MASTER OF COMPUTER APPLICATION

SEMESTER 1

RELATIONAL DATABASE MANAGEMENT SYSTEM

Unit 1

Comparison between Different Databases

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1. INTRODUCTION

A Database Management System commonly termed as DBMS is computer software that manages the organization and access to data in a database and it is employed for management of different databases. DBMS are used by organizations and people around the world to effectively manage their valuable data. Here Data refers to the information that is recorded and stored on computers. A DBMS makes use of database models and implement them on their networks. The structure of a Database is provided by the DBMS. It helps in storage and recovery of data. Sometimes, there is confusion between Database and Database Management System. Database is essentially a collection of data which is stored in a computer system in a planned manner. A database model is used for organization of such data and its organization.

To support the different needs of people, there exist various types of databases. For a few thousand rupees, you can buy a DBMS for your personal computer whereas for large scale enterprises, much more complex and costly DBMSs are needed. Lots of mainframe based DBMSs are also leased by organizations.

As there are many types of DBMSs present in the market, you ought to be familiar with their fundamental features, and also advantages and disadvantages. In this unit, you will learn about the various types of databases, their importance and their applications. You will also study about the advantages and disadvantages of various DBMS.

1.1 Objectives

After studying this unit, you should be able to:

- *Describe the significance of database*
- *Discuss the applications of database*
- *Elucidate the advantages and disadvantages of different database management system*
- *Differentiate between DBMS and RDBMS*
- *Compare different types of databases*

2. SIGNIFICANCE OF DATABASES

Generally, data is considered the most significant resource of any organisation. It is utilized and gathered practically from all over, from organizations making an attempt to find out the patterns of clients depending on the usage of credit card usage, to space organizations making an attempt to gather data from various planets.

As data is a very significant resource, it requires tough, protected, and easily obtainable software that can collect and utilize it fast. A substantial and a consistent database is the solution to these requirements.

An organisation comprising a database system usually includes a person called as Database Administrator (DBA). The operational data's responsibility is handled by DBA. A database administrator is responsible for the following:

- Installation of databases
- Configuration of databases
- Administration of databases
- Upgrade of databases
- Maintaining databases
- Monitoring databases

A DBA possess technical knowledge in detail. Also DBA has the capability to recognize and examine the needs of management.

A database is very significant for an organisation mainly because of following reasons:

1. ***Reduces redundancy:*** In databases, storing data in an outmoded method can be averted. In case of systems which are non-databases, every application comprises its own individual files which can frequently cause significant redundancy in accumulated data. Thus this process results in wasting storage area.
2. ***Security can be imposed***: In DBMS, appropriate security is assured to the database. Security guidelines are defined by DBMS to use the data. Thus database can be accessed only by doing suitable login. To access all parts of information included in the database, there is a need to set up different types of deterrents for all kinds of access such as insert, retrieve, delete, and so on.

3. ***Providing permission for multiple user interfaces:*** DBMS can offer simultaneous execution of numerous parts included in database. Here, DBMS also manages deadlock in addition to other conflicts.
4. ***Maintaining Integrity:*** Database's Integrity signifies that there should be accurate data. Two entries having some variation that propose to display the same "information" is considered as an example showing deficiency of integrity. This may take place because of the redundancy or inaccurate data. For instance, it may be shown that an employee works for 400 hours in the week instead of 40, or as relating to a section that is not available. These types of problems can be prevented by controlling the database in a centralised manner. Integrity constraints, (also called business rules), can be defined and applied by means of DBMS. This is done to check integrity if an update operation is carried out.
5. ***Backup & recovery:*** DBMS include suitable backup in the situation of failure. Numerous methods are used for recovering failure in a DBMS.
6. ***Standards can be imposed:*** The process of standardising the representation of data is significant for replacing data or moving data among systems. Various global standards that are to be imposed are permitted by DBMS.
7. ***Providing constant storage space for the objects of database:*** The database can be utilised as stable warehouse of application objects, database as well as structures of database. This signifies that database can store a complicated object of languages.
8. ***Application development time decreases:*** To build up the programs related to client utility, the effort needed decreases significantly with databases. Also the time decreases accordingly.

SELF-ASSESSMENT QUESTIONS – 1

1. What is a repository of data, intended to assist proficient storage of data, retrieval and preservation called?
   (a) DBMS
   (b) ADBMS
   (c) Database
   (d) RDBMS
2. DBMS can provide simultaneous implementation of different portions of database. (True/False)

3. APPLICATIONS OF DATABASE SYSTEM

Having studied significance of databases, now we will discuss the applications of database system. As shown in Figure 1.1, people can have an interaction with data available in database through various methods. Clients can straight forwardly have an interaction with database by means of user interface which is offered by DBMS. This way, the commands can be issued against database by clients. These commands are known as queries. The clients can inspect the outcomes or even collect and store the results in Excel or Microsoft Word format.

