**Performance Test Plan**

**1. Introduction**

This plan defines the approach for testing the website’s performance using Apache JMeter. The objective is to evaluate the system’s ability to handle concurrent users, its behavior under stress, and how quickly it responds to requests.

**2. Objectives**

* Use JMeter to simulate user traffic and API requests.
* Validate performance under normal load conditions (Load Testing).
* Identify system limits under extreme load (Stress Testing).
* Measure response times for critical workflows and endpoints.

**3. Scope**

**In Scope**

* Load Testing (simulate expected traffic levels).
* Stress Testing (determine system breaking point).
* Response Time Testing (page loads & API calls).

**Out of Scope**

* Security testing
* Usability testing

**4. Test Environment**

* **Tool:** Apache JMeter
* **Test Environment:** Staging environment closely mirroring production
* **Monitoring:** Server CPU, memory, database performance

**5. Test Scenarios**

**5.1 Load Testing Scope (flows to test)**

* Homepage load (GET /)
* User login (POST /login)
* Search (GET /search?q=<term>)
* Checkout process (POST /checkout)

**Load Profile**

* Start with 100 concurrent users, run for 30 minutes.
* Increase to 500 concurrent users, run for 30 minutes.
* Scale to 1000 concurrent users, run for 30 minutes**.**

**Thread Group Setup (per scenario)**

* Number of Threads (Users): 100 > 500 >1000
* Ramp-Up Period: 60 seconds (smooth ramp)
* Duration: 30 minutes per test
* Think Time: 2–3s (Uniform Random Timer)

**Pass/Fail Criteria**

* 95% of requests must respond under 2s.
* Error rate ≤ 0.1%.
* Server resource usage ≤ 60% CPU for sustained load.

**5.2 Stress Testing**

* Ramp up users from 1000 > 2000 >5000+ until system failure (errors >10% or response times consistently >5s).
* Hold maximum load for 15 minutes.

**Recovery Observation**

* After reaching failure point, reduce load to baseline (100 users) and observe:
  + - Does the system recover automatically?
    - Is manual restart needed?
    - How long recovery takes?

**Pass/Fail Criteria**

* System should recover gracefully when load decreases.
* No permanent crashes or data loss.

**5.3 Response Time Testing**

* Capture API response times and full-page load times.

**Method to be used**

* Run with 10 virtual users (light load, near real-world conditions).
* Capture response times for each request and transaction.
* Measure full page load time using JMeter’s HTTPS Test Recorder
* Response time standards:
* **<1s:** Excellent
* **1–2s:** Acceptable
* **>2s:** Poor

**Pass/Fail Criteria**

* 90% of requests should fall under the “Acceptable” range or better.
* Any API consistently >2s flagged for optimization.

**6. Performance Metrics**

* **Response Time**: Goal <2s under normal load.
* **Error Rate**: Goal <0.1% of failed requests.
* **Throughput**: Requests/second handled by the site.
* **System Utilization**: CPU, memory, and bandwidth usage.
* **CPU Utilization**: <60%

**7. Entry & Exit Criteria**

**Entry Criteria**

* JMeter test scenarios are designed in the GUI
* Test data is available and accessible
* Test environment is ready

**Exit Criteria**

* Site handles expected load with <2s response time.
* Error rate <0.1%.
* Stress threshold documented.

**8. Risks & Mitigation**

* Staging doesn’t match production.
* Network latency affects response time.

**9. Deliverables**

* JMeter test plans (JMX files).
* Test execution results with graphs.
* Performance summary report.