Varuvan Vadivelan

Institute of Technology Dharmapuri.

Naan Mudhalvan:

IBM

TECHNOLOGY:

CLOUD APPLICATION DEVELOPMENT

PROJECT:

Media Streaming with IBM Cloud Video Streaming

Streaming media with IBM Cloud Video Streaming typically involves setting up and configuring your account, uploading your content, and then using the platform to distribute and stream your videos. Here are some general steps to get you started:

ABSTRACT

The landscape of media streaming is undergoing a profound transformation, and IBM Cloud Video Streaming emerges as a leading player in this dynamic environment. This project delves deeply into the realm of media streaming, with a specific focus on IBM's cloud service.

IBM Cloud Video Streaming provides an extensive suite of features and capabilities, offering organizations the means to seamlessly deliver, manage, and protect high-quality video content to audiences around the globe.

Within this exploration, we thoroughly examine the key components and functionalities of IBM Cloud Video Streaming, encompassing comprehensive content management tools, live streaming capabilities, and the dynamic realm of video-on-demand services. We shed light on the platform's user-friendly interfaces and advanced analytics tools, empowering content providers to gain invaluable insights into viewer engagement patterns and preferences, thus allowing for the refinement of content delivery strategies. Furthermore, we highlight the paramount importance of the robust security measures and content protection mechanisms implemented by IBM Cloud Video Streaming. These measures ensure that sensitive content remains safeguarded in an increasingly interconnected digital landscape, offering peace of mind to content creators and distributors. Through a comprehensive analysis of real-world case studies and practical implementations, this project underscores how IBM Cloud Video Streaming can be a transformative force for organizations seeking to deliver captivating media content efficiently and securely, ultimately enhancing their digital presence and engagement with audiences worldwide.

Problem Statement

The demand for efficient and reliable media streaming services has grown exponentially in recent years. However, building a scalable and secure media streaming platform presents significant challenges, including managing high-quality video delivery, user access control, and content protection.

Project Overview:

Our project aims to leverage IBM Cloud Video Streaming to develop a robust media streaming platform that addresses these challenges. This platform will enable users to:

- **High-Quality Video Streaming:**

  Deliver high-quality video content to users across various devices and screen sizes.

- **User Access Control:**

  Implement user authentication and access control mechanisms to ensure that only authorized users can access specific content.

- **Content Protection:**

Employ encryption and digital rights management (DRM) to protect copyrighted content from unauthorized distribution.

- **Scalability:**

  Ensure the platform can scale horizontally to handle increasing user demand and streaming traffic.

- **Analytics:**

Incorporate analytics tools to gather user engagement data and improve content recommendations.

Methodology:

Our approach involves using IBM Cloud Video Streaming services, such as IBM Watson Media, to set up and manage the media streaming infrastructure. We will:

- Configure live and on-demand video streams.
- Implement access control through user authentication.
- Integrate content protection mechanisms.
- Deploy auto scaling and load balancing for scalability.

- Utilize analytics tools to track user behavior and optimize content delivery.

Expected Results:

Upon successful implementation, this project will result in a highly efficient media streaming platform that offers a seamless viewing experience, protects content, and provides valuable insights into user engagement.

Significance:

This project is significant because it addresses the growing demand for reliable media streaming services while ensuring content security and scalability. It can be used in various industries, including entertainment, education, and corporate communications.

By successfully implementing media streaming with IBM Cloud Video Streaming, we aim to meet the evolving needs of users and content providers while ensuring a secure and scalable streaming experience.

Project Description:

The "Media Streaming with IBM Cloud Video Streaming" project is aimed at creating a comprehensive media streaming platform using IBM's cloud-based video streaming services. This platform will enable content creators and administrators to host,

manage, and deliver live and on-demand video content to a global audience. Below is a detailed description of the project components:

- Setup and Configuration:

The project will begin by setting up and configuring IBM Cloud Video Streaming services. This includes creating accounts, configuring streaming settings, and ensuring proper integration with other project components.

