# **Enterprise RAID Management**

### Using the Dell OpenManage Deployment Toolkit

The Dell OpenManage<sup>™</sup> Deployment Toolkit includes utilities, sample scripts, and other tools for server management in an enterprise environment. This article discusses using and modifying the raidcfg utility and sample script to perform efficient RAID configuration and management for multiple systems.

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Visit www.dell.com/powersolutions for the complete category index. **R**AID management in an enterprise environment with a large number of systems can be time-consuming and cumbersome. To gain maximum operational efficiency and stay competitive in the global economy, IT organizations must be able to perform routine systems management tasks like RAID configuration quickly and efficiently. The Dell OpenManage Deployment Toolkit (DTK) can help administrators achieve these goals.

The DTK provides a set of utilities, sample batch scripts, drivers, and configuration files for automated and scripted management of RAID configurations, BIOSs, baseboard management controllers (BMCs), and Dell<sup>™</sup> Remote Access Controllers (DRACs) on supported Dell PowerEdge<sup>™</sup> systems both efficiently and reliably. It allows administrators to perform tasks like RAID and DRAC configuration simultaneously on multiple systems, thus help-ing create consistency and standardization across systems management processes. In addition, the sample scripts provided by the DTK are designed to be modified to fit organizations' specific RAID management needs.

#### Accessing the Dell OpenManage Deployment Toolkit

Unlike other Dell OpenManage products, the DTK is not included on the Dell OpenManage CDs shipped with PowerEdge servers. Instead, it is delivered as a self-extracting zip package for the Microsoft® Windows® Preinstallation Environment (WinPE) and as an ISO image for embedded Linux® operating systems through the Dell support Web site (support.dell.com). Extracting the zip package (in WinPE) or booting the CD created from the ISO image (in Linux) creates a Toolkit folder (/opt/dell in Linux). This folder contains subdirectories with the necessary files to perform deployment tasks. The Tools directory (the bin directory in Linux) carries administrative utilities such as raidcfg and syscfg. These utilities can be used as stand-alone tools for configuring individual components or integrated into scripts for a complete oneto-many scripted mass deployment. The sample batch and shell scripts and configuration files required for a complete system deployment are in the template directory.



Figure 1. Dell OpenManage Deployment Toolkit directory structure for Windows



The Systems directory contains platform-specific information such as configuration capture files and answer files for specific PowerEdge platforms. For details on other directories and information related to creating WinPE images, administrators should refer to the DTK user's guide. Figures 1 and 2 show the DTK file structure in Windows and embedded Linux environments, respectively.

#### Using the raidcfg utility and sample script

Figure 2. Dell OpenManage Deployment Toolkit directory structure for embedded Linux The DTK includes tools that enable administrators to create RAID configurations and hard drive partitions as well as

update the BIOS, BMC, and DRAC firmware versions on supported Dell PowerEdge systems. Among these tools are the raidcfg utility and sample script, which help administrators perform RAID management tasks.

#### Raidcfg utility

The raidcfg utility is used to configure and report RAID-related information for supported RAID controllers. The utility abstracts any hardware differences in the RAID controllers and allows administrators to use standardized command-line interface (CLI) commands across all supported controllers on supported PowerEdge systems. The raidcfg utility supports various RAID levels (including RAID-0, RAID-1, RAID-5, RAID-10, and RAID-50) and provides switches and parameters to configure the read/write policy, stripe size, failover, and so on. The raidcfg utility performs the following tasks:

- · Displays help and usage information
- · Reads configuration options from CLI parameters
- · Enumerates RAID controllers, physical disks, and virtual disks
- Creates and deletes virtual disks
- Logs activity to a given file name
- Returns specific error codes and messages

Figure 3 shows a representative list of valid options and arguments for the raidcfg utility.<sup>1</sup>

#### Raidcfg script

The raidcfg sample script (RAIDCFG.BAT in WinPE and raidcfg.sh in Linux) configures RAID controllers detected on the system. No administrator input is required to run this script. The default environment variable values used in this script can be set in the tkenvset script (TKENVSET.BAT in WinPE and tkenvset.sh in Linux). The raidcfg script uses the raidcfg utility to automatically configure the detected controllers on the target system. For example, for the first controller discovered, if the raidcfg utility discovers only one attached hard drive, the script creates a RAID-0 configuration; if two hard drives are discovered, the script creates a RAID-1 configuration; if three or more hard drives are discovered, the script creates a RAID-5 configuration. By default, the code to create RAID-10 and RAID-50 configurations is commented out in the script, but this code can be uncommented to create these configurations for available controllers in the system.

