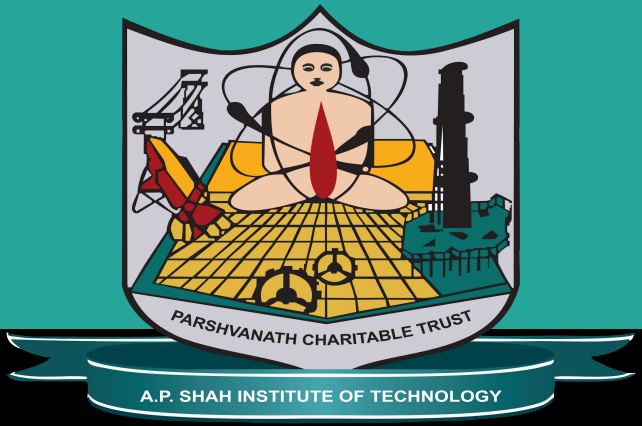

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UNIVERSITY OF MUMBAI

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A Project Report on

Krishi Setu: Connecting Farmers and Consumers

Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-8)
in
INFORMATION TECHNOLOGY

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1.Project Conception and Initiation

1.1 Abstract

Distributed messaging structures are the core for Modern applications build with micro services architecture. Messaging technologies are every increasing need for modern applications which have to deal with a heavy traffic. These technologies are crucial for micro services, cloud native applications and data streaming applications. With ever increasing traffic scalability of the application is important factor. It must be done in such a way that it is provides all the necessary services to its users and should not cost more than necessary while maintaining security and the integrity of the users using the application. Krishi Setu is an application that is build on the idea of loosely coupled micro services.

1.2 Objectives

- To build a distributed computing network with kubernetes
- To set up scalable image upload
- To set up Payments
- To let farmers to sell products
- To let consumers to buy products

1.3 Literature Review

1	Title :	Kubernetes as an Availability Manager for Micro service Applications
	Author and Publisher :	Leila Abdollahi Vayghan, Mohamed Aymen Saied, Maria Toeroe, Ferhat Khendek, unpublished.
	Methodology :	The authors have presented a brief overview of Kubernetes architectural components and architectures for deploying microservices based application with Kubernetes. The authors have investigated the impact of adding redundancy on the availability of micro service-based applications and performed experiments under Kubernetes default configuration and its most responsive one.

1.3 Literature Review

2	Title:	Modern Messaging for Distributed Systems
	Author and Publisher:	L Magnoni, Journal of Physics Conference Series 608(1):012038
	Methodology :	L Magnoni has discussed the Importance of loosely coupled communication, Connection-oriented communication, Messaging for loosely coupled communication, Messaging scenario, Messaging middleware.

1.3 Literature Review

3	Title:	Modern Messaging Queues - RabbitMQ, NATS and NATS Streaming
	Author and Publisher:	Pooja J Bhat, Priya D, International Journal of Recent Technology and Engineering (IJRTE)
	Description:	Authors have explained in detail about the Messaging Technologies and Terminologies. Authors have also compared and explained the features of these technologies and provided the benchmark for RabbitMQ and NATS. They have also explained the architecture of RabbitMQ and NATS.

1.4 Problem Definition

- Farmers these days do not get proper value for the farm produce. They strive so hard yet are compelled to sell their produce at a low price. The middleman forces the farmer to sell his produce at a low rate.

1.5 Scope

- To make a distributed computing platform for farmers to sell their products and for consumers to buy the products.

