

# Using SmartStart Scripting Toolkit with Microsoft® Automated Deployment Service



August 2003 (First Edition)  
Part Number 340246-001

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# Contents

<b>Abstract</b> .....	<b>5</b>
<b>Audience Assumptions</b> .....	<b>5</b>
<b>Overview</b> .....	<b>5</b>
<b>Using Sysprep</b> .....	<b>6</b>
<b>Supported Servers, BIOS Versions, and Driver Versions</b> .....	<b>6</b>
<b>Supported Hardware Options</b> .....	<b>7</b>
<b>Enabling PXE</b> .....	<b>8</b>
<b>Deploying on Blade Servers</b> .....	<b>9</b>
<b>Configuring HP ProLiant Servers with ADS</b> .....	<b>9</b>
Creating a Virtual Floppy Image for Configuring HP ProLiant Servers .....	9
Sample Files for Capturing System Settings .....	10
Sample Files for Initial Server Deployment .....	11
Sample Files for Post Operating System Installation .....	12
Deploying HP ProLiant Systems with Microsoft ADS.....	12
<b>Updating HP Drivers for Microsoft ADS Deployment Agent Builder</b> .....	<b>14</b>
<b>Troubleshooting</b> .....	<b>15</b>

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## Abstract

This white paper describes how to use Microsoft® Automated Deployment Service (ADS) with HP ProLiant servers.

For detailed information about using Microsoft ADS, refer to the Microsoft ADS User Guide.

For detailed information about using SmartStart Scripting Toolkit, refer to the *SmartStart Scripting Toolkit User Guide* or the *SmartStart Scripting Toolkit Best Practices* at

<http://www.hp.com/servers/sstoolkit>

## Audience Assumptions

This guide is intended for experienced IT professionals.

## Overview

ADS is a tool developed by Microsoft to help deploy and manage Microsoft Windows® 2000 and Windows Server 2003 operating systems. ADS runs on Windows Server 2003, Enterprise and Datacenter Editions. This document focuses on deploying HP ProLiant systems with ADS. Refer to the ADS help file for detailed information about ADS.

ADS comes with tools that bring a server from bare metal to a fully deployed Windows server operating system. A typical deployment requires the following steps:

1. Perform hardware configuration on the target server using an MS-DOS® virtual floppy image that contains HP SmartStart Scripting Toolkit server configuration tools.
2. Download the ADS Deployment Agent to the target server and partition the hard drive.
3. Transfer a previously captured operating system image from ADS to the target server.
4. Customize the target system using Sysprep.
5. Perform post-installation configuration and installation of HP Smart Components on the target server.

This guide explains how to perform HP ProLiant server configuration using ADS, as described in step 1 in the preceding section. HP has been working with Microsoft throughout the development of ADS to ensure the interoperability of ProLiant systems with ADS. MS-DOS virtual floppy images are used in conjunction with the HP SmartStart Scripting Toolkit to set up the system and storage option configurations. Detailed information about using the toolkit and virtual floppy images is described in the following sections of this guide.

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## Using Sysprep

ADS utilizes the Windows System Preparation (Sysprep) tool to prepare the reference operating system for image capturing. Ensure that software installed on the reference system is Sysprep compliant.

The Sysprep executable, along with its documentation and other tools, is located on the Windows CD in the `\support\tools\deploy1.cab` file. Information about the Windows 2000 Sysprep tool can also be found at

<http://www.microsoft.com/windows2000/downloads/tools/sysprep/default.asp>

Sample Sysprep input files (Sysprep.inf) are available from ADS in the `%programfiles%\Microsoft ADS\samples\Sysprep` directory.

