Remotely flash LSI 9300 with FreeDOS Live CD

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Abstract

This guide explains how to create a custom FreeDOS Live CD to remotely upgrade the firmware of LSI 9300 HBA on a Supermicro server.

The custom LiveCD is created from a Linux computer.

This guide is based on the instructions from https://www.youtube.com/watch?v=IwPsadNho9M

This guide can also be useful to create a custom Live CD for other tools that needs FreeDOS.

For the moment it works only on computers that boot in LEGACY mode, it does not work in UEFI mode.

Introduction

To operate smoothly with TrueNAS, the Broadcom/LSI 9300 HBA needs to run a very specific firmware:

IT mode

at least version **16.00.12.00** (this version is only available on the TrueNAS community forum)

[LSI 9300-xx Firmware Update](#)

JoshDW19 submitted a new resource: LSI 9300-xx Firmware Update - Fixes a controller reset issue in LSI 9300-xx HBA cards Hey Community, If you are using an LSI 9300 HBA with FreeNAS or the soon-to-be TrueNAS CORE, you may experience some performance issues causing the controller to reset...

www.truenas.com

Despite TrueNAS comes with `sas3flash` for FreeBSD, this version suffers several drawbacks

it does not support downgrading the firmware version

it does not support switching from IR to IT mode (or the opposite direction)

Indeed, only the DOS version of `sas3flash` works for any scenario, so you have to create a custom FreeDOS Live CD with the flashing utility to update remotely (through IPMI) a Supermicro server running TrueNAS.

This guide has been tested only on Debian Linux 11.
It should also work on Ubuntu and other Linux distributions.

Create the working environment and download the resources

Create a working directory

Code:

mkdir ~/freedos-live-sas3

cd ~/freedos-live-sas3

Download the needed resources:

[FreeDOS 1.3 LiveCD](#)

[sas3flash for DOS](#)

[firmware 16.00.12.00 for Broadcom 9300 HBA](#)

> You cannot download sas3flash for DOS from the command line because you have to accept the Broadcom license.
> So use your web browser to get the file and copy it later to the working directory

Code:

```
cp ~/Downloads/Installer_P16_for_MSDOS_and_Windows.zip ~/freedos-live-sas3
wget https://www.ibiblio.org/pub/micro/pc-stuff/freedos/files/distributions/1.3/official/FD13-LiveCD.zip
wget https://www.truenas.com/community/resources/lsi-9300-xx-firmware-update.145/download -O
SAS3_FW_Phase16.0-16.00.12.00_Firmware.zip
```

Extract the archives

Code:

```
unzip FD13-LiveCD.zip
unzip SAS3_FW_Phase16.0-16.00.12.00_Firmware.zip
unzip Installer_P16_for_MSDOS_and_Windows.zip
```

Mount the FreeDOS LiveCD image in a directory to access the content

Code:

```
mkdir src-cd
sudo mount -t iso9660 -o loop FD13LIVE.iso src-cd/
```

Prepare the custom FreeDOS LiveCD
Copy the content of the FreeDOS LiveCD to another directory

Code:

```
mkdir custom-cd
cp -r src-cd/isolinux custom-cd/
chmod -R +w custom-cd/isolinux
```

Copy the flash utility and the firmwares you need

Code:

```
cp Installer_P16_for_MSDOS_and_Windows/sas3flash_dos_rel/sas3flsh.exe custom-cd/
cp SAS3_FW_Phase16.0-16.00.12.00_Firmware/9300-8i/SAS9300_8i_IT.bin custom-cd/fw8i-it.bin
echo "SAS3_FW_Phase16.0-16.00.12.00_Firmware/9300-8i/SAS9300_8i_IT -> fw8e-it.bin" >> custom-
cd/README.TXT

cp SAS3_FW_Phase16.0-16.00.12.00_Firmware/9300-8e/SAS9300_8e_IT.bin custom-cd/fw8e-it.bin
echo "SAS3_FW_Phase16.0-16.00.12.00_Firmware/9300-8e/SAS9300_8e_IT -> fw8e-it.bin" >> custom-
cd/README.TXT
```

