

# The Linux Filesystem

- Important Files and Directories
- Files, links, and inodes
- Special Files
- Filesystems
- Mounting Filesystems
- File System Integrity and fsck

# Important Directories

- /etc – System/application configuration
  - /etc/X11
  - /etc/mail
  - /etc/httpd
- /bin – Essential system binaries
- /boot – Kernel binaries, boot loader
- /dev – Device files
  - Special files representing disks, terminals, printers, etc.
  - More->

# More Important Directories

- /var – Variable files and directories
  - /var/tmp
  - /var/log
  - /var/spool
    - /var/spool/mqueue
    - /var/spool/lpd
    - /var/spool/cups
  - /var/run

# More Important Directories

- /home – Users' home directories
  - root's homedir is /root
- /lib – Shared libraries and kernel modules
- /proc – Kernel and process information
- /sbin – essential system binaries
- /tmp – Temporary files
- /opt – Optional packages
  - More ->

# More Important Directories

- /usr – Second important directory hierarchy
  - /usr/bin – Essential user binaries
  - /usr/sbin – User system binaries
  - /usr/man – Manual pages
  - /usr/X11R6 – X Window System version 11 release 6
  - /usr/share – Architecture-independent
    - /usr/share/doc – Documentation, How-To's
    - /usr/share/info – GNU documentation
  - More ->

- /usr/local
  - /usr/local/bin – User-installed binaries
  - /usr/local/src – Source of user-installed applications
  - /usr/local/lib – User-installed libraries
  - /usr/local/man User-installed documentation
  - /usr/local/etc – User-installed application configuration files

# Linux Filesystem

- Hierarchical data structure
- “/” is the root directory
- /usr, /etc, /var, /boot, /tmp, /lib, /sbin, /dev, /proc, etc. are at the first level
- Directories at the first level are the children or subdirectories of the root directory
- Conversely, the root directory is the parent directory of the first level directories

- Linux directories are addressed by pathnames
- In a pathname, directories are separated by “/”
- Linux allows many different characters to be used in filename, but it is recommended you use only alpha-numeric characters, underscore, and period
- Linux filenames and pathnames are case sensitive

- By convention, Linux filenames often contain a period followed by one or more characters
- This is called an extension, and is often used to convey information about the contents of the file.

- Some common Linux filename extensions
  - foo.c – C-program source
  - foo.pl – Perl program source
  - foo.gz – gzip-compressed
  - foo.Z – Unix compressed
  - foo.zip – Windows compressed
  - foo.txt – Plain text file
  - foo.cpp – C++ source
    - More ->

- foo.tar – Tar archive (tar file)
- foo.pdf – Portable Document Format (PDF)
- foo.ps - Postscript format
- foo.bz2 – bz2 compressed
- foo.html – HyperText Markup Language
- foo.jpg – Joint Photographic Expert Group (JPEG) Format
- foo.gif – Graphics Interchange Format(GIF)

# Hidden Files

- Filenames beginning with a period
- Visible with `-a` option to `ls`

# Important System Files

- `~/bash_profile`
  - bash login shell initialization file
    - Only executed for login shell
  - Used to set shell options, shell variables, run commands upon login, etc.
    - Path
    - Command Aliases
    - Terminal Prompt
    - etc.

# Important System Files

- `~/.bashrc`
  - bash nonlogin shell initialization script
  - Run each time a new bash shell is spawned
  - Function similar to `.bash_profile`

# Important System Files

- `/dev/null` - “The Bit Bucket”
- Output to `/dev/null` simply disappears
- Input from `/dev/null` reads null characters
- Get rid of program output or error
  - `grep foo /etc/* 2> /dev/null`
- create empty files
  - `cat /dev/null > empty`

# Important System Files

- `/dev/pts` – Pseudoterminal directory
- Each terminal window has a device file associated with it in the `/dev/pts` directory.
- You can see the pts device files in the output of the “`who`” and “`w`” commands
- Try redirecting output to the pts files and see what happens.

# Important System Files

- `/etc/hosts` – Hosts Table
  - Used in conjunction with DNS and NIS to resolve hostnames to IP addresses and vice versa.
  - Always contains at least an entry for localhost, `127.0.0.1`

# Important System Files

- `/etc/group` – Group Table
- Unix/Linux supports assignment of file and directory permissions based on group membership.
- `/etc/groups` contains a list of system groups and users assigned membership to each group.
  - In addition, each user's primary group is assigned in the system password file, `/etc/passwd`.

# Important System Files

- `/etc/mtab` – Mount Table
  - Used by the *mount* program to keep track of currently mounted filesystems.
- `/etc/motd` – Message of the Day
  - Can contain a text message which will be displayed to each user upon login.

# Important System Files

- `/etc/nsswitch.conf`
  - Configures how system and network information is looked up.
    - `passwd`
    - `hosts`
    - `group`
    - `services`
    - `etc.`

# Important System Files

- `/etc/passwd` – System Password Files
  - Contains
    - password
    - home directory
    - user ID #
    - group
    - shell
    - comment
  - information for each user.

# Important System Files

- `/etc/printcap` – System Printer Information
- `/etc/profile` – System default shell initialization file
- `/etc/resolv.conf` – Resolver Configuration File
  - Contains DNS server information

# Important System Files

- `/etc/services` – Maps internet services to port numbers and protocols
- `/etc/shadow` – Shadow Password File
  - Contains MD5-encrypted passwords and password modification and expiration information for each system user.

# Important Directories

- `/etc/rc.d/init.d` – System Startup Scripts
- Contains startup scripts for system programs and services.
- The files in `/etc/rc.d/init.d` are linked from the 6 specific run level directories, `/etc/rcn.d`.
- These links can be controlled with the *chkconfig* command.

# Important System Files

- `/etc/sysconfig` – System Configuration Directory
- Contains system configuration files for system and service startup

# Important System Files

- /proc – Kernel Runtime Information Filesystem
- A pseudofilesystem contain real-time information about the operation of the Linux kernel.
- Can also be used to configure kernel behavior on the fly.

# Important System Files

- /tmp – Temporary File System
- Contains temporary run-time files written system services and programs.
- /tmp is world readable and writeable. (777)

# Important System Files

- `var/log` – System Log Filesystem
  - Contains system log file from kernel, system services, and programs.
  - System Log rotation can be configured via `logrotate.conf` and the files in the `logrotate.d` directory.
- `/var/spool` – Spool directory printing, email, etc.

# Important System Files

- `/etc/filesystems` – Contains a list of filesystem types supported by the system.
- `/etc/mail` – Default configuration directory for Sendmail
- `/etc/httpd` – Default configuration directory for Apache web server.