Second Iteration

Step 1: Considered Inputs

This iteration there weren't inputs updates.

Step 2: Establish iteration goal

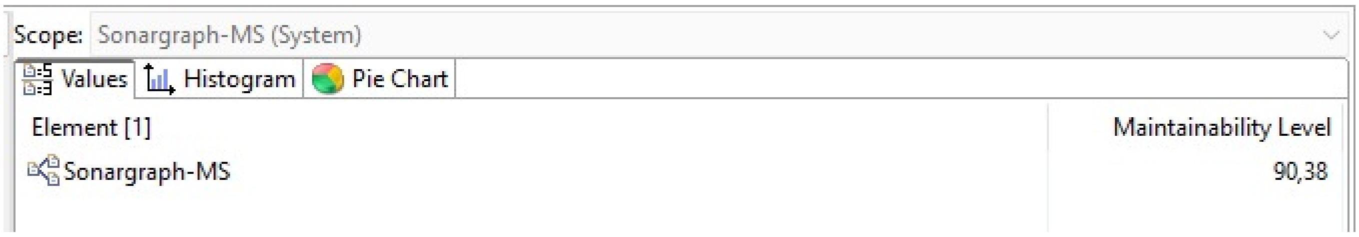
The iteration goal is to re-evaluate the microservices communication and create a data migration process. The drivers related to this are the following:

CRN1 – Microservices;

CRN2 – Data Migration;

CRN3 – Deployment.

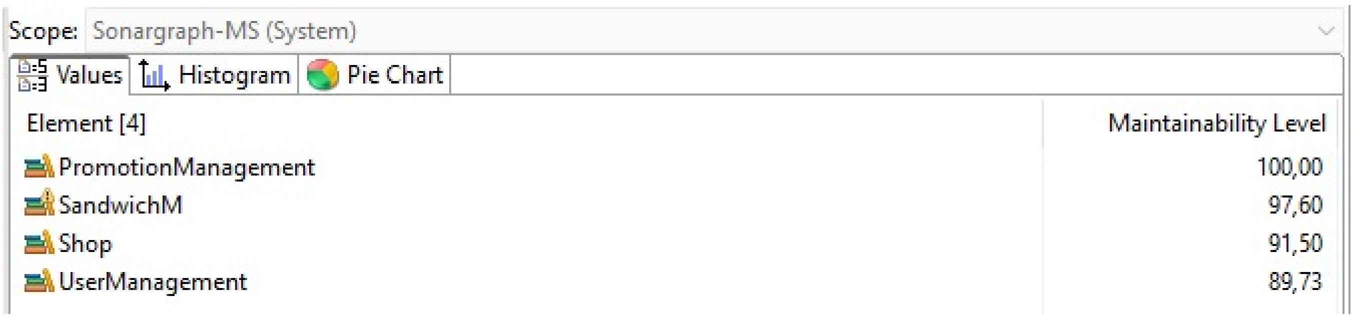
Acording QA1 is expected to have a high percentage of maintenability. Using the sonorgraph this percentage for the project and for each microservice was measured respectively:



Scope: Sonargraph-MS (System)

Values | Histogram | Pie Chart

Element [1]	Maintainability Level
Sonargraph-MS	90,38



Scope: Sonargraph-MS (System)

Values | Histogram | Pie Chart

Element [4]	Maintainability Level
PromotionManagement	100,00
SandwichM	97,60
Shop	91,50
UserManagement	89,73

Step 3: Choose what to refine

The elements to refine is the communication between microservices, that at the moment are made by HTTP requests and must be by GraphQL requests.

Step 4: Choose design concepts that satisfy the selected drivers

Design Decisions and Location	Rationale and Assumptions
Create a Microservices Communication Diagram	The diagram describing the communication between the different microservices.

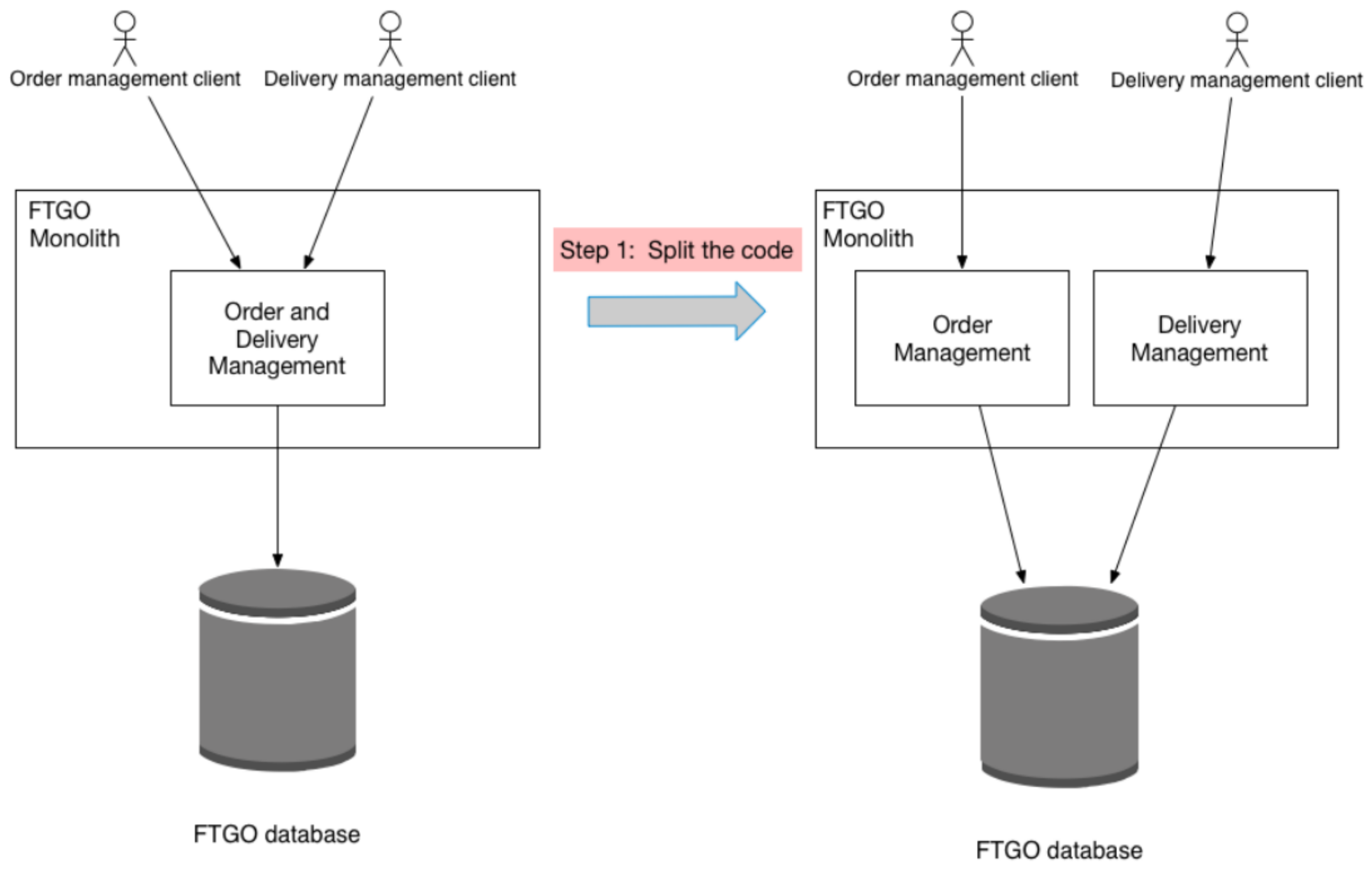
Design Decisions and Location	Rationale and Assumptions
Create a Components Diagrams for the data migration	There must be a diagram describing the different components, involved in the data migration and their interactions.
Create a Deployment Diagram	There must be a diagram describing the deployment of the prototype.

