Step 1 - What are ORMs

1. Boring official defination

ORM stands for Object-Relational Mapping, a programming technique used in software development to convert data between incompatible type systems in object-oriented programming languages. This technique creates a "virtual object database" that can be used from within the programming language.

ORMs are used to abstract the complexities of the underlying database into simpler, more easily managed objects within the code

2. Easier to digest defination

ORMs let you easily interact with your database without worrying too much about the underlying syntax (SQL language for eg)

Step 2 - Why ORMs?

1. Simpler syntax (converts objects to SQL queries under the hood)

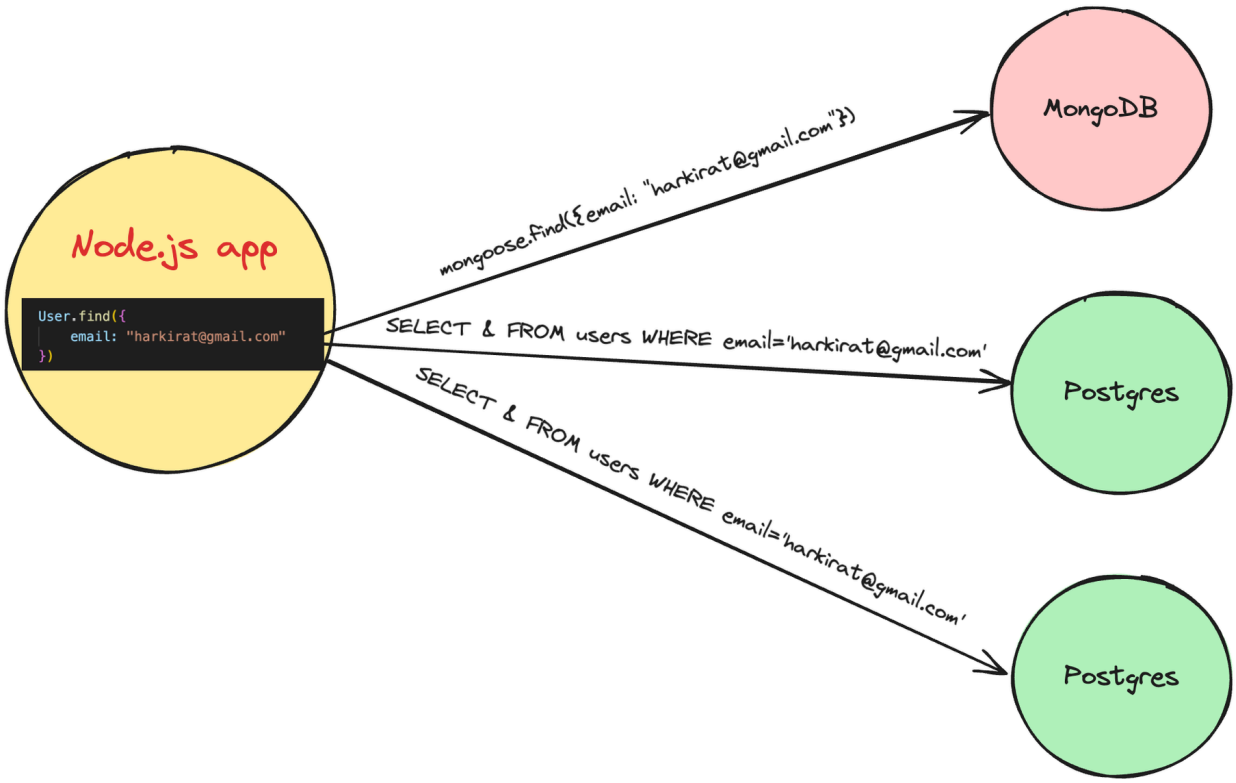
Non ORM

```
const query = 'SELECT * FROM users WHERE email = $1';
const result = await client.query(query, ["harkirat@gmail.com"]);
```

ORM

```
User.find({
    email: "harkirat@gmail.com"
})
```

2. Abstraction that lets you flip the database you are using. Unified API irrespective of the DB



3. Type safety/Auto completion

Non ORM (pg)

