

NWCLUG 01/05/2010

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Xen

Open Source Virtualization

Types of Virtualization

- OS Virtualization
 - Chroot
 - FreeBSD Jails / Solaris Containers
- Full Virtualization
 - VMware
 - QEMU
 - VirtualBox
- Paravirtualization
 - Xen

Definitions

- **Guest Operating System**

The operating system that Xen hosts

- **Domain**

The virtual machine under which a guest operating system executes

- **Hypervisor**

Software interface for hardware requests, i.e. CPU, Memory, I/O

What is Xen?

- **Hypervisor**
 - Layer of software that runs directly on hardware that acts as an interface between the hardware and domains
 - Named Xen
- **Domain 0 (Dom0)**
 - Trusted guest OS that provides hardware drives, a kernel, and a userland
 - Controls the hypervisor and manages guests
 - Modified Linux kernel
- **Domain guests (DomU)**
 - Guest Operating Systems
 - Launched by Dom0

Why use Xen?

- Server Consolidation.
- Hardware Independence
- Multiple OS configurations
- Kernel Development
- Cluster Computing.
- Hardware support for custom OSes

How does it work?

- CPU
 - Virtualization of the CPU
 - CPU Scheduling
 - Time & Timers
- Memory Management
 - Virtual Address Translation
 - Physical Memory
- Device I/O
 - Network
 - Disk
- Control Transfer

Domain management and Control

- Xend
 - System Manager for the Xen environment
- xm
 - Command line tool
- Xenstored
 - registry of information including memory and event channel links between Domain 0 and all other Domain U Guests.
- Libxenctrl
 - C library that provides Xend the ability to talk with the Xen hypervisor via Domain 0

