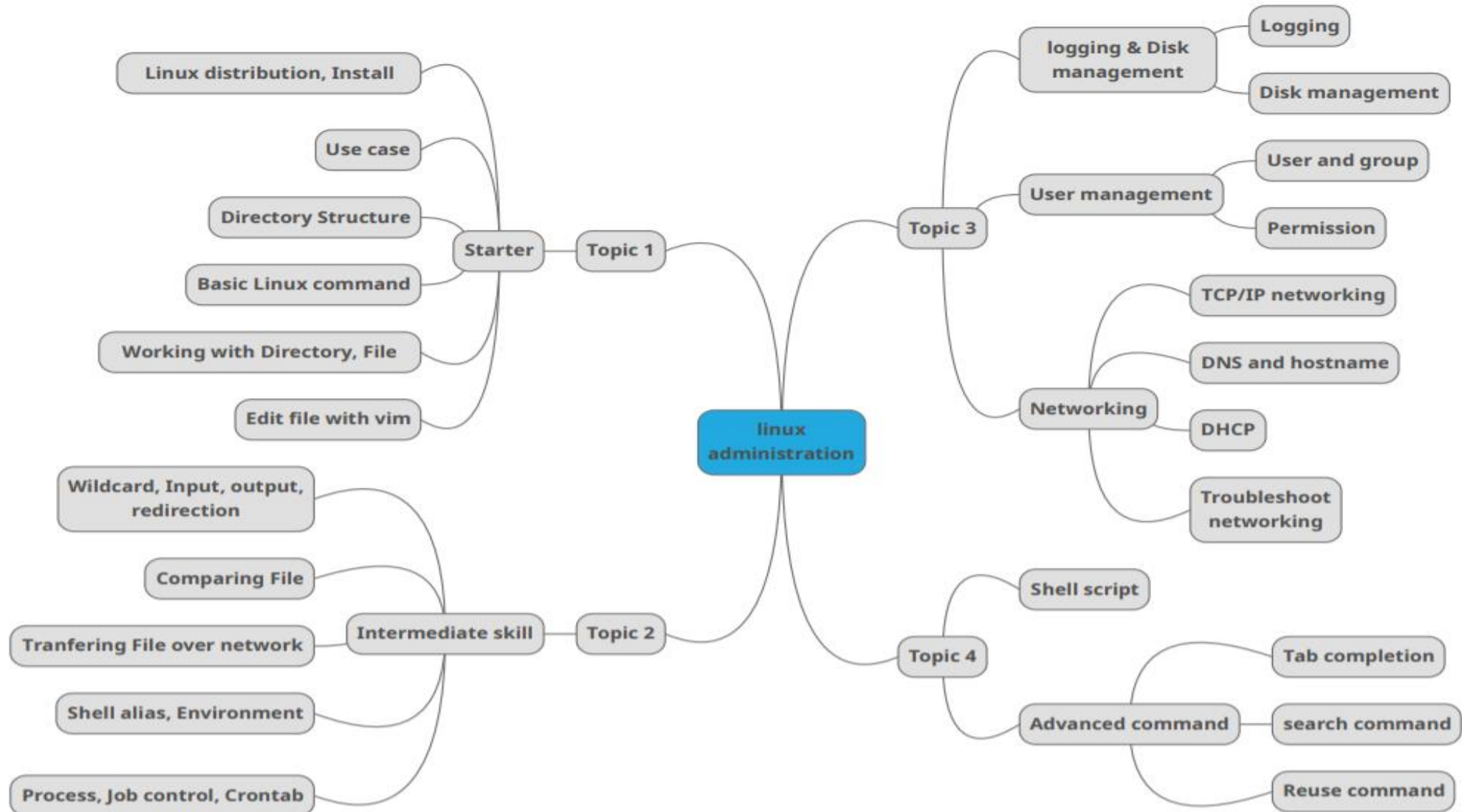




Linux administration

Techmaster

Nội dung

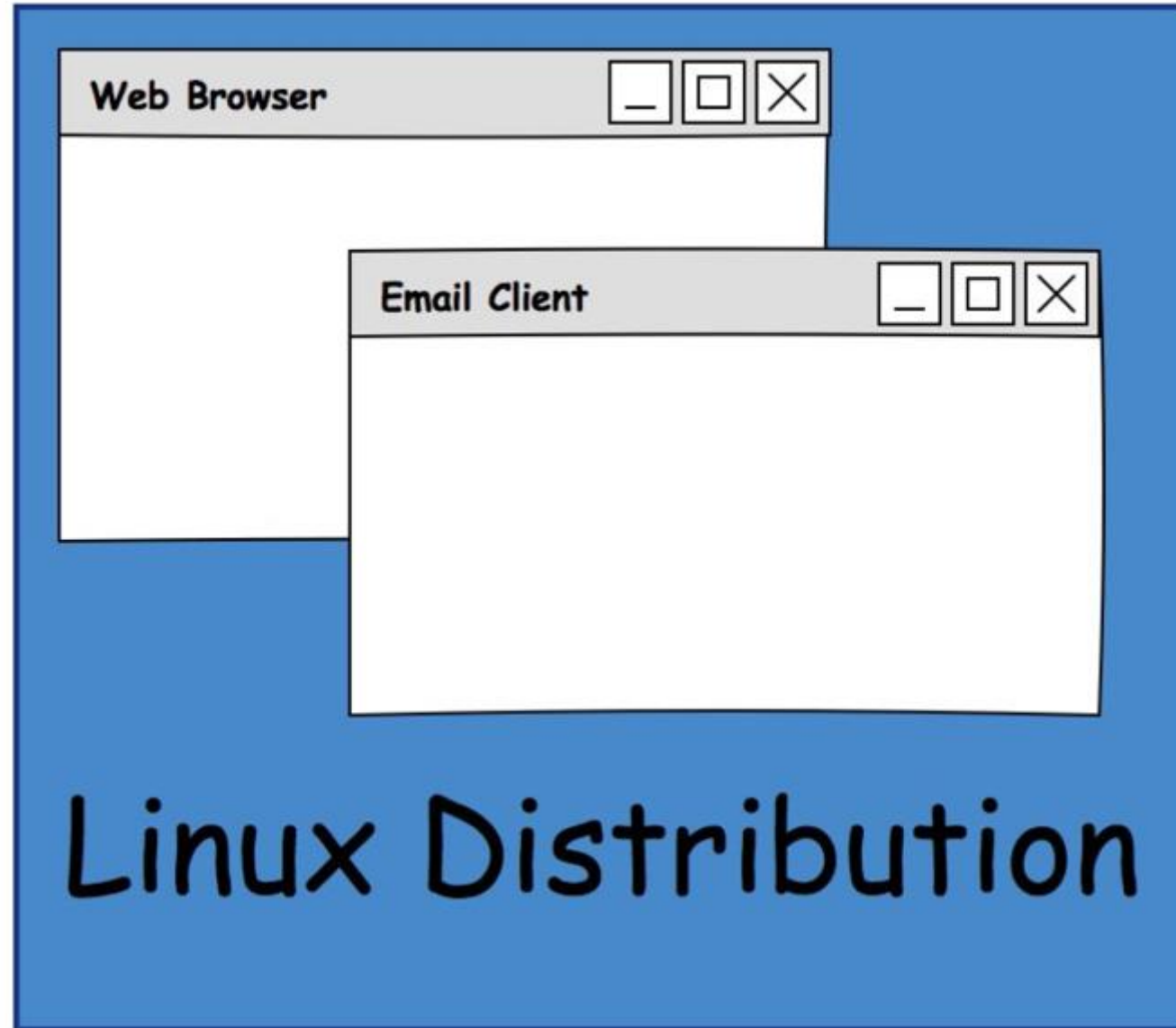


Linux Distributions



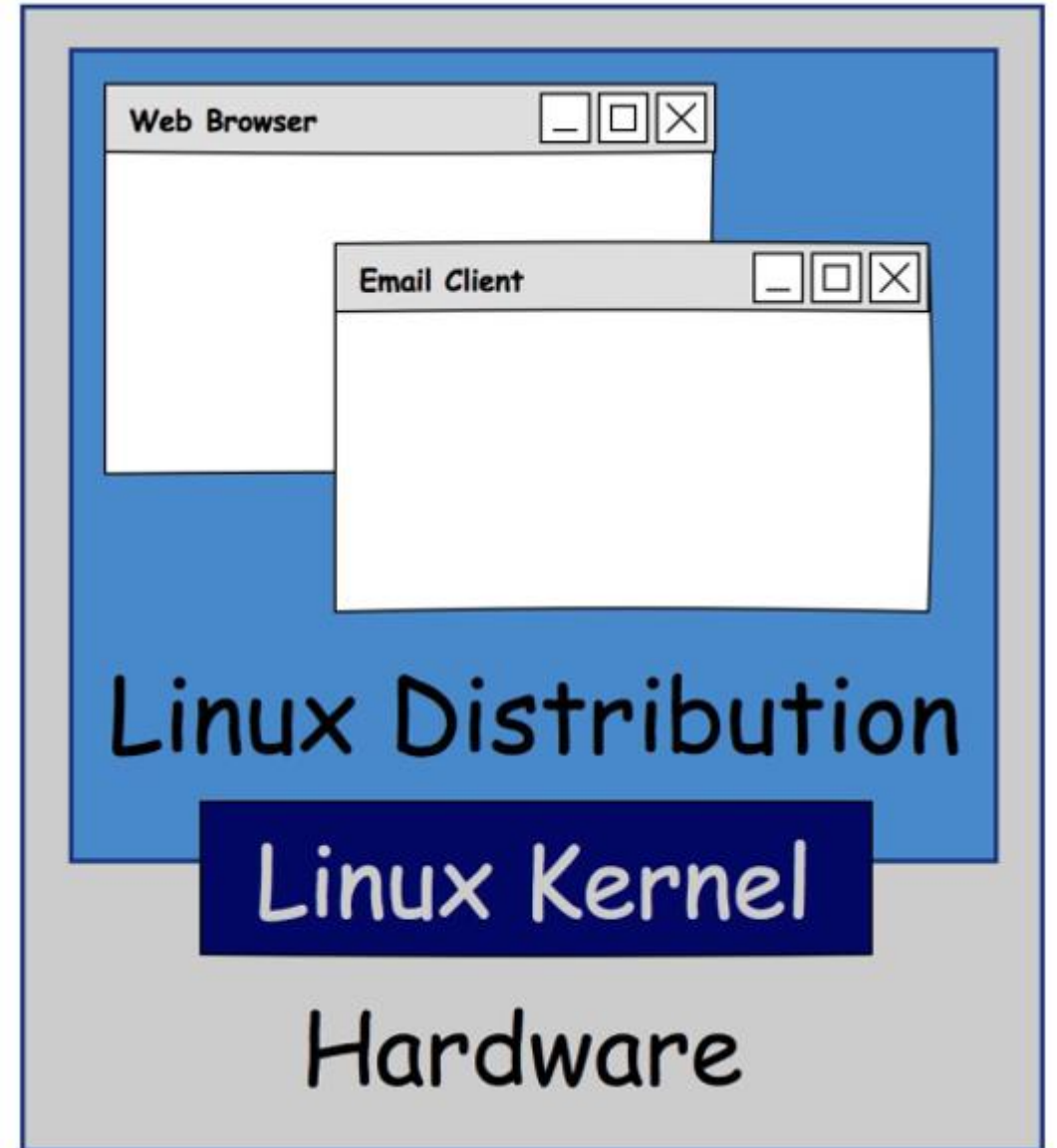
Linux

- Linux is an Operating System
- Linux OS = Linux Distribution
 - Curated software
- Distro / Flavor = Distribution



Linux Kernel

- The kernel is the core
- Linux Kernel + Apps = Distro





redhat.®



ubuntu

Popular in:

- Banks
- Airlines
- Telecoms
- Healthcare

Popular in:

- Startups
- SaaS
- Social Network
- Cloud Based

Linux isn't just for business:



- Linux Mint
- Debian
- Mageia
- Fedora
- openSUSE
- Arch Linux

Summary



- Linux Distro = kernel + software
- RHEL and Ubuntu
- CentOS = RHEL- branding/logos

