one or more servers from the **Computing Devices** page using a server template:

1. Click **Resources > Computing Devices**.
2. Click the **Server Assets**, **Blade Assets** or **Accepted** tab.
3. Select one or more server assets to be provisioned.  
A server asset can only be provisioned if it is in the FREE state.
4. Click **Actions > Provision Server(s)**.
5. In the **Provision Managed Server(s) Using a Template** dialog:
  - **Server Template** - Select a server template from the drop-down list.
  - **Assigned to Workspace** - Select a workspace from the drop-down list.
6. Click **OK**.

## Provision From Provisioned Resources Using a Template

To provision one or more servers from the **Provisioned Resources** page using a server template:

1. Click **Resources > Provisioned Resources**.
2. Click **Actions > Provision Managed Server(s) Using a Template**.
3. In the **Provision Managed Server(s) Using a Template** dialog:
  - **Server Template** - Select a server template from the drop-down list.
  - **Server Allocation** - Select either **Dedicated** or **Autoselected**.
    - **Dedicated** - If you check **Dedicated** you are choosing to allocate server assets immediately. You can then select a **Server Brand** and **Server type** (if you select a blade asset, you are asked to select a chassis), and you must select a server asset.
    - **Autoselected** - If you check **Autoselected** server assets are automatically selected upon startup. Enter the number of servers to provision in the **Quantity** field.
  - **Server Brand** - Select a server brand from the drop-down list.
  - **Server Type** - Select a server type from the drop-down list.
  - **Server Asset** - Select one or more server assets.
  - **Assigned to Workspace** - Select a workspace from the drop-down list.
4. Click **OK**.

## Provision Servers from an OpScript Using a Template

In order to provision servers from an OpScript you must first add a server template. See “[Add/Edit Server Templates](#)” on page 46. You can use an OpScript to provision a managed server asset or a server.

### Provision Managed Server Assets from an OpScript

To provision one or more managed server assets from an OpScript using a server template:

1. Modify one of your canned OpScripts (start or stop multiple servers) and use the following settings:
  - a. Set **Language** to **Beanshell**.
  - b. Set **Script Location** to **Use Command Generator**.
  - c. Set **Command Target** to **Managed Server Asset**.

In this case you are provisioning a dedicated server asset, one that is already managed. This is similar to provisioning a server from the **Computing Devices** page.
  - d. Click the **Add** button associated with the **Command Sequence** field, and select **Provision Server** from the **Command Name** drop-down list.
  - e. Optionally, you can add other commands.
  - f. Select a server template from the **Server Template** drop-down list.
  - g. Click **OK**.
2. After adding the new OpScript, select it from the **Displaying All OpScripts** table.
3. Click **Actions > Run**.
4. Select a server asset from the pop-up list.
5. Press **OK**.

## Provision Servers from an OpScript

To provision one or more servers from an OpScript using a server template:

1. Modify one of your canned OpScripts (start or stop multiple servers) and use the following settings:
  - a. Set **Language** to **Beanshell**.
  - b. Set **Script Location** to **Use Command Generator**.
  - c. Set **Command Target** to **Server**.
  - d. Check the checkbox when **Provision a New Server** checkbox appears.
  - e. From the **Server Template** drop-down list select a server template.
  - f. From the **Server Assigned to Workspace** field select a workspace to assign the server to after it is provisioned.
  - g. Click **OK**.
2. After adding the new OpScript, select it from the **Displaying All OpScripts** table.
3. Click **Actions > Run**.
4. Select a server asset from the pop-up list.
5. Press **OK**.

## Provision Unmanaged Server

When you provision an unmanaged server you can only add or delete it from Intel Deployment Manager. You cannot manage it. For example, if you provision an unmanaged server you cannot load any software on it. However, Intel Deployment Manager can manage IP address allocation for unmanaged servers.

To provision an unmanaged server:

1. In the Navigation Area, click **Resources > Provisioned Resources > *ProvisionedResourcesName*** (where *ProvisionedResourcesName* is the name of a resource existing under the **Provisioned Resources** icon in the Navigation Area). The **Displaying All Servers** table is displayed.
2. Click **Actions > Provision Unmanaged Server**. The Provision Unmanaged Server dialog displays the following sections:
  - **Basic**
  - **Management Options**
  - **Constraints**
  - **NIC**
3. In the **Basic** section, enter the following information:

Field Name	Description
<b>Server Brand</b>	Select the brand of the server you want to provision.
<b>Server Type</b>	Select the type of server from the drop-down options. Selecting the brand and type of computing device provides information for subsequent selection boxes.
<b>Server Asset</b>	Select the server asset from the drop-down options. The server assets displayed are those that you added in the server assets section using the <b>Add Unmanaged server</b> command. Only free server assets are displayed in the <b>Server Assets</b> list.
<b>Hostname</b>	Enter the host names of the servers you want to provision. If you leave this field blank, the system assigns host names for the servers.
<b>Assigned to Workspace</b>	Select the workspace to which you want to assign this server.

4. Enter the following information in the **Management Options** sections:

Field Name	Description
<b>Miscellaneous Info.</b>	Enter any information you would like to record regarding this server.

5. In the **Constraints** section, enter the parameter, operator, and value. You can enter the constraints applicable to the selected server. An error is displayed if incompatible constraints are assigned to this server. See “[Constraints Editor](#)” on page 204.
6. Enter the following information in the **NIC 1** section (note that some fields are displayed depending on the **Network Name** selected, and that other fields are entry fields or display only fields depending upon your other choices):

Field Name	Description
<b>Network Name</b>	Select a network from the drop-down list.
<b>IP Allocation Scheme</b>	The IP allocation scheme is displayed in this field.
<b>IP Address</b>	Enter the IP address of the server, or an IP address range for a group of servers.
<b>Subnet Mask</b>	The subnet mask for this network is displayed, if applicable.
<b>Default Gateway</b>	The IP address for the default gateway is displayed, if applicable.
<b>NIC Asset ID</b>	Enter the ID of the NIC for this IP address to use. The NIC Asset ID corresponds to the NIC number in the <b>Displaying All Server Assets</b> table for server assets. The first NIC (displayed in the Server Assets table) is the NIC 1 of the server asset which is referred to as NIC Asset ID 1 when provisioning servers.
<b>Network Device Name</b>	The network device name is displayed.
<b>Domain Name Servers</b>	Displays all IP addresses for the Domain Name Servers.

7. To add additional NICs, click **Add More NICs**.
8. Click **OK**.

## Start Up a Server

To start up a server:

1. In the Navigation Area, click **Resources > Provisioned Resources**. The **Displaying All Servers** table is displayed.
2. Select the server you want to start up.
3. Click **Snapshot > Startup** or **Load and Startup**.
4. The **Startup Server(s)** dialog is displayed. If you clicked **Load and Startup**, select a startup mode:

- **Auto Load Server Snapshot**

This option is always applicable. The **Auto Server Snapshot Load** option causes a snapshot load only if it is necessary. If the server was just created, or if you changed the snapshot or the computing device for the server, the snapshot is forcibly loaded. When you try to startup the server, only the following items cause **Auto Server Snapshot Load** to write a new image to the hard disk:

- name of snapshot changed
- computing device changed

- **Overwrite Server Disk OS**

This option causes the server's disk OS to be overwritten with the OS on the snapshot.

- **Reboot to Disk OS**

This option skips loading the snapshot, and boots up directly using the copy of the snapshot on the hard disk. This option is provided only if a provisioned server has assets assigned to it.

- **Skip Personalization**

This option is unchecked by default. Check this option if you do not want to personalize the server when starting it up. Checking this option overrides any personalization information that you previously entered—it also overrides the **Enable Personalization** checkbox.

---

**Caution** Checking this option might cause a server to go into a DISCONNECTED state because it is not personalized.

---

5. If you clicked **Startup** the startup mode defaults to:

---

**Note** You must have dedicated server assets assigned to the provisioned server in order to use the **Startup** option.

---

- **Skip Server Snapshot Load**

This option skips loading the snapshot and boots up directly using the copy of the snapshot on the hard disk.

- **Skip Personalization**

This option is unchecked by default. Check this option if you do not want to personalize the server when starting it up. Checking this option overrides the any personalization information that you previously entered—it also overrides the **Enable Personalization** checkbox.

---

**Caution** Checking this option might cause a server to go into a DISCONNECTED state because it is not personalized.

---

6. Click **Yes** to start up the server. You can click **No** if you decide not to start up the server.

After a server is up and running, you can deploy software on it. The software needs to be packaged and imported onto the Intel Deployment Manager server before it can be deployed. See “Deploy Software” on page 95.



This chapter describes adding and managing server templates for use in provisioning and includes the following topics:

- ◆ “[Server Templates](#)” on page 46
  - “[Display Server Templates](#)” on page 46
  - “[Add/Edit Server Templates](#)” on page 46
  - “[Add a Similar Server Template](#)” on page 50
  - “[Delete a Server Template](#)” on page 51
  - “[Assign a Server Template](#)” on page 51
  - “[Unassign a Server Template](#)” on page 51

## Server Templates

A *server template* provides a set of default values to be used when provisioning one or more servers. Instead of repeatedly, manually entering the same information every time you provision a server, you can enter the information once into a server template, and then assign the template to the server(s) you want to provision.

Given an existing template, you can add a similar template and customize it as needed—you can maintain as many server templates as you need.

To use a template to provision servers, see “[Provision Servers Using a Server Template](#)” on page 36.

### Display Server Templates

To display existing server templates:

1. Click **Resources > Templates**
2. Click the **Templates** tab.

All existing server templates are displayed in the **Displaying All Server Templates Table**.

### Add/Edit Server Templates

When you add a server template you need to specify all of the values to be used when provisioning a server. This process is very similar to provisioning a server (see “[Provision a Server](#)” on page 31), but a few less field entries are required.

Adding and editing server templates are similar tasks. Editing involves updating field entries for an existing template.

To add or edit a server template:

1. Click **Resources > Templates**
2. Click the **Templates** tab.
3. Click **Actions > Add** or **Edit**.

4. In the **Add Server Template** or **Edit Server Template** dialog, enter information under the **Basic** tab:
  - **Template Name** - Enter a unique name for the server template.
  - **Operating System** - Select the operating system for this server from the drop-down options. Selecting the operating system acts as a filter when listing the snapshots.
  - **Applications** - Select the applications required for this server from the drop-down options. This selection of the application acts as a filter when listing the server snapshot. It limits the snapshot with the given application.

---

**Note** Intel Deployment Manager determines what applications are on a snapshot when you create explicit application licenses for that snapshot.

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- **Server Snapshot** - Select the server snapshot from the drop-down options. All accessible server snapshots are listed.
- **Hostname(s)** - Enter the hostname(s) of the server(s) you want to provision. If you leave this field blank, the system assigns hostname(s) for the server(s).

To better control how hostnames are assigned for servers, you can use `%num%` and/or `%let%` variables in the hostname you enter. The variable `%num%` is replaced with a number that makes the hostname unique. For example, `redhat%num%` is translated into the hostname `redhat2` when the server is provisioned, where 2 was chosen by the system. The variable `%let%` is similar to `%num%` except that a letter is substituted instead of a number; that is a, b, c instead of 1, 2, 3.

- **Assigned to Workspace** - Select a workspace from the drop-down list.

5. In the **Management Options** section, enter the following information:

- **DNS Domain Name** - Enter the domain name to which this server belongs.
- **Domain Name Servers** - List all IP addresses for the Domain Name Servers. This field can be left blank.
- **Default Gateway** - Enter the IP address of the default gateway that the server(s) should use.

If one of the server's NICs specifies a default gateway, this field is ignored. If this field is left blank, Intel Deployment Manager determines the default gateway for the server from the default gateway of the network for the first NIC that does not use DHCP.

- **Miscellaneous Information** - This field is for you to enter any extra information that you might require regarding this server.
- **Enable Personalization** - Check this option for Intel Deployment Manager to set up the networking information and the hostname for the server. If you do not check this option, after loading the snapshot, Intel Deployment Manager will not be able to manage the server.

- **Install Remote Access Software** - Check this option if you want to access this server remotely.
- **Hard Disk Surface Scan on Start Up** - Check this option if you want to perform a surface scan of the hard disk when a snapshot is loaded on the server. A surface scan ensures that the server's disks are in good shape before loading the snapshot. This improves reliability at the cost of increased startup time.
- **Resize Partition** - If you check this option, when saving the snapshot it proportionally resizes the partitions to fit the disk. Also, any unpartitioned space between disk partitions is removed when this option is enabled.
- **Extend Last Partition** - Check this option if you want to extend the last partition to the last sector of the hard drive.

For example, if a server snapshot is taken from a server with a given disk size, enabling the **Extend Last Partition** feature allows you to deploy this snapshot on a server that has a larger disk size, and extends the last partition to use the remaining disk space on the new server.

If this option is checked when the snapshot is being restored, it does not guarantee that the last partition will be expanded.

If the last partition is saved in sector-by-sector mode, or if the last partition is FAT12/16 or a swap partition, the last partition will not be extended.

---

**Note** If both options, **Extend Last Partition** and **Resize Partition**, are selected, the **Resize Partition** option takes precedence.

---

- **Cross Network Checks** - By default the **Cross Networks Checks** option is checked. If this option is checked, it verifies that the server asset can be automatically re-connected to the provisioning network. The automatic re-connection can be done only if either the network of the server asset and the server are the same.
- **Wait for Startup** - By default the **Wait for Startup** option is checked. If the option is checked, the server waits for the ITAP agent to start up. The server is then placed in the UP state. If the ITAP agent does not contact the elemental server after a period of time, the server is placed in the DISCONNECTED state. If the option is not checked, once the startup command is given, the server is placed in the DISCONNECTED state. It does not wait for the ITAP server to startup. After the ITAP server starts up, the server is eventually placed in the UP state.
- **IP Address Checks** - By default, this option is checked. If you uncheck this option, the Intel Deployment Manager server will not check or allocate the IP addresses associated with the server. This option supports the `Load Server Snapshot` action. You can specify an IP address for the server snapshot without requiring it to be a valid IP address.

6. In the **Access** section, enter the following information:

- **Protocol** - From the drop-down options, select a protocol for accessing the terminal of the selected server asset. The options listed are remote access applications that are supported on the target computing device.

Note that Hyper Text Transfer Protocol requires that a web server be installed on the target server asset.

- **Initial Window Size** - Set the size for the terminal's browser window.
- **Access via Console when in ActiveOS** - Check this option if you wish to access the server asset when it is in the ADMIN State.

7. In the **Constraints** section, you can edit the applicable constraints using the constraints editor. See “[Constraints and the Constraints Editor](#)” on page 201 You can enter the constraints that you want for the selected template. An error is displayed if incompatible constraints are assigned.

8. In the **NIC 1** section, enter the following information:

- **Network Name** - Displays the network to which this NIC is attached.
- **IP Allocation Scheme** - Select from one of the following:
  - **External DHCP**- If you select this option the NIC uses an external DHCP server to determine its IP address.
  - **Static** - This option causes an IP address to be immediately allocated for this NIC. If you do not enter an IP address, a free IP address is allocated for you.
  - **Dynamic** - This radio button appears if a network is selected from the **Network Name** field. It causes allocation of the IP address to be delayed until the server is started up.

If you **Reboot to Admin State** a server with **Dynamic** set, the IP address is freed when the server is down. You are not allowed to enter an IP address, subnet mask, or default gateway for external DHCP and dynamic allocation schemes.

- **No IP Personalization**- The server is not personalized with an IP address.

---

**Caution** If the IP address is not personalized the server uses the IP address from the snapshot that was used to provision it. If this NIC is used to boot from the network, this can result in an address conflict with another system using the same IP address.

---

- **Subnet Mask** - Enter the subnet mask for this network.

If the Subnet Mask field is left blank, the related management network's subnet mask will be used.

- **Default Gateway** - Enter the IP address for the default gateway. If this field is left blank, the server's default gateway is determined from the server's **Default Gateway** field.

- **NIC Asset ID** - Select the ID of the server asset's NIC from the drop-down list.
- **Network Device Name** - Enter the network device name (`eth0`, and so on). If you enter **Auto** then a name is automatically assigned for the network device. For most servers, **Auto** is the default.

For example, you can enter `eth0` for Linux-based systems.

- **Domain Name Servers** - Enter the IP addresses for the Domain Name Servers. If you leave this field blank, the Domain Name Servers assigned to this server are used.

If you want to provision a server that has more than one NIC, click **Add More NIC**, and enter the information for that NIC.

9. Click **OK**.

## Add a Similar Server Template

You can create a similar template from an existing template and customize it as needed. This enables you to quickly develop new templates to satisfy specific requirements, by only having to change a few field entries for each template.

To add a similar template:

1. Click **Resources > Templates**
2. Click the **Templates** tab.
3. Click **Actions > Add Similar**.

Edit the new template to customize it as discussed in “[Add/Edit Server Templates](#)” on page 46.

## Delete a Server Template

You cannot delete a server template if it is in use by a server.

To delete a template:

1. Click **Resources > Templates**
2. Click the **Templates** tab.
3. Click **Actions > Delete**.

## Assign a Server Template

To assign a server template:

1. Click **Resources > Templates**
2. Click the **Servers** tab.
3. Click **Actions > Assign**.
4. Select the template you want to assign.
5. Select the workspace you want to assign the template to.
6. Click **OK**.

## Unassign a Server Template

To unassign a server template:

1. Click **Resources > Templates**
2. Click the **Servers** tab.
3. Select the template you want to unassign.
4. Click **Actions > Unassign**.
5. Select the workspace you want to unassign the template from.
6. Click **OK**



This chapter includes the following topics:

- ◆ “[Role-based Administration](#)” on page 54
  - “[Permissions](#)” on page 56
- ◆ “[Users](#)” on page 58
  - “[Add/Edit User](#)” on page 58
  - “[Delete User](#)” on page 60
  - “[Change Password](#)” on page 61
- ◆ “[User Roles](#)” on page 62
  - “[Add/Edit User Role](#)” on page 63
  - “[Delete User Role](#)” on page 65
- ◆ “[Access Policies](#)” on page 66
  - “[Add/Edit Access Policy](#)” on page 66
  - “[Delete Access Policy](#)” on page 68

A *User* represents a single user of Intel Deployment Manager. The user subcomponent contains personal data about the user.

It is strongly recommended that users should not use the `Administrator` login, except in emergencies. This is because the `Administrator` login has the maximum permissions, making the administrator the most powerful and potentially the most dangerous user in Intel Deployment Manager. You should immediately change the `Administrator` password whenever you perform a fresh installation or upgrade of Intel Deployment Manager.

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**Note** The **Users** component is visible from the administration console only if **Default Authentication** was selected during installation.

---

## Role-based Administration

A *role* represents an arbitrary group of users who have a need to perform a similar set of tasks. Every Intel Deployment Manager user belongs to one or more roles. Each role contains fields to map itself to LDAP groups, containers, or organizational units. Roles also contain a small set of resource-independent permissions (capabilities).

A *workspace* represents an arbitrary grouping of resources. Any object that can be managed by Intel Deployment Manager, including snapshots, is considered to be a resource. Resources can belong to one or more workspaces. Workspaces can contain resources of different types.

Roles are linked to workspaces with an *access policy*. An access policy maps a specific role to a Workspace. When a role is mapped to a workspace by an access policy, all users in that role are allowed to view all the resources in the workspace. Each access policy also has a set of permissions which identify the operations the user is allowed to perform on the resources included in the workspace.

Intel Deployment Manager contains some predefined roles, workspaces, and access policies. Intel Deployment Manager has a special unmodifiable workspace called `Everything` that every resource belongs to. There are two unmodifiable roles: `Everyone` and `Sysadmin`. Every user belongs to the user role `Everyone`. The `Sysadmin` user role has all system permissions enabled. Additionally, the LDAP group that this `Sysadmin` role maps to, is determined by a property in the elemental platform named `server.role.sysadmingroup`. The default value of this property is `Intel Deployment Manager Admins`. This `Sysadmin` role has an unmodifiable access policy that maps it to the `Everything` workspace with all resource permissions.

To support access to auto-discovered assets, all auto-discovered assets are automatically placed in a special workspace called `Discovered`. Therefore, if you want to assign a role to access newly discovered assets, you would allow this role to access the workspace named `Discovered`. Also, the owner of the discovered assets is set to a special user named `System`.

A user is allowed access to a resource if and only if one of the following two conditions are met:

- ◆ The user is the owner of that resource. The user that created the resource is always its owner.

- ◆ There is an access policy between user role  $R$  and workspace  $W$  where the user belongs to role  $R$  and the resource belongs to workspace  $W$ .

The owner of a resource and the workspaces it belongs to are displayed in the owner and workspaces columns for that resource. You might need to visit the table options page for the resource's table to display these columns.

For a user to perform an action on a resource, that user must possess the proper permissions for the resource. With the exception of permissions to create resources, all permissions for a resource are determined from the permissions of all access policies that apply for the user and the resource. If there are multiple applicable access policies, the user has permission to perform the action if any access policy has the permissions to allow the user to perform that action. *Create permissions* are associated with the user's roles. If a user belongs to multiple roles, the create permissions for that user are the union of the create permissions for the user's roles. The permissions for roles and access policies are described in detail later in this chapter.

## Permissions

*Permissions* identify the operations a user can perform on resources within Intel Deployment Manager. Permissions are classified into two categories: *system permissions* and *resource permissions*. System permissions are independent of resources and are associated directly with roles. Resource permissions are mapped to access policies and indicate the operations allowed for the resources in the workspaces of those access policies.

### System Permissions

A user role can be assigned the following set of system permissions. If a user belongs to multiple roles, the user's permissions are a union of the all permissions assigned to the user's roles.

- ◆ `View Custom Logs` - Allows the user to view the custom log (events) table.
- ◆ `View Reports` - Allows the user to view reports.
- ◆ `View System Settings` - Allows the user to view any preferences, settings, and drivers.
- ◆ `Modify System Settings` - Allows the user to modify any preferences, settings, system storage, Intel Deployment Manager licenses, and drivers. The user is also allowed to delete events from the custom log.
- ◆ `Modify Roles` - Allows the user to modify users and roles.
- ◆ `Modify constraints` - Allows you to modify the constraints for snapshots, computing devices, and software. The resource must also have the *Full Control* permission to perform this operation.

Some system permissions are called *create permissions* since they control the creation of resources. There is a create permission for each kind of resource. If a user role has a create permission, users assigned to that role can create resources of that type. For example, if a role has `Create workspaces` permission, users in that role can create workspace objects. See the table in [Step 6](#) on page 64 for a list of create permissions.

## Resource Permissions

Resource permissions are further divided into two categories: *common resource permissions* and *operation permissions*. Common resource permissions are a small set of permissions common across all resources. Operation permissions apply only to particular commands, or a set of commands for a resource.

Common resource permissions can be applied to resources such as workspaces, snapshots, network device configurations, computing devices, switches, load balancers, licenses, software, OpScripts, jobs, tasks, networks, workspace networks, and system storage.

For each of these resource categories, you can specify one of the following common resource permission levels. These resource levels are listed starting with the most powerful and ending with the least powerful.

- ◆ **Full Control** - Allows you to view, delete, edit, assign, and perform operations on this resource. Assigning a resource refers to assigning or unassigning this resource to a workspace. If a user owns a resource, the system assumes that the user has **Full Control** permission for that resource.
- ◆ **Use** - Allows you to view and use this resource. You are not allowed to edit the resource's configuration. This permission also allows a user to assign this resource to other resources. For example, you can assign a computing device to a server only if you have the **Use** permission for both the server and the computing device. However, you cannot assign resources to workspaces.
- ◆ **Read Only** - Allows you to only view a resource. No operations can be performed on this resource with the exception of viewing its data.

Operation permissions control the actions you can perform on resources. If you are not assigned a particular operation permission, you cannot perform the operation associated with the permission, irrespective of the common resource permission value for that resource. See the list in [Step 6](#) on page 67 for a list of operation permissions.

## Users

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**Note** The **Users** component is not displayed if Intel Deployment Manager is using directory services for user authentication.

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**Users** is available in the **Settings** section. The administration console supports the following operations for users:

Menu	Options
Actions	<ul style="list-style-type: none"><li>◆ Edit ...</li><li>◆ Add ...</li><li>◆ Delete ...</li><li>◆ Change Password ...</li></ul>
Table	<ul style="list-style-type: none"><li>◆ Options ...</li><li>◆ Export</li></ul>

### Add/Edit User

To add or edit a user:

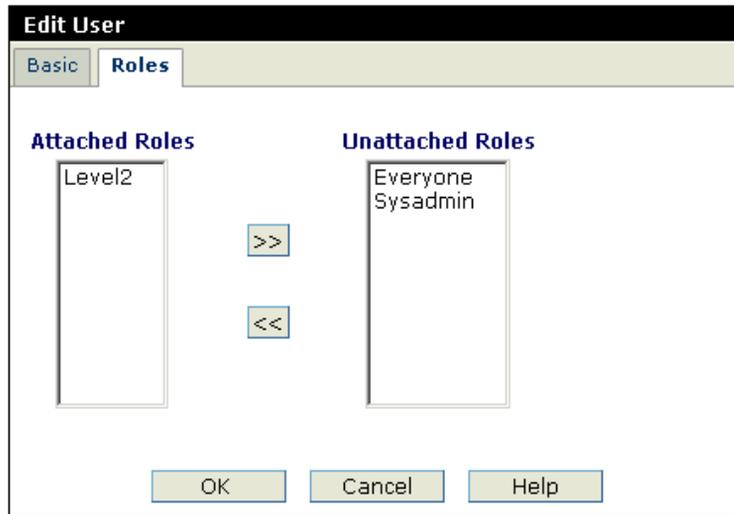
1. In the Navigation Area, click **Settings > Users**.
2. The **Displaying All Users** table is displayed.
  - If you are editing a user, select the user you want to edit.
  - Do not select a user if you are adding a new user.
3. Click **Actions > Add** or **Edit**. The **Add/Edit User** dialog displays the following two sections:
  - **Basic**
  - **Roles** (Displayed only when editing a user).

4. Edit the following information in the **Basic** section:

Field Name	Description
<b>User ID</b>	Enter a user ID. The user ID identifies this user from other users included in Intel Deployment Manager. Do not exceed 32 characters. Use only letters, numbers, and underscores. Note: You cannot edit the user ID.
<b>Full Name</b>	Enter the user's full name.
<b>E-mail</b>	Enter the user's e-mail address.
<b>Organization</b>	Enter the user's organization.
<b>Title</b>	Enter the user's title.
<b>Phone (Work)</b>	Enter the user's work phone number.
<b>Phone (Home)</b>	Enter the user's home phone number.
<b>Phone (Fax)</b>	Enter the user's fax number.
<b>Phone (Pager)</b>	Enter the user's pager number.
<b>Phone (Cell)</b>	Enter the user's cell phone number.
<b>Last Login Time</b>	The <b>Last Login Time</b> displays the last time when the selected user logged into Intel Deployment Manager. If the user has never logged in then this field displays <b>Never Logged in</b> .

5. In the **Roles** section all the roles that you added using **Settings > User Roles** are displayed. The **Roles** section of the **Edit User** dialog allows you to attach or unattach roles to a specific user using the >> or << buttons. The user ID you logged in under must have the permission to attach or unattach roles. Click **OK** to save changes. You can click **Cancel** if you do not want to save your changes.

Edit User > Roles



## Delete User

To delete a user:

1. In the Navigation Area, click **Settings > Users**. The **Displaying All Users** table is displayed.
2. Select the user(s) you want to delete.
3. Click **Actions > Delete**.
4. The user ID(s) are displayed for verification. Click **Yes** to delete them, or click **No** if you do not want to delete them.

## Change Password

A password is used by a user to log in to Intel Deployment Manager. Depending on permissions, a user might be able to change another user's password.

