

Linux Systems Administration

Getting Started with Linux

source :

Network Startup Resource Center

www.nsrc.org

Who Are We Teaching?

- You have experience with Linux or Unix
- Real-world experience
- You have an Intermediate level of knowledge
- **Are we right?**

Objectives

Review Core Concepts & Terminology

- System Access
- Users: Types, Changing, Acting as Others Shells
- User Processes
- File System Layout
- Editors
- Editing Configuration Files
- Software Management
- Managing Services & Processes Checking System & Memory Load

Log into your Systems

- ssh ***groupN.apnictraining.net*** user **apnic**
where “***N***” is the number of your pc lab
password is written on the board
- Windows Users: use puTTY
- Mac and Linux Users: from your terminal

System Access

- Logging In Locally
 - With a “GUI” or Graphical User Interface
 - With a “CLI” or Command Line Interface
- Logging in Remotely
 - From Windows, with puTTY
 - From Linux or Mac, with ssh
- Requirements:
 - You need a username and password
 - These were given out in class

Types of Users

- Root User
 - The Super User
- Normal User
 - The sysadm account
- System User
 - An account used by an application

The Super User

- By default, one account can do anything: root
- Some Linux distributions disable logging in as this user
- Root is powerful
 - It can change (or delete) any file
 - It can perform any function
- Root is dangerous
 - Inexperienced users can break a system
 - Root can be exploited by attackers
- Limit what Root can do remotely – if you allow at all

Normal Users

- A standard user account
- Can log in and access a home directory
- Can have group permissions
- Can read/write/execute in its home directory
- Cannot start or stop the system
- Cannot start or stop system services
- Standard user accounts are safer than root