Copy only the firmware you really need

In this example I copy the firmware for 9300-8i and 9300-8e

Shorten the filename because **FreeDOS allow only 8 characters + 3 extentions**

I create also a README.TXT file to know the original filename

Optional edit the boot menu title

Code:

nano custom-cd/isolinux/isolinux.cfg

Edit the "live" entry, change the **label** and the **help text**

Code:

```
label live
menu label Use FreeDOS 1.3 Live to flash LSI 9300 firmware
menu default
text help
Go to D: to find the flash utility and firmwares
endtext
```

It is a good idea to edit the boot menu title and help text to remember the purpose of the LiveCD

Generate the ISO image

Code:

```
sudo apt install genisoimage
cd custom-cd
genisoimage -o ../fdlive-flash.iso -V "FreeDOS 1.3 LiveCD SAS3FLASH" -b isolinux/isolinux.bin -no-emul-boot -boot-load-size 4 -boot-info-table -c isolinux/boot.cat .
```

Do not forget the final dot at the end of command line

You can use VirtualBox to test your new FreeDOS LiveCD

Boot the Supermicro server with the LiveCD

Virtual CDROM does not work with the HTML5 KVM !

Connect to the IPMI interface of the Supermicro server

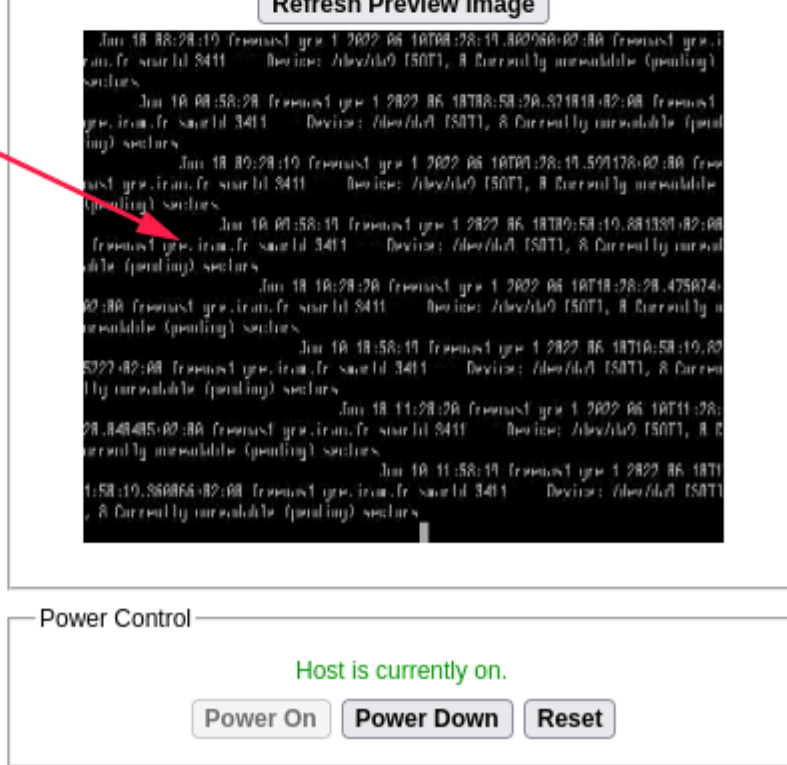Click on the *Remote Console Preview* to launch the **JAVA KVM**
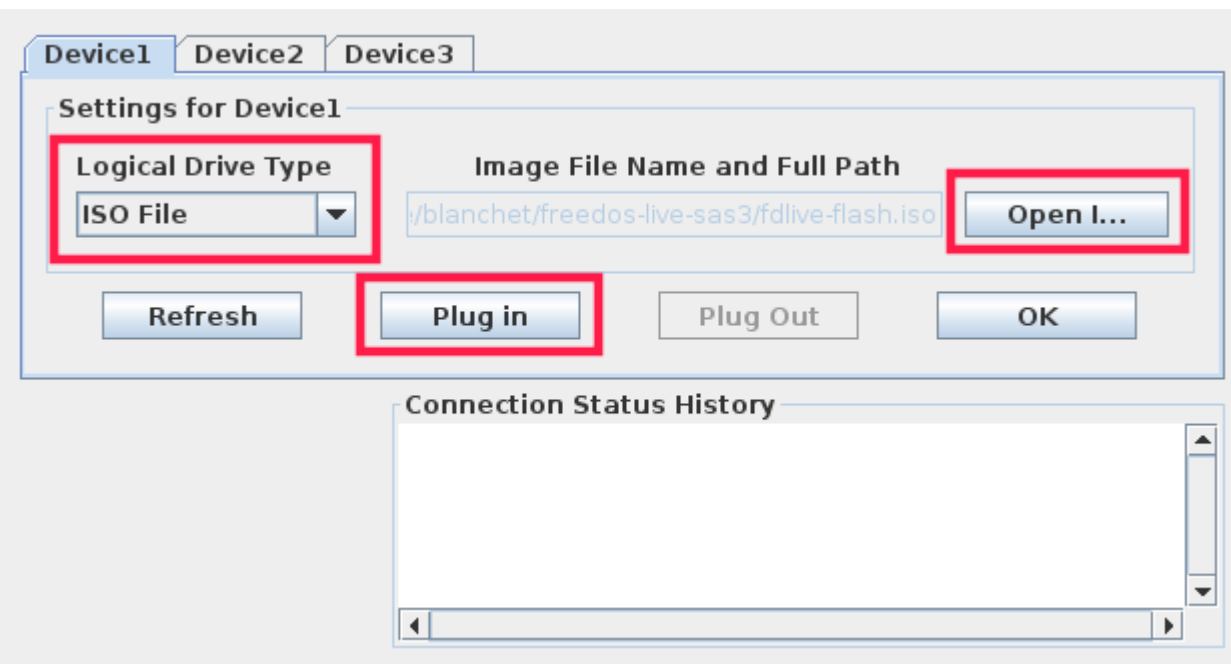
click on the
image to
launch
JAVA KVM

