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DATABASES DIFFERENCE BETWEEN

Relational Database VS Object-Oriented Database (Key Differences)



In the world of database management, it seems like relational and object-oriented databases are constantly squaring off in an epic battle of superior storage. Let's delve into the world of relational and object-oriented databases to see who has the most potential for your data managements needs.

Databases are used to store and manipulate data in an efficient and organized manner. There are several different types of databases, including the relational and object-oriented varieties. Both, relational database and object-oriented database, can be incredibly powerful tools for managing data; however, they use different approaches when working with information.

Relational Database VS Object-Oriented Database

In this post we'll make a comparison of both the databases and will see which database suits your needs.

When making a decision between relational versus object-oriented databases, it's important to know your project requirements as well as your budgeting constraints.

Different tasks require different types of systems in order to efficiently process results; understanding these factors can help you make an informed decision about which type is best for your project needs.

What is Relational Database?

A relational database is a type of database that organizes data into tables and uses structured query language (SQL) to access information.

In a [relational database](#), there are various tables containing fields with specific data. Each one of these fields or columns is related to the other columns in some way and comprise a single table. This allows for easy retrieval of information from multiple sources within a single query.

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Relational databases can store data more accurately because the comprehensive organization enables each piece of information to be organized efficiently, enabling relationships between elements within the table to be established.

Relational databases are highly scalable which ensures improved performance as opposed to older methods like file-based systems which become inefficient when the number of records increases significantly.

What is Object Oriented Database?

Object-oriented databases (also called object databases) are a type of database management system (DBMS) that store data in the form of objects using object-oriented programming concepts.

An object in an object or entity oriented database is a collection of attributes and methods that provide a description of the object. The attributes define states or properties, while the methods define behaviors or actions.

This type of database allows for greater flexibility when writing and executing queries, as a query does not need to directly address the data values, but can also address other aspects like States and Actions associated with the objects in the database.

In comparison to relational databases, an object-oriented database unifies the concepts of both data structure and behavior within individual objects and allows users more direct access to their data since they only need to interact with objects instead of tables and columns. They also allow applications to integrate data quickly as objects contain relevant methods with which to interact on each platform. Object oriented databases are used in private clouds as well as large organizations, mainly because their ability makes them well suited for managing large amounts of structured and unstructured data.

Advantages of Relational Database

Relational databases are the most common type of database and are the staple for many businesses. They are popular for their strong data structures, consistent implementation and flexibility. The advantages of a relational database include:

- **Storage efficiency** – Relational databases are very efficient because they use a system of tables with repeating data only stored once, thus saving a lot of storage space.
- **Structured data** – Relational databases require structure to be maintained in order to hold data in tables organized by rows and columns, allowing for easier retrieval and manipulation by running queries over the records.
- **Scalability** – A relational database can be scaled to accommodate increased usage which is accomplished by adding more resources or additional hardware components such as new servers or additional hard drives.
- **Data Integrity** – Referential integrity ensures that related fields in different tables remain synchronized when updated or deleted. This ensures accurate results even when joined queried across multiple tables.
- **Multi User Accessibility** – Multiple users can access the same information with little risk of corrupting it as locking mechanisms exist to protect ongoing transactions while they're being updated.

Disadvantages of Relational Database

Complex Data Structures: Relational databases have complex data structures that may require significant knowledge and understanding to create, maintain and update. This complexity can make them difficult to learn and manage for new users or programmers who don't have a good understanding of database design principles.

Limited Flexibility: Relational databases can only store one type of information in a field or record, which makes it difficult to store complex information. It makes it even harder when changes need to be made across multiple tables as they must all be updated in order to remain consistent with each other – this often leads to extra work and errors if not done correctly.

Performance Challenges: Relational databases can struggle with performance when managing large datasets or running analytical queries against them, as the underlying database structure does not always scale easily with increasing demands on resources such as memory and processing power.

Advantages of Object Oriented Database

Object-oriented databases (OODB) offer a number of benefits and advantages due to their data structure, which makes them powerful and efficient in storing, managing, and retrieving large amounts of complicated data. OODBs are especially advantageous when dealing with complex objects such as multimedia, videos, images and documents rather than just standard data.

Some of the main advantages of an object-oriented database include:

- **Creating and storing objects** that exist in real world settings allows the database to easily represent hierarchical relationships between individual pieces of data.
- **Allows for easier searching** and retrieval capabilities through comparison queries.

- **Faster access times** with more efficient storage capabilities when handling large amounts of data due to object transactions that operate more quickly than relational databases where object transactions break down into smaller ones.
- **Easier integration** with other systems due to its ability to handle complex objects without major modifications or rework during development.
- **Queries are self contained** since it retrieves an entire object at once rather than breaking down into smaller subqueries like a relational database.
- **Easy scalability** by adding additional processing power or memory capacity as needed for increased use or higher demand workloads cost effectively.

