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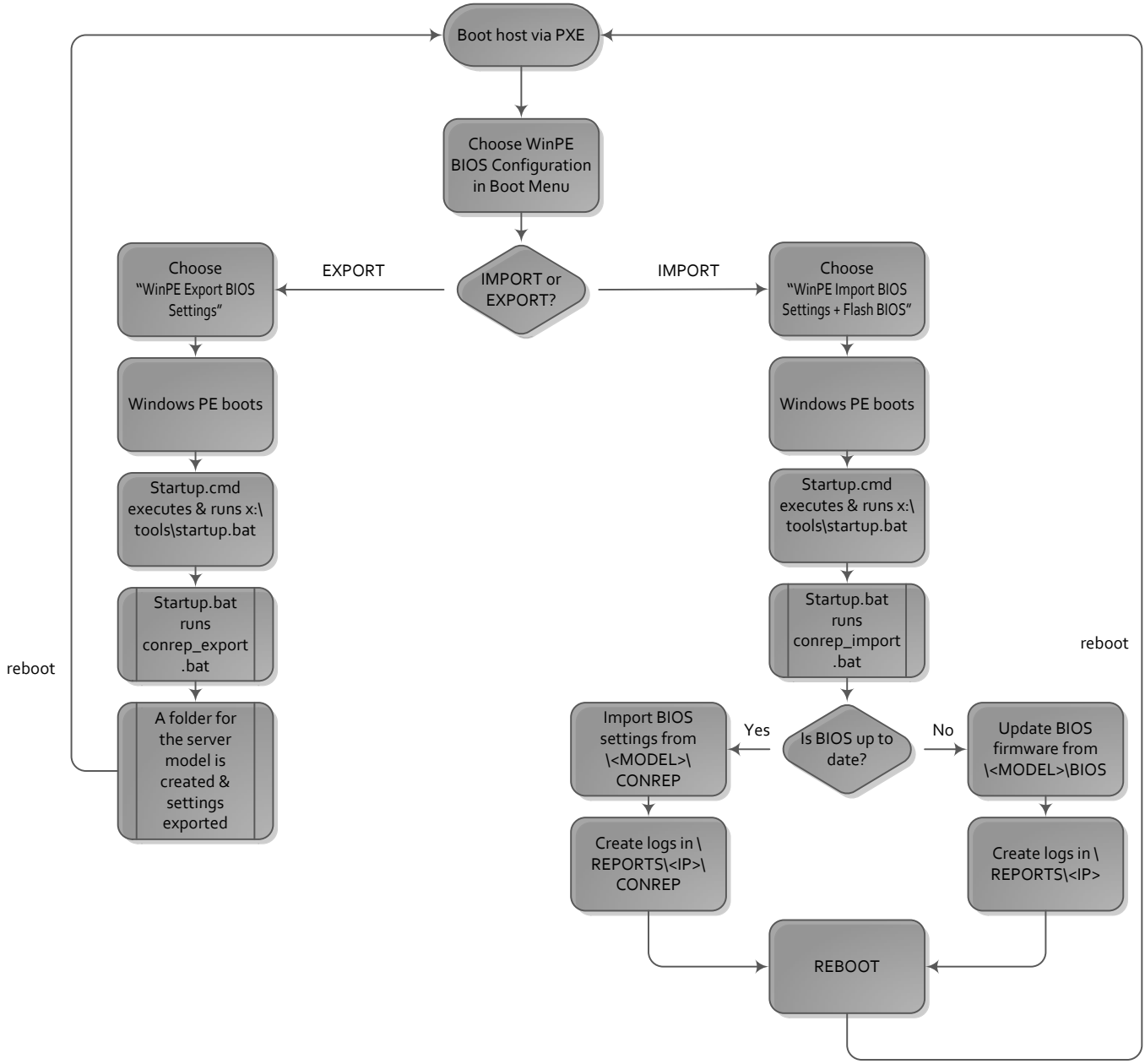
What is the goal?