Option	Argument	Description
-ac <b>or</b> action	cvd or createvdisk	Creates a virtual disk
-ad <b>or</b> adisk	ch:targ,ch:targ:lun, orch:targ:enclosure	Specifies an array disk
-c <b>or</b> controllerid	Valid controller ID number	Specifies a RAID controller
-cp <b>or</b> cachepolicy	d, c	Specifies the virtual disk cache policy
-fd <b>or</b> failoverdrive	ch:targ,ch:targ:lun, orch:targ:enclosure	Specifies the location of the failover drive in an array
-rorRAID	Valid RAID level number	Sets the RAID level for the array (valid values are 0, 1, 5, 10, and 50)

Figure 3. Sample list of valid options and arguments for the raidcfg utility

<sup>1</sup> For a complete list of raidcfg commands, refer to the Dell Open/Manage Deployment Toolkit Command Line Interface Reference Guide at support.dell.com/support/edocs/software/dtk/2.1/CL/index.htm.

set DT\_DRIVE=%systemdrive%
set DT\_PATH=%DT\_DRIVE%\Dell\Toolkit
:: \* Please leave the trailing \ alone for
:: \* DT\_TOOLS, the code using the environment
:: \* variable does not account for this.
set DT\_TOOLS=%DT\_PATH%\Tools\
set DT\_SYSTEMS=%DT\_PATH%\Tomplate\Scripts
set DT\_SCRIPTS=%DT\_PATH%\Template\Scripts
set DT\_STOP\_ON\_ERROR=FALSE
set DT\_DRMK\_PATH=%DT\_DRIVE%\Dell\DRMK

Figure 4. Tkenvset script settings in WinPE

## Modifying the tkenvset and raidcfg scripts for scripted RAID management

The Tools directory contains the executable utilities and sys.ini file. Sys.ini is used by syscfg to determine the system type. The template/ scripts directory carries the .BAT or .sh scripts (in WinPE or Linux, respectively) needed for scripted RAID management.

The tkenvset script is where administrators define the execution environment. The default settings can normally remain unless a network share is being used to access the DTK directory structure. In that case, the DT\_DRIVE variable should be set to the network drive letter (in WinPE) or the mount point of the shared directory (in Linux). When administrators are installing from a CD that contains the boot environment integrated with the DTK directory structure, the utilities reside on the *X*: CD drive; in this case, WinPE sets the %systemdrive% environment variable to this drive by default, so the environment file does not need to be changed. Figure 4 shows the tkenvset settings in WinPE.

In Linux, the default DTK directory is /opt/dell/toolkit, and the tkenvset script requires no changes unless a network share is being used. In that case, the DT\_PATH variable should be set to the mount point of the network share. Figure 5 shows the tkenvset settings in Linux. Administrators should modify the isolinux.cfg file under the isolinux directory of the Linux ISO image prior to burning the contents on the CD. This file is called in the DTK startup phase to mount the share where the DTK contents are located.

The only other change that may be necessary is to the raidcfg script to expand the types of RAID available for use. The raidcfg script probes the available controllers on the system and loops through each one to check the number of available physical disks for use in a RAID container. Based on the number of available disks, the raidcfg script selects a RAID type (for example, RAID-0, RAID-1, or

```
export DT_PATH=/opt/dell/toolkit
export DT_TOOLS=$DT_PATH/bin
export DT_SYSTEMS=$DT_PATH/systems
export DT_SCRIPTS=$DT_PATH/template/scripts
export DT_DRMK_PATH=/opt/dell/drmk
```

Figure 5. Tkenvset script settings in Linux

RAID-5). The script has additional RAID settings, such as RAID-10, but certain lines in the script must be uncommented to enable these settings. For example, in Figure 6 the provisions for RAID-10 in the first line have been commented out, but this line could be edited to include RAID-10 by changing it to % i in (10 5 1 0) do.

