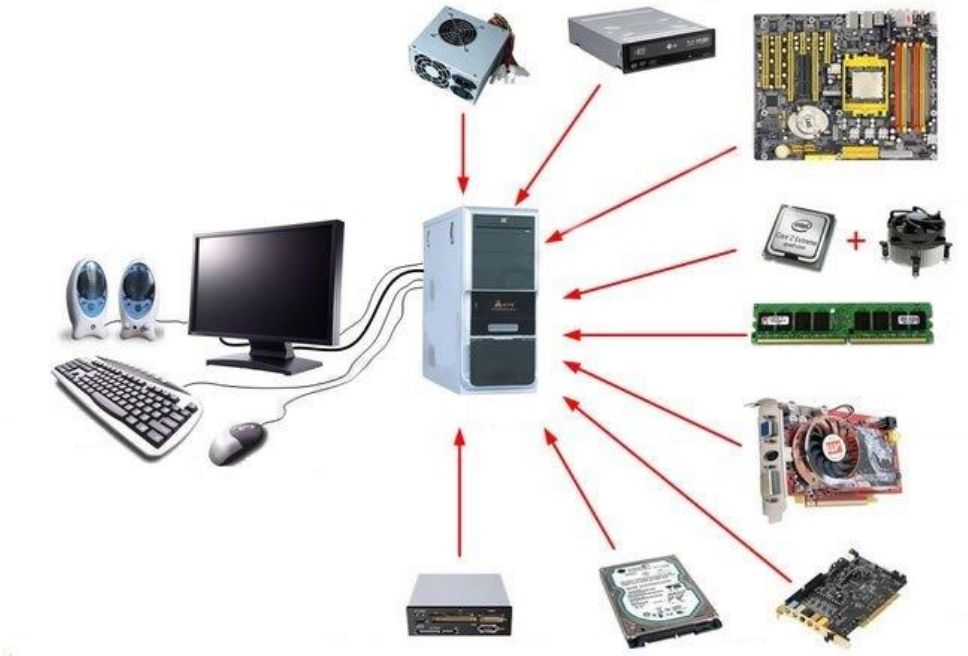
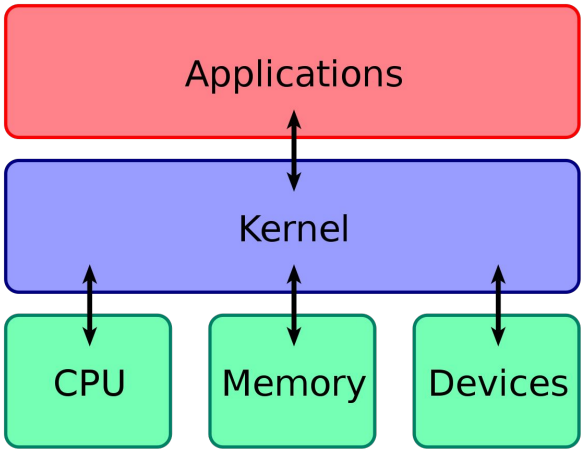
Shell/Bash notes

