MEDIA STREAMING WITH IBM CLOUD VIDEO STREAMING

Phase 3: Development Part 2

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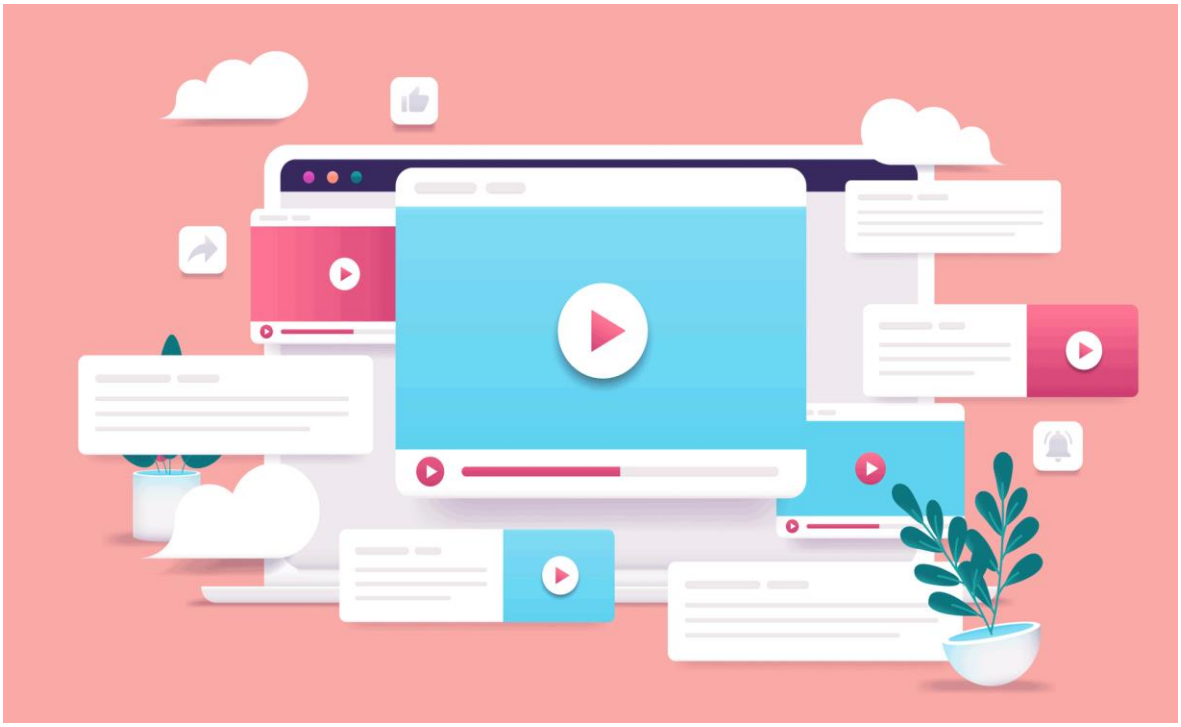
Introduction:

- ✓ Our project aims to create a cutting-edge video streaming platform that offers users a seamless and immersive video playback experience.
- ✓
- ✓ In an age where digital video content is king, our platform aspires to be the go-to destination for content creators and viewers alike.
- ✓
- ✓ We recognize the increasing demand for high-quality video streaming services, and this project is our response to that need.



Platform Features:

A platform's features refer to the functionalities and capabilities it offers to users. These may include user registration, content creation, communication tools, and more.

1. **User Registration:**

- Allow users to sign up with their email address or social media accounts.
- Collect essential information during registration, such as name, email, and password.
- Send a verification email to confirm the user's email address.

2. User Profile:

- Let users edit and update their profiles.
- Include profile pictures and personal information.
- Provide an option to set privacy settings for profile visibility.

3. Dashboard:

- Display personalized content and information.
- Show recent activity, notifications, and updates.

4. Search and Discovery:

- Enable users to search for content, users, or items.
- Implement filters, categories, and sorting options for ease of navigation.

5. Content Creation and Sharing:

- Allow users to create, upload, or post content (e.g., text, images, videos).
- Include options for adding tags and descriptions.
- Provide sharing options, including public, private, and restricted sharing

6. Interactions

- Support likes, comments, and shares on user-generated content.
- Enable direct messaging and communication between users.

7. Security and Privacy:

- Implement encryption for data transmission.
- Allow users to set privacy preferences for their content and profile.
- Regularly update security measures to protect user data.

8. Notifications:

- Send notifications for new messages, comments, likes, and relevant updates.
- Provide notification settings for user customization.

Intuitive User Interface:

An intuitive user interface is a design that is user-friendly and easy to understand. It ensures that users can navigate the platform effortlessly, with clear visuals, easy-to-use menus, and a logical layout.

1. **Clean and Minimalistic Design:**

- Use a clean and intuitive design with a consistent color scheme.
- Prioritize readability and accessibility.

