JOMLAUNCH’23

GraphQL

The Better Way to Do APIs

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@sourabhbagrecha @sourabhbagrecha

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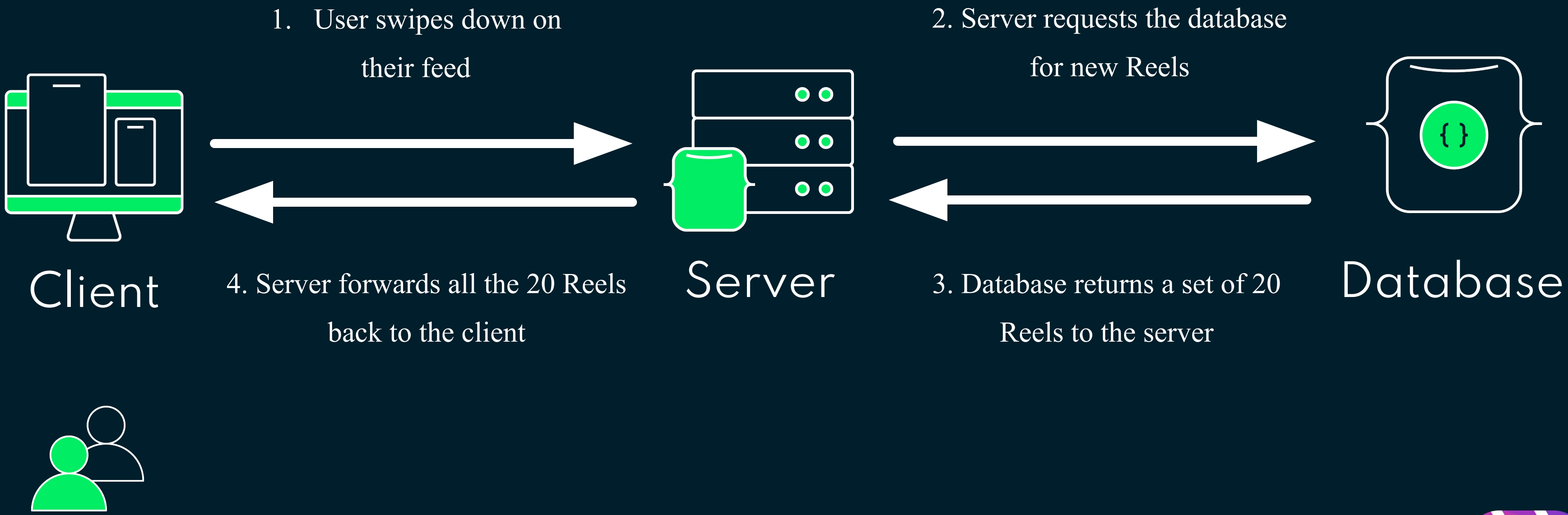
mdb.link/jomlaunch-2023

Mindless Scrolling

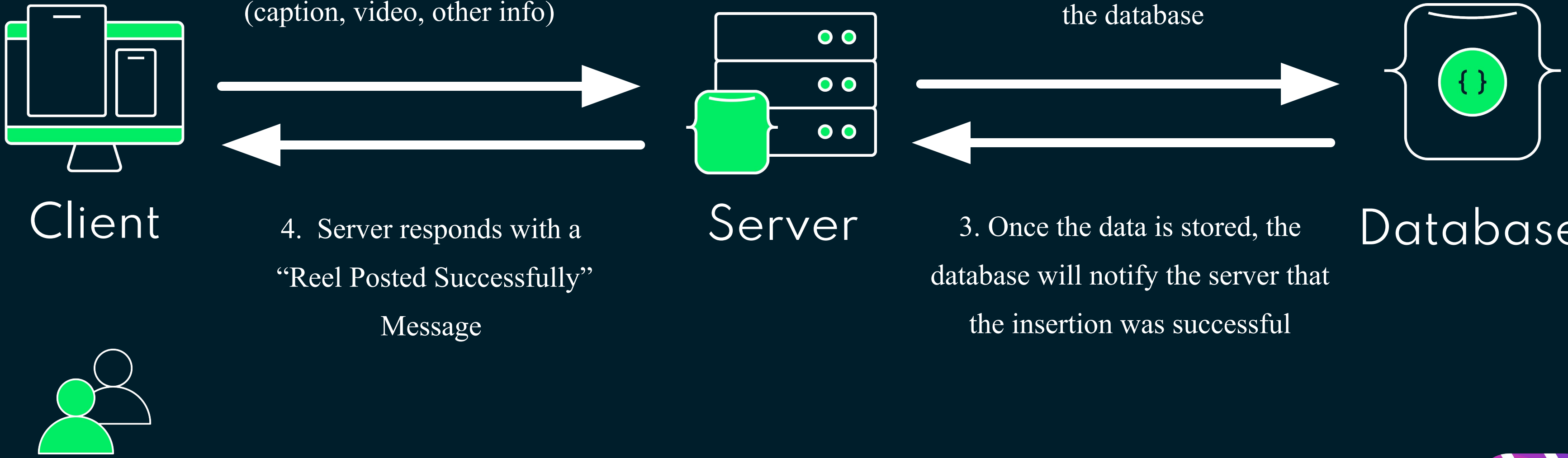
How does the Web work?

Client-Server Architecture


1. User swipes down on their feed
2. Server requests the database for new Reels
Client
4. Server forwards all the 20 Reels back to the client
Server
3. Database returns a set of 20 Reels to the server
Database

Refreshing the Home Page

Client-Server Architecture



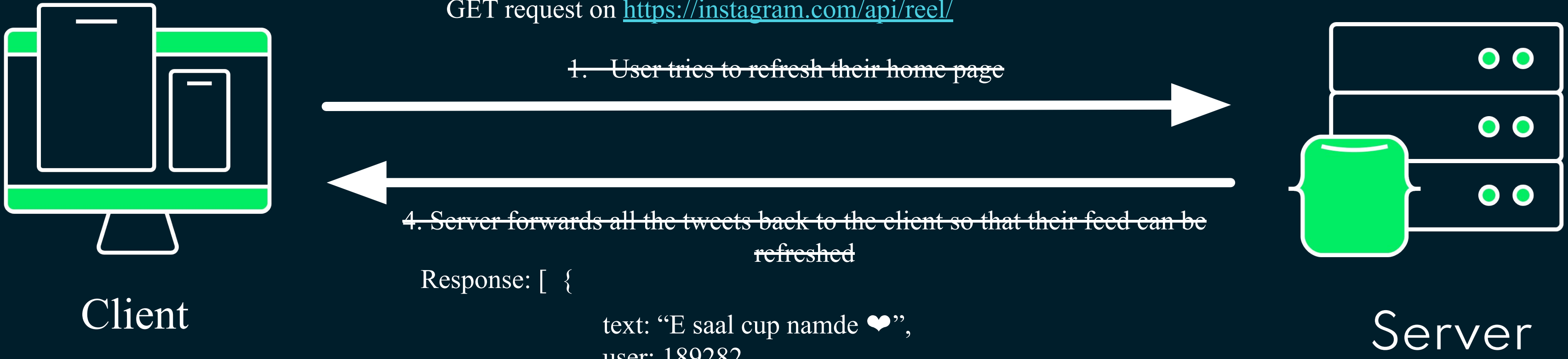
1. User sends Reel data (caption, video, other info)
2. Server verifies the data and executes an insert operation on the database
Client
Server
Database
3. Once the data is stored, the database will notify the server that the insertion was successful
4. Server responds with a "Reel Posted Successfully" Message

Posting a new Reel

But, how do these machines communicate?

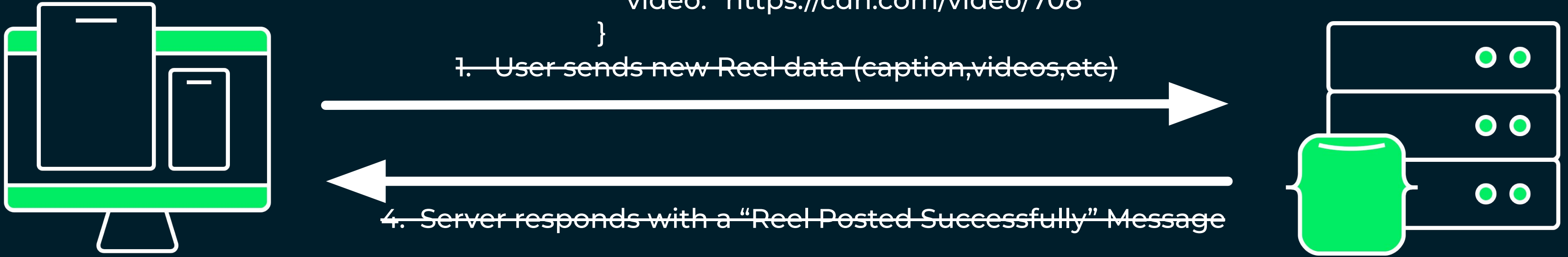
What is a REST API?

Translating real-world actions into REST APIs


GET request on https://instagram.com/api/reel/
~~1. User tries to refresh their home page~~
~~4. Server forwards all the tweets back to the client so that their feed can be refreshed~~
Client
Server

```
Response: [  {
              text: “E saal cup namde ❤”,
              user: 189282,
              timestamp: “Feb 5, 2023, 00:00”,
              image: “https://cdn.com/video/708”
            },
            {
              text: “Hi Insta Fam”,
              user: 189689,
              timestamp: “April 5, 2023, 01:40”,
              image: “https://cdn.com/video/711”
            }
            … and some more reels …
```

Translating real-world actions into REST APIs



POST request on https://instagram.com/api/**reel/**

```
with Data: {
        text: “E saal cup namde”,
        video: “https://cdn.com/video/708”
    }
```

~~1. User sends new Reel data (caption,videos,etc)~~

~~4. Server responds with a “Reel Posted Successfully” Message~~

```
Response: {
        message: “Reel Posted Successfully!”,
        data: {
          text: “E saal cup namde”,
          user: 18928298,
          timestamp: “Feb 5, 2023, 00:00”,
          image: “https://cdn.com/video/708”
        }
      }
```

