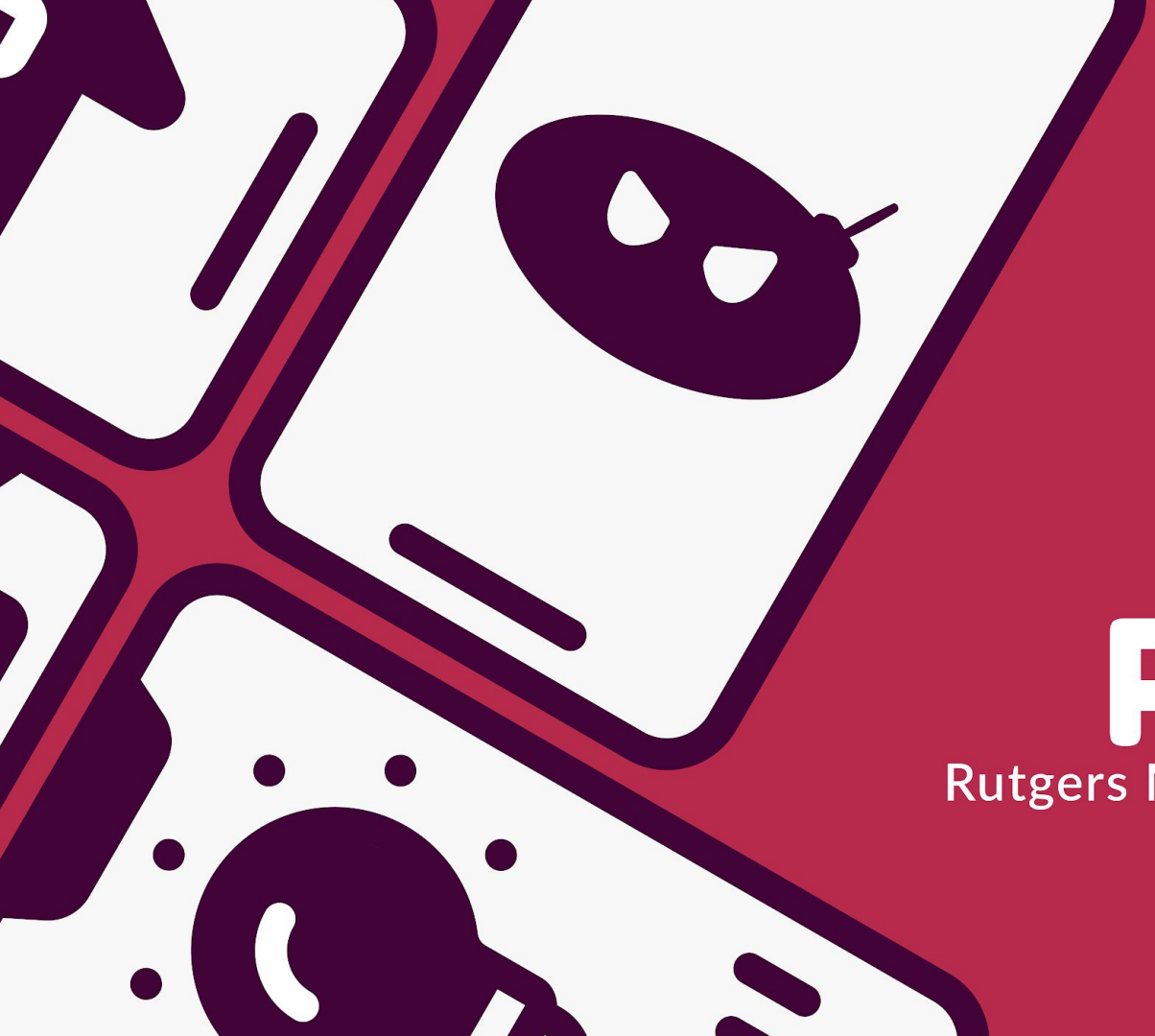


RUMAD

Rutgers Mobile App Development

Overview

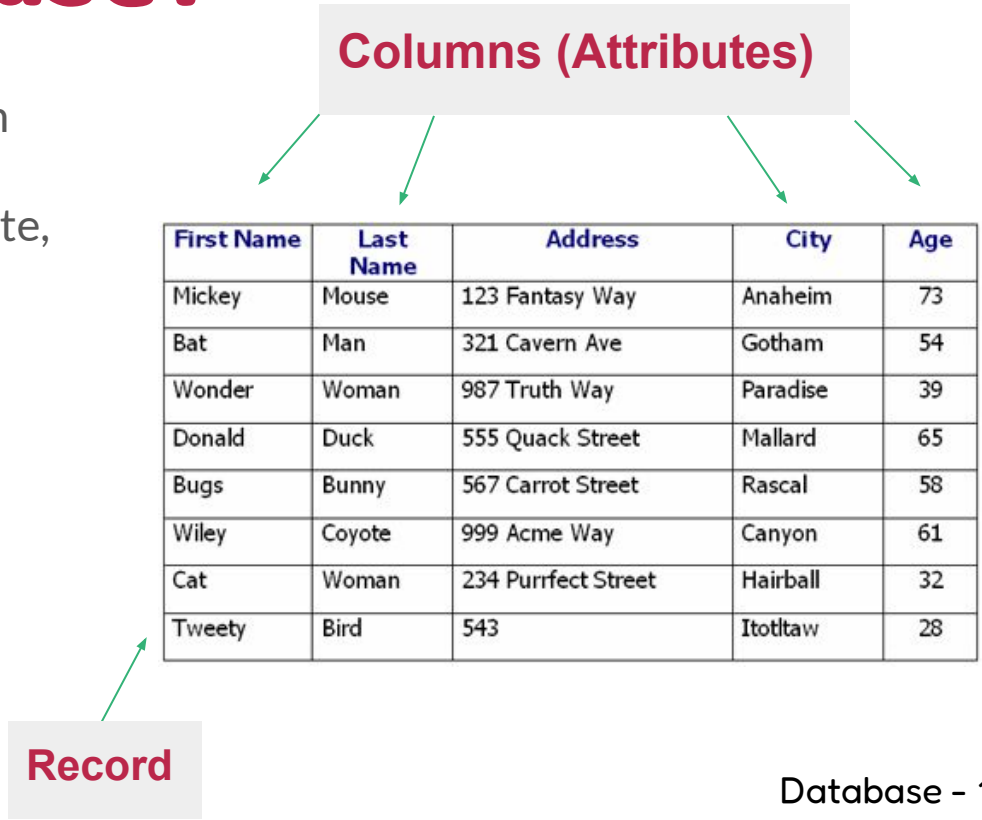
For this section, we'll be covering:

- Databases
- Setting up Supabase

Databases

What is a database?

