Topic: Memory Hierarchy

Suggested reading:

[Wikipedia Page of Memory Hierarchy](#)

Sections 10.1 and 10.2 from Book by Silberschatz, Chapter 10

[Slides by Silberschatz](#)

We are going to learn about internal of DBMS. This includes understanding of file structure and implementation of relational algebra operators. However, to understand these concepts we need to be aware of two points: memory hierarchy and cost model of DBMS.

Let us first start with the memory hierarchy. The fastest memory on the computing system is the processor cache. Even within the processor cache, there are various levels typically referred as L1 and L2 cache. Then comes the main memory or Random Access Memory (RAM). Both cache and RAM are non-persistent memories. It means that the data stored in these types of memories cannot survive if you power-off the system.

Next comes the non-volatile or persistent storage. It can either be in the form of flash memory or magnetic disks. These are also referred as secondary storage. Then comes the tertiary storage in the form of optical disks and magnetic tapes. As we move from processor cache to magnetic tapes, time required to fetch the data goes on increasing and cost of storage per byte goes on decreasing.

In our analysis, we will assume that the DBMs stores the data on secondary storage and fetches it in the main memory for processing. We will mostly ignore the rest of the memory hierarchy for the sake of simplicity. This model is not perfect. But as the saying goes, "All models are wrong. Some models are useful"

Homework

https://docs.google.com/spreadsheets/d/16_kfW2MECgJkzaoN-loPQaszbHC1ouKnG912NmgHhso/edit?usp=sharing

Post the time required to fetch data from various types of memories. Try to find some old as well as the latest memory products. We will like to see how memory hierarchy has evolved over the time. The given link is a shared Google doc amongst all. For each entry, you have to fill in five columns. For the column memory hierarchy, you have to mention whether it is a Cache/ RAM/ Secondary storage/ Tertiary storage.