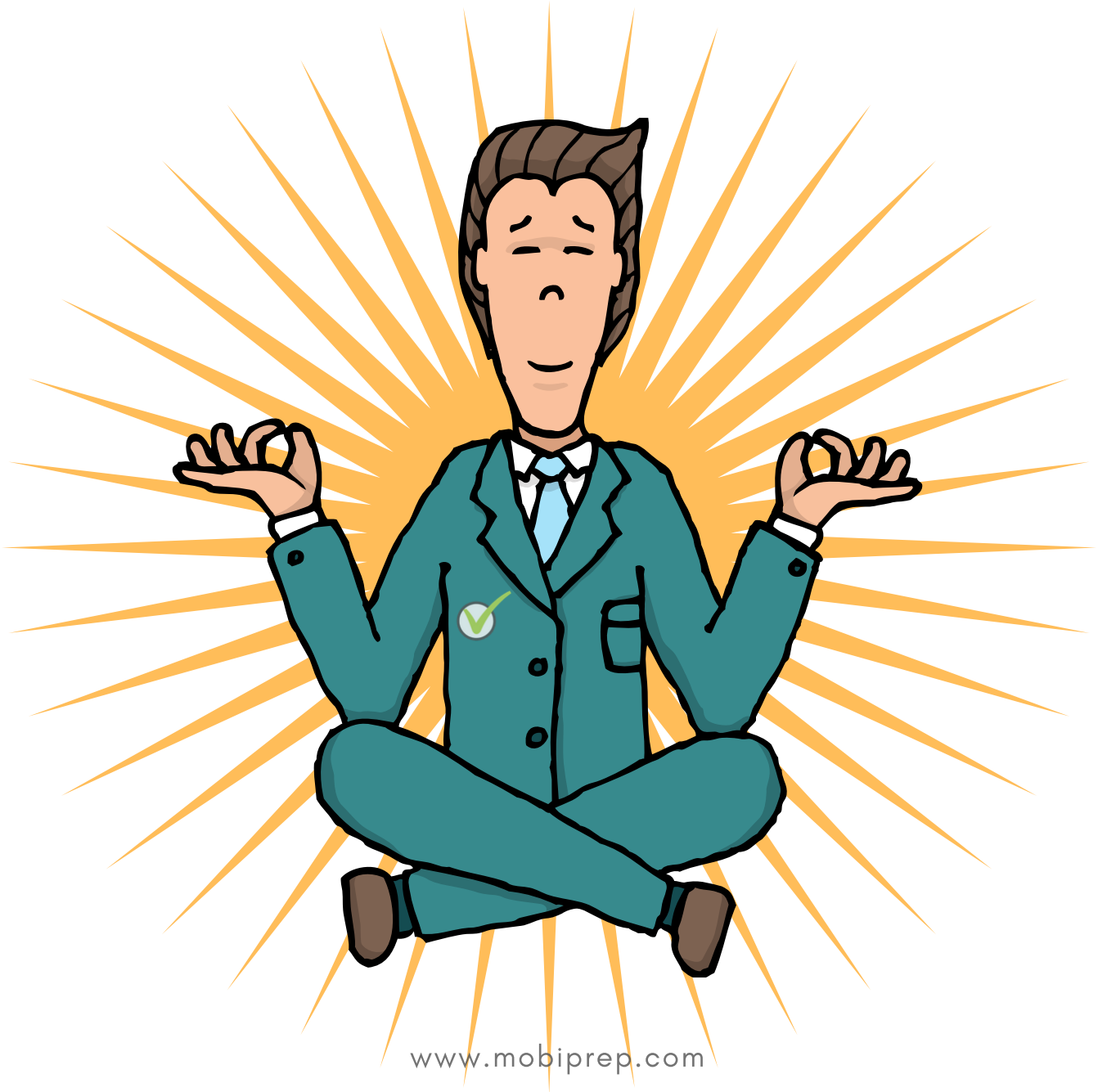
Placement handbook of

OPERATING SYSTEM

TOP 40 MCQ'S WITH ANSWERS



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TOP 40 OPERATING SYSTEM MCQ's WITH ANSWERS