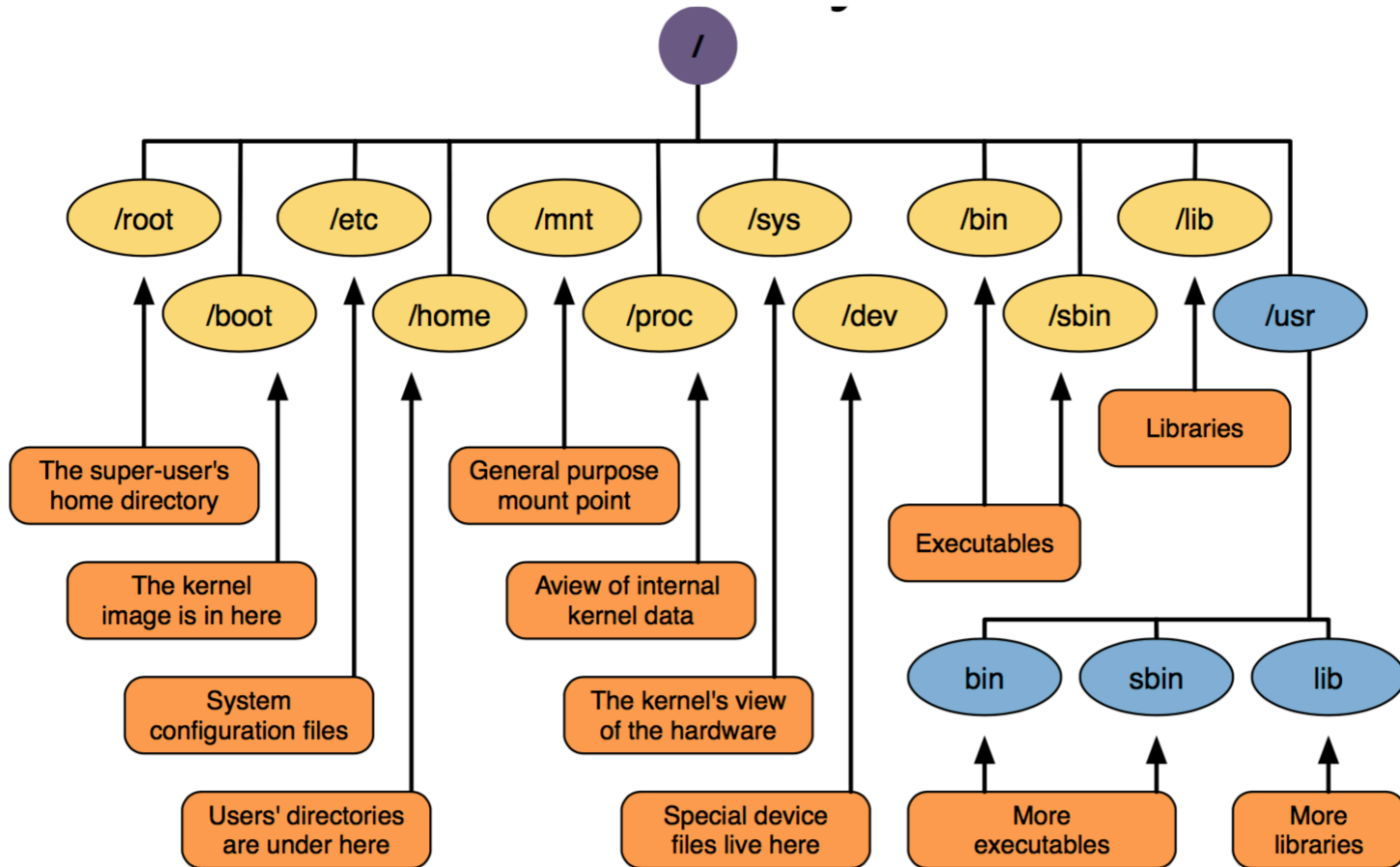
System Users

- A user account used by a program
ftp, www-data, postgres, ntp Typically cannot log in interactively
- May or may not have shell access
- Can have group permissions
- System Users are safer than other users
 - Don't run applications as root
 - Don't run applications as a normal user

Become Another User (like root)

- su: “substitute user identity”
- Syntax: su [options] [username]
 If no username, “root” is assumed
- su will ask you for the target user's password
- A new shell is opened as that user
- Quit the shell by typing “exit”

Linux File System



Execute a Command as Another User

- sudo:
 - execute a single command as another user
- sudo syntax:
 - Sudo [options] [-u user] command
- If no user is specified, root is assumed
- New shell opens with other user's privileges
- The specified command is executed
- The shell is exited

Shells

- Command Line Interface (CLI) for executing programs
Windows equivalent: `command.com` or `command.exe`
- Also programming languages for scripting
DOS/Windows equivalent: batch files, VBScript
Linux/Unix: Perl, php, python, etc.
- You have a choice of similar shells
sh: the “Bourne Shell”. Standardized in POSIX
bash: the “Bourne-Again Shell”. POSIX + command history
Others: csh, ksh, tcsh, zsh

User Processes

- Programs you run, typically interactively including the shell!
- Often-used programs have short, cryptic names
ls, cp, rm, pwd, cd, cat, less, mkdir, mv, rm, man
- Hundreds of programs included in base systems
In embedded Linux and Linux routers, sometimes these are combined into a single binary called BusyBox

Thousands of programs can be downloaded, free
Thousands more can be purchased

Common Commands

- ls: list the contents of a directory
- pwd: print working directory
- cd: change directory
- mkdir: make a directory
- cp: copy
- mv: move
- rm: remove
- man: display the manual

Software Management @ the CLI

- dpkg is the Debian/Ubuntu software manager
 - dpkg --get-selections: see what's installed
 - dpkg-reconfigure: reconfigure a package
 - dpkg --purge: remove software & its config files
- apt is the best way to use dpkg
 - apt-cache search: see what's available
 - apt-get update: get a new list of what's available
 - apt-get install: install software & its dependancies

The Format of a Command

- **command [options] parameters**
- Commands are programs
- Options modify commands
 - Typically a dash followed by a letter (-v)
 - Some utilities also allow dash dash word (--verbose)
- Commands act on Parameters (ls -al /etc)
- Spaces are critical "-- help" != "--help"

