System Administration

CIS-2235 Advanced (Linux) System Administration

Course Overview

We will look at the role of a system administrator and the skills necessary to:

- Install, maintain, and troubleshoot Linux services.
- Monitor system services.
- Gain knowledge of administrative applications.
- Perform basic scripting of admin tasks.
- Apply skills and tools to build and maintain a Ubuntu server.

Lab Rubric

Each lab requires a lab report. It is designed to give you practice creating documentation.

1. Were all the tasks completed correctly?
2. Are all problems and solutions documented?
3. Are the solutions fully documented? or sparse?
4. Are the solutions verified?
5. Is the documentation neat, orderly, and understandable?

Duties of a System Administrator

Essential duties:

- Controlling access
- Adding and maintaining hardware
- Automating tasks
- Overseeing backups and recovery
- Installing and upgrading software
- Monitoring
- Troubleshooting
- Maintaining documentation
- Security: both creating policies and monitoring

Linux

Parts of a Linux distro:

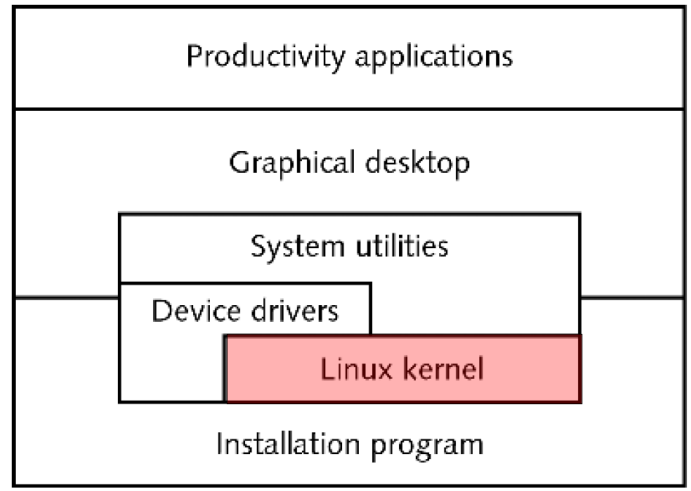


Figure 1-3 Many components together create a Linux distribution

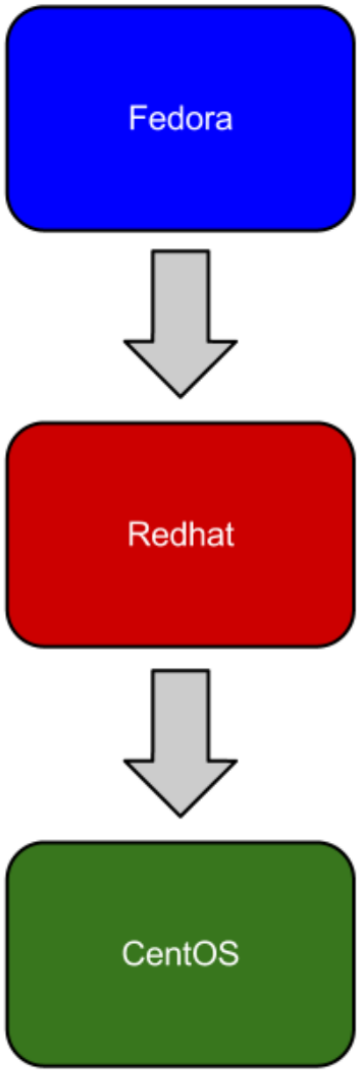
Name some Linux distributions…
Name some graphical desktops…
Name some apps…

Linux Distributions

Distribution	Web site	Comments
Arch	archlinux.org	For those who fear not the command line
CentOS	centos.org	Free analog of Red Hat Enterprise
CoreOS	coreos.com	Containers, containers everywhere
Debian	debian.org	Free as in freedom, most GNUish distro
Fedora	fedoraproject.org	Test bed for Red Hat Linux
Kali	kali.org	For penetration testers
Linux Mint	linuxmint.com	Ubuntu-based, desktop-friendly
openSUSE	opensuse.org	Free analog of SUSE Linux Enterprise
openWRT	openwrt.org	Linux for routers and embedded devices
Oracle Linux	oracle.com	Oracle-supported version of RHEL
RancherOS	rancher.com	20MiB, everything in containers
Red Hat Enterprise	redhat.com	Reliable, slow-changing, commercial
Slackware	slackware.com	Grizzled, long-surviving distro
SUSE Linux Enterprise	suse.com	Strong in Europe, multilingual
Ubuntu	ubuntu.com	Cleaned-up version of Debian

Table 1.1 Most popular general-purpose Linux distributions

Red Hat Lineage



- Run by Redhat (company)
- Community driven
- Focused on quick releases (~6 Months)
- Stresses features and functionality
- Free

- Based on Fedora
- Run by Redhat (company)
- Released corporately by Redhat
- Focused on long releases for stability
- Stresses stability over features
- Commercial (non-free)