To change a user's password:

1. In the Navigation Area, click **Settings > Users**. The **Displaying All Users** table is displayed.
2. Select a user by clicking the checkbox associated with that user.
3. Click **Actions > Change Password**. The user ID is displayed in the **Enter a New Password** dialog. To change the password:
  - **New Password** - Enter the new password. The password must be between 6 and 32 characters in length.
  - **Retype New Password** - Retype the new password. The password must be between 6 and 32 characters in length, and must exactly match the password you entered in the **New Password** field.
4. Click **OK** to change the password. You can click **Cancel** to dismiss the dialog without changing the password, or click **Reset** to clear the password fields.

## User Roles

Intel Deployment Manager supports user roles. A *role* represents an arbitrary group of users who have a need to perform a similar set of tasks. Every user belongs to one or more roles. Each role contains fields to map itself to LDAP groups, containers, or organizational units. Roles also contain a small set of resource-independent permissions (capabilities).

When using any directory services, you must have the following information available:

- ◆ IP addresses of directory servers
- ◆ Organizational units on the target directory trees

If you are using an LDAP server for user authentication:

- ◆ Add a group of users to your LDAP server for Intel Deployment Manager.
- ◆ Assign users to this group. Any LDAP user that belongs to this group can log in as an Intel Deployment Manager administrator using the correct user name and password.

When creating non-administrative users for Intel Deployment Manager, create a group on the LDAP server and map it to a role in the Intel Deployment Manager server.

- ◆ Contact your LDAP administrator to create users on the LDAP server for Intel Deployment Manager, and to assign them to the groups.

**User Roles** is available in the **Settings** section. The administration console supports the following operations for user roles:

Menu	Options
Actions	<ul style="list-style-type: none"><li>◆ Edit ...</li><li>◆ Add ...</li><li>◆ Delete ...</li></ul>
Table	<ul style="list-style-type: none"><li>◆ Options ...</li><li>◆ Export</li></ul>

## Add/Edit User Role

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**Note** All user roles, except `Sysadmin`, can be edited.

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Only a user with `Administrator` permissions can delete user roles. You can add or edit user roles depending on your user permissions.

To add or edit a user role:

1. In the Navigation Area, click **Settings > User Roles**.
2. If you want to edit a user role, select the role you want to edit.
3. Click **Actions > Add** or **Edit**. The **Add User Role** or **Edit User Role** dialog displays the following sections:
  - **Basic**
  - **System Permissions**
  - **Create Permissions**
  - **Users** (This tab is displayed only if LDAP authentication is *not* used for login).
4. In the **Basic** section, you can enter the following information:

Field Name	Description
<b>Name</b>	Assign a name for this user role.
<b>Description</b>	Enter a description for this user role.
<b>LDAP Group</b>	If you are using an LDAP directory server to authenticate the login of a user, enter the name of the LDAP Group for this role. Otherwise, leave it blank. The LDAP group is assigned by and obtained from your LDAP administrator.
<b>Comments</b>	Enter any comments related to this user role. You can enter more details regarding this user role, for example, you can enter the permissions that are granted to this user role.

5. The **System Permissions** section enables you to assign the following set of permissions. If a user belongs to multiple roles, the permissions of that user is a union of the permissions of all of the user's roles.

Field Name	Description
<b>Select All</b>	If checked all the following permissions are selected.
<b>View Custom Logs</b>	If checked, the user can view the custom logs table.
<b>View Reports</b>	If checked, the user can view reports.
<b>View System Settings</b>	If checked, the user can view any Intel Deployment Manager system preferences, settings, and drivers.
<b>Modify System Settings</b>	If checked, the user can modify any Intel Deployment Manager system preferences, settings, drivers, Intel Deployment Manager licenses, and storage. The user is also allowed to delete events from the custom log.
<b>Modify Roles</b>	If checked, the user is allowed to add, edit, and delete users and roles within Intel Deployment Manager.
<b>Modify Constraints</b>	If checked, the user is allowed to add, edit, and delete constraints applicable to snapshots and computing devices in Intel Deployment Manager.

---

**Note** System permissions are resource-independent and are associated directly with user roles. Resource permissions are mapped to access policies and indicate the operations allowed for the resources in the workspaces of those access policies.

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6. The **Create Permissions** section enables you to assign the following set of permissions that allow a user to add specific resources to Intel Deployment Manager:

Field Name	Description
<b>Select All</b>	If checked all the following permissions are selected.
<b>Create workspaces</b>	If checked, the user can add a new workspace.
<b>Create Snapshots</b>	If checked, the user can add snapshots to Intel Deployment Manager.
<b>Create Network Device Configurations</b>	If checked, the user can add configurations for load balancers and switches.
<b>Create Servers</b>	If checked, the user can provision servers.
<b>Create Computing Devices</b>	If checked, the user can add and accept computing devices.
<b>Create Licenses</b>	If checked, the user can add licenses.
<b>Create Software</b>	If checked, the user can add software.

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Field Name	Description
<b>Create Jobs</b>	If checked, the user can add jobs and OpScripts.
<b>Create Networks</b>	If checked, the user can add networks.

7. In the **Users** section, you can attach or unattach users to the user role.
8. Click **OK**.

## Delete User Role

If you delete a user role from Intel Deployment Manager, it does *not* delete the LDAP group that it was associated with. For example, a user role `test_user_role` is associated with an LDAP group named `Intel_Deployment_Manager_users`. An Intel Deployment Manager administrator deletes `test_user_role`. The LDAP group `Intel_Deployment_Manager_users` is not affected when `test_user_role` is deleted.

To delete a user role:

1. In the Navigation Area, click **Settings > User Roles**.
2. Select the user roles you want to delete. The roles, `Everyone` and `Sysadmin`, cannot be deleted.
3. Click **Actions > Delete**.
4. Click **Yes** to delete the role, or **No** if you decide to keep it.

## Access Policies

An *access policy* maps a specific role to a workspace. When a role is mapped to a workspace by an access policy, all users in that role are allowed to view all of the resources in the workspace. Each access policy has a set of permissions which identify the operations the user is allowed to perform on the resources included in the workspace.

The **Access Policies** option is available in the **Settings** section. The administration console supports the following operations for access policies:

Menu	Options
Actions	<ul style="list-style-type: none"><li>◆ Edit ...</li><li>◆ Add ...</li><li>◆ Delete ...</li></ul>
Table	<ul style="list-style-type: none"><li>◆ Options ...</li><li>◆ Export</li></ul>

### Add/Edit Access Policy

To add or edit an access policy:

1. In the Navigation Area, click **Settings > Access Policies**.
2. The **Displaying All Access Policies** table is displayed.
  - If you are editing an access policy, select the policy you want to edit.
  - Do not select an access policy if you are adding a new one.
3. Click **Actions > Add** or **Edit**. The **Add Access Policy** or **Edit Access Policy** dialog supports the following sections:
  - **Basic**
  - **Resource Permissions**
  - **Operation Permissions**

4. Enter the following information in the **Basic** section:

Field Name	Description
<b>User Role</b>	Select the user role with which you want to associate this access policy.
<b>Workspace</b>	Select the workspace to which you want to associate this access policy.
<b>Description</b>	Enter a description for this access policy. A description is a brief summary for this access policy.
<b>Comments</b>	You can enter any relevant comments for this access policy. You can enter more details regarding this access policy, for example, you can describe the permissions that are granted to this access policy.

5. In the **Resource Permissions** section, you can associate the permissions that a specific access policy can have when accessing the **Resources** section. The levels of permissions are:

- **Full Control** - Allows you to view, delete, edit, assign, and perform operations on this resource. Assigning a resource refers to assigning or unassigning this resource to a workspace. If a user owns a resource, the system assumes that the user has **Full Control** permission for that resource.
- **Use** - Allows you to view and use this resource. You are not allowed to edit the resource's configuration. This permission also allows you to assign this resource to other resources. For example, you can assign a computing device to a server only if you have the **Use** permission for both the server and the computing device. However, you cannot assign resources to workspaces.
- **View Only** - Only allows you to view a resource. No operations can be performed on the resource.

6. In the **Operation Permissions** section, you can select the permissions a specific access policy can have when performing a particular operation. The operation permissions are:

- **Power Cycle Servers** - Allows you to power on, off, or cycle any computing device that you have access to. The computing device must also have the **Use** or **Full Control** permission to perform one of the power operations.
- **Open Terminal** - Allows you to have remote access to any server. The server must also have **Use** or **Full Control** permission to perform this operation.
- **Open Console** - Allows you to open a console on any server. The server must also have **Use** or **Full Control** permission to perform this operation.
- **Save (Computing Devices) Snapshot** - Allows you to save a snapshot for a computing device. The computing device must also have the **Use** or **Full Control** permission to perform the save.

- **Save (Provisioned Resources) Snapshot** - Allows you to save a full custom snapshot for a server. The server must also have the **Use or Full Control** permission to perform the save.

7. Click **OK**.

## Delete Access Policy

To delete an access policy:

1. In the Navigation Area, click **Settings > Access Policies**. The **Displaying All Access Policies** table is displayed.
2. Click **Actions > Delete**.
3. The verification dialog is displayed. Click **Yes** if you want to delete the access policy. Click **No** if you decide to not delete this access policy

# Automatic Detection

This chapter includes the following topics:

- ◆ “[Automatic Hardware Attribute Detection](#)” on page 70
- ◆ “[Automatic OS Detection](#)” on page 71

## Automatic Hardware Attribute Detection

*Automatic hardware attribute detection* is the process which automatically determines various hardware attributes for a system, such as system-type, CPU-speed, and memory size.

Automatic hardware attribute detection is invoked at several points in the workflow. It is invoked just after accepting an auto-discovered computing device, when you update a computing device, or after an update package (software) is executed. For automatic hardware attribute detection to succeed, the system must be running the ActiveOS. If the system is not currently running the ActiveOS, it will wait for the system to boot into the ActiveOS for a fixed period of time. If the ActiveOS does not come up after this fixed period of time, the hardware attribute detection fails.

Some of these attributes are determined by examining the system's SMBIOS (if present). Others are determined by examining the NICs and hard-disks attached to the system. Once the system determines its hardware attributes, they are stored in the computing device.

Every hardware attribute has a corresponding constraint on the basis of which automatic hardware detection is performed. The following table describes the automatic hardware detection based on the hardware attributes and the corresponding attributes by the Intel Deployment Manager back-end.

Table 1 Hardware Constraints and Descriptions

Hardware Attribute	Description	Constraints
Memory	Motherboard memory size	MBmem
Architecture	Hardware Architecture	MBArch
Chip Set	Motherboard chip set	MBcset
CPU Count	CPU count	MBcpuCount
CPU Speed	CPU speed in megahertz	MBavgCpuMHz
Manufacturer	Name of manufacturer	SYmanufacturer
Model	Model Name	SYmodel
Serial Number	Serial Number	YSerialNo
NIC Count	Number of NICs	CNcount
NIC Type	Type of NIC	
NIC Speed	Speed/bandwidth of NIC	
NIC Duplex	Duplex of NIC/connection	
NIC MAC Address	Hardware/MAC address of NIC	
Hard Disk Count	Number of hard disks	HDcount

Table 1 Hardware Constraints and Descriptions

Hardware Attribute	Description	Constraints
Hard Disk Device Name	Hardware device name (IDE or SCSI)	HDtype
Hard Disk Size	Hard disk size	HDsize
BIOS Manufacturer	Name of BIOS Manufacturer	
BIOS Version	BIOS version	MBbiosVer (from “BIOS” firmware in the Server Asset)
BIOS Release Date	BIOS release date	
Chassis Slot	System slot	SYslot
Chassis Serial Number	System chassis number	EXchassisId
Chassis Model	System chassis model	
Chassis IP Address	System chassis IP address	
Chassis Manufacturer	System chassis manufacturer	
Rack Number	Rack serial number	

## Automatic OS Detection

*Automatic OS detection* is responsible for automatically determining the OS for a server or a computing device. The OS is determined by examining the partitions of the hard disks in the system.

Automatic OS selection is performed by examining various files contained on the disk partitions. The data collected from this operation is sent to the Intel Deployment Manager back-end, which then determines which OS best matches this data.

Automatic OS detection is performed whenever you choose **Automatically Detect OS** in the **Save Snapshot** dialog. The OS of the saved snapshot will be set to the automatically detected OS on the computing device's disks.

## Accepting a Discovered Computing Device

Before you can perform any actions on a computing device, you must accept it. See [“Accepting Intel Server Compute Blades”](#) on page 115.



## Using Snapshots

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This chapter includes the following topics:

- ◆ “[Managing Snapshots](#)” on page 74
  - “[Saving a Full Snapshot](#)” on page 74
- ◆ “[Working with Snapshots](#)” on page 77
  - “[Edit Snapshot](#)” on page 77
  - “[Apply Licenses to Snapshots](#)” on page 79
  - “[HTTP Import](#)” on page 80
  - “[Server Side Import](#)” on page 81
  - “[HTTP Export](#)” on page 82
  - “[Server Side Export](#)” on page 82
  - “[Search Storage](#)” on page 83
  - “[Assign Snapshot](#)” on page 83
  - “[Unassign Snapshot](#)” on page 84
  - “[Delete Snapshot](#)” on page 84
  - “[Tree/Table View](#)” on page 85

A *snapshot* is a set of software that includes an operating system (OS) and other (optional) software, registered with the Intel Deployment Manager system for use on specific server types.

Snapshots are useful for:

- performing instant and full disaster recovery
- accelerating server deployment and provisioning
- rapid replication and deployment of software environments
- migration of software environments across hardware models
- reduction in cost and time spent to install, configure, and re-purpose servers

## Managing Snapshots

You can save full or incremental snapshots. You can also save snapshots periodically using scripts and scheduling. An incremental snapshot takes up less disk space and, depending on selected options, is significantly faster than saving a full snapshot.

Using scheduled jobs, you can save incremental snapshots from a single or multiple targets. The base on which the increment is based (the *base snapshot*) is found automatically from the current target's image.

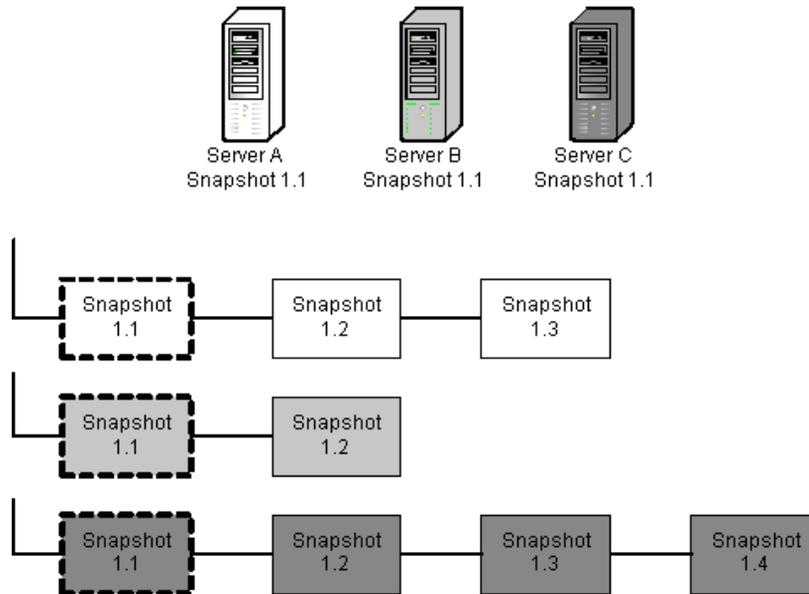
### Saving a Full Snapshot

When you perform a full snapshot save

- ◆ A new snapshot tree is created, with the full snapshot saved as the root node.
- ◆ Each snapshot tree has only one full snapshot, namely the root node. All other nodes in the tree are increments only.
- ◆ When saving a complete snapshot, you can save a snapshot in the file mode or sector mode. The subsequently saved incremental snapshots use the same mode.
- ◆ You can save full backup snapshots periodically and save their increments for multiple targets. This can be achieved in either of two possible ways:
  - Save a full snapshot of each target (which goes into its own tree at the root node), and have incremental snapshots go into each tree. Each target thereby has its own snapshot tree. When you perform a full snapshot save for each of the server snapshots, that snapshot is saved at the root node (identified by the dotted box). All consecutive increments of these snapshots are then saved after the root node. The Figure "Full Snapshot Save (Case 1)" on page 75 describes a scenario where you save a snapshot used on three different servers. For example, Snapshot 1.1 is used on Server A, Server B, and Server C. A full save is performed for the snapshot on each server. So when you perform a full save of the

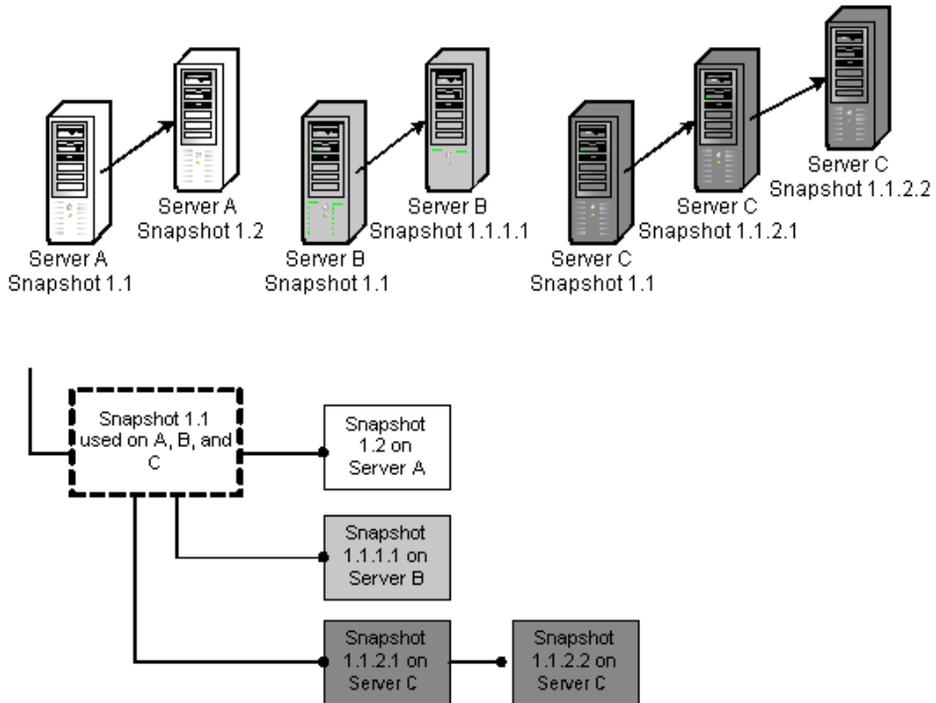
snapshot, as used on three different servers, they are saved as three separate root nodes. The following increments of the snapshot (Snapshot 1.2, Snapshot 1.3, and so on) are then saved in the trunk of the root nodes.

#### Full Snapshot Save (Case 1)



- You can also deploy a snapshot (full or incremental) on multiple target servers and then save increments relative to the root node. For example (see the Figure "Full Snapshot Save (Case 2)" on page 76), Snapshot 1.1 is used on Server A, Server B, and Server C. No full save is performed for any of the servers, only incremental saves relative to the deployed image are saved (shown in the gray-dotted box). The first increment saved for Snapshot 1.1 (on server A) is saved as Snapshot 1.2 on the same trunk. The increment saved (on server B) for Snapshot 1.1 is saved as Snapshot 1.1.1.1 in the next branch. The following increments saved (on Server C) for Snapshot 1.1 are saved as Snapshot 1.1.2.1 and Snapshot 1.1.2.2 in the next branch.

Full Snapshot Save (Case 2)



You cannot save incremental backups in situations where:

- the number of partitions have changed.
- a partition has changed type (say from NTFS to ext3)
- incremental snapshots are not supported for network devices

You can always take a full snapshot, and then take incremental snapshots relative to this new base.

After taking a full or incremental snapshot, the system you took the snapshot from must be rebooted to the ADMIN state. See [“Reboot to Admin State”](#) on page 126.

## Working with Snapshots

The **Snapshots** component in the Navigation Area displays a view of all the snapshots that are imported or saved. It displays the following categories:

- ◆ **Servers** - displays all the snapshots saved for servers
- ◆ **Load Balancers** - displays all the snapshots saved for load balancers
- ◆ **Switches** - displays all the snapshots saved for switches

Each of the categories displays the following menus:

- ◆ **Actions** - allows you to edit, HTTP Import, HTTP Export, Server Side Import, Server Side Export, assign, unassign, and delete snapshots
- ◆ **View** - allows you to display a tree and/or table view

---

**Note** Incremental snapshots are not supported for load balancers and switches.

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### Edit Snapshot

To edit a snapshot:

1. Click **Resources > Snapshots**.
2. Click the tab that contains the snapshot you want to edit: **Servers**, **Load Balancers**, or **Switches**. A table displays all snapshots for the selected category.
3. Select the snapshot you want to edit.
4. Click **Actions > Edit**.
5. The **Edit Snapshot** dialog displays the following sections:
  - **Basic**
  - **Constraints**
6. You can edit the following information in the **Basic** section.

Field Name	Description
<b>Snapshot Name *</b>	You can edit the snapshot name. Do not exceed 64 characters. Renaming the snapshot, if in use, updates the snapshot name in the provisioned servers entries.
<b>HW Architecture</b>	The HW architecture that the selected snapshot supports is displayed. For example, x86.

Field Name	Description
<b>Revision No.</b>	The revision number of the snapshot is displayed.
<b>HW Manufacturer</b>	The HW manufacturer name of the machine from which this snapshot was saved is displayed.
<b>HW Model</b>	The HW model from which this snapshot was saved is displayed.
<b>OS *</b>	Select the OS from the drop-down options. If the correct OS is not selected, the snapshot will not be loaded successfully on the computing device.
<b>Incremental Snapshot</b>	When editing a snapshot this is a read-only field. You already set the option when saving the snapshot. This flag displays as a checkbox if you are trying to save a snapshot for a server in the Up state. You see <b>No</b> in this field if you are trying to save a snapshot for a server in the DOWN state.
<b>Compression of Snapshot</b>	When editing a snapshot this is a read-only field. You already set the option when saving the snapshot. This option is checked by default. You can uncheck this option if you do not want to compress the snapshot while saving the snapshot. Compressing a snapshot takes longer, but reduces the size of the snapshot.
<b>Date Based Snapshot</b>	When editing a snapshot this is a read-only field. You already set the option when saving the snapshot. This option applies to incremental backup in file mode only. The date-based stamp controls how the delta archiver determines whether or not a regular file has changed. When the flag is not selected, the delta archiver determines whether or not a regular file has changed based on the file contents only. When the flag is selected, the delta archiver first makes a quick check on whether or not the time stamp of a file has changed. If there is no change, the delta archiver assumes that the file has not changed. If the time stamp has changed then the contents of the file considered. Setting the date-based stamp flag will give faster incremental backup with the slight risk that a backup could be incomplete caused by a wrong time stamp.
<b>Partition Sector Save</b>	When editing a snapshot this is a read-only field. You already set the option when saving the snapshot. Select this option if the snapshot should be saved by storing sectors for each partition on each disk. Snapshots saved in this mode provide a complete backup of primary and logical partitions on the disks, excluding swap partitions and the extended partition (if exists). Note that even sectors not used by the filesystem are saved using this option.
<b>Disk Sector Save</b>	Select this option if the snapshot should be saved by storing sectors for each disk. Snapshots saved in this mode provide a complete backup of the disks, covering both partitioned and un-partitioned disk space. Such snapshots can not be used on server assets with different disk sizes or disk geometries. Note that even sectors not used by the filesystem are saved using this option.
<b>Licenses</b>	Select the licenses that should be assigned to this snapshot.
<b>Storage</b>	Displays the storage you assigned for saving this snapshot.
<b>Directory</b>	Displays the directory in which the snapshot is saved.
<b>Creator</b>	Displays the Intel Deployment Manager user who imported the snapshot.

Field Name	Description
<b>Creation Time</b>	Displays the time when this snapshot was imported.
<b>Assigned to Workspace</b>	Displays the workspace to which this snapshot is assigned.
<b>Comments</b>	Enter any comments for this snapshot.

7. In the **Constraints** section you can assign constraints to the selected snapshot. Select the required parameters by checking the checkboxes. See “[Constraints and the Constraints Editor](#)” on page 201
8. Click **OK** to save the changes to this snapshot, or you can click **Cancel** to exit this dialog without modifying the snapshot.

## Apply Licenses to Snapshots

Before you associate licenses with snapshots, you must add licenses. See “[Add/Edit License](#)” on page 154. You cannot apply licenses to snapshots for switches or load balancers.

To associate a license with a server snapshot:

1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**.
3. Select the snapshot to which you want to associate a License.
4. Click **Actions > Edit**. The **Edit Snapshot** dialog is displayed.
5. In the **Basic** section, the **Licenses** field allows you to associate licenses with the selected snapshot.
6. Click **OK** after you have made the necessary changes.

## HTTP Import

Snapshots are imported in the `.epk` and `.zip` formats. The `.epk` file format checks for the validity of the file being imported. If the original `.epk` file was altered and you attempt to import it, the attempt will fail.

You need to import a snapshot to load it on a computing device, load balancer, or switch. Only snapshots exported by Intel Deployment Manager can be imported. Before importing a snapshot, you should allocate storage to store the snapshot. For further information, see “[Allocate System Storage](#)” on page 171.

Because of browser restrictions, the size of the snapshot that you import must be less than 2 GB.

To perform an HTTP import:

1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**. For example, If you are importing a load balancer snapshot, click the **Load Balancers** category.
3. Click **Actions > HTTP Import**. The **HTTP Import** dialog is displayed.
4. Enter a name for the snapshot. For example, `http1_Snapshot`. Do not exceed 64 characters.
5. Select the **Storage for this Snapshot**. The Storage allocated using **Allocate System Storage** is listed. See “[Allocate System Storage](#)” on page 171.
6. Select the workspace that you want to assign this snapshot to.
7. Enter any comments regarding this snapshot. Click **Continue**.
8. The **HTTP Import status** window appears. Click **Browse** to select the snapshot you want to import, and click **OK**.

---

**Caution** Do not close the **HTTP Import** window until the import has completed. If you do, the import will stop.

---

## Server Side Import

A server-side import provides faster transfer than an HTTP import. Only snapshots exported by Intel Deployment Manager can be imported. There is no restriction on the size of the snapshot you can import.

To perform a server-side import:

1. Mount or map the source drive (the drive that contains the snapshot you want to import) to the Intel Deployment Manager server.
2. Click **Resources > Snapshots**.
3. Click a tab: **Servers**, **Load Balancers**, or **Switches**. For example, If you are importing a load balancer snapshot, click the **Load Balancers** category.
4. Click **Actions > Server Side Import**. The **Server Side Import** dialog is displayed.
5. Enter the location of the snapshot in the **Source Snapshot Location** field. Use the full path name of the mounted or mapped drive.
6. Enter the name of the snapshot that you are importing.
7. Select **Storage** for this Snapshot. The storage created using **Allocate System Storage** is listed. See “[Allocate System Storage](#)” on page 171.
8. In the **Assigned to Workspace** drop-down list, select the workspace that you want to assign the snapshot to.
9. Enter any comments regarding this snapshot in the **Comment** field.
10. Click **OK**.

## HTTP Export

An HTTP export performs an export of the selected snapshot from the Intel Deployment Manager server to a local machine. Before you perform an HTTP export, make sure the size of the snapshot is less than 2 GB.

---

**Note** When a snapshot is exported it does not get removed from the Intel Deployment Manager server.

---

To perform an HTTP export:

1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**.
3. Select the snapshot you want to export.
4. Click **Actions > HTTP Export**. The **File Download** dialog displays.
5. Choose whether to open the file from its current location, or save the file to your disk.
6. Click **OK**.

## Server Side Export

A server-side export provides faster transfer than an HTTP export. There is no restriction on the size of the snapshot you can export using a server-side export.

