Garage Management System: A Salesforce-Based Solution for Modern Automotive Service Centers

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Prepared By
Gujjula Anjani Krishna

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1. Executive Summary

The Garage Management System (GMS) is a cutting-edge, Salesforce-based solution meticulously developed to transform the operations of automotive service facilities. This report details the comprehensive implementation of the GMS, highlighting its user-friendly interface, robust features, and integrated functionalities designed to deliver top-notch service, increase operational efficiency, and cultivate lasting customer relationships. By leveraging Salesforce's declarative and programmatic capabilities, the GMS digitizes key processes, from customer intake and service scheduling to billing and feedback collection. The system incorporates intelligent automation, stringent data validation, and powerful reporting tools to empower garages to thrive in a competitive market while ensuring a seamless and satisfying experience for both customers and staff.

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2. Introduction

Project Overview

The Garage Management System represents a strategic initiative to revolutionize automotive service operations through the power of Salesforce. This comprehensive platform addresses the complex challenges faced by modern automotive service centers by consolidating critical operational aspects. Its primary objective is to streamline work order processing, ensure real-time inventory visibility, manage multi-layered customer interactions effectively, and provide comprehensive service monitoring. The system's design emphasizes enhancing user experience through intuitive interfaces and automating traditionally manual garage processes, significantly reducing human error and processing time.

Challenges in Traditional Garage Management

Traditional garage management often encounters inefficiencies and limitations, including:

- **Manual & Error-Prone Processes: Relying on paper-based systems or disconnected spreadsheets leads to inconsistencies, errors, and significant time consumption.**
- **Lack of Integrated Data: Siloed information across departments (e.g., customer details, service history, parts inventory) hinders a holistic view of operations and customer relationships.**
- **Inefficient Scheduling: Difficulty in optimizing technician availability, equipment usage, and service bay capacity, leading to bottlenecks and customer dissatisfaction.**
- **Suboptimal Communication: Challenges in maintaining clear and timely communication with customers regarding service status, estimates, and feedback.**
- **Limited Business Insights: Lack of real-time data and robust reporting capabilities impedes informed decision-making and strategic planning.**
- **Security Vulnerabilities: Manual systems often lack sophisticated access controls and data protection mechanisms.**

Salesforce as a Solution Platform

Salesforce was chosen as the foundational platform for the GMS due to its enterprise-grade capabilities, scalability, and robust ecosystem. The Salesforce Lightning Experience platform offers:

- **Cloud-Native Architecture: Ensuring accessibility from anywhere, anytime, with inherent scalability to support growth.**
- **Powerful Customization: Allows for tailored object models, fields, and user interfaces to match specific garage workflows.**
- **Declarative Automation: Tools like Flow and Process Builder enable complex business logic without extensive coding.**

- **Programmatic Extensibility: Apex provides powerful capabilities for advanced automation and complex calculations not achievable declaratively.**
- **Robust Security Model: Comprehensive features for access control, data sharing, and authentication.**
- **Integrated Reporting & Dashboards: Native tools for real-time analytics and business intelligence.**

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3. System Architecture and Data Model

The Garage Management System is architected on the robust Salesforce Lightning Experience platform, leveraging its enterprise-grade framework to deliver powerful automation, extensive customization, and seamless integration possibilities. The system employs a multi-layered approach prioritizing scalability, security, and performance.

Overview of Salesforce Lightning Experience

Salesforce Lightning Experience provides a modern and intuitive user interface along with a powerful component-based development framework. It facilitates the rapid development and deployment of enterprise applications by offering both declarative (point-and-click) and programmatic (code-based) options for building functionalities. This foundation ensures the system can handle increasing workloads while maintaining responsive performance and data integrity.

