**Review questions chapter 4**

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| 1. **What are the differences among sequential access, direct access, and random access?**   Sequential access is accessing data in a specific linear sequence (example: tapes). Direct access has the data address based on a physical location. With random access, any location can be selected at random, and the addressable locations in memory have a unique, physically wired-in addressing mechanism.   1. **What is the general relationship among access time, memory cost, and capacity?**   Faster access time, greater cost per bit; greater capacity, smaller cost per bit; greater capacity, slower access time.   1. **How does the principle of locality relate to the use of multiple memory levels?**   It is possible to organize data across a memory hierarchy such that the percentage of accesses to each successively lower level is substantially less than that of the level above. Because memory references tend to cluster, the data in the higher level memory need not change very often to satisfy memory access requests.   1. **What are the differences among direct mapping, associative mapping, and set-associative mapping?**   In a cache system, direct mapping maps each block of main memory into only one possible cache line.  Associative mapping permits each main memory block to be loaded into any line of the cache.  In set-associative mapping, the cache is divided into a number of sets of cache lines; each main memory block can be mapped into any line in a particular set.   1. **For a direct-mapped cache, a main memory address is viewed as consisting of three fields.  List and define the three fields.**   One field on the direct-mapped cache memory identifies a unique word or byte within a block of main memory. The remaining two fields specify one of the blocks of main memory. These two fields are a line field, which identifies one of the lines of the cache, and a tag field, which identifies one of the blocks that can fit into that line.   1. **For an associative cache, a main memory address is viewed as consisting of two fields. List and define the two fields.**   A tag field uniquely identifies a block of main memory. A word field identifies a unique word or byte within a block of main memory. |