**ENI08108 Operating Systems**

**Practical Skills Assessment**

The objective of the practical assessment is to allow you to show your skills in, and understanding of the analysis, design and writing of programs at the Operating Systems level.

This practical assessment is worth 40 % of the overall module mark and includes three tasks.

Task 1. Scripting in a UNIX CLI.

Task 2. Implementing a solution to a standard scheduling problem encountered when programming with multiple processes.

Task 3. Programming in bash interacting with the docker containers.

Task 4: Collate required evidence of Tasks 1-3 and write responses to related questions.

**Task Details:**

**Task 1:**

Write a shell script that takes directory path as an argument, searches for all text files within the directory, and counts the occurrences of a specific word (user provided) in each file. Additionally, display the total count across all files.

**[Total: 20 Marks]**

To complete the task, you will need to:

1. Set up a virtualisation environment through a VPN and identify the correct bash inside your UNIX virtual environment [3 marks]
2. Create a directory and create the files already given to you .Make use of appropriate search commands to find out the occurrences [5 marks]
3. Write the required script in an appropriate text editor and save as count.sh[10 marks]
4. Use the correct file commands in UNIX scripting [2 marks]

**Task 2:**

A biomedical manufacturing plant has multiple processes they want to schedule and need advice on which scheduling algorithm to use. Their scheduler selects the next task to execute based on its arrival time and priority. You have been asked to select a scheduling algorithm based on factors such as system requirements, workload characteristics and performance. You have been provided with a sample of process data including PID, Arrival Time and Burst Time.

Use a CPU simulator to implement 3 scheduling algorithms and compare their results based on turnaround time, waiting time and CPU utilisation.

**Process ID Arrival Time Burst Time**

P1 0 10

P2 2 5

P3 5 8

P4 8 12

P5 10 6

**[Total: 30 marks]**

To complete the task, you will need to:

1. Input the processes listed into a CPU simulator for 3 different CPU scheduling algorithms chosen from: Shortest Job First, Priority Scheduling, Round Robin and First Come First Served. [10 marks]
2. Compare the performance of your chosen algorithms in terms of turnaround time, waiting time and CPU utilisation [10 marks]
3. Discuss the practical implications of the simulation results in the context of optimizing task execution within the manufacturing processes of the plant with the help of Process States [10 Marks]

**Task 3:**

You have been provided with a container for Task 3 of the assessment which uses the bash shell, and includes an executable named ‘trial’. You are required to write a “for” loop in bash script that runs the program “trial” 20 times and sends its output to a differently named file each time. The script should name the output files output NN.txt, where NN is 01 , 02 , ….,20. It should also print the name of the current file in each iteration so the user can see the progress of the script. You will need to save the script with an appropriate file name.

**[Total: 25 Marks]**

To complete the task, you will need to:

1. Pull an image from the Docker hub and create a container [10 marks]
2. Open VS code in Docker and correctly implement the required code [14 marks.
3. Save the script in “runtrials.sh” [1 mark]

**Task 4:**

Documentation is required as evidence of completion of Tasks 1-3. You should submit a word document with a maximum of 800 words that includes a section for each task (use clear headings). The evidence requirements that should be included for each section are listed below.

**[Total:25 marks]**

You must include the following:

**Task 1**

1.1 Screenshots showing[3 marks]

a)Screenshot of your bash script named as count.sh.

b)Screenshot of the file count.sh created /listed in the required directory in UNIX shell along with the text files file1.txt,file2.txt and file3.txt.

c)Screenshot of the output received after the successful completion of the occurrences of words in the UNIX shell.

**Task 2**

2.1 A written description of the CPU simulator chosen for the scheduling problem 2d its key features used to solve the problem. [5 marks]

2.2 Screenshots showing[4 marks]

a)Screenshots showing the selection of each algorithm with the Processes based on their arrival time and Burst Time.

b)Screenshots showing the creation of Processes to start scheduling considering all the other necessary parameters.

b)Screenshots showing the View log and View process States to find the efficient algorithm after CPU scheduling.

**Task 3**

3.1 A description of the method used to implement the virtual machine in terms of bash scripting and containerisation in Docker [5 marks]

3.2 Screenshots showing[3 marks]

a)Screenshot of the necessary image pulled.

b)Screenshot of the container created and running in UNIX shell.

c)Screenshot of VS Code and its necessary environment creation to link the **docker.**

**Submission Instructions:**

**All script files, screenshots and documentation for Task 4** must be submitted as a zip file via **Moodle.**

**Task1 should be named as count.sh with the text files file1.txt,file2,txt and file3.txt .**

**These Text files are given in the zip file.**

Name the zip file NNNN.zip, where NNNN is your Student Number .

Please do not submit other types of archives(.tar.gz, .tar.xz, .rar)or other types of documents(.doc,.docx, .odt).