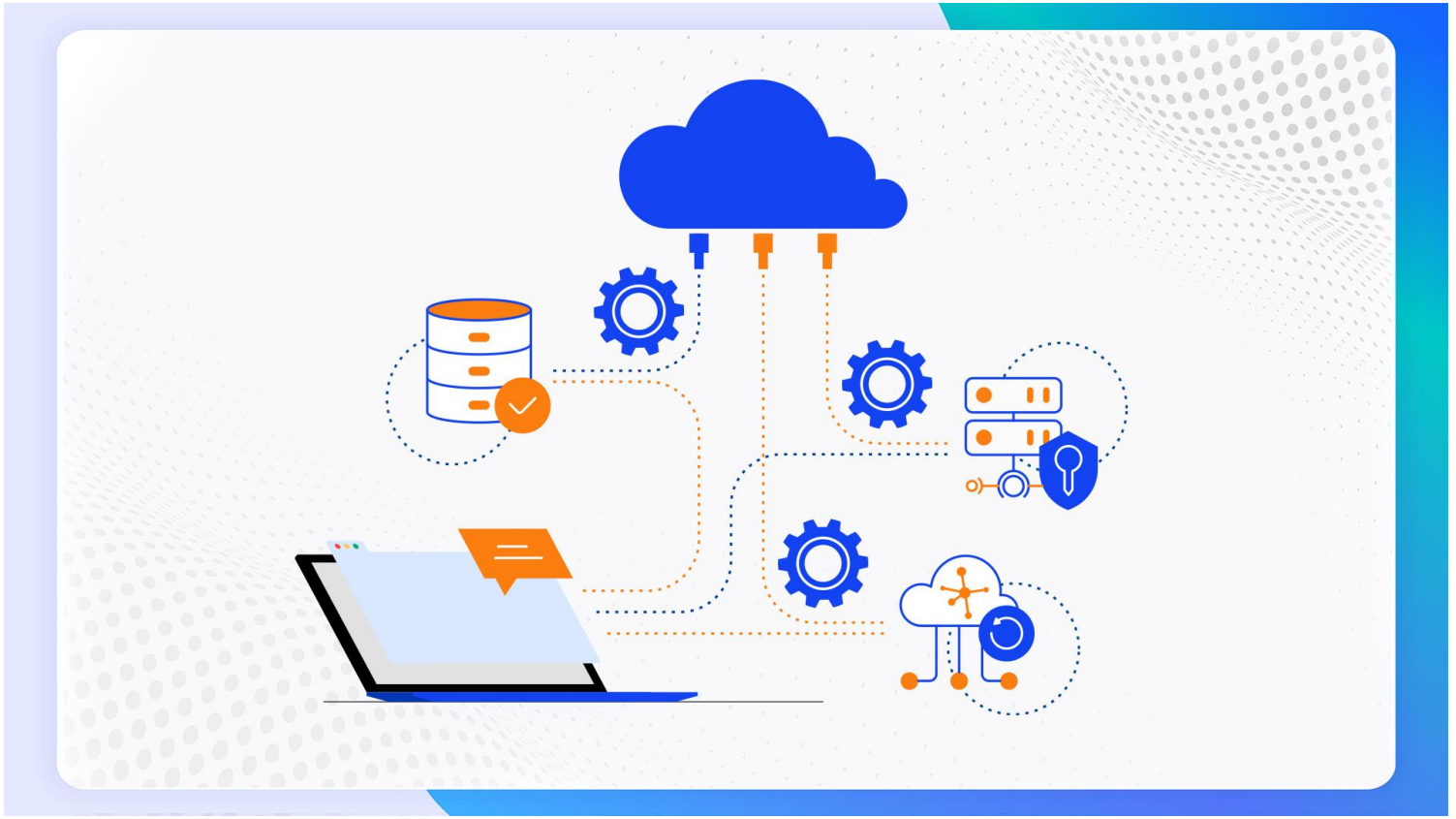
Scalability experiment of microservice architecture