To perform a server-side export:

1. Mount or map the destination drive (the drive you are exporting to) to the Intel Deployment Manager server.
2. Click **Resources > Snapshots**.
3. Click a tab: **Servers**, **Load Balancers**, or **Switches**.
4. Select the snapshot you want to export.
5. Click **Actions > Server Side Export**.
6. Enter the **Destination File Name** for the snapshot. Include the full path name of the mounted or mapped drive.

7. Click **Continue**.

## Search Storage

You can use the **Search Storage** action if you want to search for a pre-installed package (snapshot, software, or OpScript) on a system storage device. Each subdirectory in the system storage is checked. If files for a snapshot, software, or OpScript are found on the filesystem, but no database entry exists, Intel Deployment Manager creates the database entries and associates them with the files.

**Search Storage** can be used to quickly import packages from a previous installation of Intel Deployment Manager, or from a set of files copied over from a different Intel Deployment Manager server. Note that sharing of package files between multiple Intel Deployment Manager servers is not supported.

To search storage:

1. Click **Resources > Snapshots**.
2. Click a tab. All of the tabs under **Snapshots** support **Search Storage**.
3. Click **Actions > Search Storage**. The **Search Storage** dialog is displayed.
4. Select a storage device to search from the **Storage** drop-down list.
5. Click **OK**. A list of all server snapshots is displayed.

## Assign Snapshot

To assign a snapshot to a workspace:

1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**. The **Displaying All Accepted Assets** table appears.
3. Select the asset you want to assign to a workspace. You can assign computing devices from **Blade Assets**, **Chassis Assets**, or **Server Assets**.
4. Click **Actions > Assign**.
5. In the **Assign to Workspace** dialog, select the workspace.
6. Click **OK**.

## Unassign Snapshot

You can unassign a snapshot from a workspace if it is no longer to be used by that workspace.

To unassign a snapshot:

1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**.
3. Select the component you want to unassign: **Blade Assets**, **Chassis Assets**, or **Server Assets**.
4. Click **Actions > Unassign**. The **Unassign from Workspace** dialog is displayed.
5. Select the workspace that the component should be unassigned from.
6. Click **OK**.

## Delete Snapshot

Deleting a snapshot deletes the snapshot and its saved incremental snapshots.

A snapshot cannot be deleted if it was used to create an existing server or a server template—the server or server template has to be deleted before you can delete the snapshot. This restriction does not apply for network devices.

To delete snapshot(s):

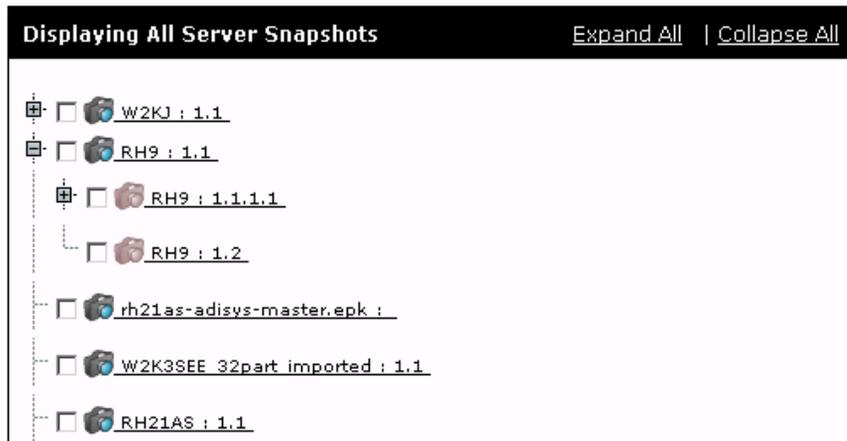
1. Click **Resources > Snapshots**.
2. Click a tab: **Servers**, **Load Balancers**, or **Switches**.
3. Select the snapshot(s) you want to delete.
4. Click **Actions > Delete**. The names of snapshots to be deleted are displayed for verification.
5. To delete these snapshot(s) click **Yes**; otherwise, click **No**.

## Tree/Table View

You can view all available snapshots in the tree/table view. The **View** menu lists the tree and table options.

The Tree View for snapshots displays the saved snapshots in a tree format, as shown in the following figure. A plus (+) sign indicates that an incremental backup has been saved for the snapshot. The **Expand All** and **Collapse All** options enable you to view or hide all the backup versions saved for a snapshot.

Tree View



The Table View for snapshots displays the saved snapshots in a table format, as shown in the following figure.

Table View

<input type="checkbox"/>	Name ▲ [1]	Revision	Import/Export Status	Architecture
<input type="checkbox"/>	<a href="#">NT4</a>	1.1	<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">nt4-adisys-master.epk</a>		<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">RH21AS</a>	1.1	<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">rh21as-adisys-master.epk</a>		<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">rh80-full-adisys-master.epk</a>		<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">RH9</a>	1.1	<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">RH9</a>	1.2	<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">RH9</a>	1.1.1.1	<a href="#">Loaded</a>	x86
<input type="checkbox"/>	<a href="#">RH9</a>	1.1.1.2	<a href="#">Loaded</a>	x86

This chapter includes the following topics:

- ◆ “[Computing Devices](#)” on page 88
  - “[Accept Computing Device](#)” on page 89
  - “[Edit Computing Device](#)” on page 89
  - “[Assign Computing Device](#)” on page 90
  - “[Unassign Computing Device](#)” on page 90
  - “[Delete Computing Device](#)” on page 91
  - “[Save Snapshot](#)” on page 92
  - “[Deploy Software](#)” on page 95
- ◆ “[Blade Assets](#)” on page 96

Configuring computing and network devices refers to the process of creating and modifying the stored hardware attributes of servers, chassis, blades, switches and other hardware to be managed by Intel Deployment Manager. Computing devices comprise all types of server assets that Intel Deployment Manager manages; such as server assets, blade assets, and chassis assets. Network devices include network hardware-based load balancers and switches.

## Computing Devices

The **Computing Devices** component in the Navigation Area provides a view of all managed assets, to the extent permitted by a user's assigned permissions to access them.

The **Computing Devices** section groups together all the assets that Intel Deployment Manager can administer. The assets are divided into several categories including: server assets, blade assets, and chassis assets. This component also displays the accepted, rejected, and discovered assets.

**Computing Devices** displays the following categories:

- ◆ **Blade Assets** - This section lists all entities that represent a physical blade server that can be provisioned.
- ◆ **Chassis Assets** - This section lists all entities that represent a physical chassis that contains blade assets.
- ◆ **Server Assets** - These are entities that represent a physical server that can be provisioned.
- ◆ **Discovered** - This section lists all the computing devices that have been auto-discovered, but have not yet been accepted by the user.
- ◆ **Rejected** - This section lists all the computing devices that have been auto-discovered, but which the user has rejected for management by Intel Deployment Manager.
- ◆ **Accepted** - This section lists all computing devices that have been discovered and accepted. After auto-discovering a computing device, you must accept it before performing other actions like provisioning, loading a snapshot, or saving a snapshot.

From the **Accepted** section you can work on all blade assets, chassis assets, and server assets that have been accepted. The **Accepted** section displays the following menus:

- **Actions** - enables you to edit, add managed or unmanaged servers, provision servers, initiate discovery, assign, unassign, or delete computing devices.
- **Snapshots** - enables you to save a snapshot of the selected computing device.
- **Software** - enables you to deploy selected software on selected computing devices.
- **Maintenance** - enables you to reboot, reset, reconnect, rediscover asset attributes, enter, or exit maintenance mode, and reboot to ADMIN State.
- **Power** - enables you to power on, off, or cycle selected computing devices.
- **Console** - enables you to access the system console of a selected computing device remotely. This is only supported on some devices.
- **Access** - enables you to access the selected computing device remotely.

The following procedures can be performed upon any computing device: server assets, blade assets, or chassis assets.

## Accept Computing Device

To manage a computing device you must first accept it. Only DISCOVERED assets can be accepted.

To accept a computing device:

1. Click **Resources > Computing Devices**.
2. Click the **Discovered** tab. All discovered computing devices are displayed.
3. Select the computing device(s) you want to accept.
4. Click **Actions > Accept**.
5. The verification dialog is displayed. If you want to accept the selected device click **Yes**, or click **No** to reject it.
6. After you accept a computing device, it needs to be manually rebooted (or for an Intel Blade Server, rebooted from the UI) to load the ActiveOS and continue the auto-discovery process. After the reboot is completed, in the **Displaying All Computing Devices** table, the **Asset Status** of the accepted computing device displays UPDATE DONE. Shell You should see Accessphrase displayed on the console of the computing device.

## Edit Computing Device

Editing a computing device changes the stored attributes for the device. You can edit a computing device from the **Accepted** section as well as from the **Blade Assets**, **Chassis Assets**, or **Server Assets** page. For information about editing computing devices see:

- [“Edit Managed Blade Asset”](#) on page 96.
- [“Edit Chassis Asset”](#) on page 102.

## Assign Computing Device

Assigning a computing device to a workspace makes the device available to that workspace for users.

To assign a computing device to a workspace:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Select one of the following categories: **Blade Assets**, **Chassis Assets**, or **Server Assets**.
3. Select the asset you want to assign to a workspace.
4. Click **Actions > Assign**.
5. In the **Assign to Workspace** dialog, select the workspace for this computing device.
6. Click **OK**.

## Unassign Computing Device

You can unassign a resource from a specific workspace if it is no longer to be used by that workspace.

To unassign a resource from a workspace:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click a tab: **Blade Assets**, **Chassis Assets**, or **Server Assets**.
3. Select the asset you want to unassign from a workspace.
4. Click **Actions > Unassign**.
5. In the **Unassign from Workspace** dialog, select the workspace that this component should be unassigned from.
6. Click **OK**.

## Delete Computing Device

Deleting a computing device removes the device from the Intel Deployment Manager records. It might halt the device if it is running ActiveOS.

To delete a computing device:

1. Click **Resources > Computing Devices**.
2. Click the **Accepted** tab.
3. Select the computing device you want to delete.
4. Click **Actions > Delete**.
5. The verification dialog is displayed. The computing device is displayed in the following format: *<description> : <id> (<model>, <serial-number>)*. For example,

**Adisys2 : 35299908 (x86, 1 x 600MHz, 13660MB)**

For partial assets the computing devices are displayed as

*<mac-addr> : <description> : <id> (<model>, <serial-number>)*.

6. Click **Yes** to delete the selected device. You can click **No** if you decide not to delete the device.

## Save Snapshot

A *server snapshot* is a set of software that includes an operating system (OS) and other (optional) software, registered with the Intel Deployment Manager system for use on specific server types. Saving a snapshot enables you to save a backup of the computing device's image. You can then provision another computing device with the snapshot.

Before you save a snapshot of a computing device, on the **Server Asset** page ensure that:

- You added storage device.
- You allocated system storage.
- The selected computing device is not in use by a provisioned resource that is in the UP state. Also, no software (for example, bootable code) should be running on the provisioned resource.

---

**Note** Before saving the snapshot of a Windows NTFS computing device, make sure you have the ITAP agent, `itap_agent.exe`, installed on it. This agent is necessary for live discovery and auto-discovery of a computing device.

---

On the **Provision Server** page, when saving a snapshot of a provisioned resource (as opposed to a computing device), the computing device can be in the UP or DOWN state. If it is in the DOWN state, the provisioned resource should have a computing device dedicated to it.

To save a snapshot of a computing device:

1. Click **Resources > Computing Devices**.
2. Click the **Blade Assets**, or the **Server Assets** tab. You can also save a snapshot from the **Accepted** section.
3. Select the device for which you want to save a snapshot.
4. Click **Snapshots > Save**. The **Save Snapshot** dialog is divided into the following sections:
  - **Basic**
  - **Constraints**
  - **Advanced**

5. Enter the following information in the **Basic** section:

Field Name	Description
<b>Name</b>	You can assign a snapshot name. Do not exceed 32 characters.
<b>OS</b>	Click the drop-down menu to select the operating system.
<b>Licenses</b>	Select the licenses required. When this snapshot is loaded on a server and the status of the server is UP, one License is used.
<b>Storage</b>	Select a system storage option from the drop-down menu. No System Storage available displays if you did not add any system storage.
<b>Comments</b>	Enter extra comments for the selected master server snapshot.

6. In the **Constraints** section, you can edit the applicable constraints for the snapshot. See “[Constraints and the Constraints Editor](#)” on page 201.

7. In the **Advanced** section, enter the following information:

Field Name	Description
<b>Custom save reboot Software</b>	<p>You can specify, when saving, you want to reboot the server with the selected software. Any software which had the <b>Causes Reboot</b> option checked qualifies for this selection. If the software you select cannot cause a reboot then the operation will fail. Software is assigned the <b>Causes Reboot</b> functionality in the <b>Add Software and/or Edit Software</b> dialogs.</p> <p>Sysprep is an example of software that can be used with the <b>Custom save reboot Software</b> option. Once the files are transferred, Sysprep can be used (added to Intel Deployment Manager as software) to reboot the machine. This software must have the <b>Causes Reboot</b> option checked in order to be displayed in the <b>Custom Save reboot software</b> field before the custom snapshot action is performed. On executing the custom snapshot, Sysprep executes and prepares the server asset according to the information provided in the <code>sysprep.inf</code> file.</p>
<b>Save Reboot Software Arguments</b>	Enter additional arguments to pass to the custom reboot software.

Field Name	Description
<b>Sector by Sector Save</b>	<p>With this option you can choose whether to save the snapshot of the server's hard disk in file or sector mode. Click the drop-down menu to select from the following options:</p> <ul style="list-style-type: none"> <li>◆ <b>None</b> - If you select none, you have chosen to not save in file mode.</li> <li>◆ <b>Partition Sector Save</b> - Select this option if the snapshot should be saved by storing sectors for each partition on each disk. Snapshots saved in this mode provide a complete backup of primary and logical partitions on the disks, excluding swap partitions and the extended partition (if it exists). Note that even sectors not used by the filesystem are saved using this option.</li> <li>◆ <b>Disk Sector Save</b> - Select this option if the snapshot should be saved by storing sectors for each disk. Snapshots saved in this mode provide a complete backup of the disks, covering both partitioned and un-partitioned disk space. Such snapshots can not be used on server assets with different disk sizes or disk geometries. Note that even sectors not used by the filesystem are saved using this option.</li> </ul>
<b>Filesystem Check</b>	<p>Click the drop-down menu to select from the following options:</p> <ul style="list-style-type: none"> <li>◆ <b>None</b> - Select this option if you do not want to perform a filesystem check (for example, <code>fsck</code>).</li> <li>◆ <b>Automatic</b> - Select this option if you want to perform an automatic filesystem check, if needed, when saving a snapshot.</li> <li>◆ <b>Force</b> - Select this option if you want to perform a filesystem check each time a snapshot is saved.</li> </ul>
<b>Ignore FS Check Errors</b>	<p>This option is unchecked by default. If you check this option the filesystem errors are ignored and the partition is skipped.</p>
<b>Compression of Snapshot</b>	<p>This option is checked by default. You can uncheck this option if you do not want to compress the snapshot while saving the snapshot. Compression of a snapshot prolongs the process of saving a snapshot, but saves space.</p>

8. Click **Save**.

## Deploy Software

Deploying software is the process of running a previously uploaded software package. It can be used to update firmware, configure RAID devices, or install applications on a server. To deploy software on a computing device:

1. Click **Resources > Computing Devices**.
2. Click the **Accepted** tab. The **Displaying All Accepted Assets** table is displayed
3. Select the computing device on which you want to run the software.
4. Click **Software > Deploy**.
5. In the **Deploy Software** dialog, enter the following information:

Field Name	Description
<b>Assets</b>	The computing devices on which you want to execute software are displayed.
<b>Software</b>	Click the down arrow to view the software stored on the Intel Deployment Manager server. Only the software loaded in Intel Deployment Manager is displayed (what is displayed depends on your user capabilities).
<b>Additional Arguments</b>	You can add any additional arguments you want to pass on to the software.
<b>Don't Monitor Progress</b>	If you check this option, the progress of this software is not monitored. Instead, the software is started and the system immediately returns.
<b>Post Action</b>	Select an action from the drop-down menu to be performed after receiving a return value. If the return value indicates that software execution was a success only then post action is performed. Currently, there is only one post action; <b>Re-discover Asset Attributes</b> . This action updates the information for the asset.

6. Click **Deploy**.

## Blade Assets

A *Blade Asset* is an entity that represents a bare-metal physical blade server that can be used for provisioning. A *Blade Server* is a server computer built on a thin, modular circuit board that must be plugged into a multi-blade chassis for it to be used. A blade asset is automatically discovered, tracked, provisioned, managed, and re-purposed through Intel Deployment Manager operations. This entity can be managed or unmanaged (typically for maintenance purposes). Every blade asset must identify the chassis asset that contains it, as well as the slot in the chassis in which the blade resides. You can manage blade assets by using the various options listed in the **Actions** drop-down menu.

The following steps provide an overview of the physical hardware preparation for the server:

1. Change the BIOS setup of the server to boot from the network before the local hard disk.
2. Shut down the server's operating system properly (if it is running).

Now you can add this managed server as a server asset.

When you add a managed server asset, its hardware characteristics are registered with Intel Deployment Manager. The system then uses this information to uniquely identify each asset. You can add assets using either auto-discovery, or the administration console.

### Edit Managed Blade Asset

To edit a managed blade asset:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Blade Assets** tab. The **Displaying All Blade Assets** table is displayed.
3. Click **Actions > Edit**.
4. The **Edit** dialog displays the following sections:
  - **Basic**
  - **Network \***
  - **System**
  - **Console**
  - **NIC \***
  - **Hard Disk \***
  - **RPC**

- **Firmware**
- **Constraints**

5. The **Basic** section includes information that is collected for your records. This section is optional. You can go directly to the **Network** section.

---

**Note** Model name, serial number, and description are automatically detected from the device when added or an update is performed and if the device supports them. These fields are used by Intel Deployment Manager when logging information about the device.

---

In the **Basic** section, you can enter the following information:

<b>Field Name</b>	<b>Description</b>
<b>Description</b>	Enter a description for the server asset. Do not exceed 80 characters.
<b>Manufacturer</b>	Enter the name of the manufacturer of the server asset. Do not exceed 80 characters.
<b>Model Name</b>	Enter the model name of the server asset. Do not exceed 80 characters.
<b>Serial Number</b>	Enter the serial number of the server asset. Do not exceed 80 characters.
<b>Miscellaneous Info.</b>	This field is provided to enter information that you can use for your records. Do not exceed 256 characters per field.
<b>Additional Info #1</b>	You can enter additional information here.
<b>Additional Info #2</b>	You can enter additional information here.
<b>Additional Info #3</b>	You can enter additional information here.
<b>Additional Info #4</b>	You can enter additional information here.
<b>Additional Info #5</b>	You can enter additional information here.
<b>Comment</b>	Enter any comments for this server asset.
<b>Chassis</b>	From the drop-down options select the chassis where this blade asset is located.
<b>Location</b>	You can enter the rack or cage number of this server asset.
<b>Licenses</b>	Select the applicable license(s) from those you registered earlier.
<b>Slot</b>	Slot in the chassis that the blade is connected to.

6. The **Network** section includes information that is used by Intel Deployment Manager when managing this computing device. This section is mandatory. Enter the following information:

<b>Field Name</b>	<b>Description</b>
<b>Maintenance mode</b>	Maintenance mode enables you to block-out one or many computing devices for any changes that you might need to make to its physical hardware. For a computing device to enter the maintenance mode it must be in the IDLE state.
<b>Architecture</b>	Select the appropriate architecture for this asset from the drop-down options
<b>Management Protocol</b>	The management protocol is an ActiveOS or a management device driver, deployed to run on an Intel Deployment Manager managed server, or to remotely manage a device. This entry depends on the architecture selected for the asset.
<b>Boot Domain *</b>	Select the boot domain if you installed a boot daemon on a different server on a different part of the network (for example, on a different subnet) than the Intel Deployment Manager server.
<b>IP Address *</b>	Enter the IP address for this managed blade asset. If you leave this field blank, Intel Deployment Manager looks through the network for an IP address that can be assigned to this server asset.
<b>Network *</b>	Select the network to which this asset belongs.
<b>Subnet Mask</b>	Enter the subnet mask for this asset. If this field is left blank, the subnet mask of the network is used.
<b>Gateway</b>	Enter the default gateway this asset should use. If this field is left blank, the default gateway for the network is used.
<b>Next Server IP</b>	Enter the IP address for the next server. In case you want to use another TFTP server besides the one installed by default (on the same server as Intel Deployment Manager), then you must specify another IP address.

7. In the **System** section, enter the following:

Field Name	Description
<b>Allocatable</b>	Check this option if you want this blade asset to be available for server provisioning.
<b>Number of CPUs *</b>	Enter the number of CPUs physically supported by this asset. The default is 1.
<b>Average CPU Clock Rate *</b>	Enter the average CPU rate in MHz.
<b>Motherboard Chip Set *</b>	Enter the chip set number of the motherboard.
<b>Amount of Memory (RAM) *</b>	Enter the amount of memory in MB.

8. Enter the following information in the **Console** section:

Field Name	Description
<b>Protocol</b>	Select the protocol used to access this computing device's system console.
<b>IP Address</b>	Enter the IP address used to access this computing device's system console. If left blank, the address entered in the <b>Network</b> section is used.
<b>Port</b>	Enter the port that should be used to contact the console.
<b>Initial Window Size</b>	Set the size for the console's browser window.

9. If the server has a primary NIC, in the NIC section, enter the following information:

Field Name	Description
<b>Speed</b>	Enter the bandwidth of the NIC, for example <b>10 Mbps</b> .
<b>Switch Name *</b>	Enter an identifier for your switch.
<b>Switch Port</b>	Port (recorded earlier) into which the NIC is plugged.
<b>Port Mode</b>	Select the Port mode or Duplex mode on the switch. The options are <b>Auto</b> , <b>Half</b> , and <b>Full</b> . <ul style="list-style-type: none"> <li>◆ <b>Auto</b> negotiates whether the attached device is transmitting in half or full, and then automatically changes that port to that mode.</li> <li>◆ <b>Half</b> works optimally only if one device is transmitting and all the other devices are receiving, otherwise, collisions occur. When the collisions are detected, the devices causing the collision wait for a random time before retransmitting. This means that at half duplex, Ethernet throughput is limited by the need to retransmit data when collisions occur. Half is the most common transmission method and is adequate for normal workstation and PC connections.</li> <li>◆ <b>Full</b> provides dual communication on a point-to-point connection and allows each device to simultaneously transmit and receive on a connection. Full mode is typically used to connect to other switches or to connect fast access devices such as workgroup servers.</li> </ul>
<b>MAC Address *</b>	Enter the MAC Address of the blade asset in the form of this example: <b>AF:04:0F:1E:17:69</b>
<b>Enable Portfast</b>	Check this option only if you want this port to be permanently transitioned to the spanning-tree FORWARDING state.
<b>NIC is Manageable</b>	Check this option if you want this NIC to be managed by Intel Deployment Manager.
<b>NIC is Bootable</b>	If the server asset is set to boot from this NIC, then check this option. Otherwise, select the <b>Bootable</b> checkbox for the server asset. Also, you can have one NIC checked as bootable.
<b>Switch Settings</b>	Enter any extra settings for this switch. The extra switch options are switch dependent and passed directly to the switch for execution. For example, if the port is on a CISCO 65xx switch, you can enter <code>set port speed 2/4 100</code> which is passed to the command line of the switch to set the port speed of port 2/4 to 100Mbps. See the CISCO switch manual for details. This option is recommended for use only by advanced users (or for support) only.
<b>Description</b>	Enter a description for the NIC. Do not exceed 64 characters.
<b>Comments</b>	Enter any extra comments for the NIC.

If you want to add another NIC, click **Add NIC**. The Add NIC dialog displays. Enter the required information.

10. Enter the following information in the **Hard Disks** section:

Field Name	Description
<b>Interface *</b>	Select either IDE or SCSI.
<b>Device Path *</b>	Enter the location of the hard disk. for example, <code>/dev/hda/</code>
<b>Saveable</b>	Check this option if the disk image should be saved when a snapshot is saved. An asset can have multiple hard disks, and you can save or not save one or more of them.
<b>Size *</b>	Enter the size of the disk in gigabytes.
<b>Raid Level *</b>	Select the RAID Level.
<b>Misc. RAID Controller Info</b>	Enter any information that you would like to record regarding the RAID controller.

If you want to add more hard disks, click **Add Hard Disk**. The **Add Hard Disk** dialog is displayed. Enter the required information.

11. The information provided in the **RPC** section is used to power cycle the assets.

Field Name	Description
<b>Telnet IP Address *</b>	Enter the Telnet IP address of the Bay Tech switch.
<b>Telnet Port *</b>	Enter the Telnet port of the Bay Tech switch.
<b>User Login *</b>	Enter the user login required for the BayTech switch.
<b>Password *</b>	Enter the password required to log in to the BayTech switch.
<b>Module *</b>	Each DS9 switch has 9 modules. Of the 9 modules only modules 2 through 9 are used to connect the power strips. Each module has 4 ports to which you can connect a power strip, and each power strip has 9 outlets for connecting the server assets. To power cycle an asset the module number, module port, and the outlet number combination is used in a command issued to the DS9 switch during the telnet session.
<b>Module Port *</b>	Enter the port to which the power strip is connected.
<b>Outlet *</b>	Enter the outlet to which the server asset is connected.

12. Enter the following information in the **Firmware** section:

Field Name	Description
<b>Name *</b>	Enter a name for the firmware system.
<b>Manufacturer</b>	Enter the name of the manufacturer for the firmware.

Field Name	Description
<b>Version</b>	Enter the version for the firmware.
<b>Release Date</b>	Enter a release date in the <i>mm/dd/yy</i> format.
<b>Misc. BIOS Info.</b>	Enter any information that you would like to record regarding the firmware.

- In the **Constraints** section you can edit the constraints applicable to this blade asset. See [“Constraints and the Constraints Editor”](#) on page 201.
- Click **OK** to complete editing the blade asset. A unique ID is assigned to identify the asset in the Intel Deployment Manager system (the ID appears in the table when the asset is displayed).

## Edit Chassis Asset

To edit a chassis asset:

- In the Navigation Area, click **Resources > Computing Devices**.
- Click the **Chassis Assets** tab.
- If you want to edit a blade chassis, select it in the **Displaying All Blade Chassis** table.
- Click **Actions > Edit**. The **Edit Blade Chassis Asset** dialog displays the following sections:
  - **Basic**
  - **Network**
  - **Console**
  - **Remote Power Control**
- The **Basic** section includes information that is collected for your records. This section is optional. You can go directly to the **Network** section. In the **Basic** section, you can enter the following information:

Field Name	Description
<b>Description</b>	You can provide a description for the chassis asset.
<b>Manufacturer</b>	You can enter any details regarding the manufacturer of the blade chassis.
<b>Model Name</b>	Enter the model name for the selected chassis asset.
<b>Serial Number</b>	Enter a serial number for the chassis asset.

Field Name	Description
<b>Miscellaneous Info.</b>	This field is provided to enter information that you can use for your records. Do not exceed 256 characters per field.
<b>Additional Info #1</b>	You can enter additional information here.
<b>Additional Info #2</b>	You can enter additional information here.
<b>Additional Info #3</b>	You can enter additional information here.
<b>Additional Info #4</b>	You can enter additional information here.
<b>Additional Info #5</b>	You can enter additional information here.
<b>Comment</b>	You can enter any comments specific to this asset.
<b>Location</b>	Enter the rack number of this chassis asset.
<b>Assigned to Workspace</b>	Select the workspace you want to assign this chassis to. All the workspaces that you have access to are visible in the drop-down menu.