## Supported Servers, BIOS Versions, and Driver Versions

**NOTE:** To ensure that HP systems work properly with ADS, change the Standard Boot Order in the ROM-Based Setup Utility (RBSU) so that the network boots before the storage controller. Set the Standard Boot Order as follows:

1. A:
2. CD-ROM
3. Network
4. Storage Controller

Table 1 lists servers and BIOS versions that have been tested with Microsoft ADS. The BIOS versions are the minimums required to work with Microsoft ADS. The servers listed are supported by HP and have been validated through formal internal testing with the default boot controller. These servers are also supported by the core operating system drivers embedded with Windows Server 2003 and do not require additional drivers to use the Microsoft ADS Deployment Agent Builder.

**NOTE:** The Microsoft ADS Deployment Agent Builder is embedded with the Microsoft ADS component Network Boot Service (NBS) for building RAMDISK images. For more detailed information, refer to the "Updating HP Drivers for Microsoft ADS Deployment Agent Builder" section of this guide.

To download the latest system BIOS and Preboot eXecution Environment (PXE) firmware, refer to

<http://h18000.www1.hp.com/support/files/server/us/index.html>

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**Table 1: Minimum BIOS to use with Microsoft ADS**

Server	BIOS Version	PXE Agent Version on Embedded NIC
ProLiant BL10e	I03 02/17/03	4.0.22
ProLiant BL20P	I01 01/31/03	4.0.22
ProLiant BL20P G2	I04 06/19/03	3.1.15
ProLiant BL40P	I02 07/25/03	6.2.11
ProLiant DL360 G2	P26 05/14/03	3.1.15
ProLiant DL360 G3	P31 07/04/03	3.1.15
ProLiant DL380 G2	P24 11/15/02	4.0.17
ProLiant DL380 G3	P29 06/19/03	3.1.15
ProLiant DL580 G2	P27 06/19/03	3.0.05*
ProLiant DL740	P47 06/19/03	3.1.15
ProLiant DL760 G2	P44 06/19/03	3.0.05*
*Not embedded		

**NOTE:** HP recommends updating servers to the latest BIOS regularly.

## Supported Hardware Options

The following tables list hardware options that have been tested with Microsoft ADS. The hardware options listed are supported by HP and have been validated through formal internal testing. The driver versions are the minimums required to work with Microsoft ADS.

Servers that have PXE boot enabled on the embedded NIC automatically connect to the Microsoft PXE Server. Most servers that do not have embedded NICs with PXE support can obtain support with the addition of a PXE-enabled stand-up NIC. Table 2 lists supported stand-up NICs with PXE support.

To download the latest drivers, refer to

<http://h18000.www1.hp.com/support/files/server/us/index.html>

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**Table 2: Supported Stand-up NICs with PXE Support**

<b>NIC</b>	<b>Minimum PXE Agent</b>	<b>Driver Version for Windows 2000 Server</b>	<b>Driver Version for Windows Server 2003</b>
NC3123*	3.0.05	6.4.14.51	6.6.8.6
NC7770**	3.2.1	6.34.0.0	6.34.0.0
NC7170	1.2.11	6.6.4.43	6.6.4.43

\*NC3123 Revisions J and higher have PXE enabled by default.

\*\*Only NC7770 Rev 0E and higher are flash upgradeable. Revision 0E requires that the EEPROM WRITE jumper be moved to ENABLE before attempting a flash. This jumper has to be returned to DISABLE after completing the upgrade.

Table 3 lists supported stand-up array controllers.

**Table 3: Supported Stand-up Array Controllers**

<b>Array Controller</b>	<b>Minimum ROM Version</b>	<b>Driver Version for Windows 2000 Server</b>	<b>Driver Version for Windows Server 2003</b>
SA 5312	2.38	5.46.2.32	5.46.2.32
SA 5304	3.32	5.46.2.32	5.46.2.32
SA 5302	3.32	5.46.2.32	5.46.2.32
SA 532	2.38	5.46.2.32	5.46.2.32
SA 641	1.30	5.46.2.32	5.46.2.32
SA 642	1.30	5.46.2.32	5.46.2.32
SA 5i Plus	2.38	5.46.2.32	5.46.2.32
SA 5i	2.38	5.46.2.32	5.46.2.32
SA 6400	1.32	5.46.2.32	5.46.2.32

