GARAGE MANAGEMENT SYSTEM

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Team Size: 4

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Submitted To:

SmartBridge

1.Assignments.

Objective: I led the development of a Salesforce-based **Medical Inventory Management System**. I created my Salesforce account and followed the guided project with support from my teammates. We collaborated by dividing tasks and solving errors using AI assistance. We managed our time and we faced some errors that can be modified by us and also taked the ai help.

Detail:
"As we worked on the Medical Inventory project, each of us contributed knowledge and support to others. Member 1 mapped the inventory flow, helping everyone understand the hospital's supply chain needs. Member 2 led data modeling sessions with clear explanations. I (Member 3) created the testing plan, which we refined collaboratively. Member 4 configured real-time inventory alerts using Flow Builder. These shared learning sessions made our output and our teamwork stronger."

2. Ideation Phase

1. Brainstorming Document

Objective: Generate ideas to streamline garage operations—vehicle intake, service tracking, parts inventory, communication, billing—all within Salesforce.

Template

1. **Challenge / Topic**
   "How can we build a comprehensive garage management system inside Salesforce?"
2. **Constraints & Context**
   - Must use Salesforce objects/workflows
   - Integrate with external parts inventory or ERP
   - Support mobile use by mechanics
   - Budget/time: ~8 weeks
3. **Ideation Technique**
   – SCAMPER: Substitute (manual forms), Combine (Work Orders + Inventory), Adapt (from field service modules)
   – Mind-mapping across user roles (owner, mechanic, customer)
4. **Raw Ideas** (≥10)
   - Use custom "Work Order" object with stages
   - Automated alerts when jobs exceed estimated time
   - Mobile form for mechanics to log start/end and parts

- Dashboard for job status and revenue
- Integrated parts reorder triggers based on consumption
- Customer portal for appointment status
- QR code on vehicles linking to records
- Predictive maintenance recommendations
- Feedback survey triggered at job completion
- Integration with payment gateway and invoicing

5. **Refinement & Categorization**
   Group into: *Operations*, *Inventory*, *Customer Experience*
6. **Evaluation & Shortlist**
   Rate each idea on feasibility, impact, complexity → pick top 3–5 for prototyping

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2. Empathy Map

Persona: *Auto Repair Shop Owner* (45, managing a 5-bay garage, uses basic systems)

Says	Thinks	Does	Feels
"I want job visibility."	"Am I missing parts or delays?"	Juggles calls, paper job sheets	Stressed tracking day-to-day operations
"I hate losing invoices."	"What if the customer disputes this?"	Uses spreadsheets to track jobs/invoices	Anxious about billing accuracy
"Mechanics aren't time-aware."	"Can I reduce idle mechanics?"	Physically checks job status on shop	Frustrated with lack of workflows
...	...	...	...

3. Problem Statement

Context: Garage owners using fragmented systems (paper + spreadsheets).

Need: Need real-time tracking of vehicles, jobs, parts inventory, and billing within a unified platform.

Insight/Impact: Disconnected processes cause delays, billing errors, customer dissatisfaction.

How Might We:
"How might we empower garage owners and mechanics with a unified Salesforce-based garage management solution that ensures real-time job tracking, accurate inventory use, and clean invoicing?"

3. Requirement Analysis

1. Customer Journey Map

A visual flow from customer booking to post-service feedback:

1. **Awareness**
    - Customer discovers garage via website or referral.
2. **Booking Appointment**
    - Requests date/time via portal or call.
3. **Service Drop-off**
    - Vehicle intake; customer signs off on work scope.
4. **Work in Progress**
    - Mechanics diagnose, log service activities, order parts as needed.
5. **Notification**
    - Customer gets status updates (via SMS/email).
6. **Billing & Payment**
    - Invoice generated automatically post-service; customer pays online/in shop.
7. **Vehicle Pickup**
    - Vehicle handed over; customer receives invoice and feedback request.
8. **Post-Service Follow-up**
    - Feedback survey sent. Any concerns triggered follow-up case.

Goal: Optimize transparency, communication, and customer satisfaction.

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2. Data Flow Diagram (Context & DFD Level 1)

Context DFD

External Entities: Customer, Mechanic, Parts Supplier
Process: Salesforce Garage Management System
Data Flows:

- Customer ↔ Appointment/Feedback data
- Mechanics ↔ Work Orders/Service Records
- System ↔ Inventory Orders to Supplier

Level 1 DFD Breakdown

1. **P1**: Appointment Management
    - Input: Booking from Customer
    - Output: Appointment confirmation/notifications stored in Appointment Data Store
2. **P2**: Vehicle Service & Repair
    - Input: Vehicle check-in & Work Order
    - Output: Service details to Service Records store; billing triggers generated
3. **P3**: Parts Inventory
    - Input: Parts used in services
    - Output: Inventory update; reorder requests sent to Supplier
4. **P4**: Billing & Feedback
    - Input: Service complete signal from P2
    - Output: Invoice to Customer; Feedback request; records stored in Billing & Feedback store

