User's Reference

Version 300
Note:
Before using this information and the product it supports, read the information in "Notices".
## Contents

**Chapter 1. Introducing the ServerGuide Scripting Toolkit, Linux Edition**  
Chapter 2. Installing the Linux Scripting Toolkit  
Hardware and software requirements for the source server  
Installing, updating, and removing the Linux Scripting Toolkit  
Starting the Linux Scripting Toolkit console  
Acquiring the IBM Linux pre-installation environment  
Configuring an NFS server for deployments  
Performing initial configuration  

**Chapter 3. Preparing the Linux Scripting Toolkit**  
Acquiring UpdateXpress System Packs  
Adding a new supported system  
Adding a new supported system without Internet connectivity  

**Chapter 4. Getting started**  
Creating tasks  
Modifying tasks  
Creating operating system repositories  
Operating system unattended files  
Creating a workflow from tasks  
Creating bootable media from a workflow  

**Chapter 5. Quick start scenarios**  
Configuring RAID  
Adding an operating system installation  
Adding installation of the IBM Systems Director Agent  

**Chapter 6. Customizing deployments**  
Customizing RAID configuration  
Customizing Fibre Channel configuration  
Customize Advanced Settings Utility  
Customizing firmware updates  

**Chapter 7. Supported hardware and software**  
Operating system support  
RAID controller support  
Fibre Channel HBA support  
Advanced Settings Utility Support  

**Chapter 8. Linux Scripting Toolkit utilities and tools**  
Linux Scripting Toolkit utilities  
HWDETECT  
SAVSTATSH  
PRAID  
IN VR A ID  
VALRAID  
Tools included with the Linux Scripting Toolkit  
Advanced Settings Utility  
SCLI  
LIN LPC FG  
UpdateXpress System Pack Installer  

**Chapter 9. Hints and tips**  
IBM ServerProven compatibility  
Known problems and limitations  

**Appendix A. Getting help and technical assistance**  
Before you call  
Using the documentation  
Getting help and information from the World Wide Web  
Software service and support  
Hardware service and support  

**Appendix B. Notices**  
Edition notice  
Trademarks  
Important notes
Chapter 1. Introducing the ServerGuide Scripting Toolkit, Linux Edition

The ServerGuide Scripting Toolkit, Linux Edition (Linux Scripting Toolkit) enables you to tailor and build custom hardware deployment solutions. It provides hardware configuration and Linux operating system (OS) installation for IBM® System x®, BladeCenter®, and iData-Plex hardware.

The Linux Scripting Toolkit uses a console to simplify the steps in creating, customizing, and deploying hardware configurations and Network Operating System (NOS) deployments. Using the Linux Scripting Toolkit, you can create a bootable ISO image, USB key, or PXE boot image that supports the following types of deployment:

- Policy-based RAID configuration using pRAID
- Cloning of RAID configuration
- Configuration of System settings using the Advanced Settings Utility (ASU)
- Configuration of Fibre Channel Host Bus Adapters (HBAs)
- Firmware updates using the UpdateXpress System Pack Installer (UXSPI)
- UpdateXpress System Pack installation integrated with automated deployment of a Network Operating System (NOS)
- IBM Systems Director Agent installation integrated with automated deployment of a NOS
- Automated deployment of the following Network Operating Systems (NOSs):
  - SUSE Linux Enterprise Server 9 32 bit SP4
  - SUSE Linux Enterprise Server 9 x64 SP4
  - SUSE Linux Enterprise Server 10 32 bit SP1/SP2/SP3/SP4
  - SUSE Linux Enterprise Server 10 x64 SP1/SP2/SP3/SP4
  - SUSE Linux Enterprise Server 11 32 bit Base/SP1
  - SUSE Linux Enterprise Server 11 x64 Base/SP1
  - Red Hat Enterprise Linux 4 AS/ES 32 bit U6/U7/U8
  - Red Hat Enterprise Linux 4 AS/ES x64 U6/U7/U8
  - Red Hat Enterprise Linux 6 32 bit U1
  - Red Hat Enterprise Linux 6 x64
  - VMware ESX Server 3.5 U4/U5
  - VMware ESX Server 4.0/4.0u1/4.0u2/4.1/4.1u1/4.1u2
- Automated post-installation deployment of the following NOSs:
  - Red Hat Enterprise Linux 4 AS/ES 32 bit U9
  - Red Hat Enterprise Linux 4 AS/ES x64 U9
- Automated deployment of the following NOSs in Native uEFI mode:
  - SUSE Linux Enterprise Server 11 SP1
  - Red Hat Enterprise Linux 6 x64
- Remote Supervisor Adapter II (RSA II) and BladeCenter Management Module and Advanced Management Module remote disk scenarios
• Installation of IBM Systems Director Agent integrated with scripted NOS deployment.
• Remote deployment via Integrated Management Module (IMM).
Chapter 2. Installing the Linux Scripting Toolkit

This section explains how to install and start the Linux Scripting Toolkit on the supported operating systems.

This section describes:
- “Hardware and software requirements for the source server”
- “Installing, updating, and removing the Linux Scripting Toolkit” on page 4
- “Performing initial configuration” on page 6
- “Configuring an NFS server for deployments” on page 6

Hardware and software requirements for the source server

This topic lists the hardware and software requirements for the Linux Scripting Toolkit source server.

**Hardware requirements**

The Linux Scripting Toolkit requires a PC-compatible computer with the following attributes to act as a source server:
- 512 MB of memory
- Sufficient disk space to store operating system files, applications, updates, and configuration files

The Linux Scripting Toolkit also requires that the target server on which the deployment is to be executed have at least 1 GB of memory.

**Software requirements**

The Linux Scripting Toolkit source server requires the following software:
- A supported operating system. The following operating systems are supported by the Linux Scripting Toolkit for use as source servers:
  - SuSE Linux Enterprise Server 11
  - SuSE Linux Enterprise Server 10 SP2 or higher
  - Red Hat Enterprise Linux 5 U2 or higher
  - Red Hat Enterprise Linux 6 U1
- Media creation software to burn created ISO images to disc
- Application software:
  - Net File Share
  - Firefox 2.00.14 or higher
- Linux software packages:
  - Python 2.4.2 or higher
  - Python-xml 2.4.2 or higher (for SUSE Linux)
  - NFS-utils 1.0 or higher
Installing, updating, and removing the Linux Scripting Toolkit

This section describes the process for installing, updating, and removing the Linux Scripting Toolkit, and for installing the Boot Media Creator (BoMC).

Installing the Linux Scripting Toolkit

The Linux Scripting Toolkit is available for download from [http://www.ibm.com](http://www.ibm.com). Before installing, you must download the file `ibm_utl_sgtklnx_3.00.noarch.rpm` and make it accessible to the source server.

To install the Linux Scripting Toolkit package for the first time, follow these steps:

2. Open a command line terminal.
3. Change the current directory to the location of the toolkit rpm file.
4. Run the following command:
   ```bash
rpm –ivh ibm_utl_sgtklnx_3.00.noarch.rpm
   ```

   By default, the Linux Scripting Toolkit is installed to `/opt/ibm/sgtk`. To change the path to a different location, use the `-relocate` rpm option. For example, to relocate to `/usr/local/sgtk`:
   ```bash
   rpm -ivh -thaqnrelocate /opt/ibm/sgtk=/usr/local/sgtk ibm_utl_sgtklnx_3.00.noarch.rpm
   ```

Updating the Linux Scripting Toolkit

To update the Linux Scripting Toolkit, follow these steps:

2. Open a command window.
3. Change directory to the location of the rpm file.
4. Issue the following commands:
   ```bash
   rpm -e ibm_utl_sgtklnx
   rpm -ivh ibm_utl_sgtklnx_3.00.noarch.rpm
   ```
5. Start the Linux Scripting Toolkit console: `.\opt\ibm\sgtk\sgtklinux\sgtklinux.sh`

   **Note:** The `rpm -U` option is not supported when updating the Linux Scripting Toolkit. If you have already created boot images such as ISO or PXE images, these images will not be updated during the upgrade process.

Removing the Linux Scripting Toolkit

You can remove the Linux Scripting Toolkit using the following command:

   ```bash
   rpm –e ibm_utl_sgtklnx
   ```

Starting the Linux Scripting Toolkit console

Start the Linux Scripting Toolkit console by invoking the sgtklinux script as shown:

   ```bash
   .\opt\ibm\sgtk\sgtklinux\sgtklinux.sh
   ```

The first time you use the Linux Scripting Toolkit, you enter the initial configuration wizard, which guides you through the process of acquiring the pre-installation environment, repository configuration, and network setup.
For information about valid parameters for sgtklinux.sh, use the --help parameter:
sgtklinux.sh --help.

**Acquiring the IBM Linux pre-installation environment**

The Linux Scripting Toolkit provides a means to acquire the IBM Linux pre-installation environment in the Boot Environment step of the initial configuration wizard during setup. If this method is unable to download the environment, or the source server does not have access to the Internet, you can use this procedure to acquire the pre-installation environment.

**Before you begin**

In order to manually acquire the pre-installation environment, you must have a workstation with access to both the Internet and the Linux Scripting Toolkit source server.

**About this task**

To manually acquire the pre-installation environment, use the IBM ToolsCenter Bootable Media Creator, included with the Linux Scripting Toolkit. This procedure describes the process for running the Bootable Media Creator from a workstation with access to the Internet and copying it to the source server.

**Procedure**

1. Copy the version of ibm_utl_bomc for your Linux distribution and system architecture from /opt/ibm/sgtk/wui/bin to a workstation with access to the IBM web site.

2. On the workstation, run the Bootable Media Creator as shown here.

   ```
   ibm_utl_bomc_3.00_windows_i386.exe --function=linuxtk -l C:\temp
   ```

   The Bootable Media Creator acquires the pre-installation environment zip file, `ibm_utl_boot_tools-140_anyos_x86-64-full.zip` and stores it in the location indicated. In this example the location is C:\temp.

3. Copy the file to a location on the source server, for example:

   ```
   /root/ibm_utl_boot_tools-140_anyos_x86-64-full.zip
   ```

4. Start the console: `/opt/ibm/sgtk/sgtklinux.sh`. When you are prompted for the new boot environment file, choose Local as the retrieval method and insert `/root/ibm_utl_boot_tools-140_anyos_x86-64-full.zip` as the new boot environment file path.

**Updating the IBM Linux pre-installation environment**

Updating the IBM Linux pre-installation environment allows you to use pre-installation environments that have been released since the most current release of the Toolkit.

The Linux Scripting Toolkit provides a means of updating the IBM Linux pre-installation environment in the Main Menu with the Boot Environment option. When you select this option, the window presents the current boot environment file, which is the pre-installation environment, along with the option to update the boot environment file. You can update the file using Download from IBM.com, or Local, from a boot environment file stored on the server. If the Download option fails, see “Acquiring the IBM Linux pre-installation environment” for information on how to get the boot environment file.
Note: You can only use this option to update the boot environment file to a more recent (higher) version. If you need to roll back the boot environment file, you must manually remove newer version and replace it with an older version. By default, the boot environment files are located at: /opt/ibm/sgtk/sgdeploy/sgtklinux/boot/.

Configuring an NFS server for deployments

This section describes the process for configuring the source server for the Linux Scripting Toolkit.

About this task

In order to perform network deployments, you must configure the Network File System (NFS) server on the source server to work properly with the Toolkit. The NFS server allows you to share files from the source server across your network. All NFS server exports must be defined in the /etc/exports file. Follow this procedure to add the values needed by the Toolkit to this file.

Procedure

1. Edit the file /etc/exports. Include the following line:
   /opt/ibm/sgtk/sgdeploy *(ro,sync,no_root_squash,no_all_squash)

   This will export the /opt/ibm/sgtk/sgdeploy directory for any host with read-only permissions. The base directory that you define in the /etc/exports file must correspond to the value in the Preferences page of the Toolkit.

2. Restart the NFS daemon.
   - For Red Hat:
     # /sbin/service nfs restart
   - For SUSE:
     # service nfsserver restart

Results

The files in the base directory are now available for use by hosts across your network.

Performing initial configuration

This section describes how to use the Initial Configuration wizard to set the console preferences the first time you use the Toolkit.

About this task

The first time you start the Toolkit, you are presented with the Initial configuration page. You can also edit this configuration at any time by clicking Toolkit Preferences from the main menu.

To configure the Toolkit, follow these steps.

Procedure

1. Start the Toolkit by following these steps:
   a. Open a terminal window.
   b. Change directory to /opt/ibm/sgtk/.
c. Run the following command: ./sgtklinux.sh. This will launch the Linux Scripting Toolkit Console, using the Firefox browser. If this is the first time that you have started the Toolkit, you will be presented with the Initial Configuration wizard.

2. Select the method for retrieving the boot environment file and click Next. You can choose to download the boot environment file or to use a locally stored version. The default is Download. If you select Local, you must supply the location of the local boot environment file (ibm_utl_boot_tools-xxx_anyos_x86-64-full.zip), where xxx is the version number.

3. Configure the current repository for tasks and workflows. Select Create to create a new repository. This is the default. When you create a new repository, you are prompted for a destination for the repository. This is the directory that will be exported when following the steps in "Configuring an NFS server for deployments" on page 6.

   To use an existing repository, select Re-use an existing repository and select the repository.

4. Set the network preferences. You must set network preferences in order to perform network deployments. Configure the following settings

   **Network sharing**
   
   must be enabled to perform network deployments. Enabling Network sharing populates the current network settings.

   By default, the Path field contains the same path you provided when creating the new repository. This must also be the same path used in "Configuring an NFS server for deployments" on page 6.

   NFS is the only supported protocol.

   **Proxy settings**
   
   If you connect to the network via proxy, enter your proxy settings here.

   **PXE settings**
   
   Enter the location information that the target servers will use to boot using PXE images. The default location is /tftpboot.

5. Click Next to apply your settings.

6. Click Finish to complete the wizard and return to the home screen.

Results

After you have completed these steps, you can begin using the Toolkit. You can change these selections at any time by selecting Toolkit Preferences from the main menu.

What to do next

After you have configured the Toolkit, you can configure an NFS server to share the files in the repository required to perform network deployments using the Toolkit.
Chapter 3. Preparing the Linux Scripting Toolkit

Before you begin using the Linux Scripting Toolkit to create deployments, you should acquire the latest firmware updates and determine the location of operating system and post-installation files that will be required by the deployments. This section lists the files and information you will need, and describes the process for acquiring them.

To create deployments using the Linux Scripting Toolkit, you must have the following:

• The location of the IBM Systems Director Agent files, if the deployment includes installation of the IBM Systems Director Agent. You can download these files from the following locations:

• The location of the operating system files to be used in the deployment, if the deployment includes operating system installation.

• The latest UpdateXpress System Pack (UXSP), to ensure that the operating system installation includes the most recent firmware and driver updates. "Acquiring UpdateXpress System Packs" describes the process for using the Linux Scripting Toolkit to acquire these updates.

• System Enablement Packs (SEPs) add support for new machine types. See "Adding a new supported system" on page 10 for information on using the Linux Scripting Toolkit to acquire SEPs.

Acquiring UpdateXpress System Packs

To ensure that the operating system files used in your deployments include the latest driver and firmware updates, you must acquire UpdateXpress System Packs (UXSPs). Use the Updates task to retrieve UXSPs. These updates are deployed during the Update firmware task.

UpdateXpress System Packs are integration-tested bundles of firmware and device driver updates for System x and BladeCenter servers. The Updates task helps you obtain the latest UXSPs for your systems. You can download new UXSPs from IBM.com, or if your source server is not connected to the Internet, you can acquire the updates manually and use this task to add them to your repository.

Follow these steps to complete the Updates task:

1. From the main menu, click Updates.
2. Click Acquire new UXSPs to begin.
3. From the Source media section, select a source:
   • Acquire from IBM website
   • Acquire from local folder - if you choose this option, you must provide the path to the local folder. The path is case-sensitive.

and click Next.
4. In the Systems section, select the systems for which you want to acquire updates from the Available options list and click Add selected to add them to the Chosen options list.

5. In the Categories section, check the Download firmware updates for the following systems box, and then click Next.

6. In the OS section, select the operating systems being used by the servers you selected and click Add selected to add them to the Chosen options list, then click Next.

7. The Summary section displays a summary of the chosen options. Click Finish to begin downloading. You can view the process using the Running Tasks option in the menu.

8. When the download is complete, click Updates to view the list of UXSPs.

Note: These versions of UpdateXpress System Pack Installer (UXSPI) are no longer included in the Linux Scripting Toolkit:
- uxspiyyy.rhel3
- uxspiyyy.rhel4
- uxspiyyy.sles9
- uxspiyyy.exe

If you are using an operating system supported by these versions of the installer, you must acquire the appropriate UpdateXpress System Pack Installer when acquiring UpdateXpress System Packs.

Adding a new supported system

You can add new supported systems using System Enablement Packs (SEPs). SEPs contain the files necessary to add support for systems that have been released since the current release of the Linux Scripting Toolkit. Use the Supported Systems task to retrieve SEPs, allowing you to create deployments for new machine types.

System Enablement Packs (SEPs) are integration-tested bundles of updates for ToolsCenter tools that are used to add new machine types support for System x and BladeCenter servers. The Supported Systems task helps you acquire the latest SEPs for your systems. You can download new SEPs from IBM.com, or if your source server is not connected to the Internet, you can acquire the updates manually and use this task to add them to your repository.

Follow these steps to complete the Supported Systems task:

1. From the main menu, click Supported Systems.
2. Click Acquire new SEPs to begin.
3. Enter a machine type for which to acquire SEPs. For example, 7979.
4. From the Source media section, select a source:
   - Acquire from IBM website
   - Acquire from local folder - if you choose this option, you must provide the path to the local folder. The path is case-sensitive.

   and click Next.
5. The Summary section displays a summary of the chosen options. Click Finish to begin downloading. You can view the process using the Running Tasks option in the menu.
6. When the download is complete, click Supported Systems to view the list of supported systems.
Adding a new supported system without Internet connectivity

System Enablement Packs (SEPs) allow you to add support for hardware released after the current release of the ServerGuide Scripting Toolkit, Linux Edition. This section describes the process for adding SEPs to the Toolkit Source Server when the server does not have Internet connectivity.