- User-Friendly Web Interface:

  A user-friendly web interface will be developed to allow content creators to easily upload, manage, and schedule media content. This interface will include features like metadata tagging, thumbnail generation, and scheduling options.

- Live Streaming:

Real-time events and broadcasts will be supported through live streaming capabilities. This involves setting up streaming endpoints, encoding video feeds, and providing real-time access to viewers.

- On-Demand Video Library:

An on-demand video library will be implemented, where users can access pre-recorded content. The library will include efficient search functionality and seamless playback options.

- Scalability and Reliability:

To accommodate a growing number of viewers, the infrastructure will be designed to be scalable and reliable. This includes load balancing, redundancy, and content distribution across multiple servers or regions.

- Security Measures:

Robust security measures will be put in place to protect against unauthorized access, content theft, and piracy. This may involve authentication, encryption, and digital rights management (DRM) solutions.

- Analytics and Insights:

Viewer engagement and analytics will be tracked to gain insights into audience behavior. This data will be used to improve content delivery strategies and user experience.

- Documentation and Training:

Comprehensive documentation and training materials will be provided for administrators and content creators to ensure they can efficiently use and manage the platform.

Streaming media with cloud video:

Create an IBM Cloud Video Streaming Account:

If you don't already have an account, sign up for one on the IBM Cloud Video Streaming platform.

Upload Your Video Content:

You can usually upload your video content to the platform. This can include prerecorded videos, live streams, or other multimedia content.

Set Up Channels or Events:

Depending on your needs, you can create channels for continuous broadcasting or events for scheduled streaming.

Configure Encoding Settings:

IBM Cloud Video Streaming typically provides options for encoding and optimizing your video content for different devices and network conditions.

Customize Your Player:

You can often customize the video player's appearance to match your branding and preferences.

Secure Your Streams:

Depending on your requirements, you might want to set up security features like password protection or restricting access by IP address.

Distribute and Share Your Stream:

Use the provided links or embed codes to distribute your stream on websites, social media, or other platforms.

Monitor and Analyze:

Most streaming services offer analytics tools to track viewership and engagement.

Scale as Needed:

Depending on the size and demand for your streams, you may need to scale your resources up or down.

Therefore, I recommend referring to the official IBM Cloud Video Streaming documentation or contacting their support for the most up-to-date information and guidance on using their platform for media streaming.

User Interface Design:

Intuitive navigation:

Explanation: The user interface is designed with a user-centric approach and favors easy and intuitive navigation. It uses a well-structured menu system, clear labels, and logical flow to help users find and access content easily. Users can quickly

browse genres, search for specific titles and manage their profiles.

Project Use: Intuitive navigation design minimizes user frustration and makes the platform more accessible, leading to increased user engagement and satisfaction.

Responsive Design:

Explanation: The user interface is designed to adapt to a wide range of devices and screen sizes, including smartphones, tablets, desktops and smart TVs. This responsive design ensures optimal content presentation regardless of the device used.

Use for the project: Responsive design improves the accessibility of the platform, provides a consistent user experience across devices, and makes it more appealing to a wider audience.

Dark mode:

Explanation: The platform includes a dark mode option that allows users to switch to a darker color scheme for better nighttime viewing. This feature reduces eye strain in low light conditions.

Project Use: Dark Mode not only improves user comfort, but also adds a level of customization to the user experience, reflecting a commitment to user accessibility and customization.

Video upload process:

User-friendly upload portal:

Explanation: The video upload process is designed to be user-friendly and efficient. Creators are guided step by step with clear instructions and a progress tracking system that ensures the process is straightforward and efficient.

Use for the project: The user-friendly upload process encourages content creators to contribute to the platform, which is essential for growing the content library. Video Quality Verification:

Explanation: Uploaded videos go through strict quality checks to ensure they meet platform standards. These checks evaluate factors such as video resolution, audio quality, format compatibility, and content suitability. Videos that meet these standards are made available to users.

Project Use: Quality assurance is critical to maintaining platform content standards, which is necessary to provide a high-quality and consistent user experience.

