**Salesforce Implementation Project**

**Title:** Smart City Waste & Recycling Management System  
**Domain:** Smart Cities / Municipal Services **Solution Category:** Salesforce CRM + IoT Integration

**Primary Users:** City Officials, Waste Collection Staff, Truck Drivers, and Citizens.

**Problem Statement**

➤ GreenCity Municipal Corporation faces growing challenges in managing urban waste and recycling. Overflowing bins, inefficient truck routing, and limited citizen participation create operational inefficiencies, higher costs, and environmental concerns.

➤ To address this, the corporation requires a **Salesforce-based Waste & Recycling Management Platform** that:

**•** Tracks waste bins, IoT fill-level data, trucks, and routes.

**•** Automates waste pickup assignment to nearest available trucks.

**•** Provides real-time notifications to citizens.

**•** Rewards citizens for recycling participation.

**•** Enables predictive dashboards for sustainable decision-making.

**Phase - 1 : Problem Understanding & Industry Analysis**

**Requirements Analysis**

**➣System Needs**

• Maintain detailed records of bins, including geographic location and IoT-based fill level data.

**•** Track fleet information: drivers, vehicle capacity, and assigned collection zones.

**•** Ensure pickup requests are generated automatically and avoid duplication for the same bin.

**•** Provide real-time communication to citizens regarding bin collection and reward point updates.

**•** Deliver analytical dashboards to city officials for performance and sustainability insights.

**➣Key Stakeholders & Their Expectations**

**• Municipal Administrators** → Require visibility into waste collection patterns, recycling rates, and cost savings through dashboards.

**• Truck Operators** → Need efficient job allocation that considers proximity and load capacity.

**• Community Members** → Expect timely waste collection services and transparency in reward programs.

**• Technical Support Team** → Responsible for IoT connectivity, data synchronization, and smooth functioning of recycling records.

**➣Current vs. Proposed Workflow**

1. **Existing Approach:** Collection relies heavily on manual reporting, complaint calls, and irregular routing. This leads to inefficiencies, delays, and dissatisfaction among residents.