6. The **Network** section includes information that is used by Intel Deployment Manager when managing this computing device. This section is mandatory. Enter the following information:

Field Name	Description
<b>Maintenance</b>	If this option is checked Intel Deployment Manager attempts to establish communication with the blade asset, making it a managed blade asset.
<b>Architecture</b>	Select the appropriate architecture for this asset from the drop down options.
<b>Management Protocol</b>	The management protocol is an ActiveOS or a management device driver, deployed to run on an Intel Deployment Manager managed server, or to remotely manage a device. This entry depends on the architecture selected for the asset.
<b>Boot Domain</b>	Select the boot domain if you installed a boot daemon on a different server on a different part of the network (for example, on a different subnet) than the Intel Deployment Manager server. If you select <b>Any</b> , then Intel Deployment Manager goes and selects whichever boot domain is available.
<b>IP Address</b>	Enter the IP address for this chassis asset. If you leave this field blank, Intel Deployment Manager assigns the first available IP address to this chassis asset from the pool of IP address range (networks) defined in Intel Deployment Manager.
<b>Port</b>	Enter the IP port for the chassis asset.
<b>User Login ID</b>	Enter the user login ID for this chassis asset.
<b>User Password</b>	Enter the password for the chassis asset's user login ID.
<b>Network</b>	Select the network to which this chassis asset belongs.

Field Name	Description
<b>Subnet Mask</b>	Enter the subnet mask for this asset. If this field is left blank, the subnet mask of the network is used. Default settings are used only when the chassis asset boots into the ActiveOS.
<b>Gateway</b>	Enter the default gateway this asset should use. If this field is left blank, the default gateway for the network is used. Default gateway settings are used only when the chassis asset boots into the ActiveOS.
<b>Next Server IP</b>	Enter the IP address for the <i>next server</i> . In case you want to use another TFTP Server instead of the one installed by default (on the same server as Intel Deployment Manager), then you must specify another IP address. The DHCP packet has a <b>Next Server IP</b> field which is used as the TFTP server IP address. Usually, the system will attempt to pick this value for you. This field lets you override the system's choice.

7. Enter the following information in the **Console** section:

Field Name	Description
<b>Console Protocol</b>	Select the protocol used to access this computing device's system console.
<b>Console IP</b>	Enter the IP address that you want to use to access the system console of this computing device. By default, Intel Deployment Manager uses the IP address you entered in the <b>Network</b> section.
<b>Console Port</b>	Enter the port that should be used to contact the console.
<b>Console Initial Size</b>	Set the size for the console's browser window.

8. Enter the following information in the **NIC** section:

Field Name	Description
<b>Speed</b>	Select the bandwidth of the NIC, for example, <b>10 Mbps</b> .
<b>Switch Name</b>	Enter an identifier for your switch.
<b>Switch Port</b>	Port (recorded earlier) into which the NIC is plugged.

Field Name	Description
<b>Port Mode</b>	<p>Select the duplex mode on the switch. The drop-down options are <b>Auto</b>, <b>Half</b>, and <b>Full</b>.</p> <ul style="list-style-type: none"> <li>◆ <b>Auto</b> negotiates whether the attached device is transmitting in half- or full-duplex, and then automatically changes that port to that mode.</li> <li>◆ <b>Half</b> works optimally only if one device is transmitting and all the other devices are receiving, otherwise, collisions occur. When the collisions are detected, the devices causing the collision wait for a random time before retransmitting. This means that at half duplex, Ethernet throughput is limited by the need to retransmit data when collisions occur. Half-duplex is the most common transmission method and is adequate for normal workstation and PC connections.</li> <li>◆ <b>Full</b> provides dual communication on a point-to-point connection and allows each device to simultaneously transmit and receive on a connection. Full-duplex mode is typically used to connect to other switches or to connect fast access devices such as workgroup servers.</li> </ul>
<b>Enable Portfast</b>	Check this option only if you want this port to be permanently transitioned to the spanning tree FORWARDING state.
<b>NIC is Manageable</b>	Check this option if you want this NIC to be managed by Intel Deployment Manager.
<b>NIC is Bootable</b>	If the chassis asset is set to boot from this NIC, then check this option. Otherwise, select the <b>Bootable</b> checkbox for the asset. Also, you can have one NIC checked as bootable.
<b>Switch Settings</b>	Enter any extra settings for this switch. The extra switch options are switch dependent and passed directly to the switch for execution. For example, if the port is on a CISCO 65xx switch, you can enter <code>set port speed 2/4 100</code> which is passed to the command line of the switch to set the port speed of port 2/4 to 100Mbps. See the CISCO switch manual for details. This option is recommended for use only by advanced users (or for support) only.
<b>Description</b>	Enter a description for the NIC. Do not exceed 64 characters.
<b>Comments</b>	Enter any additional comments for the NIC. If you want to add additional NICs, click <b>Add more NICs</b> .

9. Click **OK** to finish editing this chassis asset. A unique ID is assigned to identify the asset in the Intel Deployment Manager system (the ID appears in the table when the asset is displayed).
10. After adding or editing the switch, especially if you changed IP Address, telnet port, user name, and/or passwords, you must rediscover the asset attributes.
  - a. Click **Resources > Network Devices**.
  - b. Click the **Switches** tab.

- c. Click **Maintenance** > **Rediscover Asset Attributes**.

# Intel Server Chassis and Server Compute Blades

This chapter includes the following topics:

- ◆ “[Intel Server Chassis](#)” on page 108
  - “[Preparing an Intel Server Chassis](#)” on page 108
  - “[Managing Intel Server Chassis](#)” on page 110
    - “[Changing the Default Discovery Interval](#)” on page 110
    - “[Forcing Chassis Discovery](#)” on page 110
    - “[Accepting a Discovered Chassis](#)” on page 111
    - “[Changing the IP Address of an Accepted Chassis](#)” on page 111
    - “[Changing the IP Address of a Discovered Chassis](#)” on page 112
    - “[Automatic Retrieval of Log Entries](#)” on page 112
    - “[Rejecting a Discovered Chassis](#)” on page 113
    - “[Deleting an Accepted Intel Server Chassis](#)” on page 114
- ◆ “[Managing Intel Server Compute Blades](#)” on page 115
  - “[Accepting Intel Server Compute Blades](#)” on page 115
    - “[No Bootable NICs Error](#)” on page 115
  - “[Adding an Intel Server Compute Blade](#)” on page 116
  - “[Moving an Intel Server Compute Blade](#)” on page 116
  - “[Removing an Intel Server Compute Blade](#)” on page 117
  - “[Creating a Snapshot for a Windows Server](#)” on page 117
  - “[Deploying OpScripts on One Intel Server Compute Blade](#)” on page 118
  - “[Deploying OpScripts on Multiple Intel Server Compute Blades](#)” on page 118

## Intel Server Chassis

### Preparing an Intel Server Chassis

To prepare an Intel Server Chassis for management by Intel Deployment Manager:

1. Prepare and connect switch ports (you need an external switch with at least 3 free ports):
  - a. Verify that there is a 4-port gigabit switch properly installed on the back of the Intel Server Chassis.
  - b. Connect one port on the 4-port gigabit switch to the external switch.

Intel Deployment Manager only supports management of an Intel Server Chassis over a Ethernet switch using CAT5. Fiberchannel switches are not supported.
  - c. Connect the Intel Server Chassis management port to the external switch.

Intel Deployment Manager must be running on an external server. Running Intel Deployment Manager on one of the Intel Server Compute Blades is not supported.
2. Power on the Intel Server Chassis.
3. Make sure that the Intel Server Chassis and the Intel Deployment Manager server is on the same LAN:
  - a. Login to the Intel Server Management Module on a client connecting to the Intel Server Chassis.
  - b. Select **MM Control > Network Interfaces**.
  - c. Under **External Network Interface (eth0) > Static IP Configuration**, verify that the interface is on the same LAN as the Intel Deployment Manager server.
  - d. Save the configuration.
  - e. If you made any changes, select **MM Control > Restart MM**. When MM is restarted you are logged out of your browser session.

4. Enable SNMP on the Intel Server Chassis:
  - a. Login to the Intel Server Management Module on the Intel Server Chassis.
  - b. Select **MM Control > Network Protocols**.
  - c. Select **SNMP Agent: enabled**
  - d. Add **Community Name** = `private`, and **Host Name or IP Address** as the name or IP address of the Intel Deployment Manager server.
  - e. Save the configuration.
  - f. Select **MM Control > Restart MM**
5. After a couple of minutes, the chassis is automatically discovered. If you want to initiate immediate discovery, you can use the procedure given in “[Forcing Chassis Discovery](#)” on page 110.

If the chassis is successfully discovered it is listed under the **Discovered** and **Chassis Asset** tabs.
6. Plug the Intel server compute blade into the Intel Server Chassis.
7. For each Intel server compute blade, change the boot order so that the blade boots from the network. From the Intel Server Management Module:
  - a. Select **Blade tasks > Configuration**.
  - b. Change the boot order so that the blade boots from the network before booting from the hard disk. For example: CD, Floppy, Network, HD0.

This boot order causes the blade to attempt to boot from the network (Network-PXE) before trying to boot from a hard disk. Booting from the network enables an ActiveOS to be loaded and run in memory on the blade.
  - c. Save the configuration.

Repeat this step for each Intel server compute blade in the chassis.
8. Before accepting a chassis, you must add a network. See “[Add/Edit Network](#)” on page 158.
9. You must accept discovered Intel Server Chassis before they can be managed by Intel Deployment Manager. See “[Accepting a Discovered Chassis](#)” on page 111.

## Managing Intel Server Chassis

Intel Deployment Manager uses the Service Location Protocol (SLP), described in RFC 2608, to discover Intel Server Chassis. You can change the default interval between discovery attempts, or manually initiate chassis discovery. You can also accept or reject discovered chassis.

### Changing the Default Discovery Interval

By default, Intel Deployment Manager sends out a broadcast every two minutes to discover Intel Server Chassis. If you want to change this broadcast interval:

1. Click **Settings > Preferences > SLP Poll Interval in ms (0 disables polling)**.

2. Enter the new value.

This is the number of milliseconds (1000 per second) between broadcasts. Setting this value to zero disables auto-discovery.

3. Click **Submit**.

### Forcing Chassis Discovery

To immediately initiate discovery of an Intel Server Chassis:

1. In the Navigation Area, click **Resources > Computing Devices**

2. Click the **Discovered** tab.

3. Click **Actions > Initiate Active SLP Discovery**

Discovered chassis appear under the **Discovered** tab. After discovering an Intel Server Chassis, you must accept it before it can be managed by Intel Deployment Manager.

## Accepting a Discovered Chassis

You must accept a discovered Intel Server Chassis before it can be managed by Intel Deployment Manager. Before accepting a chassis, you must add a network. See “[Add/Edit Network](#)” on page 158.

To accept an Intel Server Chassis:

1. In the Navigation Area, click **Resources > Computing Devices**
2. Under the **Discovered** tab, select the chassis you want to accept.
3. Click **Actions > Accept**.

After you accept the Intel Server Chassis, Intel Deployment Manager attempts to learn about the Intel Server Compute Blades it contains; the status of the chassis is shown as UPDATING. When this process is complete, the chassis appears under the **Chassis Asset** tab with a status of UPDATE DONE.

## Changing the IP Address of an Accepted Chassis

If you use the Intel Server Management Module interface to change the IP address of an Intel Server Chassis, you need to manually update Intel Deployment Manager.

To change the IP address of an accepted Intel Server Chassis:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Accepted** tab.
3. Select the chassis.
4. Click **Actions > Edit**.
5. Click the **Network** tab.
6. Update the IP address.
7. Click **OK**.
8. Click the **Discovered** tab.
9. If a duplicate Intel Server Chassis appears (the same chassis as the one already accepted, but with a different IP address), delete it.

## Changing the IP Address of a Discovered Chassis

After changing the IP address of an Intel Server Chassis using the Intel Server Management Module interface, delete any previously discovered chassis that have the old IP address.

To delete a previously discovered chassis:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Discovered** tab.
3. Delete the Intel Server Chassis with the old IP address. To identify the correct IP address to delete:
  - a. Click **Table > Table Options**.
  - b. Select **Management IP Address** from **Hidden Columns**, and click the << button to move it to **Displayed Columns**.
  - c. Click **OK**. You can now see the Management IP Address in the **Displaying all Discovered Server Assets** table.

## Automatic Retrieval of Log Entries

As soon as an Intel Server Chassis is accepted, Intel Deployment Manager starts automatically retrieving log entries every two minutes from the Intel Server Management Module on the chassis. After retrieval, the entries are deleted from the chassis log. These entries can be viewed in the Intel Deployment Manager Event Log (Click **Settings > Custom Log**).

## Rejecting a Discovered Chassis

When you reject an Intel Server Chassis it is removed from the **Discovered** list. Intel Deployment Manager does not manage, and does not attempt to rediscover rejected chassis.

---

**Note** Intel Deployment Manager uses the IP address of the Intel Server Chassis to determine its identity. Changing the IP address can cause it to be rediscovered.

---

To reject a chassis:

1. In the Navigation Area, click **Resources > Computing Devices**
2. Under the **Discovered** or **Chassis Asset** tab, select the Intel Server Chassis you want to reject.
3. Click **Actions > Reject**.

### Deleting a Network or Chassis When Rejected Assets Exist

If you get an error message when attempting to delete a network or a chassis, and you have rejected blades or chassis, try deleting the rejected assets.

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Rejected** tab.
3. Select all of the rejected blades and chassis.
4. Click **Actions > Delete**.
5. Retry the delete network or delete chassis operation.

## Deleting an Accepted Intel Server Chassis

If you do not want Intel Deployment Manager to manage an Intel Server Chassis and its Intel Server Compute Blades anymore, delete the blades, then delete the chassis. You cannot delete a chassis without first deleting its blades.

1. In the Navigation Area, click **Computing Devices > Accepted**.
2. Select all Intel Server Compute Blades belonging to the chassis.
3. Click **Actions > Delete**.
4. Select the Intel Server Chassis to be deleted.
5. Click **Actions > Delete**.

---

# Managing Intel Server Compute Blades

## Accepting Intel Server Compute Blades

Intel Server Compute Blades in the DISCOVERED state can be accepted using the same procedure as for other types of blade assets. See “[Accept Computing Device](#)” on page 89.

Before accepting any blades, you must add a network. See “[Add/Edit Network](#)” on page 158.

After accepting a blade you can power cycle the asset to put it into the maintenance mode. To power cycle the asset:

1. In the Navigation Area, click **Resources > Computing Devices**
2. Click the **Accepted** tab.
3. Click **Power > Cycle**.

## No Bootable NICs Error

An attempt to accept Intel Server Compute Blades without first defining a network results in assets with the status: `Server asset XXXXXXXX:YYYYYYY: Intel Blade Server has no bootable NICs.`

To resolve the problem:

1. Add a network. See “[Add/Edit Network](#)” on page 158.
2. Delete the Intel Server Compute Blades that are in the error state. See “[Delete Computing Device](#)” on page 91.
3. Rediscover attributes for the Intel Server Chassis. See “[Forcing Chassis Discovery](#)” on page 110.

## Adding an Intel Server Compute Blade

Whenever an Intel server compute blade is added to an Intel Server Chassis, Intel Deployment Manager needs to rediscover the chassis attributes.

After adding a blade to a chassis, perform the following procedure to get an *accepted* Intel Server Chassis to discover the blade:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Accepted** tab.
3. Select the Intel Server Chassis in which the Intel server compute blade was inserted.
4. Click **Maintenance > Rediscover Asset Attributes**.

After the asset attributes are rediscovered, you can click the **Chassis Assets** tab and select **View Slots** for the chassis to verify that the new blade was discovered.

## Moving an Intel Server Compute Blade

Whenever an Intel server compute blade is moved from one slot to another on an Intel Server Chassis, Intel Deployment Manager needs to rediscover the chassis attributes.

After moving a blade from one slot to another on an *accepted* chassis, perform the following procedure to get the slot information updated for all of the blades:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Click the **Chassis Assets** tab.
3. Select the Intel Server Chassis to which the blade was moved.
4. Click **Maintenance > Rediscover Asset Attributes**.

After the slot information is updated, you can click the **Chassis Assets** tab and select **View Slots** for the chassis to verify that the new blade was discovered.

## Removing an Intel Server Compute Blade

Whenever an Intel server compute blade is removed from an Intel Server Chassis, Intel Deployment Manager needs to rediscover the chassis attributes.

Intel Deployment Manager does not automatically remove an Intel server compute blade from its database. If you permanently remove a blade from an accepted chassis, you must also manually delete the blade from Intel Deployment Manager.

If the Intel server compute blade was provisioned before being removed, you must remove any provisioned resources that are using the blade.

To remove the Intel server compute blade:

1. In the Navigation Area, click **Resources > Computing Devices**
2. Click the **Chassis Assets** tab.
3. Select **View Slots** on the chassis from which the blade was removed.
4. Select the blade that was removed.
5. Click **Actions > Delete**.

## Creating a Snapshot for a Windows Server

You can create a snapshot for a Windows server from an IA32 or other x86 architecture computing device. You must install the Intel Deployment Manager ITAP agent for Windows on your computing device *prior* to saving a snapshot. The Windows `itap_agent.exe` and `readme.txt` are provided by VERITAS. The Windows `itap_agent.exe` can be downloaded from your Intel Deployment Manager server at [http://Intel\\_Deployment\\_Manager\\_server/downloads](http://Intel_Deployment_Manager_server/downloads).

To verify installation of the ITAP agent:

1. Check Windows Services to verify that the service named `Device Daemon Monitor` is running.
2. Verify that the ITAP agent installation directory is created on your Windows system drive (for example, `c:\d2d`).

The ITAP agent also enables communication between Intel Deployment Manager and the Intel Server Compute Blades, performs hardware attribute detection, supports network personalization, and enables the deployment of software packages and the execution of scripts. The ITAP agent is only required on Windows systems; it is not applicable for Linux systems.

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**Note** If the x86 computing device supports the `Stand by` and `Hibernate` features available in the **Power Options** within the **Control Panel**; do not enable these two features because Intel Deployment Manager cannot remotely wake up the x86 Server if it is in `Stand by` or `Hibernate` mode.

---

## Deploying OpScripts on One Intel Server Compute Blade

1. In the Navigation Area, click **Resources > Jobs**.
2. Click the **OpScripts** tab.
3. Select an OpScript (**Startup** or **Shutdown**) by clicking on its checkbox.
4. Click **Actions > Run**.
5. On the **Run OpScript** page, click on the magnifying glass icon next to **Script Parameter - Server**. A popup window appears with a list of managed servers.
6. Select the server on which you want to run the OpScript.
7. Click **Use Selected Item**.

## Deploying OpScripts on Multiple Intel Server Compute Blades

1. In the Navigation Area, click **Resources > Jobs**.
2. Click the **Jobs** tab.
3. Click **Actions > Add**.
4. On the **Add Job** page, click on the magnifying glass icon next to **Script Name**. A popup window appears with a list of OpScripts.
5. Select the OpScript which you want to schedule as a job.
6. Click **Use Selected Item**.

7. Enter a Job Name and Description.
8. For **Execution Criteria**, select an option from the drop-down list.
  - Use **On Scheduled Dates** if you want the job to be executed based on time and date.
  - Use **On Occurrence of Listed Event Category** if you want the job to be executed based on a specified event.
9. For **Wild Card Parameter** select **Script Parameter - Server** and choose a **Wild Card Parameter Value**.
  - **All Values in all Workspaces** causes the OpScript to be executed on all Intel Server Compute Blades in all workspaces.
  - **All Values in one Workspace** causes the OpScript to be executed on all Intel Server Compute Blades in one workspace.
  - **Selected Values** enables you to select specific Intel Server Compute Blades for the OpScript to run on.
10. Click **OK**. The OpScript is scheduled to run as a job, and will execute on the number of servers that was specified in [Step 9](#).



This chapter includes the following topics:

- ◆ “[Computing Devices](#)” on page 122
  - “[Enter Maintenance Mode](#)” on page 122
  - “[Exit Maintenance Mode](#)” on page 123
  - “[Reboot](#)” on page 123
  - “[Reset](#)” on page 124
  - “[Reconnect](#)” on page 124
  - “[Rediscover Asset Attributes](#)” on page 125
  - “[Reboot to Admin State](#)” on page 126
- ◆ “[Remote Power Management](#)” on page 127
  - “[Power On](#)” on page 127
  - “[Power Off](#)” on page 127
  - “[Power Cycle](#)” on page 128
- ◆ “[Remote Console and Desktop Access](#)” on page 128
  - “[Console Open With](#)” on page 128

Managing a computing device refers to the process of managing the hardware attributes of a server, chassis, or blade. The **Maintenance**, **Power**, **Console**, and **Access** menus, available from the **Accepted**, **Blade Assets**, **Chassis Assets**, and **Server Assets** categories, assist you in managing the selected computing devices.

The **Maintenance** menu supports the following operations: **Enter Maintenance Mode**, **Exit Maintenance Mode**, **Reboot**, **Reset**, **Rediscover Asset Attributes**, **Reconnect**, and **Reboot to Admin State**.

The **Power** menu supports operations like **Power Cycle**, **Power On**, and **Power Off** that allow you to remotely control the power on computing devices. Intel Deployment Manager currently supports remote power management using chassis that support remote power management. Your Intel Deployment Manager license must have the **Remote Power Management** option checked for you to remotely manage your computing devices.

The **Console** and **Access** menus support the **Open** and **Open with** operations. The **Console** menu allows you to access the system console of a selected computing device. The **Access** menu allows remote desktop access to the selected computing device.

## Computing Devices

The administration console enables you to perform the following operations from the **Computing Devices > Maintenance** menu:

---

**Note** All operations listed in the **Maintenance** menu perform the same function for both computing devices and provisioned resources.

---

### Enter Maintenance Mode

To enter maintenance mode:

1. Click **Resources > Computing Devices**.
2. Select a category. You can enter an asset into maintenance mode from the **Accepted**, **Blade Assets**, **Chassis Assets**, or the **Server Assets** category.
3. Select the asset(s) you want to put into maintenance mode.
4. Click **Maintenance > Enter Maintenance Mode**.
5. You are asked to verify that you want to enter maintenance mode for the selected asset(s). Click **Yes** to proceed, or click **No** if you do not want to enter maintenance mode for the selected asset(s).

## Exit Maintenance Mode

To exit maintenance mode:

1. Click **Resources > Computing Devices**.
2. Select a category. You can exit maintenance mode for an asset from the **Accepted, Blade Assets, Chassis Assets**, or the **Server Assets** category.
3. Select the asset(s) you want to take out of maintenance mode.
4. Click **Maintenance > Exit Maintenance Mode**.
5. You are asked to verify that you want to exit maintenance mode for the selected asset(s). Click **Yes** to proceed, or click **No** if you do not want to exit maintenance mode for the selected asset(s).

## Reboot

When rebooting a computing device, it reboots from the disk OS. To reboot a computing device, it should be:

- ◆ managed
- ◆ in the UP state
- ◆ it can be live discovered

To reboot a computing device:

1. Click **Resources > Computing Devices**.
2. Select a category. You can reboot an asset from the **Accepted, Blade Assets, Chassis Assets**, or the **Server Assets** category.
3. Select the asset(s) you want to reboot.
4. Click **Maintenance > Reboot**.
5. You are asked to verify that you want to reboot the selected asset(s). Click **Yes** to proceed, or click **No** if you do not want to reboot the asset(s).

## Reset

The `Reset` command resets the state of an asset so that it boots into the ActiveOS on the next reboot. If the asset is already running ActiveOS, the reset command causes a reboot of the ActiveOS. The reset command has no effect on server assets if they are busy or are booting from their disks.

To reset a FREE computing device:

1. Click **Resources > Computing Devices**.
2. Click a tab. You can reset an asset from the **Accepted**, **Blade Assets**, **Chassis Assets**, or the **Server Assets** category.
3. Select the asset(s) to reset.
4. Click **Maintenance > Reset**.
5. You are asked to verify that you want to reset the selected asset(s). Click **Yes** to reset the asset, or **No** if you decide to not reset the asset.

## Reconnect

Reconnect causes Intel Deployment Manager to attempt to contact the selected asset(s). If an asset is in the DISCONNECTED state and it can be contacted, the asset is automatically put back into the UP state.

To reconnect a free asset:

1. Click **Resources > Computing Devices**.
2. Select a category. You can reconnect an asset from the **Accepted**, **Blade Assets**, **Chassis Assets**, or the **Server Assets** category.
3. Select the asset that you want to reconnect.
4. Click **Maintenance > Reconnect**.
5. You are asked to verify that you want to reset the selected asset(s). You can click **Yes** to reconnect the free asset, or **No** if you decide to not reconnect.

## Rediscover Asset Attributes

Hardware architecture attributes can be updated on an unallocated computing device running ActiveOS. Its hardware architecture attributes can be rediscovered. This is accomplished using auto-discovery. It is not recommended that you execute `Rediscover Asset Attributes` on a server asset used by a provisioned server because the updated hardware architecture will not propagate to the provisioned server.

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**Note** In order to properly manage server assets, make sure there are no other network boot servers (such as bootp servers) in Intel Deployment Manager managed networks that will respond to network boot requests from managed server assets.

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This action is not supported for live servers.

For example, a provisioned server has a certain hardware component defined initially in the computing device. The hardware component was eventually changed or removed. This recent modification will not be applied to the provisioned server which maintains the initial (in this case outdated) information.

To rediscover the asset attributes of an asset:

1. Click **Resources > Computing Devices**.
2. Select a category. You can rediscover the asset attributes of an asset from these categories: **Accepted, Blade Assets, Chassis Assets, or Server Assets**.
3. Select the asset whose hardware attributes you want to rediscover.
4. Click **Maintenance > Rediscover Asset Attributes**.
5. You are asked to verify that you want to rediscover the asset attributes. You can click **Yes** to rediscover the asset attributes, or click **No** to cancel the process.

## Reboot to Admin State

When a managed server is running the ActiveOS, it is said to be in the ADMIN state. ActiveOS is a system software process deployed and run automatically on an Intel Deployment Manager-managed server. The ActiveOS enables remote operation and management of servers that are registered as assets and set to the MANAGED state.

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**Note** A `Reboot to Admin State` transforms live-discovered server assets into managed server assets.

---

When making any hardware changes, including hot swapping peripherals such as storage and PCI cards, reboot your system into the ADMIN state and rediscover the server asset to ensure that the changes are detected by Intel Deployment Manager.

To reboot an asset to ADMIN state:

1. Click **Resources > Computing Devices**.
2. Select a category. You can reboot an asset to the ADMIN state from the **Accepted, Blade Assets, Chassis Assets**, or the **Server Assets** page. You can also reboot an asset to the ADMIN state from the **Provisioned Resources** section.
3. Select the asset(s) you want reboot to ADMIN State.
4. Click **Maintenance > Reboot to Admin State**.
5. You are asked to verify if you want to reboot the selected asset(s) to ADMIN state. Click **Yes** to reboot, or click **No** if you do not want to reboot.

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# Remote Power Management

## Power On

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**Note** Blades are power managed via the chassis they are in. Enter the chassis asset access information: IP address, user name, and password. When Intel Deployment Manager can access the chassis, the blades can be power managed.

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To power on computing devices:

1. Click **Resources > Computing Devices**.
2. Select a category. You can power on a computing device from the **Accepted, Blade Assets, Chassis Assets**, or the **Server Assets** page.
3. Select the computing device(s) to remotely power on.
4. Click **Power > On**.
5. You are asked to verify if you want to turn on the power for the selected computing devices. Click **Yes** to power on the computing devices, or click **No** if you do not want to power on the computing devices.

## Power Off

To power off a computing device:

1. Click **Resources > Computing Devices**.
2. Select a category. You can power off a computing device from the **Accepted, Blade Assets, Chassis Assets**, or the **Server Assets** page.
3. Select the computing device that you want to remotely power off.
4. Click **Power > Off**.
5. You are asked to verify if you want to turn off the power for the selected computing device. Click **Yes** to power off the computing device, or click **No** if you do not want to power off the computing device.