Linux Directory Structure

The Filesystem Hierarchy



What You Will Learn



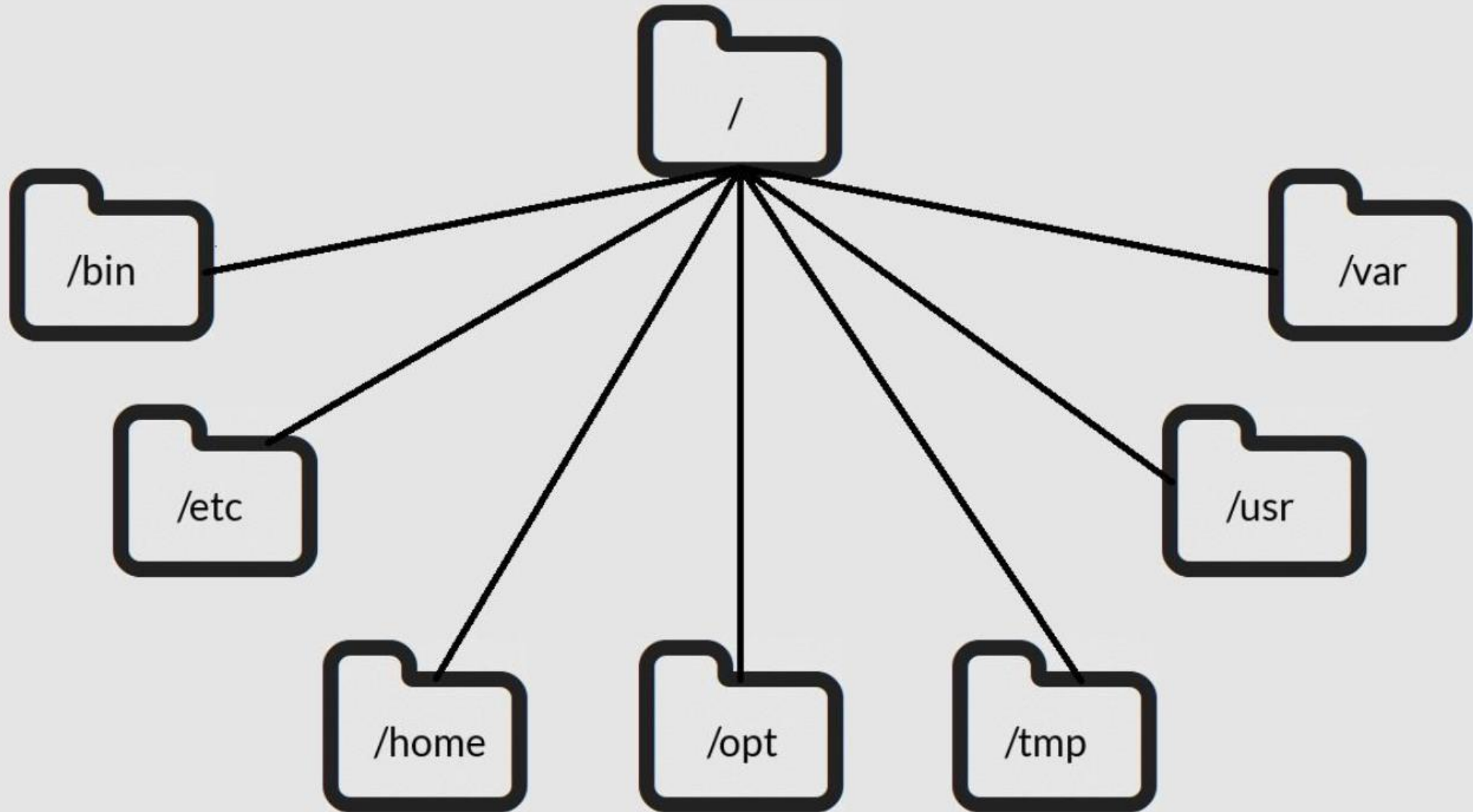
- Linux directory structure
- Location of operating system component
- Application directory structures