## Enabling PXE

Microsoft ADS requires the use of PXE. For information about enabling PXE on ProLiant servers, refer to the white paper, “Using PXE technology with HP ProLiant Servers”, at

<ftp://ftp.compaq.com/pub/products/servers/management/rdp/pxe-proliant.pdf>

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## Deploying on Blade Servers

For initial deployment of an operating system to a blade server, HP recommends using the ProLiant Essentials Rapid Deployment Pack. However, other methods of deployment are available. For alternative deployment options, refer to

<http://h18000.www1.hp.com/products/servers/proliant-bl/e-class/deployment.html>

## Configuring HP ProLiant Servers with ADS

This section describes how to use HP SmartStart Scripting Toolkit with Microsoft ADS. The SmartStart Scripting Toolkit enables you to use scripts to configure system and storage options for new servers in an MS-DOS environment. Microsoft ADS software ships with a bootable DOS diskette image that contains a subset of MS-DOS 6.22 files. This image is used with SmartStart Scripting Toolkit utilities to configure an HP ProLiant server. The virtual floppy image is located in the %programfiles%\Microsoft ADS\bin directory in the ADS controller. Use the following command to restore the DOS environment to a physical diskette:

```
Dskimage.exe vfloppy.vfi a:
```

**NOTE:** The virtual floppy should be built in a way that all commands are scripted without user interaction and will automatically reboot the system at the end of the execution.

For more information about SmartStart Scripting Toolkit, refer to

<http://www.hp.com/servers/sstoolkit>

## Creating a Virtual Floppy Image for Configuring HP ProLiant Servers

The easiest way to create server configuration files is to capture the configuration of a reference server. The following procedure describes a general method for capturing system and storage options settings from a reference server to use with Microsoft ADS. These settings are stored in configuration files and are used later to create a virtual floppy image to use for server deployment. The configuration files captured are hardware specific and should only be used to configure similar ProLiant systems. Refer to the “Sample Files for Initial Server Deployment” section for generic configuration files for the virtual floppy.

1. Copy `ACR.exe` and `CONREP.exe` from the SmartStart Scripting Toolkit to the diskette containing the ADS DOS environment.
2. Configure the reference system with the desired configuration settings.
3. Boot the reference system into DOS using with the diskette created in step 2.
4. Capture system and storage options settings onto the diskette by executing the following commands in the DOS environment:

```
Acr.exe /c a:\array.ary  
Conrep.exe /s a:\system.hwr
```

- 
- To create a diskette that automatically configures the system with the captured configuration, edit the `autoexec.bat` file on the diskette so that it contains only the following commands:

```
A:\Conrep.exe /l a:\system.hwr  
A:\Acr.exe /i a:\array.ary /o
```



**CAUTION:** The preceding command will overwrite any existing settings.

---

```
Vfreboot.com
```

These commands will be executed when target systems are booted with this diskette image.

- Test the diskette to verify that it works on target systems by ensuring the settings in the RBSU and the storage controller are set appropriately.
- Capture the physical diskette image to use with Microsoft ADS by typing the following command at the ADS controller:

```
%programfiles%\Microsoft ADS\bin\Dskimage.exe a: name.vfi
```

Use a meaningful file name for the diskette image captured.

- Place the image file in the `%programfiles%\Microsoft ADS\tftproot` directory or the appropriate directory in the ADS controller.
- Use the Sequence Editor to create a task for using the virtual floppy image.

Three sets of sample SmartStart Scripting Toolkit configuration files are provided with this document. These files are designed specifically to work with `ACR.exe` and `CONREP.exe` in the ADS DOS environment. To use the sample files, extract the ADS DOS environment to a diskette, copy `CONREP.exe` and `ACR.exe` from the SmartStart Scripting Toolkit to the diskette, and refer to the following instructions. Use of the samples files is optional, and the files might require modifications to work properly in different environments.