Step 5: Instantiate architectural elements, allocate responsibilities, and define interfaces

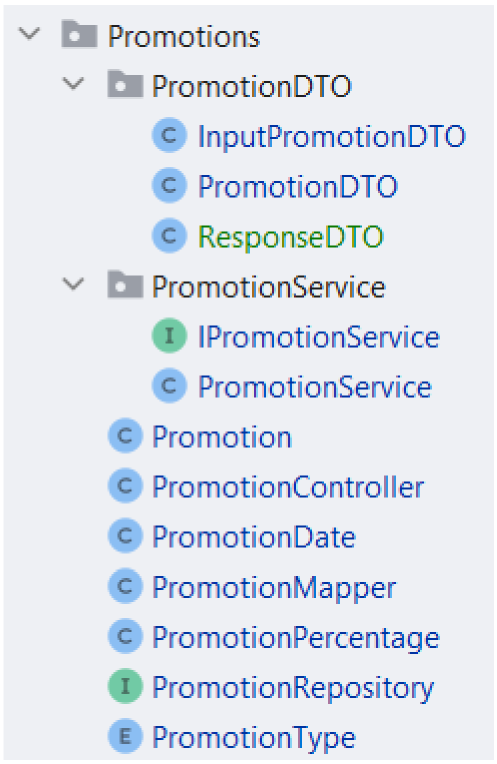
Data Migration

The team members never migrated a monolithic project to a microservices project so firstly we decided follow step by step the Strangler Fig Apllication pattern.

Step 1

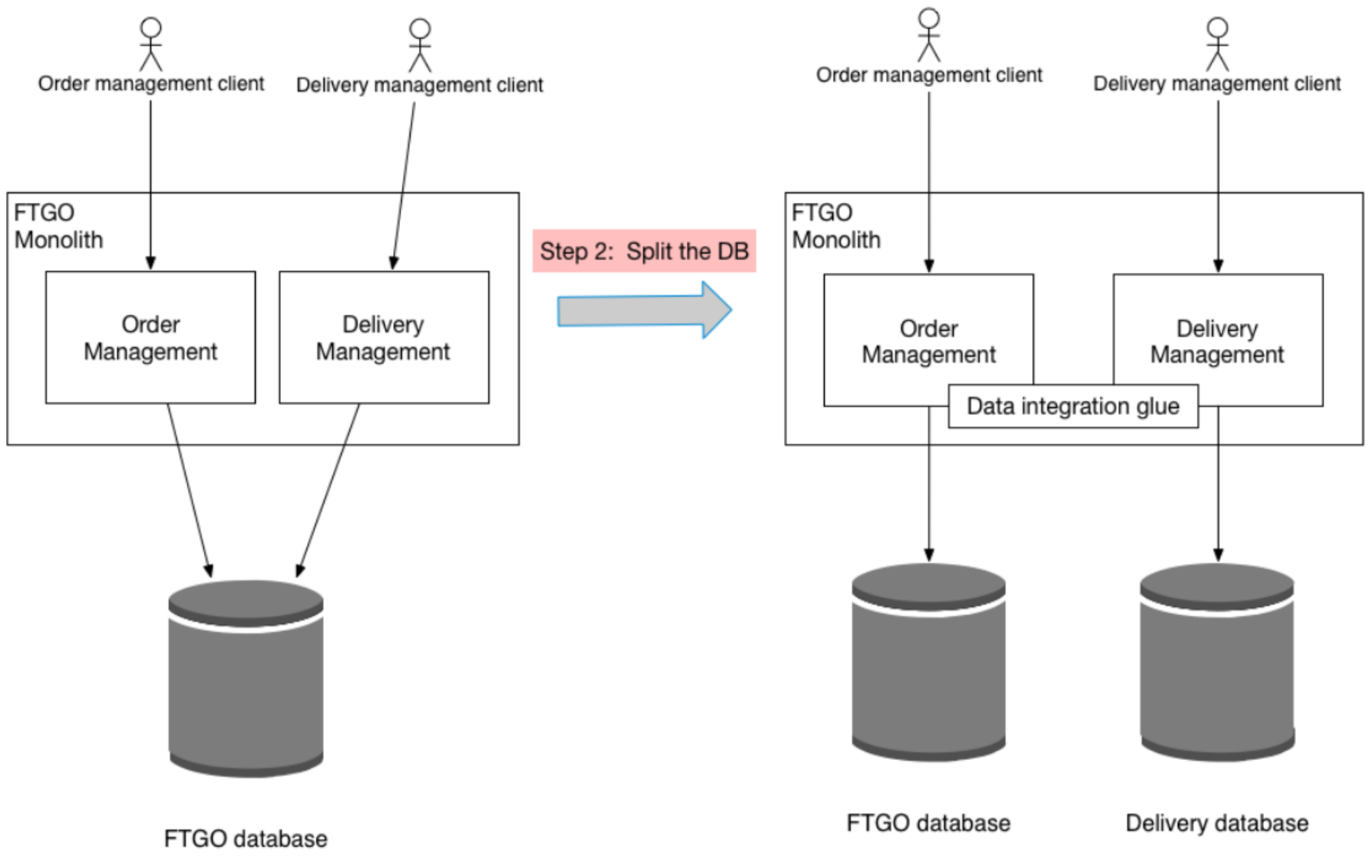


The first step consists in separate the codebase in different aggregates. This step was already done for the project first iteration.



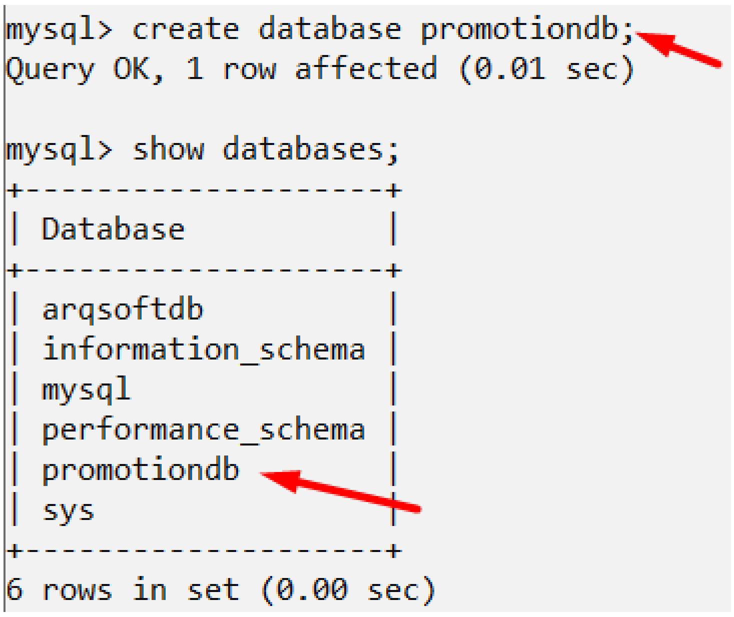
```
Promotions
    PromotionDTO
        InputPromotionDTO
        PromotionDTO
        ResponseDTO
    PromotionService
        IPromotionService
        PromotionService
    Promotion
    PromotionController
    PromotionDate
    PromotionMapper
    PromotionPercentage
    PromotionRepository
    PromotionType
```

