Introduction to NodeJS & MongoDB
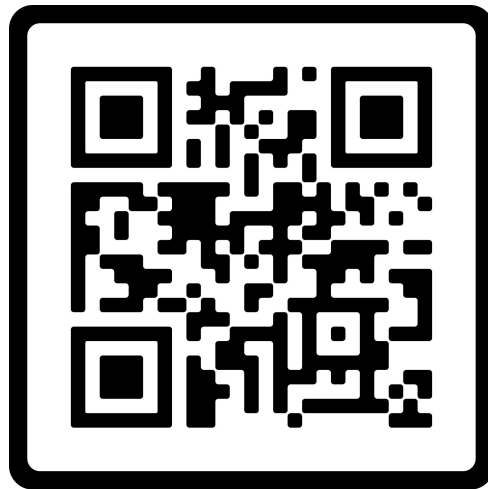
A Student-Run Short Course (SRC) conducted by the Student Academic Council.

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Logistics

❏ 3rd to 12th Apr, 10 PM to 11 PM. AB 7/209.

❏ All important updates will be communicated through Google Classroom.

❏ Earlier Parts :

  ❏ https://github.com/Reuben27/ReactJS-SRC

  ❏ https://github.com/Reuben27/Web-Development-SRC

❏ P/F course. Attendance compulsory.

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Databases

- A database is an organized collection of structured information or data.
- It provides mechanisms to store, retrieve, and manage data efficiently.
- Databases are used in various applications, including web development, mobile apps, and enterprise systems.

Types of Databases

- Relational Databases:
  - Relational databases organize data into tables with rows and columns.
  - They enforce a structure called a schema, which defines the relationships between tables and the data types of each column.
  - Data is stored in a structured format, ensuring consistency and integrity.
  - Examples of relational databases include MySQL, PostgreSQL, SQLite, Oracle, SQL Server, etc.

Types of Databases

- Non-Relational Databases (NoSQL Databases):
  - NoSQL databases, store and retrieve data in formats other than the tabular relations used in relational databases.
  - They offer more flexibility in terms of data models and are suitable for handling unstructured or semi-structured data.
  - NoSQL databases are designed to scale horizontally and handle large volumes of data efficiently.

NoSQL Databases

There are several types of NoSQL databases, including:
- Document Stores: Store data in flexible, JSON-like documents. Example: MongoDB, Couchbase, CouchDB.
- Key-Value Stores: Store data as key-value pairs. Example: Redis, Amazon DynamoDB.
- Column-Family Stores: Store data in columns rather than rows. Example: Apache Cassandra, HBase.
- Graph Databases: Optimize for storing and querying graph data structures. Example: Neo4j, Amazon Neptune.
- NoSQL databases are commonly used in scenarios such as real-time analytics, content management systems, IoT applications, and more.

MongoDB Architecture

- MongoDB uses a distributed architecture.
- It consists of:
  - Document: Basic unit of data in MongoDB, similar to a row in a relational database.
  - Collection: Group of documents, equivalent to a table in relational databases.
  - Database: Container for collections, similar to a schema in relational databases.
- MongoDB can be deployed in a standalone, replica set, or sharded cluster configuration.

Installation

- Install [MongoDB community edition](#) (With Compass)
- Install [Mongosh](#) and add executable to path variable.

In VsCode:

- Install MongoDB extension

Basic Mongo Shell methods

- show dbs
- use 'dbname'
- db.createCollection("collectionName")
- db.dropDatabase()
- db.collectionName.insertOne({field:value,...})
- db.collectionName.find()
- db.collectionName.insertMany([{},{},{}])

Basic Data Types

- String
- Integer
- Double
- Boolean
- Date
- Null
- Arrays
- Nested Documents

Basic CRUD Methods

- db.collectionName.find().sort({field:1|-1})
- db.collectionName.find().limit(1)
- db.collectionName.find({query},{projection})
- db.collectionName.updateOne(filter, update)
- db.collectionName.updateMany(filter, update)
- db.collectionName.deleteOne()
- db.collectionName.deleteMany()

Comparison Operators

- $gt: Greater than
- $lt: Less than
- $gte: Greater than equal
- $lte: Less than equal
- $ne: Not equal
- $in: In this array
- $nin: not in this array

Logical Operator

- $and
- $or
- $nor
- $not

Thank you!