CS 2080: PROGRAMMING WITH UNIX

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LECTURE 5: LINUX SHELL COMMANDS II + REGULAR EXPRESSIONS

- Outline:
  - Miscellaneous
  - Storage
  - System Status
  - Regular expressions
  - Piping

MISCELLANEOUS

- *bc*: Arbitrary precision calculator (use *quit* to exit)
- *cal*: Display calendar
- *calendar*: Reminder service (occasions of today and tomorrow)
- *clear*: Clear the screen

MISCELLANEOUS

- *nice*: Run a command with a different job priority, thus influencing the process scheduling.
  - A higher niceness means a lower priority for the job itself.
  - Niceness ranges from -20 (most favorable to the process) to 19 (least favorable to the process).
  - Option –n: Add an integer to the default niceness of 10.

MISCELLANEOUS

- *nohup*: Preserve a running job after logging out or receiving a hang-up signal (SIGHUP).
  - The output is redirected to nohup.out (or another file as specified).
  - Similar to ampersand (&), but also catches SIGHUP.
  - nohup *command*
  - *command* &
- *passwd*: Set your login password (visited in Lecture 4 for setting the root password)

MISCELLANEOUS

- *script*: Produce a transcript of your login session. If timing data are saved (--log-timing), *scriptreplay* can replay the terminal session.
- *spell*: Report misspelled words
- *aspell*: Spell check a file (use the –c option) in an interactive mode that allows corrections.
- *w*: Show who is logged in and what they are doing
- *who:* Who is currently logged in

MISCELLANEOUS

- *uptime*: Tell how long the system has been running
- *reboot*: Reboot the machine
- *shutdown*: Power off the machine
  - shutdown -h now
  - -h is equivalent to --poweroff or –P, unless --halt is specified.
  - Halt terminates all processes and shuts down the CPU
  - However, Poweroff turns the entire computer off

STORAGE

- *bzip2*: Very high-quality file compression program
  - Use the –k option to keep the original file
  - Use the –d option to decompress
- *bunzip2*: Decompress (expand) a file previously compressed with bzip2 (i.e., a .bz2 file)
  - Use the –z option to compress
- Compression is always performed even if the resulting file is larger!
- It usually does not pay off for files smaller than 100 bytes.

STORAGE

- *gzip*: Compress files
  - Use the –k option to keep the original file
  - Use the –d option to decompress
- *gunzip:* Decompress (expand) a .gz archive
- Compression is always performed even if the resulting file is larger!
- The same algorithm as used in Zip.
- You may also use *zip* and *unzip*.
- For source code or English text, 60-70% compression is typical.

STORAGE

- *tar*: Compress files
  - Use the –c option to create a new archive
  - Use the –v option to make it verbose
  - Use the –f option to give a file name for the archive
  - *tar –c –v –f f1.txt.tar f1.txt* **or** *tar –cvf f1.txt.tar f1.txt*
- *tar -xvf:* Decompress (expand) a tar archive
- Compression is always performed even if the resulting file is larger!
- Both tar and gzip are often installed on most Linux distributions by default, while zip/unzip and bzip2 are not.

SYSTEM STATUS

- *date*: Display date and time (UTC)
- *df*: Show the free disk space
  - df –h
- *free*: Show the amount of free and used main memory
  - Use, for example, the –m option or the --mebi option to show the amounts in Mebibytes

SYSTEM STATUS

- Recall:
  - Decimal prefix: 1 MB (Megabyte) = 1,000,000 Bytes
  - Binary prefix: 1 MiB (Mebibyte) = 2ˆ20 Bytes = 1,048,576 Bytes

  - Mb = Megabits (used in data transfer and communication)
  - 1 Byte = 8 bits

SYSTEM STATUS

- *du*: Estimate file space usage
  - Use the –h option for a human-readable output
- Note: The du –h command and the ls –l command may give two different answers:
  - du –h indicates the disk space usage for a file or directory, e.g., 4KB.
  - ls –l shows the size of a file or directory, e.g., 7 Bytes.
  - Depending on the filesystem, the disk usage may be much larger than the size!

SYSTEM STATUS

- *env*: Show the environment variables
  - To show a specific environment variable's value, use echo and $: For example, *echo $PATH*
  - To create a new environment variable or set a new value for an existing one, assign a value without using the $ sign, for example, Test=10

SYSTEM STATUS

- *finger*: Display information about users
- *ps -ef*: See all system processes using the standard syntax
- *kill : Terminate a process*
  - kill -9 [PID]

REGULAR EXPRESSIONS (PATTERN MATCHING)

- *grep*: Short for “Global Regular Expression Print”
  - Searches for one or more patterns in each file. The patterns should be separated by \| (backslash and vertical bar).
  - Example: grep 'uccs\|university’ f1.txt
  - grep –i: ignore case
- *egrep*: Deprecated. Equivalent to grep –e. Supports regular expressions.
  - Example: grep -e '[a-d|A-D]’ f1.txt
  - You may need to escape some special characters, such as dot: '\.'

REGULAR EXPRESSIONS (PATTERN MATCHING)

- *fgrep*: Deprecated. Equivalent to grep –f. A file should be provided that contains the pattern.
  - Example: grep –f pattern.txt f1.txt
- *find*: Search the filesystem for filenames matching patterns or attributes.
  - find [where to start] [what to find]
  - Example: find . f1.txt
  - Example find / “*proc”
- *strings*: Display text strings found in Binary files

PIPING

- *| (vertical bar)*
- *You may read it “pipe”*

RECALL FROM LECTURE 3: THE UNIX PHILOSOPHY

- **Write programs that do one thing and do it well.**
- **Write programs to work together. Expect the output of one program to become the input of another.**
- Design and build software (including operating systems) to be tried early, ideally within weeks.
- **Write programs to handle text streams since that is a universal interface.**

PIPING

- Connect the stdout (standard output) of one process to the stdin (standard input) of another process.
- command_1 | command_2 | command_3 | .... | command_N
- Pipes are unidirectional: data flow from left to right in the pipeline

QUESTIONS?

See you!