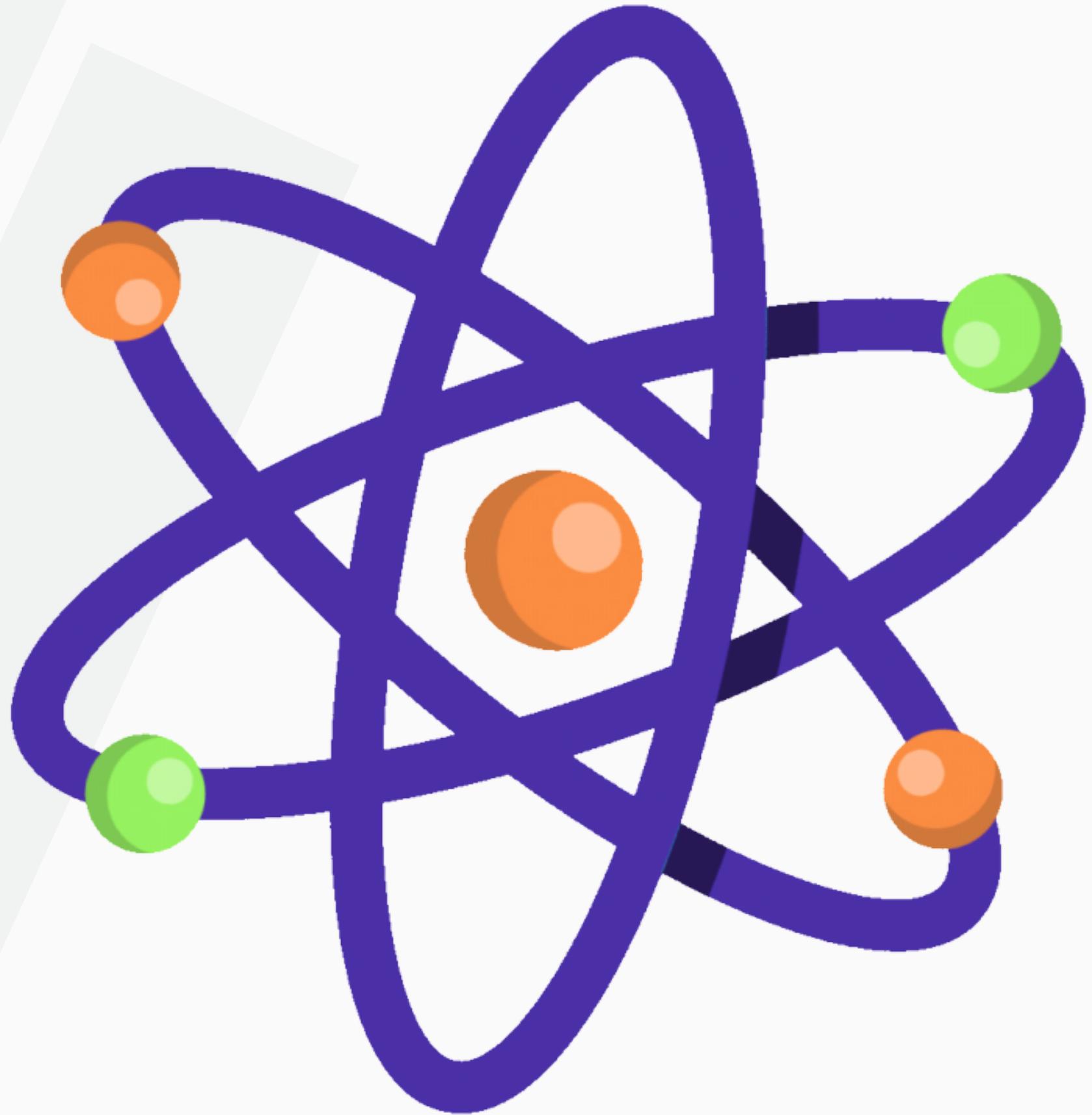


## Introduction

# MongoDB vs SQL - A Comparative Analysis



# 1

## Introduction to NoSQL (MongoDB):

- NoSQL is a type of database management system (DBMS) that is designed to handle and store large volumes of unstructured and semi-structured data

- NoSQL is a type of database management system (DBMS) that is designed to handle and store large volumes of unstructured and semi-structured data



The term NoSQL originally referred to “non-SQL” or “non-relational” databases, but the term has since evolved to mean “not only SQL,” as NoSQL databases have expanded to include a wide range of different database architectures and data models.

## **NoSQL databases are generally classified into four main categories:**

### **Document databases:**

These databases store data as semi-structured documents, such as JSON or XML, and can be queried using document-oriented query languages.

### **Key-value stores:**

These databases store data as key-value pairs, and are optimized for simple and fast read/write operations.

### **Column-family stores:**

These databases store data as column families, which are sets of columns that are treated as a single entity. They are optimized for fast and efficient querying of large amounts of data.

### **Graph databases:**

These databases store data as nodes and edges, and are designed to handle complex relationships between data.

# Introduction to SQL (Relational Databases):

**Structured query language (SQL) is a programming language for storing and processing information in a relational database. A relational database stores information in tabular form, with rows and columns representing different data attributes and the various relationships between the data values.**

- **SQL represents a family of relational databases.**
- **RDBMS (Relational Database Management System) uses structured data with predefined schemas.**
- **Relationships between tables are established using keys.**

# 2

# MongoDB (NOSQL)

MongoDB is a non-relational document database that provides support for JSON-like storage. The MongoDB database has a flexible data model that enables you to store unstructured data, and it provides full indexing support, and replication with rich and intuitive APIs.

