

Building a Private Cloud with Xen

Overall Objective:

Implement a GNU/Linux based Hypervisor to facilitate Linux system administration and to better understand cloud computing.

Background Information:

Xen is the most popular open source and scalable Hypervisor in the market. With its flexible design, it's robust enough to use in both small workstation-level installations and as the core Hypervisor for a cloud platform.

Deployment Resources:

http://wiki.xen.org/wiki/XCP_1.1_Manuals

Xen Cloud Platform Installation Guide

Xen Cloud Platform Virtual Machine Installation Guide

Requirements:

- Either AMD-V or Intel-VT is required on any XCP host to run Windows guest operating systems
- Each XCP host should have: 1-2GB of RAM and 16GB of HD Space (much more for XCP installs that use their local storage for the VMs)
- For this implementation, an NFS share on CentOS 5 to store VM data (60+ GB). A dedicated NFS OS such as FreeNAS would be more advisable for a low-end private-cloud deployment or a NAS/iSCSI for a high-end deployment.

Overview:

- I) Implement Xen via Xen Cloud Platform(XCP) by Xen
 - Part A) Install a NFS server (CentOS 5)
 - Part B) Download and Install XCP on 2 hosts
 - Part C) Configure the XCP Pool
- II) Implementing Xen via XenServer by Citrix
 - Part A) Download and Install XenServer by Citrix
 - Part B) Download and Install XenCenter (Citrix's management client)
 - Part C) Add previous XCP hosts to XenCenter and perform initial configurations
 - Part D) Use XenCenter to create 1 VM in the XCP Pool from Templates
 - Part E) Use XenCenter to Add XS1 and XS2 to a Pool with XS1 as the Master
- III) Implement some management platform like CloudStack or Eucalyptus (outside the scope of this guide)

Notes: This guide assumes the following configuration: (global) Username: root, psw: password

192.168.0.49 = NFS server, DNS Name = NFS.local

192.168.0.51 = Xen Cloud Platform Host 1, DNS Name = XCP1.local

192.168.0.52 = Xen Cloud Platform Host 2, DNS Name = XCP2.local

192.168.0.53 = XenServer 1, DNS Name = XS1.local

192.168.0.54 = XenServer 2, DNS Name = XS2.local

192.168.0.100 = Windows Workstation

Please change the IP numbers and host names as applicable.

I) Implement Xen via Xen Cloud Platform(XCP) by Xen

Part A) Installing an NFS server (CentOS 5)

Enter the following on the Linux-based server with ample (60+GB) storage:

- 1) setup
- 2) ~disable the firewall and SELinux
- 3) yum -y install portmap nts-utils nfs-utils-lib
- 4) chkconfig portmap on
- 5) chkconfig nfs on
- 6) [root@NFS ~] cd /
- 7) [root@NFS /] mkdir source
- 8) chmod -R 777 source (this will need to be run constantly)

- 9) echo "/source *(rw,no_root_squash,sync)" >> /etc/exports
 - 10) [optional] echo "portmap: 192.168.0.0 255.255.0.0" >> /etc/hosts.allow
 - 11) service portmap start
 - 12) service nfs start
 - 13) Interestingly, since an NFS is a standard Linux file share, it can be mounted on Windows by using the command "mount -u:root -p:password \\192.168.0.49/source N:" after installing the "Services for NFS" under "Turn Windows features on or off". It can also be mounted on ESXi directly and used as a datastore from which to store and launch VMs. Mount it within the Windows workstation at this time.

Part B) Download and Install XCP

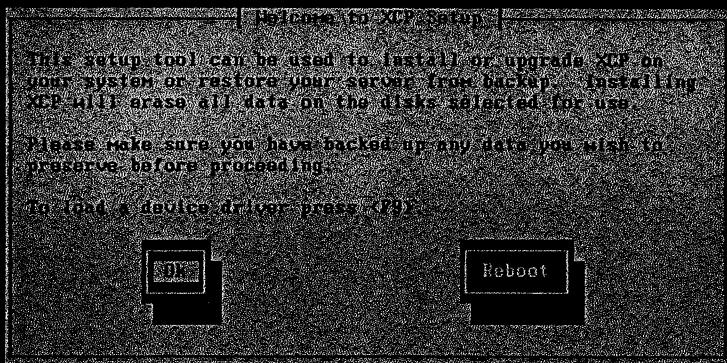
- 1) Download the XCP installation ISO from <http://www.xen.org/download/xcp/index.html> or <http://downloads.xen.org/XCP/50674/XCP-1.1-base-50674.iso>
 - 2) Once XCP has finished downloading, burn it to a CD or mount it.
 - 3) Power on the target host system. Remember the required specs: 1-2GB of RAM and 16GB HD (more if using the local storage), AMD-V/Intel-VT for Windows OSs
 - 4) press <Enter> to begin

```
(XEN) -> Using new HCR method
(XEN) checking TSC synchronization across 2 CPUs: passed.
(XEN) Platform timer is 14.319MHz UPET
(XEN) Brought up 2 CPUs
(XEN) I/O virtualisation disabled
(XEN) mtrr: your CPUs had inconsistent fixed MTRR settings
(XEN) mtrr: your CPUs had inconsistent variable MTRR settings
(XEN) dom0 grant table @ffff030005b519ef0
(XEN) *** LOADING DOMAIN 0 ***
(XEN) Xen kernel: 64-bit, lsbn, compat32
(XEN) Dom0 kernel: 32-bit, PRE, lsbn, paddr 0x100000 -> 0x5dd000
(XEN) PHYSICAL MEMORY ARRANGEMENT:
(XEN) Dom0 alloc.: 0000000000000000->0000000000000000 (150744 pages to be allocated)
(XEN) VIRTUAL MEMORY ARRANGEMENT:
(XEN) Loaded kernel: 00000000c0100000 >00000000c05d4000
(XEN) Init, randisk: 00000000c05d4000 >00000000c4074000
(XEN) Phys-Mach map: 00000000c4675000->00000000c4731000
(XEN) Start info: 00000000c4731000->00000000c4731400
(XEN) Page tables: 00000000c4732000->00000000c475e000
(XEN) Boot stack: 00000000c475f000->00000000c475f800
(XEN) TOTAL: 0000000000000000->00000000c4600000
(XEN) ENTRY ADDRESS: 0000000000000000
(XEN) Dom0 has maximum 2 UCPU's
(XEN) Scrubbing Free ROM: ..
```



