ADITYA UNIVERSITY

Definitions

A Database is a collection of data describing the activities of one or more organizations.

It consists of , tables, queries, reports, view.

DBMS- It is a software designed in maintaining & utilizing large collections of data.

RDBMS-It is a database management system based on the elational model. Ex:-Microsoft Access,Informix.

RDBMS Softwares

ORACLE
Microsoft SQL Server
PostgreSQL
MySQL
SYBASE
IBM DB2

History of DBMS

Ancient and Early Systems-manual data recording

File Based systems(1950s-1960s)

First DBMS-Hierarchical and Network models(1960s-1970s)

Relational model(1970s) orcale(1979) launched the first commerical RDBMS

Expansion of RDBMS(1980s)

Rise of NoSQL and Big Data(2000s)

Cloud computing and NewSQL(2010s)

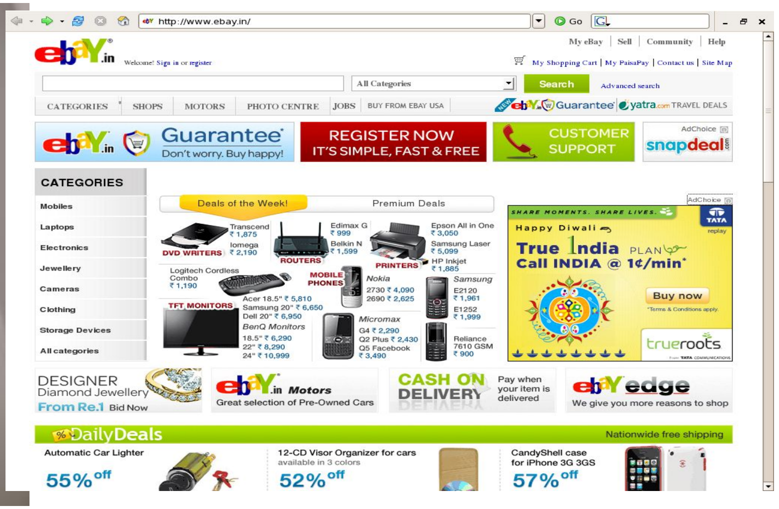
Advacnced, Distributed and AI-Integrated DBMS(2020s)

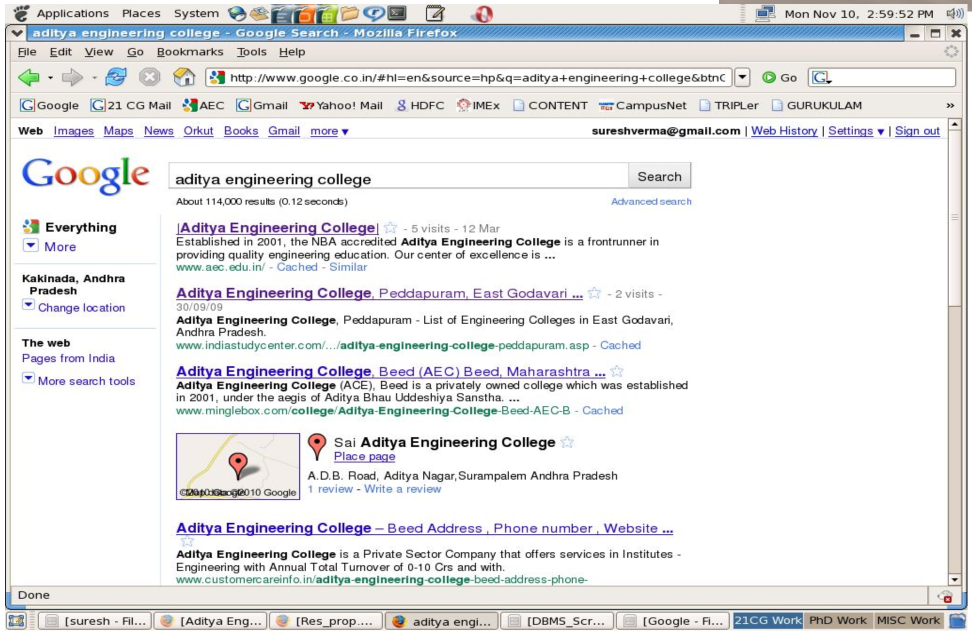
Why Use a DBMS?

- hasin Data independence and efficient access.
- Reduced application development time.
- Data integrity and security
- Data administration.
- Concurrent access, recovery from crashes.