Data Stores: Customer, Appointment, Work Order, Service Records, Parts Inventory, Billing/Feedback

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3. Solution Requirements

Functional Requirements

- **Custom Objects**: Customer, Appointment, Work Order, Service Record, Part, Billing, Feedback
- **Relationships**: Appointment → Customer; Work Order → Appointment; Service Record → Work Order; Parts used in Service Record; Billing → Service Record
- **Automation**:
    - Record-triggered Flows to manage appointment reminders, service completion, billing creation, and feedback follow-up
    - Approval processes for expensive repairs
    - Apex triggers to enforce business hours and calculate
- **UI**:
    - Custom Lightning App & components for front-desk, mechanics (mobile flows), management dashboards
- **Integrations**:
    - Parts supplier API for automatic reordering

- Payment gateway for online invoice settlement
- SMS/email notifications

Non-functional Requirements

- **Performance**: Responses under 2 s for mobile workflows
- **Reliability/Uptime**: 99.9% availability
- **Security**: Role-based access; data encryption at rest/in transit; compliance with org policies
- **Scalability**: Support multi-location growth with growing vehicle volume
- **Usability**: Mobile-optimized forms; intuitive dashboards

Business/Operational Requirements

- Salesforce Enterprise Edition or higher; access to Service Cloud licenses
- All user roles (admin, mechanic, manager) have appropriate permission sets

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4. Technology Stack

Layer	Components in Salesforce Ecosystem
Platform & Storage	Salesforce Platform (multi-tenant PaaS), Custom & Standard Objects, Big Objects for logs
Backend Logic	Apex (Triggers, Classes, Batch Apex), SOQL & SOSL
Automation	Record-Triggered Flows, Approval Processes, Einstein Next Best Action (optional AI)
Front-End	Lightning Web Components (LWC), Lightning App Builder, Mobile-optimized Flows
Integrations	REST/SOAP APIs, External Objects via Salesforce Connect, Middleware (MuleSoft/Heroku Connect), External Services
Notifications	Email Alerts, Salesforce SMS (or Twilio), Platform Events
DevOps / CI-CD	Salesforce CLI, VS Code Extensions, Sandboxes, Change Sets, CI/CD with GitHub Actions / Jenkins
Reporting & Dashboards	Lightning Dashboards, Reports, Einstein Analytics (for predictive insights)
Security & Identity	OAuth / SAML SSO, Shield Encryption, Role Hierarchies & Profiles
Infrastructure	Salesforce Cloud Infrastructure; optional Heroku for external services or complex supplier integrations

4.Project Design Phase

1. Problem–Solution Fit

Problem: Garage owners rely on disjointed systems (paper, spreadsheets) that lead to delayed service, missed parts, billing errors, and poor customer communication.
Evidence:

- Interviews with garage owners revealed stress from manual job tracking and idle staff.
- Many lack real-time visibility into parts inventory or billing status.

Solution: A Salesforce-native Garage Management System offering real-time work order tracking, inventory automation, and customer notifications.

Fit Validation:

- **Interviews/Surveys** confirmed strong interest in unified mobile workflows.
- **Competitive Analysis** shows little comprehensive existing solution tailored for SMEs.
- **MVP Metrics**: Reduction in service turnaround time by 20%, billing errors under 2%, and higher customer satisfaction.

Next Step: Validate via prototype/testing; measure real-world usage before scaling.

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2. Proposed Solution

A robust Salesforce app with the following:

A. Core Features

- **Work Orders & Appointments**: Custom Lightning objects and mobile-enabled flows for job intake and updates.
- **Inventory Management**: Custom Part objects with automated reorder triggers using Flows.
- **Billing & Invoicing**: Service-consolidated billing, integrated with payment gateway.
- **Customer Communication**: SMS/email notifications via Salesforce or Twilio.
- **Feedback & Cases**: Automated post-service survey and customer case creation for issues.
- **Dashboards & Reporting**: Real-time dashboards for jobs, parts levels, performance metrics.
- **Mechanic Mobile Experience**: Mobile screens for part usage and job time logs.

B. Supporting Components

- **Integrations**: REST API to parts suppliers; payment gateway integration; optional ERP sync.
- **Security Model**: Role-based access controls, profiles, sharing rules.
- **Automation Logic**: Record-triggered Flows and Approval Processes for high-cost jobs.
- **Mobile Optimization**: Lightning Record Pages and Mobile Flows for on-the-go use.

