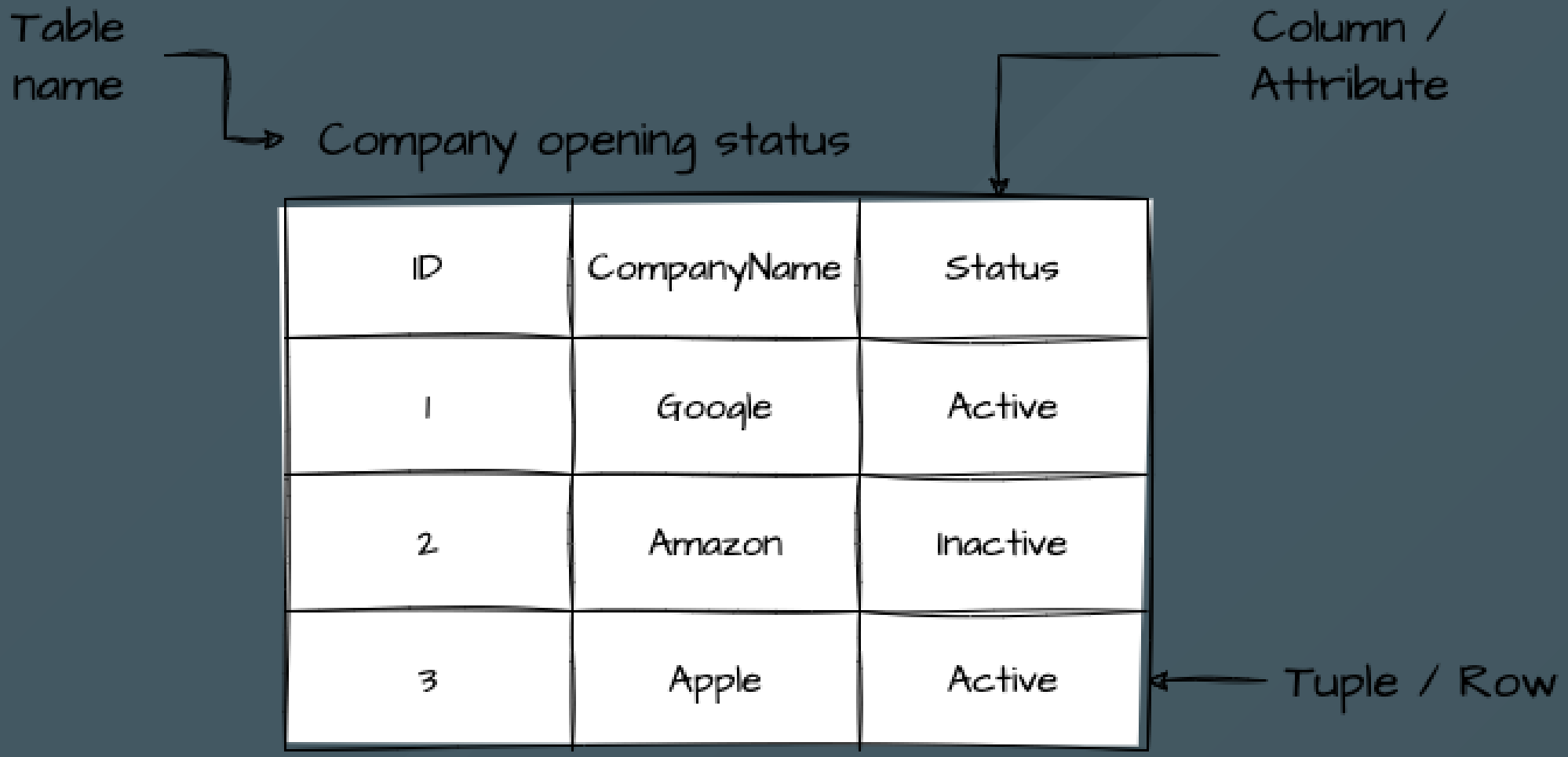
Database

- Database
- Database Management System
- Relational Database
- NoSQL Database

Relational vs NoSQL

- MySQL, SQLite, Oracle, ...
- Data Model
  - Tables
  - Relationships
- Operations
  - CRUD
- Access Control
  - GUI
  - API, ODBC, JDBC, ...

Relational Data Model



Company opening status

ID	CompanyName	Status
1	Google	Inactive
2	Walmart	Active
3	Apple	Active

Interviewee

ID	Name	Company
1	Aaron	Apple
2	Alex	Walmart
3	John	Apple

company_id	interviewee_id	Status
3	1	offered
2	2	offered
3	3	pending

Database Access

- GUI
  - MySQL Workbench
  - MySQL Shell for VS Code
- API
  - ODBC
  - JDBC
  - ORM - Object Relational Mapping
    - Hibernate, SQLAlchemy, Sequelize, ...

SQL

- SQL
- SQL Syntax
- SQL Tutorial

```
SELECT column1, column2, ...
FROM table_name
WHERE condition;
```

```
CREATE TABLE table_name (
  column1 datatype,
  column2 datatype,
```

MySQL

- Local Setup
  - MySQL Community Server
  - MacOS: Homebrew - `brew install mysql`
  - Docker
    - MySQL
- `mysql -u root -p`

MySQL connection with Node.js

sql/index.js

- mysql2
- sequelize

NoSQL Database

- Document
  - JSON
- Collection
  - Table
- Document Database
  - MongoDB
  - CouchDB

Document Data Model

https://api.github.com/users/mojombo/repos

Evolution of MongoDB

- Initial NoSQL databases supported read-only operations
- Not good at high volume transactional operations
  - MongoDB 4.0 supports multi-document ACID transactions
- MongoDB has evolved for
  - Foreign key in addition to embedded documents
  - Schema validation
  - Aggregation pipeline
  - Indexes
  - ...

Comparison between MongoDB and MySQL

MongoDB	MySQL
Collection	Table
Document	Row
Field	Column
Index	Index
Embedded Document	Join
Reference	Foreign Key

MongoDB

- Local Setup
  - MongoDB Community Server
  - Docker: MongoDB
- Cloud
  - MongoDB Atlas
- Access to MongoDB
  - GUI: MongoDB Compass
  - API: mongoose

Shared access to MongoDB

You can definitely setup your own MongoDB server either in local or in cloud, and have your own connection access. Or, you can use our shared access to sample MongoDB server I created for this class. I will share the username and password in the Slack channel.

```
mongodb+srv://<username>:<password>@fullstack-
training.gw3nkbl.mongodb.net/<database>
```

Defining a Schema and Model

- Schema

```
const mongoose = require('mongoose');
const Schema = mongoose.Schema;

const userSchema = new Schema({
  name: String,
  email: String,
  created: { type: Date, default: Date.now }
  ...
});

const User = mongoose.model('User', userSchema);
```

MongoDB CRUD

CRUD Operations

- Read
  - `db.collection.find()`
  - `db.collection.findOne()`
- Create
  - `db.collection.insertOne()`
  - `db.collection.insertMany()`

MongoDB connection with Node.js

mongo/index.js

- mongoose
- mongoose document

Http Server with MongoDB

http-server-mongodb/index.js

- Setup MongoDB connection
- Setup HTTP server
- Map HTTP requests to CRUD operations
  - get all
  - get one
  - create
  - update
  - delete

How to test the server

- Termial tools
  - curl
  - httpie
- GUI tools
  - Postman
  - Thunder Client for VS Code
  - Talend API Tester