High-Level Design(HLD) and Low-Level Design(LLD)

System design architecture can be depicted as High-Level Design(HLD) or Low-Level Design(LLD). Let's look at what they signify.

1. **High-Level Design(HLD):**
   This kind of architecture takes into consideration the main components that would be developed for the resulting product. The designer only focuses on a high-level overview, including
   - principal components,
   - database
   - services
   - relationships between each module/component

   with a brief description of the system.

2. **Low-Level Design(LLD):**
   On the contrary, this kind of architecture considers the in-depth and detailed design of each component mentioned in the High-Level Design of the system. It exposes the logical relationship between different elements and a detailed description of all the modules. Low-Level Design includes more technical information as compared to High-Level Design. Low-Level Design includes the description of the following components:
   - IP Address
   - Class Diagrams, Sequence Diagram, Activity Diagrams
   - VLAN and Port Numbering
   - Information about all the platforms, services, and processes of the product would depend on
   - Algorithm and pseudocode
   - Different Classes, interfaces and the relationship between them
   - Relationships between the modules and system features
   - External Interface Requirements, Hardware and Software Interfaces
   - Design and Implementation Constraints

Example 1:
Suppose Ram wants to create a social media app. The high-level design will consist of an overview of the system like a mobile app for ios/Android, an app for OS/X & Windows, Web GUI, SQL/No-SQL database. In contrast, the low-level design would consist of how each user application is logically linked to other modules and all the extra details of each component mentioned in the HLD that’s useful and necessary before developers can start writing the code directly.

Example 2:

Let’s try to design a Cab Booking System like Ola, Uber etc. An application like this has extensive design and functionalities involved. Well, let's try designing one.

First, we must understand the Functional and Non-Functional Requirements of such applications.

Functional Requirements:

- Checking nearest cab availability
- Booking a cab
- Fare calculation and payment
- GPS tracking for the cab

Non-Functional Requirements:

- Security (secure transactions)
- Reliability
- Scalability
- Less Response Time

High Level Design:

The High Level Design would consist of the major modules for Desktop and Mobile Client like:

- Manage Car Details
- Manage Customer Details
- Manage Booking Details
- Manage Price Details
- Manage Payment Details
- Manage Car Insurance Details
- Map Service

The admin application would mainly consist of a cab request service and cab finder service. Also, remember that the live location of a driver is always shared with the system, this can be further managed by a tracking module i.e. the location service.
The trip completion event would be managed by the payment service which would calculate the price on the basis of distance covered and the rate per unit distance.
High-Level Design would include a brief description of the basic functionalities like user login to the system, checking credentials, Check car availability in vicinity etc and the databases like profile database, authentication database.

Low-Level Design:

The Low Level Design would be the more detailed description of the High-Level Design. It would carry the details like:

- Payment Gateways linked to the payment service.

- Database along with the driver service, Payment Service, User Service, Trip Archives etc
- Detailed map service for location tracking.
- Private classes, private methods, private attributes
- Data structures and algorithms to be used

High-Level Design Vs Low-Level Design

The below table summarises the difference between HLD and LLD.

Parameter	High-Level Design (Macro-Level/System Design)	Low-Level Design (Micro-Level/ Detailed Design)
Abbreviations	HLD	LLD
Input	SRS (Software Requirement Specification)	Reviewed HLD (High- Level Design).
Definition	Describes the main components that would be developed for the resulting product.	Describes the design of each element mentioned in the High-Level Design of the system.
Content	The system architecture details, database design, services and processes, the relationship between various modules, and features.	Classes, interfaces, relationships between different classes, and actual logic of the various components.
Chronological order in the design phase	Created first	Created after High-Level Design is completed.
Technicality involved	Less technical	More Technical
Target Audience	Management and program team	Used by implementers and the coding team.