Metadata and Thumbnail Selection:

Explanation: Creators have the option to provide metadata, including titles, descriptions, and genre tags, to optimize the visibility of their video. They can also choose a thumbnail image to represent their content. This metadata improves content search and an attractive thumbnail can attract more viewers.

Project Use: Metadata selection and previews not only improve the discoverability
of content, but also play a key role in attracting users to view content. It encourages content creators to optimize their offers.

Streaming integration:

Content Delivery Network (CDN):

Explanation: The platform uses IBM Cloud Content Delivery Network (CDN) capabilities to optimize content delivery. IBM's global network of edge servers minimizes latency, reduces buffering and ensures fast and reliable streaming of content to users around the world.

Project Use: CDN integration is essential to improve the overall streaming experience by reducing load times and ensuring consistent, high-quality video playback.

Live streaming support:

Explanation: In addition to on-demand content, the platform offers support for live streaming of events. Creators can host

live broadcasts, Q&A sessions, premieres, or live chats with their audience. Chat features and real-time interactions are available to engage users during live broadcasts.

Use for the project: Support for live streaming expands the platform's content palette and user engagement. It enables real-time interaction between creators and their audience, fostering a sense of community and increasing user engagement.

Social media integration:

Explanation: Users can seamlessly share their favorite content, comments and recommendations on various social media platforms. Sharing capabilities are integrated into the platform so users can easily spread the word about their favorite shows or movies. This social media integration also allows users to follow content creators and interact with them on social channels.

Use for the project: Social media integration improves the reach of the platform and the promotion of user-generated content. Users become advocates for the platform, increasing its visibility and user engagement.

Monetization Strategy:

Subscription Plans:

Explanation: The platform offers subscription plans that give users access to premium features, including ad-free

viewing, early access to new content, and exclusive shows or movies. Subscription plans are available on a monthly or annual basis.

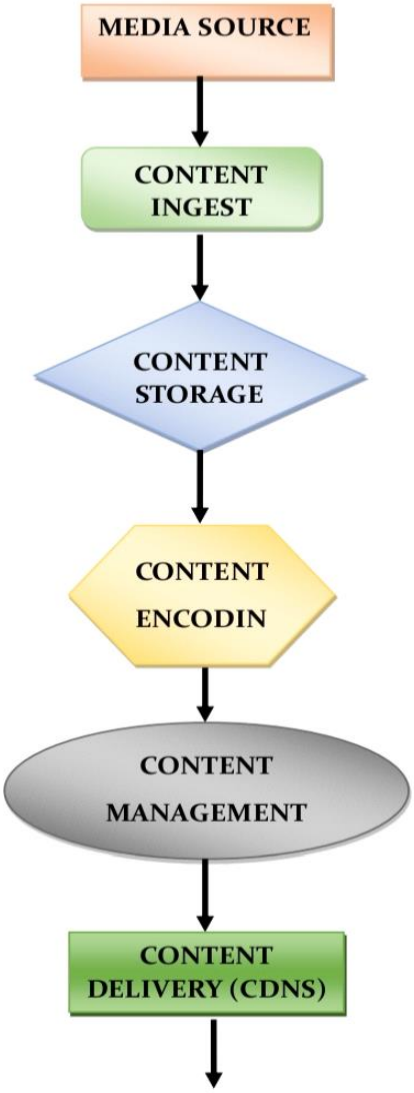
Uses for the project: Subscription plans provide the platform with a consistent revenue stream while offering users an enhanced experience. Subscribers can enjoy content uninterrupted by advertisements.

