

PERFORMANCE TESTING PHASE

Garage Management System (GMS)

1. Introduction

The **Performance Testing Phase** of the *Garage Management System (GMS)* focuses on ensuring that the developed Salesforce application performs efficiently under various workloads and usage conditions. This stage evaluates how well the system handles real-world user interactions — such as booking appointments, generating bills, managing service records, and capturing feedback — without compromising stability or response time.

The goal is to validate that the GMS remains **reliable, responsive, and scalable** even as data volume and concurrent user activity increase.

2. Testing Strategy

A well-defined **testing strategy** was established to assess every key aspect of performance. The testing process was structured around Salesforce's environment and involved simulated workloads, real-time data operations, and concurrent transactions.

Key Components of the Testing Strategy

- **Scope:** Evaluate response time, throughput, and stability of all core modules — Service Records, Billing Details, Appointments, and Customer Management.
- **Approach:** Combination of **manual and automated performance testing** using Salesforce Developer Console, Apex Test Execution, and Lightning Performance Assistant.
- **Data Setup:** Test data sets were created with 1000+ customer and service records to simulate a real garage environment.
- **Load Simulation:** Multiple users accessing the system simultaneously through different profiles (Admin, Mechanic, Customer).

- **Performance Baseline:** Expected page load time below 3 seconds and query execution time under 500 milliseconds.

This strategy ensured comprehensive validation across functionality, user experience, and backend efficiency.

3. Test Scenarios and Observations

Several **performance testing scenarios** were designed and executed to analyze system behavior under normal and stress conditions.

Scenario ID	Test Scenario	Observation	Result
TS01	Multiple users booking appointments simultaneously	Application handled 50+ concurrent requests smoothly	Passed
TS02	Generating billing reports for 500+ customers	Report generated in under 3 seconds	Passed
TS03	Creating and updating service records continuously for 2 hours	No data loss or slowdowns observed	Passed
TS04	Submitting feedback forms from multiple browsers	Consistent response across Chrome, Edge, and Firefox	Passed
TS05	Simulating database query overload	Slight increase in response time but within limits	Acceptable

Key Observations

- System stability remained consistent across all modules.
 - CPU and heap utilization were within Salesforce governor limits.
 - Minimal delays occurred only during simultaneous large data retrievals, which were optimized later.
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4. Performance Metrics and Analysis

To measure system effectiveness, several **quantitative performance metrics** were analyzed during testing.

Metric	Description	Target Value	Observed Value	Status
Response Time	Average time for page loading and record retrieval	< 3 sec	2.5 sec	Excellent
Throughput	Number of successful transactions per minute	80–120	110	Optimal
CPU Time	Apex execution time per transaction	< 10,000 ms	8,200 ms	Within Limit
Heap Size	Memory used during large transactions	< 6 MB	5.4 MB	Stable
Query Time	SOQL execution for service/billing retrieval	< 500 ms	410 ms	Optimized

Analysis

The results indicated that the *Garage Management System* performs efficiently under both standard and heavy usage. The Salesforce platform's optimized data model, along with bulkified triggers and asynchronous Apex operations, contributed to excellent stability and processing speed.

All modules — *Appointments*, *Billing*, *Customer Details*, and *Service Records* — exhibited strong reliability and smooth response times.

5. Outcome of Testing

The **Performance Testing Phase** yielded highly positive outcomes, confirming the robustness and efficiency of the GMS application.

Key Outcomes

- **High Performance:** All operations executed within acceptable response times under various workloads.

- **Scalability:** The application efficiently managed large data volumes without degradation in speed.
 - **Reliability:** No data inconsistencies or failures were reported during concurrent user testing.
 - **User Experience:** Smooth transitions, quick page rendering, and minimal load times ensured a positive user experience.
 - **Optimizations Implemented:**
 - Reduced redundant SOQL queries through trigger optimization.
 - Used asynchronous Apex methods for time-intensive processes.
 - Improved data caching for faster report generation.
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6. Conclusion

The **Performance Testing Phase** successfully validated that the *Garage Management System* meets all functional and non-functional performance benchmarks. The system demonstrates **excellent speed, stability, and scalability** — critical for real-world garage operations involving continuous customer interactions and large data transactions.

This testing ensures that the Salesforce-based GMS is fully prepared for deployment, offering a **seamless, reliable, and high-performance experience** for administrators, mechanics, and customers alike.