School of Computing, University of Leeds, 2017/18

XJCO2211

Operating Systems

Coursework

Deadline: Monday 5th November

This assignment is worth **20%** of the final module grade. It is comprised of **2 parts**. Your submission should include the final version of your code.

Introduction

This coursework is a programming project with a short report. You will be creating a simplified shell.

The Key learning objectives are to:

- Improve programming skills and understand how to use system calls
- Understand the creation and management of processes
- Understand how interprocess communication and resource management can be used

Assessment & Submission

There will be two assignments on Minerva for the two parts of your coursework. You will be required to submit both your code and the associated report to the corresponding assignments. You will also be required to demonstrate the shell you have produced.

Code Submission: Upload your code to the assignment either as a single C file named "USERNAME.c" or if you use multiple source files, as a .ZIP named "USERNAME.zip".

Report Submission: Upload the report as a PDF named "USERNAME_report.pdf" to the assignment on the module VLE.

Demonstration: You will be assigned a 5 minute time slot during one of the lab sessions for you to demonstrate your shell. For all submissions received before the deadline your assigned slot will be available on Friday 9th November.

Disclaimer

This is intended as an individual piece of work and, while discussion of the work is encouraged, plagiarism in any form is strictly prohibited. The answers you hand in should be your own work. Standard late penalties apply for work submitted after the deadline.

The Task

You are required to write a simple shell in C in Linux. The features of this shell are described below. The features described below can be implemented in any order. The marks for demonstrating each feature are shown below.

Shell Features

1. Your shell should support the following *built-in* commands: **[2 marks]**
    a. **info**: Print the following to the standard output where *USERNAME* is replaced with your own – "XJCO2211 Simplified Shell by *USERNAME*".
    b. **exit**: Close the shell and terminate.
    c. **pwd**: Print the current working directory of the shell to the standard output.
    d. **cd *PATH***: change the current working directory of the shell to the directory given by the parameter *PATH.*

2. Run another program from your shell. **[2 marks]**
    a. **ex *PATH***: execute the program specified in the *PATH* parameter.
    b. **ex *PATH ARGS***: execute the program specified in the *PATH* parameter and pass it the remaining arguments.

3. Allow the commands to be pipelined between processes using the standard '|' character. The command **ex ProgA | ex ProgB** should redirect the standard output of **ProgA** to the standard input of **ProgB.** **[2 marks]**

4. Create a new command **search** that takes a text input, allowing the use of the asterisk "*****" regular expression as a wildcard, and lists all files in the current directory with a similar name. For example **search *.txt** will list all text files in the current folder. **[2 marks]**

5. Implement any one additional feature of your own design to the shell. Possible examples could be: customisable prompts, new built-in commands or colour styling of output. **[2 mark]**

Submit your code for the completed solution on Minerva. **[Total: 10 marks]**

Report

Write a report on your implementation of the shell with a **maximum length of 5 sides of A4.** You should reference any additional materials that you have used, including any tutorials or documentation. Your report should be formatted with the main text body in **Arial point size 11**, **1.5 line spacing**, **your name in the header** and **page number in the footer**.

In your report you should discuss:

- How you achieved each of the above features and your design decisions.
- Your reason for implementing your additional feature.
- The differences between your approach and other possible approaches for some features.
- Some differences that would occur if you implemented this shell for a different operating system.
- Reflect on what you've learned.

Submit your report on Minerva as a PDF.

The report will be marked as follows:

Coverage	2
Understanding	3
Depth (completeness, detail, comparison)	8
Referencing	3
Report structure	2
Writing quality	2

[Total: 20 marks]