Applications

- Banking: all transactions
- Airlines: reservations, schedules
- Universities: registration, grades
- Sales: customers, products, purchases
- Online retailers: order tracking, customized recommendations
- Manufacturing: production, inventory, orders, supply chain
- Human resources: employee records, salaries, tax deductions




Applications Places System
Mon Nov 10, 2:59:52 PM
aditya engineering college - Google Search - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.google.co.in/#hl=en&source=hp&q=aditya+engineering+college&btnC
Google 21 CG Mail AEC Gmail Yahoo! Mail HDFC IMEx CONTENT CampusNet TRIPLer GURUKULAM
Web Images Maps News Orkut Books Gmail more
sureshverma@gmail.com | Web History | Settings | Sign out
Search
Advanced search
Everything
More
The web
Pages from India
More search tools
Done
[suresh - Fil... [Aditya Eng... [Res_prop.... aditya engi... [DBMS_Scr... [Google - Fi... 21CG Work PhD Work MISC Work

aditya engineering college

About 114,000 results (0.12 seconds)

Kakinada, Andhra Pradesh
Change location

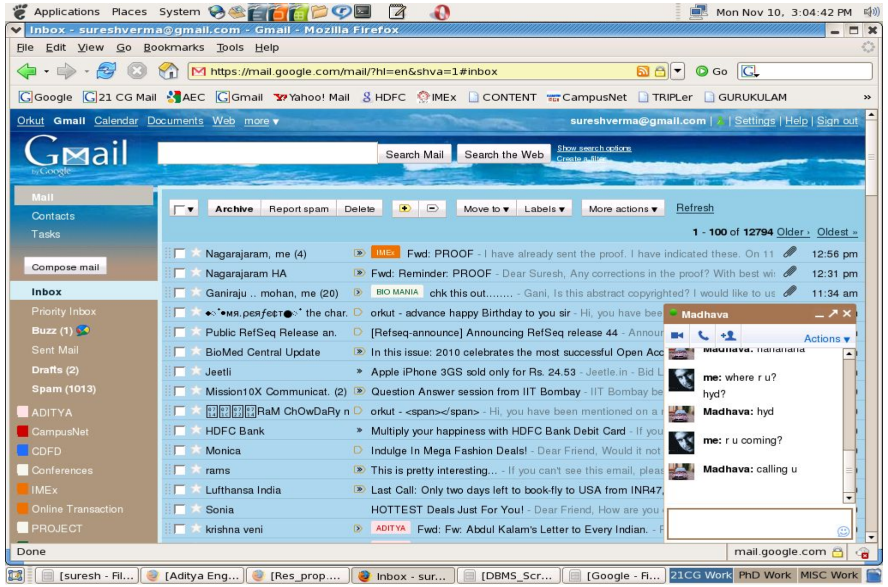
|Aditya Engineering College| - 5 visits - 12 Mar
Established in 2001, the NBA accredited **Aditya Engineering College** is a frontrunner in providing quality engineering education. Our center of excellence is ...
www.aec.edu.in/ - Cached - Similar

Aditya Engineering College, Peddapuram, East Godavari ... - 2 visits - 30/09/09
Aditya Engineering College, Peddapuram - List of Engineering Colleges in East Godavari, Andhra Pradesh.
www.indiastudycenter.com/.../aditya-engineering-college-peddapuram.asp - Cached

Aditya Engineering College, Beed (AEC) Beed, Maharashtra ...
Aditya Engineering College (ACE), Beed is a privately owned college which was established in 2001, under the aegis of Aditya Bhau Uddeshiya Sanstha. ...
www.minglebox.com/college/Aditya-Engineering-College-Beed-AEC-B - Cached

Sai **Aditya Engineering College**
Place page
A.D.B. Road, Aditya Nagar,Surampalem Andhra Pradesh
1 review - Write a review

Aditya Engineering College – Beed Address , Phone number , Website ...
Aditya Engineering College is a Private Sector Company that offers services in Institutes - Engineering with Annual Total Turnover of 0-10 Crs and with.
www.customercareinfo.in/aditya-engineering-college-beed-address-phone-


Applications Places System
Mon Nov 10, 3:04:42 PM
Inbox - sureshverma@gmail.com - Gmail - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
https://mail.google.com/mail/?hl=en&shva=1#inbox
Google 21 CG Mail AEC Gmail Yahoo! Mail HDFC IMEx CONTENT CampusNet TRIPLer GURUKULAM
Orkut Gmail Calendar Documents Web more
sureshverma@gmail.com | Settings | Help | Sign out
Gmail by Google
Search Mail
Search the Web
Show search options
Create a filter
Mail
Contacts
Tasks
Compose mail
Inbox
Priority Inbox
Buzz (1)
Sent Mail
Drafts (2)
Spam (1013)
ADITYA
CampusNet
CDFD
Conferences
IMEx
Online Transaction
PROJECT
Archive Report spam Delete Move to Labels More actions Refresh
1 - 100 of 12794 Older › Oldest »
Actions
Done
mail.google.com
[suresh - Fil... [Aditya Eng... [Res_prop.... Inbox - sur... [DBMS_Scr... [Google - Fi... 21CG Work PhD Work MISC Work

```
Nagarajaram, me (4)          IMEx Fwd: PROOF - I have already sent the proof. I have indicated these. On 11    12:56 pm
Nagarajaram HA               Fwd: Reminder: PROOF - Dear Suresh, Any corrections in the proof? With best wi    12:31 pm
Ganiraju .. mohan, me (20)   BIO MANIA chk this out........ - Gani, Is this abstract copyrighted? I would like to us    11:34 am
•мя.ρєяƒє¢т• the char.       orkut - advance happy Birthday to you sir - Hi, you have bee
Public RefSeq Release an.    [Refseq-announce] Announcing RefSeq release 44 - Annour
BioMed Central Update        In this issue: 2010 celebrates the most successful Open Acc
Jeetli                       Apple iPhone 3GS sold only for Rs. 24.53 - Jeetle.in - Bid L
Mission10X Communicat. (2)   Question Answer session from IIT Bombay - IIT Bombay be
RaM ChOwDaRy n               orkut - <span></span> - Hi, you have been mentioned on a
HDFC Bank                    Multiply your happiness with HDFC Bank Debit Card - If you
Monica                       Indulge In Mega Fashion Deals! - Dear Friend, Would it not
rams                         This is pretty interesting... - If you can't see this email, pleas
Lufthansa India              Last Call: Only two days left to book-fly to USA from INR47,
Sonia                        HOTTEST Deals Just For You! - Dear Friend, How are you
krishna veni                 ADITYA Fwd: Fw: Abdul Kalam's Letter to Every Indian. - F
```

```
Madhava
Madhava: hahahaha
me: where r u?
hyd?
Madhava: hyd
me: r u coming?
Madhava: calling u
```