The goal is to update BIOS firmware and BIOS settings in an automated way. This can be interesting when many hosts have to be configured and to get a homogenous infrastructure.

What are the processes or how does it work?



Prerequisites:

- A **Windows 2008 R2 server** (can be a VM) with **Windows Automated Installation Kit (WAIK)** installed
- **HP scripting toolkit for Windows** (here: version 9.40 - SP57971.exe)
  NB: The toolkit files should already be extracted to the Windows 2008 server to C:\HP.
- The latest **HP BIOS Firmware** to be deployed to the host(s)
- A **running UDA** configured **with DHCP & PXE and a second disk** mounted (configuration not covered here)
  NB: Taking a snapshot before modifying UDA configuration can save a lot of time.

Prepare a bootable Windows PE image for HP ProLiant Server (.wim)

1. Prepare the image (add HP drivers & tools):

1. Log in to the Windows 2008 machine
2. In the **Start menu**, right click **Deployment Tools Command Prompt,** and choose **Run as administrator**.
3. Change to the PETools folder:

   ```
   cd C:\Program Files\Windows AIK\Tools\PETools
   ```

4. Create the WinPE build environment:

   ```
   copype.cmd x86 c:\winpe_x86
   ```

5. Mount the Winpe.wim file to the **Mount** directory:

   ```
   Dism /Mount-Wim /WimFile:C:\winpe_x86\winpe.wim /index:1 /MountDir:C:\winpe_x86\mount
   ```

6. Add the HP drivers to the WinPE image:

   ```
   dism /image:c:\winpe_x86\mount /Add-Driver /driver:c:\HP\x86\drivers\winpe30 \ /recurse
   ```

7. Add the SSSTK IO and ILO2 (for G5 servers) drivers to the image:

   ```
   copy C:\HP\x86\drivers\winpe30\system\hpsstkio\hpsstkio.sys
   c:\winpe_x86\mount\Windows\System32\drivers\

   md c:\winpe_x86\mount\DRV\cpqcidrv\

   copy C:\HP\x86\drivers\winpe30\system\cpqcidrv\*.* C:\winpe_x86\mount\DRV\cpqcidrv\*.*
   ```

8. Copy the HP SSSTK Tools to the image to be able to start them locally afterwards :
   NB: This step can be skipped if the tools will be launched from a NFS share

   ```
   md c:\winpe_x86\mount\tools\

   copy c:\HP\x86\tools\ c:\winpe_x86\mount\tools\
   ```

9. Copy additional packages to the image (like WMI and scripting) :

   ```
   dism.exe /image:c:\winpe_x86\mount /add-package /packagepath:"C:\Program Files\Windows
   AIK\Tools\PETools\x86\WinPE_FPs\WinPE-Scripting.cab"

   dism.exe /image:c:\winpe_x86\mount /add-package /packagepath:"C:\Program Files\Windows
   AIK\Tools\PETools\x86\WinPE_FPs\WinPE-WMI.cab"
   ```

10. Commit changes to the image and unmount it:

    ```
    Dism /Unmount-Wim /MountDir:C:\winpe_x86\mount\ /Commit
    ```

11. The image is now ready.

2. Prepare the boot environment for PXE:

1. Create required folders:

   ```
   md C:\tftpboot
   md C:\tftpboot\Boot
   ```

2. Mount the WinPE image to get the boot files:

   ```
   Dism /Mount-Wim /WimFile:C:\winpe_x86\winpe.wim /index:1 /MountDir:C:\winpe_x86\mount
   ```

3. Copy the boot files from the image to the tftpboot\Boot folder:

   ```
   copy C:\Winpe_x86\mount\Windows\Boot\PXE\*.* C:\tftpboot\Boot
   ```

4. Discard changes and unmount the image:

   ```
   Dism /Unmount-Wim /MountDir:C:\winpe_x86\mount\ /Discard
   ```

5. Copy the boot.sdi file from the Windows AIK folder to you boot environment:

   ```
   copy "c:\Program Files\Windows AIK\Tools\PETools\x86\boot\boot.sdi" c:\tftpboot\Boot
   ```

