DBMS

Data Base Management Systems

DBMS introduction

- Database Management System (**DBMS**) is a software used to manage Databases
- A **database** is a collection of information that is organized so that it can be easily accessed, managed and updated.
- The DBMS will execute our instructions and return the results
- We have several management systems

- Here we discuss about mainly 2 types of DBMS

1. Relational Database
2. NoSQL Database

Relational Databases

- In relational Databases we stores data in the form of rows(tuple) and columns(attributes), and together forms a table(relation).
- The data in an RDBMS is stored in database objects which are called as **tables**. This table is basically a collection of related data entries and it consists of numerous columns and rows.
- **Examples** of Relational databases are MySQL, Microsoft SQL Server, Oracle, IBM DB2, PostgreSQL, etc.

- Each table in the database carries a key that makes the data unique from others.
- A relational database uses SQL for storing, manipulating, as well as maintaining the data
- A transaction is a single logical unit of work which accesses and possibly modifies the contents of a database. Transactions access data using read and write operations.
- In order to maintain consistency in a database, before and after the transaction, certain properties are followed. These are called **ACID** properties.

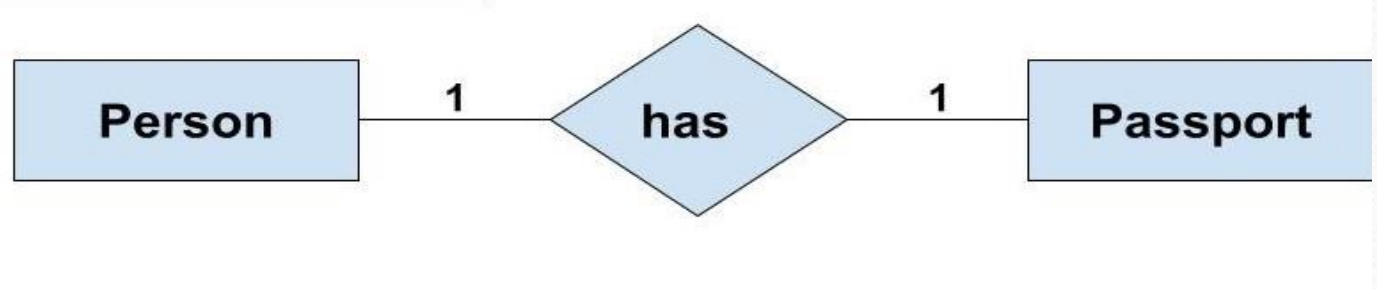
- **A means Atomicity**: This ensures the data operation will complete either with success or with failure. It follows the 'all or nothing' strategy. For example, a transaction will either be committed or will abort.
- **C means Consistency**: If we perform any operation over the data, its value before and after the operation should be preserved. For example, the account balance before and after the transaction should be correct, i.e., it should remain conserved.
- **I means Isolation**: There can be concurrent users for accessing data at the same time from the database. Thus, isolation between the data should remain isolated. For example, when multiple transactions occur at the same time, one transaction effects should not be visible to the other transactions in the database.
- **D means Durability**: It ensures that once it completes the operation and commits the data, data changes should remain permanent.

NoSQL

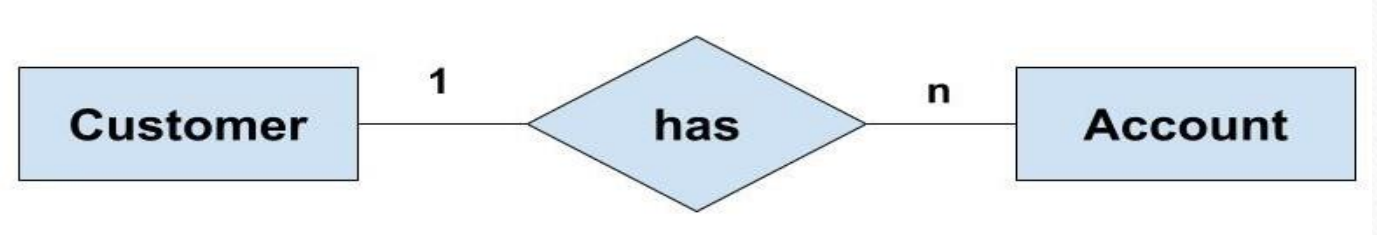
- Non-SQL/Not Only SQL is a type of database that is used for storing a wide range of data sets.
- It is not a relational database as it stores data not only in tabular form but in several different ways.
- And NoSQL don't understand the SQL they have their own language.
- **Examples** of NoSQL databases are Mongo DB, Couch DB, Oracle NoSQL, HBase, etc.
- In MongoDB we don't have tables and relations . But we use Coleections and documents instead of tables and record

Types of Relation

1. One to One relationship



1. One to Many or Many to One relationship



2. Many to many relationships

KEYS IN DBMS

- A key is an attribute or a set of attributes which help you uniquely identify a record or a row of data in a relation.
- Examples of attributes are Roll no, Name, Age, Address in a Students table

Roll no	Name	Age	Address
1	Abhishek	20	kozhikode

- Keys are used to establish a relationship between tables and identifying relationship between tables.

- Different types of keys are.

1. **Super key**
2. **Candidate key**
3. **Primary key**
4. **Foreign key**
5. **Composite key**
6. **Compound key**

NORMALIZATION

- Normalization is a technique of organizing the data into multiple related tables to **minimize redundancy**
- Normalization divides the larger table into the smaller table and links them using relationship.
- Data redundancy (Replication of similar data in multiple places).Replication of data will end up in size increment of database
- So normalization is not about eliminating data redundancy it about minimizing it.
- Types of Normalization

  1NF, 2NF, 3NF, 4NF(BCNF)

1NF

- Is the normalization process
- It is the basic requirement while creating table

The rules are :

- Each column of your table contain atomic value.
- In a column should contain only same type of data
- Each column should have a unique name
- Order in which data saved doesn't matter

2NF

- The table should be in 1NF
- And shouldn’t contain any partial dependency

3NF

- The table should be in 2NF
- And shouldn’t contain any transitive dependency

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4NF(BCNF)

- Boyce-Codd Normal Form or 3.5 NF
- It is an upgraded version of a 3 NF
- It should be in the 3 NF
- For any Dependency A-->B, A should a super key
- Or a prime attribute depends on a non prime attribute

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