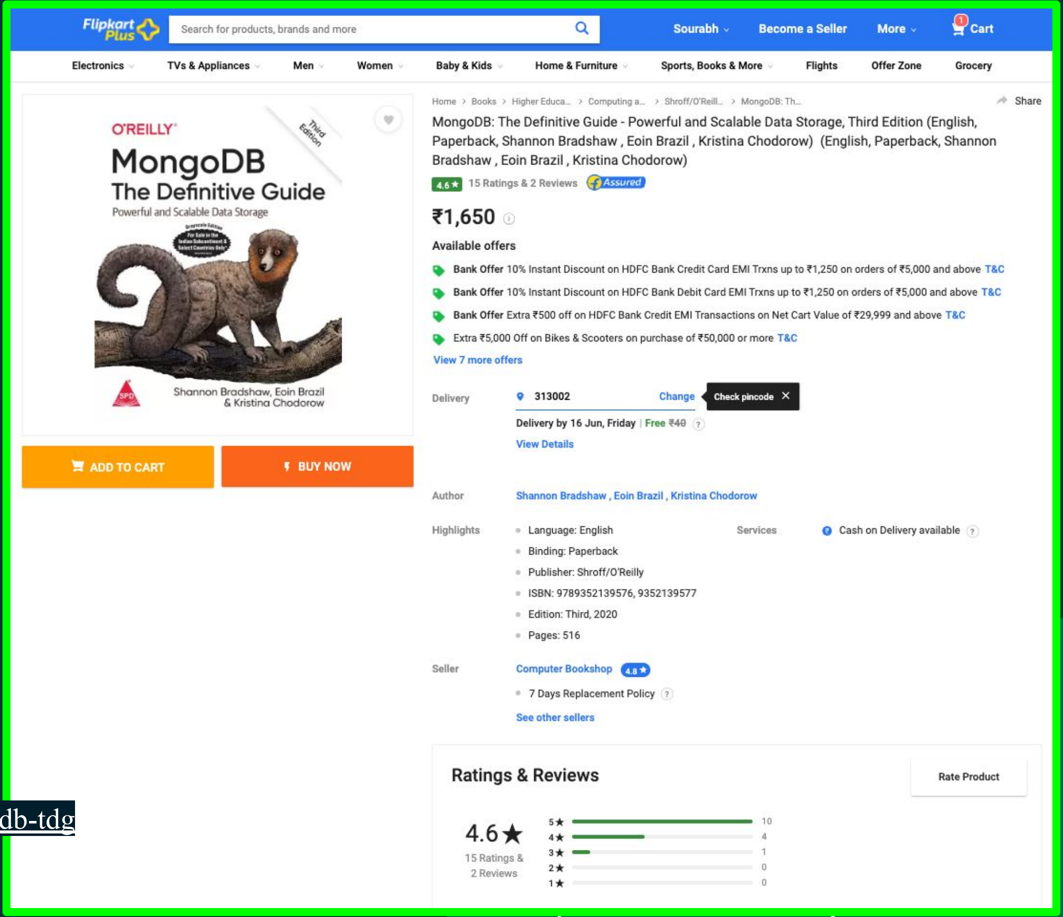
Challenges with REST API

“

Fetch a product using REST API

GET request on

https://flipkart.com/api/desktop/products/mongodb-tdg



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MongoDB: The Definitive Guide - Powerful and Scalable Data Storage, Third Edition (English, Paperback, Shannon Bradshaw , Eoin Brazil , Kristina Chodorow) (English, Paperback, Shannon Bradshaw , Eoin Brazil , Kristina Chodorow)

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- Bank Offer Extra ₹500 off on HDFC Bank Credit EMI Transactions on Net Cart Value of ₹29,999 and above T&C
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View Details

Author Shannon Bradshaw , Eoin Brazil , Kristina Chodorow

Highlights
- Language: English
- Binding: Paperback
- Publisher: Shroff/O'Reilly
- ISBN: 9789352139576, 9352139577
- Edition: Third, 2020
- Pages: 516

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Ratings & Reviews

4.6★
15 Ratings & 2 Reviews

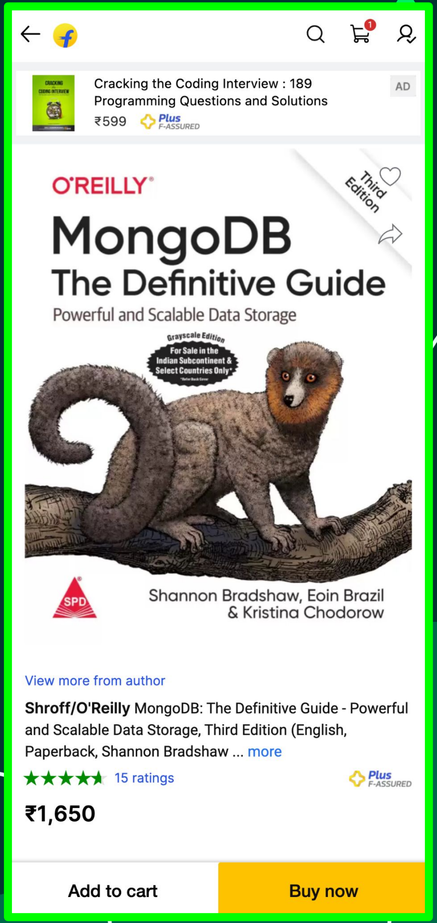
5★	10
4★	4
3★	1
2★	0
1★	0

“

Fetching a product using REST API

GET request on

https://flipkart.com/api/**mobile**/products/mongodb-tdg/**intro**



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★★★★★ 15 ratings Plus F-ASSURED

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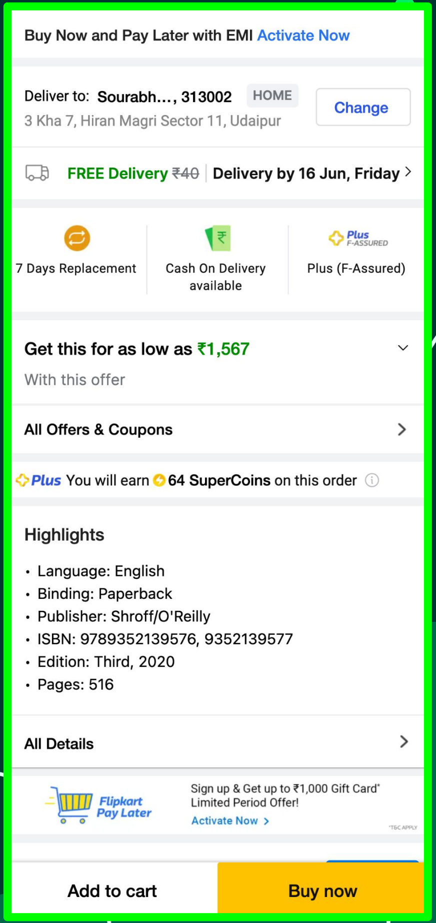
Fetching a product using REST API

GET request on https://flipkart.com/api/mobile/products/mongodb-tdg/delivery-info

GET request on https://flipkart.com/api/mobile/products/mongodb-tdg/product-highlights


Buy Now and Pay Later with EMI Activate Now

Deliver to: Sourabh..., 313002 HOME Change
3 Kha 7, Hiran Magri Sector 11, Udaipur

FREE Delivery ~~₹40~~ | Delivery by 16 Jun, Friday

7 Days Replacement | Cash On Delivery available | Plus (F-Assured)

Get this for as low as ₹1,567
With this offer

All Offers & Coupons

Plus You will earn 64 SuperCoins on this order

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- Pages: 516

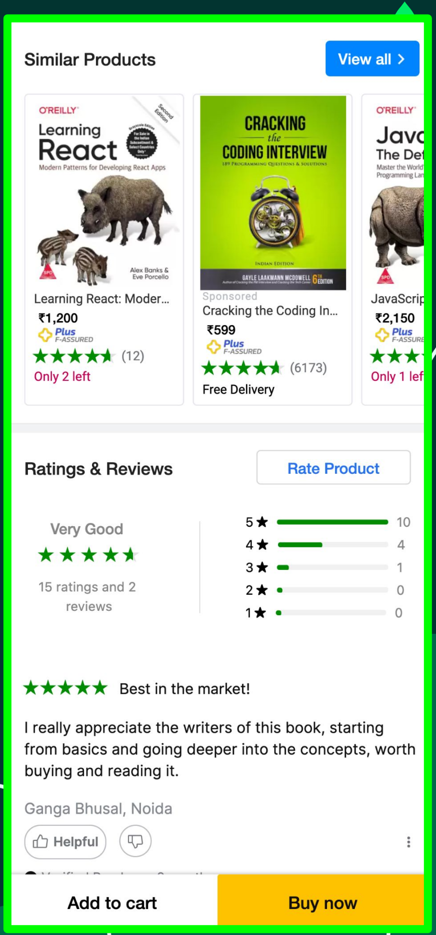
All Details

Flipkart Pay Later Sign up & Get up to ₹1,000 Gift Card* Limited Period Offer! Activate Now

Fetching a product using REST API

GET request on
https://flipkart.com/api/mobile/products/mongodb-tdg/similar-products

GET request on
https://flipkart.com/api/mobile/products/mongodb-tdg/ratings



★★★★★ Best in the market!

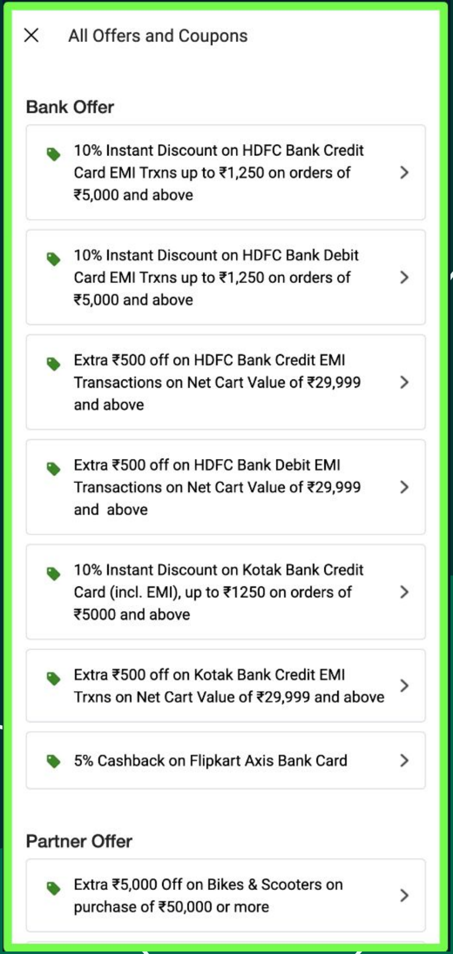
I really appreciate the writers of this book, starting from basics and going deeper into the concepts, worth buying and reading it.

