CSI 3131 - Final Exam - Summer 2019 Exam

Multiple Choice Questions: - (There are 39 in total)

1 - Draw the SRJF scheduling algorithm and compare the MCs that are given below.

2 - Draw a round-robin scheduling algorithm and compare between the MCs that are given below.

3 - What does exec() system call do?

4 - Show how many page faults are generated using different paging algorithms (LRU)

5 - Show how many page faults are generated using different paging algorithms (FIFO)

6 - Show how many page faults are generated using different paging algorithms (Most Optimal)

7 - Which of these are true about segmentation?

Options

A) suffers internal fragmentation,
B) suffers internal frag,
C) the segment offset and segment base address are added to get the physical address,
D) all of the above
E) none

8 - What are system calls used for?

9 - Gives you page access time, ram access time, fault rate as a percent. Calculate the effective page access time.

10 - [alpha * t + (1-alpha) * tn + 1] What happens when alpha = 1 and alpha = 0?

11 - [Given a piece of code]

```
If fork() > 0:
        sleep(100)
```

What happens?
Options:

A) It spawns zombie process
B) It spawns orphan process
C) Process run and never terminates
D) Process runs for 100

12 - Something about LWP
13 - Something about OS implemented semaphores (signal and wait atomic, provides queue)

14 - Segmentation causes what kind of fragmentation

15 - 256kb. The logical location is 0010… given by 001… What is the physical address

16 - The read time is ___ nanoseconds and the page fault time is ___ milliseconds. What is the effective access (?) time?

17 - Advantage of hierarchical page table

18 - Decreasing page size causes: (T or F)
-Page table to be smaller
-Something about _ _ _ cache

19 - A page table has a page size of 2kb. Segments of memory (64MB) are comprised each of a two-level page table, where there are three outer page tables. If the inner page tables are each 64kb in size…

20 - Signals are what type of communication?

- Asynchronous
- Synchronous
- A third option I don't recall
- All of the above
- None of the above

21 - Using SRTF/RR, when does a certain process finish?

22 - What is the working set at time t given a sequence of pages needed vs time?

23 - What tells the OS what mode you're currently in?

24 - T/F questions about the OS implementation of semaphores.

- wait and signal are atomic
- implementations is busy-wait free
- there was another one I don't remember :(

25 - If a thread in a process calls exec(), what happens?

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Short Answer Questions:

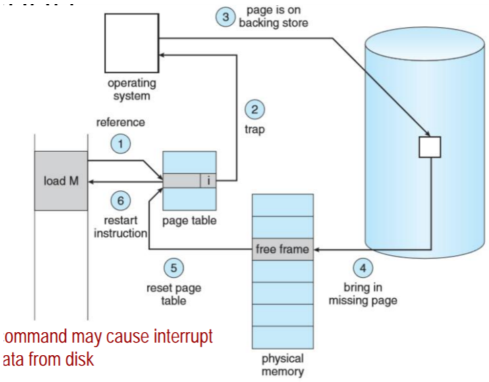
1 - Explain THRASHING. Explain what's happening and explain how the OS recovers from it?

2 - What is the TRAP instruction? What is it used ina modern OS?

3 - Can ready state go to block state? Explain your answer.

4 - Explain three kinds of control bits for page tables.

5 - Describe what happens when a page fault occurs.(Diagram with 6 steps of page faulting with free RAM Space. List those 6 steps.) (Explain the steps the OS goes through when there is a page fault, [this diagram below])



6 - Bankers algorithms - use bankers algorithm to say if a sequence is safe. [Gives you a table of numbers] [Question that is GONNA be asked] [Very common]

7 - Difference between mode switch and context switch.

8 - Explain processor affinity and load balancing.

9 - In the context of the critical section problem, what deadlock-free and starvation-free?

10 - (Round robin) Explain why that it puts the process to the back of the queue.

11 - Explain how multi-level feedback queues work and talk about 3 different aspects you could modify the scheme.

12 - List the conditions of deadlock.

13 - Explain what virtual memory is in the context of the operating system.

CSI 3531 - Final Exam - Summer 2019 Exam (French):

Multiple Choice Questions:

1 -

Short Answer Questions:

1 - In the ready queue of a CPU, there are no more than 75 processes. The context switch time is 1 ms. If we employ the Round Robin algorithm, what quantum can we choose to be sure that all processes use the CPU at least once in 2 seconds?

Possible solution: (2000 ms - 1 ms * 75 processes) / 75 process = 25.67 ms

2 - 3 processes share 4 units of a resource that can only be allocated or freed one at a time. The Max units needed by each process is 2 units. Is deadlock possible? Justify.

Possible solution: No, it is not possible. If each process gets one unit, one remains. Whichever process gets that last unit, will be able to finish executing, thus freeing 2 units that the other 2 processes can use to finish executing.

3 - N processes share M units of a resource. The Max needed by each process is not more than M. The total sum of the needed units of the resource is less than N+M. Is deadlock possible? Justify.

Possible solution: Absolutely no idea. My hunch says no.

4 - In a process, we make the following memory references:

18, 32, 176, 282, 89, 368, 211, 489, 432, 12

Consider that one page has a length of 100 bytes.

1. What is the page reference string?
   Sol: 0, 0, 1, 2, 0, 3, 2, 4, 4, 0
2. How many page faults if we use the FIFO algo, the LRU algo, or the second-chance algo with 3 frames?
   Pretty standard solution.

5 - We have the following 3 processes:

```
Process one:
    Forever, do
        Event 1
        **signal(S_2)**
        **wait(S_1)**
```

Process one:

Forever, do

Event 1

signal(S_2)

wait(S_1)

```
    end
Process two:
    Forever do,
        wait($S_2$)
        Event 2
        signal($S_3$)
    end
Process three:
    Forever do,
        wait($S_3$)
        Event 3
        signal($S_1$)
    end
```

Initialize semaphores and place their wait() and signal() calls in the right places in the processes such that we get the following pattern: Event1, Event2, Event3, Event1, Event2, Event3, etc…

Sol: 3 semaphores. At the top of each loop, the process waits on their own semaphore, and at the end of the same loop, they signal the semaphore of the next process. Semaphore1 is initialized at 1, while semaphores 2 and 3 are initialized at 0.

6 - If the context switch time is 2 ms, what would be the correct quantum for a Round-Robin algorithm such that the context-switching time is never more than 10% of the total time?

Possible Sol: 2 ms = 10% (quantum + 2 ms). Solve for quantum…

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Good way to practice MC Questions for English Section:
https://www.sanfoundry.com/operating-system-questions-answer/