The following configuration files are samples only. They include techniques for detecting and reporting errors back to the ADS controller. Refer to the *SmartStart Scripting Toolkit User Guide* for more details about the configuration files.

## Sample Files for Capturing System Settings

The `Capture_Configuration` folder contains a sample `autoexec.bat` file that can be used with the ADS DOS diskette to execute `CONREP.exe` and `ACR.exe` to capture system and storage options onto the floppy diskette. You can obtain system-specific settings for configuring similar hardware using the captured data files.

To capture system settings using the sample files:

- Replace the `autoexec.bat` file on the diskette with the sample file supplied in the folder.
- Copy `ACR.exe` and `CONREP.exe` from the SmartStart Scripting Toolkit to the diskette.

- 
3. Boot the reference server with the diskette. The `autoexec.bat` file executes and stores the storage array option settings into `array.ary` and system option settings into `system.hwr` on the floppy diskette. These files can then be used to create a virtual floppy image that will configure servers exactly like the reference server.

To create a virtual floppy image with the captured configuration files, follow steps 5 through 9 in “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers.”

## Sample Files for Initial Server Deployment

The `Initial_Deployment` folder contains files for generating a generic virtual floppy image to be used on all supported servers. These batch files configure the operating system to Microsoft Windows 2000 or Server 2003 in the system settings and automatically configure the storage array depending on the number of available hard drives and current settings. The files include the following:

- **Autoexec.bat**—This file calls the `HP_ADS.bat` file.
- **HP\_ADS.bat**—This file contains details from step 5 of the “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers” section. It executes `CONREP.exe` to configure the system options. On successful completion of `CONREP.exe`, the batch file then executes `ARRTYPE.exe` to detect supported controllers and uses `ACR.exe` to configure the storage controller. When all commands have been executed, `HP_ADS.bat` reboots the system and returns the status with the log file to the ADS Controller.
- **Array.ary**—This file is used with `ACR.exe` to configure storage array settings. Systems with no storage RAID controllers are not required to use `ACR.exe`. `Array.ary` instructs `ACR.exe` to autoconfigure the first RAID controller. `ACR.exe` automatically configures the RAID settings depending on the available hard drives and current settings.
- **System.hwr**—This file is a configuration file for use with `CONREP.exe`. This file instructs `CONREP.exe` to set the operating system to Windows 2000 Server or Windows Server 2003.

To use these files for general HP ProLiant server deployment with Microsoft ADS:

1. Copy `HP_ADS.bat`, `array.ary`, and `system.hwr` from the folder to the diskette.
2. Copy `ACR.exe`, `CONREP.exe`, `ARRTYPE.exe`, and `SSSTKARR.ini` from the SmartStart Scripting Toolkit to the diskette.
3. Replace the `autoexec.bat` file on the diskette with the sample file supplied in the folder.
4. Boot the target system with the diskette to be sure that the diskette can be executed without user interaction and that it automatically configures the system correctly.

To create a virtual floppy image with these files, follow steps 7 through 9 in “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers.”

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## Sample Files for Post Operating System Installation

The `Post_OS_Installation` folder contains files for disabling PXE on the target system. The virtual floppy image file is provided to automatically disable PXE on target systems. Optionally, you can disable PXE in RBSU after the system is deployed with an operating system. The files include the following:

- **Autoexec.bat**—This file calls the `HP_ADS.bat` file.
- **HP\_ADS.bat**—This file contains added error detection and details from step 5 of the “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers” section. It executes `CONREP.exe` with the supplied configuration files and checks the complete status for errors. When all commands have been executed, `HP_ADS.bat` reboots the system and returns the status with the log file to the ADS Controller.
- **System.hwr**—This file is a configuration file for use with `CONREP.exe`. This file instructs `CONREP.exe` to turn off PXE on the target system.

To use these files to turn off PXE boot after the system is deployed:

1. Copy `CONREP.exe` from the SmartStart Scripting Toolkit to the diskette.
2. Replace the `autoexec.bat` on the diskette with the one from the folder.
3. Copy `HP_ADS.bat` and `system.hwr` to the diskette.

You can create a virtual floppy image to disable the PXE boot option in RBSU on ProLiant servers. To create a virtual floppy image with these files, refer to steps 7 through 9 in the “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers” section.

## Deploying HP ProLiant Systems with Microsoft ADS

Deployment procedures are driven by a task sequence file with Microsoft ADS. Microsoft has defined the format of the sequence file and a list of commands to use with it. The sequence file is stored as Extensible Markup Language (XML). Microsoft ADS is shipped with a sequence editor application that can be used to create and edit the sequence file. You can also find a list of sample sequence files in the `%programfiles%\Microsoft ADS\Samples\Sequences\` folder.

A typical Microsoft ADS server deployment scenario for HP ProLiant servers consists of the following steps:

**NOTE:** Ensure that the target system is set to the current date and time before connecting to the Microsoft ADS controller.

1. Boot to the virtual floppy as described in the preceding section to configure system and storage options.
2. Boot the target system into the Deployment Agent environment.
3. Partition the disk to the appropriate size.
4. Transfer the captured partition image to the target server.

- 
5. Configure the personalization file to set system-specific options, such as computer name, product key, workgroup, password, and so on.
  6. Perform post-installation configuration, such as installing HP Smart Components.

The previous procedures can vary depending on environment and system settings. The following is a sample of the task sequence file. Note that the sample file is not complete and shows only a portion of the steps required for deployment. The sample sequence file includes steps 1 through 4 of the procedures described in the preceding section. Refer to the comments at the beginning of each task for an explanation of the task. Refer to the ADS help file for a detailed explanation of each ADS command.

```
<!-- Boot target system to virtual floppy image -->
<!-- (named generic.vfi) to configure system and storage -->
<!-- controller options. The system will be rebooted at the -->
<!-- end of virtual floppy execution -->
<task description="Boot Virtual Floppy" timeout="300"
doesReboot="true">
    <command>/PXE/boot-vf</command>
    <parameters>
        <parameter>"\generic.vfi"</parameter>
    </parameters>
</task>

<!-- Boot the system into Deployment Agent environment for OS -->
<!-- deployment -->
<task description="Boot Deployment Agent" doesReboot="false">
    <command>/PXE/boot-da</command>
</task>

<!-- Ceate a single 5000MB partition on the logical disk to -->
<!-- store the OS -->
<task description="Partition the disk" doesReboot="false">
    <command>/BMONITOR/bmpart.exe</command>
    <parameters>
        <parameter>\device\harddisk0\partition0</parameter>
        <parameter>-init</parameter>
        <parameter>-c:5000</parameter>
        <parameter>-a</parameter>
    </parameters>
</task>
```

---

```

<!-- Download image of the OS (named HP_ProLiant_Image) to -->
<!-- target system -->
<task description="Download image" doesReboot="false">
  <command>/IMAGING/imgbmdeploy.exe</command>
  <parameters>
    <parameter>"HP_ProLiant_Image"</parameter>
    <parameter>\device\harddisk0\partition1</parameter>
    <parameter>-r</parameter>
    <parameter>-client</parameter>
  </parameters>
</task>

```

The sample files that are provided with Microsoft ADS are very generic and can handle most non-system-specific scenarios. HP ProLiant servers, however, require an extra step at the beginning of the sequence to configure system settings and storage array option settings before deploying an operating system image. This extra step can be accomplished with a virtual floppy image as shown in the first task in the preceding sample. Follow the steps in the “Creating a Virtual Floppy Image for Configuring HP ProLiant Servers” section to create the virtual floppy image mentioned in step 1.

