CMSC 257 Assignment 5: Sample Unix Shell

Project due date: 11:59 pm EST, 04/26/17

What is a shell?

- Command line interpreter
  - – You type “ls /etc”
  - – The shell invokes the first parameter as a command, with the remainder as the parameters
  - – eg: exec(ls,”/etc”)
- Built-in commands
  - – Most commands are separate executable programs
    - • ls, rm, mv, make, gcc
  - – Some commands are interpreted by the shell
    - • cd, exit, pid, ppid.

Interactive vs Batch

- Interactive
  - – User types commands in, hits return to invoke them
- Batch
  - – shell reads from an input file
- What is the difference?
  - – where the commands come from
- You need to implement the Interactive shell model.

Input/Output

- C has 3 standard files prepared for you
  - – stdin = input
  - – stdout = output
  - – stderr = error output
- printf(“foo”) == fprintf(stdout,”foo”)
- scanf(“%s”,str) == fscanf(stdin,”%s”, str)
- fprintf(stderr,”Panic!”) prints an error message separately

Process Control

- Your shell should execute the next command line **after** the previous one terminates
  - – you must wait for any programs that you launch to finish
- You don’t have to provide the functionality of launching multiple simultaneous commands with “;” separating them

Hints

- A shell is a loop
  - – read input
  - – execute program
  - – wait program
  - – repeat

• Useful routines
  – fgets() for string input
  – strtok() for parsing
  – exit() for exiting the shell
  – getpid() for finding the current process ID
  – getppid() for finding the parent process ID
  – getcwd() for getting the current working directory
  – getenv()/setenv()
  – chdir() for changing directories

• Executing commands
  – fork() creates a new process
  – execvp() runs a new program and does path processing
  – wait(), waitpid() waits for a child process to terminate

Requirements:

- <executable> -p <prompt> should allow the user to select an user-defined prompt. Otherwise, the default should be "257sh> ".
  - Shell functions to be implemented separately: exit, pid, ppid, cd.
  - For implementing "exit" from the shell, use the raise() signal handler.
  - "cd" prints the current working directory; whereas "cd <path>" will change the current working directory.
  - All other shell commands will need a child process using fork() and then calling execvp().
- No input will be greater than 50 characters.
- Only the interactive system needs to be implemented (batch system is not needed)
- Background process execution (using &) is NOT required.
- Each time a child process is created, evaluate its exit status and print it out.
- ^C should not take us out of the shell; use a signal handler. Hint: you can use the same signal handler code from the slides.

Note: Late assignments will lose 5 points per day upto a maximum of 3 days. Code must be submitted in the prescribed format.

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