Ganga Bhusal, Noida

Fetching a product using REST API

GET request on

https://flipkart.com/api/**mobile**/products/mongodb-tdg/**offers-and-coupons**



All Offers and Coupons

Bank Offer

10% Instant Discount on HDFC Bank Credit Card EMI Trxns up to ₹1,250 on orders of ₹5,000 and above

10% Instant Discount on HDFC Bank Debit Card EMI Trxns up to ₹1,250 on orders of ₹5,000 and above

Extra ₹500 off on HDFC Bank Credit EMI Transactions on Net Cart Value of ₹29,999 and above

Extra ₹500 off on HDFC Bank Debit EMI Transactions on Net Cart Value of ₹29,999 and above

10% Instant Discount on Kotak Bank Credit Card (incl. EMI), up to ₹1250 on orders of ₹5000 and above

Extra ₹500 off on Kotak Bank Credit EMI Trxns on Net Cart Value of ₹29,999 and above

5% Cashback on Flipkart Axis Bank Card

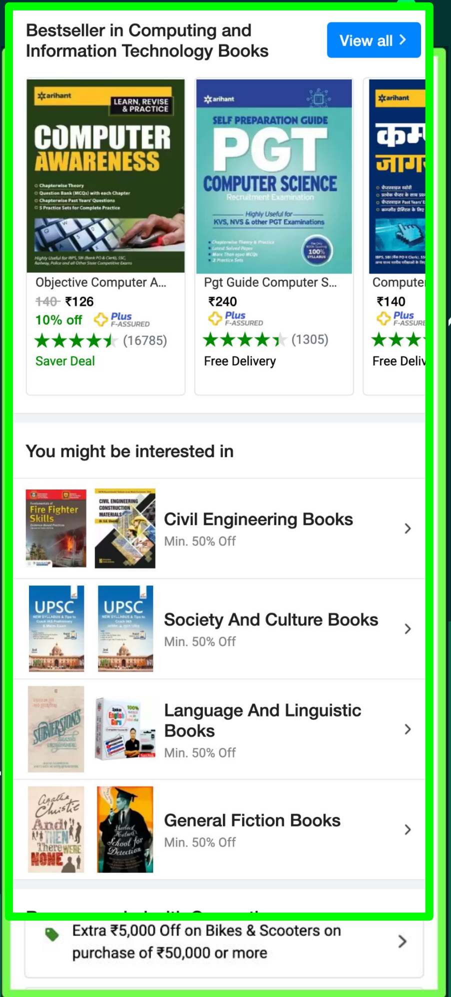
Partner Offer

Extra ₹5,000 Off on Bikes & Scooters on purchase of ₹50,000 or more

Fetching a product using REST API

GET request on
https://flipkart.com/api/**mobile**/products/mongodb-tdg/**other-bestsellers**

GET request on
https://flipkart.com/api/**mobile**/products/mongodb-tdg/**other-interested**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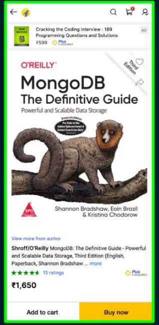
Fetching data part-by-part

- Atomic operations
- Under-fetching trap
- Need to make multiple n calls
- Eg:
  - Avg. Response Size: ~20KB
  - Avg Network Calls: 6

GET request on
https://flipkart.com/api/**390**/products/mongodb-tdg/intro



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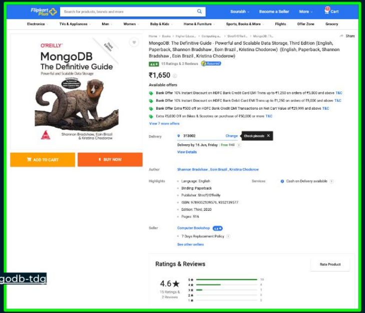
Fetching data all-at-once

- Non-atomic operations
- Over-fetching trap
- Need to make just one n/w call
- Eg:
  - Avg. Response Size: ~100KB
  - Avg Network Calls: One

GET request on
https://flipkart.com/api/**1920**/products/mongodb-tdg



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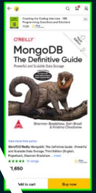

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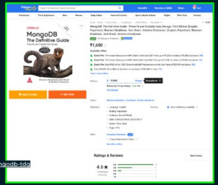
GET request on
https://flipkart.com/api/**1920**/products/mongodb-tdg



Both the traps at scale, kill your app's performance significantly!

<u>Translation</u>
When is the pain gonna end?

Struggling between underfetching and overfetching?

GraphQL to the Rescue!

GraphQL

- A query language for APIs
- Provides a complete description of the data in your API
- Gives clients the power to ask for exactly what they need-

  Nothing more, nothing less!

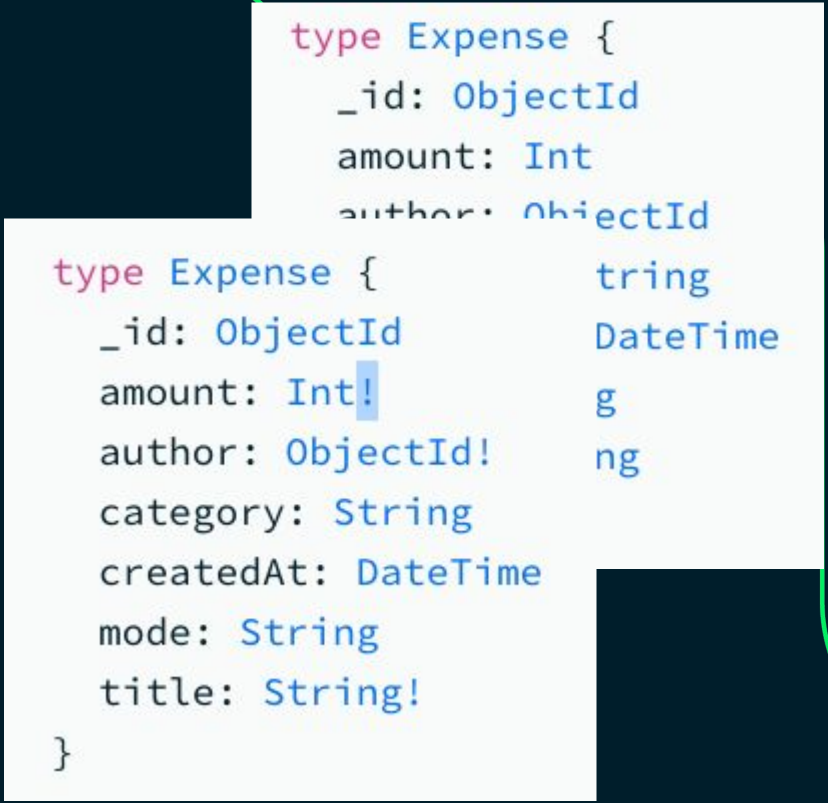
Define the Schema of your App

Let's create a personal expense manager app

Define the Schema of your App

List All Entities

- Mention all the: Entities(Tables, Collections and Classes) that you want to expose through the API
- In our app, we are focusing on one collection: Expenses
- Specify all the properties every object has with the appropriate data-type
- Add an "!" to specify if that field is required

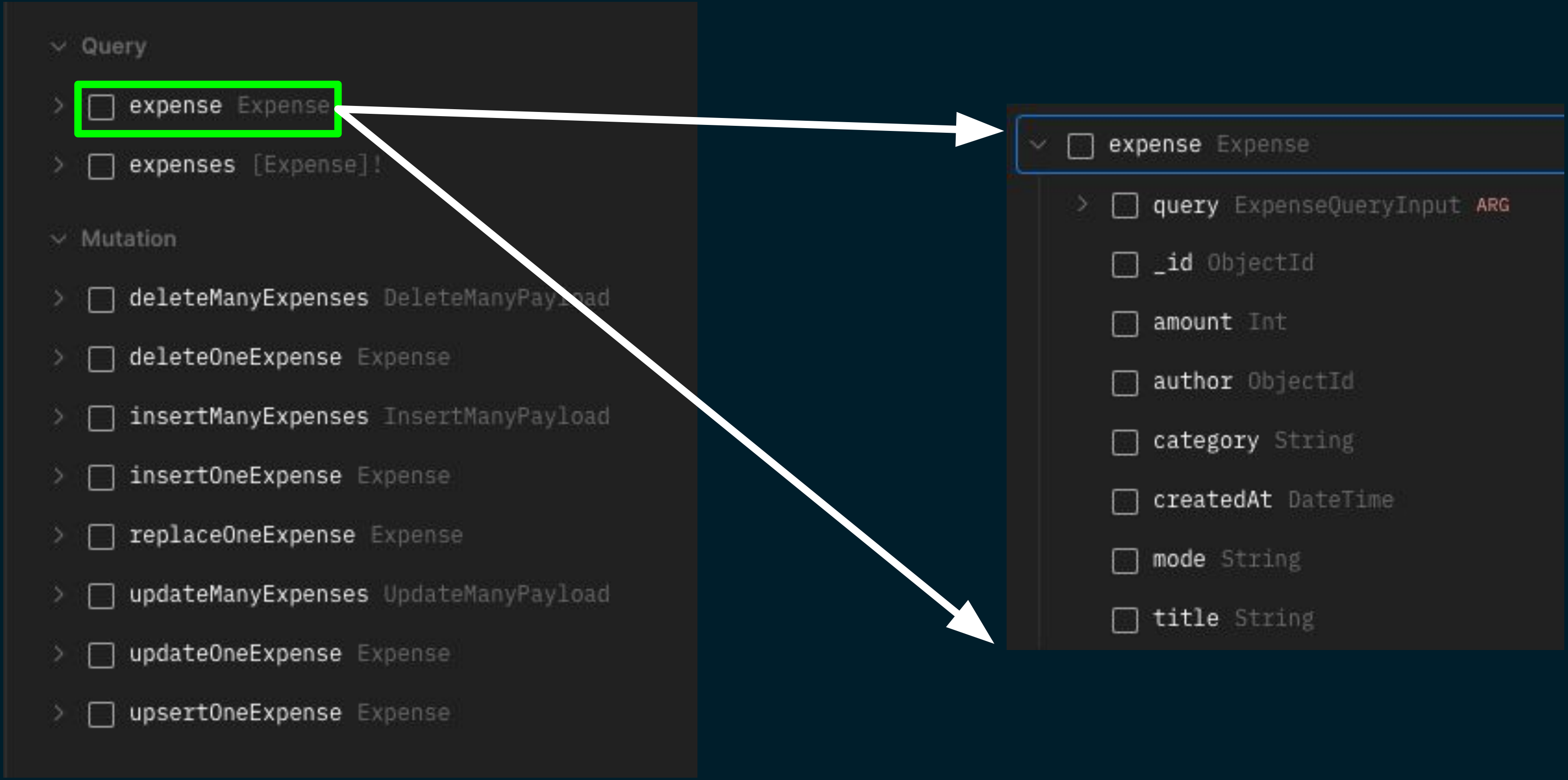


```
type Expense {
  _id: ObjectId
  amount: Int
  author: ObjectId
          tring
          DateTime
          g
          ng
```

```
type Expense {
  _id: ObjectId
  amount: Int!
  author: ObjectId!
  category: String
  createdAt: DateTime
  mode: String
  title: String!
}
```

How to query our App’s data efficiently (through GraphQL)?

Query your data through GraphQL



Query

expense Expense

expenses [Expense]!

