

# 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?

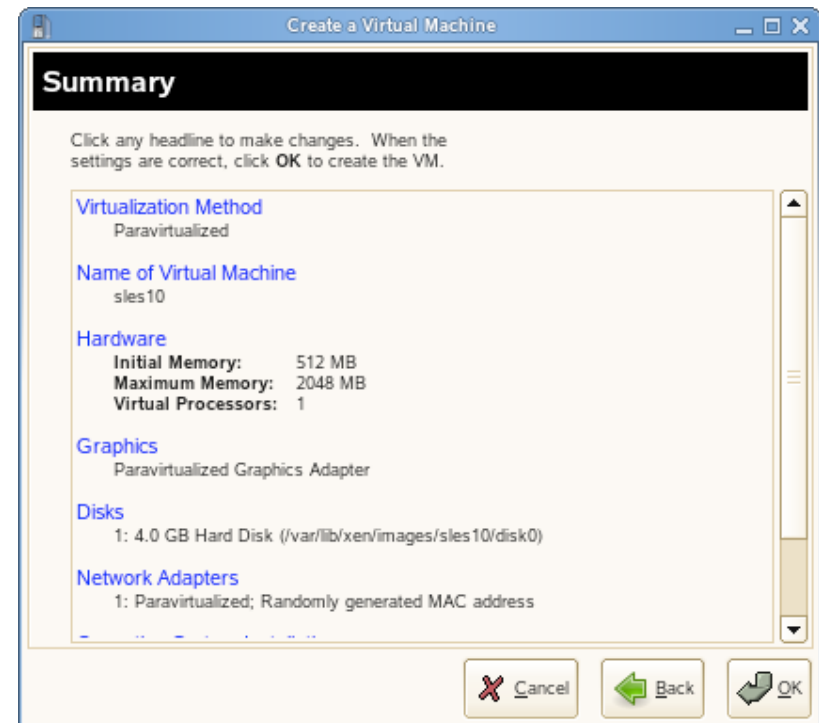
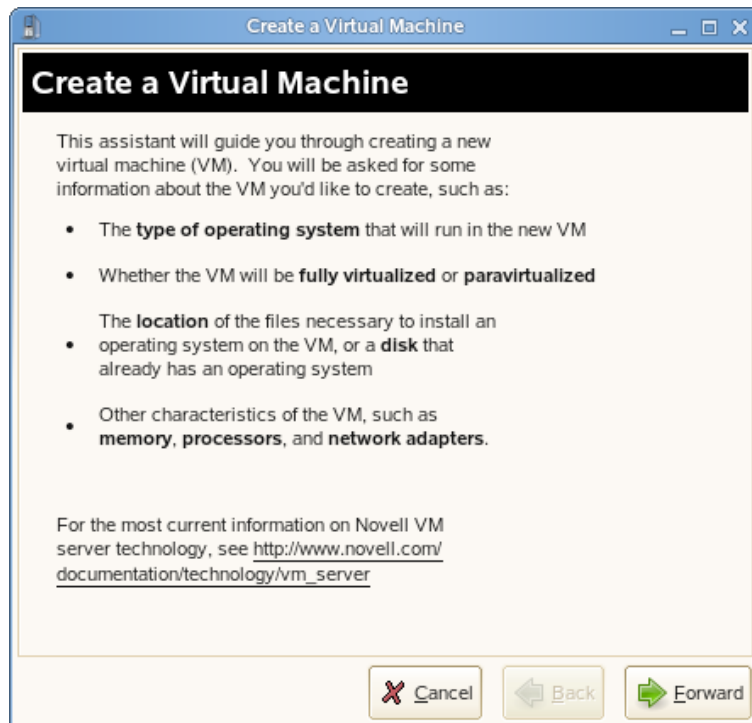
- ◆ An open source industry standard for virtualization, created by the University of Cambridge Computer Laboratory
- ◆ A tool to consolidate physical servers into virtual machines
- ◆ Enables multiple virtual servers to run on a single physical server
  - ◆ Each VM is isolated from other VMs and the 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

