INTI International College Penang **School of Engineering and Technology**

3+0 Bachelor of Science (Hons) in Computer Science, in collaboration with Coventry University, UK

3+0 Bachelor of Science (Hons) in Computing, in collaboration with Coventry University, UK

Coursework cover sheet

Section A - To be completed by the student

Full Name:	
CU Student ID Number:	
Semester:	
Lecturer: VASUKY MOHANAN	
Module Code and Title: 5004CEM OPERATING SYSTEMS AND SECURITY	
Assignment No. / Title: Portfolio	50% of Module Mark
Hand out date: 10/1/24	Due date: 3/3/24
Penalties: No late work will be accepted. If you are unable to submit coursework on time due to extenuating circumstances, you may be eligible for an extension. Please consult the lecturer.	
Declaration: I/we the undersigned confirm that I/we have read and agree to abide by the University regulations on plagiarism and cheating and Faculty coursework policies and procedures. I/we confirm that this piece of work is my/our own. I/we consent to appropriate storage of our work for plagiarism checking. Signature(s): ----------	

Section B - To be completed by the module leader

Intended learning outcomes assessed by this work:

1. Make use of services provided by the operating system, such as process control, file management, threading, memory management, device access.
2. Understand mechanisms underlying the moderation system and be able to use the tools associated with them.
3. Understanding different approaches to allow multiple processes to communicate over a network.

Marking scheme	Max	Mark
1. Report	100	
Total	100	

Lecturer's Feedback

Internal Moderator's Feedback

Task 1 – Linux Commands

For each of the activity below

- **Find the command**
- **Run/Execute the command to showcase the purpose.**
- **Screen shot the execution of the said command.**
- **All questions carry the same 2 marks.**

a) Find the number of occurrences of each word in file

b) Display the end of the /etc/passwd file every 5 seconds.

c) Look up DNS information.

d) Display all the details of currently active kernel-resident network interfaces.

e) Assign IP-address to an Interface

f) Change MTU

g) Displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc

h) Show Statistics for All Ports

i) Obtain information about Internet servers.

j) Backup your harddisk to another harddisk in the same system.

Task 2 – Processes and Threads **[10 marks]**

Write a C/C++/java multithreaded program that does the following:

1. Ask the user to key in the dimension of TWO (2) 2-d arrays.
2. Use a random number generator to populate BOTH arrays.
3. Use multi-threading to implement matrix multiplication.
4. Print the results.

Task 3 – Threads and Forks [30 marks]
Write a multi threaded and fork program that does the following:

Both programs must implement the following:

a) Randomly generate a set of 100 numbers and fill up an array with those numbers.
b) Use a multi threaded program that uses 1 thread to add the numbers and another thread to minus the numbers.
c) Implement a separate program that does the same but using child process.
d) Design a method to compare both program's performances. Justify your comparison method.
e) Use the method in d) above to compare BOTH programs. Analyse and discuss the results.

Task 4 - OS Process Scheduling [20 marks]

Write a C/C++/java/python program that does the following:

a) Derive a method to keep information about 5 processes. The information shows the process name and CPU burst cycle of each process.
b) Ask the user to input time quantum value. The time quantum cannot be <= 1 and cannot be larger than the biggest CPU cycle of your processes.
c) Based on the time quantum value supplied by the user, simulate Round Robin Scheduler.
d) Print out the remaining CPU cycles for each process after every time step.

Task 5 - Defensive Programming [20 marks]

Operating Systems are vulnerable towards buffer overflow attacks. The following **THREE** methods are used by modern Operating Systems to mitigate these types of attacks. Critically analyse each method and present your findings in a report:

a) Address Space Layout Randomization (ASLR)

b) Data Execution Prevention (DEP)

c) Stack Smashing Protector (SSP)