1. Let m[0]…m[4] be mutexes (binary semaphores) and P[0] …. P[4] be processed.
Suppose each process P[i] executes the following:

```
wait (m[i]); wait(m[(i+1) mode 4]);
------
release (m[i]); release (m[(i+1)mod 4]);
```

This could cause-

(a) Thrashing
(b) Deadlock
(c) Starvation, but not deadlock
(d) None of the above

Ans-b

P[0] has acquired m[0] and waiting for m[1]
P[1] has acquired m[1] and waiting for m[2]
P[2] has acquired m[2] and waiting for m[3]
P[3] has acquired m[3] and waiting for m[0]

Hence a deadlock

So the answer is b.

2. Which of the following requires a device driver?
a) Register
b) Cache
c) Main memory
d) Disk

Answer: (d)

3. What is the swap space in the disk used for?
(a) Saving temporary html pages
(b) Saving process data

(c) Storing the super-block
(d) Storing device drivers
Answer (b)

Swap space is typically used to store process data.

4. Consider the following code fragment:

```
if (fork() == 0)
{ a = a + 5; printf("%d,%d\n", a, &a); }
else { a = a –5; printf("%d, %d\n", a, &a); }
```

Let u, v be the values printed by the parent process, and x, y be the values printed by the child process. Which one of the following is TRUE?

(a) u = x + 10 and v = y
(b) u = x + 10 and v != y
(c) u + 10 = x and v = y
(d) u + 10 = x and v != y

Answer -(c)

fork() returns 0 in child process and process ID of child process in parent process.
In Child (x), a = a + 5
In Parent (u), a = a – 5;
Therefore x = u + 10.

The physical addresses of 'a' in parent and child must be different. But our program accesses virtual addresses (assuming we are running on an OS that uses virtual memory). The child process gets an exact copy of parent process and virtual address of 'a' doesn't change in child process. Therefore, we get same addresses in both parent and child.

5. The process of transferring data intended for a peripheral device into a disk (or intermediate store) so that it can be transferred to peripheral at a more convenient time or in bulk, is known as

[A]. multiprogramming
[B]. spooling
[C]. caching
[D]. virtual programming

Ans- B.

Spooling means "simultaneous peripheral operation online". For example simultaneous means if two or more users issue the print command & the printer can accept the request even printing some other jobs. The printer printing one job at the same time the spool disk can load same other jobs.

6. The Register - to - Register (RR) instructions-

A. have both their operands in the main store.

B. which perform an operation on a register operand and an operand which is located in the main store, generally leaving the result in the register, except in the case of store operation when it is also written into the specified storage location.

C. which perform indicated operations on two fast registers of the machine and leave the result in one of the registers.

D. all of the above

Ans-C

7. In analyzing the compilation of PL/I program, the term "Machine independent optimization" is associated with

A. recognition of basic syntactic constructs through reductions.
B. recognition of basic elements and creation of uniform symbols.
C. creation of more optional matrix.
D. use of macro processor to produce more optimal assembly code

Ans-C

8. Which of the following is a block device?
A. mouse
B. printer
C. terminals
D. disk
Ans-D

A block device is one with which the driver communicates by sending entire blocks of data. For example, Hard disks.