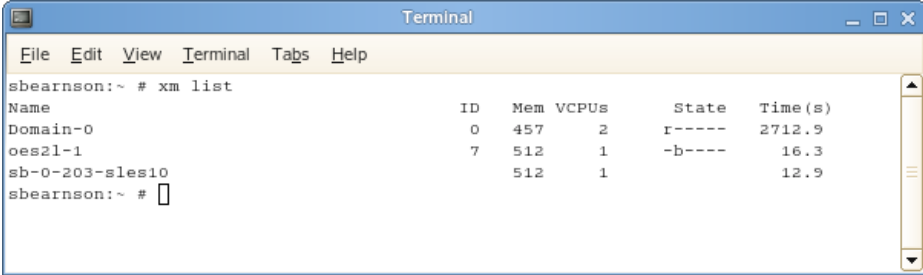


# xm commands

💧 `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 interface for a XenServer. The main window displays the 'Network Interface Cards' section. The interface includes a menu bar (File, View, Pool, Server, VM, Storage, Templates, Tools, Window, Help) and a toolbar with navigation and management buttons (Back, Forward, Add New Server, New Pool, New Storage, New VM, Shut Down, Reboot, Suspend). A 'System Alerts: 1' indicator is visible in the top right. The left sidebar shows the 'Server View' with a tree structure for 'XenCenter' and 'Xenserver' (containing DVD drives, Local storage, and Removable storage). The main content area shows the 'NICs' tab with a table of network interface cards.

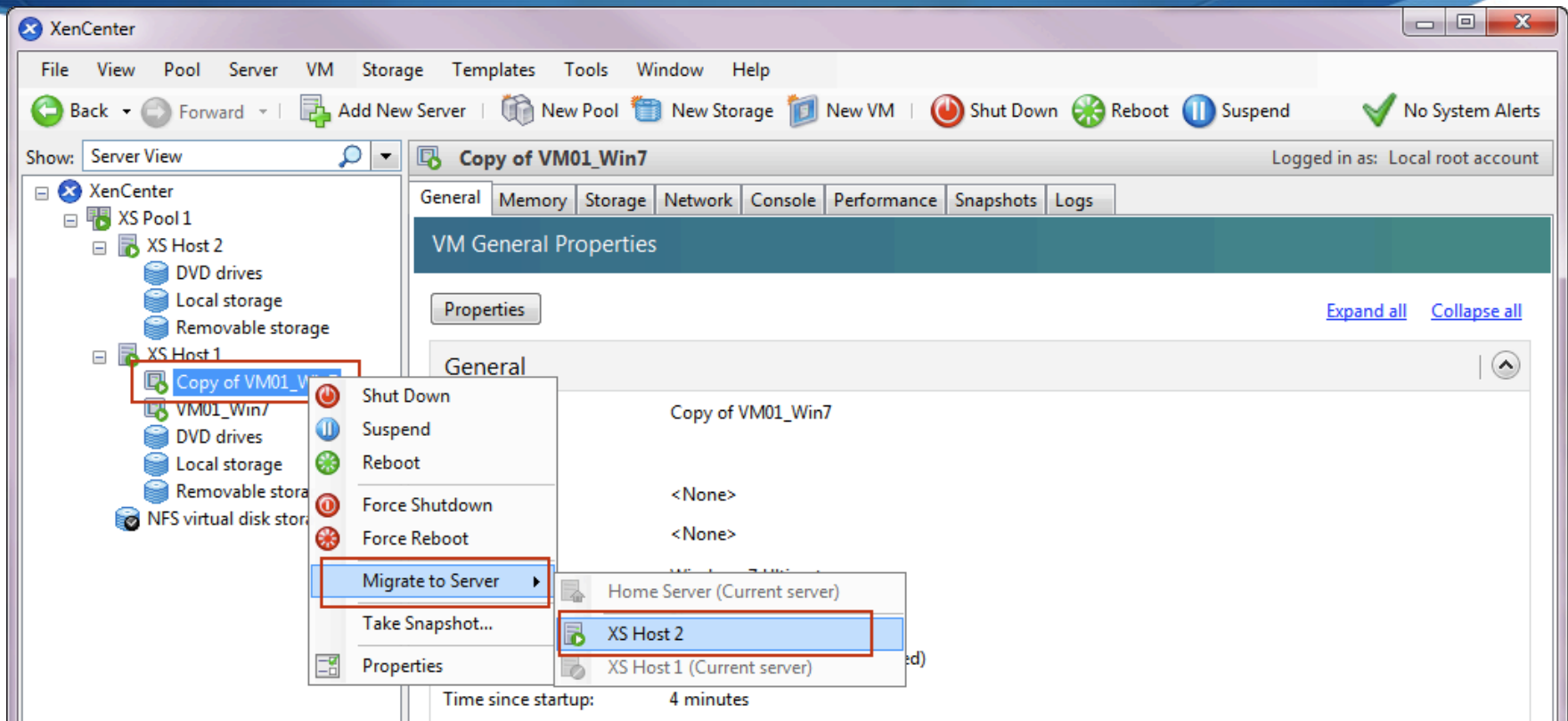
NIC	MAC	Link Status	Speed	Duplex	Vendor	Device	PCI Bus Path
Bond 0+1	00:0c:29:d6:9c:a4	Connected	1000 Mbit/s	Full			N/A
Bond 2+4	00:0c:29:d6:9c:b8	Connected	1000 Mbit/s	Full			N/A
Bond 3+5	00:0c:29:d6:9c:c2	Connected	1000 Mbit/s	Full			N/A
NIC 0	00:0c:29:d6:9c:a4	Connected	1000 Mbit/s	Full	Intel Corporation	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