1.6 Technology stack

- NodeJs
- ReactJs
- MongoDB
- ExpressJs
- Docker
- Kubernetes

1.7 Benefits for environment & Society

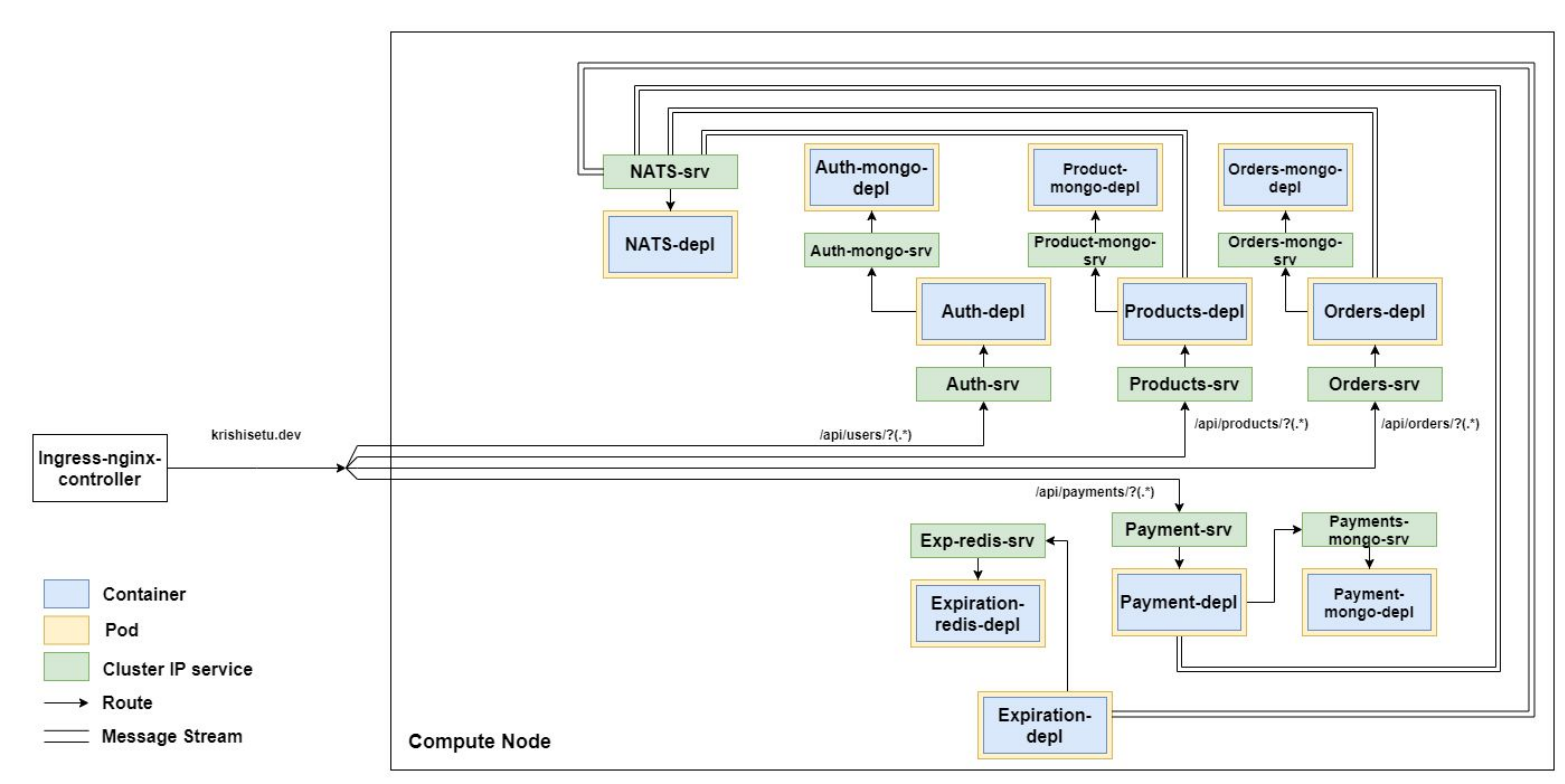
- Farmers would be getting their appropriate value for their goods
- The entire application is leveraging Open Source technologies. And the application is Open Source thus encouraging the developers community to contribute to the growth of the application and making it more reliable to its users

2. Project Design

2.1 Proposed System

We can create the platform for farmers where they can directly sell their good in quantity they desire to either direct consumers or the local distributors in major cities, thus severing the chain of middlemen