Data Access: Related information are stored in different files. Any two independent files are not linked.

Ex: Student_files and Student_report are related but two different files.

We need to display student details along with his report, we cannot directly pick. We need to search the data in two files. It is difficult.

Data Redundancy: No methods to validate duplicate data in file system. Waste of space for duplicate data & it leads to confusion.

Data Consistency: Mismatch in different copies of same data.

Ex: student and student_report files have student address in it, there was a change request for one particular student address. We searched student file for the address & it updated correctly. But in student_report the address is unchanged. Actually we need to update it.

Drawbacks of File Systems

Data Isolation: We have to generate a single report of student-student details report, library book details, hostel information. All information are stored in different files. If there are 2-3 files it is a bit simple. If there are n files programming would be complex.

Security & Integrity: Data is visible to different classes of users. Integrity constraint that student age must be above 18.

Concurrent Access: Accessing the same data by different users

Ex: Two students want a book. One student searches for a book & sees a copy available at the same time. Another student sees that one copy available. First student gets the book but not updated to zero.

Database Users

- **Naive Users** – these are the users who use the existing application to interact with the database. For example, online library system, ticket booking systems, ATMs etc which has existing application and users use them to interact with the database to fulfill their requests.

- **Sophisticated Users** – They are database developers, who write SQL queries to select/insert/delete/update data. They do not use any application or programs to request the database. They directly interact with the database by means of query language like SQL.

Database Users

- **Application Programmers-**Computer professionals who write application programs. Programmers choose many tools to develop user interfaces. RAD(Rapid application development) tools enable an application programmer to construct forms and reports.

- **Specialized Users-**They write specialized database applications. They develop complex programs.

Database Administrator

Designing and maintaining the database is by a professional.

