Schema Refinement [Normalization]

Development Steps:

High Level DB Design:

Requirement Analysis (Type of data/security/Operations)
Conceptual/Logical DB design (Table, Inter-relation)

Low Level DB Design:

Normalization
Physical DB Design (Indexing)
Application and Security Design (Query)

Key Attribute set

Minimum number of attributes used to differentiate all records of the DB.

Key Attribute set {Sid, Phno, Lno, (DOB,Fname) } ➔ Candidate Keys

Any one of the candidate keys can be assigned as a primary key.

Primary Key: One of the candidate keys (unique for relation)

Alternative Keys: All the candidate keys except Primary key.

Example Query:

```
Create table Emp (

Sid varchar (10) PRIMARY KEY,
Sname Varchar (10),
Phno varchar (20) UNIQUE,
Lno varchar (20) UNIQUE,
DOB data,
Fname varchar (15),
UNIQUE (DOB, Fname)
)
```

- Primary Key is not allowed to be null, But UNIQUE keys can be null.
- Only one Primary key is allowed.

Super Key: Super set of attributes to any candidate keys

{Sid, Sname} ➔Super key
{Sid ,Phno} ➔ super key
{Sname, DOB}➔ not super key

- Let R be the relational schema with n attributes
  R (A_1, A_2, ……., A_n)
  How many super keys are possible?

  A. With only candidate key A_1

  B. With CK A_1, A_2

  C. With CK A_1A_2, A_3A_4

  D. With CK A_1A_2, A_2A_3

Properties of Decomposition

- Lossless join decomposition:
  because of decomposition it should not create any extra tuple.

- Dependency preserving decomposition:
  dependency present in original relation must be preserved in the decomposition also.

Functional Dependency:

Trivial FD:

Non-Trivial FD: