

Command Summary

Module 1: Introduction

- **ls** – list files
 - **-l** – long
 - **-a** – all
 - **-d** – directory
 - **-Z** – selinux
 - **-i** – inode information
- **cd** – change directory
 - **.** – this directory
 - **..** – the parent directory
 - **~** – the home directory
 - **-** – the previous directory
- **pwd** – print working directory
- **cat** – print a file
 - **-n** – number lines
 - **-b** – number non-blank lines
- **wc** – count lines, words, and characters
 - **-l** – count lines only
- **less** – view output one page at a time
 - **q** – quit
 - **/string / ?string** – search forward, backward for *string* (**n** / **N** repeats)
 - **gg / G** – top/bottom
 - **F** – follow (**CTL-c** to stop)
- **alias** – remap a command (add to **~/ .bashrc** to make permanent)
- **redirection:**
 - **a | b** – send output from command **a** to command **b**
 - **a > x** – overwrite file **x** with output of command **a**
 - **a >> x** – append output of **a** to file **x**
 - **a | xargs b** – send output from command **a** as arguments to **b**
 - **b \$(a)** – expand command **a** as arguments to **b**
- **command separation:**
 - **;** – separate commands on a line
 - **a && b** – run **b** if **a** succeeds
 - **a || b** – run **b** if **a** fails
 - **&** – run a command in the background
 - **** – continue command on next line

- **streams:**
 - **0** – **STDIN**
 - **1** – **STDOUT**
 - **2** – **STDERR**
 - **2> /dev/null** – suppress errors
 - **2>&1> /dev/null** – suppress all output
- **CTL shortcuts:**
 - **CTL-a** / **CTL-e** – start / end of line
 - **CTL-c** – stop a running command or input
 - **CTL-d** – send End Of File (logs out if sent to a bare prompt)
 - **CTL-L** – clear the screen
 - **CTL-r** – reverse search for commands
- **history** – display previous commands
 - **!###** – run command **###** from history
- **!!** – last command
- **!\$** -- last argument
- **\$?** – last exit code
- **exit**, **logout**, **CTL-d** – ways to end a shell
- **--help** – standard short help option
- **man** – manual pages
 - **-k string** – find man pages about *string*
 - **mandb** – update man page database
- **info** – documentation

Module 2: Files and Directories

- **file** – determine file type
- **stat** – display file status (metadata)
- **which** – locate first command in **\$PATH**
- **whereis** – search for a command and related files
- **locate** – find files based on an index database
 - **updatedb** – update the locate database

- **find**
 - **-maxdepth** / **-mindepth** – directory depth of search
 - **-type** – of file
 - **-name** – literal name
 - **-iname** – case insensitive name
 - **-nouser** – unowned
 - **-o** – OR (default is AND)
 - **-perm** – permissions (/ = match any)
 - **-exec** *command* {} \; – run command on the results
 - **-atime**, **-ctime**, **-mtime** – access, change, modify time
 - **-1** = last 24 hours
 - **1** = 24-48 hours
 - **+1** = more than 48 hours
 - **-newer** – compare time to a file
 - **-newermt** YYYY-MM-DD – newer modify time
 - **-not -newerct** YYYY-MM-DD – older change time
 - **-ls** / **-delete** – list or delete the results
- **head** – display the top of a file
 - **-n** – number of lines to display
- **tail** – display end of a file
 - **-f** – follow
- **touch** – change file timestamps, create empty file
- **echo** – display something

- **mkdir** – make directory
 - **-m** – mode (permissions)
 - **-p** – create path if not extant
- **rmdir** – remove directory
- **rm** – remove file
 - **-r** – recursively
 - **-f** – force
- **cp** – copy
- **mv** – move, rename
- **dmesg** – print kernel ring buffer (boot messages)
- **tee** – split output to STDOUT and a file
- **column** – put lists into columns
- **sort**
 - **-n** – numerically
 - **-r** – reverse
 - **-u** – unique
- **tr** – translate characters
- **uniq** – find unique lines
- **diff** – compare two files