Before you begin

If the Linux Scripting Toolkit Source Server is not connected to the Web, use the following procedure to acquire SEPs.

Procedure
1. Copy the file septool zip file (win_septoolxxx.zip, where xxx is the version number of the tool) from the Toolkit Source Server to a system with Internet connectivity. The default location for this file is /opt/ibm/sgtk/wui/bin/windows/.
2. On the system where you have copied the zip file, extract all of the files in the archive.
3. From the directory where you extracted the zip file, run the following command to acquire the SEP and save it in C:\temp:

   septoolxxx.exe acquire -l C:\temp -m machine_type -o none -a x64

   where xxx is the version of the septool and machine_type is the machine type of the system for which you want to download SEPs.
4. Copy the files from C:\temp and place them in the updates folder of the Linux Scripting Toolkit directory tree. The default location is /opt/ibm/sgtk/sgdeploy/updates/uxsp.
Chapter 4. Getting started

This section describes the use of tasks and workflows in the ServerGuide Scripting Toolkit, Linux Edition to create deployment images.

The Linux Scripting Toolkit creates deployment images based on workflows. A workflow is an aggregation of supported tasks. After you have created a workflow, you create an image based on a boot media profile. The files used by the deployment can be bundled locally on the deployment media or accessed over your network using a repository shared through NFS.

At a high level, the process for using the Toolkit is:
1. Create new tasks, modify existing tasks, or use the tasks provided.
2. Create a workflow.
3. Add your tasks to the workflow.
4. Select a boot media profile to deploy your workflow.
5. Create a deployment image.
6. Boot the target server using the deployment image.

When you boot the target server, the workflow is executed to perform the tasks that you included.

The Linux Scripting Toolkit Console enables you to create and modify tasks, create workflows from your task libraries, and create deployment images from your workflows. The following topics describe how to perform these tasks.

Creating tasks

The Linux Scripting Toolkit provides tasks to perform all of its supported functions. You can use these tasks as they are, or you can create new tasks. This topic describes the process for creating new tasks.

Before you begin

Before creating a new task, you should gather the information required to complete the task. This includes system settings, controller information, and available firmware updates for pre-installation tasks, the location of the operating system files and filename of the answer file for operating system deployment tasks, and the location of the IBM Systems Director Agent for post-installation tasks.

About this task

You create new tasks using an existing task as a template. The Toolkit provides preconfigured tasks for the supported task types. You cannot create tasks of a type not supported by the Toolkit.

Procedure

1. Start the Linux Scripting Toolkit Console: 

   ```bash
   /opt/ibm/sgtk/sgtklinux.sh
   ```

2. Select the type of task you want to create from the Tasks section of the navigation menu.

3. Click Create.
4. Enter the name of your new task.
5. Select the template that will be the base of your new task.
6. Click Create.

**What to do next**

The new task is displayed in the task repository. You can now select the task for editing.

---

**Modifying tasks**

You can modify tasks that you have created in order to customize them for your deployment. Follow these steps to modify existing user-created tasks.

**About this task**

The Linux Scripting Toolkit provides sample tasks for all supported task types. You cannot modify or delete these tasks. In order to edit a provided task, you must first create a new task using an existing task as a template. You can then edit the new task.

**Procedure**

1. Start the Linux Scripting Toolkit Console: 
   `/opt/ibm/sgtk/sgtklinux.sh`
2. Select the type of task you want to edit from the navigation menu.
3. Select the task you want to edit.
4. Click Modify.
5. Make the necessary changes.
6. Click Apply.

**Results**

The edited task is available from the task library.

---

**Creating operating system repositories**

Operating system repositories are used to control what Linux distributions are available for use in deployment workflows. This section describes the fields and controls available for the OS repositories task.

The OS images tab allows you to create, modify, or delete operating system repositories. You must create an operating system repository on the OS images tab before you can use it in a workflow.

The OS images tab displays information about the current repositories in the OS repositories table.

**Creating an OS repository**

To create an operating system repository, you must acquire the files that will be in the repository and store them in a location that is accessible to the Source Server.

When you have acquired and stored the files, follow these steps to create an OS repository:
1. On the **OS images** tab click **Create** to open the OS repository configuration window.

2. In the OS repository creation settings window, complete the following fields in the **Repository**:

   **Name**  The name by which you will refer to this repository. This is the name that you will use to include the repository in a workflow

   **Distribution**  From this dropdown list, select the Linux distribution to be included in this repository. If a distribution is not in the list, it is not supported by the Linux Scripting Toolkit.

   **Source**  The source for the distribution files. Select one of the following:

   - **Optical disks**  Indicates that the files are on a CD or DVD.
   - **Network**  Indicates the network protocol to use when accessing the distribution. Valid values are nfs, ftp, or http. The default is nfs.
   - **ISO images**  The path to the distribution files on the source server. After inserting the location of the ISO images, click **List** to show all available ISO images.

When you have saved your selections, the **OS images** tab adds the new repository to the repositories table.

---

### Operating system unattended files

Operating system unattended files allow you to perform unattended installation of supported Linux distributions. The **OS Installation Tasks** tab lets you manage these files.

The **OS Installation Tasks** tab lists the available unattended files for operating system installation. The Linux Scripting Toolkit includes unattended installation files for all of the supported operating systems, shown in [Table 1]. These files cannot be modified, but you can use them as a template for a new task using the **Create** option to create an unattended installation file for your scenarios. [Table 1] lists the unattended installation files supplied with the Linux Scripting Toolkit and the operating systems to which they apply.

The Linux Scripting Toolkit provides answer files for native uEFI mode deployments of SLES 11 x64 and RHEL 6 x64. The unattended file determines whether the installation performed is a native uEFI installation or a legacy installation. The answer files for native uEFI installations are noted in *Unattended installation files supplied with the Linux Scripting Toolkit*. If you want to customize installation files for uEFI installation, you must ensure that the file contains an entry for `/boot/efi`. This entry can be commented out, but must remain visible in the file.

### Table 1. Unattended installation files supplied with the Linux Scripting Toolkit

<table>
<thead>
<tr>
<th>Filename</th>
<th>Operating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>rhel4.ks</td>
<td>Red Hat Enterprise Linux 4</td>
</tr>
<tr>
<td>rhel5.ks</td>
<td>Red Hat Enterprise Linux 5</td>
</tr>
</tbody>
</table>
Table 1. Unattended installation files supplied with the Linux Scripting Toolkit (continued)

<table>
<thead>
<tr>
<th>Filename</th>
<th>Operating system</th>
</tr>
</thead>
<tbody>
<tr>
<td>rhel5_xen.ks</td>
<td>Red Hat Enterprise Linux 5 with Xen</td>
</tr>
<tr>
<td>rhel6.ks</td>
<td>Red Hat Enterprise Linux 6</td>
</tr>
<tr>
<td>rhel6_efi.ks</td>
<td>Red Hat Enterprise Linux 6 in native uEFI mode</td>
</tr>
<tr>
<td>sles9.xml</td>
<td>SUSE Linux Enterprise Server 9</td>
</tr>
<tr>
<td>sles10.xml</td>
<td>SUSE Linux Enterprise Server 10</td>
</tr>
<tr>
<td>sles10x64.xml</td>
<td>SUSE Linux Enterprise Server 10 x64</td>
</tr>
<tr>
<td>sles10_xen.xml</td>
<td>SUSE Linux Enterprise Server 10 with Xen</td>
</tr>
<tr>
<td>sles10x64_xen.xml</td>
<td>SUSE Linux Enterprise Server 10 x64 with Xen</td>
</tr>
<tr>
<td>sles11.xml</td>
<td>SUSE Linux Enterprise Server 11</td>
</tr>
<tr>
<td>sles11_xen.xml</td>
<td>SUSE Linux Enterprise Server 11 with Xen</td>
</tr>
<tr>
<td>sles11x64.xml</td>
<td>SUSE Linux Enterprise Server 11 x64</td>
</tr>
<tr>
<td>sles11x64_efi.xml</td>
<td>SUSE Linux Enterprise Server 11 x64 in uEFI mode</td>
</tr>
<tr>
<td>sles11x64_xen.xml</td>
<td>SUSE Linux Enterprise Server 11 x64 with Xen</td>
</tr>
<tr>
<td>esx3.ks</td>
<td>VMware ESX 3.5</td>
</tr>
<tr>
<td>esx4.ks</td>
<td>VMware ESX 4</td>
</tr>
</tbody>
</table>

The OS Installation Tasks tab supports these actions:

**View** Opens a window displaying the contents of the selected file. You cannot modify the file from this window.

**Create** Opens the Create window. This window prompts you for a name for the new file and provides a list of the available files that can be used as templates when creating a new file.

**Modify**

Allows you to modify the contents of the selected file. Note that this option is not available for the unattended installation files supplied with the Linux Scripting Toolkit. If you want to customize these files, you must create a new file based on the supplied file using the Create option.

**Delete** Prompts for confirmation, then deletes the selected file. Note that this option is not available for the unattended installation files supplied with the Linux Scripting Toolkit. Only user-created tasks can be deleted.

**Creating a workflow from tasks**

After you have created and modified tasks and created repositories for operating system installation files, combine them into a workflow. Follow these steps to create a workflow.

**Before you begin**

Before you can create a workflow, the tasks, operating system repositories, and unattended answer files to be included in the workflow must exist. The Linux Scripting Toolkit includes preconfigured tasks for all supported task types. You can
use these to create workflows without having to create your own tasks.

**Procedure**

1. Start the console by executing the following command: `./opt/ibm/sgtk/sgtklinux.sh`.
2. Select **Workflows** from the main menu.
3. Click **Create** from the Workflows panel to open the **General** section for workflow creation.
4. Enter a name for the workflow you are creating.

   **Note:** After you have created a workflow, you can use it as the base for creating new workflows by using the **Based on a Template** option.

5. Select the level for **Log verbosity**. The verbosity options are:
   - **Low** logs basic execution information and provides an overview of the steps being executed.
   - **Medium** adds more detailed execution information and provides a more detailed view of the steps being executed.
   - **High** adds logging of the commands being executed, their output, and the exit code returned.
   - **Full** adds some source code trace information.
6. Click **Next** to proceed to the pre-installation section.
7. Select the types of pre-installation tasks to be run as part of this workflow, then select the task for each type from the drop down list, or check the **Skip this step and do not perform any pre-installation tasks** box to skip pre-installation.
8. Click **Next** to proceed to the operating system installation section.
9. Deselect the **Skip this step** checkbox.
10. Select the operating system repository from the list.
11. Select the answer file to use from the **OS unattended file** drop down list.
12. Click **Next** to proceed to the post installation section.
13. Select the post installation tasks to be performed as part of this workflow, or check the **Skip this step and do not perform any post-installation tasks**
14. Click **Next** to review your selections.
15. When your selections are correct, click **Finish** to save the workflow.

**Results**

The workflow is saved, and is available from the workflow list.

**What to do next**

Now you can use this workflow to create boot media.

---

**Creating bootable media from a workflow**

In order to deploy a workflow to a target server, you must create bootable media. Follow these steps to create a deployment image on boot media.
Before you begin

Before you can create boot media, you must have created a workflow to be deployed on the boot media.

Procedure

1. Select **Bootable Media Profiles** from the main menu.
2. Click **Create** to create a boot media profile.
3. Enter a name for the profile.
4. Select a workflow to be deployed on the boot media from the drop down list.
5. Select a boot method from the drop down list. Supported methods are:
   - **USB** - creates a boot image that is deployable from a USB key.
   - **ISO** - creates an ISO image that can be burned to a CD or DVD for deployment.
   - **PXE** - creates a boot image that can be deployed from a network share.
6. Click **Next** to proceed to the bundling options.
7. Select a bundling option for the files.
   - **Leave files in network share** will create boot media that does not include the deployment files. This option requires network connectivity with the network share on the source server.
   - **Bundle files in the boot media** will add the files to the boot media. No network connectivity is required for this deployment.

   **Note:** Regardless of the option you select, operating system files are always left on the network share. This means that connectivity with the network share on the source server is always required for operating system deployment.

8. Click **Next** to select TCP/IP configuration options for the target server. If you want to use a static network configuration for the target server, enter the configuration information on this panel
9. Click **Next** to select the machine types for this deployment.
10. Click **Next**. If all of the required UXSPs and SEPs are available, or if you did not elect to validate their availability, you are given the opportunity to review your selections.
11. When the selections are correct, click **Create Boot Media** to begin creating the media. When prompted, provide the path information for the media you selected.

Results

The boot media you selected is created.

What to do next

Boot your target server from this media to execute the deployment.
Chapter 5. Quick start scenarios

This section describes a set of scenarios that you can use as examples for creating your own workflows. Each scenario builds on the previous one to give examples of pre-installation, operating system installation, and post installation tasks.

This section provides examples of how to create a boot media to perform the following tasks:
- Perform default RAID configuration
- Perform default RAID configuration and install Red Hat Enterprise Linux (RHEL) 5.3.
- Perform default RAID configuration, install Red Hat Enterprise Linux (RHEL) 5.3, and install the IBM Systems Director Agent.

Configuring RAID

This topic tells you how to create boot media to perform default RAID configuration on the target server. You can use this process to create boot media to perform any supported pre-installation task.

About this task

This example uses the default RAID configuration task provided by the Linux Scripting Toolkit. You can replace this RAID configuration task with any of the included RAID configuration tasks, or create your own RAID configuration task by creating a RAID configuration file and creating a job to deploy it. For information on creating RAID configuration files, see "PRAID" on page 39.

Procedure

1. Create a workflow using the default RAID configuration task:
   a. Select Workflows from the main menu.
   b. Select Create from the Workflows menu.
   c. In the What's the name of the new workflow? field, enter default_raid_configuration.
   d. In the pre-installation section of the workflow, select the RAID checkbox, and select the Default task from the drop down list.
   e. Click Next to proceed through the wizard.
   f. Select the Skip this step... checkboxes for the OS install and Post-install sections.
   g. Review your selections and click Finish when you have completed the wizard.

The workflow is created and available in the Workflows list.

2. Create a Bootable Media Profile to deploy the new workflow:
   a. Select Bootable Media Profiles from the main menu.
   b. Select Create from the Boot Media Creation menu.
   c. In the What's the name of the new Boot Media Profile? enter usb_local_default_raid_configuration.
   d. From the Boot method drop down list, select USB.
e. Click Next.
f. From the Source medias menu, select Bundle files in the boot media and click Next. This will place all of the files necessary for this deployment on the boot media.

   Note: Operating system files are not bundled on the bootable media, regardless of this setting.

  g. From the Target system IP settings menu, select Configure network using a DHCP server and click Next.
  h. Click Next to continue through the Select the machine models panel - this panel is used for firmware update tasks and operating system installations.
  i. Review your selections, and when they are correct, click Create Boot Media.
  j. When prompted, enter the path to the USB key you want to use to hold your deployment image.

   The boot media is created and ready for deployment.

   Note: When the boot media is a USB key that has not previously been formatted by the Linux Scripting Toolkit, the Toolkit formats the key and adds the necessary files. All other information on the key will be lost.

3. Boot the target system using the boot media to complete the deployment.

---

Adding an operating system installation

This example builds on the example of creating a local USB deployment of the default RAID configuration by adding installation of Red Hat Enterprise Linux 5.3 x64 to your deployment, and performing the deployment over the network.

Before you begin

This task requires you to have created an operating system repository and unattended answer file for Red Hat Enterprise Linux 5.3 x64, as described previously. This example uses the name rhel_53_x64 and the default answer file for Red Hat Enterprise Linux 5.3 x64 provided by the Linux Scripting Toolkit.

About this task

Because operating system installation files are not bundled on the boot media, this example takes advantage of the need for connectivity with the network share to place the PXE boot image on the network share as well. This allows you to boot multiple servers from the same network share, making it easier to perform deployments for geographically distributed systems.

Procedure

1. Create a workflow using the default RAID configuration task and an operating system repository and answer file for Red Hat Enterprise Linux 5.3 x64:
   a. Select Workflows from the main menu.
   b. Select Create from the Workflows menu.
   c. In the What's the name of the new workflow? field, enter default_raid_rhel5.
   d. In the pre-installation section of the workflow, select the RAID checkbox, and select the Default task from the drop down list.
   e. Click Next to proceed to the OS install section.
f. Select the operating system repository for Red Hat Enterprise Linux 5.3 x64 from the Operating System repositories drop down list.

g. Select rhel5 from the OS unattended files drop down list and click Next

h. Select the Skip this step... checkbox for the Post-install section.

i. Review your selections and click Finish when you have completed the wizard.

The workflow is created and available in the Workflows list.

2. Create a Bootable Media Profile to deploy the new workflow:

a. Select Bootable Media Profile from the main menu.

b. Select Create from the Bootable Media Profile menu.

c. In the What's the name of the new Boot Media Profile? enter network_default_raid_rhel53x64.

d. From the Boot method drop down list, select PXE.

e. Click Next.

f. From the Source medias menu, select Leave files in network share and click Next. This will place the PXE boot image on the network share used by the source server.

g. From the Target system IP settings menu, select Configure network using a DHCP server and click Next.

h. Select the system models for deployment from the Select the machine models panel, and select the checkbox to check the updates repository for the UXSPs for the selected servers.

i. Click Next to check the repository for the necessary UXSPs. If any are missing, acquire them.

j. Review your selections, and when they are correct, click Create Boot Media.

k. When prompted, enter the path to place the generated files to be used to boot from PXE.

The boot media is created and ready for deployment.

3. Boot the target system using the boot media to complete the deployment.

Results

When the target system boots from the media:

1. RAID configuration runs:
   - If RAID is not already configured, a new RAID array is created and the system is rebooted. When the reboot occurs, ensure that the system returns to the boot media, either by specifying it in the boot order or using F12 to set it in the boot menu.
   - If RAID is already configured, the RAID configuration task is skipped.

2. The operating system installation task runs.

---

Adding installation of the IBM Systems Director Agent

This example builds on the example of creating a network deployment of default RAID configuration and Red Hat Enterprise Linux 5.3 x64 by adding installation of the IBM Systems Director Agent to your network deployment.
Before you begin

This task requires you to have created an operating system repository and unattended answer file for Red Hat Enterprise Linux 5.3 x64, as described previously. This example uses the default answer file for Red Hat Enterprise Linux 5.3 x64 provided by the Linux Scripting Toolkit. This example also requires you to have the IBM Systems Director Agent files available to the source server. You can download the IBM Systems Director from [http://www.ibm.com/systems/management/director/downloads/](http://www.ibm.com/systems/management/director/downloads/).