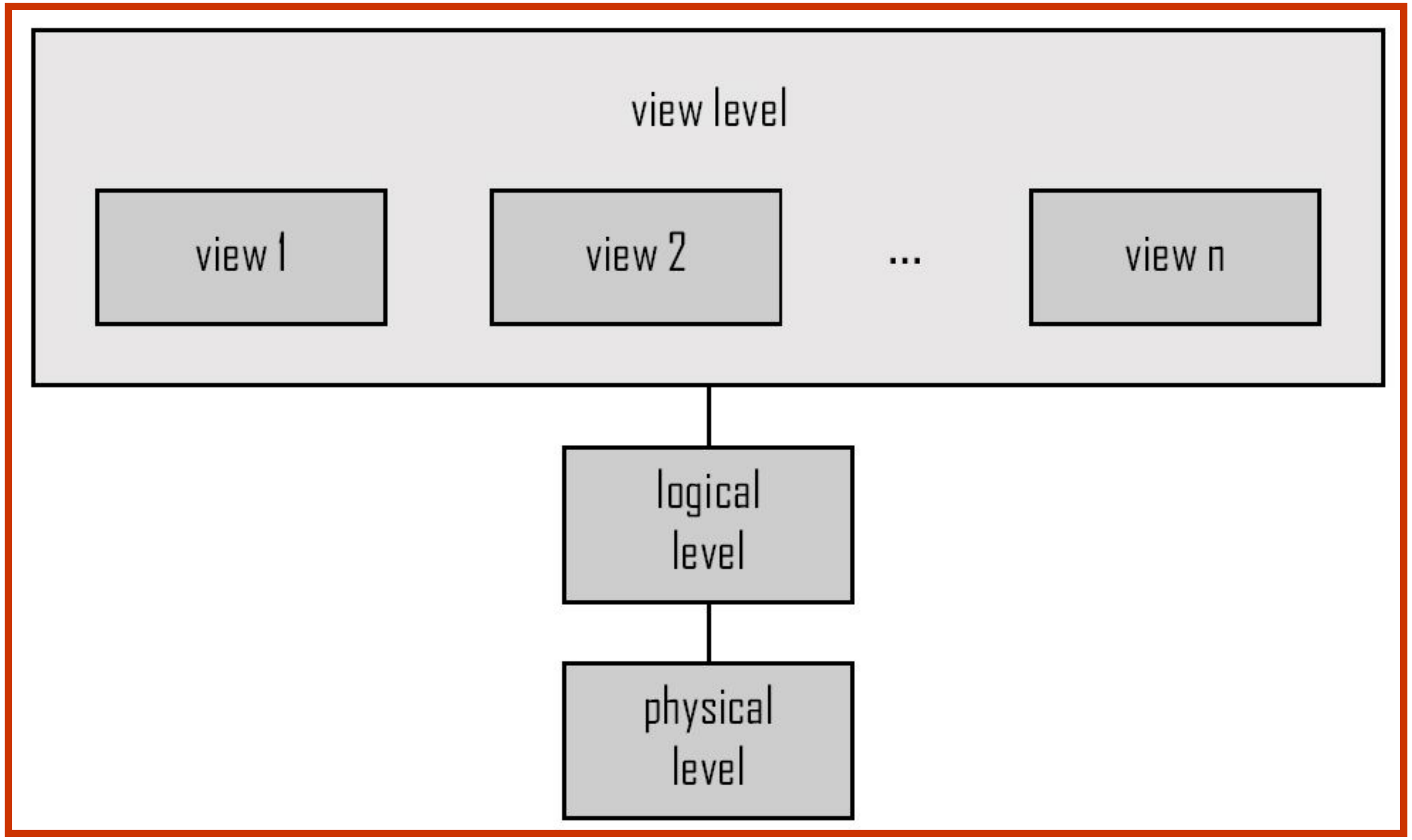
DBA Tasks

1) Design of conceptual and physical schema
2) Security and Authorization
3) Data availability and recovery from failures
4) Database tuning((Monitoring Performance and responding to changes)

View of Data

- Abstraction-Hiding unwanted data from user and providing abstract view of data to the users.
- Physical level:-It is the lowest level of data abstraction. It describes how data is actually stored in database.
- Logical level:- It is the next higher level of data abstraction. What data are stored in the database, what relationships exist among those data.
- View level:- The highest level of data abstraction. This level describes the user interaction with database system.

View of Data



Data Models

- Structure of a database is the data model. It provides a way to describe the design of a database at physical, logical and view level.

Types of models

- Relational model
- Entity-Relationship data model
- Object-based data models
- Semi structured data model (XML)
- Other older models: Network model & Hierarchical model

Data Models

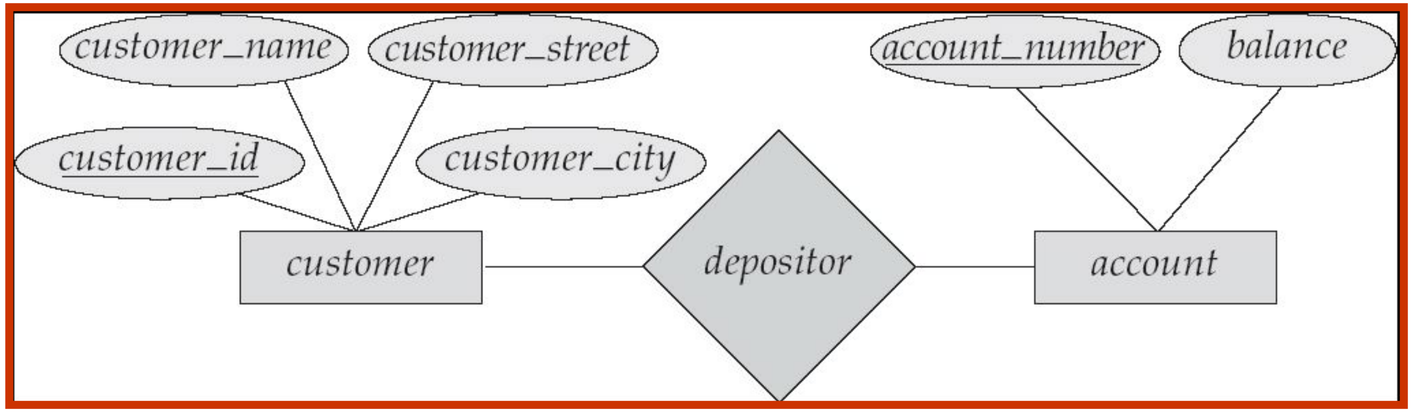
- Relational model:- It is the most widely used data model. It uses a collection of tables to represent both data and relationships among those data. Each table has multiple columns and rows. Each column has a unique name. Relational model is an example of a record based model.
- Entity Relationship model:- It is based on perception of a real world that consists of objects called entities and relationship among those objects. ER is widely used in database design.
- Object based data model:-It is an extending the ER model with notations of encapsulation, methods, object identity. Object relational data model combines the features of object oriented data model and relational data model.