2.2 Design(Flow Of Modules)

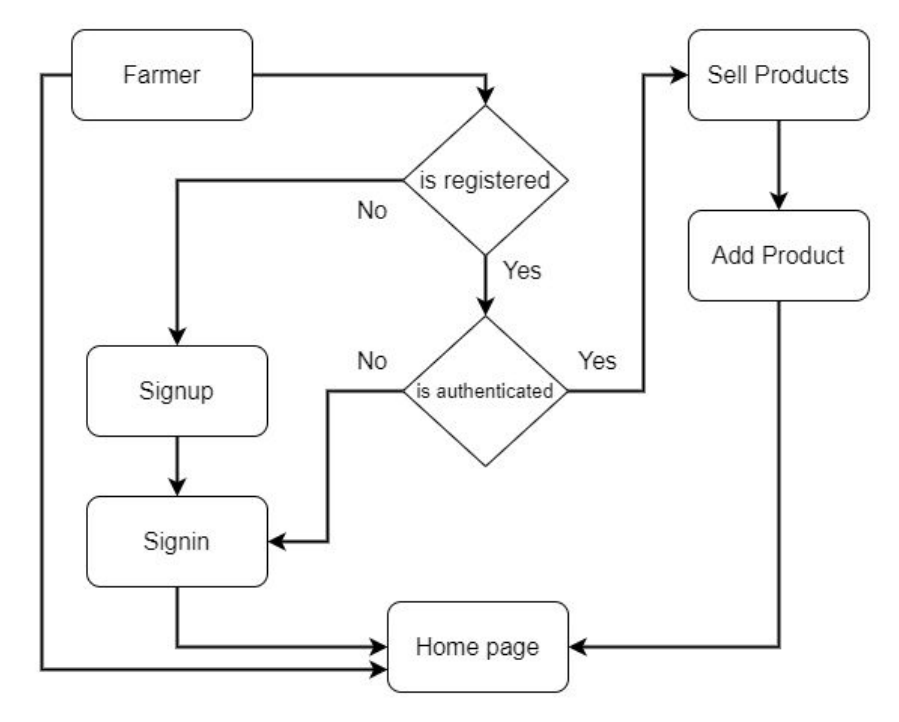


Architecture of Krishisetu

2.3 Description Of Use Case

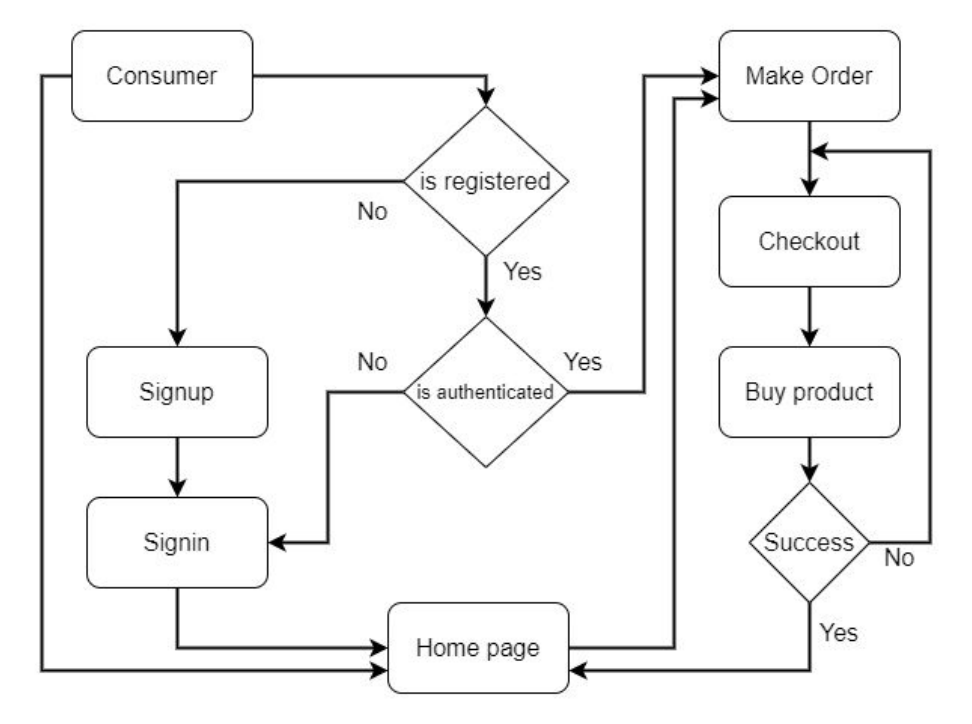
- Krishisetu allows the farmers to register themselves and sell their goods online.
- Krishisetu allows the consumers to register themselves and buy the available products.

