SNS COLLEGE OF TECHNOLOGY

COIMBATORE – 35

DEPARTMENT OF COMPUTER SIENCE AND ENGINEERING (UG & PG)

Second Year, 4th Semester

2 Marks Question and Answer

Subject Code & Name: 19CSB201- OPERATING SYSTEMS

1. Differentiate Logical Address Space & Physical Address Space.

Logical Address Space	Physical Address Space
Logical address is generated by CPU.	Physical Address is an address of main memory.
Set of all logical addresses generated by program is a Logical Address Space.	Set of all physical addresses corresponding to logical address is a Physical Address Space.

2. Define Overlays.

The idea to keep in memory only those instructions and data that are needed at any given time are known as overlays. We can use overlays to enable a process to be larger than the amount of memory allocated to it.

3. Define Swapping.

It is a technique of temporarily removing inactive program from the memory of a system. It removes the process from the primary memory when it is blocked and deallocating the memory. Then this free memory is allocated to other processes.

4. What is fragmentation?

fragmentation is a phenomenon in which storage space is used inefficiently, reducing storage capacity and in most cases performance. The term is also used to denote the wasted space itself.

There are three different but related forms of fragmentation: *external* fragmentation, *internal* fragmentation, and *data* fragmentation

5. What are the 2 types of fragmentation?

The 2 types of fragmentations are,

i. Internal fragmentation
ii. External fragmentation

6. Define Compaction.

When enough total memory space exists to satisfy a request, but it is not contiguous, storage is fragmented into a large number of small holes. This situation leads to the external fragmentation. One of the solutions to this problem is compaction. Compaction is to move all the allocated holes to one side and all free holes are moved to another side.

7. What is paging?

Paging is a memory management scheme that permits the physical address space of a process to be non-contiguous. Paging reduces the external fragmentation.

8. What are the advantages of Paging?

- Support higher degree of multiprogramming.
- Paging reduces fragmentation.
- Paging increases memory and processor utilization.
- Compaction overhead required for the relocatable partition scheme is also eliminated.

9. What is TLB?

The TLB is associative, high speed memory. Each entry in the Translation Look aside Buffer (TLB) consists of two parts: a key or tag and a value. The search is fast, hardware is expensive. The number of entries in a TLB is small, often numbering between 64 and 1,024.

10. Define hit ratio.

The percentage times that a particular page number is found in the TLB is called the hit ratio.

11. How do you calculate the effective memory access time?

To find effective memory access time, we must weigh each by its probability:

For example, consider a page number that is found 80 percent of times in a TLB.

If it takes 20 nanoseconds to search and 100 nanoseconds to access the memory, then the mapped memory access takes 120 nanoseconds. If we fails to find page number in TLB (20 nanoseconds), then we must first access memory for the page table and frame number (100 nanoseconds), and then access the desired byte in memory (100 nanoseconds), for a total of 220 nanoseconds.

Effective memory access time = 0.80*120+0.20*220

= 140 nanoseconds.

12. Define reentrant code or pure code.

Re-entrant code is non-self-modifying code. If the code is re-entrant, then it never changes during execution.

13. Define segmentation.

Segmentation is a memory management scheme. Segmentation divides a program into a number of smaller blocks called segments. A segment can be defined as a logical grouping of information, such as sub routine, array or data area. **Segmentation** is variable size.

14. Differentiate LDT and GDT.

Local Descriptor Table	Global Descriptor Table
Information about the first partition among the two partitions of the logical address space is kept in the LDT.	Information about the second partition among the two partitions of the logical address space is kept in the GDT.
This first process is private to the processes.	This second process is shared among to the processes.

15. What is address binding?

Binding the memory address of instructions and data is called as address binding. Address binding can be done in three ways

1. Compile time
2. Load time
3. Execution time.

16. How do you protect the memory?

By implementing the machine architecture in the form of memory bound registers we can protect the memory. By using Memory management Unit that is combination of relocation register and limit register we protect the memory.

17. What is TLB hit & TLB miss?

The required page is available in the TLB cache, and then it is called TLB hit. The required page is not in the TLB, it is called TLB miss.

Refer the page number: 293

18. What are the different types of page table structure?

- Hierarchical Paging
- Hashed page table
- Inverted page table

19. Give 2 examples of OS for segmentation with paging.

- IBM OS/2 32- bit
- Linear address in Linux

20. Define Virtual memory.

Virtual memory is a technique that allows the execution of processes that may not be completely in memory. One major advantage of this scheme is that programs can be larger than physical memory. Running a program that is not entirely in memory would benefit both the

system and the user. Virtual memory is commonly implemented by demand paging. Virtual memory is available in the secondary storage.

21. Define demand paging.

Virtual memory is commonly implemented by demand paging. A **demand paging** is similar to a paging system with swapping. With demand paging, a page is brought into the main memory only when a reference is made to a location on that page.

22. What is lazy swapper or pager?

Lazy swapper is a concept used in demand paging. A **swapper** manipulates entire processes, whereas a **pager** is concerned with the individual pages of a process. We thus use pager, rather than swapper, in connection with demand paging.

23. What is pure demand paging?

When the operating system sets the instruction pointer to the first instruction of the process, which is on a non-memory-resident page, the process immediately faults for a page. After this page is bought into memory, the process continues to execute, faulting as necessary until every page that it needs is in memory. At that point, it can execute with no more faults. This scheme is called **pure demand paging:** Never bringing a page into memory until it is required.

24. Explain equal allocation & proportional allocation.

The easiest way to spilt m frames among n processes is to give everyone an equal share, m/n frames. This scheme is called equal allocation.

We allocate available memory to each process according to its size. This scheme is called proportional allocation.

25. What is dirty bit or modified bit?

If no frames are free, two page transfers are required which doubles the page fault service time and increases the effective access time accordingly. We can reduce this over head by using **modify bit or dirty bit.** Each page or frame may have a modify bit associated with it in the hardware. The modify bit for a page is set by the hardware whenever any word or byte in the page is written into, indicating that the page has been modified.

26. What is the major problem for implementing demand paging?

- It needs some hardware and software support

- the major difficulty occurs when one instruction may modify several different locations.

27. Define Belady's Anomaly.

For some page replacement algorithms, the page fault rate may increase as the number of allocated frames increases. This problem is known as Belady's Anomaly. FIFO page replacement algorithm may affect this unexpected problem.

28. What is the difference between global and local replacement algorithm?

Global replacement allows a process to select a replacement frame from the set of all frames, even if that frame is currently allocated to some other process; one process can take a frame from another.

Local replacement requires that each process select from only its own set of allocated frames.

29. Define Thrashing.

The high paging activity is called Thrashing. A process is thrashing if it is spending more time paging than executing.

30. How do you calculate the effective memory access time?

Effective access time is directly proportional to the page fault rate. It is important to keep the page fault rate low in a demand paging system. Otherwise, the effective access time increases, slowing process execution dramatically.

Let p be the probability of a page fault ($0 \leq p \leq 1$)

Effective access time = (1-p)*ma + p*page fault time

Where

p – Page fault

ma – memory access time

31. Define zero-fill-on-demand.

Many operating systems provide a pool of free pages for new requests. These free pages are typically allocated when the stack or heap for a process must expand or for managing copy-on-write pages. These pages are allocated by operating system using a technique called zero-fill-on-demand. Zero-fill-on-demand pages have been zeroed-out before being allocated, thus erasing the previous contents of the page.

32. What is copy-on-write?

Copy-on-write works by allowing the parent and child processes to initially share the same pages. These shared pages are marked as copy-on-write pages, meaning that if either process writes to a shared page, a copy of the shared page is created.

33. What is the cause of thrashing?

1. Thrashing results in severe performance problems.
2. CPU utilization is too low.
3. Page fault rate may increases.
4. Reduce the system throughput.

34. Difference between segmentation & paging.

segmentation	paging
Program is divided into variable size segments.	Program is divided into fixed size pages.
It is slower than paging.	It is faster than segmentation.
Segmentation is user view of memory.	Paging is not a user view of memory.
Segmentation may suffer from external fragmentation.	Paging suffers from internal fragmentation.
It uses segment table as a hardware support	It uses page table as a hardware support
It does not use TLB	It use the TLB cache

35. Compare paging with demand paging.

paging	Demand paging
Program is divided into fixed size pages.	Program is divided into fixed size pages.
It is faster	It is some what slow compare to paging .
Whole program is loaded into main memory when it is executed	Only needed page should loaded into memory
It does not use the page replacement algorithm	It uses the page replacement algorithm
It can not affected by the thrashing	It may affected by the thrashing
Effective access time is less	Effective memory access time is high compare to paging

36. When does page fault occurs?

The required page is not available in main memory, and then the page fault will occur.