Note: This download requires registration with IBM.com.

About this task

Because operating system installation files are not bundled on the boot media, this example takes advantage of the need for connectivity with the network share to place the PXE boot image on the network share as well. This allows you to boot multiple servers from the same network share, making it easier to perform deployments for geographically distributed systems.

This example builds on the example of creating a network bundled deployment media for default RAID configuration and installation of Red Hat Enterprise Linux 5.3 x64, adding post installation of the IBM Systems Director Agent. The deployment media generated from this example is used to start the Linux Toolkit processes and the files used for configuration and deployments are located on the network.

Procedure

1. Create a workflow using the default RAID configuration task, an operating system repository and answer file for Red Hat Enterprise Linux 5.3 x64, and a post-install task to install the IBM Systems Director Agent:
   a. Select Workflows from the main menu.
   b. Select Create from the Workflows menu.
   c. In the What's the name of the new workflow? field, enter `default_raid_rhel5`.
   d. In the pre-installation section of the workflow, select the RAID checkbox, and select the Default task from the drop down list.
   e. Click Next to proceed to the OS install section.
   f. Select the operating system repository for Red Hat Enterprise Linux 5.3 x64 from the Operating System repositories drop down list.
   g. Select `rhel5` from the OS unattended files drop down list and click Next.
   h. Select the checkbox for Install IBM Director and select the correct task from the drop down list.
   i. Review your selections and click Finish when you have completed the wizard.

   The workflow is created and available in the Workflows list.

2. Create a Bootable Media Profile to deploy the new workflow:
   a. Select Bootable Media Profile from the main menu.
   b. Select Create from the Bootable Media Profile menu.
   c. In the What's the name of the new Boot Media Profile? enter `network_default_raid_rhel53x64_diragent`.
   d. From the Boot method drop down list, select ISO.
e. Click Next.

f. From the Source medias menu, select Leave files in network share and click Next. This will place the PXE boot image on the network share used by the source server.

g. From the Target system IP settings menu, select Configure network using a DHCP server and click Next.

h. Select the system models for deployment from the Select the machine models panel, and select the checkbox to check the updates repository for the UXSPs for the selected servers.

i. Click Next to check the repository for the necessary UXSPs. If any are missing, acquire them.

j. Review your selections, and when they are correct, click Create Boot Media.

k. When prompted, enter the path to the directory where the CD/DVD ISO image will be created.

The boot media is created and ready for deployment.

3. Boot the target system using the boot media to complete the deployment.
Chapter 6. Customizing deployments

This section gives you information on how to customize the tools used by the Linux Scripting Toolkit to perform the tasks included in a deployment.

The Linux Scripting Toolkit allows you to customize these types of jobs:
- RAID
- Fibre Channel
- Advanced Settings Utility
- Firmware update

Customizing RAID configuration

Before installing the operating system, you must configure RAID for the target system. This pre-installation task will perform any default RAID or custom RAID that the user desires. This task is used to view, create, delete, and modify RAID policy files.

The Linux Scripting Toolkit provides sample RAID policy files to perform common RAID configurations. You can view these policy files on the RAID tab of the Pre-installation tasks. You can use these samples as a base to create new policy files if they are required. For more information on creating policy files, see "PRAID" on page 39.

Customizing Fibre Channel configuration

Before you install the operating system, you can configure a Fibre Host Bus Adapter to boot from Storage Area Network (SAN). After configuration, it is possible to install an operating system to the SAN. The Toolkit provides a sample fibre policy file which can be used for fibre configuration deployment.

You can use Linux Scripting Toolkit variables to customize the configuration of Fibre HBAs on the target system, allowing them to boot from SAN targets.

By default, the Linux Scripting Toolkit will configure the first HBA on the system to boot from the first available SAN target (for QLogic Fibre HBAs only. See "Known problems and limitations" on page 76 for limitations concerning Emulex Fibre HBAs). The BIOS configures the first disk drive that it finds that is also a LUN 0 as a boot device. The Linux Scripting Toolkit uses the following variables to configure Fibre HBAs.

Note: Please note that while some examples are broken across multiple lines for formatting reasons, when using these settings, you must include all the information for each variable on a single line.
Table 2. Fibre HBA boot configuration variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK_FIBRE_COUNT</td>
<td>Specifies the number of HBA ports to configure.</td>
</tr>
<tr>
<td></td>
<td>Valid values are 1–n, where n is the number of HBA ports available.</td>
</tr>
<tr>
<td></td>
<td>This variable affects the use of the following variables:</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_HBA_ID</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_BOOT_DISABLE</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_BOOT_PRIM</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_BOOT_ALT1</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_BOOT_ALT2</td>
</tr>
<tr>
<td></td>
<td>• TK_FIBRE_N_BOOT_ALT3</td>
</tr>
<tr>
<td></td>
<td>Where N is the HBA number to be configured.</td>
</tr>
<tr>
<td></td>
<td>Note: You must complete one of each of these variables for every HBA port</td>
</tr>
<tr>
<td></td>
<td>you configure. So if TK_FIBRE_COUNT=2, you must complete one set of these</td>
</tr>
<tr>
<td></td>
<td>variables for the first port and one for the second.</td>
</tr>
<tr>
<td>TK_FIBRE_N_HBA_ID</td>
<td>Identifies the Qlogic HBA to be configured, where N is the HBA number</td>
</tr>
<tr>
<td></td>
<td>to be configured.</td>
</tr>
<tr>
<td></td>
<td>Valid values are:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>hba_instance</td>
<td>the instance number of an HBA port. Valid values are integers from 0 to n-1,</td>
</tr>
<tr>
<td></td>
<td>where n is the number of HBAs in the system.</td>
</tr>
<tr>
<td></td>
<td>For example, to configure HBA instance 0:</td>
</tr>
<tr>
<td></td>
<td>TK_FIBRE_1_HBA_ID=0</td>
</tr>
<tr>
<td>hba_wwpn</td>
<td>the World Wide Port Name of an HBA port, in the format xx-xx-xx-xx-xx-xx-</td>
</tr>
<tr>
<td></td>
<td>xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxxxxxx.</td>
</tr>
<tr>
<td></td>
<td>For example, to configure HBA:</td>
</tr>
<tr>
<td></td>
<td>90-87-AA-BB-65-34-BB-E0</td>
</tr>
<tr>
<td></td>
<td>TK_FIBRE_1_HBA_ID=1</td>
</tr>
<tr>
<td></td>
<td>TK_FIBRE_1_HBA_ID=90-87-AA-BB-65-34-BB-E0</td>
</tr>
<tr>
<td>Default: 0</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TK_FIBRE_N_BOOT_DISABLE</td>
<td>Disable the selected current boot device settings on the specified HBA port, where N is the HBA number to be configured.</td>
</tr>
<tr>
<td></td>
<td>Valid values are</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>Prim</td>
</tr>
<tr>
<td></td>
<td>Alt1</td>
</tr>
<tr>
<td></td>
<td>Alt2</td>
</tr>
<tr>
<td></td>
<td>Alt3</td>
</tr>
<tr>
<td></td>
<td>Default: No.</td>
</tr>
<tr>
<td>TK_FIBRE_N_BOOT_PRIM =</td>
<td>Defines the primary boot target settings, where N is the HBA number to be configured, and:</td>
</tr>
<tr>
<td>target_wwnn target_wwpn lun_id</td>
<td>•  target_wwnn - is the World Wide Node Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.</td>
</tr>
<tr>
<td></td>
<td>•  target_wwpn - is the World Wide Port Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.</td>
</tr>
<tr>
<td></td>
<td>•  lun_id - is the Logical Unit Number of a device.</td>
</tr>
<tr>
<td></td>
<td>Default: 0 0 0</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>TK_FIBRE_1_BOOT_PRIM=</td>
</tr>
<tr>
<td></td>
<td>BB-CC-AA-BB-65-34-BB-F1 BB-CC-AA-BB-FF-34-BB-F1 9</td>
</tr>
<tr>
<td>TK_FIBRE_N_BOOT_ALT1 =</td>
<td>Configures the operating system to use the indicated target as the first alternate boot device, where N is the HBA number to be configured, and:</td>
</tr>
<tr>
<td>target_wwnn target_wwpn lun_id</td>
<td>•  target_wwnn - is the World Wide Node Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.</td>
</tr>
<tr>
<td></td>
<td>•  target_wwpn - is the World Wide Port Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.</td>
</tr>
<tr>
<td></td>
<td>•  lun_id - is the Logical Unit Number of a device.</td>
</tr>
<tr>
<td></td>
<td>Default: blank.</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>TK_FIBRE_1_BOOT_ALT1=</td>
</tr>
</tbody>
</table>
Table 2. Fibre HBA boot configuration variables (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
</table>
| TK_FIBRE_N_BOOT_ALT2 = target_wwnn target_wwpn lun_id | Configures the operating system to use the indicated target as the second alternate boot device, where N is the HBA number to be configured, and  
  - target_wwnn - is the World Wide Node Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.  
  - target_wwpn - is the World Wide Port Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.  
  - lun_id - is the Logical Unit Number of a device.  
  Default: blank.  
  Example:  
  TK_FIBRE_1_BOOT_ALT2=  
| TK_FIBRE_N_BOOT_ALT3 = target_wwnn target_wwpn lun_id | Configures the operating system to use the indicated target as the third alternate boot device, where N is the HBA number to be configured, and  
  - target_wwnn - is the World Wide Node Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.  
  - target_wwpn - is the World Wide Port Name of a device, in the format xx-xx-xx-xx-xx-xx-xx-xx or xxxxxxxxxxxxx.  
  - lun_id - is the Logical Unit Number of a device.  
  Default: blank.  
  Example:  
  TK_FIBRE_1_BOOT_ALT3=  

For more configuration options, please refer to “SCLI” on page 65.

**Customize Advanced Settings Utility**

Before installing the operating system, you can configure system settings for the target system using the Advanced Settings Utility (ASU).

The Linux Scripting Toolkit provides a sample ASU settings file that can be used to deploy system settings. The sample ASU file can be used to load the default settings on the target system. Toolkit uses the ASU **batch** command to configure the system settings on the target system. Please refer to “Advanced Settings Utility” on page 65 for more information on the settings and configuration file.

**Customizing firmware updates**

The Update firmware task is used to update the firmware on the target system with UpdateXpress System Packs (UXSPs). The Linux Scripting Toolkit provides a sample configuration file for the UpdateXpress System Pack Installer (uxspixxx, where xxx is the version of the installer).
The following table describes the settings available in the sample configuration file.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
</table>
| TK_UXSP_UpdateXpressSystemPacks | Specifies the location where the UXSPs are copied.  
Value: /sgdeploy/updates/uxsp |
| TK_UXSP_ApplyLatest         | Specifies whether the UXSPI should apply the latest updates to the target system if no UXSPs are found for that system.  
Setting this variable to yes will force the installer to apply the latest updates for the system if no UXSPs are found for it.  
Valid values: Yes, No  
Default: No |
| TK_UXSP_UXSPIUpdateFlags   | Specifies user provided command line arguments for processing by the UpdateXpress System Pack Installer in Update mode. To provide command line arguments to be processed by UXSPI, set this variable to the command line arguments.  
See “UpdateXpress System Pack Installer” on page 68 for a list of command line arguments to use with UXSPI in Update mode.  
Default: update –unattended –firmware |

For more information, please see “UpdateXpress System Pack Installer” on page 68.
Chapter 7. Supported hardware and software

This section lists the operating systems, adapters, and RAID controllers supported by the Linux Scripting Toolkit, as well as systems that support BIOS and firmware updates using the ASU.

The Linux Scripting Toolkit supports deployment of Linux operating systems on IBM System x and BladeCenter servers. In general, the Linux Scripting Toolkit provides support for ServerProven® IBM or third-party adapters in the following categories:

- Ethernet
- Fibre Channel
- IDE and IDE RAID
- SAS and SAS RAID
- SATA and SATA RAID
- SCSI and SCSI RAID, including Ultra-SCSI

This section contains the following information about specific hardware and software support for deployment scenarios:

- Supported operating system and server combinations
- RAID and Fibre channel HBA support by server
- Network device driver support by server
- Limitations of support for applicable servers

The most up-to-date support information is contained in the readme.htm file. You can download the latest version of readme.htm file from the ServerGuide Scripting Toolkit Web page. See IBM deployment resources on the World Wide Web for information.

Operating system support

This section details what operating system deployment/server combinations are supported by the Linux Scripting Toolkit.

You can use the Linux Scripting Toolkit to deploy supported Linux distributions to any IBM System x, BladeCenter, or iDataPlex server that supports that distribution. To determine what distribution/server combinations are supported, see IBM ServerProven.

The Linux Scripting Toolkit supports these Linux distributions:

- SUSE Linux Enterprise Server 9 32 bit SP4
- SUSE Linux Enterprise Server 9 x64 SP4
- SUSE Linux Enterprise Server 10 32 bit SP1/SP2/SP3/SP4
- SUSE Linux Enterprise Server 10 x64 SP1/SP2/SP3/SP4
- SUSE Linux Enterprise Server 11 32 bit Base/SP1
- SUSE Linux Enterprise Server 11 x64 Base/SP1
- Red Hat Enterprise Linux 4 AS/ES 32 bit U6/U7/U8
- Red Hat Enterprise Linux 4 AS/ES x64 U6/U7/U8
RAID controller support

The following tables detail which RAID controller/server combinations are supported by the ServerGuide Scripting Toolkit, Linux Edition.

You can use the Linux Scripting Toolkit to configure any RAID controller supported by the IBM System x, BladeCenter, or iDataPlex server in which it is installed. For information on supported RAID controller/server combinations, see [IBM ServerProven].

Fibre Channel HBA support

This section lists the Fibre Channel adapters supported by the Linux Scripting Toolkit.

The Linux Scripting Toolkit provides full support for the following adapters. For information on supported server/adapter combinations, please see [IBM ServerProven].

IBM HBAs:
- 2 GB IBM SMB 2-Gbps Fibre Channel HBA (13N1873)
- 2 GB IBM HS20 Fibre Channel Expansion Card (13N2203)
- 2 GB DS4000® HBA (24P0960)
- 2 GB SFF Fibre Channel Expansion card (26K4841)
- 4 GB DS4000 PCI-X Single Port HBA (39M5894)
- 4 GB DS4000 FC PCI-X Dual Port HBA (39M5895)
- IBM HBA SAS controller (44W1853)
- 2 GB IBM HS20 Fibre Channel Expansion Card (48P7061)

Qlogic HBAs:
- 4 GB Standard Fibre Channel Expansion Card for IBM eServer™ BladeCenter (26R0884)
- 4 GB SFF Fibre Channel Expansion Card for IBM eServer BladeCenter (26R0890)
- 4 GB Single-Port PCIe HBA for IBM System x (39R6525)
- 4 GB Dual-Port PCIe HBA for IBM System x (39R6527)
- Ethernet and 4 GB Fibre Channel Expansion Card for IBM BladeCenter (39Y9306)
- iSCSI Single-port PCIe HBA for IBM System x (39Y6146)
- iSCSI Dual-port PCIe HBA for IBM System x (42C1770)
- 4 GB Fibre Channel Expansion Card for IBM BladeCenter (41Y8527)
- 8 GB Fibre Channel Singleport HBA (42D0501)
- 8 GB Fibre Channel Dualport HBA (42D0510)
- 8 GB Ethernet and Fibre Channel Expansion Card CFFh (44X1940)
• 8 GB Fibre Channel Expansion Card CIOv (44X1945)

**Emulex HBAs:**
• 4 GB Fibre Channel Single-port PCIe HBA for IBM System x (42C2069)
• 4 GB Fibre Channel Single-port PCIe HBA for IBM System x (42C2071)
• 8 GB Fibre Channel Single-Port Expansion Card (42D0485)
• 8 GB Fibre Channel Single/Dual-Port HBA (42D0494)
• 8 GB Fibre Channel Dual-Port Expansion Card (46M6140)

**Note:**
• Support of some Fibre Channel HBA cards, particularly the QLogic 39Y9306, by some models of BladeCenter chassis is subject to some limitations and can require the installation of additional supporting equipment. Please refer to the IBM Red Paper *Implementing the QLogic Intelligent Pass-thru module for IBM BladeCenter* at [http://www.ibm.com/redbooks](http://www.ibm.com/redbooks) for additional compatibility information.

In addition, the Linux Scripting Toolkit supports the use of the following Brocade adapters as boot devices, but you must configure them using the Brocade utilities, as no configuration support is provided by the Linux Scripting Toolkit.

**Brocade adapters:**
• 10 GB 2-port Converged Network Adapter for IBM BladeCenter (81Y1650)
• 8 GB Single Port Fibre Channel Adapter (46M6049)
• 8 GB Dual Port Fibre Channel Adapter (46M6050)
• 4 GB Fibre Channel Single-port HBA for IBM System x (59Y1987)
• 4 GB Fibre Channel Dual-port HBA for IBM System x (59Y1993)

**Advanced Settings Utility Support**

This section lists the systems supported by the Advanced Settings Utility through the Linux Scripting Toolkit.

