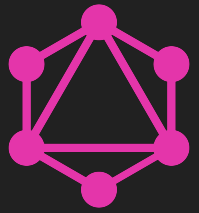
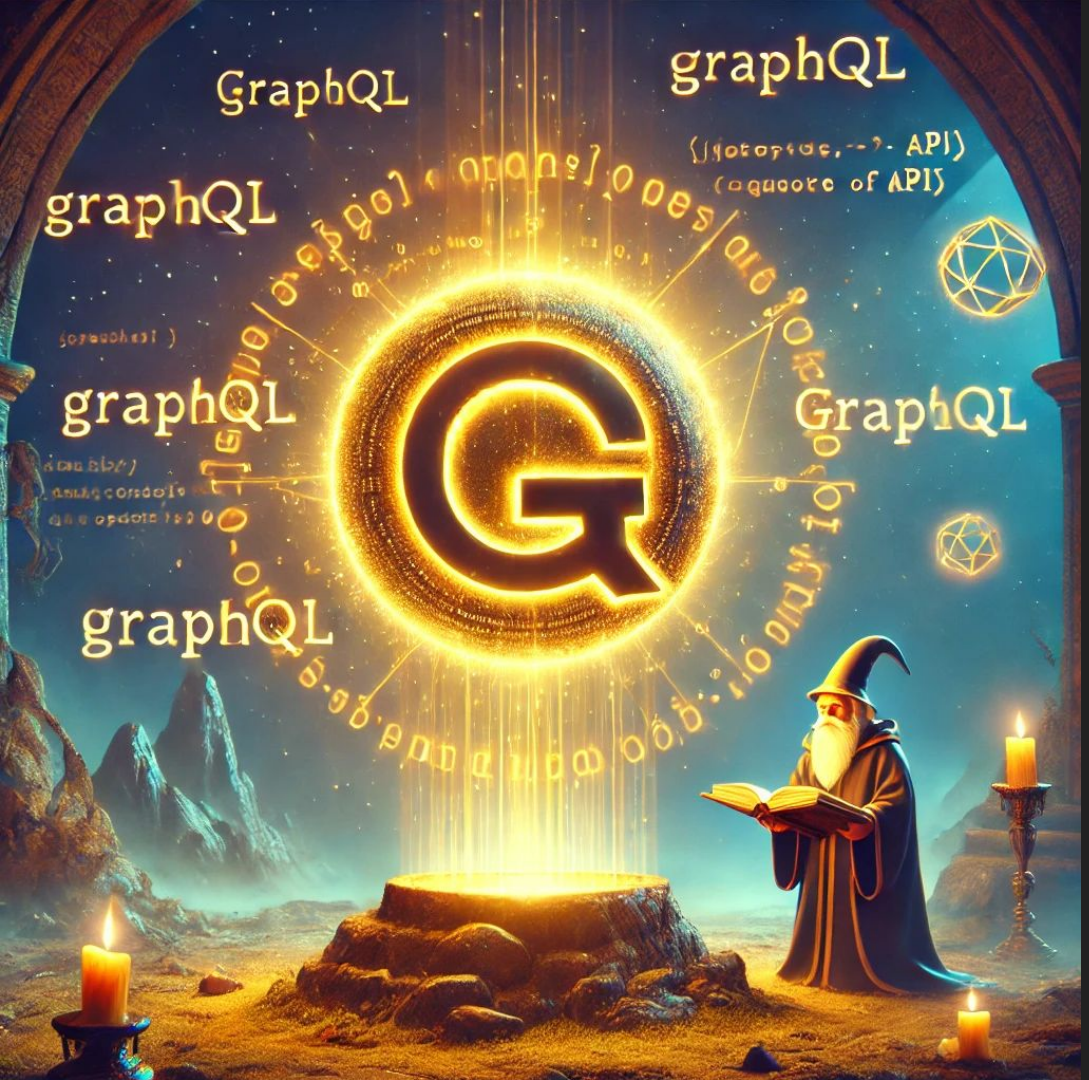


GraphQL

One API to rule them all

Dimitris Kontokostas
Not only Java Thessaloniki Meetup



me: GhatGPT, create an image for GraphQL inspired from LOTR, like GQL ruling all REST APIS

chatGPT: sorry, can't do that, copyrighted material

me: ok, then do your best

(… after a few attempts…)

