

# Distributed Streaming Platform Clone

## Abstract

MovieVerse is a microservices-based movie recommendation platform that offers personalized content based on region-specific availability. Built with Flask, MySQL, Docker, Kong API Gateway, and Kubernetes, this system allows modular, scalable movie fetching with high security and performance. Movies are filtered into three regions — India, USA, and UK — and monitored using Prometheus.

## 1 System Overview

The system is built on microservices architecture comprising the following:

- **Flask API Service:** Handles requests and interacts with the MySQL database.
- **MySQL Database:** Stores metadata about movies, user preferences, and regions.
- **Kong API Gateway:** Manages user requests, routes to services, and provides security.
- **Prometheus:** Monitors services and visualizes metrics.
- **Kubernetes:** Orchestrates all Dockerized services for scalable deployment.

## 2 Architecture Design

### 2.1 Microservices and Components

- **Database (MySQL):** Stores titles, languages, regions, and availability.
- **Data Access Layer (Flask):** Pulls data in JSON and renders to frontend.
- **API Gateway (Kong):** Filters traffic and ensures secure access.
- **Monitoring (Prometheus):** Tracks performance and uptime.
- **Orchestration (Kubernetes):** Manages container lifecycles and scaling.

Names from Database
Germany-Der mÃ¼de Tod
UK-A Matter of Life and Death
France, Italy-Le roi de coeur
France, Iran, USA-The Other Side of the Wind
India-Ankur
USA-Kiss Daddy Goodbye
USA-The Evil Dead
Hong Kong-Mo tai
India-Pestonjee
India-Ek Din Achanak
Chile-La Telenovela Errante
Iran-Leila
Canada-Joe Finds Grace
India-Aashirwad
Romania, Canada, USA-Teenage Space Vampires
USA-Against All Hope

Figure 1: Website from Dockerized MySQL Database

### 3 Region-Based Filtering

Kong routes incoming traffic based on region, resulting in 3 distinct endpoints:

- **India Service:** localhost:8050
- **USA Service:** localhost:8051
- **UK Service:** localhost:8052

Each service is Dockerized and deployed via Kubernetes for load balancing and resilience.

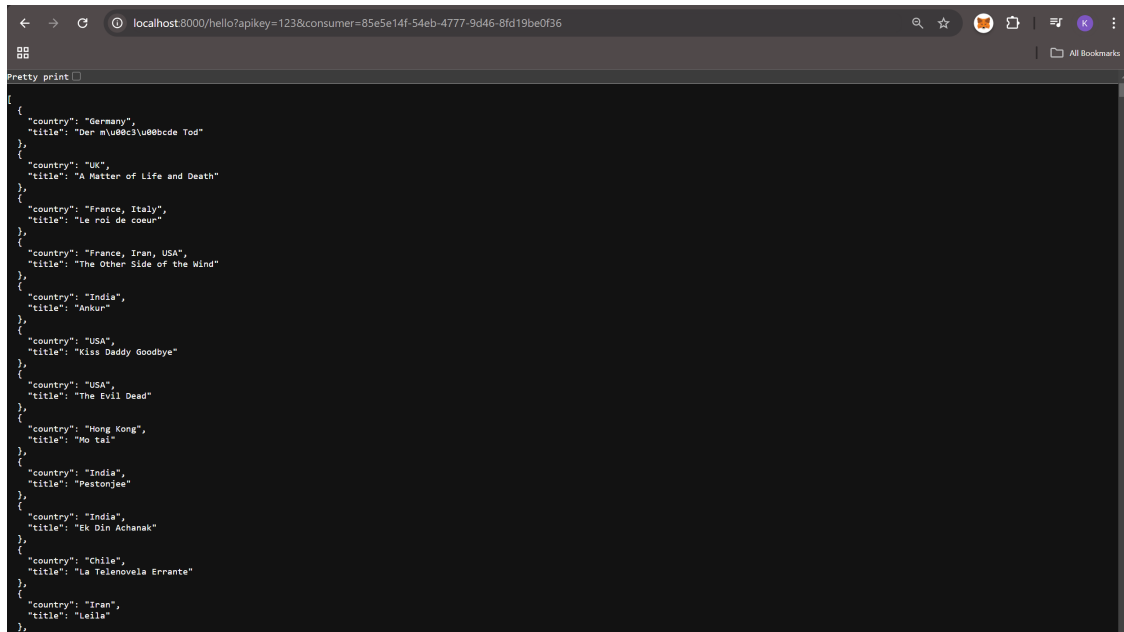
### 4 Kong API Gateway

Kong acts as the central access point for all user requests:

- **Routing and Load Balancing:** Directs traffic based on region.
- **Security:** Supports API keys and OAuth2.
- **Performance:** Uses caching, request limiting, and horizontal scaling.
- **Plugin Support:** Offers plugins for logging, monitoring, and transformations.

### 5 Monitoring and Scalability

Prometheus tracks metrics such as request rate and service health.