The Linux raidcfg script has the same basic mechanism built in, as shown in Figure 7. As in WinPE, uncommenting the first line (by removing the # character at the beginning of the line) and commenting out the second line (by adding a # character at the beginning of the line) allows RAID-10 and RAID-50.

#### Modifying configuration files for scripted RAID management

After editing the raidcfg script to specify the RAID type, administrators may want to configure the boot OS (WinPE or embedded Linux) to automatically execute the raidcfg script when booting from a network share. For Windows installation, WinPE is the boot environment. After creating a WinPE CD (see the DTK user's guide for details on how to do this), administrators can use the winbom.ini or startnet.cmd file to map the network drive and execute the raidcfg batch file—for example, administrators can add the following lines to the startnet.cmd file:

Net use z: \\hostname\sharename /user:valid\_username
 password
Z:\raidcfg.bat

For Linux deployments with a Dell-provided ISO image, administrators must copy the contents of the ISO image to a holding directory and edit the /isolinux/isolinux.cfg file to perform the same

```
:: for %%i in ( 10 5 1 0 ) do (
for %%i in ( 5 1 0 ) do (
    echo Checking if RAID %%i can be created on controller %CONT_ID% ...
    %DT_TOOLS%\raidcfg.exe controller action=createvdisk controllerid=%CONT_ID%
    adisk=%ARRAY_DISKS% raid=%%i > nul
    if NOT ERRORLEVEL 1 (
        echo RAIDCFG created RAID %%i on controller %CONT_ID%
        goto success
    )
```

Figure 6. Example WinPE raidcfg script displaying available RAID types

```
# for r in 50 10 5 1 0;
   for r in 5 1 0;
   do
      RAID_TYPE=$r
      echo Checking if RAID $RAID_TYPE can be created on controller $CONT_ID ...
      $DT_TOOLS/raidcfg controller action=createvdisk controllerid=$CONT_ID adisk=$ARRAY_DISKS
         raid=$RAID_TYPE $RAID50_PARAM > /dev/null
      retval=$?
      if [ $retval -eq 0 ]; then
         RAID_CFG_SUCCESS=1
         break
      fi
      RAID50_PARAM=
   done
   # Could not create a VD
   if [ $RAID_CFG_SUCCESS -ne 1 ]; then
      echo "Error: Could not configure RAID on controller $CONT_ID"
   else
      echo Created RAID $RAID_TYPE on controller $CONT_ID
   fi;
```

Figure 7. Example Linux raidcfg script displaying available RAID types

functions. The isolinux.cfg file has several example uses and need only be edited to include the appropriate names. For example, to configure the Linux image to map a Windows share and execute the raidcfg script on the share, administrators should change the default line to default network-smbfs, and then modify the line immediately following network-smbfs that begins with the append keyword. On that line, administrators should edit share\_location to set the IP address of the target system and the share name, modify share\_script to be the relative path to the script to be executed (that is, /opt/dell/toolkit/raidcfg.sh), and edit share\_options to contain username=username,password=password. Next, administrators should save the isolinux.cfg file and create a new CD using the directory the ISO contents were copied to along with the edited isolinux.cfg file. For additional information on creating a CD, refer to the DTK user's guide.

Once the respective files for the WinPE and Linux images are modified, booting the CD on the target platform automatically executes the raidcfg script to configure the desired RAID containers.

#### Achieving efficient deployment using the Dell OpenManage Deployment Toolkit

The Dell OpenManage Deployment Toolkit enables administrators to deploy multiple Dell PowerEdge servers both efficiently and quickly to help increase server availability and minimize downtime. The DTK is both expandable and scalable, and is designed to integrate easily into existing deployment frameworks. As the need for automated deployment processes in enterprise environments continues to increase, the DTK can help system administrators continue to meet the challenge.

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#### FOR MORE INFORMATION

Dell OpenManage Deployment Toolkit User's Guide and Dell OpenManage Deployment Toolkit Command Line Interface Reference Guide: support.dell.com/support/edocs/software/dtk