Module 3: vi

- **Normal** – command mode; **ESC**
 - **u** – undo
 - **ctrl-r** – redo
 - **yy** – yanks (copy)
 - **dd** – delete / cut
 - **p** – paste
 - **:** commands:
 - **w** – write
 - **q** – quit
 - **a** – all
 - **!** – force
 - **! cmd** – run command
 - **e** – edit from last write
 - **n/N** – next / previous file
 - **split/vsplit**
 - **r** – read
 - **r ! cmd** – read command into file
 - **abbr** – abbreviate
 - **set number** – turn on line numbering, **!** turns it off
- **Visual** – select mode; **v, V, CTL-v**
 - **y** – copy
 - **d** – delete
 - **p** – paste
- **Insert** – typing mode; **i, o, A**

Module 4: Users and Groups

- **useradd**
 - **-G** – additional groups
 - **-u / -g** – UID / GID
 - **-s** – shell
 - **-Z** – SELinux
- **passwd**
 - **-l / -u** – lock / unlock
 - **-S** – status
- **usermod**
 - **-aG** – add to Groups
- **userdel**
 - **-r** – remove home directory
- **vipw, vigr, visudo** – editors for special files
- **groupadd**
- **groupmod**
- **groupdel**
- **groupmems**
 - **-g** – groupname, mandatory
 - **-a / -d** – add /delete
 - **-l** – list
- **id** – show real and effective UID
- **su** – change current UID
 - **su -** – use destination environment
- **sudo** – change effective UID to root
- **who** – is currently logged on
- **w** – who plus stats and current command
- **uptime**
- **lastlog** – last logins
- **last** – successful logins
- **lastb** – bad logins
- **loginctl** – control the login manager
 - **list-users** – list current logins
 - **user-status** *user* – show info about user session
 - **show-user** *user* – show info about user
 - **terminate-user** *username* – end all processes for user
 - **kill-user** **--signal** *XX* *username* – send a signal to all processes of a user
 - **list-sessions** – show active sessions
 - **session-status** *session-id* – show details, including log snippets, of a session
 - **terminate-session** *session-id* – end all processes in a session
 - **kill-session** *session-id* – send a signal to all processes of a session
 - **enable-linger** *username* – allow a user to run processes without logging in

Module 5: Permissions and Ownership

- **chown** *user:group* – change ownership
- **chmod** – change permissions
 - **r = 4**
 - **w = 2**
 - **x = 1**
 - **SUID = 4 (s)**
 - **SGID = 2 (s)**
 - **Sticky = 1 (t)**
 - **u, g, o, a** – user, group, other, all
- **umask** – permissions to unset on file / directory creation
- **getfacl** – get file ACL
- **setfacl** – set file ACL
 - **-m** – modify an ACL
 - **-x** – remove an ACL entry
 - **-b** – remove all ACLs for file
 - **-R** – apply ACL recursively through subdirectories
 - **[d] :u|g|o|m:UID|GID::perms**
 - **d** – default
 - **u, g, o** – user, group, other
 - **m** – mask
 - **UID,GID**
 - **perms** – rwx permissions

Module 6: Regular Expressions

- **character sets**
 - **[a-z]** – any single lowercase alpha character
 - **[A-Z]** – single uppercase alpha character
 - **[abc]** – a, b, or c.
 - **[0-9]** – any single digit
 - **[^a2]** – any character NOT **a** or **2**
 - **.** – any single character other than line break
 - **[.]** – a literal period
 - **[a|b]** – **a** OR **b**
 - **^/\$** – beginning / end of line

- **modifiers** – Match the preceding...
 - **?** – 0 or 1 times
 - ***** – 0 or more times
 - **+** – 1 or more times
 - **{N}** – exactly N times
 - **{N, }** – N or more times
 - **{N, M}** – between N and M times

- **backreferences**
 - **()** Encloses the pattern to store matches from
 - **\N** Return the match from the Nth (1-9) stored backreference