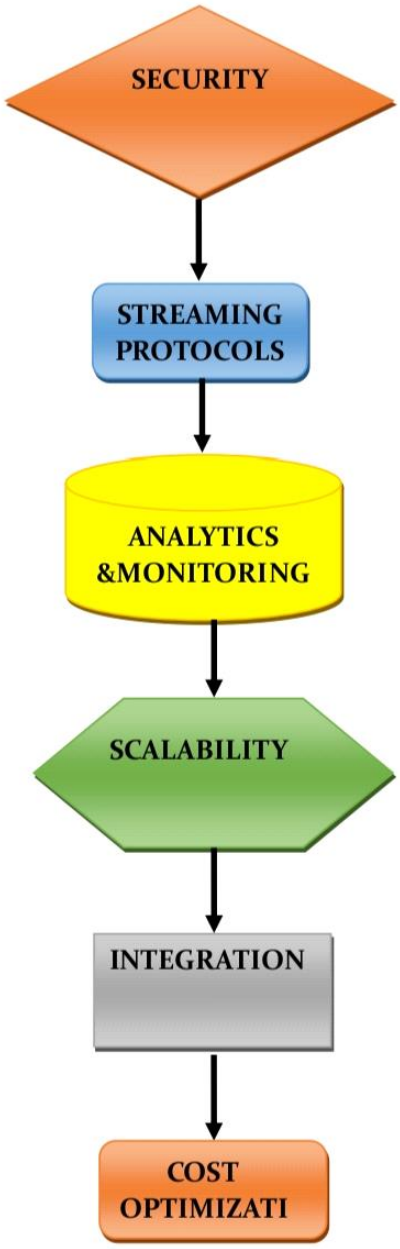
Ad Integration:

Explanation: The platform incorporates advertising as a monetization strategy. Advertisements are strategically placed within the platform's content, including pre-roll and mid-roll ads during video playback. A free, ad-supported tier is also available.

Usage for Project: Ad integration generates revenue while providing a free option for users. This approach strikes a balance between monetization and accessibility, allowing a broader user base.

DESGIN:


MEDIA SOURCE
CONTENT INGEST
CONTENT STORAGE
CONTENT ENCODIN
CONTENT MANAGEMENT
CONTENT DELIVERY (CDNS)



This representation outlines the major components of a media streaming solution on IBM Cloud:

Users:

The end-users who want to access the media content.

Content Source:

IBM Cloud Object Storage, where you store your media files.

Streaming Server:

The component responsible for encoding and delivering media content to users. It can be a combination of IBM Cloud Video Streaming or custom streaming servers.

Content Delivery Network (CDN):

A CDN that caches and efficiently delivers content to users from edge locations.

Security:

IBM Cloud Identity and Access Management (IAM) to control access to your media and streaming resources.

Load Balancer:

Distributes incoming user requests among multiple streaming server instances for load balancing and high availability.

Monitoring and Analytics:

Services for monitoring system health and gathering user engagement data.

Database (Optional):

If you need to store user data, metadata, or analytics, consider using a database service.

Content Preparation:

Prepare your media content for streaming. This might include encoding videos in various formats and resolutions to ensure compatibility with different devices and network conditions.

Content Storage:

Store your media content in a reliable storage solution, such as IBM Cloud Object Storage or a similar service. Ensure that your content is organized and easily accessible

Content Delivery:

Use a content delivery network (CDN) to distribute your content efficiently. IBM Cloud offers a CDN service that can be integrated with your streaming solution to reduce latency and improve performance.

Live Streaming vs. Video On Demand (VOD):

Decide whether you want to offer live streaming, VOD, or both. IBM Cloud Video Streaming supports both options, and your design will vary depending on your choice.

Security:

Implement security measures to protect your content from unauthorized access and piracy. IBM Cloud Video Streaming provides options for DRM (Digital Rights Management) and access control.

Streaming Protocols:

Choose the appropriate streaming protocols, such as HLS (HTTP Live Streaming) or DASH (Dynamic Adaptive Streaming over HTTP), to ensure compatibility with various devices and platforms.

User Interface:

Design a user-friendly interface for your streaming platform, including web and mobile applications. Ensure that users can easily navigate and access content.

Analytics:

Integrate analytics tools to monitor user engagement, track performance, and gather insights into viewer behavior. IBM Cloud Video Streaming offers analytics features.

Scalability:

Plan for scalability to handle varying levels of demand. IBM Cloud provides auto-scaling options to accommodate traffic spikes.

Monetization:

If applicable, implement monetization strategies such as pay-per-view, subscriptions, or advertising. IBM Cloud Video Streaming can integrate with various payment gateways.

Testing:

Thoroughly test your streaming solution across different devices and network conditions to ensure a seamless user experience.