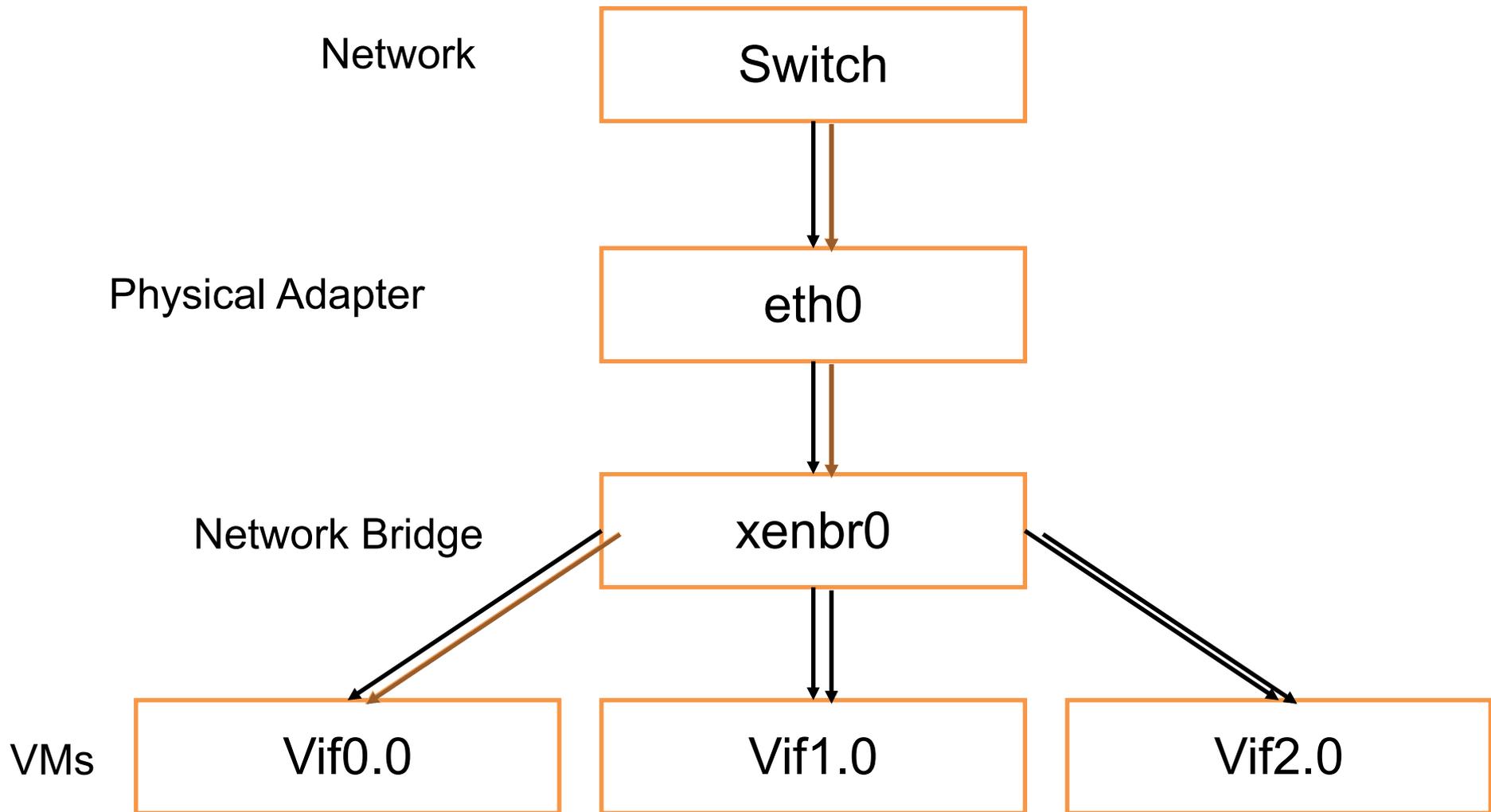
Installing Xen

- Pick a distro
- Install the xen-specific packages
- It should be that easy

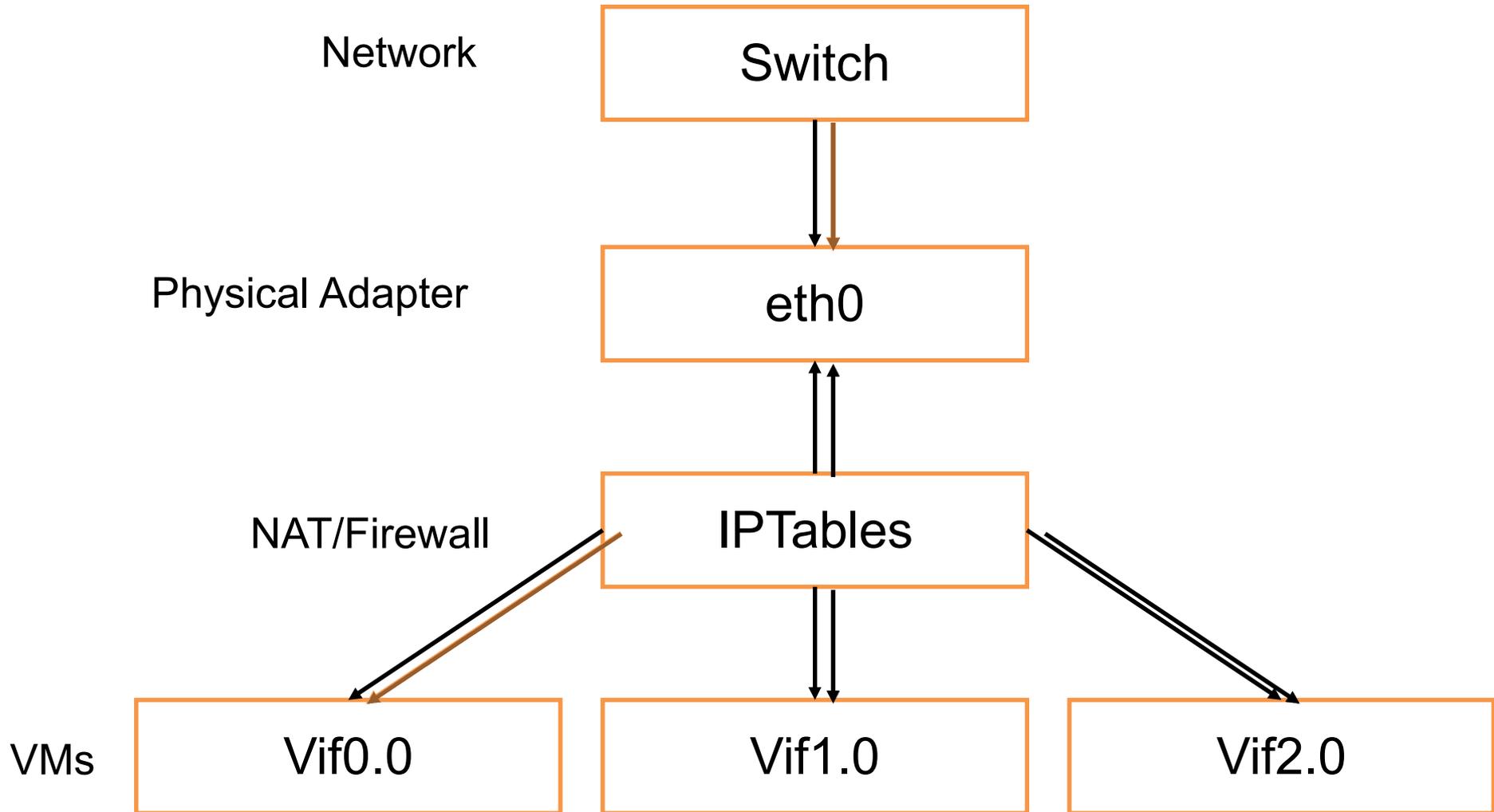
Configuring the Dom0

- Grub
 - Boot using the Xen hypervisor as the kernel
 - Load the Dom0 Kernel as a Module
 - Start xend on boot
- VM Storage Space
 - Local vs SAN
 - Files or LVM (or other devices)
- Setup VM Networking
 - Bridging or NAT

VM Networking: Bridging



VM Networking: NAT



Getting to know Xen

- `/etc/xen`
 - Xen and DomU configuration directory
- `/etc/init.d/xend`
- `/boot/grub/menu.lst`
- `/var/lib/xen/images` for file-backed virtual disks

Creating VMs

- Manual or automatic?
 - virt-install
 - Xen-tools
- File-based vs Device-based
- Create the harddrives
 - LVM create the logical volumes
 - Files, create the files
- Format the disks
- Install OS

Example VM Config

```
name = "DomU-1"  
maxmem = 512  
memory = 512  
vcpus = 1  
bootloader = "/usr/bin/pygrub"  
on_poweroff = "destroy"  
on_reboot = "restart"  
on_crash = "restart"  
vfb = [ ]  
disk = [ "tap:aio:/var/lib/xen/images/Centos5Image.img,xvda,w" ]  
vif = [ "mac=00:16:3e:79:fd:8d,bridge=xenbr0" ]
```

Important things to know

- Config file is executed as a standard Python script
- Basic DomU configuration

```
Kernel = "/boot/vmlinuz-2.6-xen.gz"
```

```
vif = []
```

```
disk = ['phy:/dev/targetvg/lv,sda,w']
```

