

→ What is a Database (DB)?

Any collection of related information,

Ex : * Phonebook

This stores people's phone numbers

* Shopping list

* Todo list.

stores a list of things that you want to do during a day.

* Your 5 best friends

* Facebook's User Base.

All of the Users that Facebook keeps track of and stores.

→ All of the above are collections of information that store related stuff.

Databases can be stored in different ways.

* On paper → shopping list

* In your mind → Best Friends.

* On a Computer.

→ This Powerpoint

→ Comments Section → Storing comments of the video.

→ Computers + Databases = ⚡ (Heart)

Computers are the best medium to store databases.

Let's see why.

Comparing Amazon.com & shopping list

Amazon.com

shopping list

→ Keeps tracks of Products, Reviews, Orders, Credit Cards, Users etc.

→ keeps track of consumer products that need to be purchased.

→ Trillions, of pieces of information need to be stored and readily available

→ 10 - 20, pieces of info need to be stored and readily available.

→ Information is extremely valuable and critical to Amazon's functioning. re. the info amazon is storing is extremely essential for its functioning.

→ It Information is for convenience only and not necessary for shopping, ie like if you didn't have shopping list, you could still go to the store.

→ Security is essential, It stores people personal information like Credit card Address, Phn no.

→ Security is not at all important re even if you drop your shopping list there no loss

→ Information stored
in computer

→ Data stored on a piece of
paper or even just in memory

Therefore for any application like Amazon,
for storing the data, duplicating it, back up etc
are easy to do on with computer.

Computers are good at keeping track of large
amounts.

Therefore, we are going to use database to
store huge amount of information, to do so, we
will use a special software to help us
create and maintain a database.

Database Management System :- (DBMS).

→ A special software program that helps
users create and maintain a database.

→ Makes it easy to manage large amounts
of information.

(Ex :- For a company like Amazon, it
needs to store trillions of information. DBMS can
make it easy to store trillions of information)

→ Handles Security

Allow only certain people with username
and password can access the data.

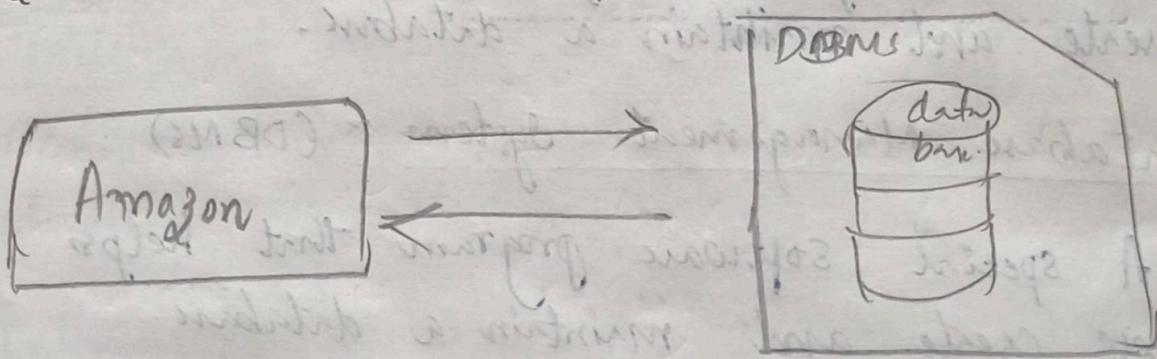
→ Backups
back up the data and import and export
the data from other sources.

→ Importing / Exporting

→ Concurrency

→ Interacts with software application.
Amazon.com is a website which is interacting
with Amazon database.

Amazon.com Database Diagram.



Amazon is communicating with a database management system.

DBMS is creating and storing and keeping track of database.

∴ DBMS is not actual database

But it is the software application that is creating, maintaining, updating and deleting information from the actual database.

→ Amazon.com will interact with the DBMS in order to create, read, update and delete information.

Amazon.com is not actually creating, reading, updating and deleting info, but telling DBMS to do it.

C.R.U.D			
create	Read	Update	Delete
Retrieve			

It represents the 4 main operations that we're going to do with the database.

- Creating information in the database
Create new data entries
- Reading information from the database
- Updating the existing info
- Deleting unwanted info.

