DATA AND
ARTIFICIAL INTELLIGENCE

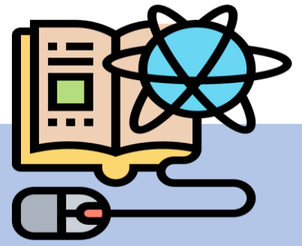
Introduction to SQL

Learning Objectives

By the end of this lesson, you will be able to:

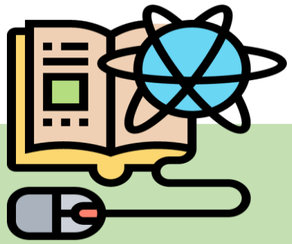
- Explain database and its types
- Differentiate between DBMS and RDBMS systems
- Analyze the applications of SQL
- List the different features of Table and Views

What Is Data?



- Data is described as facts, numbers, or other forms of information that are generally structured in a specific way and stored for a particular purpose.
- Data can be in several forms, including numbers, text, and bits or bytes.

What Is a Database?



- A database is a structured collection of data that is generally stored in a computer so that it can be accessed, managed, and updated easily.
- Databases are often created using formal design and modeling approaches, and they are typically managed using a Database Management System (DBMS).
- The data, DBMS, and associated applications are referred to as a database system or database.

Types of Databases

- Relational database
- NoSQL database
- Graph database
- Centralized database
- Distributed database

Relational Database

- A relational database is a collection of data objects that are linked together by pre-defined relationships.
- A relational database's data is structured into tables, where the rows are records with a unique ID in each row called the key.
- Also, the columns are data attributes, with each record generally having a value for each attribute, making it easier to establish relationships among data points.
- Examples of relational databases:

Microsoft SQL Server

PostgreSQL

MySQL

NoSQL Database

- NoSQL databases are nontabular databases that store data in JSON documents instead of relational tables.
- They are classified into several categories based on their data model, such as document, key-value, wide-column, and graph databases.
- NoSQL databases are designed to be flexible, scalable, and capable of responding rapidly to the data management requirements of modern businesses.
- Examples of NoSQL databases:

Graph Database

- The graph database (GDB) is a database that uses graph structures to describe and store data for semantic queries with nodes, edges, and attributes.
- An edge contains a start node, an end node, a type, and a direction, and it may also be used to describe parent-child relationships, actions, and ownership.
- Examples of graph databases:

Centralized Database

- A centralized database is stored, located, changed, and maintained in a single location, such as a mainframe computer.
- It is frequently accessed via an internet connection, such as a LAN or WAN.
- Examples of centralized databases:

SQLite

Microsoft SQL Server

MySQL

Distributed Database

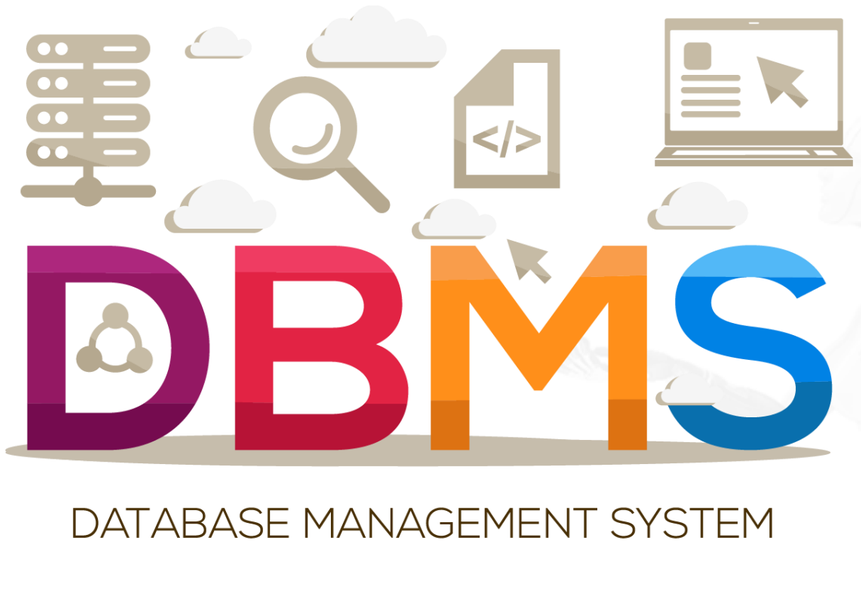
- A distributed database (DDB) is a unified collection of several linked databases that are physically dispersed across multiple locations in a computer network.
- In order to form a distributed database system (DDBS), the files must be structured, logically interconnected, and physically distributed over several sites.
- Examples of distributed databases:

Ghost DB

Amazon SimpleDB

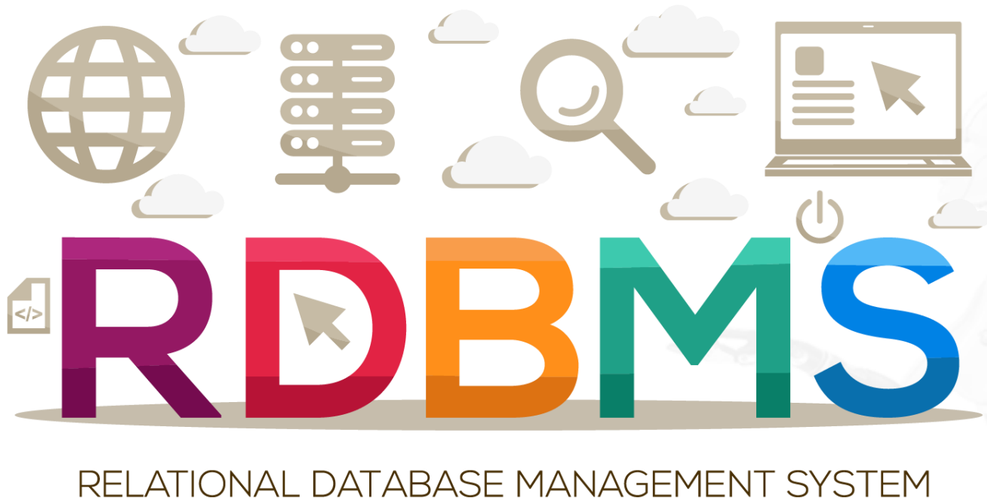
Database Management System (DBMS)

- A database management system (DBMS) is a software that stores and retrieves data for users while taking necessary security precautions.
- It comprises a set of applications that manipulates the database.
- The DBMS acts as an interface between the data and software, allowing users and third-party applications to store and retrieve data.



Relational Database Management System (RDBMS)

- A relational database management system (RDBMS) is an advanced version of a database management system (DBMS).
- RDBMS is the most popular DBMS in the market.
- Few examples of RDBMS are MySQL, Oracle, and Microsoft SQL Server.



DBMS vs. RDBMS

DBMS

- It stores data as a file.
- It only supports a single user.
- It stores data which are not related to each other
- Data fetching is slower for the complex and large volumes of data.

RDBMS

- It stores data in the form of tables.
- It supports multiple users.
- Data stored in tables are related via foreign keys.
- Data fetching is rapid because of the relational approach.

