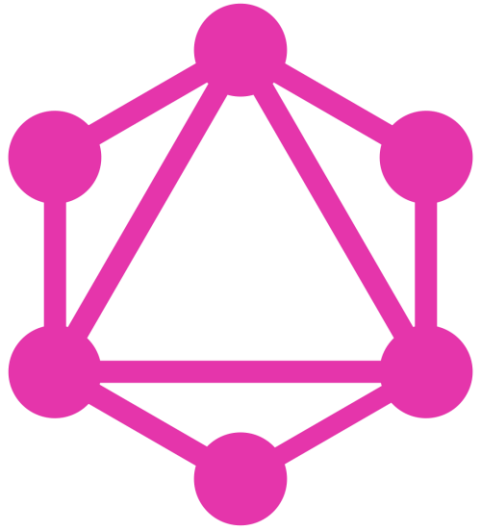
GraphQL in .NET Core



- *Poornima Nayar*
- *Freelance .NET Developer*
- *Berkshire, UK*
- *Microsoft MVP, Umbraco MVP*
- *Mummy, Reading, Carnatic Music*
- *@poornimanayar*
- *https://poornimanayar.co.uk*

GraphQL is a query language for APIs and a runtime for fulfilling those queries with your existing data.

Specify types and ask for specific fields on those types

GraphQL is a specification

GraphQL lets you traverse the data graph and extract parts of it

/user/id
/user/id/events
/user/id/friends-suggestions
/user/id/friends-birthdays

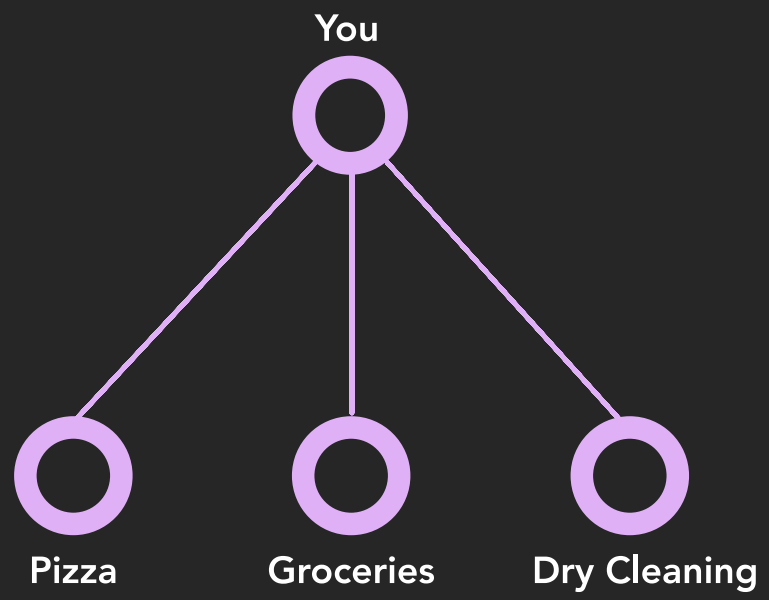
Over fetching
Under fetching
N+1

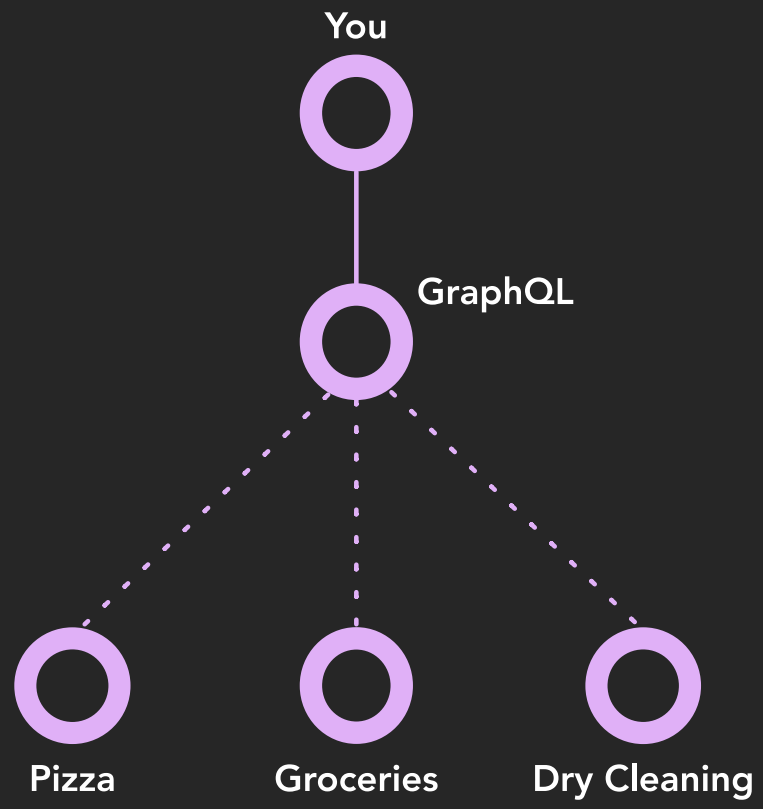
Single, smart endpoint that takes in complex queries and builds the data output

The clients specify the shape of the data that they need, and the server responds back with the exact same data graph as the query.

```
query{
  course(id:1045){
    id,
    credits,
    title,
    enrollments{
      student{
        firstName,
        lastName,
        emailAddress
      }
    }
  }
}
```


```
{
  "data": {
    "course": {
      "id": 1045,
      "credits": 4,
      "title": "Calculus",
      "enrollments": [
        {
          "student": {
            "firstName": "Meredith",
            "lastName": "Alonso",
            "emailAddress": "Meredith@graphqlschool.com"
          }
        },
        {
          "student": {
            "firstName": "Peggy",
            "lastName": "Justice",
            "emailAddress": "Peggy@graphqlschool.com"
          }
        }
      ]
    }
  },
  "extensions": { ↔ }
}
```


You
Pizza
Groceries
Dry Cleaning


You
GraphQL
Pizza
Groceries
Dry Cleaning

- Strongly Typed
- Specification
- Introspective
- Hierarchical
- JSON response that mirrors the query
- Application Layer
- Version Free
- Transport-layer agnostic


airbnb


KLM

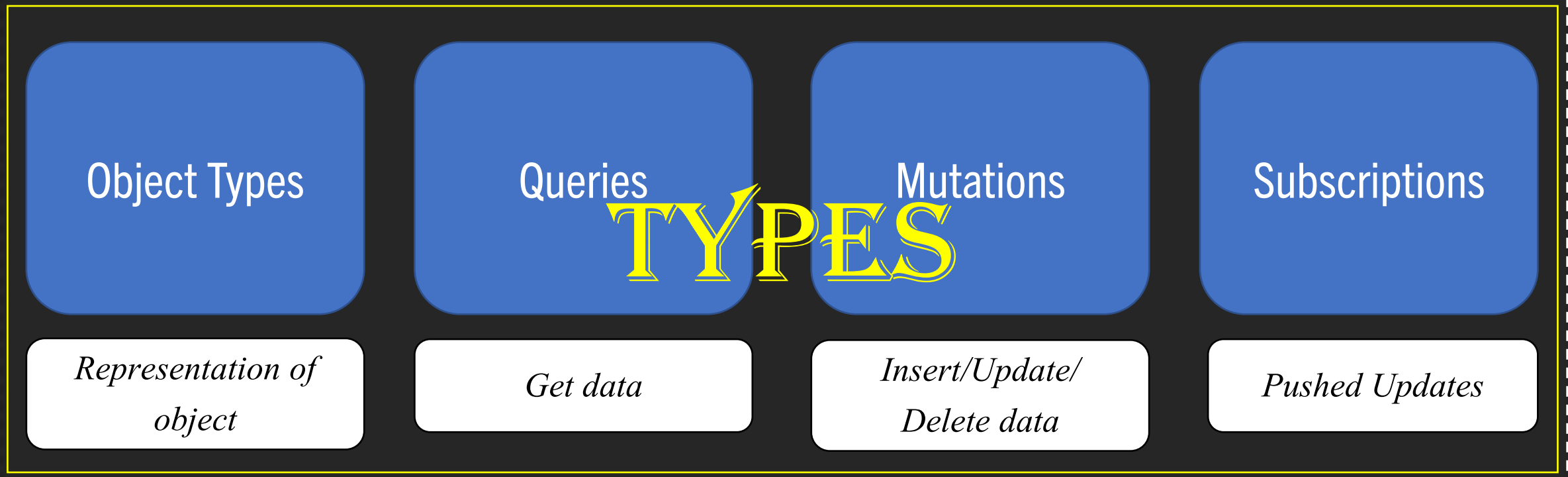

yelp


PayPal

THE GRAPHQL TYPE SYSTEM

GraphQL schema is specified using GraphQL SDL (Schema Definition Language), also sometimes referred to as just GraphQL Schema Language.

Schema


Object Types
Queries
Mutations
Subscriptions
TYPES
Representation of object
Get data
Insert/Update/ Delete data
Pushed Updates

Field

Name

Name of the field

Scalar/Complex Types

Type of the field

Resolvers

How to resolve the field to concrete data

Anatomy of a GraphQL Type

```
type StudentType {
    id: Int!
    firstName: String!
    lastName: String!
    emailAddress: String!
    enrollmentDate: DateTime!
    enrollments: [EnrollmentType]
}
```

Type

Fields

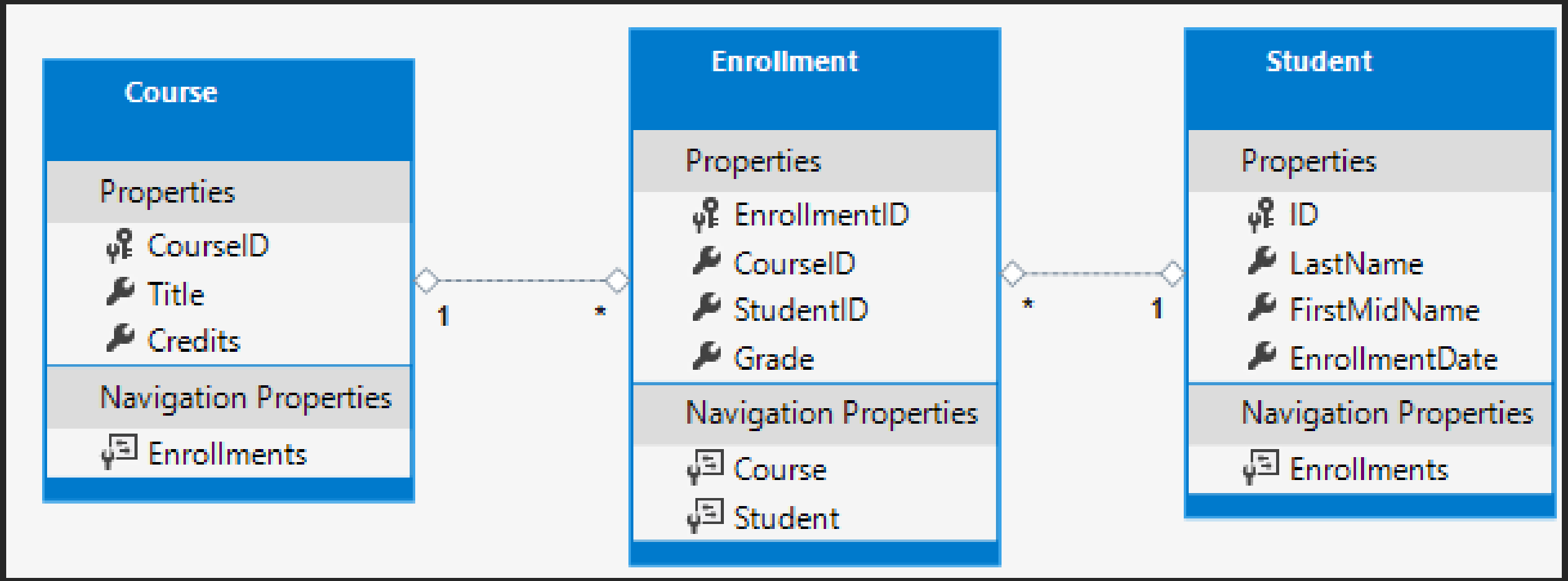
Scalars / Complex type

- Int
- Float
- String
- Boolean
- ID

Enumeration Types

Non-nullable fields `id:Int!`

Lists `enrollments: [EnrollmentType]`


Course
Properties
CourseID
Title
Credits
Navigation Properties
Enrollments
1
*
Enrollment
Properties
EnrollmentID
CourseID
StudentID
Grade
Navigation Properties
Course
Student
*
1
Student
Properties
ID
LastName
FirstMidName
EnrollmentDate
Navigation Properties
Enrollments

GraphQL in .NET Core

- GraphQL.NET
- HotChocolate

- GraphQL.Net Client
- StrawberryShake

IDE

- GraphiQL
- GraphQL Playground
- Insomnia
- Altair
- Firecamp
- Voyager
- BananaCakePop

- Syntax Highlighting
- Intellisense
- Real-time error highlighting and reporting
- Support for variables and auth tokens
- Run and inspect query results
- Schema introspection, up-to-date documentation and help!