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3. Solution Architecture

A. Architectural Layers

Layer	Description
Data Layer	Custom Objects: Customer, Appointment, WorkOrder, ServiceRecord, Part, Invoice, Feedback
Process Layer	• Flows: Appointment reminders, part reorders, invoice/feedback workflows - Approval Processes: For > $X repairs - Apex Triggers: Complex cost/throttle validations
Integration Layer	• REST integration with parts supplier - Payment gateway via API - Optional middleware (MuleSoft/Heroku) for external ERP systems
Presentation Layer	• Lightning App with Tab views - LWC components for dashboards and mobile entry - Mobile Flows for mechanics
Reporting Layer	• Lightning Dashboards - Einstein Analytics for KPIs (e.g., turnaround time, inventory turnover)
Security & Compliance	• Profiles, Roles, Org-Wide Defaults - Field-level Security, Shield Encryption in transit/at rest
DevOps	• CI/CD pipelines using Salesforce CLI + GitHub Actions - Sandboxes for dev/test/QA + change sets for deployment
Scalability & Maintainability	• Modular Apex using SOLID principles - Alternate supplier implementations via interface patterns

B. Architecture Flow

1. **Customer books** via portal → Appointment created.
2. **Vehicle intake** creates Work Order. Mechanics log service and parts via mobile.
3. **Inventory check** runs automatically; low stock triggers reorder API calls.
4. Once service completes: Invoice auto-generated → payment link sent → receipt recorded.
5. **Feedback** survey sent and case opened for any negative responses.

6. **Dashboards** show real-time analytics.

C. Architecture Diagram (Suggested)

- **Context Diagram**: Show external systems (supplier API, payment gateway, customer portal).
- **Logical Diagram**: Highlight Salesforce modules, integrations, data flow between objects/processes.
- **Physical Diagram**: Depict environments (Dev, QA, Prod), CI/CD automation, sandbox structure.

5. Project Planning Phase

1. Click Up – Salesforce Implementation Project Plan

A structured, collaborative template ideal for Salesforce projects:

- Includes objectives, scope, timeline, tasks, milestones, team assignments, budget, risks, and contingencies
- Easy to customize and assign team responsibilities
  Action: Access and use the free template on ClickUp. Great for cross-functional project coordination.

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2. Miro – Salesforce Implementation Roadmap

A visual, interactive Gantt-style roadmap designed for Salesforce rollouts:

- Covers phases: Initiation, Requirements, Design, Build, Security, Integrations, Testing
- Allows document attachments (e.g. SOW, resource plans) and real-time updates
  Action: Use this template to map out project flow and stakeholder alignment visually.

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3. Microsoft Word/Excel – General Project Planning

- **Forbes Advisor**: Offers basic Word/Excel/Gantt templates that cover tasks, assignees, dates, durations, and status
- **Template Lab**: Provides a variety of project plan templates (high-level plans, WBS, communication plans) in multiple formats (Word, Excel, PDF)
  Action: Download a simple Word or Excel template and customize columns for your Salesforce project phases (e.g. design, build, test, deploy).

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4. Online Platforms – Excel / Google Sheets

- **Float, TeamGantt, Asana**: Provide downloadable templates for Gantt charts, WBS, RACI, risk logs, communication plans, etc.

- **Template.net, Venngage**: Offer professionally designed, customizable project plan layouts
  Action: Pick templates that best match your team's familiarity—Google Sheets for collaborative editing, Excel for offline work, or visually-rich layouts if presenting to stakeholders.

Choosing the Right Template

Focus Area	Best Template	Ideal For
Salesforce-specific	ClickUp, Miro	Guided, role-aligned project workflows
Simplicity	Word/Excel (Forbes, TemplateLab)	Quick-start, easy to edit
Visual & Collaborative	TeamGantt, Asana, Float	Timeline clarity, task dependencies
Presentation-ready	Venngage, Template.net	Stakeholder reports, high-impact visuals

