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MODULE 01

Linux Fundamentals

Objectives

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- Describe the history of Linux
- Describe the Free Software Model
- Describe the General Public License (GPL)
- List the different programming, hardware and software features of Linux

Objectives

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- List the benefits and limitations of Linux
- Identify the major Linux distributions
- Describe various Linux standards
- Describe the Linux Documentation Project
- Identify Linux system administration tasks

History of Linux

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- History:
  - Created by Linus Torvalds in 1991
  - Released on the Internet
  - Many volunteers joined in development
- A full Linux system consists of:
  - The Linux kernel
  - The GNU applications and utilities
  - Other Tools and applications
- Linux is licensed under the GNU GPL:
  - Peer review of source code
  - Code is available for derivative works
  - Programmers world-wide test new releases
  - No license costs
  - No upgrade costs

The Free Software Model

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- Linux is open source software. All the source code which makes up Linux itself is covered by the GNU General Public License (GPL), which is copyrighted by the Free Software Foundation (FSF)
- A crucial aspect of *free software* is that users are *free to make modification*, *free to cooperate, free to share their bug fixes and improvements*

Proprietary Software Under Linux

- Creating, running and selling proprietary software under Linux is allowed and even encouraged (for example Oracle's 8i) because it's a use of the system rather than a derivative from the Linux sources
- If developers and companies take GPL'd source code and incorporating it into their own non-GPL projects – *this is strictly forbidden*.

The GNU General Public License

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- This license is intended allow *free use* and *redistribution of program's source code* as well as any programs *derived therefrom*
- Use and redistribution GPL softwares is free. You're allowed to charge for copies of the softwares but can't prevent others from freely copying it

The GNU General Public License

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- If you create and redistribute derivatives of GPL product, they must be covered by the same license as the orginal

Linux Features

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- *Hardware* : runs on many platforms : Alpha, AMD “Hammer” (x86-64 bit), Intel, MIPS, PowerPC, Sparc, …

  http://www.tldp.org/HOWTO/Hardware-HOWTO.html

- *Loadable Device Modules* : software can be added while the system is running. This eliminates the need to restart systems and results in lower downtime and greater reliability

Linux Features

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- *Software* : to find out softwares works on Linux, check Linux software sites :

  http://www.freshmeat.net

  http://www.linuxberg.com

  http://www.rpmfind.net/linux/RPM/

Linux Features

- *GUI Windows Mangers* : supports GNOME, KDE,…
- *Programming Languages* : C, C++, FORTRAN, Java, Perl, Python, PHP, …

Linux Advantages

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- *GUI is optional* :
  - Linux does not require GUI to function
  - Using Linux without a windowing system also reduces security risks when your system connect to Internet
- *Remote Administration is Easy* :
  - Linux allows you to remotely handle your system and maintenance tasks.
  - via a network with a command line interface or GUI utilities

Linux Advantages

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- *Rebooting is Uncommon* : The uptime of a Linux system is usually measured in months, even years. System only requires to boot when upgrade hardware or kernel
- *Viruses Are Almost Non-existent* : programs on Linux run as users, NOT as root, it can not modify important system files

Linux Advantages: Greater Security

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- Some argue that Free Software is not secure:
  - Because anyone can look at the source and find security holes
  - A central authority doesn't control the code
- Open Source software is more secure:
  - Secrecy doesn't guarantee security
  - Thousands of programmers examine the code
  - Since bugs are open for all to see they are fixed faster than a closed source system

Linux Limitations

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- No formal quality assurance program
- Will only scale to 16 processors “out of the box”
- Not all things are well documented
- Bugs do exist
- Maximum file size of 1 Terabyte
- …

Linux Distributions

- Debian GNU/Linux

  http://www.debian.org

- MandrakeSoft

  http://www.linux-mandrake.com

- Red Hat

  http://www.redhat.com

Linux Distributions

- Slackware Linux

  http://www.slackware.com

- SuSE

  http://www.suse.com

- TurboLinux

  http://www.turbolinux.com

- …

Linux Standards

- Linux strives for POSIX compliance
  - Standards concentrate on kernel functionality and API
  - Administration not covered by standards
- Administration is similar for all Linux systems
  - Command names can vary among distributions
  - Command options can vary
  - Some systems support administrators better
- Linux is developing standard structures:
  - File system Hierarchy Standard
  - Linux Standard Base (LSB)

Linux Documentation

- Individual commands within Linux are documented through **`man`** or **`info`** pages

- The Linux Documentation Project : works on developing and maintaining good, reliable documentation for Linux OS

  http://www.tldp.org

System Administration

- The roles and responsibilities of a Linux administrator
  - similar to other OS administrators
  - the specifics may differ from what they are used to do administration tasks: *Linux administrator use text-based utilities while other OS (Windows) use GUI*

System Administration Duties

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- Operational Duties : backup, recovery, add/remove users, changing password, monitoring system activities, …
- Administrative Duties : building a successful infrastructure, includes system and network design : recovery planning, security, policy and procedures development
- Support …

Summary

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- List the benefits and limitations of Linux
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