Data Models

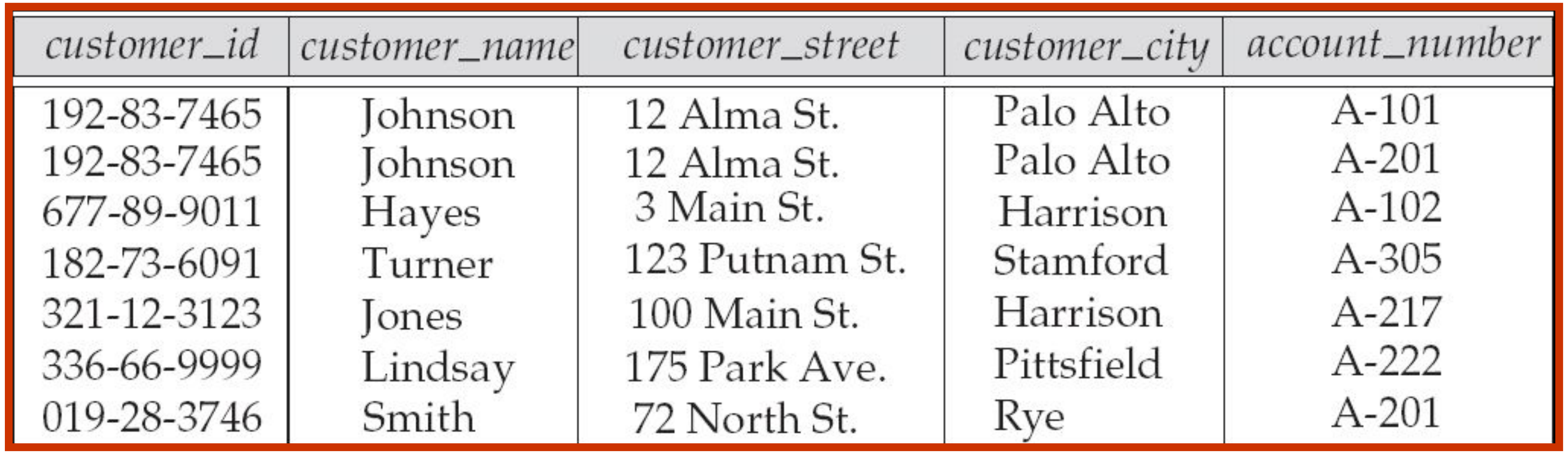
- Semi structured data model:-It permits the specification of data where individual data items of same type may have different set of attributes.
- Network model:- It represents data as record types and also represents a limited type of 1:N relationship. One instance of record to many record instances using some pointer linking mechanisms.
- Hierarchical model:- It represents data as hierarchical tree structure. Each hierarchy represents a number of related records.

Data Models

Sample Entity-Relationship (ER) model



Sample Relational model



customer_id	customer_name	customer_street	customer_city	account_number
192-83-7465	Johnson	12 Alma St.	Palo Alto	A-101
192-83-7465	Johnson	12 Alma St.	Palo Alto	A-201
677-89-9011	Hayes	3 Main St.	Harrison	A-102
182-73-6091	Turner	123 Putnam St.	Stamford	A-305
321-12-3123	Jones	100 Main St.	Harrison	A-217
336-66-9999	Lindsay	175 Park Ave.	Pittsfield	A-222
019-28-3746	Smith	72 North St.	Rye	A-201