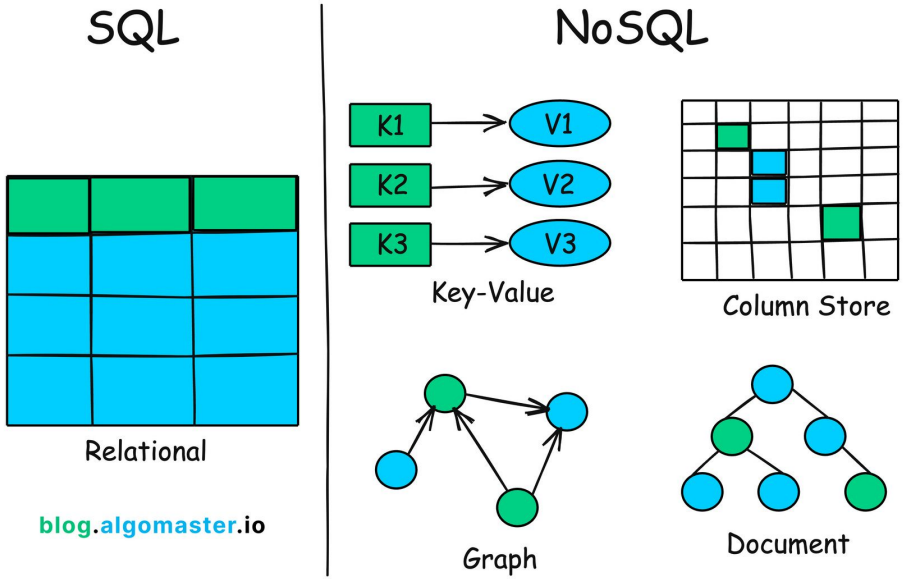
- Collection of structured information (**data**)
- Allows users to store, retrieve, update, and delete data efficiently



First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28

Types of Databases?

- **Relational Databases**
  - Tabular format
  - Uses SQL for querying
- Non-Relational (NoSQL) Databases
  - More flexibility in the way data is stored
  - No standardized querying language



Why do we need databases?

Recall the homework exercises we did:

- We have a tasks-cases.json with all our tasks.
- We imported these task cases into an **in-memory** list called **tasks**.
- We did operations on this list but what happens when we restart our server? What happens when we need to store 100K → 1M tasks?

Databases are essential for storing large amounts of data in one place. With databases, organizations can quickly access, manage, modify, update, organize and retrieve their data.

What is a DBMS?

- Database Management System
  - Software for creating, managing, and interacting with databases

- Examples of DBMS:
  - mySQL
  - MongoDB
  - **Supabase**

Relational Databases

What is a Table?

- A database is a collection of **tables**.
- A table is a structured way of storing data in rows and columns.
- Row = a record in your table
- Column = an attribute/property

Ex: You can have a table of students with columns: name, netID, major
The rows of the table is each instance of a student.

Columns (Attributes)

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28

Rows (Records)

How to interact with a DB?

C.R.U.D Operations

1. **Create**
    a. Inserting a record of data into your DB
2. **Read**
    a. Getting/Selecting data from your DB
3. **Update**
    a. Updating an existing record
4. **Delete**
    a. Deleting a record from your DB

We'll go into more detail later!

A.C.I.D Properties

A **good** relational database is **ACID**-compliant

A - Atomicity

- "All or Nothing" - if one part of the **transaction** fails, all changes are reverted

C - Consistency

- All rules/constraints are followed no matter what.

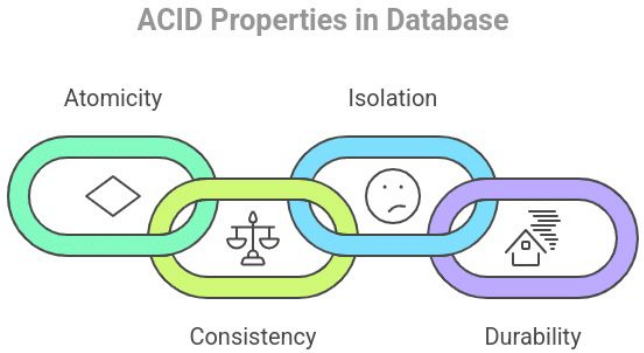
I - Isolation

- When concurrent transactions are made, each one behaves as if it's the only one.

D - Durability

- Once a transaction is successfully completed, the result is permanent. (Crashes & restarts don't wipe/revert the database)