Step 2



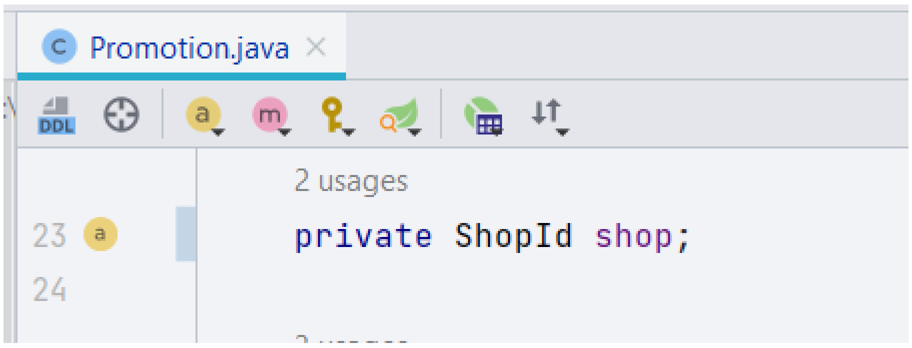
Secondly is needed to create a new database for the aggregate that will be converted to a microservice. Besides that is necessary to have communication beetween aggregates by the data integration glue (foreign keys beetween aggregates database tables).

The database creation:



```
mysql> create database promotiondb;
Query OK, 1 row affected (0.01 sec)

mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| arqsoftdb          |
| information_schema |
| mysql              |
| performance_schema |
| promotiondb        |
| sys                |
+--------------------+
6 rows in set (0.00 sec)
```

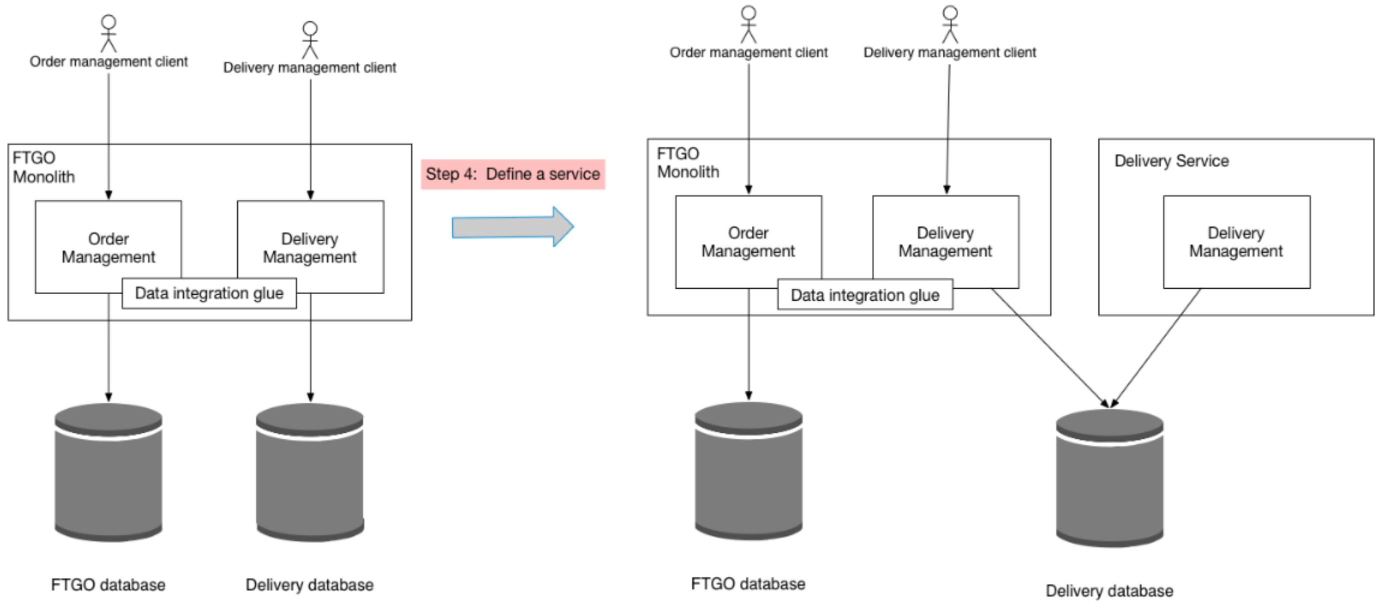
Data Integration Glue:



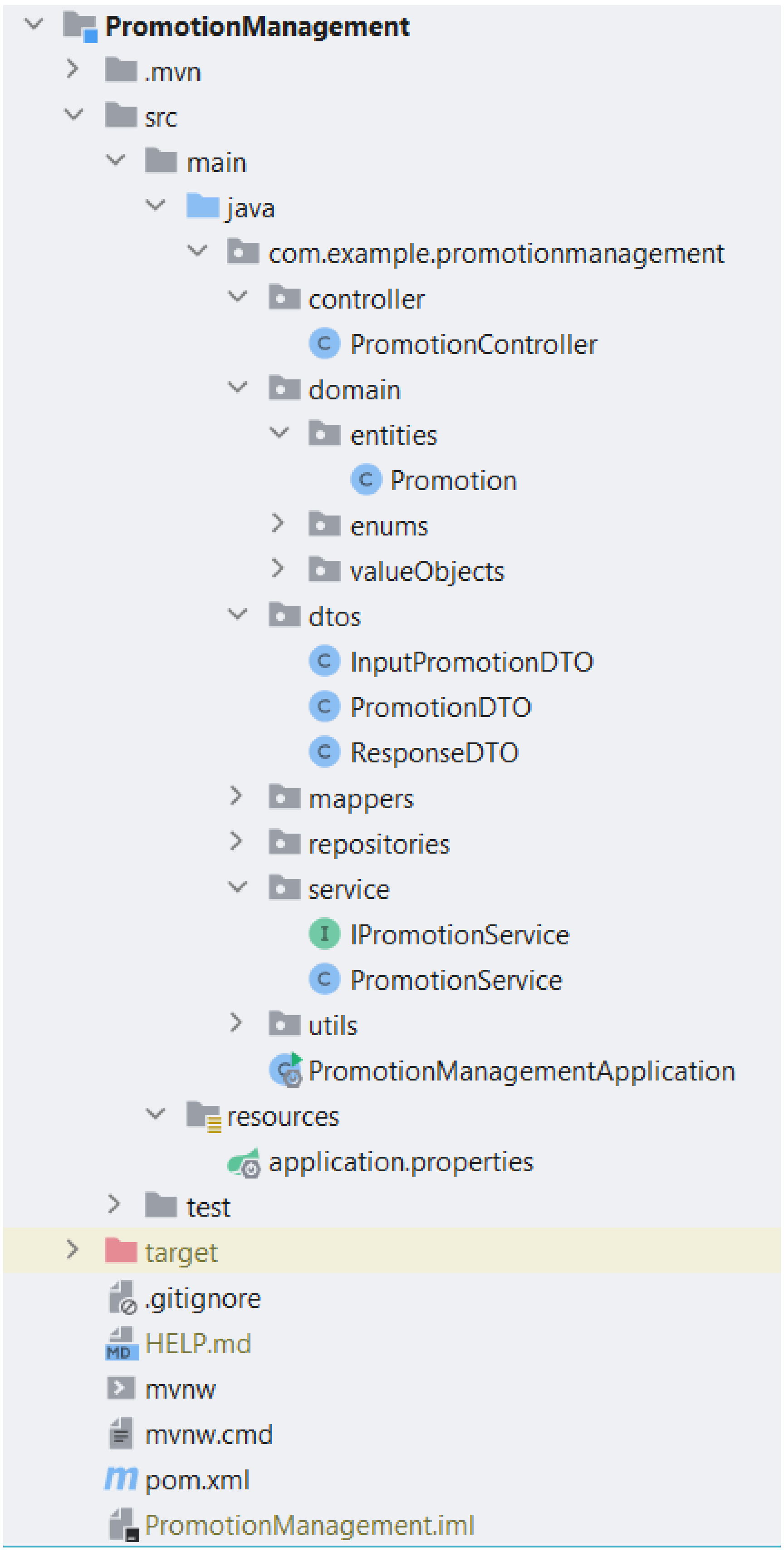
```
private ShopId shop;
```

Now is not used the object shop but the shop Id.

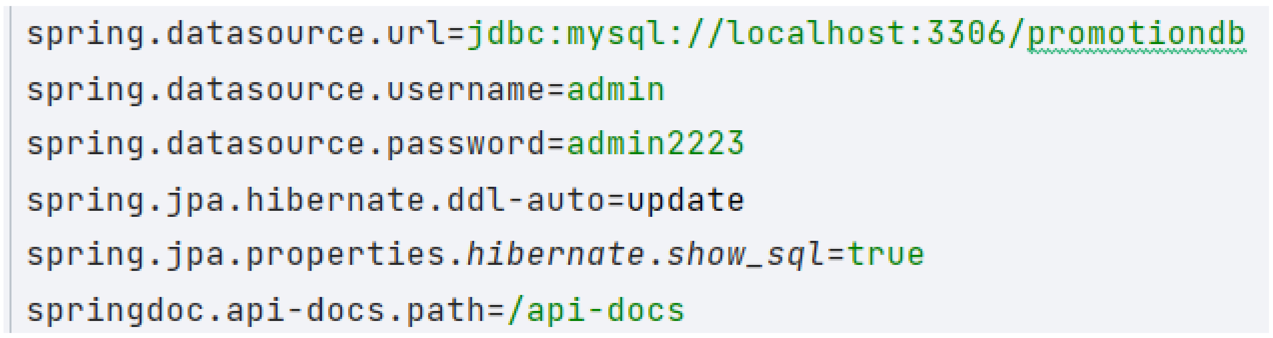
Step 3



The next step is to create a new project that is going to be the new microservice, deploy it and connect it to the database created in the step before.

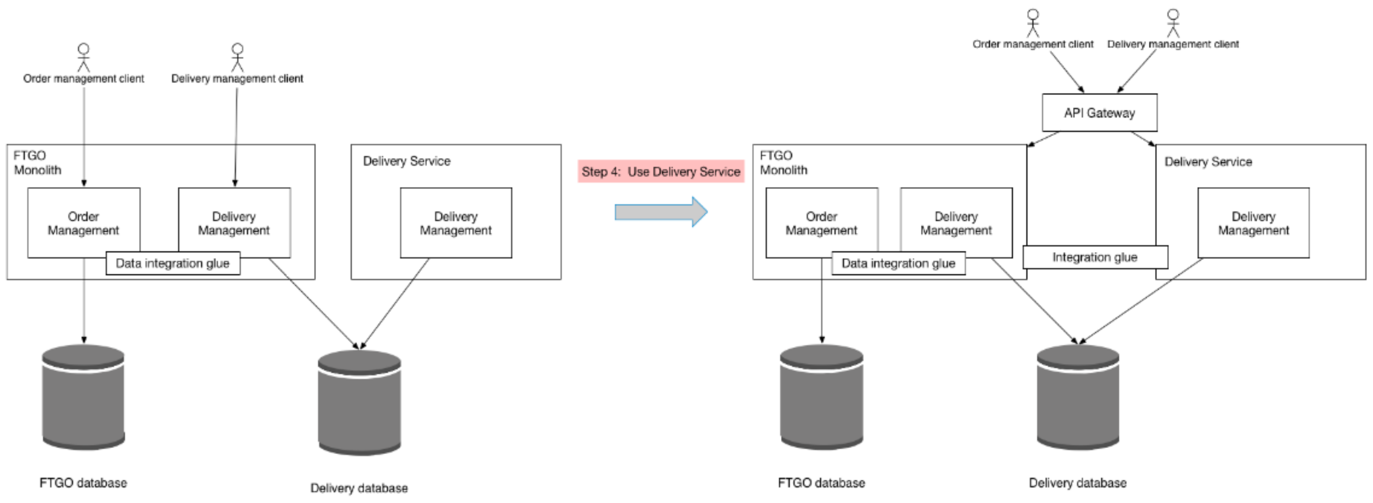


```
PromotionManagement
  .mvn
  src
    main
      java
        com.example.promotionmanagement
          controller
            PromotionController
          domain
            entities
              Promotion
            enums
            valueObjects
          dtos
            InputPromotionDTO
            PromotionDTO
            ResponseDTO
          mappers
          repositories
          service
            IPromotionService
            PromotionService
          utils
          PromotionManagementApplication
      resources
        application.properties
    test
  target
  .gitignore
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
  PromotionManagement.iml
```