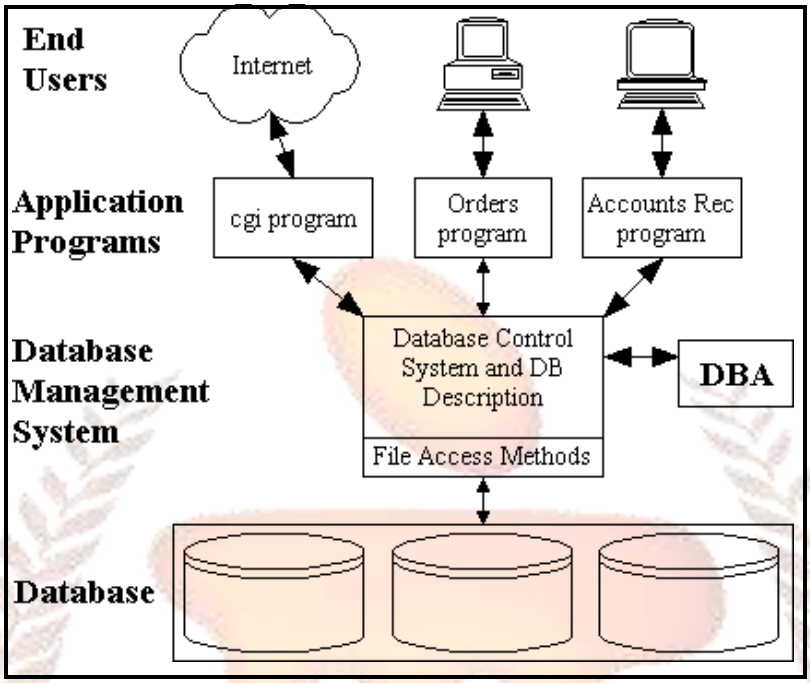

Fig 1.1: Database Environment Constituents

Interacting with database in this way is known as ad-hoc querying. For this, knowledge of query language is needed on the client part. As many clients do not owns this degree of knowledge, making use of application programs is another and more general method used for using the database.

There are two main constituents available in an application program. A graphical user interface is utilised to consent the request of the clients such as to enter, modify or delete data. Also it offers a method for showing the data recovered from database. Business logic includes programming logic which is essential to execute the requirements of the clients. Here the machine which is utilised for running user interface is considered as client. Also the machine which is utilised for running DBMS and includes a database is considered as the server of a database. It is to be recognised that the applications in addition to the database are not required to exist on same workstation.

For recognising the database applications in a simple and improved way, they can be classified into various categories. These categories are chosen according to client's location in addition to database software. We have defined these categories as below:

- Personal databases
- Two-tier databases
- Multi-tier databases
- Enterprise application

Now, these categories are discussed in detail in the following sections

3.1 Personal Databases

These databases are prepared for assisting one client. These databases offers the client with capability to handle (that is, storing, deleting, updating and retrieving) some quantity of data proficiently. These databases are mainly utilised on the following:

- personal computers
- laptops
- PDAs smart phones

Nowadays these databases are extensively used as they can significantly enhance individual productivity. However some limitations are there. A risk is there and also the users cannot easily distribute the data between them. For instance, a marketing manager needs a combined view of client contacts however he cannot get this quickly from databases of all marketing persons. Thus personal databases are mostly utilised by small-scale organisations where the requirement for sharing data with someone else is about negligible.

3.2 Two-Tier Client/Server Databases

Personal database is restricted to a single user only. However there are numerous circumstances when the clients or workgroup want the data to be distributed or shared between them. For this, the most frequent method used for sharing data is the creation of two-tier client/server databases which we have shown in Figure 1.2 as below.

