Automated BIOS Management

Using the Dell OpenManage Deployment Toolkit

BIOS management can be a time-consuming and cumbersome task for enterprise IT administrators. The Dell™ OpenManage™ Deployment Toolkit enhances operational efficiency by enabling automated and scripted BIOS management for Dell PowerEdge™ servers—helping administrators perform BIOS and configuration updates simultaneously on multiple systems.

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The Dell OpenManage Deployment Toolkit (DTK) comprises a set of MS-DOS®–based utilities, sample batch scripts, and configuration files that enable automated and scripted management of the BIOS, baseboard management controller (BMC), remote access controller (RAC), RAID controller, and hard drive partitions of a Dell PowerEdge server.[1] The DTK lets administrators update and configure these components on multiple systems simultaneously, thus enhancing consistency and standardization of systems management processes.

This article discusses two utilities that can facilitate BIOS management: bioscfg.exe and biosflsh.exe. It also provides an example of how these utilities can be used within the bioscap.bat, biosrep.bat, and biosup.bat sample scripts that the DTK provides. These DTK sample scripts may require customization to fit the specific BIOS management needs of an enterprise. Figure 1 illustrates components of the DTK and how they operate with system components for BIOS management.

Obtaining the Dell OpenManage Deployment Toolkit

Unlike other Dell OpenManage products such as Dell OpenManage Server Administrator, the DTK is not included on the Dell OpenManage CD that ships with every Dell PowerEdge system. The DTK is available as a self-extracting zip package through the Dell support Web site at support.dell.com. Figure 2 displays the contents and organization of the DTK package after it has been unzipped. As shown in this figure, the DTK package is organized into four primary directories:

- **Tools:** This directory contains the utilities—such as the bioscfg.exe and biosflsh.exe executables described in this article—that system administrators can use to perform various administrative tasks. These utilities can be used either as stand-alone tools for configuring individual components or integrated into scripts for one-to-many system deployments.

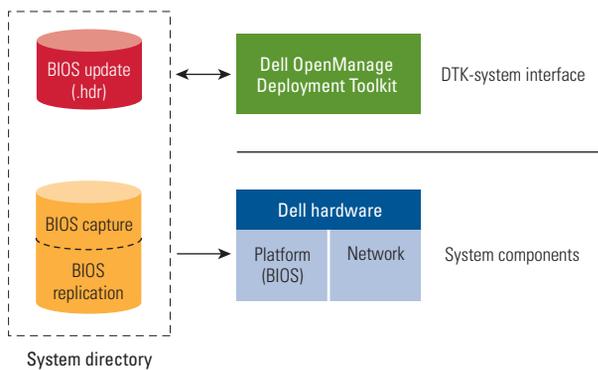[1] The DTK is not supported on Dell PowerEdge SC servers.

Figure 1. BIOS management components of the Dell OpenManage Deployment Toolkit

- **Template:** This directory contains sample batch scripts and configuration files required for system deployments.
- **Docs:** This directory contains the detailed *Dell OpenManage Deployment Toolkit User's Guide* and the *Dell OpenManage Deployment Toolkit Command Line Interface Reference Guide,* which explain parameters and switches for DTK utilities.
- **Systems:** This directory serves as a repository for platform-specific information such as BIOS update header (.hdr) files and configuration capture files for specific Dell PowerEdge platforms.

Creating the DTK bootable disk

DTK utilities are based on MS-DOS version 6.22 and later; DTK scripts are based on MS-DOS version 7.1 and later. These utilities and scripts can be executed from such sources as floppy disks, CDs, network shares, and USB keys to perform the supported administrative tasks. The scenario in this article assumes the use of a floppy disk to perform system BIOS management. After downloading the DTK, administrators should create a bootable disk that contains the DTK file structure described in Figure 1 and in the "Obtaining the Dell OpenManage Deployment Toolkit" section in this article.

The bootable disk should contain the following files from the scripts subdirectory within the template directory: bioscap.bat, biosrep.bat, biosup.bat, el.bat, errhndl.bat, and tkenvset.bat. This disk also should contain the following files from the Tools directory: bioscfg.exe, biosflsh.exe, reboot.exe, sys.ini, and sysinfo.exe.

A system-specific BIOS .hdr file is used for BIOS flash updates, and this file should be placed in the DTK Systems directory. The BIOS .hdr file for a specific system can be extracted from the appropriate flash BIOS update package, which is available at support.dell.com.[2] After the flash BIOS update package has been downloaded, administrators can extract the BIOS .hdr file using the command `filename.exe -writehdrfile`, where *filename.exe* is the name

of the system-specific flash BIOS update package. To optimize load time, Dell recommends that the .hdr file reside on the hard drive rather than on removable media.

