GraphQL

* Is new API standard that was invented & open sourced by Facebook
* Enables declarative data fetching
  + Allows API to specify exactly which data it needs
* GraphQL server exposes single endpoint and responds with exactly the data it needs

Why GraphQL

* Increased mobile usage creates need for efficient data loading
  + Low powered devices, sloppy network were the initial reasons graphQL was developed by Facebook
* Variety of different frontend frameworks and platforms on the client-side
* Fast development speed & expectation for rapid feature development

GraphQL is not only for React Developers

* Facebook uses GraphQL since 2012 in their native mobile apps
* GraphQL can be used with any programming language and framework
* GraphQL is used by other big companies such as Coursera yelp and twitter

GraphQL vs REST

* Great idea in REST: stateless servers and & structured access to resources
* REST is a strict specification
* Rapidly changing requirements on client-side don’t go well with REST

**Key: GraphQL was developed to cope with the need for more flexibility and efficiency in client server communication**

Example: Blogging App with REST

Graphical user interface, application, PowerPoint

Description automatically generated

Graphical user interface

Description automatically generated with low confidence

Traditional REST

* API endpoint ‘**/users/<id>**’ only needs **id** and **name**
  + Adding **Address** and **birthday** puts extra strain on user’s data plan
* We are actually downloading data that we don’t want to display
* To be conservative on usage 🡪 you need to refine API for that specific purpose
  + Not a good idea when the app needs quick iteration

GraphQL

Graphical user interface, text, application

Description automatically generated

Text

Description automatically generated

* Fetches everything on single request
  + Allows to fetch only needed data 🡪 saving data on user
* Advantages
  + No more over – and under fetching
  + **Overfetching:** Downloading unnecessary data
  + **Underfetching:** An endpoint doesn’t return enough of the right information; need to send multiple requests (n+1 requests problem)

**Rapid Product Iterations**

* REST: structure endpoints according to clients’ data needs
* No need to adjust API when product requirements and design change
* Faster feedback cycles and product iterations

**Insightful Analytics**

* Fine-grained info about what data is read by clients
* Enables evolving API and deprecating unneeded API features
* Great opportunities for instrumenting and performance monitoring

**Benefits of Schema & Types**

* GraphQL uses strong type system to define capabilities of an API
* Schema serves as contract between client and server
* Frontend and backend teams can work completely independent from each other

**Core Concepts**

* **Schema Definition Language**
  + Is it’s own type for defining it’s own schema

Rectangle

Description automatically generated with medium confidence

* + **!** following the type means that this field is ***required*.**

A picture containing graphical user interface

Description automatically generated

* Note that we just created a *one-to-many*-relationship between Person and Post since the posts field on Person is actually an *array* of posts

* **Fetching data with queries**
  + REST APIs, data is loaded from specific endpoints
    - Each endpoint has a clearly defined structure of the information that it returns.
    - This means that the data requirements of a client are effectively *encoded* in the URL that it connects to.
  + GraphQL APIs typically only expose *a* ***single endpoint*.**
    - it’s completely flexible and lets the client decide what data is actually needed.
* **Basic queries**

Example 1

Rectangle

Description automatically generated with low confidence

Response

Graphical user interface

Description automatically generated with low confidence

A picture containing text

Description automatically generated

* **Queries with Arguments**
  + GraphQL, each field can have 0 or more arguments

Rectangle

Description automatically generated with low confidence

* **Writing Data with Mutations**
  + Next to requesting information from a server, the majority of applications also need some way of making changes to the data that’s currently stored in the backend
  + Changes made using **mutations**
    - creating new data
    - updating existing data
    - deleting existing data

Shape

Description automatically generated with medium confidence

* **Realtime Updates with Subscriptions**
  + Is to have a *realtime* connection to the server in order to get immediately informed about important events
  + It initiates and holds a steady connection to the server.

Example

Shape, rectangle

Description automatically generated with medium confidence

* **Defining a Schema**
  + The *schema* is one of the most important concepts when working with a GraphQL API
  + Writing Query type

Graphical user interface

Description automatically generated with low confidence

* + Writing  Mutation type

Graphical user interface, text, application

Description automatically generated

* + Writing Subscription type

Shape, rectangle

Description automatically generated

Example (Full schema)

Graphical user interface, text, application

Description automatically generated

**Big Picture (Architecture)**

* **Architectural Use Cases**
  + GraphQL server with a connected database
  + GraphQL server to integrate integrate existing system

Running node

node src/index.js

**Setting up node**

**npm** **install** apollo-server

**npm** **install** @prisma/cli --save-dev

npx prisma init

Graphical user interface, text, application, email

Description automatically generated

Text

Description automatically generated with medium confidence

3. write database script

Graphical user interface, text, application, email

Description automatically generated

4. run script command

Graphical user interface, text, application

Description automatically generated

**Connecting the Server and Database with Prisma Client**