Mutation

deleteManyExpenses DeleteManyPayload

deleteOneExpense Expense

insertManyExpenses InsertManyPayload

insertOneExpense Expense

replaceOneExpense Expense

updateManyExpenses UpdateManyPayload

updateOneExpense Expense

upsertOneExpense Expense

expense Expense

query ExpenseQueryInput ARG

_id ObjectId

amount Int

author ObjectId

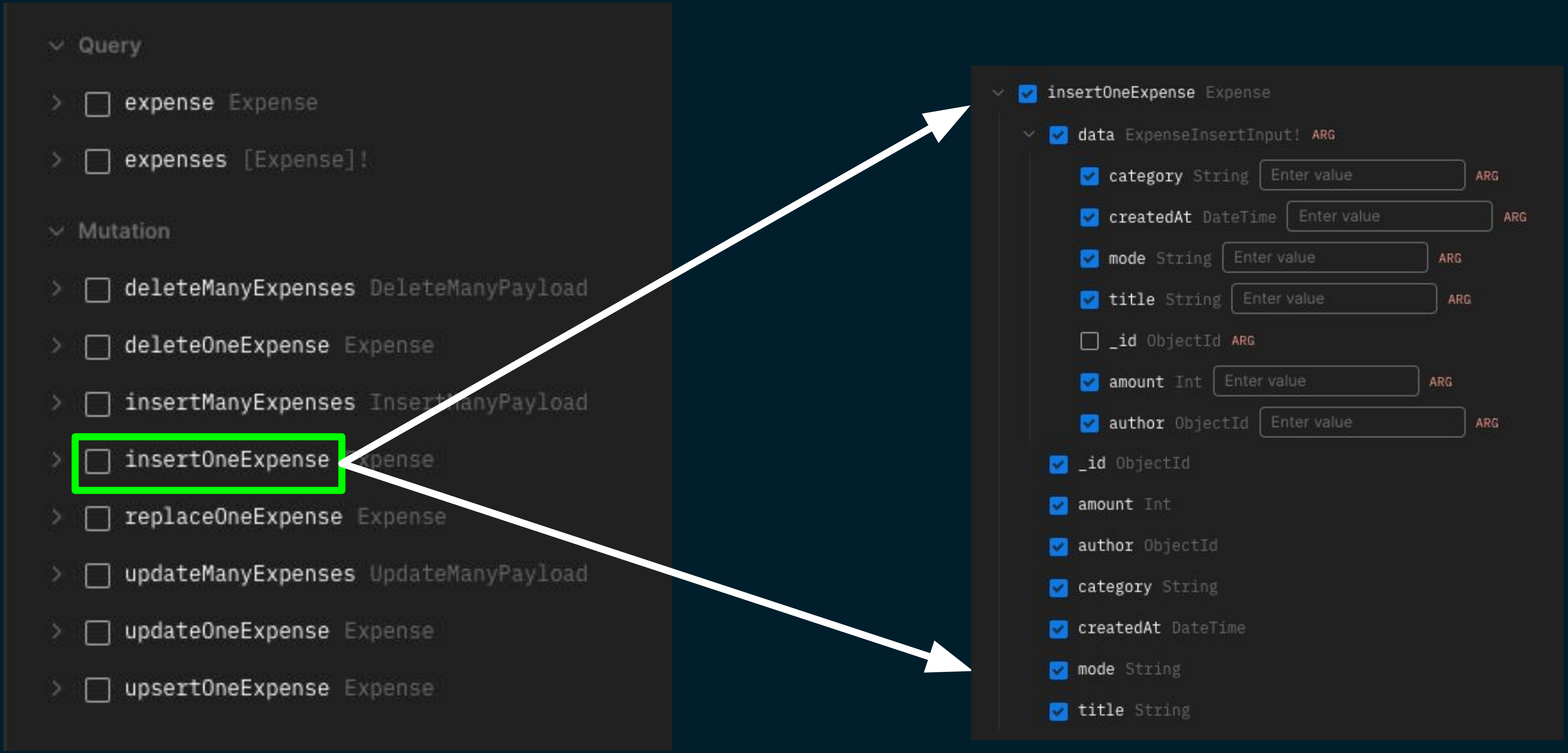
category String

createdAt DateTime

mode String

title String

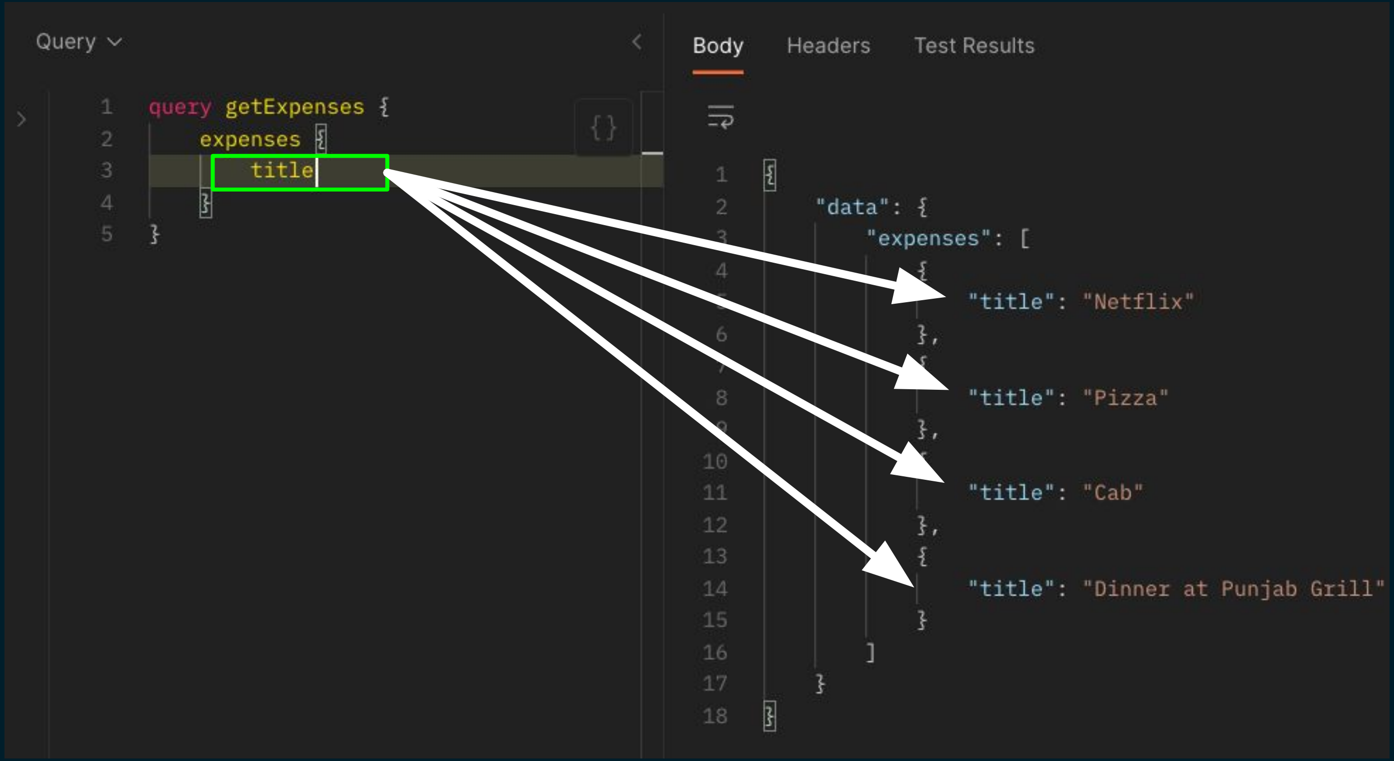
Mutate your data through GraphQL



```
⌄ Query
›  ☐ expense Expense
›  ☐ expenses [Expense]!
⌄ Mutation
›  ☐ deleteManyExpenses DeleteManyPayload
›  ☐ deleteOneExpense Expense
›  ☐ insertManyExpenses InsertManyPayload
›  ☐ insertOneExpense Expense
›  ☐ replaceOneExpense Expense
›  ☐ updateManyExpenses UpdateManyPayload
›  ☐ updateOneExpense Expense
›  ☐ upsertOneExpense Expense
```

```
⌄ ✓ insertOneExpense Expense
   ⌄ ✓ data ExpenseInsertInput! ARG
        ✓ category String [Enter value] ARG
        ✓ createdAt DateTime [Enter value] ARG
        ✓ mode String [Enter value] ARG
        ✓ title String [Enter value] ARG
        ☐ _id ObjectId ARG
        ✓ amount Int [Enter value] ARG
        ✓ author ObjectId [Enter value] ARG
     ✓ _id ObjectId
     ✓ amount Int
     ✓ author ObjectId
     ✓ category String
     ✓ createdAt DateTime
     ✓ mode String
     ✓ title String
```

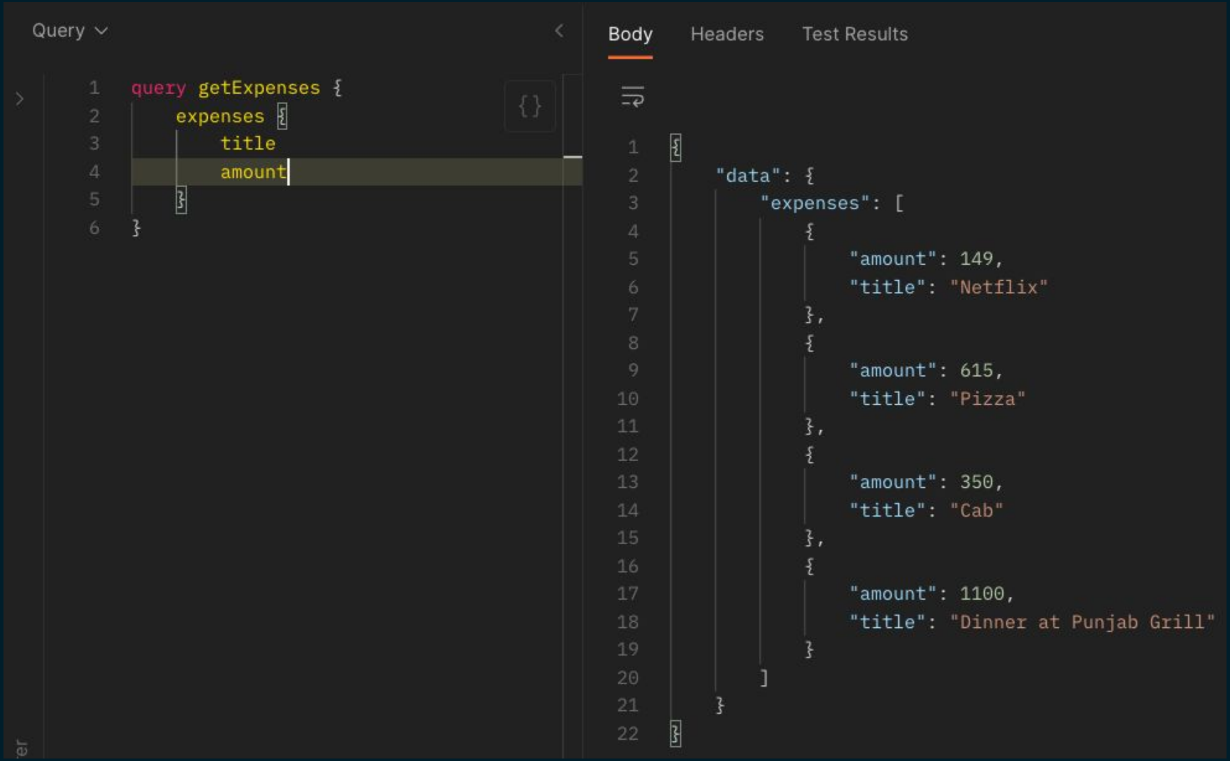
Query your data through GraphQL



```
query getExpenses {
    expenses {
        title
    }
}
```

```
{
    "data": {
        "expenses": [
            {
                "title": "Netflix"
            },
            {
                "title": "Pizza"
            },
            {
                "title": "Cab"
            },
            {
                "title": "Dinner at Punjab Grill"
            }
        ]
    }
}
```

