Parts of a Database System

by Sophia

WHAT'S COVERED

In this lesson, you will explore modern database systems that have many pieces working together to support business needs. This lesson explores the five main parts of a database system—hardware, software, people, procedures, and data—in two parts. Specifically, this lesson will cover:

1. Main Parts of a Database

As you learned in the prior lesson, the issues with flat file systems make the use of a relational database much more effective and efficient. Where flat file systems contain separate and unrelated files, a relational database stores logically related data in separate tables within the same system. This structure helps organize how data is stored, accessed, and managed, all in one place. A database system has five main parts: hardware, software, people, procedures, and data.

2. Components of Database Systems

2a. Hardware

Hardware refers primarily to the CPU, the RAM, and the disk drives on the physical or virtual system on which the database runs. In some designs, hardware can encompass all the physical devices that the database system interacts with. This can include the servers that the database runs on as well as connected systems like desktops, workstations, tablets, and mobile devices that connect to the database. Hardware can also include

the network components, data storage devices, and other devices that may be unique to a database system, such as a digital key reader or automated teller machine.

TERM TO KNOW

Hardware

The physical components such as the CPU, RAM, and storage devices on which a database runs.

2b. Software

The **software** in the database system can consist of the programs that organize the database system and enable user interaction. The operating system software helps to manage the hardware components and allows the other key software to run on the servers and computers. Some common operating systems include Windows, Linux, macOS, UNIX, Android, and iOS. The **database management system (DBMS)** software manages the database within the entire database system. Some common DBMS software includes PostgreSQL, Oracle, MySQL, and MS SQL Server.

The other types of software in a database system are the applications or utilities used to access and manipulate data. These are the programs that are used to interact with the DBMS to insert data, query data, and create reports. Various tools and utilities are also used to help create the database structures and control access. One such utility is the web interface that you use in this course to access the PostgreSQL database to practice SQL commands.

TERMS TO KNOW

Software

The operating system and the applications that manage the database and enable people to interact with it.

Database Management System (DBMS)

Software that manages the database within the entire database system.

2c. People

The people include the various types of users in the database system. There are generally five different types of users that are defined based on job functions within the database.

System administrators oversee the entire database/information system to ensure that everything is operating optimally.

Database designers design the database structure and architect the database to ensure that the database design not only fits the business needs but also functions optimally.

Database administrators, or DBAs, are the users that manage the database management system and ensure that the database is running correctly. DBAs control access and optimize the queries.

System analysts and programmers design and implement the application programs that interact with the database management systems. They create the web applications, applications, and reporting systems that end users use to interact with the data.

Lastly, you have **end users**, who are the individuals that use the applications to run the day-to-day operations of the organization. Different end users will interact with different levels of the information from the database.

DID YOU KNOW

Sales, marketing, customer service, directors, or even the CEO of a company would be considered an end user of a database system.

TERMS TO KNOW

System Administrator

A person who oversees the entire database/information system to ensure that everything is operating optimally.

Database Designer

A database architect of the database who ensures that it fits the business needs and functions optimally.

Database Administrator (DBA)

A user of the database management system who ensures that the database is running correctly.

System Analyst

Designs and implements the application programs that interact with the database management systems.

End User

The user of the applications to run the day-to-day operations of the organization.

2d. Procedures

Procedures are the rules or instructions that define how the database is designed and how it is used. They are a key aspect of the database design process, as they ensure that the specific way that a business operates is correctly reflected in the database design and setup. These procedures can also include various methods to monitor and audit the data based on a business process or laws and can include what data to capture, how to back it up, where it is stored, access, and security around the data. Some of these procedures will be items required by law, regulation, or industry requirements. Others will be designed for specific one-off purposes that are unique to a particular event or process idea.

TERM TO KNOW

Procedures

Rules or policies about how the database is designed and used.

2e. Data

Lastly, you have **data**, comprising the raw facts that are used to build information. You learned about data and information in the previous lesson.

The entire database system has to fit within an organization's operational structure. Depending on the business and the size and complexity of the organization, there may be varying amounts of each part of the database system. Data also has its own format that the database designer can work with. An e-commerce order will have a specific format returned from the order system, while a web log or firewall log will have a different structured format. The inbuilt formats for some data types can simplify the process of designing, optimizing, and querying tables that include them.

TERM TO KNOW

Data

Known as "raw facts," or the data we collect, like phone numbers or addresses.

SUMMARY

In this lesson, you learned that there are five **main parts of a database** system. The **components of a database** include **hardware**, **software**, **people**, **procedures**, and **data**. Hardware covers the physical objects used. Software involves the programs for interacting with the data, or raw facts used to build information, by performing certain procedures that define how the database is used. You also learned that a variety of people in different roles are also part of a database management system, including system administrators, database administrators, database designers, programmers, and end users. Finally, you learned that all of these people work together to create and maintain the database system

of a company or organization. Next time, you will examine the differences between relational databases and non-relational databases.

Source: THIS TUTORIAL WAS AUTHORED BY DR. VINCENT TRAN, PHD (2020) AND FAITHE WEMPEN (2024) FOR SOPHIA LEARNING. PLEASE SEE OUR **TERMS OF USE**.

TERMS TO KNOW

Data
Known as “raw facts,” the data we collect, like phone numbers or addresses.

Database Administrator (DBA)
A user of the database management system who ensures that the database is running correctly.

Database Designer
A database architect of the database who ensures that it fits the business needs and functions optimally.

End User
The user of the applications to run the day-to-day operations of the organization.

Hardware
CPU, RAM, and disk drive speed all have an influence on how well a database runs on a computer system.

People
Database administrators, database designers and users are the people who manage, design, and use databases. Each type of person has specific needs and responsibilities when working with a database.

Procedures
Rules on how a database is used or designed. Think of this as similar to how you would design a business process, but here, how and what business data is stored, how it is used, who accesses it, and how it can be accessed.

Software
The operating system and RDBMS (Relational Database Management System) that influence performance and management/administration of a database.

System Administrator
A person who oversees the entire database/information system to ensure that everything is operating optimally.