11: Caching

Analogy

Imagine you are a student and you are studying for a test. You might have a notebook where you write down important information that you need to remember for the test. This notebook is like a cache, because it stores information that you need to access quickly. Instead of having to search through all of your textbooks and notes every time you need to remember something, you can just look in your notebook and find the information you need. This makes studying more efficient, because you can access the information you need more quickly. In a similar way, caching in computing allows a processor to quickly access data that it frequently uses, improving the overall performance of the computer.

Definition

In simple terms, caching is a way of storing data in a temporary storage area so that it can be quickly accessed by a computer's processor. This can help improve the performance of the computer by allowing the processor to access frequently used data more quickly, without having to retrieve it from a slower storage device.

Types of Caching

- **Memory caching**: This is the most common type of caching, and it involves storing frequently accessed data in the computer's main memory, or RAM so that it can be quickly accessed by the processor. ⭐
    - eg. Google, which uses memory caching in its Android operating system and various online services, such as search and maps, to store frequently accessed data in memory, so that it can be quickly accessed by the processor.
    - Apple, which uses memory caching in its Mac and iOS devices to store frequently accessed data, such as files and programs, in memory, so that they can be quickly accessed by the processor.
- **Disk caching**: This type of caching involves storing frequently accessed data on the computer's hard drive or solid-state drive, so that it can be quickly accessed

without having to retrieve it from a slower storage device, such as a network location.

- **Browser caching:** This type of caching is used by web browsers to store frequently accessed web pages and resources, such as images and stylesheets so that they can be quickly loaded when the user revisits the same website. ⭐
    - eg. Google, which uses browser caching in its Chrome web browser to store frequently accessed web pages and resources, such as images and stylesheets, so that they can be quickly loaded when the user revisits the same website.
    - Amazon, which uses browser caching on its Amazon.com website to store frequently accessed web pages and resources, such as images and stylesheets, so that they can be quickly loaded when the user revisits the website.
- **CDN caching:** This type of caching is used by content delivery networks (CDNs) to store copies of frequently accessed web content, such as images and videos, at locations around the world, so that users can access the content more quickly. ⭐
- **Database caching:** This type of caching is used by database systems to store frequently accessed data in memory so that it can be quickly retrieved by applications. ⭐