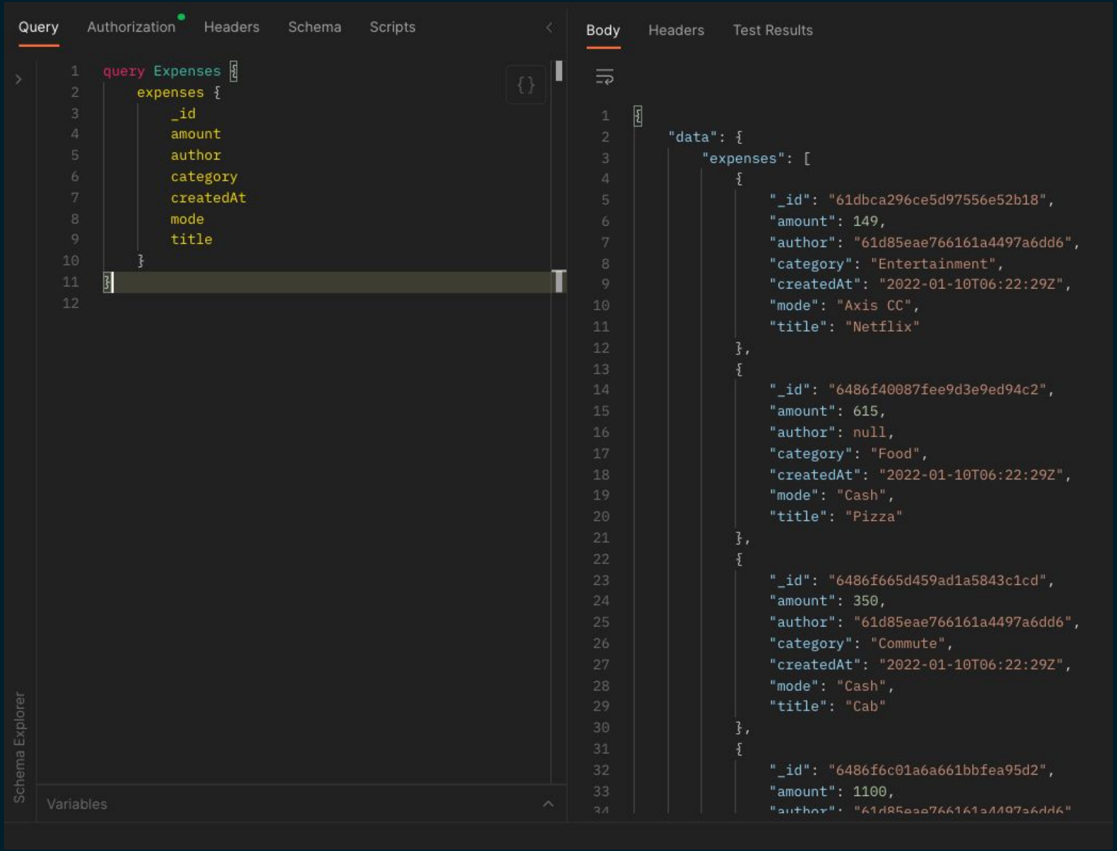
Query your data through GraphQL



```
query getExpenses {
    expenses {
        title
        amount
    }
}
```

```
{
    "data": {
        "expenses": [
            {
                "amount": 149,
                "title": "Netflix"
            },
            {
                "amount": 615,
                "title": "Pizza"
            },
            {
                "amount": 350,
                "title": "Cab"
            },
            {
                "amount": 1100,
                "title": "Dinner at Punjab Grill"
            }
        ]
    }
}
```

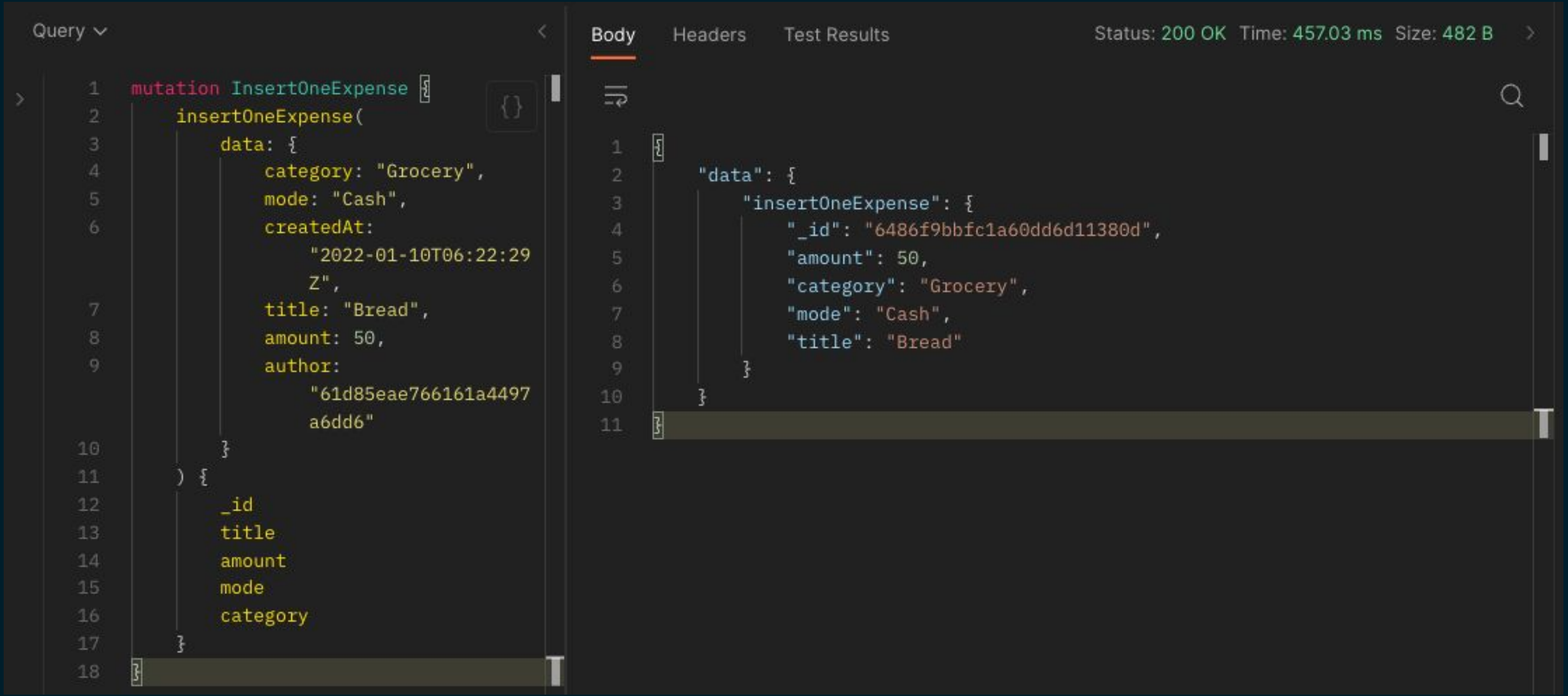
Query your data through GraphQL



```
query Expenses {
    expenses {
        _id
        amount
        author
        category
        createdAt
        mode
        title
    }
}
```

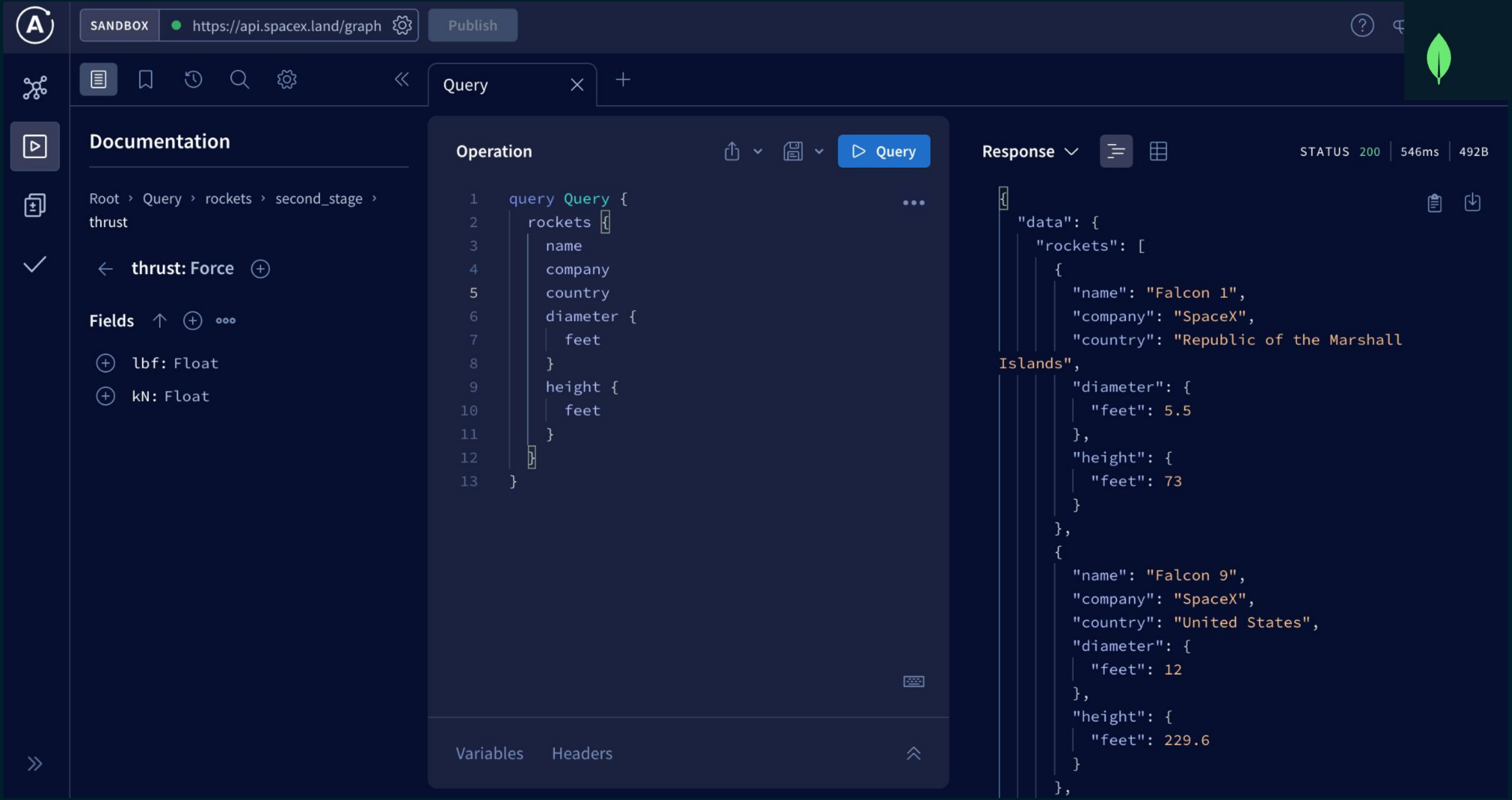
```
{
    "data": {
        "expenses": [
            {
                "_id": "61dbca296ce5d97556e52b18",
                "amount": 149,
                "author": "61d85eae766161a4497a6dd6",
                "category": "Entertainment",
                "createdAt": "2022-01-10T06:22:29Z",
                "mode": "Axis CC",
                "title": "Netflix"
            },
            {
                "_id": "6486f40087fee9d3e9ed94c2",
                "amount": 615,
                "author": null,
                "category": "Food",
                "createdAt": "2022-01-10T06:22:29Z",
                "mode": "Cash",
                "title": "Pizza"
            },
            {
                "_id": "6486f665d459ad1a5843c1cd",
                "amount": 350,
                "author": "61d85eae766161a4497a6dd6",
                "category": "Commute",
                "createdAt": "2022-01-10T06:22:29Z",
                "mode": "Cash",
                "title": "Cab"
            },
            {
                "_id": "6486f6c01a6a661bbfea95d2",
                "amount": 1100,
                "author": "61d85eae766161a4497a6dd6"
```

