1 Unix utilities and shell builtins

1.1 File system

- **cat*** concatenates and prints files:
  - `A` shows all nonprinting characters,
  - `b` numbers nonempty output lines,
  - `n` numbers all output lines,
  - `s` suppresses repeated empty output lines.
- **tac*** does the same in reverse.
- **rev** reverses lines characterwise.

- **chgrp** changes group ownership.
- **chmod** changes permissions of a file:
  - `ugoa` permissions of the owner, group, other/all users,
  - `+-=` adds, removes or sets selected file mode bits,
  - `rwx` selects file mode bits: read/write/execute (4-2-1).
- **chown** changes owner of a file.
- **umask** sets file mode creation mask.

- **shasum** prints or checks SHA message digests:
  - `a` algorithm: 1, 224, 256, 384, 512, 512224 or 512256,
  - `b` reads in binary mode,
  - `c` checks SHA sums read from the „files".
- See also **cksum** (CRC checksums) and **md5sum**.

- **dd** converts and copies a file:
  - `if=` reads from a file instead of standard input,
  - `of=` writes to a file insteaed of standard output,
  - `bs=` up to „bytes" bytes at a time,
  - `count=` copies only „n" input blocks.

- **cp*** copies files and directories:
  - `a` never follows symlinks, preserves all attributes,
  - `d` never follows symlinks in „source",
  - `l` hard links files instead,
  - `s` makes symbolic links instead,
  - `b` makes a backup of each existing destination file,
  - `f` removes an existing destination file if needed,
  - `i` prompts before overwrite,
  - `u` copies only newer source files,
  - `r` copies directories recursively,
  - `t` copies all „source" arguments into „directory".
- **mv*** moves (renames) files:
  - `b` makes a backup of each existing destination file,
  - `i` prompts before overwriting,
  - `f` does not prompt before overwriting,
  - `n` does not overwrite existing destination files.
- **rm*** removes files or directories:
  - `f` never prompts,
  - `i` always prompts,
  - `r` removes directories and their contents.
- See also **rmdir** (directories removal).
- **mkdir** makes directories (`mkdir p`: with parents as needed, no error if existing).

- **df** reports file system disk space usage:
  - `h` prints size in powers of 1024,
  - `i` list inode information instead of block usage,
  - `t` limits listing to file systems of given type,
  - `x` limits listing to file systems not of given type,
  - `T` prints file systems types.
- **du*** estimates file space usage:
  - `a` writes counts for all files, not just directories,
  - `c` produces a grand total,
  - `d` the depth at which summing should occur,
  - `h` prints sizes in human readable format,
  - `s` diplays only a total.

- **file** determines file type.

- **fsck** checks and repairs a Linux filesystem:
  - `a` automatically repairs (without any question!),
  - `t` specifies the type(s) of filesystem to be checked,
  - `A` tries to check all filesystems in one run,
  - `M` skips mounted filesystems,
  - `R` skips the root filesystem.

- **ln*** makes hard links between files (not directories; only in the same file system):
  - `s` makes symbolic links instead.

- **ls** lists directory contents:
  - `a` does not ignore entries starting with dot,
  - `F` appends indicator to entries,
  - `h` prints human readable sizes,
  - `i` prints the index number of each file,
  - `l` prints permissions, number of hard links, owner, group, size, last-modified date as well,
  - `r` reverses order while sorting,
  - `R` lists subdirectories recursively,
  - `S` sorts by file size (largest first),
  - `t` sorts by modification time (newest first),
- **tree** folds lower case to upper case characters.

- **mount** mounts a filesystem.

- **pwd*** prints name of current directory.

- **split*** splits a file into pieces:
  - `a` generates suffixes of length „n" (default 2),
  - `b` puts „size" bytes per output file,
  - `d` uses numeric (not alphabetic) suffixes,
  - `l` puts „number" lines/records per output file,
  - `n` generates „chunks" output files.

- **tar** stores and extracts files from a disk archive:
  - `c` creates a new archive,
  - `x` extracts files,
  - `t` lists the contents of an archive,
  - `v` verbosely lists files processed,
  - `j` bzip2 compression,
  - `z` uses zip/gzip (gz compression),
  - `f` uses archive file or device (???),
  - `k` does not replace existing files when extracting.