6. Add the WinPE image to the boot environment:

   ```
   copy C:\Winpe_x86\winpe.wim C:\tftpboot\Boot
   ```

7. Create the BCD file. Therefore create a *.cmd filewith following content and launch it:

   ```
   Rem Creates BCD (boot configuration data) for three Windows PE 3.0 images
   set BCD-File=c:\BCD
   del %BCD-File%
   Bcdedit /createstore %BCD-File%
   Bcdedit /store %BCD-File% /create {ramdiskoptions}
   Bcdedit /store %BCD-File% /set {ramdiskoptions} ramdisksdidevice boot
   Bcdedit /store %BCD-File% /set {ramdiskoptions} ramdisksdipath  \boot\boot.sdi

   for /f "tokens=1-3" %%a in ('Bcdedit /store %BCD-File% /create /d "WinPE Import BIOS
   Settings + Flash BIOS" /application osloader') do set guid1=%%c
   Bcdedit /store %BCD-File% /set %guid1% systemroot \Windows
   Bcdedit /store %BCD-File% /set %guid1% detecthal Yes
   Bcdedit /store %BCD-File% /set %guid1% winpe Yes
   Bcdedit /store %BCD-File% /set %guid1% osdevice
   ramdisk=[boot]\boot\WinPE_import.wim,{ramdiskoptions}
   Bcdedit /store %BCD-File% /set %guid1% device
   ramdisk=[boot]\boot\WinPE_import.wim,{ramdiskoptions}

   for /f "tokens=1-3" %%a in ('Bcdedit /store %BCD-File% /create /d "WinPE Export BIOS
   Settings" /application osloader') do set guid2=%%c
   Bcdedit /store %BCD-File% /set %guid2% systemroot \Windows
   Bcdedit /store %BCD-File% /set %guid2% detecthal Yes
   Bcdedit /store %BCD-File% /set %guid2% winpe Yes
   Bcdedit /store %BCD-File% /set %guid2% osdevice
   ramdisk=[boot]\boot\WinPE_export.wim,{ramdiskoptions}
   Bcdedit /store %BCD-File% /set %guid2% device
   ramdisk=[boot]\boot\WinPE_export.wim,{ramdiskoptions}
   ```

```
Bcdedit /store %BCD-File% /create {bootmgr} /d "WinPE BootManager"
Bcdedit /store %BCD-File% /set {bootmgr} timeout 30
Bcdedit /store %BCD-File% /set {bootmgr} displayorder %guid1% %guid2%
Bcdedit /store %BCD-File% /enum all
```