Tural Mehtiyev

Project Objective

1	**Design, implement, and evaluate the scalability of a microservice architecture in the context of an online bookstore application. This includes developing three specific microservices**	• Product Catalog Service • Shopping Cart Service • Order Management Service
2	**Conducting various performance tests on the application**	• Load Testing • Scalability Testing • Stress Testing
3	**Understanding performance and scalability of the microservice architecture through various metrics**	• Response Time • Throughput • CPU and memory usage

Heilmeier Questions

- **What have you done?**

The objective of the project was to design, implement, and evaluate the scalability of a microservice architecture in the context of an online bookstore application. This includes developing three specific microservices: Product Catalog, Shopping Cart, and Order Management.

- **How is it done today?**

The trend towards microservices architecture is accelerating due to several compelling reasons. Microservices architecture offers a way to build applications as suites of independently deployable services.

- **What is your idea to do something better?**

My idea was to use a microservice architecture, which breaks down the application into smaller, manageable services. The main purpose was to experiment the benefits of the architecture rather than innovating something new

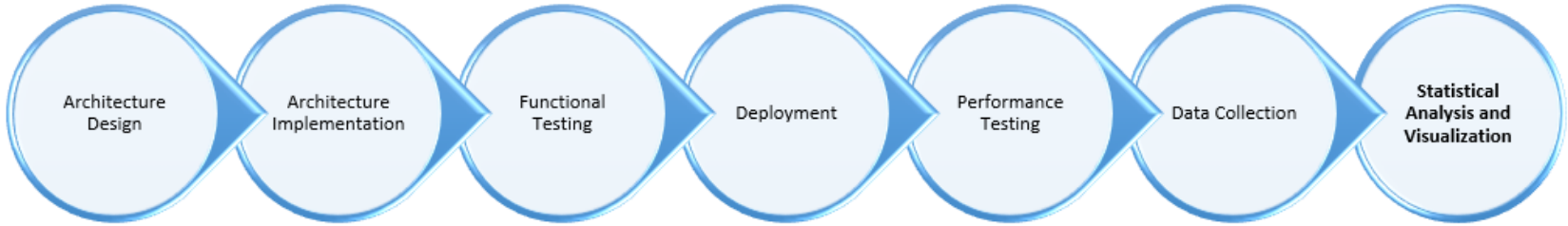
- **What risks did you have?**

One primary risk encountered during the project was the steep learning curve associated with new development tools and the underestimation of project scope, which led to extended timelines.

