# Install VMware® ESX Server4.x.x without isolating the SAN

Do you find detaching SAN cables or organising LUN masking a hassle each time you build or rebuild a VMware ESX Server? This document shows you how to streamline the process by not loading HBA drivers during the initial installation process.

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# 1. Introduction

I wrote the first document on stripping the HBA drivers out of the ESX 3.x.x ISO almost three years ago now – and I believe quite a few people found it useful.

I've finally got around to deploying ESX 4 – so I thought that I might as well document the procedure for stripping the HBA drivers from that too.

On the negative side - it's quite different from the ESX 3.x.x procedure, on the positive side – it is far less involved.

There are a few more commands in the ESX 4 kickstart language that make it less likely to overwrite a SAN disk these days – but personally I'm all for removing any element of doubt…

The following write up goes down to a very basic level – experienced Linux users will just have to bear with me – I have deliberately tried to make it as easy to follow as possible for administrators with very little command line experience.

I have documented the process from the perspective of amending the standard ESX 4 update 1 ISO, but I would be surprised if it did not work in a similar manner for all ESX 4.x.x. releases?

There are two excellent free VM appliances that can greatly help with installing ESX:

UDA from Carl Thijssen http://www.ultimatedeployment.org/

and

EDA from Herco Van Brug http://www.vmware.com/appliances/directory/89313

I would thoroughly recommend that anyone who will be building a fair number of ESX servers has a look at both of them.

Bouke Groenescheij wrote an excellent script to strip the ESX drivers from the ESX 3.x.x ISO after my last document on ESX 3.x.x.

It was so straightforward to script the process this time, that I've included a sample script with this pdf – but no doubt Bouke will produce a far more robust version – check out his site here http://www.jume.nl/

I know of no errors in this document – but as ever – this process should only be used "at your own risk" – I accept no responsibility for any problems that may arise from its use.

## 2. Detailed process to remove the HBA drivers

The following process details how to remove the build time HBA drivers from the standard ESX 4.x.x ISOs.

I did all my work on the UDA 2.0 beta (build 13) box – which runs Centos 5.3. You should be able to perform these tasks on any Linux box that you have available though. You could probably even do it on an ESX 4 server – though I haven't specifically tested that out.

The concepts will be very similar whatever flavour of Linux you use.

I have used the ESX 4 u1 iso in all my examples – but unless VMware decide to base their install CD on a different flavour of Redhat – I would expect the same procedure to work for all flavours of ESX 4.x.x

I have chosen to work in /var/public/smbmount/local/

This is purely because this is the only area with enough free space on my server.

You can use any directory with plenty of space.

Sign on to the Linux box you intend to use for the procedure as root – then you're ready to start:

Change to the directory you wish to work in:

**cd /var/public/smbmount/local**

Create a new directory to work in:

**mkdir esx4u1nosan**

Now download your ESX 4.x.x ISO and copy it to that directory

I use VeeamFast SCP to copy the file to my Linux box – another good utility is WinSCP.

copied ESX-4.0.0-update01-208167.iso to the esx4u1nosan directory

Change working directory to the esx4u1nosan directory

**cd esx4u1nosan**

Create a directory specifically to hold the files extracted from the iso:

**mkdir mountiso**

Mount your ISO (so the files and directories within the ISO are expanded):

**mount ESX-4.0.0-update01-208167.iso ./mountiso -t iso9660 -o loop**

You should now be able to see a directory structure under the mountiso directory.

If you browse through this directory structure you will find one instance of the initrd.img

./mountiso/isolinux/initrd.img

This is the file that is used by ESX 4, to boot from at install time, and hence the one that we need to remove the HBA drivers from.

2.1 Process to actually remove the HBA drivers from the initrd.img file

Optional - take a backup of the initrd.img that you are going to be working with – just in case you ever want it again…

**cp ./mountiso/isolinux/initrd.img ./initrd.img.orig**

Then, create another new directory to work on the initrd.img file in, and change the working directory to it:

**mkdir initrd**

**cd initrd**

Copy the initrd.img file in to the working directory - renaming it with a .gz extension as it will shortly need to be uncompressed with gunzip.

**cp ../mountiso/isolinux/initrd.img  initrd.img.gz**

Use gunzip to uncompress it (the command also renames it back to initrd.img)

**gunzip initrd.img.gz**

Unlike the initrd.img that was in the ESX 3.x.x iso this is not a mountable file system, instead it is a compressed cpio archive.