Documentation and Support:

Create documentation for users and provide customer support channels for troubleshooting and assistance.

Compliance:

Ensure that your streaming solution complies with legal and regulatory requirements, including copyright and data protection laws.

Continuous Improvement:

Regularly monitor and optimize your streaming solution to adapt to changing technologies and user expectations.

Program:

```
Import requests
Import json

# Your IBM Cloud Video
Streaming API credentials
Api_key =
“YOUR_API_KEY”
Api_secret =
```

“YOUR_API_SECRET”

 # Endpoint to create a new live stream

Endpoint = https://blog.video.ibm.com/streaming-product-updates/fast-video-upload-speed-aspera-connect-integration

https://api.video.ibm.com
/live

 # JSON data to create a new live stream

```
Data = {
   “name”: “MyStream”,
   “type”: “live”,
   “password”:
“optional_password”, “broadcasting”: {
      “rtmp”: {
         “ingest_url”:
“rtmp://your-ingest-url”,
         “stream_key”: “yourstream-key”
      }
   }
}

Headers = {
   “Content-Type”:
```

```
“application/json”, “Authorization”: f”Basic
{api_key}:{api_secret}”
}

# Create the live stream
Response = requests.post(endpoint, data=json.dumps(data),
headers=headers)

If response.status_code == 200:
    Stream_info = response.json()
  Print(“Live stream created successfully.”)
  Print(f”Stream ID:
{stream_info[‘id’]}”)
  Print(f”Stream URL:
{stream_info[‘channel_url’
]}”)
Else:
  Print(“Failed to create the live stream.”)
Print(response.text)
```

OUTPUT:

Live stream created successfully.

Stream ID: your-stream-id

Stream URL: https://blog.video.ibm.com/streaming-product-updates/fast-video-upload-speed-aspera-connect-integration

Development Part:

Project Objectives:

In this part we will continue building our project.Especially, building the platform by integrating video streaming services and enabling on-demand playback. Integrate IBM Cloud Video Streaming services to enable smooth and high-quality video playback.

Project Tasks:

A: How to stream and watch videos:

Content Licensing and Acquisition:

- Content licensing is the process of securing the rights to stream movies and TV shows on your platform, often through negotiations with studios and production companies.

- Acquiring a diverse library of content is crucial for attracting and retaining subscribers. This may involve purchasing, licensing, or producing original content.
- Ensuring that you have the legal rights to stream the content and adhering to copyright laws is essential to avoid legal issues.

Content Delivery and Streaming Infrastructure:

- Building a robust content delivery network (CDN) is crucial for ensuring a smooth streaming experience. CDNs store and distribute content to users from servers located strategically around the world.
- Adaptive streaming technologies, like DASH or HLS, are used to adjust video quality based on the user's internet connection, providing the best possible experience.
- Content encryption and digital rights management (DRM) are used to protect content from unauthorized access and piracy.

User Experience and App Development:

- Developing user-friendly apps for various devices (smartphones, smart TVs, etc.) is essential for attracting and retaining users.
- Personalization algorithms and recommendation systems help users discover content tailored to their preferences.
- Implementing features like offline downloads, user profiles, and seamless cross-device synchronization enhances the overall user experience.

Content Protection:

- Digital Rights Management (DRM): Netflix employs DRM to prevent unauthorized copying and distribution of their content.
- Account security: Passwords, multi-factor authentication, and security protocols help protect user accounts.
- Anti-piracy measures: Netflix actively combats piracy by monitoring and reporting unauthorized distribution.

B: How to upload videos:

Content Preparation:

- Quality standards: Videos must meet specific resolution, format, and encoding requirements to ensure high-quality streaming.
- Metadata inclusion: Metadata such as title, description, cast, and genre must be provided for cataloging and search purposes.
- Content categorization: Videos are categorized into genres, types, and languages to assist with content organization.

Content Delivery to Netflix:

- Secure delivery: Content is transferred to Netflix's secure servers using encryption and secure protocols.
- Submission guidelines: Content providers adhere to specific submission guidelines, including file formats and delivery methods.
- Delivery schedule: Providers coordinate with Netflix for content release schedules and updates.