Transaction = sequence of one or more operations on the DB



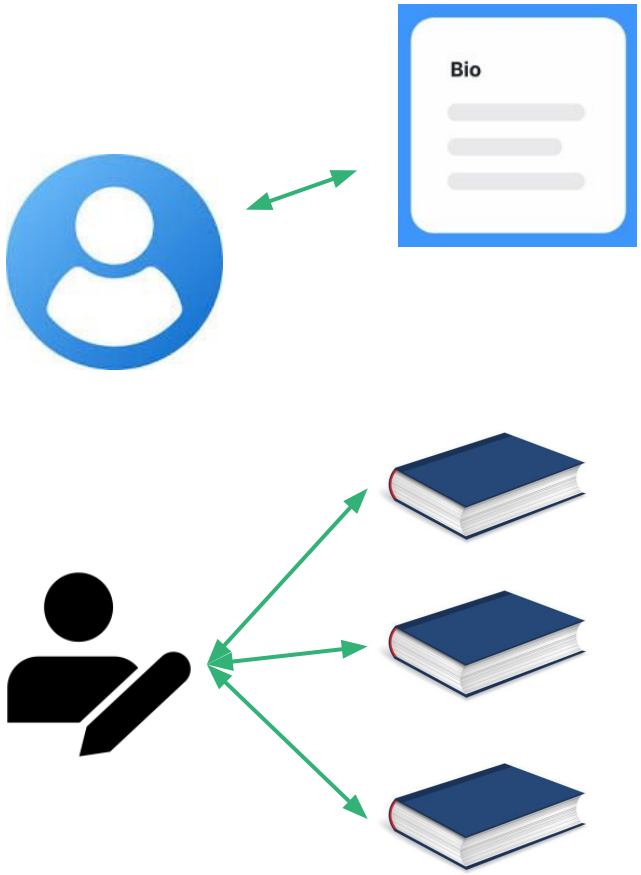
Primary Keys

- **Uniquely** identifies a row through some sort of id.
- Examples:
  - customer_id
  - student_id
- What was the primary key for tasks in our homework exercises?

SQL Relationships

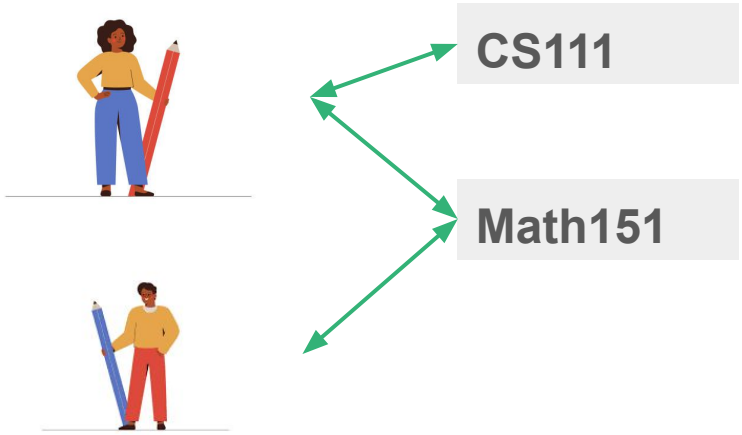
There are 4 main kinds of relationships between tables in Relational Databases:

1. One to One
    a. **One** Record in Table A → **One** Record in Table B
    b. Ex: A user has only one user profile and vice-versa
2. One to Many/Many to One
    a. **One** Record in Table A → **Many** Records in Table B
    b. Ex: An author can write many books; many books can be associated with one author



SQL Relationships Cont.

1. Many to Many
   a. **Many** Records in Table A → **Many** Records in Table B
   b. Ex: A student can enroll in many courses and courses can have many students
2. Self-Referencing
   a. Record(s) in Table A → Record(s) in Table A