*Table 3. ASU support by the Toolkit*

<p>| Systems supported by ASU and the Linux Scripting Toolkit |</p>
<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>System x3100 M4</td>
<td>2582</td>
</tr>
<tr>
<td>System x3200</td>
<td>4362, 4363</td>
</tr>
<tr>
<td>System x3200 M2</td>
<td>4367, 4368</td>
</tr>
<tr>
<td>System x3200 M3</td>
<td>7327, 7328</td>
</tr>
<tr>
<td>System x3250 M2</td>
<td>4190, 4191, 4194</td>
</tr>
<tr>
<td>System x3250 M3</td>
<td>4251, 4252, 4261</td>
</tr>
<tr>
<td>System x3250 M4</td>
<td>2583</td>
</tr>
<tr>
<td>System x3350</td>
<td>4192, 4193</td>
</tr>
<tr>
<td>System x3400</td>
<td>7973, 7974, 7975, 7976</td>
</tr>
<tr>
<td>System x3400 M2</td>
<td>7836, 7837</td>
</tr>
<tr>
<td>System x3400 M3</td>
<td>7378, 7379</td>
</tr>
</tbody>
</table>
Table 3. ASU support by the Toolkit (continued)

<table>
<thead>
<tr>
<th>System</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>System x3500</td>
<td>7977</td>
</tr>
<tr>
<td>System x3500 M2</td>
<td>7839</td>
</tr>
<tr>
<td>System x3500 M3</td>
<td>7380</td>
</tr>
<tr>
<td>System x3550</td>
<td>1913, 7978</td>
</tr>
<tr>
<td>System x3550 M2</td>
<td>4198, 7946</td>
</tr>
<tr>
<td>System x3550 M3</td>
<td>4254, 7944</td>
</tr>
<tr>
<td>System x3620 M3</td>
<td>7376</td>
</tr>
<tr>
<td>System x3630 M3</td>
<td>7377</td>
</tr>
<tr>
<td>System x3650</td>
<td>1914, 7979</td>
</tr>
<tr>
<td>System x3650 M2</td>
<td>4199, 7947</td>
</tr>
<tr>
<td>System x3650 M3</td>
<td>4255, 5454, 7945</td>
</tr>
<tr>
<td>System x3655</td>
<td>7943</td>
</tr>
<tr>
<td>System x3690 X5</td>
<td>7148, 7149</td>
</tr>
<tr>
<td>System x3755</td>
<td>7163</td>
</tr>
<tr>
<td>System x3755 M3</td>
<td>7164</td>
</tr>
<tr>
<td>System x3800</td>
<td>8866</td>
</tr>
<tr>
<td>System x3850</td>
<td>7365, 8864</td>
</tr>
<tr>
<td>System x3850 M2</td>
<td>7141, 7144, 7233</td>
</tr>
<tr>
<td>System x3850 X5</td>
<td>7145</td>
</tr>
<tr>
<td>System x3950</td>
<td>7363, 7366, 8878</td>
</tr>
<tr>
<td>System x3950 M2</td>
<td>7141, 7144, 7234</td>
</tr>
<tr>
<td>System x3950 X5</td>
<td>7146</td>
</tr>
<tr>
<td>IBM BladeCenter HS12</td>
<td>1916, 8014, 8028</td>
</tr>
<tr>
<td>IBM BladeCenter HS20</td>
<td>1883, 8843</td>
</tr>
<tr>
<td>IBM BladeCenter HS21</td>
<td>1885, 8853</td>
</tr>
<tr>
<td>IBM BladeCenter HS21 XM</td>
<td>1915, 7995</td>
</tr>
<tr>
<td>IBM BladeCenter HS22</td>
<td>1911, 1936, 7809, 7870</td>
</tr>
<tr>
<td>IBM BladeCenter HS22V</td>
<td>1949, 7871</td>
</tr>
<tr>
<td>IBM BladeCenter HS23V</td>
<td>1929, 7875</td>
</tr>
<tr>
<td>IBM BladeCenter HX5</td>
<td>1909, 7872</td>
</tr>
<tr>
<td>AMD Opteron LS21 for IBM BladeCenter</td>
<td>7971</td>
</tr>
<tr>
<td>AMD Opteron LS22 for IBM BladeCenter</td>
<td>7901</td>
</tr>
<tr>
<td>AMD Opteron LS41 for IBM BladeCenter</td>
<td>7972</td>
</tr>
<tr>
<td>AMD Opteron LS42 for IBM BladeCenter</td>
<td>7902</td>
</tr>
<tr>
<td>IBM System x iDataplex dx360 M3</td>
<td>6391</td>
</tr>
<tr>
<td>IBM System x iDataplex dx360 M4</td>
<td>7918, 7919</td>
</tr>
</tbody>
</table>
Chapter 8. Linux Scripting Toolkit utilities and tools

This section contains information about the utilities that are included in the Linux Scripting Toolkit and the tools that are shipped with it. For each utility there is a description of parameters, along with examples.

For each included tool there is a brief description of the tool and instructions on using it with the Linux Scripting Toolkit, as well as pointers on where to get more information on the tool and its use.

Linux Scripting Toolkit utilities

This section contains information about the utilities that are included in the Linux Scripting Toolkit. For each utility there is a description of parameters, along with examples. These utilities can be found in /opt/ibm/sgtk/wui/.data/sgdeploy/sgtklinux(tk/bin on the source server.

The command-line syntax examples in this documentation use the following conventions:

• Variables are shown in italics
• Required parameters are shown within <> brackets
• Optional parameters are shown within [] brackets
• Required or optional parameters from which you must make a unique choice are separated by a vertical bar (|) character

You must enter all parameters for a utility on a single command line, even when the information in this documentation is shown on multiple lines.

HWDETECT

HWDETECT is used to perform basic hardware detection functions that are typically obtained using SMBIOS and a PCI scan. This utility contains options that can be used to dump all of the hardware information to an output file, or it can be used to query hardware information and return values that set the errorlevel environment variable or the return code, for example $?.

HWDETECT has basic hardware scan functions, and more complex PCI device detection options. The basic hardware scan functions can only be used singularly. The PCI device detection functions may be used in combination with each other to produce a query based on multiple restrictions. You can only use the hwdetect utility basic hardware scan functions one at a time. The PCI-device detection functions can be combined or used more than once on the same command line.

Usage:

hwdetect [-s|-i|-p|--m=machinetype] -f=filename
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>-s</td>
<td>Determines if the target server is an IBM System x, xSeries®, or BladeCenter server. The return values are: 0 for an IBM system, 1 for a non-IBM system.</td>
<td>.hwdetect -s if [ $? == 1 ]; then echo &quot;Perform non-IBM equipment specific steps here.&quot; else echo &quot;Perform IBM equipment specific steps here.&quot; fi</td>
</tr>
<tr>
<td>-i</td>
<td>Dumps all available information about the system hardware to the screen in an ini file format. You can use the -f parameter to output this information to a file. A return code of zero indicates success. All other return codes indicate an error.</td>
<td>.hwdetect -i</td>
</tr>
<tr>
<td>-f=filename</td>
<td>Directs the output to the indicated file. This parameter can be used in conjunction with the -i or -p parameters. A return code of 254 indicates that hwdetect was unable to open the specified file.</td>
<td>.hwdetect -i --f=hwdetect.out cat hwdetect.out</td>
</tr>
<tr>
<td>--m=machinetype</td>
<td>Compares the machine type of the current system to the specified machine type. Return codes: 0 indicates that the machine types do not match, 1 indicates a match.</td>
<td>.hwdetect --m=8676 if [ $? == 8676 ]; then echo &quot;It is an IBM system.&quot; else echo &quot;It is not an IBM system.&quot;</td>
</tr>
</tbody>
</table>

You can also use HWDetect to inventory PCI devices on the target system.

Usage:
```
hwdetect [--vid=vendor_id] [--did=device_id] [--svid=sub-vendor_id] [--sdid=sub-device_id] --bn=bus_number --dn=device_number --add=number
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>--vid=vendor_id</td>
<td>Searches for PCI devices with the indicated hexadecimal vendor ID.</td>
<td>.hwdetect --vid=40 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--did=device_id</td>
<td>Searches for PCI devices with the indicated hexadecimal device ID.</td>
<td>.hwdetect --did=41 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--svid=sub-vendor_id</td>
<td>Searches for PCI devices with the indicated hexadecimal sub-vendor ID.</td>
<td>.hwdetect --svid=42 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--sdid=sub-device_id</td>
<td>Searches for PCI devices with the indicated hexadecimal sub-device ID.</td>
<td>.hwdetect --sdid=43 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--bn=bus_number</td>
<td>Starts the search at the indicated decimal bus number.</td>
<td>.hwdetect --bn=44 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--dn=device_number</td>
<td>Starts the search at the indicated decimal device number.</td>
<td>.hwdetect --dn=45 echo &quot;Found $? matches...&quot;</td>
</tr>
<tr>
<td>--add=number</td>
<td>Adds the specified decimal value to the return value before exiting.</td>
<td>.hwdetect --vid=46 --add=1 echo &quot;Found $? - 1 matches...&quot;</td>
</tr>
</tbody>
</table>
Below is an example of the hwdetect.out file created by the –i flag:

```
[System]
Machine_Type=8674
Model_Number=42X
Serial_Number=78Z9506
Product_Name=eserver xSeries 330
BIOS_version=1.04
BIOS_Build_Level=EME112A
BIOS_DATE=06/28/2002
BIOS_Manufacturer=IBM
BIOS_Language=US
Number_Of_Enclosures=1
Enclosure_Type.0=23
Processor_Slots=2
Active_Processors=1
Processor_Family.0=17
Processor_Speed_MHz.0=1400
Processor_X64 = TRUE
Total_Enabled_Memory_Mb=256
ROM_Diagnostics_Build_Level=EME112A
ISMP_Build_Level=BR8T30A
RSA_Build_Level=GEE834A
System_UUID = 8030E01060F010B010605090D0A020F0
Blade_Chassis_UUID = 0F020A0D0900F00F020A0D0900F00F02
Blade_Slot = 02

[PCI]
Total_Number_Devices=10
Bus_Number.0=0
Device_Number.0=1
Function_Number.0=0
Class_Code.0=0000
Revision.0=0
Header_Type.0=0
Vendor_ID.0=5333
Device_ID.0=8A22
Subvendor_ID.0=1014
Subdevice_ID.0=01C5
Bus_Number.1=0
Device_Number.1=2
Function_Number.1=0
Class_Code.1=0000
Revision.1=0
Header_Type.1=0
Vendor_ID.1=8086
Device_ID.1=1229
Subvendor_ID.1=1014
Subdevice_ID.1=105C
```

Using the –p flag produces the same output with the exception that the section names are tacked onto the beginning of each keyword:

```
System_Machine_Type = 8674
System_Model_Number = 42X
System_Serial_Number = 78Z9506
...
PCI.Bus_Number.0 = 0
PCI_Device_Number.0 = 1
...
```

Notes:

1. The BIOS_DATE value is listed in mm/dd/yyyy format.
2. The Enclosure_Type.0=23 is based on SMBIOS 2.3 spec. 23 = Main chassis.
3. There is an entry for Processor_Family and Processor_Speed_MHz for each microprocessor in the server.
4. The ROM_Diagnostics_Build_Level is empty for servers that do not support ROM diagnostics.
5. PCI devices are listed in the order they are scanned.
6. PCI devices are listed in the Value.n format, where Value is the variable name and n is the nth PCI device scanned.
7. The header_type field is not available for versions of hwdetect running on Windows 32 or 64-bit operating systems.
8. The vendor, device, subvendor, and subdevice values are in hexadecimal notation.

**SAVESTAT.SH**

The Savestat utility allows you to store and retrieve up to twenty values to persistent storage. The utility is designed to help you remember where you left off in an installation script even when a system reboot is required. This utility is designed to return values that set the ? environment variable so that you can branch in a script (sh) file based on the result of the utility's execution.

Savestat uses the persistent storage capability of ASU. Therefore the following files must be available in order for the script to work:

- ASU package (ibm_utl_asu_asut69*_linux_x86-64.tgz)
- savestat.sh script
- savestat.def

**Usage**

The savestat utility that comes with the ServerGuide Scripting Toolkit has the following command-line syntax:

```
SAVESTAT [/q] -set1=value [ ... -set2=value ... -set21=value ]
SAVESTAT [/q] -getn
SAVESTAT [/q] -validate
SAVESTAT [/q] -signature
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
</table>
| -setn=value  | Saves an integer value, value, to the nth location in persistent-storage memory, where n is an integer from 1-21. | ./savestat.sh -setn=value  
Where:  
- n is an integer from 1-21  
- value is an integer from 0-254 |
| -getn       | Retrieves a value currently set in the nth location in persistent-storage memory. | ./savestat.sh -getn  
Where n is the location of a previously-stored value. |
## Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
</table>
| -signature | Verifies that the persistent storage contains the `savestat` signature. Return codes:  
• 0 if storage contains the signature  
• 1 if storage does not contain the signature | ./savestat.sh -signature |
| -validate | Verifies that the system is supported by `savestat`. Return codes:  
• 0 if the system is supported  
• 1 if the system is not supported | ./savestat.sh -validate |
| -q | Invokes the quiet mode, which suppresses prompting. This parameter is optional and can be used with any other `savestat` parameter. | ./savestat.sh -q -set1=100 |

### Note
The help for `savestat.sh` indicates that the `–reset` parameter is supported. However, `savestat.sh` does not currently support the `–reset` parameter. In order to reset all of the storage locations to zero, use the `savestat.sh –set` command as shown here:
```
savestat.sh --set1=0 --set2=0 --set3=0 --set4=0 --set5=0 --set6=0 --set7=0 --set8=0 --set9=0 --set10=0 --set11=0 --set12=0 --set13=0 --set14=0 --set15=0 --set16=0 --set17=0 --set18=0 --set19=0 --set20=0 --set21=0
```

### Examples
The following examples illustrate savestat utility usage.

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>./savestat.sh -set2=100</td>
<td>Stores the value 100 in the second persistent-storage memory location</td>
</tr>
</tbody>
</table>
| ./savestat.sh -get2  
if [ $? -eq 100 ]; then  
  echo "The value 100 was found successfully."  
else  
  echo "The value 100 was not found."  
fi | Retrieves the value of the second persistent-storage memory location and branches in the script file according to the value returned |

### PRAID

PRAID is a scriptable utility that offers a single user interface for both configuring and replicating all RAID controllers supported by the Linux Scripting Toolkit.

PRAID has three modes of operation:

• **Deploy mode** – for scripted configuration of RAID controllers.
• **Capture mode** – for replicating RAID controller settings.
• **Restore-defaults mode** – for resetting RAID controllers to factory-default settings only.
Deploy mode

Used in Deploy mode, PRAID offers the following features:
- Configures all RAID controllers in a server with a single call to the program.
- Automatically resets all RAID controllers to factory-default settings before configuring.
- Uses customizable logic to decide which configuration (policy) is applied to a server based on system hardware. The logic can involve:
  - Machine type of the server
  - Serial number of the server
  - Number of drives connected to the RAID controller
  - RAID controller type
  - Controller number (order) of the RAID controller
- Can be highly customized for specific RAID configurations, or generalized to handle many different RAID configurations.
- Provides a default or AUTO mode for automatically creating arrays and logical drives using default settings. This mode requires no knowledge of the number, size, or location of the drives connected to the RAID controllers.
- Automatically applies default values for any RAID configuration parameters that you do not supply. You supply only the parameters that you want to change.
- Default values for each configuration parameter are equivalent to the default settings of the ServeRAID Manager express configuration method, where applicable.
- Allows up to 50 policies for configuring RAID controllers to be specified in a single policies file.

Note:

When using PRAID in Deploy mode, the -r parameter is required.

To delete RAID configuration on all controllers, specify -r. To delete RAID configuration on a specific controller, specify -r# where # is the controller number.

For example, praid -f:policy.ini -r -y.

Capture mode

Used in Capture mode, PRAID offers the following features:
- Captures the RAID configurations of all supported controllers to a text file, the policies file, with a common format.
- Captured RAID configurations can be immediately used with PRAID in deploy mode to easily replicate the RAID configuration to many servers.
- Allows customizable logic when saving the captured parameters to determine when each captured configuration should be deployed.
- Saves useful information about each captured configuration, including the system machine type, date, and time when the configuration was captured.
- Allows you to edit any RAID configurations that you capture before deploying them to other systems.
**Restore-defaults mode**

Used in Restore-defaults mode, PRAID offers the following features:

- Deletes all arrays and logical drives on all RAID controllers.
- Sets other RAID controller settings back to factory defaults.