Marco Mambelli
CMS PURSUE, Fermilab, June 2023

Hardware



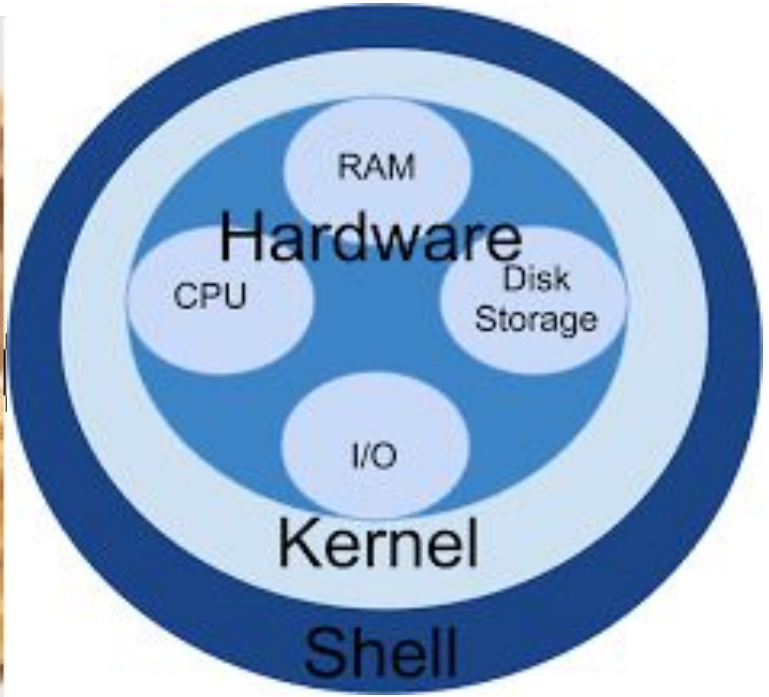
Operating System (OS) and Kernel



Terminal


File Edit View Bookmarks Settings Help
bash-4.3$ head ~/.bashrc
TZ='Pacific/Auckland'; export TZ
if [-e $HOME/.bash_aliases]; then
source $HOME/.bash_aliases
fi
XDG_CONFIG_HOME="$HOME/.config"
# . `which env_parallel.bash`
export LESS="-XR"
bash-4.3$
code : bash
media : bash

Shell



http://bashcodes.com/2013/07/introducing-unix-and-linux-operating-system/

Linux shells

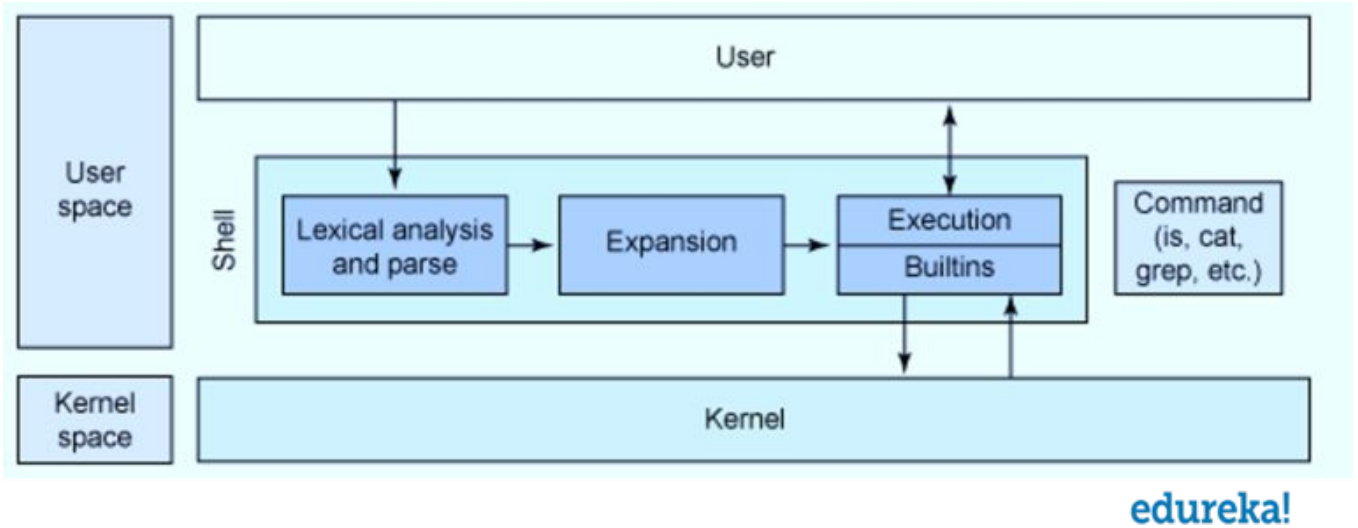
bash (sh)

zsh

ksh

tcsh (csh)

fish



https://www.tecmint.com/different-types-of-linux-shells/
https://www.edureka.co/blog/types-of-shells-in-linux/

