

**Strand:** Application package

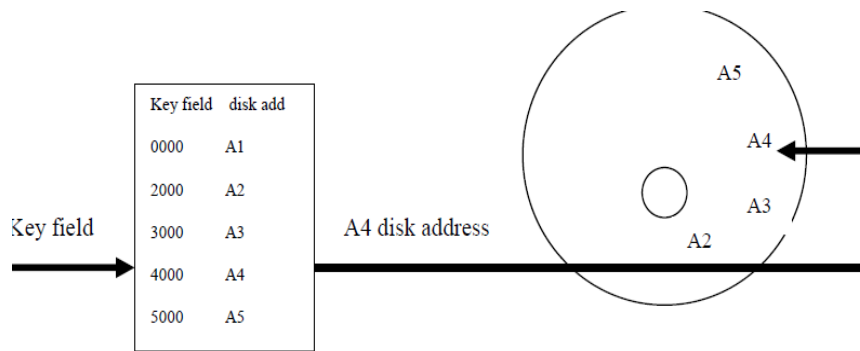
**Substrand:** Database Management

**Content Learning Outcome:**

- Explain the advantages of a database
- Distinguish between different components of a DBMS

### Disadvantage of Index sequential file organisation

it has high cost since it uses disks



### Advantages of a database

1. **Sharing:** in organizations, information from one department can be readily shared with others. Billing could let marketing know which customers ordered large quantities of merchandise.
2. **Security:** users are given passwords or access only to the kind of information they need. Thus, the payroll department may have access to employee's pay rates but other departments would not
3. **Less data redundancy:** With several departments having access to one file, there are fewer files. data redundancy is extra copies of data or duplicated data.
4. **Data integrity:** a change made in one file is updated in all related files. refers to the consistency and accuracy of data.

### Database management system

DBMS is a program that enables you to store, modify, and extract information from a database. Some DBMS such as Microsoft Access are designed specifically for personal computers. Other DBMS are designed for specialized database servers such as Oracle.

DBMS software is made up of five parts or subsystems: *DBMS engine, data definition, data manipulation, application generation and data administration.*

### DBMS engine

-provides a bridge between the logical view of the data and the physical view of the data.

**Data definition subsystem** defines the logical structure of the database by using a data dictionary or schema. Data Dictionary contains a description of the structure of data in the database. Eg

employees record	
Field Name	Data Type
employee id	Text
last name	Text
first name	Text
address	Text
city	Text

**Data manipulation subsystem** provides tools for maintaining and analyzing data. Maintaining data is also known as *data maintenance*. **It involves adding new data, deleting old data and editing existing data.**

**Application generation subsystem** provides tools to create data entry forms and specialized programming languages that interface or work with common used programming languages such as C++ or Visual Basic.

The **data administration subsystem** helps manage the overall database including maintaining security, providing disaster recovery support and monitoring the overall performance of database operations.

#### Role of a DBA (Database Administrator)

-they develop, implement, manage and maintain databases.

They also determine processing rights or determine which people have access to what kinds of data in the database.

#### **Activity Questions**

1. Completion
  - i. A collection of related fields is known as \_\_\_\_\_.
  - ii. The file organisation that uses hashing is \_\_\_\_\_.
  - iii. Adding and deleting of data is known as data \_\_\_\_\_.
2. Define data integrity.
3. Explain two advantages of using a database in school.

The end.

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**Content Learning Outcome:**

- Distinguish between the different DBMS models.

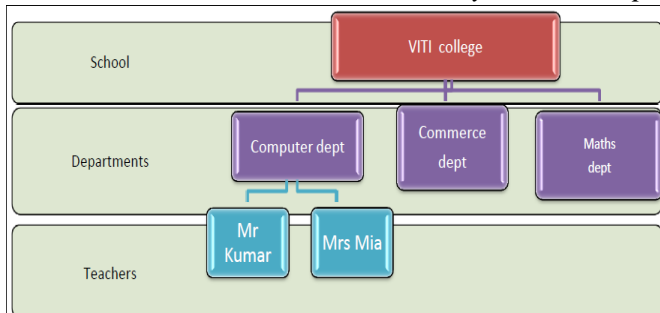
### DBMS MODELS

Refers to the arrangement of data in a particular way. These models define the rules and standards for all the data in a database.