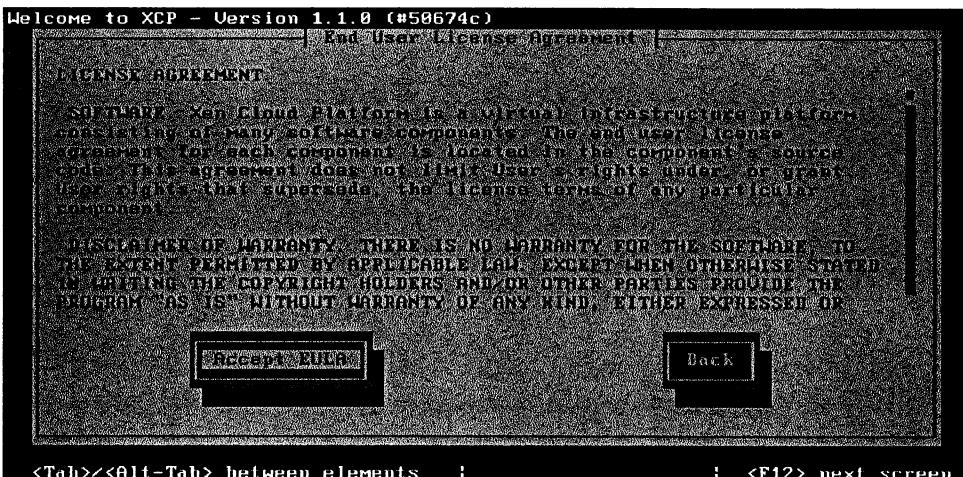
- 5) Press <Enter> to select the default keyboard layout

Welcome to XCP - Version 1.1.0 (#50674c)



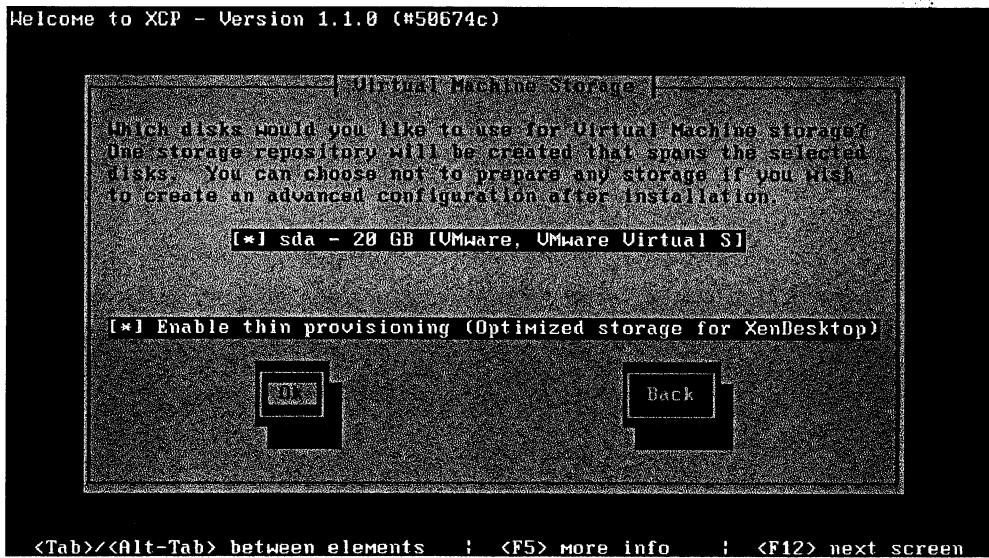
<Tab>/<Alt-Tab> between elements : <F9> load driver : <F12> next screen

6) Press <Enter> to select the default device-driver configuration



<Tab>/<Alt-Tab> between elements : : <F12> next screen

7) Press ← <left arrow> and <Enter> To accept the no warranty EULA



<Tab>/<Alt-Tab> between elements : <F5> More info : <F12> next screen

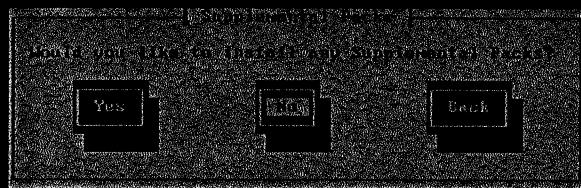
8) Use <Tab> and <Spacebar> to leave the default sda available for VM storage (although it will go unused) and select "Enable thin provisioning" → Ok to continue

Welcome to XCP - Version 1.1.0 (#50674c)



- 9) Press <Enter> to select Local Media (the default)

Welcome to XCP - Version 1.1.0 (#50674c)

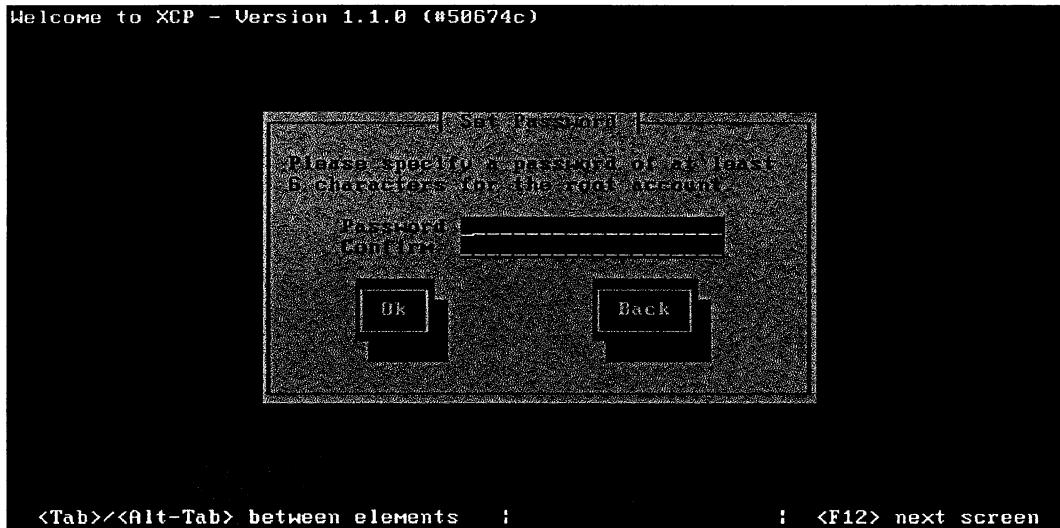


- 10) Press <Tab> and <Enter> to not install any supplemental packs

Welcome to XCP - Version 1.1.0 (#50674c)