- Based off of commercial releases of Redhat (distro)
- Run by the community
- Basically Redhat without the cost or support

At end of 2020, RedHat dropped development of CentOS, in favor of CentOS Stream. Going forward, CentOS has been renamed Rocky Linux, and is maintained by the community

Virtualization - KVM

- KVM - kernel-based virtual machine
- Built into Linux to manage VMs
- https://help.ubuntu.com/community/KVM
- Packages needed:
  - qemu-kvm
  - libvirt-daemon-system
  - libvirt-clients
  - bridge-utils
- Users need to belong to groups libvirt and kvm
- GUI hypervisor is called virt-manager
- Can have Windows or Linux guests

KVM virsh Shell

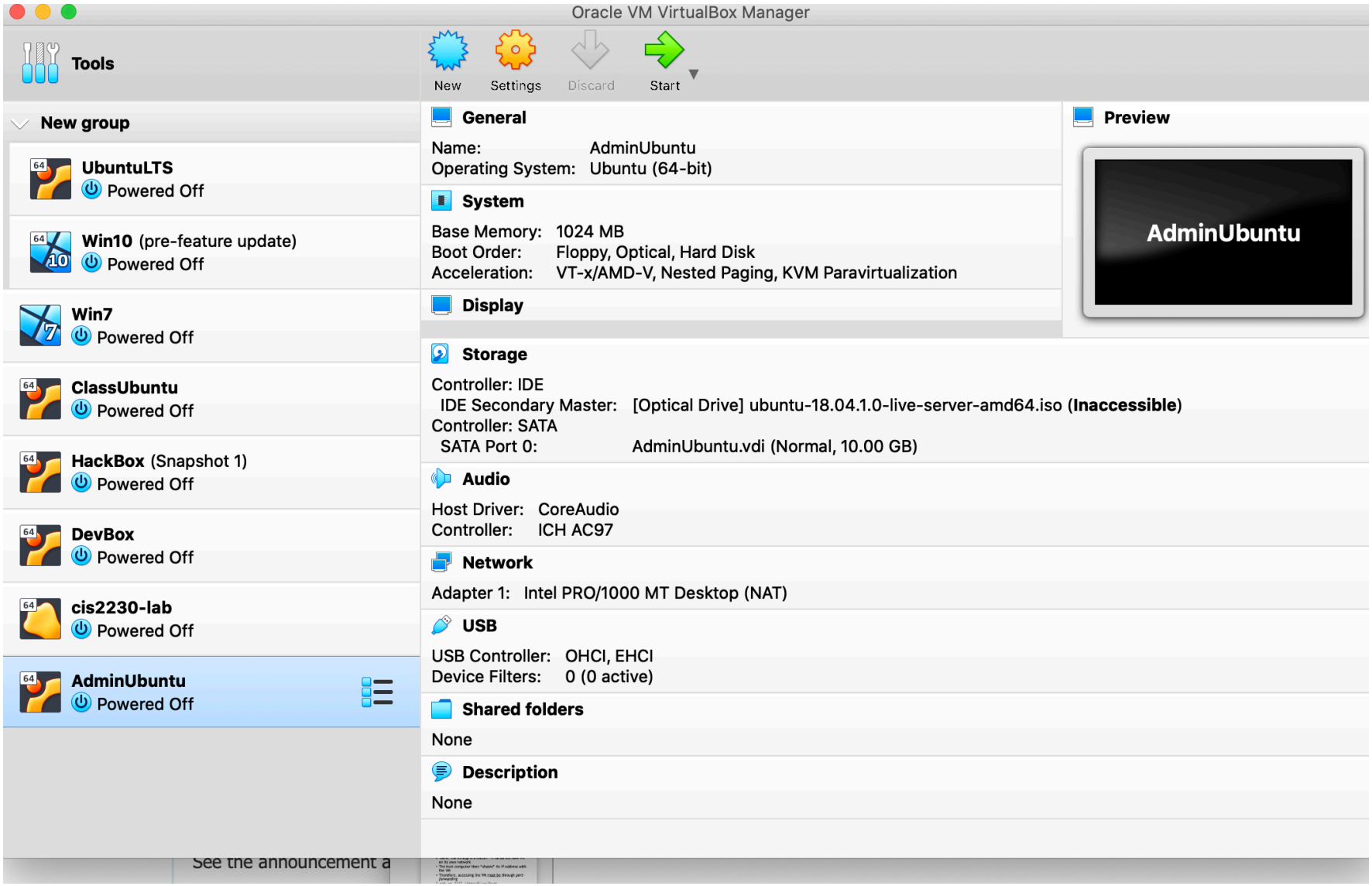
Virtual shell for controlling KVM instances

Key virsh commands:

list, connect, start, shutdown, suspend, resume

Allow you to script and batch commands to control the KVM guest

Virtualization - Oracle VirtualBox



VM setup

- In this class, you will practice Administrative skills with a Windows, macOS, or Linux host.
- We will have a Linux guest.
  - The guest will be command-line only.
  - Often, you will need to administer remote machines that don't have graphical displays.