2. **Navigation:**

- Place a navigation menu or sidebar for easy access to different sections of the platform.
- Use clear icons and labels for each section.

3. **User Profile:**

- Include a user profile picture and basic information.
- Show a list of recent activity and posts on the user's profile.

4. **Content Feed:**

- Display a personalized content feed with a mix of posts and recommendations.
- Use responsive card-based layouts for posts with images and captions.

5. **Search and Discovery:**

- Provide a search bar prominently at the top of the interface.
- Offer filtering and sorting options for search results.

6. **Content Creation:**

- Include a user-friendly content creation interface with options for adding media and tags.
- Use a WYSIWYG editor for text-based content.

7. **Notifications:**

- Place a notification icon or dropdown for instant access to alerts.
- Highlight unread notifications.

User Registration and Authentication Mechanisms:

1. **Registration:**

- Use HTTPS to encrypt data during registration.
- Verify email addresses by sending a confirmation link.
- Implement CAPTCHA or similar mechanisms to prevent bots.

2. **Authentication:**

- Use secure password hashing and salting techniques.
- Offer multi-factor authentication (MFA) options like SMS codes, email codes, or authenticator apps.
- Implement account lockout mechanisms after multiple failed login attempts to prevent brute force attacks.

3. **Session Management:**

- Use secure session tokens and set session timeouts.
- Provide a "Remember Me" option for convenience during subsequent logins.

4. **Security Measures:**

- Regularly update the platform to patch security vulnerabilities.
- Implement rate limiting to prevent login attempts from the same IP.

5. **Privacy Controls:**

- Allow users to set privacy preferences for their profiles and content.
- Clearly explain privacy settings to users.

6. **Data Protection:**

- Comply with data protection laws (e.g., GDPR, CCPA) and secure user data.

Database Integration

Database Selection:

- For the efficient storage of video information, user data, and other essential details, we've chosen to implement a relational database management system.
- MySQL, a widely-used open-source database, will serve as the backbone of our data storage and management.

Database Schema:

- To organize and manage data effectively, we've designed a comprehensive database schema.
- It includes the following key tables and their associated attributes:

Users Table:

- User ID
- Username
- Email
- Password (hashed and salted)
- User Roles/Permissions

Videos Table:

- Video ID
- Title
- Description
- Video URL
- Thumbnail URL
- Uploader (User ID)
- Upload Date
- Views
- Likes/Dislikes

- Comments

Video Categories Table:

- Category ID
- Category Name
- Video IDs (linked to videos in relevant categories)

User Favorites Table:

- User ID
- Favorite Video IDs

User History Table:

- User ID
- Watched Video IDs
- Timestamps

Database Functionality:

- **Data Retrieval**: The database will be queried to retrieve video details, user information, and other relevant data for seamless platform functionality.
- **Data Storage**: The database will store user profiles, video metadata, viewing history, and preferences.
- **Data Relationships**: Tables are linked to establish relationships between users, videos, categories, and user activities (such as favorites and history).

Database Security:

- To protect sensitive user information, password hashing and salting will be implemented to safeguard user credentials.
- Proper user authentication and authorization mechanisms will ensure secure data access.

Scalability and Performance:

The database architecture is designed to scale efficiently as the platform grows, ensuring consistent and fast access to data, even during periods of increased user activity.

Backup and Recovery:

Regular automated backups and data recovery procedures will be in place to prevent data loss in case of unexpected events.

On-Demand Playback

Video Player Development:

To enable on-demand video playback, a user-friendly video player component has been developed as an integral part of our platform. This player is designed to provide a captivating viewing experience for our users. Key features of the video player include:

HTML5 Video Player: Our platform employs HTML5 video players to ensure compatibility with a wide range of devices and browsers, allowing users to watch videos seamlessly on desktop and mobile devices.

Adaptive Streaming: We've integrated adaptive streaming technology to automatically adjust the video quality based on the user's internet connection, providing a buffer-free viewing experience.

Fullscreen Mode: Users have the option to switch to fullscreen mode for an immersive viewing experience.

Playback Controls: Standard playback controls such as play, pause, volume, and progress bar are incorporated for easy navigation.

Thumbnail Previews: Hovering over the video progress bar displays thumbnail previews, making it easier for users to jump to specific parts of the video.

On-Demand Fetching:

Our platform is designed to fetch and play videos on-demand. When a user selects a video, the following steps occur to ensure seamless playback:

1. User Request: When a user selects a video for playback, the platform sends a request to the video streaming service to retrieve the video data.

2. Video Fetching: The video streaming service provides the video content, which is delivered via adaptive streaming protocols such as HLS (HTTP Live Streaming) or DASH (Dynamic Adaptive Streaming over HTTP).