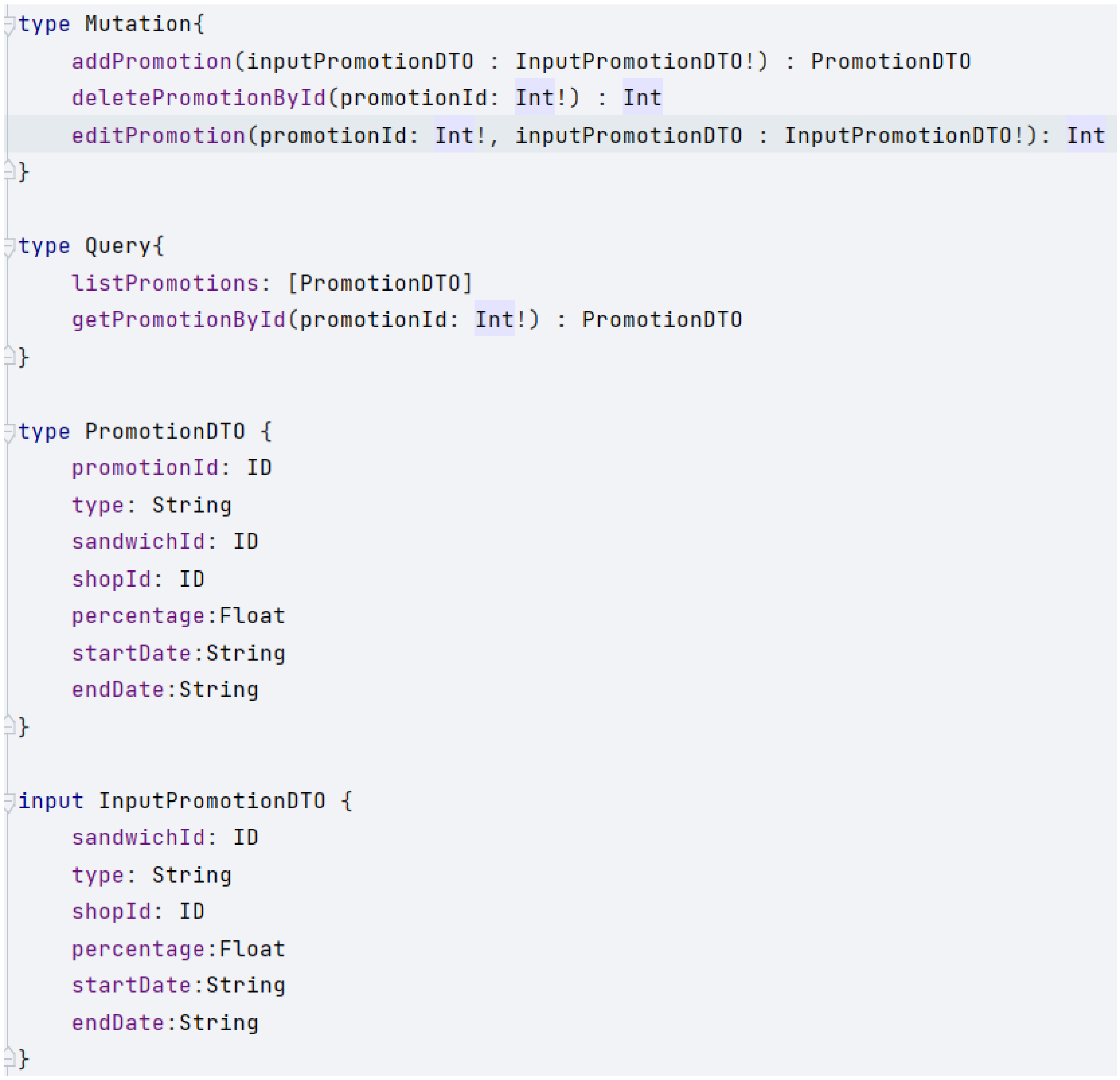


```
spring.datasource.url=jdbc:mysql://localhost:3306/promotiondb
spring.datasource.username=admin
spring.datasource.password=admin2223
spring.jpa.hibernate.ddl-auto=update
spring.jpa.properties.hibernate.show_sql=true
springdoc.api-docs.path=/api-docs
```

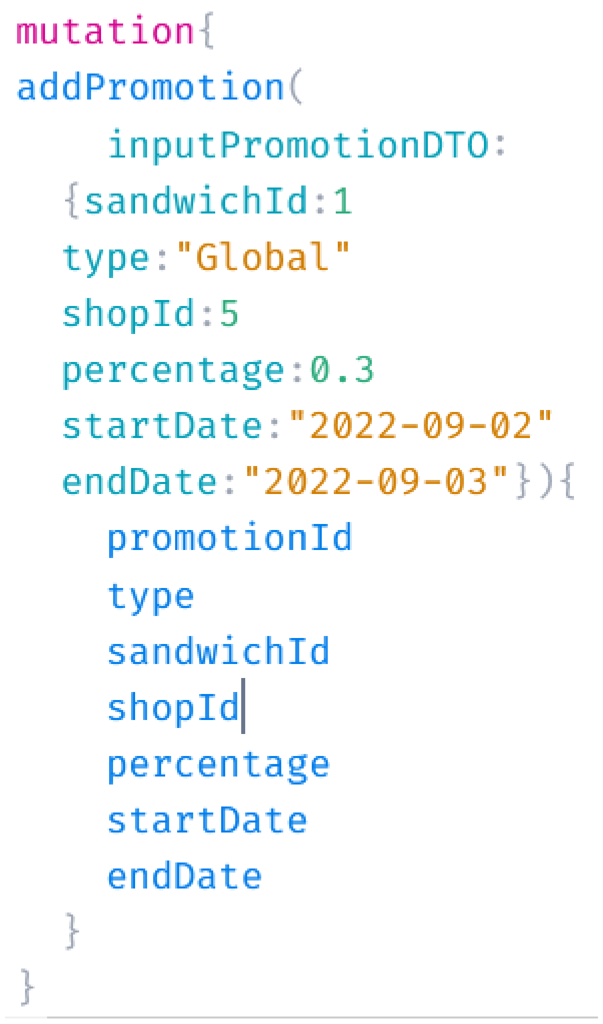
Step 4



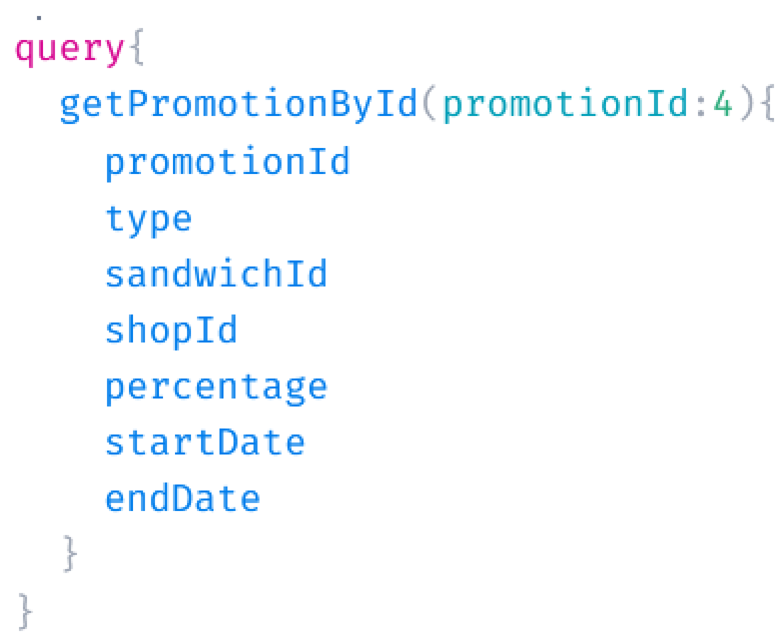
In this step the client does not communicate anymore directly with the monolith management solution but by an API Gateway. Besides that, the codebase is gradually being copied and tested from the monolith solution to the new microservice.



```graphql
type Mutation{
    addPromotion(inputPromotionDTO : InputPromotionDTO!) : PromotionDTO
    deletePromotionById(promotionId: Int!) : Int
    editPromotion(promotionId: Int!, inputPromotionDTO : InputPromotionDTO!): Int
}

type Query{
    listPromotions: [PromotionDTO]
    getPromotionById(promotionId: Int!) : PromotionDTO
}

type PromotionDTO {
    promotionId: ID
    type: String
    sandwichId: ID
    shopId: ID
    percentage:Float
    startDate:String
    endDate:String
}

input InputPromotionDTO {
    sandwichId: ID
    type: String
    shopId: ID
    percentage:Float
    startDate:String
    endDate:String
}
```