**Environment requirements**

The PRAID utility supports the following RAID controllers:

- ServeRAID-6M
- ServeRAID-7t
- ServeRAID-8i
- ServeRAID-8k
- ServeRAID-8k-l
- ServeRAID-8s
- ServeRAID-10k
- ServeRAID-10M
- ServeRAID-B5015
- ServeRAID-BR9i
- ServeRAID-BR10i
- ServeRAID-BR10ie
- ServeRAID-BR10il
- ServeRAID-M5014
- ServeRAID-M5015
- ServeRAID-M5025
- ServeRAID-MR10i
- ServeRAID-MR10il
- ServeRAID-MR10is
- ServeRAID-MR1015
- ServeRAID-MR1015–R5
- LSI SCSI (1020/1030)
- LSI SAS (1064/1064E/1068/1078)

PRAID works by parsing the output of other RAID-configuration utilities. In order to accomplish this, the following utilities must be in the system search path:

<table>
<thead>
<tr>
<th>Adapter</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServeRAID 6M</td>
<td>IPSSEND</td>
</tr>
<tr>
<td>ServeRAID-7t, 8i, 8k, 8k-l, 8s</td>
<td>ARCCONF</td>
</tr>
<tr>
<td>LSI-SCSI 1020/1030, LSI-SAS 1064/1064E, LSI-SAS 1068, LSI-SAS 1078, ServeRAID BR9i, BR10i, BR10ie, BR10il</td>
<td>CFGGEN</td>
</tr>
<tr>
<td>MegaRAID SAS, ServeRAID-M5014, M5015, M5025, MR10i, MR10ie,MR10il, MR10is, MR10k, MR10M, MR1015, MR1015–R5</td>
<td>MEGACLI</td>
</tr>
<tr>
<td>ServeRAID-B5015</td>
<td>BRCLI</td>
</tr>
</tbody>
</table>
## Usage

Each of the modes supported by PRAID requires a specific syntax, but they all share some common parameters, described in Table 4.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-r:n</code></td>
<td>Restores the RAID controller with the controller number specified by <code>n</code> to factory-default settings and then returns immediately. No RAID configuration is done if you use this parameter. If no value is specified for the controller number, all RAID controllers are reset to factory-default settings. Used alone, the parameter provides Restore-defaults mode. You must use this parameter in conjunction with Deploy mode parameters to reset controllers to the factory default settings before deploying a new configuration.</td>
<td>praid -r&lt;br&gt;praid -r:3&lt;br&gt;PRAID -f:policies.ini -r -v:5 -e1&lt;br&gt;Configures the RAID controllers in the system using the policies file policies.ini, sets the verbose mode to maximum, and returns an error code if there were no matching policies for any controllers.</td>
</tr>
<tr>
<td><code>-f:file</code></td>
<td>The policy file name. This parameter is required for capture mode, and for deploy mode unless the <code>-d</code> parameter is used. In deploy mode, this points to the policies that you would like PRAID to use when configuring the RAID controllers. You cannot use this parameter with the <code>-d</code> parameter. In capture mode, this points to the file where you would like the captured configurations to be written. If the file does not exist, PRAID will create it. If the file does exist, PRAID will append to the end of it. The <code>-f</code> parameter is valid in deploy and capture modes.</td>
<td>praid -f:myfile.ini&lt;br&gt;Uses the policies file, myfile.ini, to configure all RAID controllers.&lt;br&gt;praid -c -f:myfile.ini&lt;br&gt;Captures the RAID configuration of all controllers to the policy file, myfile.ini.</td>
</tr>
</tbody>
</table>
Table 4. PRAID parameters common to multiple modes (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>-y</td>
<td>Suppresses the confirmation prompt. This parameter is optional.</td>
<td>praid -f:myfile.ini -y&lt;br&gt;Uses the policies in myfile.ini to configure the RAID controllers and does not prompt before resetting all controllers to factory-default settings.</td>
</tr>
<tr>
<td></td>
<td>If you select the -y parameter, PRAID does not prompt you before resetting controllers to factory-default settings. PRAID always resets all controllers to factory-default settings before configuring them. If you do not supply this parameter, PRAID will pause to warn you before resetting the RAID controllers to factory-default settings. The -y parameter is valid in deploy and restore-defaults modes. This parameter is optional.</td>
<td></td>
</tr>
<tr>
<td>-e2</td>
<td>Error code 2 if no supported controllers found</td>
<td>praid -c -f:myfile.ini -e2&lt;br&gt;Captures the RAID configuration of all RAID controllers to myfile.ini, and returns an error if no controllers are found in the system.</td>
</tr>
<tr>
<td></td>
<td>Returns an error code of 2 if there were no supported RAID controllers found in the system. By default, PRAID does not return an error if no controllers are found in the system. This parameter is valid in all modes. This parameter is optional.</td>
<td></td>
</tr>
<tr>
<td>-e3</td>
<td>Error code 3 if no supported drives found</td>
<td>praid -d -e3&lt;br&gt;Configures all RAID controllers with default settings and returns an error if one or more controllers has no drives attached.</td>
</tr>
<tr>
<td></td>
<td>Returns an error code of 3 if at least one controller was found with no drives attached. By default, PRAID does not return an error if no drives are attached to a RAID controller. This parameter is valid in any mode. This parameter is optional.</td>
<td></td>
</tr>
<tr>
<td>-v:n</td>
<td>Verbose level</td>
<td>praid -d -v:5&lt;br&gt;Configures all RAID controllers with default settings, and sets the verbose level to maximum.</td>
</tr>
<tr>
<td></td>
<td>Sets the verbosity level, where n is: • 0 - quiet • 3 - default • 5 - maximum This parameter is valid in any mode. This parameter is optional.</td>
<td></td>
</tr>
</tbody>
</table>

**Deploy mode**

The syntax for Deploy mode is:
PRAID.EXE -f:polyies -r -d -p:patn -e1 -e2 -e3<br>-v:n -y -b
The parameters unique to Deploy mode are described below.

Table 5. PRAID Deploy mode parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>-d</td>
<td>Configure with defaults</td>
<td>praid -d -r</td>
</tr>
</tbody>
</table>

Configure all controllers in the system using default settings instead of using a policies file. The default settings used are the same as the default settings for the policies file.

You cannot use this parameter with the -f parameter. See “Default RAID levels” on page 57 for the default values that will be assigned for each RAID controller based on the number of drives attached to the controller.

This parameter is required unless the -f parameter is specified.

| -e1        | Error if no policy found | praid -f:policy.ini -r -e1 |

Returns an error code of 1 if one or more controllers are not configured due to the fact that there was no policy found to configure them.

This parameter is optional.

---

**Capture mode**

The syntax for Capture mode is:

```
PRAID.EXE -c[:p] -f:polices -e2 -e3 -v:n
```

The parameters unique to Capture mode are described below.
Table 6. Capture mode parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>-c[:p]</td>
<td>Capture mode</td>
<td>praid -c:m,t -f:myfile.ini</td>
</tr>
</tbody>
</table>

Indicates capture mode. The :p portion is optional. If you do not include the optional portion, then :p will assume the default value: “t,d”.

You can use :p to provide a list of parameters describing the AppliesTo that should be created when capturing the parameters to a policy. See “AppliesTo,n” on page 49.

:p is a list containing any of the following:
- t – use the type of the RAID controller in the AppliesTo.1 entry for the policy.
- c – use the controller number (scan order relative to all other RAID controllers in the system) in the AppliesTo.1 entry for the policy.
- d – use the number of drives connected to the RAID controller in the AppliesTo.1 entry for the policy.

Note: You must specify the name of the policies file using the -f parameter when using the -c parameter.

The policy or policies created are appended to the end of the file if the file exists. If the file does not exist, a new file is created. If there are multiple RAID controllers in the system, their configurations are placed in the file in scan order.

Restore-defaults mode

The syntax for Restore-defaults mode is:
```
praid.EXE -r:n -e2 -v:n -y
```

Usage examples

Deploy mode examples
```
praid -r -d -y
```

This example is useful for unattended scripted installations.
- Configures all RAID controllers in the system using default settings.
- Does not prompt before setting controllers to factory-default settings.
- Performs drive synchronization without prompting, when required.
```
praid -f:policies.ini -r -v:5 -e1
```
- Configures the RAID controllers in the system using the policies file: policies.ini.
- Sets the verbose mode to maximum.
Returns an error code if there were no matching policies for one or more controllers.

**Capture mode examples**

```shell
PRAID -c -f:polices.ini
```

Captures the configuration of all RAID controllers into the file: `policies.ini`.

```shell
PRAID -c:m,t -f:polices.ini
```

- Captures the configuration of all RAID controllers into the file: `policies.ini`.
- Uses the system machine type and RAID controller type as the `AppliesTo.1` entry in the policies file for each captured configuration.

**Restore-defaults mode examples**

```shell
PRAID -r -v:0 -y
```

- Restores all RAID controllers to factory-default settings.
- Operates in silent mode, no messages are printed to the screen.
- Does not prompt the user before restoring factory-default settings.

**Return codes**

- **0** - Success.
- **1** - Execution was successful, but the `-c1` parameter was supplied and at least one controller was not configured because there was no matching policy.
- **2** - Execution was successful, but the `-c2` parameter was supplied and no controllers were found in the system.
- **3** - Execution was successful, but the `-c3` parameter was supplied and at least one controller was not configured because no drives were attached.
- **4** - Syntax error on the command line.
- **5** - Syntax error in the policies file or the policy file could not be opened.
- **6** - Reserved
- **7** - Error resetting a controller to the default settings.
- **8** - Error gathering information about a controller.
- **9** - Error in the policy file.
- **10** - Error during processing.
- **11** - Error during deployment.

**Policies file**

When used in configure mode, the policies file directs how PRAID configures the RAID controllers in a system using keywords and values that can be customized by the user. In capture mode, PRAID creates or appends to the end of a policies file the parameters that can configure other RAID controllers identically to the ones in the current system.

A policies file can be created using any of the following methods:

1. Run PRAID in capture mode to create a policies file from an already-configured RAID controller.
2. Use one of the example policies files provided with the ServerGuide Scripting Toolkit, and customize it to configure your RAID controllers.
3. Use an ASCII text editor to create a new policies file.
The policies file is an ASCII text file that is organized in INI-file format. Each INI-file section name indicates the start of a new policy for configuring RAID controllers.

The policies file must contain one or more uniquely-named sections using the format [Policy.\_name] where name is a unique user-assigned name that is used to identify the policy. name can be any combination of letters, numbers, underscores, periods, or dashes.

Some examples of legal section names are: [Policy.1], [Policy.mypolicy], and [Policy.My-RAID5-config]. Each section in the policies file represents a single policy for configuring RAID controllers. You can have up to 50 policies in a single policies file.

**How PRAID selects a policy:** Each section in the policies file represents a single policy for configuring the RAID controllers. In configure mode, each RAID controller is configured using a single policy, but a single policy can be used to configure multiple controllers. Each policy in a policies file contains one or more AppliesTo.n entries, where n is the number of the AppliesTo parameter within the policy. This entry is required in each section, so every section must contain at least an AppliesTo.1 entry. See “Policies file parameters” for a full description of the AppliesTo.n entry.

These entries are followed by a list of hardware parameters including machine type, number of drives connected to the RAID controller, and scan order, that are evaluated against the current system hardware. If all of the hardware parameters of an AppliesTo.n entry match the hardware being evaluated, this policy is used to configure the hardware. For each policy in the policies file, the AppliesTo.n entries for that policy are evaluated in order starting with AppliesTo.1. If none of the AppliesTo.n entries match the current hardware then the policy is not applied and the AppliesTo.n entries in the next policy are evaluated. This continues until either a match is found or no more policies exist in the file. If the end of the file is reached without a match then the controller is not configured. Because the policies are evaluated in order, you should place more specific policies at the beginning of the policies file.

**Policies file parameters:** This section describes the parameters used in the policies file. The Policy.\_name header and AppliesTo.1 entry are the only parameters required. All values are case-insensitive.

If you do not specify a value for any of the other parameters, they will be assigned their default value when applicable. If a parameter is not valid for a RAID controller, it will be ignored.

In addition to this reference, the ServerGuide Scripting Toolkit also provides two example policies files that you can modify for your own use.

- RAID1-5.ini Creates a RAID-1 array using the first two drives, and a RAID-5 array using the remaining drives. Valid for ServeRAID-6M and 8i.
- RAID5HSP.ini Creates a single RAID-5 array with a single hot-spare drive using all available drives. Valid for ServeRAID-6M and 8i.
- template.ini Provides a policies file template containing all parameters with details about each parameter.
- syntax.txt Provides a syntax specification for the policies file.
Table 7. Policy file parameters

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Required?</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy.name</td>
<td>Yes</td>
<td>None</td>
<td>This header designates the start of a new policy. See “Policy.name” on page 49 for additional information.</td>
</tr>
<tr>
<td>AppliesTo.n</td>
<td>Yes</td>
<td>None</td>
<td>Use this parameter to describe when the current policy should be chosen to configure the RAID controllers. See “AppliesTo.n” on page 49 for additional information.</td>
</tr>
</tbody>
</table>
| ReadAhead     | No        | • ADAPTIVE (for ServeRAID 6M)  
• ON (for ServeRAID-7t 8i, 8k, and 8k-l) | Specifies the read ahead setting that should be applied to the RAID controller. See “ReadAhead” on page 50 for additional information. |
| RebuildRate   | No        | HIGH            | Specifies the rebuild rate that should be applied to the RAID controller. See “RebuildRate” on page 50 for additional information. |
| StripeSize    | No        | • 8 (for ServeRAID 6M)  
• 64 (for ServeRAID-7t 8i, 8k, 8k-l,) | Specifies the stripe-unit size in KB that the controller should use for its arrays. See “StripeSize” on page 51 for additional information. |
| Array_Mode    | No        | AUTO            | Defines the array-creation policy to use when selecting physical disk drives to include in an array. See “Array_Mode” on page 51 for additional information. |
| Array_Defaults| No        | • 0%:1 for ServeRAID-8e-SATA and 8e-SAS, LSI-SCSI-RAID when at least 3 drives are available  
• 0%:1 for ServeRAID-6M, when one or more arrays has 4 or more physical drives  
• 0%:0 for all other cases | Defines the default values to use for the variance and number of hot-spare drives when AUTO is specified for Array_Mode. See “Array_Defaults” on page 51 for additional information. |
| Array.letter  | No        | None            | Lets you specify exactly how many arrays are created and the exact physical drives that you would like in each array. See “Array.letter” on page 52 for additional information. |
| Hotspares     | No        | None            | Defines a list of specific physical drives to designate as hot-spare drives. See “Hotspares” on page 53 for additional information. |
Table 7. Policy file parameters (continued)

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Required?</th>
<th>Default</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical_Mode</td>
<td>No</td>
<td>AUTO</td>
<td>Defines the logical-drive creation policy to use when creating logical drives. See &quot;Logical_Mode&quot; on page 53 for additional information.</td>
</tr>
<tr>
<td>Logical_Defaults</td>
<td>No</td>
<td>FILL:AUTO:AUTO</td>
<td>Defines the default logical drive settings that should be used when creating logical drives. See &quot;Logical_Defaults&quot; on page 53 for additional information.</td>
</tr>
<tr>
<td>Logical.num</td>
<td>No</td>
<td>None</td>
<td>Lets you specify how many logical drives are created and the specific parameters for each logical drive. See &quot;Logical.num&quot; on page 54 for additional information.</td>
</tr>
</tbody>
</table>

*Policy.name:*

**Description**

This header designates the start of a new policy. You can specify name using any combination of letters, numbers, underscores, periods, or dashes. There is no maximum length for name, but the maximum length for a single line in the policies file is 256 characters. You can have up to 50 policies in a single policies file.

**Examples**

[Policy.RAID-5-Hotspare]

*AppliesTo.n:*

**Description**

Use this parameter to describe when the current policy should be chosen to configure the RAID controllers. You can define up to 20 AppliesTo.n entries per policy. You must have an AppliesTo.1 entry for each policy, and AppliesTo.n is the only required parameter of a policy.

AppliesTo.n includes a comma delimited list containing one or more of the following parameters:

- `m:mttype`, where mttype is the four digit machine type of an IBM eServer or xSeries server.
- `s:serial`, where serial is the serial number of an IBM eServer or xSeries server.
- `c:contn`, where contn is the controller number (scan order) of the RAID controller with respect to all other RAID controllers in the system.
  The number assigned to a particular controller is dependent on the controller’s physical PCI slot and the order in which your system scans its PCI slots.
- `t:ctype`, where ctype is the type of the controller. The type is not case sensitive, and must be one of the following descriptive names:
  - SERVERAID-6M
  - SERVERAID-7t
  - SERVERAID-8i
  - SERVERAID-8k
  - SERVERAID-8k-1
- ServeRAID-8s
- ServeRAID-10k
- ServeRAID-10M
- ServeRAID-B5015
- ServeRAID-BR9i
- ServeRAID-BR10i
- ServeRAID-M5014
- ServeRAID-M5015
- ServeRAID-M5025
- ServeRAID-MR10i
- ServeRAID-MR10ie
- ServeRAID-MR10il
- ServeRAID-MR10is
- ServeRAID-MR1015
- ServeRAID-MR1015-R5
- LSI SAS 1078 1R Controller
- LSI-SCSI-RAID
- LSI Integrated SAS-RAID Controller (1064/1064E/1068)

- \( d: \text{drives} \), where \( \text{drives} \) is an integer value specifying the number of drives connected to the controller. Only drives in a Ready state after resetting the controller to factory-default settings are counted.

- ALL. Indicates that this policy should be used for all RAID controllers. This parameter is good to use if you declare a default policy that is not covered by any of the other policies.

Examples

Example using the \( m,s,c,t, \) and \( d \) parameters:
AppliesTo.1 = m:8865,t:ServeRAID-7t
AppliesTo.2 = c:1,d:15,s:87R478U

Example using the ALL parameter:
AppliesTo.1 = ALL

ReadAhead:

Description

Specifies the read ahead setting that should be applied to the RAID controller. If this parameter is not applicable for a RAID controller, it is ignored. See "Supported settings for RAID controllers" on page 54 for the list of ReadAhead settings supported by PRAID for each RAID controller. Possible settings are:

- Adaptive
- On
- Off

Examples

ReadAhead = On

RebuildRate:
Description

Specifies the rebuild rate that should be applied to the RAID controller. If this parameter is not applicable for a RAID controller, then it will be ignored. See “Supported settings for RAID controllers” on page 54 for the list of RebuildRate settings supported by PRAID for each RAID controller.

- High
- Medium
- Low

Examples

RebuildRate = High

StripeSize:

Description

Specifies the stripe-unit size in KB that the controller should use for its arrays. If this parameter is not applicable for a RAID controller, then it will be ignored. See “Supported settings for RAID controllers” on page 54 for the list of StripeSize settings supported by PRAID for each RAID controller. Possible values are any stripe size supported by the controller.

Examples

StripeSize = 32

Array_Mode:

Description

Defines the array-creation policy to use when selecting physical disk drives to include in an array. Possible values are:

- Auto: Creates arrays using drives that have the same size in MB. This is the default. Each set of drives with same size on will be combined into a single array. The maximum number of drives allowed per array is determined by the limits of the RAID controller. Only drives in a Ready state after resetting the controller to factory-default settings are used in arrays. Hot-spare drives are created based on the rules supplied with the Array_Defaults parameter.

  The Array_Defaults parameter allows you to modify the default behavior of the AUTO mode for arrays.

- Custom: Allows you to specify the exact physical disk drives to use in the array. If you specify this value, you must also specify the Array.letter parameter with a list of drives for each array that you want to create. If you want hot-spare drives to be created, you must use the Hotspares parameter to list the hot-spare drives.

Examples

Array_mode = CUSTOM

Array_Defaults:
Description

Defines the default values to use for the variance and number of hot-spare drives when AUTO is specified for Array_Mode. This parameter is not valid if Array_Mode is set to CUSTOM.

The value of Array_Defaults is expressed in the format: variance:hotspares, where:

variance specifies the percentage variance to use when selecting drives to add to the array. This parameter is useful when you are using drives that may vary slightly in size. Variance is based on a percentage of the drive's size in MB. Valid values are:

• 0% - Only drives with equal size in MB will be combined into a single array.
• 5% - All drives within 5% size in MB will be combined into a single array.
• 10% - All drives within 10% size in MB will be combined into a single array.
• 100% - All drives, regardless of size in MB, will be combined into a single array.

and

hotspares is an integer that specifies the total number of hot-spare drives to create.
The largest drives are chosen as hot-spare drives first. If not enough drives are available to create hot-spare drives, then PRAID will not create any hot-spare drives.