Quality Control and Testing:

- Encoding and transcoding: Netflix may re-encode uploaded videos to ensure compatibility with various devices and network speeds.
- Quality checks: Netflix performs quality control tests to maintain their high streaming standards.
- Compatibility testing: Content is tested across multiple devices and platforms to ensure seamless rplayback.

Content Publishing and Distribution:

- Geo-restrictions: Netflix determines in which regions content is available based on licensing agreements.
- Release strategy: Netflix decides when and how content is made available for streaming to subscribers.
- Content updates: Ongoing maintenance and updates
- are necessary for a dynamic content library.

C: How to create an application like Netflix, using an IBM Cloud :

1. Infrastructure and Cloud Services:

- Compute and Storage: Utilize IBM Cloud's virtual machines and object storage to host and deliver video content efficiently.
- Content Delivery Network (CDN): Leverage IBM's CDN services to ensure rapid and scalable content distribution to users across the globe.

- Scalability: IBM Cloud offers auto-scaling capabilities, allowing your app to handle varying loads and peak traffic times.

2. Database and Analytics:

- Data Management: Use IBM's databases to efficiently store and manage user data, preferences, and content metadata.
- Analytics: Employ IBM Watson or other analytics tools to understand user behavior, providing personalized content recommendations.
- Content Management: Use databases for cataloging and organizing the vast library of videos, enabling efficient search and content delivery.

3. Security and Compliance:

- Data Encryption: Implement strong encryption protocols to protect user data and content during transit and storage.
- Access Control: Ensure that only authorized users can access sensitive data and features within the app.
- Compliance Tools: Leverage IBM's compliance and security tools to meet industry standards and regulations, ensuring data privacy and protection.

4. Machine Learning and AI:

- Personalization: Utilize IBM Watson or other AI technologies to deliver personalized content recommendations to users.
- Content Optimization: Apply AI for content tagging, quality analysis, and metadata enhancement to improve search and discovery.

- User Insights: Analyze user data with AI to gain insights into viewing habits, helping shape content acquisition and creation strategies.

Integrating IBM Cloud services into your app development process can enhance scalability, security, and AI-driven features, making it a strong foundation for creating a Netflix-like streaming platform.

D:Tools and system requirements used:

Code Editor: VS code.