8. Copy the BCD to the tftpboot\Boot folder as well

```
copy C:\BCD C:\tftpboot\Boot
```

9. Verify the presence of following files in c:\tftpboot\Boot **before continuing**:

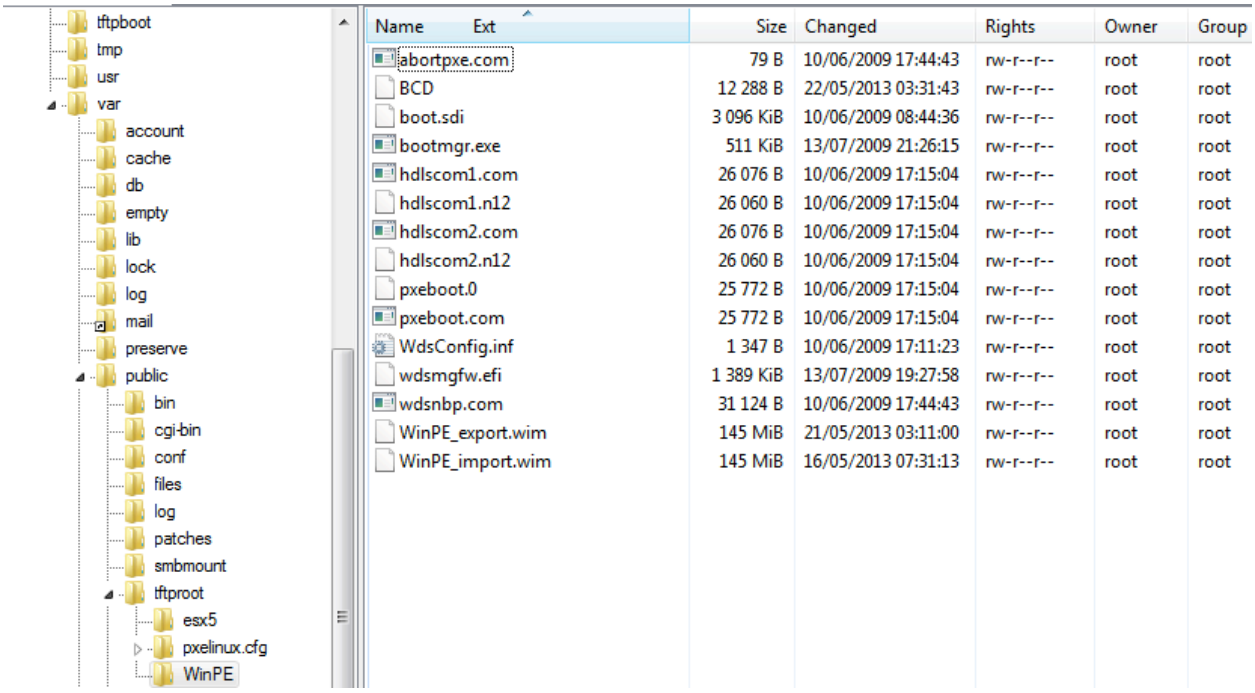
```
abortpxe.com
BCD
boot.sdi
bootmgr.exe
hdlscom1.com
hdlscom1.n12
hdlscom2.com
hdlscom2.n12
pxeboot.com
pxeboot.n12
WdsConfig.inf
wdsnbp.com
winpe.wim
```

10. Rename pxeboot.n12 to pxeboot.0

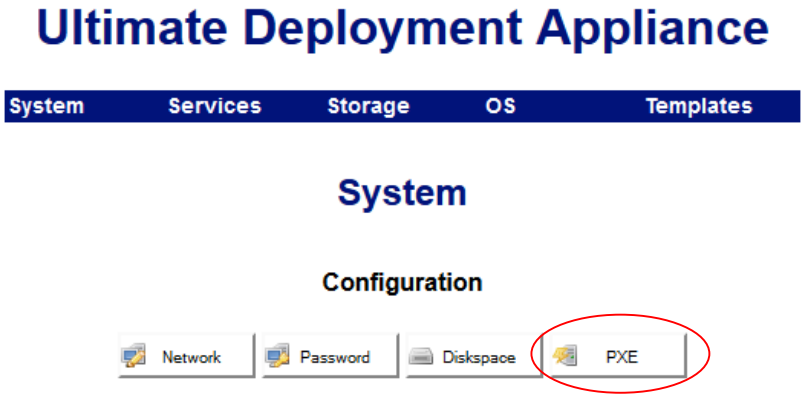
```
rename c:\tftpboot\Boot\pxeboot.n12 pxeboot.0
```

Prepare Ultimate Deployment Appliance (UDA) to boot the WinPE image

1. Copy the **c:\tftpboot\Boot** folder to **/var/public/tftproot/WinPE** in UDA (WinSCP is good for this)



2. Add an entry to the PXE boot menu. Connect to the web interface of UDA, go to **System** → **PXE**:



Enter following text under the LOCALBOOT entry in the **Header** section:

```
label WinPE
  menu WinPE BIOS configuration
  kernel boot/pxeboot.0
```

3. Apply changes.

4. Go to Services and configure tftpd. Add following lines to remap to the WinPE folder:

```
re ^bootmgr\.exe WinPE/bootmgr.exe
r ^\\Boot\\ WinPE/
r ^\\boot\\ WinPE/
r ^Boot/ WinPE/
r ^/Boot/ WinPE/
r ^boot/ WinPE/
r ^/boot/ WinPE/
```