Common Directories

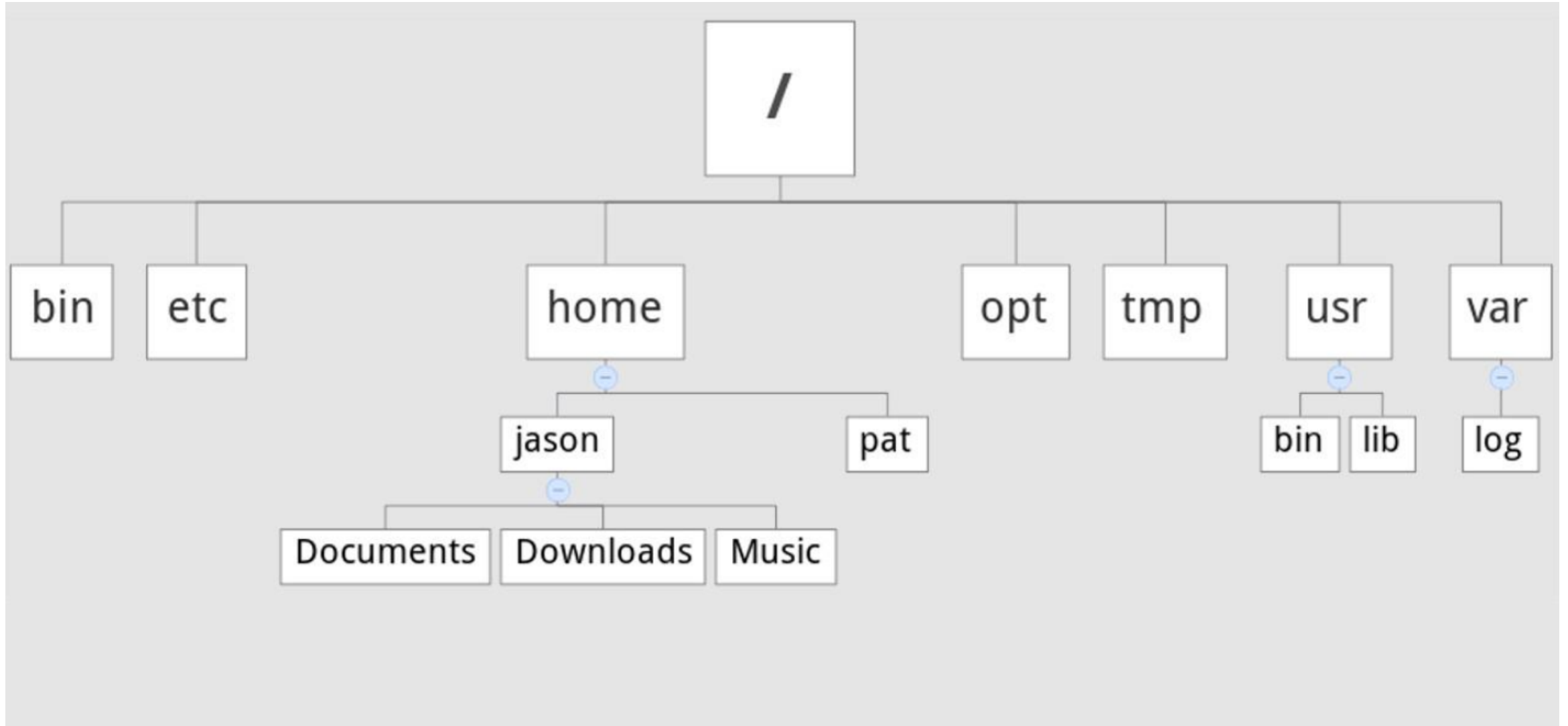


- `/` "Root," the top of the file system hierarchy.
- `/bin` Binaries and other executable programs.
- `/etc` System configuration files.
- `/home` Home directories.
- `/opt` Optional or third party software.
- `/tmp` Temporary space, typically cleared on reboot.
- `/usr` User related programs.
- `/var` Variable data, most notably log files.

Common Directories



Common Directories



Comprehensive Directory Listing



- / “Root,” the top of the file system hierarchy.
- /bin Binaries and other executable programs.
- /boot Files needed to boot the operating system.
- /cdrom Mount point for CD-ROMs.
- /cgroup Control Groups hierarchy.
- /dev Device files, typically controlled by the operating system and the system administrators.
- /etc System configuration files.

Comprehensive Directory Listing



- `/mnt` Used to mount external file systems.
- `/opt` Optional or third party software.
- `/proc` Provides info about running processes.
- `/root` The home directory for the root account.
- `/sbin` System administration binaries.
- `/selinux` Used to display information about SELinux.

Comprehensive Directory Listing



- `/usr` User related programs, libraries, and docs.
- `/usr/bin` Binaries and other executable programs.
- `/usr/lib` Libraries.
- `/usr/local` Locally installed software that is not part of the base operating system.
- `/usr/sbin` System administration binaries.
- `/var` Variable data, most notably log files.
- `/var/log` Log files.