## Power Cycle

To power cycle a computing device:

1. Click **Resources > Computing Devices**.
2. Select a category. You can power cycle a computing device from the **Accepted**, **Blade Assets**, **Chassis Assets**, or the **Server Assets** page.
3. Select the computing device that you want to remotely power cycle.
4. Click **Power > Cycle**.
5. You are asked to verify that you want to power cycle the selected computing device. Click **Yes** to power cycle the computing device, or click **No** if you do not want to power cycle the computing device.

## Remote Console and Desktop Access

### Console Open With

For an Intel chassis asset you can open a console to the Intel Chassis Management Module, or to the chassis KVM.

To open the system console of an Intel chassis asset:

1. In the Navigation Area, click **Resources > Computing Devices**.
2. Select the computing device associated with the system console you want to access.
3. Click **Console > Open with**. The **Open with** dialog is displayed.
4. Enter the following:
  - **Console Protocol** - Select a protocol for accessing the computing device. For Intel chassis the default console protocol is Chassis KVM. **Console IP** - Enter the IP Address of the computing device whose system console you want to access.
  - **Console Port** - Enter the port that should be used to contact the console. **Console Initial Size** - Set the size for the console's browser window.
5. Click **OK**.

This chapter includes the following topics:

- ◆ “[Software Categories](#)” on page 130
- ◆ “[Software Types](#)” on page 130
  - “[Creating Bootable Software](#)” on page 131
  - “[Bootable Software Command Lines](#)” on page 132
  - “[Configuration and ActiveOS Command Lines](#)” on page 133
- ◆ “[Working with Software](#)” on page 133
  - “[Add/Edit Software](#)” on page 133
  - “[Delete Software](#)” on page 135
  - “[Import Software](#)” on page 136
  - “[Export Software](#)” on page 136
  - “[Search Storage](#)” on page 137
  - “[Report for all Software](#)” on page 137
  - “[Deploy Software on Servers](#)” on page 137
  - “[Deploy and Save](#)” on page 138

## Software Categories

*Software* is generic code: a deployment engine. It is a delivery mechanism for a variety of updates for the server stack. Intel Deployment Manager supports five categories of software: applications, patches, scripts, utilities, and others.

- **Applications** are programs issued by software vendors.
- **Patches** are issued by software vendors or manufacturers.
- **Scripts** are customized software written by users. For example, updating agents.
- **Utilities** are applicable at the firmware, BIOS, and hardware layer. Using utilities software, you can accomplish: BIOS updates, firmware updates, and a utility update for a new network card type.
- The **Others** category includes activities such as deploying customer data. For example, adding existing content to your database.

## Software Types

Intel Deployment Manager supports the following software types:

- **Bootable Software** - Bootable software can be directly booted by a target server. Uses of bootable software include remote booting of OS kernels, floppy disk images, and other software that is directly loaded into memory and executed without a pre-existing, running operating system. Bootable software is run on server assets in the DOWN state. (See “Server Asset States” on page 234.) Typically, a DHCP server and a TFTP server are used to download the files to the target server. This type of software is convenient for BIOS upgrades, RAID configurations, and other low-level device operations that require a clean, real-mode DOS environment.
- **Configuration Software** - Configuration software is run on servers that Intel Deployment Manager has started UP, and has deployed an operating system on from a snapshot. (Configuration software typically includes scripts or binaries compatible with the managed server’s running OS).
- **Control Software** - Control software is run on managed servers or server assets running the ActiveOS, (that is, servers in the DOWN state or server assets that are not assigned to a server or are assigned to down Servers). Control software typically includes scripts or binaries compatible with the managed server’s ActiveOS.

## Creating Bootable Software

All bootable software contains OS images that can be loaded and directly booted on managed servers. For bootable software that uses 1.44 MB MS-DOS floppy images, these images must be created manually. The following steps describe the procedure involved in creating your own bootable software. You can use any x86 class PC with a 3.5" floppy drive connected.

1. Start with a DOS-based operating system such as Windows 95/98/ME or DOS 6.22.

If you are using pure DOS (command line prompt only) do the following:

- Insert a blank floppy disk into the 1.44 MB drive.
- Type: **format a: /q /s**  
The **/q** is for quick format. The **/s** is to transfer system files to the floppy, making it bootable.
- You should see a `format complete, System transferred` at the end of the format. This disk is now ready to become a bootable software. Go to Step 2.

If you are using a GUI based OS such as Windows 95/98/ME then do the following:

- Insert a blank floppy disk into the 3.5" drive.
- Go to **Control Panel > Add/Remove Programs**. Click the **Startup Disk** tab. Select **Create Disk**.

Windows 95/98/ME formats the disk and transfers system files as well as additional tools. The additional files can be deleted if space is limited. A complete list of required files is given below. This disk is now ready to become a bootable software.

2. Copy all your required files to the root level of a bootable floppy disk (a:\).
3. Copy `wrapapp.com` to the root level of the same bootable floppy disk. This file is located in the `<install directory>\tools\bootapps` on the Intel Deployment Manager server. It manages all communication with the Intel Deployment Manager server and reboots the server on termination.
4. Create or edit a file called `autoexec.bat`. This is the first file that will execute if the PC is booted with the floppy.
  - Line 1: **@echo off**
  - Line 2: **wrapapp.com A:\command.com /c test.bat arg1**  
**test.bat** is your program (which can also be an `.exe` or `.com` file). **arg1** is the first argument for the program. This is optional and depends on the program.
5. Test your program. Run `test.bat` and verify that it works before imaging the floppy. Also, create a `config.sys`, if necessary.

6. The final directory contents of the floppy are:
  - `command.com` (this is the command interpreter)
  - `*.sys` files (required system files)
  - `autoexec.bat`
  - `test.bat`
  - `wrapapp.com`
7. Create a binary image of the bootable floppy.
  - Use a Windows based shareware utility such as WinImage. You can download it from: <http://www.winimage.com/download.htm>
  - Use the Linux `dd` command (free). Insert the bootable floppy into the drive of a PC running Linux and enter: `dd if=/dev/fd0 of=/tmp/test.bin`
8. Zip the file `test.bin` into `test.zip`
9. In the Navigation Area, click **Software**.
  - Click **Actions > Add Software**.
  - In the **Command Line** field, enter: `dos=%FILE%\test.bin;%ARGS%`
  - When prompted, browse for `test.zip` and upload it to the system. No booter was specified so the default booter, OpBoot, will be used by default. The command line conveys to OpBoot the name of the floppy image. It also tells OpBoot to pass the arguments entered when the software was run. OpBoot handles the return of the execution status back to the Intel Deployment Manager server.

## Bootable Software Command Lines

The identifier *file-path* is a file path relative to the TFTP server directory. The identifier *booter-argument-string* is an argument string that is passed to the boot mechanism. If a DHCP server is the boot mechanism, the argument string will represent a DHCP vendor option. The following variables can be used in the identifiers:

- `%FILE%` - The directory string within which the bootable software was placed in the TFTP server directory replaces this token.
- `%ARGS%` - Replaced by the additional arguments entered when the software was executed. They are directly passed to the booter.

## Configuration and ActiveOS Command Lines

For configuration and ActiveOS software, the command line is executed when the files have been placed on the target machine. The current directory is set to the directory that represents the ZIP root directory. As with bootable software, additional arguments entered when the software was executed are specified in the command line by *%ARGS%*.

## Working with Software

You can perform the following operations from the administration console:

### Add/Edit Software

Before you add software, add storage. All software files are `.zip` files.

To add/edit software:

1. In the Navigation Area, click **Resources > Software**.
2. Click a tab: **Applications, Utilities, Scripts, Patches, Others**.
3. Click **Actions > Add** or **Edit**.
4. Select the software from the **Displaying All Software** table. The **Add Software** or **Edit Software** dialog displays the following sections:
  - **Basic**
  - **Constraints**

5. Enter the following information in the **Basic** section:

Field Name	Description
<b>Name</b>	Enter a unique name for this software. Do not exceed 32 characters. This name identifies the software from other software added to Intel Deployment Manager.
<b>Description</b>	Enter a description for the software. The description is a short summary for the software. Do not exceed 128 characters.
<b>Category</b>	The category of software you selected is displayed.
<b>Version</b>	You can enter the version of the software for your records. Do not exceed 64 characters.
<b>Type</b>	Select the type of software from the drop down options; <b>Bootable Software</b> , <b>Configuration Software</b> , or <b>ActiveOS(TM) Software</b> .
<b>Architecture</b>	Select the CPU architecture of the server on which this software will be executed.
<b>OS</b>	Select the OS that the server executing this software is using. You need to select the required operating system for configuration software and ActiveOS(TM) software. Bootable software does not require a running operating system.
<b>Command Line</b>	<p>Enter the commands that are run when software is executed.</p> <p>For bootable software, the command line specifies the file within the .zip file to boot. By default, the OpBoot™ loader is used to load the bootable software. The command line tells the OpBoot loader how to load the image. For example:</p> <pre>dos=%FILE%/floppy-144MB.img;%ARGS%</pre> <p>tells the OpBoot loader to load an MS-DOS floppy image. The image is named floppy-144MB.img in the root directory of the .zip file. Any additional arguments specified while running the Software are also passed to the code.</p> <pre>booter=%FILE%/boot-loader;arg={dos=%FILE%/floppy-144MB.img;%}</pre> <p>tells the system to use "boot-loader" as the boot loader instead of the OpBoot loader. Everything within the "arg={...}" is passed to the boot loader through a DHCP option-135 as a string.</p> <p>For configuration software and ActiveOS(TM) software, the command line is executed on the target server. The current directory is set to the directory where the uploaded .zip file was unzipped. All command lines support the following macros:</p> <p>%FILE% is the root directory of the .zip file.</p> <p>%ARGS% are the additional arguments entered while running the software.</p>
<b>Licenses</b>	Select the licenses required. When this software is loaded on a server and the status of the server is up, one license is used.
<b>Storage</b>	Select the storage location for this software's zip archive.

Field Name	Description
<b>Return Values</b>	Enter the return values that indicate successful execution of the software. On Linux the return value variable is <code>\$?</code> . On Windows the return value variable is <code>%errorlevel%</code> . The format for return values is: <code>num[.num][,num[.num]]</code> For example, if the return value is 0 it indicates that 0 (and only 0) is a successful return value. If the you assign return value as <code>1..5,101..105</code> it indicates that 1 through 5 and 101 through 105 represent successful return values. If the return values field is left blank, all return values are considered successful.
<b>Causes Reboot</b>	You should select the <b>Causes Reboot</b> option if the software that you are adding reboots the managed asset.
<b>Assign to Workspace</b>	Select the workspace to which you want to assign this software.
<b>Comments</b>	Enter any comments for this software.

6. Click the **Constraints** tab if you want to edit the constraints for this software. Click **OK** to add the software.

## Delete Software

To delete software:

1. Click **Resources > Software**.
2. Click a tab: **Applications, Utilities, Scripts, Patches, Others**.
3. Select the software that you want to delete.
4. Click **Actions > Delete**.
5. Click **Yes** to delete the selected software.

## Import Software

Only software exported by Intel Deployment Manager can be imported.

To import software:

1. Click **Resources > Software**.
2. Click a tab: **Applications, Utilities, Scripts, Patches, Others**.
3. Click **Actions > Import**.
4. The **Import Software** dialog is displayed. Enter a name for the software that you want to import. Also, enter a description for this software.
5. Select storage to store the imported software.
6. Select a workspace from the **Assign to Workspace** drop-down list.
7. Click **Continue**.
8. In the popup **Import Software** dialog, browse to select the file to be imported.
9. Click **OK**.

## Export Software

To export software:

1. In the Navigation Area, Click **Resources > Software**.
2. Click a tab: **Applications, Utilities, Scripts, Patches, Others**.
3. Select the software that you want to export.
4. Select **Actions > Export**.
5. The **File Download** dialog is displayed. You can save the file on your machine or open it from its current location. All software files are in the zipped format.

## Search Storage

You can use the **Search Storage** action if you want to search for a pre-installed package (snapshot, software, or OpScript) on a system storage device. Each subdirectory in the system storage is checked. If files for a snapshot, software, or OpScript are found on the filesystem, but no database entry exists, Intel Deployment Manager creates the database entries and associates them with the files.

**Search Storage** can be used to quickly import packages from a previous installation of Intel Deployment Manager, or from a set of files copied over from a different Intel Deployment Manager server. Note that sharing of package files between multiple Intel Deployment Manager servers is not supported.

To search storage:

1. Click **Resources > Software**.
2. Click a tab. All of the tabs under **Software** support **Search Storage**.
3. Click **Actions > Search Storage**. The **Search Storage** dialog is displayed.
4. Select a storage device to search from the **Storage** drop-down list.
5. Click **OK**. A list of all software applications is displayed.

## Report for all Software

You can view all of the software on your Intel Deployment Manager system from the **Reports** section.

Click **Resources > Reports > All Software**.

## Deploy Software on Servers

Deploying software is the process of running a previously uploaded software package. It can be used to update firmware, configure RAID devices, or install applications on a server.

To deploy software on a server:

1. Click **Resources > Provisioned Resources**.
2. Click the **Servers** tab (if its not already open).
3. Select the server on which you want to deploy software.

4. Click **Software > Deploy**.
5. In the **Deploy Software on Servers** dialog, enter the following:

Field Name	Description
<b>Hostname</b>	The name of the server on which you want to execute software is displayed.
<b>Software</b>	Click the <b>Select a software</b> icon to view the available software, and select the software you want to deploy.
<b>Additional Arguments</b>	You can add any additional arguments you want to pass on to the software.
<b>Do not Monitor Progress</b>	If you check this option, the progress of this software is not monitored.
<b>Post Action</b>	Select an action from the drop-down menu to be performed after receiving a return value. If the return value indicates that software execution was a success only then post action is performed. Currently, there is only one post action; <b>Re-discover Asset Attributes</b> . This action updates the information for the asset.

6. Click **Deploy**.

## Deploy and Save

To deploy software and to save the server snapshot:

1. In the Navigation Area, click **Resources > Provisioned Resources**.
2. Select the asset on which you want to deploy software and save its server snapshot.
3. Click the **Software** tab.
4. Select **Deploy and Save**. The **Deploy and Save** dialog displays the following sections:
  - **Basic**
  - **Constraints**
  - **Advanced**

5. In the **Basic** section enter the following information:

Field Name	Description
<b>Hostname</b>	This is the hostname of the server on which you are going to deploy software and save its server snapshot.
<b>Pre-save Software</b>	Click the Pre-save Software icon. Pre-save software is executed on the server before the <b>Save Server Snapshot</b> operation takes place.  Sysprep is an example of pre-save software. Intel Deployment Manager runs the pre-save software and transfers the files to the server asset. The arguments can be defined in such a way that Sysprep is executed at a specified time.
<b>Pre-save Software Arguments</b>	Enter the arguments you want this software to use when executed on the server.  If you specify arguments for this software, the command line field of this software entity must contain the variable string <code>%ARGS%</code> at its end. This string is replaced with the pre-save software arguments when the software is executed.
<b>Incremental Snapshot</b>	This flag displays as a checkbox if you are trying to save a snapshot for a server in the UP state.  You see <b>No</b> in this field if you are trying to save a snapshot for a server in the DOWN state.
<b>New Snapshot Name</b>	By default, the <b>Default Save Snapshot Name</b> (in the <b>Provision Managed Servers &gt; Management Options</b> section) that you entered when provisioning this resource is displayed.
<b>OS</b>	The OS is displayed. The OS field represents the category or family of an operating system. For example, Red Hat Linux 7.x, Red Hat Linux 6.x, or Windows.
<b>Licenses</b>	Select the licenses for this snapshot.
<b>Storage</b>	Select managed storage to store this snapshot from the drop-down options.
<b>Comment</b>	Enter additional comments regarding this snapshot for your records.

6. In the **Constraints** section enter the parameter, operator, and value. You can enter the constraints that you want applied to the selected server. An error is displayed if incompatible constraints are assigned. See “[Constraints Editor](#)” on page 204.

7. Enter the following information in the **Advanced** section:

Field Name	Description
<b>Custom Save Reboot Software</b>	<p>You can specify that you want to reboot the server with custom software when saving. Any software which had the <b>Causes Reboot</b> option checked qualifies for this selection.</p> <p>If the software you select cannot cause reboot then the operation fails. Software is assigned to the <b>Causes Reboot</b> functionality in the <b>Add Software</b> and/or <b>Edit Software</b> dialogs.</p>
<b>Save Reboot Software Arguments</b>	Enter additional arguments to pass to the custom reboot software.
<b>Sector by Sector Save</b>	Check this option to save this snapshot using raw sector blocks. With this option the snapshot saves each sector of the server's hard disk.
<b>Filesystem Check</b>	<p>Click the drop-down options to select from the following options.</p> <ul style="list-style-type: none"> <li>◆ <b>None</b> - Select this option if you do not want to perform a filesystem check (for example, fsck).</li> <li>◆ <b>Automatic</b> - Select this option if you want to perform an automatic filesystem check, if needed, when saving a snapshot.</li> <li>◆ <b>Force</b> - Select this option if you want to automatically perform a filesystem check each time a snapshot is saved.</li> </ul>
<b>Ignore FS Check</b>	This option is unchecked by default. If you check this option the filesystem errors are ignored and the partition is skipped.
<b>Compression of Snapshot</b>	This option is checked by default. You can uncheck this option if you do not want to compress the snapshot while saving the snapshot. Compressing a snapshot takes longer, but reduces the size of the snapshot.

8. Click **Save and Reboot**.

This chapter includes the following topics:

- ◆ “[Working with OpScripts](#)” on page 142
  - “[Edit OpScript](#)” on page 142
  - “[Delete OpScript](#)” on page 146
  - “[Run OpScript](#)” on page 146
- ◆ “[Jobs](#)” on page 147
  - “[Add/Edit Job](#)” on page 147
  - “[Delete Job](#)” on page 150
  - “[Reload Configuration Files](#)” on page 150
  - “[Task Manager](#)” on page 151

Intel Deployment Manager supports server-side scripting using *OpScripts*. You can build an OpScript by specifying a sequence of Intel Deployment Manager commands, or you can write Java code directly. Intel Deployment Manager comes with two canned scripts: start multiple servers, and stop multiple servers. You can modify these scripts to perform any operation, but you cannot add or import additional scripts.

*Jobs* enable you to schedule an OpScript to run at particular times or to be triggered by particular system or user events. The execution status of jobs and OpScripts can be monitored via the Job Monitor.

The **Job Monitor** page displays the status of all OpScripts that are running or that have completed their run. Each instance of an OpScript that is running or that ran previously is called a *Task*. Each task displays the OpScript for the task, and the status of that task. If the OpScript was started by a triggered job, the job is also displayed. If the OpScript failed, the error that caused the failure is displayed in the **Status** field.

You can generate OpScripts in several different ways. You can:

- ◆ write an OpScript in native Java
- ◆ write Java directly in the Intel Deployment Manager UI and have it executed by the BeanShell Java interpreter

- ◆ use the command generator to produce an OpScript that is comprised of a sequence of commands.

OpScripts provide several benefits. OpScripts use the JAPI interface, so all Intel Deployment Manager commands can be performed from OpScripts. Native Java and BeanShell OpScripts fully leverage the power and robustness of the Java language and JDK.

## Working with OpScripts

You can perform the following operations from the administration console:

### Edit OpScript

To edit an OpScript:

1. Click **Resources > Jobs**. By default, the **OpScripts** tab is opened, and the **Displaying All OpScripts** table is displayed.
2. To edit an OpScript, select the OpScript you want to edit.
3. Click **Actions > Edit**. The **Edit OpScript** dialog displays the following sections:
  - **Basic**
  - **Parameters** (Displayed when you select **Beanshell** and enter the code manually.)
  - **Commands**
4. Enter the following information in the Basic section:

Field Name	Description
<b>Name</b>	Enter a name for the OpScript. For example, <b>Server AssetPowerOn</b>
<b>Description</b>	Enter a description for the OpScript. For example, <b>used for Powering On a Server Asset.</b>
<b>Storage</b>	Select the storage for this OpScript from the drop-down list.
<b>Directory</b> (Displays only when editing an OpScript)	Displays the directory location of the OpScript.
<b>Language</b>	Select the language you will use for the OpScript. The drop down options are <b>Java</b> and <b>Beanshell</b> .

Field Name	Description
<b>Script Location</b> (Displays only if you are adding an OpScript)	If you select Java as the language for the OpScript the script location is automatically set to <b>Present in ZIP file</b> . If you select <b>Beanshell</b> as the language for the OpScript the script location displays the following options: <ul style="list-style-type: none"> <li>◆ <b>Use Command Generator</b></li> <li>◆ <b>Write here or Cut and Paste</b></li> <li>◆ <b>Present in ZIP file.</b></li> </ul>
<b>Command Target</b> (Displayed only if you select <b>Use Command generator</b> in the <b>Script Location</b> )	Select the target from the drop-down options. The target on which this OpScript should run is a: <ul style="list-style-type: none"> <li>◆ <b>Server</b></li> <li>◆ <b>Managed Server Asset</b></li> <li>◆ <b>Live Discovered Server Asset</b></li> <li>◆ <b>Network Device</b></li> </ul>
<b>Command Sequence</b> (Displayed only if you select <b>Use Command generator</b> in the <b>Script Location</b> )	Click <b>Add</b> to enter the sequence of the commands you want executed when using this OpScript. If you select <b>Server</b> in the <b>Command Target</b> field, the following commands are displayed in the <b>Command Name</b> drop-down list: <ul style="list-style-type: none"> <li>◆ <b>Startup</b></li> <li>◆ <b>Reboot to Admin State</b></li> <li>◆ <b>Reboot</b></li> <li>◆ <b>Deploy Software</b></li> <li>◆ <b>Save Backup</b></li> </ul> If you select <b>Managed Server Asset</b> in the <b>Command Target</b> field, the following commands are displayed in the <b>Command Name</b> drop-down list: <ul style="list-style-type: none"> <li>◆ <b>Power On</b></li> <li>◆ <b>Power Off</b></li> <li>◆ <b>Power Cycle</b></li> <li>◆ <b>Provision Server</b></li> <li>◆ <b>Startup</b></li> <li>◆ <b>Reboot to Admin State</b></li> <li>◆ <b>Deploy Software</b></li> <li>◆ <b>Save Snapshot</b></li> </ul> If you select <b>Live Discovered Server Asset</b> , only the <b>Deploy Software</b> command is displayed in the <b>Command Name</b> drop-down list.  If you select <b>Network Device</b> , only the <b>Save Snapshot</b> command is displayed in the <b>Command Name</b> drop-down list.
<b>Beanshell Code</b> (displays only if you select <b>Write here or Cut and Paste</b> in the <b>Script Location</b> )	Type or cut and paste the Beanshell code to be executed for the OpScript.

Field Name	Description
<b>Starter Class Name</b> (displays only if you select <b>Java</b> as the <b>Language</b> )	The starter class name contains the name of the class that implements the <code>com.jareva.zcil.scripting.Script</code> interface. When the native Java OpScript is executed, the <code>run()</code> method of this class is invoked. This class must be in the zip file.
<b>Starter File Name</b> (displays only if you select <b>Beanshell</b> as the <b>Language</b> , and <b>Present in ZIP file</b> in the script location)	Enter the starter file name of the Beanshell file.
<b>Provision a New Server</b>	<p>Check this checkbox if you are adding an OpScript to provision servers (<b>Command Target = Server</b>). If you check this box, two additional fields appear:</p> <ul style="list-style-type: none"> <li>◆ <b>Server template</b> - select a server template for use when provisioning.</li> <li>◆ <b>Server Assigned to Workspace</b> - select a workspace that the server should be assigned to after it is provisioned.</li> </ul> <p>When the script is run an available server asset is auto-selected and the new server is provisioned.</p>
<b>OpScript Assigned to Workspace</b>	Select the workspace that this OpScript should be assigned to.
<b>Comments</b>	Enter any relevant comments for the OpScript.
<b>Created by</b>	This field displays the user login who is adding this OpScript.

5. The **Add Parameter** section enables you to attach parameters to the OpScript. For example, if you run an OpScript to add a workspace, on execution, you can have the OpScript prompt to enter a name for the workspace. Enter the following information:

Field Name	Description
<b>Name</b>	Enter a name for the parameter. For example, <b>AddWorkspace</b> . For BeanShell OpScripts, the value of this parameter is placed in a variable with this name.
<b>Title</b>	Enter a title for the parameter. For example, <b>Workspace Name</b> .
<b>Description</b>	Enter a description for the parameter. For example, <b>Enter a name for the Workspace</b> .
<b>Optional</b>	If checked, this option indicates that execution of this parameter does not need to provide a value for the OpScript. If a value is not provided, the default value is used.
<b>Can be blank</b>	If you check this option, you are allowed to provide a blank field or null value for this parameter. Otherwise, the you must provide a specific value (not null or blank) for this parameter.

Field Name	Description
<b>Constant</b>	If checked, this option indicates that parameter is a constant. Intel Deployment Manager should not ask for a value for this parameter. This option is useful if you want this parameter to act as a user preference for the OpScript.
<b>Type</b>	Select the type of parameter from the drop-down options. You can specify the type of a server asset parameter. By specifying the type, you can ensure that only assets of that type can be set to it.
<b>Default Value</b>	Enter a default value for the parameter. If you do not specify a value, on execution, the value of the parameter is automatically set to the default value.

6. The **Add Command** section enables you to add arguments and specify actions to the OpScript. For example, if you run an OpScript to deploy software, on execution, the OpScript asks you to enter a name for the software. The fields displayed depend on the command that the OpScript is going to execute. The following fields are displayed when you choose **Deploy Software**. Enter the following information:

Field Name	Description
<b>Choose Software</b>	Click to select a list of software available for deployment on the server.
<b>Additional Arguments</b>	Enter any additional arguments you want to pass on to the software.
<b>Do not monitor progress</b>	Check this option if you do not want to monitor the progress when deploying the software.
<b>On Error</b>	You can stop execution of the software if an error occurs. This field is displayed for all commands.
<b>Wait for Completion</b>	Check this option if you want Intel Deployment Manager to wait for this command to finish before starting the next command or exiting the OpScript. This field is displayed for all commands.

7. Click **OK**.

## Delete OpScript

---

**Caution** Intel Deployment Manager comes with two canned scripts: start multiple servers, and stop multiple servers. You can modify these scripts to perform any operation, but you cannot add or import additional scripts. Given only the two scripts, it is very unlikely that you want to delete them.

---

To delete an OpScript:

1. Click **Resources > Jobs**. By default, the **OpScripts** tab is opened, and the **Displaying All OpScripts** table is displayed.
2. Select the OpScript you want to delete.
3. Click **Actions > Delete**.
4. The verification dialog is displayed. To delete the OpScript click **Yes**; otherwise, click **No**.

## Run OpScript

To run an OpScript:

1. Click **Resources > Jobs**. By default, the **OpScripts** tab is opened, and the **Displaying All OpScripts** table is displayed.
2. From the **Displaying All OpScripts** table, select the OpScript you want to run.
3. Click **Actions > Run**. The **Run OpScript** dialog displays the name, description, and language of the OpScript.
4. Select the server on which you want to run the OpScript.
5. Click **OK** if you want to run the OpScript, or you can click **Cancel**.

## Jobs

You can create a *job* to schedule an OpScript to run at particular times, or to be triggered by particular system or user events. The execution status of jobs and OpScripts can be monitored on the **Job Monitor** page.

OpScripts are server-side scripts. You can build an OpScript by specifying a sequence of Intel Deployment Manager commands, or you can write Java code directly.