2.4 Activity Diagram



Farmer flow

2.4 Activity Diagram



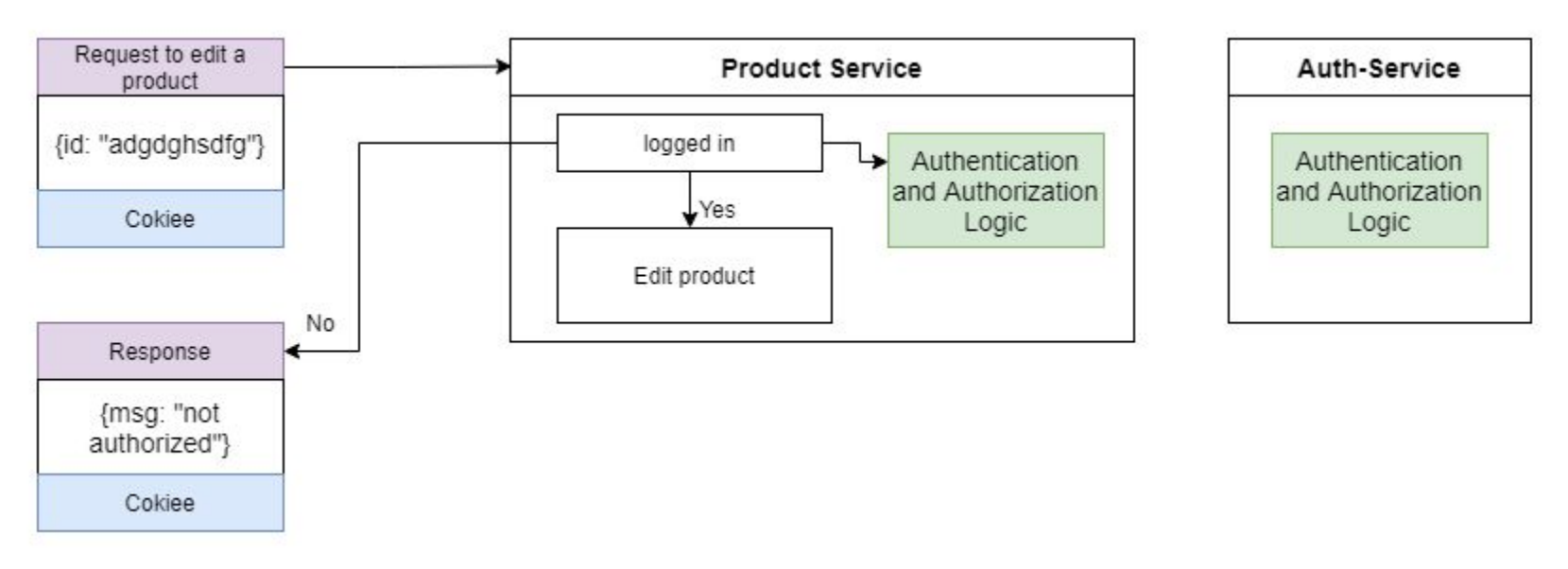
Consumer flow

2.5 Modules

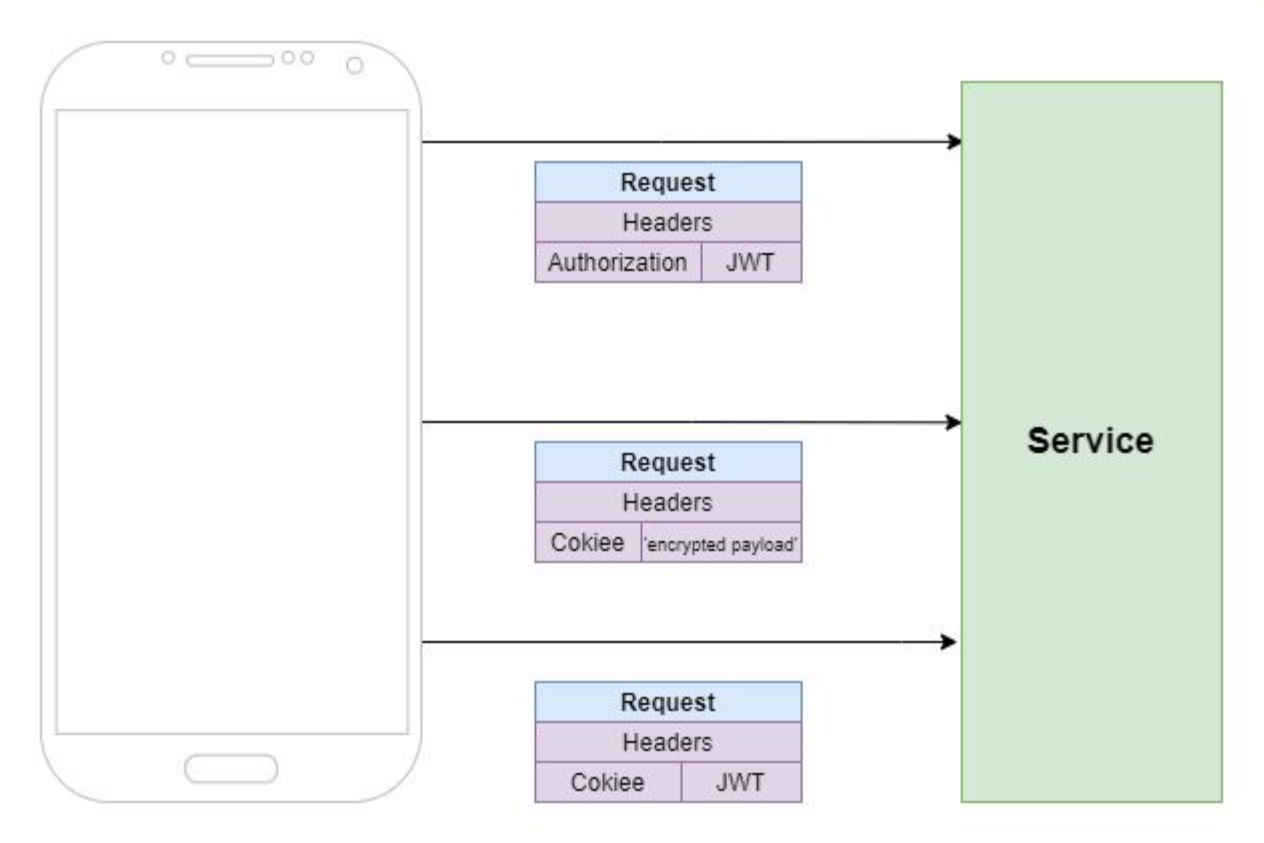
- Authentication and Authorization Strategies
- Scalable Image Upload
- Message Streaming
- Code Sharing
- Cross-Service Data Replication
- Version Control

