**What is a relational database?**

A relational database is a database that stores data by relating tables made up of rows and columns. Relational databases allow data to be application independent but also have the ability to be accessed by multiple applications (Baesens, 2015). Rows in the table represent entries where there is a key that represents a unique identifier for that row (primary key). The columns in the row represent different attributes or fields of the row. Because the data is tightly structured it can be queried using SQL which allows for easy written queries. (Allardice, 2015)

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

RDMSs allow storage and retrieval of traditional and numeric data, such as the amount of items in stock or the amount and date of delivery for a specific item. RDMSs allow storage and retrieval of multimedia data, including videos, audio, and images (Baesens, 2015). For instance, YouTube can be structured as a relational database with the different videos being entries. Each video is then given a primary key that is unique to that video.

**What are the main components of a relational database?**

The main components of a relational database are what make up a particular database, such as: data model, schemas and instances, tables, relationships, keys, etc (Baesens, 2015). These components can be further simplified to internal components of the database such as the “Data, Metadata, and DBM” and external components such as “Hardware, Software, People, Procedures, and Data, etc” (Rytikova, personal communication, 2016). The data model abstracts the relational database’s data concepts and its constraints (Rytikova, personal communication, 2016). The data model is the description of the data concepts, the data relationships, and various data constraints that make up the content of the database (typically a graphical representation) (Rytikova, personal communication, 2016). It is broken into three parts; the conceptual data model, logical data model, and physical data model. The conceptual data model relays the high-level concepts, close to how the business users perceive the data. The logical data model displays concepts in businesslike language that abstract the physical data organization but are independent from the physical technology. Examples of logical data models are hierarchical, network, relational, and object oriented models. The physical model represents low-level concepts that describe the data’s physical storage details (Baesens, 2015).

The schema and its state distinguish between the description of the data and the data itself. The database schema is a description of the database, clarifies the data and their definitions, which is not expected to change frequently. The schema indicates the different tables that make up the database by specifying what rows and columns it possesses ("Three Level Database Architecture," 2013). An example of a database schema is “STUDENT (number, name, address, and email)”. A RDMS’s state is the data at a particular moment and is constantly in flux (Baesens, 2015).

**What are the main characteristics of a relational database?**

The characteristics of a relational database are redundancy, integrity, and concurrency (when ACID properties are implemented). Relational databases provide reduced redundancy from previous types of databases (such as a file based database), which increases consistency of the data and guarantees correctness (Baesens, 2015). This is done by having applications access a primary repository of data vice each application having an independent database. Integrity of data is enforced through syntactical and semantical rules. Syntactical rules clarify standardized formats for data; semantical rules are logical business rules. Concurrency is allowed through the use of transactions when the database implements the following characteristics: Atomicity (all or nothing), Consistency (invariant that every transaction takes the database from a consistent to another consistent state), Isolation (transactions run as if they were in isolation), and Durability (changes to the database can be made permanent) (Baesens, 2015).

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

The main functions of a RDBMS allow a user to manipulate the data in a database, such as updating or retrieving data in the database. The RDBMS allows users to use the relationships of the database to efficiently query data. The primary functions of SQL to interface with the relational database are the SELECT, FROM, and WHERE statements (Baesens, 2015).

**Why the database design is important?**

A good database design allows the users to make a RDBMS that closely matches the real life system (Baesens, 2015). It is important to make sure that the requirements are accurately defined and the schemas are correctly developed. Successful infrastructure and scheme developments enables well founded logical and physical design choices. If the requirements are incorrectly identified, development and design rework may be necessary, as well as possibly increased hardware costs (Baesens, 2015).

**What other types of databases exist today on the market?**

There are multiple types of databases categorized differently based their physical data level, conceptual data level, and external data level. The databases that we have covered so far are categorized by their data models. Types of databases covered by the material include file based databases, relational databases, and NoSQL databases. NoSQL databases can be further broken down into document databases, graph stores, Key-value stores, and wide-column stores. Additional database types include Entity-Relationship, Object-oriented, and object-relational ("NoSQL Databases Explained | MongoDB," n.d.).

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

NoSQL databases are semi-structured while relational databases only work with structured data. Because NoSQL databases store semi-structured data they are not as strictly defined and do not adhere to the relational data model, allowing their schemas and the data stored to be dynamic ("NoSQL Databases Explained | MongoDB," n.d.). Compared to relational databases, NoSQL databases do not have a predefined schema. They can dynamically store data being collected and without defining it to a specific column family ("NoSQL Databases Explained | MongoDB," n.d.). NoSQL databases are distributed and open sourced, while relational databases are typically centralized and a mix of propriety or open source. The different modeling techniques used in NoSQL help process data faster, increase storage, and provide advantages in hierarchical data processing ("NoSQL Databases Explained | MongoDB," n.d.).

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

Relational databases can be used in conjunction with Big Data. It's common to use a big data query to create a result that is then stored in a relational database for used for the generation of analysis and reports. An example of an environment that uses relational databases to process Big Data is the Microsoft Analytics Platform System ("Why should I care about big data?," n.d.).

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

I think that Relational databases are here to stay for the foreseeable future. Relational databases benefit from having a relatively easy learning curve based off the structured nature of the data model (Baesens, 2015). . Relational databases are also ubiquitous and they will stay that way until there is a very good reason to not use them. Relational databases are also easy to use and they work very well across many different application platforms.

References

Allardice, S. (2015, October 21). Foundations of Programming: Databases | Lynda.com [Video file]. Retrieved from http://www.lynda.com/Access-tutorials/Foundations-Programming-Databases/412845-2.html?srchtrk=index%3a1%0Alinktypeid%3a2%0Aq%3adatabase+programing%0Apage%3a1%0As%3arelevance%0Asa%3atrue%0Aproducttypeid%3a2

Baesens, B. (2015, September 7). Chapter 1: Fundamental Concepts of Database Management [Video file]. Retrieved from https://www.youtube.com/watch?v=8Pa\_P3qnJco&index=1&list=PLdQddgMBv5zEhlpqdiUcf9aTNEtmESgyl

Link Analytics. (2012, October 8). Big Data Analytics: Answers from Big Data. Retrieved from https://www.youtube.com/watch?v=LrNlZ7-SMPk

NoSQL Databases Explained | MongoDB. (n.d.). Retrieved from https://www.mongodb.com/nosql-explained

Three Level Database Architecture. (2013, August 20). Retrieved from http://jcsites.juniata.edu/faculty/rhodes/dbms/dbarch.htm

W3resource. (2015, July 4). NoSQL introduction - w3resource. Retrieved from http://www.w3resource.com/mongodb/nosql.php

Why should I care about big data? (n.d.). Retrieved January 26, 2016, from https://msdn.microsoft.com/en-us/library/dn749785.aspx

Wikipedia. (n.d.). Database - Wikipedia, the free encyclopedia. Retrieved January 26, 2016, from https://en.wikipedia.org/wiki/Database