### Add/Edit Job

To add or edit a Job:

1. Click **Resources > Jobs**.
2. Click the **Jobs** tab.
3. If you want to edit a job, select it.
4. Click **Actions > Add** or **Edit**. The **Add Job** or **Edit Job** dialog displays the following sections:
  - **Basic**
  - **Parameters** (Displayed only for jobs with parameters).
  - **Recurrence**
5. Enter the following information in the **Basic** section:

Field Name	Description
Script Name	Click the icon to select from the OpScripts loaded on your Intel Deployment Manager system. Select the script you want and then click <b>Use Selected Item</b> .
Job Name	Assign a name to this job.
Job Description	You can enter a description for this job.
Execution Criteria	Select the execution criteria for this OpScript from the drop down options: <ul style="list-style-type: none"> <li>◆ <b>On Scheduled Dates</b></li> <li>◆ <b>On occurrence of listed event category</b></li> </ul>
<b>Start Date</b> (Displays only if you select <b>On Scheduled Date</b> as the Execution Criteria)	Click the calendar icon to select the time and date when you want this job to be executed.

Field Name	Description
Script Name	Click the icon to select from the OpScripts loaded on your Intel Deployment Manager system. Select the script you want and then click <b>Use Selected Item</b> .
<b>Triggering event categories</b> (Displays only if you select <b>On occurrence of listed event</b> category)	Click <b>Add</b> or <b>Remove</b> to select the events. This job is executed when the selected events occur.
<b>Skip Time</b> (Displays only if you select <b>On Scheduled Date</b> as the Execution Criteria)	This field contains the maximum amount time in milliseconds that a time scheduled job can be late by. For example, if the job is scheduled to go off at 12:00pm and this field is set to 600000, that is, 10 minutes), the job can start as late as 12:10pm, if for some reason it couldn't start it earlier, (for example, if Intel Deployment Manager was down or too busy.) However, it will not be allowed to start the job at 12:11pm or later. It would just not trigger the job if it cannot trigger it by 12:10pm. If this field is not specified, the skip time defaults to 15 minutes.
<b>Delete after Triggering</b>	Check this option if you want the job to get deleted from the database after it starts.
<b>Priority</b>	Select a priority for the job from the drop-down list.
<b>Wild Card Parameter</b> (Displays only if you select an OpScript with one or more parameters)	The wild card parameter contains a selection list of all the selected OpScript's parameters. If an OpScript parameter is chosen as the wildcard parameter, the value of that parameter is not filled in until the OpScript's job is triggered. The value for this parameter is determined upon whether the job is time based or event based. If it is event based, the value of that parameter is set to the resource that generated an event. For example, if you created a job using an event with a parameter of type <code>server</code> , and if the job was set up to be triggered by a <code>Server is Up</code> event, when the job is triggered, the value of the wildcard parameter will be set to that server. For time-based jobs, the job will start <i>n</i> copies of the OpScript each copy of which will have its wildcard parameter set to one of the <i>n</i> resources that are the same type as the wildcard parameter and which are accessible by the user.
<b>Wild Card Parameter Values</b> (Displays only if you select a <b>Wild Card Parameter</b> )	You can select a wild card parameter value in order to choose targets for your command script. Select one of the following: <ul style="list-style-type: none"> <li>◆ <b>All Values in all Workspaces</b> - If you select this option the job runs for all values of the selected wild card parameter in all workspaces.</li> <li>◆ <b>All values in one Workspace</b> - If you select this option a drop-down list appears from which you can select the workspace to run the job in. The job runs for all values of the selected wild card parameter in the selected workspace.</li> <li>◆ <b>Selected values</b> - If you select this option a selection box appears with a list of values for the selected wild card parameter. Use the <b>Add</b> and <b>Remove</b> buttons to add or remove values.</li> </ul>
<b>OpScript Assigned to Workspace</b>	Select the workspace that the OpScript should be assigned to.

Field Name	Description
Script Name	Click the icon to select from the OpScripts loaded on your Intel Deployment Manager system. Select the script you want and then click <b>Use Selected Item</b> .
Comments	Enter any comments specific to this job.
Created By	The name of the user creating this job is displayed.

6. In the **Parameters** section, select the server on which you want to run this OpScript. You need to provide values for all of the OpScript's parameters, except for the OpScript's wildcard parameter. When the job is triggered, the parameters of the job's OpScript will be set to these values.
7. Enter the following information in the **Recurrence** section:

Field Name	Description
Recurrence	Select the number of times you want to run this job.
Range of Recurrence	You can schedule the job with a start and end date. You can select <b>No end date</b> if this is a recurring job.

8. Click **OK**.

## Delete Job

---

**Note** Only completed jobs can be deleted.

---

To delete a job:

1. Click **Resources > Jobs**.
2. Click the **Jobs** tab. The **Displaying All Jobs** table is displayed.
3. Select the job(s) that you want to delete.
4. Click **Actions > Delete**.
5. The verification dialog is displayed. Click **Yes** if you want to delete the job; otherwise, click **No**.

## Reload Configuration Files

Configuration files are read when Intel Deployment Manager is started up. User events properties files are configuration files located in `/opt/veritas/opforce/conf/events`.

If you add or edit user events, you must either restart Intel Deployment Manager or reload the configuration files to activate them. Reloading the configuration files enables you to activate the new configuration without having to restart your system.

To reload configuration files:

1. Click **Settings > Preferences**.
2. Click **Reload Configuration Files**.

---

## Task Manager

A *task* is a long-running operation performed by The Task Manager provides a list of all of the tasks on the system and gives you information about the status of each task. You can use it to determine if a task is queued, sleeping, running, completed, or completed with errors. Whereas the Job Monitor gives you information only about jobs, the Task Manager provides information about all tasks, including jobs.

You can use the Task Manager to change the priority of a task, to abort a running task, or to delete a completed task.

### Abort

The abort operation enables you to kill a running task. To abort a task:

1. Click **Settings > Task Manager**.
2. Select one task.
3. Click **Action > Abort**.
4. In the verification dialog, click **Yes** to abort the task, or **No** to let it continue running.

### Change Priority

1. Click **Settings > Task Manager**.
2. Select one task.
3. Click **Action > Change Priority**.
4. Enter a new priority in the **New Priority** field. Priorities range from 1 to 64, with 64 being the highest priority. You can only change a priority by +/- three points; for example, if the current priority is 23, you can raise it to 26, or lower it to 20.
5. Click **OK**.

## Delete

When a task completes, you can use the Task Manager to determine whether or not it completed successfully. Completed tasks remain in the table until you delete them. The delete operation enables you to delete a completed task from the **Displaying All Tasks** table. You can only delete completed tasks.

To delete a task:

1. Click **Settings > Task Manager**.
2. Select one task.
3. Click **Action > Delete**.
4. In the verification dialog, click **Yes** to delete the task, or **No** to let it remain in the **Displaying All Tasks** table.

This chapter includes the following topics:

- ◆ “[Licenses](#)” on page 154
- ◆ “[Working with Licenses](#)” on page 154
  - “[Add/Edit License](#)” on page 154
  - “[Assign Licenses](#)” on page 155
  - “[Unassign Licenses](#)” on page 156
  - “[Delete Licenses](#)” on page 156

## Licenses

Intel Deployment Manager provides the means to track application and operating system licenses for provisioned managed servers in the UP state.

The License entity is more than a labeled counter. All license entities have a unique name, a current count of managed server in the UP state that are using that license, and a maximum value allowed for that count. Every snapshot has an associated set of licenses. When a managed server using that snapshot is started up, the counter for each of the snapshot's licenses increases. If any of the licenses' counters exceed their maximum, the start up command is aborted. When a managed server is shut down, all the counters of the server's snapshot's licenses are decremented. Therefore, by using Intel Deployment Manager's license entities, you can keep track and limit the number of simultaneous running copies of applications or operating systems.

Licenses can also be used to limit server assets that can run server snapshots using a particular license. This limitation is useful if your set of application or operating system licenses are applicable to only a subset of the server assets. You can limit server assets that can be run by unchecking the **Any Server Asset Can Use This license** option for a license. When unchecked, Intel Deployment Manager allows a server asset to be assigned to a server if that server's snapshot has an unchecked license, and if the server asset has that license in its list of licenses. By default, **Any Server Asset Can Use This License** is unchecked for new licenses.

When you provision a server, the constraint check during a start up verifies that your Intel Deployment Manager server has a license. If not, you need to add a license manually before you can start up.

## Working with Licenses

The administration console enables you to perform the following operations:

### Add/Edit License

To add a license:

1. In the Navigation Area, click **Resources > Licenses**.
2. The **Displaying All Licenses** table appears. If you want to edit a license, select the license you want to edit.
3. Click **Actions > Add** or **Edit**.

- The **Add/Edit License** dialog is displayed. Enter the following information:

Field Name	Description
<b>License Name</b>	Enter the license name. Do not exceed 32 characters.
<b>Description</b>	Enter a license description. A description is a brief summary for the license. Do not exceed 64 characters.
<b>Type</b>	Click the drop-down options to select license type ( <b>OS</b> or <b>Application</b> ).
<b>Maximum Number of Licenses</b>	Enter maximum number of licenses required. Maximum value for this field is 9999999.
<b>Current Number of Licenses Used</b>	Enter current number of licenses used or leave it at 0 (zero) initially. Maximum value for this field is 9999999.
<b>Any Server Asset can use this License</b>	Click the checkbox if the license can be used by any server managed by Intel Deployment Manager. Some licenses are specific to certain servers. Those licenses cannot be used on other servers. A server always consumes licenses while it is not in the DOWN state. If startup fails on a server, but it goes into the DISCONNECTED state, the licenses are still held for that server.
<b>Expiration Date</b>	Enter the date that the license expires. Do not exceed 16 characters. License expiration is not tracked by Intel Deployment Manager, it is only for information purposes.
<b>Assigned to Workspace</b>	From the drop-down options, select the workspace that this license should be assigned to. This license is applicable only to those server assets that are assigned to the same workspace.

- Click **OK** to add the license.

## Assign Licenses

To assign a license to a workspace:

- In the Navigation Area, click **Resources > Licenses**.
- Select the license you want to assign.
- Click **Actions > Assign**.
- Select the workspace you want to assign the license to.
- Click **OK**.

## Unassign Licenses

To unassign a license from a workspace:

1. In the Navigation Area, click **Resources > Licenses**.
2. Select the license you want to unassign.
3. Click **Actions > Unassign**.
4. Select the workspace you want to unassign the license from.
5. Click **OK**.

## Delete Licenses

To delete a license:

1. In the Navigation Area, click **Resources > Licenses**. The **Displaying All Licenses** table appears.
2. Select the license(s) you want to delete.
3. Click **Actions > Delete**.
4. The verification dialog is displayed. Click **Yes** to delete the license(s), or click **No** if you do not want to delete the license(s).

This chapter includes the following topics:

- ◆ “[Networks](#)” on page 158
  - “[Add/Edit Network](#)” on page 158
  - “[Assign Network](#)” on page 160
  - “[Unassign Network](#)” on page 160
  - “[Delete Network](#)” on page 161
- ◆ “[IP Lists](#)” on page 161
  - “[Add/Edit IP List](#)” on page 162
  - “[Assign IP Lists](#)” on page 163
  - “[Unassign IP Lists](#)” on page 163
  - “[Delete IP Lists](#)” on page 164

A network entity in Intel Deployment Manager represents a subnet in a TCP/IP network. The network entity contains fields specifying the network's public or private IP address range, the network mask, and the default gateway for the network.

The **Networks** component enables you to manage networks, and IP lists.

## Networks

Every managed computing device must specify a network and IP address that Intel Deployment Manager can use to communicate with when the device is in the FREE or ADMIN state.

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**Note** To provision a server see "[Provisioning Servers](#)" on page 30.

---

### Add/Edit Network

Adding a network enables you to define a network topology that can be used to provision computing devices and network devices.

To add/edit a network:

1. In the Navigation Area, click **Resources > Networks**. The **Displaying All Networks** table is displayed.
2. Click the Networks tab (if it is not already open).
3. If you want to edit a network, select the network that needs to be edited.
4. Click **Actions > Add** or **Edit**. The **Add Network** or **Edit Network** dialog is displayed.

5. Enter the following information:

Field Name	Description
<b>Name</b>	Enter a name, a unique identifier, for the new network that you are creating. Do not exceed 32 characters. Do not use any special characters.
<b>Network Address</b>	Enter the base IP address of the network.
<b>Subnet Mask</b>	Enter the subnet mask to determine the network. The mask determines the subnet an IP address belongs to.
<b>Default Gateway</b>	Enter the IP address of the default gateway that this network should use.
<b>Domain Name Servers</b>	Enter the IP addresses for the Domain Name Servers. To enter multiple Domain Name Servers, separate them with commas. By default, Intel Deployment Manager uses the Domain Name Servers assigned to this network.
<b>Accept Discovered Asset</b>	Check this option if this network should be used when automatically determining a network when accepting a discovered server asset.
<b>IP Exclusion Range</b>	<p>Allows you to block a range of IP addresses. Once blocked that IP address range is not used by Intel Deployment Manager when assigning IP addresses to newly discovered assets. To delete a range, select it and click <b>Delete Range</b>.</p> <p>For example, in a given network, if a particular IP address is in use by an external server then you can exclude it via the IP exclusion range.</p> <p><b>Note</b> An IP address range excluded from a network is automatically excluded from its IP list. But the IP addresses excluded from an IP list are not excluded from its network.</p>
<b>New IP Exclusion Range</b>	Add a new IP exclusion range. For example, 192.168.7.189 : 192.168.7.185. Click <b>Add Range</b> .
<b>Assigned to Workspace</b>	Select the workspace that this network should belong to.

6. Click **OK** to add the network.

## Assign Network

To assign a network to a workspace:

1. In the Navigation Area, click **Resources > Networks**.
2. Select the network you want to assign.
3. Click **Actions > Assign**.
4. Select the workspace you want to assign the network to.
5. Click **OK**.

## Unassign Network

To unassign a network from a workspace:

1. In the Navigation Area, click **Resources > Networks**.
2. Select the network you want to unassign.
3. Click **Actions > Unassign**.
4. Select the workspace you want to unassign the network from.
5. Click **OK**.

## Delete Network

You cannot delete a network if it:

- ◆ contains servers that are in the UP state
- ◆ has server assets that are free
- ◆ is being used as a VIP for a load balancer

If you delete a network that has one or more servers, the following error message is generated:  
`Network is used.`

To delete a network:

1. In the Navigation Area, click **Resources > Networks**.
2. Select the network you want to delete.
3. Click **Actions > Delete**.
4. Click **YES** to delete the network.

## IP Lists

*IP lists* are sections of network IP address ranges allocated for exclusive use by particular workspaces. Intel Deployment Manager treats IP lists as a kind of network, although in actuality they are not; they are only part of their associated networks. You can connect NICs of provisioned servers to IP lists.

The **IP Lists** table displays the IP address ranges that are free or in use by IP list entities for each network in the system. This table can be used to determine which IP address ranges are available for a network when creating a new IP list. It can also be used to track which IP addresses are consumed by existing IP list objects.

## Add/Edit IP List

When you add an IP list, you are allocating IP addresses from a network.

To add or edit an IP list:

1. In the Navigation Area, click **Resources > Networks**.
2. Click the **IP Lists** tab.
3. If you want to edit an IP list, select the IP list that needs to be edited.
4. Click **Actions > Add** or **Edit**.
5. The **Add IP List** or **Edit IP List** dialog appears. Enter the following information:

Field Name	Description
<b>Name</b>	Enter a name, a unique identifier, for this IP list.
<b>Network</b>	Select from the drop down options the network from which you want to allocate a section of IP addresses.
<b>Number of IP Addresses</b>	Enter the number of IP addresses. You must provide a value in this field, <i>or</i> in the <b>Start and End IP Addresses</b> field.
<b>Start and End IP Addresses</b>	You can enter the first and last IP addresses of the range. These fields should be within the range of the network listed in the field above. You must provide a value in this field, <i>or</i> in the <b>Number of IP Addresses</b> field.
<b>Default Gateway</b>	Enter the IP address of the default gateway for this IP list.
<b>Domain Name Servers</b>	Enter the IP addresses of the Domain Name Servers.
<b>New IP Exclusion Range</b>	Add a new range of IPs to be excluded. For example, <b>192.168.7.189</b> : <b>192.168.7.185</b> . Click <b>Add Range</b> .
<b>IP Exclusion Ranges</b>	Allows you to block a range of IP addresses. Once blocked, that IP address range is not used when assigning IP addresses to newly discovered assets. To delete a range, select it and click <b>Delete Range</b> .  For example, in a given network, if a particular IP address is in use by an external server, you can exclude it using an IP exclusion range.  An IP address range excluded from a network is automatically excluded from its IP list. But the IP addresses excluded from an IP list are not excluded from its network.
<b>Assigned to Workspace</b>	Select the workspace that this IP list should belong to.

6. Click **OK** to add this IP list to provisioned resources.

The IP list name is displayed by clicking **Resources > Provisioned Resources > *NetworkName* > *IPListName*** (where *NetworkName* is the name of your network, and *IPListName* is the name you assigned to the IP list). It can be used to provision servers. If you assign this IP list to a workspace, it is displayed by clicking **Workspaces > Provisioned Resources > *NetworkName* > *IPListname*** too.

## Assign IP Lists

To assign an IP list to a workspace:

1. In the Navigation Area, click **Resources > Networks**.
2. Click the **IP Lists** tab.
3. Select the IP list(s) you want to assign.
4. Click **Actions > Assign**.
5. Select the workspace you want to assign the IP list to.
6. Click **OK**.

## Unassign IP Lists

To unassign an IP list from a workspace:

1. In the Navigation Area, click **Resources > Networks**.
2. Click the **IP Lists** tab.
3. Select the IP list(s) you want to unassign.
4. Click **Actions > Unassign**.
5. Select the workspace you want to unassign the IP list from.
6. Click **OK**.

## Delete IP Lists

You can delete an IP list that contains servers. All the servers in the IP list are moved to the IP list's network.

1. In the Navigation Area, click **Resources > Networks**.
2. Click the **IP Lists** tab.
3. Select the IP list(s) you want to delete.
4. Click **Actions > Delete**.
5. Click **OK**.

This chapter includes the following topics:

- ◆ “[Workspaces](#)” on page 166
  - “[Everything Workspace](#)” on page 166
  - “[Discovered Workspace](#)” on page 166
- ◆ “[Using Workspaces](#)” on page 167
  - “[Add/Edit Workspace](#)” on page 167
  - “[Delete Workspace](#)” on page 167

## Workspaces

A *Workspace* is a collection of all the resources that you can use when working with Intel Deployment Manager. Workspaces serve two purposes:

- They provide a means of grouping related resources for ease of use.
- Workspaces can be used to restrict or grant access to particular sets of resources to particular user roles.

Resources include computing devices, network devices, templates, snapshots, networks, software, jobs, licenses, and provisioned resources. Each workspace has certain resources allotted to it.

When you click the **Workspaces** tab, several buttons are displayed under it in the Navigation Area. They are

- **Display** - Enables you to select the workspaces that you want to display, depending on whether or not you have access to the selected workspaces.
- **View All** - Displays all the workspaces you have access to.
- **Add** - This button allows you to add a workspace. When you log on to Intel Deployment Manager for the first time, you will see two existing workspaces: *Everything* and *Discovered*.

### Everything Workspace

The *Everything* workspace is a central repository for all the resources managed by Intel Deployment Manager. Every resource that is added to Intel Deployment Manager is included in the *Everything* workspace. All resources always belong to the *Everything* workspace: you cannot remove resources from this workspace. Assigning a resource to *Everything* has no effect because it already belongs to this workspace (If you assign a resource to *Everything*, the resource does *not* become available to all the workspaces).

### Discovered Workspace

All the assets that Intel Deployment Manager discovers are listed in the *Discovered* workspace. The newly discovered assets remain listed here until they get accepted or get allocated to another workspace.

## Using Workspaces

The administration console enables you to perform the following operations:

### Add/Edit Workspace

To add a workspace:

1. In the Navigation Area, click **Workspaces**.
2. In the Navigation Area, click **Add**.
3. The **Add Workspace** dialog is displayed. Enter the following information.
  - **Name** - Enter a name for the workspace. Do not exceed 32 characters.
  - **Description** - Enter a description for the workspace. This description is used for your internal reference.
  - **Comments** - You can enter any arbitrary comments for the workspace. These comments are also used for your internal reference.
4. Click **OK** to add the workspace.

### Delete Workspace

In order to delete a workspace, all computing devices within that workspace must be shut down. You can delete multiple workspaces using **Delete Workspaces** dialog. When you delete a workspace, all the resources allotted to that workspace are deleted.

To delete a workspace:

1. In the Navigation Area, click **Workspaces**.
2. The **Displaying all Workspaces** table appears. Select the checkbox(es) for the workspaces you want to delete.
3. Click **Actions > Delete**.
4. The verification dialog is displayed. Click **Yes** to delete the workspaces. Click **No** if you do not want to delete the workspaces



This chapter includes the following topics:

- ◆ “[Storage Devices](#)” on page 170
  - “[Add or Edit a Storage Device](#)” on page 170
  - “[Allocate System Storage](#)” on page 171
  - “[Delete System Storage](#)” on page 172
- ◆ “[System Storage](#)” on page 172
  - “[Edit System Storage](#)” on page 172
  - “[Release System Storage](#)” on page 173

The storage allocation capability enables you to control where snapshots and software are stored, and to optimize the use of resources. Intel Deployment Manager provides storage management capabilities to better manage snapshots and software.

Storage must be registered with Intel Deployment Manager. The registration process describes storage characteristics, and how the system can access the storage. Once registered, you can explicitly set properties for accessing the storage. Intel Deployment Manager supports access to storage devices via NFS, CIFS, or Samba\*, but not all protocols are supported on each platform.

- If your Intel Deployment Manager server is running on a Windows system your storage server can run Linux with Samba, or Windows with CIFS. Running Linux with NFS is not supported.
- If your Intel Deployment Manager server is running on a Linux system, your storage server can run Linux with Samba or NFS, or Windows with CIFS.

After registering a storage device with Intel Deployment Manager you can allocate it. Physical storage can be either local, on the same server as Intel Deployment Manager, or on other servers accessible through the network, providing overall system scalability.

The **Storage** component supports the following categories:

- ◆ storage devices
- ◆ system storage

## Storage Devices

To register storage with the system, you must first add a storage device. Information about how to access the storage, such as the protocol and access passwords, are required to initialize the storage. Intel Deployment Manager then gathers information about the storage and begins to track it.

### Add or Edit a Storage Device

To add or edit a storage device:

1. In the Navigation Area, click **Settings > Storage > Storage Devices**.
2. Click **Actions > Add** or **Edit**.
3. In the **Add Storage Device** dialog, select a storage driver, or in the **Edit Storage Device** dialog, select a storage device from the **Displaying All Storage Devices** table. For example, Ember™.
4. Enter the following information:
  - **Storage Driver** - Select a storage driver from the drop-down options. The Ember™ driver provides access to exported NFS directories and Windows shares on the appropriate systems. NFS is supported on Unix and Linux systems. CIFS is supported on Linux and Windows. The driver does not export or share the storage, it simply provides Intel Deployment Manager with access to the storage. You can export the storage with "net use" (CIFS - Windows), "/etc/exports" (NFS - Linux), or a similar method.
  - **Storage Host IP Address** - Enter the IP address of the server where the storage directory is located. For example, 192.168.7.50
  - **Storage Directory** - Enter the path of the storage directory. For example, if a shared storage directory was created on your C: drive named `test_storage1`, enter `test_storage1`.
  - **Mount Protocol** - Select the protocol used to mount the storage device. For Windows, select `smbfs`.
  - **Storage User Domain** (For CIFS/SMB shared directories only) - Enter the Windows user domain. For example, `DOMAIN`.
  - **Storage User ID** (For CIFS/SMB shared directories only) - Enter the Windows user ID. For example, `Administrator`.
  - **Storage User Password** (For CIFS/SMB shared directories only) - Enter the password for the user ID. Passwords are case-sensitive. The storage user domain, user ID, and user password are displayed if the CIFS protocol is specified.

5. Click **Done** to add this storage device.

## Allocate System Storage

To allocate system storage:

1. In the Navigation Area, click **Settings > Storage > Storage Devices**.
2. Select the storage driver associated with the storage you want to allocate.
3. Click **Actions > Allocate System Storage**.
4. In the **Allocate System Storage** dialog, enter:
  - **Storage Driver** - This displays the storage driver that you selected when adding free storage.
  - **Storage Location** - Displays the server on which the storage is located.
  - **Storage Type** - **Storage Type** identifies accessibility of the storage, which is selected as system-wide by default.
  - **Allocation Size** - You can limit the amount of storage you want allocated to a user or to the system. The **Allocation Size** is N/A. The EMber™ storage driver does not require this field.
  - **Find and Import Snapshots, Software, OpScripts** - Check this checkbox if you want to search for a pre-installed package (snapshot, software, or OpScript) on a system storage device. Each subdirectory in the system storage is checked. If files for a snapshot, software, or OpScript are found on the filesystem, but no database entry exists, Intel Deployment Manager creates the database entries and associates them with the files.

This can be used to quickly import packages from a previous installation of Intel Deployment Manager, or from a set of files copied over from a different Intel Deployment Manager server. Note that sharing of package files between multiple Intel Deployment Manager servers it not supported.
5. Click **OK**.

## Delete System Storage

To delete system storage:

1. In the Navigation Area, click **Settings > Storage > Storage Devices**.
2. In the **Displaying All Storage Devices** table, select the storage device you want to delete.
3. Click **Actions > Delete**.
4. Click **Yes** to delete the storage, or **No** if you decide to retain it.

## System Storage

After registering storage, you must use Intel Deployment Manager to manage the registered storage. Only system storage can be used to store snapshots and imported software.

## Edit System Storage

To edit system storage:

1. In the Navigation Area, click **Settings > Storage > System Storage**.
2. Select the storage location that you want to edit.
3. Click **Actions > Edit**.
4. The **Edit System Storage** dialog is displayed. Enter the following:
  - **Storage Location** - Selected in the **Displaying All Managed Storage** table.
  - **Storage Type** - Selected when adding this storage.
  - **Storage Domain** (For CIFS Only) - Enter the domain of the storage user.
  - **Storage User** (For CIFS Only) - Enter the storage user's ID.
  - **Change Storage Password** (for CIFS Only) - Check this option if you want to change the storage user's password.
  - **Allocation Size** - This is the storage size that was allocated when adding the storage.
5. Click **Done**.

## Release System Storage

When releasing storage, Intel Deployment Manager remains aware of it, but no longer manages it. You cannot store snapshots or software in a released storage location.

To release storage:

1. In the Navigation Area, click **Storage > Allocated Storage**.
2. Select the storage location that you want to release.
3. The verification dialog is displayed. You can click **Yes** or **No**, depending on whether or not you want to release the selected storage device.



This chapter includes the following topics:

- ◆ “[Event Kinds](#)” on page 176
  - “[Event Fields](#)” on page 176
- ◆ “[Event Types](#)” on page 179
- ◆ “[Generating Lifetimes from Events](#)” on page 187
- ◆ “[Custom Log](#)” on page 187

Intel Deployment Manager provides an event logging mechanism to track the use of managed resources. An *event* is a record that identifies an operation that was performed on a resource by a user at a particular time. All operations that change the state of managed resources generate events, so events can be used to track changes. Events can be used to track which users or workspaces are using resources, and this information can be used to generate billing information. Events are also generated for any errors that occur in the Intel Deployment Manager system.

## Event Kinds

All events have an associated *kind*. The **Kind** field identifies the kind of event that has occurred, but this field is independent of the event *type*, which instead describes the type of resource or entity that an event is associated with. Most **Kind** field values are one of the duration kinds. Such events are known as duration events. A *duration event* indicates that some important change has occurred concerning the lifetime of a managed resource or entity.