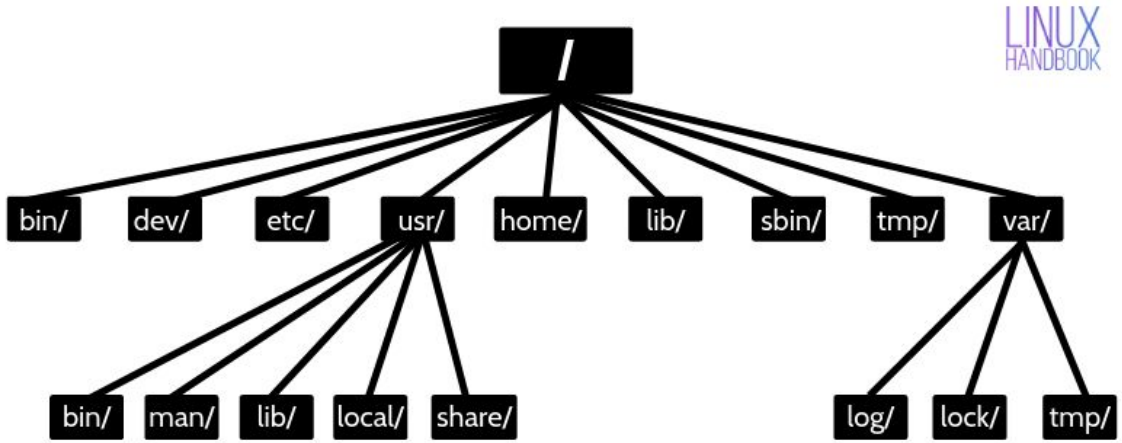
Unix File System

Everything is a file

- Regular file
- Directory
- Link
- Devices, …

Standard streams

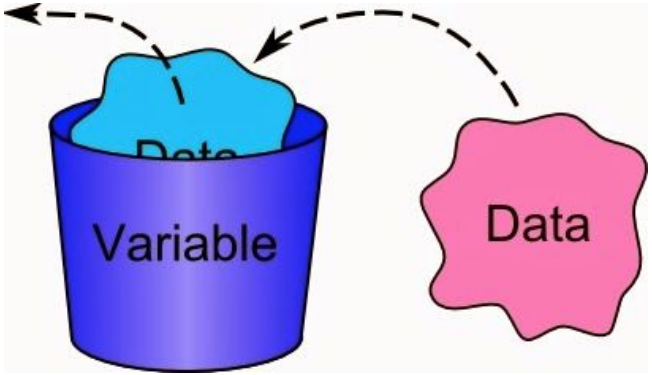
- stdin (0)
- stdout (1)
- stderr (2)



https://en.wikipedia.org/wiki/Unix_filesystem
https://linuxhandbook.com/linux-directory-structure/

Variables

used to store information to be referenced and manipulated in a computer program.
Variables have a **name**, **value**, **representation**, a **type**



also have a **scope** which is the part of the program where you can access it
and a **lifetime** or a duration for which a variable exists

Bash variables

Untyped *

    *define -[aif…] var

Names are case sensitive

Parameters substitution

Global environment variables

Shell variables

Local function variables

varname=value
${var}

define -i numvar

${varname%.*}

export varname=value
PATH
SHELL
USER
PWD
HOME
TMPDIR

https://ostechnix.com/bash-variables-shell-scripting/
https://tldp.org/LDP/Bash-Beginners-Guide/html/sect_03_02.html
https://www.cyberciti.biz/tips/bash-shell-parameter-substitution-2.htm

Script

File with (bash) code

Shebang (#!)

Variables
Functions
Options and Arguments
Flow control
Output
    stdout, stderr
Exit code

```bash
#!/bin/bash
NAME=""
TIMES=1
usage() {
  echo "Usage: $0 [ -n NAME ] [ -t TIMES ]" 1>&2
}
exit_abnormal() {
  usage
  exit 1
}
while getopts ":n:t:" options; do
  case "${options}" in
    n)                                  # If the option is n,
      NAME=${OPTARG}                    # set $NAME to specified value.
      ;;
    t)                                  # If the option is t,
      TIMES=${OPTARG}                   # Set $TIMES to specified value.
      re_isanum='^[0-9]+$'              # Regex: match whole numbers only
      if ! [[ $TIMES =~ $re_isanum ]] ; then   # if $TIMES not whole:
        echo "Error: TIMES must be a positive, whole number."
        exit_abnormal
        exit 1
      elif [ $TIMES -eq "0" ]; then     # If it's zero:
        echo "Error: TIMES must be greater than zero."
        exit_abnormal                   # Exit abnormally.
      fi
      ;;
    :)                                  # If expected argument omitted:
      echo "Error: -${OPTARG} requires an argument."
      exit_abnormal                     # Exit abnormally.
      ;;
    *)                                  # If unknown (any other) option:
      exit_abnormal                     # Exit abnormally.
      ;;
  esac
done
if [ "$NAME" = "" ]; then               # If $NAME is an empty string,
  STRING="Hi!"                          # our greeting is just "Hi!"
else                                    # Otherwise,
  STRING="Hi, $NAME!"                   # it is "Hi, (name)!"
fi
COUNT=1                                 # A counter.
while [ $COUNT -le $TIMES ]; do
  echo $STRING
  let COUNT+=1
done
exit 0
```

