

Xen Virtualization: Xen (source) and XenServer

An introduction to free and commercial methods
of creating virtual servers

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Why Virtualization?

- ◆ Scenario: imagine that you have:
 - ◆ an aging set of hardware soon to be retired
 - ◆ a limited budget for hardware
 - ◆ a need for an offsite or international server
 - ◆ an interest to maximize use of new servers

What is Xen?

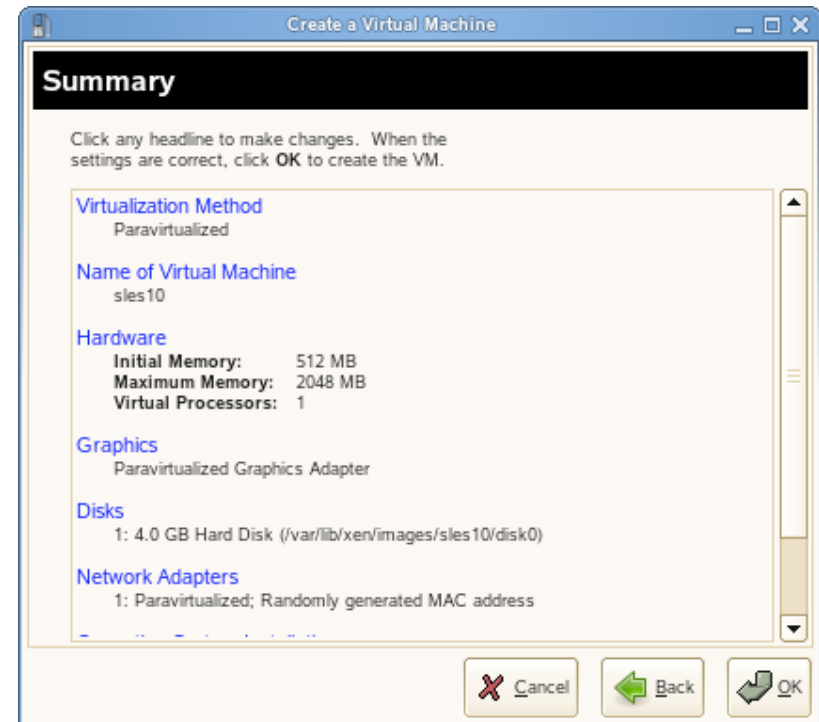
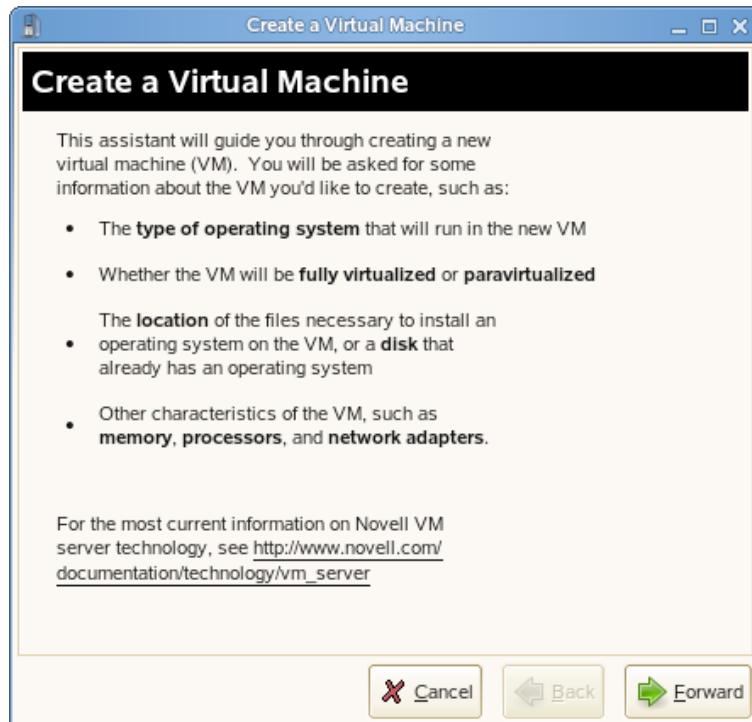
- ◆ An open source industry standard for virtualization, created by the University of Cambridge Computer Laboratory
- ◆ A tool to consolidate physical servers into virtual machines
- ◆ Enables multiple virtual servers to run on a single physical server
 - ◆ Each VM is isolated from other VMs and the host
- ◆ Can run in Paravirtualized (requires OS modifications) or fully virtualized mode
- ◆ VM migration allows you to decouple virtual servers from hardware, easily relocate to an alternative location or data center
- ◆ Increase CPU utilization – average CPU is only 10% used – and reduce power and cooling requirements

Where is Xen used?

