

Module-IV

Introduction to types of DBMS

Object Oriented Database

- An object database (also object-oriented database management system, OODBMS) is a database management system in which information is represented in the form of objects as used in object-oriented programming. Object databases are different from relational databases which are table-oriented.
- Object databases store objects rather than data such as integers, strings or real numbers. Objects are used in object oriented languages such as Smalltalk, C++, Java, and others. Objects basically consist of the following:
 - Attributes - Attributes are data which defines the characteristics of an object. This data may be simple such as integers, strings, and real numbers or it may be a reference to a complex object.
 - Methods - Methods define the behavior of an object and are what was formally called procedures or functions.
- Therefore objects contain both executable code and data.

Object Oriented Database

- There are other characteristics of objects such as whether methods or data can be accessed from outside the object.
- Classes are used in object oriented programming to define the data and methods the object will contain.
- The class is like a template to the object. The class does not itself contain data or methods but defines the data and methods contained in the object.
- The class is used to create (instantiate) the object. Classes may be used in object databases to recreate parts of the object that may not actually be stored in the database.
- Methods may not be stored in the database and may be recreated by using a class.

Object Oriented Database

Object-Oriented Model

Object 1: Maintenance Report

Date	
Activity Code	
Route No.	
Daily Production	
Equipment Hours	
Labor Hours	

Object 1 Instance

01-12-01
24
I-95
2.5
6.0
6.0

Object 2: Maintenance Activity

Activity Code	
Activity Name	
Production Unit	
Average Daily Production Rate	

Object Oriented Database

Object Database Advantages over RDBMS

- Objects don't require assembly and disassembly saving coding time and execution time to assemble or disassemble objects.
- Reduced paging Easier navigation
- Better concurrency control - A hierarchy of objects
- may be locked.
Data model is based on the real world. Works well
- for distributed architectures.
- Less code required when applications are object
- oriented.

Object Oriented Database

Object Database Disadvantages compared to RDBMS

- Lower efficiency when data is simple and relationships are simple.
- Relational tables are simpler.
- Late binding may slow access speed. More user
- tools exist for RDBMS. Standards for RDBMS are
- more stable.
- Support for RDBMS is more certain and change is less likely to be required.

Object Oriented Database

How Data is Stored ?

- Two basic methods are used to store objects by different database vendors.
- Each object has a unique ID and is defined as a subclass of a base class, using inheritance to determine attributes.
- Virtual memory mapping is used for object storage and management.

Geographic Database

What is a GIS?

- A GIS (Geographic Information System) is a computer system capable of assembling, storing, manipulating and displaying geographically referenced information, i.e data identified according to their locations.

Geographic Database

How does a GIS work?

- A GIS, which can use information from many different sources, in many different forms can help with such analyses. The primary requirement of the source data is that its location is known.
- Location may be annotated by x,y and z coordinates of longitude, latitude and elevation or by such systems as ZIP codes or highway mile markers and so on.
- If the data to be used are not already in digital form, that is in a form the computer can recognize, various techniques can capture the information. Maps can be digitized, or hand-traced with a computer mouse, to collect the coordinates of its features.
- A GIS makes it possible to link (or integrate) information that is difficult to associate through any other means. Thus, a GIS can use combinations of mapped variables to build and analyze new variables.

Geographic Database

Advantages of GIS

- Information Retrieval :-

With a GIS one can point at a location object, or area on the screen and retrieve recorded information about it from off-screen data files.

- Topological Modeling :-

- A GIS can recognize and analyze the spatial relationships among mapped phenomena. Conditions of adjacency (What is next to what), containment (What is enclosed by what) and proximity (how close something is to something else) can be determined with a GIS.

- Networks :-

- A GIS can simulate the route of materials along a linear network. It is possible to assign values such as direction and speed to the digital stream and move the contaminants through the stream system.

Geographic Database

Advantages of GIS

- **Overlay:-**
Using maps of wetlands, slopes, streams, land use , and soils, the GIS might produce a new map layer or overlay that ranks the wetlands according to their relative sensitivity to damage from near by factories or homes releasing contaminants into them.
- **Data Output :-**
- A GIS is its ability to produce graphics on the screen or on the paper that conveys the result of its analyses to the people who make decisions about resources.

Multi Media DBMS

- Video images need to be stored in a database management system so that specific video clips, bound to a user defined time frame can be extracted and viewed. This means **Streaming Video**, captured by a video camera needs to be :
 1. Bound to a time line
 2. Sectioned accurately in accordance with the time line
 3. Stored in a database capable of handling video image file based to the time line.
- Here, the first two steps in this process flow is generally done by a software product that sits between the video camera and the DBMS. A user can specify a time line to this software and it will take care of sectioning the streaming video and forwarding these sections to the DBMS for storage.

Multi Media DBMS

- Disadvantages of Multi Media DBMS
- The data file produced by the intermediary software is huge. This places considerable strain on the insertion, retrieval and updations of such data files.
- To be able to keep the system running 24/7 such data will have to be regularly purged from the DBMS and stored on other storage media such as a tape, DVD or CD-ROM.

Mobile and Personal DBMS

- Most RDBMS vendors offer a mobile or personal version of their enterprise wide, flagships products. **For EX:-** MS Access and MS SQL Server or Personal oracle and oracle.
- MS Access and personal oracle are fully functional modestly scaled down versions of enterprise wide RDBMS products from Microsoft and Oracle.
- These products run very efficiently on laptops and notebook computers where resources are fairly limited and offer a pretty good response.
- This permits the capture of business data directly on a laptop or notebook computer at places away from the office. Once such data captured / manipulation, the data can be uploaded to the enterprise wide database at the office later.

