GraphQL

MMI HOLDINGS

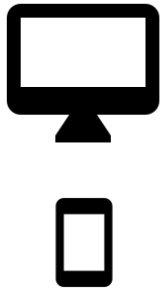
History

- Developed and open sourced by Facebook
- Specification (http://facebook.github.io/graphql/)
- Alternative to REST
- Not data storage (GraphDB)
- Declarative data fetching
  - Increased mobile usage
  - Variety of different frontend frameworks
  - Rapid feature development
- Since 2012. Publically 2015

Community adoption

http://graphql.org/users/

REST vs GraphQL



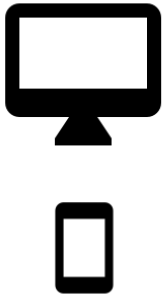
HTTP GET

```
{
  “user”: {
    “id”: “er3tg439frjw”
    “name”: “Mary”,
    “address”: { … },
    “birthday”: “July 26, 1982”
  }
}
```

/users/<id>

/users/<id>/posts

/users/<id>/followers



HTTP GET

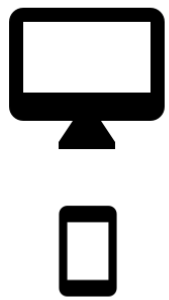
```
{
  “posts”: [{
    “id”: “ncwon3ce89hs”
    “title”: “Learn GraphQL today”,
    “content”: “Lorem ipsum … ”,
    “comments”: [ … ],
  }]
```

/users/<id>

/users/<id>/posts

/users/<id>/followers

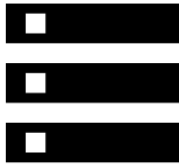
REST vs GraphQL



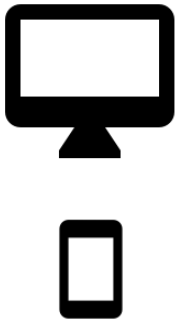
/users/<id>

/users/<id>/posts

/users/<id>/followers

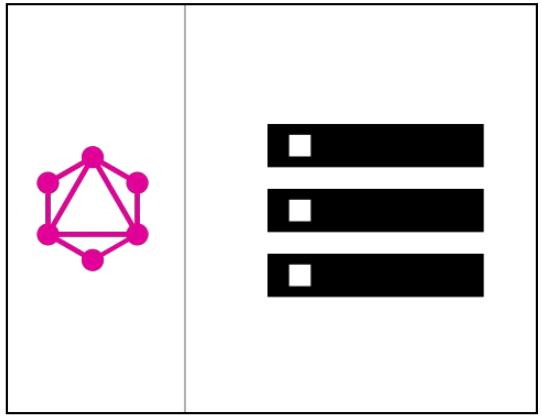


REST vs GraphQL



```
query {
  User(id: “er3tg439frjw”) {
    name
    posts {
      title
    }
    followers(last: 3) {
      name
    }
  }
}
```

HTTP POST



```
{
  “data”: {
    “User”: {
      “name”: “Mary”,
      “posts”: [
        { title: “Learn GraphQL today” }
      ],
      “followers”: [
        { name: “John” },
        { name: “Alice” },
        { name: “Sarah” },
      ]
    }
  }
}
```

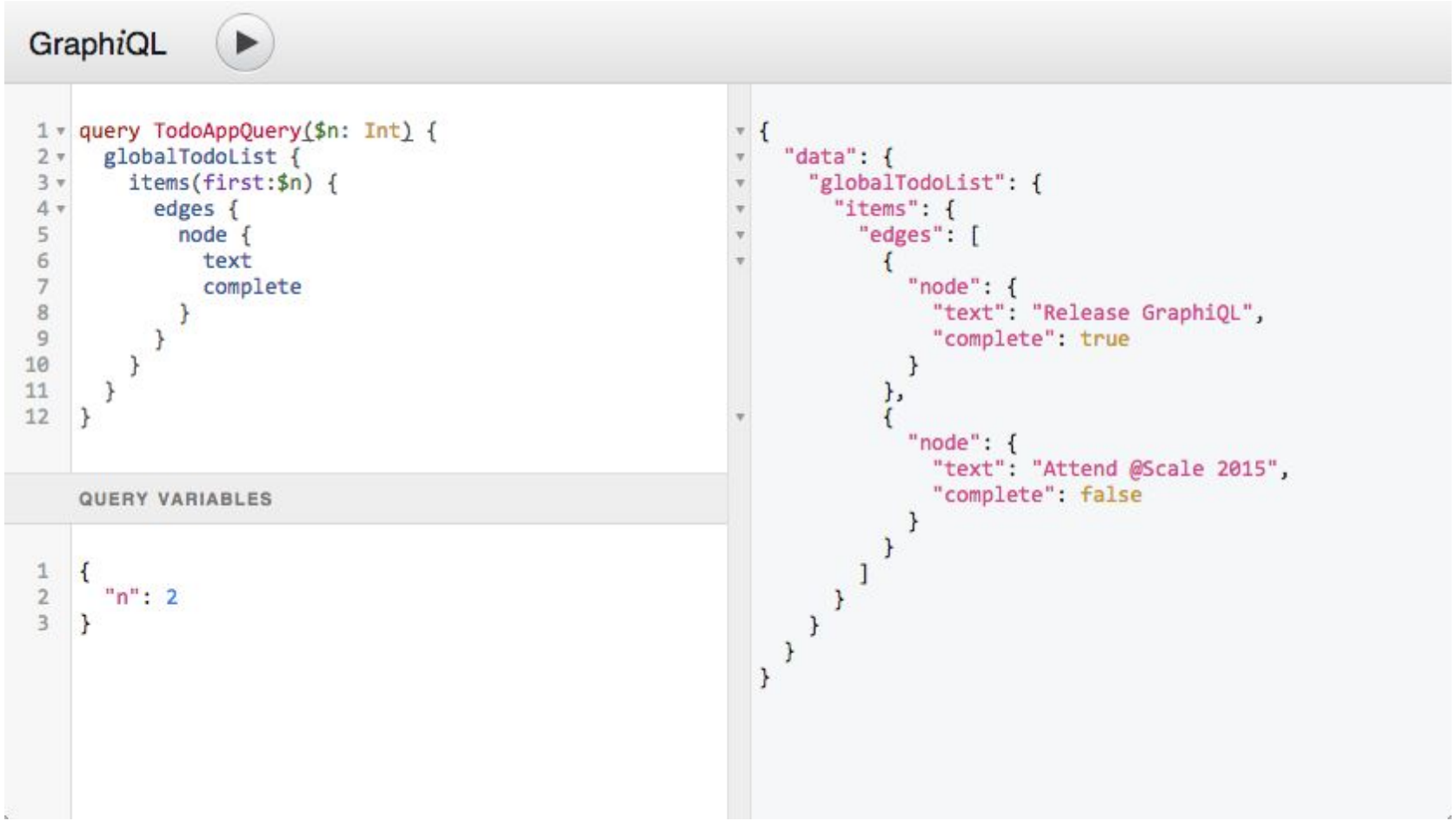
GraphQL

Benefits

- No more Over- and Underfetching
- Rapid Product Iterations on the Frontend
- Insightful Analytics on the Backend
- Benefits of a Schema & Type System

```
type Person {
    name: String!
    age: Int!
}
```

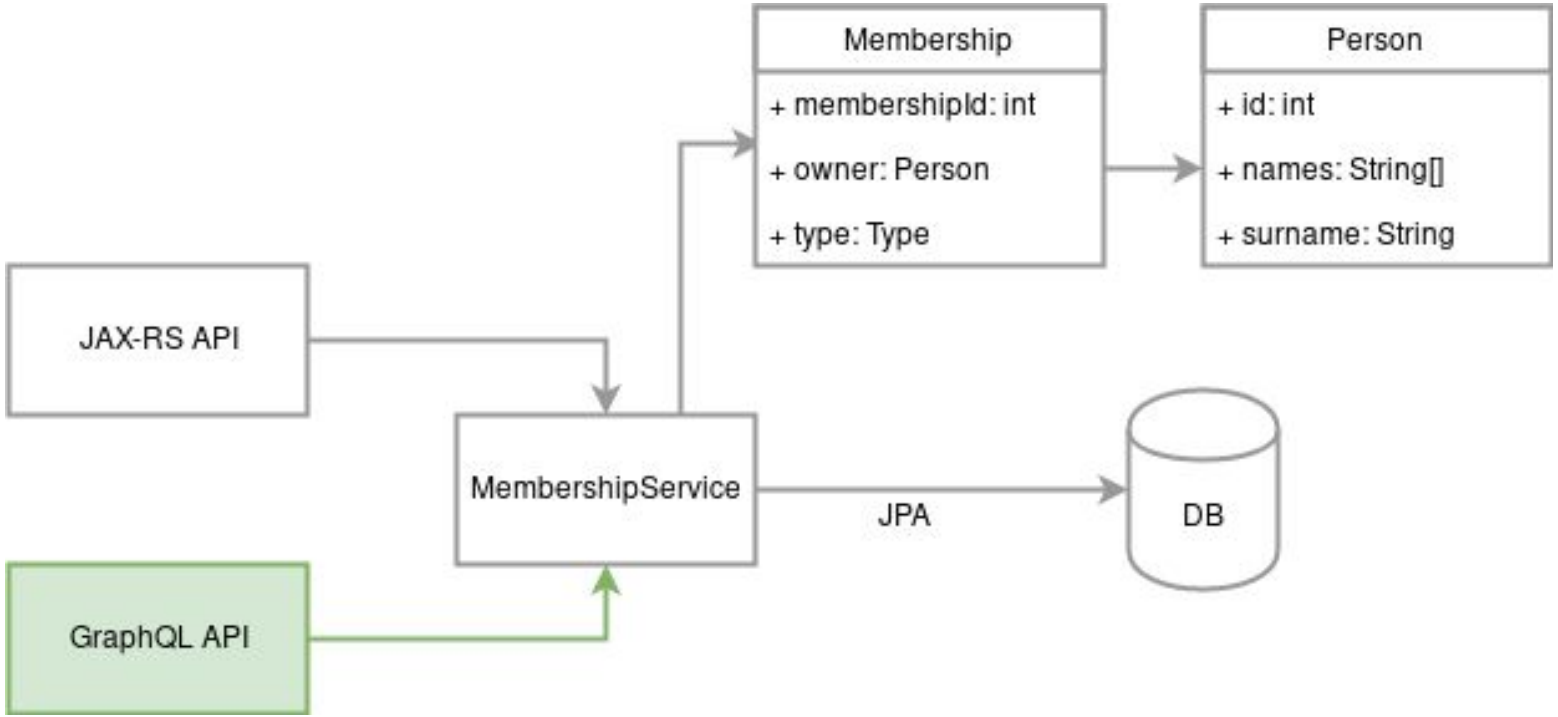
GraphiQL


GraphiQL
query TodoAppQuery($n: Int) {
globalTodoList {
items(first:$n) {
edges {
node {
text
complete
}
}
}
}
}
QUERY VARIABLES
{
"n": 2
}
{
"data": {
"globalTodoList": {
"items": {
"edges": [
{
"node": {
"text": "Release GraphiQL",
"complete": true
}
},
{
"node": {
"text": "Attend @Scale 2015",
"complete": false
}
}
]
}
}
}
}

Example application

- https://github.com/phillip-kruger/membership

- Build on existing JAX-RS Application
- Use annotations to generate schema



JAX-RS, CDI, EJB, JPA, JAXB + Bean validation

Example application

{ REST }

```
@Data @AllArgsConstructor @NoArgsConstructor
@Entity
@XmlRootElement @XmlAccessorType(XmlAccessType.FIELD)
@NamedQueries({
    @NamedQuery(name = Membership.QUERY_FIND_ALL, query = "SELECT m FROM Membership m"),
    @NamedQuery(name = Membership.QUERY_FIND_ALL_TYPE, query = "SELECT m FROM Membership m WHERE m.type=:type")
})
public class Membership implements Serializable {
    private static final long serialVersionUID = -8531040143398373846L;

    public static final String QUERY_FIND_ALL = "Membership.findAll";
    public static final String QUERY_FIND_ALL_TYPE = "Membership.findAllType";

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private int membershipId;

    @OneToOne(fetch = FetchType.EAGER,cascade = CascadeType.ALL)
    @JoinColumn(name = "owner_id")
    @NotNull(message = "Owner can not be empty")
    private Person owner;

    @NotNull(message = "Type can not be empty")
    private Type type;

}
```

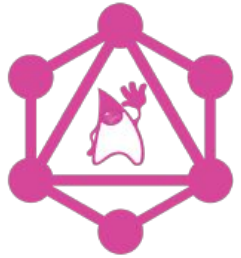
Example application

http://localhost:8080/membership-service/rest

{ REST }

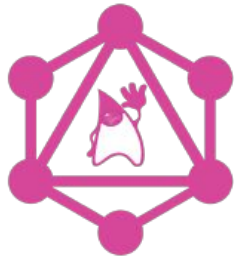
```
@Log
@Path("/")
public class MembershipRestApi {

    @Inject
    private MembershipService membershipService;

    @GET
    @Produces(MediaType.APPLICATION_JSON)
    public List<Membership> getAllMemberships(){
        return membershipService.getAllMemberships();
    }

    @GET @Path("{id}")
    @Produces(MediaType.APPLICATION_JSON)
    public Membership getMembership(@NotNull @PathParam(value = "id") int id){
        return membershipService.getMembership(id);
    }

    @POST
    @Consumes(MediaType.APPLICATION_JSON)
    public void joinMember(@NotNull Membership membership) {
        membershipService.createMembership(membership);
    }
```

GraphQL Query



```
@GraphQLQuery(name = "memberships")
public List<Membership> getAllMemberships() {
    return getAllMemberships(Optional.empty());
}

@GraphQLQuery(name = "membership")
public Membership getMembership(
        @GraphQLArgument(name = "membershipId") int id) {
    return em.find(Membership.class,id);
}
```

GraphQL Query

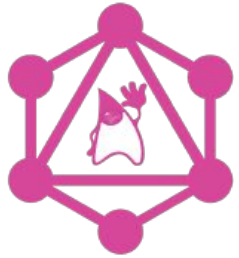


```
{
    memberships {
        owner {
            names
        }
        type
    }
}
```

```
{
    membership(membershipId:2){
        owner{
            names
            surname
        }
    }
}
```

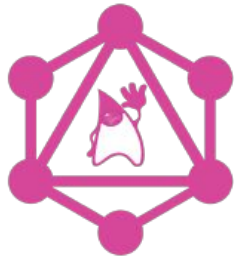
Fragments & Named

```
query Memberships {
    memberships{
        ...fullMembership
    }
}
```



```
fragment fullMembership on Membership
{
        membershipId
    owner{
        ...owner
    }
    type
}
```

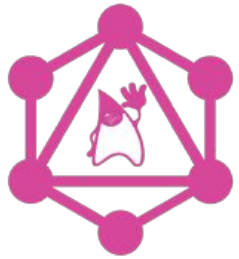
```
fragment owner on Person {
    id
    names
    surname
}
```



Filtering

```
query FilteredMemberships {
    memberships(filter:{
        type:FREE
    }){
        ...fullMembership
    }
}
```

```
query FilteredMemberships {
    memberships(filter:{
    surnameContains: "Kru"

    }){
    ...fullMembership
    }
}
```



Variables

```
query Membership($id:Int!) {

membership(membershipId:$id){
          ...fullMembership
     }
}
```

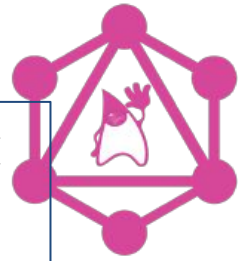
```
{
     "id":1
}
```

Mutation (add)

```
mutation CreateMember($membership: MembershipInput!) {
    membership(membership:$membership) {
        ...fullMembership
    }
}
```

```
{
    "membership": {
        "owner": {
            "names": "Christina",
            "surname": "Storm"
        },
        "type": "FULL"
    }
}
```

Mutation (edit)



```
mutation EditMember($membership: MembershipInput!) {
    membership(membership:$membership) {
        ...fullMembership
    }
}
```

```
{
    "membership": {
        "membershipId": 2,
        "owner": {
            "names": [
                "Charmaine",
                "Juliet"
            ],
            "surname": "Krüger"
        },
        "type": "FULL"
    }
}
```

Build-in client validation
Custom Handler (eg. ConstraintViolationException)

Errors

```
mutation CreateMember($membership: MembershipInput!) {
    membership(membership:$membership) {
        ...fullMembership
    }
}
```

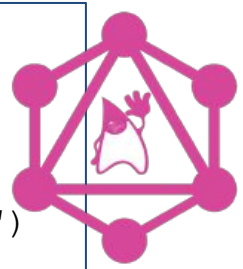
```
{
    "membership": {
        "owner": {
            "names": "Christina",
            "surname": "S"
        },
        "type": "FULL"
    }
}
```

```
@Size(min=2, message = "Surname '${validatedValue}' is too short, minimum {min} characters")
private String surname;
```

Introspection

```
{
    __schema {
        queryType {
            name
            fields {
                name
            }
        }
        mutationType{
            name
            fields{
                name
            }
        }
        subscriptionType {
            name
            fields{
                name
            }
        }
    }
}
```

```
{
    __type(name: "Membership")
{
        name
        kind
        fields {
            name
            args {
                name
            }
        }
    }
}
```



GraphQL

Other

- Delete
- Directives (include/skip fields based on condition)
  - @include(if: Boolean)
  - @skip(if: Boolean)
- Pagination
  - memberships (first:2 after:4)
  - memberships (first:2 offset:6)
- Subscriptions
  - Realtime updates (event stream)
- Conditions in filter (OR & AND)
- Java Client

GraphQL

Links

http://graphql.org/
http://facebook.github.io/graphql/
https://www.howtographql.com/
https://github.com/graphql-java/graphql-java
http://graphql-java.readthedocs.io/en/v7/
https://github.com/graphql-java/graphql-java-servlet
https://github.com/leangen/GraphQL-SPQR
https://github.com/graphql/graphiql
https://github.com/phillip-kruger/membership