Core Custom Objects

The architectural framework incorporates a sophisticated blend of customized Salesforce objects, meticulously designed to manage specific aspects of garage operations:

- **Customer Details (Customer_Details__c):**
  - **Purpose: Centralized repository for all client information.**
  - **Fields: Customer Name (Text, Record Name), Phone number (Phone), Gmail (Email).**
  - **Key Feature: Serves as the primary link for all customer interactions, vehicle histories, and service preferences.**
- **Appointment (Appointment__c):**
  - **Purpose: Manages service scheduling and initial intake details.**
  - **Fields: Appointment Name (Auto Number: app-{000}), Appointment Date (Date, Required), Vehicle number plate (Text, Length 10, Required, Unique), Service Amount (Currency, Read-Only for Profiles), Maintenance service (Checkbox), Repairs (Checkbox), Replacement Parts (Checkbox).**
  - **Relationships: Look-up to Customer Details__c (linking appointments to specific customers).**
  - **Key Feature: Captures the initial service request, vehicle details, and dynamically calculates the estimated service amount based on selected services.**
- **Service records (Service_records__c):**
  - **Purpose: Tracks individual service tasks and their progression.**
  - **Fields: Service records Name (Auto Number: ser-{000}), Quality Check Status (Checkbox), Service Status (Picklist: Started, Completed), service date (Formula Field: CreatedDate).**
  - **Relationships: Look-up to Appointment__c (linking service records to specific appointments), with a required filter ensuring Appointment Date is less than Service records Created Date.**
  - **Key Feature: Provides granular tracking of service execution and quality control.**
- **Billing details and feedback (Billing_details_and_feedback__c):**

- Purpose: Manages financial transactions and captures customer feedback.
- Fields: Billing details and feedback Name (Auto Number: bill-{000}), Payment Paid (Currency), Rating for service (Text, Length 1, Required), Payment Status (Picklist: Pending, Completed).
- Relationships: Look-up to Service records__c (linking billing to completed services).
- Key Feature: Handles payment processing and gathers essential customer satisfaction data.

Relationships Between Objects

The system's data model is interconnected through lookup relationships, ensuring data integrity and enabling a holistic view of the garage's operations:

- **Customer Details to Appointment (One-to-Many): A customer can have multiple appointments.**
- **Appointment to Service records (One-to-Many): An appointment can lead to multiple service records (though in this context, it seems to imply one primary service record per appointment).**
- **Service records to Billing details and feedback (One-to-Many): A service record can have one or more associated billing/feedback entries.**

This relational structure allows for comprehensive tracking of a vehicle's journey through the service center, from initial booking to final payment and feedback.

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4. Key Features and Functionalities

The Garage Management System's core functionality suite delivers a comprehensive set of tools designed to revolutionize garage operations management, leveraging Salesforce's robust automation capabilities.

Work Order Management (Appointment & Service Records)

The system meticulously manages the lifecycle of a service request:

- **Appointment Scheduling: Allows customers to book appointments, capturing essential details like customer information, desired service types (Maintenance, Repairs, Replacement Parts), and vehicle number plates. The Appointment Date is a crucial field, ensuring all necessary information is collected upfront.**
- **Dynamic Service Amount Calculation: Based on the services selected during appointment creation (Maintenance, Repairs, Replacement Parts), an Apex Trigger dynamically calculates and populates the Service Amount field. This ensures accurate upfront estimates.**
- **Service Execution Tracking: Once an appointment is confirmed, a Service record is created, automatically assigned a unique ser-{000} ID. The Service Status defaults to 'Started'.**
- **Quality Control Checkpoints: The Quality Check Status checkbox on the Service records object allows technicians to confirm critical quality checks have been performed.**
- **Automated Status Update: Upon marking Quality Check Status as true, the Service Status automatically updates to 'Completed', providing real-time visibility into service progression.**
- **Lookup Filter for Service Records: A validation on the Appointment lookup ensures that the Appointment Date for a service record is logically less than the Service records Created Date, maintaining data integrity.**

Customer Management

- **Centralized Customer Profiles: The Customer Details object acts as a single source of truth for all customer information, including contact details (Phone number, Gmail) and a unique Customer Name.**

- **Relationship Tracking: All appointments, service records, and billing details are linked back to the Customer Details, providing a comprehensive view of a customer's history with the garage. This enables personalized service delivery and proactive communication.**

