## 5. Create a test plan for testing the performance and scalability of web service, including test scenarios, test environment setup, and performance metrics to be measured.

TEST PLAN – YouTube

1. **Introduction:**

## Project Information:

* + Project Name: YouTube
  + Project Code: HS1520
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## Document Information:

* + Document Title: Test Plan
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1. **Objectives:**

## Purpose:

This test plan aims to define the strategy, scope, resources, and schedule for performance and scalability testing of the YouTube mobile application.

## Scope:

This testing will focus on evaluating the performance and scalability of the YouTube app under varying conditions, including different user loads and network conditions.

# Test Plan:

## Features to be tested:

When testing the performance and scalability of the YouTube app, the following are key features to be tested,

* User authentication and login
* Content search
* Video playback
* User Profiles
* User Interactions
* Device compatibility
* Network conditions
* Offline mode
* Load handling and scalability

## Features not to be tested:

* Video Content quality
* Device-specific functionalities
* Security testing

# Testing Strategy:

## Testing Levels:

### Unit Testing:

* + **Objective:** Verify the performance of individual units or components.

### Activities:

* + - Test critical functions and algorithms within the code.
    - Validate the efficiency.
  + **Tools:** Unit testing frameworks.

### Integration Testing:

* + **Objective:** Validate the performance of integrated components.

### Activities:

* + - Test interactions between different modules.
    - Verify the performance of integrated components.
  + **Tools:** Integration testing tools.

### System Testing:

* + **Objective:** Assess the overall performance of the YouTube app as a complete system.

### Activities:

* + - Test end-to-end scenarios, including user interactions and backend processes.
    - Validate the app's performance across different devices and platforms.
  + **Tools:** Testing frameworks, load testing tools.

### Performance Testing:

* + **Objective:** Evaluate the app's performance under various conditions.

### Activities:

* + - Conduct load testing to determine the app's behavior under expected and peak loads.
    - Measure response times and resource utilization.
  + **Tools:** Load testing tools like J-meter monitoring tools.

### Scalability Testing:

* + **Objective:** Assess the app's ability by increasing the number of users.

### Activities:

* + - Test the app's performance under incremental user load.
    - Evaluate the system's scalability by adding resources.
  + **Tools:** Load testing tools.

### Stress Testing:

* + **Objective:** Evaluate whether the app performs under stress conditions.

### Activities:

* + - Apply a load beyond the app's capacity.
  + **Tools:** Stress testing tools.

### Compatibility Testing:

* + **Objective:** Ensure the app performs well on different devices and platforms.

### Activities:

* + - Test the app on various smartphones and tablets.
    - Validate performance on different operating systems.
  + **Tools:** Physical devices and simulators.

### Network Testing:

* + **Objective:** Assess the app's performance under different network conditions.

### Activities:

* + - Test performance on various network speeds including 4G, 5G, and Wi-Fi.
  + **Tools:** Network simulation tools.

### User Acceptance Testing (UAT):

* + **Objective:** Validate performance from the end-user perspective.

### Activities:

* + - Involve real users to validate performance in a real-world environment.
    - Collect feedback from the users.
  + **Tools:** User feedback surveys.

### Regression Testing:

* + **Objective:** Ensure that performance improvements or changes do not affect existing functionality.

### Activities:

* + - Re-run performance tests after each release or major change.
    - Validate key performance metrics are within acceptable ranges.
  + **Tools:** Automated testing tools and regression testing frameworks.

# Test Environment Setup:

## Hardware:

* **Server Machines:** Use dedicated servers for hosting the Youtube application.
* **Client Machines:** Use devices representing different platforms, such as iOS and Android.

## Software:

* **Operating Systems:** Test on the latest versions of Android and iOS.
* **Database:** Use a copy of the production database for testing.
* **Load Testing Tool:** Choose a suitable load testing tool like J-meter.
* **Monitoring Tools:** Implement tools to measure and monitor system performance.

## Network:

* High-speed internet connection.
* Simulate different network speeds (4G, 45G, Wi-fi) using network simulation tools.

# Test Execution:

**Test Data**

* Utilize a diverse set of video content for streaming tests.
* Use real user profiles for login scenarios.

**Test Execution Schedule**

* Define a schedule for each test scenario, considering peak usage times.

**Monitoring**

* Utilize monitoring tools to capture key performance metrics such as response time, error rate, memory utilization,

# Performance Metrics:

* **Login Time**: Time taken for users to log in successfully.
* **Video Start Time**: Time taken for a video to start playing.
* **Buffering Rate**: Percentage of time spent buffering during video playback.
* **Concurrent Users**: Maximum number of simultaneous users supported.
* **System Resource Utilization**: CPU and memory usage during peak loads.

# Test Deliverables:

* Performance Test Plan
* Test Scripts
* Test Results Report

# Risk and Contingencies:

* **Regular Risk Assessment:** Continuously assess and update the list of risks throughout the testing process.
* **Early Issue Identification:** Implement monitoring and alerting to identify issues at an early stage.
* **Communication:** Open communication between testing, development, and operations teams to quickly address issues.

# Conclusion:

Summarize the results, findings, and recommendations for improvements of the YouTube application.