5. Configure SMB: Create a **writeable** share/ and usernames if required.

```
[HP]
   browsable = true
   read only = no
   guest ok = yes
   path = /local/HP
   public = yes
   writable = yes
```

6. Create a folder for HP inside this share:

```
mkdir /local/HP
chmod 777 /local/HP
```

7. Restart SMB & verify that SMB is started (GUI or ssh):

```
smbd restart
smbstatus –l
```

8. Share folder structure explained:

hp	← share just created
<SEVERMODEL>	← folder created with conrep_export.bat
bios_config.dat	← export created by conrep_export.bat
BIOS	← **to be created manually after** a first export for a model
cpqsetup.exe etc	← BIOS firmware to be copied manually **after** a first export for a model
REPORTS	← folder created with conrep_export.bat
<IP>	← folder created with conrep_export.bat
CONREP	← folder created with conrep_export.bat
bios_config.dat	← copy of the file imported with conrep_import.bat
Bios_settings_imported.txt	← "report" created with conrep_import.bat
Bios_upgrade_completed.txt	← "report" created with conrep_import.bat

Personalize images and create one for exports and one for imports

1. Create a copy of Winpe.wim, and rename one file to **WinPE_export.wim**, and the other one to **WinPE_import.wim**
2. Mount the **WinPE_export.wim** file to the **Mount** directory:

   ```
   Dism /Mount-Wim /WimFile:C:\winpe_x86\ WinPE_export.wim /index:1
   /MountDir:C:\winpe_x86\mount
   ```

3. Edit x:\windows\system32\startnet.cmd:

   ```
   notepad startnet.cmd
   ```

   Add:

   ```
   x:\tools\startup.bat
   ```

4. Create a new bat file called x:\tools\startup.bat:

   ```
   notepad x:\tools\startup.bat
   ```

5. Paste following script into the .bat file and save it:

```
REM ** This is the script to extract BIOS settings from a host *
REM ** and export them to a share ******************************

REM ************************************************************
REM **** CREATE MAPPINGS ***************************************
REM ************************************************************

REM **** Make sure that the network is fully started ***********

ipconfig

REM **** Map a drive to the share you are working from *********

:retrymap
net use z: \\<IP-ADDRESS-OF-YOUR-UDA>\hp
IF errorlevel 1 goto retrymap

REM ************************************************************
REM **** SET GLOBAL VARS ***************************************
REM ************************************************************

set Tools=x:\Tools
set MSTools=x:\Windows\System32
set GlobalData=z:



REM ************************************************************
```

```
REM **** SET SERVER VARS ************************************
REM ************************************************************

REM **** GET IP ADDRESS *************************************

IPCONFIG | FIND "IPv4" | find /v "169" | find /v " 0.0.0.0" > %temp%\TEMPIP.txt
FOR /F "tokens=2 delims=:" %%a in (%temp%\TEMPIP.txt) do set IP=%%a
del %temp%\TEMPIP.txt
set IP=%IP: =%
IF NOT "%IP%"=="" echo Your current IP Address is %IP%

REM ************************************************************
REM **** OPEN EXPORT SCRIPT ************************************
REM ************************************************************

call %GlobalData%\conrep_export.bat
```

6. Commit changes to the image and unmount it:

   ```
   Dism /Unmount-Wim /MountDir:C:\winpe_x86\mount\ /Commit
   ```

7. Repeat the steps with **WinPE_import.wim** while changing the last line of the script
   from:

   ```
   call %GlobalData%\conrep_export.bat
   ```

   to

   ```
   call %GlobalData%\conrep_import.bat
   ```

8. Copy **WinPE_import.wim** and **WinPE_export.wim** to **/var/public/tftproot/WinPE** in UDA (WinSCP is good for this).
   NB: if there is already a .wim in this folder, delete it first! There is not enough space on that partition to hold 3 .wim files.