Five common database models are hierarchal, network, relational, multidimensional and object-oriented.

#### Hierarchical database

Fields and records are structured in **nodes**. Nodes are points connected like the branches of an upside-down tree. Each entry has one **parent node**, although a parent may have several **child nodes**. This is sometime described as a *one-to-many relationship*



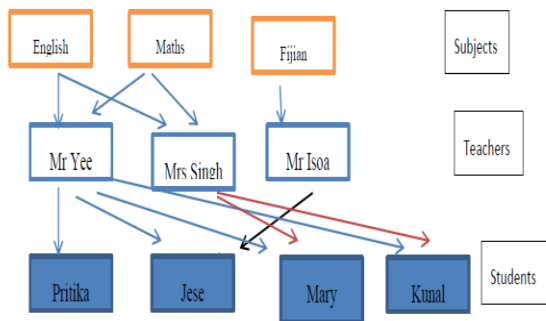
#### Disadvantages

1. If one parent node is deleted, all the subordinate child nodes are also deleted
2. A child node cannot be added unless a parent node is added first.
3. It has a rigid structure: there is no connection between the child nodes themselves, therefore lack of flexibility.

#### Network database

It also has a hierarchical arrangement of nodes. However, each child node may have more than one parent node. This is sometimes described as a *many-to-many relationship*.

There are additional connections called **pointers**, between parent nodes and child nodes. Thus, a node may be reached through more than one path and may be traced down through different branches.



Each student can have more than one teacher. Each teacher can teach more than one subject. Students may take more than one subject and can be taught by more than one teacher.

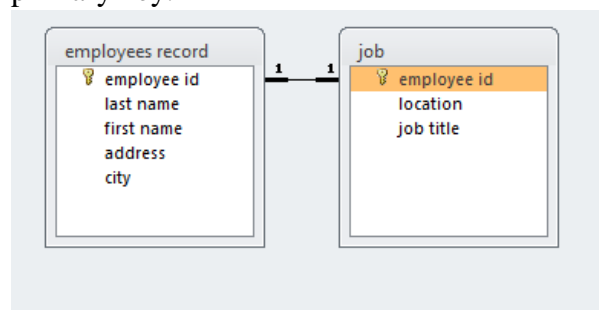
**Advantage:** The network arrangement is more efficient and flexible than the hierarchical network.

**Drawback:** there is no connection between nodes on the same functional level.

### Relational database

Data elements are stored in different tables called **relations**, each of which consists of rows called **tuples** and columns called **attributes**.

A table and its data are called a relation. Tables are connected through a common key field named as primary key.



### Advantage:

The most valuable feature of relational databases is their simplicity and flexibility.

Entries can be easily added, deleted and modified.

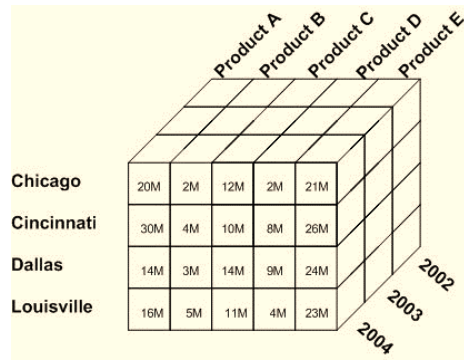
### Multidimensional database

Data is stored in data cubes with three or more dimensions. In this way, complex relationships between data can be represented and efficiently analyzed.

Multidimensional databases provide several advantages over relational databases. Two of the advantages are:

**Conceptualization:** it provides users with an intuitive model in which complex data and relationships can be conceptualized.

**Processing speed:** analyzing and querying a large multidimensional database can be much faster. For example, a query requiring just a few seconds on a multidimensional database could take minutes or hours to perform on a relational database.



### Activity Questions

1. Differentiate between hierarchical and network database
2. Describe a relational database
3. Explain the two advantages of multidimensional database.

