Normalization- Relational database schema = set of relations,Relation = set of attributes,How we group the attributes to relations is very important,Normalization or Schema Refinement help determine “GOOD” relations. To avoid redundancy by storing each ‘fact’ within the database only once.To put data into a form that conforms to relational principles (e.g., single valued attributes, each relation represents one entity) - no repeating groups.

What problems (if any) does a given decomposition cause? Two properties of decompositions Loss-less join property, Dependency preserving property ,Normal forms have been proposed to preserve above properties. To avoid the above mentioned issues in the relational schema, we can apply a formal process called Normalization. Normalization is based on functional dependencies. FDs are used to specify *formal measures* of the "goodness" of relational designs

Closure of a set F of FDs is the set F^+ of all FDs that can be inferred from F, **Closure** of a set of attributes X with respect to F is the set X^+ of all attributes that are functionally determined by X,X^+ can be calculated by repeatedly applying IR1, IR2, IR3 using the FDs in F. Normalizations-Key points-Redundancy is based on functional dependencies,Therefore, *normalization* is based on functional dependencies,Therefore, relational database schema need to be refined.Schema Refinement Steps-Determine Functional dependencies for relation ,Find all keys in relation,Normalize the relation.

The relational model represents the database as a collection of **relations.**Relation consists of, Relation schema,Relation instance (table).relation schema -Describes the column heads (attributes) of the relation,name of the relation,name of each filed,domain of each field,Domain : is described by domain name and set of associated values .

A constraint involving *two* relations ,**referencing relation** ,**referenced relation**.Tuples in the *referencing relation* have attributes **FK** (called **foreign key** attributes) that reference the primary key attributes **PK** of the *referenced relation* .Display the foreign keys by drawing an arrow from the **foreign key** to the **primary key.** DBMS must prevent entry of incorrect information.

To prevent : Constraints / conditions are specified on a relational schema = ICs .Database which satisfies all constraints specified on a database schema is a legal instance.DBMS enforces constraints - permits only legal instances to be stored.When the application is run the DBMS checks for the violation and disallows the changes to the data that violates the specified IC. Specified and enforced at different times. **Specified :** When the DBA /end user defines the data base schema .**Enforced :** When database application is run,DBMS checks for violations,Disallow violating entries.