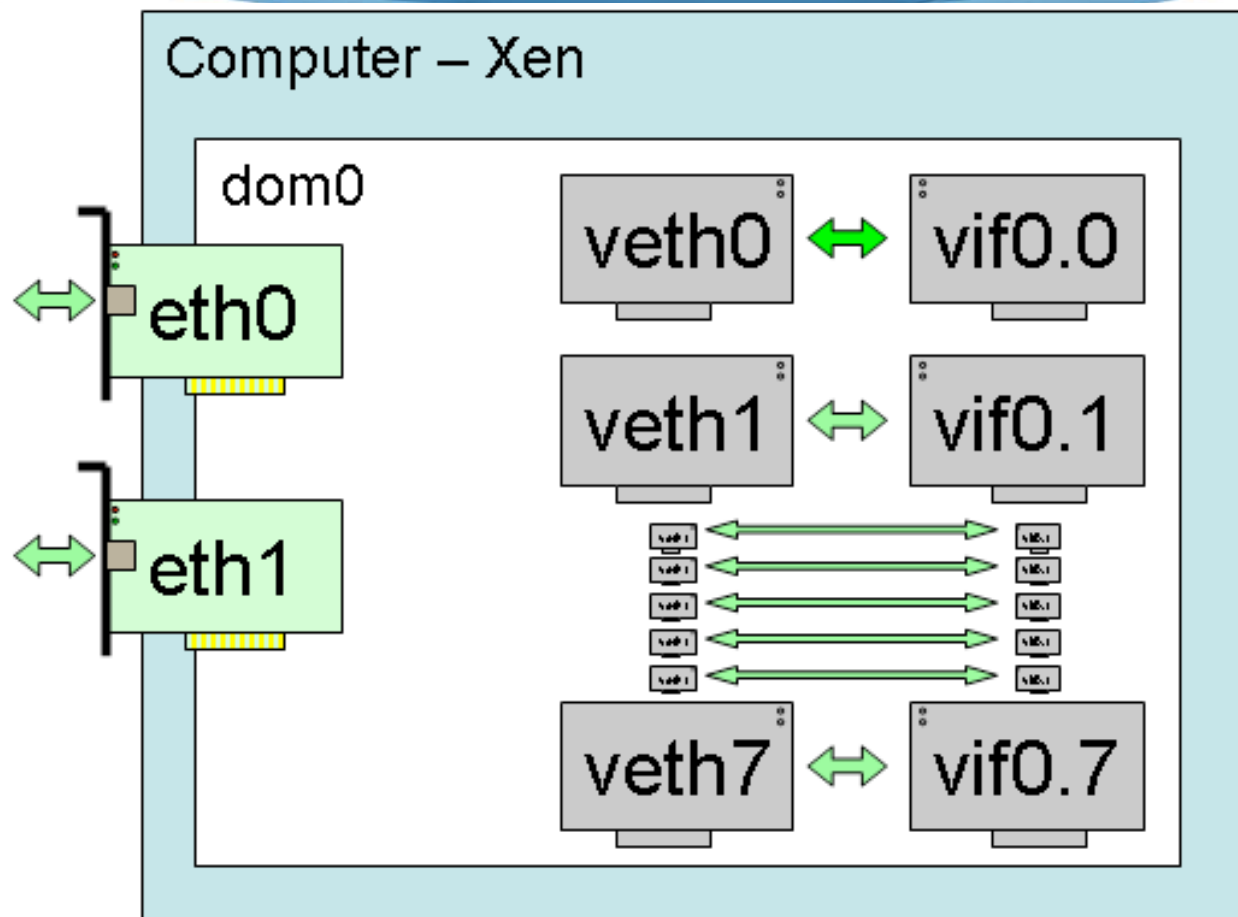
# OpenXenManager

- ◆ 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