Installing Linux

Unit objectives

After completing this unit, you should be able to:

- Prepare a system for installation
- Install Linux from CD-ROM
- Perform a network installation
- Set up a RHEL or SLES network install server
- Set up and perform a RHEL Kickstart install
- Set up and perform a SLES AutoYaST install

Preparing a system for installation

- Know your hardware.
  - CPU, memory, keyboard, mouse
  - Hard disks, CD-ROM players
  - Graphical adapters, monitor capabilities
  - Network adapters, IP addresses
  - Printers
- Is all your hardware supported?
  - Linux Hardware-HOWTO
  - Distributor's hardware compatibility list
  - Hardware manufacturer
  - If unsure, just try it!
- Determine where Linux will be installed.

Installing Linux

- Boot system from bootable media.
  - All modern systems can boot from CD-ROM directly
    - Must be enabled in firmware
- After booting, install from:
  - Local CD-ROM/DVD
  - Local hard disk
  - Network

Network installations

- Installations where packages to install are downloaded from the network
- Network protocols supported depends on distribution
  - Network File System (NFS)
  - File Transfer Protocol (FTP)
  - Hypertext Transfer Protocol (HTTP)
  - Server Message Block (SMB)
- Requires a network install server
- Usually requires special network-enabled boot media
  - Preboot Execution Environment (PXE) boot requires no media

Network install server: Overview

- Should be a Linux/UNIX server
- Content of all relevant CDs copied to disk
  - Should use a naming scheme that allows multiple versions and distributions to be exported
    - For example: /export/rhel54s, /export/rhel60, /export/suse11, and so on
- Method
  - NFS
  - (Anonymous) FTP
  - HTTP
  - SMB

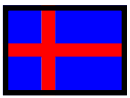
Network install server: Configuration

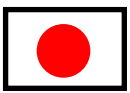
- Repository structures
  - Raw install tree
  - ISO images
  - Raw install disks
  - YaST install tree
- Server fileset configuration
  - RHEL: Copy `.discinfo`, `server/`, and `images/`
  - SUSE Linux: Copy CD 1 completely and, from all other CDs, copy `SUSE/` and `media*`
- Server configuration
  - Red Hat
    - Manual
  - SUSE Linux
    - `/sbin/yast2 instserver`

Installation steps

- All installation programs need to perform essentially the same steps.
  1. Choose language, keyboard type, mouse type.
  2. Create partitions.
  3. Set up a boot loader.
  4. Configure network.
  5. Configure users and authentication.
  6. Select package groups.
  7. Configure X.
  8. Install packages.
  9. Register.
- The order of steps might vary from distribution to distribution.
- Other steps might also be included.
  - For example, firewall, printers, and sound.

Select language, keyboard, and mouse

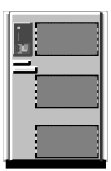




- Select the language to be used during installation process.
  - Different distributions support different languages.
- Select the keyboard layout.
  - Different countries use different keyboard layouts.
  - Dead (compose) keys allow you to input accented or special characters, such as é, ç, ß, and so forth.
- Select your mouse.
  - A mouse can be connected using a PS/2, USB, or serial connector.
  - If your mouse has only two buttons, you can emulate the third (middle) button by clicking both buttons simultaneously.

Install class

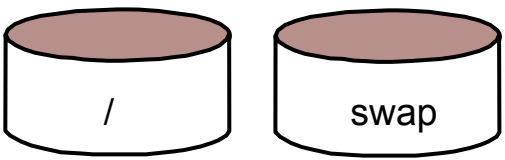
- Some distributions have installation classes for typical users.
  - Workstation
  - Laptop
  - Server
  - Developer



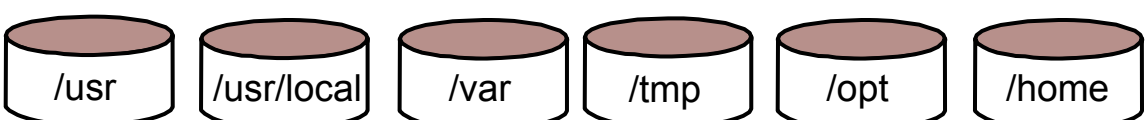
- A custom class allows you to make all decisions yourself.
  - Packages to be installed
  - Various configuration options

Disk partitioning

- Linux installation requires you to create Linux partitions.
- At a minimum, create / and swap:



- Red Hat will create logical volumes by default.
- You might need or want to create other partitions.
  - For example, /usr, /usr/local, /var, /tmp, /opt, and /home



Configure a boot loader

- A boot loader loads and starts the Linux kernel.
- It can boot other operating systems as well.
  - Windows, BSD, and so on
  - Give each OS a unique label
- It can be password protected.
  - Prevents users from passing boot parameters to Linux or booting any OS
- Should generally be configured in the MBR unless another boot loader is used.
- Common boot loaders include:
  - GRUB: Grand Unified Boot Loader
  - YaBOOT: Yet Another Boot Loader

Configure network

- Most distributions configure your network adapter as part of the installation process.
- You need the following information:
  - IP address
  - Subnetmask
  - Network address
  - Broadcast address
  - Host name
  - Default router/gateway
  - DNS server addresses
- They can also be configured to use DHCP.
- Most distributions do not support wireless adapters at install time.