Application Directory Structures



- `/usr/local/crashplan/bin`
- `/usr/local/crashplan/etc`
- `/usr/local/crashplan/lib`
- `/usr/local/crashplan/log`

Application Directory Structures



- /opt/avg/bin
- /opt/avg/etc
- /opt/avg/lib
- /opt/avg/log

Application Directory Structures



- `/etc/opt/myapp`
- `/opt/myapp/bin`
- `/opt/myapp/lib`
- `/var/opt/myapp`

Application Directory Structures



- `/usr/local/bin/myapp`
- `/usr/local/etc/myapp.conf`
- `/usr/local/lib/libmyspp.so`

Basic Linux Commands



Basic Linux Commands



- `ls` - Lists directory contents.
- `cd` - Changes the current directory.
- `pwd` - Displays the present working directory.
- `cat` - Concatenates and displays files.
- `echo` - Displays arguments to the screen.
- `man` - Displays the online manual.
- `exit` - Exits the shell or your current session.
- `clear` - Clears the screen

ls Options



- `-l` long listing format

man Keyboard Commands

- `space` - display the next page
- `q` - quit

Man Pages



- How to navigate man pages.
- How the `$path` environment variable is used.
- What the `which` command does.
- How to ask commands for help.
- How to search man pages.

Navigating Man Pages



- Enter Move down one line.
- Space Move down one page,
- g Move to the top of the page.
- G Move to the bottom of the page,
- q Quit

Environmental Variables



- Storage location that has a name and a value
- Typically uppercase
- Access the contents by executing:
 - `echo $VAR NAME`

PATH



Which Locate a command

```
[jason@linuxsvr ~]$ echo $PATH
/usr/local/bin:/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/sbin:/home/jason/bin
[jason@linuxsvr ~]$ whatsupdoc
-bash: whatsupdoc: command not found
[jason@linuxsvr ~]$ which cat
/bin/cat
[jason@linuxsvr ~]$ which tac
/usr/bin/tac
[jason@linuxsvr ~]$ █
```

Which command



- An environment variable
- Controls the command search path
- Contains a list of directories

```
[jason@linuxsvr ~]$ ls /bin
```

alsaunmute	dmesg	iptables-xml-1.4.7	ping	tar
arch	dnsdomainname	kbd_mode	ping6	taskset
awk	domainname	kill	plymouth	tcsh
basename	dumpkeys	link	ps	touch
bash	echo	ln	pwd	tracepath
cat	ed	loadkeys	raw	tracepath6
chgrp	egrep	logger	readlink	traceroute
chmod	env	login	red	traceroute6
chown	ex	ls	rm	true
cp	false	lsblk	rmdir	unlockmgr_server
cpio	fgrep	mail	rpm	umount
csch	find	mailx	rvi	uname
cut	findmnt	mkdir	rview	unicode_start
dash	fusermount	mknod	sed	unicode_stop
date	gawk	mktemp	setfont	unlink
dbus-cleanup-sockets	grep	more	setserial	usleep
dbus-daemon	gtar	mount	sh	vi
dbus-monitor	gunzip	mountpoint	sleep	view
dbus-send	gzip	mv	sort	ypdomainname
dbus-uuidgen	hostname	netstat	stty	zcat
dd	ipcalc	nice	su	
df	iptables-xml	nisdomainname	sync	


```
[jason@linuxsvr ~]$ ls --help
```

```
Usage: ls [OPTION]... [FILE]...
```

```
List information about the FILES (the current directory by default).
```

```
Sort entries alphabetically if none of -cftuvSUX nor --sort.
```

Mandatory arguments to long options are mandatory for short options too.

-a, --all	do not ignore entries starting with .
-A, --almost-all	do not list implied . and ..
--author	with -l, print the author of each file
-b, --escape	print octal escapes for nongraphic characters
--block-size=SIZE	use SIZE-byte blocks. See SIZE format below
-B, --ignore-backups	do not list implied entries ending with ~
-c	with -lt: sort by, and show, ctime (time of last modification of file status information) with -l: show ctime and sort by name otherwise: sort by ctime
-C	list entries by columns
--color[=WHEN]	colorize the output. WHEN defaults to `always' or can be `never' or `auto'. More info below
-d, --directory	list directory entries instead of contents, and do not dereference symbolic links
-D, --dired	generate output designed for Emacs' dired mode
-f	do not sort, enable -aU, disable -ls --color

