

## Lab 2: Exploring GraphQL APIs

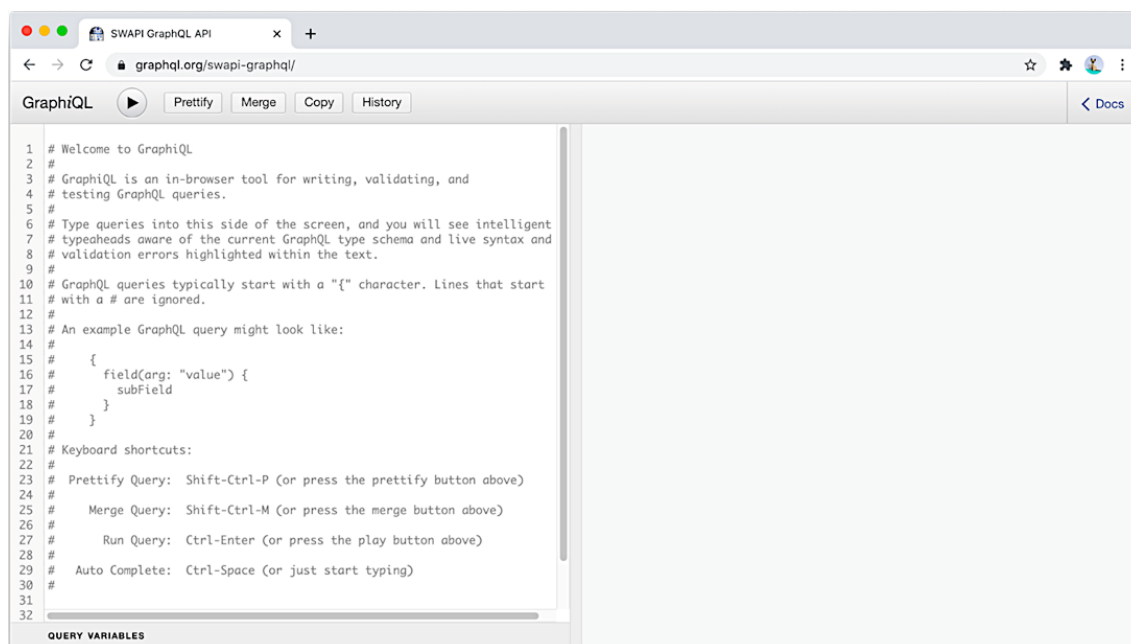


This lab covers:

- Using GraphQL's in-browser IDE to test GraphQL requests
- Exploring read and write example operations from the GitHub GraphQL API
- Exploring GraphQL's introspective features

### The GraphiQL editor

Head over to [graphql.org/swapi-graphql/](https://graphql.org/swapi-graphql/) in your browser to find the GraphiQL editor, which works with the Star Wars data and is publicly available for you to test:



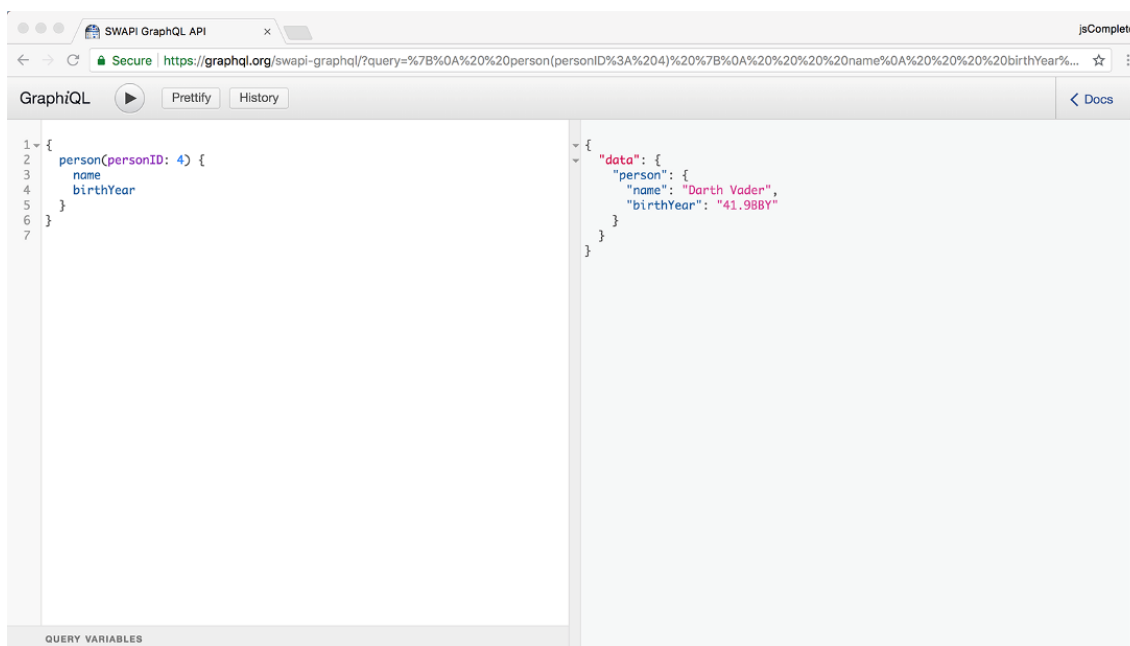
This editor is a simple two-pane application: the left pane is the editor, and the right pane is where the results of executing GraphQL requests appear.