Sangam SKM College - Nadi  
Lesson Notes - Week 3  
Year 13  
Computer Studies

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- Distinguish between the different DBMS models.

### Hypermedia database/object oriented database

Object oriented databases organize data using classes, objects, attributes and methods. They store and link a range of data including graphics, animation, video, music and voice.

This structure stores data as well as instructions to manipulate the data. It is designed to provide input for object-oriented software development.

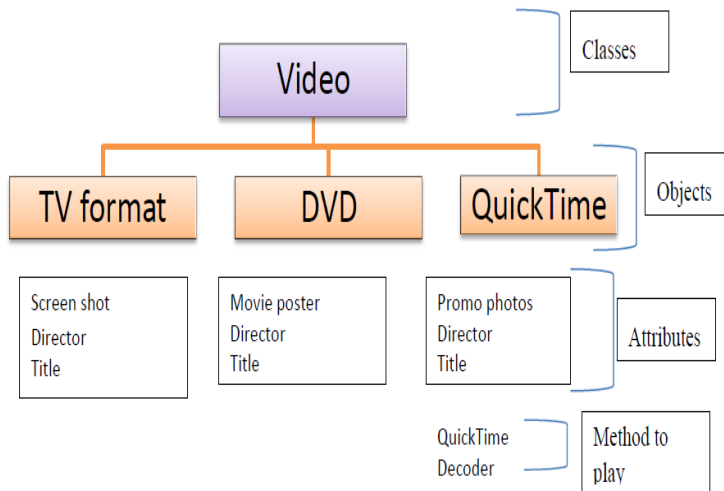
**Classes** are general definitions.

**Objects** are specific instances of a class that can contain both data and instructions to manipulate the data.

**Attributes** are the data fields which an object possesses.

**Methods** are instructions for retrieving or manipulating attributes values.

For example a Video shop might use an object-oriented video database. (See figure 3.9). The database uses a class, Video, to define video objects that are stored in the database. This definition includes the attributes Screen shot, Director, Title and the method to play. TV format, DVD and QuickTime are objects each with specific attribute values



Organization	Description
<b>Hierarchical</b>	Data structured in nodes organized like an upside-down tree, each parent node can have several children; each child node can have only one parent.
<b>Network</b>	Like hierarchical except that each child can have several parents.
<b>Relational</b>	Data stored in tables consisting of rows and columns.
<b>Multidimensional</b>	Data stored in data cubes with three or more dimensions.
<b>Object-oriented</b>	Organizes data using classes, objects, attributes and methods.

## TYPES OF DATABASE

There are four types of databases:

### I. Individual database

-is also called a **personal computer database**. It is a collection of integrated files primarily used by just one person. The data and the DBMS are under the direct control of the user.

### II. Company database (shared database)

-the **company database** may be stored on a mainframe and accessed by users on a network. It is managed by a computer professional known as **database administrator**.

Company databases are the foundation for management information systems. For instance, a dept store can record all sales transaction in the database. A sales manager can use this information to see which salespeople are selling the most products. The manager can then determine year-end sales bonuses.

### III. Distributed database

it is when portions of database is stored on multiple computers within the network.

A centralized distributed database management system (DDBMS) manages the database as if it were all stored on the same computer.

eg. Sales figures for a chain of department stores, then, could be located at various stores. But executives at district offices or at the chain's headquarters could have access to these figures.

#### IV. COMMERCIAL DATABASE

It offers access to a wide variety of data to the public or selected outside individuals for a fee. Sometimes they are also called information utilities or data banks. Often individuals are able to search the database to obtain a summary of available information without charge. They pay only for those items selected for further investigation

##### Summary of the four types of databases

Type	Description
Individual	Integrated files used by just one person
Company	Files shared in an organization
Distributed	Database spread geographically and accessed using database server
Commercial	Information utilities or data banks available to users on a wide range of topics.

#### Activity Questions

1. Another name for Commercial database is \_\_\_\_\_
2. Describe a Company database.
3. Explain the components of Hypermedia database.

THE END.