Engineering DBMS

- These include storage of :
 - Computer – Aided Design (CAD) data
 - Computer – Aided Manufacturing (CAM) data
 - Computer – Aided Engineering (CAE) data
 - Computer – Integrated Manufacturing (CIM) data.
- Computer Aided Software Engineering (CASE)
 - A CASE database stores data required to assist software developers, including source code, dependencies between software modules, definitions and use of variables, the development history of the software system and so on.

Decision Support DBMS

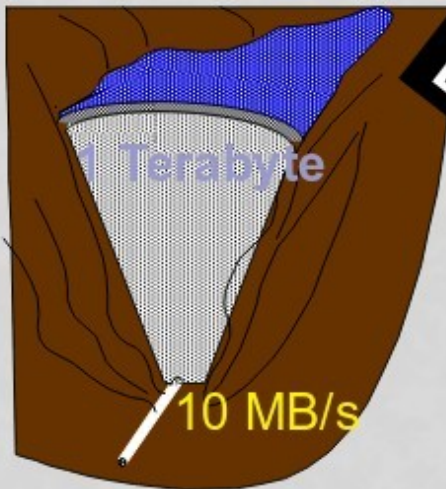
- A Decision Support System is a computer program application that business data and presents it so that users can make business decisions easily.
- It is an informational application, which distinguishes it from an operational application that collects business data in the course of a normal business operation.
- A decision support system may present information graphically and may include an expert system or artificial intelligence. It may be aimed at business executives or some other group that is described.

Parallel Database

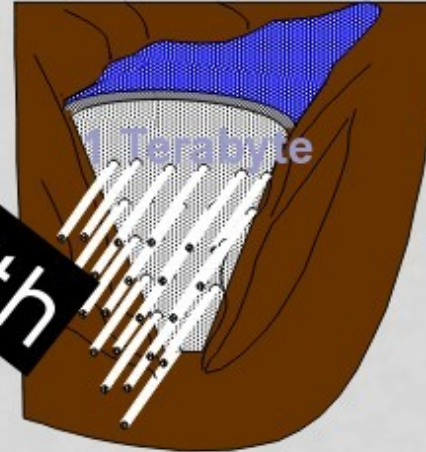
- 1 A parallel database system seeks to improve performance through parallelization of various operations, such as loading data, building indexes and evaluating queries.
- Although data may be stored in a distributed fashion, the distribution is governed solely by performance considerations.
- Parallel databases improve processing and input/output speeds by using multiple CPUs and disks in parallel.
- Centralized and client–server database systems are not powerful enough to handle such applications.
- In parallel processing, many operations are performed simultaneously, as opposed to serial processing, in which the computational steps are performed sequentially.

WHY PARALLEL PROCESSING

At 10 MB/s
1.2 days to scan



1,000 x parallel
1.5 minute to scan.



- Divide a big problem into many smaller ones to be solved in parallel
- Increase bandwidth (in our case decrease queries' response time)

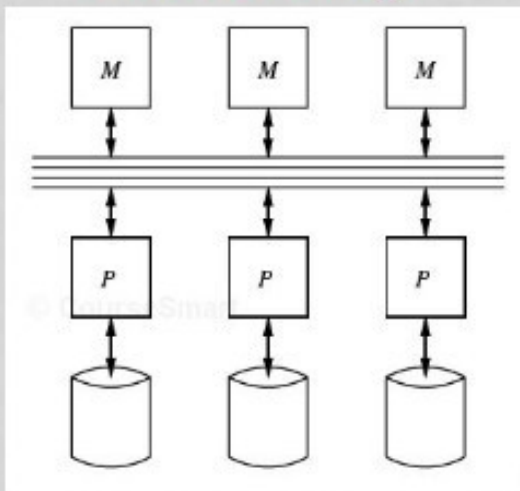
Parallel DBMS

- λ A parallel database system seeks to improve performance through parallelization of various operations, such as loading data, building indexes and evaluating queries.
- λ Although data may be stored in a distributed fashion, the distribution is governed solely by performance considerations.
- λ Parallel databases improve processing and input/output speeds by using multiple CPUs and disks in parallel.
- λ Centralized and client–server database systems are not powerful enough to handle such applications.
- λ In parallel processing, many operations are performed simultaneously, as opposed to serial processing, in which the computational steps are performed sequentially.

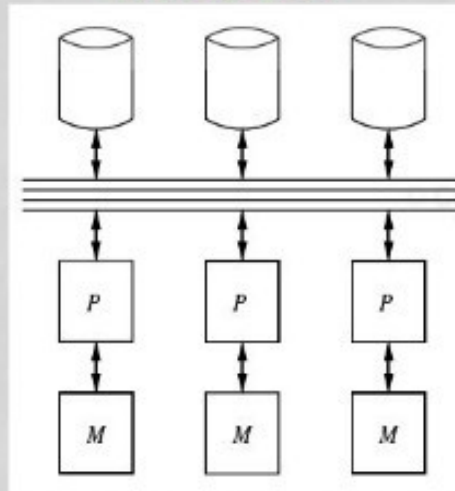
Parallel Database

- Three possible architectures for passing information

Shared-memory



Shared-disk



Shared-nothing