Boot the first HP Server to create a reference configuration

1. **Start the host** and **select PXE** as boot device (F12)
2. In the UDA menu, choose **WinPE BIOS configuration**
3. In the Windows PE Boot menu, choose **WinPE Export BIOS Settings**
4. Let it to its job and wait until the host rebooted.
5. *Check the logs if you like*

Import settings to other HP Servers from the reference configuration

1. Be sure that the all the values in the **bios_config.dat** file are set correctly.
2. **Copy the BIOS files** to the correct folder (<MODEL>/BIOS/ cpqsetup.exe etc)
3. **Start the host** and **select PXE** as boot device (F12)
4. In the UDA menu, choose **WinPE BIOS configuration**
5. In the Windows PE Boot menu, choose **WinPE Import BIOS Settings + Flash BIOS**
6. Let it to its job and wait until the host rebooted.
7. **If BIOS was updated, continue with step 3 to be sure to have the settings imported as well.**
8. *Check the logs if you like*

NB: For step 3, if the host is running ESXi, following procedure can be used to reboot the host with PXE. The host should do everything automatically and reappear in vCenter after a while.
Note that connecting via SSH to the host and issuing the command "esxcli hpbootcfg execute –P" prior to a host reboot would be enough but scripting it doesn't require a connection to each host via SSH.

```
#Activate SSH if necessary (I did it on the whole cluster at once)
Connect-VIServer <YOURVCENTER>
get-cluster | get-VMhost  -Name <HOSTNAME*> | sort Name | Foreach {
  Start-VMHostService -HostService ($_ | Get-VMHostService | Where { $_.Key -eq "TSM-SSH"} )
}

#Enter maintenance mode
Set-VMHost -VMHost <HOSTNAME> -State "Maintenance"

#set PXE as the first boot device for the NEXT boot only
$User = "root"
$Password = "PASSWORD"
$plink = "C:\plink.exe"
$esxcli = "esxcli"
$plinkoptions = " -v -ssh -pw $Password"
$cmd = 'hpbootcfg execute -P'
$remoteCommand = $esxcli + " " + '"' + $cmd + '"'
$Computer = "<HOSTNAME>"
echo y | c:\plink.exe -ssh <HOSTNAME> -pw $Password 'exit'
$command = $plink + " " + $plinkoptions + " " + $User + "@" + $Computer + " " +
$remoteCommand
$launchtask = Invoke-Expression -command $command
```

```
#reboot the host
Restart-VMHost $Computer -confirm:$false
Disconnect-VIServer –confirm:$false
```