Duration events can be of the kind: `Start`, `End`, or `Change`. `Start` events indicate the start of a resource or entity lifetime. `End` events indicate the end of the lifetime. `Change` events indicate that a live resource or entity has changed in some significant way.

In addition to duration events, you can also encounter events of kind `Activity`, `Activity Done`, `Point`, `Info`, and `Error`. The `Activity` event indicates that the user has just begun an operation. The `Activity Done` event indicates that a long-running user-initiated operation has completed. The `Point` event indicates that some important operation occurred at the given point in time, however, there is no duration or resource lifetime associated with that event. `Info` events provide informational messages and can usually be ignored. `Error` events are generated whenever any user command or long running operation generates an error: they can also be generated if server assets or other resources are currently in an invalid or inaccessible state. See the online help for a complete list of error messages.

## Event Fields

### Event Fields

Field Name	Description
<b>Time</b>	The time the event occurred.
<b>User ID</b>	The user ID of the user that performed the operation recorded by this event. If this field is the empty string (""), then the event was not performed by a user. That is, the Intel Deployment Manager system performed the operation.
<b>Serial Number</b>	The serial number of the server asset that this event is associated with. If this event cannot be associated with a server asset, or if that server asset does not have a serial number, this field is the empty string ("").
<b>Event ID</b>	A numerical resource ID used to uniquely identify the operation or object that this event is based on. This resource ID is unique only for a given set of values for the field event-type. This field can be used to determine duration events associated with a particular resource to compute resource lifetimes for billing purposes.

## Event Fields

Field Name	Description
<b>Type</b>	The type of event. The type identifies what type of resource or operation that this event is associated with. The possible types of events are described in the section “ <a href="#">Event Types</a> ” on page 179.
<b>Kind</b>	The kind of event. The event's kind is described in the section “ <a href="#">Event Kinds</a> ” on page 176.
<b>Message</b>	A short, user-friendly message describing this event. If the event is an error, the error message is displayed here.
<b>Attributes</b>	A string of optional attributes associated with the event. The meaning of the attributes varies depending on the value of the event's <b>Type</b> field. The attributes string consists of a semicolon (;) separated list of <i>var=value</i> expressions, where <i>var</i> is a variable name and <i>value</i> is the value of the variable.
<b>Resource ID</b>	An ID that identifies the event's resource. This resource ID is unique for a given owning workspace and event type. This ID is set to 0 if this is an user activity event.
<b>Activity ID</b>	An ID that identifies the user operation that created this event.
<b>Message Parameter #1</b>	The first parameter in a list of parameters associated with this event's message. The meaning of these parameters depend upon the value of the <b>Message</b> field. The purpose of these parameters is to allow you to generate an internationalized message with detailed information, where the format of the message is determined from the value of the event-message field, and the parameters are instantiated from the values given in this parameter list.
<b>Message Parameter #2</b>	The second parameter in a list of parameters associated with the event's message. See the description for Message Parameter #1.
<b>Message Parameter #3</b>	The third parameter in a list of parameters associated with the event's message. See the description for Message Parameter #1.
<b>Message Parameter #4</b>	The fourth parameter in a list of parameters associated with the event's message. See the description for Message Parameter #1.
<b>Message Parameter #5</b>	The fifth parameter in a list of parameters associated with the event's message. See the description for Message Parameter #1.

## Event Types

All events have an *event type*, which identifies the type of resource or operation that the event is associated with. Except where noted, all event types use only the duration event kinds, or the error event kind. The event type can take one of the following values.

### Event Types

Event Type	Description
User	This event corresponds to the creation, modification, or deletion of an user object. The <b>Serial Number</b> fields are always empty. The user being created, deleted, or modified is specified as the value of the <i>userId</i> variable in the <b>Attributes</b> field. The <b>User</b> field of the event contains the user ID of the user performing the operation, <i>not</i> the user that the operation is being performed on.
Workspace	This event corresponds to adding, editing, or deleting a workspace
Snapshot	This event corresponds to the creation, modification, or deletion of a snapshot object. The <b>User</b> fields contain the name of the owner of the snapshot. The <b>Serial Number</b> field is always empty. The <b>Attributes</b> field of the snapshot contains the following variables: <ul style="list-style-type: none"> <li>◆ <i>type</i> - type of server asset that this snapshot runs on.</li> <li>◆ <i>arch</i> - CPU architecture that this snapshot runs on.</li> <li>◆ <i>baseOs</i> - operating system that this snapshot is based on.</li> <li>◆ <i>isGateway</i> - this variable is deprecated and should always be set to false</li> <li>◆ <i>isLoadingable</i> - true if this snapshot can be loaded onto a server</li> <li>◆ <i>scope</i> - scope in which this snapshot can be used</li> <li>◆ <i>configName</i> - name of the snapshot</li> <li>◆ <i>licenses</i> - semicolon separated list of licenses required by this snapshot</li> </ul>
Server	This event corresponds to the creation, modification, or deletion of a server object. The <b>Serial Number</b> field is always empty. The <b>Attributes</b> field of the server equals the <b>Attributes</b> field of the snapshot associated with the server. The <b>Attributes</b> field is empty if the server has no associated snapshot.

## Event Types

Event Type	Description
ServerUse	<p>This event corresponds to a change of status for a server object, typically due to a start-up, shut-down, reboot, or save command. The lifetime of a <code>ServerUse</code> duration begins when a server is changed from a <code>DOWN</code> state to a non-down state, and the lifetime ends when a server is changed from a non-down state to a <code>DOWN</code> state. The <b>Serial Number</b> field contains the serial number of the asset that is assigned to the server. The <b>Attributes</b> field contains all variables and values of the snapshot associated with the server. In addition to the snapshot variables, the <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>serverId</i> - ID of the server whose state was changed. This ID equals the <b>Event-id</b> field of the corresponding server event(s).</li> <li>◆ <i>hostName</i> - Host name of the server.</li> <li>◆ <i>status</i> - Status of the server.</li> <li>◆ <i>imageLoad</i> - If the server is being started up, this variable indicates the load command for server's snapshot. Otherwise, this variable is not displayed.</li> <li>◆ <i>assetId</i> - ID number of the server asset assigned to this server. If this server does not have a server asset, this variable is not displayed</li> </ul>
Network	<p>This event corresponds to the creation, modification, or deletion of a network. The <b>Serial Number</b> field is always empty. The <b>Attributes</b> field of the network contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>startIp</i> - Start IP address of the network.</li> <li>◆ <i>endIp</i> - End IP address of the network.</li> <li>◆ <i>mask</i> - IP address mask of the network.</li> </ul>
Storage Device	<p>This event corresponds to the creation, modification, or deletion of a storage device. The <b>Serial Number</b> fields are always blank. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>location</i> - The name of the storage device's driver.</li> <li>◆ <i>slocitem</i> - A string key uniquely identifying the storage device.</li> </ul>
Session	<p>This event corresponds to a user logging in or out of the Intel Deployment Manager system. The <b>Serial Number</b> fields are always empty. The <b>Attributes</b> field is always empty.</p>
Terminal	<p>This event corresponds to the opening of a remote terminal on one of the servers managed by Intel Deployment Manager. All <code>terminal</code> events are of the kind <code>Point</code>. The <b>Serial Number</b> field contains the serial number of the server's assigned server asset. The <b>Attributes</b> field of this event equals the contents of the <b>Attributes</b> field for the <code>ServerUse</code> event for this server.</p>

## Event Types

Event Type	Description
Server Asset	<p>This event corresponds to the creation, modification, or deletion of a server asset. The <b>Serial Number</b> field equals the server asset's serial number. The <b>ID</b> field equals the server asset's ID. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>arch</i> - The architecture of the server asset.</li> <li>◆ <i>serverId</i> - ID of the server associated with the server asset being updated. This ID equals the <b>Event Id</b> field of the corresponding server event(s). If the server asset is not assigned to a server, this variable is not present.</li> <li>◆ <i>hostName</i> - Host name of the server associated with the server asset being updated. If the server asset is not assigned to a server, this variable is not present.</li> </ul>
Power	<p>This event corresponds to a remote power-on, power-off, or power-cycle command. All <code>Power</code> events are of kind <code>Point</code>. The <b>Serial Number</b> field equals the server asset's serial number. The <b>ID</b> field equals the ID of the asset being powered on/off/cycled. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>assetId</i> - ID of server asset being powered on/off/cycled.</li> <li>◆ <i>command</i> - Identifies the power command: <code>on</code> for power-on, <code>off</code> for power-off, or <code>cycle</code> for power-cycle.</li> <li>◆ <i>serverId</i> - ID of the server associated with the server asset being powered on/off/cycled. This ID equals the <b>Event ID</b> field of the corresponding server event(s). If the server asset is not assigned to a server, this variable is not present.</li> <li>◆ <i>hostName</i> - Host name of the server associated with the server asset being powered on/off/cycled. If the server asset is not assigned to a server, this variable is not present.</li> </ul>
Delete Events	<p>This event corresponds to the deletion of a set of events from the system. The <b>Serial Number</b> fields are always empty. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>time</i> - The time in which events were deleted up to. This time is a numerical value representing the number of milliseconds since midnight January 1, 1970.</li> <li>◆ <i>timeStr</i> - The time in which events were deleted up to. Unlike the <i>time</i> variable, however, the value of this field is printed out in a user-readable form.</li> </ul>

## Event Types

Event Type	Description
System Storage	<p>This event corresponds to the creation, deletion or modification of system storage. The <b>Serial Number</b> fields are always blank. The <b>ID</b> field equals the ID of the system storage. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>type</i> - The type of system storage.</li> <li>◆ <i>location</i> - The storage device location for the system storage.</li> <li>◆ <i>size</i> - The allocated size of the system storage.</li> </ul>
Software	<p>This event corresponds to the creation, deletion or modification of software entities. The <b>Serial Number</b> fields are always blank. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>name</i> - The name of the software.</li> <li>◆ <i>type</i> - The software's type.</li> </ul>
Software Use	<p>This event indicates that someone is executing a software entity object on a server asset object. The <b>Serial Number</b> field equals the server asset's serial number. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>arch</i> - The architecture of the server asset.</li> <li>◆ <i>codeid</i> - The ID number of the software being run.</li> <li>◆ <i>name</i> - The name of the software being run.</li> <li>◆ <i>type</i> - The type of the software being run.</li> <li>◆ <i>returnCode</i> - If the software run has completed, this is set to the return code for that software. Otherwise, this variable is not present.</li> </ul>
None	<p>This event is not associated with a resource. This type is typically used for error events. The <b>Serial Number</b>, and <b>Attributes</b> fields are always blank.</p>
Licenses	<p>This event corresponds to the creation, modification, or deletion of a license entity. The <b>Serial Number</b> fields are always empty. The <b>Attributes</b> field of the network contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>name</i> - Name of the license entity.</li> <li>◆ <i>type</i> - Type of the license entity.</li> <li>◆ <i>maxNumLicenses</i> - Maximum number of licenses allocatable for this license entity.</li> <li>◆ <i>usableOnAnyServer</i> - True if licenses from this license entity can be allocated using any server asset in the system.</li> </ul>
Activity	<p>This event corresponds to the initiation of a user operation (activity) on the system, where this user operation can change the state of elements within this system. If the activity has an associated server asset, the <b>Serial Number</b> field contains the serial number of the asset. The <b>Attributes</b> field is always blank.</p>

## Event Types

Event Type	Description
IP List	<p>This event corresponds to the creation, modification, or deletion of an IP list. The <b>Serial Number</b> field is always empty. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>name</i>: Name of the IP list</li> <li>◆ <i>startIP</i>: Start IP address of the IP list</li> <li>◆ <i>endIP</i>: End IP address of the IP list</li> <li>◆ <i>provisioningNetwork</i>: Network that this IP list is allocated from</li> </ul>
Unmanaged Server	<p>This event corresponds to the creation, modification, or deletion of a unmanaged server object. The <b>Serial Number</b> field contains the serial number of the unmanaged server asset associated with this unmanaged server. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>hostName</i>: Host name of the unmanaged server</li> <li>◆ <i>assetId</i>: ID of unmanaged server asset associated with the unmanaged server</li> </ul>
Unmanaged Server Asset	<p>This event corresponds to the creation, modification, or deletion of a unmanaged server object. The <b>Serial Number</b> field contains the serial number of the unmanaged server asset. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>serverId</i>: ID number of the unmanaged server associated with this unmanaged server asset. If this unmanaged server asset is not assigned to a unmanaged server, this variable is not provided.</li> <li>◆ <i>hostName</i>: Host name of the unmanaged server associated with this unmanaged server asset. If this unmanaged server asset is not assigned to a unmanaged server, this variable is not provided.</li> </ul>
Chassis	<p>This event corresponds to the creation, modification, or deletion of a chassis server asset object. The <b>Serial Number</b> field contains the serial number of the chassis. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>manip</i>: IP address used by Intel Deployment Manager to communicate with this chassis</li> <li>◆ <i>manport</i>: Port used by Intel Deployment Manager to communicate with this chassis</li> </ul>

## Event Types

Event Type	Description
NIC	<p>This event corresponds to the creation, modification, or deletion of a server NIC. The <b>Serial Number</b> field contains the serial number of the server asset associated with this NIC's server, if the NIC's server has an assigned server asset. The <b>Attributes</b> field contains the following variables:</p> <ul style="list-style-type: none"> <li>◆ <i>serverId</i>: ID of the server that this NIC is attached to</li> <li>◆ <i>hostName</i>: Host name of the server that this NIC is attached to</li> <li>◆ <i>nicId</i>: ID of this NIC for the NIC's server assetId: ID of the NIC's server's assigned server asset. If there is no such asset, this variable is not provided.</li> <li>◆ <i>subnetName</i>: Name of the network or IP list that this NIC is attached to.</li> <li>◆ <i>ipAddr</i>: IP address of the NIC. If the NIC has no IP address, this variable is not provided.</li> </ul>
Package	<p>This event corresponds to the creation, modification, or deletion of a storage package. Storage packages are data structures used by Intel Deployment Manager to represent the set of files and directories used by snapshots, software, or OpScripts. The <b>Serial Number</b> field is always blank. The <b>Attributes</b> field contains the following values:</p> <ul style="list-style-type: none"> <li>◆ <i>managedStorageId</i>: ID of the system storage that holds this package</li> <li>◆ <i>location</i>: Storage driver used to manage the package's storage</li> <li>◆ <i>resourceDesc</i>: Location of the package's storage directory.</li> </ul>
System	<p>This event reports some important change to Intel Deployment Manager itself, such as the startup of Intel Deployment Manager. The <b>Serial Number</b> field is always blank. The <b>Attributes</b> field is always blank.</p>
Alarm	<p>This event is generated whenever Intel Deployment Manager attempts to trigger one of its time-base jobs. The <b>Serial Number</b> and <b>Attributes</b> fields are always empty.</p>
OpScript	<p>This event corresponds to the creation, modification, or deletion of an OpScript. The <b>Serial Number</b> field is always blank. The <b>Attributes</b> field contains the following values:</p> <ul style="list-style-type: none"> <li>◆ <i>language</i>: Language OpScript is written in: 1=Java, 2=BeanShell</li> <li>◆ <i>packageId</i>: ID of storage package for OpScript</li> <li>◆ <i>parameters</i>: Comma-separated list of the OpScript's parameter names</li> <li>◆ <i>scriptFile</i>: Name of class for a native OpScript.</li> </ul>
User Role	<p>This event corresponds to the creation, modification, or deletion of a user role. The <b>Serial Number</b> and <b>Attributes</b> field are always blank.</p>

## Event Types

Event Type	Description
Job	<p>This event corresponds to the creation, modification, or deletion of a job. The <b>Serial Number</b> field is always blank. The <b>Attributes</b> field contains the following values:</p> <ul style="list-style-type: none"> <li>◆ <i>eventMessageIds</i>: Comma separated list of the event IDs that trigger this event</li> <li>◆ <i>wildcardParamName</i>: Name of the job's wildcard parameter. This variable is not provided if the job has no wildcard parameter</li> </ul>
Network element	<p>This event corresponds to the creation, modification, or deletion of a network element. The <b>Serial Number</b> field contains the serial number of the network element. The <b>Attributes</b> field contains the following values:</p> <ul style="list-style-type: none"> <li>◆ <i>manip</i>: IP address used by Intel Deployment Manager to communicate with this network element</li> <li>◆ <i>manport</i>: Port used by Intel Deployment Manager to communicate with this network element</li> <li>◆ <i>isswitch</i>: Equals 'y' if the network element is a switch</li> <li>◆ <i>ISSLB</i>: Equals 'y' if the network element is a server load balancer</li> </ul>
OpScript Output	<p>This event contains one line of output from a running OpScript. If the output was written to standard error, the event kind is <code>error</code>. Otherwise, the event kind is <code>info</code>. The <b>Serial Number</b> and <b>Attributes</b> fields are always blank.</p>
Access Policy	<p>This event corresponds to the creation, modification, or deletion of an access policy. The <b>Serial Number</b> field is always blank. The <b>Attributes</b> field contains the following values:</p> <ul style="list-style-type: none"> <li>◆ <i>resPerms</i>: An integer representing a bit vector of the resource permissions for this access policy</li> <li>◆ <i>opPerms</i>: An integer representing a bit vector of the operation permissions for this access policy</li> </ul>
SLB Template	<p>This event corresponds to the creation, modification, or deletion of a server load balancer template. The <b>Serial Number</b> and <b>Attributes</b> fields are always blank.</p>
SLB Pool	<p>This event corresponds to the creation, modification, or deletion of a server load balancer pool. The <b>Serial Number</b> field contains the serial number of the load balancer. The <b>Attributes</b> field is always blank.</p>

## Event Types

<b>Event Type</b>	<b>Description</b>
User Event	This event corresponds to a user-defined event created by some external process. The contents of this event are determined by this external process.
Intel Deployment Manager License Key	This event corresponds to the creation or deletion of an Intel Deployment Manager license key. The <b>Serial Number</b> and <b>Attributes</b> fields are always blank.

## Generating Lifetimes from Events

For billing generation and other purposes, you might want to recreate resource lifetimes from their associated events. All events associated with a given lifetime are guaranteed to have the same **Type** and **Event-id** fields. However, fetching all events with the same type, and event-ids is not sufficient, since events associated with several non-overlapping lifetimes are returned. This is because the system can reuse the event-id when a lifetime is finished. Therefore, when generating lifetimes from events, you must also carefully examine the **Time** and **Kind** fields of events to avoid mistaking several non-overlapping lifetimes as one long lifetime.

## Custom Log

The Custom Log displays all events, and allows deletion of events available to your login user ID.

To view a list of all events:

1. In the Navigation Area, click **Settings > Custom Log**.
2. The **Custom Log** dialog is displayed. Enter the required fields:
  - **From Date** - Select the day, month and year from the drop-down menu.
  - **To Date** - Select a day, month, and year from the drop-down menu.
3. Click **OK** when finished entering data. You might click **Export** if you want to export the data to a Microsoft Excel spreadsheet.

## Delete Custom Log Entries

To delete events:

1. In the Navigation Area, click **Settings > Custom Log**.
2. Click **Delete**
3. In the **Delete Custom Log Entries** dialog, select a date. Entries before this date are to be deleted.
4. Click **Delete** to delete the entries, or click **Cancel** to cancel this action.





# Server and Server Asset States

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This appendix includes the following topics:

- ◆ “[Server States](#)” on page 190
- ◆ “[Server Asset States](#)” on page 196

All computing devices have states assigned to them to identify their status.

## Server States

Each server has a status and sub-status. Only the status is initially displayed. To see the sub-status, click the server's displayed status to open up a status window. The meaning of this sub-status depends upon the server's status.

The server states in the Intel Deployment Manager environment are categorized as follows:

- ◆ Intermediate Steps during the Startup-Server request.
- ◆ Intermediate Steps in the Shutdown-Server, Reboot-Server, Save-Config Requests. All steps are listed in the order in which they are performed.
- ◆ Server State Errors. By convention, their names start with `Failed`.

The following table describes the server states.

Server States

State ID	Server Status	Description
0	OK	The server is in a valid state. The system has no information on the status of the previous <code>startup</code> , <code>shutdown</code> , <code>reboot</code> , or <code>save</code> . Newly created servers start off with the OK state.
<b>Intermediate Steps during the Startup-Server Request</b>		
2001	BEGINNING START UP	The server has just begin a startup command. This value only occurs for servers with a <code>STARTINGUP</code> status.
2002	GETTING LICENSE	The server is reserving licenses required by its snapshot. This value only occurs for servers with a <code>STARTINGUP</code> status. If the server has a dedicated server asset, it will also wait in this state until it can contact the default controller OS of this server asset.
2003	RESERVING SERVER	The server is allocating a free server asset for its use. This value only occurs for servers with a <code>STARTINGUP</code> status.
2004	MOUNTING HARD DISKS	The system is mounting disks on the server in preparation of the load of the server's Snapshot. This value only occurs for servers with a <code>STARTINGUP</code> status.

## Server States

State ID	Server Status	Description
2005	PREPARING TO LOAD SNAPSHOT	The system is waiting for the server to initiate the load of the server's snapshot. This value only occurs for servers with a STARTINGUP status.
2006	LOADING SNAPSHOT	The system is loading the server's snapshot onto the server's hard disks. The progress of this load will be stored in the <b>status-info</b> field as a percentage. The progress of this load will be displayed in the progress bar of the server's status window as a percentage. The throughput and the percentage complete for the current partition will also be displayed.
2007	BOOTING	The system is booting the server. This value only occurs for servers with a STARTINGUP status.
<b>Intermediate Steps in the Shutdown-Server, Reboot-Server, Save-Config Requests</b>		
2020	BEGINNING SHUT DOWN	The system has just begun a shutdown, reboot, or save command on the server.
2021	PREPARING TO SAVE SNAPSHOT	The system is preparing the server to save a snapshot for a save or shutdown command.
2022	PREPARING TO SHUT DOWN	The system is preparing the server to perform a shutdown.
2023	SAVING SNAPSHOT	The system is saving the server's snapshot. The progress of this save will be stored in the <b>status-info</b> field as a percentage. The progress of this save will be displayed in the progress bar of the server's status window as a percentage. The throughput and the percentage complete for the current partition will also be displayed.
2024	REBOOTING	The system is rebooting the server back into the UP state.
2099	DONE	The system has successfully completed the last startup, shutdown, reboot, or save operation for this server.
<b>Intermediate Steps in the Execute Software Request</b>		

## Server States

State ID	Server Status	Description
2040	RUNNING SOFTWARE	This server is running software
2041	UPLOADING SOFTWARE	This server is uploading a software package.
2098	SOFTWARE DOWN	The system has successfully finished running software.
<b>Servers State Errors</b>		
2100	FAILED: UNKNOWN ERROR	The last command performed on this server failed for some unknown reason. This can be treated as a variant of an internal error. The message of the error will be displayed via the <code>more details</code> link in the status window
2101	FAILED: INTERNAL ERROR	The last command performed on this server failed due to an internal error. Such errors might be due to bugs in the Intel Deployment Manager software. The message of the error will be displayed via the <code>more details</code> link in the status window.
2102	FAILED: NO AVAILABLE SERVER ASSETS	The last startup command performed on this server failed because there are no more available server assets.
2103	FAILED: NETWORK ERROR	The last command performed on this server failed due to a communication error. Such errors are usually due to a hardware failure of one of Intel Deployment Manager's servers.
2104	FAILED: NO AVAILABLE LICENSES	The last start up command performed on this server failed due a lack of available licenses required by the server's snapshot.
2105	FAILED: TOO MANY SERVERS ARE UP	The user's account has too many servers in the UP state to allow any more servers to be started up.
2106	FAILED: COULDN'T START SNAPSHOT LOAD	The last start-up command performed on this server failed because the system could not contact the server to initiate the load of the snapshot.

## Server States

State ID	Server Status	Description
2107	FAILED: BOOT FAILED	The last command performed on this server failed because the system could not contact the server to initiate a boot or reboot operation.
2108	FAILED: COULDN'T CONTACT SERVER AFTER BOOT	The last command performed on this server timed out while waiting for the server to boot or reboot. This usually indicates a failure in the setup of the server's snapshot.
2109	FAILED: SNAPSHOT ALREADY EXISTS	The last save or shutdown command performed on this server failed because it attempted to save a snapshot with the same name as an existing snapshot.
2110	FAILED: COULDN'T START SNAPSHOT SAVE	The last save or shutdown command performed on this server failed because the system could not contact the server to initiate the save of the snapshot.
2111	FAILED: IP ADDRESS IS RESERVED	The last start-up command performed on this server failed because this server has an IP address that is being used by another active server in the same managed network.
2112	FAILED: NO AVAILABLE IP ADDRESSES	The last start-up command performed on this server failed because there are no more available IP addresses to assign to this server.
2113	FAILED: ILLEGAL IP ADDRESS	The last start-up command performed on this server failed because it had an illegal IP address.
2114	FAILED: SYSTEM IS TOO BUSY	The last command performed on this server failed because the system is too busy to initiate another command.
2115	SCRUBBED	The last command performed on this server was aborted by the Intel Deployment Manager system's consistency checker.
2116	FAILED: SERVER ASSET IS NOT POWERED ON	The last command performed on this server failed since the server asset for this server is not in a POWERED ON state.

## Server States

State ID	Server Status	Description
2117	FAILED: SERVER PERSONALIZATION FAILED	An error occurred while trying to personalize the server. Personalization is Intel Deployment Manager's process of injecting IP addresses and other server specific information into a server's snapshot after it is loaded on a server.
2118	FAILED: CANNOT CONTACT SERVER	The Intel Deployment Manager server was unable to contact the server. Make sure that the server is running the ActiveOS software. If it is not, try power cycling the server to get it to load and execute the ActiveOS software.
2119	FAILED: CANNOT ROUTE COMMUNICATIONS TO SERVER	The Intel Deployment Manager server was unable to start up the server because it could not determine a communications route to the server. This is usually due to the fact that the server is not connected to an IP list or a network with a uplink.
2120	FAILED: NO OS DETECTED	The Intel Deployment Manager server was unable to perform the save because it could not determine what OS the custom snapshot should be.
2121	FAILED: IO ERROR	While saving or loading a snapshot, an I/O error occurred.
2122	FAILED: CHECKSUM MISMATCH	The checksum failed while loading a snapshot.
2123	FAILED: CHECKSUM GENERATION	Generating a checksum failed while saving a snapshot.
2124	FAILED: SAVE ERROR	Saving a snapshot failed.
2125	FAILED: LOAD ERROR	Loading a snapshot failed.
2126	FAILED: MBR RESTORE	Restoring the MBR failed while loading a snapshot.
2127	FAILED: STORAGE MOUNT	Failed to access the storage of a snapshot while loading or saving.
2128	FAILED: MBR FIXUP	An error occurred while the MBR was being fixed up after imaging.

## Server States

State ID	Server Status	Description
2129	FAILED: RESTORE BOOT SECTOR	Failed to restore the bootsector while loading a snapshot.
2130	FAILED: SAVE BOOT SECTOR	An error occurred while saving the bootsector.
2131	FAILED: FILE SYSTEM CREATE	An error occurred while creating a filesystem while loading a snapshot.
2132	FAILED: FILE SYSTEM LABELING	Failed to restore a filesystem label while loading a snapshot.
2133	FAILED: READ ONLY FILESYSTEM	Attempted to save a snapshot on a read-only filesystem.
2134	FAILED: OUT OF DISK SPACE	A disk full error occurred while saving a snapshot.
2135	FAILED: PARTITION TABLE SAVE	Failed to save the partition table of the disk.
2136	FAILED: PARTITION TABLE RESTORE	Failed to restore the partition table from the snapshot to the disk.
2137	FAILED: COULDN'T RUN SOFTWARE	An error occurred while trying to execute the software. This can be due to a bad command line argument, a corrupted software file, or a crash during execution of the software.
2138	FAILED: SOFTWARE RETURNED AN ERROR	The given software has completed execution, but returned an error return code. The return code is displayed in the server's status window.
2139	FAILED: SERVER COULD NOT BE CONTACTED AFTER PERSONALIZATION	
2140	FAILED: FILE SYSTEM CHECK	Filesystem needs to be checked with <code>fsck</code> or <code>chkdsk</code> .
2141	FAILED: OUT OF MEMORY	The system being imaged ran out of memory.
2142	FAILED: DISK TOO SMALL	The hard disk was too small to accept the snapshot being loaded.