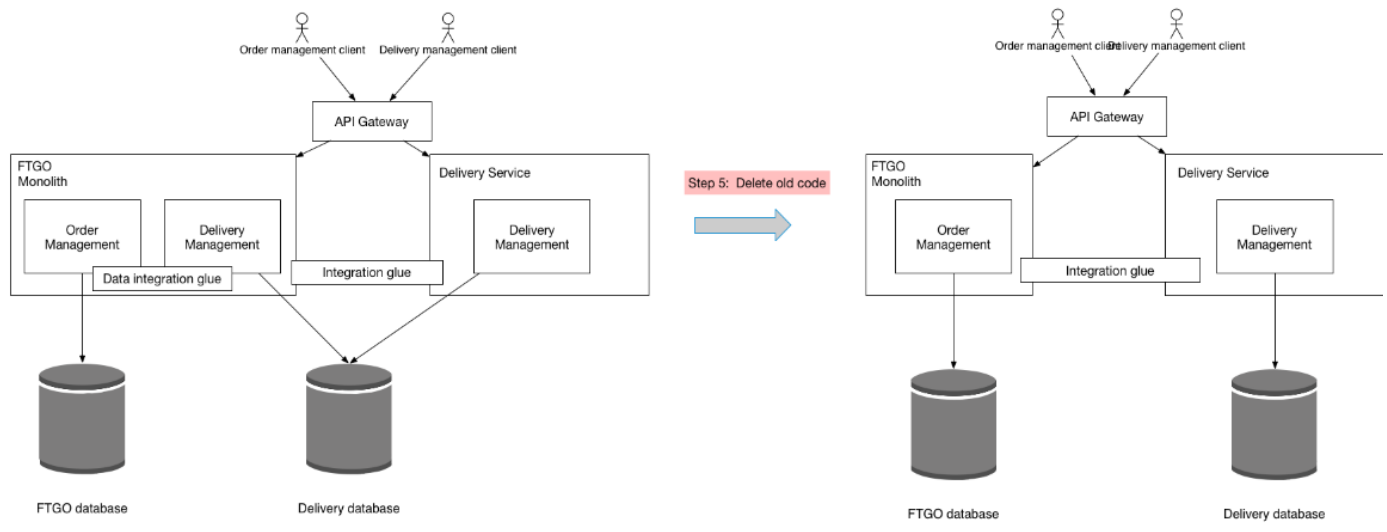


```
mutation{
addPromotion(
    inputPromotionDTO:
  {sandwichId:1
  type:"Global"
  shopId:5
  percentage:0.3
  startDate:"2022-09-02"
  endDate:"2022-09-03"}){
    promotionId
    type
    sandwichId
    shopId
    percentage
    startDate
    endDate
  }
}
```



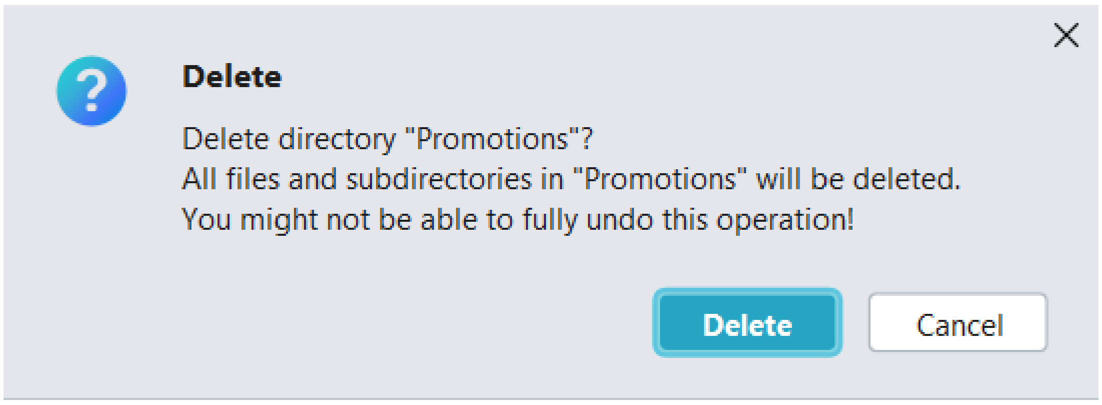
```
query{
  getPromotionById(promotionId:4){
    promotionId
    type
    sandwichId
    shopId
    percentage
    startDate
    endDate
  }
}
```

Step 5



The final step is delete the aggregate codebase that was copied to the new microservice.

This is a valid way of data migration and also go to the encounter the selected drivers of scalability, maintainability and modifiability.



Delete

Delete directory "Promotions"?
All files and subdirectories in "Promotions" will be deleted.
You might not be able to fully undo this operation!

GraphQL

GraphQL is a query language that allows the user to request only the information that he needs. The APIs are organized in terms of types and fields, not endpoints so, we can access the full capabilities of our data from a single endpoint. With GraphQL, the addition of new fields and types to an API dont affect the already existing queries, helping in the modifiability of the application.

The monolith application was built in a way that all request answer with a generic answer (ResultDTO, composed by a generic object_Result, responsible for retrieving the data or an error message, and a statusCode that allows the requester to know the code of the answer). Due to that generic implementation, the team was not able to implement the framework. One way to resolve this problem is to use the *JSON.stringify()* but using this method there isn't any purpose to use GraphQL. So, instead to return ResultDTO, will be returned the DTO itself. For that reason, any exception raised in the process of the query or mutation, will result in a GraphQL Error since he cannot return the expected DTO.