https://github.com/glideinWMS/glideinwms/blob/master/factory/tools/gwms-logcat.sh
https://www.computerhope.com/unix/bash/getopts.htm

Command line

Command, options, [subcommand, subcommand options,] arguments

-o	short option
--option	long option
--help	to get a list of valid options and what they do
	man command or info command will also provide information

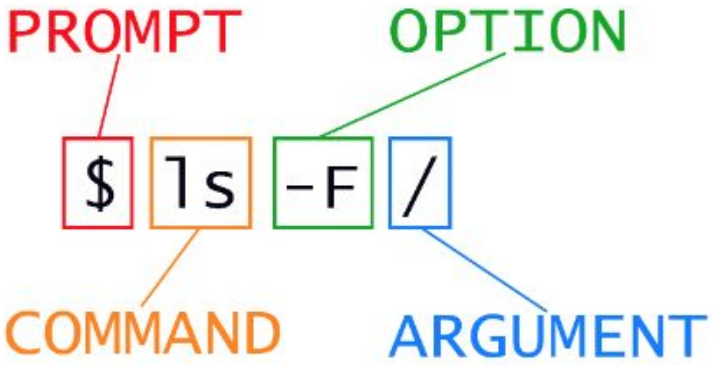
Tokenization — separating the element in the command line

Use quotes (single or double) to avoid separating on spaces

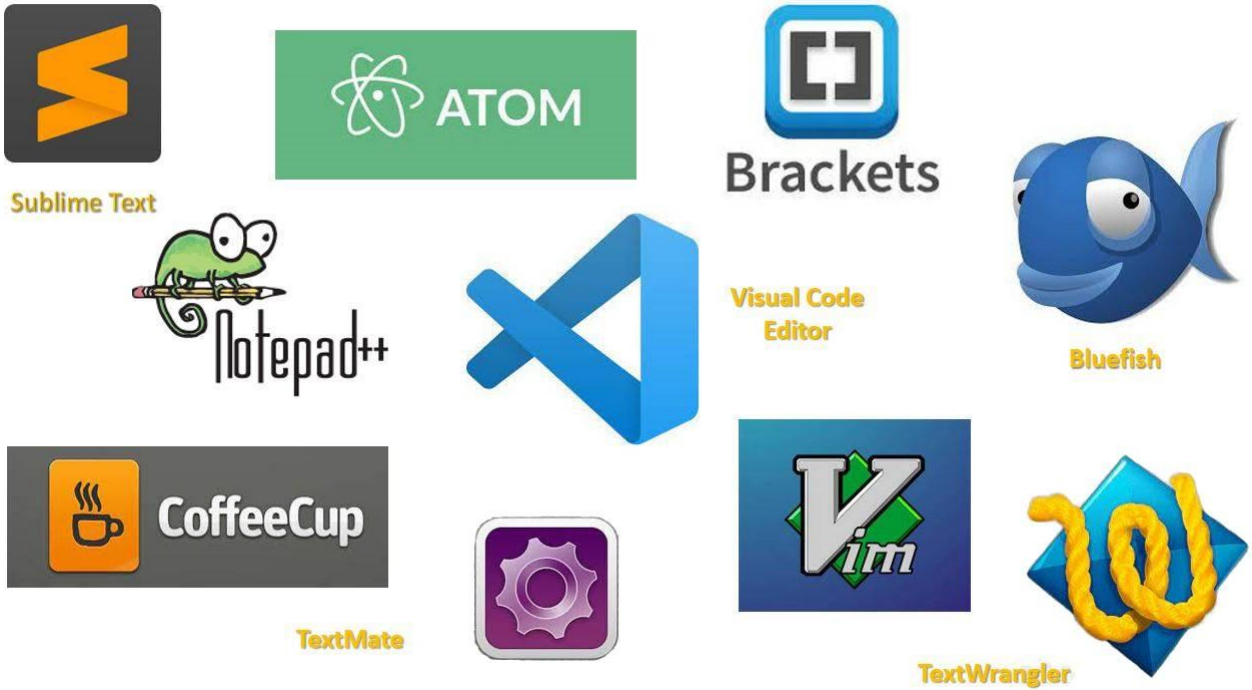
Expansion — substituting variables, wildcards, …