We can tell this by looking at the output of the following command:

file initrd.img

initrd.img: ASCII cpio archive (SVR4 with no CRC)

Extract the files from the initrd.img archive

**cpio -idvm <initrd.img**

It now extracts a large number of sub-directories and files…

Remove the original initrd.img file – to avoid confusion when we re-archive all the files

**rm -f initrd.img**

To find all the instances of qlogic drivers (and related descriptor files):

**find -name ql***

./usr/lib/vmware/vmkmod/qla4xxx.o

./usr/lib/vmware/vmkmod/qla2xxx.o

./usr/share/hwdata/pciids/qla4xxx.xml

./usr/share/hwdata/pciids/qla2xxx.xml

Similarly to see all the emulex drivers (and related descriptor files):

find **-name lp***

./usr/lib/vmware/vmkmod/lpfc820.o

./usr/share/hwdata/pciids/lpfc820.xml

Now delete all these files:

**rm -f ./usr/lib/vmware/vmkmod/qla4xxx.o**

**rm -f ./usr/lib/vmware/vmkmod/qla2xxx.o**

**rm -f ./usr/share/hwdata/pciids/qla4xxx.xml**

**rm -f ./usr/share/hwdata/pciids/qla2xxx.xml**

**rm -f ./usr/lib/vmware/vmkmod/lpfc820.o**

**rm -f ./usr/share/hwdata/pciids/lpfc820.xml**

Now re-create the initrd.img (but without the HBA related files) back in the esx4u1nosan directory:

**find . | cpio --create --format='newc' > ../newinitrd**

Move back to the esx4u1nosan directory

**cd ..**

Re-compress it (takes quite a while...):

**gzip --best newinitrd**

Rename it:

**mv newinitrd.gz initrd.img**

Hopefully if you now compare the sizes of the newly created file and the original one – the new one will be slightly smaller:

**ls -l**

```
total 992637
-rw-r--r--  1 root root 852717568 Feb  5 15:17 ESX-4.0.0-update01-208167.iso
drwxr-xr-x 14 root root      1024 Feb  5 18:18 initrd
-rw-r--r--  1 root root  79414253 Feb  5 18:29 initrd.img
-r--r--r--  1 root root  80348421 Feb  5 17:59 initrd.img.orig
dr-xr-xr-x  7 root root      2048 Nov 13 02:37 mountiso
```

Depending on how you intend to use the amended initrd.img file, you can now either use it directly in the tftpboot section of a PXE boot install environment – or you can bundle it back up with the main ESX 4.x.x ISO.

## 3. Process to re-create the ESX 4.x.x ISO using the new initrd.img file

We now have a new initrd.img file stripped of the HBA drivers.

We need to create a new ESX 4.x.x ISO file containing the amended initrd.img file (along with all the other files in the normal ESX ISO).

Unfortunately we cannot just copy the amended files back to the directories mounted from the initial ISO – as the initial mount is readonly.

What we need to do is copy the directories and files from the initial mount point to somewhere else. Then replace the initrd.img file and then create a new ISO.

Take a writeable copy of the data from the initially mounted ISO

**cp -r ./mountiso ./writeiso/**

Now copy the new initrd.img over the old initrd.img file:

**cp initrd.img ./writeiso/isolinux/**

**"y"** to overwrite

We now need to use the mkisofs utility to create the new ISO.

(If you are running this process on server running a version of linux that does not have mkisofs installed – then you will need to download and install it first)

Change your working directory - as the mkisofs parameters are all relative

**cd writeiso**

Then run mkisofs with the following parameters to create the new ISO

**mkisofs -l -J -R -r -T -o ../ESX-4.0.0-update01-208167-nosan.iso -b isolinux/isolinux.bin -c isolinux/boot.cat -no-emul-boot -boot-load-size 4 -boot-info-table ./**

Change directory back to esx4u1nosan

**cd ..**

You should then see the old and new ISOs (the new one should be a little smaller)

ls –l

```
-rw-r--r--  1 root root 852717568 Feb  5 15:17 ESX-4.0.0-update01-208167.iso
-rw-r--r--  1 root root 851781632 Feb  5 19:25 ESX-4.0.0-update01-208167-nosan.iso
drwxr-xr-x 14 root root      1024 Feb  5 18:18 initrd
-rw-r--r--  1 root root  79414253 Feb  5 18:29 initrd.img
-r--r--r--  1 root root  80348421 Feb  5 17:59 initrd.img.orig
dr-xr-xr-x  7 root root      2048 Nov 13 02:37 mountiso
dr-xr-xr-x  7 root root      1024 Feb  5 19:21 writeiso
```