Power Control

Host is currently on.

Power On   Power Down   Reset

Open *Virtual Media | Virtual Storage*
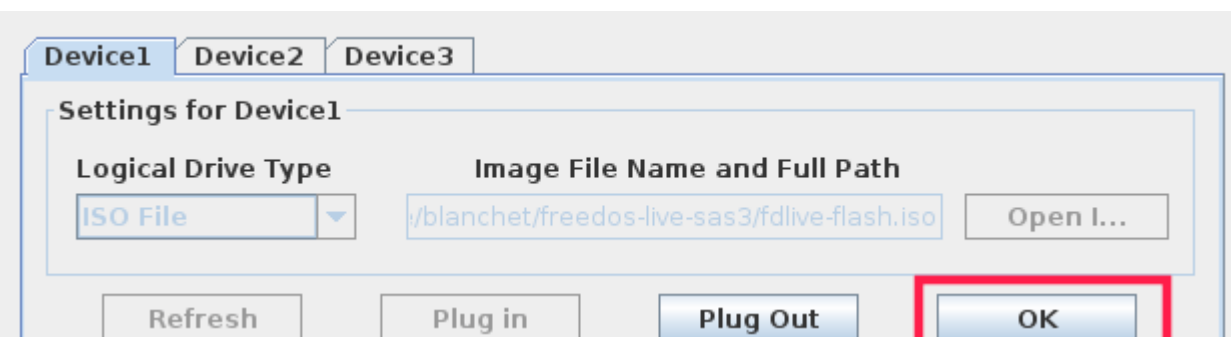

Logical Drive Type: **ISO File**

Open: **fdlive-flash.iso**

Click **Plug in** to mount the ISO image

A message appears: **Device1:VM Plug-In OK!!**

Click **OK** to close the windows

Connection Status History

Device1 :VM Plug-In OK!!

Reboot the Supermicro server

When the computer restarts press **F11** to display the boot menu


```
        Please select boot device:

ISATA  P4: 32GB SATA Flash Driv
ISATA  P5: 32GB SATA Flash Driv
ISATA  P0: Samsung SSD 860 PRO
ISATA  P1: Samsung SSD 860 PRO
#0100 ID00 LUN0 ATA      WDC   WUH721818
#0100 ID01 LUN0 ATA      WDC   WUH721818
#0100 ID02 LUN0 ATA      WDC   WUH721818
#0100 ID03 LUN0 ATA      WDC   WUH721818
#0100 ID04 LUN0 ATA      WDC   WUH721818
#0100 ID05 LUN0 ATA      WDC   WUH721818
#0100 ID06 LUN0 ATA      WDC   WUH721818
#0100 ID07 LUN0 ATA      WDC   WUH721818
#0100 ID08 LUN0 ATA      WDC   WUH721818
#0100 ID09 LUN0 ATA      WDC   WUH721818
#0100 ID10 LUN0 ATA      WDC   WUH721818
#0100 ID11 LUN0 ATA      WDC   WUH721818
ATEN Virtual CDROM YS0J
Enter Setup

      ↑ and ↓ to move selection
    ENTER to select boot device
     ESC to boot using defaults
```