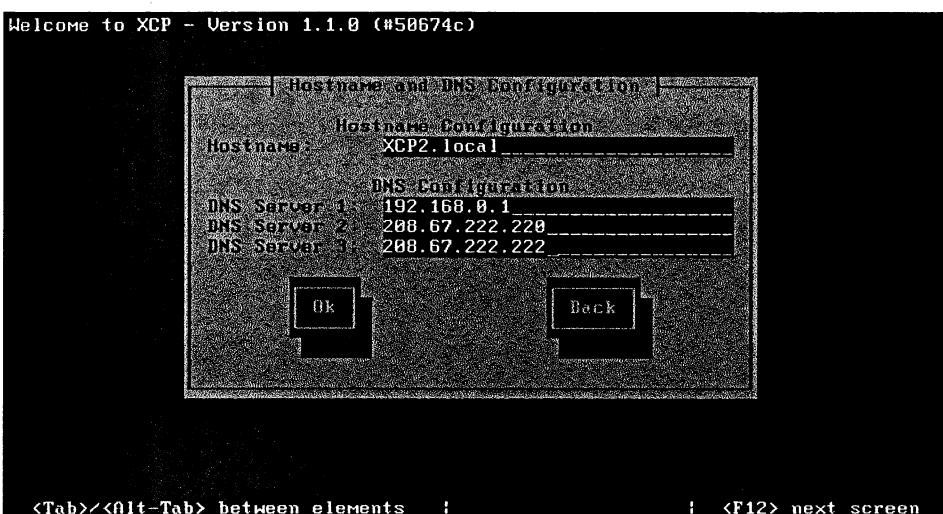
- 11) <up arrow> and <Enter> to skip verification of installation media



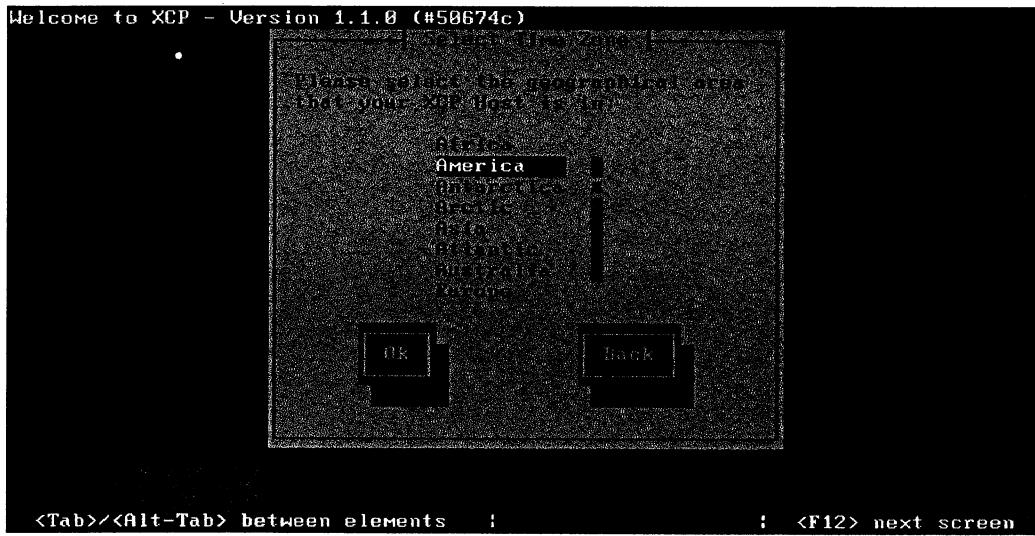
12) Enter “password” for the Password (twice) and Ok to continue



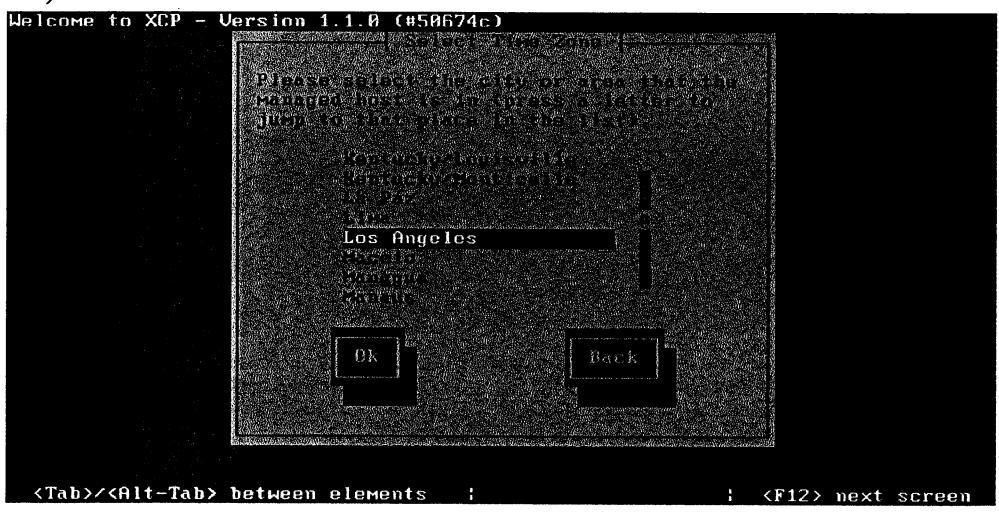
13) Enter 192.168.0.51 /24 for the first Xen Cloud Platform host or 192.168.0.52 /24 for XCP2, GW = 192.168.0.1



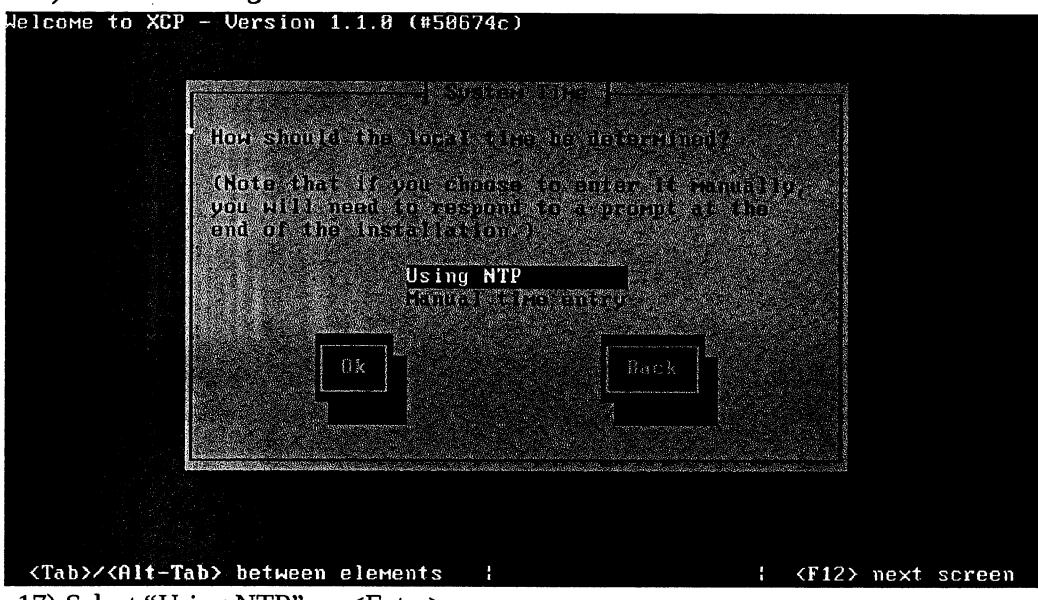
14) Enter XCP1.local or XCP2.local with 192.168.0.1/208.67.222.220/ 208.67.222.222 for the DNS Servers