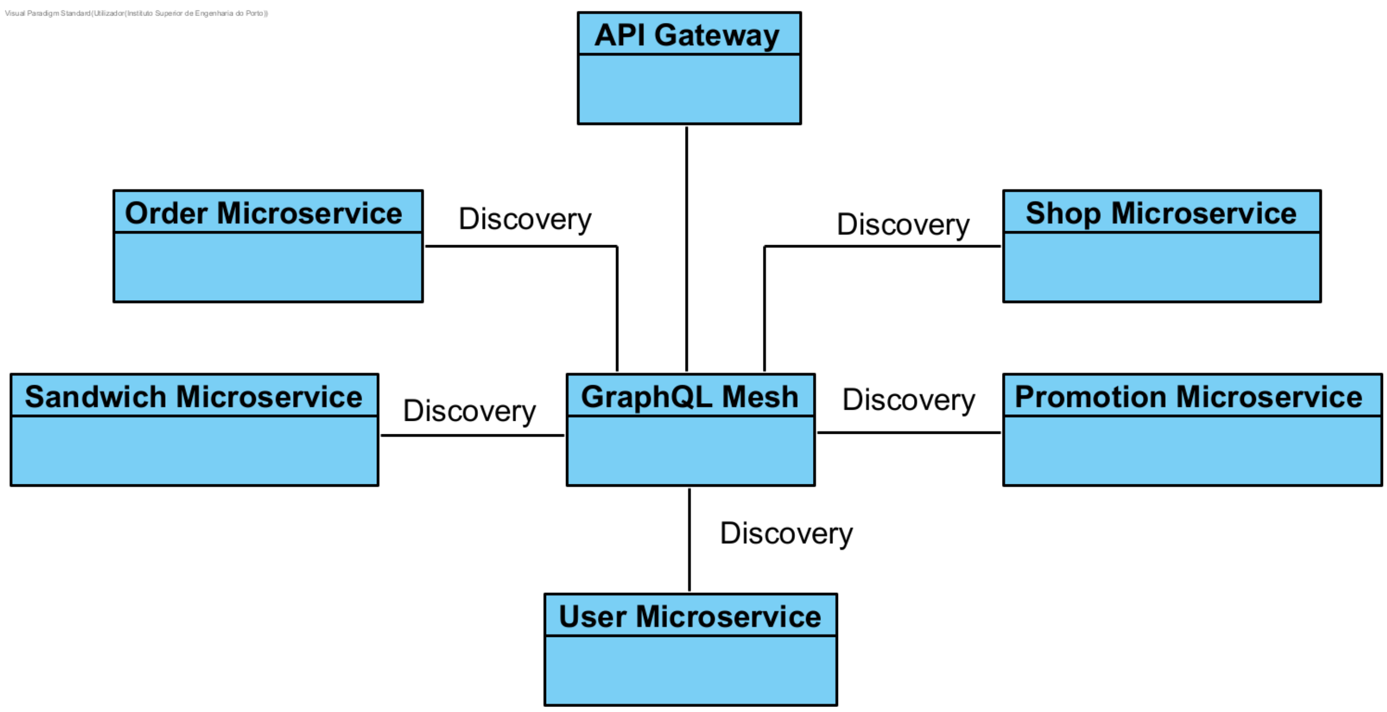
Nevertheless, the team was able to understand the advantages of a framework like GraphQL. The customization in every request is in fact an asset that will increase the performance of most applications, especially if the applications have microservices communicating with each others.

Deployment

Docker will be used to create containers for the different components and microservices of the prototype.

Step 6: Sketch views and record design decisions

Service Discovery Diagram

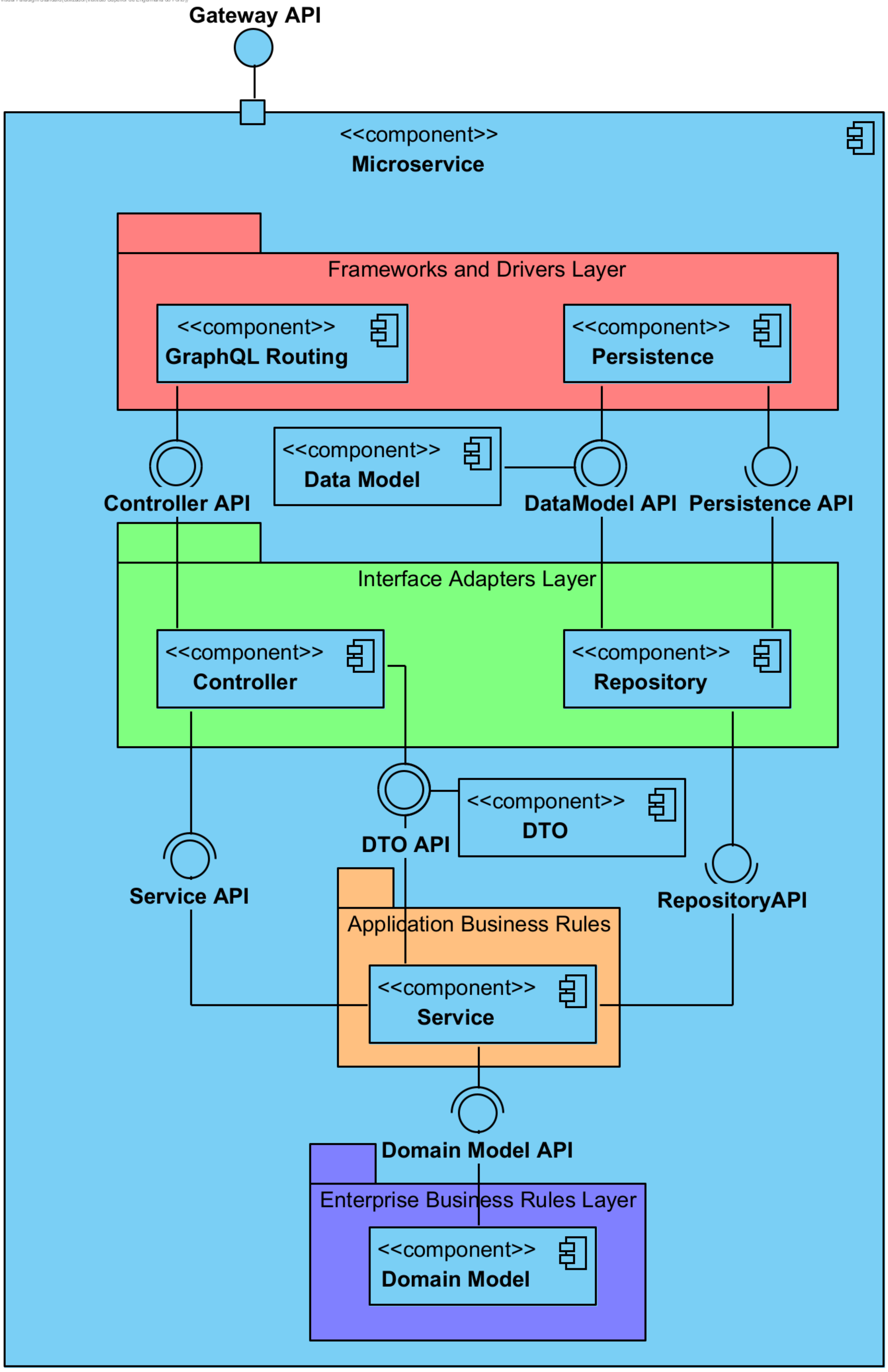


GraphQL Mesh represents a central server that will register all the microservices, within the network. The addresses are composed by the host and port.

The other microservices comunicate by the GraphQL Mesh in the central server, giving its information to be used.

