



National University of Computer & Emerging Sciences, Karachi
Spring-2023 School of Computing
Mid Term II

3rd April 2023, 08:30 AM – 09:30 AM

Course Code: CS2006

Course Name: Operating Systems

Instructor Name: Engr. Abdul Rahman, Dr. Nadeem Kafi, Dr. Gufran, Dr. Nausheen, Ms Ansum Hamid, Ms Mubashra Fayyaz, Sir Danish, Sir Farooq Zaidi, Ms Rabia Ansari, Ms Naz Memon

Student Roll No:

Section No:

Instructions:

- Return the question paper.
- Read each question completely before answering it. There are 3 questions and 2 pages.
- All the answers must be solved according to the sequence given in the question paper.
- Handwriting / diagrams should be neat and clean. Avoid cutting and over-handwriting.
- Students are not allowed to write anything on the question paper except roll number & section.
- Submit the question paper along with the answer script.
- This paper is subjective.

Max Points: 30

Time: 60 minutes.

Question 1 [10 points] – CLO2:

Suppose we need to combine round-robin and priority scheduling in such a way that the system executes the highest-priority process and runs processes with the same priority using round-robin scheduling. Draw the Gantt chart and a table showing waiting and turnaround times using the following set of processes that arrive at time = 0 and with the burst time in milliseconds as shown below:

Processes	Burst Time	Priority
P1	4	3
P2	1	2
P3	3	2
P4	2	1
P5	3	3

$2 = TC$
 higher number, lower priority.

Question 2 [10 points] – CLO3:

[2 points]

(A) What is a thread-join operation?

(B) Consider the following two threads, to be run concurrently in a shared memory (all variables are shared between the two threads):

Thread A	Thread B
for (i=0; i<5; i++) { x = x + 1; }	for (j=0; j<5; j++) { x = x + 2; }

Assume a single-processor system, that load and store are atomic, that x is initialized to 0 before either thread starts, and that x must be loaded into a register before being incremented (and stored back to memory afterwards). The following questions consider the final value of x after both threads have completed.

[2*4=8 points]

(B) Nadeem Kafi

[5 points] There are two concurrent programs, and you must choose one to run. You currently have 16 processors gauge performance, but you will run on 1024 processors. The following information is collected. Which programme will give the best performance?

Program A			Program B		
Processors	Speedup	Serial program	Processors	Speedup	Serial program
2	1.88	0.07	2	1.79	0.13
4	3.12	0.10	4	2.9	0.13
8	4.5	0.12	8	4.3	0.13
6	5.8	0.13	6	5.7	0.13

Corrections in the questions:

- The last entry is 16 processors.
- Serial portion of a program never changes with the addition of more processors.

Solution:

Approach 1:

The serial portion will always remain constant at 0.13, thus parallel portion will be 0.87. Given processor count we can put values in the Amdahl's law equation and get values from 1024 processors. This values will be same given same values of serial and parallel portions. Therefore any program can be used.

Approach 2: Program B is best because its sequential overhead is not growing, and therefore going to larger numbers of processors it will have better speedups.

Best of Luck!!!!