15) Select "America" → <Enter>

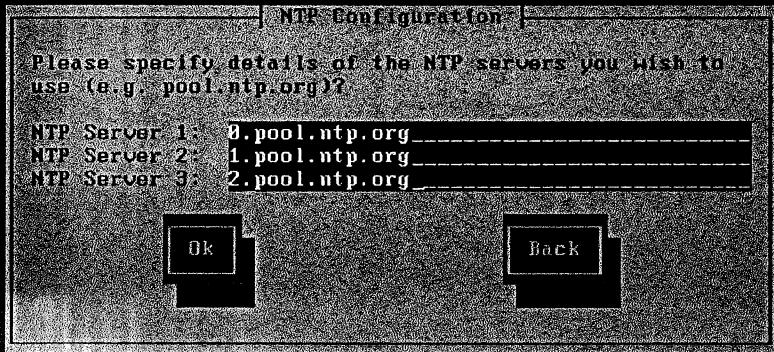


16) Select "Los Angeles" → <Enter>



17) Select "Using NTP" → <Enter>

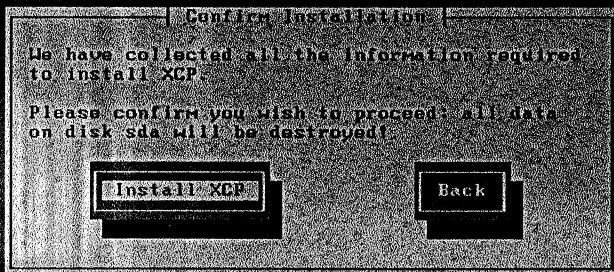
Welcome to XCP - Version 1.1.0 (#50674c)



<Tab>/<Alt-Tab> between elements : <F12> next screen

18) Enter 0.pool.ntp.org, 1.pool.ntp.org, 2.pool.ntp.org and → <Enter>

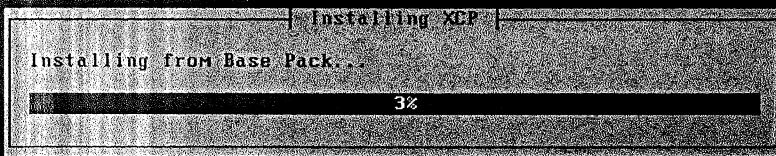
Welcome to XCP - Version 1.1.0 (#50674c)



<Tab>/<Alt-Tab> between elements : <F12> next screen

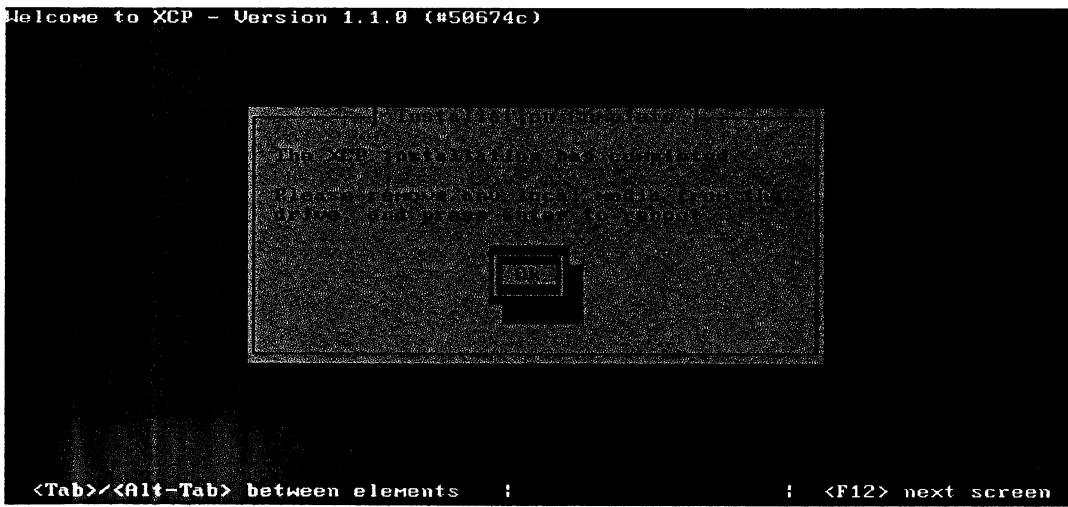
19) <Tab> → <Enter> to finally begin installing XCP

Welcome to XCP - Version 1.1.0 (#50674c)

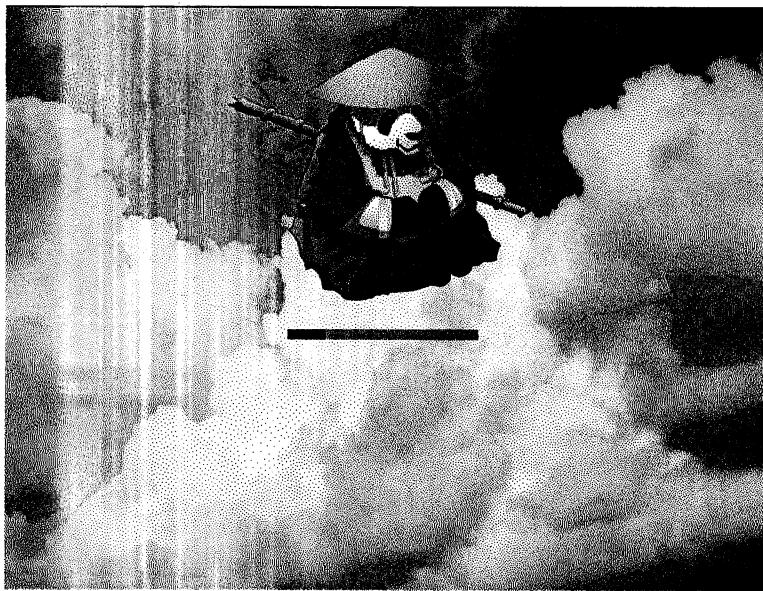


Working: Please wait...