Types of schemas

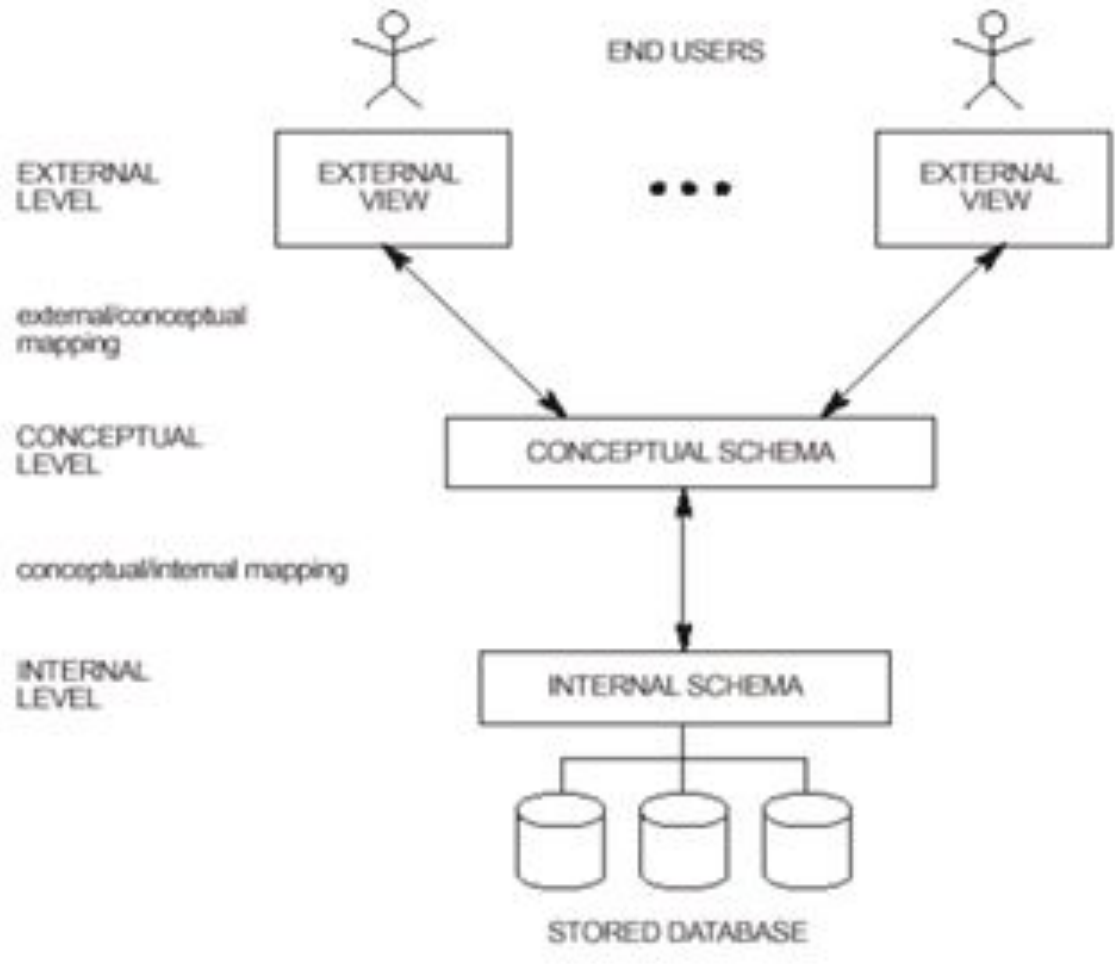
- Collection of information stored at a particular moment is called instance.
- Overall design of the database is called schema.

- Conceptual or logical schema:- It describes the stored data in terms of the data model & describes all relations that are stored in the database.

- Physical or internal schema:- It specifies additional storage details. How data actually stored on secondary storage devices such as disks and tapes.

- External schema:-It allows data access at the level of individual users or group of users.

Three Schema Architecture



Data Independence

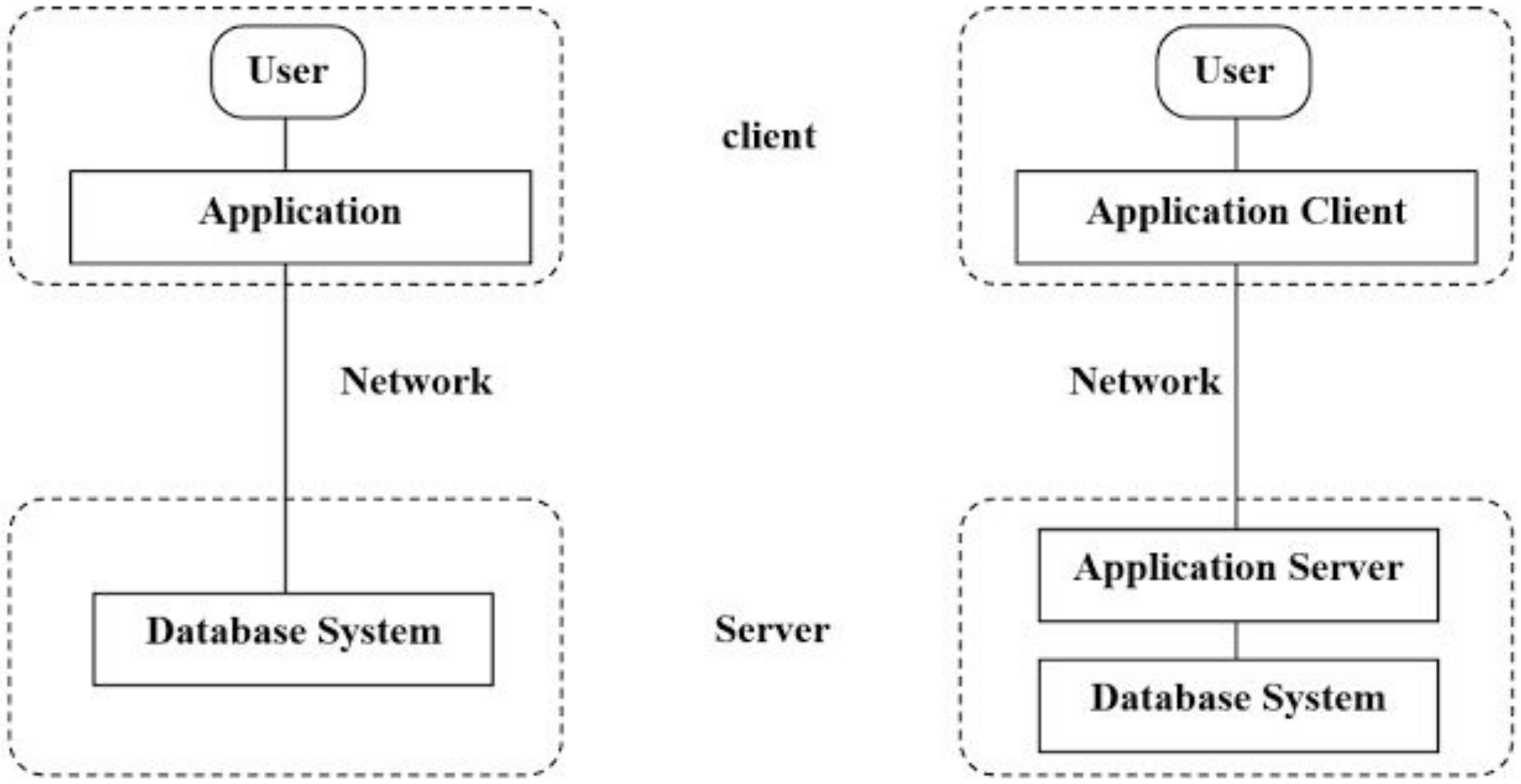
- It helps you to modify the schema at one level of the database system without altering the schema at the next higher level.
- Logical level data independence