9. Which of the following software types is used to simplify using systems software?
A. spreadsheet
B. operating environment
C. timesharing
D. multitasking
Ans-C

10. An instruction in a programming language that is replaced by a sequence of instructions prior to assembly or compiling is known as-
A. procedure name
B. macro
C. label
D. literal
Ans-B

11. A program-
A. is a device that performs a sequence of operations specified by instructions in memory.
B. is the device where information is stored
C. is a sequence of instructions
D. is typically characterized by interactive processing and time of the CPU's time to allow quick response to each user.
Ans- C

12. The minimum number of page frames that must be allocated to a running process in a virtual memory environment is determined by -
a) the instruction set architecture
b) page size
c) physical memory size
d) number of processes in memory

Answer (a)
Each process needs minimum number of pages based on instruction set architecture. Example IBM 370: 6 pages to handle MVC (storage to storage move) instruction
Instruction is 6 bytes, might span 2 pages.
2 pages to handle from.
2 pages to handle to.
13. A process executes the following code
```
 for (i = 0; i < n; i++) fork();
```
The total number of child processes created is
(A) n
(B) 2^n - 1
(C) 2^n
(D) 2^(n+1) - 1;

Answer (B)
```
       F0       // There will be 1 child process created by first fork
     /    \
   F1      F1    // There will be 2 child processes created by second fork
  / \      / \
 F2  F2  F2  F2  // There will be 4 child processes created by third fork
/ \  / \/ \ / \
 .....   // and so on
```
If we sum all levels of above tree for i = 0 to n-1, we get 2^n - 1. So there will be 2^n – 1 child processes.

14. Consider a disk pack with 16 surfaces, 128 tracks per surface and 256 sectors per track. 512 bytes of data are stored in a bit serial manner in a sector. The

capacity of the disk pack and the number of bits required to specify a particular sector in the disk are respectively:
(A) 256 Mbyte, 19 bits
(B) 256 Mbyte, 28 bits
(C) 512 Mbyte, 20 bits
(D) 64 Gbyte, 28 bits

Answer (A)
Capacity of the disk = 16 surfaces X 128 tracks X 256 sectors X 512 bytes = 256 Mbytes.
To calculate number of bits required to access a sector, we need to know total number of sectors. Total number of sectors = 16 surfaces X 128 tracks X 256 sectors = 2^19
So the number of bits required to access a sector is 19.

15. consider the 3 processes, P1, P2 and P3 shown in the table

Process	Arrival time	Time unit required
P1	0	5
P2	1	7
P3	3	4

The completion order of the 3 processes under the policies FCFS and RRS (round robin scheduling with CPU quantum of 2 time units) are
(A) FCFS: P1, P2, P3 RR2: P1, P2, P3
(B) FCFS: P1, P3, P2 RR2: P1, P3, P2
(C) FCFS: P1, P2, P3 RR2: P1, P3, P2
(D) FCFS: P1, P3, P2 RR2: P1, P2, P3

Answer (C)

16. Consider Peterson's algorithm for mutual exclusion between two concurrent processes i and j. The program executed by process is shown below.

```
repeat
   flag [i] = true;
```

```
    turn = j;
    while ( P ) do no-op;
    Enter critical section, perform actions, then exit critical
    section
    flag [ i ] = false;
    Perform other non-critical section actions.
  until false;
```

For the program to guarantee mutual exclusion, the predicate P in the while loop should be (GATE 2001)
a) flag [j] = true and turn = i
b) flag [j] = true and turn = j
c) flag [i] = true and turn = j
d) flag [i] = true and turn = i

Answer: (b)

Basically, Peterson's algorithm provides guaranteed mutual exclusion by using the two following constructs – flag[] and turn. flag[] controls that the willingness of a process to be entered in critical section. While turn controls the process that is allowed to be entered in critical section. So by replacing P with the following,
flag [j] = true and turn = j
process i will not enter critical section if process j wants to enter critical section and it is process j's turn to enter critical section.

17. The essential content(s) in each entry of a page table is / are
(A) Virtual page number
(B) Page frame number
(C) Both virtual page number and page frame number
(D) Access right information

Answer (B)

A page table entry must contain Page frame number. Virtual page number is typically used as index in page table to get the corresponding page frame number.

18. which one of the following page replacement policies, Belady's anomaly may occur?
(A) FIFO
(B) Optimal
(C) LRU
(D) MRU

Answer (A)

Belady's anomaly proves that it is possible to have more page faults when increasing the number of page frames while using the First in First Out (FIFO) page replacement algorithm.