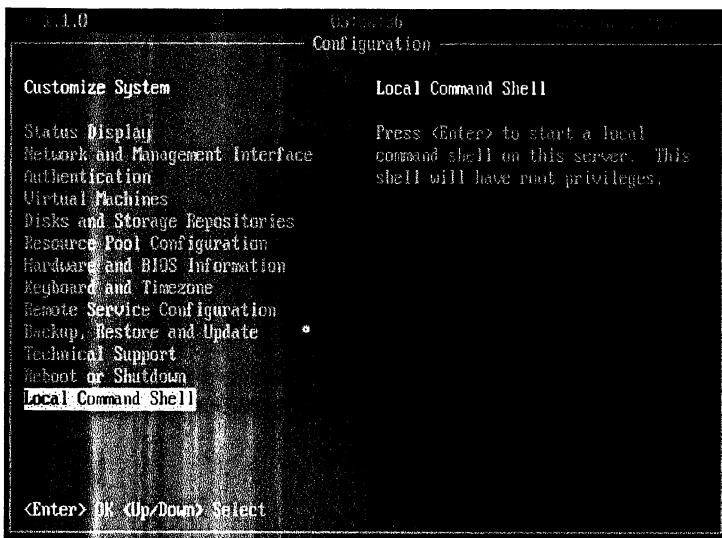
20) Wait for it...



21) Press <Enter> when the XCP installation is done to reboot. Consider removing the installation media at this time.



22) Wait for Xen to load.



23) And it's done loading.

24) Repeat this installation (I Part B 3-23) for XCP2. Remember to use the appropriate configuration settings.

Part C) Configure the XCP Pool

Run the following commands on either XCP1 or XCP2:

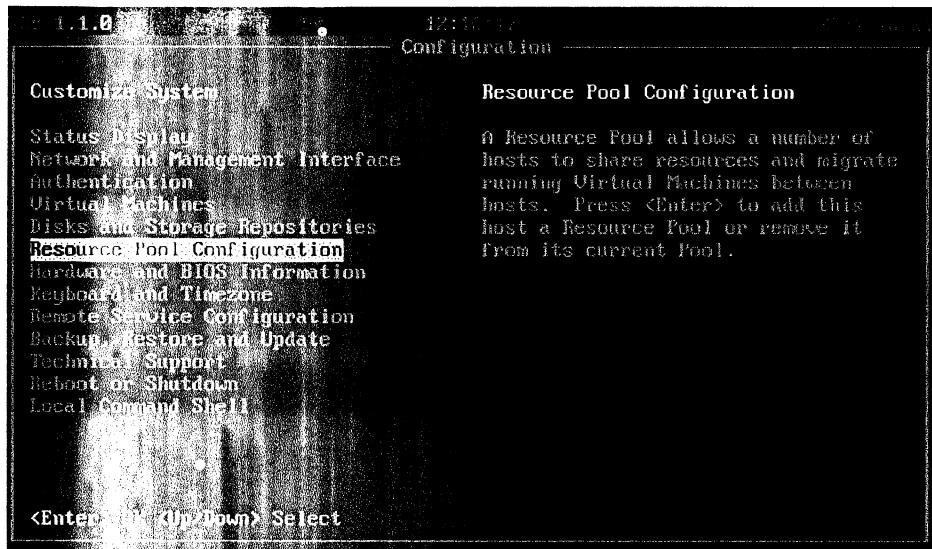
- 1) open the “Local Command Shell” → Enter psw: “password” when prompted
- 2) Enter the following command exactly:

```
xe sr-create content-type=user type=nfs name-label=source \
    shared=true device-config:server=192.168.0.49 \
    device-config:serverpath=/source
```
- 3) xe pool-list
- 4) xe pool-param-set uuid=<pool uuid(R0)> \
 default-SR=<storage_repository_uuid printed from step 2>

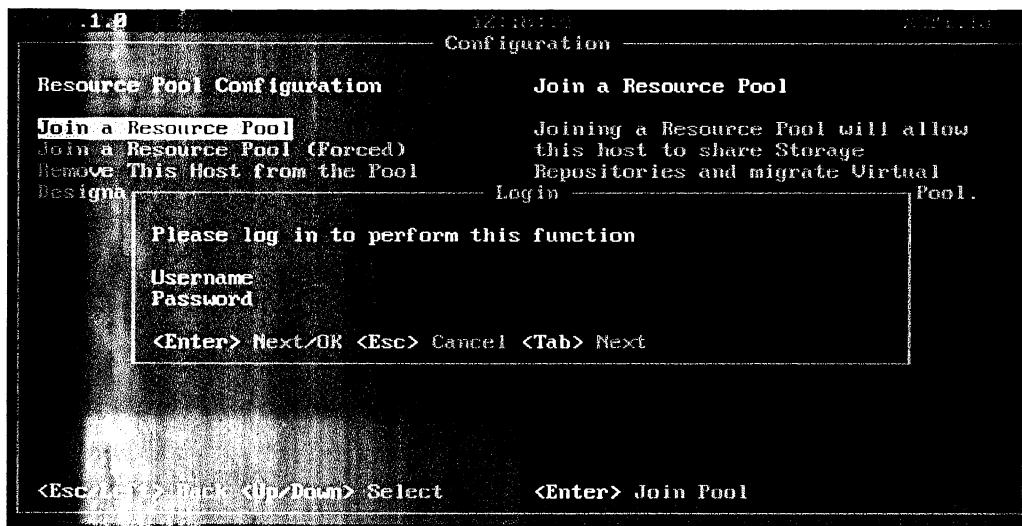
```
Shell for 'local user 'root''.
Type 'exit' to return to the management console.
[root@XCP2 ~]# xe sr-create content-type=user type=nfs name-label=source \
> shared=true device-config:server=192.168.0.49 \
> device-config:serverpath=/source
154d554c-ff1a-f6a7-d37e-b76bf96ee2ab
[root@XCP2 ~]# ls
bin  lib  libvirt  libvirt-bin  libvirt-daemon  libvirt-daemon-system  libvirt-qemu  libvirt-python  libvirt-qemu-bin  libvirt-qemu-system  libvirt-qemu-system-bin
[root@XCP2 ~]# xe pool-list
uuid ('R0'): 48b66db3-f465-73e1-ed83-bc58e26d5468
  name-label (RW): 
  name-description (RW): 
    master (R0): b5490ff2-b324-441d-a836-46e4e8f81cd8
    default-SR (RW): 5b13b36c-9cd8-6dbb-446a-a9a60a4e9afe
[root@XCP2 ~]# xe pool-param-set uuid=48b66db3-f465-73e1-ed83-bc58e26d5468 \
> default-SR=154d554c-ff1a-f6a7-d37e-b76bf96ee2ab
[root@XCP2 ~]#
```

- 5) “Since the shared storage has been set as the pool-wide default, all future VMs will have their disks created on this shared storage by default.”