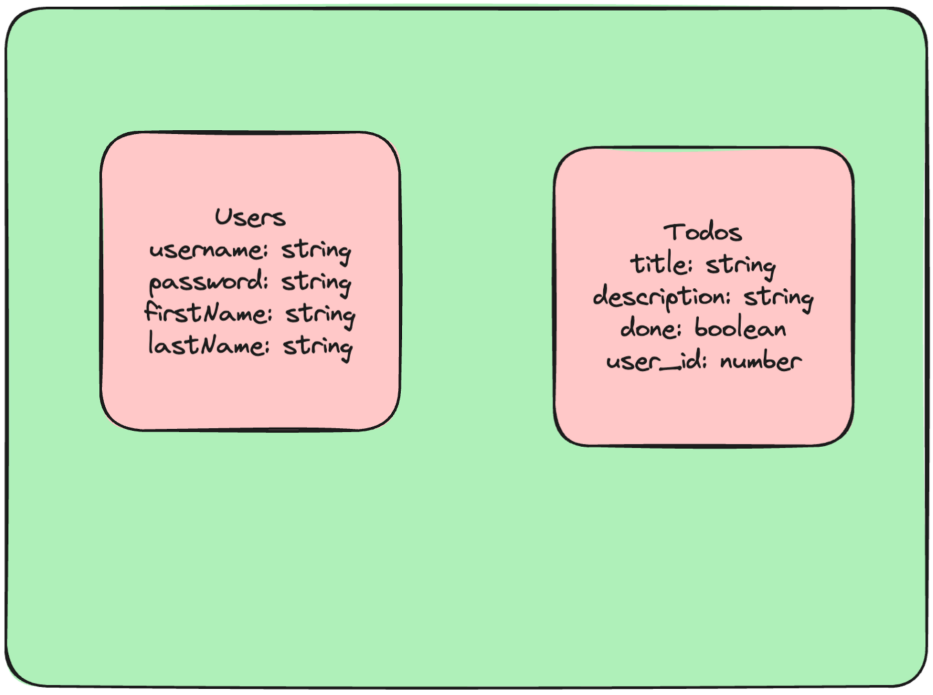
```
const result: any
const result = await client.query(query, ["harkirat@gmail.com"]);
```

ORM

```
const user: {
    email: string;
    username: string;
    password: String;
}
const user = UserDb.find({
    email: "harkirat@gmail.com"
})
// Asy
const user = UserDb.find({
    email: "harkirat@gmail.com"
})
```

4. Automatic migrations

In case of a simple Postgres app, it's very hard to keep track of all the commands that were ran that led to the current schema of the table.




```
CREATE TABLE users (
    id SERIAL PRIMARY KEY,
    name VARCHAR(100),
    email VARCHAR(100) UNIQUE NOT NULL
);
```

Copy

```
ALTER TABLE users
ADD COLUMN phone_number VARCHAR(15);
```

As your app grows, you will have a lot of these `CREATE` and `ALTER` commands.

ORMs (or more specifically Prisma) maintains all of these for you.

For example - https://github.com/code100x/cms/tree/main/prisma/migrations

Step 3 - What is Prisma

1. Data model

In a single file, define your schema. What it looks like, what tables you have, what field each table has, how are rows related to each other.

2. Automated migrations

Prisma generates and runs database migrations based on changes to the Prisma schema.

3. Type Safety

Prisma generates a type-safe database client based on the Prisma schema.

4. Auto-Completion

Step 4 - Installing prisma in a fresh app

Let’s create a simple TODO app

1. Initialize an empty Node.js project

```
npm ini  y
```
Copy

1. Add dependencies

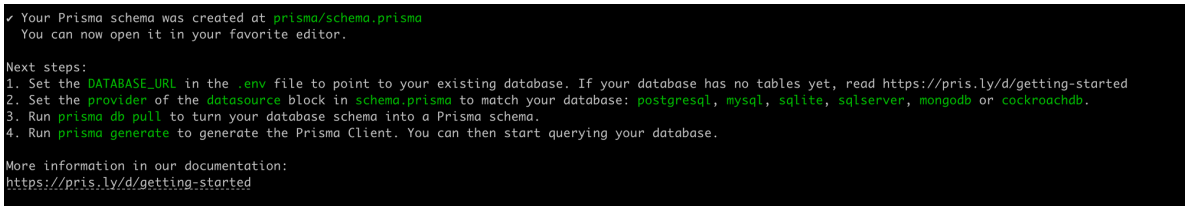
```
npm install prisma typescript ts-node @types/node --save  dev
```
Copy