To keep things tidy we can now unmount the intial ESX 4.x.x ISO

**umount mountiso**

Then delete the initrd, writeiso and mountiso directories (check that you're in the right place first ☺ ):

**rm -rf ./initrd**
**rm -rf ./writeiso**

You should now just have the old and new ISO, and copies of the old and new initrd.img

ls –l

```
-rw-r--r-- 1 root root 852717568 Feb  5 15:17 ESX-4.0.0-update01-208167.iso
-rw-r--r-- 1 root root 851781632 Feb  5 19:25 ESX-4.0.0-update01-208167-nosan.iso
-rw-r--r-- 1 root root  79414253 Feb  5 18:29 initrd.img
-r--r--r-- 1 root root  80348421 Feb  5 17:59 initrd.img.orig
```

You now have a new ISO called ESX-4.0.0-update01-208167-nosan.iso – which will not load the HBA drivers at ESX build time when you boot from it.

## 4. Using the provided script to strip the HBA drivers from the ESX 4 iso, and create a new "nosan" iso

Using a script to remove the HBA drivers from the ISO is a far more sensible way to go than doing the process manually – it literally takes just a few minutes.

The basic script that I have provided (removesanesx4iso.sh) was written and tested on the UDA 2 beta server (Centos 5.3). It should run on most Linux distributions though (you might need to install mkisofs if it is not already installed). (I've never tried to run it on ESX 4)

To run the script:

Copy the script and the normal ESX 4 iso to a directory on your Linux server with plenty of space (I would guess that 5 Gb or so would be plenty – but I haven't checked this). (I recommend winscp or fastscp to do the copy if it is from windows)

Logon to the linux server as root (I would recommend putty). (you may need to use sudo if appropriate in your environment)

cd to the directory that you have copied the script and iso into.

Edit the WORKSPACE and ESX4ISO variables in the script to contain the directory that you are in, and the exact name of the ISO you want to strip the drivers from (both are case sensitive). (Use vi to edit the file, or I guess you could edit it before you copy it over from windows – but avoid using something like notepad which can add line feed characters that Linux will not understand)

Set the script to be executable:

**chmod 744 removesanesx4iso.sh**

Type the below to actually run it:

**./ removesanesx4iso.sh**

It should then run for a while, producing the odd status message, and then finish up leaving a new nosan iso in the same directory as the script and original ISO.

Note: It is a fairly a basic script – hopefully Bouke will produce a more robust one, including error checking and the like…

## 5. How to test the new ISO

If you are anything like me, then you will probably want to prove to yourself that the new ISO really doesn't load the HBA drivers.

This used to be pretty obvious with ESX 3.x.x, as it used to display a large screen telling you that it was loading the HBA drivers.

Unfortunately this is no longer the case in ESX 4.x.x.

There may well be an easier way – but all I did to test it was:

a) boot from the standard ESX 4 ISO on a test server attached to some (non production) SAN LUNs.

   Run the graphical ESX installer – until it gets to the point that it detects the both local and SAN LUNs and asks you which one you want to install on. Then just cancel out.

b) boot from the new "nosan" ESX 4 ISO on the same test server attached to some (non production) SAN LUNs.

   Run the graphical installer – until it gets to the point that it trys to detects the both local and SAN LUNs. This time it should only display the local disk as an option to install on.

You have now proved that the new ISO really doesn't load the HBA drivers.

## 6. How to use the new iso (or initrd.img)

You can now use the new "nosan"ESX 4 ISO to build an ESX server without the Emulex and Qlogic drivers loading at build time – and without needing to worry about disconnecting the server from the SAN first….

Probably the easiest way to explain how, is to just say use the new ISO in exactly the same way as you would have used the old ISO in the past.

You could:

1) burn it to a DVD and install ESX directly from there
2) install ESX directly from the new iso (via ilo/drac funnctionality)
3) supply the new iso directly to the EDA and UDA appliances (perhaps in later versions one or both appliances may automatically remove the HBA drivers anyway?)
4) if you have your own independent PXE boot environment – then you could just use the new initrd.img file directly (usually placing it somewhere in the tftproot directory)

I hope you have found this document both useful and accurate.

Any suggestions or corrections – please let me know.

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