A screenshot of a web browser window displaying a JSON array of movie data. The browser's address bar shows the URL 'localhost:8000/hello?apikey=123&consumer=85e5e14f-54eb-4777-9d46-8fd19bc0f36'. The JSON data is formatted with a 'Pretty print' button. The data is an array of 15 objects, each containing 'country' and 'title' fields. The movies listed are: 'Der müde Tod' (Germany), 'A Matter of Life and Death' (UK), 'Le roi de coeur' (France, Italy), 'The Other Side of the Wind' (France, Iran, USA), 'Ankur' (India), 'Kiss Daddy Goodbye' (USA), 'The Evil Dead' (USA), 'Mo tai' (Hong Kong), 'Pestonjee' (India), 'Ek Din Achanak' (India), 'La Telenovela Errante' (Chile), and 'Leila' (Iran).

```
{
  {
    "country": "Germany",
    "title": "Der müde Tod"
  },
  {
    "country": "UK",
    "title": "A Matter of Life and Death"
  },
  {
    "country": "France, Italy",
    "title": "Le roi de coeur"
  },
  {
    "country": "France, Iran, USA",
    "title": "The Other Side of the Wind"
  },
  {
    "country": "India",
    "title": "Ankur"
  },
  {
    "country": "USA",
    "title": "Kiss Daddy Goodbye"
  },
  {
    "country": "USA",
    "title": "The Evil Dead"
  },
  {
    "country": "Hong Kong",
    "title": "Mo tai"
  },
  {
    "country": "India",
    "title": "Pestonjee"
  },
  {
    "country": "India",
    "title": "Ek Din Achanak"
  },
  {
    "country": "Chile",
    "title": "La Telenovela Errante"
  },
  {
    "country": "Iran",
    "title": "Leila"
  },
}
```

Figure 2: Movie Data via Kong API Gateway

## 6 Conclusion and Future Work

MovieVerse demonstrates how microservices, containerization, and orchestration can build a secure and region-aware recommendation platform. In the future, the system can be enhanced with:

- Circuit breakers for improved fault tolerance.
- Integration with external APIs for real-time movie updates.
- Advanced AI-based recommendation models.

```
localhost:8050/?apikey=123&consumer=85e5e14f-54eb-4777-9d46-8fd19be0f36

petty print

{
  "country": "India",
  "title": "Ankur"
},
{
  "country": "India",
  "title": "Pestonjee"
},
{
  "country": "India",
  "title": "EK Din Achanak"
},
{
  "country": "India",
  "title": "Ashirwad"
},
{
  "country": "USA, India",
  "title": "Bunyan and Babe"
},
{
  "country": "India",
  "title": "Ek Hasina Thi"
},
{
  "country": "India",
  "title": "Fakir of Venice"
},
{
  "country": "India",
  "title": "Pattabhiraman"
},
{
  "country": "India",
  "title": "Ispide Rajavum Idheya Raniyum"
},
{
  "country": "India",
  "title": "Gone Kesh"
},
{
  "country": "India",
  "title": "Medunivaadai"
},
{
  "country": "India",
  "title": "Mukherjee Dar Bou"
},
}
```