Mutate your data through GraphQL



```
mutation InsertOneExpense {
    insertOneExpense(
        data: {
            category: "Grocery",
            mode: "Cash",
            createdAt:
                "2022-01-10T06:22:29
                Z",
            title: "Bread",
            amount: 50,
            author:
                "61d85eae766161a4497
                a6dd6"
        }
    ) {
        _id
        title
        amount
        mode
        category
    }
}
```

```
{
    "data": {
        "insertOneExpense": {
            "_id": "6486f9bbfc1a60dd6d11380d",
            "amount": 50,
            "category": "Grocery",
            "mode": "Cash",
            "title": "Bread"
        }
    }
}
```


SANDBOX https://api.spacex.land/graph Publish

Query

Documentation

Root › Query › rockets › second_stage › thrust

thrust: Force

Fields

lbf: Float

kN: Float

Operation

Query

```
query Query {
  rockets {
    name
    company
    country
    diameter {
      feet
    }
    height {
      feet
    }
  }
}
```

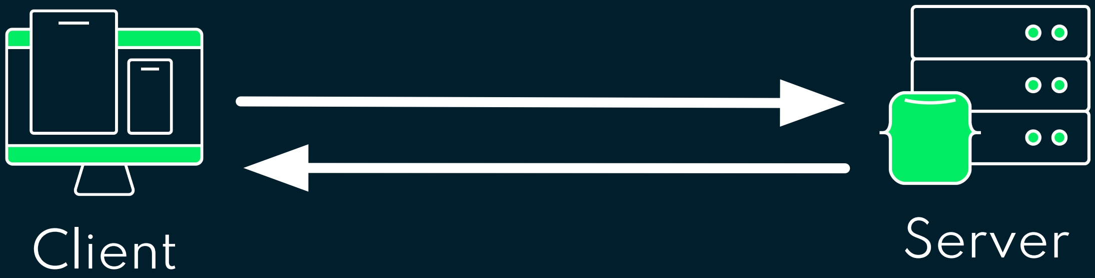
Variables Headers

Response STATUS 200 546ms 492B

```
{
  "data": {
    "rockets": [
      {
        "name": "Falcon 1",
        "company": "SpaceX",
        "country": "Republic of the Marshall
Islands",
        "diameter": {
          "feet": 5.5
        },
        "height": {
          "feet": 73
        }
      },
      {
        "name": "Falcon 9",
        "company": "SpaceX",
        "country": "United States",
        "diameter": {
          "feet": 12
        },
        "height": {
          "feet": 229.6
        }
      },
```

Is it very easy to build a full-stack GraphQL based app?

Fetching data through a GraphQL API



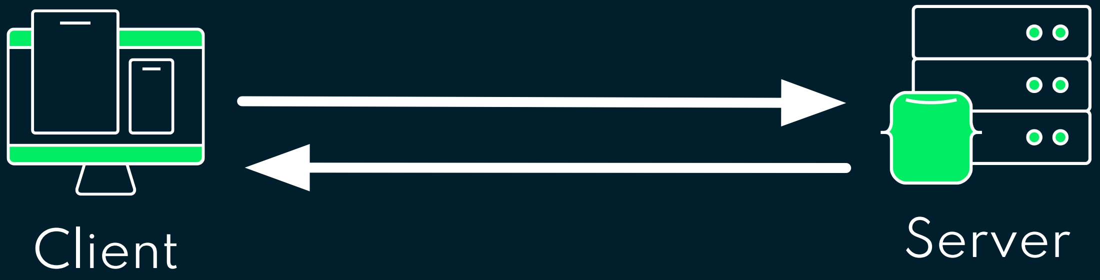
Front-end Developers
Back-end Developers

Hey, can you give me an API to fetch the details of a rocket?

Sure, you can make a GET request on:

https://spacex.com/api/rocket-details

Fetching data through a GraphQL API

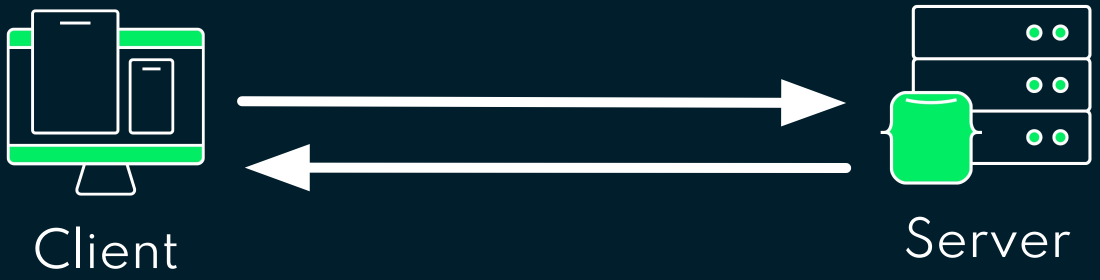


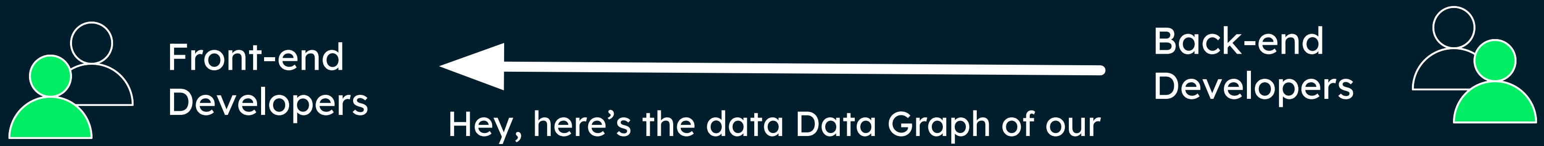
Front-end Developers
Back-end Developers

Hey, can you give me an API to fetch the name and name of the company of a rocket?

Sure, you can make a GET request on: https://spacex.com/api/rocket-details-with name-company-name

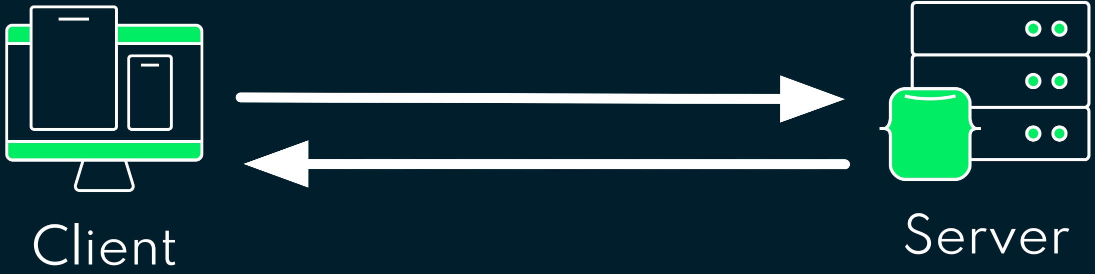
Fetching data through a GraphQL API





Hey, here's the data Data Graph of our API, you can take whatever you want and leave whatever you don't want

Fetching data through a GraphQL API



Front-end Developers 😍

Back-end Developers 😭

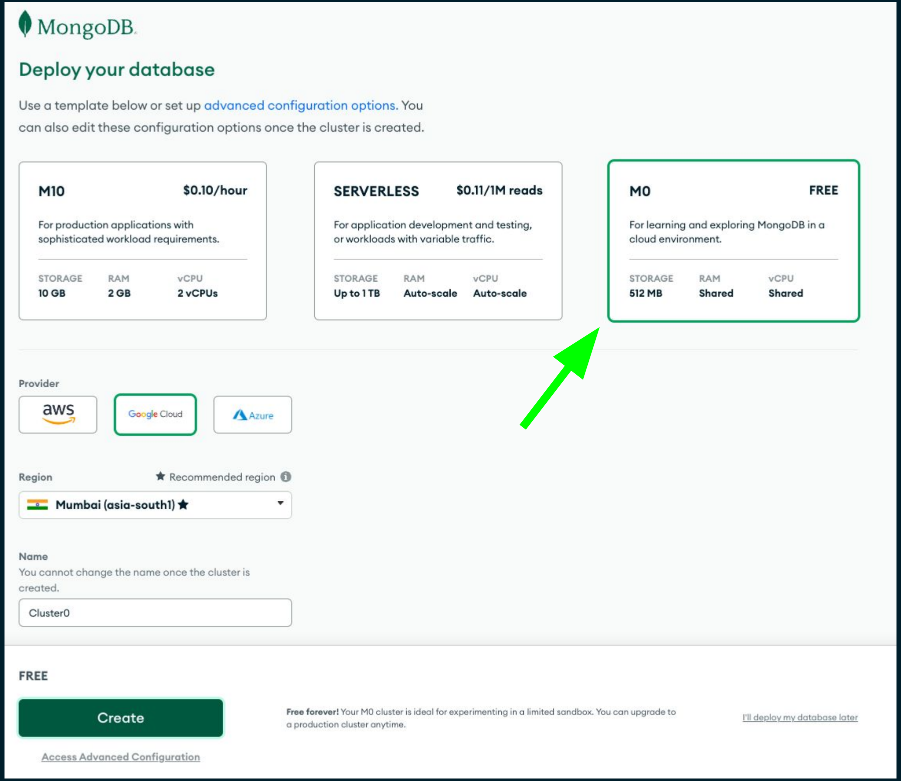
Challenges for Back-end developers to create a GraphQL API

Challenges for Back-end developers to create a GraphQL API

- Create a resolver for every field and entity
  - Implies lot of maintenance
- Making sure that the client has access to only those fields that they are allowed to
- Evolve with changing business needs without introducing any downtime

Introducing MongoDB Atlas GraphQL API

Deploy a Free Tier Database on MongoDB Atlas



MongoDB

Deploy your database

Use a template below or set up advanced configuration options. You can also edit these configuration options once the cluster is created.

