**Lesson 7**

**Objectives**

* Three Level ANSI-SPARC Architecture
  + External level
  + Conceptual Level
  + Internal Level

Three level architecture provides a base for understanding some of the functionality of a DBMS.

This architecture is used to show and describe the data at three distinct levels.

**External Level**

The way user perceives the data is called the external level.

* This level describes that which part of database is relevant to whom user.
* Consist of a number of different external views
* View consists of only those attributes, which are of interest of user.
  + Remaining will be in database but particular user will be unaware of those.
* Different views have different representations of same data. e.g. date of birth, age, etc.
* Calculated data, e.g. total salary from commission and gross salary.

**Conceptual Level**

Provides mapping and the desired independence between external and internal level.

* This level describes what data is stored in the database and the relationship among data.
* Logical structure of the database
* Complete view of the data requirements of the organization that is independent of any storage consideration.
  + Entities, attributes and their relationships.
  + Constraints on data
  + Security information

**Internal Level**

The physical representation of the database on the computer.

Describes how the data is stored in the database

* Data structures and file organizations on storage devices

Graphical representation of three level architecture is given in figure below



Objective of three Level Architecture

The objective of the three-level architecture is to separate each user’s view of the database from the way the database is physically represented. There are several reasons why this separation is desirable:

* End user should be able to access the same data, but hava different customized view of the data. Each user should be able to change the way he or she views the data, and this change should not affect other users.
* Users should not have to deal directly with physical database storage details, such as indexing or hashing. In other words, a user’s interaction with the database should be independent of storage considerations.
* The database administrator (DBA) should be able to change the database storage structures without affecting the user’s views.
* The internal structure of the database should be unaffected by changes to the physical aspects of storage, such as the changeover to a new storage device.
* The DBA should be able to change the conceptual structure of the database without affecting all users.

From the above discussion we can conclude that the main objective is to achieve the data independence which means upper levels are unaffected by changes to lower level.

Achieved independence can be categorized into following way

* Logical Data Independence
* Physical Data Independence

**Logical Data Independence**

Refers to the immunity of the external schemas to changes in the conceptual schema.

* Changes in conceptual schema only effect the user for whom the changes have been made
  + Other users should not be

**Physical Data Independence**

Refers to the immunity of the conceptual schemas to changes in the internal schema.

* Changes in internal schema such as using different file organizations will not affect external schema.
  + Storage structures.
  + Different storage devices.

Pictorial representation for the independence is given in figure below