- Networking

```
vif = [vifname,bridge,ip,mac]
```

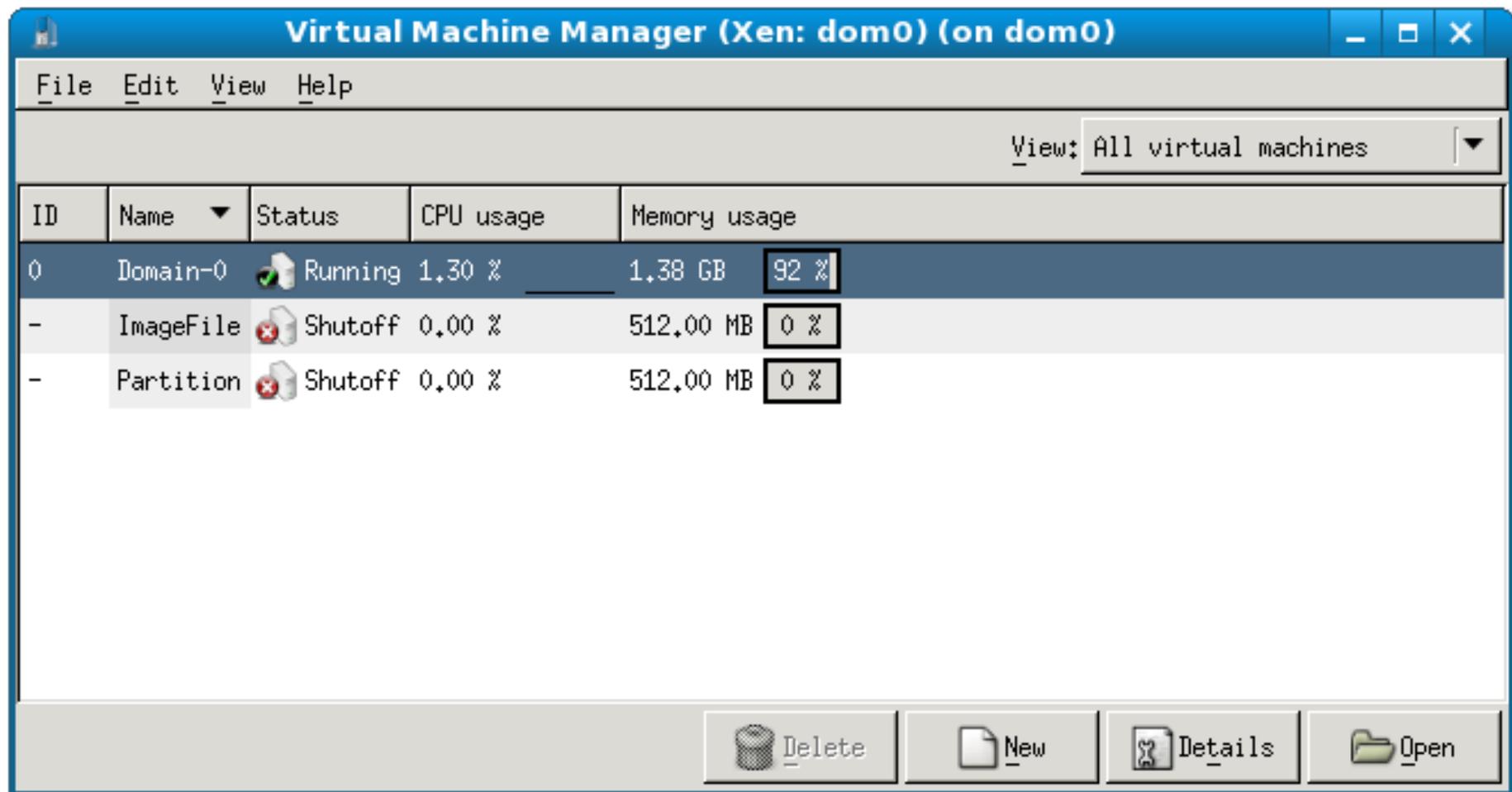
xm – Xem Manager

- Command line tool on Dom0 for managing DomUs
- Quick overview of options: xm <option>
 - console -- attach to a device's console
 - create -- boot a DomU from a config file
 - destroy -- immediately stop a DomU
 - list -- List running DomUs
 - migrate -- Migrate a console to another Dom0
 - pause/unpause -- akin to suspend. TCP connections will timeout
 - shutdown -- Tell a DomU to shut down.
 - network-attach/network-detach
 - block-attach/block-detach

RedHat/CentOS virt-manager

- Simple graphical interface
- Basically does what xm does, plus:
 - Built in short-term performance graphing
 - Built in VNC client

Main window of virt-manager



Migration

- Cowboy method
- Cold migration
 - xm save, xm restore
- Live migration
 - Xm migrate –live <domain id> <destination machine>

Important things to know about live migration

- Set `xend.conf` to allow migration from other xen Dom0s
- Machine must reside on shared storage
- Must be on the same layer 2 network

Backups

- Cowboy method for file-backed domains
- Stop and tar
- LVM
 - Snapshot DomU from Dom0
 - Mount snapshot and rsync or tar

The end

Questions?

Resources

- Xen project website
 - <http://www.xen.org/support/documentation.html>
 - <http://www.xen.org/support/tutorial.html>
- The Book of Xen
 - <http://nostarch.com/xen.htm>