Class 3: Unix and You

Overview

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Announcements

- Basic/Adv - Git 1 due October 16
- Basic/Adv - Unix due October 23
- Git 1 survey closing tonight
    - Class surveys close in a week!

Review

- Programs vs processes
- Processes have extra info
  - PID
  - File descriptor table
- Signals are another communication mechanism
  - ^C: SIGINT
  - ^Z: SIGTSTP
  - `kill`

Review

- Everything is a "file"
  - Files are a read/write interface
  - Become a general communication mechanism
  - Can be used to represent anything that'd work with such an interface
  - Terminals are files as well!
- Files have metadata including permissions
  - Represented in decimal/octal, with three bits
  - `rwx`

```
user  group  other
rwx   rwx    rwx
110   100    100
6     4      4
```

Shell operation

1. Receive a command from a file or terminal input
   - `ls -l $HOME > some_file`
2. Splits it into tokens separated by white-space
   - Takes into account *"quoting"* rules
   - `ls`, `-l`, **`$HOME`**, `>`, `some_file`
3. Expands/substitutes special tokens
   - `ls`, `-l`, **`/home/brandon`**, `>`, `some_file`
4. Perform file redirections (and making sure they don't end up as command args)
   - `ls`, `-l`, `/home/brandon`; (set standard output to **`some_file`**)
5. Execute command (remember our friend `exec()`?)
   - `argc` = 3
   - `argv` = [`"ls"`, `"-l"`, `"/home/brandon"`]
   - Standard output redirected to `some_file`
   - First "normal" token is the command/utility to run

Shell operation

- File redirection
  - `<`, `>`, `>>`
- Variable expansion
  - Text substitution before execution
  - `echo $HOME`
  - `$` indicates variable expansion

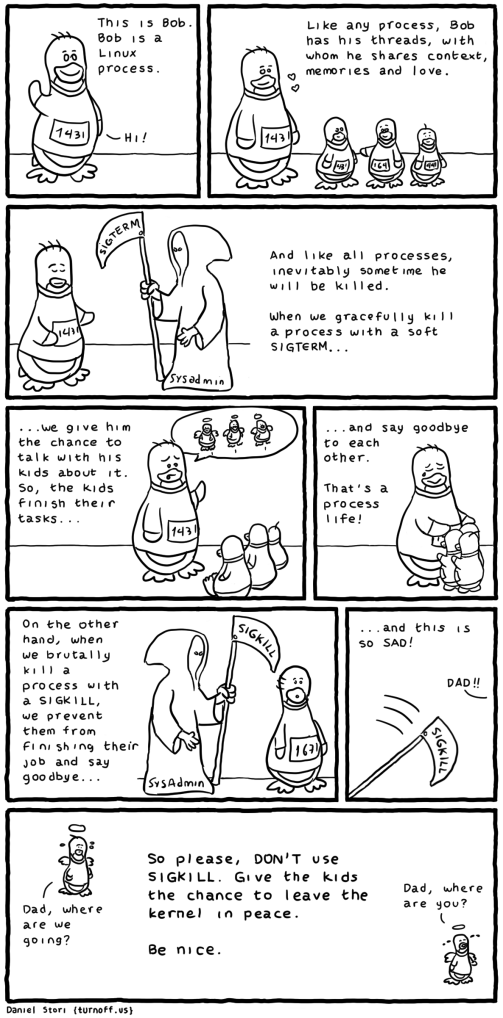
Shell scripts

- Just files with shell commands in them
- Same stuff that you'd type at terminal
- Shebang to specify interpreter when you execute the file
  - `#!/bin/bash`
  - Applicable to other interpreted languages e.g. Python

signals - turnoff.us



the real reason not to use sigkill - turnoff.us



Q&A

Exercises

1. Write a command that saves the output of `ls` to a file `listing`
2. The command `rev` reverses a line of text and `sort` takes lines of input and outputs them in a sorted manner
    - Write a command that takes the output of `ls`, reverses the name of each file, sorts these reversed names and saves it to a file called `gnitsil`
3. Write a command that runs `git status` and saves the standard output to `out.txt` and standard error to `err.txt`
4. The command `date` outputs a timestamp
    - Write a command that appends the current timestamp to a file called `timestamps.log`

Exercises

- Write a shell script that appends an ISO 8601 format timestamp, then appends the first argument to a file named `log`
  - `date -Isec` can get this timestamp for you
  - `date "+%Y-%m-%dT%H:%M:%S%z"` for macOS (or if you want to be cross compatible)
  - `$1` expands the first argument
  - Make sure to give it a shebang
  - Make sure to `chmod` it so it's executable
  - Run it with an argument e.g. `$ ./myscript this-is-an-argument`

Basic assignment

Addenda