Preparing environments for BIOS management

To develop an end-to-end BIOS management process using the DTK, administrators must employ non-BIOS-specific tools from within the sample scripts provided by the DTK framework. Although DTK scripts are expandable and can be used in a variety of ways, this article restricts discussion to scripts related to the bioscfg.exe and biosflsh.exe utilities to demonstrate how to set up environments for efficient BIOS management.

Using tkenvset.bat to set DTK paths

The tkenvset.bat file establishes the paths for the DTK utilities and scripts and sets the variables for the systems to be deployed and configured. These paths and variables must be specified before any of the scripts can be used. For example, if an administrator wishes to specify the A:\ drive for all DTK executions and use default settings for all other variables, the DT_DRIVE variable should be changed by issuing the following command:

```
set DT_DRIVE=A
```

Configuring the BIOS with the bioscfg.exe utility

The bioscfg.exe program runs on all supported Dell PowerEdge systems. There are, however, limitations on the Dell PowerEdge *x5xx* series of servers. The bioscfg.exe utility is used to report and set BIOS configuration options. It uses BIOS interfaces to
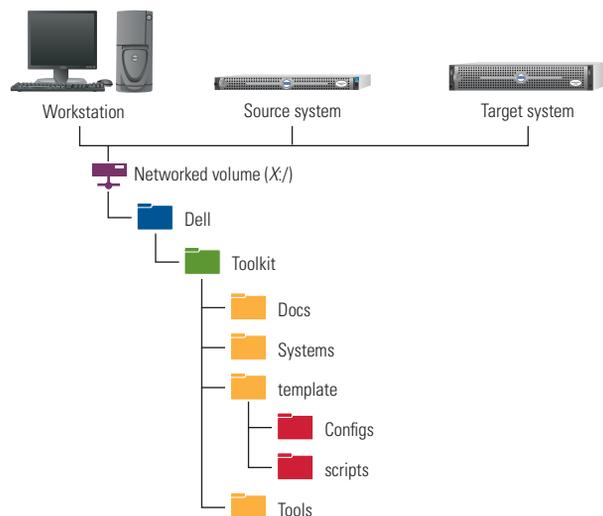

Figure 2. Dell OpenManage Deployment Toolkit package contents and organization

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[2] For more information and to obtain the latest BIOS update packages for the Microsoft® Windows® and Red Hat® Enterprise Linux® operating systems, visit docs.us.dell.com/support/edocs/software/smdup.

manipulate the boot order and BIOS settings. Executing bioscfg.exe configures all options available on the BIOS setup screen, including boot order, embedded device configuration, and asset tag management.

The bioscfg.exe utility can perform the following tasks:

- Read configuration options from files or command-line interface (CLI) parameters
- Display pertinent help and usage information
- Output configuration options to a file or screen
- Log activity to a specified file
- Return specific error codes and error messages

Options	Valid arguments	Description	Replication
--bootseq	Numerical list or list of device names, separated by commas	Sets the boot order	Yes (for systems that support a list of device names only)
--conboot	enable disable	Enables or disables console redirection after boot	Yes
--conred	off serial1 serial2	Sets console redirection to a particular port	Yes
--conterm	vt100 ansi	Sets console redirection terminal type	Yes
--embnic1	on off onnopxe	Enables or disables the first embedded NIC	Yes
--embnic1pxe	on off	Enables or disables PXE on the first embedded NIC	Yes

Figure 3. Valid options and arguments for the bioscfg.exe utility

Figure 3 displays a few of the valid options and arguments for the bioscfg.exe utility.[3]

Using bioscap.bat to capture BIOS configuration

System administrators can use bioscap.bat to capture BIOS settings from a model system whose configuration must be replicated across multiple similar systems in an IT environment. This can save significant time for enterprises that require multiple systems to use the same BIOS settings.