- **grep**
 - **-v** – invert the match (return ONLY lines where pattern was NOT matched)
 - **-o** – match entire line (rather than within the line)
 - **-b** – respect word boundaries
 - **-i** – case insensitive
 - **-E** – extended grep
 - **+ ? | { } ()** – literals in basic grep, metacharacters in extended (**-E**)
 - **--color** – highlight the matched string

- **sed**
 - **-n** – prevent normal output printing
 - **-i** – perform an in-place edit
 - **-r** – extended regular expression mode
 - **-e** – multiple expressions in a line
 - **-f** – run a sed script. `sed -f script original changed`
 - **p** – print
 - **s** – substitute
 - **d** – delete
 - **g** – global
 - `sed 's/pattern/replacement/g' filename`

- **awk '{ commands }' filename.**
 - **Commands**
 - **print** – print matches
 - **sub()** – substitute, once per line
 - **gsub()** – global substitute
 - **-F** – set delimiter
 - **-f** – run a script
 - **/pattern/** match a pattern (occurs before commands portion)

 - **Variables**
 - **\$0** – entire current record
 - **\$n** – where **n** is a number; field by sequence e.g. **\$1,\$2**
 - **NF** – number of fields in current record
 - **NR** – number of current record
 - **FNR** – if multiple input files, record number of current file
 - **FS/RS** – input field separator/record separator
 - **OFS/ORS** – output field separator/record separator
 - **FILENAME** – the name of the input file; undefined in BEGIN block
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 - **Scripting Constructs**
 - **BEGIN** Run first, used to make header or set variables.
 - **BODY** Where the bulk of the script resides.
 - **END** Run last, used to create a footer.

Module 7: Booting

- **grub2-mkconfig -o /path/grub.cfg** – generate the GRUB configuration file
- **grub2-setpassword** – set a grub password
- **systemctl** – control systemd
 - **status** – shows general status and state
 - **show** – lists all properties
 - **list-units** – show units in memory
 - **start/stop/restart** – control the running state
 - **reload** – force the service to re-read configuration files (.conf, not unit files)
 - **daemon-reload** – re-read unit files and re-run the systemd generator for dependencies
 - **enable/disable** – turn on/off service auto-start
 - **enable --now** – equivalent to **enable** and **start**
 - **mask/unmask** – completely prevent a service from starting
 - **is-enabled** – query enable status
 - **verify** – check syntax on unit files
 - **cat** – print assembled unit files for a service
 - **isolate** – change running state to a designated target (multi-user, graphical)
 - **get-default/set-default** – control default target
 - **halt/reboot/poweroff** – control power state
 - **list-depend** – show dependencies
 - **set-property** – change parameters of running units
- **systemd-analyze** – analyze systemd
 - **unit-paths** – show directories read by systemd
 - **verify** – check unit file syntax
 - **calendar** – evaluate time specification
- **runlevel** – view previous and current runlevel
 - **N** – none (booted)
 - **1/S** – single-user, rescue.target
 - **3** – multi-user.target
 - **5** – graphical.target

Module 8: Processes and Services

- **ps** – show running processes
 - **-e** – everything
 - **-f** – full listing
 - **-u** – user
 - **-o** – modify output, takes arguments separated by commas:
%cpu, %mem, args, cgroup, comm, pid, gid, uid, nice, user
 - **-Z** – selinux
- **kill** – pass a signal
 - **-9** – **KILL**
 - **-20** – **SPT** (pause)
 - **-18** – **CONT** (resume)
- **pgrep** / **pkill** – process grep / pgrep and signal processes
 - **-u** – user
 - **-l** – long (shows command line)
 - **-n** – newest
 - **-v** – **invert** selection
- **killall** – signal multiple processes
 - **-u** – user
 - **-i** – interactive (prompt)
 - **-v** – verbose, **not** invert
- **CTL-z** – pause a process
 - **fg/bg** – resume foreground / background
 - **jobs** – show paused or backgrounded processes
 - **disown**
 - **-a** – all
 - **-h** – leave in table, do not terminate on exit
- **top** – view running processes
 - **h** – Display a help screen
 - **i** – toggle idle processes
 - **f** – Select fields to display
 - **F** – Select sort field
 - **M** – Sort by memory usage.
 - **P** – Sort by CPU usage.
 - **V** – Show parent process relationships
 - **u** – Filter by user.
 - **r** – Renice a process.
 - **k** – Kill a process.
 - **q** – quit top