2.5 Module-1

Authentication and Authorization

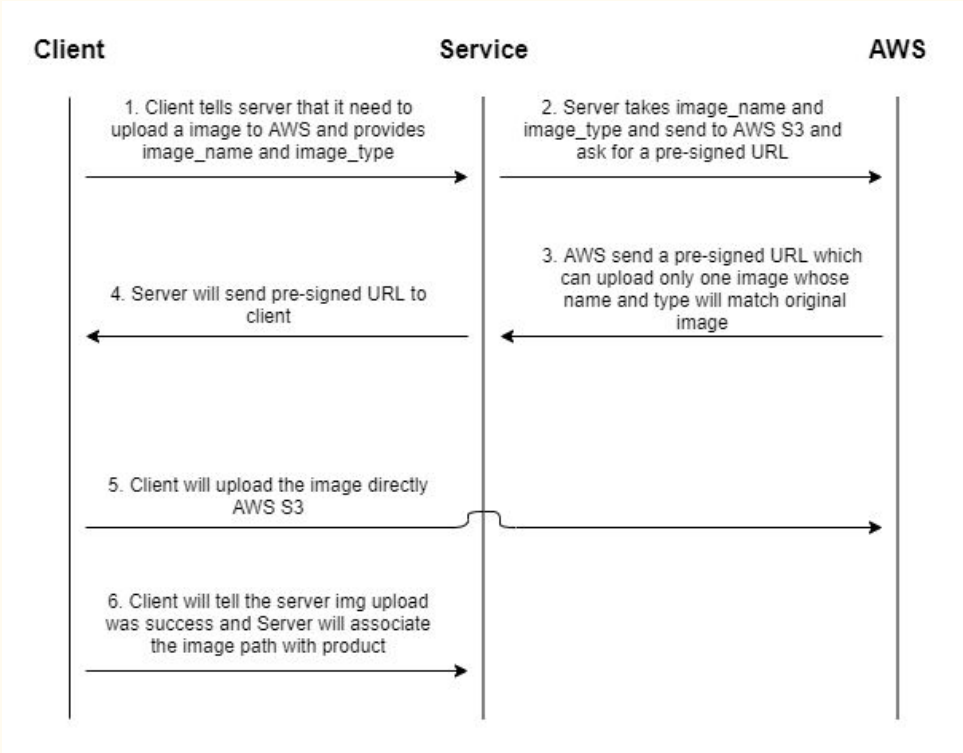


Teaching microservices how to Authenticate a user



Authentication Mechanism

2.5 Module-2 : Scalable Image Upload



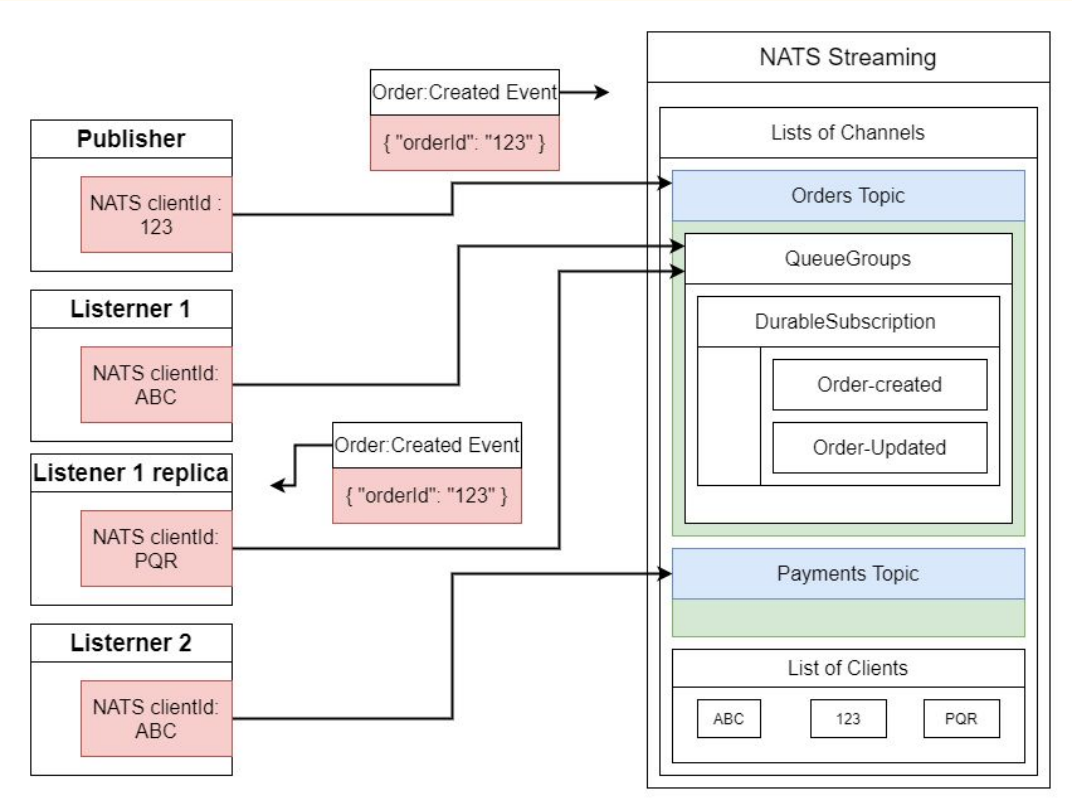
Working with Pre-signed URL flow

https://krishisetu.s3.ap-south-1.amazonaws.com/test/apple.jpeg?Content-Type=image%2Fjpeg&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=MY_AWS_ACCESS_KEY_ID%2Fap-south-1%2Faws4_request&X-Amz-Date=20210408T002339Z&X-Amz-Expires=900&X-Amz-Signature=6092937d89d0-s-d0g0-09fdb2b7a9402229bc1bee24c628382bd183ba3dcb80f8&X-Amz-SignedHeaders=host

Domain	https://krishisetu.s3.ap-south-1.amazonaws.com
FileName	apple.jpeg
AWSAccessKeyID	MY_AWS_ACCESS_KEY_ID
Content-type	image%2Fjpeg => image/jpeg
ExpiresAt	900 => 15 min (default)
Bucket Region	ap-south-1
Signature	6092937d89d0-s-d0g0-09fdb2b7a9402229bc1bee24c628382bd183ba3dcb80f8