Billing & Feedback

- **Automated Billing Integration: The Billing details and feedback object captures payment information. The Payment Paid field is designed to be populated automatically via a Flow when the Payment Status is 'Completed', drawing the amount from the related Service Amount on the Appointment.**
- **Payment Status Tracking: A picklist field (Payment Status) allows for clear tracking of billing states ('Pending', 'Completed').**
- **Customer Feedback Collection: The Rating for service (1-5) field on the Billing details and feedback object provides a direct mechanism for customers to rate their experience, enabling continuous service improvement.**

Dynamic Service Pricing (Apex)

The AmountDistributionHandler Apex class, triggered before insert and before update on the Appointment__c object, implements the business logic for calculating the Service_Amount__c based on the selected services:

- **Logic:**
    - **Maintenance, Repairs, and Replacement Parts: $10,000**
    - **Maintenance and Repairs: $5,000**
    - **Maintenance and Replacement Parts: $8,000**
    - **Repairs and Replacement Parts: $7,000**
    - **Maintenance Service only: $2,000**
    - **Repairs only: $3,000**
    - **Replacement Parts only: $5,000**

This ensures that the service amount is dynamically calculated and displayed to the customer based on their selections.

Automated Email Notifications (Flow)

A Record-triggered Flow on the Billing details and feedback object automates customer communication:

- **Trigger: When a Billing details and feedback record is Created or Updated.**
- **Condition: Executes only when Payment_Status__c is 'Completed'.**
- **Action:**
    1. **Update Records: Sets the Payment_Paid__c field on the Billing details and feedback record to the value of Service_Amount__c from the related Appointment__c record.**
    2. **Email Alert: Sends a personalized "Thank You for Your Payment" email to the customer using their Gmail__c from the Customer Details record. The email includes the customer's name and the Amount paid. This enhances customer experience and provides automated confirmation.**

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5. Security and Access Management

The GMS implements a robust, multi-layered security framework leveraging Salesforce's native capabilities to protect sensitive data and manage user access effectively.

Profiles and Permissions

Profiles define what users can see and do within Salesforce. The GMS utilizes both standard and custom profiles:

- **Standard Profiles: Salesforce provides default standard profiles (e.g., System Administrator, Standard User).**
- **Custom Profiles:**
    - **Manager Profile: Cloned from "Standard User".**
        - **Custom App Settings: Default for "Garage Management Application".**
        - **Custom Object Permissions: Full Read, Create, Edit, Delete, View All, Modify All access for Appointments, Billing details and feedback, Service records, and Customer details objects.**
        - **Session Settings: Session timeout set to "8 hours of inactivity".**
        - **Password Policies: "Never expires" for user passwords, minimum length of "8".**
    - **Sales Person Profile: Cloned from "Salesforce Platform User".**
        - **Custom App Settings: Default for "Garage Management Application".**
        - **Custom Object Permissions: Defined specifically for Appointments, Billing details and feedback, Service records, and Customer details objects to grant access relevant to a sales person's role (likely Read, Create, Edit on relevant objects, but details on which specific permissions were set are crucial here).**

Roles and Role Hierarchy

Roles define a user's visibility access at the record level within Salesforce, primarily through the role hierarchy. Users at higher levels in the hierarchy have greater access to records owned by or shared with users lower in the hierarchy.

- **Manager Role: Created under the "CEO" role in the hierarchy. This role allows managers to view records owned by users reporting to them (e.g., Sales Persons).**
- **Sales Person Role: Created under the "Manager" role. Users assigned to this role will have their records visible to managers above them in the hierarchy.**

This hierarchy ensures that management can oversee the activities and data of their direct reports.

Public Groups

Public Groups are a powerful tool for streamlining user management and simplifying sharing settings.

- **Sales Team Group: A public group named "sales team" was created, including all users with the "Sales person" role. This group can then be used in sharing rules or other security settings to grant access to a collection of users more efficiently than adding individual users.**

Sharing Settings (OWD & Sharing Rules)

Sharing Settings control how records are accessed and shared across the organization, crucial for maintaining data security and privacy.

