

OSCAL Exercises

➤ **The due day: April 23.**

A. OSCAL accessibility:

- <http://athena.ecs.csus.edu/~zhangd/oscal/oscal.htm>
- login credential: CSC139/csus.os.prin
- Java security issue. If you can't run applets from OSCAL due to security requirement on your machine, here is some work-around.
 - Windows. Go to Control Panel, and then Java Control Panel, click Security tab:
 - Either add OSCAL's URL to the list of trusted sites
 - Or change security level from High to Medium (if you don't see the option of adding URL to the list of trusted sites), which results in: "All Java applications will be allowed to run after presenting a security prompt" after restarting the machine. After you are done with the exercises, revert the security level back to High.
 - MacBook. Go to Utilities, and then Java Preferences. Click Security tab, and add OSCAL's URL to the list of trusted sites.

B. The list of exercises.

1. First-Come, First-Served Scheduling. For the given workload of 6 processes below:

Process	Arrival Time	Service Time (CPU burst)
P1	0	15
P2	1	12
P3	2	9
P4	3	6
P5	4	3
P6	5	1

Submit the following:

- *Average waiting time* and *average normalized turnaround time* (T_q/T_s : see explanation in the page) when there is a *convoy effect*.
 - *Average waiting time* and *average normalized turnaround time* when the same workload (processes and their CPU burst times remain unchanged) has a completely reversed arrival times (P6 arrives at 0, P5 at 1, P4 at 2, P3 at 3, P2 at 4, and P1 at 5) (note: reload the page before you enter the workload in reverse order).
2. Round-Robin. For the given workload above, submit the following:
- Number of *context switching* for time quantum 1 (RR1).
 - Number of *context switching* for time quantum 4 (RR4).
3. Shortest-Job-First (SPN) and Shortest-Remaining-Time-First (SRT). For the given workload above, submit the following:
- *Average turnaround time* by SPN.
 - *Average turnaround time* by SRN.

4. RMS. Submit the following:
 - Find a workload of 3 periodic tasks that is not schedulable by RMS. Indicate their respective *service times* and *periods*.
 - Indicate the mistake in the presentation of the animation for the default example of three periodic tasks (hint: the periods of three tasks).
5. FIFO Page Replacement Algorithm. For the reference string of “1 2 3 4 1 2 5 1 2 3 4 5”, verify that Belady’s anomaly for 3-frame and 4-frame cases. Submit the number of page faults for 3-frame and 4-frame allocations.
6. LRU and MFU Page Replacement Algorithms. Compare the two with regard to the reference string of “7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1” and submit the number of page of faults generated by the two for 4-frame and 5-frame allocations.
7. Clock Page Replacement Algorithm. For the following reference string: “R20 R21 R22 R7 R4 R9 R6 R3 R8 R4 R5 R10 R11 W9 R25 R26 R27 W27 R30 W30 R5 R31”, find out which pages will be replaced by Clock replacement for bringing in pages 25, 26, 27, 30, and 31, respectively. Submit 5 pairs of “Page xx replaced by yy”.
8. Banker’s Algorithm. Produce an *unsafe* state by changing the content of Claim (Maximum Needs) matrix, i.e., changing the maximum needs of one or more process. Submit the revised Claim matrix that causes the state to be unsafe.

Submit the results to OSCAL Exercises in SacCT.