3. Local Caching: To optimize performance, the video content may be locally cached on the user's device, reducing the need for repeated fetching of the same video.

4. Video Playback: The video player component on our platform then takes the fetched video data and presents it to the user, ensuring smooth and high-quality playback.

Seamless Transition Between Videos:
Our platform provides a seamless transition between videos, whether users are watching a series of episodes, a playlist, or related content. Users can easily navigate to the next video in the sequence, enhancing their viewing experience.

User Experience Enhancement:
On-demand playback is at the core of our platform, allowing users to watch content at their convenience. Whether it's catching up on missed live events or exploring a vast library of content, the on-demand playback functionality ensures users have the flexibility to enjoy videos on their terms.

User Interface (HTML/CSS/JavaScript):

1. **HTML (index.html):**

<!DOCTYPE html>

```
<html>
<head>
  <link rel="stylesheet" type="text/css" href="styles.css">
</head>
<body>
  <header>
    <h1>Welcome to My Streaming Platform</h1>
  </header>
  <main>
    <video id="video-player" controls></video>
  </main>
  <footer>
    <button id="start-stream">Start Streaming</button>
    <button id="stop-stream">Stop Streaming</button>
  </footer>
  <script src="script.js"></script>
</body>
</html>
```

1. **CSS (styles.css):**

```
body {
  font-family: Arial, sans-serif;
}

header {
  text-align: center;
  background-color: #333;
  color: #fff;
  padding: 10px;
}
```

```
main {
    text-align: center;
    padding: 20px;
}

footer {
    text-align: center;
    background-color: #333;
    color: #fff;
    padding: 10px;
}
```

1. **JavaScript (script.js):**

```
const videoPlayer = document.getElementById('video-player');
const startStreamButton = document.getElementById('start-stream');
const stopStreamButton = document.getElementById('stop-stream');

// Event listeners for streaming buttons
startStreamButton.addEventListener('click', startStreaming);
stopStreamButton.addEventListener('click', stopStreaming);

function startStreaming() {
    const request = require('request');

// Replace these with your IBM Video Streaming API credentials
const apiKey = 'YOUR_API_KEY';
const accountId = 'YOUR_ACCOUNT_ID';
const accessToken = 'YOUR_ACCESS_TOKEN';

// Set up the endpoint for starting a stream
const startStreamEndpoint =
`https://api.video.ibm.com/streaming/v1/accounts/${accountId}/streams`;

// Define your streaming parameters
const streamParams = {
  name: 'MyStream',
  broadcasting: true,
  transcoding_profile: 'hd_4mbps',
};

// Create an HTTP POST request to start the stream
```

```
const options = {
  url: startStreamEndpoint,
  method: 'POST',
  json: true,
  body: streamParams,
  headers: {
    'Authorization': `Bearer ${accessToken}`,
    'Content-Type': 'application/json',
    'Accept': 'application/json',
  },
};

// Send the request to start the stream
request(options, (error, response, body) => {
  if (!error && response.statusCode === 201) {
    console.log('Stream started successfully');
    console.log('Stream ID:', body.id);
  } else {
    console.error('Error starting the stream:', error);
  }
});
}

function stopStreaming() {
    const request = require('request');

// Replace these with your IBM Video Streaming API credentials and stream
ID
const apiKey = 'YOUR_API_KEY';
const accountId = 'YOUR_ACCOUNT_ID';
const accessToken = 'YOUR_ACCESS_TOKEN';
const streamId = 'YOUR_STREAM_ID';

// Set up the endpoint to stop the stream
const stopStreamEndpoint =
`https://api.video.ibm.com/streaming/v1/accounts/${accountId}/streams/${s
treamId}`;

// Create an HTTP DELETE request to stop the stream
const options = {
  url: stopStreamEndpoint,
  method: 'DELETE',
  headers: {
    'Authorization': `Bearer ${accessToken}`,
```

```
    'Accept': 'application/json',
  },
};

// Send the request to stop the stream
request(options, (error, response, body) => {
  if (!error && response.statusCode === 204) {
    console.log('Stream stopped successfully');
  } else {
    console.error('Error stopping the stream:', error);
  }
});
}
```