Configure root and user accounts

- *root* is the superuser of the system.
  - It can do anything.
  - It needs a strong password.
  - Do not use your system as root unless you need to!
- Most distributions allow you to add user accounts during installation as well.
  - Create a user account for every individual user that is going to use the system.

Select package groups

- Most distributions group individual packages in package groups.
- Only select the package groups you need on your workstation.
- Selecting individual software packages is usually still possible but tedious.
  - A typical distribution has over 1000 packages.

Configure X

- X (X Window System) is the graphical user interface of Linux.
- It needs to be configured for your system.
  - Graphical adapter
  - Monitor
- Most adapters and monitors are autodetected.
  - If not autodetected, select manually or use a generic adapter or monitor
- Usually, customization is allowed.
  - Resolution, refresh rate
  - Color depth
- Test settings if possible.
- If nothing works, skip X configuration.

Other (optional) installation screens

- Some distributions offer additional installation screens.
  - Printer configuration
  - Firewall configuration
  - Sound card configuration
  - Modem configuration
  - Time zone configuration
- These are usually straightforward

Installing packages

- The installation will take several minutes to complete.
  - Most distributions provide a progress bar or total time indication or both.
- While the installation is going on, various virtual terminals provide background information on the progress.
  - Switch between VTs using **Ctrl-Alt-F1**, **Ctrl-Alt-F2**, and so forth.
- Insert additional media when prompted.

Post-install configuration

- After installation has finished, your system will reboot to activate the newly installed kernel.
  - SLES performs the reboot during installation.
- After reboot, some post-installation configuration might happen.
  - Configure graphics.
  - Configure sound card.
  - Install documentation, updates, and drivers.
  - Create user accounts.
  - Register.

Partitioning tools

- PartitionMagic
  - Commercial program from PowerQuest
  - Runs under MS-DOS and Windows
  - Can create, resize, move, and delete partitions
- GNU parted
  - Can create, resize, move, and delete partitions.
  - QTParted: Graphical frontend for parted
- fdisk
  - Virtually every PC OS (Windows, OS/2, Linux) comes with a tool *fdisk* to create partitions for that OS.
- Disk Druid, YaST, and others
  - Partitioning programs integrated in install program

RHEL/Fedora kickstart installations

- RHEL method of automating installations
- File `ks.cfg` with three sections:
  - Install commands
  - %packages section
  - %pre, %post sections
- File creation
  - Manually
  - `system-config-kickstart`
  - `/root/anaconda-ks.cfg` (created during installation)
- Location
  - Boot floppy or NFS server
    - NFS also requires a Dynamic Host Configuration Protocol (DHCP) server.
- Initiation
  - linux ks=ks.cfg URL at syslinux boot: prompt

RHEL/Fedora kickstart example


```
# cat anaconda-ks.cfg
# Kickstart file automatically generated by anaconda.

install
cdrom
lang en_US.UTF-8
langsupport --default=en_US.UTF-8 en_US.UTF-8
keyboard us
xconfig --card "Intel 815" --videoram 16384 --hsync 30-94 --vsync 48-120
--resolution 800x600 --depth 16 --startxonboot  --defaultdesktop gnome
network --device eth0 --bootproto static --ip 10.0.0.3
--netmask 255.255.255.0 --gateway 10.0.0.100 --hostname sys2
rootpw --iscrypted $1$Q1EsuwfB$aowfCXdJRUcpW/8h4Jl0c.
firewall --disabled
selinux --enforcing
authconfig --enableshadow --enablemd5
timezone America/Los_Angeles
bootloader --location=mbr --append="rhgb quiet"
# The following is the partition information you requested
# Note that any partitions you deleted are not expressed
# here so unless you clear all partitions first, this is
# not guaranteed to work
#clearpart --all --drives=had
. . .
```

SLES AutoYaST installations

- SUSE Linux method of automating installs
- File `ay.xml` containing all installation information
  - General settings for keyboard and so forth
  - Partition settings
  - Packages
  - Pre- and post-install scripts
- File creation
  - `yast autoyast`
- Location
  - Store file on network server
- Initiation
  - `install=nfs://10.0.0.1/export/sles10sp1 \`
    `autoyast=nfs://10.0.0.1/autoyast/myprofile.xml`

AutoYaST example


```
<?xml version="1.0"?>
<!DOCTYPE profile SYSTEM "/usr/share/autoinstall/dtd/profile.dtd">
<profile xmlns="http://www.suse.com/1.0/yast2ns"
xmlns:config="http://www.suse.c
om/1.0/configns">
  <bootloader>
    <activate config:type="boolean">false</activate>
    <global>
      <embed_stage1.5 config:type="boolean">true</embed_stage1.5>
      <gfxmenu>/boot/message</gfxmenu>
      <lines_cache_id>0</lines_cache_id>
      <prompt>1</prompt>
      <stage1_dev>/dev/hda7,/dev/hda</stage1_dev>
      <timeout config:type="integer">8</timeout>
    </global>
    <initrd_modules config:type="list">
      <initrd_module>
        <module>piix</module>
      </initrd_module>
      <initrd_module>
        <module>processor</module>
      </initrd_module>
      <initrd_module>
        <module>thermal</module>
. . .
```

Checkpoint (1 of 2)

1. True or False: Linux can coexist with Windows on the same hard disk.

2. Which of the following steps is not essential in the installation process:
   a. Create partitions for Linux.
   b. Configure your printer.
   c. Select your keyboard type.
   d. Identify the packages to install.