Appendix

1. Appendix A: conrep_export.bat

```
:: ************************************************************
:: ************************************************************
:: **** # UPDATE HP ProLiant BIOS Firmware & Settings  #*******
:: **** # using CONREP. For ProLiant up to G7.               #*******
:: **** #  - conrep_export.bat    -                                    #*******
:: **** # Export BIOS settings.                                       #*******
:: **** # Author: Tom Ewerling - 24/05/2013                       #*******
:: **** # version 1.1 - 16/06/2013                                  #*******
:: ************************************************************
:: ************************************************************

REM ************************************************************
REM **** LOADING DRIVERS ************************************
REM ************************************************************

for /f %%F in ('dir /s /b /OD x:\windows\inf\oem*.inf') do drvload %%F
drvload x:\DRV\cpqcidrv\CpqCiDrv.inf

REM ************************************************************
REM **** SET SERVER VARS ************************************
REM ************************************************************

REM **** GET IP ADDRESS ************************************
IPCONFIG | FIND "IPv4" | find /v "169" | find /v " 0.0.0.0" > %temp%\TEMPIP.txt
FOR /F "tokens=2 delims=:" %%a in (%temp%\TEMPIP.txt) do set IP=%%a
del %temp%\TEMPIP.txt
set IP=%IP: =%
IF NOT "%IP%"=="" echo Your current IP Address is %IP%

REM **** DETERMINE SERVER MODEL ********************************
x:
cd %Tools%
hpdiscovery.exe
for /f "delims=" %%a in ('"hwquery.exe hpdiscovery.xml allboards.xml SRV=SystemName"') do @set
MyServer=%%a
set MyServer=%MyServer:~4%
REM **** REMOVE SPACES IN NAME ********************************
:DEL_TRAILING_SPACES
IF "%MyServer:~-1%"==" " (
set MyServer=%MyServer:~0,-1%
GOTO DEL_TRAILING_SPACES
)

IF NOT "%MyServer%"=="ProLiant DL580 G5" (
       IF NOT "%MyServer%"=="ProLiant DL580 G7" (
              IF NOT "%MyServer%"=="ProLiant DL980 G7" (
                     IF NOT "%MyServer%"=="ProLiant DL785 G5"  (
                     echo Error: Unsupported servermodel. Your model %MyServer% is not supported.
                     pause
                     Goto:EOF
                     )
              )
       )
)
echo Your Servermodel is "%MyServer%"


REM ************************************************************
```

```
REM **** EXPORT BIOS SETTINGS *********************************
REM ***********************************************************
z:
REM *Create a new directory for this model if it doesn't exist.*
IF NOT EXIST "%MyServer%"\*.* md "%MyServer%" > NUL

REM **** EXPORT BIOS SETTINGS *********************************
IF EXIST %GlobalData%\REPORTS\%ip%\ rmdir /s %GlobalData%\REPORTS\%ip%\ /q
IF NOT EXIST %GlobalData%\REPORTS\%ip%\CONREP md %GlobalData%\REPORTS\%ip%\CONREP
x:
cd %Tools%
conrep.exe -s -f %GlobalData%\REPORTS\%ip%\CONREP\bios_config.dat
copy %GlobalData%\REPORTS\%ip%\CONREP\bios_config.dat "%GlobalData%\%MyServer%\bios_config.dat"
z:
IF NOT errorlevel 0 goto error
echo "CONREP settings capture completed"


REM ***********************************************************
REM **** REBOOT ***************************************************
REM ***********************************************************
x:
cd %Tools%
reboot

REM ***********************************************************
REM **** ERROR HANDLING ******************************************
REM ***********************************************************
:error
echo Error: %errorlevel%
pause
```

