
Selected Questions

Choose the correct/best answer (only one answer for each question)

1) The followings are Operating system goals except

- A. Use the computer hardware in an efficient manner
- B. **Provide text processing support**
- C. Execute user programs and make solving user problems easier
- D. Make the computer system convenient to use
- E. Other:

2) A(n) is a software-generated interrupt caused either by an error or a user request

- A. API
- B. Input request
- C. system call
- D. pool
- E. **Other:** 

3) When a user-level process wishes to call a function inside the kernel,

- A. it directly executes the desired function
- B. it causes an exception
- C. **the OS changes it from user mode to kernel mode**
- D. the OS changes it from **kernel mode to user mode**
- E. Other:

4) Multiprogramming

- A. is a method of memory allocation by which the program is subdivided into multiple programs
- B. consists of those programs that may be generated by a processor during the execution of a process
- C. **allows multiple programs to reside in separate areas of the core at the same time**
- D. is a method for allocating I/O resources to multiple programs
- E. Other:

5) Which of the following about parent-child process relation is NOT correct?

- A. Parent and children may share all resources
- B. Children may share subset of parent's resources
- C. **Children cannot contain threads if parents don't contain threads**
- D. Parent and children may execute concurrently
- E. Other:

6) Which of the following is NOT correct:

- A. Processes carry a large amount of state information compare to thread
- B. Processes have separate address space and threads share their address space
- C. Context switching between processes is slower than between threads
- D. **Process creation is faster than threads creation**
- E. Other:

7) A situation in which random read/write access by multiple processes to the same shared data can result incorrect results.

- A. Critical section
- B. Context switch
- C. Bounded waiting
- D. Mutex
- E. **Other:** 

Consider the following scenario:

State 1: Process P1 acquires semaphore S by performing an wait() operation.

State 2: Process P2 then arrives and attempts to acquire S.

State 3: Process P3 then arrives and attempts to acquire S.

State 4: Process P1 releases S by performing a signal() operation.

8) Which of the following could be true right after State 3 and right before State 4?

- A. P2 is running its critical section
- B. P3 is running its critical section
- C. P3 is blocked on semaphore S
- D. P1 is blocked on semaphore S
- E. Other:

Consider a program that contains the following two threads. The threads are running concurrently, and x initial value is 0. Answer the following four questions

<pre>thread1() { for (int i=0; i<5; i++) { x = x + 1; System.out.print(x + " "); } }</pre>	<pre>thread2() { for (int j=0; j<5; j++) { x = x + 2; System.out.print(x + " "); } }</pre>
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9) The variables i and j are allocated in

- | | |
|--|--|
| <ul style="list-style-type: none"> A. Heap segment C. Data segment | <ul style="list-style-type: none"> B. Process registers D. Thread registers E. Other: |
|--|--|

10) The variable x is allocated in

- | | |
|--|--|
| <ul style="list-style-type: none"> A. Heap segment C. Data segment | <ul style="list-style-type: none"> B. Process registers D. Thread registers E. Other: |
|--|--|

11) The followings are possible outputs on the screen when i = 3 and j =2 except

- | | |
|--|---|
| <ul style="list-style-type: none"> A. 1 2 3 5 7 C. 1 3 4 6 7 | <ul style="list-style-type: none"> B. 1 2 2 4 3 D. 2 4 5 6 7 E. Other: |
|--|---|

Check whether the following statements are True or False

Statement	T	F
1) Entering a system call involves changing from user mode to kernel mode .	<input type="checkbox"/>	<input type="checkbox"/>
2) When a user-level process wishes to call a function inside the kernel, it directly executes the desired function.	<input type="checkbox"/>	<input type="checkbox"/>
3) On a uniprocessor system, there is exactly one ready process at any point in time	<input type="checkbox"/>	<input type="checkbox"/>
4) CPU, memory, and disk are examples of resources that the OS must manage	<input type="checkbox"/>	<input type="checkbox"/>
5) When an I/O operation completes , the previously blocked process moves into the RUNNING state	<input type="checkbox"/>	<input type="checkbox"/>
6) Two processes reading from the same physical address will access the same contents	<input type="checkbox"/>	<input type="checkbox"/>
7) Threads that are part of the same process run in parallel on a uniprocessor system	<input type="checkbox"/>	<input type="checkbox"/>
8) Locks prevent the OS scheduler from performing I/O operations	<input type="checkbox"/>	<input type="checkbox"/>
9) A process is created only if it is forked from another process	<input type="checkbox"/>	<input type="checkbox"/>
10) Dispatching means removing a process from memory and storing it on disk then bringing it back in from the disk to continue execution when resources are available	<input type="checkbox"/>	<input type="checkbox"/>

Complete the following statements with the right answers. You can use the help answers provided below OR write the right one if not found (10 points).

- A. Demand Paging
- B. Virtual/Logical
- C. page fault
- D. MMU
- E. Holes
- F. Lazy Swapper

- G. FIFO
- H. First-Fit
- I. Second-Fit
- J. Best-Fit
- K. Worst-Fit
- L. Zero or 1

- M. mode bit
- N. Never
- O. 2
- P. 2^n
- Q. 2^m

P	F
0	3
1	12
2	7
:	:
31	5

Fig. 1

1. never swaps a page into memory unless page will be needed.
2. total memory space exists to satisfy a request, but it is not contiguous.
3. In OS concepts, the view separates the user/CPU view from what is actually happening.
4. is fast-lookup hardware cache that reduces the amount of time it takes to perform address translation.
5. are the four conditions that must hold for a deadlock to occur.
6. Given the following free memory blocks, which are listed according to their order in memory, and P₁, a 2500-KB process. If allocation algorithm was applied, P₁ would reside in b₂.

[b₁ : 2300KB ; b₂ : 2600KB ; b₃ : 2500KB ; b₄ : 2700KB]

7. For P₁ above, if the system is using 512KB paging, then P₁ needs a total of pages, however, it has KB of internal fragmentation.
 8. In the best case, to allocate all P₁ pages in memory the minimum number of page-faults that may occur is
 9. If the base register holds 500 and the limit register is 300, then an attempt by the user to address location 400
 10. A computer system has 8 distinct resources, with 'n' processes competing for them. Each process may need at most 4 resources. The maximum value of 'n' for which the system is guaranteed to be deadlock-free is
 11. In virtual memory, the bit is used to reduce the number of page transfers.
 12. Applying SSTF scheduling algorithm on the following track requests in the disk queue where the read/write arm on 50 causes a total-head-movement (# of cylinders) of cylinders.
- Track request: 95, 119, 34, 123, 11**
13. A crucial requirement for is the ability to restart any instruction after a

14. Fig.1 above shows a part of a page table for a memory with a page size of 1024 locations. Each logical address is in the form $[p, d]$, where p and d are the page number and offset, respectively. Considering that the memory allocation of processes begins from address 0 in physical memory, the physical address that the logical address $[0, 514]$ maps to is
15. For the memory in the previous question and the paging table shown in Fig.1, m is bits.

Solve the following problems

1. Assume that main memory is composed of three frames, and that a program requests pages in the following order: 1, 2, 1, 3, 1, 2, 4, 2, 1, 3, 4. Assume the main memory is initially empty.
- A. Using FIFO replacement, how many page faults will occur?
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- B. Using Least Recently Used replacement, how many page faults will occur?
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2. Consider a disk queue holding requests to the following cylinders in the listed order: 116, 22, 3, 11, 75, 185, 100, 87. Using the SCAN scheduling algorithm, what is the order that the requests are serviced, assuming the disk head is at cylinder 88 and moving upward/inward through the cylinders?
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