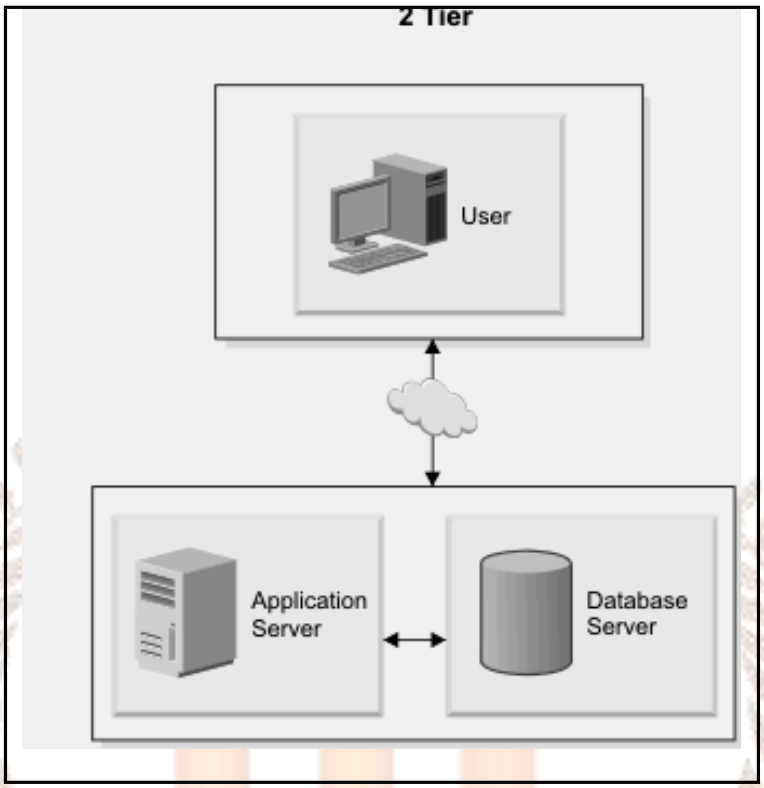

Fig 1.2: Two-tier Databases

All the links in a workgroup are the computer workstations. These computers are linked to each other through network which can be either wired LAN or wireless LAN. Mostly, all computers uses a particular application (client) providing the user an interface and business logic by which manipulation of data is performed. The database in addition to DBMS is stored on the workgroup's central device and workgroup have permission to use shared data.

Different members of group, for example, project manager, programmer, etc., may have different point of views regarding the database which is shared among them. The main objection to the databases of personal computers can be overcome by this arrangement. The objection is that users cannot share the data easily. However, various concerns of data management that does not exist with the databases used by one user are established by this arrangement. These concerns include data security in addition to data integrity in the case when numerous users try to alter as well as update the data simultaneously.

3.3 Multi-Tier Client/Server Databases

Architecture of two-tier database includes one drawback. That is, the total functionality which is required to be coded in the application available on the client's system can be quite large. This is because both business logic as well as the user interface logics required to be included by it. This signifies that the computers of clients are required to be sufficiently powerful for handling programmed application.

Other disadvantage is that whenever some change is done to either the business logic or user interface, the application comprised by every computer of client is to be modified.

To avoid these disadvantages, most current applications that are required to assist numerous users are built by means of the multi-tier architecture concept. These applications, in most of the companies, are intended to assist a branch or a division which is usually big as compared to workgroup (usually among 25 and 100 individuals). We have shown an example based on a company comprising several applications of multi-tier database in Figure 1.3 below:

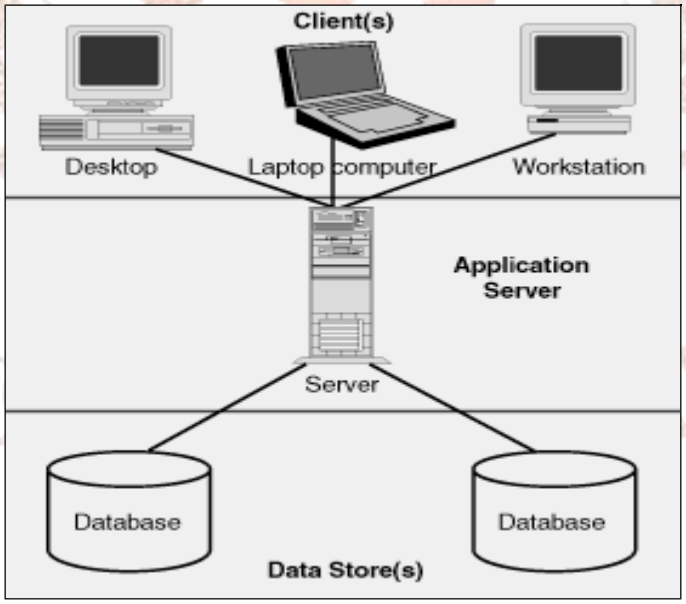

Fig 1.3: Architecture of Three-Tiered Client/Server Database

In case of multi-tiered databases, personal computers of clients can make access to user interface. To carry out the transactions of business which are requested by clients, the

required business logic is included in the application layer or Web server layer. Application layer performs an interaction with database server.

