**Project with Microservices Architecture**

***Legend****: COMPLETE, IN-PROGRESS*

**Progress:**

Spring 1 - Implement Basic Services using H2 database with basic REST endpoints

Added user, product, cart service *(**HATEOAS not for now)*

Sprint 2 - Configure service discovery, config server

Configured

Spring 3 - Implement basic UI using angular 8

*In progress...*

Sprint 4 - Add order service and required communication with other services

Added basic APIs

Added validation before initiating order

(\*Configured Jenkins pipeline script for CI-CD for user-service and tried deployment using docker container, docker-hub.

Tried it on an AWS free instance, but free instances are too small and frequently hanging)

Configured it on GCP Instance – with 3.75GB RAM 10G HDD)

Configured Kafka on local windows machine and tried pub-sub with it

Configured Kafka with docker containers - zookeeper and 1 broker *(2 brokers causing some never ending error logs -solve later)*

Using Conduktor to administer Kafka

*Kafka event notifications for payment, order confirmation, shipping & notification*

Sprint 5 - Add auth service with JWT tokens

Added *(Integrate other services to use it – not for now)*

Sprint 6 - Add API gateway service

Added service with spring cloud gateway and configured routes

Sprint 7 – Enable CI-CD

Reserved a Google Cloud VM instance

Installed and configured Jenkins to link with GitHub repos

Created pipeline to build, test and create docker image and then push them to docker-hub

Tried mono-repo as well as repo-per-microservice – will continue with mono-repo for now

Tried Declarative and Scripted pipeline –

Using Scripted pipeline for now

*Need to refine Jenkins files further – will do it later*

*(faced issues with deployment steps in Declarative - will try again later)*

Using docker-compose within Jenkins to start/stop all docker containers for now *(will try orchestration later)*

Sprint 8 – Add monitoring

Configured Micrometer, Prometheus, Grafana

Application metrics can be monitored on (Grafana)<http://35.244.121.244:3000/>, (Prometheus) <http://35.244.121.244:9090/>

Currently only actuator exposed metrics are recorded *(Will add custom metrics later)*

Sprint 9 – Enable logging and configure ELK - ElasticSearch, LogStash, and Kibana

*In progress...*

Sprint 10 – Configure MongoDB for product-service

Sprint 11 – Configure Distributed Request Tracing

Spring 12 -

**Initial Features Scope:**

User profile (details, addresses) management

Product search, inventory management

Cart management

Order management

Payment management (only shopping credits mode for now)

**GOAL:**

Host it on: ~~AWS~~ or Google Cloud

Architecture: Microservice based

Try: *domain-driven-design, TDD, event storming, event-driven architecture, event sourcing, CQRS*

Service communication: REST APIs, send events over Kafka ~~(try gRPC LATER)~~

Database: In-memory H2 for now, integrate Postgres & NoSQL(MongoDB/~~DynamoDB~~) later

UI: Angular 8, TypeScript, Bootstrap

Event Streaming: Kafka

Caching: Redis

Also (*try* *later*): Reactive stream - [WebFlux](https://docs.spring.io/spring/docs/current/spring-framework-reference/web-reactive.html)

Microservice tools -

Service Discovery: [**Spring Cloud Netflix Eureka**](https://spring.io/projects/spring-cloud-netflix)

Configuration Server: [**Spring Cloud Config**](https://spring.io/projects/spring-cloud-config)

Security: [**Spring Security**](https://spring.io/projects/spring-security) – **JWT** (Explore [Spring Cloud Security](https://spring.io/projects/spring-cloud-security) later)

Monitoring: [**Micrometer**](https://micrometer.io/) **+** [**Prometheus**](https://prometheus.io/) **+** [**Grafana**](https://grafana.com/)

Request [Tracing](https://medium.com/swlh/distributed-tracing-in-micoservices-using-spring-zipkin-sleuth-and-elk-stack-5665c5fbecf): [**Spring Cloud Sleuth**](https://spring.io/projects/spring-cloud-sleuth) **+** [**Zipkin**](https://zipkin.io/)

Fault Tolerance: [**Spring Cloud Circuit Breaker**](https://spring.io/projects/spring-cloud-circuitbreaker) **+** [**Resilience4J**](https://github.com/resilience4j/resilience4j)

Load Balancing: [**Spring Cloud LoadBalancer**](https://spring.io/guides/gs/spring-cloud-loadbalancer/)

For microservices to discover each other with service name and communicate internally(not through gateway)

API Gateway: [**Spring Cloud Gateway**](https://spring.io/projects/spring-cloud-gateway)

An api gateway – single point of entry (port 8000) for all client requests which will then redirect it to respective to service

Other –

JPA, Swagger2 (for API docs), DevTools, Actuator,

Logging –

ELK - ElasticSearch, LogStash, and Kibana

Testing:

Unit: Junit, Mockito, Hamcrest - @DataJpaTest, @WebMvcTest, @SpringBootTest

Deployment:

CI/CD: Do with Jenkins configured on GCP, ~~Bamboo~~ and then maybe Jenkins X for kubernetes

Path: => Bare OS Spring Boot services deployment

=> Bare OS docker containers deployment – manage using docker-compose

=> Deploy containers on Kubernetes

=> *If possible, try on OpenStack/CloudFoundry*

SCM: GitHub

Other Editor Tools: Git Bash, Eclipse, Visual Studio Code, Postman, SourceTree



User Service

Order Service

Email Service

Payment Service

TO DO

Eureka Service

UI Client

Config Repo On GitHub

Config Service

Resource Server

Product *Search* Service

Auth Server

Cart Service

Gateway Service

Kafka – ORDER\_TOPIC

Product Inventory Service