Two types of Databases.

1) Relational Database
(SQL) (Relational)

→ Organise data into one or more tables

Each table has columns and rows

A unique key identifies each row.

→ Here, we will organise all the data that we want to store inside these predefined tables

Ex: Excel

Ex: Student Table.

ID	Name	Major
1	Jack	Biology
2	Eva	Social
3	Trevor	Science
4	Mary	Math

2) Non-Relational (NoSQL)
not just SQL

→ Organise data for anything but a traditional table

key-value stores

Documents (JSON, XML)

Graphs

Flexible Tables

→ Any database that's not relational is put into this category.

→ Anything that's not relational

Relational Databases (SQL)

→ Relational Database Management Systems (RDBMS)

RDBMS is just a DBMS that helps you create and maintain a relational Database.

Some of the popular are MySQL, Oracle, PostgreSQL, mariadb etc.

→ RDBMS is just a software application that we can use in order to create, maintain and do different things to our Relational Database.

Structured Query Language.

→ It is a standardized language used for interacting with RDBMS.

→ It is used to perform CRUD operations, as well as other administrative tasks (user management, security, backups etc).

→ Relational Databases uses tables in order to organise its information. SQL is used to define those tables and insert info in those tables.

→ SQL is used on every RDBMS, but different relational database management systems will implement SQL just a bit differently.

Therefore, SQL code used on one RDBMS is not always portable to another without slight modification.

Non-Relational DBMS (NRDBMS).

Help users create and maintain a non-relational Database.

→ mongoDB, dynamoDB, apache cassandra.

Unlike RDBMS, where we have SQL which is a standard language to interact with all of them, there isn't any standard language for interacting with non-relational DBMS.

• Implementation Specific

Any non-relational Database falls under this category, so there's no set language standard.

→ Most NRDBMS will implement their own language for performing C.R.U.D and administrative operations on the database.

Core concepts within Database.

1) Database Query. [Queries]

Queries are requests made to database management system for specific information.

(From the word, we can understand that we are asking DBMS to give us specific info)

As the database's structure or layout becomes more and more complex, it becomes difficult to get the specific pieces of information we want.

We can write this complex database query like a program, then that query will then instruct the RDBMS to grab specific information from the database.

A google search is a query.

In google search, for a query, we can use English or any language we want.

But with a Relational Database management system, we have to write our queries using either SQL or any other specific language for that DBMS.

Summary

- Database is any collection of related information.
- Computers are great for storing databases. Because they are really fast, they store lots of pieces of information, they can handle things like security really easily.
- Database Management Systems (DBMS) make it easy to create, maintain and secure a database.
- DBMS allow you to perform the C-R-U-D operations and other administrative tasks on database.
- Two types of Databases, Relational & Non-Relational.
- Relational databases use SQL and store data in tables with rows and columns.
- Non-Relational data store data using other data structures.

Student

Tables & Keys.

Student Id	Name	Major
1	Kate	Sociology
2	Taek	Biology
3	Christie	English
4	Jack	Biology
5	Mike	Computer
6	Manoj	Physics

→ All tables in Relational databases are going to have two things.

i) Columns — Vertical section

It defines a single attribute

ii) Rows ..

Individual entry in student table

Represents a single student

Special column — primary key

It is basically an attribute which uniquely defines the row in the database.

Used to differentiate rows.

It is always unique for specific row.

→ Surrogate key is just like a primary key, that has no mapping to anything in real world.

→ Natural key is a key that has a mapping to the real world, just like Social Security Numbers, Aadhar Number.

→ Foreign key is basically an attribute, that we can store on an database table that will link us to another database table. It is primary key of another branch table. It is able to help us define relationships between tables.

→ Sometimes primary keys consists of two columns, this is called composite key. A composite key is basically a key that needs two attributes.

Ex: Branch Supplier

Branch Id	Supplier Name	Supply type
2	Hammer Mill	Paper
2	Uni-ball	Utensils.
3	Patriot paper	Paper
42	Labels	Custom Forms
3	Uni-ball	Utensils
3	Hammer Mill	Paper
3	Stamford labels	Custom Forms