DBMS vs. RDBMS

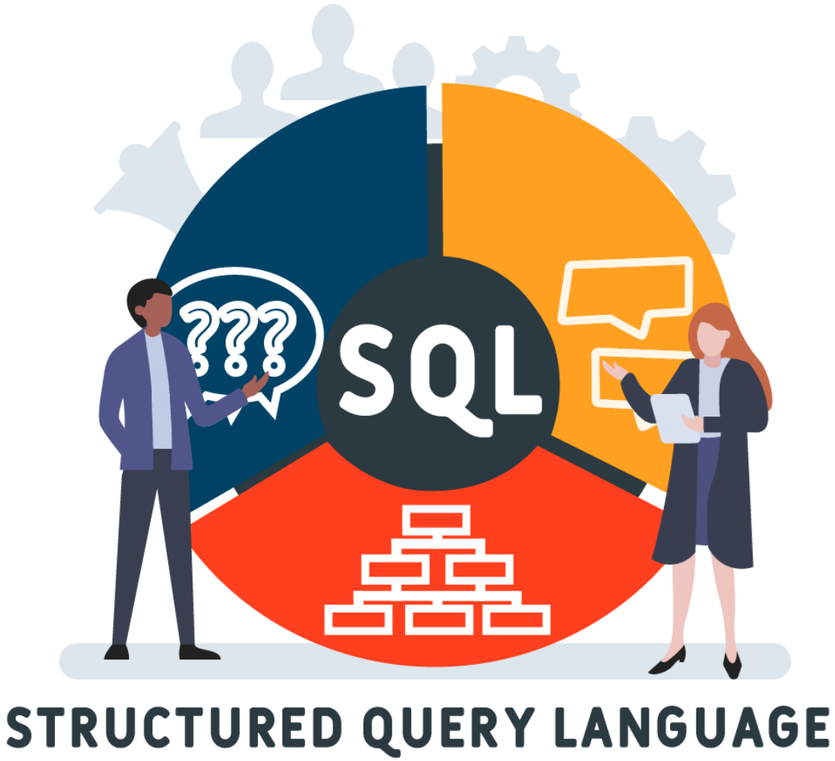
DBMS

- It does not support normalization.
- It has no security.
- Examples: File System, XML, MS Access, and Windows Registry

RDBMS

- It supports normalization.
- It has multiple levels of security.
- Examples: MySQL, PostgreSQL, Oracle, and SQL Server

Structured Query Language (SQL)



- SQL stands for Structured Query Language.
- SQL is the standard language used to operate, manage, and access databases.
- SQL is the standard language for managing a relational database management system, such as MySQL.

