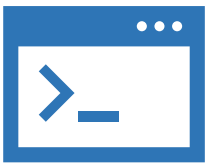


CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 1 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program that will take a string of characters from the console and output the frequency of each character in it.

Q2.) Write a program that creates two child processes. Each of the child processes prints numbers from 1 to 5. Each time a child prints a number it also prints its own PID and parent PID. The parent waits for both of its child to finish execution and prints "GoodBye" before exiting. Your program should **not** get lines printed from parent and child in a jumbled sequence. Each process should display its own ID, and parent ID and/or child ID.

CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 2 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell script to display Fibonacci Series up to N^{th} term. N must be accepted from the command line as command line input. Program should give an appropriate message in case the number N is negative or 0.

For e.g. `program1.sh 5`

Q2.) Write a program that creates **exactly three child** processes. The first child process should execute a command to show information about the current user, the second child process should execute a command to display the current directory and details of all files within the directory, and the third child process should execute a command to show the current date only. The parent process waits for all the child processes to finish and prints the termination status of the children. Display of information should be in order of first process, followed by second process, and then the third process. Each process should display its own ID, and parent ID and/or child ID

CSEN2253: OPERATING SYSTEMS LAB

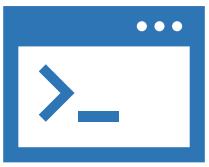
Semester Exam on 28th September 2021

Section A Set 3 **Total Marks 40** **Time 90 Minutes**

Q1.) Ramu's basic salary (BASIC) is input through the keyboard. His dearness allowance (DA) is 52% of BASIC. House rent allowance (HRA) is 15% BASIC. Contributory provident fund is 12% of (BASIC + DA). Write a shell script to calculate his gross salary and take-home salary using the following formula:

Gross salary = BASIC + DA + HRA + (BASIC + DA) * 0.12
Take home salary = BASIC + DA + HRA - (BASIC + DA) * 0.12

Q2.) Write a C program to create two threads, one for calculating the sum of odd integers from 1 to N and another one to calculate factorial of N. But you must ensure that the parent thread should terminate after terminating its child threads. Your program should **not** get lines printed from parent and child in a jumbled sequence. Each thread should display its own ID, and caller ID.



CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 4 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program that will take a range of numbers as its command-line arguments and produce the list of Armstrong numbers within that range. [e.g., Range: 100 - 450 Armstrong Numbers: 153, 370, 371, 407].

Q2.) Write a C program to create two child processes one for calculating the sum of odd integers from 1 to N and another one to calculate factorial of N. But you must ensure that the parent process should terminate after terminating its child process. Your program should **not** get lines printed from parent and child in a jumbled sequence. Each process should display its own ID, and parent ID and/or child ID.

CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 5 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell script to search a pattern from a file. The pattern and filename both should be accepted at runtime from the command line/console. If the pattern is found, then it should display the lines containing the pattern. But before searching the pattern, shell script should check the following:

a. Filename is given or not.
b. Pattern is given or not.
c. File exists in current directory or not

Q2.) Recall a question from your class test. Two companies in our country are currently manufacturing vaccines. The Central Government and different State Governments need to buy the vaccines from the two available companies [implying there are two entities producing, and two entities consuming]. Represent this scenario using threads.

Clearly show what are the shared data items, mutex and semaphores. Properly control access to the shared data using the available tools. The different threads should at least run 10 instances of each. Appropriate messages should be displayed to make it evident that the synchronization works.

Show the status of the shared data after each access by any/either thread.

Main should wait for all threads to finish.

Each thread should display its own ID, and caller ID.

CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 6 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program that accepts a filename as a command-line argument. Your program should then check if such a file exists in the current directory. If it does, then change the filename to <`filename.bkp`>. Before renaming the file copy the file to a different directory. If the file does not exist, display a message saying nothing to back up. [Show your output for both cases, when the file exists, and when it does not.

Q2.) Write a multi-threaded C program that takes two numbers `x` and `y` as command line inputs. First, ensure the correct number of arguments have been provided. Next, create two threads.

The first thread should calculate the summation of [`1/x + 1/(x+1) + 1/(x+2) + … 1/y`] *(e.g.: if x=5 and y=10, summation of 1/5 + 1/6 + 1/7 + 1/8 +1/9 + 1/10 should be calculated)*

The second thread should calculate the absolute difference between x and y, z = |x-y| and then check if z is prime or not.

Synchronize the working such that thread1 starts, then thread2 starts, then thread1 ends, then thread2 ends. Display appropriate messages such that this working is evident.

Main should wait for all threads to finish.

Each thread should display its own ID, and caller ID. Each thread should return an appropriate message which should be printed by the caller.

CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 7 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell script that takes a number as input from the command line argument. Reverse the number and find the absolute difference between the input number and the reversed number.

Q2.) Write a multi-threaded C program that takes two numbers x and y as command line inputs. First, ensure the correct number of arguments have been provided. Next, create two threads.

