**Homework Assignment 1**

1. What is a relational database?

Relational database is a type of database that includes a structure allowing us to identify and access data that has a relation with another data in the database. Simply, it is a collection of data items with pre-defined relationships between them. The data is organized in rows and columns. The row is a record with a unique ID called key and column holds attributes of data. A relationship exists in the table as each record has a value for each attribute (Rouse, n.d.).

1. What is the role of the relational database in an organization today?

Relational database is needed for data access within an organization which is implemented by a structured query language that inserts, updates and deletes data in a table. A strong relationship is maintained between data within a relational database and allows simple way in updating current information and deleting information that is not needed. For example, in a business organization, data search and sort features make it easy for customers to find products according to their needs like cost and brand (Singh, 2017).

1. What are the main characteristics of a relational database?

* The data in the relational database must be represented in tables having row and columns.
* A table row represents a single entity occurrence within the entity set.
* Each table column represents attribute and each column has a unique name.
* The values in a column must be of single data value.
* Insert, update and delete operations must be supported.
* Each row in the table is identified by a unique key called primary key.
* Duplication of data(data redundancy) must be avoided so that same data is not stored is not at multiple locations (University of Babylon).

1. What are the main functions of the Relational Database Management System (RDBMS)?

* Data Dictionary Management: A data dictionary is a where the Relational Database Management System stores the data elements and their relationships, a metadata. All the required data component structures and their relationships are known by this function. This is done by Database Administrators and Programmers and is hidden from user.
* Data Storage Management: This function helps in storage of data like video/audio format, or code, reports. Performance tuning which relates to database efficiency is involved with this function.
* Security Management: A set of rules that determine only specific users can access the database. This function determines the restrictions of the user to see or manage data.
* Backup and Recovery Management: This function deals with threats to a database. Backup deals with data safety and integrity and recovery deals with time taken to recover the database after outage.
* Multiuser control: Allows multiple users to access the database at the same time without affecting the integrity of the database.
* Data Integrity Management: This function sets up rules like avoiding data redundancy where data is duplicated and tries to maximize data consistency where the user is returned correct output (Fandom, n.d.).

1. Why the database design is important?

Database design is defined as a database structure that is used as a blueprint to store and edit data. This is implemented by a software called Database Management System(DBMS). Very few programmers design a good database schema, therefore database design is important. A good database design overcomes inconsistent data, data redundancy, inefficient query execution. Implementing primary keys and unique constraints helps in ensuring data consistency. Assigning keys and values so that when a change is made, there must be no change in other irrelevant tables. A good database design results in easy maintenance (Studylib).

1. What other types of databases exist today on the market?

Some of the common databases that exist today in the market:

* Centralized database: Data is stored in a centralized location and users from different location will access it.
* Distributed database: Data is not available at one place and is distributed at various levels of an organization, which is connected by communication links.
* Commercial database: A paid database for large data used by users who need information which is done using connection links.
* NoSQL database: Deals with large amounts of unstructured data, this database can avoid ACID properties, data is stored in hierarchical architecture without any primary or foreign keys.
* Cloud database: Data is stored in a virtual environment in clouds. Some benefits of cloud database is high storage capacity, scalability and availability of data (Tutorialspoint, n.d.).

1. What is the fundamental difference between NoSQL and a relational database?

Relational database follows a structured way of sorting data and data stored depends on physical memory of the system. The data is represented in tabular form having rows and supports ACID properties(Atomicity, Consistency, Isolation, Durability).Relational database follows structured query language(SQL). NoSQL follows an unstructured way of sorting data. The data is represented as document based, key-value pairs or graph databases. Large data can be added by using server support in NoSQL and follows unstructured query language, focusses on collection of documents and varies from database to database (AssignmentHelp, n.d.).

1. What is the role of a relational database in the Big Data ecosystem?

Relational database in the big data ecosystem help in data flow within an organization. Accessing tables using rows and columns is a plus in relational database, few tables can be hidden, and data security is well maintained. The skill set for a relational database is ubiquitous. SQL on Hadoop is now emerging as a standard protocol in the big data market (Walker, 2015).

1. In your opinion, what is the future for relational databases? Explain your reasoning.

There has always been a discussion on future of relational databases. This is because the kind of data that the user must deal with. Many people consider moving to NoSQL due to its flexible nature. But there are few flaws, NoSQL databases have many types and a database designer must know what kind of database has to be used, NoSQL is highly scalable but it do costs huge amount to run software that support scalability. So, it is up to the database design requirements as to which database to implement. If we choose NoSQL, there are limitations that have to be accepted or use SQL databases that adapt (S.Seiner, 2013).

# References

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