Applications of SQL

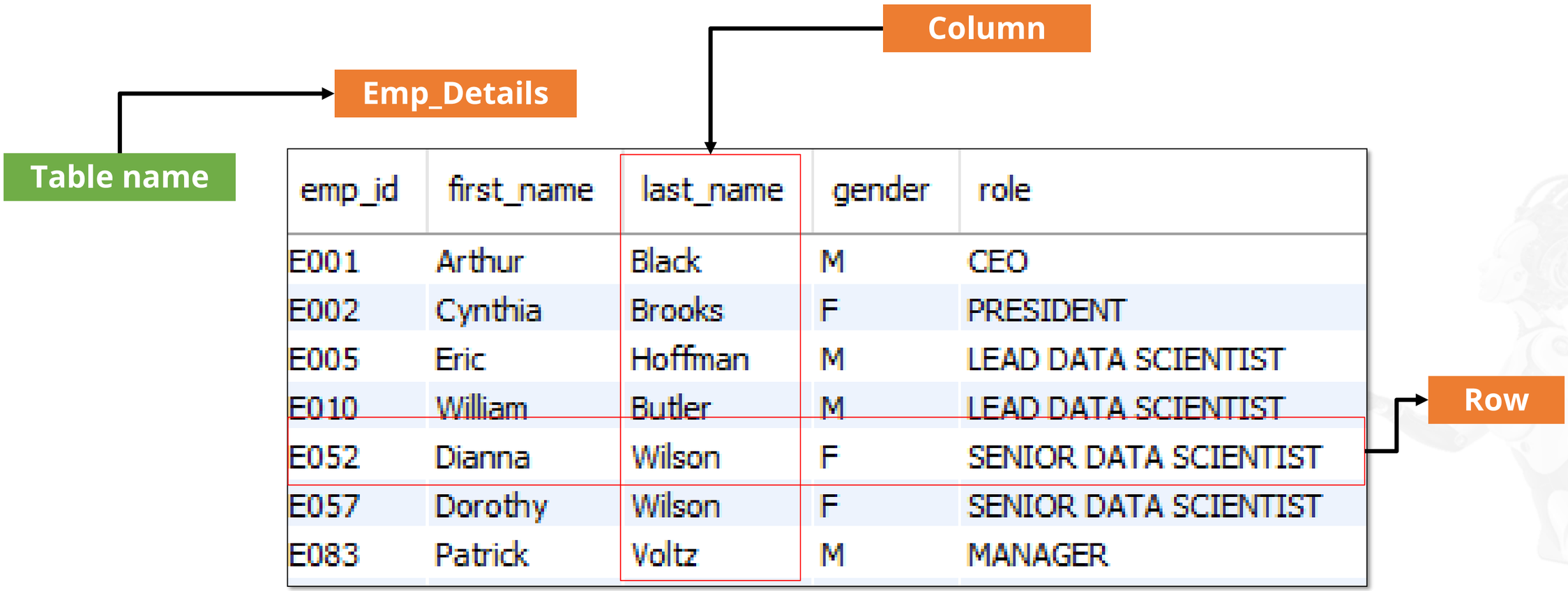
Is the most widely used query language

Supports custom features

Enables access to data in RDBMS

Supports multiple programming languages

Tables in MySQL

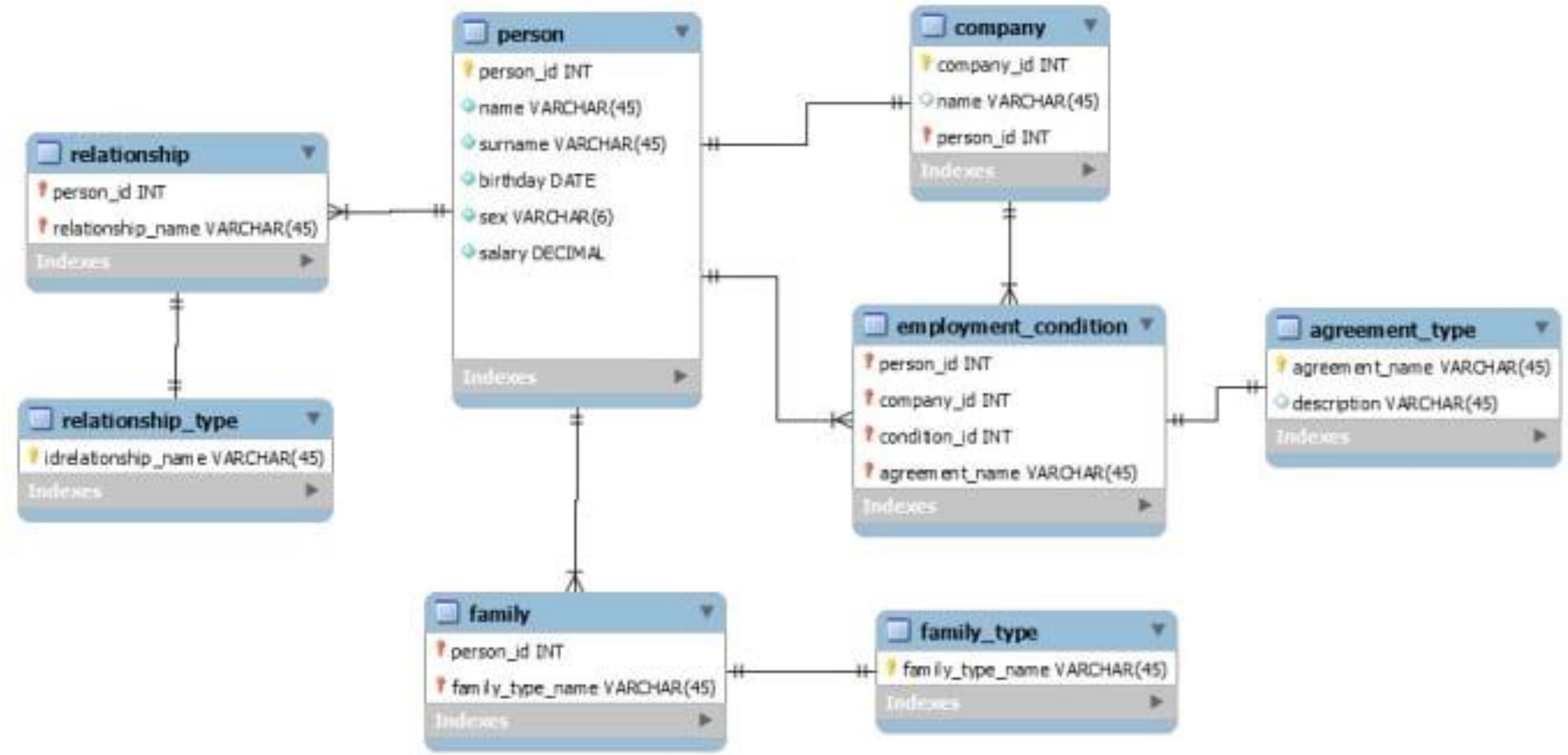


emp_id	first_name	last_name	gender	role
E001	Arthur	Black	M	CEO
E002	Cynthia	Brooks	F	PRESIDENT
E005	Eric	Hoffman	M	LEAD DATA SCIENTIST
E010	William	Butler	M	LEAD DATA SCIENTIST
E052	Dianna	Wilson	F	SENIOR DATA SCIENTIST
E057	Dorothy	Wilson	F	SENIOR DATA SCIENTIST
E083	Patrick	Voltz	M	MANAGER

Tables in MySQL

- Tables are database objects with unique names which consist of a collection of data stored in a database.
- Each table includes data points of an object which are logically structured in a row and column format.
- A table can have any number of rows, but it must have a certain number of columns.
- In relational databases, a table is referred to as a relation and a row as a tuple.

Relationships in MySQL



Relationships in MySQL

- A relationship is a condition that exists between two tables in a database when data from one table reflects data from another table.
- Relationships enable relational databases to divide and store data in many tables while connecting dissimilar data components.
- It connects or relates data from various tables.
- Two tables are required to form a table relationship at the same time, one of which is called the primary or parent table and the other the related or child table.

Views in MySQL

Table Layout Template

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Mauris non viverra libero. Nunc egetum nisi ete metus semper venenatis vitae et nisi. Suspendisse ut turpis eros. Donec auctor laoreet ipsumatico etos consequat. Aenean vel sem metus. Vestibulum nec neque arcu. Aenean ultrices tincidunt blandit.