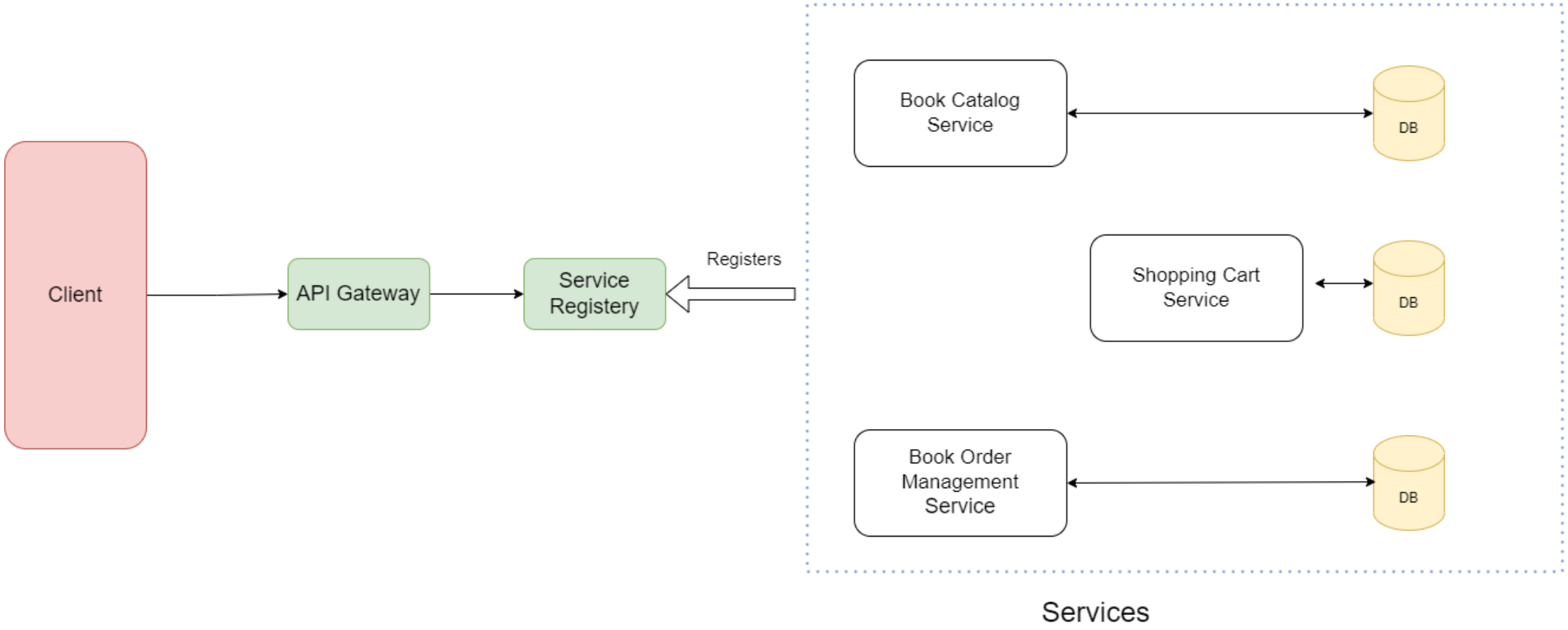
- **How to check the success?**

Success can be measured by having a ready application for testing, executing performance tests, conducting statistical analysis on collected data, and making an informed decision on further research scope for master thesis.

Technical Approach: Key Steps

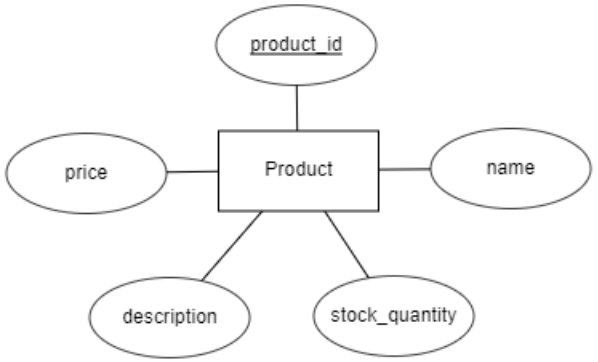


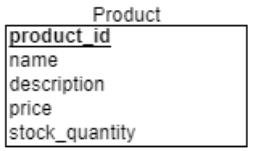
Technical Approach: Architecture Diagram



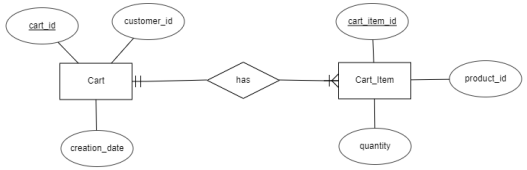
Technical Approach: Initial Designed ERD Diagrams and Schemas

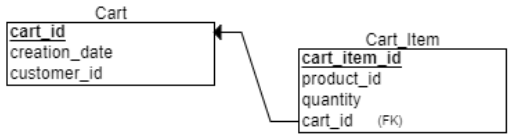
Product Catalog Service



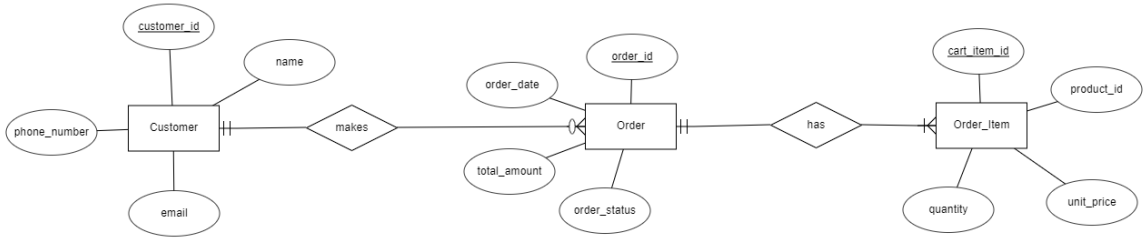


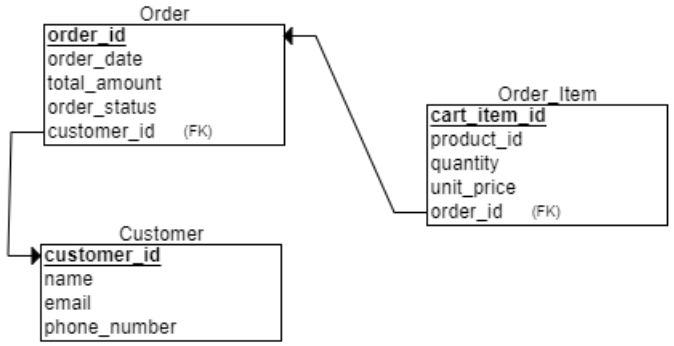
Shopping Cart Service





Order Management Service





API Documentation of Product Catalog Service

FastAPI 0.1.0 OAS 3.1

/openapi.json

default

GET	/	Root
GET	/products	Get Products
POST	/products	Add Product
GET	/products/{product_id}	Get Product
DELETE	/products/{product_id}	Delete Product
PUT	/products/{product_id}	Update Product

https://product_catalog-1-f3543029.deta.app/docs
https://github.com/ADA-GWU/guidedresearchproject-tmehtiyev2019/blob/main/app/product_catalog_microservice/README.md

API Documentation of Shopping Cart Service

FastAPI 0.1.0 OAS 3.1

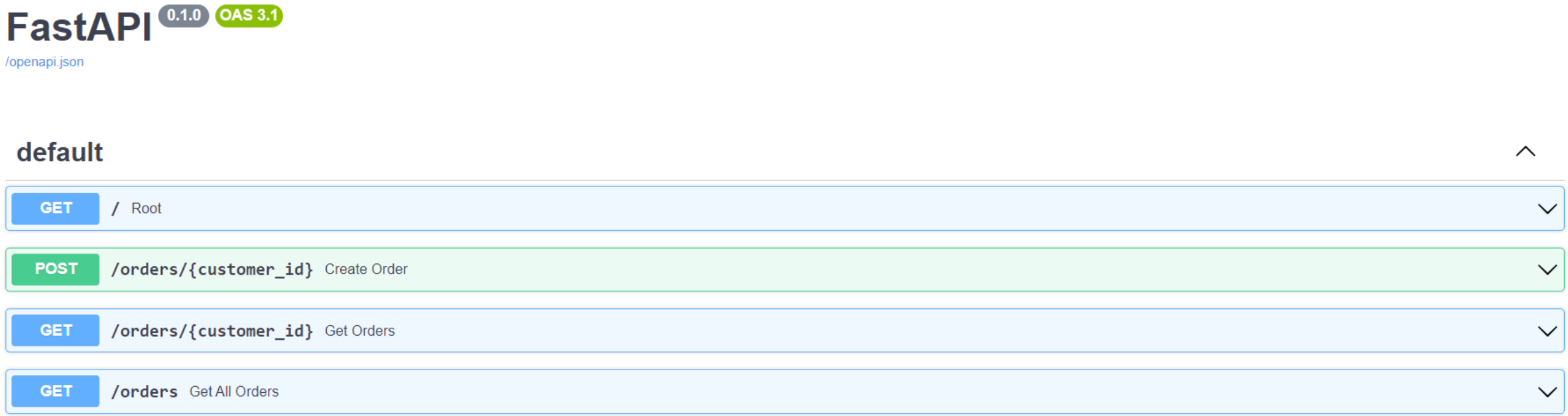
/openapi.json

default

GET	/	Root
GET	/carts	Get All Carts
GET	/cart_items	Get All Cart Items
GET	/carts/{customer_id}	Get Cart
POST	/carts/{customer_id}	Add Item To Cart
PUT	/carts/{customer_id}	Update Cart Status
DELETE	/carts/{customer_id}/{product_id}	Delete Item From Cart
PUT	/carts/{customer_id}/{product_id}	Update Item In Cart

https://shopping_cart-1-y6546994.deta.app/docs
https://github.com/ADA-GWU/guidedresearchproject-tmehtiyev2019/blob/main/app/shopping_cart_microservice/README.md

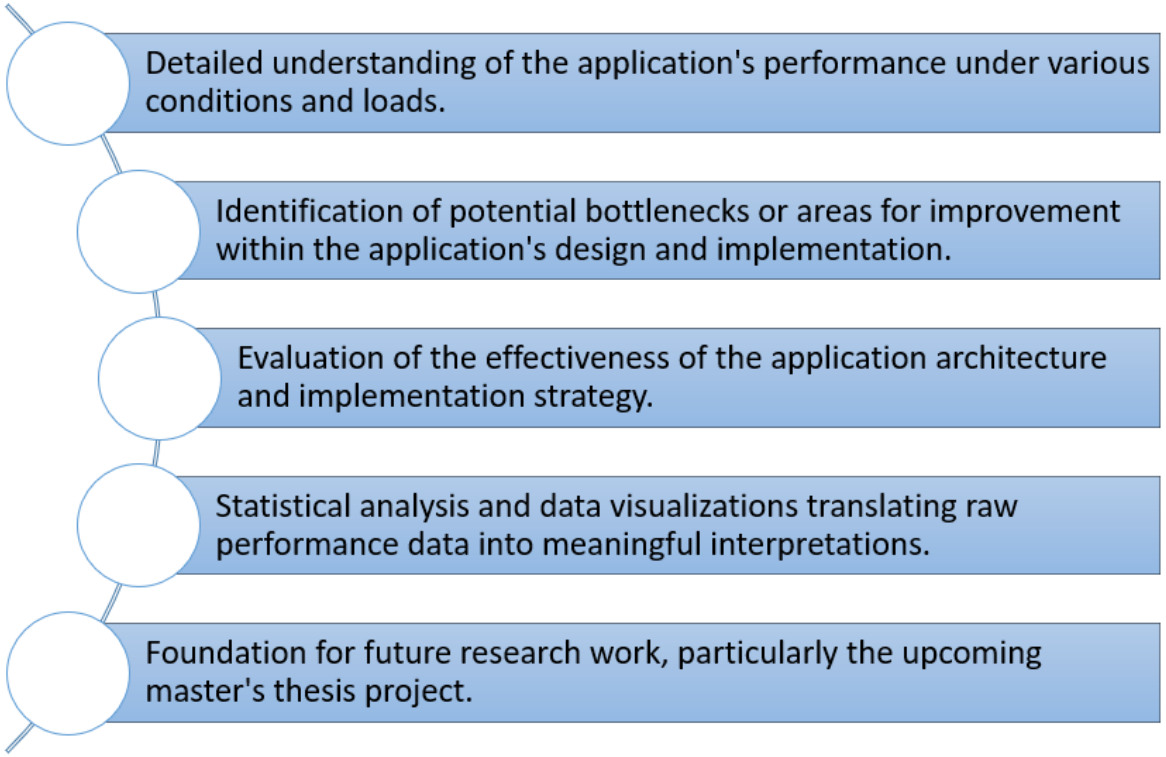
API Documentation of Order Management Service



https://order_management-1-w1405204.deta.app/docs
https://github.com/ADA-GWU/guidedresearchproject-tmehtiyev2019/blob/main/app/order_management_microservice/README.md

Results

- Currently the results are in progress. Plan is to cover the below main points in the result part



Conclusion

- Conclusion will be derived based on the results

Future Work