

Database Assignment

1. Define the following key terms related to databases:

1.1.1. Database

A database is a structured collection of data organized in a way that it can be easily accessed, managed, and updated.

1.1.2. Table

In a relational database, data is stored in tables. A table is a collection of related data organized in rows and columns.

1.1.3. Record

A record, also known as a row or tuple, is a single instance of data within a table. It contains a set of values corresponding to the fields defined in the table.

1.1.4. Field

A field, also known as a column or attribute, is a single piece of data within a record. It represents a specific characteristic or property of the entity being stored in the table.

1.1.5. Primary Key

A primary key is a unique identifier for each record in a table. It ensures that each row in the table can be uniquely identified and retrieved.

1.1.6. SQL

SQL is a standard programming language used to manage and manipulate relational databases. It is used for tasks such as querying data, updating records, defining schema, and managing permissions.

1.1.7. Query

A query is a request for information from a database. It is typically written in SQL and specifies the criteria for selecting and retrieving data from one or more tables.

1.1.8. Index

An index is a data structure that improves the speed of data retrieval operations on a database table. It is created on one or more columns of a table and allows the database management system to quickly locate rows based on the indexed column(s)

1.1.9. Normalization

Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity

1.1.10. Database Management System (DBMS)

A DBMS is software that enables users to interact with databases. It provides tools and utilities for creating, storing, retrieving, updating, and managing data in a structured format.

2. Section B: Discussions

2.1.1. Purpose of a Primary Key:

The primary key in a database table serves as a unique identifier for each record in the table. Its primary purpose is to ensure data integrity and facilitate efficient data retrieval. By enforcing uniqueness, the primary key prevents duplicate records and allows for accurate referencing and linking between tables in relational databases.

Example: Consider a table named "Students" in a school database. Each student record can be uniquely identified by a student ID number. In this case, the student ID serves as the primary key for the "Students" table.

2.1.2. Difference between DBMS and Database:

Database: A database is an organized collection of structured data that is stored and managed in a computer system. It consists of tables, records, and fields that hold the actual data. Examples include MySQL, PostgreSQL, MongoDB, etc.

DBMS (Database Management System): A DBMS is software that provides an interface for users to interact with the database. It facilitates the creation, maintenance, and manipulation of databases. DBMS handles tasks such as data storage, retrieval, security, backup, and concurrency control. Examples include MySQL, Oracle Database, Microsoft SQL Server, etc.

In essence, the database is the actual repository of data, while the DBMS is the software used to manage and manipulate that data.

2.1.3. Importance of Normalization:

Normalization is crucial in database design as it helps eliminate data redundancy and dependency, thereby improving data integrity and efficiency. By organizing data into smaller, related tables and reducing duplication, normalization minimizes the risk of inconsistencies and anomalies during data manipulation and updates.

Example: Suppose we have a database for a library. Without normalization, we might have a single table containing both book information and borrower information. This could lead to redundant data if a borrower checks out multiple books or if a book has multiple editions. By

normalizing the database into separate tables for books, borrowers, and transactions, we can ensure that each piece of data is stored only once and maintain consistency throughout the database.