M10 **$0.10/hour**

For production applications with sophisticated workload requirements.

STORAGE	RAM	vCPU
10 GB	2 GB	2 vCPUs

SERVERLESS **$0.11/1M reads**

For application development and testing, or workloads with variable traffic.

STORAGE	RAM	vCPU
Up to 1 TB	Auto-scale	Auto-scale

M0 **FREE**

For learning and exploring MongoDB in a cloud environment.

STORAGE	RAM	vCPU
512 MB	Shared	Shared

Provider: aws [✓ Google Cloud] Azure

Region ★ Recommended region

Mumbai (asia-south1) ★

Name

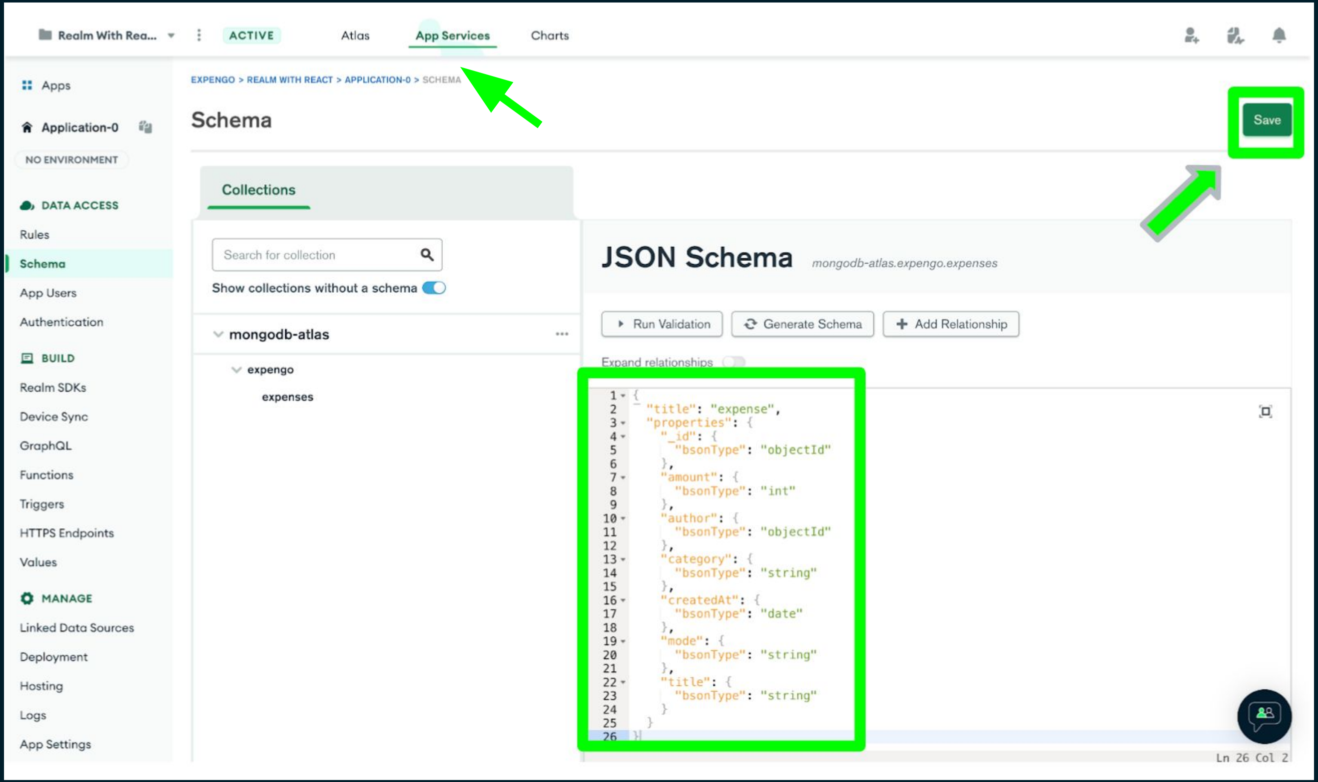
You cannot change the name once the cluster is created.

Cluster0

FREE

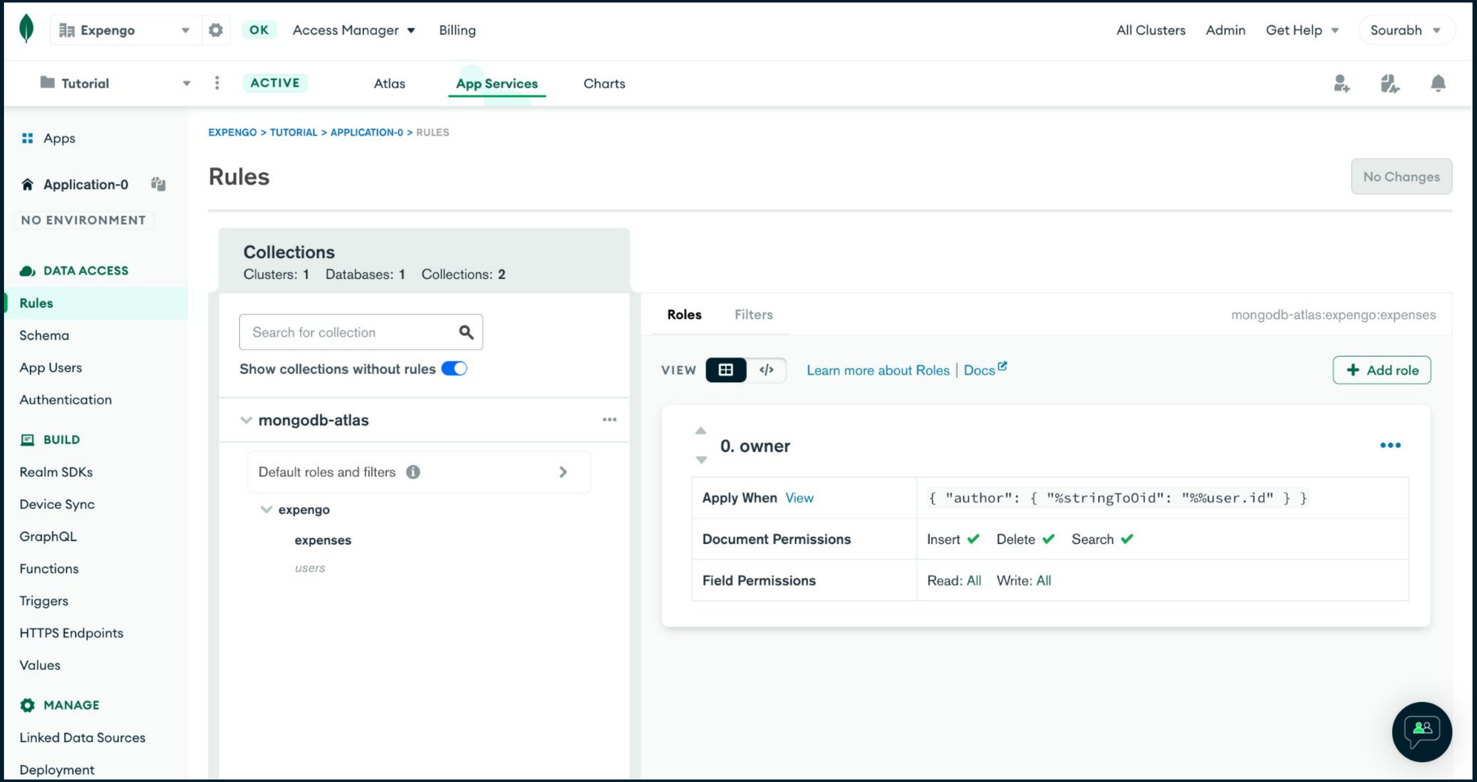
Free forever! Your M0 cluster is ideal for experimenting in a limited sandbox. You can upgrade to a production cluster anytime.

Define your Schema in Atlas App Services



```
{
  "title": "expense",
  "properties": {
    "_id": {
      "bsonType": "objectId"
    },
    "amount": {
      "bsonType": "int"
    },
    "author": {
      "bsonType": "objectId"
    },
    "category": {
      "bsonType": "string"
    },
    "createdAt": {
      "bsonType": "date"
    },
    "mode": {
      "bsonType": "string"
    },
    "title": {
      "bsonType": "string"
    }
  }
}
```