- ◆ ~ 20% of Data Centers are using Xen
- ◆ Nearly 100% of cloud computing on Xen
 - ◆ Amazon's Elastic Compute Cloud "EC2" service
- ◆ Included in distros Red Hat, SLES, Solaris, Debian
 - ◆ though Red Hat has decided to move to KVM only
- ◆ Oracle VM is built on Xen

Create a virtual machine with virt-manager

🟢 SuSE, Red Hat: Virtual Machine Manager, Create VM

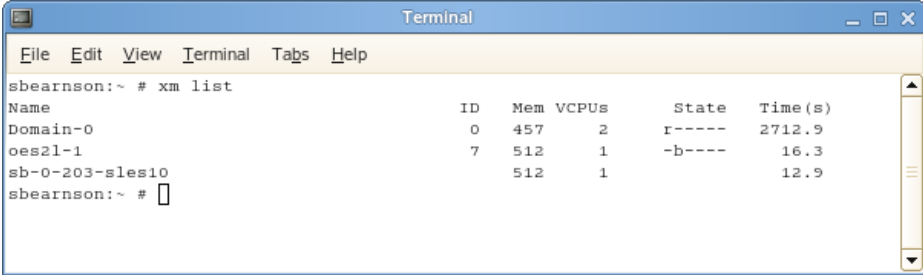


xm commands

💧 `xm create -c -f server1`

💧 `xm shutdown server1`

💧 `xm list`



```
Terminal
File Edit View Terminal Tabs Help
sbearnsnson:~ # xm list
Name                ID   Mem VCPUs   State   Time(s)
Domain-0            0   457    2   r----- 2712.9
oes21-1             7   512    1   -b----- 16.3
sb-0-203-sles10    512  1      12.9
sbearnsnson:~ #
```

💧 `xm destroy`

Citrix XenServer specs

- ◆ Citrix bought XenSource back in 1997
- ◆ XenServer can make VM management easier:
 - ◆ creates and provisions NAS storage
 - ◆ manages virtual network connections
 - ◆ handles live migration across server pools
- ◆ XenServer can make use of
 - ◆ Up to 128 GB RAM
 - ◆ Up to 6 NICs
 - ◆ Up to 32 CPU cores
 - ◆ 64 bit architecture

Citrix XenServer

- ◆ Has free version that you can download
 - ◆ requires a yearly re-register
 - ◆ has no time- or per-server- use limits
- ◆ Has better virtual network card management than regular xen
 - ◆ (snapshot next slide)
- ◆ Comes with a bank of OS templates ISOs for installing various operating systems
- ◆ For CLI, XenCenter uses 'xe' commands instead of 'xm'
- ◆ Convert existing physical machines to virtual with XenConvert tool: or convert from VMWare
- ◆ Booting a server from CD gives another way to convert Physical to Virtual

XenServer virtual NICs

The screenshot shows the XenCenter application window. The main content area displays the 'Network Interface Cards' section for a XenServer. The table below lists the NICs and their properties.