If the Virtual CD-ROM does not appear in the boot menu, then Enter Setup

select **Enter Setup**

go to **BOOT**

Boot mode : **LEGACY** (do not forget to restore to UEFI later)

Boot Option #1, USB CD/DVD ATEN Virtual CROM YS0J

Virtual Media   Record   Macro   Options   User List   Capture   Power Control   Exit

```
              Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
   Main  Advanced  Event Logs  IPMI  Security  Boot  Save & Exit

   Boot Configuration                                          Sets the system boot order
   Setup Prompt Timeout                     5

   Boot Mode Select                      [LEGACY]

   FIXED BOOT ORDER Priorities
```
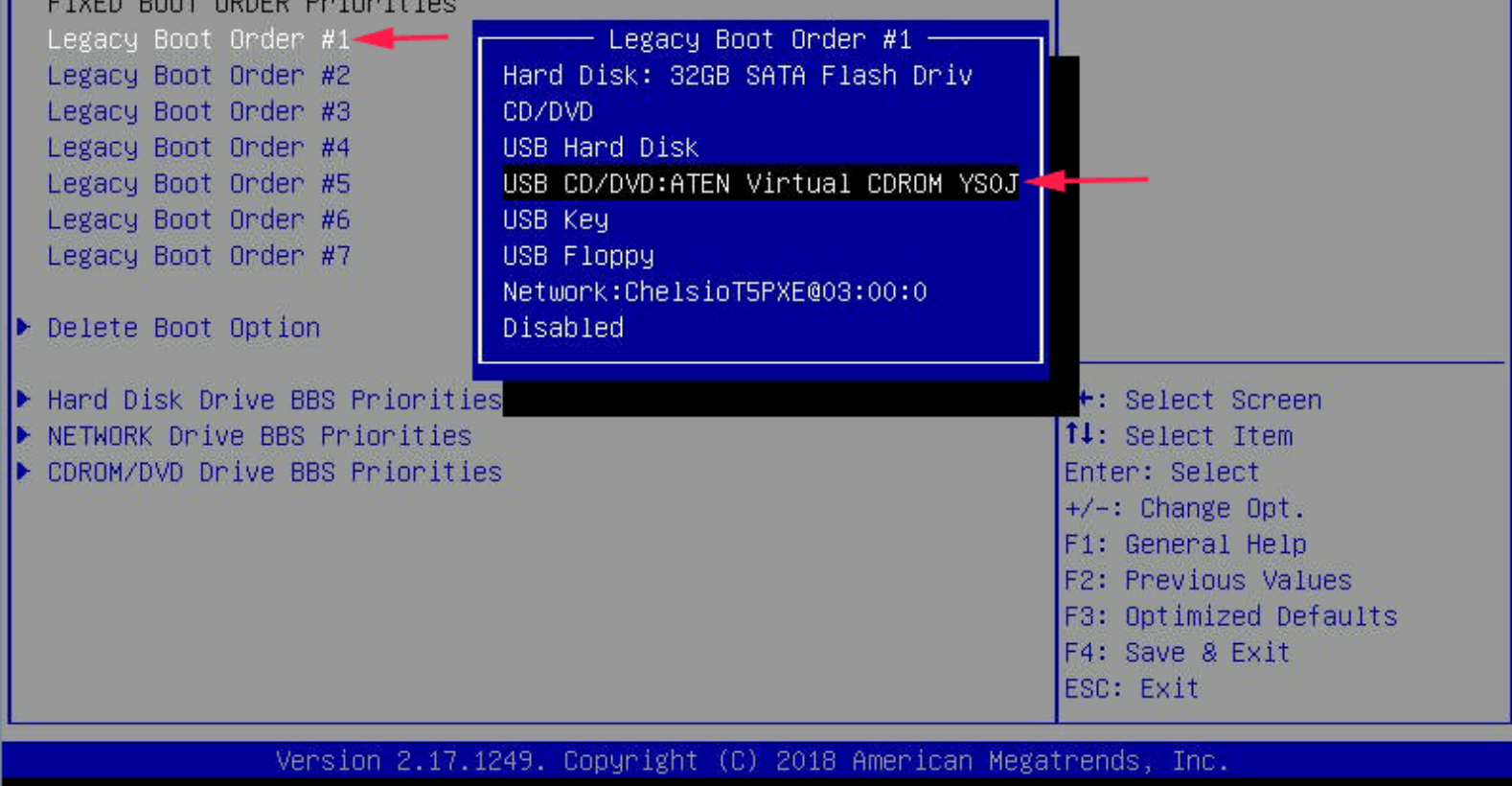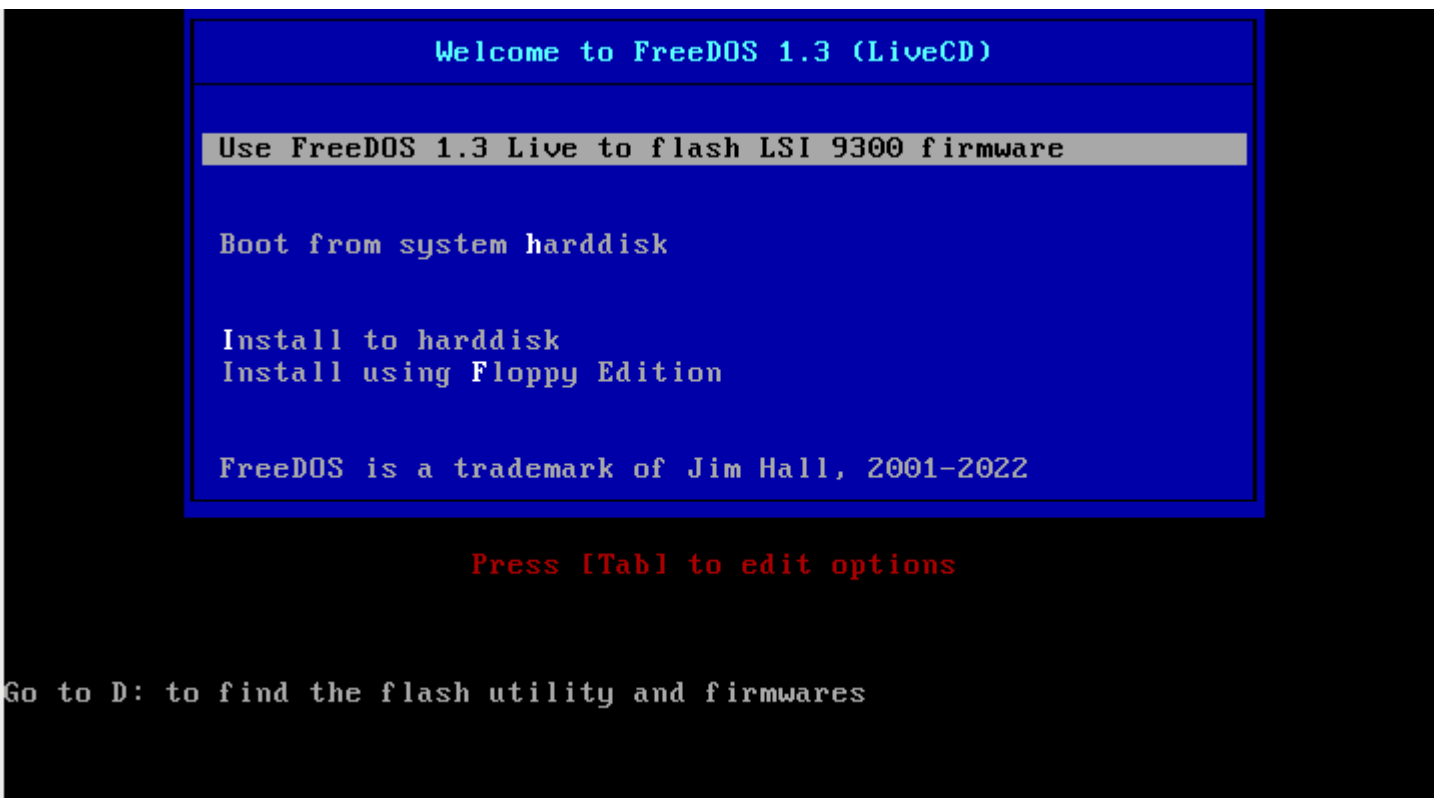
Save and Exit (**F4**)