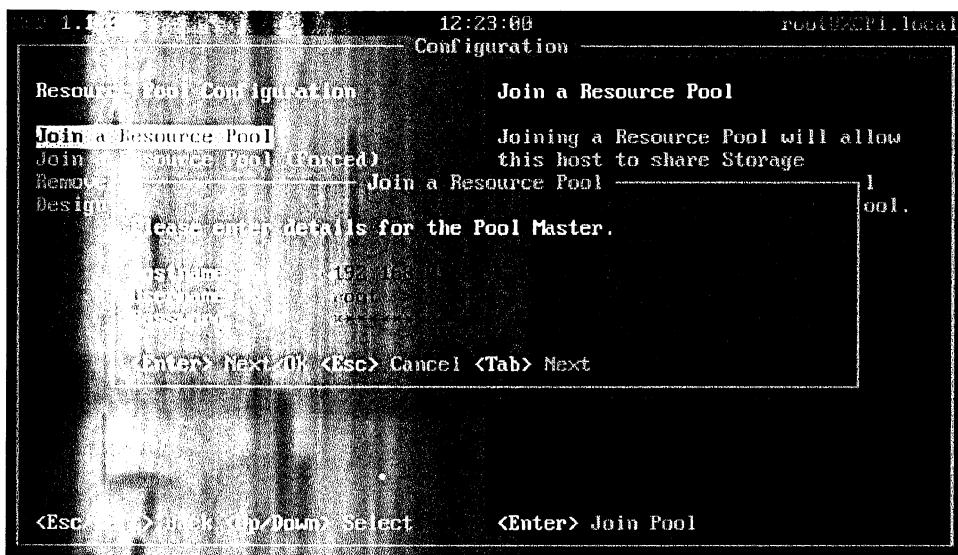
Perform the following steps on either XCP1 or XCP2 (the opposite of one chosen for steps 1-6).



- 6) Select “Resource Pool Configuration” → <Enter>



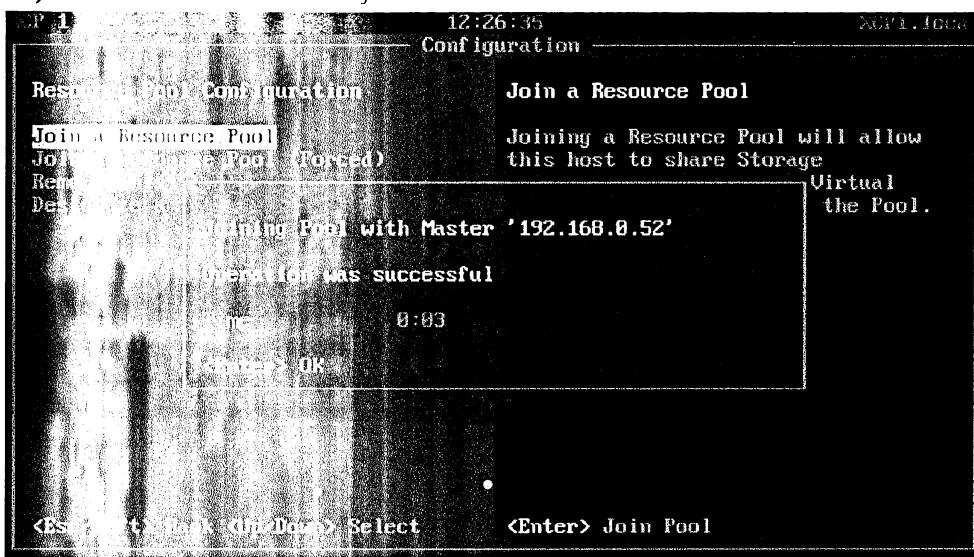
- 7) Select “Join a Resource Pool” and enter your password



- 8) Hostname: Enter the IP of the XCP host chosen for steps 1-5

So if XCP2 was chosen for steps 1-5, enter 192.168.0.52, or the IP of XCP2 Username: root Psw: password

- 9) <Enter> and → <F8> to join the Pool



- 10) Awesome.

III) Implementing Xen via XenServer by Citrix

Part A) Download and Install XenServer by Citrix

- 1) Download the XenServer installation CD (for part II and the XenCenter management app from
http://www.citrix.com/lang/English/lp/lp_1688615.asp or
<http://downloadns.citrix.com.edgesuite.net/akdlm/6760/XenServer-6.0.201-install-cd.iso>
- 2) Power on the target host system. Remember the required specs: 1-2GB of RAM and 16GB HD (more if using the local storage), AMD-V/Intel-VT for Windows OSs

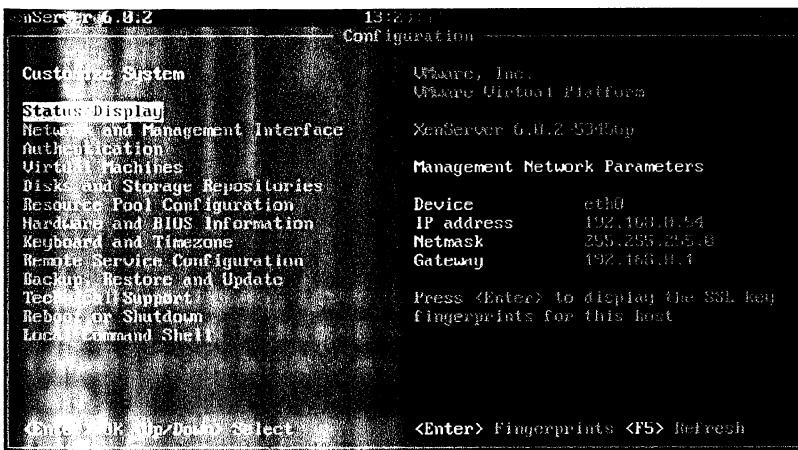


- 3) press <Enter> to begin
- 4) Press <Enter> to select the default keyboard layout
- 5) Press <Enter> to select the default device-driver configuration
- 6) Press ← <left arrow> and <Enter> To accept the no warranty EULA
- 7) Use <Tab> and <Spacebar> to leave the default sda available for VM storage (although it will go unused) and select "Enable thin provisioning" → Ok to continue
- 8) Press <Enter> to select Local Media (the default)
- 9) Press <Tab> and <Enter> to not install any supplemental packs
- 10) <up arrow> and <Enter> to skip verification of installation media
- 11) Enter "password" for the Password (twice) and Ok to continue
- 12) Enter 192.168.0.53 /24 for the first XenServer host or 192.168.0.54 /24 for XS2, GW = 192.168.0.1



- 13) Enter XS1.local or XS2.local with 192.168.0.1/208.67.222.220/ 208.67.222.222 for the DNS Servers
- 14) Select "America" → <Enter>
- 15) Select "Los Angeles" → <Enter>
- 16) Select "Using NTP" → <Enter>

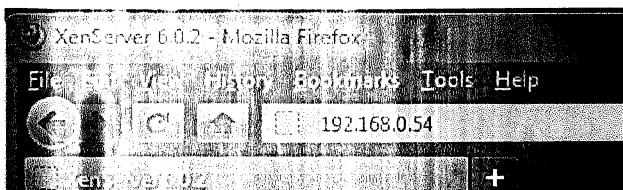
- 17) Enter 0.pool.ntp.org, 1.pool.ntp.org, 2.pool.ntp.org and → <Enter>
- 18) <Tab> → <Enter> to finally begin installing XenServer
- 19) Press <Enter> when the XenServer installation is done to reboot. Consider removing the installation media at this time.