1. Initialize typescript

```
npx tsc --init
Change `rootDit` to `src`
Change `outDir` to `dist`
```
Copy

1. Initialize a fresh prisma project

```
npx prisma  init
```
Copy



Step 5 - Selecting your database

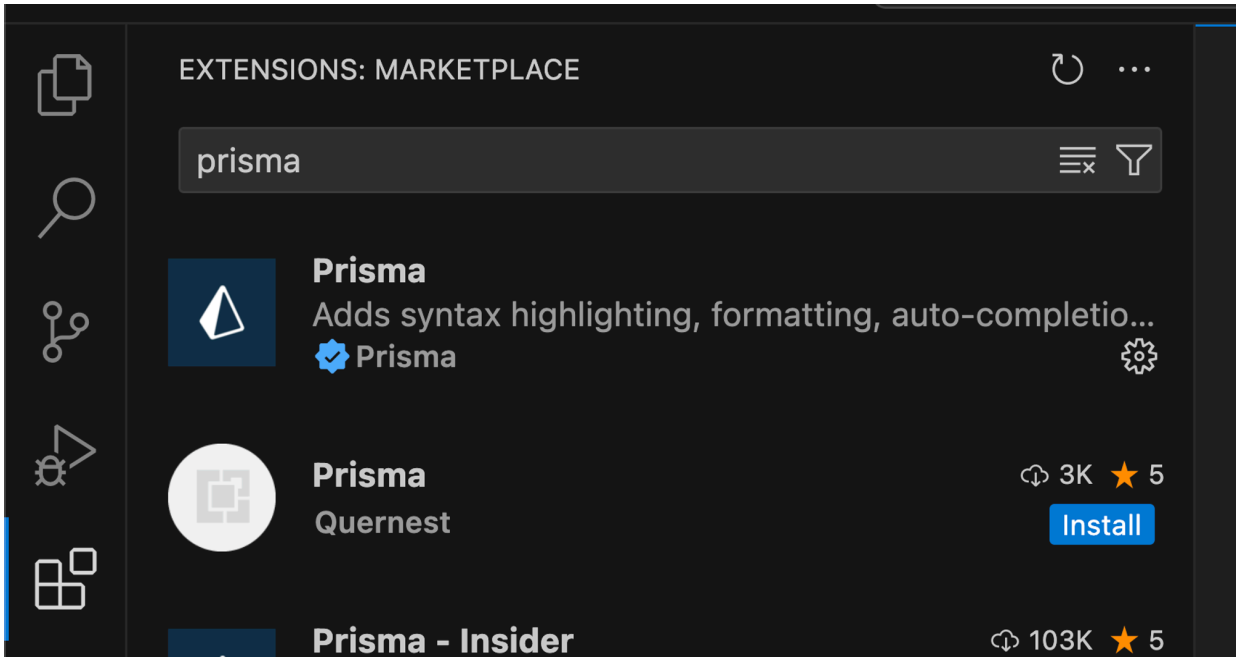
Prisma lets you chose between a few databases (MySQL, Postgres, Mongo)

You can update `prisma/schema.prisma` to setup what database you want to use.

💡 Also replace the database url with your test url for now

```
prisma > schema.prisma > ...
1   // This is your Prisma schema file,
2   // learn more about it in the docs: https://pris.ly/d/prisma-schema
3
4   generator client {
5     provider = "prisma-client-js"
6   }
7
8   datasource db {
9     provider = "postgresql"
10    url      = env("DATABASE_URL")
11  }
12
```

💡 Good to have the VSCode extension that lets you visualise prisma better



Step 6 - Defining your data model

Prisma expects you to define the shape of your data in the `schema.prisma` file

If your final app will have a Users table, it would look like this in the `schema.prisma` file

```
                                                    Copy
model User {
  id          Int      @id @default(autoincrement())
  username    String   @unique
  password    String
  firstName   String
  lastName    String
}
```

Assignment

Add a Users and a Todo table in your application. Don't worry about `foreign keys` / `relationships` just yet

▼ Answer

Copy

```
// This is your Prisma schema file,
// learn more about it in the docs: https://pris.ly/d/prisma-schema

generator client {
  provider = "prisma-client-js"
}

datasource db {
  provider = "postgresql"
  url      = env("DATABASE_URL")
}

model User {
  id         Int      @id @default(autoincrement())
  username   String   @unique
  password   String
  firstName  String
  lastName   String
}

model Todo {
  id          Int     @id @default(autoincrement())
  title       String
  description String
  done        Boolean @default(false)
  userId      Int
}
```

Generate migrations

You have created a single schema file. You haven't yet run the `CREATE TABLE` commands. To run those and create `migration files` , run

```
npx prisma migrate dev --name Initialize the schema
```
Copy

Your DB should now have the updated schema.

💡 Check the `prisma/migrations` folder and check if you see anything interesting in there

Step 7 - Exploring your database

If you have `psql`, try to explore the tables that `prisma` created for you.

```
psql -h localhost -d postgres -U postgres
```
Copy

Step 8 - Generating the prisma client

What is a client?

Client represents all the functions that convert

```
User.create({email: "harkirat@gmail.co...
```

Copy

into

```
INSERT INTO users VALUES ...
```

Copy

Once you've created the `prisma/schema.prisma` , you can generate these `clients` that you can use in your Node.js app

How to generate the client?

```
npx prisma gene...
```

Copy

This generates a new `client` for you.

Step 9 - Creating your first app

Insert

Write a function that let's you insert data in the `Users` table.