Go ahead and type the following simple GraphQL query in the editor.

**field**

```
{
  person(personID: 4) {
    name
    birthYear
  }
}
```

This simple GraphQL query asks for the name and birth year of the person whose ID is 4. To execute the query, you can press Ctrl-Enter or press the run button (with the little black triangle). When you do, the result pane shows the data that the query is asking for.



For the above example, the editor is completely aware that there is a `person` object with `name` and `birthYear` fields. In addition, the editor has live syntax and validation error highlighting for any text you type.

## GraphQL Clients

We can just send an HTTP POST request to the endpoint you mounted your GraphQL server on, passing the GraphQL query as the query field in a JSON payload.

We want to send the query to GraphQL server. We can do this from the command line with curl. If you paste this into a terminal:

**Do this:**

```
curl -X POST \  
-H "Content-Type: application/json" \  
-d '{"query": "{ person(personID: 4) { name birthYear }}"}' \  
https://swapi-graphql.netlify.app/.netlify/functions/index
```

**Output** You should see the output returned as JSON:

```
{"data":{"person":{"name":"Darth Vader","birthYear":"41.9BBY"}}
```

```
$ curl -X POST \
> -H "Content-Type: application/json" \
> -d '{"query": "{ person(personID: 4) { name birthYear }}"}' \
> https://swapi-graphql.netlify.app/.netlify/functions/index
{"data":{"person":{"name":"Darth Vader","birthYear":"41.9BBY"}}
```

If you prefer to use a graphical user interface to send a test query, you can use clients such as GraphQL and Insomnia.

It's also simple to send GraphQL from the browser. Open a developer console.

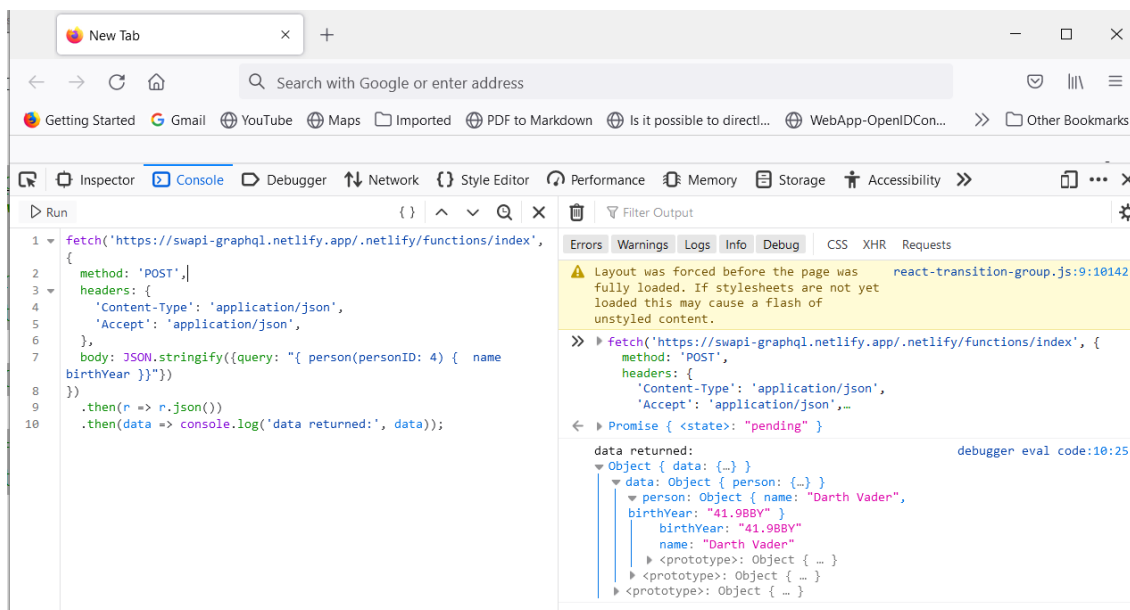
### Do this: (Use FireFox Developer Console)

