End Sem Exam 2021

Operating System Lab (CS342)

Department of CSE, IIT Patna

Date:- 20-April-2021 Deadline:- 21-April, 10 AM

Instructions:

1. All the questions should be completed and uploaded before the deadline. Marks will be deducted for the submissions made after the deadline.
2. Markings will be based on the correctness and soundness of the outputs. Marks will be deducted in case of **plagiarism**.
3. Proper indentation & appropriate comments (if necessary) are mandatory. [2+2 marks]
4. You should zip all the required files and name the zip file as roll_no.zip, eg. 1501cs11.zip.
5. Provide a **readme** file with all the execution details (commands to execute) of the codes and sample inputs-outputs **(2 marks)**.
6. Upload your assignment (the zip file) in the following link:
https://www.dropbox.com/request/8NyrQsdc99E4LJDidSxu

1. Consider a system with ‘n’ (n>2) processes and single resource with ‘r’ copies. Write a program in c that

    i) takes the value of ‘c’ (c<r) and ‘r’ as input and each process requires ‘c’ copies of ‘r’ to complete its execution. Print the **maximum** value of ‘n’ to ensure a deadlock free operation.

    ii) takes the value of a number of processes ‘n’ and number of copies ‘c_i’ for process n_i as input. Each process needs a different number of copies ‘c_i’ of single instance resources ‘r’. Print the, **maximum**/**minimum** copies of ‘r’ are required for the system **not guaranteed**/**guaranteed** to be deadlock free operation.

2. Think and design your own page replacement algorithm (similar to existing algorithms but not exactly the same). State your algorithm and implement it in c/c++. Compare and contrast with existing algorithms such as FIFO, LRU and LIFO in terms of page fault and running time. Also, mention the superiority of your algorithm , such as running time , some particular type of inputs. You may make necessary assumptions by mentioning it in a readMe file.

Input :

N : No. of trials
K, P : No. of frame, Length of page sequence of trial 1
PS : Page Sequence of trial 1
……. : No. of frame, Length of page sequence of trial 2
……. : Page Sequence of trial 2

Output :

A : List of page faults made by each trials by your algorithm
LRU : List of page faults made by each trials by the LRU Algorithm
FCFS : List of page faults made by each trials by the FIFO Algorithm
T1, T2, T3 : Time Taken for all trials by your algorithm,LRU and FIFO Algorithm, respectively.

3.There are two processors which can be used to execute the jobs. First, processor takes d1 amount of time and the second processor takes d2 amount of time to each job. These are also termed as time slices of each processor. Once the time slice is over then the next job in the queue will get the chance to execute and the current job, if it is not yet completed, will go to the end of the job queue. This job switching time is considered to be negligible.

Perform the job scheduling and show the status of job scheduling after a certain time instant. Display each job with job id, arrival time, execution time, start time, finish time, status.Do not use any library/package (eg. STL etc) to implement this. Your code must be well documented and any invalid input must also be handled properly.

Assumptions:

- When both the processors are available then the next job from the queue will be assigned to processor 1 over processor 2.
- Also, if two jobs are switching out at the same time from both the processors then the job from processor 1 will first be entered into the queue before the job from processor 2.

Input :

The first number in the file represents the processor 1 time slice (d1). The second number in the file denotes the processor 2 time slice (d2).This number is followed by a series of job details in a tabular form. Each row of the job details table indicates job id, arrival time and execution time.

Sample input

```
5
10
A 0 18
B 0 12
C 0 7
D 0 11
E 0 28
F 7 18
G 16 12
##Then program asks for a time instant.
53
```

Output :

Once a time instant is entered as an input to display the job scheduling result then the program generates an output to show the details of job scheduling at that time instant. The symbols in the current status represent W: waiting, C: Completed, E: Currently Executed.

Sample output :

The output file will have the following format. **The column headers are just for illustration purpose.Only required numbers are sufficient in the output :**

Details of job scheduled at time instant 53

job_id	arrival_time	Execution time	start_time	end_time	current_status
A	0	18	0	43	C
B	0	12	0	24	C
C	0	7	5	22	C
D	0	11	10	30	C
E	0	28	10		E
F	7	18	20	51	C
G	16	12	25	52	C

4. Given a disk with 200 cylinders (0-199), suppose we have 8 pending requests:
98, 183, 37, 122, 14, 124, 65, 67
and read/write read is currently at cylinder 98.
Apply S-LOOK and show the disk head movement and seek time .