Typescript will help you out, here's a starter code -

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function insertUser(username: string, password: string, firs

}
```

▼ Solution

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function insertUser(username: string, password: string, fi
  const res = await prisma.user.create({
    data: {
        username,
        password,
        firstName,
        lastName
    }
  })
```

```
  console.log(res);
}

insertUser("admin1", "123456", "harkirat", "singh")
```

Update

Write a function that let's you update data in the `Users` table.

Starter code -

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

interface UpdateParams {
    firstName: string;
    lastName: string;
}

async function updateUser(username: string, {
    firstName,
    lastName
}: UpdateParams) {

}
```

▼ Solution

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

interface UpdateParams {
    firstName: string;
    lastName: string;
}

async function updateUser(username: string, {
    firstName,
    lastName
}: UpdateParams) {
  const res = await prisma.user.update({
    where: { username },
```

```
    data: {
      firstName,
      lastName
    }
  });
  console.log(res);
}

updateUser("admin1", {
    firstName: "new name",
    lastName: "singh"
})
```

Get a user's details

Write a function that let's you fetch the details of a user given their email

Starter code

```
import { PrismaClient } from "@prisma/client"

const prisma = new PrismaClient();

async function getUser(username: string) {

}
```

▼ Solution

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function getUser(username: string) {
  const user = await prisma.user.findFirst({
    where: {
        username: username
    }
  })
  console.log(user);
}
```

```
getUser("admin1");
```

Step 10 - Relationships.

Prisma let's you define `relationships` to relate tables with each other.

1. Types of relationships

1. One to One
2. One to Many
3. Many to One
4. Many to Many

2. For the TODO app, there is a `one to many` relationship

3. Updating the prisma schema

▼ Updated schema

Copy

```
// This is your Prisma schema file,
// learn more about it in the docs: https://pris.ly/d/prisma-schema

generator client {
  provider = "prisma-client-js"
}
```

```
datasource db {
  provider = "postgresql"
  url      = "postgresql://postgres:mysecretpassword@localhost:5432/postgre
}

model User {
  id         Int      @id @default(autoincrement())
  username   String   @unique
  password   String
  firstName  String
  lastName   String
  todos      Todo[]
}

model Todo {
  id          Int     @id @default(autoincrement())
  title       String
  description String
  done        Boolean @default(false)
  userId      Int
  user        User    @relation(fields: [userId], references: [id])
}
```

4. Update the `database` and the `prisma client`

```
npx prisma migrate dev --name relationship
npx prisma generate
```

Copy

Try exploring the `prisma/migrations` folder now. Do you see more migrations for the newly created realtiohsip?

Step 11 - Todo functions

1. createTodo

Write a function that let's you put a `todo` in the database.

Starter code -

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function createTodo(userId: number, title: string, description: string)

}

createTodo(1, "go to gym", "go to gym and do 10 pushups");
```

▼ Solution

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function createTodo(userId: number, title: string, description: strir
  const todo = await prisma.todo.create({
    data: {
      title,
      description,
      userId
    },
  });
  console.log(todo);

}

getUser(1, "go to gym", "go to gym and do 10 pushups");
```

2. getTodos

Write a function to get all the todos for a user.

Starter code

```
import { PrismaClient } from "@prisma/client"

const prisma = new PrismaClient();

async function getTodos(userId: number, ) {

}

getTodos(1);
```

▼ Solution

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function getTodos(userId: number, ) {
    const todos = await prisma.todo.findMany({
        where: {
        userId: userId,
        },
    });
    console.log(todos);
}

getTodos(1);
```

3. getTodosAndUserDetails (Does/should it use joins?)

Write a function that gives you the todo details of a user along with the user details

Starter Code

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function getTodosAndUserDetails(userId: number, ) {

}
```

```
getTodosAndUserDetails(1);
```

▼ Bad solution (2 queries)

Copy

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function getTodosAndUserDetails(userId: number) {
    const user = await prisma.user.findUnique({
        where: {
            id: userId
        }
    });
    const todos = await prisma.todo.findMany({
        where: {
            userId: userId,
        }
    });
    console.log(todos);
    console.log(user)
}

getTodosAndUserDetails(1);
```

▼ Good Solution (using joins)

Copy

```
import { PrismaClient } from "@prisma/client";

const prisma = new PrismaClient();

async function getTodosAndUserDetails(userId: number, ) {
    const todos = await prisma.todo.findMany({
        where: {
            userId: userId,
        },
        select: {
            user: true,
            title: true,
            description: true
        }
    });
    console.log(todos);
}
```

```
getTodosAndUserDetails(1);
```

💡 See https://github.com/prisma/prisma/issues/5026 to log the actual SQL queries

Page 12 - Expressify it

Assignment for this week

Try creating a todo application that let's a user signup, put todos and fetch todos.

Use

1. Typescript as the language
2. Prisma as the ORM
3. Postgres as the database
4. Zod as validation library