- **Organization-Wide Defaults (OWD): These define the baseline access for all objects.**
    - **Service records Object: OWD set to Private. This means that by default, users can only see their own Service records. This is a critical security measure ensuring confidentiality.**
- **Sharing Rules: Provide exceptions to OWD settings, extending access to records based on criteria or ownership.**

- **"Sharing setting" Rule for Service records:**
  - **Label: Sharing setting**
  - **Purpose: Shares Service records owned by "Sales person" roles with "Manager" roles.**
  - **Access Level: Read/Write.**
  - **Mechanism: This rule allows managers to view and edit all service records created by sales persons reporting to them, even though the OWD for Service records is private. This aligns with the hierarchical data visibility requirement.**

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6. Data Validation and Integrity

The GMS incorporates robust data validation mechanisms to ensure the accuracy, consistency, and uniqueness of information entered into the system.

Validation Rules

Validation rules are applied when a user attempts to save a record. If the data does not meet specified criteria, an error message is triggered, preventing the user from saving the record until the issues are resolved.

- **Appointment Object - "Vehicle" Rule:**
  - **Rule Name: Vehicle**
  - **Error Condition Formula: NOT(REGEX(Vehicle_number_plate__c , "[A-Z]{2}[0-9]{2}[A-Z]{2}[0-9]{4}"))**
  - **Error Message: "Please enter vaild number" (sic)**
  - **Error Location: Vehicle number plate field.**
  - **Purpose: This rule ensures that the Vehicle number plate entered for an appointment adheres to a specific alphanumeric format (e.g., "TS12AB3456"), preventing invalid entries.**
- **Billing details and feedback Object - "rating_should_be_less_than_5" Rule:**
  - **Rule Name: rating_should_be_less_than_5**
  - **Error Condition Formula: NOT(REGEX(Rating_for_service__c , "[1-5]{1}"))**
  - **Error Message: "rating should be from 1 to 5"**
  - **Error Location: Rating for Service field.**
  - **Purpose: This rule ensures that the Rating for service field only accepts single-digit values between 1 and 5, maintaining consistency in feedback data.**

Matching Rules

Matching rules identify duplicate records based on specific criteria before they are created or updated.

- **Customer details Object - "Matching customer details" Rule:**
  - **Rule Name: Matching customer details**
  - **Matching Criteria:**
    - **Gmail: Exact Match**
    - **Phone Number: Exact Match**

- **Purpose: This rule identifies potential duplicate customer records if they have the exact same Gmail address or Phone Number, promoting data cleanliness. The rule is activated to enforce this check.**

Duplicate Rules

Duplicate rules leverage matching rules to define what action Salesforce should take when a duplicate record is detected.

- **Customer details Object - "Customer Detail duplicate" Rule:**
  - **Rule Name: Customer Detail duplicate**
  - **Matching Rule: Matching customer details**
  - **Purpose: This rule utilizes the "Matching customer details" rule to prevent the creation of duplicate customer records or to alert users when a potential duplicate is detected. When activated, it helps maintain a clean and accurate customer database.**

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7. Reporting and Business Intelligence

The GMS provides robust reporting and dashboard capabilities, allowing management and staff to gain critical insights into operational performance, customer satisfaction, and financial metrics.

Custom Report Types

Custom Report Types define the objects and fields available for reporting, as well as the relationships between those objects. This allows users to create reports that span multiple related objects.

- **"Service information" Report Type:**
  - **Primary Object: Customer details**
  - **Related Objects (A to B relationships):**
    1. **Customer details to Appointment**
    2. **Appointment to Service records**
    3. **Service records to Billing details and feedback**
  - **Category: Other Reports**
  - **Deployment Status: Deployed**
  - **Purpose: This custom report type enables comprehensive reporting that links customer information directly to their appointments, the services performed, and the associated billing and feedback, providing a complete customer journey overview.**

Reports

Reports are lists of records that meet criteria you define. They can be displayed in a variety of formats and used to analyze business data.

