- **Database**: *Database is a single, large, organized collection of data that can be used simultaneously by many departments and users.*
- **Relational Database Design:** *In the relational model, data are represented in the form of tables. Each table has multiple columns, and each column has a unique name. Each row of the table represents one piece of information.*
- **Candidate Key**: *An attribute, or smallest set of attributes, that uniquely identifies a record within a relation.*
- **Primary key**: *Candidate key selected to identify records uniquely within relation.*
- **Foreign Key**: *A foreign key (FK) is a "copy" of a primary key that has been exported from one table and added as a new column in another table to represent the relationship between them*
- **Entity**: *a distinct object (a person, place, thing, etc) in the organisation that is to be represented in the database.*
- **Attribute**: *a property that describes some aspect of the object that we wish to record.*
- **Relationship**: *an association between entities.*
- **Base Relation**: *Named relation corresponding to a relation in conceptual schema, whose tuples are physically stored in a database.*
- **View**: *A virtual relation that does not necessarily exist in the database, with contents defined as a query on one or more base relations.*
- **Data Independence and the ANSI-SPARC Three-Level Architecture** (slide 13 of Ch. 2)
  - ***External Level:*** *Describes that part of database that is relevant to a particular user*
  - ***Conceptual Level****: Describes what data is stored in database and relationships among the data.*
  - ***Internal Level:*** *Physical representation of the database on the computer, describes how the data is stored in the database.*
- **Domain constraint**: *data type of attributes and the set of allowable values for one or more attributes.*

- **Entity integrity:** *In a base relation, no attribute of a primary key can be null.*

- **Referential integrity:** *If foreign key exists in a relation, either foreign key value must match a candidate key value of some record in its home relation or foreign key value must be wholly null.*

- **Database Design** (slide 4 of Ch. 10): The process of creating a design that will support the enterprise's mission statement and the mission objectives for the required database system
  - *Three phases of Relational Database Design:*
    - ***Conceptual:*** *to build the conceptual representation of the database, which includes identification of the important relations, relationships, and attributes*
    - ***Logical:*** *to translate the conceptual data model into a logical data model and then to validate this model to check that it is structurally correct and able to support the required transactions*
    - ***Physical:*** *Process of producing a description of the implementation of the database on secondary storage; it describes the base relations, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures*

- **ER Modeling**

  - ***Composite Attribute:*** *Attribute composed of multiple components, each with an independent existence. E.g. address attribute can be subdivided into street, city.*

  - ***Multi-valued Attribute:*** *Attribute that holds multiple values for each occurrence of an entity type. E.g. each occurrence of the Branch entity type can have multiple values for the telNo attribute.*

  - ***Derived Attribute:*** *Attribute that represents a value that is derivable from the value of a related attribute, or set of attributes, not necessarily in the same entity type. E.g. the duration attribute of the Lease entity is calculated from the rentStart and rentFinish attributes.*

  - ***Weak entity:*** *a weak entity cannot exist in the database unless another type of entity also exists in the database, but does not require that the identifier of that other entity be included as part of its own identifier.*

  - *A **binary relationship** is so called because it contains two entities and one*

association between them.

- *A **ternary relationship** is so called because it contains three entities and two associations among them.*
- ***Recursive / unary relationship** is the relationship type where the same entity type participates more than once in different roles.*

- **Enhanced ER Modeling**
  - ***Disjoint constraint:** Describes relationship between members of the subclasses and indicates whether member of a superclass can be a member of one, or more than one, subclass.*
  - ***Participation constraint:** Determines whether every member in superclass must participate as a member of a subclass. May be mandatory or optional, represented as {Mandatory} and {Optional} respectively.*
  - ***Specialization:** Process of **maximizing differences** between members of an entity by identifying their distinguishing characteristics. Sub-classes are created as a result.*
  - ***Generalization:** Process of **identifying their common characteristics** among entities. Superclass is created as a result.*
- **Normalization** *is a technique for producing a set of suitable relations with desirable properties, given the data requirements of an enterprise. As normalization proceeds, the relations become progressively more restricted (stronger) in format and also less vulnerable to update anomalies*
  - ***Determinant:** The **determinant** of a functional dependency refers to the attribute or group of attributes on the left-hand side of the arrow of a functional dependency.*
  - ***Full functional dependency:** the determinant has the *minimal* number of attributes necessary to maintain the dependency with the attribute(s) on the right hand-side.*
  - ***1NF:** A relation in which the intersection of each row and column contains one and only one value.*
  - ***2NF:** A relation that is in 1NF and every non-primary-key attribute is fully*

functionally dependent on the primary key.

- ***3NF:*** *A relation that is in 1NF and 2NF and in which no non-primary-key attribute is transitively dependent on the primary key.*
- ***BCNF:*** *A relation is in BCNF if and only if every determinant is a candidate key.*

- **SQL (Structured Query Language)**
  - ***DDL (Data Definition Language):*** *for defining database structure:*
  - ***DML (Data Manipulation Language):*** *for retrieving and updating data*