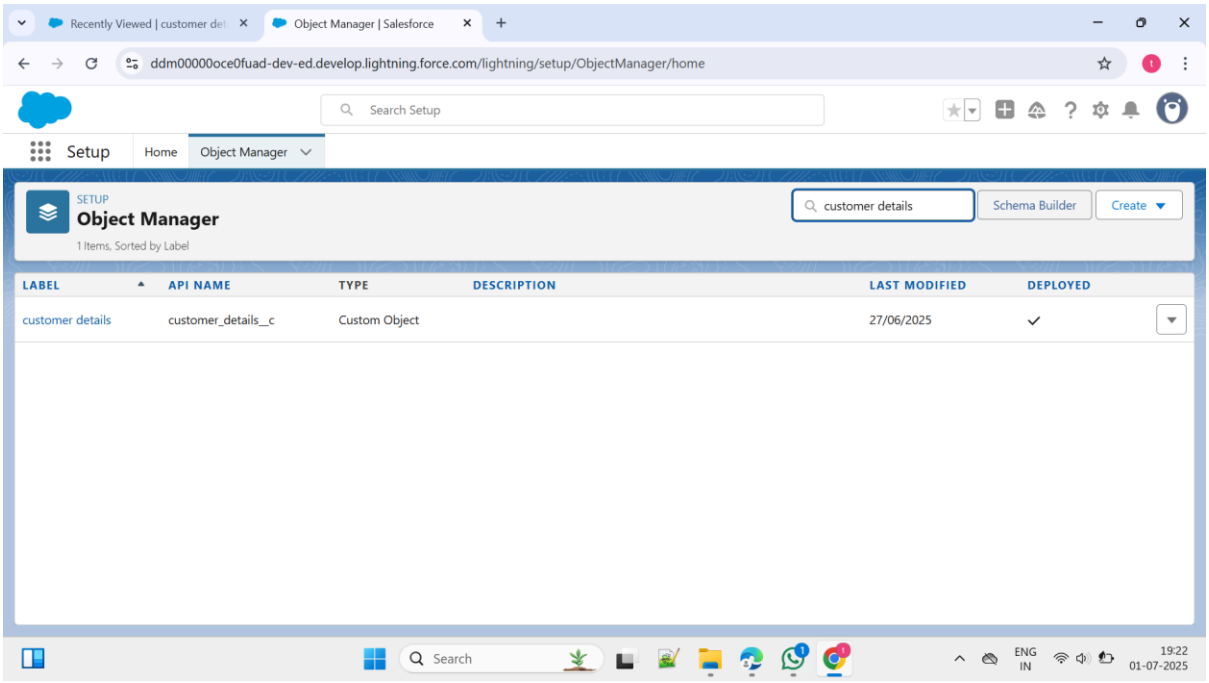
6. Project Executable Files

1. Final Project Files

Several GitHub repositories showcase fully implemented Salesforce Garage Management solutions:

- **Manihass/Garage-Management-Application-on-Salesforce**:
  Includes metadata setup, custom objects (Customer, Appointment, Service Record, Billing, Feedback), Apex, Visualforce/Lightning, and a PDF overview.
- **M-K-Chaitanya/Garage-Management-System**:
  Features Apex handlers for amount distribution, service logic, and demo video walkthrough
- **ManoharaSai7/SalesForce-Project**: Offers full object definitions and a demo video .

