COMP3520 Operating Systems Internals Assignment 1 – Discussion Document

General Instructions

For the discussion document, all questions are compulsory. You **must** make a genuine attempt at questions. An attempt at a question is considered genuine **if and only if** it is honest **and** serious.

You must attempt this part of the assignment individually. You will be required to submit your work to *Turnitin* for similarity checking as part of assignment submission.

You must cite and reference all copied or paraphrased material that are not your own. Any suitable referencing scheme may be used. Where practical, you should use your own words.

Unless specifically directed, your answers must be in *Academic English*. You may use diagrams to support your written answers.

Please label your answers with the correct question numbers but do not repeat the question.

Submit your discussion document to the appropriate submission inbox in the COMP3520 Canvas website.

The discussion document is worth 20 % of full marks for Assignment 1. Marking criteria are included in a separate document.

Suggested length: ~800 words plus figures

Questions

In your answers, you will be assessed on how well you:

- Demonstrate understanding of relevant operating systems concepts;
- Present logical responses using appropriate information and ideas; and
- Use *Academic English* appropriately.

Question 1 (1 point)

Explain the purpose of a condition variable.

Question 2 (1 point)

Consider the function call *pthread_cond_wait(&a_condition_variable, &a_mutex)*. Assume that *a_condition_variable* and *a_mutex* have been correctly initialized. Explain why it is an error to call this function if the mutex is **unlocked** just before the call.

Question 3 (3 points)

In addition to the *pthread_cond_wait()* function, the *pthreads* library offers a *pthread_cond_timedwait()* function that is useful for solving certain types of synchronization problems. Consult the Linux man page for a detailed description of this function.

Describe ONE scenario where you would use the *pthread_cond_timedwait()* function. Justify your answer.

Question 4 (7 points)

In English and pseudocode, describe and justify the algorithm that you have used to solve the traffic light synchronization problem.

Question 5 (8 points)

Describe, in depth, the methods that you have used to debug the program that you have developed to solve the traffic light synchronization problem. In your response, provide relevant input data, the resulting output of your program and, if applicable, the expected output for a representative range of test cases.