- 20) Done.
- 21) Repeat steps 2-20 for XS2

Part B) Download and Install XenCenter (Citrix's management client)

- 1) Open a web browser

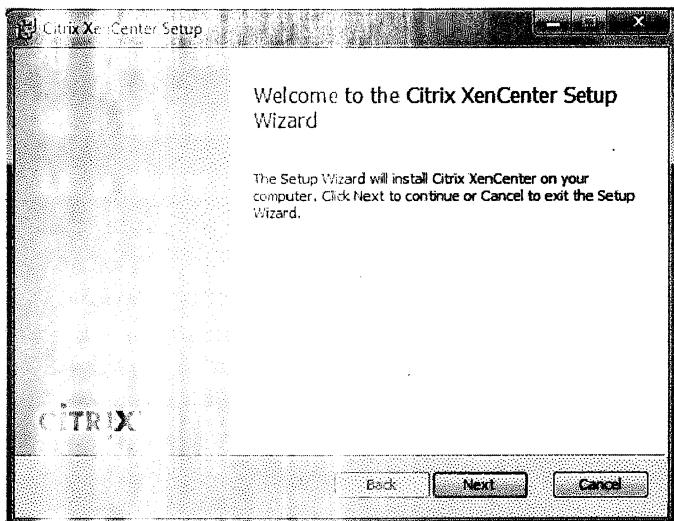


Citrix Systems, Inc. XenServer 6.0.2

[XenCenter CD image](#)

[XenCenter installer](#)

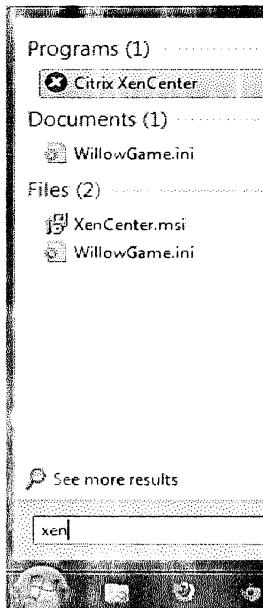
- 2) Type in 192.168.0.53 or 192.168.0.54
- 3) Click on the XenCenter installer to download the .msi installer (or the CD image if you prefer .iso files).
- 4) Save appropriately and run it.
- 5) Select "Run" if prompted with a security warning



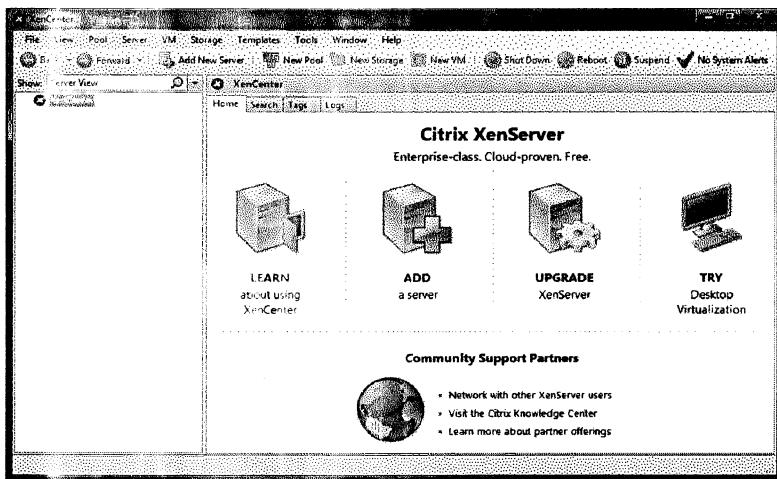
- 6) Next

7) "All Users" → Next → Install → *wait* → Finish

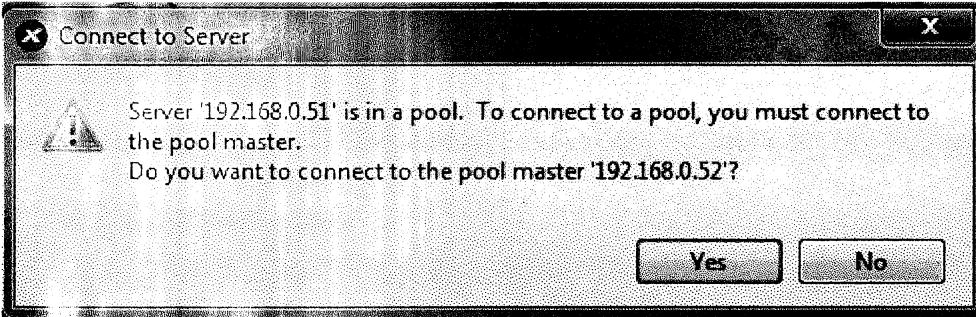
Part C) Add previous XCP hosts to XenCenter and perform initial configurations



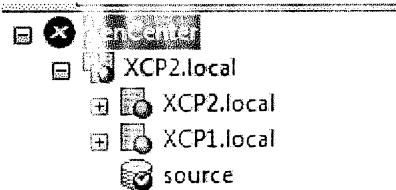
- 1) Start-menu → search for "Xen" → *XenCenter pops up* → click on it
- 2) "No" to check for updates



- 3) Right-click "XenCenter" → Add
- 4) Add XCP1 via its IP: 192.168.0.51, User name: root, Psw: password

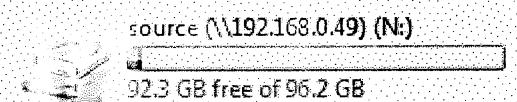


- 5) Yes
- 6) <Enter> → check the "Save and restore..." check box → OK → Close the License Manager

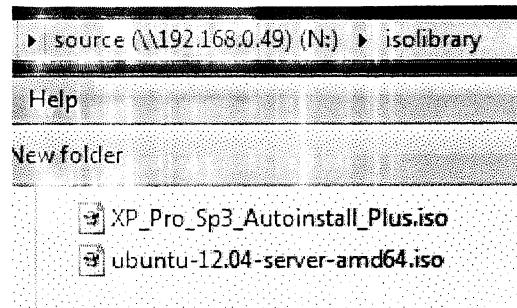


- 7) Notice how XCP1.local and XCP2.local are part of the same pool with the master host as the pool name. In addition the Storage Resource “source” from the NFS server is also automatically detected.
Note: All of the yellow-icon entries are “Templates” that Xen Cloud Platform uses to deploy supported operating systems from. They seem important so consider not deleting them.