${varname}	variable value
$(command)	output of the command
$((expression)	output of the math expression
* ?	many or one character

Use single quote to avoid expansion

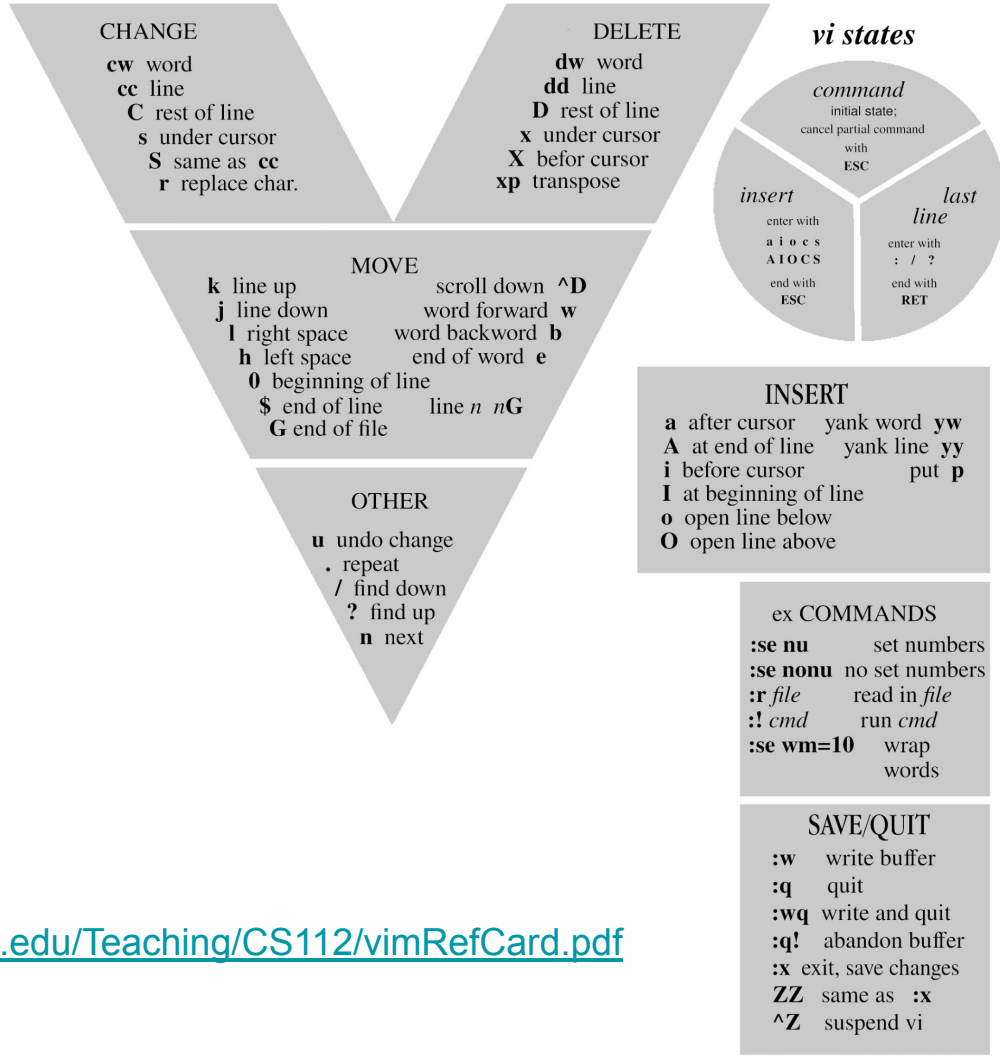


Text editors



vi (vim)

