COMP3520 Operating Systems Internals Assignment 2 – 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. Please include your University student identification number (but **not** your name) in your discussion document.

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

The discussion document is worth **40 %** of full marks for Assignment 2. Marking criteria are included in a separate document.

Suggested length: ~1200 words plus figures

Questions

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

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

Question 1 (3 points)

Compare First Come First Served Scheduling, Round Robin Scheduling and Highest Response Ratio Next Scheduling. In your comparison, include a discussion of their potential advantages and disadvantages.

Question 2 (4 points)

In the Stallings textbook, a "Fair-Share Scheduling" scheme is discussed (on pages 450 – 452). Carefully read this section and then:
   a. Explain how it works; and
   b. Discuss its potential advantages and disadvantages.

Question 3 (5 points)

In English and pseudocode, describe the algorithm that you have used to implement the Very Simple Experimental Dispatcher (VSED). In your answer, highlight your modifications to the original program provided to you.

Question 4 (10 points)

a. By using the **random_aps.c** program, generate one random job list using the following parameters where n, x, and y are the number of jobs, mean duration between job arrivals and inverse of mean job service time respectively: n = 100, x = 2, and y = 0.3. attach the results at the end of your discussion document.
b. Run your VSED program under the following time quanta settings:
    i.   RQ0 = 1, RQ1 = 1, and RQ2 = 1;
    ii.   RQ0 = 4, RQ1 = 2, and RQ2 = 1;
    iii.   RQ0 = 1, RQ1 = 2, and RQ2 = 4;
    iv.   RQ0 = 30, RQ1 = 1, and RQ2 = 1.
    For each run, give its average turnaround time and average waiting time.
c. Change the **random_aps.c** program to set the priority to 0 for all jobs. Then run the program to generate one random job list using the same parameters as that in (a), i.e., n = 100, x = 2, and y = 0.3. attach the results at the end of your discussion document.
d. Now, run your VSED program under the following time quanta settings which are the same as that in (b):
    i.   RQ0 = 1, RQ1 = 1, and RQ2 = 1;
    ii.   RQ0 = 4, RQ1 = 2, and RQ2 = 1;

iii.   RQ0 = 1, RQ1 = 2, and RQ2 = 4;
iv.   RQ0 = 30, RQ1 = 1, and RQ2 = 1

For each run, give its average turnaround time and average waiting time.

e. Give a detailed analysis by comparing the performance results under different job and quanta settings.

Question 5 (6 points)

You have a dispatcher list of 15 jobs as follows:

    0, 0, 2
    0, 0, 3
    0, 0, 14
    0, 0, 7
    0, 0, 5
    0, 0, 9
    0, 0, 2
    0, 0, 4
    0, 0, 11
    0, 0, 1
    0, 0, 6
    0, 0, 3
    0, 0, 12
    0, 0, 4
    0, 0, 8

a. Run your VSED program using the above job list under the following quanta settings:

i.   RQ0 = 1, RQ1 = 1, and RQ2 = 1;
ii.   RQ0 = 4, RQ1 = 2, and RQ2 = 1;
iii.   RQ0 = 1, RQ1 = 2, and RQ2 = 4;
iv.   RQ0 = 15, RQ1 = 1, and RQ2 = 1

For each run, give its average turnaround time and average waiting time.

b. Compare the performance results under different quanta settings. What are the implications?

Question 6 (6 points)

Reorder the job list of Question 5 by soring the jobs according to their service times as follows:

    0, 0, 1
    0, 0, 2
    0, 0, 2
    0, 0, 3
    0, 0, 3
    0, 0, 4
    0, 0, 4
    0, 0, 5
    0, 0, 6
    0, 0, 7
    0, 0, 8
    0, 0, 9

0, 0, 11
0, 0, 12
0, 0, 14

a. Run your VSED program under the following quanta settings:
 i. RQ0 = 1, RQ1 = 1, and RQ2 = 1;
 ii. RQ0 = 4, RQ1 = 2, and RQ2 = 1;
 iii. RQ0 = 1, RQ1 = 2, and RQ2 = 4;
 iv. RQ0 = 15, RQ1 = 1, and RQ2 = 1

For each run, give its average turnaround time and average waiting time.

b. Compare the performance results that you have obtained in this question with the performance results from Question 5. What are the implications?

Question 7 (6 points)

You have a dispatcher list of 15 jobs as follows:
 0, 0, 12
 0, 0, 13
 0, 0, 14
 0, 0, 10
 0, 0, 15
 0, 0, 12
 0, 0, 12
 0, 0, 14
 0, 0, 11
 0, 0, 11
 0, 0, 15
 0, 0, 13
 0, 0, 12
 0, 0, 14
 0, 0, 14

a. Run your VSED program using the above job list under the following quanta settings:
 v. RQ0 = 1, RQ1 = 1, and RQ2 = 1;
 vi. RQ0 = 8, RQ1 = 4, and RQ2 = 2;
 vii. RQ0 = 2, RQ1 = 4, and RQ2 = 8;
 viii. RQ0 = 15, RQ1 = 1, and RQ2 = 1

For each run, give its average turnaround time and average waiting time.

b. Compare the performance results. What are the implications?