GET STARTED

GraphQL Endpoint

```
Install-Package GraphQL
Install-Package GraphQL.Server.Transports.AspNetCore
Install-Package GraphQL.Server.Transports.AspNetCore.SystemTextJson
Install-Package GraphQL.Server.Ui.Playground
Install-Package GraphQL.Server.Ui.GraphiQL
```

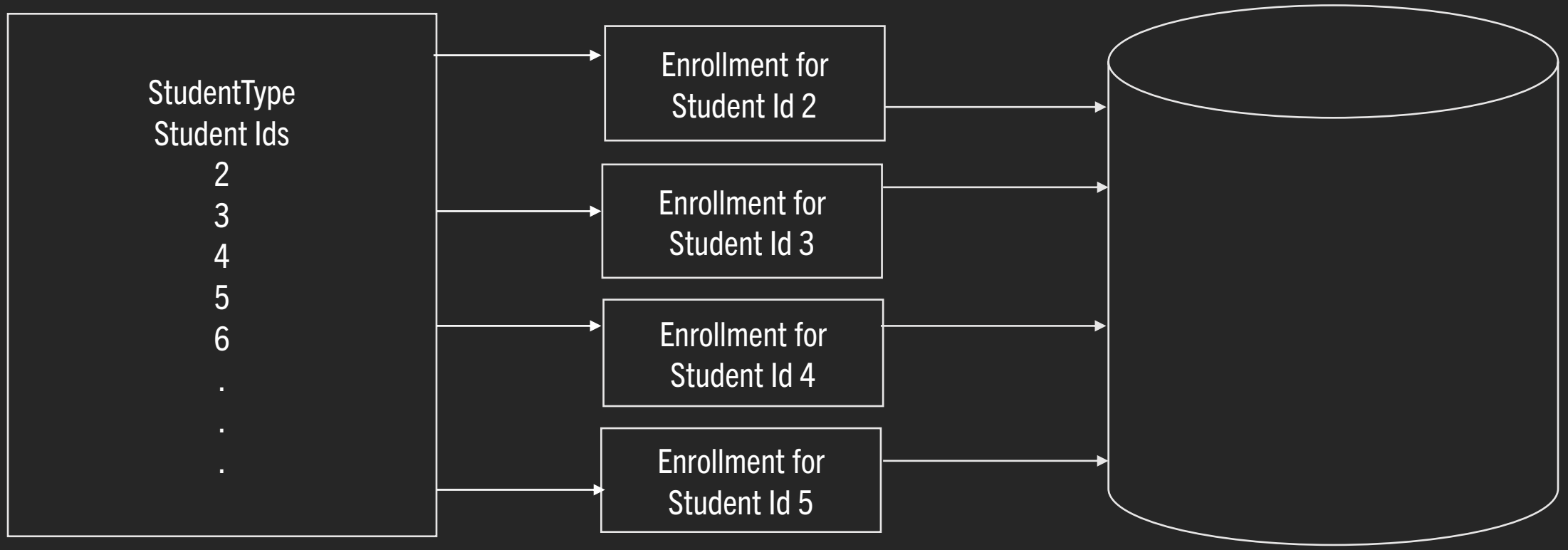
Client App

Install-Package GraphQL.Client

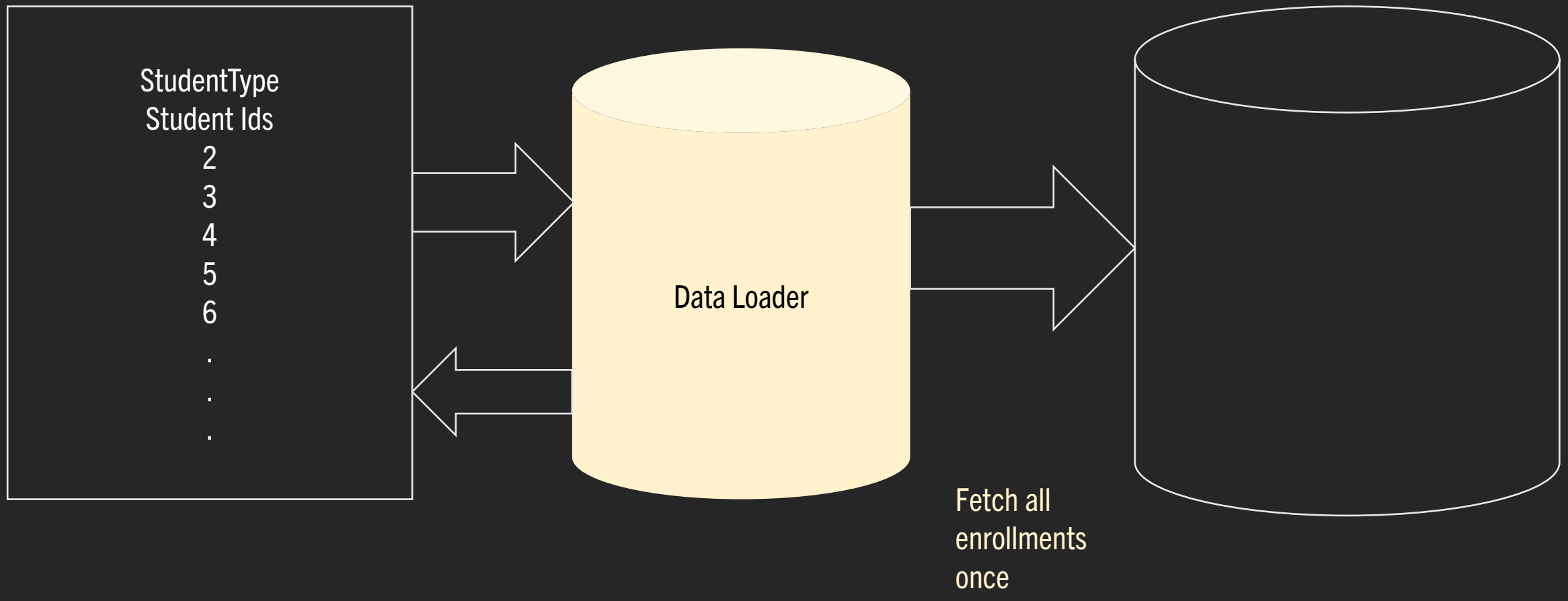
Install-Package GraphQL.Client.Serializer.SystemTextJson

QUERY

- One of the operation types in GraphQL
- Top-level entry point for read operations
- Get/fetch the data, ask for specific fields on objects using a POST operation
- query keyword, although not needed, best practice
- Hierarchical JSON response that mirrors the query
- Queries can be executed in parallel


StudentType
Student Ids
2
3
4
5
6
.
.
.
Enrollment for Student Id 2
Enrollment for Student Id 3
Enrollment for Student Id 4
Enrollment for Student Id 5

N+1 issue


StudentType
Student Ids
2
3
4
5
6
.
.
.
Data Loader
Fetch all
enrollments
once

MUTATIONS

- Top-level entry point for write operations
- HTTP POST
- mutation keyword
- Accepts a InputType as an argument
- Returns a GraphType as the result which can be queried
- Mutations are executed in series, one-by-one

SUBSCRIPTIONS

- Updates are pushed from the server, not polled by client
- Clients can choose to listen
- Works over WebSockets
- HTTP POST
- subscription keyword
- Subscriptions are stateful

Install-Package GraphQL.Server.Transports.Subscriptions.WebSockets

Install-Package GraphQL.Client.Abstractions.Websocket

- Pagination
- Filtering & Sorting
- Authorization
- Caching
- Automated Persisted Queries
- Microservice-style architecture

- Exact Fetching
- Loosely coupled client and server
- Autogenerating API documentation
- Version Free
- Ability to lock down fields by permission

- Caching complexity
- File uploading
- Nested queries could result in bringing out the entire database
- Learning curve

http://bit.ly/graphql-in-netcore