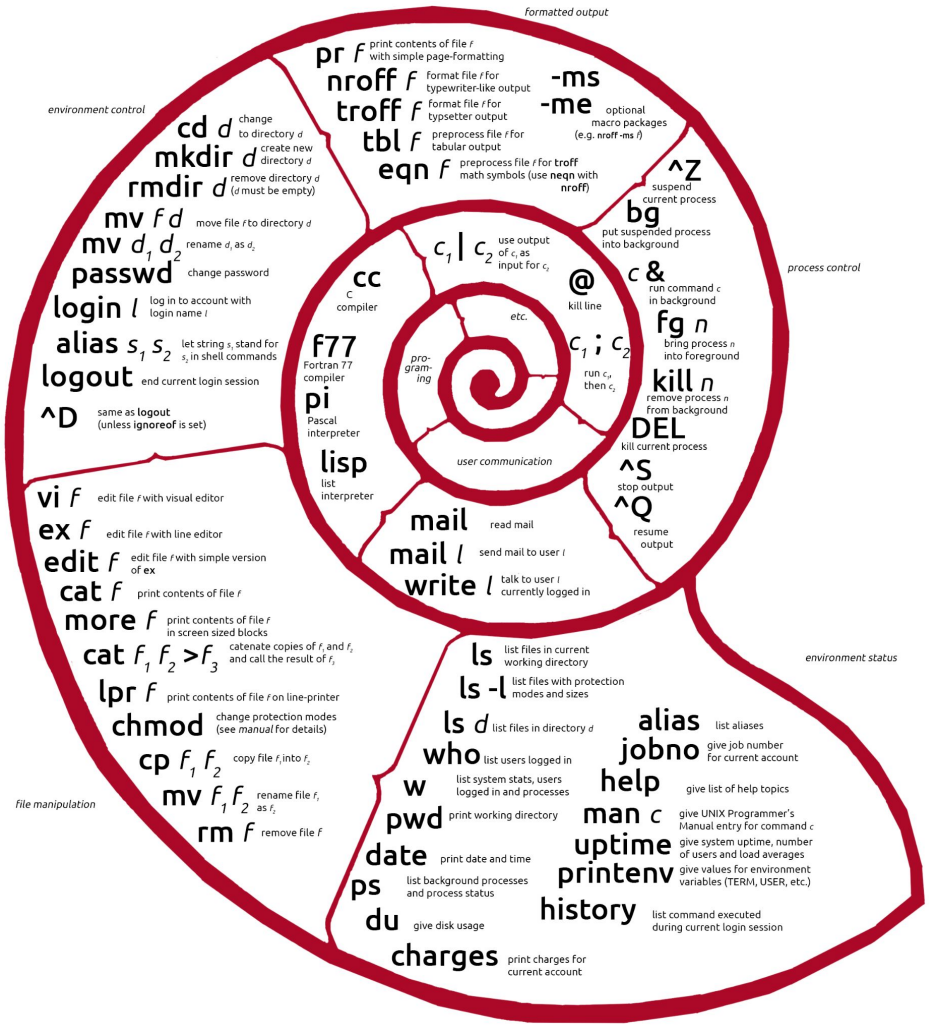
Commands summary



http://marvin.cs.uidaho.edu/Teaching/CS112/vimRefCard.pdf

Unix

Shell Commands



Based off a marvelous Unix Poster, if you own the rights to this poster Please Contact me:

Remixed by JaceTheSaltSculptor

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More about bash

Here a couple of cheat sheets with shell commands:

- https://appletree.or.kr/quick_reference_cards/Unix-Linux/Linux%20Command%20Line%20Cheat%20Sheet.pdf
- https://github.com/LeCoupa/awesome-cheatsheets/blob/master/languages/bash.sh

And a few more references:

- Classic: http://www.tldp.org/LDP/abs/html/
- Break it down: http://explainshell.com
- Great guide: http://wiki.bash-hackers.org/
- Good to know: https://mywiki.wooledge.org/BashPitfalls

Useful tools

- bat - cat alternative with syntax highlighting and git integration https://github.com/sharkdp/bat
- fzf - fuzzy finder https://github.com/junegunn/fzf
- fd - simple and fast alternative to the traditional find https://github.com/sharkdp/fd
- fish - the friendly interactive shell https://github.com/fish-shell/fish-shell
- exa - ls alternative https://github.com/ogham/exa
- tmux - terminal multiplexer https://github.com/tmux/tmux