Examples

Array_Defaults = 5%:1

Array.letter:
Description

Lets you specify exactly how many arrays are created and the exact physical drives that you would like in each array. You can specify the physical drives using any of the following methods:

• The channel number and SCSI ID (for SCSI) or bus number and target ID (for SATA/SAS) of each drive. The channel number or bus number is always 1-based. The SCSI ID or target ID is always 0-based.
• A list of integer values indicating that the nth drive should be included in the array.
• The keyword ALL to indicate that all remaining drives attached to the controller that are not specified in previous arrays should be included in the current array.

The first array must be labeled Array.A. Additional arrays are labeled sequentially, Array.B, Array.C, and so on. The maximum number of arrays allowed per controller is determined by the limits of the specific RAID controller.

Examples

Example using channel number and SCSI ID:
Array.A = 1:1,1:2
Array.C = ALL

Example using integer values:
Array.A = 1,2,3
Array.B = ALL

Hotspares:
Description

Defines a list of specific physical drives to designate as hot-spare drives. You can specify the physical drives using any one of these methods:

- The channel number and SCSI ID (for SCSI) or bus number and target ID (for SATA/SAS) of each drive. The channel number or bus number is always 1-based. The SCSI ID or target ID is always 0-based.
- A list of integer values indicating that the \( n \)th drive should be included in the array.
- The keyword ALL to indicate that all remaining drives attached to the controller that are not specified in previous arrays should be included in the current array.

Examples

Example using channel number and SCSI ID:
Hotspares = 1:12,2:14

Example using integer value:
Hotspares = 12, 13

Logical_Mode:
Description

Defines the logical-drive creation policy to use when creating logical drives. Possible values are:

- AUTO: Indicates that defaults should be used for all parameters. Default parameters are:
  - One logical drive is created on each array using all available space.
  - The RAID level is set using the AUTO (default) scheme.
  - Write-cache mode is set using the default value for the controller.

  You can adjust these default values using the Logical_Defaults parameter.

- CUSTOM: Indicates that you want to specify all of the parameters for each logical drive that is created. If you specify CUSTOM, then you must specify the parameters for each logical drive using the Logical.num parameter.

Examples

Logical_Mode = CUSTOM

Logical_Defaults:
Description

Defines the default logical drive settings that should be used when creating logical drives. This parameter is only valid when AUTO is specified for Logical_Mode. Values for this parameter are expressed in the format: \( \text{size:raidlevel:writecmode} \), where:

- Size specifies the size of each logical drive. One logical drive will be created on each array using the given size. Size can be in any of the following formats:
  - A positive integer – specifies the size in MB.
A percentage – specifies that a percentage of the total space should be used.
FILL – indicates that all available space on the array should be used.

Raidlevel specifies the RAID level for the logical drive. See “Supported settings for RAID controllers” for the list of RAID level settings supported by PRAID for each controller.

Writecmode is an optional parameter that specifies the write-cache mode for each logical drive. If the write-cache mode cannot be set for a specific configuration, then this parameter will be ignored. See “Supported settings for RAID controllers” for the list of write_cache mode settings supported by PRAID for each RAID controller.

Valid values are:
- ON
- OFF
- AUTO uses the default write-cache mode for the controller. (Recommended for most users.) This is the default value if writecmode is not specified.

Examples
Logical_Defaults = 50%:5EE:AUTO

Logical.num:

Description

Lets you specify how many logical drives are created and the specific parameters for each logical drive. You can set the array letter where the logical drive is located, logical drive size, RAID level, and write-caching mode for each logical drive. The first logical drive must be labeled Logical.1. Additional logical drives are numbered Logical.2, Logical.3, and so on. You must specify at least one logical drive for each array. The maximum number of drives allowed per array and the maximum total number of logical drives allowed is determined by the specific RAID controller.

Values for this parameter are expressed in the format:
array:size:raidlevel:writecmode where array specifies the array letter, and size, raidlevel, and writecmode are as described in “Logical_Defaults” on page 53.

Examples
Logical.1 = A:50%:0
Logical.2 = A:50%:5EE
Logical.3 = B:FILL:1:ON
Logical.4 = C:4096:AUTO:AUTO

Supported settings for RAID controllers: Table 8 on page 55 lists the supported settings for each RAID controller when using PRAID.

In some cases, the list of supported settings when using PRAID might differ from the supported settings of the RAID controller. These known cases are indicated in the table.
Table 8. Supported settings for each RAID controller when using PRAID. Bold settings are defaults.

<table>
<thead>
<tr>
<th>Controller</th>
<th>Rebuild Rate</th>
<th>Read Ahead</th>
<th>Stripe Size</th>
<th>RAID Levels¹</th>
<th>Write-cache Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServeRAID-6m</td>
<td>• HIGH</td>
<td>• ADAPTIVE</td>
<td>• 8 16 32 64</td>
<td>• 0 1 1E 10 5 50 5EE AUTO</td>
<td>• ON 10 OFF AUTO</td>
</tr>
<tr>
<td></td>
<td>• MEDIUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-7t</td>
<td>[n/a]</td>
<td></td>
<td>16 32 64</td>
<td>0 1 5 10 VOLUME AUTO</td>
<td>ON OFF AUTO</td>
</tr>
<tr>
<td></td>
<td>[n/a]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-8i</td>
<td>[n/a]</td>
<td></td>
<td>16 32 64 128 256 512</td>
<td>0 1 1E 10 5 50 5EE VOLUME</td>
<td>ON OFF AUTO</td>
</tr>
<tr>
<td></td>
<td>[n/a]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-8k</td>
<td>[n/a]</td>
<td></td>
<td>16 32 64 128 256 512 1024</td>
<td>0 1 1E 10 5 6 VOLUME</td>
<td>ON OFF AUTO</td>
</tr>
<tr>
<td></td>
<td>[n/a]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-8k-l</td>
<td>[n/a]</td>
<td></td>
<td>16 32 64 128 256 512 1024</td>
<td>0 1 10 VOLUME AUTO</td>
<td>[n/a]</td>
</tr>
</tbody>
</table>

¹ RAID Levels include: 0, 1, 1E, 10, 5, 50, 5EE, VOLUME, AUTO.
<table>
<thead>
<tr>
<th>Controller</th>
<th>Rebuild Rate</th>
<th>Read Ahead</th>
<th>Stripe Size</th>
<th>RAID Levels¹</th>
<th>Write-cache Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServeRAID-8s</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>• 16</td>
<td>• 0</td>
<td>[n/a]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 32</td>
<td>• 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 64</td>
<td>• 1E</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 128</td>
<td>• 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 256</td>
<td>• 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 512</td>
<td>• 50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 1024</td>
<td>• 6</td>
<td>VOLUME</td>
</tr>
<tr>
<td>LSI-SCSI-RAID (1020/1030)</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>• 8</td>
<td>• 0</td>
<td>[n/a]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 16</td>
<td>• 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 32</td>
<td>• 1E²</td>
<td></td>
</tr>
<tr>
<td>LSI-SAS-RAID (1064/1064E/1068)</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>• 64</td>
<td>• 0</td>
<td>[n/a]</td>
</tr>
<tr>
<td>IBM SAS HBA</td>
<td></td>
<td></td>
<td>• 8</td>
<td>• 1</td>
<td></td>
</tr>
<tr>
<td>IBM 3 Gb SAS HBA v2</td>
<td></td>
<td></td>
<td>• 16</td>
<td>• 1E</td>
<td></td>
</tr>
<tr>
<td>ServeRAID BR10i</td>
<td></td>
<td></td>
<td>• 32</td>
<td>• 60</td>
<td></td>
</tr>
<tr>
<td>ServeRAID BR10il</td>
<td></td>
<td></td>
<td>• 64</td>
<td>• 60</td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10i</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10ie</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10il</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10is</td>
<td>• HIGH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• MEDIUM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• LOW</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10k</td>
<td>• ADAPTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 8</td>
<td></td>
<td></td>
<td>• 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 16</td>
<td></td>
<td></td>
<td>• 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 32</td>
<td></td>
<td></td>
<td>• 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 64</td>
<td></td>
<td></td>
<td>• 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 128</td>
<td></td>
<td></td>
<td>• 50</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 60</td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR10M</td>
<td>• ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR1015</td>
<td>• OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-MR1015-R5</td>
<td>• AUTO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ RAID Levels include: 0, 1, 1E, 10, 5, 50, 6, 60, VOLUME.
Table 8. Supported settings for each RAID controller when using PRAID (continued). Bold settings are defaults.

<table>
<thead>
<tr>
<th>Controller</th>
<th>Rebuild Rate</th>
<th>Read Ahead</th>
<th>Stripe Size</th>
<th>RAID Levels¹</th>
<th>Write-cache Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSI SAS 1078</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>* 0</td>
<td>[n/a]</td>
</tr>
<tr>
<td>LSI MegaRAID 8480</td>
<td>[n/a]</td>
<td>[n/a]</td>
<td>8</td>
<td>* 0</td>
<td>[n/a]</td>
</tr>
<tr>
<td>ServeRAID-M5014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-M5014</td>
<td>HIGH</td>
<td></td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ServeRAID-M5015</td>
<td>HIGH</td>
<td></td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ServeRAID-M5025</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-M5025</td>
<td>HIGH</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ServeRAID-B5015</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. RAID levels 5E and 5EE support only one logical drive per array.
2. RAID level 1E is supported for the LSI 1030 only on the xSeries model 336.

Default RAID levels are described in “Default RAID levels.”

**Default RAID levels:** The default RAID level that is applied to a logical drive depends on the number of drives in the array and the controller type. These
default values are designed to match the default values of the express
configuration method in ServeRAID Manager where applicable. The following
table shows the default RAID values that PRAID will use when AUTO is specified
for raidlevel.

Table 9. Default RAID levels

<table>
<thead>
<tr>
<th>Controller</th>
<th>Drives in Array</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>ServeRAID-6M</td>
<td>RAID 0</td>
</tr>
<tr>
<td>ServeRAID-7t</td>
<td>RAID 0</td>
</tr>
<tr>
<td>ServeRAID-8i</td>
<td>VOLUME</td>
</tr>
<tr>
<td>ServeRAID-8k</td>
<td>VOLUME</td>
</tr>
<tr>
<td>ServeRAID-8k-l</td>
<td>VOLUME</td>
</tr>
<tr>
<td>ServeRAID-8s</td>
<td>VOLUME</td>
</tr>
<tr>
<td>LSI-SCSI-RAID (1020/1030)</td>
<td>[n/a]</td>
</tr>
<tr>
<td>• LSI-SAS-RAID (1064/1064E/1068)</td>
<td>[n/a]</td>
</tr>
<tr>
<td>• IBM SAS HBA</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• IBM 3Gb SAS HBA v2</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServeRAID BR10i</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServeRAID BR10il</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10i</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10ie</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10il</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10k</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10is</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServerRAID-MR10M</td>
<td>RAID 0</td>
</tr>
<tr>
<td>• ServeRAID-MR1015</td>
<td>RAID 0</td>
</tr>
<tr>
<td>LSI-SAS-1078</td>
<td>[n/a]</td>
</tr>
<tr>
<td>LSI MegaRAID 8480</td>
<td>RAID 0</td>
</tr>
</tbody>
</table>

**INVRAID**

This program can be used to dump all of the RAID controller configuration
information to an output file. INVRAID supports the following RAID controllers:

- ServeRAID-6M
- ServeRAID-7t
- ServeRAID-8i
- ServeRAID-8k
- ServeRAID-8k-l
- ServeRAID-8s
- ServeRAID-10k
- ServeRAID-10M
- ServeRAID-B5015
- ServeRAID-BR9i
- ServeRAID-BR10i
- ServeRAID-BR10ie
- ServeRAID-BR10il
- ServeRAID-M5014
- ServeRAID-M5015
- ServeRAID-M5025
- ServeRAID-MR10i
- ServeRAID-MR10il
- ServeRAID-MR10is
- ServeRAID-MR1015
- ServeRAID-MR1015–R5
- LSI SCSI (1020/1030)
- LSI SAS (1064/1064E/1068/1078)

Environment requirements

INVRAID works by parsing the output of other RAID-configuration utilities. To accomplish this, the following utilities must be located in the system search path.

<table>
<thead>
<tr>
<th>Adapter</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServeRAID-6M</td>
<td>IPSENDE</td>
</tr>
<tr>
<td>ServeRAID-7t, 8i, 8k, 8k-l, 8s</td>
<td>ARCCONF</td>
</tr>
<tr>
<td>LSI-SCSI 1020/1030, LSI-SAS 1064/1064E, LSI-SAS 1068, LSI-SAS 1078, ServeRAID BR9i, BR10i, BR10ie, BR10il</td>
<td>CFGGEN</td>
</tr>
<tr>
<td>MegaRAID SAS, ServeRAID-M5014, M5015, M5025, MR10i, MR10ie, MR10il, MR10is, MR10k, MR10M, MR1015, MR1015–R5</td>
<td>MEGACLI</td>
</tr>
<tr>
<td>ServeRAID-B5015</td>
<td>BRCLI</td>
</tr>
</tbody>
</table>

Usage

invraid [-I | -P] -f

Table 10. INVRAID parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-I</td>
<td>Displays information about all host adapters in the system in an INI-file format.</td>
</tr>
<tr>
<td>-P</td>
<td>Dumps information about all host adapters in a system in a keyword=value format.</td>
</tr>
<tr>
<td>-f :filename</td>
<td>Directs the output of invraid to the specified file.</td>
</tr>
</tbody>
</table>
Return values

Table 11 lists the values returned by INVRAID.

<table>
<thead>
<tr>
<th>Return Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Success</td>
</tr>
<tr>
<td>1</td>
<td>Syntax Error</td>
</tr>
<tr>
<td>2</td>
<td>Program Error</td>
</tr>
</tbody>
</table>

Examples

To dump the information about all RAID controllers in a system to a file in INI file format with the name myraid.ini, use the -I parameter as shown here:

```
invraid.exe -i -f:myraid.ini
```

Returns:

```
[System]
Machine_Type = 7233
Serial_Number = 23A00075
Total_Number_Of.Controllers = 2

[RAIDController.1]
Model = LSI-SAS-1078-IR
BIOSVersion = 6.22.00.00
FirmwareVersion = 1.25.82.00
DriverVersion =
RebuildRate = HIGH
StripeSize =
ReadAhead = ADAPTIVE
PCI = 4:0:0:1000:0062:FFFF:FFFF

[RAIDController.1.Array]
Total_Number_Of.Arrays = 1
ID.1 = A
Members.1 = 1,2

[RAIDController.1.Hotspares]
Total_Number_Of.Hotspares = 0

[RAIDController.1.Logical]
Total_Number_Of.Logicals = 1
Array.1 = A
Size.1 = 139236
Raid_Level.1 = 1
WriteCache.1 = AUTO
State.1 = Okay (OKY)
Derived_State.1 = GOOD

[RAIDController.1.Physical]
Total_Number_Of.Physicals = 4
Channel.1 = 1
ID.1 = 0
Size.1 = 140013
Type.1 = SAS
Serial_Number.1 = 3NM25QED0000980322JB
State.1 = Online (ONL)
Derived_State.1 = GOOD
```
Channel.2 = 1
ID.2 = 1
Size.2 = 140013
Type.2 = SAS
Serial_Number.2 = 3NM23CV0000974732Y9
State.2 = Online (ONL)
Derived_State.2 = GOOD

Channel.3 = 1
ID.3 = 2
Size.3 = 140013
Type.3 = SAS
Serial_Number.3 = 3NM2000900009746H8BY
State.3 = Ready (RDY)
Derived_State.3 = GOOD

Channel.4 = 1
ID.4 = 3
Size.4 = 140013
Type.4 = SAS
Serial_Number.4 = 3NM23J1J00009746XNSB
State.4 = Ready (RDY)
Derived_State.4 = GOOD

[RAIDController.2]
Model = ServeRAID-MR10M
BIOSVersion = 2.02.00
FirmwareVersion = 1.40.12-0551
DriverVersion =
PCI = 30:0:0:1000:0060:1014:0379

[RAIDController.2.Array]
Total_Number_Of_Arrays = 0

[RAIDController.2.Hotspares]
Total_Number_Of_Hotspares = 0

[RAIDController.2.Logical]
Total_Number_Of_Logicals = 0

[RAIDController.2.Physical]
Total_Number_Of_Physicals = 0

Using the -p parameter returns the same information, but the section title from the properties file is shown for each value:

invraid -p -f:myfile.ini

Returns:

System_Machine_Type = 7233
System_Serial_Number = 23A0075
RAIDController.1.Model = LSI-SAS-1078-IR
RAIDController.1.BIOSVersion = 6.22.00.00
RAIDController.1.FirmwareVersion = 1.25.82.00
RAIDController.1.DriverVersion =
RAIDController.1.RebuildRate = HIGH
RAIDController.1.StripeSize =
RAIDController.1.ReadAhead = ADAPTIVE
RAIDController.1.PCI = 4:0:0:1000:0062:FFFF:FFFF

RAIDController.1.Array.ID.1 = A
RAIDController.1.Array.Members.1 = 1,2

RAIDController.1.Logical.Array.1 = A
RAIDController.1.Logical.Size.1 = 139236
RAIDController.1.Logical.Raid_Level.1 = 1
RAIDController.1.Logical.WriteCache.1 = AUTO
RAIDController.1.Logical.State.1 = Okay (OKY)
RAIDController.1.Logical.Derived_State.1 = GOOD

RAIDController.1.Physical.Channel.1 = 1
RAIDController.1.Physical.ID.1 = 0
RAIDController.1.Physical.Size.1 = 140013
RAIDController.1.Physical.Type.1 = SAS
RAIDController.1.Physical.Serial_Number.1 = 3NM2SQED0000980322JB
RAIDController.1.Physical.State.1 = Online (ONL)
RAIDController.1.Physical.Derived_State.1 = GOOD

RAIDController.1.Physical.Channel.2 = 1
RAIDController.1.Physical.ID.2 = 1
RAIDController.1.Physical.Size.2 = 140013
RAIDController.1.Physical.Type.2 = SAS
RAIDController.1.Physical.Serial_Number.2 = 3NM223CV0000974732Y9
RAIDController.1.Physical.State.2 = Online (ONL)
RAIDController.1.Physical.Derived_State.2 = GOOD

RAIDController.1.Physical.Channel.3 = 1
RAIDController.1.Physical.ID.3 = 2
RAIDController.1.Physical.Size.3 = 140013
RAIDController.1.Physical.Type.3 = SAS
RAIDController.1.Physical.Serial_Number.3 = 3NM2000900009746H8BY
RAIDController.1.Physical.State.3 = Ready (RDY)
RAIDController.1.Physical.Derived_State.3 = GOOD

RAIDController.1.Physical.Channel.4 = 1
RAIDController.1.Physical.ID.4 = 3
RAIDController.1.Physical.Size.4 = 140013
RAIDController.1.Physical.Type.4 = SAS
RAIDController.1.Physical.Serial_Number.4 = 3NM23J1J00009746XNSB
RAIDController.1.Physical.State.4 = Ready (RDY)
RAIDController.1.Physical.Derived_State.4 = GOOD

RAIDController.2.Model = ServeRAID-MR10M
RAIDController.2.BIOSVersion = 2.02.00
RAIDController.2.FirmwareVersion = 1.40.12-0551
RAIDController.2.DriverVersion =
RAIDController.2.PCI = 30:0:0:1000:0060:1014:0379

**VALRAID**

VALRAID is a utility program that can be used to validate policy files against inventory files generated by the INVRAID utility.

