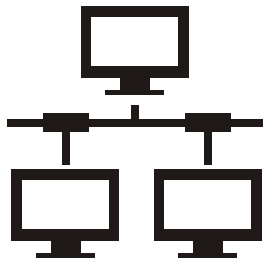
COMPUTER SCIENCE & IT



POSTAL
BOOK PACKAGE
2024

OBJECTIVE PRACTICE SETS

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1 CHAPTER

Basic Concepts of Operating System

Multiple Choice Questions & NAT Questions

Q.1 Consider the following code:

```
int n = 5;
while (n > 0)
{
    fork( );
    n--;
}
```

The total number of child processes created is equal to _____.

Q.2 Consider the following program:

```
main( )
{
    for(int i = 0; i < 4; i++)
    {
        fork0;
        fork0;
    }
}
```

The number of child processes created, is equal to _____.

Q.3 The following C program is executed on a Unix/Linux system.

```
# include <unistd.h>
int main( ) {
    int i;
    for (i = 1; i <= 50; i++)
        if (i % 2 == 0 || i % 3 == 0) fork( );
    return 0;
}
```

Then the number of child processes created is equal to _____.

Q.4 Consider the following code:

```
#include <unistd.h>
int main( )
{
    fork( );
    for (i = 1; i <= 5; i++)
    {
        fork( );
        printf("*");
    }
    return 0;
}
```

Then the number of times * is printed, is equal to _____.

Q.5 Which of the following need not necessarily be saved on a context switch between the processes?

(a) Program counter
(b) Stack pointer
(c) Translation lookaside buffer
(d) General purpose registers

Q.6 Which of the following should be allowed only in Kernel mode?

1. Changing mapping from virtual to physical address.
2. Mask and unmask interrupts.
3. Disabling all interrupts.
4. Reading status of processor.
5. Reading time of day.

(a) 1, 2 and 3
(b) 1, 2, 4 and 5
(c) 2, 3 and 5
(d) All of these

Q.7 An interrupt handler is a

(a) location in memory that keeps track of recently generated interrupts
(b) peripheral device
(c) utility program
(d) special numeric code that indicates the priority of a request

Q.8 Executing more than one program concurrently by one user on one computer is known as
(a) multiprogramming (b) time-sharing
(c) multitasking (d) multiprocessing

Q.9 The simultaneous processing of two or more programs by multiple processors is
(a) multitasking (b) multiprogramming
(c) time-sharing (d) multiprocessing

Q.10 Which of the following does not interrupt a running process?
(a) timer interrupts (b) device
(c) power failure (d) scheduling process

Q.11 System call is used to access
(a) I/O functionality
(b) operating system functionality
(c) application functionality
(d) None of the above

Q.12 Swapping is performed by
(a) long term scheduler
(b) mid term scheduler
(c) short term scheduler
(d) dispatcher

Q.13 Choose the false statement
(a) static linking requires no support of OS
(b) dynamic linking requires no support of OS
(c) dynamic loading requires no support of OS
(d) none of the above

Q.14 Assume that the kernel mode is non-preemptive. What happens when an I/O interrupt comes while a process 'P_1' is running in the kernel mode on the CPU?
(a) CPU is given to the process for which the I/O has completed
(b) CPU is given to some other process based on the scheduling policy
(c) P_1 continues to execute on the CPU
(d) None of the above

Q.15 Overlay is
(a) a part of an operating system
(b) a specific memory location
(c) a single contiguous memory that was used in the olden days for running large programs by swapping
(d) overloading the system with many user files

Q.16 When an interrupt occurs, an operating system
(a) ignores the interrupt
(b) always changes the stage of the interrupted process after processing the interrupt
(c) always resumes execution of the interrupted process after processing the interrupt
(d) may change the state of the interrupted process to "blocked" and schedule another process

Q.17 Consider the following statements:
S_1: The OS is designed to maximize the resource utilization.
S_2: The control program manages the system programs.
Which of the above statements is/are true?
(a) S_1 is true S_2 is false
(b) S_2 is true and S_1 is false
(c) Both S_1 and S_2 are true
(d) Both S_1 and S_2 are false

Q.18 Bootstrap loader is always stored in
(a) Cache (b) ROM
(c) RAM (d) disk

Q.19 Which of the following is true?
(a) Overlays are used to increase the size of physical memory.
(b) Overlays are used to increase the logical address space.
(c) When overlays are used, the size of a process is not limited to the size of physical memory.
(d) Overlays are used whenever the physical address space is smaller than the logical address space.

Q.20 Process is
(a) A program in high level language kept on disk
(b) Contents of main memory
(c) A program in execution
(d) A job in secondary memory

Q.21 The state of a process after it encounters an I/O instruction is?
(a) Ready
(b) Blocked
(c) Idle
(d) Running

Q.22 Which of the following statements is true?

(a) Hard real time OS has less jitter than soft real time OS

(b) Hard real time OS has more jitter than soft real time OS

(c) Hard real time OS has equal jitter as soft real time OS

(d) None of the above

Multiple Select Questions (MSQ)

Q.23 Consider a demand-paging system with the following time-measured utilizations:

CPU utilization	20%
Paging disk	97.7%
Order I/O devices	5%

Which (if any) of the following will not (probably) improve CPU utilization?

(a) Install a faster CPU.

(b) Install a bigger paging disk.