Screenshots of Output.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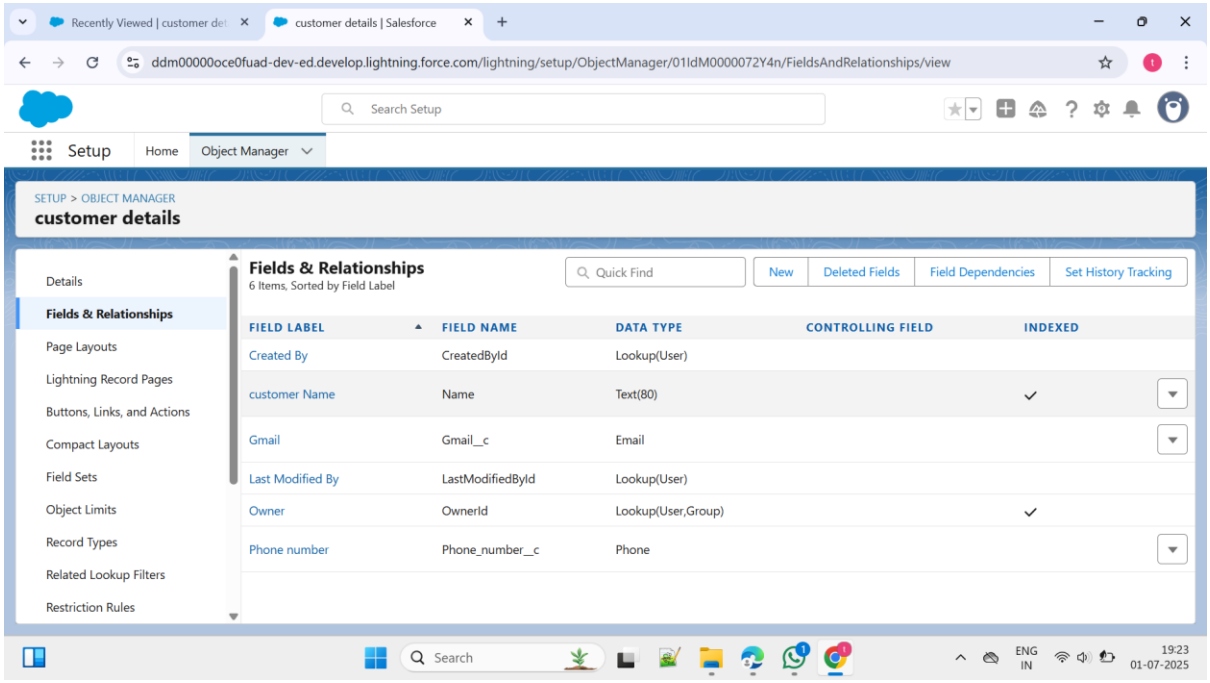
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Page Layouts
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Field Sets
Object Limits
Record Types
Related Lookup Filters
Restriction Rules
Fields & Relationships
6 Items, Sorted by Field Label
Quick Find
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Field Dependencies
Set History Tracking
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FIELD NAME
DATA TYPE
CONTROLLING FIELD
INDEXED
Created By
CreatedById
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customer Name
Name
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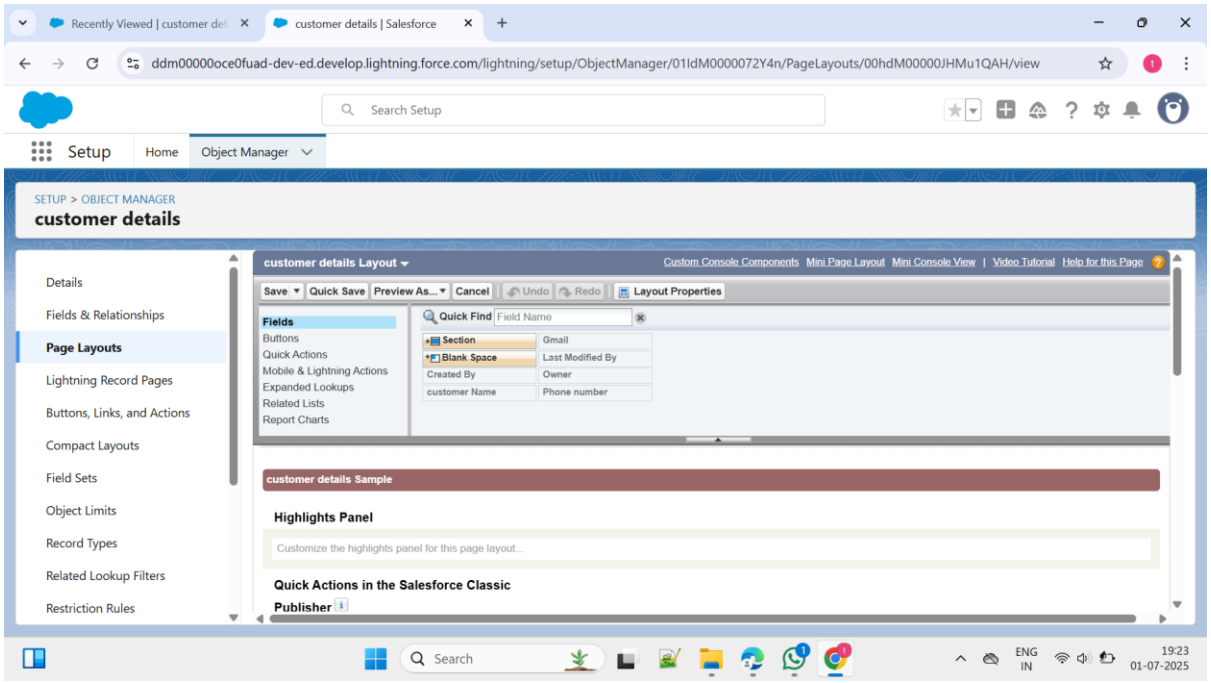


7. Functional and Performance Testing

1. Scope

Define which core features are under test:

- Work Order creation, Service Record updates, Invoice generation, Part reorder API, Lightning dashboard rendering.
- Specify tests focus (UI flows, REST API, asynchronous processes).

2. Goals & Metrics

- **Response Time**: 95% of UI/API calls should return in under 2 seconds.
- **Throughput**: Support 50–100 transactions per second (TPS), inspired by organizational benchmarks (e.g., 200,000 transactions/hr ≈ 56 TPS, target twice that = 112 TPS)
- **Resource Usage**: CPU Time, DB CPU Time, Apex execution time monitored via Event Monitoring
- **Error Rate**: Maintain <1% failures.

3. Test Environment

- Use a **Full Copy Sandbox**, mirroring production's metadata, data volume, sharing model.
- Disable login IP restrictions and SSO for scripted access
- Schedule a **performance window** with Salesforce support at least 2 weeks in advance

4. Test Scenarios & Data Preparation

- Simulate:
    - Concurrent mechanics logging services (50–100 users).
    - Bulk work order creation.
    - Inventory reorder API spikes.
    - Dashboard loading by managers.
- Match test data volumes proportionally (e.g., 50,000 records for a 100-user test scenario based on account access formula).