- **"New Service information Report":**
  - **Report Type: "Service information"**
  - **Columns: Customer name, Appointment Date, Service Status, Payment paid.**
  - **Group Rows: Rating for Service, Payment Status.**
  - **Chart: Line Chart**

- **Folder: "Garage Management Folder"**
- **Purpose: This report provides a detailed view of service information, grouped by customer rating and payment status, allowing for analysis of customer satisfaction and payment trends. The line chart visually represents these trends over time.**

Dashboards

Dashboards are visual representations of data from reports, providing a high-level overview of key metrics.

- **"Service Rating dashboard":**
  - **Folder: "Service Rating dashboard"**
  - **Components: Includes a component based on the "New Service information Report," likely displaying the Line Chart of service information.**
  - **Purpose: This dashboard provides a quick and intuitive visual summary of service ratings and other key service metrics.**
  - **Subscription: Configured for weekly subscription on Mondays, ensuring that relevant stakeholders automatically receive updated performance insights regularly.**

Report Folder & Sharing

- **"Garage Management Folder": Created to organize all reports related to the Garage Management System.**
- **Report Folder Sharing: The "Garage Management Folder" is shared with "Roles" (specifically "Manager" roles) with "View" access. This ensures that managers have visibility into all reports within this folder, aligning with the organizational hierarchy and access requirements.**

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8. System Implementation and Record Creation

The implementation of the Garage Management System involves a structured approach to setting up the Salesforce environment, defining the data model, configuring security, automating processes, and establishing reporting capabilities. The detailed steps taken during the project setup are outlined as follows:

1. **Developer Account Creation: A Salesforce developer org was created as the foundational environment for building and testing the GMS. This involved signing up at developer.salesforce.com/signup and providing necessary organizational and user details.**
2. **Account Activation: The developer account was activated via email verification, setting up initial login credentials and security questions.**
3. **Custom Object Creation:**
   - **Customer Details: Created with Customer Name as a Text record name.**
   - **Appointment: Created with Appointment Name as an Auto Number (app-{000}).**
   - **Service records: Created with Service records Name as an Auto Number (ser-{000}).**
   - **Billing details and feedback: Created with Billing details and feedback Name as an Auto Number (bill-{000}). All objects were configured to allow reports, track field history, and allow search.**
4. **Custom Tab Creation: Custom tabs were created for each of the four custom objects (Customer Details, Appointment, Service records, Billing details and feedback) to make them accessible within the Salesforce user interface.**
5. **Lightning App Creation: A new Lightning App named "Garage Management Application" was created.**

- **It included essential navigation items: Customer Details, Appointments, Service records, Billing details and feedback, Reports, and Dashboards.**
- **The "System Administrator" profile was assigned access to this app.**

6. **Field Creation for Customer Details:**
   - **Phone number (Phone Data Type).**
   - **Gmail (Email Data Type).**
7. **Lookup Field Creation:**
   - **On Appointment object to Customer Details.**
   - **On Service records object to Appointment (with a required filter: Appointment: Appointment Date less than Appointment: Created Date).**
   - **On Billing details and feedback object to Service records.**
8. **Checkbox Field Creation:**
   - **On Appointment: Maintenance service, Repairs, Replacement Parts.**
   - **On Service records: Quality Check Status.**
9. **Date Field Creation:**
   - **On Appointment: Appointment Date (Required).**
10. **Currency Field Creation:**
    - **On Appointment: Service Amount (Read-only for all profiles).**
    - **On Billing details and feedback: Payment Paid.**
11. **Text Field Creation:**
    - **On Appointment: Vehicle number plate (Length 10, Required, Unique).**
    - **On Billing details and feedback: Rating for service (Length 1, Required).**
12. **Picklist Field Creation:**
    - **On Service records: Service Status (Values: Started, Completed).**
    - **On Billing details and feedback: Payment Status (Values: Pending, Completed).**
13. **Formula Field Creation:**
    - **On Service records: service date (Date Type, Formula: CreatedDate).**
14. **Validation Rule Creation:**
    - **On Appointment: To validate Vehicle number plate format.**
    - **On Billing details and feedback: To ensure Rating for service is between 1 and 5.**
15. **Matching and Duplicate Rules:**
    - **Matching rule "Matching customer details" on Customer details based on Gmail and Phone Number (Exact match), then activated.**
    - **Duplicate rule "Customer Detail duplicate" on Customer details using the above matching rule, then activated.**
16. **Profile Creation:**

- Cloned "Standard User" to create "Manager" profile with specific object permissions, session settings, and password policies.
- Cloned "Salesforce Platform User" to create "sales person" profile with specific object permissions.

