Operating Systems - Monsoon 2023

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August 19, 2023

Assignment 1 (Total points: 100)
Due: Aug 26, 2023. Time: 23:59 Hrs. (Hard Deadline)

Q1 : Create a parent-child relationship between two processes. The parent should print two statements: **(30 Marks)**

1) A) Parent (P) is having ID <**PID**>
   B) ID of P's Child is <**PID_of_Child**>
   The child should print two statements:
   C) Child is having ID <**PID**>
   D) My Parent ID is <**PID_of_Parent**>

Make use of wait() in such a manner that the order of the four statements A, B, C and D is: A, C, D, B. You are free to use any other relevant statement/printf as you desire and their order of execution does not matter.

2) Write a program to create two process using **v*fork*()** system call in which child process will calculate factorial of 4 and parent process will calculate Fibonacci series up to 16. Child should wait for parent to complete its working.

Rubrics:

Student should have implemented following things:

- Program source code(s) with Makefile to compile.
- Write-up giving a brief description of how the program works (less than 1 page)

Q2 : You're making a special unix system, and your project manager wants you to create three specific commands for csh to be used in it.**(50 Marks)**

1) **word:** It is a built-in command, Reads the number of words in a text file, and throws an error if the file does not exist.
Syntax: word [-option] [file_name]
Note: if no option is passed then there should be only one file, the number of files may vary as per option and the same would reflect in syntax .
It should additionally also cater 2 options:

- -n : ignores new line character
- -d : difference between 2 text files word size

2) **dir:** It creates a directory, and then changes the path to that directory. It is an external command, throw an error if that directory already exists.

Syntax: dir [-option] [dir_name]

It should additionally also cater 2 options:

- -r : removes if the directory already exists and create a new directory instead of throwing an error
- -v : print a message for each step in the running of this command

3) **date:** It returns the last modified date and time of a particular file.

Syntax: date [-option] [file_name]

It should additionally also cater 2 options:

- -d : display time described by STRING
- -R : output date and time in RFC 5322 format

Rubrics:

Student should have implemented following things:

- Program source code(s) with Makefile to compile.
- Write-up giving a brief description of how the program works (less than 1 page)
- Use C - libraries for implementing the shell commands.
- Use of exec(), fork(), wait()
- Error handling in terms of wrong command or wrong option or wrong argument

Q3: Make an arithmetic calculator for a school. Follow the given instructions for the same. **(20 Marks)**

Create a bash script shell that acts like a math calculator. It should do these things:

1) Read a text file named "**input.txt**" that has two numbers and an operation in the format **x y operation** where x and y are numbers and the operation is the name of the command. **Note:** The file may have more than one set of inputs.
2) Calculate the result of that operation.
3) Save the result in a new text file named "**output.txt**" in the directory named "**Result**" (if the directory doesn't exist in the current directory, make it).

There are only three operations:

1) "**xor**": Get the xor of the two given numbers.
2) "**product**": Get the product of the two given numbers.
3) "**compare**": Get the bigger number from the two given numbers.

Rubrics:

Student should have implemented following things:

- Program source code(s) with Makefile to compile.
- Write-up giving a brief description of how the program works (less than 1 page)

- Read, write of text file through bash script only
- Creation of directory(if needed) through bash script only