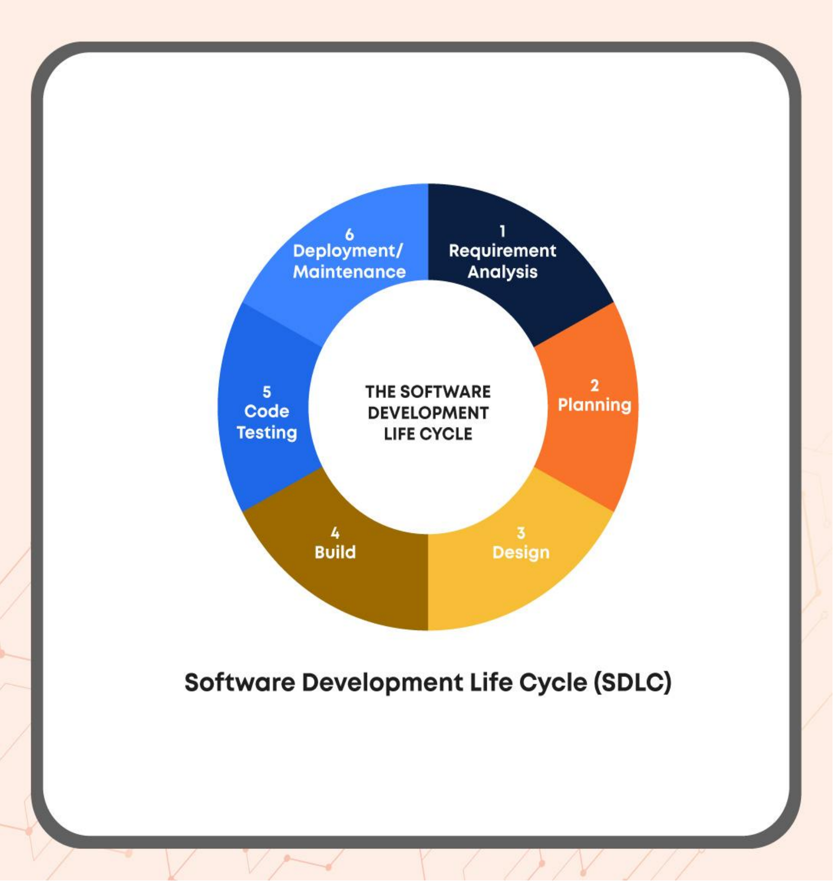
Introduction to System Design

System Design is one of the most critical steps in software development. System Design affects all significant steps from software implementation to its deployment.

What is system design?

System Design is the process of creating the architecture for different components, interfaces and modules of the system and providing it with data helpful in implementing the system elements.
It is the way toward characterising, creating, and planning frameworks that fulfil the necessities and prerequisites of a particular business or association.
It is the stage where the SRS report is changed over into a component division architecture that can be executed and decides the resulting framework execution.

So, let's look at the various phases of the life cycle of software :



Software Development Life Cycle (SDLC)

The steps are as follows:

1. Requirement Analysis:

Functional and Non-Functional requirements are collected by interacting with the stakeholders and users using different requirement elicitation techniques.

2. Planning/Analysis:
   The requirements are defined and documented after further analysis.
3. System Design:
   Architecture is created for the system and its components (High-Level design and Low-Level design)
4. Coding/Implementation:
   The software is built using suitable programming languages and technologies.
5. Testing:
   The quality of the software is evaluated.
6. Deployment/Maintenance:
   Software is prepared for release.

System designing is the backbone of software development, and all the further steps directly depend on the design prepared. It is crucial for any person indulging in software development roles to understand and master them. System Design is also frequently asked in interviews for primary product-based companies like Facebook, Google, and Amazon. The system design involves identifying the sources of data, the nature and type of data available.
For example: In order to create a salary calculation app, there is a need to use inputs, such as attendance, leave details, additions or reductions etc. This helps to understand what kind of data is available and who provides it to the system so that the system can be designed taking into account all relevant factors.

Now since we have understood the significance of the subject, let's dive deep into it.

The objective of System Design

1. Practicality:
   System designing is crucial in making a system that suits the needs of target users in real-time scenarios.
2. Correctness:
   The system must satisfy all the functional and non-functional requirements of the stakeholders and users.
3. Completeness:
   The system should be complete in all terms, from components to functionality required and specified in the SRS (Software Requirement Specification).
   In addition, the system design leads to ensuring that the system is designed so that it meets the needs of the users and makes it user-oriented.
4. Efficiency:

The system should be resource-effective, and neither surpasses the cost nor fail to deliver any functionality. Another important goal of system design is concerned with creating a more efficient system to provide the required output and response time within the allotted time. In this way, the system design section ensures the safety and efficiency of the system.

5. Flexibility:
   The system should be able to adapt to the changing needs of the user. The other objective of this phase is to aim to build such a system that can be environmentally friendly and respond to changes if necessary.
6. Optimisation:
   It helps you understand how to optimize time (latency) and space (memory) for the individual components to run the entire system.
7. Reliability:
   System design helps to make software reliable. Reliability is defined as the failure-free system in a particular environment (or specific input cases) for a particular period of time.
   The system design also helps to achieve fault tolerance. **Fault tolerance** is the ability of the software to continue operating when one or two of its components stop working.

Advantages of System Design

1. Awareness of the full stack of the computer science i.e. API protocols, networking, databases, communication paradigms.
2. Increases efficiency and consistency.
3. The speedy software development process
4. Fewer mistakes, therefore, saves time and resources.
5. The actual procedure, therefore, saves resources.
6. Simpler and uncomplicated.
7. Reduces designing cost.