1. Right click on GraphQL page inside Firefox and select `Inspect Element` :
2. By default, Firefox does not allow you to paste stuff into the dev tools console. You have to manually type "allow paste" into the console to enable pasting.
3. Copy and paste following snippet in the firefox console:

```
fetch('/graphql', {
  method: 'POST',
  headers: {
    'Content-Type': 'application/json',
    'Accept': 'application/json',
  },
  body: JSON.stringify({query: "{ hello }"})
})
.then(r => r.json())
.then(data => console.log('data returned:', data));
```

**Output** You should see the data returned, logged in the console:

```
{
  "data": {
    "person": {
      "name": "Darth Vader",
      "birthYear": "41.9BBY"
    }
  }
}
```



### GraphQL Query

1. You define a query called AllFilms. The query will fetch the desired films along with information about them.
2. You specify that you want all the films available.
3. For each film within your collection, what attributes and values do you want to get? This is how you define the scope of data to fetch for an individual film.
4. You want the ID, director, episode ID, title, and release date for each film.
5. For an individual film, you also want to fetch the first ten characters associated with it.
6. For each character, you specify what information to retrieve.
7. You want the ID, name, birth year, eye color, and hair color of each character.
8. You also want the homeworld for the character.
9. And, for that homeworld, you need its name.

Go to <https://graphql.org/swapi-graphql/> to Launch the GraphQL Interface:

Please run the following Query:

```
query AllFilms {  
  allFilms {  
    films {  
  
      id  
      director  
      episodeID  
      title  
      releaseDate  
      characterConnection(first: 10) {  
  
        characters {  
  
          id  
          name  
          birthYear  
          eyeColor  
          hairColor  
  
          homeworld {  
  
            name  
          }  
        }  
      }  
    }  
  }  
}
```

As you can see, it looks a bit Swift-y or JSON-y. Feel free to experiment with the GraphQL playground for SWAPI. Add or remove things in the query, run it, and check out the results.

Try these queries:

```
query AllFilms {  
  allFilms {  
    films {  
      title
```

```

    }
  }
}

```

```

query{
  allFilms{
    films{
      title
    }
  }
}

```

```

{
  "data": {
    "allFilms": {
      "films": [
        {
          "title": "A New Hope"
        },
        {
          "title": "The Empire Strikes Back"
        },
        {
          "title": "Return of the Jedi"
        },
        {
          "title": "The Phantom Menace"
        },
        {
          "title": "Attack of the Clones"
        },
        {
          "title": "Revenge of the Sith"
        }
      ]
    }
  }
}

```

Query for Planet Residents to Star Wars film "A New Hope"

```

query AllFilms {
  film(id: "ZmlsbXM6MQ==") {
    id
    title
    planetConnection {
      planets {
        name
        residentConnection {
          residents {
            name
          }
        }
      }
    }
  }
}

```

```

query{
  film(id: "ZmlsbXM6MQ=="){
    id
    title,
    planetConnection{
      planets{
        name
        residentConnection{
          residents{
            name
          }
        }
      }
    }
  }
}