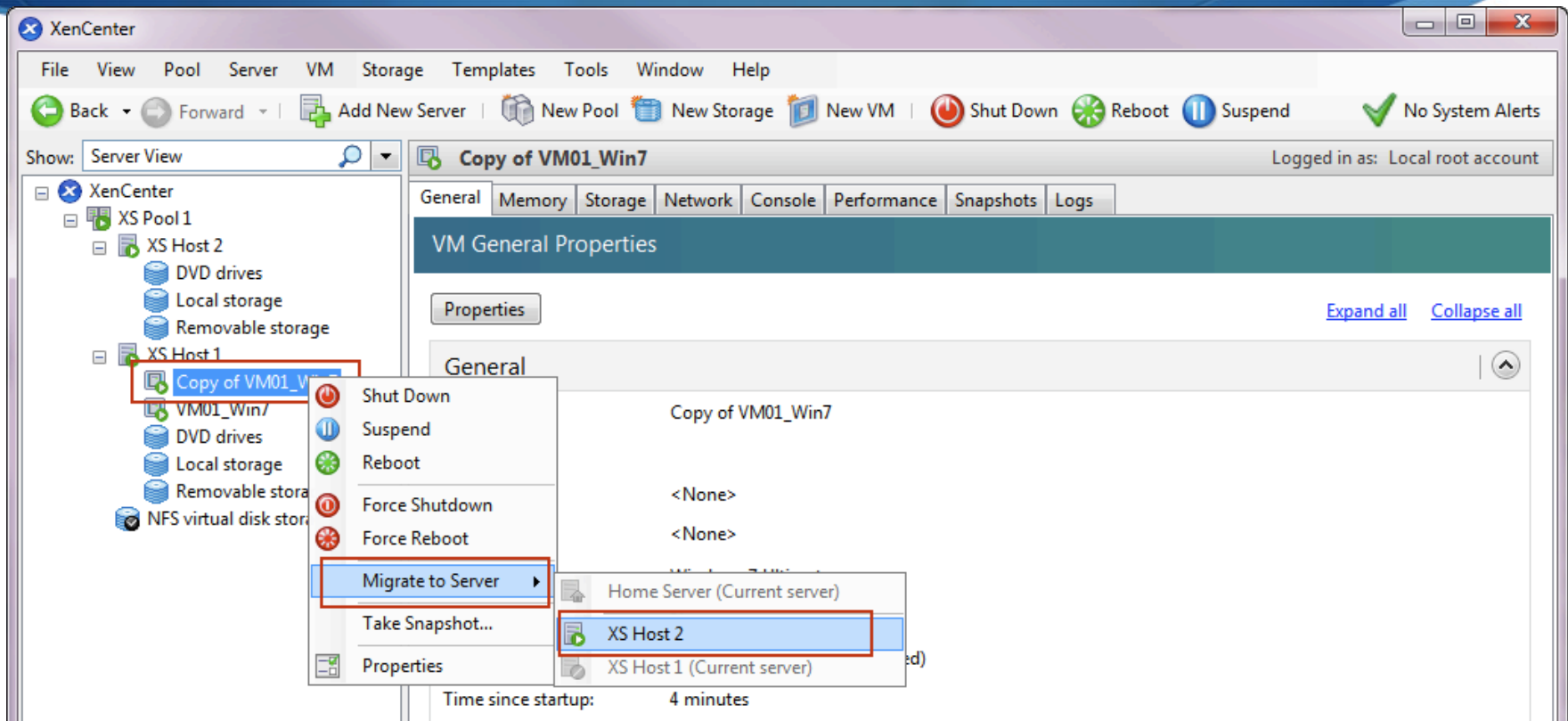
NIC	MAC	Link Status	Speed	Duplex	Vendor	Device	PCI Bus Path
Bond 0+1	00:0c:29:d6:9c:a4	Connected	1000 Mbit/s	Full			N/A
Bond 2+4	00:0c:29:d6:9c:b8	Connected	1000 Mbit/s	Full			N/A
Bond 3+5	00:0c:29:d6:9c:c2	Connected	1000 Mbit/s	Full			N/A
NIC 0	00:0c:29:d6:9c:a4	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:01.0
NIC 1	00:0c:29:d6:9c:ae	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:05.0
NIC 2	00:0c:29:d6:9c:b8	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:06.0
NIC 3	00:0c:29:d6:9c:c2	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:07.0
NIC 4	00:0c:29:d6:9c:cc	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:08.0
NIC 5	00:0c:29:d6:9c:d6	Connected	1000 Mbit/s	Full	Intel Corporation	82545EM Gigabit Ethernet Controller (Copper)	0000:02:09.0

[Help me dedicate a NIC...](#)

VM migration

- ◆ Migrate virtual servers between different physical servers during maintenance to minimize downtime
- ◆ To enable migration on SLES Xen: requires editing of xend-config.sxp:
 - ◆ xend-relocation-hosts-allow, xend-relocation-server, xend-relocation-port
 - ◆ `xm migrate --live <domain_name> <host>`
- ◆ How to migrate a VM on XenServer:
 - ◆ Right-click, Migrate to another server, select the destination
 - ◆ Fully featured commercial version does automatic migrations to more available hardware pools for fault tolerance.