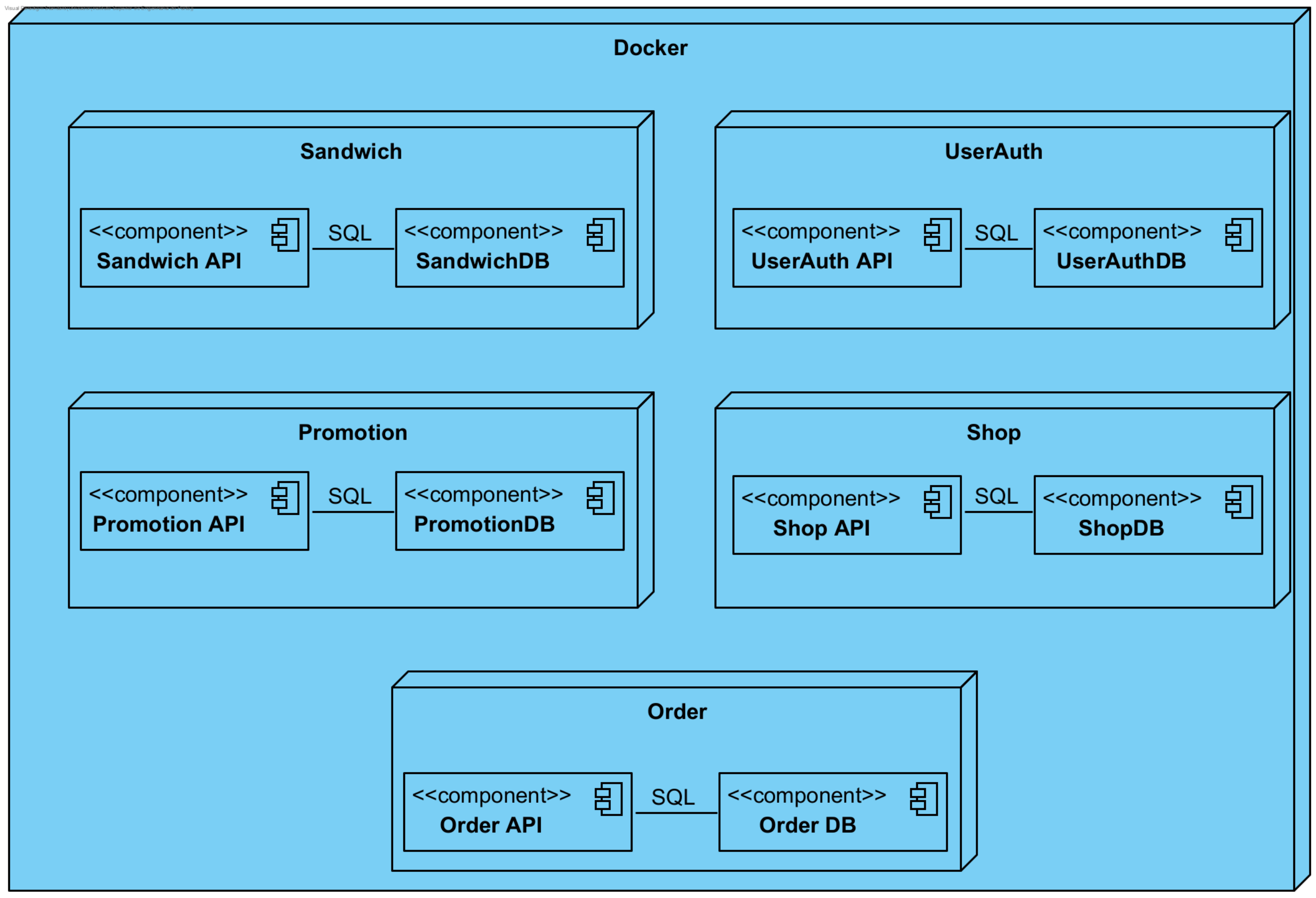
All the microservices registered in the central server are available for everyone to use. To use them it's not necessary to know the address, just the name.

Component Diagram

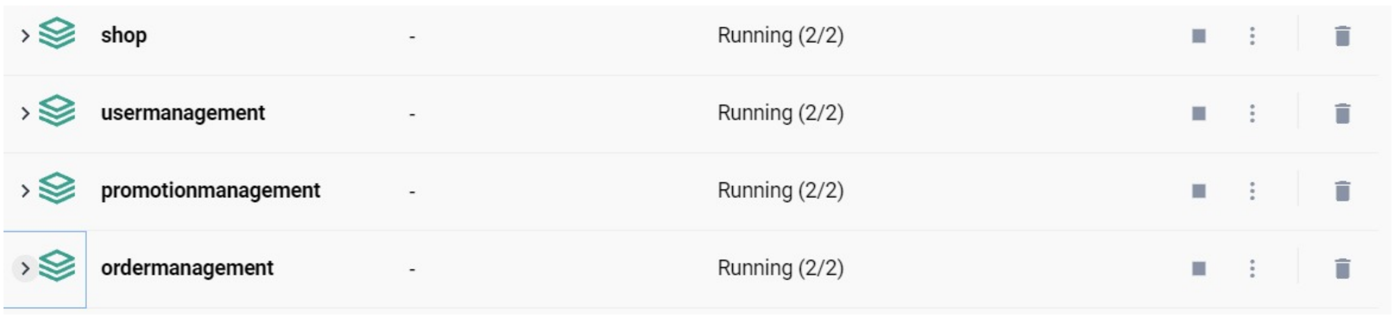

Gateway API
<<component>>
Microservice
Frameworks and Drivers Layer
<<component>>
GraphQL Routing
<<component>>
Persistence
<<component>>
Data Model
Controller API
DataModel API
Persistence API
Interface Adapters Layer
<<component>>
Controller
<<component>>
Repository
<<component>>
DTO
DTO API
Service API
RepositoryAPI
Application Business Rules
<<component>>
Service
Domain Model API
Enterprise Business Rules Layer
<<component>>
Domain Model

In the monolitic application the onion architeture was used and the team decided to implement each microservice with the same architeture because it's the one the team is used to work. The main difference are in the routing, now is done by GraphQL instead of HTTP and there is an API Gateway.

Deployment Diagram



Docker is the tool that supports the deployment of the system. There is a big container which will have smaller one with each microservice and respetective database.



shop	-	Running (2/2)
usermanagement	-	Running (2/2)
promotionmanagement	-	Running (2/2)
ordermanagement	-	Running (2/2)

Step 7: Analyse current design, and review iteration goal + achievement of

design purpose

Kanban Board

	Iteration 2	
Not Addressed	Partially Addressed	Completely Addressed
-	QA4	QA1
-	CON1	QA3
-	-	TC1
-	-	TC2
-	-	TC3
-	-	TC4
-	-	TC5
-	-	CRN1
-	-	CRN2
-	-	CRN3
-	-	CON2
-	-	CON3
-	-	CON4

Road Map

Person	Work	Completed
Luís	Promotion Migration	Completely Addressed
Luís	GraphQL Implementation	Completely Addressed
Luís	ADD - 1st Iteration	Completely Addressed
Luís	ADD - 2nd Iteration	Completely Addressed
Luís	ATAM	Completely Addressed

Person	Work	Completed
Daniel	Sandwich Migration	Completely Addressed
Daniel	GraphQL Implementation	Completely Addressed
Daniel	ADD - 1st Iteration	Completely Addressed
Daniel	Gateway Implementation	Partially Addressed
Rui	Shop Migration	Completely Addressed
Rui	GraphQL Implementation	Completely Addressed
Rui	ADD - 1st Iteration	Completely Addressed
Rui	Contract-based testing	Partially Addressed
Daniela	US01 - Register User	Completely Addressed
Daniela	User Migration	Completely Addressed
Daniela	Order Migration	Completely Addressed
Daniela	GraphQL Implementation	Completely Addressed
Daniela	Deployment	Partially Addressed