User Registration:

```
const express = require('express');
const bodyParser = require('body-parser');
const app = express();

app.use(bodyParser.json());

const PORT = process.env.PORT || 3000;
app.listen(PORT, () => {
  console.log(`Server is running on port ${PORT}`);
});

const express = require('express');
const bodyParser = require('body-parser');
const mongoose = require('mongoose');
const app = express();

app.use(bodyParser.json());

const PORT = process.env.PORT || 3000;
app.listen(PORT, () => {
  console.log(`Server is running on port ${PORT}`);
});

// Connect to your MongoDB database
```

```
mongoose.connect('mongodb://localhost/your-database-name', {
useNewUrlParser: true, useUnifiedTopology: true });

// Create a user schema
const userSchema = new mongoose.Schema({
  username: String,
  password: String,
  email: String,
});

const User = mongoose.model('User', userSchema);

// User registration endpoint
app.post('/register', async (req, res) => {
  const { username, password, email } = req.body;

  try {
    const user = new User({ username, password, email });
    await user.save();
    res.status(201).json({ message: 'User registered successfully', user });
  } catch (error) {
    console.error('Error registering user:', error);
    res.status(500).json({ message: 'User registration failed' });
  }
});
const users = [];

// User registration endpoint
app.post('/register', (req, res) => {
  const { username, password, email } = req.body;

  const express = require('express');
const bodyParser = require('body-parser');
const app = express();
const pgp = require('pg-promise')();

app.use(bodyParser.json());

const PORT = process.env.PORT || 3000;
app.listen(PORT, () => {
  console.log(`Server is running on port ${PORT}`);
});

// Define the PostgreSQL database connection
```

```
const db = pgp({
  user: 'your-username',
  password: 'your-password',
  host: 'localhost',
  port: 5432,
  database: 'your-database-name',
});

// Create a user table schema
const createTable = `
  CREATE TABLE IF NOT EXISTS users (
    id SERIAL PRIMARY KEY,
    username VARCHAR(255) NOT NULL,
    password VARCHAR(255) NOT NULL,
    email VARCHAR(255) NOT NULL
  );
`;

db.none(createTable)
  .then(() => {
    console.log('User table created successfully');
  })
  .catch((error) => {
    console.error('Error creating user table:', error);
  });

// User registration endpoint
app.post('/register', async (req, res) => {
  const { username, password, email } = req.body;

  try {
    await db.none('INSERT INTO users(username, password, email)
VALUES($1, $2, $3)', [username, password, email]);
    res.status(201).json({ message: 'User registered successfully' });
  } catch (error) {
    console.error('Error registering user:', error);
    res.status(500).json({ message: 'User registration failed' });
  }
});
  const user = { username, password, email };
  users.push(user);

  res.status(201).json({ message: 'User registered successfully', user });
});
```

MySQL connector library for Python

```
pip install mysql-connector-python
```

Code for connecting to a MySQL database

```
import mysql.connector

# Connect to the database
db = mysql.connector.connect(
    host="your_host",
    user="your_username",
    password="your_password",
    database="your_database"
)

# Create a cursor
cursor = db.cursor()

# Create a table (if it doesn't exist)
create_table_query = """
CREATE TABLE IF NOT EXISTS videos (
    id INT AUTO_INCREMENT PRIMARY KEY,
    title VARCHAR(255),
```

```
    url VARCHAR(255)
)
"""
cursor.execute(create_table_query)

# Insert data into the table
insert_query = "INSERT INTO videos (title, url) VALUES (%s, %s)"
video_data = ("Video Title", "video_url.mp4")
cursor.execute(insert_query, video_data)

# Commit changes to the database
db.commit()

# Read data from the table
select_query = "SELECT * FROM videos"
cursor.execute(select_query)
videos = cursor.fetchall()

for video in videos:
    print(f"Video ID: {video[0]}, Title: {video[1]}, URL: {video[2]}")

# Update data in the table
update_query = "UPDATE videos SET title = %s WHERE id = %s"
new_title = "New Video Title"
video_id = 1
cursor.execute(update_query, (new_title, video_id))
db.commit()
```

```
# Delete data from the table
delete_query = "DELETE FROM videos WHERE id = %s"
video_id_to_delete = 2
cursor.execute(delete_query, (video_id_to_delete,))
db.commit()

# Close the cursor and the database connection
cursor.close()
db.close()
```

On-Demand Playback

```
<!DOCTYPE html>
<html>
<head>
    <title>On-Demand Video Playback</title>
</head>
<body>
    <h1>Video Title</h1>
    <video id="videoPlayer" controls>
        <source src="video_url.mp4" type="video/mp4">
        Your browser does not support the video tag.
    </video>
    <button id="playButton">Play</button>
    <button id="pauseButton">Pause</button>

    <script>
        const videoPlayer = document.getElementById('videoPlayer');
```

```
        const playButton = document.getElementById('playButton');
        const pauseButton = document.getElementById('pauseButton');

        // Event listener for the play button
        playButton.addEventListener('click', () => {
            videoPlayer.play(); // Start playing the video
        });

        // Event listener for the pause button
        pauseButton.addEventListener('click', () => {
            videoPlayer.pause(); // Pause the video
        });

        // You can add more features like seeking, volume control, etc., as needed.

        // Example: Event listener for video end
        videoPlayer.addEventListener('ended', () => {
            // You can perform actions when the video ends, e.g., load the next video.
            // For instance: window.location.href = "next_video_url.html";
        });
    </script>
</body>
</html>
```