19. Consider a disk system with 100 cylinders. The requests to access the cylinders occur in following sequence:
4, 34, 10, 7, 19, 73, 2, 15, 6, 20
Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1ms to move from one cylinder to adjacent one and shortest seek time first policy is used?

(A) 95ms
(B) 119ms
(C) 233ms
(D) 276ms

Answer (B)

4, 34, 10, 7, 19, 73, 2, 15, 6, 20
Since shortest seek time first policy is used, head will first move to 34. This move will cause 16*1 ms. After 34, head will move to 20 which will cause 14*1 ms. And so on. So cylinders are accessed in following order 34, 20, 19, 15, 10, 7, 6, 4, 2, 73 and total time will be (16 + 14 + 1 + 4 + 5 + 3 + 1 + 2 + 2 + 71)*1 = 119 ms.

20. The initial program that is run when the computer is powered up is called _____

a) boot program
b) bootloader
c) initializer
d) bootstrap program

Ans-d

21. How does the Hardware trigger an interrupt?

a) Sending signals to CPU through a system bus
b) Executing a special program called interrupt program
c) Executing a special program called system program
d) Executing a special operation called system call

Ans-a

22.The two ways of aborting processes and eliminating deadlocks are _____.

a) Abort all deadlocked processes
b) Abort all processes
c) Abort one process at a time until the deadlock cycle is eliminated
d) All of the mentioned

Ans-c

23. If we preempt a resource from a process, the process cannot continue with its normal execution and it must be _____.

a) aborted
b) rolled back
c) terminated
d) queued

Ans-b

24. What is the solution to starvation?
a) the number of rollbacks must be included in the cost factor
b) the number of resources must be included in resource preemption
c) resource preemption be done instead
d) all of the mentioned

Ans-a

25. What is the full name of the IDL?
a) Interface definition language
b) Interface direct language
c) Interface data library
d) None of these

Ans-(1) Interface definition language. The IDL stands for Interface Definition Language. It is used to establish communications between clients and servers in RPC (Remote Procedure Call).

26. If the page size increases, the internal fragmentation is also?..?
a) Decreases
b) Increases
c) Remains constant
d) None of these

Ans-(2) Increases

27. If a page number is not found in the translation lookaside buffer, then it is known as a?
a) Translation Lookaside Buffer miss
b) Buffer miss
c) Translation Lookaside Buffer hit
d) All of the mentioned

Ans-(1) Translation Lookaside Buffer miss.

A Translation Lookaside Buffer miss arises when the page table entry needed to translate a virtual address to a physical address is not available in the translation lookaside buffer.

28. Those processes should be aborted on occurrence of a deadlock, the termination of which?

a) is more time consuming
b) incurs minimum cost
c) safety is not hampered
d) all of the mentioned

Ans-b

29. In a system with 32 bit virtual addresses and 1 KB page size, use of one-level page tables for virtual to physical address translation is not practical because of (GATE CS 2003)

a) the large amount of internal fragmentation
b) the large amount of external fragmentation
c) the large memory overhead in maintaining page tables
d) the large computation overhead in the translation process

Answer (c)
Since page size is too small it will make size of page tables huge.

Size of page table =
(total number of page table entries) *(size of a page table entry)
Let us see how many entries are there in page table

Number of entries in page table =
(virtual address space size)/(page size)
= (2^32)/(2^10)

= 2^22

Now, let us see how big each entry is.

If size of physical memory is 512 MB then number of bits required to address a byte in 512 MB is 29. So, there will be (512MB)/(1KB) = (2^29)/(2^10) page frames in physical memory. To address a page frame 19 bits are required. Therefore, each entry in page table is required to have 19 bits.

Note that page table entry also holds auxiliary information about the page such as a present bit, a dirty or modified bit, address space or process ID information, amongst others. So size of page table

> (total number of page table entries) *(size of a page table entry)
> (2^22 *19) bytes
> 9.5 MB

And this much memory is required for each process because each process maintains its own page table. Also, size of page table will be more for physical memory more than 512MB. Therefore, it is advised to use multilevel page table for such scenarios.