Searching Man Pages

```
man -k SEARCH_TERM
```

```
[jason@linuxsvr ~]$ man -k calendar
cal                (1) - displays a calendar
difftime           (3p) - compute the difference between two calendar time values
[jason@linuxsvr ~]$
```

Searching Man Pages



```
man -k SEARCH TERM
```

```
[jason@linuxsvr ~]$ man -k calendar
cal                (1)  - displays a calendar
difftime           (3p) - compute the difference between two calendar time values
[jason@linuxsvr ~]$
```

Working with Directories

What You Will Learn



- How to use directory shortcuts.
- How to execute commands outside of \$PATH.
- How to create and remove directories.

Directories



- Are Containers for other files and directories.
- Provide a tree like structure.
- Can be accessed by name or shortcut.

Directory Shortcuts



- This directory
- .. The parent directory `cd`
- Change to the previous directory

Executing Commands



- \$PATH determines command search path.
- You can specify a command with a full path.
- You can execute command not in \$PATH.
- ./command = Execute command in this dir.

Creating and Removing Directories



- `mkdir [-p] directory` - Create a directory,
- `rmdir [-p] directory` - Remove a directory,
- `rm -rf directory` - Recursively removes directory.

Listing Files

And Understanding Is Output

What You Will Learn



- What the long listing format components are . How to see hidden files and directories.
- How to list files by type.
- How to list files sorted by time.
- How to handle spaces in file names.
- What symbolic links are.

Decoding `ls -l` Output

```
$ ls -l
```

```
-rw-rw-r-- 1 jason users 10400 Sep 27 08:52 sales.data
```

Permissions	-rw-rw-r--
Number of links	1
Owner name	jason
Group name	users
Number of bytes in the file	10400
Last modification time	Sep 27 08:52
File name	sales.data

Listing All Files, Including Hidden Files



- Hidden files begin with a period.
 - Sometimes called "dot files."
- Hidden files are not displayed by default.
- To show hidden files with `ls`, use `ls -a`.
- Command options can be combined.
 - `ls -l -a` is the same as `ls -la` and `ls -al`.

File and Directory Permissions Explained



What You Will Learn



- Symbolic permissions
- Numeric /octal permissions
- File versus directory permissions .
- Changing permissions .
- Working with groups .
- File creation mask

Permissions



```
$ ls -l
```

```
-rw-rw-r-- 1 jason users 10400 Sep 27 08:52 sales.data
```

Symbol

-

d

l

Type

Regular file

Directory

Symbolic link

Permissions



```
$ ls -l
```

```
-rw-rw-r-- 1 jason users 10400 Sep 27 08:52 sales.data
```

Symbol	Permission
r	Read
w	Write
x	Execute

Permissions - Files với Directories



Permission	File	Directory
Read (r)	Allows a file to be read.	Allows file names in the directory to be read.
Write (w)	Allows a file to modified.	Allows entries to be modified within the directory.
Execute (x)	Allows the execution of a file.	Allows access to contents and metadata for entries.

Permission Categories



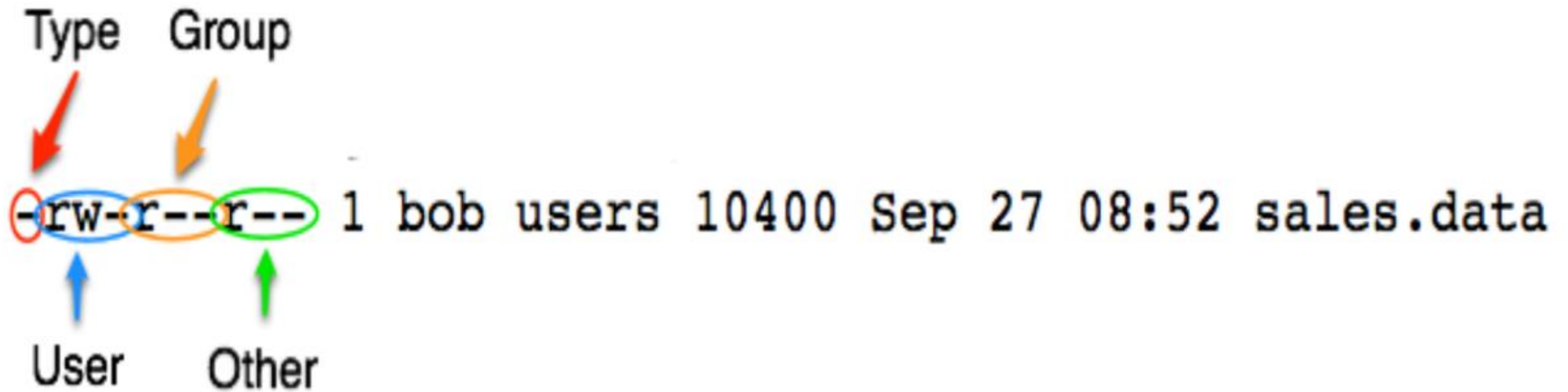
Symbol	Category
u	User
g	Group
o	Other
a	All