Disadvantages of Object Oriented Database

Object-Oriented Databases (OODBMS) can come with some important limitations when compared to Relational Database management systems.

Performance is a common red-flag for OODBMS, as relational databases have the innate ability to index subset tables for improved query time and performance.

According to an analysis of multiple database products by ORACLE, OODBMS often times deliver unacceptably slow query results when compared to relational databases.

Additionally, **navigational methods are used in object-oriented databases** while using queries such as Structured Query Language (SQL) is used within relational databases – this can be seen as either a strengthening or limitation depending on how knowledgeable a user may be with SQL.

Costs may also be of concern when considering an object-oriented database. It must be noted that even though hardware and software expenses are sometimes lower than relational offerings, the extra resources and expertise necessary for program development and integration may exceed the maintenance cost of a relational system in certain cases .

Further, due to **implementation complexity issues**, it may also not always be suitable for a greater variety of users within company networks.

Finally, certain **incompatibility issues** associated with object-oriented technologies can occur when attempting to integrate them into their environment or connecting them with standards such other non-object systems. This means that the sharing of data between outside sources may require extra effort in order for business transactions take place correctly.

Relational Database VS Object-Oriented Database

Relational databases are powerful data storage models, however they may not be the best choice for all applications. While relational databases can be powerful implements for creating meaningful data relationships and data management, some of their disadvantages make them less desirable for certain applications.

This table shows the key differences between relational database and object-oriented databases.

Criteria	Relational Database	Object Oriented Database
Definition	Data is stored in tables which consist of rows and columns.	Data is stored in objects. Objects contain data.
Amount of data	It can handle large amounts of data.	It can handle larger and complex data.
Type of data	Relational database has single type of data.	It can handle different types of data.
How data is stored	Data is stored in the form of tables (having rows and columns).	Data is stored in the form of objects.
Data Manipulation Language	DML is as powerful as relational algebra. Such as SQL, QUEL and QBE.	DML is incorporated into object-oriented programming languages, such as C++, C#.
Learning	Learning relational database is a bit complex.	Object oriented databases are easier to learn as compared to relational database.
Structure	It does not provide a persistent storage structure because all relations are implemented as separate files.	It provides persistent storage for objects (having complex structure) as it uses indexing technique to find the pages that store the object.

Criteria	Relational Database	Object Oriented Database
Constraints	Relational model has key constraints, domain constraints, referential integrity and entity integrity constraints.	To check the integrity constraints is a basic problem in object-oriented database.
Cost	The maintenance cost of relational database may be lower than the cost of expertise required development and integration of object oriented database.	In some cases hardware and software cost of object oriented databases is lower cost than relational databases.

Relational Database VS Object-Oriented Database

RELATIONAL DATABASE VS OBJECT-ORIENTED DATABASE



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RELATIONAL DATABASE

OBJECT-ORIENTED DATABASE

Definition

Data is stored in tables which consist of rows and columns.

Data is stored in objects. Objects contain data.

Amount of Data

It can handle large amounts of data.

No data can be found, and no one else has written about it.

Type of Data

Relational database has single type of data.

It can handle different types of data.

How data is stored

Data is stored in the form of tables {having rows and columns}.

Data is stored in the form of objects.

DML

DML is as powerful as relational algebra. i.e. SQL, QUEL & QBE.

DML is incorporated into object-oriented programming languages, such as C++, C#.

Learning

Learning relational database is a bit complex.

Object-oriented databases are easier to learn as compared to relational database.

Structure

It does not provide a persistent storage structure because all relations are implemented as separate files.

Object-oriented databases provide persistent storage for objects having complex structure as it uses an indexing technique to find the pages that store the object.

Constraints

Relational model has key constraints, domain constraints, referential integrity, and entity integrity constraints.



To check the integrity constraints is a basic problem in object-oriented database.

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Relational Database VS Object-Oriented Database

Final Words

In conclusion, relational databases and object-oriented databases have distinct advantages and disadvantages that must be considered before deciding which type of database is best suited for a particular project. Relational databases are highly structured and provide powerful searching capabilities, while object-oriented databases allow developers to represent more complex objects and data relationships. Ultimately, the decision should be based on the needs of the application; cost, scalability and ease of development will also influence the choice.

Further Reading

- [Relational Database Benefits and Limitations](#)
- [Relational Vs Non Relational Database](#)
- [13 Examples of Relational Database](#)
- [9 Types of Databases](#)
- [Distributed Database](#)
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