This architecture assists in the development of the database from the information systems modules that concentrate son either business logic, presentation logic, or both. This permits us to make the performance as well as maintenance level of database and application better.

3.4 Enterprise Application

This database is designed for the utilisation of whole organisation. It supports organisation-wide procedures as well as decision making. At times, particularly for medium to huge organisations, using database of single enterprise is not considered as appropriate. This is due to the reasons given below:

- the intricacies in performance for huge databases,
- different users having various requirements,
- the problem in accomplishing data's single definition for every client of database

However the requirements of information from various branches and divisions are successfully supported by an enterprise database. The enterprise databases progress has effected in the following developments:

- ERP (Enterprise resource planning) systems
- Data warehousing.

Enterprise Resource Planning (ERP): There is an important connection between ERP systems and database systems. Databases are utilised to store the incorporated data needed by the applications of ERP. Other particular applications, such as CRM (customer relationship management) systems as well as SCM (supply chain management) systems also rely on databases for data warehousing.

By means of **Data warehouses,** users can work with the data used in the past. This is done so as to recognise pattern, trends, and solutions to the questions regarding planned business. Thus Data warehouses need data from every branch of the organisation.

In the Table 1.1, we have summed up numerous kinds of database applications, clients for each application, and the sizes of database applications.

Table 1.1: Database Applications Summary

Type of Database	Typical Number of Users	Typical Size of Database
Personal	1	Megabytes
Two-Tier	5-100	Megabytes-Gigabytes
Three-Tier	100-1000	Gigabytes
ERP	>100	Gigabytes-Terabytes
Data warehousing	>100	Terabytes-Petabytes

Activity 1

Illustrate the DBMS application in the industries specified below:

(a) E-commerce Industry
(b) Health Industry
(c) Hotel and Tourism

SELF-ASSESSMENT QUESTIONS – 2

3. For sharing data among clients, the most frequent way is the creation of two-tier client/server databases. (True/False)
4. An application program comprises two components, one being the GUI. Name the other component.
   (a) Presentation logic
   (b) Business logic
   (c) Message logic
   (d) User interface logic
5. The requirements of information from various branches as well as divisions are successfully supported by a _____ database.

4. DIFFERENT TYPES OF DBMS

We can define DBMS (database management system) as one software and a group of software applications that are used to manage the formation, preservation, and the utilisation of a database. Establishments are permitted to formulate databases for different applications. DBMS provides permission to several users to make use of same database simultaneously. DBMS offers resources for handling the access of data and imposing data integrity. Also it allows database to recover after collapsing and the data is restored from backup. In addition, DBMS maintains the security of the database. Servers of database are committed systems that carry the real databases. Also they execute just the DBMS and the connected software.

We use the numerous criteria to categorize DBMSs. These are given below:

- based on data model
- based on user
- based on sites
- based on cost
- based on purpose

Now we will discuss about numerous types of DBMS based on the criterions defined above.

4.1 Based on Data Model

For database Systems, various models are used based on data model:

- Hierarchical Model
- Network Model
- Relational Model
- Object-relational Model
- Object Model

This criterion is the one which is most extensively accepted for classification of database. So now we will study in detail about the DBMS based on these data model.

(i) ***Hierarchical data model:*** Here, we organise data into a structure which appears as a tree. In this structure, every node comprises one parent node. Root node is an

exception, that is, it does not contain any parent. This is to note that although a node can comprise numerous child nodes, but it can comprise just one parent node. A record is represented by a node available in structure which appears as tree. Every attribute of a particular record is available below entity type. All entity types are connected to one another by means of 1: N mapping.

Advantages

Hierarchical databases include the following advantages:

- ***Simplicity:*** It has a simple design process since data (in many practical circumstances) usually consists of hierarchical relationship. It is thus easier to see the data organised in this manner.
- ***Security***: These databases can execute the changing level of security characteristics.
- ***Database integrity:*** It is extremely advertised in these systems due to its inbuilt structure of parent and child.
- ***Relationship Handling:*** These databases are considered as extremely proficient for the relationships of the type 1 : M.

Disadvantages

Hierarchical databases include the following disadvantages:

- ***Complication in implementation:*** Implementing Hierarchical database is quite difficult since it is based on the data's physical warehousing.
- ***Trouble in management:*** It is not easy to manage hierarchical database. For instance moving a part of data from one position to the other position needs you to modify every accessing application related to that data which is complicated to perform.
- ***Structural reliance:*** In this database, relationships are defined in a rigid manner. Thus if a change is performed in any portion of database structure, then the programs using it would also require change. So the process of maintaining the database is a very complicated and monotonous job.
- ***Difficulty in programming:*** Programming this type of database is considered a quite difficult task. To do this, the programmers should essentially recognise the physical route followed by data items.