- **uptime** – show system status
- **free / vmstat** – display memory
- **nice** – set an initial process priority
 - **-n** – value (-20 to 19)
- **renice** – change a running process priority

- **systemd-cgls** – show control groups
- **systemd-cgtop** – show control group resource usage
- **systemd-delta** – show changes to systemd configuration files
- **systemd-run** – start a new transient scope, slice, service or timer

- limit user resources in **/etc/security/limits.conf**
 - **ulimit** – adjust limits on the fly

Module 9: Filesystems

- **xfs_db** – examine an xfs filesystem
- **ln** *original link* – link file
 - **-s** – symbolic
- **lsblk** – list block devices
- **parted** – partition table manipulation
 - **print free**
- **fdisk** – partition table manipulation
 - **-l** – list
 - **m** – menu
 - **n** – new
 - **p** – print current
 - **w** – write
 - **q** – quit
- **fallocate** – allocate space to a file
 - **-l** – set length (**KB, MB, GB...**)
- **partprobe** – inform kernel of changes
- **mkfs.*** – make filesystem
 - **-L** – label
- **mount** */device /dir*
 - **-a** – mount all automatically
 - **-o** – options
 - **defaults** – alias for **async, auto, dev, exec, nouser, rw, suid**
 - **async** – allow the asynchronous input/output operations
 - **auto** – mount automatically using **mount -a**
 - **noauto** – no automatic mount
 - **dev** – interpret character or block special devices on the filesystem
 - **exec** – allow the execution of binaries
 - **noexec** – no execution of binaries
 - **nouser** – disallow non-root to mount and unmount
 - **rw / ro** – read/write / read-only
 - **suid** – allow set-user/group bits to take effect.
 - **remount** – remount the filesystem in case it is already mounted.
 - **noatime** – do not update access times
- **umount** – unmount
- **blkid** – show block device attributes
- **fstab** – format:
[device] [directory] [type] [options] [dump(0,1)] [fsck(0,1,2)]
- **mkswap** – create a swap filesystem
- **fdisk** – interactive partition table manipulation

- **swapon/swapoff** – control swap devices and files
 - **-s** – show swap
 - **-a** – all
 - **-L** – label
 - **-v** – verbose
- **mkswap** – create swap area
 - **-L** – label
- **df** – show disk usage
 - **-h** – human readable
- **systemd-escape** – translate strings for use in systemd unit names
 - **-p** – path formatting

- **pvcreate** – create a PV
- **pvdisplay** – display detailed information about a PV
- **pvremove** – remove (destroy) a PV
- **pvresize** – resize PV to reflect size of underlying device
- **pvs** – display information about PVs on a system
- **pvscan** – scan devices for LVM (PV) data; update cache

- **vgcreate** – create a VG
- **vgdisplay** – display detailed info about VG(s)
- **vgextend** – add PV(s) to VG
- **vgreduce** – remove PV(s) from VG (CAUTION!)
- **vgremove** – destroy a VG
- **vgs** – display information about VGs
- **vgscan** – scan devices for LVM (VG) data; update cache

- **lvcreate** – create an LV
- **lvdisplay** – display detailed information about an LV
- **lvextend** – add physical extents to an LV
- **lvreduce** – remove physical extents from an LV
- **lvremove** – destroy an LV
- **lvresize** – shrink or grow an LV (-r autoresize resident FS)
- **lvs** – display information about LVs
- **lvscan** – scan devices for LVM (LV) data; update cache

- **cryptsetup**
 - **luksFormat** – create a LUKS device
 - **luksOpen** – open LUKS for reading
 - **luksClose** – close LUKS access
 - add mapping and keys in **/etc/crypttab**