## Updating HP Drivers for Microsoft ADS Deployment Agent Builder

Microsoft ADS uses a pre-operating system (Deployment Agent) environment to carry out various tasks during image deployment. The Microsoft ADS Network Boot Service component contains a Deployment Agent Builder that builds a Deployment Agent RAMDISK image dynamically. The Deployment Agent Builder first collects a list of hardware device information from the target system during the PXE boot process, and then builds the RAMDISK image using the appropriate drivers.

Current Windows Server 2003 drivers work on all the systems listed in Table 1. Updating drivers for the Deployment Agent Builder is required only for supporting new hardware, such as the boot controller in the Deployment Agent environment.

Three folders in the %programfiles%\Microsoft ADS\nbs\repository directory on the server where the ADS Network Boot Service is installed supply drivers for building the RAMDISK image. The Deployment Agent Builder builds the RAMDISK image using the driver files from the User\PreSystem, Windows, and User\PostSystem folders, respectively. Copy driver files to User\PreSystem and User\PostSystem only. The Deployment Agent Builder uses the first matched driver files for building the RAMDISK. Be sure to place the downloaded driver files into the proper folder.

To supply the Deployment Agent Builder with the latest drivers:

1. Download the latest drivers from <http://www.hp.com/support/files>.
2. Execute the downloaded Smart Component installer.

- 
3. Select **Extract** to extract the driver binary and setup files from the HP ProLiant Package Setup.
  4. Select a destination for the extracted files.
  5. Close the HP ProLiant Package Setup.
  6. Copy all the files that were extracted from the component to the appropriate folder.
  7. Restart the ADS Deployment Agent Builder service in **Services**.

## Troubleshooting

- **Issue:** Target system cannot establish connection with the Microsoft ADS controller after booting into the Deployment Agent environment.  
**Solution:** Ensure that the target system is set to the current date and time before connecting to the Microsoft ADS controller.
- **Issue:** System failed to use the NIC to perform a PXE boot.
- **Solution:** Ensure that the system boot order is set appropriately according to the “Supported Servers, BIOS Versions, and Driver Versions” section of this document, and that the system has the latest firmware installed. Refer to the “Enabling PXE” section of this document for instructions on enabling PXE on ProLiant servers. To download the latest system BIOS and PXE firmware, refer to <http://h18000.www1.hp.com/support/files/server/us/index.html>
- **Issue:** Pressing the **F12** key on a ProLiant DL580G2 server after the Power On Self Test (POST) does not cause the system to perform a PXE boot.  
**Solution:** The **F12** option can only be used on systems with an embedded NIC. This option will be removed from the BIOS in the next release. To resolve this issue, change the standard boot order in RBSU so that the NIC boots before the boot controller. Press the **F9** key after POST to enter RBSU.
- **Issue:** Pressing the **F12** key to force a PXE boot causes the system to hang when exiting PXE ROM.  
**Solution:** Change the standard boot order in RBSU so that the NIC boots before the boot controller. Press the **F9** key after POST to enter RBSU. This issue will be resolved in a future release of the BIOS.
- **Issue:** ProLiant DL740 and DL760G2 servers hang when exiting PXE.  
**Solution:** Change the standard boot order in the RBSU so that the boot controller boots before the NIC. Press the **F9** key after POST to enter RBSU. Press the **F12** key to force the system to perform a PXE boot if necessary. This issue will be resolved in a future release of the BIOS.
- **Issue:** I am unable to boot to the Deployment Agent environment with a new add-in device.  
**Solution:** Update the Deployment Agent Builder with the latest driver as described in the “Updating HP Drivers for Microsoft ADS Deployment Agent Builder” section.

- 
- **Issue:** I am unable to boot to the Deployment Agent environment with a new add-in device after updating drivers to the Deployment Agent Builder.

**Solution:** ADS cannot interpret a driver information (.inf) file. No resolution is currently available for this issue; it will be resolved in future updates.