17. Role Hierarchy Setup:
    - "Manager" role created under "CEO".
    - "sales person" role created under "Manager".
18. User Creation:
    - User "Niklaus Mikaelson" created with "Manager" role and profile.
    - Multiple users created with "sales person" role and profile.
19. Public Group Creation:
    - "sales team" public group created, including all users with the "Sales person" role.
20. Sharing Settings Configuration:
    - Service records OWD set to "Private".
    - Sharing rule "Sharing setting" created for Service records to share records owned by "Sales person" roles with "Manager" roles with "Read/Write" access.
21. Flow Creation:
    - Record-triggered Flow on Billing details and feedback (on Create or Update) to update Payment Paid when Payment Status is 'Completed' and send an email alert to the customer.
22. Apex Handler and Trigger:
    - AmountDistributionHandler Apex class created to calculate Service_Amount__c on Appointment__c based on selected service checkboxes.
    - AmountDistribution Apex Trigger created on Appointment__c (before insert, before update) to call the AmountDistributionHandler.
23. Report and Dashboard Setup:
    - Report folder "Garage Management Folder" created and shared with "Manager" roles.
    - Custom Report Type "Service information" created linking Customer details, Appointment, Service records, and Billing details and feedback.
    - Report "New Service information Report" created using the custom report type, with specific columns and grouping, and a Line Chart.
    - Dashboard folder "Service Rating dashboard" created.
    - Dashboard created, including the report component, and subscribed for weekly delivery.

Creating Records

The final stage of implementation involves populating the system with sample data to test its functionality:

- **Customer Details: New records created with phone numbers and email addresses.**
- **Appointments: Records created, ensuring Appointment Date is less than Created Date for related Service records, and Vehicle number plate adheres to the validation rule. Service checkboxes were selected to observe the Service Amount calculation.**

- **Service Records: Created by linking to existing Appointments. Quality Check Status was toggled to 'true' to observe the Service Status update.**
- **Billing details and feedback: Records created, linking to Service Records. Payment Status was set to 'Completed' to trigger the automated payment update and email notification. Rating for service was entered adhering to the validation rule.**

This comprehensive setup demonstrates a functional and robust Garage Management System within Salesforce.

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9. Conclusion

The Garage Management System, meticulously built on the Salesforce platform, represents a transformative stride towards modernizing and optimizing automotive service operations. By integrating cutting-edge technology with a user-centric design, this solution directly addresses the unique and complex challenges faced by contemporary automotive service businesses. Through the systematic automation of core workflows, significant enhancements in inventory management, and the cultivation of superior customer engagement via a seamless portal, the system not only drives unparalleled operational efficiency but also fosters greater transparency across all facets of the service process.

The project's success is underpinned by rigorous planning, meticulous development, and comprehensive multi-layered testing methodologies, which together ensure unwavering reliability, robust scalability, and enterprise-grade security. Its carefully designed, multi-layered architecture, coupled with flexible integration capabilities, positions it as a highly adaptable solution, ready to evolve with future business needs and technological advancements. Furthermore, the establishment of a comprehensive training and support infrastructure guarantees successful adoption by all users, thereby maximizing the return on investment.

Ultimately, the Garage Management System is engineered not only to meet the current operational demands of automotive service centers but also to strategically lay the groundwork for sustained growth and continuous innovation. It empowers businesses to consistently deliver exceptional service experiences, optimize their valuable resources, and achieve significant, measurable improvements in key performance metrics. This comprehensive solution stands as a testament to a steadfast commitment to excellence, unequivocally positioning the client at the forefront of their competitive industry.