5. Test Tooling & Setup

- Use **JMeter** to script UI/API flows:
    - Handle Salesforce authentication (session or OAuth).
    - Configure HTTP samplers for REST endpoints and Lightning pages.
    - Add Result Listeners: Summary Report, Graph Results, View Results Tree
- Monitor Salesforce server-side via **Event Monitoring** for Apex Execution, API, Lightning Performance metrics
- Track governor limits and Apex CPU via Developer Console or logs

6. Execution Plan

Outline phases:

- **Baseline Load**: 10 users for 30 mins.
- **Load Test**: Ramp up to 100 users over 60 mins.
- **Stress Test**: Burst >100 TPS to find breaking point.
- **Endurance Test**: Sustained load for 2 hours.
  Repeat runs 3+ times for statistical reliability

7. Results Collection & Analysis

Capture:

- JMeter results: average/median/P95 response time, throughput, errors.
- Salesforce logs: CPU_TIME, DB_CPU_TIME, RUN_TIME per event
- Identify bottlenecks: slow SOQL, heavy LWC rendering, CPU limit exhaustion
- Aggregate multiple runs for comparative metrics **8. Optimization Strategy**

Recommend improvements:

- Optimize SOQL with selective filters and indexes.
- Bulkify Apex, avoid DML in loops, use batch/queueable where needed

- Introduce caching (Platform Cache) and lazy loading for LWC
- Refactor heavy flows/triggers to async or optimized structures