MongoDB is a non-relational document database that provides support for JSON-like storage. The MongoDB database has a flexible data model that enables you to store unstructured data, and it provides full indexing support, and replication with rich and intuitive APIs.

# 3

# SQL Overview

## Relational Database Management System (RDBMS):

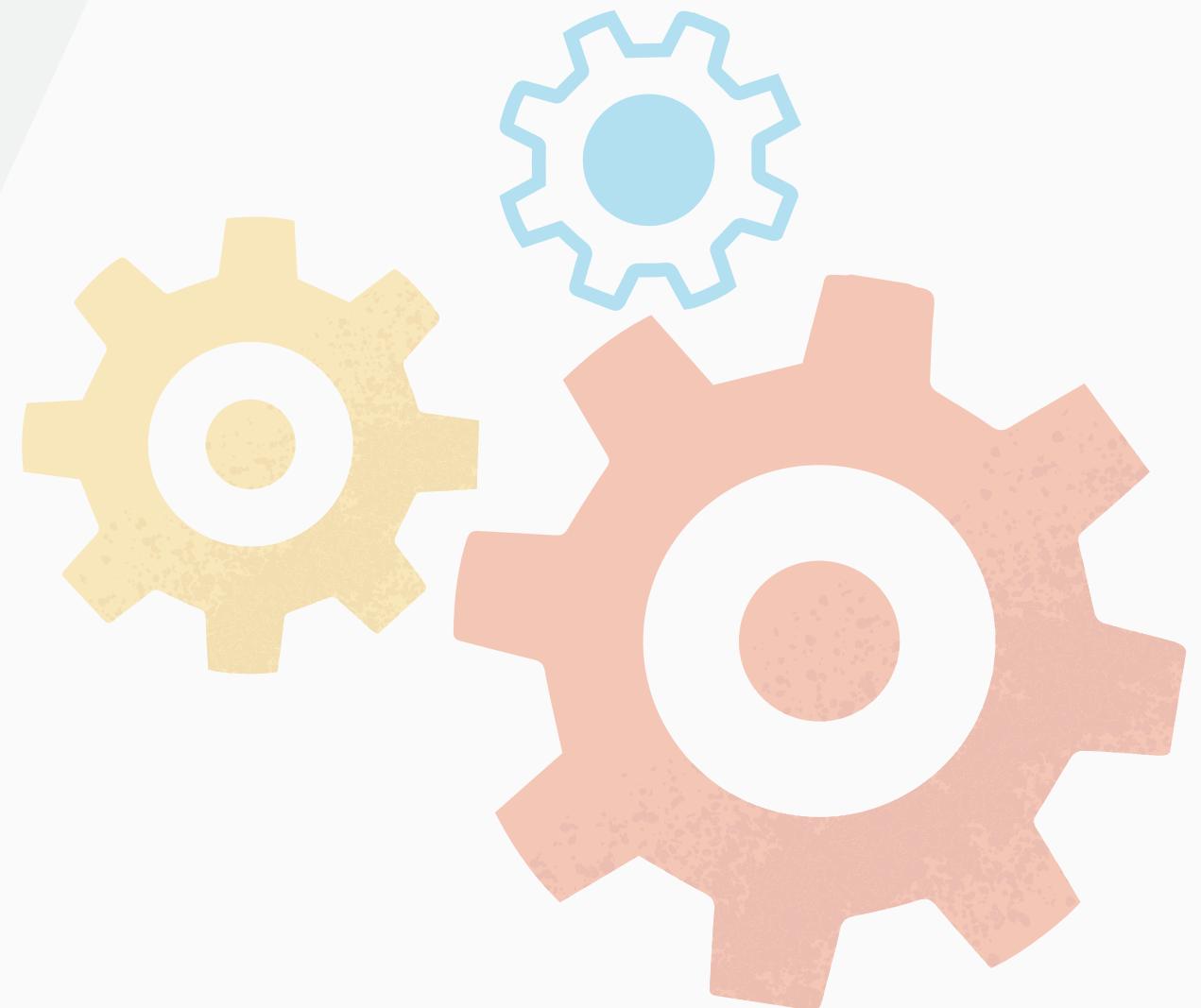
- SQL databases organize data into structured tables with fixed schemas.
- Relationships between tables are defined using keys (primary, foreign).

## Key Features:

- Structured Query Language (SQL): Standardized language for managing and manipulating relational databases.
- Fixed and predefined schema: All data must conform to the table's structure.
- Scalability: Vertical scaling, suitable for moderate-sized datasets.

# **Example Use Cases:**

- Database Creation and Management.
- Data Manipulation and Retrieval.
- Data Analysis and Reporting.
- Business Intelligence
- Web Application Development..
- Integration With Other Software and Systems.
- User and Access Management. ...
- Data Definition Language.



# 4

## Feature Comparison

### MongoDB:

Schema: Dynamic – Fields can vary.

Scalability: Horizontal – Adds more servers to handle load.

Query Language: JSON-based queries.

Use Cases: Flexible and evolving data.



# **SQL:**

- Schema: Fixed and predefined – Tables have a clear structure.
- Scalability: Vertical – Add more power to a single server.
- Query Language: SQL.
- Use Cases: Well-defined and structured data.

# 5

## Pros and Cons

- **MongoDB:**
  - Pros: Flexible schema, scalability, JSON-based queries.
  - Cons: Lack of ACID compliance, may not be suitable for complex transactions.
- **SQL:**
  - Pros: ACID compliance, well-suited for complex transactions.
  - Cons: Fixed schema, vertical scalability challenges, may require complex joins.