2. Appendix B: conrep_import.bat

```
:: ************************************************************
:: ************************************************************
:: **** # UPDATE HP ProLiant BIOS Firmware & Settings  #*******
:: **** # using CONREP. For ProLiant up to G7.               #*******
:: **** #  - conrep_import.bat    -                                    #*******
:: **** # Check BIOS version & update. Update settings.      #*******
:: **** # Author: Tom Ewerling - 24/05/2013                        #*******
:: **** # version 1.1 - 16/06/2013                                 #*******
:: ************************************************************
:: ************************************************************

REM ************************************************************
REM **** LOADING DRIVERS ************************************
REM ************************************************************

for /f %%F in ('dir /s /b /OD x:\windows\inf\oem*.inf') do drvload %%F
drvload x:\DRV\cpqcidrv\CpqCiDrv.inf

REM ************************************************************
REM **** SET SERVER VARS ************************************
REM ************************************************************

SET DATESTAMP=%DATE:~10,4%_%DATE:~4,2%_%DATE:~7,2%
SET TIMESTAMP=%TIME:~0,2%_%TIME:~3,2%
SET DATEANDTIME=%DATESTAMP%_%TIMESTAMP%

IF NOT EXIST %GlobalData%\REPORTS\%ip%\CONREP md %GlobalData%\REPORTS\%ip%\CONREP

REM **** DETERMINE SERVER MODEL ******************************
x:
cd %Tools%
hpdiscovery.exe
for /f "delims=" %%a in ('"hwquery.exe hpdiscovery.xml allboards.xml SRV=SystemName"') do @set
MyServer=%%a
set MyServer=%MyServer:~4%

IF NOT "%MyServer%"=="ProLiant DL580 G5" (
       IF NOT "%MyServer%"=="ProLiant DL580 G7" (
              IF NOT "%MyServer%"=="ProLiant DL980 G7" (
                     IF NOT "%MyServer%"=="ProLiant DL785 G5"  (
                     echo Error: Unsupported servermodel. Your model %MyServer% is not supported.
                     pause
                     Goto:EOF
                     )
              )
       )
)
echo Your Servermodel is "%MyServer%"

REM ************************************************************
REM **** UPDATE BIOS FIRMWARE IF REQUIRED *********************
REM ************************************************************

REM **** DETERMINE BIOS VERSION ******************************

for /f "delims=" %%a in ('"hwquery.exe hpdiscovery.xml allboards.xml ROM=ROM"') do @set MyRom=%%a
set MyRom=%MyRom:~4%
for /f "delims=" %%a in ('"hwquery.exe hpdiscovery.xml allboards.xml ROMdate=ROMDate"') do @set
MyRomdate=%%a
set MyRomdate=%MyRomdate:~8%
```

```
REM **** IF BIOS VERSION OUTDATED --> UPDATE ******************

echo "Actual BIOS Version: %MyRom%"
echo "Actual BIOS Date: %MyRomdate%"

IF EXIST "%GlobalData%\%MyServer%\BIOS\cpqsetup.exe" (
       %GlobalData%
       cd "%GlobalData%\%MyServer%\BIOS\"
       cpqsetup.exe /s
       REM cpqsetup.exe /s /f  **** use this line instead if BIOS upgrade should be forced
       goto CONTINUE
)

echo "No BIOS files in folder. Please correct."
pause
GOTO:EOF

:CONTINUE
IF errorlevel 3 (
       echo "BIOS already up to date. Nothing to be done. Continuing with settings import."
       set errorlevel=0
       GOTO IMPORT
)

IF errorlevel 2 (
       echo "%DATEANDTIME%: BIOS upgraded."
       IF EXIST %GlobalData%\REPORTS\%ip%\ echo "%DATEANDTIME%: BIOS upgrade from version
%MyRom%_%MyRomdate% completed. See CPQSETUP.log for more details." >
%GlobalData%\REPORTS\%ip%\Bios_upgrade_completed.txt
       IF EXIST X:\CPQSYSTEM\LOG\*.log copy X:\CPQSYSTEM\LOG\*.log %GlobalData%\REPORTS\%ip%\
       SET REBOOTPXE=true
       GOTO REBOOT
)
IF EXIST X:\CPQSYSTEM\LOG\*.log copy X:\CPQSYSTEM\LOG\*.log %GlobalData%\REPORTS\%ip%\

:IMPORT
REM ************************************************************
REM **** IMPORT BIOS SETTINGS *********************************
REM ************************************************************
z:
IF NOT EXIST "%GlobalData%\%MyServer%\bios_config.dat" (
echo "Error: No previous export exists. Export settings first."
GOTO:EOF
)

REM **** IMPORT ************************************************

x:
cd %Tools%
conrep.exe -l -f "%GlobalData%\%MyServer%\bios_config.dat"
z:
IF NOT errorlevel 0 goto error
echo "CONREP settings import completed"
IF EXIST %GlobalData%\REPORTS\%ip%\CONREP\ echo "%DATEANDTIME%: CONREP settings import completed" >
%GlobalData%\REPORTS\%ip%\CONREP\Bios_settings_imported.txt

REM ************************************************************
REM **** REBOOT ************************************************
REM ************************************************************
:REBOOT
x:
cd %Tools%
```

```
IF "%REBOOTPXE%"=="true" (
       reboot PXE
       GOTO:EOF
)
reboot
GOTO:EOF

REM *************************************************************
REM **** ERROR HANDLING ****************************************
REM *************************************************************
:ERROR
echo Error: %errorlevel%
pause
```

3. Sources

ftp://ftp.hp.com/pub/c-products/servers/management/smartstart/WindowsUserGuide%28415598-403%29.pdf

http://technet.microsoft.com/en-us/library/cc722358%28v=ws.10%29.aspx

http://www.gtkdb.de/index_17_797.html