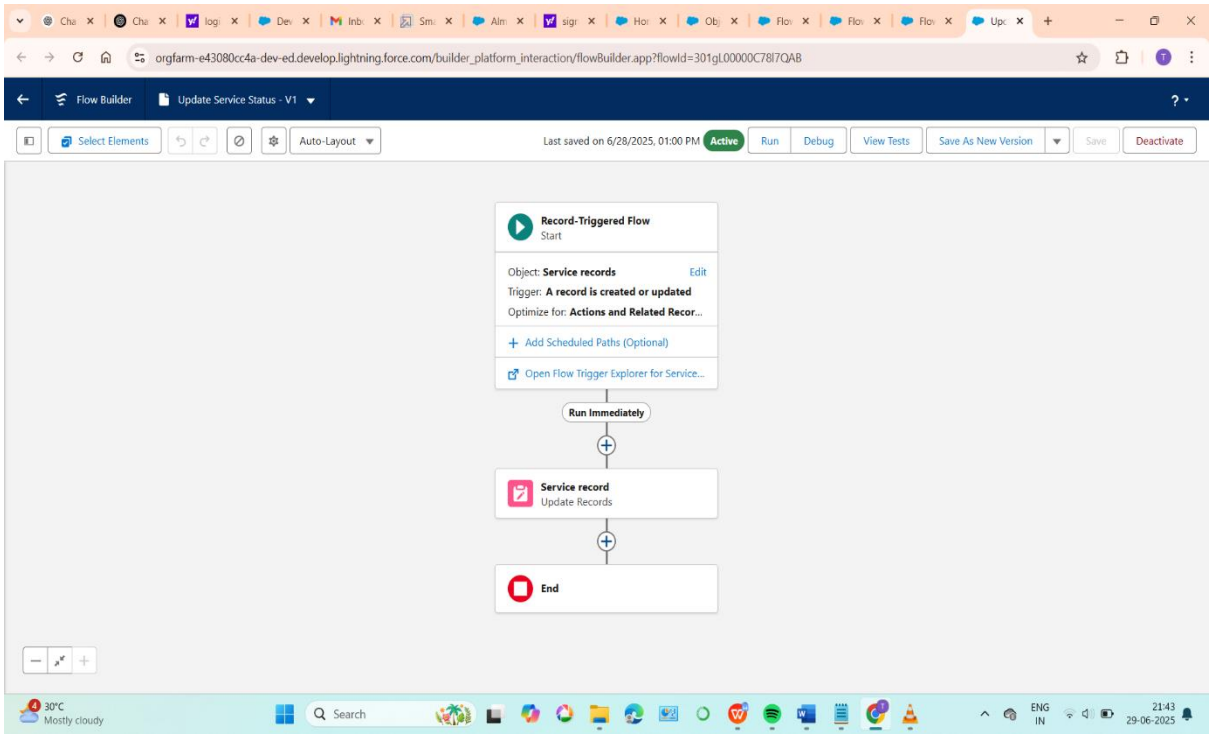
9. Retesting & Validation

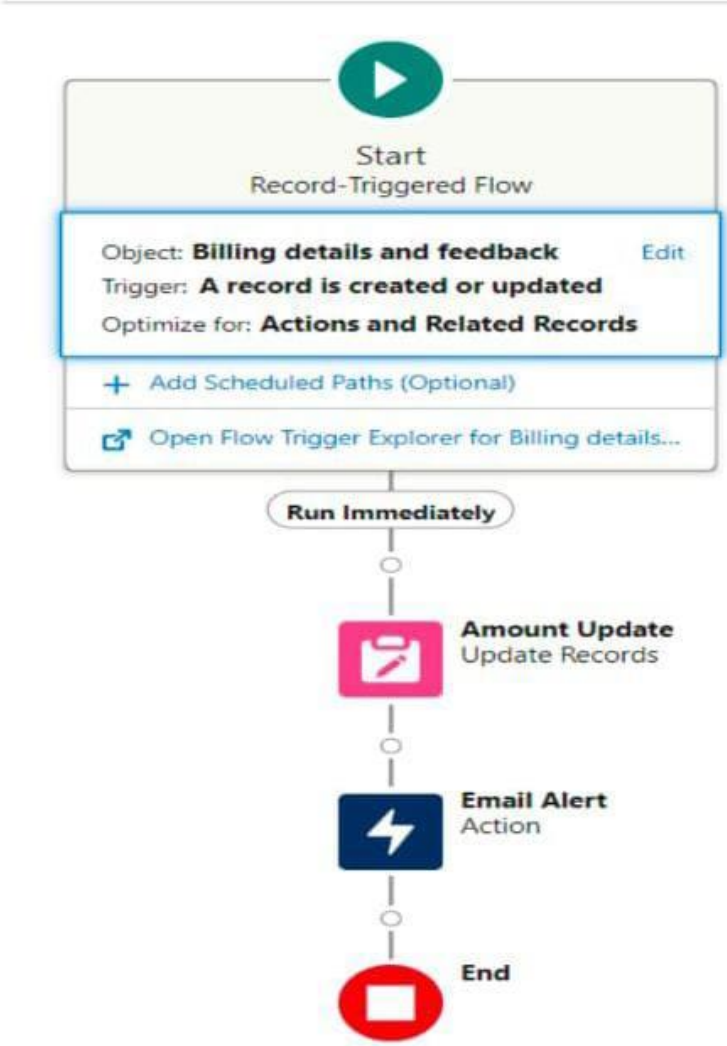
- Re-run tests post-optimizations.
- Compare metrics pre- and post- changes.
- Verify adherence to performance goals

10. Conclusion & Recommendations

- Summarize test findings and confirm if performance criteria are met.
- Provide a roadmap for continuous testing: periodic load tests, monitoring key metrics, especially post-implementing new features.

Screenshots demonstrating testing

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Record-Triggered Flow
Object: Billing details and feedback
Edit
Trigger: A record is created or updated
Optimize for: Actions and Related Records
Add Scheduled Paths (Optional)
Open Flow Trigger Explorer for Billing details...
Run Immediately
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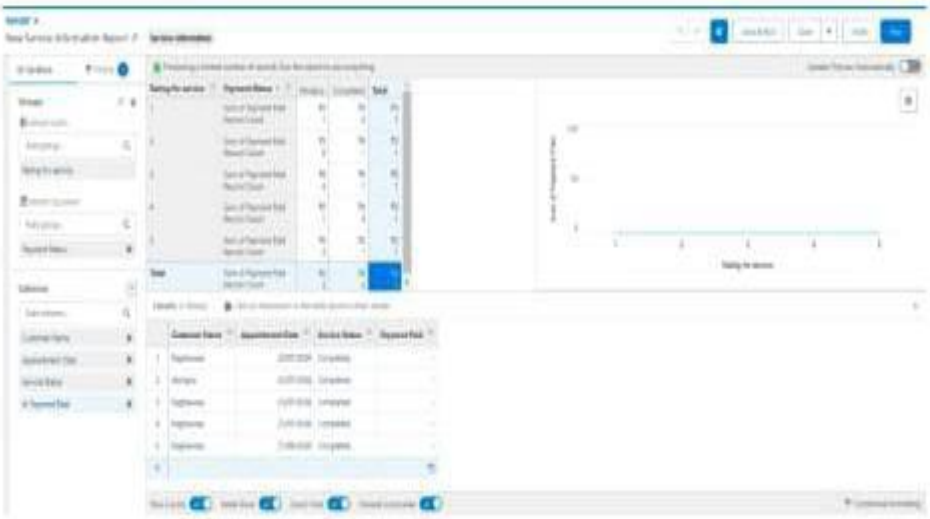
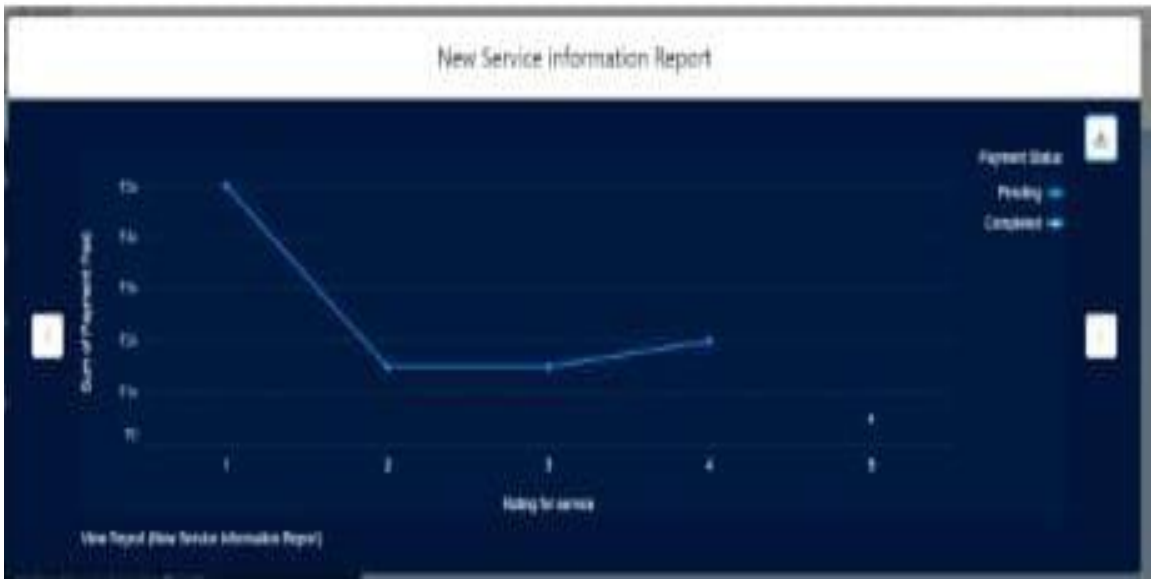
Update Records
Email Alert
Action
End