(c) Increase the degree of multiprogramming.

(d) Decrease the degree of multiprogramming.

Q.24 Consider a demand-paging system with the following time-measured utilizations:

CPU utilization	20%
Paging disk	97.7%
Order I/O devices	5%

Which (if any) of the following will (probably) improve CPU utilization?

(a) Install more main memory.

(b) Install a faster hard disk or multiple controllers with multiple hard disks.

(c) Add prepaging to the page fetch algorithms.

(d) Increase the page size.

Q.25 Which one of the following is/are true?

(a) Kernel is the program that constitutes the central core of the operating system.

(b) Kernel is the first part of operating system to load into memory during booting.

(c) Kernel is made of various modules which can not be loaded in running operating system.

(d) Kernel remains in the memory during the entire computer session.

Q.26 Which one of the following error will be handle by the operating system?

(a) Power failure

(b) Lack of paper in printer

(c) Connection failure in the network

(d) Disk failure

Q.27 Which of the following statement(s) is/are correct for unix system calls?

(a) exec is used to invokes another program overlaying memory space with a copy.

(b) brk( ) A process synchronizes with termination of child process.

(c) wait is used to to increase or decrease the size of data region.

(d) fork is used to creates a new process.

■■■■

Answers Basic Concepts of Operating System

1. (31)	**2.** (255)	**3.** (65535)	**4.** (12)	**5.** (c)	**6.** (a)	**7.** **(c)**	**8.** (c)	**9.** (d)
10. (b)	**11.** (b)	**12.** (b)	**13.** (b)	**14.** (c)	**15.** (c)	**16.** **(d)**	**17.** (a)	**18.** (b)
19. (c)	**20.** **(a)**	**21.** (b)	**22.** (a)	**23.** (a, b, c)	**24.** (a, b, c)	**25.** (a, b, d)	**26.** (a, b, c)	
27. (a, d)								

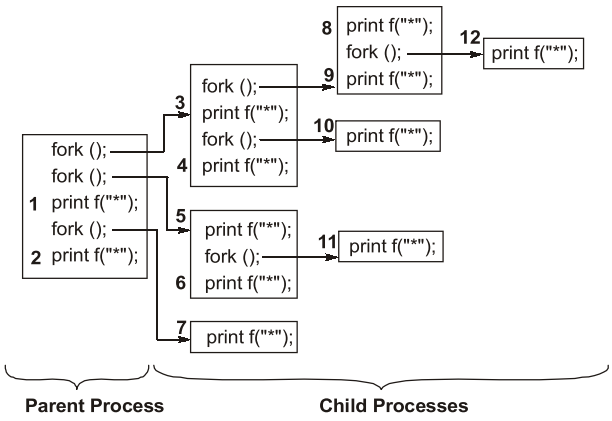
Explanations **Basic Concepts of Operating System**

1. **(31)**
There will be totally 5 fork calls after unrolling the loop, and 5 fork calls lead to $2^5-1 = 31$ child processes. Hence 31 will be the answer.

2. **(255)**
Unrolling the loop, we have totally 2*4 = 8 fork calls. So with 8 fork calls, we can have $2^8 - 1$, that is, 255 child processes. Hence answer is 255.

3. **(65535)**
If k is the total number of fork calls, then number of child processes created = $2^k - 1$
Total number of fork calls
= Number of integers between 1 and 50 which are divisible by either 5 or 7
= n(divisible by 5) + n(div by 7) – n(div by 35)
= 10 + 7 – 1 = 16
So, number of child processes
= $2^{16} - 1 = 65535$.

4. **(12)**
The code can be reduced to:
fork( )
fork( );
printf("*");
fork( );
printf("*");
Let's start the trace



Number of times * printed = 12
Therefore (12) is the answer.

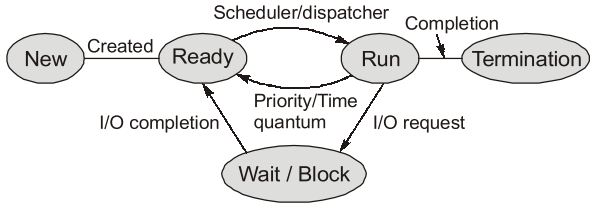
5. **(c)**
PCB doesn't need to save TLB entries during a context switch, as once a CS occurs, the TLB entries may become invalid as the virtual to physical mappings may be irrelevant to the newly scheduled process, so the TLB is generally flushed in this case. Hence (c) is the answer.

6. **(a)**
Only critical services must reside in the kernel. All services mentioned except reading status of processors and reading time of the day are critical. Hence option (a) is correct.

14. **(c)**
When the kernel is non-preemptive and any process is running in a kernel mode, then process continues to run until either it completes or it waits for some input/output.

16. **(d)**
When a interrupt occurs operating system decides the request on the fact that the interrupt has higher priority or less priority. If less, the interrupted process is resumed and only after the execution of process, the interrupt is handled. However if interrupt has higher priority the process is blocked and interrupt is entertained. Hence an operating system may or may not change the state of the interrupted process to "blocked" and schedule another process.

19. **(c)**
By using the overlays we can execute much greater processes simultaneously which cannot be execute and reside in the memory at the same time. In this the process to be executed process brought to memory only when it is needed at the time of execution.

20. **(a)**
The program under execution is called process.

21. **(b)**
The process state diagram is: