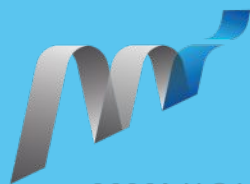




GraphQL



MMI HOLDINGS

History



GraphQL

- 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



GraphQL



Product Hunt



<http://graphql.org/users/>

REST vs GraphQL



```
{
  "user": {
    "id": "er3tg439frjw"
    "name": "Mary",
    "address": { ... },
    "birthday": "July 26, 1982"
  }
}
```

/users/<id>

/users/<id>/posts

/users/<id>/followers



```
{
  "posts": [{
    "id": "ncwon3ce89hs"
    "title": "Learn GraphQL today",
    "content": "Lorem ipsum ... ",
    "comments": [ ... ],
  }]
}
```

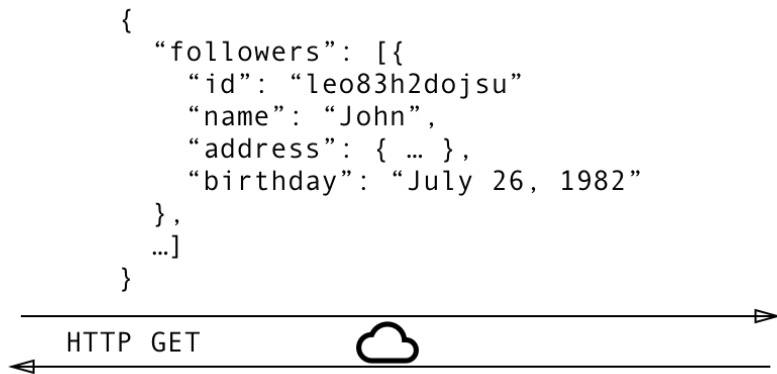
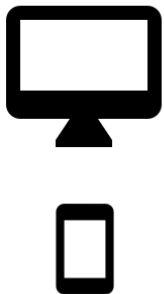
/users/<id>

/users/<id>/posts

/users/<id>/followers



REST vs GraphQL



/users/<id>

/users/<id>/posts

/users/<id>/followers



REST vs GraphQL

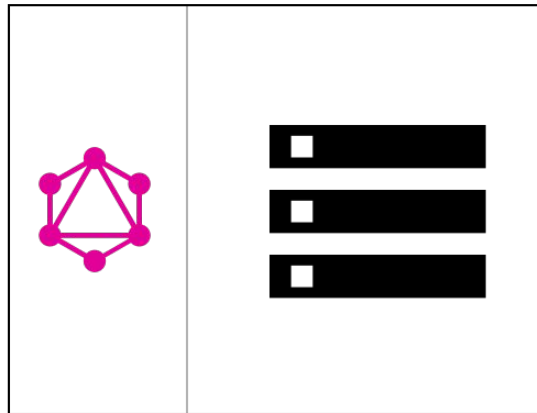


```
query {  
  User(id: "er3tg439frjw") {  
    name  
    posts {  
      title  
    }  
    followers(last: 3) {  
      name  
    }  
  }  
}
```

HTTP POST



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



Benefits



GraphQL

- 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



```
1 query TodoAppQuery($n: Int!) {  
2   globalTodoList {  
3     items(first:$n) {  
4       edges {  
5         node {  
6           text  
7           complete  
8         }  
9       }  
10    }  
11  }  
12 }
```