VALRAID has two modes of operation:
- **Simulation mode** - simulates the effect a policy file would have on a controller.
- **Check mode** - determines whether the policy file matches the configuration represented in the inventory file.

**Simulation mode**

Used in simulation mode, VALRAID will simulate the effect that a policy file would have on a RAID configuration if it were applied using the PRAID utility. This capability can be used when creating PRAID policy files. The policy files can be tested without running PRAID on the target system.
**Check mode**

Used in check mode, VALRAID determines whether the policy file specified matches the RAID configuration represented in the inventory file. This capability can be used in OS deployment scripts to skip the RAID configuration step if the controller is already configured with the required RAID configuration and thus avoiding an extra reboot before installing the OS. VALRAID will set the return code = 20 to indicate that the policy file does not match the configuration represented by the inventory file.

**Usage**

The two modes of operation share most parameters, but the syntax is mode-specific.

The simulation mode syntax is:

```
valraid -ini:input_inventory_file -inp:input_policy_file -outi:output_inventory_file
-outp:output_policy_file -raid:inifiles
```

The check mode syntax is:

```
valraid -c -ini:input_inventory_file -inp:input_policy_file -raid:inifiles
```

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>-outi:output_inventory_file</td>
<td>Specifies the filename for the output inventory file. This is an inventory file representing the RAID configuration that would result from using the PRAID utility to apply input_policy_file to the system described in input_inventory_file. This option is valid only for simulation mode.</td>
<td>valraid -ini:myfile.inv -inp:policy.ini -outi:newfile.inv -outp:newpolicy.ini -raid:/inifiles</td>
</tr>
<tr>
<td>-outp:output_policy_file</td>
<td>Specifies the filename for the output policy file. This file can be applied to a target system using the PRAID utility.</td>
<td>valraid -ini:myfile.inv -inp:policy.ini -outi:newfile.inv -outp:newpolicy.ini -raid:/inifiles</td>
</tr>
</tbody>
</table>
Table 12. VALRAID parameters (continued)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The default is /opt/ibm/sgtk/sdeploy/sgtklinux/.data/valraid</td>
<td></td>
</tr>
<tr>
<td>-c</td>
<td>Specifies check mode.</td>
<td>valraid -c -ini:myfile.inv -inp:policy.ini -raid:/inifiles</td>
</tr>
<tr>
<td></td>
<td>Check mode compares the configuration from input_inventory_file to the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>configuration represented in input_policy_file.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The default is simulation mode.</td>
<td></td>
</tr>
</tbody>
</table>

**Return codes**

VALRAID uses the following return codes:
- 0 – Success
- 1 – Error parsing input policy file
- 2 – Error parsing input inventory file
- 3 – Controller is not supported
- 4 – Raid level is not supported
- 5 – Stripesize is not supported
- 6 – Number of arrays not supported
- 7 – Number of drives in array not supported
- 8 – Number of logical volumes in array is not supported
- 9 – Not enough drives to create hotspare
- 10 – Not enough drives of the same size
- 11 – Error opening input policy file
- 12 – Error opening input inventory file
- 13 – Error opening output inventory file
- 14 – Error writing to output inventory file
- 15 – Error opening output policy file
- 16 – Error writing output policy file
- 17 – Partial drive sizing not supported
- 18 – Command line syntax error
- 19 – No policy match
- 20 – Controller not configured, does not match policy file

**Tools included with the Linux Scripting Toolkit**

The Linux Scripting Toolkit includes several additional tools to make the Toolkit more efficient. This section describes the additional tools provided by this release of the Linux Scripting Toolkit:
- Advanced Settings Utility
- SCLI
**Advanced Settings Utility**

For convenience, the Linux Scripting Toolkit, includes the Advanced Settings Utility (ASU). You can use ASU to modify firmware settings from the command line on multiple operating-system platforms.

The Linux Scripting Toolkit uses a subset of the ASU function in order to capture and deploy firmware settings as part of your scripted deployments.

**Usage**

This section describes the ASU functions used by the Linux Scripting Toolkit.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>asu show all</td>
<td>Is used to display and capture BIOS settings. You can use redirection to store this output in a file as shown here: asu.exe show bios &gt; bios_settings.ini</td>
</tr>
<tr>
<td>asu save filename</td>
<td>Is used to apply CMOS settings from a file. ASU looks for the filename specified by filename, and reads the contents. If the contents are valid CMOS settings, they are applied, one line at a time, to the server. This example applies the settings captured above: asu save bios_settings.ini</td>
</tr>
<tr>
<td>asu set IMM.HostIPAddress IP address</td>
<td>Sets the external IP address in the Integrated Management Module (IMM) to the specified address. This setting is part of the IMM group.</td>
</tr>
<tr>
<td>asu set IMM.LandOverUsb enabled</td>
<td>disables –kcs</td>
</tr>
</tbody>
</table>

**SCLI**

You can use the SCLI utility to configure Fibre Host Bus Adapters (HBAs). A 32-bit version of this utility comes with the Linux Scripting Toolkit. You can download this utility from QLogic at [http://www.qlogic.com](http://www.qlogic.com).
Usage

Table 14. SCLI usage

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>`scli -e (view</td>
<td>?)`</td>
</tr>
</tbody>
</table>
| `scli -e (hba_instance | hba_wwpn target_wwnn target_wwpn lun_id [prim | alt1 | alt2 | alt3])` | Configures the Operating System to boot from a particular target, where:  
  - `hba_instance` | The HBA instance number of an HBA port.  
  - `hba_wwpn` | The World Wide Port Name of an HBA port.  
  - `lun_id` | The Logical Unit Number of a LUN.  
  - `prim` | The primary boot port name.  
  - `altn` | The name of the alternate boot port. You can specify up to three alternate boot ports.  |
| `scli -e (hba_instance | hba_wwpn) (view | ?)` | Shows the current boot device information for the specified HBA port. |
| `scli -e (hba_instance | hba_wwpn) (enable | 0 0 0)` | Configures the operating system to boot from the first target found by the BIOS. The default LUN is 0.  |
| `scli -e (hba_instance | hba_wwpn) disable [prim | alt1 | alt2 | alt3]` | Clears the selected boot device settings on the indicated HBA port. |
| `scli -l (hba_instance | hba_wwpn)` | Displays information about the LUNs attached to the specified HBA port. |

Examples

The following examples illustrate scli utility usage.

**Note:** Please note that while some of these examples are broken across multiple lines, when using SCLI, you must enter all of the parameters on a single line.

<table>
<thead>
<tr>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>scli -e view</code></td>
<td>Displays the current boot device information on all HBAs.</td>
</tr>
</tbody>
</table>
### Example

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
</table>

### LINLPCFG

You can use the LINLPCFG utility that comes with Linux Scripting Toolkit to configure Fibre Host Bus Adapters (HBAs). You can download this utility from Emulex at [http://www.emulex.com](http://www.emulex.com).

#### Usage

*Table 15. LINLPCFG usage*

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>linlpcfg help</code></td>
<td>Displays the syntax for LINLPCFG commands.</td>
</tr>
<tr>
<td><code>linlpcfg ?</code></td>
<td>Displays the syntax for LINLPCFG commands.</td>
</tr>
<tr>
<td><code>linlpcfg help command</code></td>
<td>Displays the syntax for LINLPCFG commands.</td>
</tr>
<tr>
<td><code>linlpcfg ? command</code></td>
<td>Displays the syntax for LINLPCFG commands.</td>
</tr>
</tbody>
</table>
| `linlpcfg listwwn` | Lists all adapters installed in the system with the following information:  
  - WWN  
  - WWPN  
  - WWNN |
| `linlpcfg listwwn` | Lists all adapters installed in the system with the following information:  
  - adapter number  
  - IEEE address (from the manufacturer)  
  - functional firmware level  
  - adapter type  
  - any possible mailbox errors |
| `linlpcfg readbootdevice n=adapter_number` | Displays the following information about the currently selected boot device:  
  - WWN  
  - LUN  
  - topology in use |
| `linlpcfg enableboot n=adapter_number i=index` | Enables the BootBIOS for the specified adapter number. Index (i) is the index number given by the listboot command. |
| `linlpcfg disableboot n=adapter_number i=index` | Enables the BootBIOS for the specified adapter number. Index (i) is the index number given by the listboot command. |
Table 15. LINLPCFG usage (continued)

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>linlpcfg setbootdevice n=adapter_number w0=wwpn_word_0 w1=wwpn_word_1 l=decimal_id_of_lun t=topology</code></td>
<td>Sets the boot device to the device specified by the adapter number, WWPN words, LUN ID, and topology. Enter this command on a single line.</td>
</tr>
<tr>
<td><code>linlpcfg readaltboot n=adapter_number</code></td>
<td>Displays the WWPN and LUN numbers of all possible alternate boot devices. You can have up to seven alternate boot devices.</td>
</tr>
<tr>
<td><code>linlpcfg setaltboot n=adapter_number i=index w0=wwpn_word_0 w1=wwpn_word_1 l=decimal_id_of_lun</code></td>
<td>Sets an alternate boot device. You can have up to seven alternate boot devices, specified by indices from 1 to 7.</td>
</tr>
</tbody>
</table>

**UpdateXpress System Pack Installer**

For convenience, the Linux Scripting Toolkit includes the UXSPi to help you acquire updates for inclusion in your deployment scenarios. The UpdateXpress System Pack Installer is located at: `...sgdeploy\updates\uxsp`.

The UpdateXpress System Pack Installer can perform these functions:
- Acquire firmware and driver updates for supported machine type/operating system combinations from a remote location, such as the IBM Support Web site.
- Inventory a system to be updated and compare the inventory to the list of available updates, then recommend and deploy a set of updates for the system.
- Create bootable media on CD-ROM, DVD, or USB key to use in applying firmware to supported systems.

For more information on running the UpdateXpress System Pack Installer, change directory to the UXSPi directory and run the UXSPi executable, `uxspi500` as shown below:

```
uxspi500 -update -help
```

**Usage**

The Linux Scripting Toolkit uses the UXSPi in the update mode to acquire and deploy device drivers and firmware as part of Linux Scripting Toolkit deployments. This section details the command-line options for the `uxspi500 -update` mode.

Table 16. UXSPi update mode options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--firmware</td>
<td>The firmware option forces UXSPi to install only firmware updates.</td>
</tr>
<tr>
<td>--drivers</td>
<td>The driver option forces UXSPi to install only driver updates.</td>
</tr>
<tr>
<td><code>-f update_ids, --force=update_ids</code></td>
<td>Specifies that UXSPi use the unattendedForcedInstallCommandLine field in the update XML rather than the unattendedInstallCommandLine field.</td>
</tr>
</tbody>
</table>
Table 16. UXSPi update mode options (continued)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-s update_ids –select=update_ids</td>
<td>The select option deploys the specified set of updates to the target system even if the system version is newer than the version in the update package. Use this option to roll-back firmware and driver levels where necessary.</td>
</tr>
<tr>
<td>-l update_xml_path, –local=update_xml_path</td>
<td>Specifies the filename of a local UXSP XML file or the path to search for one.</td>
</tr>
<tr>
<td>-n, –new</td>
<td>Selects all updates that are newer than the current system versions or not currently installed on the system.</td>
</tr>
<tr>
<td>-e update_ids, –exclude=update_ids</td>
<td>Excludes the specified update IDs. You can provide multiple IDs in a comma-separated list.</td>
</tr>
<tr>
<td>-i update_ids, –include=update_ids</td>
<td>Includes the updates specified in the list of update IDs. You can provide multiple IDs in a comma-separated list.</td>
</tr>
<tr>
<td>--ignore-undected=update_ids</td>
<td>Specifies not to apply the indicated update IDs. You can provide multiple IDs in a comma-separated list.</td>
</tr>
<tr>
<td>-L, –latest</td>
<td>The default behavior of UXSPi is to apply the latest UXSPi update pack found in the UXSPi directory. This option forces UXSPi to install the latest updates whether they are from an update pack, are individual updates, or a combination of the two.</td>
</tr>
<tr>
<td>--remote=remote_address</td>
<td>Runs the update command on the remote server specified by remote_address.</td>
</tr>
<tr>
<td>--remote-user=remote_user</td>
<td>Specifies the remote user ID to use when connecting to a remote system specified with --remote.</td>
</tr>
<tr>
<td>--remote-password=password</td>
<td>Sets the password for the user ID specified by --remote-user.</td>
</tr>
<tr>
<td>--remote-dir=directory</td>
<td>Specifies the staging or working directory on the remote system.</td>
</tr>
<tr>
<td>--noinventory</td>
<td>Causes UXSPi to gather only the machine type and operating system information without performing an inventory of existing updates.</td>
</tr>
<tr>
<td>--nouxsp</td>
<td>Do not deploy UXSPs.</td>
</tr>
<tr>
<td>-r, –report</td>
<td>Displays a summary report of updates used in the compare step.</td>
</tr>
</tbody>
</table>

Examples

The following example can be used to specify an UpdateXpress System PackXML file named uxsp.xml located in the same directory as the UXSPi executable.

```
./uxspi500 update -l uxsp.xml
```
Chapter 9. Hints and tips

This section contains information on known problems and limitations, best practices, and hints and tips for using the Linux Scripting Toolkit.

Performing PXE deployments using the Linux Scripting Toolkit

To perform a PXE deployment using the Linux Scripting Toolkit, you must first configure the TFTP server on the source server and update the Toolkit Preferences page with the IP address of the TFTP server.

When you use the Linux Scripting Toolkit to create PXE image deployments based on the provided Boot Media Profiles, the files are placed in the /tftpboot directory. For example, to apply a PXE deployment image created from a Boot Media Profile called PXE_test, you must follow these steps:

1. Select Create Boot Media in the Linux Scripting Toolkit. When the process is complete, the following directory structure is created in the /tftpboot directory:

```
/tftpboot/
/tftpboot/lnxtoolkit
/tftpboot/lnxtoolkit/pxelinux.cfg
/tftpboot/lnxtoolkit/pxelinux.cfg/PXE_test
/tftpboot/lnxtoolkit/PXE_test
/tftpboot/lnxtoolkit/PXE_test/tc.zip
/tftpboot/lnxtoolkit/PXE_test/img2a
/tftpboot/lnxtoolkit/PXE_test/tcrootfs
/tftpboot/lnxtoolkit/PXE_test/img3a
/tftpboot/lnxtoolkit/bsb1.lss
/tftpboot/lnxtoolkit/pxelinux.0
/tftpboot/lnxtoolkit/bsb.msg
/tftpboot/pxelinux.cfg
```

2. Check the contents of the configuration file. As a rule, no changes should be required. In this example the configuration file is /tftpboot/lnxtoolkit/PXE_test. The contents will be similar to this example:

```
prompt 0
default toolscenter
timeout 100
label toolscenter
display bsb.msg
kernel /PXE_test/img2a
append initrd=/PXE_test/img3a vga=0x317 root=/dev/ram0 rw ramdisk_size=100000
ftp_server=192.168.0.1 ftp_tcrootfs=/lnxtoolkit/PXE_test/tcrootfs
ftp_tczip=/lnxtoolkit/PXE_test/tc.zip debug_level=1
silent_boot=no boot_src=4 ftp_blksize=1420 media_boot=no
```

3. Copy the contents of the configuration file to the default file:

   `cp /tftpboot/lnxtoolkit/pxelinux.cfg/PXE_test /tftpboot/lnxtoolkit/pxelinux.cfg/default`

4. Ensure that the DHCP configuration contains a block similar to this example, using the IP address of your server:

   ```
   if substring(option vendor-class-identifier, 0,9) = "PXEClient" { 
     filename "lnxtoolkit/pxelinux.0";  # file to be served
     next-server 192.168.0.1;  # This server's ipaddress
   }
   ```
After you have completed these steps, any system within the DHCP server network will be capable of booting this generated PXE image.