3. What is the best source of information about your hardware?

Checkpoint solutions (1 of 2)

1. True or False: Linux can coexist with Windows on the same hard disk.

   The answer is true.

2. Which of the following steps is not essential in the installation process:
   a. Create partitions for Linux.
   b. Configure your printer.
   c. Select your keyboard type.
   d. Identify the packages to install.

   The answer is configure your printer.

3. What is the best source of information about your hardware?

   The answer is a currently installed and configured operating system, such as Windows.

Checkpoint (2 of 2)

4. True or False: A network install server needs to be a Linux system.

5. Which of the following install methods does not require a network server?
   a. NFS
   b. SMB
   c. FTP
   d. CD-ROM

6. What are some possible locations where a RHEL/Fedora kickstart or SLES AutoYaST file can be stored?

Checkpoint solutions (2 of 2)

4. True or False: A network install server needs to be a Linux system.

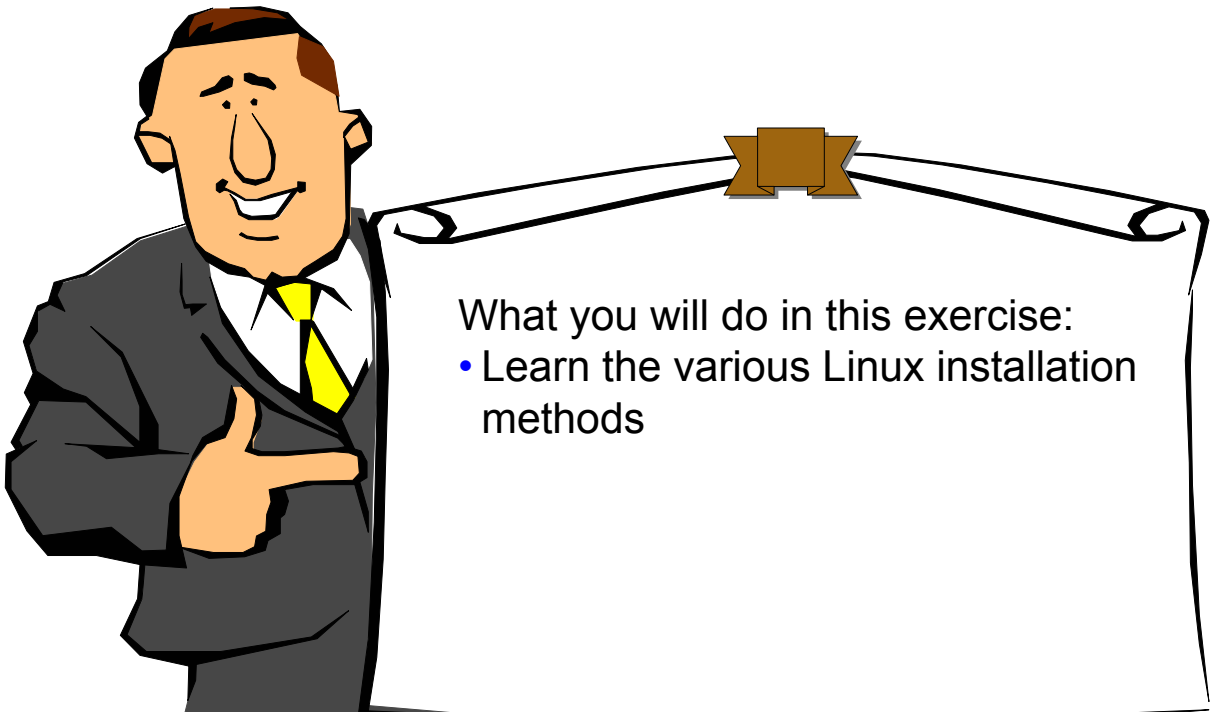
   The answer is false. It can be any operating system that provides NFS, FTP, or HTTP services.

5. Which of the following install methods does not require a network server?
   a. NFS
   b. SMB
   c. FTP
   d. CD-ROM

   The answer is CD-ROM.

6. What are some possible locations where a RHEL/Fedora kickstart or SLES AutoYaST file can be stored?
   Possible answers include floppy disk, network server (HTTP, NFS), USB key, and Local VFAT partition.

Exercise: Installing Linux



What you will do in this exercise:

- Learn the various Linux installation methods

Unit summary

Having completed this unit, you should be able to:

- Prepare a system for installation
- Install Linux from CD-ROM
- Perform a network installation
- Set up a RHEL or SLES network install server
- Set up and perform a RHEL Kickstart install
- Set up and perform a SLES AutoYaST install