**Course: CS-400**

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**Timings:**

**Lesson 1**

**Objectives**

* What is database?
  + What is data?
  + Data vs Information
  + Metadata
* Why database?
* Advantages of database
* Examples of database application
* How to build and manage database?
  + Database Systems
    - File based system
    - DBMS approach

**What is database?**

* Database is an **organized collection3** of **logically related2** **data1**
  1. Data: Stored representation of objects and events that have meaning and importance in user’s environment.
     + Objects and events are those things for which user/organization wants to store some data. e.g. Assume you are going to build database of university; then you must have to store the data about students, registration, examination, faculty, etc. Here individual students and faculty members are object for which data (name, age, address, etc) should be represented. Registration and Examination are two events for which data should be represented.
  2. Logically Related data: Logically related data means data should be relevant in some context and irrelevant data must not be included (collected).   
     Example:
     + Assume you are going to collect the data of student in University system: In University system; student name, age, qualification, father name will be logically related and should be included (collected) in this system. While no. of his/her sisters, no. of his/her brothers is not related in the context of University system. Even this is also data about student but logically not related in the context of University system. Hence, this data should not be included in University system.
  3. Organized Collection: Organized collection means data should be arranged/structured in such a way that one can effectively process it when necessary.

Example: Data about student

Unorganized:

AliRawalpindi124, IslamIslamabad1224; Here, name, city, roll no, and age of student is collected in unorganized fashion. Some one cannot process it due to unstructured nature of data. It is difficult to distinguish between name and city then between roll no and age.

Organized:

Ali#Rawalpindi#1#24## Islam#Islamabad12#24or

Ali

Rawalpindi

1

24

Islam

Islamabad

12

24

**Data vs Information:**

The term data and information are closely related, and in fact are often used interchangeably. Simple difference between data and information is that information is data that have been processed in such a way that the knowledge of the person who uses the data is increased. Example

Ali

Rawalpindi

1

24

Islam

Islamabad

12

24

From above data we can obtain some knowledge on the base of guess. This data can be converted into information by doing some process as follow.

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Name City Roll No Age

Ali Rawalpindi 1 24

Islam Islamabad 12 24

Here, the process to convert data into information was adding a few additional data items and providing some structure. After that we recognize that it’s a data of some class; name, city, roll no and age.

Actually additional information is description about data (metadata). In this context we can define a database as follow;

“An organized collection of logically related data and description about data, designed to meet the information needs of an organization.

**Metadata**

* Data about data is called metadata; just like in above example name, age, roll no, and age is a data that is used to describe actual data. So this additional data is called metadata.
* Metadata is a data that describe the properties and characteristics of end user data, and the context of that data.

**Why database?**

Database is an essential need of current age due to following reasons.

* Shift from computation to information
* Data is everywhere.
  + Each and every field of life is incomplete without data.
* Data is increasing rapidly
  + So there is a need to arrange and manage rapidly increasing data. This need of arrangement can be fulfilled by database need of management can be fulfilled by some system (database management system).

**Advantages of Database**

By the database following advantages can be achieved.

* Related data is collected at one place.
* Data will be well organized.
* User’s operations can be performed on data.
  + Retrieving/accessing
  + Updating/modifying
  + Removing/deleting
  + Entering new relevant data
* Processing can be made to convert the data into information
  + Converted information can be used to support decision making.
    - Reports
    - Graphs
    - Views
* Data can be shared

**Examples of database application**

* Purchases from the supermarket
* Purchases using your credit card
* Booking a holiday at the travel agents
* Using the local library
* Taking out insurance
* Renting a video
* Using the Internet
* Studying at university

**How to build/create and manage database?**

There are two main activities that belongs to database

* Creation of database
  + Creating a database for an organization
* Management of Database
  + Managing created database in the environment of an organization.

There are two possible approaches to create and manage the database

* File Based Approach
* DBMS (database management system) approach.