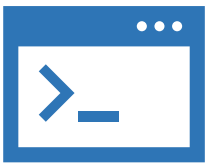
The first thread should calculate the summation of [`1/x + 1/(x+1) + 1/(x+2) + … 1/y`] *(e.g.: if x=5 and y=10, summation of 1/5 + 1/6 + 1/7 + 1/8 +1/9 + 1/10 should be calculated)*

The second thread should calculate the absolute difference between x and y, z = |x-y| and then check if z is prime or not.

Synchronize the working such that thread1 starts, then thread2 starts, then thread2 ends, then thread1 ends. Display appropriate messages such that this working is evident.

Main should wait for all threads to finish.

Each thread should display its own ID, and caller ID. Each thread should return an appropriate message which should be printed by the caller.



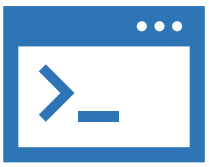
CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 8 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program to create two directories `Test1` and `Test2`. Create files `a1`, `a2` inside `Test1` and `b1`, `b2` inside `Test2`. Also, display the obtained result within your script.

Q2.) Recall a question from your class test. Two companies in our country are currently manufacturing vaccines. The Central Government and different State Governments need to buy the vaccines from the two available companies [implying there are two entities producing, and two entities consuming]. Represent this scenario using threads.
Clearly show what are the shared data items, mutex and semaphores. Properly control access to the shared data using the available tools. The different threads should at least run 10 instances of each. Appropriate messages should be displayed to make it evident that the synchronization works.
Show the status of the shared data after each access by any/either thread.
Main should wait for all threads to finish.
Each thread should display its own ID, and caller ID.



CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 9 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell script that saves current processes information twice in an interval of 1 minute. The first information should be saved in a file named `p1.txt`. The second information should be saved in a file named `p2.txt`. The program should finally display information that do not match in the two files.

Q2.) Write a program which in turn should execute three sperate external programs. First it should call a program named **`sal_entry`** to accept the Basic Salary of an employee. This should be passed on to another program named **`computation`** which calculates the Take Home Salary as [Basic + 1500 + 18%of Basic Salary]. The calculated salary should be passed on to another program named **`display`** for final output to the user. Since three external programs are required, create exactly three child processes to handle the scenario. Your program should **not** get lines printed from parent and child in a jumbled sequence. Each process should display its own ID, and parent ID and/or child ID.
Take care so that you do not give rise to any zombie/orphan process.

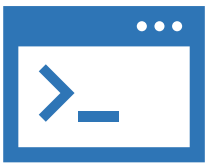
CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 10 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program that accepts a directory name as a command-line argument. And delete the directory. If the directory contains other files, copy such files into a different location before deleting the directory. [Show your output for both cases, when the directory exists, and when it does not].

Q2.) Write a multi-threaded C program that uses different threads to accept input, compute, and display information.
In the **first thread accept an input** for Basic Salary.
Pass this to the **second thread to calculate** Take Home Salary as [Basic + 1500 + 18%of Basic Salary].
Use the **third thread to display** the final calculated salary.
Main should wait for all threads to finish.
Each thread should display its own ID, and caller ID. Each thread should display appropriate messages while executing.



CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 11 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell program to show the currently logged-in user and under what directory. Next, accept a path as input from the user, traverse to that user entered directory and show the contents of that directory.

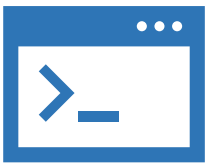
Q3.) Recall a question from your class test. Two companies in our country are currently manufacturing vaccines. The Central Government and different State Governments need to buy the vaccines from the two available companies [implying there are two entities producing, and two entities consuming]. Represent this scenario using threads.

Clearly show what are the shared data items, mutex and semaphores. Properly control access to the shared data using the available tools. The different threads should at least run 10 instances of each. Appropriate messages should be displayed to make it evident that the synchronization works.

Show the status of the shared data after each access by any/either thread.

Main should wait for all threads to finish.

Each thread should display its own ID, and caller ID.



CSEN2253: OPERATING SYSTEMS LAB

Semester Exam on 28th September 2021

Section A Set 12 **Total Marks 40** **Time 90 Minutes**

Q1.) Write a shell script that takes a stream of characters as input from the user. Display a string after having removed the vowels and numbers from the input. Also, display the total number of characters in the input stream, the number of characters in the modified string, and the difference in length between the two strings.

Q2.) Write a program which in turn should execute three sperate external programs. First it should call a program named **`sal_entry`** to accept the Basic Salary of an employee. This should be passed on to another program named **`computation`** which calculates the Take Home Salary as [Basic + 1500 + 18%of Basic Salary]. The calculated salary should be passed on to another program named **`display`** for final output to the user. Since three external programs are required, create exactly three child processes to handle the scenario. Your program should **not** get lines printed from parent and child in a jumbled sequence. Each process should display its own ID, and parent ID and/or child ID.
Take care so that you do not give rise to any zombie/orphan process.