- ***Bad portability:*** These databases offers bad portability since there is no standard available.

(ii) ***Network model:*** This model was invented by Charles Bachman. Afterwards, by means of CODASYL (Conference on Data Systems Languages) association in 1969, it was formulated into a standard arrangement. This model is considered similar to the hierarchical model. However this model permits every record to comprise numerous records of parent as well as child, thus generating a network structure. We have shown below an example of this model in Figure 1.4.

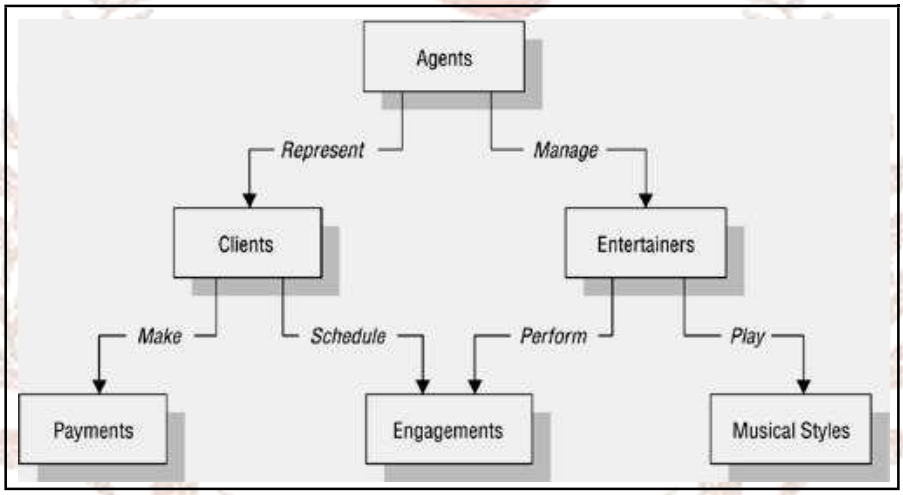

Fig 1.4: Network Model

Some network Databases examples that are most commonly used are:

- Turbo IMAGE,
- IDMS,
- RDM Embedded
- RDM Server

Advantages

Network databases include the following advantages:

- ***Simplicity:*** This model is easy to design because mostly all instances of data relationship usually occur as N: M type.
- ***Relationship handling:*** It is proficient of handling relationship in a better manner. The relationship of the type N: M can accommodate various complicated relationships that are available in real data relationship situations.

- ***Flexibility:*** These databases provide more flexibility as compared to hierarchical database. This is because here you can navigate data items in numerous ways. Thus high level of flexibility of data access is provided.
- ***Standards:*** These databases include the development of worldwide standards.

Disadvantages

Network databases include the following disadvantages:

- ***Complication in implementation***: Implementing these databases is not easy.
- ***Problem in Management:*** Managing this database is not easy.
- ***Structural reliance:*** As access relies on navigational paths which are available in database at any moment, then you cannot consider programs autonomous of structures of database. So there is a need to modify them on the modification of database structure.

Because of these drawbacks, their recognition is quickly lost between clients and then relational databases replaced them.

(iii) ***Relational model:*** This model makes use of a mathematical relation concept. Thus, you can consider database as group of relations. You can consider a relation as a table where table's each row symbolises a set of associated data values. Here, a table's row can be addressed as tuple. Also the header of column can be addressed as attribute.

A relation schema R is indicated by R (A1,...,An) . It includes the name of the relation R in addition to attributes list indicated by A1,...,An . The

abbreviated form of domain of Ai is indicated by dom (Ai) which is the set of all the possible values that this attribute may take.

Relation schema that illustrates a relation denoted by R is considered as the relation's name. The relation's degree is based on how many attributes exists in respective relation schema.

Information regarding a person or anything of interest is included in a record. Data regarding a particular facet of that person or thing is accumulated by a field.

Advantages

Relational model include the following advantages:

- ***Simplicity:*** It is simple as well as easy to handle RDBMS. Clients can make access to a relation by means of attributes used commonly. Also they can do modification or manipulation of relations easily.
- ***Relationship Handling:*** These databases can handle every type of relationship.
- ***Flexibility:*** This model possibly provides more flexibility as compared to other database models.
- ***Follow every mathematical theory:*** Based on the idea of relational algebra it thus follows obeys every mathematical theory.