we can change the relations, logical structure of data but external schema will remain same.

- Physical level data independence

we can change the storage details without altering applications.

Database Architecture



(a) Two-tier Architecture

(a) Three-tier Architecture

Two-Tier Database Architecture

Component that resides at client machine invokes database system functionality at server machine through query language statements.

Ex: API standards like JDBC, ODBC are used for interaction between the client and the server.

Three-Tier Database Architecture

Client acts as a front end. Client end communicates with an application server, usually through a form interface. The application server in turn communicates with a database system to access data. 3-tier applications are more appropriate for large applications that run on WWW.

Database Architecture

Three Components

- Database system:- It resides along with its query processing languages. We have the relations that define the data and their constraints.
- Application:- It presents abstract view of the database and acts as a mediator between the end user and database. Multiple views of the database can be provided by the application.
- End user:- users know nothing about existence of the database.

Classification of Database Management Systems

1) Data model

Main data model in many commerical DBMS is relational model.

Object based data model has been implemented in some commerical systems but has not had widespread use.

Many legacy applications run on database systems based on hierarchical & network data models.

Some experimental DBMS are based on XML model which is a tree structured data model-Native XML DBMS

2) Classify DBMS is the number of users supported by the system.

Single user systems- support only one user at a time & mostly used with PCs

Multi user systems- include majority of DBMS and support concurrent multiple users

Classification of Database Management Systems

3) Number of sites over the database is distributed.

A DBMS is centralized if the data is stored in a single computer site.

A centralized DBMS can support multiple users but DBMS software & database reside totally at a single computer site.

A distributed DBMS-database & DBMS software distributed over many sites, connected by a computer network.

Homogeneous DBMS-use same DBMS software at all sites

Heterogeneous DBMS-use different DBMS software at each site.

4) Cost

Open source DBMS products like MYSQL & POSTGRE SQL

Main RDBMS products 30-day copy versions, cost under $100

Pay in Millions for installations and maintenance of database manually.

Classification of Database Management Systems

5) Types of access path options for storing files

DBMS can be general purpose or special purpose.

When performance is a primary consideration, a special purpose DBMS can be designed & built for a specific application, such a system cannot be used for other applications. Ex:- airline reservations and telephone directory systems

Database Languages

1) Data Manipulation Language(DML)

It enables users to access and manipulate data.