- **tee** (named after the T-splitter used in plumbing) duplicates pipe content:
  - `a` appends to the given files, does not overwrite,
  - `i` ignores interrupts.

- **touch** changes file timestamps.

- Missing: **cmp**, **fuser**, **pax**, **type**.

1.2 Processes

- **chroot** changes the root directory for the current running process and their children.

- **at** schedules commands to be executed once, at a particular time in the future: it accepts times of the form `HH:MM`, `midnight`, `noon` or `teatime`; `MMDD[CC]YY`, `MM/DD/[CC]YY`, `DD.MM.[CC]YY` or `[CC]YY-MM-DD` (the specification of a date must follow the specification of the time of day). You can also give times like `now + 3 hours`.

- **bg** resumes suspended jobs in the background.
- **fg** resumes suspended jobs in the foreground.
- **jobs** lists the active jobs.
- **command &** runs command in the background.

- **cron**: a daemon executing scheduled commands.
- **crontab** maintain individual users' crontab files.

- **kill** sends a `TERM` signal to a process.
- **killall** kills processes by name.

- **ps** reports a snapshot of the current processes.
  - `a` lifts the „only yourself" restriction,
  - `-e` selects all processes,
  - `u` displays user-oriented format,
  - `x` lifts the „must have a tty" restriction.
- **pstree** displays a tree of processes.

- **nice** changes process priority.

- **pgrep**, **pkill** looks up or signals processes based on name and other attributes.

- **time** runs programs and summarizes system resource usage.

- **top** displays linux processes.

1.3 User environment

- **clear** clears the terminal screen.
- **env** runs a program in a modified environment.
- **exit** terminates the calling process.
- **finger** looks up user information.
- **history** displays the history list.
- **mesg** displays messages from other users.

- **passwd** changes user password:
  - `d` deletes an account's password (makes it empty),
  - `e` expires an account's password,
  - `n` sets minimum days to change password,
  - `w` sets warning days before password expire,
  - `x` sets the maximum number of days a password remains valid.

- **su** changes user ID or becomes superuser.
- **sudo** executes a command as another user.

- **uname** prints system information:
  - `a` all information, in the following order:
  - `s` the kernel name,
  - `n` the network node hostname,
  - `r` the kernel release,
  - `v` the kernel version,
  - `m` the machine hardware name,
  - `p` the processor type,
  - `i` the hardware platform,
  - `o` the operating system.

- **uptime**: how long has the system been running?

- **wall** writes a message to all users,
- **write** sends a message to another user.

- **who** shows who is logged on,
- **w** does the same and shows what they are doing,
- **whoami** prints effective userid.

1.4 Text processing

- **awk**: a pattern scanning/processing language.
- **grep** prints lines matching a pattern.
- **sed**: a stream editor filtering/transforming text.

- **comm** compares two sorted files line by line.

- **cut*** prints selected parts of lines:
  - `c` selects only these characters,
  - `d` uses „delim" instead of Tab for field delimeter,
  - `f` selects only these fields,
  - `s` does not print lines not containing delimeters.
- **join** joins lines of two files on a common field.
- **paste** merges lines of files.
  - `d` reuses characters from „list" instead of tabs,
  - `s` pastes one file at a time, not in parallel.

- **diff** compares files line by line:
  - `y` outputs in two columns,
  - `i` ignores case differences,
  - `w` ignores all white space.

- **fmt** is a simple optimal text formatter,
- **fold** wraps each line to fit in specified width.

- **head*** outputs the first (last) part of files:
  - `c` the first „num" bytes,
  - `n` the first „num" lines,
- **tail*** the last „num" bytes:
  - `c` the last „num" bytes,
  - `n` the last „num" lines,
  - `f` outputs appended data as the file grows,
  - `s` sleeps for approximately „n" seconds between iteration

- **less** is opposite of **more**.
- **more** is a file perusal filter for crt viewing.

- **nl*** numbers lines of files:
  - `s` adds „string" after line number,
  - `w` uses „number" columns for line numbers.