	Donec aliquam	Aenean et nisi	Pellentesque	Vivamus vitae	Consectetur
Morbi pretium facilisis	-27,402	-42,285	-27,402	-9,146	-2,459
Curabitur elementum	$96,223	$88,306	$96,223	$105,556	$133,124
Mauris sed consequat	N/A	No	N/A	Yes	N/A
Proin con accumsan	-27,402	-42,285	-27,402	-9,146	-2,459
Donec accumsan:	**$391,448**	**$422,849**	**$391,448**	**$304,864**	**$245,995**

Views in MySQL

- Views are virtual tables in SQL that are built by choosing fields from one or more tables present in the database.
- A *view* may contain database tables from single or multiple databases.
- Views do not contain any data and do not exist physically in the database.
- A *view* is a collection of preset SQL queries that are used to retrieve data from the database.
- A *view* can represent all the data in a table or only specific rows based on certain criteria.

Table vs. View

Table

- Tables are database objects that comprise a collection of data stored in a database.
- Tables contains data and exist physically in the database.
- A table is an independent data object.

View

- Views are virtual tables in SQL that are built by choosing fields from one or more tables present in the database.
- Views do not contain any data and do not exist physically in the database.
- A view depends on tables.

Key Takeaways

- A database is a structured collection of data that is managed using a database management system (DBMS).
- DBMS allows third-party applications to store and retrieve data.
- SQL is used to operate, manage, and access databases.
- MySQL is the most popular open-source RDBMS used for developing dynamic and robust web applications.
- Tables are collections of data that exist physically in a database, whereas views are virtual tables that do not include any data and do not exist physically in the database.