12-May-2025

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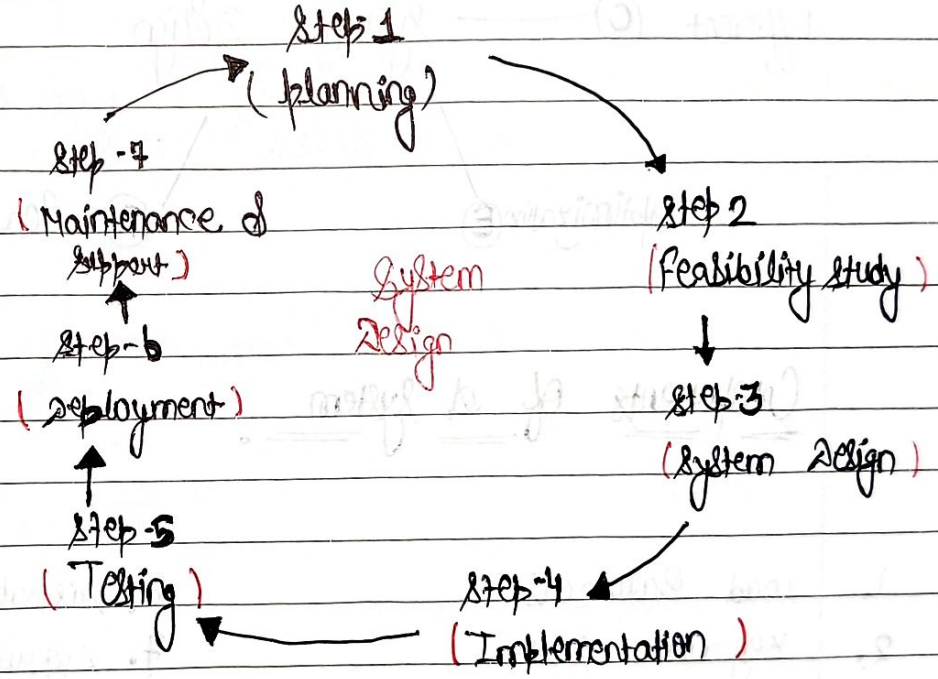
Lecture - 1

System Design

What is System Design :-

System design is the process of defining the architecture, components, Modules interface and data for a system to satisfy specified requirement.



Why Learn System Design :-

1. Plan
2. Analyze
3. System design
4. Develop
5. Implement
6. Maintain

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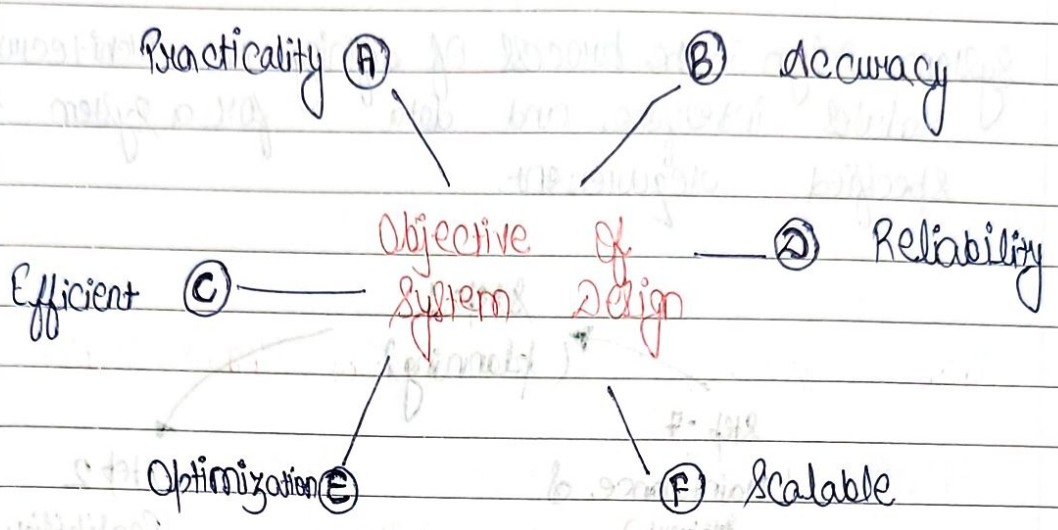
Objectives of System Design :-