XenServer Migrate



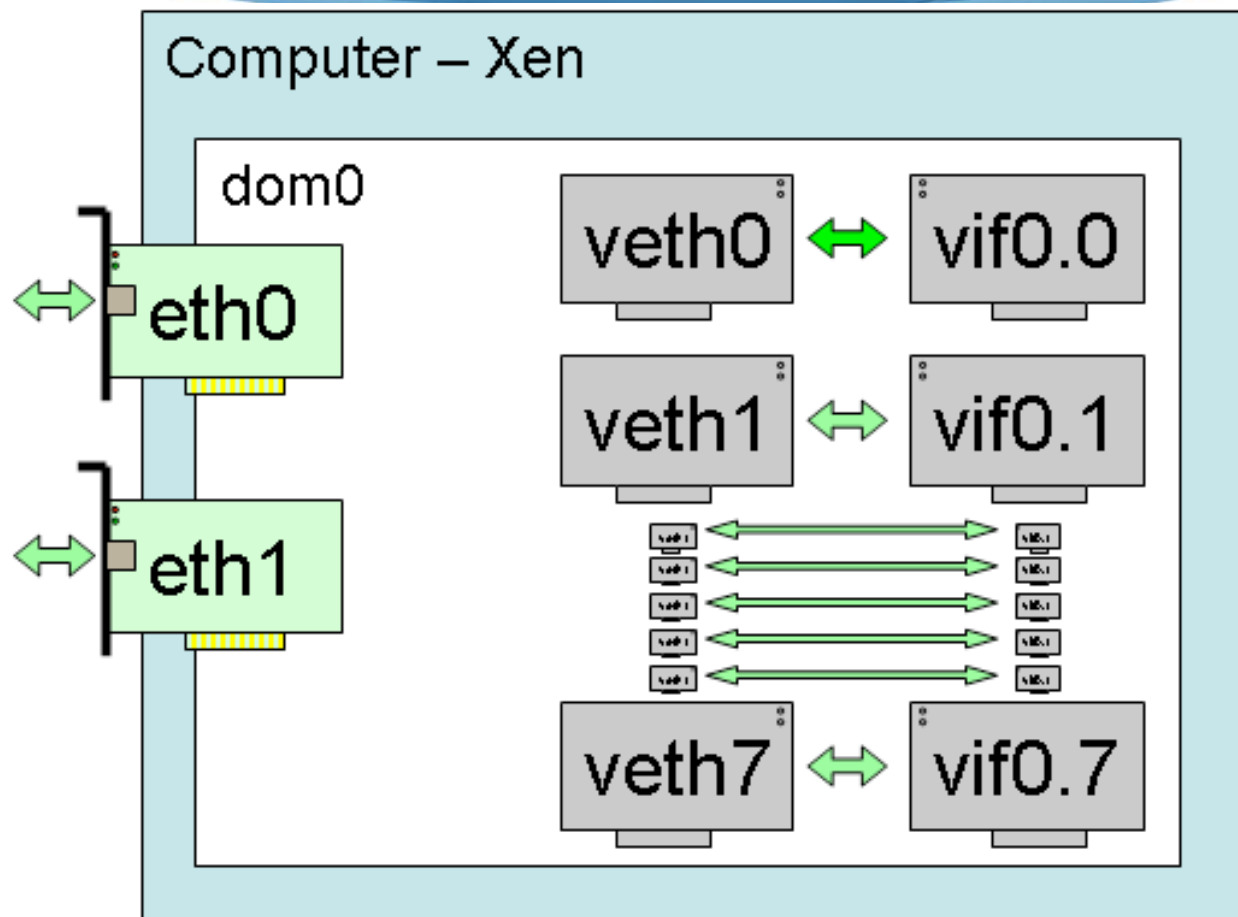
OpenXenManager

- ◆ OpenXenManager (formerly OpenXenCenter) is a python-based Linux-compatible client to XenServer.
- ◆ Buggy, but does work for basic controls:
 - ◆ start, stop, suspend, reboot, create virtual machines
- ◆ <http://www.openxenmanager.com/>

Storage and networking under Xen

- ◆ Block-file storage simulates a hard disk
 - ◆ Storing hard disk images over SAN allows for migration
 - ◆ `dd if=/dev/zero of=/vm/hd.img bs=1M count=1 seek=80000`
for 80 GB file
 - ◆ `/etc/xen/vm/guest:`
 - ◆ `disk=['file:/vm/hd.img,xvda,w']`
- ◆ Virtual network card splits one network connection into several; can have their own MAC addresses
 - ◆ can do network bonding

Xen networking



References

- ◆ <http://www.serverwatch.com/virtualization/article.php/3822191/VMware-Xen-Heat-Up-the-Cloud.htm>
- ◆ Xen on Suse Linux: <http://www.novell.com/linux/virtualization/>
- ◆ XenServer howtos: <http://www.citrix.com>
- ◆ <http://www.docstoc.com/docs/413389/Virtualization-in-the-Data-Center>
- ◆ No Xen in RHEL6: <http://www.virtualizationpractice.com/blog/?p=5586>
- ◆ Mark's blog post on Zimbra and XenServer:
<http://marksallee.wordpress.com/2010/03/16/zimbra-mail-on-xenserver-virtual-machines-iscsi/>

Summary

- ◆ Xen helped our group to:
 - ◆ provision more servers on existing hardware
 - ◆ migrate virtual servers to other locations, requiring less rebuilds
 - ◆ reduce downtime during hardware problems
- ◆ Learning curve was worth the effort