```

```

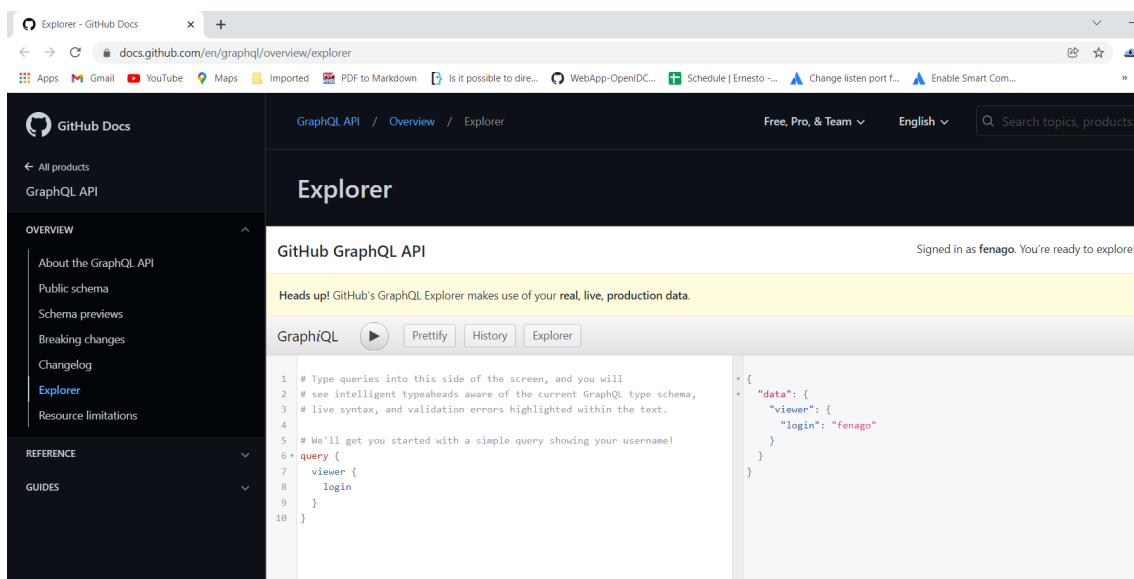
{
  "data": {
    "film": {
      "id": "ZmlsbXM6MQ==",
      "title": "A New Hope",
      "planetConnection": {
        "planets": [
          {
            "name": "Tatooine",
            "residentConnection": {
              "residents": [
                {
                  "name": "Luke Skywalker"
                },
                {
                  "name": "C-3P0"
                },
                {
                  "name": "Darth Vader"
                },
                {
                  "name": "Owen Lars"
                },
                {
                  "name": "Beru Whitesun lars"
                },
                {
                  "name": "R5-D4"
                },
                {
                  "name": "Biggs Darklighter"
                },
                {
                  "name": "Anakin Skywalker"
                },
                {
                  "name": "Shmi Skywalker"
                },
                {
                  "name": "Cliegg Lars"
                }
              ]
            }
          }
        ]
      }
    }
  }
}

```

Notice how the root query film() takes in the id parameter of the film "A New Hope" and the projection from GraphQL returns the title, planets connected to the film, and then resident names of the planets.

## Examples from the GitHub API

Let's explore some real-world examples of GraphQL requests from the GitHub API. We can use GitHub's GraphQL API explorer at <https://docs.github.com/en/graphql/overview/explorer>; this embedded GraphQL editor includes the proper authentication headers for the API (you need to be logged in with a GitHub.com account).



Let's first look at some common queries from this API.

### Warning

The GitHub API uses your real, live production data at GitHub.com.

### Reading data from GitHub

When you first launch the GitHub GraphQL API explorer, it has a default simple query that displays your login. The currently logged-in user is represented by the `viewer` field. Under this field, you can read all the information that is available about you at GitHub.

Here is a query to see information about the most recent 10 repositories that you own or contribute to.

```
{
  viewer {
    repositories(last: 10) {
      nodes {
        name
        description
      }
    }
  }
}
```

Here is another query to see all the supported licenses in GitHub along with their URLs.

```
{
  licenses {
    name
    url
  }
}
```

Next is a more complex query to find the first 10 issues of the facebook/graphql repository. It asks for the name of the author and the title used for the issue page, along with the date when the issue was created.

```
{
  repository(owner: "facebook", name: "graphql") {
    issues(first: 10) {
      nodes {
        title
        createdAt
        author {
          login
        }
      }
    }
  }
}
```