- **shuf*** generates random permutations:
  - `e` treats each „arg" as an input line,
  - `i` treats each number .. through .. as an input line,

`n` outputs at most „count" lines,
`r` output lines can be repeated (with `-n`).

- **sort*** sorts lines of text files:
`f` folds lower case to upper case characters,
`g` compares general numerical values,
`h` compares human readable numbers,
`n` compares string numerical values,
`r` reverses the results.

- **tr** translates or deletes characters:
`c` uses the complement of „set1",
`d` deletes characters, does not translate,
`s` replaces each sequence of a repeated character that is listed in the last specified „set" with a single occurrence of that character.

- **uniq*** omits repeated lines:
`c` prefixes lines by the number of occurences
`d` only prints duplicate lines, one for each group
`f` avoids comparing first fields
`i` ignores differences in case
`s` avoids comparing first characters
`w` compares no more than n characters

- **wc*** prints newline, word and byte counts (`lwc`):
`m` prints the character counts,
`L` prints the maximum display width.

- **xargs** builds and executes command lines from standard input.

- **yes** outputs a string repeatedly until killed.

1.5 Shell builtins

- **alias** allows a string to be substituted for a word.
- **cd** changes the shell working directory:
`-` to the previous directory.
- **echo*** displays a line of text:
`e` enables interpretation of backslash escapes,
`n` does not output the trailing newline.
- **test** checks file types and compares values.
- **unset** unsets a shell variable, removing it from memory and the shell's exported environment.
- **wait** waits for process to change state.

1.6 Networking

- **curl** transfers a URL.
- **dig** is a DNS lookup utility (domain information groper).
`x` simplified reverse lookups.
- **host** is a DNS lookup utility.
- **ifconfig** configures a network interface.
- **inetd** is a super-server daemon that provides Internet services.
- **netcat**: arbitrary TCP and UDP connections and listens.
- **netstat** prints network connections, routing tables, interface statistics, masquerade connections, and multicast memberships.
- **nslookup** queries Internet name servers interactively.
- **ping** tests the reachability of a host on an IP network by sending ICMP ECHO_REQUEST:
`c` stops after sending „count" packets,
`n` numeric output only, avoids to lookup symbolic names for host addresses.
- **rdate** sets the system's date from a remote host.
- **rlogin** is an OpenSSH SSH client (remote login program)
- **route** shows and manipulates the IP routing table.
- **ssh** is an OpenSSH SSH client (remote login program).
`D` (bind address)
`p` (port)
`X` (X11 forwarding)
- **traceroute** is a computer network diagnostic tool for displaying the route (path) and measuring transit delays of
- **wget** is a non-interactive network downloader.
`A`, `R` specifies lists of file suffixes or patterns (when wildcard characters appear) to accept or reject,
`b` goes to background immediately after startup,
`c` continues getting a partially-downloaded file,
`m` turns on options suitable for mirroring: infinite recursion and time-stamping,
`np` does not ever ascend to the parent directory when retrieving recursively,
`U` identifies as „agent-string" to the HTTP server.
`w` waits the specified number of seconds between the retrievals (see also `-random-wait`).

1.7 Searching

- **find** searches for files in a directory hierarchy.
- **grep** prints lines matching a pattern.
- **locate** finds files by names.
- **whatis** displays one-line manual page description.
- **whereis** locates the binary, source, and manual page files for a command.

1.8 Miscellaneous

- **bc** is an arbitrary precision calculator language.
1. `echo 'obase=16;255' | bc` prints FF,
2. `echo 'ibase=2;obase=A;10' | bc` prints 2,
3. `scale=10` (after `bc -l`) sets working precision.
- **dc** is a reverse-polish desk calculator. One of the oldest Unix utilities, predating even the invention of the C programming language.
- **cal**, **ncal** displays a calendar.
`e` displays date of Easter,
`j` displays Julian days,
`m` displays the specified month,
`w` prints the numbers of the weeks,
`y` displays a calendar for the specified year,
`3` displays the previous, current and next month.
- **date** prints or set the system date and time.
- **lp** prints files.
- **od** dumps files in octal.
- **sleep** delays for a specified amount of time.
- **true**, **false** does nothing, (un)successfully.