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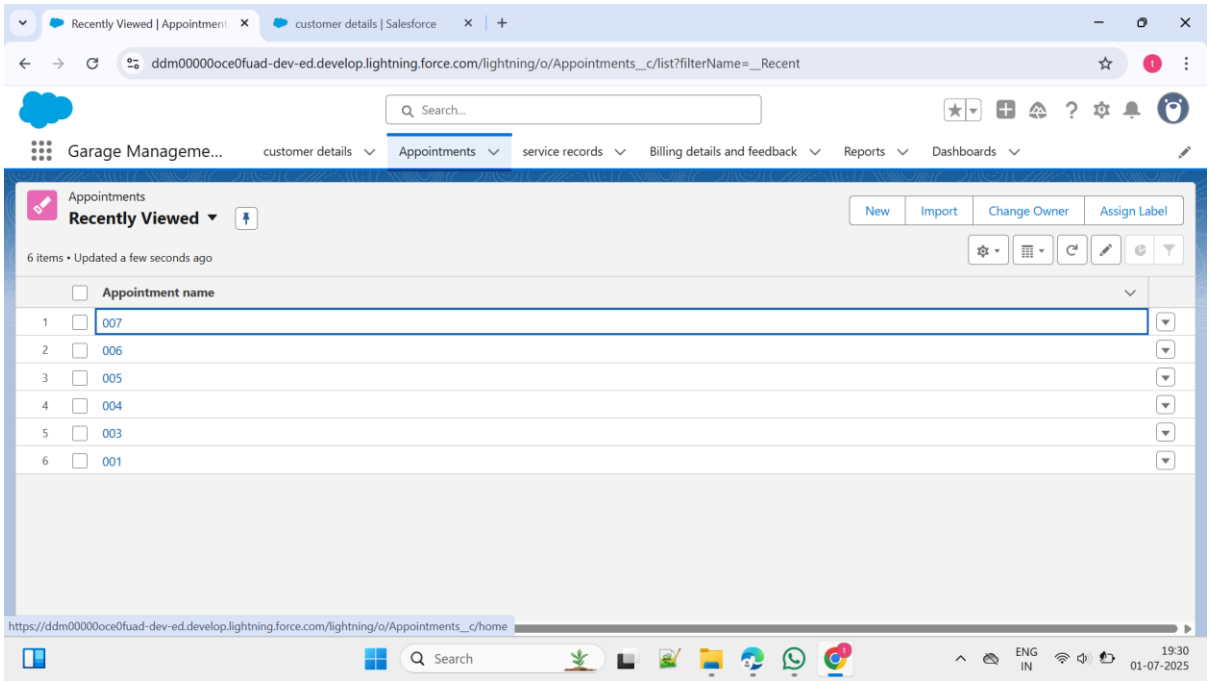

8.Doc and Demo

Final Project Report

Team Contribution Table

Team Member	Role	Responsibilities	Key Deliverables	Contribution Level
Member 1	Project Lead	- Overall project coordination - Client communication - Final report compilation	- Final Project Report - Client Presentation	100%
Member 2	Technical Lead	- System architecture design - Database schema creation - API integration	- ER Diagram - API Documentation	100%
Member 3	Developer	- Frontend development - User interface design - Testing and debugging	- UI Screenshots - Test Cases and Results	100%

Team Member	Role	Responsibilities	Key Deliverables	Contribution Level
Member 4	Documentation Lead	- User manual creation - Technical documentation - Training materials preparation	- User Manual - Training Slides	100%

GITHUB LINK:

https://github.com/sawoodd/garage-management/tree/main/video%20demo