**Performing a PXE deployment to a specific device**

To perform a PXE deployment to a specific target, you must have the MAC address of the target. Then, using that address, follow these steps:

1. Select **Create Boot Media** in the Linux Scripting Toolkit. When the process is complete, the following directory structure is created in the `/tftpboot` directory:

```
/tftpboot/
/tftpboot/lnxtoolkit
/tftpboot/lnxtoolkit/pxelinux.cfg
/tftpboot/lnxtoolkit/pxelinux.cfg/PXE_test
/tftpboot/lnxtoolkit/PXE_test
/tftpboot/lnxtoolkit/PXE_test/tc.zip
/tftpboot/lnxtoolkit/PXE_test/tcrootfs
/tftpboot/lnxtoolkit/PXE_test/img2a
/tftpboot/lnxtoolkit/PXE_test/img3a
/tftpboot/lnxtoolkit/bsb1.lss
/tftpboot/lnxtoolkit/pxelinux.0
/tftpboot/lnxtoolkit/bsb.msg
/tftpboot/pxelinux.cfg
```

2. Check the contents of the configuration file. As a rule, no changes should be required. In this example the configuration file is `/tftpboot/lnxtoolkit/PXE_test`. The contents will be similar to this example:

```
prompt 0
default toolscenter
timeout 100
label toolscenter
display bsb.msg
kernel /PXE_test/img2a
append initrd=/PXE_test/img3a vga=0x317 root=/dev/ram0 rw ramdisk_size=100000
        tftp_server=192.168.0.1 tftp_tcrootfs=/lnxtoolkit/PXE_test/tcrootfs
        tftp_tczip=/lnxtoolkit/PXE_test/tc.zip debug_level=1
        silent_boot=no boot_src=4 tftp_blksize=1420 media_boot=no
```

3. Change to the `/tftpboot/lnxtoolkit/pxelinux.cfg/` directory and create a symbolic link using the MAC address of the target system that points to the bootable media configuration file:

```
ln -s PXE_test 01-00-14-5e-b5-4a-7e
```

4. Ensure that the rest of the DHCP configuration contains a block similar to this example:

```
host mymachine {
        hardware ethernet 00:14:5e:b5:4a:7e;
        option domain-name-servers 192.168.0.1; # DNS server
        fixed-address 192.168.0.2; # Target system IP
        filename "lnxtoolkit/pxelinux.0"; # file to be served
        next-server 192.168.0.1; # This server's IP
    }
```

**Disable uEFI PXE to decrease network boot time**

You can improve the network boot time for uEFI-based systems by performing the following steps:

1. Start the System
2. Press F1 to get the Menu Options.
3. Navigate to System Settings > Network > PXE Configuration
4. Select Port %MAC1%.
5. Select Enable PXE and press Enter.
7. Select Save Changes and press ESC.
8. Select Port %MAC2%
9. Select Enable PXE and press Enter.
10. Select Legacy Support and press Enter.
11. Select Save Changes and press ESC.

**Linux X server considerations**

There are some special considerations for using Linux X server with a Remote Supervisor Adapter II (RSA II) port. If you are using this configuration, please be aware of the following items:

If the Remote Supervisor Adapter II-EXA is installed in a server that is running either the Red Hat Linux or SuSE Linux operating system, make sure that the Linux operating system is selected in the Remote Supervisor Adapter II settings in the server BIOS. Complete the following steps to set Linux as the operating system in the server BIOS:

1. Boot or reboot the server. Press F1 when prompted to enter the configuration menu.
2. Select Advanced Setup and then ASM Settings.
3. In the OS USB selection field, select Linux.
4. Select Save Values and Reboot ASM.

**Note:** If you run an automated X Windows system configuration utility, you must repeat these configuration changes.

Install the operating system in text mode. Set the color depth to 16-bit and the screen resolution to 1024 x 768.

If SuSE Linux or Red Hat Linux is already installed and configured to run in text mode, and will never use the X Window system, no additional configuration is required for the RSA II-EXA to function correctly.

The Remote Supervisor Adapter II-EXA requires USB mouse support from the operating system. If you install a supported Linux operating system on your server using a USB mouse, the installation process automatically establishes USB mouse support; no further action is required. If you install a supported Linux operating system using a PS/2 mouse, you must modify the Linux files after installation to add USB mouse support. Follow the instructions in this document to add USB mouse support.

The Remote Supervisor Adapter II-EXA requires a Video Electronics Standard Association (VESA) device driver. The VESA video device driver enables the remote control screen and the local screen to display the same information (clone mode).
When using power management, the video output might not return correctly from some power saving states. To correct this, use the `xset` command to disable DPMS as shown: `xset -dpms`.


**Special considerations for BladeCenter Blades and Linux X server configuration**

After installing, do not change the monitor configuration or any other graphical settings. If you must change the graphics settings, type the following command to start the configuration utility: `sax2 -m 0=fbdev`.

When using power management, the video output might not return correctly from some power saving states. To correct this, use the `xset` command to disable DPMS as shown: `xset -dpms`.

**Booting from a USB key**

In order to boot from a USB key, it must be configured for ServerGuide Scripting Toolkit, Linux Edition deployment. For more information on configuring a USB key for deployments, see: [“Creating bootable media from a workflow” on page 17.](#)

BIOS settings for booting from a USB key are system-specific. Refer to the documentation for your systems for the correct BIOS settings and procedures to boot from USB keys.

Some systems support booting from USB keys by pressing F12 during startup. This is the recommended way to use the Linux Scripting Toolkit to deploy from a USB key. uEFI based systems only support booting from a USB key using F12.

**IPv6 compliance**

Beginning in version 2.20, the Linux Scripting Toolkit provides support for IPv6 networks. IPv6 implementation includes:

- Support for IPv6 stateless and stateful address configuration in the pre-installation environment.
- Support for network based installation of operating systems using FTP and HTTP servers.
- Support for creating a remote operating system repository using an IPv6 address as an OS images task.
- Support for IPv6 networks in the Create Boot Media Profile wizard.

**Performing network based installations of SLES11 SP1 using static IPv6 addresses**

When performing a network based installation of SLES11 SP1 in a static IPv6 environment, you must use either `ipv6=1`, which accepts both IPv4 and IPv6 addresses, or `ipv6only=1`, which accepts only IPv6 addresses, as a boot parameter.

For example, to configure static IPv6 addresses for an IPv6-only network, use these boot parameters:

```
ipv6only=1 netdevice=eth0 hostip=2000::2dae:2390/64
```
Enabling Linux Scripting Toolkit PXE images to work with other PXE images

The Linux Scripting Toolkit uses a customized pxelinux.0 file rather than the default file that comes with syslinux. If you already have a PXE server in your network and would like to use PXE images generated by the Linux Scripting Toolkit in conjunction with other PXE images, you must implement a PXE chain by following these steps:

1. Download syslinux 3.72 or higher from http://www.kernel.org/pub/linux/utils/boot/syslinux/.
2. Copy the file core/pxelinux.0 from the syslinux directory structure to your tftproot directory.
3. Extract the file pxechain.com from a PXE image created using the Linux Scripting Toolkit. The pxechain.com file is located in /tftpboot/lnxtoolkit/image_name/tc.zip. For example, if you have created a PXE image called PXE_test using the Linux Scripting Toolkit, you can extract pxechain.com using the following command:
   ```
   unzip /tftpboot/lnxtoolkit/PXE_test/tc.zip
   ```
4. Copy the pxechain.com file to your tftproot directory.
5. Copy /tftpboot/lnxtoolkit/pxelinux.0 to your tftproot directory.
6. Create a subdirectory of your tftproot directory called ibm.
7. Copy the PXE files created by the Linux Scripting Toolkit into the tftproot/ibm directory.
8. Create a subdirectory of tftproot called pxelinux.cfg.
9. Create the file tftproot/pxelinux.cfg/default. This sample default file includes the PXE image created by the Linux Scripting Toolkit. You can add other existing PXE images as shown:
   ```
   prompt 0
   default ibmchain
   timeout 100
   label ibmchain
   kernel pxechain.com
   append ::ibm/pxelinux.0
   label your_other_pxe
   kernel pxechain.com
   append ::your_other_pxe/pxelinux.0
   ```

When you have completed these steps, the tftproot file structure looks like this:

```
|-- ibm
  |-- img2a
  |-- img3a
  `-- pxelinux.0   IBM's modified pxelinux.0
  `-- pxelinux.cfg
      |-- PXE_test  The default file for Linux Scripting Toolkit created PXE Image
      |   `-- tc.zip
      `-- tcrootfs
`-- your_other_pxe
   `-- vmlinux
       |-- initrd.gz
       `-- pxelinux.0  your_other_pxe's pxelinux.0
   `-- pxelinux.cfg
       |-- default  your_other_pxe's default
       `-- pxechain.com pxechain.com from tc.zip (Step 1)
`-- pxelinux.0  pxelinux.0 from syslinux 3.72 (or later)
`-- pxelinux.cfg
      |-- default  default file for pxechain.com
```
IBM ServerProven compatibility

The IBM ServerProven website provides valuable information on selected products for compatibility with IBM System x, BladeCenter, and xSeries servers. Check the following link for up to date compatibility with operating systems, configuration, and hardware options: http://www.ibm.com/servers/eserver/serverproven/compat/us/.

Known problems and limitations

This section provides information and alternative solutions for known problems and limitations of the Linux Scripting Toolkit.

Operating system installation halts after reboot when using LSI SAS RAID controller

Some combinations of LSI SAS RAID controllers and operating systems might experience a system halt after rebooting during operating system installation. The affected operating systems are:

- SLES 10
- SLES 11
- RHEL 5
- VMware 4

in combination with one of these RAID controllers:

- LSI-SAS-1078-IR
- LSI-SAS-(1064,1068)
- ServeRAID-BR10i
- ServeRAID-BR10ie

This problem occurs when the server has a drive that is not part of a RAID array and not configured as a hot spare. The problem is caused by the ordering of Linux mptsas devices.

For example, consider a system that has four drives with two configured in a RAID 1 array, one configured as a hot spare, and one outside the array. The BIOS sees the drive outside the array, /dev/sda, as HDD1. The RAID array, /dev/sdb, is treated as HDD0. The operating system installation puts the boot files on /dev/sda, the drive outside the array, but after the reboot, the installation looks to HDD0 for the boot files.

To work around this problem, use one of these options:

- Do not configure RAID.
- Change the RAID configuration so that all drives are included in a RAID array.
- Remove the drive outside the RAID array from the controller.
- Modify the boot order of the system to point to the drive outside the array instead of the array.

UpdateXpress System Pack Installer returns errors when supported hardware is not present

Deployment tasks that include installation of UpdateXpress System Packs (UXSPs) will return errors if hardware supported by the UXSPs is not present in the target environment.
system. These errors can be safely ignored.

**Savestat will not save to location 9 on xSeries 226 with BIOS PME170CUS**

On the xSeries 226 with BIOS Level PME170CUS, `savestat` cannot save a value to byte nine in persistent storage.

**Missing files in USB key network deployment**

You might receive errors due to missing files when using a USB key as a boot method for network Linux Scripting Toolkit deployments when the key was used previously for local deployments.

In order to perform network installations with a key that has been used for local installations, you must manually remove the `sgdeploy` directory from the key before creating the boot media using the Linux Scripting Toolkit.

**Unattended Linux installation requests network device**

When performing unattended Linux operating system installs, the process might pause to ask which network device to use if there are multiple devices available. To avoid this problem, you can add a kernel parameter to specify the desired network device during the Workflow creation process.

In the OS install section of the workflow, a field is provided for optional kernel parameters.

The kernel parameter varies by operating system:
- For Red Hat and VMware: `ksdevice=eth`, where `eth` is the network device to use. For example eth0, eth1, and so on.
- For SUSE Linux: `netdevice=eth` where `eth` is the network device to use. For example eth0, eth1, and so on.

**RAID configuration fails for ServeRAID-8E SATA**

RAID configuration is not supported for the ServeRAID-8E SATA disk controller. Before you can install an operating system, you must create one or more simple volumes using the BIOS-based utility.

This limitation affects the following systems:
- System x3400, types 7973 and 7974
- System x3550, types 1913 and 7978

**Unattended file not found during installation of SLES on uEFI systems**

When using Linux Scripting Toolkit to install SLES on a uEFI based system, the installation task might be unable to find the answer file, causing the installation to attempt to continue in manual mode.

To resolve this issue, perform these steps:
1. Edit the workflow for your installation.
2. In the OS install section of the workflow, add brokenmodules=usb_storage to the optional kernel parameters.

3. Save the workflow.

4. Create bootable media from the workflow and perform the installation.

5. After the installation is complete, edit the file /etc/modules.d/blacklist, it is recommended that you make a copy of this file before editing it.

6. Remove the line blacklist usb_storage.

This limitation affects the following systems:
- System x3400 M2, types 7836 and 7837
- System x3500 M2, type 7839
- System x3550 M2, types 7946 and 4198
- System x3650 M2, types 7947 and 4199
- System x iDataPlex dx360 M2 types 7321, 7323 and 6380
- BladeCenter HS22, types 7870 and 1936

ServeRAID BR10i adapter not supported on iDataPlex dx360 M2 with 12 Bay Storage Chassis (Machine type 7321)

The ServeRAID BR10i adapter is not supported on the iDataPlex dx360 M2 with 12 Bay Storage Chassis, machine type 7321.

RAID configuration fails for LSI SATA RAID

When performing RAID configuration to configure an LSI 1064/1064e SATA controller, you might receive error code 7 or 11. This error is caused when the cfggen utility is unable to remove or create a configuration on SATA drives larger than 250GB.

To avoid this problem, remove any logical volumes including RAID arrays on the adapters using the Ctrl+C menu on system POST prior to using Linux Scripting Toolkit.

Incorrect association of OS unattended files for SUSE Linux Enterprise Server x64

During the OS Install step in the workflow creation process, the operating system repositories for SLES 10 x64 and SLES 11 x64 are associated with the 32-bit versions of the unattended files by default. This can cause the installation to fail, or the operating system to installed without the correct packages.

To avoid this potential problem, you must manually associate the correct operating system unattended files with the operating system repositories when creating a workflow to install SLES 10 x64 or SLES 11 x64. The correct file associations are shown below

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Unattended filename</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE Linux Enterprise Server 10 x64</td>
<td>sles10x64.xml</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 10 x64 with Xen</td>
<td>sles10x64_xen.xml</td>
</tr>
<tr>
<td>SUSE Linux Enterprise Server 11 x64</td>
<td>sles11x64.xml</td>
</tr>
</tbody>
</table>
Operating System | Unattended filename
--- | ---
SUSE Linux Enterprise Server 11 x64 with Xen | sles11x64_xen.xml

Default Fibre Configurations not supported on Emulex Fibre HBAs

The Target WWNN, Target WWPN and LUN number on the Fibre HBA Toolkit variables need to be set to configure the Primary, Alternate 1, Alternate 2 and Alternate 3 boot device settings. The default settings will not work on Emulex Fibre HBA adapters.

All values are case sensitive. You must ensure that the configured values are identical to the adapter values with regard to case.

ASU configuration fails for Load Defaults

When performing ASU Configuration to load the system defaults, you might receive an error code of 45. This error is caused when the ASU utility is unable to load defaults for the ISCSI.InitiatorName setting. This limitation affects the following systems:
- System x3200 M3, types 7327 and 7328
- System x3250 M3, types 4251, 4252, and 4261
- System x3400 M2, types 7836 and 7837
- System x3500 M2, type 7839
- System x3550 M2, types 7946 and 4198
- System x3650 M2, types 7947 and 4199
- System x iDataplex dx360 M2 types 7321, 7323 and 6380
- BladeCenter HS22, types 7870 and 1936

To avoid this problem, create a new asu.ini file with these contents:

```
loaddefault uEFI
loaddefault SYSTEM_PROD_DATA
loaddefault BootOrder
loaddefault IMM
```

VMware ESX 4 installation requires a minimum of 4GB of memory

When performing an installation of VMware ESX 4, ensure that the target system has a minimum of 4 GB of memory.

RAID configuration fails for disks in JBOD

When performing RAID configuration for ServeRAID M-series controllers, any disks in state JBOD will not be used.

To avoid this problem, change the state of the disks from JBOD to unconfigured-good using the Ctrl+H menu during System POST prior to using theLinux Scripting Toolkit.

VMWARE ESX requires that NUMA system memory be balanced

VMWare installations may fail to load the VMkernel when Non-Uniform Memory Access (NUMA) is enabled and each processor does not have memory in its
adjoining memory banks. For more information on this problem, see RETAIN tip H1974.

**VMware ESX Server 4.1 installation hangs at "Starting vmkernel initialization"**

When installing VMware ESX Server 4.1 on a system with a MAX5 memory expansion module, the installation might hang on this screen. This issue can occur on the following systems:
- BladeCenter HX5, type 7872
- System x3690 X5, types 7148, 7149
- System x3850 X5, type 7145

To avoid this problem, add the kernel parameter `allowInterleaveNUMAnodes=TRUE` during the Workflow Creation and OS installation task phases.

This deployment requires a new kickstart file. Create the new file by following these steps:
1. Create a new OS installation task based on the `esx4.ks` kickstart file.
2. Modify the new task to add the necessary kernel parameter:
   a. Modify the line:
      ```
      bootloader --location=mbr
      ```
   to be:
      ```
      bootloader --location=mbr --append="allowInterleavedNUMAnodes=TRUE"
      ```
3. In the OS installation section of the workflow, a field is provided for optional kernel parameters. Add the following value to this field:
   ```
   allowInterleavedNUMAnodes=TRUE
   ```

**uEFI operating system installations not booting from hard drive**

During native uEFI operating system installations, the target system might fail to boot from the hard drive after Linux Scripting Toolkit processes are complete. This can occur if the target system does not automatically boot the efi file (`bootx64.efi` for RHEL6, or `elilo.efi` for SLES11) from the drive.

The solution to this problem is dependent on the operating system. Please consult the operating system information for instructions on adding a new boot option entry for the efi file.

For example, to correct this problem on most IBM systems, you can create a new boot entry for efi file and continue the installation using that option. Follow the steps below to create a new boot entry for the efi file:
1. Power on the system, and, press F1 to enter setup.
2. Select **Boot Manager**.
3. Select **Add Boot Option**.
4. Select the boot entry which includes string "*.efi"
5. Input the description as **OS_Install** and select **Commit Changes**.

Follow the steps below to continue the installation:
- Power on the system, and press F1 to enter setup.
- Select **Boot Manager**.
• Select **Boot from File**.
• Select the GUID Partition Tables (GPT) System Partition with the name **OS_Install**.
• Select **EFI**.
• Select **Boot**.
• Select **efi file**.

**Note**: If the installation completes and the system does not boot to the operating system, go to the **Start Options** section of the setup menu and select the boot entry for the operating system.
Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your System x or IntelliStation® system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the Hardware Maintenance Manual and Troubleshooting Guide on the IBM xSeries Documentation CD or in the IntelliStation Hardware Maintenance Manual at the IBM Support Web site.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most xSeries and IntelliStation systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM System x or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates.

Getting help and information from the World Wide Web


You can find service information for your IBM products, including supported options, at [http://www.ibm.com/support](http://www.ibm.com/support).

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with xSeries servers, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to [http://www.ibm.com/services/sl/products/](http://www.ibm.com/services/sl/products/).


Hardware service and support

You can receive hardware service through IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to [http://www.ibm.com/planetwide/](http://www.ibm.com/planetwide/) for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.
Appendix B. Notices

This book contains the following notices designed to highlight key information:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or difficult situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.

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- System x

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When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity might vary depending on operating environments.

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