Session 1 - Notes

What happens in System Design?

1. Vague Questions
    1. Ask clarifying questions
    2. Follow A Framework
    3. Time-bound yourself
    4. Stay on track
2. No “Right” Answer!
    1. No Good or Bad Design
    2. Justifying our choices
    3. Explain/Call out Trade-offs
        1. Highlight Pros and Cons
        2. Why do pros outweigh cons
3. Two-way conversation
    1. Think out loud
    2. Check-in with your teammate
    3. Summarise your design
    4. Check on where to dive deeper

System Design Framework and Timelines:

Step 1: Define the scope - Ask questions (5-10 minutes)

Step 2: Design at a high-level (5 - 10 minutes)

Step 3: Deep-dive in 1-2 components (10 - 15 minutes)

Step 4: Identify points of failure / bottlenecks / scalability issues and fix the issues (10-15 minutes)

Step 5: Summarise, extend and discuss alternatives (5 - 10 minutes)

Types of Databases:

1. SQL
2. NoSQL

Examples of SQL: MySQL, Postgres, etc

A ⇒ Atomicity

All statements in a transaction will either be fully completed or fully rolled back in case of failure

C ⇒ Consistency

Data across tables will always be consistent

Deleting of primary keys without deleting foreign keys is not permitted.

I ⇒ Isolation

One transaction will not interfere with the changes being done in another transaction

Isolation ensures data integrity

D ⇒ Durability

Do not accidentally delete data ever.

If your DB crashes, your data should not be lost.

A transaction that has been COMMITED, should always persist in DB,

even in case of system crashes.

Transaction ⇒ Group of statements that is executed together

Unset

```
BEGIN TRANSACTION;

// Deduct money from my account

Update account_balance

SET account_balance = account_balance - 100

Where account_owner = “Abhishek”

// Add money in your account

Update account_balance

SET account_balance = account_balance + 100
```

```
Where account_owner = “student1”

// DB Crashes here

COMMIT;
```

Isolation Levels:

1. Read Uncommitted - Level 0
2. Read Committed - Level 1
3. Repeatable Read - Level 2 ⟹ Default
4. Serializable - Level 3 ⟹ Strictest

P.S Example of Isolation Levels will be covered again in Session 2