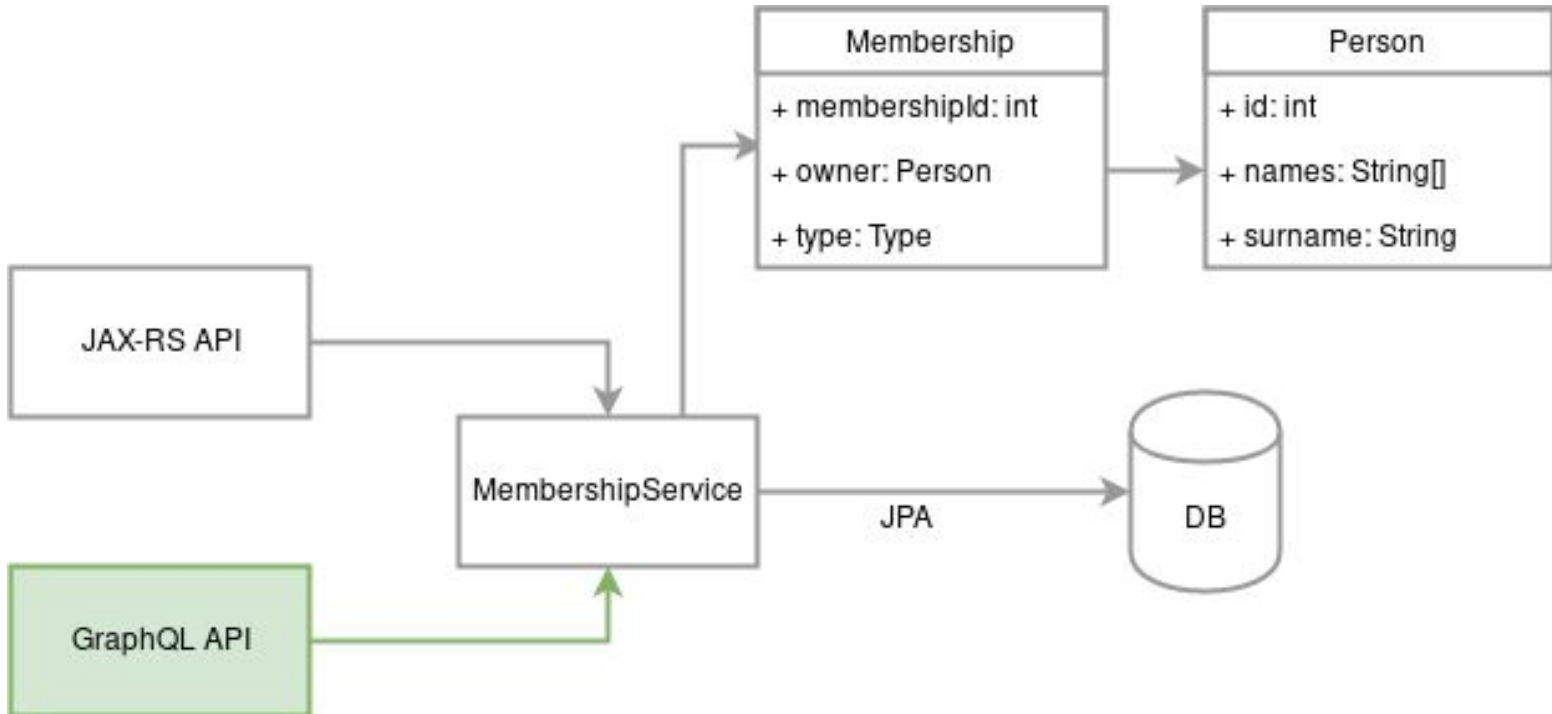
QUERY VARIABLES

```
1 {  
2   "n": 2  
3 }
```

```
{  
  "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



```
@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;
}
```

```
@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)



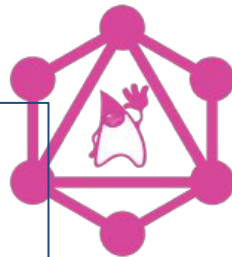
```
mutation CreateMember($membership: MembershipInput!) {  
  createMembership(membership:$membership) {  
    ...fullMembership  
  }  
}
```

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

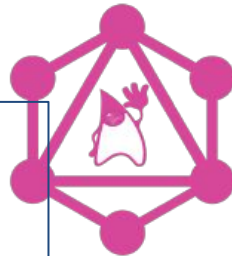
Mutation (edit)

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

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



Mutation (delete)



```
mutation DeleteMembership($id:Int!){  
  deleteMembership(membershipId:$id){  
    ...fullMembership  
  }  
}
```

```
{  
  "id":2  
}
```

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

Errors

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



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

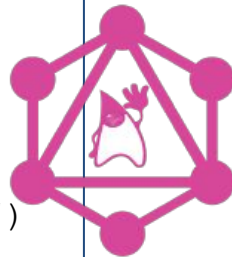
```
{  
  "membership": {  
    "owner": {  
      "names": "Christina",  
      "surname": "S"  
    },  
    "type": "FULL"  
  }  
}
```

```
@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  
      }  
    }  
  }  
}
```





- 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>