Software Development

NoSQL

Module 17

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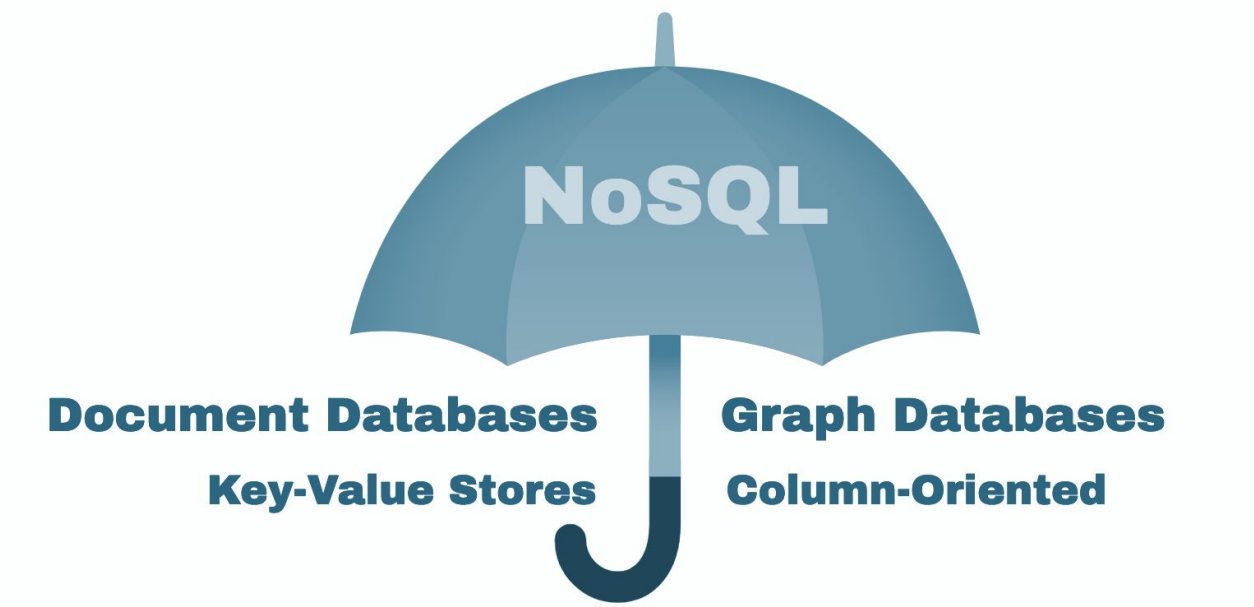
What Is NoSQL?

NoSQL is an umbrella term for any database that is not a traditional, relational SQL database. There are four main types of NoSQL databases.



How Do NoSQL Databases Store Data?

While NoSQL databases are all non-relational, each type of NoSQL database stores data in a unique way and is used differently by developers. In this unit, we focus on

MongoDB, a general purpose NoSQL, **document database** that uses documents to store data. MongoDB works well with JavaScript because it stores data in objects.

How Does MongoDB Store Data Differently from SQL Databases?

SQL Is a Relational Database

SQL uses **rows** and **tables** to store data, enforcing a rigid schema.

Table

Rows

Order_ID	Customer_ID	Date_ID
10001	d005458dtsf	6/26/2019
10002	d007sfgs847	8/3/2018
10003	d004fgsfh445	12/3/2018

SQL Is a Relational Database

Because SQL is a relational database, SQL also relies on joins to combine related data from different tables.

Customer_ID	Date_ID
d005458dtsf	6/26/2019
d007sfgs847	8/3/2018
d004fgsfh445	12/3/2018

Order_ID	Customer_ID	Date_ID
10001	d005458dtsf	6/26/2019
10002	d007sfgs847	8/3/2018
10003	d004fgsfh445	12/3/2018

MongoDB

MongoDB Uses Documents and Objects Instead of Tables and Rows

MongoDB stores data in **objects** stored in a format called BSON, or Binary JSON. Binary JSON is not human readable, but by the time we see it, it is transformed into a human-readable format like JSON.

Groups of Documents Are Stored in Collections

Unlike SQL tables, collections do not have an enforced schema to limit the type of data stored. Each document in a collection may have different fields (keys) and can contain different types of data. Regardless, we try to keep the data consistent.

```
_id: ObjectID("6115da38e3d9071d5112304")
color: "blue"
```

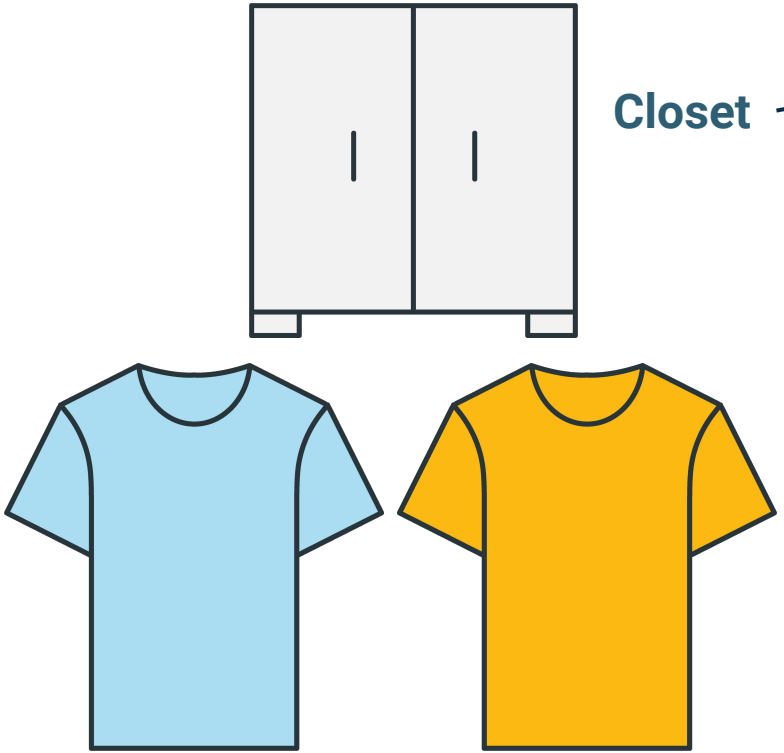
Collection

Documents

```
_id: ObjectID("60b928383676a178954635c6")
color: "yellow"
size: "XL"
type: "shirt"
```

Related Data Can Be Stored in Embedded Documents

Unlike SQL, related data in MongoDB is not split between tables. Instead, related data is nested within a single object as an embedded document.



Closet

```
_id: ObjectID("611aacb2b637af8cdc9ce70e")
item: "closet"
∨ Shirts: Array: "XL"
    ∨ 0: Object
            item: "shirt"
            color: "blue"
            number: "0"
    ∨ 1: Object
            item: "shirt"
            color: "yellow"
            number: "1"
```

The closet has two related shirts

SQL vs. MongoDB

Let's compare how data is stored in SQL vs. MongoDB databases:

SQL, Relational Database	Database
	Table (rigid schema)
	Row
	Column
	Related data split between tables
MongoDB, NoSQL, Non-Relational	Database
	Collection (No enforced schema)
	Document (BSON object)
	Field (Key)
	Related data nested in embedded document

So Why Use MongoDB?

The following are some reasons for why developers choose MongoDB:

1. MongoDB stores data as a BSON object, making it a great fit for JavaScript apps.
2. MongoDB does not use tables or enforce a rigid schema, allowing more flexibility for developers.
3. MongoDB is a great choice for heterogeneous data, and scales easily.
4. MongoDB is capable of storing related data well.

Instructor **Demonstration**

Mini-Project