The computer reboots on the LiveCD

Select **Use FreeDOS 1.3 Live to flash LSI 9300 firmware**

After booting the prompt display **R:\>**

Switch to **D:** and run **sas3flsh.exe**

Code:

R:\> d:
D:\> sas3flsh.exe -listall

Adapter Selected is a Avago SAS: SAS3008(C0)

```
Num  Ctlr        FW Ver      NVDATA      x86-BIOS      PCI Addr
----------------------------------------------------------------------

0  SAS3008(C0)  16.00.01.00   0e.01.00.08   08.37.00.00    00:18:00:00
1  SAS3008(C0)  16.00.01.00   0e.01.00.07   08.37.00.00    00:af:00:00


    Exiting SAS3Flash.
```

I have 2 SAS3008 boards #0 and #1 and I have to check the models

Code:

```
D:\> sas3flsh.exe -c 0 -list
    Adapter Selected is a Avago SAS: SAS3008(C0)


    Controller Number        : 0
    Controller              : SAS3008(C0)
    Firmware Product ID        : 0x2221 (IT)
    Firmware Version        : 16.00.01.00
    NVDATA Vendor          : LSI
    NVDATA Product ID         : SAS9300-8e
    BIOS Version            : 08.37.00.00
    UEFI BSD Version         : 18.00.00.00
    FCODE Version          : N/A
    Board Name             : SAS9300-8e
```

The board #0 has the firmware **16.00.01.00** and it is a **9300-8e** model, so i use **fw8e-it.bin**

If you do not remember the original filenames use the following command to display D:\README.TXT

Flash the firmware with **9300-8e** firmware 16.00.12.00

Code:

```
D:\> sas3flsh.exe -c 0 -f fw8e-it.bin
```

Check the firmware after the flashing

Code:

```
D:\> sas3flash -c 0 -list
    Adapter Selected is a Avago SAS: SAS3008(C0)


    Controller Number        : 0
    Controller              : SAS3008(C0)
    Firmware Product ID        : 0x2221 (IT)
    Firmware Version        : 16.00.12.00
    NVDATA Vendor          : LSI
```

NVDATA Product ID	: SAS9300-8e
BIOS Version	: 08.37.00.00
UEFI BSD Version	: 18.00.00.00
FCODE Version	: N/A
Board Name	: SAS9300-8e

Ok board #0 has been correctly reflashed.

Repeat for board #1

Display info for board #1

Code:

```
D:\> SAS3DOS\sas3flsh.exe -c 1 -list
    Adapter Selected is a Avago SAS: SAS3008(C0)


    Controller Number       : 1
    Controller           : SAS3008(C0)
    Firmware Product ID       : 0x2221 (IT)
    Firmware Version       : 16.00.01.00
    NVDATA Vendor         : LSI
    NVDATA Product ID         : SAS9300-8i
    BIOS Version         : 08.37.00.00
    UEFI BSD Version         : 18.00.00.00
    FCODE Version         : N/A
    Board Name         : SAS9300-8i
```

Board #1 has the firmware **16.00.01.00** and it is a **9300-8i** , so I need **fw8i-it.bin**

Code:

```
D:\> sas3flsh.exe -c 1 -f fw8i-it.bin
```

Display info for board #1

Code:

```
D:\> sas3flsh.exe -c 1 -list
    Adapter Selected is a Avago SAS: SAS3008(C0)


    Controller Number       : 1
    Controller           : SAS3008(C0)
    Firmware Product ID       : 0x2221 (IT)
    Firmware Version       : 16.00.12.00
    NVDATA Vendor         : LSI
    NVDATA Product ID         : SAS9300-8i
    BIOS Version         : 08.37.00.00
    UEFI BSD Version         : 18.00.00.00
    FCODE Version         : N/A
```

Board Name   : SAS9300-8i

Now use the menu MACRO to send CTRL-ALT-DEL to reboot the server

Unmount the virtual CDROM

Virtual Media | Virtual Storage | Plug Out

When the computer reboots, press **DEL** to enter the BIOS

If needed switch back the boot mode to UEFI

Boot the server

Enjoy your Broadcom 9300 HBA with the appropriate firmware to run TrueNAS !