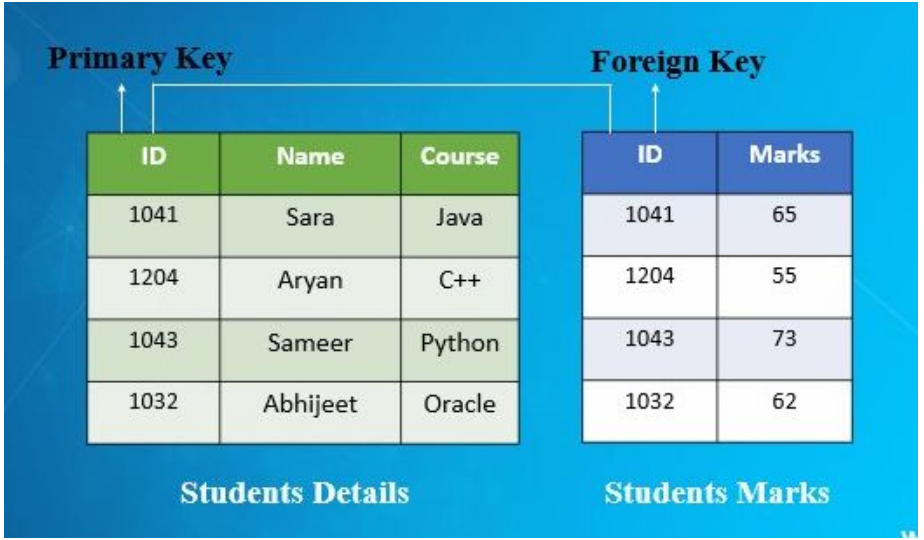
employees

employee_id	employee_name	manager_id
1	Alice	NULL
2	Bob	1
3	Charlie	1

foreign key
primary key

Foreign Keys

- This is how we implement our SQL relationships
- A foreign key in one column **references** a primary key in another column
- These columns could be in different tables or the in the same table



What kind of relationship might exist between students and their grades?

Foreign Keys

Example:

We have an Authors table and Books table

How do we establish this relation?:
1 author → the books that the author wrote

We create a column in our **books** table called **author_id**. This will be our foreign key.

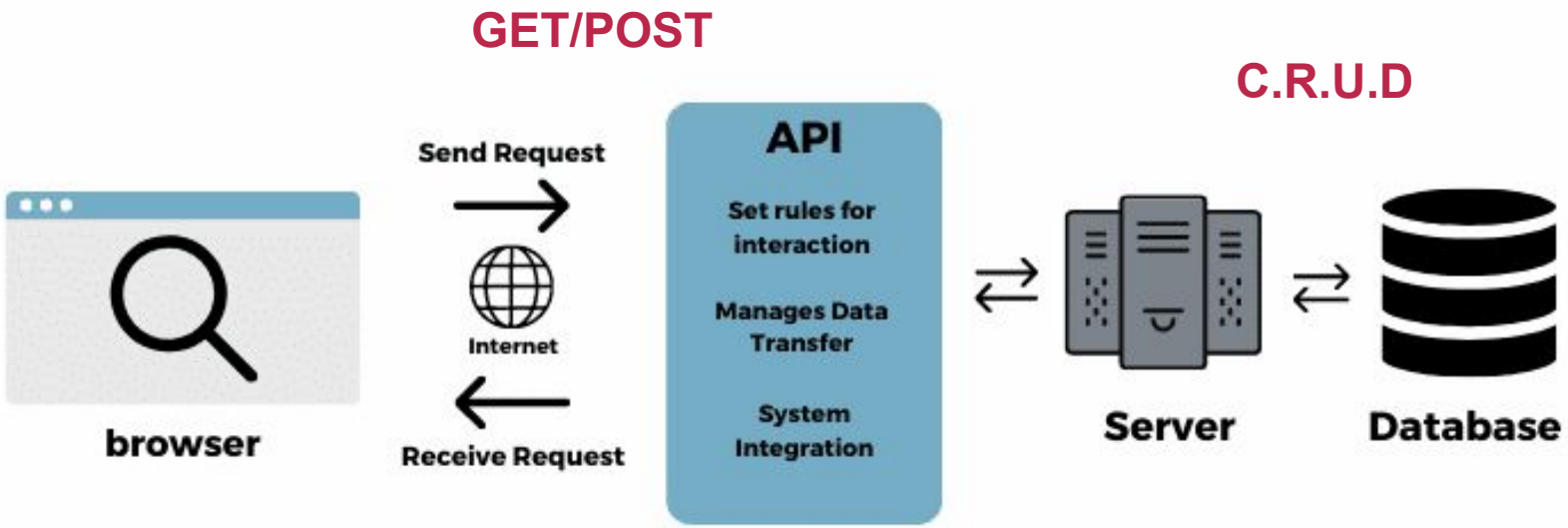
We make author_id reference **id** in our authors table.

