

# CS470 Lab1 README

April 23, 2020

## 1 Introduction

This README is for a shell written in C that provides access to basic system functions as well as a few custom commands described below. A manual is accessible in the shell via "help", "man", or "manual".

## 2 Requirements

This shell is meant to be ran on a **macOS** system.  
There are no other requirements.

## 3 Custom Commands

Custom commands can be used in the form '[command] [OPTION]'. eg. 'prompt -help'.

- prompt - Changes the prompt preceding the carrot
- cpuinfo - Provides information related to the systems CPU
- meminfo - Provides information related to the systems memory
- exit - Exit the shell

### 3.1 prompt

prompt [OPTION]

Changes the prompt preceding the carrot.

Default Prompt : 'cwushell'

Valid Options : single words

If no option is given, the default prompt will be set

### 3.2 cpufreq

cpufreq -<switch>

Provides information related the systems CPU

Valid switches :

-c CPU Clock Speed

-t CPU Type

-n Number of cores

### 3.3 meminfo

meminfo -<switch>

Provides information related the systems memory

Valid switches :

-t Total system RAM

-u Amount of RAM in use

-c Size of L2 cache / core

### 3.4 exit

exit [n] Exits the shell with the return code given ([n]) If no code is given, the exit code from the previous program will be used

## 4 Return / Exit Codes

This program uses fork() to execute the programs called by the user. It uses the following exit codes to determine the result of the program.

### 4.1 Prompt

14 - default prompt

15 - user provided

### 4.2 General

1 - Successful

2 - Unsuccessful (Error)

3 - Unsuccessful (Invalid Input)

## 5 Known Issues

### **Slightly inaccurate memory reporting with 'meminfo -u'**

The link below expands on the issue of using `host_statistics()` to gather memory information. There is a discrepancy in how many pages are returned from the function call and the number of actual pages. This appears to be the fault of mach's implementation of memory reporting. None the less, I found the post below interesting.

<https://stackoverflow.com/questions/14789672/why-does-host-statistics64-return-inconsistent-results>

## 6 Example Output

```
[Michael@MacBook-Pro:untitled michael]$ ./a.out
cwushell> help

This shell was created by Michael Solwold for a CS470 Lab.
This shell is intended to be ran on macOS

System Commands :

    System commands that output information such as ls or pwd are available
    This shell is unable to change directory

Custom Commands : use '[command] -help'. (eg. 'prompt -help')

    prompt [OPTION]                Changes the prompt preceding the carrot
    cpuinfo -<switch>              Provides information related to the systems CPU
    meminfo -<switch>              Provides information related to the systems Memory
    exit [n]                       Exit the shell

cwushell> ls
CMakelists.txt      a.out      cmake-build-debug  main.c
cwushell> pwd
/Users/michael/ClionProjects/untitled
cwushell> prompt hello
hello> cpuinfo -h
cpuinfo -<switch>
    Provides information related the systems CPU
    Valid switches :
        -c                CPU Clock Speed
        -t                CPU Type
        -n                Number of cores
hello> cpuinfo -c
CPU Clock Speed: 2.8 GHz
hello> cpuinfo -t
CPU Type: GenuineIntel
hello> cpuinfo -n
Number of Cores: 8
hello> meminfo -help
cpuinfo -<switch>
    Provides information related the systems memory
    Valid switches :
        -t                Total system RAM
        -u                Amount of RAM in use
        -c                Size of L2 cache / core
hello> meminfo -t
This system has 17179869184 bytes (16GB) of Total RAM
hello> meminfo -u
This system has 16572293120 bytes (15.43GB) of RAM in use
hello> meminfo -c
This system has 262144 bytes of L2 Cache per core
hello> thisisnotavalidcommand
*** ERROR: exec failed: No such file or directory
Type 'help' for help
hello> prompt
cwushell> exit
[Michael@MacBook-Pro:untitled michael]$ echo $?
14
[Michael@MacBook-Pro:untitled michael]$ ./a.out
cwushell> prompt -help
prompt [OPTION]
    Changes the prompt preceding the carrot.
    Default Prompt : 'cwushell'
    Valid Options : single words
    If no option is given, the default prompt will be set
cwushell> prompt michael
michael> exit 47
[Michael@MacBook-Pro:untitled michael]$ echo $?
47
[Michael@MacBook-Pro:untitled michael]$
```