INFORMATION TECHNOLOGY PROGRAMME

COMP621 OPERATING SYSTEMS

Trimester 2, 2026

Individual Assignment

Submission dates:
[1] Document Due Date: Tuesday 4:00 p.m., 13 April 2026

This assignment is worth **40 % of the total marks in the course** and will cover the following learning outcomes as listed in the Course Outline:

Learning Outcome 1: Demonstrate an in-depth knowledge of the core concepts of operating systems.

Learning Outcome 2: Explain resource management techniques and address the issues related to performance, fairness, synchronization, and deadlocks.

Learning Outcome 3: Deploy and test operating systems concepts like scheduling algorithms in a simulation environment.

Learning Outcome 4: Install, deploy, configure, and maintain Windows and/or Linux operating systems.

Learning Outcome 5: Develop workplace soft-skills including carrying out individual research and/or delivering oral presentations.

General Instructions:

- Include a cover page that includes your name, student ID, course code and title, assignment title.
- All sources should be acknowledged in the main body of the assignment and in a reference list at the end of the assignment. You are also required to reference any tools/software/applications used. Refer to the 7th edition of the APA referencing style guide.   Examples of how to present references can be found here: https://apastyle.apa.org/style-grammar-guidelines/references/examples.
- Your assignment should be your own work to demonstrate your thinking. Any direct quotes from any source should be placed in "quotation marks".

- Upon submission, your assignment will be checked for copied materials as well as the use of AI (artificial intelligence), with penalties to be applied where appropriate and if not referenced.
- You may resubmit draft versions of your assignment **until the due date**. After the due date, the latest version will be accepted as the final version. Note that similarity reports may take 24 hours to generate.
- Resources to assist with writing skills can be found at https://moodle.ais.ac.nz/course/view.php?id=4#section-4
- Late submissions will be penalised by 5% of the available marks from the marks awarded per working day (24 hours) for up to four days and receive a zero mark after four days. (96 hours).

Tasks (100 Marks)

Note: Write a project report addressing parts given below.

Part A Testing Operating Systems concepts (15 Marks)

Question 01

Compile the following source code in the compiler's source editor window:

```
program LoopTest
    i = 0
    for n = 0 to 40
    i = i + 1
    next
end
```

And create at least four different processes (with different priorities) and provide the screen shots of process queues.

Part B Scheduling Algorithms & Synchronization & Deadlocks (35 Marks)

Question 02 (15 Marks)

Select the following different scheduling policies and run the processes in the OS simulator. Perform experiments to explain the difference between the following:

- First-Come-First-Served (FCFS) (3 marks)
- Shortest-Job-First (SJF) (4 marks)
- Round-Robin (RR) (4 marks)
- Pre-emptive and non-pre-emptive scheduling (4 marks)

Record the experiments in the form of screenshots to support your answer.

Question 03 (20 Marks)

You need to simulate a restaurant kitchen where chefs and kitchen staff are engaged in meal preparation. The kitchen has limited resources such as ovens, prep tables, refrigeration units, and cooking vessels. Each staff member is assigned specific tasks, including ingredient preparation, cooking, plating, and quality control. Develop an OS-based simulation that monitors resource

allocation and detects potential deadlocks. If a deadlock situation arises, ensure that the system identifies and reports it:

- Identify which kitchen staff member and resources run into deadlocks.
- What would you do to recover from deadlock.

Table 1

Kitchen Staff	Resources		
	Ovens	Prep Tables	Cooking Vessels
Head Chef	2	1	3
Sous Chef 1	1	3	2
Sous Chef 2	3	2	1
Kitchen Assistant	2	2	2

Show your work through the screenshots.

.Part C Operating Systems Deployment and Configuration (Total: 50 Marks)

Instructions:
Use VM-Ware (or suitable alternative) to deploy and configure Ubuntu operating system for the following tasks. Save all the evidence by taking screenshots and placing them in MS Word document. Save the document by following the submission process as explained on the cover page.
NOTE: In this question marks are allocated/distributed based on the provided evidence in the form of snapshots.

Question 4. Create two new users *student1* and *student2* in the virtual machine. Save evidence. **(5 marks)**

Question 5. Create a shared folder called *share2026*, containing a file called *exam2026.doc*, in the /home directory and configure access permissions (read only) for user *student1* and full control for user *student2* to access this folder. Verify this configuration and save evidence. **(9 marks)**

Question 6. Use terminal to check the following in the Ubuntu: **(9 marks)**

a) The Ubuntu version
b) Installed software in the Ubuntu.
c) System details
d) Memory details

Question 7. (27 Marks)

Use terminal to create one teacher and three student files (cpp). Teacher is the parent process that create three student files with student's names as children processes. The teacher file displays the record of all student files. Use the appropriate system calls to accomplish the task. Provide cpp codes and screenshots of steps followed and generated output.