Outline

- Problem it solves
- Queries
- Mutations
- Subscriptions
- Resolvers
- N+1 query problem
- Error handling
- GraphQL vs REST

Results

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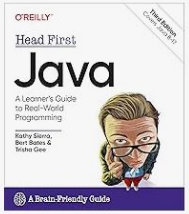

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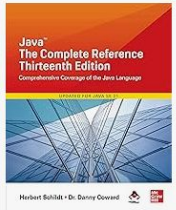

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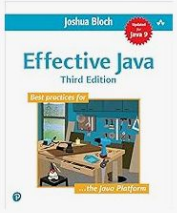

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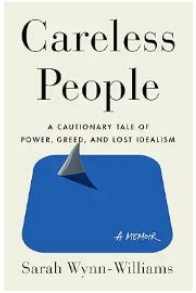

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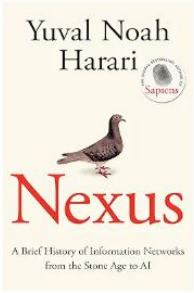

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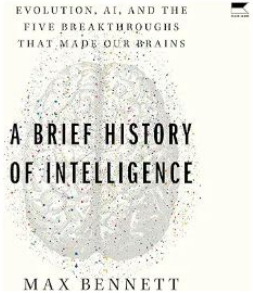

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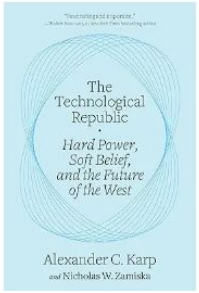

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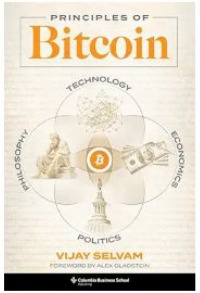

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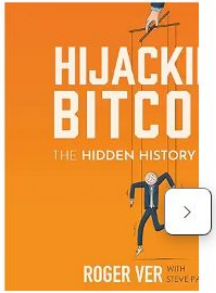

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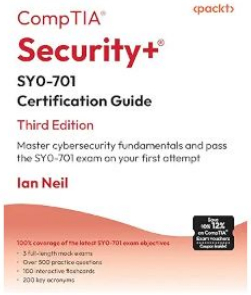

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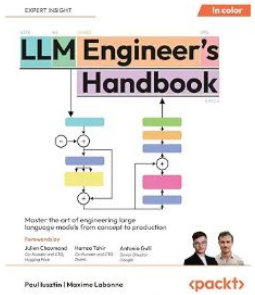

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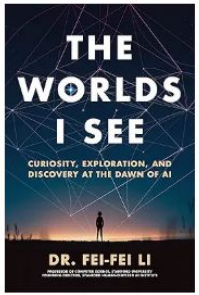

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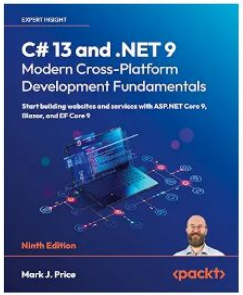

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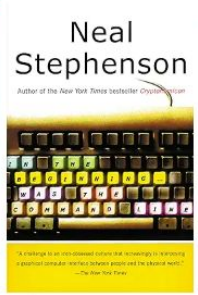

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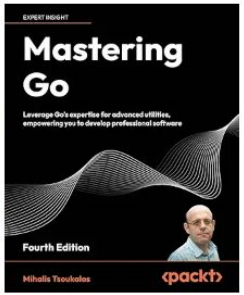

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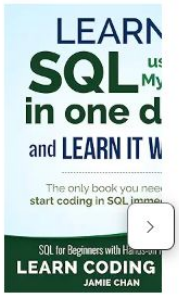

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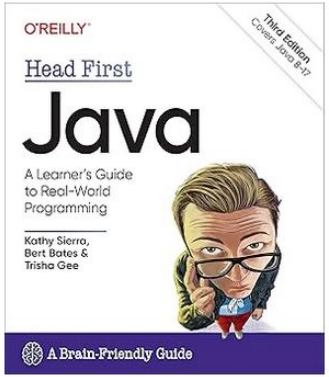