Disadvantages

Relational model include the following disadvantages:

- ***Hardware expenses:*** This type of database requires more influential hardware systems in addition to the devices of data warehousing in comparison to its antecedents.
- ***Awful design occurs from easy design:*** It is simple to design, apply and deal with this type of database. Here the user is not required to recognize the complexities of the data warehousing. However this process of easy design mostly results in a very badly intended DBMS.

(iv) ***Object-relational DBMS:*** This type of database is defined as a DBMS which is considered analogous to relational database, however with an OODBMS. Here, classes, objects, in addition to inheritance are straight forwardly assisted in database schemas as well as query language. Also it assists the expansion of data model by means of standard data types along with techniques.

This system spans the gap among abstract methods of data modelling like ERD (Entity-relationship Diagram) in addition to ORM (Object- relational Mapping), that frequently make use of:

- ❖ classes
- ❖ inheritance
- ❖ relational databases

The terms defined above do not assist them straightforwardly. It also spans the gap among relational databases in addition to object-oriented methods utilized in languages like C++, Java, etc.

ORDBMS permits the developers of software to incorporate their individual types in addition to methods and these can be used in the DBMS. This database offers a span among relational as well as object- oriented DBMS.

Advantages

Object-Relational databases include the following advantages:

- ***Flexibility:*** These databases are considered as flexible but not more than the flexibility of relational database.
- ***Reusability:*** This type of data model occurs from reuse as well as sharing. DBMS server is permitted to carry out functionalities centrally, instead of coding it in all applications. If the functionality can be implanted in server, it is not required to specify it in all applications that require it. Thus every application is allowed to allocate the functionality.
- ***Managing relationship:*** This type of data model allows to utilise the relationships among data so as to gather related records effortlessly.
- ***Abstraction:*** This type of DBMS permits the developers of software to incorporate their individual types as well as technique that are applied to them in DBMS. The technology of ORDBMS is intended to permit developers to raise the degree of abstraction over which the domain of problem is observed.

Disadvantages

Object-relational database model include the following disadvantages:

- ***Complication in implementation:*** Implementing these types of databases is difficult as well as perplexing in nature.
- ***Costly:*** It comprises increased overheads connected with its working.

(v) ***Object database:*** This type of database is also known as object oriented database. In simple words, we can say that Object Database Management System (ODBMS) is a combination of database and Object Oriented Programming (OOP) concepts. In this type of DBMS, the database objects are emerged as the objects of programming

language in various programming languages. Programming language is extended by means of ODBMS with the following qualities:

- concurrency control
- transparently persistent data
- data recovery
- associative queries, etc.

Some of these types of databases are intended to function intimately with the programming languages of OODBMS like Java, C++, C#, Smalltalk, etc. Others possess their personal programming languages.

OODBMS is usually suggested on the business requirement for performing well on a complicated data.

Advantages

ODBMS include the following advantages:

- ***Relationship Handling:*** These databases can handle every type of relationship.
- ***Better as compared to other models:*** The main reason why ODBMS is better than other database management systems is because operations in ODBMS are carried out using navigational interfaces instead of declarative one (used in other types). The use of pointers in ODBMS allows the navigational access to data in a very efficient manner.

Disadvantages

ODBMS include the following disadvantages:

- ***Complexity:*** In the case of general purpose type of queries related with same information, formulating pointer-based methods will becomes lower as well as more complicated as compared to relational.
- ***Deficiency of interoperability:*** There is a deficiency of numerous devices or features in ODBMS. These devices or features are considered as fixed in:
  - SQL
  - reporting tools
  - OLAP tools
  - Backup & recovery standards.

- ***Flaws in their query assistance:*** Furthermore, dissimilar to relational model, these databases are not comprised by formal mathematical basis, which is the reason for flaws in query assistance. However, this limitation is equalized by the actuality that SQL and navigational access are completely supported by some ODBMSs. For example, Matisse, SQL++, etc.

4.2 Based on Number of User

Now, another criterion is based on how many clients are supported by means of system. A system based on single user can support just single client at a particular time. Also it is mainly utilised with personal computers.

On the other hand, multi-user systems comprising the bulk of DBMSs, can capably support simultaneous multiple clients.

4.3 Based on number of sites

Other essential criterion used for classification is based on the quantity of sites upon which database is allocated. Depending on this, database can be distributed.

You can consider a DBMS centralized if data is accumulated at an individual sites of computer. Centralized DBMS have the capability to support numerous clients. However the DBMS in addition to database exist completely at a particular site of computer.