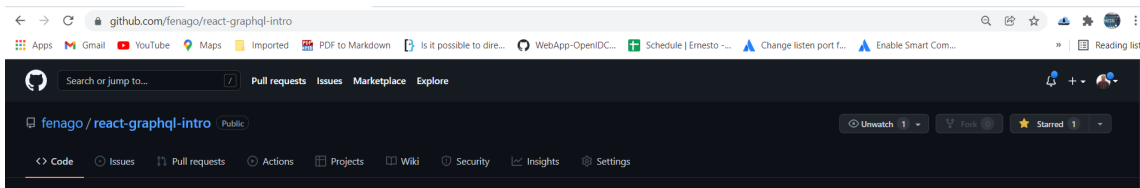
### Updating data at GitHub

Let's now explore some mutations we can do with the GitHub GraphQL API. The simplest mutation is to "star" a repository. If you execute the following mutation under your logged-in user, its action is equivalent to going to [github.com/fenago/react-graphql-intro](https://github.com/fenago/react-graphql-intro) and clicking the star button.

```
mutation {
  addStar(input: { starrableId: "R_kgDOGoeL3w" }) {
    starrable {
      stargazers {
        totalCount
      }
    }
  }
}
```

### Output

After running the mutation using your github user. Go to following github repo, you will see that repository has been starred:



The mutation stars the repository and then reads the new total number of stargazers after the mutation. The input for this mutation is a simple object that has a `starrableId` value, which is the node identifier for the react-graphql-intro repository. I was able to find that value using this query.

```
{
  repository(name: "react-graphql-intro", owner: "fenago") {
    id
  }
}
```



```
}  
}
```

Let's execute another mutation. This time, let's add a comment to an issue in a repository. I created an issue for you to test this mutation under the repository at [github.com/fenago/react-graphql-intro](https://github.com/fenago/react-graphql-intro). You can see the details of this issue using the following query.

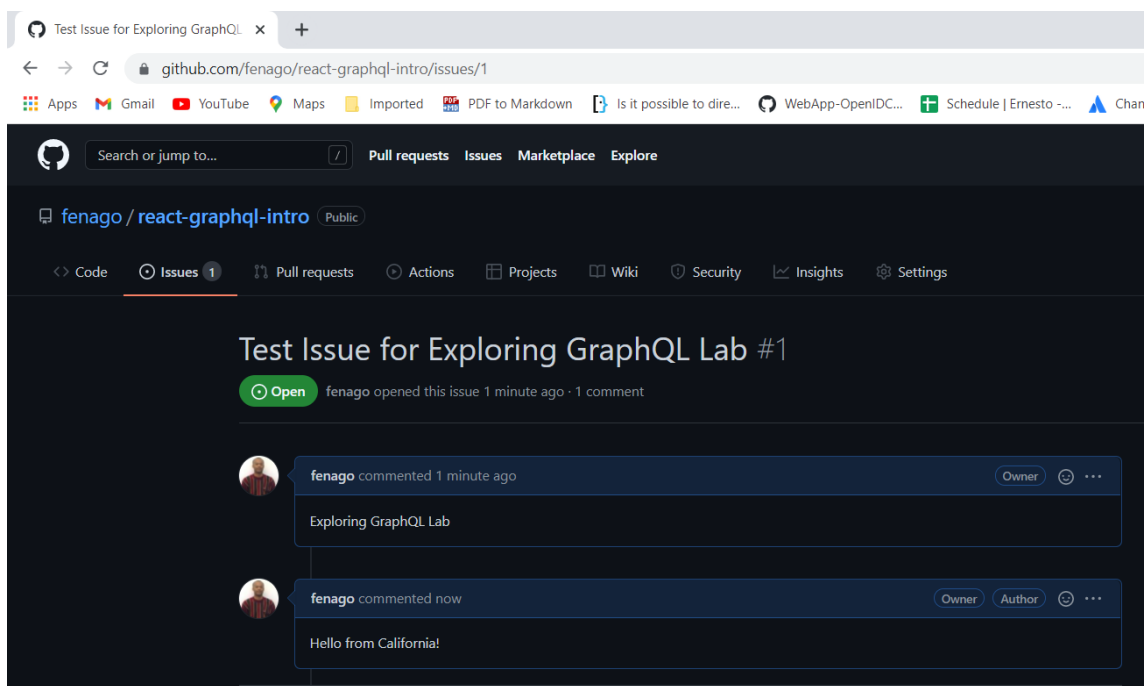
```
query GetIssueInfo {  
  repository(owner: "fenago", name: "react-graphql-intro") {  
    issue(number: 1) {  
      id  
      title  
    }  
  }  
}
```

This gives you the value of the `id` field needed to add a comment to the issue using a mutation. Now execute the following mutation, which uses that `id` value.

```
mutation AddCommentToIssue {  
  addComment(input: {  
    subjectId: "I_kwDOGoeL385BTxzR",  
    body: "Hello from California!"  
  }) {  
    commentEdge {  
      node {  
        createdAt  
      }  
    }  
  }  
}
```

After the mutation saves your comment to the special issue, it reports the `createdAt` date for that comment.