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GraphQL: Graph Query Language

- Data query and manipulation language
- Declarative Data Fetching
- Storage agnostic
- Supports separate sources by design
- Returns results in a unified graph

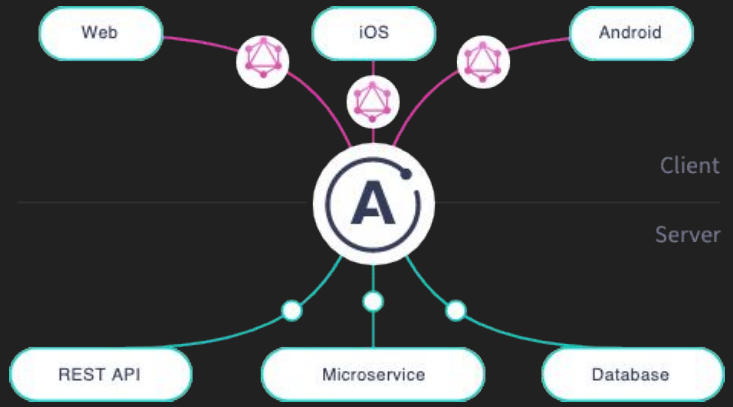


Image from: https://www.apollographql.com/blog/what-is-graphql-introduction

Timeline

- 2012 development
- 2015 Reference implementation
  - https://engineering.fb.com/2015/09/14/core-infra/graphql-a-data-query-language/
- 2018 GraphQL foundation
  - https://graphql.org/

Huge adoption by Big companies, i.e. facebook, github, etc

- https://github.com/graphql-kit/graphql-apis
- https://github.com/chentsulin/awesome-graphql

GraphQL Schema

Domain model

```
type Book {
  title: String
  author: Author
}

type Author {
  firstName: String
  lastName: String
  books: [Book]
}
```

```
type Book {
  title: String
  author: Author
  reviews: [Review]
}

type Author {
  firstName: String
  lastName: String
  books: [Book]
}

Type Review {
  Rating: Int
  comment: String
}
```

Root queries

```
type Query {
  books: [Book]
  authors: [Author]
}
```

```
type Query {
  books: [Book]
  book(id: ID): Book
  authors: [Author]
  author(id: ID): Author
}
```

GraphQL Queries

Schema

```
type Book {
  title: String
  author: Author
  reviews: [Review]
}

type Author {
  firstName: String
  lastName: String
  books: [Book]
}

Type Review {
  rating: Int
  comment: String
}
```

```
type Query {
  books: [Book]
  book(id: ID): Book
  authors: [Author]
  author(id: ID): Author
}
```

Query

```
{
  book(id: “b1”) {
    title
    reviews{
      rating
    }
    author {
      firstName
      lastName
    }
  }
}
```

```
{ "data": {
   "bookById": {
      "title": "Effective
Java",
      "author": {
        "firstName": "Joshua",
        "lastName": "Bloch"
      },
      "reviews": [
        {
          "rating": "Excellent"
        },
        {
          "rating": "Great"
        }
      ]
    }
  }
}
```

GraphQL Queries

```
{
  book(id: “book-1”) {
    title
    reviews{
      rating
    }
    author {
      firstName
      lastName
    }
  }
}
```

```
query MyBookQuery {
  book(id: “b1”) {
    title
    reviews{
      rating
    }
    author {
      firstName
      lastName
    }
  }
}
```

```
query MyFlexQuery (
  $id: ID
) {
  book(id: $id) {
    title
    reviews{
      rating
    }
    author {
      firstName
      lastName
    }
  }
}
```

```
query MyBatchQuery {
  book(id: “b1”) {
    title
    reviews{
      rating
    }
  }
  author(id: “a2”) {
    firstName
    lastName
  }
}
```

GraphQL Mutations

Schema

```
type Mutation {
  createAuthor(
    id: ID,
    firstName: String,
    lastName: String
  ): Author
}
```

Subscription

```
subscription NewReviewCreated {
  reviewCreated {
    rating
    comment
  }
}
```