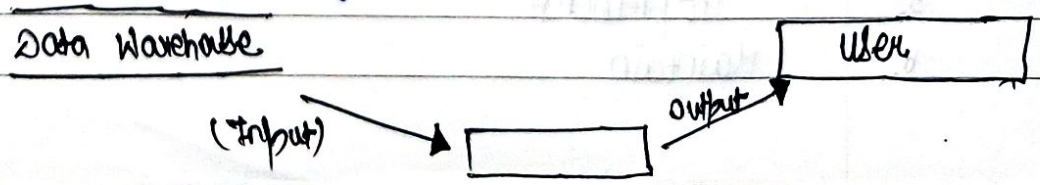


Components of a System.

1. Load Balancers
2. Key value store
3. Blob storage & Data base
4. Rate Limiter
5. Monitoring System
6. Distributed System Messaging Queue
7. Distributed Unique ID generator
8. Distributed Search
9. Distributed Logging Service
10. Distributed Task Scheduler.

How Data flows b/w system ?

Data flow is defined as a graphical representation of the flow of data through information.



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What is Low Level Design or LLD :-

LLD, Or Low-Level Design, is a phase in a software development process where detailed blueprint, and their interaction are specified, along with implementation. It involves converting the high level design into a more detailed blueprint.

Note :- Low level design is also known as Object-level designing Or Micro-level Or detailed designing.

3 pillers of Low Level Design :-

1. Scalability
2. Maintainability
3. Reuseability
   → Tightly Coupled

• Difference b/w the high level Design and Low Level Design :-

HLD		LLD
Structure component & relationships	describes	implementation details
Architects	Typically created by	Engineers

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High - Level Design	Low - Level Design
1. High Level Design is the general System design means it refer to the overall System Design.	Low Level Design is like detailing HLD it refer to component Level Design.
2. It is also knowns as macro level / System Design.	It is also known as micro level / detailed design.
3. It is describes the overall architecture of the application	It describes detailed description of each and every module.
4. High Level Design express the brief functionality of each Module.	Low Level Design express details of functional logic of the module.
5. It is created by Solution architect.	It is created by design-ers and developers.

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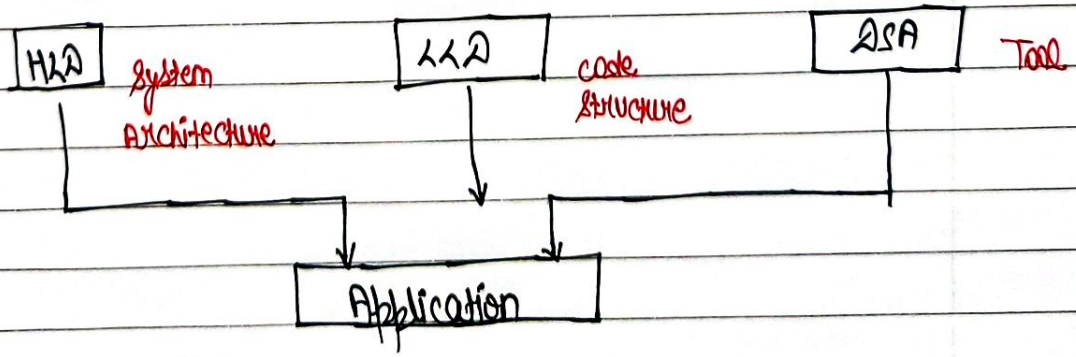
- How does LLD differ from Data Structure & Algorithm (DSA)?

Aspect	Low Level Design	Data Structure & Algorithm.
Focus	System / component design	Problem solving and optimization
Skills	OOPs, Design Pattern, architecture	Algorithms, logic, data structure
Objective	Code structure and maintainability	Efficiency and correctness
Example	Designing a Library managment system	Solving "Longest substring without repeating characters"
Real-world use	Used in system design interview	Used in coding interview.



Note :-
- DSA is a brain of an application
- LLD is a skeleton of an application