In case of DDBMS (distributed DBMS), the real database in addition to the software of DBMS are distributed on a number of sites, which are linked by means of computer network. Distributed DBMS may be further divided into homogeneous database or heterogeneous database. At every site, the similar software of DBMS is utilised by homogeneous DDBMSs. On the other hand, different software of DBMS is utilised by heterogeneous DDBMSs at every site.

4.4 Based on Cost

Now, another criterion is considered as cost. Intermediary vendors having extra services supports free (open source) DBMS such as MySQL, etc.

Some DBMSs are obtainable as free assessment one month copy versions in addition to personal versions, and this may cost about ` 5000 and permit better functionality. Some are

obtainable with license restrictions depending on the quantity of simultaneous clients or quantity of client seats available at a site.

Separate single user related versions of several databases like MS Access are traded for each copy or considered as incorporated in the entire a desktop configuration or laptop configuration. The advanced characteristics like data warehousing as well as data mining, assistance for more data types can be obtainable by paying more price.

4.5 Based on Purpose

At last, you can classify a DBMS into the following:

- general purpose DBMS
- special purpose DBMS

In case when the level of performing is a main concern, then special- purpose DBMS are planned and constructed for a particular application. You cannot use this type of system to support other applications with no main changes. Various airway bookings as well as systems of phone book folders are considered as special-purpose DBMSs. These takes place under the group of OLTP (online transaction processing) systems. OLTP is required to support huge simultaneous transactions without postponing much.

Activity 2

Make use of different kinds of data models so as to represent numerous people in your institution or organization.

SELF-ASSESSMENT QUESTIONS – 3

6. In a _____ schema, we organise data into a structure which appears as a tree.
7. Network schema provides permission for only 1:1 relationships. (True/False)
8. In case of relational schema, every tuple is separated into fields which we call as _____.
9. Which of the following is not considered as a logical structure of database?
   a) Tree
   b) Relational
   c) Network
   d) Chain
10. Relational model makes use of some unknown terminology. A tuple is said to be equal to a _____.
11. Logical data structure having 1:M relationship is considered as a:
    a) Network
    b) Tree
    c) Chain
    d) Relation

5. COMPARISON BETWEEN CENTRALIZED AND DISTRIBUTED DATABASE

Now we will differentiate between centralized database system and distributed database system. Firstly, let us define both the terms. In case of centralized database system, every component of system exists at a single computer. Distributed database can be defined as database managed by means of central DBMS.

In case of distributed databases, devices used for storage are not connected to a mutual Central processing unit. We have shown the main points of differences between centralized database system and distributed database system in the Table 1.3 as below:

Table 1.3: Differences between Centralized and Distributed DB

Basis	Centralised Database	Distributed Database
Location of Data Storage	Stores data in the storage devices located at one place and they are connected to a single CPU.	Data is in the storage devices that may be situated in different geographical locations.
Data Administration	Data is administered by a central DBMS.	Data is administered by number of servers.
Ease of Maintenance	Easier to maintain and keep updated.	Maintaining data in the distributed database needs additional work.
Cost of Maintenance	Low cost of maintenance.	High cost of maintenance.
Creation of Databases	Creation of databases for centralised database is easy as compared to distributed.	The creation of databases for distributed database is more complex.
Integrity of Data	It is easier to maintain the integrity of data.	It is difficult to maintain the integrity of data.
Load Balance	Data Load is on central storage device.	Data load is balanced as it is stored on various storage devices that may be situated in different geographical locations.
Security	More secure as compared to distributed database.	Remote database fragments must be secured, and they are not centralised so the remote sites must be secured as well.
Economics	Requires complete modification of the system components for making any changes.	Systems can be modified, added and removed from the distributed database without affecting other modules.

SELF-ASSESSMENT QUESTIONS – 4

12. It is easy to preserve and update the _____ database

13. In case of distributed database, data is handled by numerous servers. (True/False)

6. SUMMARY

Let us recapitulate the important concepts discussed in this unit:

- DBMSs (Database management systems) were generated to manage incorporated drawbacks of file system. In addition, data integrity, elimination of redundancy, and promoting data security are imposed by DBMS.
- An organisation comprising a database system usually includes a person called as DBA (Database Administrator). The operational data's main liability is handled by DBA.
- We can classify the database applications into various categories, based on the client's location and software of the database. These databases are termed as are personal, two-tier, and multi-tier databases.
- We can classify DBMSs in accordance with various criterion, that is data model, quantity of users, quantity of sites, types of access paths, and price.
- In relational data model, a database is considered as a set of tables and you can accumulate every table as an individual file.
- In a centralized DBMS, a data is accumulated at individual sites of computer. Distributed database can be defined as database managed by means of central DBMS (database management system).
- There also occur various distinctions among a DBMS and RDBMS. All principles of E.F. Codd are followed by RDBMS and it depends on relational database model. A DBMS may not necessarily follow relational database model.

