Introduction to the Command Line

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Slides available →

https://raw.githubusercontent.com/MarkusG/UCI-Slides/master/CLI.pdf

About Me

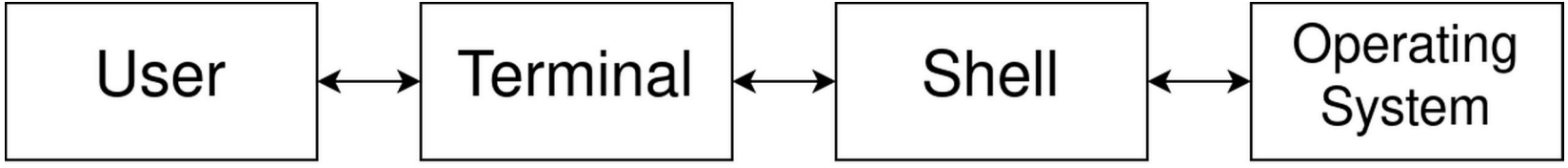
- Mathematics student at Saddleback College
- Software Developer at Roland DGA
- Programming since 2016
- Using Linux since 2018
- In the top 10% of ranked Tetris players worldwide

Why Use the Command Line?

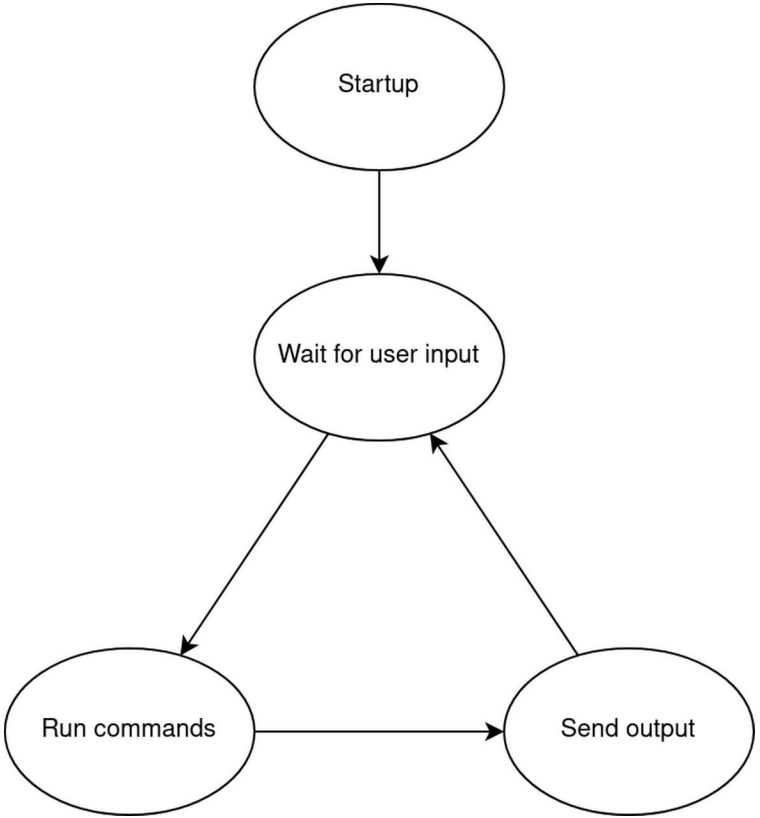
- **It’s powerful**
  - “Graphical user interfaces make easy tasks easy, while command line interfaces make difficult tasks possible.” (TLCL xvii)
- **It’s everywhere**

Some Quick Terminology

- **Terminal – displays text and receives keystrokes from the user**
- **Shell – interprets and runs commands**
- **Operating system – handles the computer's resources**
  - Responsible for spawning new programs



From the Shell’s Perspective



Shells Across Operating Systems

- **Windows**
  - Command Prompt/Windows Terminal
  - PowerShell
- **Linux and OSX**
  - bash, zsh, fish, and countless others

Anatomy of a Shell Command

```
[jdoe@linux ~]$ ls -la --color=always some_directory
```

- **Prompt** – Tells you who and where you are
  - Current directory
- **Command** – The application to run
- **Short/long options** – One-time application settings
- **Argument(s)** – Tells the application what to operate on

Getting Help

- `man` – “manual” pages for commands (and more!)
- `whatis` – short, one-line help information

Working with the File System

- `ls` – “list” files/directories in the current directory
- `cd` – “change directory”
- `mkdir` – “make directory”
- `mv` – “move” a file/directory
- `rm` – “remove” - delete
- `ln` – “link” – shortcuts

- Let’s try it!

Kicking Things up a Notch with Expansions

- **The shell can evaluate/expand expressions**
  - `*` - “wildcard” expansion – matches files in the current directory
  - `{a..b}` – range expansion – `{0..3}` expands to `0 1 2 3`
  - `{a,b,c}` – set expansion – expands to `a b c`
  - `$((expr))` – arithmetic expansion - `$((1 + 1))` expands to `2`
    - Not too useful outside of scripts

- **Let’s try it!**

Input/Output

- **`cat` – “concatenate” files**
- **echo – “echo” the argument back to you**
- **`grep` – “it’s a long story” – search for a pattern in a file**
  - Regular expressions coming up in the next presentation!
- **`wc` – “word count”**
- **`head` – view the first few lines of a file**
- **`tail` – view the last few lines of a file**

- **Let’s try it!**

Redirection

- **The Unix Philosophy**
  - Each program should do one thing
  - The output of one program can be the input to another
- **How do we do it?**
  - `cmd1 | cmd2` – "pipes" output of `cmd1` to the input of `cmd2`
  - `cmd > somefile.txt` – writes the output of `cmd` to `somefile.txt`
  - `cmd < somefile.txt` – runs `cmd`, taking input from `somefile.txt`
  - `cmd1 | cmd2 | cmd3 | cmd4 | cmd5` ad infinitum

Scripting

- **The shell is a program like any other, so it can take input like any other!**
- **This allows us to write a sequence of shell commands and then tell the shell to execute them**
- **The shebang**
  - Describes what program to run, taking the rest of the file as input

`/bin/someprogram` **is equivalent to** `echo <stuff> | someprogram <stuff>`

Scripting - Variables

- **We can save the output of commands with variables**
- **Variables are accessed using `$` or `${}`**

```
my_name="Mark"
greeting="Hello, ${my_name}!"
ls_output="$(ls)"
```

Scripting – Control Flow

- `if` – runs based on whether or not a condition is true
- `case` – works like a series of if statements
- `for` – a “for each” loop; runs once for everything in a given set
- `while` – runs while a certain condition is true