Define access rules for your data



EXPENGO > TUTORIAL > APPLICATION-0 > RULES

Rules

No Changes

Collections
Clusters: 1 Databases: 1 Collections: 2

Search for collection
Show collections without rules

mongodb-atlas
Default roles and filters
expengo
expenses
users

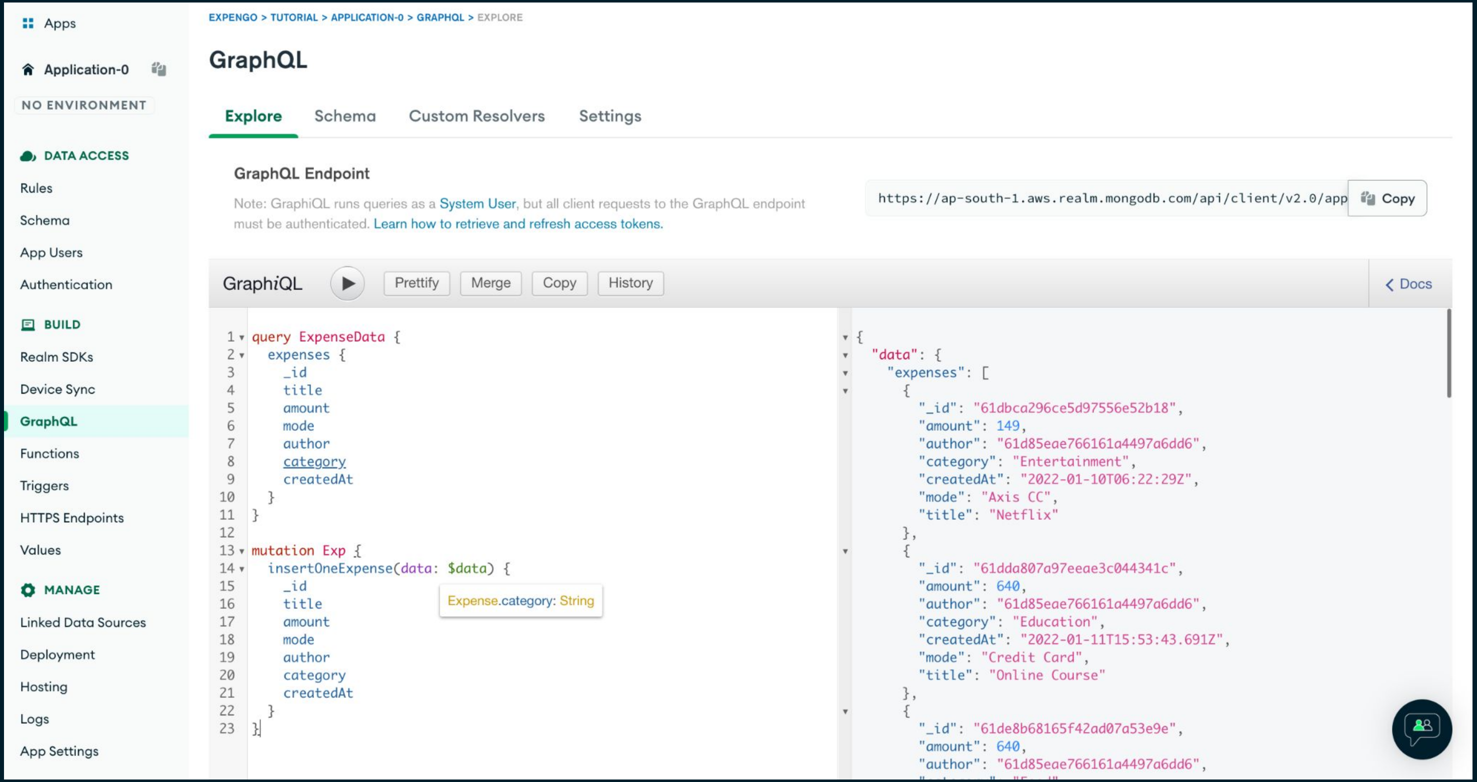
Roles Filters mongodb-atlas:expengo:expenses

VIEW Learn more about Roles | Docs
Add role

0. owner

Apply When View	`{ "author": { "%stringToOid": "%%user.id" } }`
Document Permissions	Insert ✓ Delete ✓ Search ✓
Field Permissions	Read: All Write: All

That’s it, your GraphQL API is ready to be integrated in your apps



GraphQL Endpoint

Note: GraphiQL runs queries as a System User, but all client requests to the GraphQL endpoint must be authenticated. Learn how to retrieve and refresh access tokens.

https://ap-south-1.aws.realm.mongodb.com/api/client/v2.0/app Copy

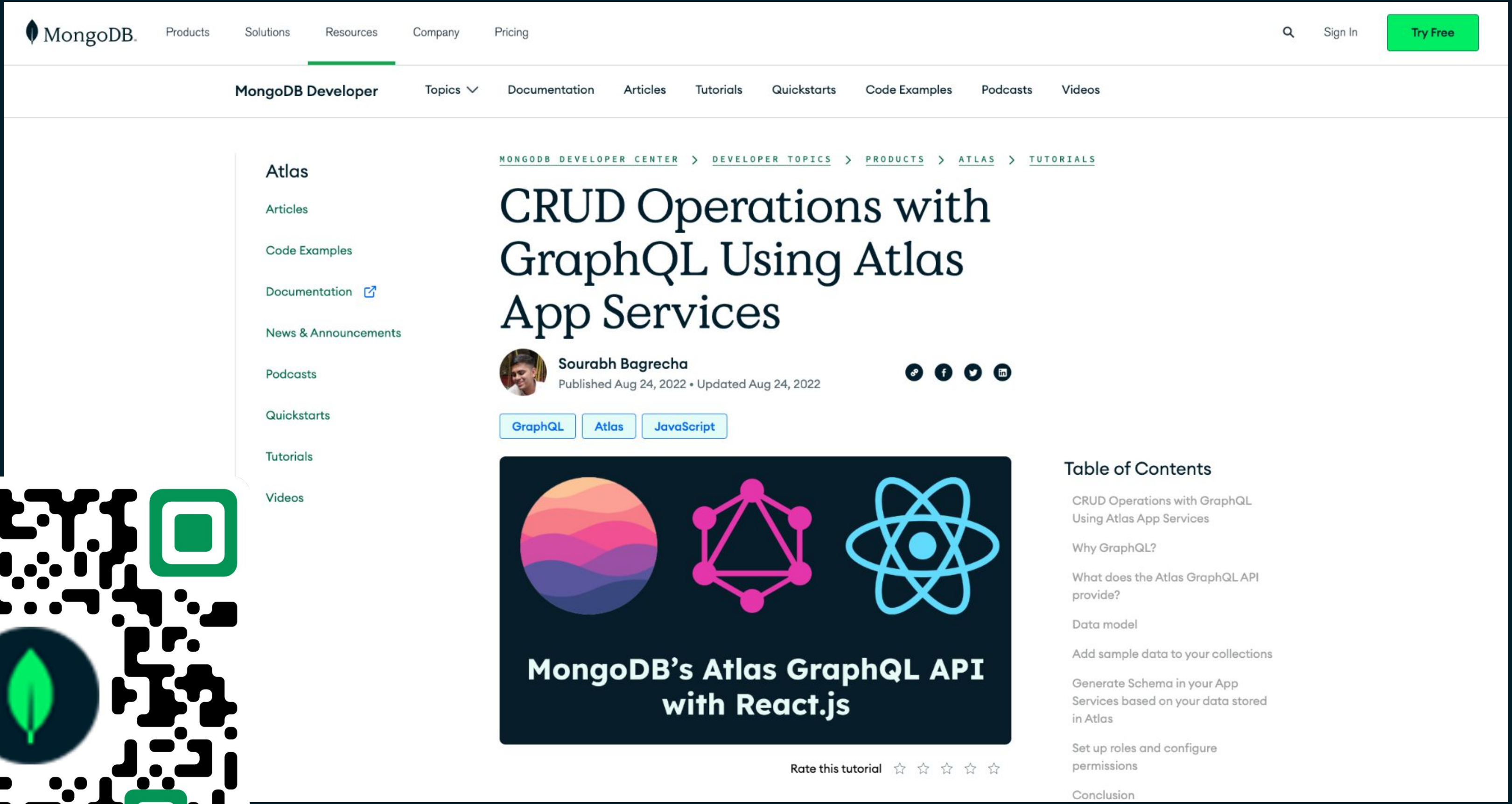
```graphql
query ExpenseData {
  expenses {
    _id
    title
    amount
    mode
    author
    category
    createdAt
  }
}

mutation Exp {
  insertOneExpense(data: $data) {
    _id
    title
    amount
    mode
    author
    category
    createdAt
  }
}
```

```json
{
  "data": {
    "expenses": [
      {
        "_id": "61dbca296ce5d97556e52b18",
        "amount": 149,
        "author": "61d85eae766161a4497a6dd6",
        "category": "Entertainment",
        "createdAt": "2022-01-10T06:22:29Z",
        "mode": "Axis CC",
        "title": "Netflix"
      },
      {
        "_id": "61dda807a97eeae3c044341c",
        "amount": 640,
        "author": "61d85eae766161a4497a6dd6",
        "category": "Education",
        "createdAt": "2022-01-11T15:53:43.691Z",
        "mode": "Credit Card",
        "title": "Online Course"
      },
      {
        "_id": "61de8b68165f42ad07a53e9e",
        "amount": 640,
        "author": "61d85eae766161a4497a6dd6",
```

Best of both worlds?

- No Under-fetching trap
- No Over-fetching trap
- No Over-head on backend developers
- Just pure bliss



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CRUD Operations with GraphQL Using Atlas App Services

Sourabh Bagrecha
Published Aug 24, 2022 • Updated Aug 24, 2022

GraphQL Atlas JavaScript

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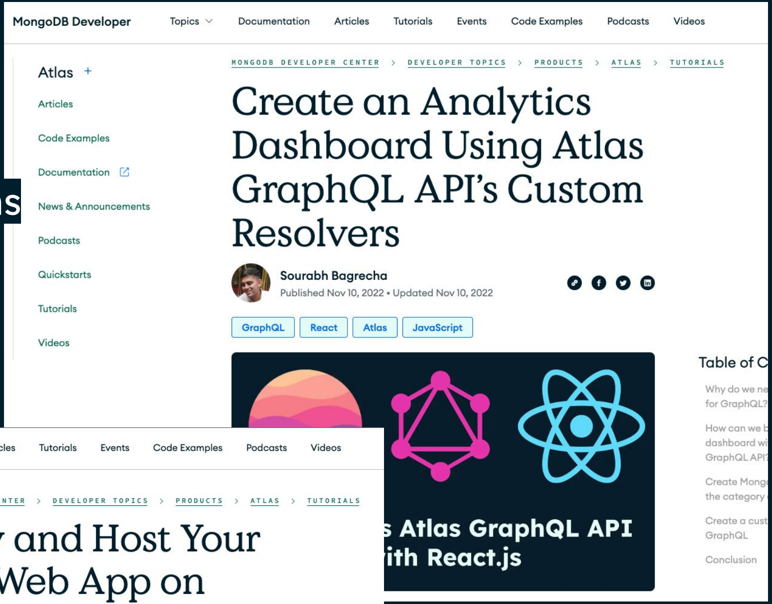
What does the Atlas GraphQL API provide?
Data model
Add sample data to your collections
Generate Schema in your App Services based on your data stored in Atlas
Set up roles and configure permissions
Conclusion

Not just GraphQL, learn-

- Authentication
- Authorization
- CRUD- Create, Read, Update and Delete operations
- Analytics Dashboard
- And much more, using Atlas App Services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Sourabh Bagrecha
Published Nov 10, 2022 • Updated Nov 10, 2022

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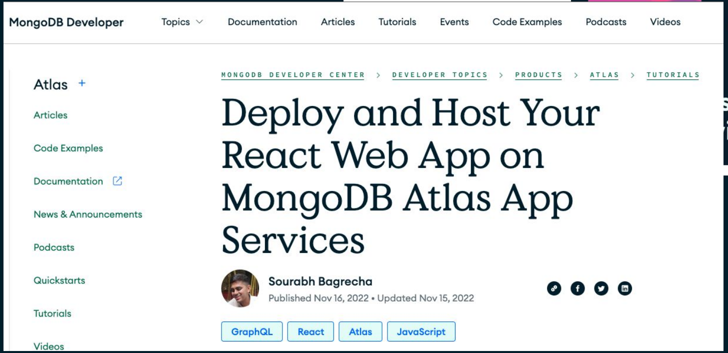
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Sourabh Bagrecha
Published Nov 16, 2022 • Updated Nov 15, 2022

GraphQL React Atlas JavaScript

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