Groups



- Every user is in at least one group.
- Users can belong to many groups.
- Groups are used to organize users.
- The groups command displays a user's groups.
- You can also use `id -Gn`

Cách thức giải mã Permission



The diagram illustrates the components of a Linux permission string. It shows the string `-rw-r--r--` with annotations:

- Type:** Indicated by a red arrow pointing to the first character (`-`).
- Group:** Indicated by an orange arrow pointing to the first character of the group permissions (`r`).
- User:** Indicated by a blue arrow pointing to the first character of the user permissions (`r`).
- Other:** Indicated by a green arrow pointing to the first character of the other permissions (`r`).

The full line of text is: `1 bob users 10400 Sep 27 08:52 sales.data`

Thay đổi permission



Item	Meaning
chmod	Change mode command
ugo	User category user, group, other, all
+ -=	Add, subtract, or set permissions
rwX	Read, Write, Execute

Chuyển đổi Permission giữa số và chữ



r	w	x	
0	0	0	Value for off
1	1	1	Binary value for on
4	2	1	Base 10 value for on

Ví dụ về Permission

Octal	Binary	String	Description
0	0	---	No permissions
1	1	--x	Execute only
2	10	-w-	Write only
3	11	-wx	Write and execute (2+1)
4	100	r--	Read only
5	101	r-x	Read and execute (4+1)
6	110	rw-	Read and write (4+2)
7	111	rwX	Read, write, and execute (4+2+1)

Tổng hợp về Permission



	U	G	O
Symbolic	rwX	r-X	r--
Binary	111	101	100
Decimal	7	5	4

Các trường hợp thực tế thường dùng



Symbolic	Octal
<code>-rwx-----</code>	700
<code>-rwxr-xr-x</code>	755
<code>-rw-rw-r--</code>	664
<code>-rw-rw----</code>	660
<code>-rw-r--r--</code>	644

Finding Files and Directories

The find Command



```
find [path...] [expression]
```

Recursively finds files in path that match expression. If no arguments are supplied it find all files in the current directory.

find Options



- `-name pattern` Find files and directories that match pattern.
- `-iname pattern` Like `-name`, but ignores case.
- `-ls` Performs an `ls` on each of the found items.

find Options



`-mtime days`

Finds files that are days old.

`-size num`

Finds file that are of size num.

`-newer file`

Finds files that are newer than file.

`-exec command {} \;`

Run command against all the files that are found.

Tìm kiếm nhanh với locate



`locate pattern`

- Lists files that match pattern.
- Faster than the `find` command.
- Queries an index.
- Results are not in real time.
- May not be enabled on all systems.

Viewing and Editing Files

Displaying the Contents of Files



➤ `cat file`

Display the contents of file.

➤ `more file`

Display the contents of file.

➤ `less file`

More features than more

➤ `head file`
portion of

Output the beginning (or top)
file

➤ `tail file`
portion of

Output the ending (or bottom)
file.

Head and Tail



- Displays only 10 lines by default .
- Change this behavior with -n
- Viewing file in realting (tailf -f file)

Deleting, Copying, Moving, and Renaming Files

What You Will Learn



- Deleting files
- Copying files
- Moving files
- Renaming files
- Compressing files
- Creating archives

Remove file



```
rm file
```

Remove file.

```
rm -r dir
```

Remove the directory and its contents recursively.

```
rm -f file
```

Force removal and never prompt for confirmation.

Copy file



```
cp source_file destination_file
```

Copy source_file to destination_file.

```
cp src_file1 [src_fileN ...] dest_dir
```

Copy source_files to destination_directory.