## Server States

State ID	Server Status	Description
2143	FAILED: REBOOT	Attempt to reboot the server failed.
2144	FAILED: CUSTOM REBOOT	Attempt to reboot using a custom reboot, specified by the user, failed.

## Server Asset States

Each server asset also has a status. You can get more information by clicking the displayed status. This opens a **Server Asset Status** window. Server asset states are categorized as follows:

- ◆ Intermediate Steps for the Save Snapshot request.
- ◆ Intermediate Steps for the Deploy Software request.
- ◆ Last Save or Software execution Errors.

The following table describes the server asset states.

Table 1 Server Asset States

State ID	Server Asset States	Description
0	OK	The server asset is in a valid state. No knowledge is known about the status of the last operation. Newly created server assets are assigned this value.
<b>Intermediate Steps for the Save Snapshot Request</b>		
3001	STARTING SAVE	A <code>Save Snapshot</code> command is just starting on this server asset.
3002	SAVING SNAPSHOT	The progress of this save is displayed in the progress bar of the server's status window as a percentage. The throughput and the percentage complete for the current partition is also displayed.
3003	FINISHING SAVE	A <code>Save Snapshot</code> command has just finished saving the server asset's hard disk contents into a snapshot and the system is now performing some final bookkeeping to commit this save.
3099	SAVE DONE	The last command performed on this server asset was successful.
<b>Intermediate Steps for the Execute Software Request</b>		
3020	RUNNING SOFTWARE	Software is currently running on this server asset.
3021	UPLOADING SOFTWARE	Software is currently being uploaded to this server asset.
3098	SOFTWARE DONE	The last execution of software on this server asset was successful.
3040	UPDATING	The Intel Deployment Manager system is currently updating the server asset.
3097	UPDATE DONE	The update of the server asset is done.
<b>Last Save or Software execution Errors</b>		

Table 1 Server Asset States

State ID	Server Asset States	Description
3100	FAILED: UNKNOWN ERROR	The last Save Snapshot command failed for some reason unknown by the Intel Deployment Manager system. This error can be treated as another kind of internal error. The message of the error is displayed via the <code>more_details</code> link in the server asset status window
3101	FAILED: INTERNAL ERROR	The last Save Snapshot command failed due to some internal error in the Intel Deployment Manager system. This error might indicate there is a bug in the Intel Deployment Manager system software. The message of the error is displayed via the <code>more_details</code> link in the server asset status window
3103	FAILED: NETWORK ERROR	The last Save Snapshot command failed due to some a networking failure between the components of the Intel Deployment Manager system. This error usually indicates a hardware failure somewhere in the Intel Deployment Manager system.
3104	FAILED: SNAPSHOT ALREADY EXISTS	The last Save Snapshot command failed due to the fact that the system already has a snapshot with the same name.
3105	FAILED: COULDN'T START SAVE	The last Save Snapshot command failed due to the fact that the Intel Deployment Manager server was not able to communicate with the agent running on the server asset. This usually indicates that something is wrong with the server asset.
3106	FAILED: STARTUP FAILED	The system could not start up the server asset.
3107	SCRUBBED	The Intel Deployment Manager system's consistency checker found this server in an inconsistent state and has reset it to a consistent state.
3108	NOT RESPONDING	The Intel Deployment Manager system is unable to communicate with the server asset.

Table 1 Server Asset States

State ID	Server Asset States	Description
3109	FAILED: COULDN'T CONTACT SERVER ASSET	The Intel Deployment Manager server was unable to contact the server asset. Make sure that the server asset is running the ActiveOS software. If it is not, try power cycling the server asset to get it to load and execute the ActiveOS software.
3110	FAILED: NO OS DETECTED	The Intel Deployment Manager server was unable to perform the save command because it could not automatically determine the base OS of the snapshot to save.
3111	FAILED: COULDN'T RUN SOFTWARE	An error occurred while trying to execute the software. This can be due to a bad command line argument, a corrupted software file, or a crash during execution of the software.
3112	FAILED: SOFTWARE RETURNED AN ERROR	The software has completed execution but returned an error return code. The return code is displayed in the server asset's status window.
3113	FAILED: IO ERROR	While saving or loading a snapshot, an I/O error occurred.
3114	FAILED: CHECK SUM MISMATCH	The checksum failed while loading a snapshot.
3115	FAILED: CHECK SUM GENERATION	Generating a checksum failed while saving a snapshot.
3116	FAILED: SAVE ERROR	Saving a snapshot failed.
3117	FAILED: LOAD ERROR	Loading a snapshot failed.
3118	FAILED: MBR RESTORE	Restoring the MBR failed while loading a snapshot.
3119	FAILED: STORAGE MOUNT	Failed to access the storage of a snapshot while loading or saving.
3120	FAILED: MBR FIXUP	An error occurred while the MBR was being fixed up after imaging.
3121	FAILED: RESTORE BOOT SECTOR	Failed to restore the bootsector while loading a configuration.

Table 1 Server Asset States

State ID	Server Asset States	Description
3122	FAILED: SAVE BOOT SECTOR	An error occurred while saving the bootsector.
3123	FAILED: FILESYSTEM CREATE	An error occurred while creating a filesystem while loading a snapshot.
3124	FAILED: FILESYSTEM LABELING	Failed to restore a filesystem label while loading a configuration.
3125	FAILED: READ ONLY FILE SYSTEM	Attempted to save a snapshot on a read-only filesystem.
3126	FAILED: OUT OF DISK SPACE	A disk full error occurred while saving a snapshot.
3127	FAILED: PARTITION TABLE SAVE	Failed to save the partition table of the disk.
3128	FAILED: PARTITION TABLE RESTORE	Failed to restore the partition table from the snapshot to the disk.
3129	FAILED: FILE SYSTEM CHECK	Filesystem needs to be checked with <code>fsck</code> or <code>chkdsk</code> .
3130	FAILED: OUT OF MEMORY	The system being imaged ran of memory.
3131	FAILED: DISK TOO SMALL	The hard disk was too small to accept the snapshot being loaded.
3132	FAILED: REBOOT	Attempt to reboot the server failed.
3133	FAILED: CUSTOM REBOOT	Attempt to reboot using a custom reboot, specified by the user, failed.

# Constraints and the Constraints Editor

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**B**

This Appendix includes the following topics:

- ◆ “[Constraints Language](#)” on page 203
  - “[Template Variables](#)” on page 204
- ◆ “[Constraints Editor](#)” on page 204
  - “[Comparing Constraints](#)” on page 207
- ◆ “[Grammar and Semantics for Constraints](#)” on page 212
  - “[Grammar for Constraint Rules](#)” on page 212
  - “[Template Variable Definitions](#)” on page 213
- ◆ “[Operations](#)” on page 215
  - “[Grammar for Attribute Type Definitions](#)” on page 215
- ◆ “[Type of Attributes](#)” on page 216
  - “[Grammar for the Attribute List String](#)” on page 216
  - “[Default Attribute Type Definition String](#)” on page 216
  - “[Attribute List String](#)” on page 216

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Intel Deployment Manager lets you create and manage snapshots and other hardware dependent data. In order to simplify cross-platform verification processes, Intel Deployment Manager defines a constraint system. This constraint system provides the means for you to systematically define the notable attributes of a snapshot, hardware, or any other platform-specific data and the rules that these attributes should follow. Intel Deployment Manager system can then perform a verification process using the attribute and the user defined rule set.

Attributes for an object are created when that object is added to the system. When creating a computing device object; for example, you enter attributes such as the machine architecture, CPU speed, and hard disk size.

A *constraint rule* is a rule written as a character string that describes how attributes describe the object. For example, a snapshot can have the attribute `128 MB OF MEMORY`, because it was saved from a machine with 128 MB of memory. A rule might say that this snapshot is allowed to run on machines, not only those with exactly 128 MB of memory, but also on machines with more memory.

When loading a snapshot onto a computing device or executing software on a server OS, the constraint rules of the two are compared. If the comparison finds that the two are compatible, the operation is allowed to proceed. If, for instance, you request to load a snapshot onto a computing device, the constraint rule for the snapshot is verified against the constraint rule of the computing device. Only on a positive match will the system actually place the snapshot onto the computing device's hard disk.

When entering information for any of the constraint-protected objects (for example, computing devices), included is the constraint rule itself. Often, you might want to write the rule so that it is dependent on other attributes of the object, such as the architecture or chipset of a server system. Without some forethought, you could create a constraint rule where some of the values might have to be entered multiple times, once for the attribute and once for the constraint rule. In order to simplify this process, constraint rule templates can be used. Using a specific syntax, you can write a constraint rule template that refers to other attributes of the object. These values will be substituted when the rule is actually being used in a comparison. This allows you to enter a generic, custom constraint rule without having to enter or update certain values in multiple locations.

## Constraints Language

The constraint rule string is written as a series of attributes, values, and operations on those attributes and values. The basic structure of the rule can be broken down into two parts. First, a constraint is defined by creating a relation using an attribute, value, and an attribute-op triplet (for example,  $A=B$  signifies attribute A, value B, and an attribute-op of equals). Second, constraints are then glued together by a constraint-op (for example,  $A=B \& C=D$  signifies two constraints  $A=B$  and  $C=D$  combined with an  $\&$  constraint-op).

The language is strongly typed. Attributes have a type associated with them that determines how each operation executes. The type system supports integer and string primitives, sets, and arrays, as well as operations on those sets and arrays. The following table describes the properties that can be set in the file `elemental.properties`

### Constraint Properties

Property Name	Description
<code>constraints.types</code>	Attribute type definition string. String that declares the types for all of the valid attributes.
<code>constraints.contexts.all</code>	Attribute list string. A list of attributes that the constraint system recognizes. There is normally one entry here for each type definition.
<code>server.constraints.server.default</code>	The default constraint rule to use for computing devices.
<code>server.constraints.vserver.default</code>	The default constraint rule to use for servers.
<code>server.constraints.dmexec.defaults</code>	The default constraint rule to use for configuration software.
<code>server.constraints.mcode.default</code>	The default constraint rule to use for bootable software.
<code>server.constraints.bmexec.default</code>	The default constraint rule to use for ActiveOS software.
<code>server.constraints.image.default</code>	The default constraint rule to use when saving new snapshots.

The section “Grammar and Semantics for Constraints” on page 212, describes the grammar for the constraint rule string as well as some basic semantic and type information.

## Template Variables

In order to simplify the creation of generic rules, constraint templates are supported. By specifying a constraint value (right-hand side) that corresponds to a constraint variable name (signified by surrounding % symbols), the value of the attribute name will be inserted from the variable. The variable is usually set to an attribute of the object, such as the architecture of a computing device, or some other property that can be inferred, such as the number of hard disks. Each variable corresponds to a field or multiple fields in the computing device, snapshot, or software.

Note that template variables are not true variables in the sense that they can be assigned, or that they can be a part of a larger expression. There are restrictions on their use that prevent you from creating complex expressions. (See “Grammar and Semantics for Constraints” on page 212). They are limited to the right-hand side of the constraint expression and cannot be part of a more complex right-hand side expression.

For snapshots, the template variables are extracted from the computing device from which the snapshot was saved. This behavior allows you to create constraint rules based off of that original computing device.

## Constraints Editor

The **Constraints Editor** enables you to edit the constraints assigned to a specific snapshot or software. This dialog displays each constraint on a separate line. Each line has the following columns: a checkbox, the logical operator, parameter, operator, and value. See the following figure.

## Constraints Editor

**Edit Snapshot : snapshot1**

Basic **Constraints**

Logical Operator	Parameter	Operator	Value
<input type="checkbox"/>	Architecture	equals	Matching Attribute
<input type="checkbox"/> and	Chip Set	equals	Matching Attribute
<input type="checkbox"/> and	Number of hard disks	greater than or equal to	Matching Attribute
<input type="checkbox"/> and	Array of each HD size	greater than or equal to	Matching Attribute
<input type="checkbox"/> and	Array of each HD type	greater than or equal to	Matching Attribute
<input type="checkbox"/> and	OSBase	equals	Matching Attribute
<input type="checkbox"/> and	OSFamily	equals	Matching Attribute
<input type="checkbox"/> and	OSVendor	equals	Matching Attribute
<input type="checkbox"/> and	OSMajorVer	equals	Matching Attribute
<input type="checkbox"/> and	OSMinorVer	equals	Matching Attribute
<input type="checkbox"/> and	OSVerType	equals	Matching Attribute
<input type="checkbox"/> and	OSVerSubType	equals	Matching Attribute

- **Checkbox** - The checkbox is used to add or delete a row. For example, if the checkbox of a row is selected and you click the **Add row(s)** button, a blank row is inserted below the selected row.

If no row is selected and the **Add row(s)** button is clicked, a blank row is added below the last row. Multiple rows can be inserted simultaneously.

- **Logical Operator** - The options for the logical operator are **and** and **or**.
  - Constraint A **and** Constraint B - both should be satisfied.
  - Constraint A **or** Constraint B - any one of the constraints should be satisfied.
  - Constraint A **and** Constraint B **or** Constraint C **and** Constraint D - one of the constraints from C and D should be satisfied and one of the constraints from A and B should be satisfied.
- **Parameter** - The parameter column lists all the constraint key words. The key words are limited on the basis of an object. For example, The component software shows only those constraints that are relevant to it. If you select the user-defined option, a text box replaces the drop down.
- **Operator** - The operator column displays the following operators: **equals**, **less than**, **greater than**, **less than** and **equal to**, **equal to and more than**, and **not equal to**.
- **Value** - The value column has the following options: matching attribute, single value, set of values, and array of values.
  - **Matching Attribute** - A matching attribute indicates that the selected attribute matches completely. If a selected snapshot has a configuration for two hard disks then the machine on which it is loaded should also have two hard disks.
  - **Single Value** - A single value indicates that the selected attribute has a single hardcoded value which becomes a constraint.
  - **Set of Values** - A set of values is an unordered collection of strings or numbers.
  - **Array of Values** - An array of values is an ordered collection of strings or numbers.

If you select single value, set of values, or array of values, an adjacent text box is displayed where you can enter the required values needed to complete that specific row of constraints.

When you click **OK**, the dialog is refreshed and displays the edited constraints. You cannot click **OK** if a row is not completely edited.

To directly edit the constraint string, click on the **Expert** button.

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## Comparing Constraints

Constraints can be applied to servers, computing devices, software, and snapshots. When any of these objects are used, the constraints for the object are compared against the constraints of any other object involved in the operation. If any of the constraints fail to match, an error is generated and the operation is aborted.

A constraint rule is attached to each object and defines how an object's attributes relate to the object itself. To compare if two objects are compatible, the constraint rule for each object is compared to the other. If there exists any values for each attribute that satisfy both constraint rules, the constraint rules are said to match. So, for example, comparing two constraint rules  $A=B$  and  $A<C$ , a comparison would result in a match if (and only if) the inequality  $B < C$  were true.

Integers follow the normal comparisons. Strings are not lexicographically ordered (hereby referred to as unordered strings). This means that given two unequal unordered strings, comparisons dealing with less-than or greater-than operators are defined to be false. This behavior is different than how strings are defined in many other languages, such as C, Java, and Perl.

Sets are unordered and each element is unique (that is, behaves as if it occurs only once in the set). The comparison operators specify set operations, such as subset, strict subset, and others (See “Grammar and Semantics for Constraints” on page 212). Arrays, on the other hand, are ordered and each element might not be unique. The operators do individual comparisons on each array element at each corresponding array index. If the arrays are of different lengths, shorter arrays are defined to be less-than arrays with more items. In either case, each array element is compared up to the length of the shorter array.

The constraint matches only if the operations on each element and the array length (shorter arrays are defined to be less-than longer ones) are verified.

### Examples

In order to provide a clearer view of how constraints rules are created and written, the following examples illustrate some of the common case uses. The following table describes some of the constraints used in the examples.

## Objects and Constraint Rules

Object Type and Name	Constraint Rule applicable to Object
Server Asset A (SA-A)	MBArch=%MBArch%&HDcount=1
Server Asset B (SA-B)	MBArch=sun4u&HDcount=2
Server w/ OS A (S-A)	MBArch=%MBArch%&HDcount=1&OSBase=%OSBase%
Server w/ OS B (S-B)	MBArch=sun4u&HDcount=2&OSBase=redhat6
Software A (MC-A)	MBArch=i686&OSBase=%OSBase%
Software B (MC-B)	MBArch=dlx
Snapshot A (IM-A)	MBArch=%MBArch%&HDcount>=2
Snapshot B (IM-B)	MBArch=i686&HDcount>=1

Note the use of template variables, such as in SA-A, S-A, and IM-A, which use the MBArch variable name as the right-hand side of the MBArch attribute. These are simplified versions of the actual default constraint rules that are used in the system.

### Loading a Snapshot on to a computing device

When placing a snapshot onto a computing device, the computing device's rule and the snapshot's rule are compared. Note that, in the Intel Deployment Manager system, the comparison does not happen when loading, but rather, when provisioning. Executing software (such as a bootable software) on a computing device will go through identical verification steps for the constraints.

- IM-A onto SA-A. This will never match because the attribute HDcount will never match.
- IM-B onto SA-A. The HDcount matches, and MBArch will match only if SA-A's architecture field has set it to an x86 compatible.
- IM-A on SA-B. This will match if the snapshot was saved from a sun4u machine. Remember that the constraint variables for a snapshot come from the computing device from which the snapshot was saved.
- IM-B on SA-B. This will never match because the MBArch fields will never match.

### Executing Software on a Server with an Operating System

The following is an example of running OS dependent software, such as ActiveOS software, on a provisioned target server.

- MC-A on S-A. This will match if the computing device is an x86 compatible and the OS matches. S-A gets its OS from the snapshot that is loaded onto it. MC-A gets its OS from an attribute.
- MC-B on S-A. This will run if the computing device is of type dlx.
- MC-A on S-B, MC-B on S-B. This will never run because the architecture (MBArch) fields mismatch.

### Additional Examples

The following are some additional examples of constraints. The types of the constraint attributes are denoted in the name of the attribute.

#### Additional Examples

Constraint 1	Constraint 2	Matches	Description
INT_A=1	INT_A=1	true	1 equals 1
INT_A=2	INT_A=1	false	2 does not equal 1
INT_A=1& INT_B=2	INT_A=1& INT_B=3	false	2 does not equal 3
INT_A=1	INT_A<3	true	1 is less-than 3
STR_A=abc	STR_A=abc	true	Strings "abc" match
STR_A=abc	STR_A<=cde	false	Strings are unordered.
SET_A={1,2}	SET_A<={0,1,2, 3}	true	{1,2} is a subset of {0,1,2,3}
SET_A={1,2}	SET_A<={2,3}	false	{1,2} is not a subset of {2,3}
ARR_A={1,2}	ARR_A<={2,3}	true	Each element satisfies the <= condition and the arrays are of the same length
ARR_A={1}	ARR_A<={2,3}	true	Each element satisfies the <= condition. The first array is shorter, satisfying the less-than condition.

Intel Deployment Manager supports a strong set of constraint bases analyses for verification purposes. Custom constraints and constraint rules can be created and tailored by you to your own specific needs. In addition, the language supports the use of template strings that reduce the cost of maintenance and the possibility for human error.

## Template Variable Definitions

The following sections list the computing device variables, snapshot variables, provisioned server variables, and software variables.

### Server Asset Variables

<b>Name</b>	<b>Description</b>
<i>MBcpuCount</i>	CPU count
<i>MBavgCpuMhz</i>	CPU speed
<i>MBArch</i>	architecture
<i>MBcset</i>	chip set
<i>MBmem</i>	memory size
<i>MBbiosVer</i>	BIOS version
<i>MBbiosInfo</i>	BIOS Info
<i>MBraidInfo</i>	RAID Info
<i>HDsize</i>	array of each hard disk size
<i>HDtype</i>	array of each hard disk type
<i>HDcount</i>	number of hard disks
<i>CNcount</i>	number of network connections
<i>SYslot</i>	slot
<i>SYlocation</i>	location
<i>SYmanufacturer</i>	manufacturer
<i>SYmodel</i>	model
<i>SYmodelNo</i>	model number
<i>SYserialNo</i>	serial number
<i>SYlicenses</i>	licenses associated with the server asset as a set of strings
<i>EXchassisId</i>	server asset serial number of the parent of this asset

## Snapshot Variables

<b>Name</b>	<b>Description</b>
<i>IMlicenses</i>	licenses associated with an snapshot as a set of strings
<i>OSBase</i>	operating system name
<i>OSFamily</i>	operating system family
<i>OSVendor</i>	operating system vendor
<i>OSMajorVer</i>	operating system major version number
<i>OSMinorVer</i>	operating system minor version number
<i>OSKrnMajorVer</i>	operating system kernel major version number
<i>OSKrnMinorVer</i>	operating system kernel minor version number
<i>OSKrnMicroVer</i>	operating system kernel micro version number

## Provisioned Server Variables

<b>Name</b>	<b>Description</b>
<i>SEhostName</i>	host name of the server
<i>SEinfo</i>	server info field

## Software Variables

<b>Name</b>	<b>Description</b>
<i>MBArch</i>	architecture
<i>OSBase</i>	operating system name
<i>OSFamily</i>	operating system family
<i>OSVendor</i>	operating system vendor
<i>OSMajorVer</i>	operating system major version number
<i>OSMinorVer</i>	operating system minor version number
<i>OSKrnMajorVer</i>	operating system kernel major version number
<i>OSKrnMinorVer</i>	operating system kernel minor version number
<i>OSKrnMicroVer</i>	operating system kernel micro version number
<i>OSBase</i>	operating system name

## Grammar and Semantics for Constraints

The following sections describe:

- grammar and semantics for constraint rules
- template variable definitions

### Grammar for Constraint Rules

```
constraint-rule <- constraint
                | constraint constraint-op constraint-rule

constraint-op   <- '&' | '+'

constraint     <- attribute attribute-op value

attribute      <- id

attribute-op   <- '=' | '<' | '<=' | '>' | '>=' | '!='

value         <- single-value
                | set-value
                | templated-value
                | any-value
                | array-value

single-value   <- id

set-value      <- '{' set-value-list '}'

set-value-list <- single-value
                | single-value ',' set-value-list

array-value    <- set value
templated-value <- '%' id '%'

any-value      <- '%' '*' '%'

id            <- [A-Za-z0-9_]*
                | '\\' (id | [ ])* '\\'
```

## Template Variable Definitions

The following sections list the computing device variables, snapshot variables, provisioned server variables, and software variables.

### Server Asset Variables

<b>Name</b>	<b>Description</b>
<i>MBcpuCount</i>	CPU count
<i>MBavgCpuMhz</i>	CPU speed
<i>MBArch</i>	architecture
<i>MBcset</i>	chip set
<i>MBmem</i>	memory size
<i>MBbiosVer</i>	BIOS version
<i>MBbiosInfo</i>	BIOS Info
<i>MBraidInfo</i>	RAID Info
<i>HDsize</i>	array of each hard disk size
<i>HDtype</i>	array of each hard disk type
<i>HDcount</i>	number of hard disks
<i>CNcount</i>	number of network connections
<i>SYslot</i>	slot
<i>SYlocation</i>	location
<i>SYmanufacturer</i>	manufacturer
<i>SYmodel</i>	model
<i>SYmodelNo</i>	model number
<i>SYserialNo</i>	serial number
<i>SYlicenses</i>	licenses associated with the server asset as a set of strings
<i>EXchassisId</i>	server asset serial number of the parent of this asset

## Snapshot Variables

<b>Name</b>	<b>Description</b>
<i>IMlicenses</i>	licenses associated with an snapshot as a set of strings
<i>OSBase</i>	operating system name
<i>OSFamily</i>	operating system family
<i>OSVendor</i>	operating system vendor
<i>OSMajorVer</i>	operating system major version number
<i>OSMinorVer</i>	operating system minor version number
<i>OSKrnMajorVer</i>	operating system kernel major version number
<i>OSKrnMinorVer</i>	operating system kernel minor version number
<i>OSKrnMicroVer</i>	operating system kernel micro version number

## Provisioned Server Variables

<b>Name</b>	<b>Description</b>
<i>SEhostName</i>	host name of the server
<i>SEinfo</i>	server info field

## Software Variables

<b>Name</b>	<b>Description</b>
<i>MBArch</i>	architecture
<i>OSBase</i>	operating system name
<i>OSFamily</i>	operating system family
<i>OSVendor</i>	operating system vendor
<i>OSMajorVer</i>	operating system major version number
<i>OSMinorVer</i>	operating system minor version number
<i>OSKrnMajorVer</i>	operating system kernel major version number
<i>OSKrnMinorVer</i>	operating system kernel minor version number
<i>OSKrnMicroVer</i>	operating system kernel micro version number
<i>OSBase</i>	operating system name

## Operations

The following table lists the operations used in constraints, in order of precedence.

Operations used in Constraints

Operation	Description
=	Equality or set equality
<	Less than or strict subset
<=	Less than equal or subset
>	Greater than or strict superset
>=	Greater than equal or superset
!=	Not equal or set inequality
&	Intersection
+	Union

### Grammar for Attribute Type Definitions

```

Type-definition      <- attrib-with-type-list

attrib-with-type-list <- attribute-with-type
                       | attribute-with-type ';'
                       attribute-with-type-list

attribute-with-type  <- attribute-name ':' attribute-type

attribute-type       <- [0-9]*

attribute-name       <- id

```

## Type of Attributes

The following table lists the attribute names, values, and descriptions.

Attributes, Values, and Description

Name	Value	Description
Integer	1	Positive numerical value
String	2	Unordered string
Set of Integers	31	Set of unique numerical values
Set of Strings	32	Set of unique strings of characters
Array of Integers	41	Array of numerical values
Array of Strings	42	Array of strings of characters

### Grammar for the Attribute List String

```
attribute-list <- attribute-name  
                | attribute-name ',' attribute-list  
  
attribute-name <- id
```

### Default Attribute Type Definition String

```
MBcpuCount:1;MBavgCpuMhz:1;MBArch:2;MBCset:2;MBmem:1;MBbiosI  
nfo:2;MBraidInfo:2;MBbiosVer:2;SNSig:32;SNlocal:32;SNGlobal:  
32;SNdomain:32;CNcount:1;HDcount:1;HDtotal:1;HDsize:41;HDtyp  
e:42;OSBase:32;OSFamily:2;OSVendor:2;OSMajorVer:1;OSMinorVer  
:1;OSKrnMajorVer:1;OSKrnMinorVer:1;OSKrnMicroVer:2;SYslot:2;  
SYlocation:2;SYmanufacturer:2;SYmodel:2;SYmodelNo:1;SYserial  
No:2;SYlicenses:32;IMlicenses:32;EXmisc:32;EXpool:32;EXchass  
isId:2
```

### Attribute List String

```
MBcpuCount,MBavgCpuMhz,MBArch,MBCset,MBmem,MBbiosInfo,MBraid  
Info,MBbiosVer,SNSig,SNlocal,SNGlobal,SNdomain,CNcount,HDcou  
nt,HDtotal,HDsize,HDtype,OSBase,OSFamily,OSVendor,OSMajorVer  
,OSMinorVer,OSKrnMajorVer,OSKrnMinorVer,OSKrnMicroVer,SYslot  
,SYlocation,SYmanufacturer,SYmodel,SYmodelNo,SYserialNo,SYli  
censes,IMlicenses,EXmisc,EXpool,EXchassisId
```

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