Command Examples

- Display a list of files in the current directory:
ls
- Display a list of files in a long listing format:
ls -al
- Display a list of files in another directory:
ls -al /etc
- What else can you do with ls?
man ls to find out

Command Examples

- Equivalent ways to use: `ls -alh`

`ls -lah`

`ls -l -a -h`

`ls -l -all --human-readable`

There is no `--` option for `-l`

Read the man page, or type `ls --help`

Stopping Command Output

- A command keeps going?
- Stop it with ctrl-c

```
PING bdnog.org (104.28.23.118): 56 data bytes
64 bytes from 104.28.23.118: icmp_seq=0 ttl=58 time=33.539 ms
64 bytes from 104.28.23.118: icmp_seq=1 ttl=58 time=25.441 ms
64 bytes from 104.28.23.118: icmp_seq=2 ttl=58 time=35.806 ms
64 bytes from 104.28.23.118: icmp_seq=3 ttl=58 time=38.916 ms
^C
```

```
--- bdnog.org ping statistics ---
4 packets transmitted, 4 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 25.441/33.425/38.916/4.989 ms
```

- Stuck in less or another paging application?

Press the “q” key

Find & Edit Past Commands

- Try your up arrow
- Now type history
- Run a past command by typing !number
- Looking for something in particular?
 `history |grep command-name`
- Don't retype commands
 It takes longer
 It can lead to errors

Linux File System

- Today usually a single partition
- Can be spread across multiple partitions
- Partitions can be mounted at various levels
 - /var and /tmp are sometimes different partitions
 - this is safer for experimental or unstable code
 - filling /tmp should not crash your computer!
- Attached or Network drives can be mounted
 - /mnt is a good place for these

Configuration Files

- Text files that tell programs how to operate
- Typically plain text, sometimes XML or similar
- Often are case sensitive
- Sometimes have comments and instructions
 - # is the most common character for comments
 - /* ... */, or // are other common comment delimiters
 - Other, less common patterns exist

Configuration File Patterns

- Options are sometimes turned off by default
 - ## a description of the option
 - ## remove the # below to enable the option –#
 - default setting = off
- Quotes are used...
 - “sometimes like this”
 - 'sometimes like this'

Viewing Configuration Files

- If you want to look, but not touch
 - cat <filename> displays a files contents
 - more <filename> displays with pagination
 - less <filename> paginates with search & more
- Changing files usually requires an editor

Linux Editors

- We will be editing text files in CLI mode
- You can use any editor you want
ed, emacs, joe, nano, vi, vim
- Set your favourite program as “editor”
sudo update-alternatives --config editor
- Don't have the editor you want? Install it!
sudo apt-get install program
- We can help you with nano or vi

Linux Editors

- Go to line 99 in a file
nano = ctrl _ 99
vi = :99
 - Find a string “hello” in a file
nano = ctrl w hello
vi = /hello (then “n” for next or “N” for previous)
Save and quit
nano = ctrl o ctrl x
vi= esc + :wq
- Clicking your mouse will not move your cursor

Services Management

- Startup Scripts
 - `/etc/init.d/`
 - `/etc/init/`
- Controlling Services
 - `sudo service servicename action`
 - `start, stop, restart, reload, status`
 - `/etc/init.d/service action`

Process Management

- **ps aux** see all processes
- **ps aux |grep apache** see just apache
- **sudo kill 1234** kill process 1234
- **sudo kill -9 1234** force kill process 1234
If it's hung or stuck and won't quit

Check on the System

- **cat /etc/*-release** : find your Linux version
- **top** : a real-time view of a running system
- **free -h** : show the free memory
- **df -h** : show the disk utilisation
- **netstat -anp |more** : show net connections
- **ifconfig -a |grep inet** : find your IP addresses
- **sudo iftop -i eth0** : show network utilisation

Reviewing

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Questions!