You can see the comments you added and all the other comments on this issue at [github.com/fenago/react-graphql-intro/issues/1](https://github.com/fenago/react-graphql-intro/issues/1).

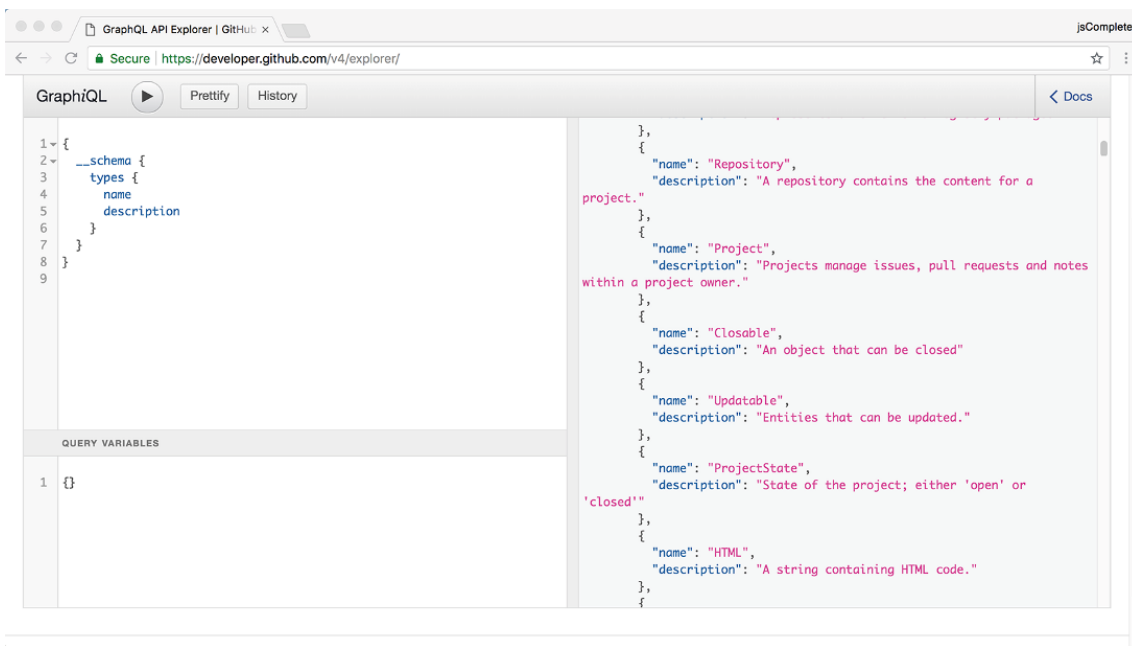


## Introspective queries

Let's ask the GitHub API schema what types it supports. Here is an introspective query to do that.

```
{
  __schema {
    types {
      name
      description
    }
  }
}
```

This query returns all the types this schema supports, and it also includes the descriptions of these types. This is a helpful list to explore the custom types defined in the GitHub GraphQL schema. For example, you should see that the GitHub API schema defines types like `Repository`, `Commit`, `Project`, `Issue`, `PullRequest`, and many more (figure 2.9).



If you need to retrieve information about a single type, you can use the `__type` meta-field. For example, here is a query to find all the supported fields under the type `Commit` along with any arguments they accept.

```
{
  __type(name: "Commit") {
    fields {
      name
      args {
        name
      }
    }
  }
}
```

Use the GraphQL type-ahead feature to discover what other information you can retrieve under these introspective meta-fields.

## Summary

- GraphQL is an in-browser IDE for writing and testing GraphQL requests. It offers many great features to write, validate, and inspect GraphQL queries and mutations. These features are made possible thanks to GraphQL's introspective nature, which comes with its mandatory schemas.
- GitHub has a powerful GraphQL API that you can use to read data about repositories and users and do mutations like adding a star to a repository or commenting on an issue in a repository.
- GraphQL introspective queries offer a way for clients to get meta-information about the GraphQL API.