The bioscap.bat script uses the bioscfg.exe executable with an -o switch to capture a system's BIOS configuration settings and save them to a specified file. This BIOS configuration file can later be accessed to replicate BIOS settings on other systems. For example, if an administrator wishes to specify the path and file name of the configuration capture file and specify the path and file name of the log file that is generated when bioscap.bat is run, the administrator should perform the following actions:

- Specify the path where the BIOS configuration capture file is to reside:
  ```
  set DT_BIOS_PATH=%DT_SYSTEMS%\%DT_PLATFORM%
  ```

- Specify the file name of the BIOS configuration capture file:
  ```
  set DT_BIOS_CAPFILE=biosset.txt
  ```

- Specify the path and the file name of the log file:
  ```
  set DT_BIOS_LOGFILE=%SVCTAG%.log
  ```

Using biosrep.bat to configure multiple systems

After the BIOS configuration file has been captured and saved to a specific location using bioscap.bat, administrators can use biosrep.bat to replicate the BIOS settings to multiple similar systems in an environment. As with the bioscap.bat script, biosrep.bat uses bioscfg.exe. To replicate the BIOS settings, biosrep.bat makes a call to bioscfg.exe with an -i switch to read the settings from the BIOS configuration capture file and deploys those settings across multiple target systems. To direct biosrep.bat to specify the path and file name of the configuration capture file and the location of the log file, administrators should perform the following actions:

- Specify the path to the BIOS configuration capture file:
  ```
  set DT_BIOS_PATH=%DT_SYSTEMS%\%DT_PLATFORM%
  ```

- Specify the file name of the BIOS configuration capture file that will be used to replicate the BIOS settings:
  ```
  set DT_BIOS_REPFILE=biosset.txt
  ```

- Specify the path and the file name of the log file:
  ```
  set DT_BIOS_LOGFILE=%DT_BIOS_PATH%\%SVCTAG%.log
  ```

Flash updating the BIOS with the biosflsh.exe utility

The biosflsh.exe utility runs on all Dell PowerEdge systems that are supported by version 1.1 and later of the DTK—except PowerEdge *x*5*xx* systems. The biosflsh.exe utility is used to flash update the system BIOS. It updates the BIOS flash ROM using BIOS .hdr files. Figure 4 displays valid options and arguments for the biosflsh.exe utility.

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[3] For a complete list of options and arguments for the bioscfg.exe utility, refer to the *Dell OpenManage Deployment Toolkit Command Line Interface Reference Guide* at support.dell.com/support/edocs/software/dtk/1.4/en/CLI/index.htm.

Options	Valid arguments	Description
-c or --check	N/A	Checks the results of the last BIOS update
-f or --flashbios	File name	Updates the BIOS with the image contained in the file
--force	N/A	Forces the utility to use the BIOS image regardless of the version
-h or --help	Option name	Displays general help information or help information for a specified option
-l or --logfile	File name	Logs information to a specified file
-s	String	Sets the environment variable to the value of a BIOS option

Figure 4. Valid options and arguments for the biosflsh.exe utility

The biosflsh.exe utility can perform the following tasks:

- Display pertinent help and usage information
- Log activity to a specified file
- Return specific error codes and error messages

Using biosup.bat to update the system BIOS

The biosup.bat sample script is used to update the system BIOS using a flash BIOS .hdr file. The flash BIOS .hdr file must be specified before running the full deployment. For information about how to extract and designate the system-specific flash BIOS .hdr file, see the "Creating the DTK bootable disk" section in this article.

Administrators should perform the following actions when preparing the biosup.bat sample script file:

- Specify the path to the BIOS binary update (.hdr) file:
  ```
  set DT_BIOS_PATH=%DT_SYSTEMS%\%DT_PLATFORM%
  ```

- Specify the file name of the BIOS .hdr file (in 8.3 format):
  ```
  set DT_BIOS_IMAGE=%MACH%.HDR
  ```

- Specify the path and the file name of the log file—for example, F:\log.txt (*Note:* The path must already exist and the media must be writeable.):
  ```
  set DT_BIOS_LOGFILE=%SVCTAG%.log
  ```

- Upgrade the BIOS with the .hdr file:
  ```
  %DT_TOOLS%\biosflsh.exe --force -f
      %DT_BIOS_PATH%\%DT_BIOS_IMAGE%
  %DT_BIOS_LOGFILE_OPT%
  ```

Improving efficiency with the Dell OpenManage Deployment Toolkit

The Dell OpenManage Deployment Toolkit provides a suite of utilities and scripts that allow system administrators to perform BIOS management efficiently. For example, administrators can create an autoexec.bat script that performs BIOS capture, replication, and updates by running the bioscap.bat, biosrep.bat, and biosup.bat scripts during system startup. The automated systems management capabilities that the DTK provides can thereby help improve an enterprise's operational efficiency.

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FOR MORE INFORMATION

Dell OpenManage Deployment Toolkit User's Guide:
support.dell.com/support/edocs/software/dtk/1.4/en/UG/index.htm

Dell OpenManage Deployment Toolkit Command Line Interface Reference Guide:
support.dell.com/support/edocs/software/dtk/1.4/en/CLI/index.htm

Dell Update Packages:
docs.us.dell.com/support/edocs/software/smdup