7. GLOSSARY

- ***Centralized Database:*** In a centralized DBMS, a data is accumulated at individual sites of computer.
- ***CODASYL:*** (Conference on Data Systems Languages) It is a standard which specifies the process of storing the data into network database and retrieving the data from network database.
- ***Data Model:*** It is a conceptual representation that captivates the relation's real meaning with data items.
- ***Database Client:*** The machine which is utilized for running user interface is considered as client.
- ***Database Server:*** The machine which is utilized for running DBMS and includes a database is considered as the server of a database.
- ***Database:*** It is defined as a repository for every file available in the organisation, that is, structured as well as integrated to make the updation of files easy and retrieval of information from them.
- ***Distributed Database Management System:*** Distributed database can be defined as database managed by means of central DBMS (database management system).
- ***Hierarchical Data Model:*** In this model, we organize data into a structure which appears as a tree. In this structure, every node comprises a parent node. Root node is an exception, that is, it does not contain any parent.
- ***IMS:*** IMS (Information management system) offers information which is needed to handle organizations in an efficient and effective manner. It is utilized to examine operational actions taking place in organisation.
- ***Network Data Model:*** This model observes database as set of linked items connected with one another by means of links.
- ***Personal Databases:*** These databases are intended to assist a single client.
- ***Relational Model:*** This makes use of a set of tables used to show data as well as the relationship between those data. All tables comprise numerous columns and every column comprises an exclusive name.

8. TERMINAL QUESTIONS

1. Explain hierarchical model and network model.
2. Describe a relational model and its characteristics.
3. Explain the significance of database.
4. Discuss the various applications of database.
5. Briefly describe network database model. Also explain the difference between network database and hierarchical database.
6. What are the various types of database management system? Briefly explain.
7. Discuss the classification of DBMS based on location of database.
8. Differentiate between a centralised and distributed database systems.
9. What do you understand by the term RDBMS? When and by who was it developed?
10. Enumerate the advantages and disadvantages of RDBMS.

9. ANSWERS

Self-Assessment Questions

1. c) Database
2. True
3. True
4. b) Business logic
5. Enterprise
6. Hierarchical schema
7. False
8. Domains
9. d) Chain
10. Network
11. b) Tree
12. Centralised
13. True

Terminal Questions

1. In Hierarchical data model, we organise data into a structure which appears as a tree. In this structure, every node comprises one parent node. Root node is an exception, that

is, it does not contain any parent. Network model permits every record to comprise numerous records of parent as well as child, thus generating a network structure. Refer section 4 for more details.

2. Relational model makes use of a set of tables used to show data as well as the relationship between those data. All tables comprise numerous columns and every column comprises an exclusive name. Refer Section 4 for more details.
3. DBMS imposes data integrity, supports data security, and removes redundancy. Refer Section 2 for more details.
4. Database applications can be classified into three categories, based on the location of the client (application) and the database software. Refer Section 3 for more details.
5. Network Data Model views database as group of related items associated with each other through links. Refer Section 4 for more details.
6. DBMSs can be classified based on various criteria such as data model, number of sites, number of users, etc. Refer Section 4 for more details.
7. On the basis of location database can be of two types. Refer Section 4 for more details.
8. In a centralised DBMS, a data is accumulated at individual sites of computer. Whereas Distributed database can be defined as database managed by means of central DBMS (database management system). Refer Section 1.5 for more details.
9. RDBMS refers to relational database management system. Refer Section 4 for more details.
10. Relational model possibly provide the high level of flexibility as compared to other database models. Refer Section 4 for more details.

10. REFERENCES

References:

- Ramakrishnan, R. & Gehrke, J. (2003), *Database Management Systems* (3rd Ed.), McGraw-Hill.
- Rob, P. & Coronel, C. (2007),*Database Systems: Design, Implementation, and Management* (7th Ed.), Thomson Learning.
- Silberschatz, Korth & Sudarshan (2002) *Database System Concepts* (4th Ed.), McGraw-Hill

E-References

- http://msdis.missouri.edu/resources/intro_to_gis/pdf/Database.pdf
- http://www.theukwebdesigncompany.com/articles/types-of- databases.php
- www.personal.psu.edu/glh10/ist110/topic/topic07/topic07_06.html
- http://kianchuan.blogspot.in/2009_01_01_archive.html
- http://etutorials.org/shared/images/tutorials/tutorial_35/01fig03.gif