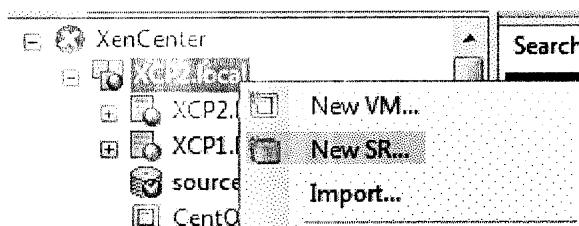
► Network Location (1)



- 8) Open a Windows file manager window (Explorer) to the drive mapped in step I A 13.
9) Double-click and wait a while.
10) Create a new folder called “isolibrary” run “[root@NFS /] chmod -R 777 source” on the file server if you don’t have permission and retry.



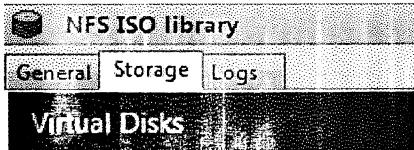
- 11) Add any .iso files for any operating systems you would like to install on your XCP or XenServer hosts.



- 12) Back in XenCenter Right-click on the pool name (right above XCP1 & XCP2) and select “New SR...”
13) Under “ISO library” select “NFS ISO” → “Next >” → 192.168.0.49:/source/isolibrary → Finish



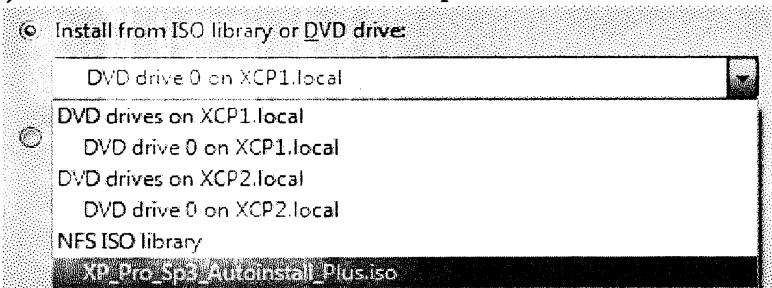
- 14) Awesome.



Disks

Name
ubuntu-12.04-server-amd64.iso
XP_Pro_Sp3_Autoinstall_Plus.iso

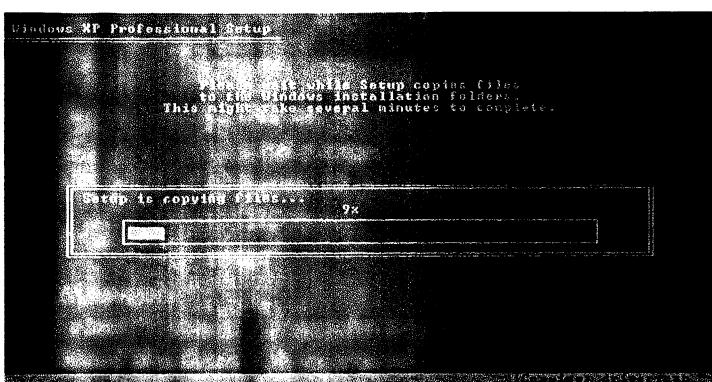
- 15) Click on the NFS ISO library → Storage tab → verify the iso files are listed under “Virtual Disks”.
- 16) Right-click the pool name → New VM → Pick the OS you have a .iso for (Win XP Sp3 will be used as a sample)
- 17) “Next >” → Name: Windows XP Sp3



- 18) Under NFS ISO library, select the chosen .iso → “Next >” → “Don't assign this VM a home Server.” (cloud-ish)
- 19) “Next >” → 1 vCPU, RAM: 256MB → “Next >” → Properties → Select “source” → “OK” → “Next >” → “Next >” → “Next >”

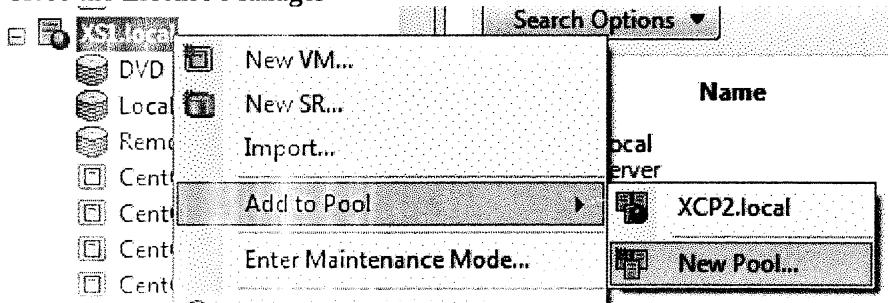


- 20) Awesome.
- 21) Select “Console” after selecting Windows XP Sp3 to see the VM boot up from the install disk.
- 22) Install the Guest OS as normal

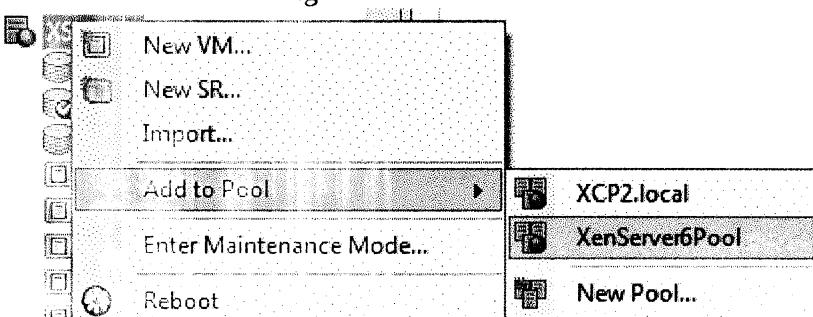


Part E) Use XenCenter to Add XS1 and XS2 to a Pool with XS1 as the Master

- 1) Right-click "XenCenter" → Add
- 2) Add XCP1 via it's IP: 192.168.0.53, User name: root, Psw: password
- 3) Close the License Manager



- 4) Right-click XS1.local → "Add to Pool" → "New Pool" → Name: "XenServer6Pool" → "Create Pool"
- 5) Right-click "XenCenter" → Add
- 6) Add XCP1 via it's IP: 192.168.0.54, User name: root, Psw: password
- 7) Close the License Manager



- 8) Right-click XS2.local → "Add to Pool" → "XenServer6Pool" → "Yes" → wait for the configuration to complete
- 9) It's complete.
- 10) Right-click the "XenServer6Pool" → "New SR..." → "NFS VHD" → "Next >"
- 11) Name: "source" → "Next >" → 192.168.0.49:/source → "Create a new SR" → "Next >"
- 12) Right-click th "XenServer6Pool" → "New SR..." → "NFS ISO" → 192.168.0.49:/source/isolibrary → Finish

Sources Used:

<http://linuxwave.blogspot.com/2008/08/nfs-howto-for-centos-5.html>

CSCI 365 Lab 7

http://www.xen.org/products/xcp/community_and_support.html

The Internet