41 Lecture - CS501

Important Subjective

1. **Explain the concept of cache hit and cache miss with an example.**
   Answer: A cache hit occurs when the data requested by the processor is present in the cache memory. On the other hand, a cache miss occurs when the requested data is not present in the cache memory. For example, let's consider a cache memory that stores the contents of the main memory. If a processor requests a particular data that is present in the cache memory, then it is a cache hit. However, if the processor requests a data that is not present in the cache memory, then it is a cache miss. In this case, the data needs to be fetched from the main memory and stored in the cache memory for future use.

   How is the hit rate of a cache memory calculated?
   Answer: The hit rate of a cache memory is calculated by dividing the number of cache hits by the total number of memory access requests. For example, if a cache memory receives 100 memory access requests and 80 of them result in cache hits, then the hit rate of the cache memory is 80%.

   Explain the difference between DRAM and SRAM.
   Answer: DRAM (Dynamic Random Access Memory) and SRAM (Static Random Access Memory) are two types of memory used in computer systems. The main difference between the two is that DRAM stores data in a capacitor, which requires constant refreshing to maintain its contents, while SRAM stores data in a flip-flop, which does not require refreshing. This makes SRAM faster and more expensive than DRAM. Additionally, DRAM is typically used for main memory, while SRAM is used for cache memory.

   What is the concept of page replacement in virtual memory?
   Answer: Page replacement is a technique used in virtual memory to manage memory allocation. When the available physical memory becomes full, the operating system swaps some of the pages in memory to the hard disk to free up space. When a process needs a page that is not present in physical memory, the operating system replaces a page that is currently in memory with the requested page from the hard disk. This is called page replacement.

   How does the size of a cache affect its performance?
   Answer: The size of a cache memory directly affects its performance. A larger cache memory can hold more data, which increases the chances of a cache hit and reduces the number of cache misses. This, in turn, reduces the time required to access data from the main memory, resulting in faster overall performance. However, a larger cache memory also requires more power and is more expensive than a smaller cache memory.

   What is the concept of write-back and write-through in cache memory?
   Answer: Write-back and write-through are two techniques used in cache memory to update the main memory. In the write-back technique, when a write operation is performed on the cache memory, the corresponding data in the main memory is not immediately updated. Instead, the data in the cache memory is marked as "dirty" and the update is deferred until a later time. In the write-through technique, the data in the cache memory and the main memory are updated

simultaneously for every write operation.

Explain the concept of associative mapping in cache memory.
Answer: Associative mapping is a technique used in cache memory to store data. In this technique, each block of data in the cache memory is associated with a tag that identifies the location of the block in the main memory. When the processor requests a block of data, the cache memory compares the tag of the requested block with the tags of all the blocks in the cache memory. If a match is found, the corresponding block of data is returned. This allows the cache memory to store data in a flexible manner without requiring a fixed address mapping.

What is the concept of TLB