AUTHORS

id	name
1	Jane Austen
2	Stephen King

BOOKS

id	title	author_id
1	Pet Cemetery	2
2	IT	2



Data Flow within an Application

Supabase

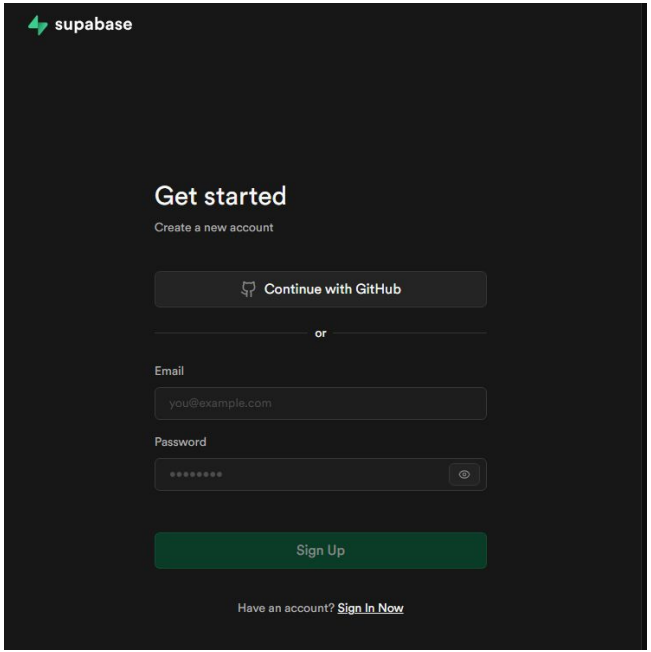
What is Supabase?

- Supabase is an open-source cloud database
  - Relational Database
  - The database exists on a cloud server
  - You don't need to host on your PC
  - BaaS – backend as a service

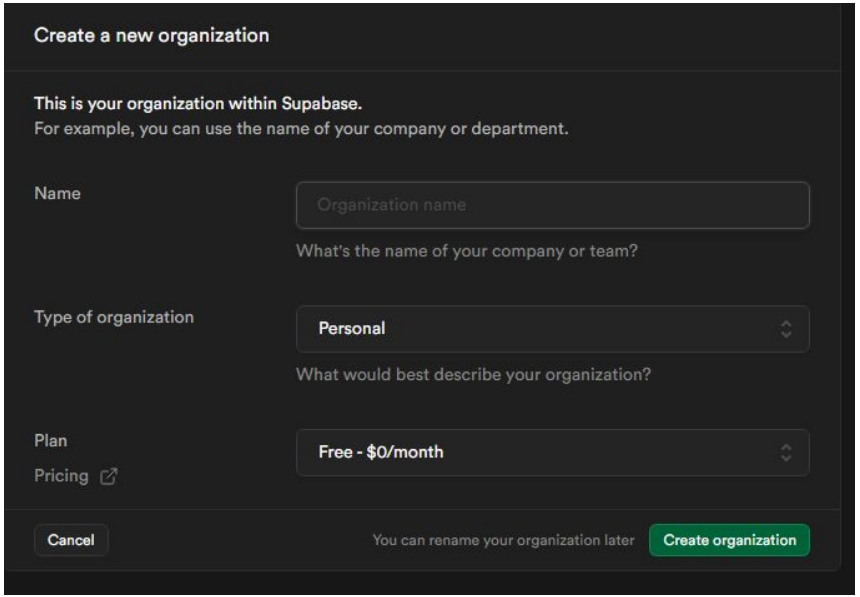
- Supabase is PostgreSQL*-based
  - Real-time functionality
  - Storage & authentication
  - SQL Templates
    - If you don't know SQL!
  - Policies

*PostgreSQL is another commonly used database
- Supabase is built upon Postgres (abstraction of Postgres)