Figure 3: Filtered Movies for India

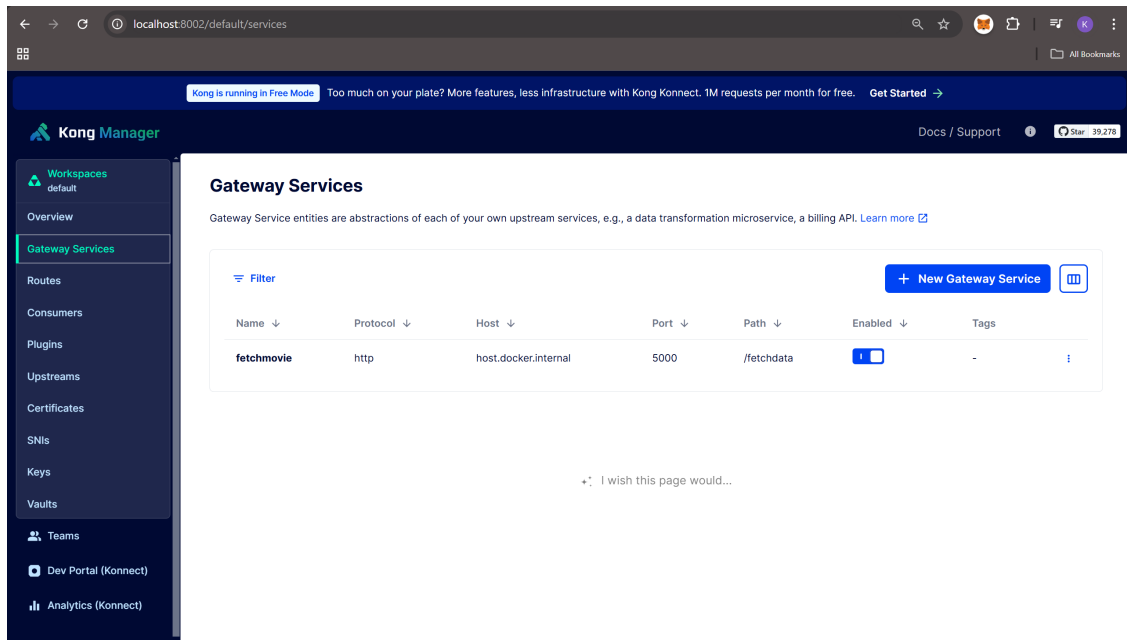


Figure 4: Kong API Gateway GUI

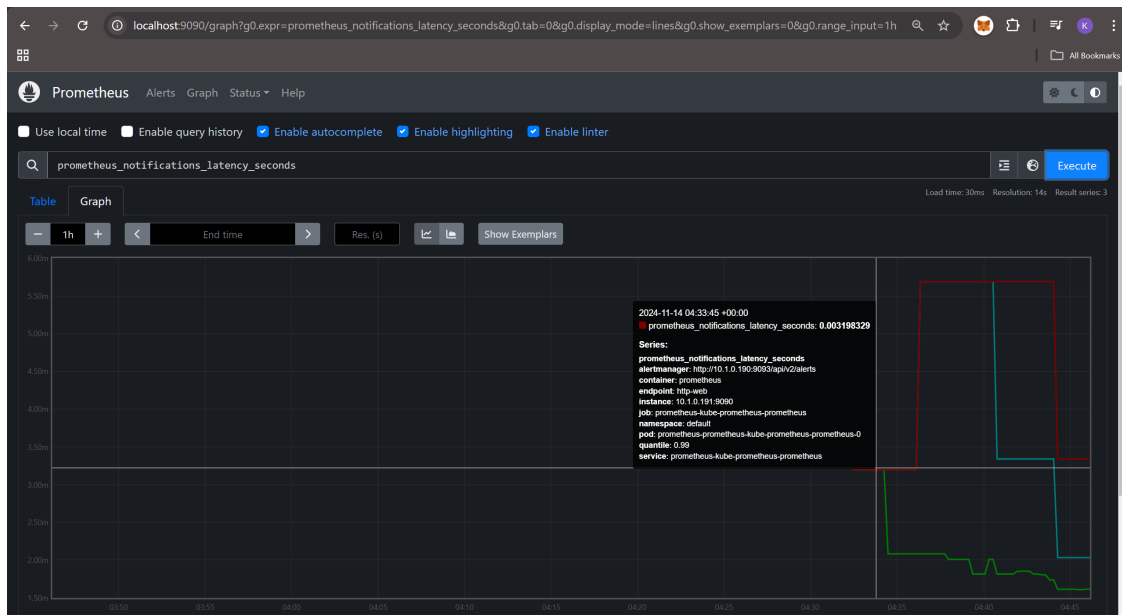


Figure 5: Prometheus Service Graph

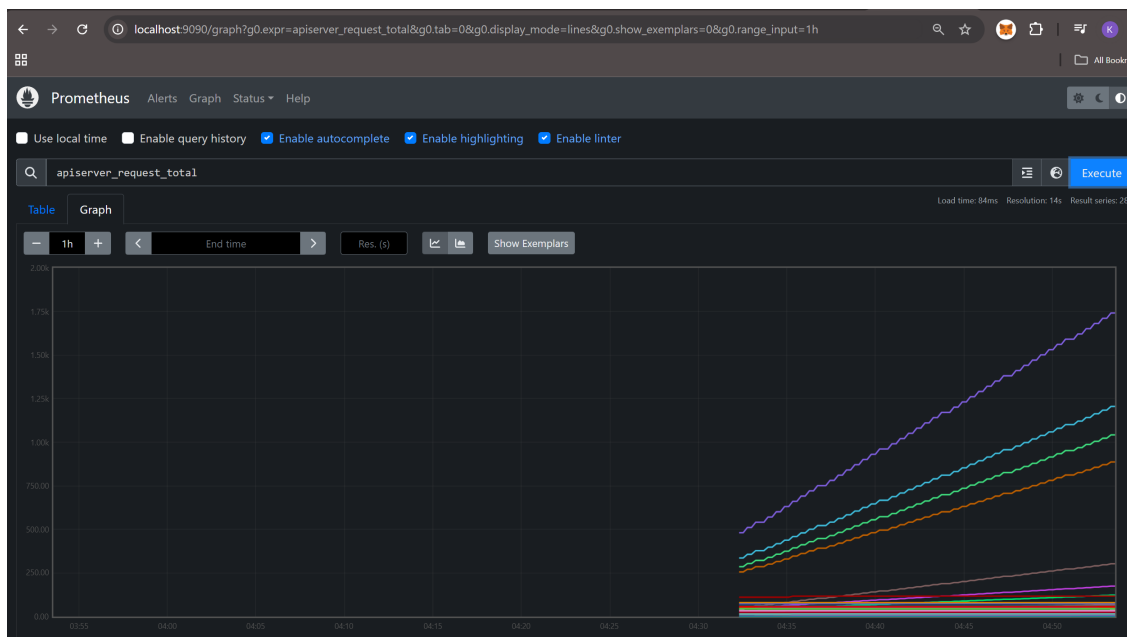


Figure 6: API Request Count from Prometheus