

easily.

- Data maintenance: Maintenance is the task concerned with keeping the data up-to-date.
- Data Verification: Before storing the data it must be verified for any error.
- Data Coding: Data will be coded for easy reference.
- Data Editing: Editing means re-arranging the data or modifying the data for presentation.
- Data transcription: This is the activity where the data is converted from one form into another.
- Data transmission: This is a function where data is forwarded to the place where it would be used further.

Metadata (**meta data**, or sometimes **meta information**) is "data about data" of any sort in any media. An item of metadata may describe a collection of data including multiple content items and hierarchical levels, for example a database schema. In data processing, metadata is definitional data that provides information about, or documentation of other data managed within an application or environment. The term should be used with caution as all data is about something and is therefore metadata.

Database

- Database may be defined in simple terms as a collection of data
- A database is a collection of related data.
- The database can be of any size and of varying complexity.
- A database may be generated and maintained manually or it may be computerized.

Database Management System

- A Database Management System (DBMS) is a collection of program that enables user to create and maintain a database.
- The DBMS is hence a general purpose software system that facilitates the process of defining constructing and manipulating database for various applications.

A database management system is, well, a system used to manage databases. A relational database management system is a database management system used to manage relational databases. A relational database is one where tables of data can have relationships based on primary and foreign keys.

1.3 Advantages of DBMS.

Due to its centralized nature, the database system can overcome the disadvantages of the file system-based system

1. **Data independency:**

Application program should not be exposed to details of data representation and storage

DBMS provides the abstract view that hides these details.

2. **Efficient data access.:**

DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently.

3. **Data integrity and security:**

Data is accessed through DBMS. It can enforce integrity constraints.

E.g.: Inserting salary information for an employee.

4. **Data Administration:**

When users share data, centralizing the data is an important task, Experience professionals can minimize data redundancy and perform fine tuning which reduces retrieval time.

5. **Concurrent access and Crash recovery:**

DBMS schedules concurrent access to the data. DBMS protects user from the effects of system failure.

6. **Reduced application development time.**

DBMS supports important functions that are common to many applications.

Database Management System

The role of DBA is very important and is defined by the following functions.

- Defining the schema: The DBA defines the schema which contains the structure of the data in the application. The DBA determines what data needs to be present in the system and how this data has to be presented and organized.
- Liaising with users: The DBA needs to interact continuously with the users to understand the data in the system and its use.
- Defining Security & Integrity checks: The DBA finds about the access restrictions to be defined and defines security checks accordingly. Data Integrity checks are defined by the DBA.
- Defining Backup/Recovery Procedures: The DBA also defines procedures for backup and recovery. Defining backup procedure includes specifying what data is to be backed up, the periodicity of taking backup and also the medium and storage place to backup data.
- Monitoring performance: The DBA has to continuously monitor the performance of the queries and take the measures to optimize all the queries in the application.

1.7 Example of a Database (with a Conceptual Data Model)

- **Mini-world for the example:**

Part of a UNIVERSITY environment.

- **Some mini-world *entities*:**

STUDENTs

COURSEs

SECTIONs (of COURSEs)

(academic) DEPARTMENTs

INSTRUCTORs

Example of a Database (with a Conceptual Data Model)

- **Some mini-world *relationships*:**

SECTIONs *are of specific* COURSEs

STUDENTs *take* SECTIONs

COURSEs *have prerequisite* COURSEs

INSTRUCTORs *teach* SECTIONs

COURSEs *are offered by* DEPARTMENTs

STUDENTs *major in* DEPARTMENTs

A Physical Centralized Architecture

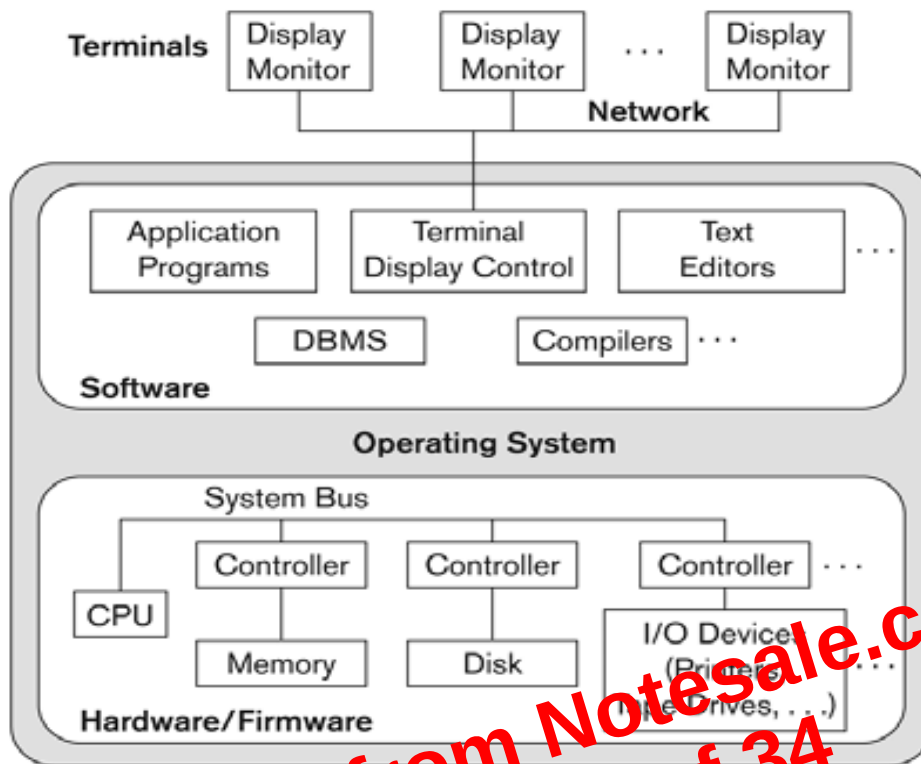


Figure 2.4
A physical centralized architecture.

Architectures for DBMS have followed trends similar to those generating computer system architectures. Earlier architectures used mainframes computers to provide the main processing for all system functions, including user application programs and user interface programs as well all DBMS functionality. The reason was that most users accessed such systems via computer terminals that did not have processing power and only provided display capabilities. Therefore all processing was performed remotely on the computer system, and only display information and controls were sent from the computer to the display terminals, which were connected to central computer via various types of communication networks.

As prices of hardware declined, most users replaced their terminals with PCs and workstations. At first database systems used these computers similarly to how they have used is play terminals, so that DBMS itself was still a Centralized DBMS in which all the DBMS functionality, application program execution and user interface processing were carried out on one Machine.