Set Up on Supabase Website



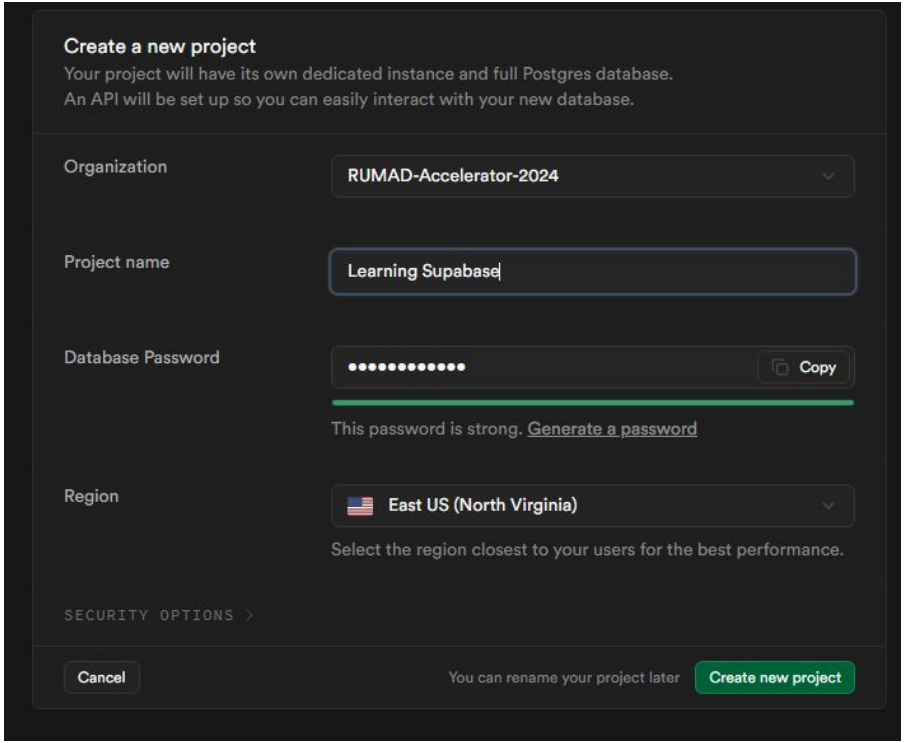
Sign in to Supabase
- Github or Email



Create an organization

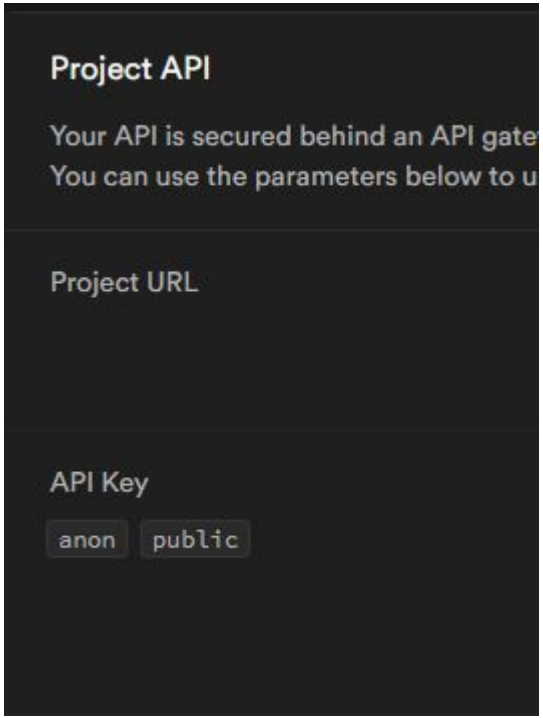
Project Creation

- Create a project
- You can have multiple projects inside an organization
- Set a strong password!



Supabase Config

- After basic setup of your Supabase project, you will get a list of information:
  - Project URL
  - API Key
- Used to connect your app to supabase
- This information is specific to **your database**
- Your API key should be maintained securely
  - Don’t want other people accessing your database!



Installing Supabase for Nodejs

- Use node package manager to install supabase

```
Terminal
1 npm install @supabase/supabase-js
```

- Initialize supabase client
  - Supabase Url (domain)
  - Supabase Key
- **createClient** takes in your personalized url and key to connect to your database

```
require('dotenv').config()
const { createClient } = require('@supabase/supabase-js')

//your Supabase url + public key from the supabase website!
const domain = process.env.SUPABASE_DOMAIN
const supabase_public_key = process.env.SUPABASE_PUBLIC_KEY

const supabase = createClient(domain, supabase_public_key)
```

Questions?

Please fill out the feedback form when you have a chance!

Feedback Form

Next week...

- More on Supabase
  - CRUD Operations
  - Supabase w/ NodeJS
  - Supabase Authentication

Did you complete Week 0?

Scan here for a guide to setting up your development environment!