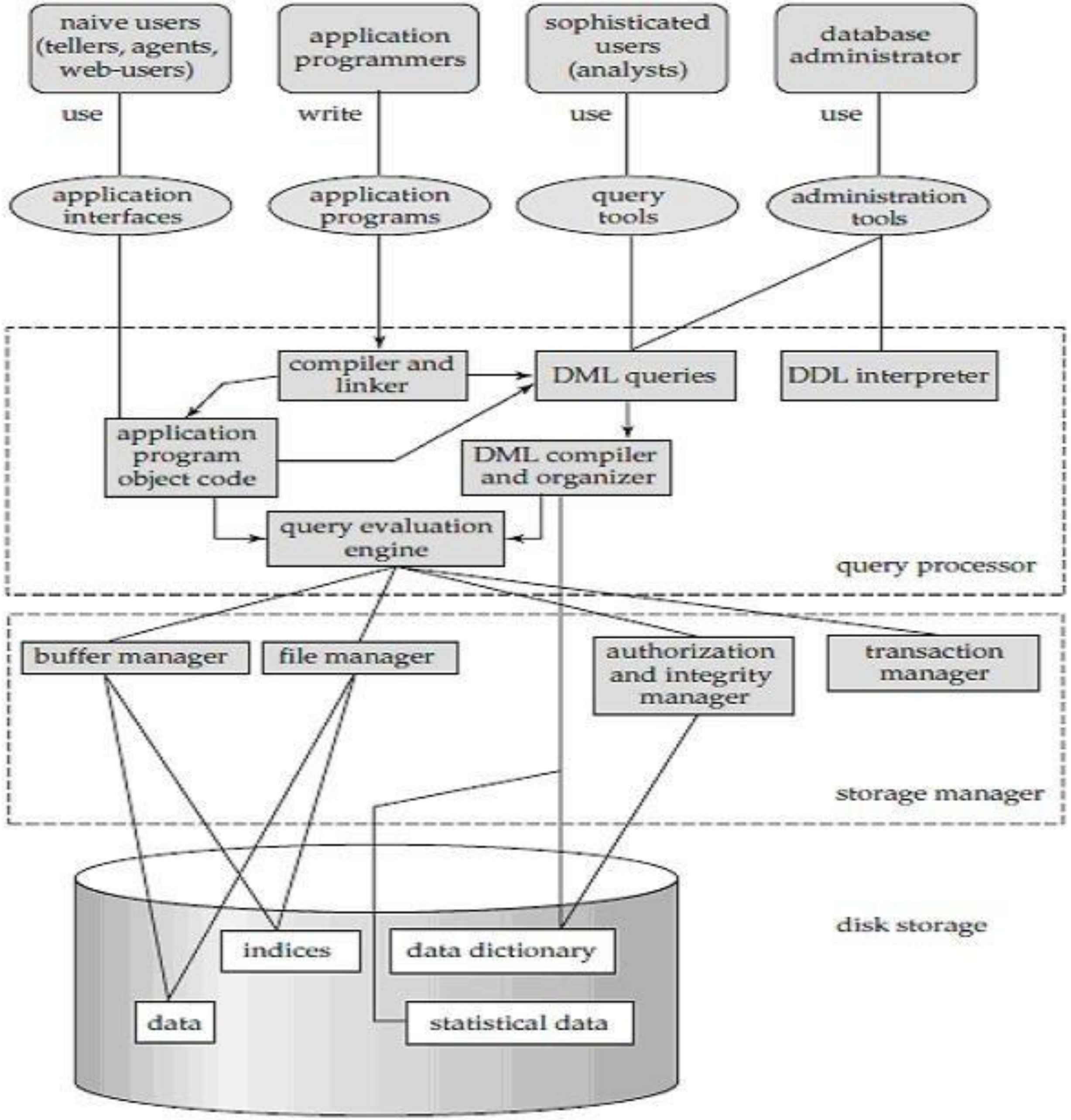
Types of access are:-

- Retrieval of information stored in the database.
- Insertion of new information into the database.
- Deletion of information from the database.
- Modification of information stored in the database.

2) Data Definition Language(DDL)

We specify a database schema by a set of definitions expressed by DDL.

It is used for defining and modifying the data and its structure.


naive users (tellers, agents, web-users)
application programmers
sophisticated users (analysts)
database administrator
use
write
use
use
application interfaces
application programs
query tools
administration tools
compiler and linker
DML queries
DDL interpreter
application program object code
DML compiler and organizer
query evaluation engine
query processor
buffer manager
file manager
authorization and integrity manager
transaction manager
storage manager
disk storage
indices
data dictionary
data
statistical data

Database System Structure

1) Types of users:

Naive users:- These are unsophisticated users who interact with the system by invoking existing application programs

Ex:-ATM

Application Programmers:- Computer professionals who write application programs. Programmers may choose many tools to develop user interfaces. RAD tools enable an application programmer to construct forms and reports.

Sophisticated Users:- They interact with the system without writing programs. Requests using database query language. Users submit a query to query processor. Query processor breaks down DML statements into instructions that storage manager understands.

Database System Structure

2) Query Processor

DML Compiler:- It translates DML Statements into low-level statements that the query evaluation engine understands.

DDL interpreter:- It interprets DDL statements and records them in a data dictionary.

Query evaluation engine:- it executes low-level instructions generated by the DML compiler.

3) Storage Manager

Buffer Manager:- It is responsible for fetching data from disk storage into main memory and deciding what data to cache in main memory.

File manager:- Manages the allocation of space on disk storage & data structures used to represent information stored on disk.

Authorization & integrity manager:- This tests for the satisfaction of integrity constraints and check the authority of users to access data.

Transaction Manager:- Ensure the database remains in a consistent state despite of system failures & that concurrent transaction executions proceed without conflicting.

Database System Structure

4) Disk Storage:-

Data Files:- Stores the database itself

Data Dictionary:- Stores metadata about the structure of database.

Indices:- This provide fast access to data items to hold particular values

Statistical data:- Stores Statistical information about the data in the database

ADITYA UNIVERSITY

Thank You