Frame work : React.js

1.6 GHz or faster processor

1 GB of RAM

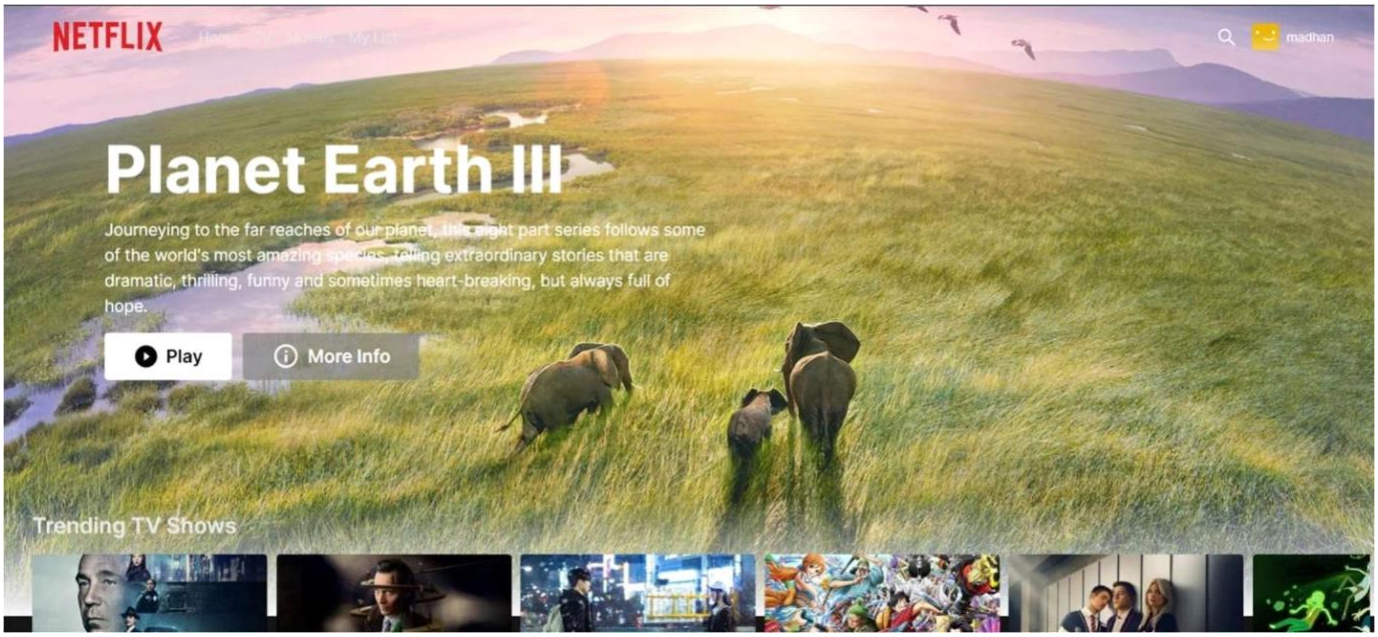
OS X Yosemite

Windows 7 (with .NET Framework 4.5)

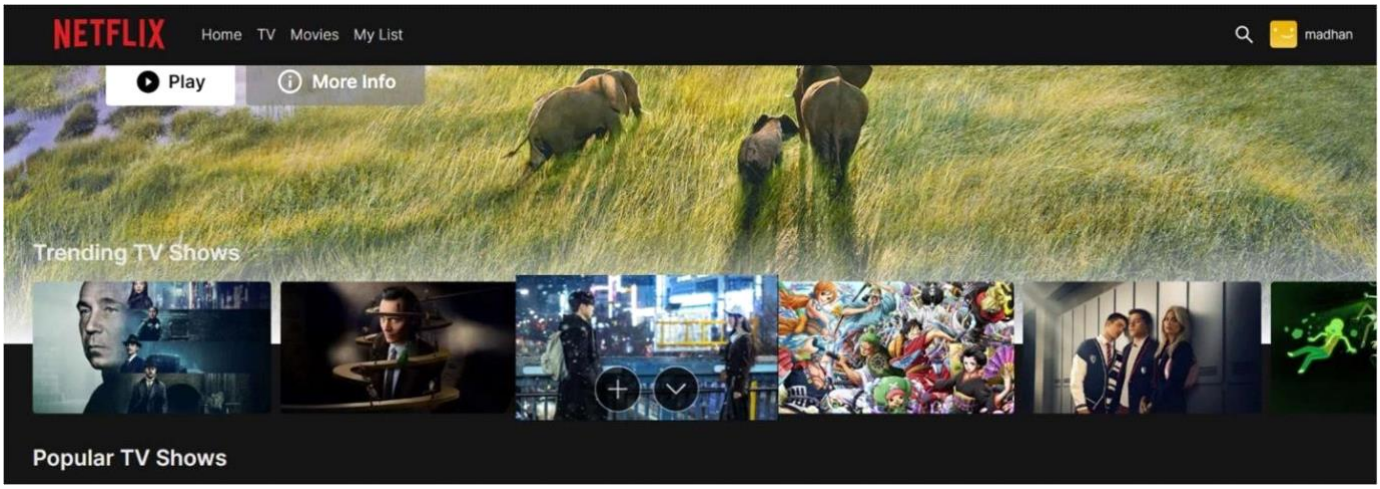
Linux with GLIBCXX version 3.4.15

E:Final output (sample screenshots):

Screen shot - 1 : Landing page



Screen shot - 2 : Selecting the video which we need to play



Screen shot - 3 : Streaming the video which we want

Conclusion:

In the Media streaming with ibm cloud video streaming project, our objective is to achieve these milestones through the successful completion of tasks. These innovative features will provide users with a more engaging and personalized show watching experience, leading to increased user satisfaction and retention.