30. An edge from process Pi to Pj in a wait for graph indicates that _____

a) Pi is waiting for Pj to release a resource that Pi needs
b) Pj is waiting for Pi to release a resource that Pj needs
c) Pi is waiting for Pj to leave the system
d) Pj is waiting for Pi to leave the system

Answer: a

31.Let the page fault service time be 10 ms in a computer with average memory access time being 20 ns. If one page fault is generated for every 106 memory accesses, what is the effective access time for the memory?

a) 21 ns
b) 30 ns
c) 23 ns
d) 35 ns

Answer-
Given-
Page fault service time = 10 ms
Average memory access time = 20 ns
One page fault occurs for every 106 memory accesses
It is given that one page fault occurs for every 106 memory accesses.
Thus,
Page fault rate
= 1 / 106
= 10-6
It is given that effective memory access time without page fault = 20 ns.

Now, substituting values in the above formula, we get-
Effective access time with page fault
= 10-6 x { 20 ns + 10 ms } + (1 – 10-6) x { 20 ns }
= 10-6 x 10 ms + 20 ns
= 10-5 ms + 20 ns
= 10 ns + 20 ns
= 30 ns
Thus, Option (B) is correct.

32.Suppose the time to service a page fault is on the average 10 milliseconds, while a memory access takes 1 microsecond. Then, a 99.99% hit ratio results in average memory access time of-
a) 1.9999 milliseconds
b) 1 millisecond
c) 9.999 microseconds
d) 1.9999 microseconds
e) None of these

Given-
Page fault service time = 10 msec
Average memory access time = 1 μsec
Hit ratio = 99.99% = 0.9999

Page fault rate
= 1 – Hit ratio
= 1 – 0.9999
= 0.0001
It is given that effective memory access time without page fault = 1 μsec.

Substituting values in the above formula, we get-
Effective access time with page fault
= 0.0001 x { 1 μsec + 10 msec } + 0.99999 x 1 μsec
= 0.0001 μsec + 0.001 msec + 0.9999 μsec
= 1 μsec + 0.001 msec
= 1 μsec + 1 μsec
= 2 μsec or 0.002 msec

Thus, Option (E) is correct.

33.Virtual memory is

(a) Large secondary memory
(b) Large main memory
(c) Illusion of large main memory
(d) None of the above

Answer-
Explanation: Virtual memory is illusion of large main memory.

34.Thrashing occurs when

(a) When a page fault occurs
(b) Processes on system frequently access pages not memory
(c) Processes on system are in running state
(d) Processes on system are in waiting state

Answer-Thrashing occurs when processes on system require more memory than it has. If processes do not have "enough" pages, the page fault rate is very high. This

leads to:

– low CPU utilization
– operating system spends most of its time swapping to disk
The above situation is called thrashing.

35.Which one of the following is not shared by threads?

a) program counter
b) stack
c) both (a) and (b)
d) none of the mentioned

Answer-option (c)

36. Consider the following snapshot of a system running n processes. Process i is holding Xi instances of a resource R, 1 <= i <= n. currently, all instances of R are occupied. Further, for all i, process i has placed a request for an additional Yi instances while holding the Xi instances it already has. There are exactly two processes p and q such that Yp = Yq = 0. Which one of the following can serve as a necessary condition to guarantee that the system is not approaching a deadlock?
a) min (Xp, Xq) < max (Yk) where k != p and k != q
b) Xp + Xq >= min (Yk) where k != p and k != q
c) max (Xp, Xq) > 1
d) min (Xp, Xq) > 1

Answer-
Since both p and q don't need additional resources, they both can finish and release Xp + Xq resources without asking for any additional resource. If the resources released by p and q are sufficient for another process waiting for Yk resources, then system is not approaching deadlock.Hence option(b) is correct.