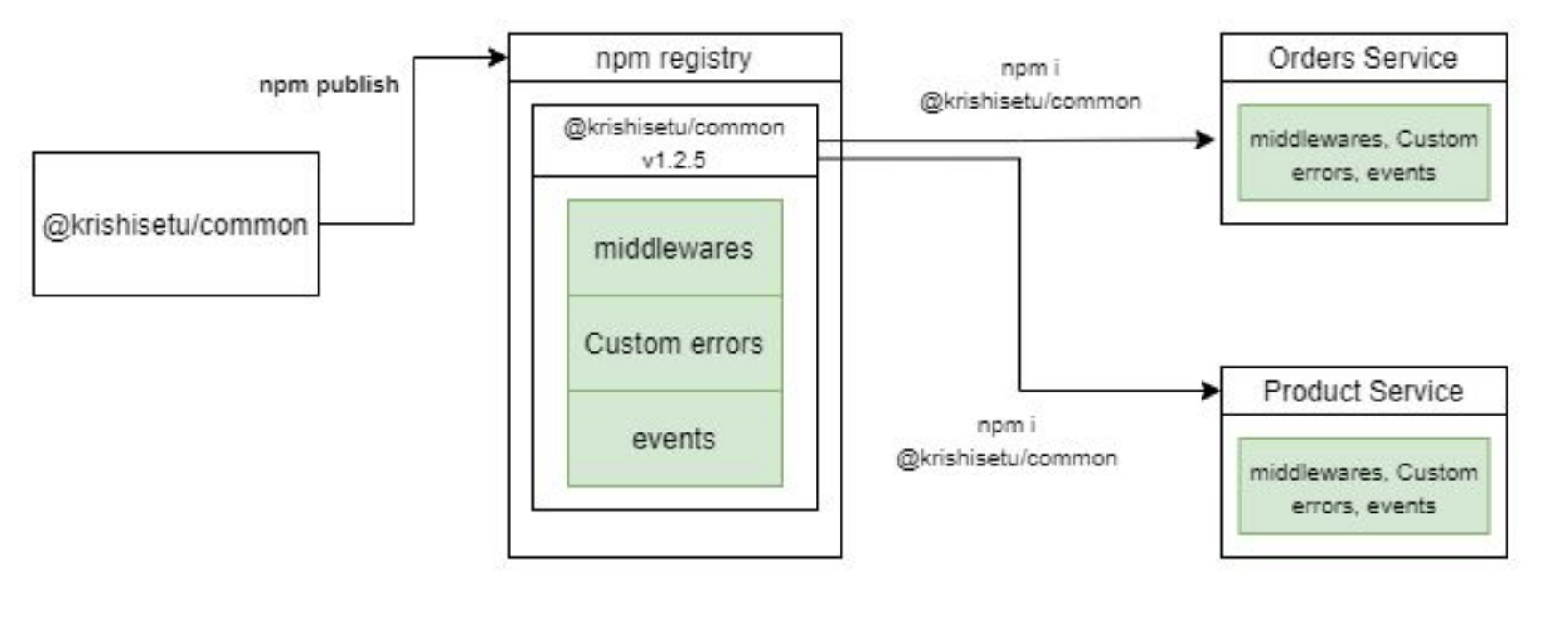
Example of pre-Signed URL

2.5 Module-3 : Message Streaming



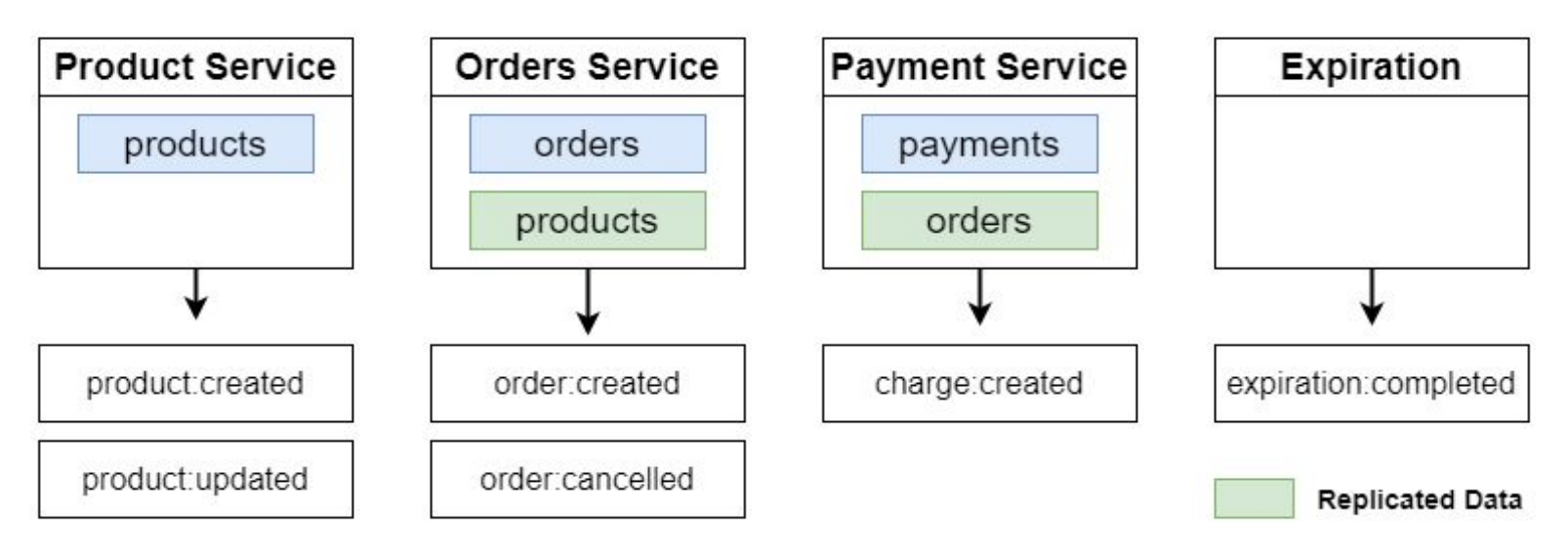
NATS pub-sub architecture

2.5 Module-4 : Code Sharing



@krishisetu/common npm module

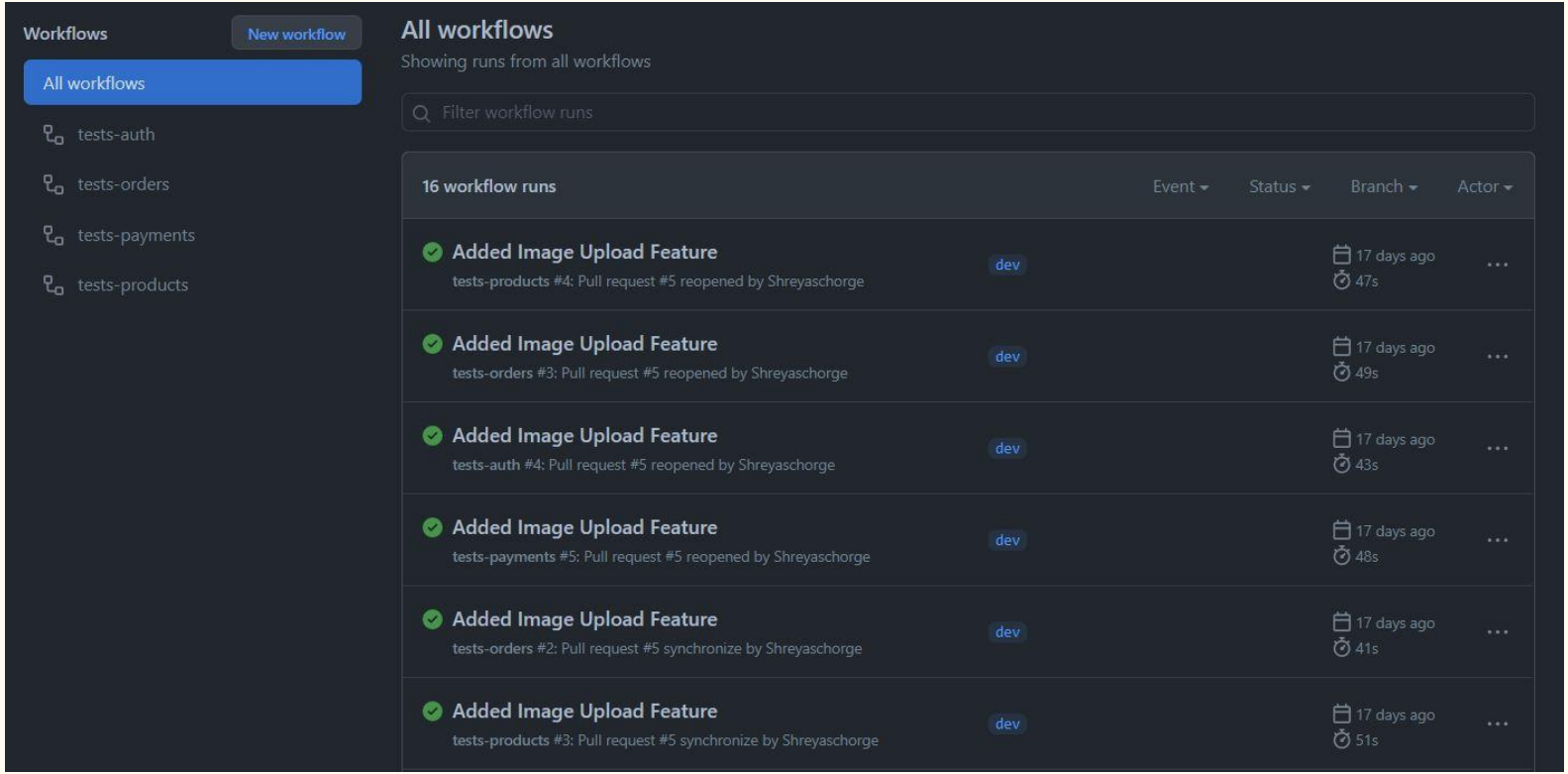
2.5 Module-5 : Cross-Service Data Replication



Cross-Service-Data-Replication

2.5 Module-6 : Version Control

Krishi Setu uses Github for version control. We are using Github Actions to automate testing. Automated tests get triggered every time we create a new pull request. After the testing is done we get the results of all the passed and failed test, if any test is a failing test we get a warning before we merge the code base with the master branch.



Automated test Suites

3. Conclusion and Future Scope

- The main objective to build this application is to eliminate all the middlemen from the chain of distribution cycle by providing them with the platform on which they can sell their goods directly to the local distributors of major cities thus giving them the value for their goods.
- Also making sure that the platform could maintain high traffic and scale up and scale down whenever necessary and it is always available to serve its users.
- The entire application is leveraging Open Source technologies thus encouraging the developers community to contribute to the growth of the application and making it more reliable to its users.
- For the future, we could add more services like a recommendation system, maps, comments, integrating monitoring system like Prometheus, Sharded Clusters and replica sets for reliability and high availability of the data.

References

[1] Leila Abdollahi Vayghan, Mohamed Aymen Saied, Maria Toeroe, Ferhat Khende, ”Kubernetes as an Availability Manager for Microservice Applications”, unpublished.

[2] L Magnon ”Modern Messaging for Distributed Systems”, Journal of Physics Conference Series 608(1):012038

[3] Poojya J Bhat, Priya D, ”Modern Messaging Queues - RabbitMQ, NATS and NATS Streaming”, International Journal of Recent Technology and Engineering (IJRTE)

Thank You