Connecting to the Guest

Ways to get a shell prompt:

- VM manager window from VBox
- SSH - native on macOS and Linux, download and SSH client (PuTTY) on Windows.
- Desktop GUI, but not in this class.

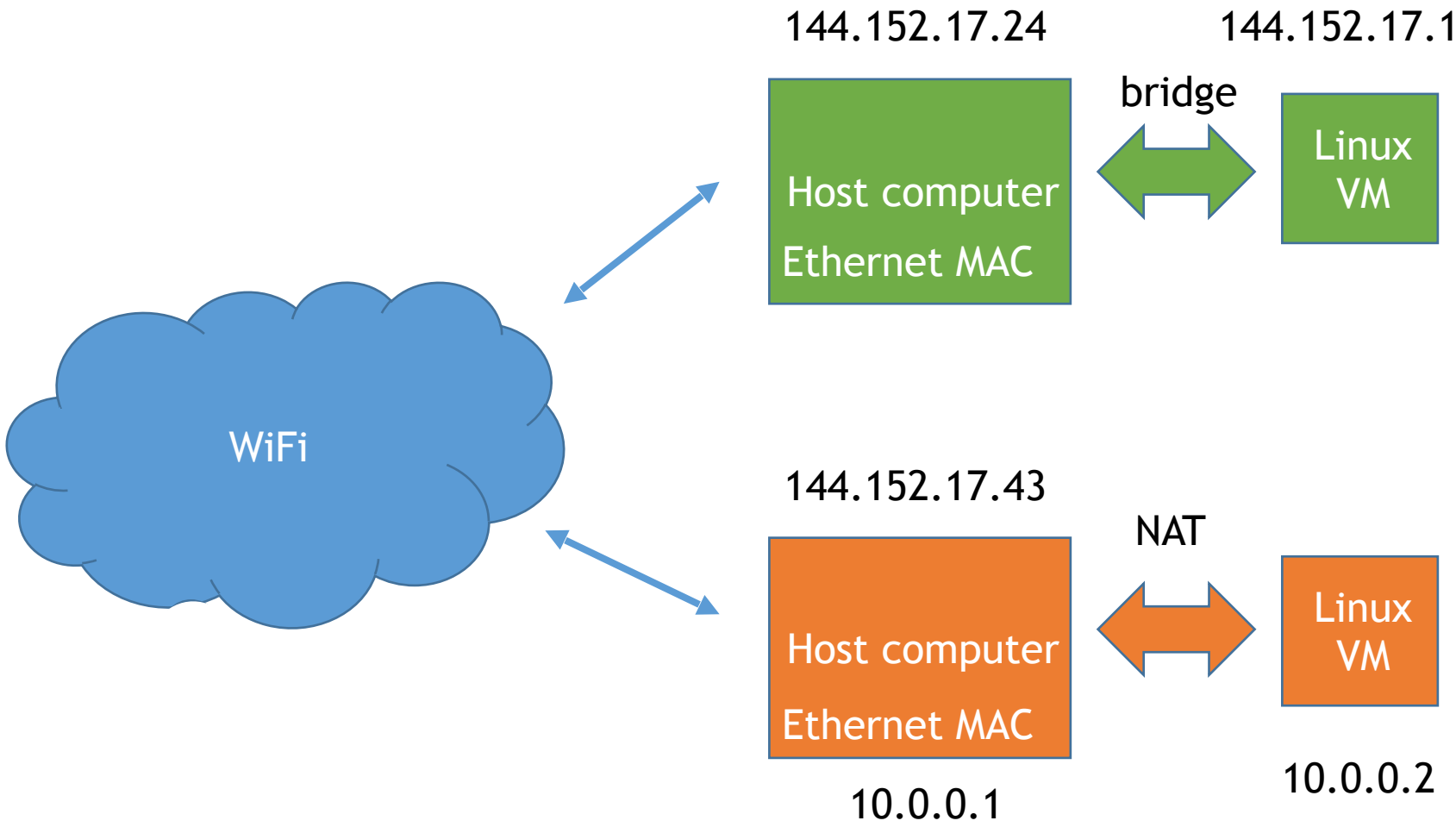
File Transfer

We also need to transfer files to/from our guest.

- SCP - built on top of SSH. For example, the WinSCP GUI on Windows.
- SFTP - supported by WinSCP and other tools.
- VBox file share - if you install VBox additions.
- Various file system mount techniques.

VM networking

Some networks don't support 1 MAC and 2 IP's



So, how to connect to the VM?

Network Address Translation (NAT)

VirtualBox serves as a network address translator to an internal virtual network.

Each guest gets an address on the internal network but shares a single "global" address with the host.

Access to the guest is via port forwarding on the host OS.

Bridge Networking

Guest gets IP address as if the VM was a real machine on the network.

VirtualBox "bridges" the independent VM onto the actual network.

This requires the host's network interface to support multiple IP addresses.

Suitable for making guest servers visible.