GraphQL Subscriptions

Schema

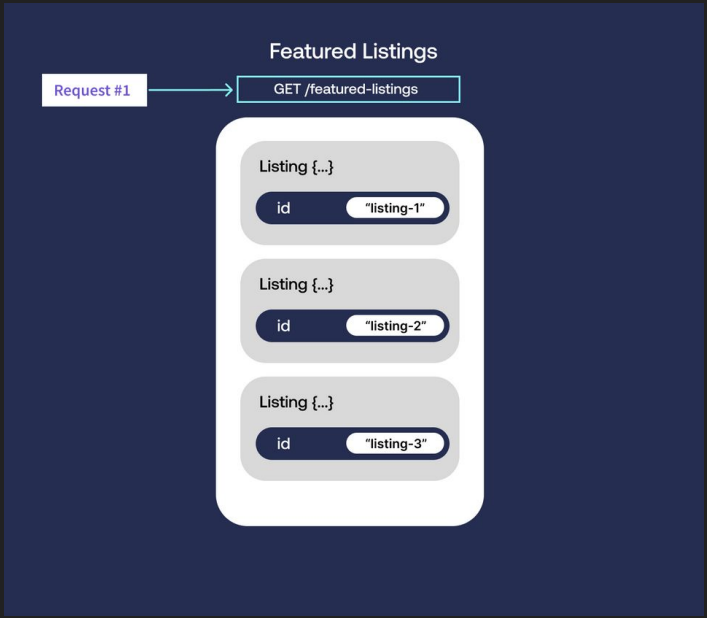
```
type Subscription {
  reviewCreated: Review
}
```

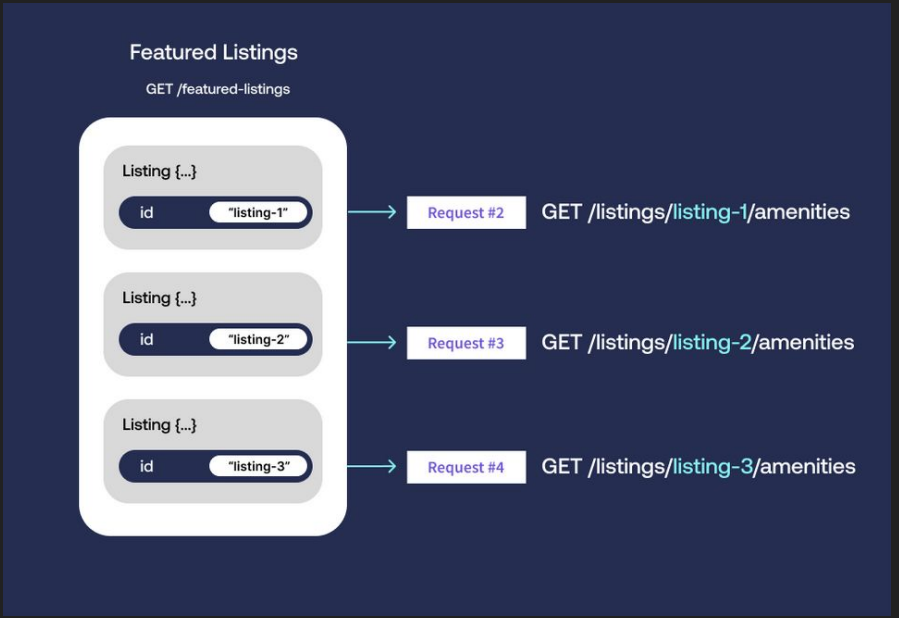
Subscription

```
subscription NewReviewCreated {
  reviewCreated {
    rating
    comment
  }
}
```

https://graphql.org/learn/subscriptions/

N+1 problem





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N+1 problem (solution)

Batch data loader to the rescue

Error handling

- All responses are HTTP 200
- `errors` key in response contains all errors, always look for those
- Mutation errors could be modeled in the schema

GraphQL vs REST

- Query language
  - Control over the shape and the size of the data they need
- Data fetching
  - Single vs multiple endpoints
  - Over/Under/Exact fetching
- Response format
  - Response format follows the query definition vs fixed responses
- Discoverability
  - Introspection vs external documentation (i.e. OpenAPI)

Thank you!

Any questions?