**ii) Planned Salesforce-Enabled Workflow:**

**•** IoT sensors detect when bins reach capacity.

**•** A pickup request is generated and automatically assigned to the closest available truck.

**•** Citizens are notified of the collection status and updated reward balances.

**•** Dashboards consolidate data for city officials, providing clear operational insights.

**➣Industry Context & Special Considerations**

**•** Smart city initiatives emphasize sustainability and efficiency in public services.

**•** Recycling adoption improves significantly when linked to gamified reward systems.

**•** IoT technology supports predictive analysis for route optimization and overflow prevention.

**➣Technology & Marketplace Exploration**

**• Mapping and Route Tools →** GIS integration to streamline driver assignments.

**• IoT Middleware Solutions →** Connect bin-level sensors directly with Salesforce records.

**• Gamification / Rewards Apps →** Enhance citizen engagement through redeemable points.

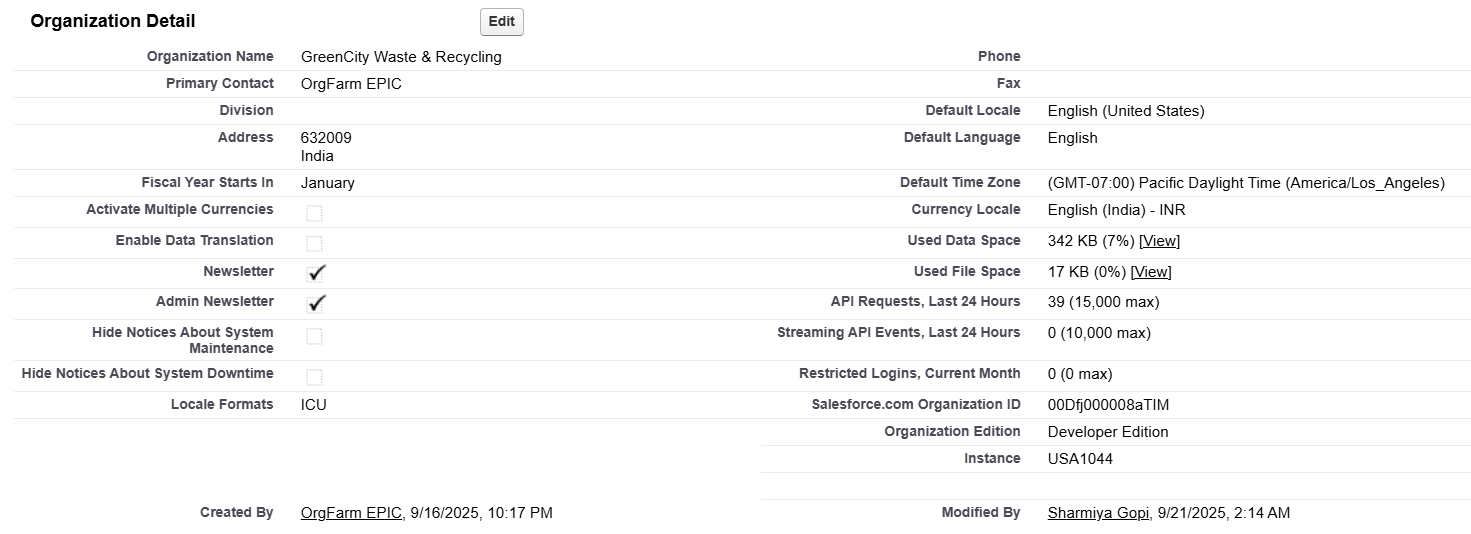
**Phase 2: Org Setup & Configuration**

**➣Salesforce Editions**

For this project, a Salesforce Developer Edition Org was selected. It is free, comes with all core CRM capabilities, and supports both configuration (Admin) and coding (Apex, LWC). This edition is ideal for building, testing, and demonstrating the Smart City Waste & Recycling solution.

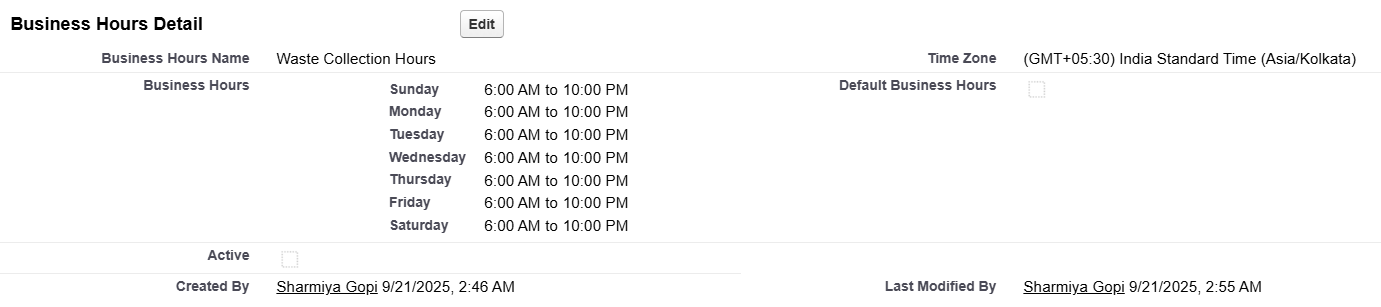
**➣Company Profile Setup**

The company profile was set up with the name GreenCity Waste & Recycling, using the Asia/Kolkata (GMT +5:30) time zone, English (India) locale, and English as the default language. The currency was configured as INR (Indian Rupee) to match local financial standards. These settings ensure the org reflects regional operations and reporting needs.

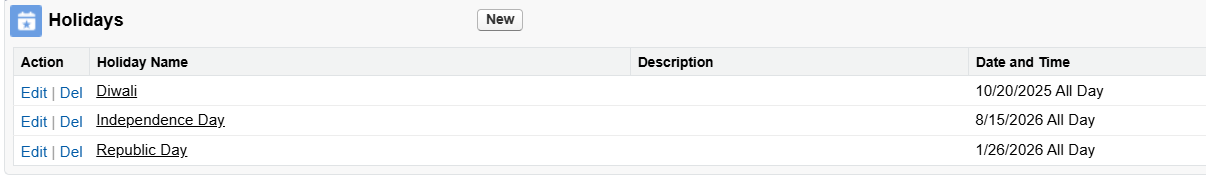


**➣Business Hours & Holidays**

**• Business Hours:** “Waste Collection Hours” → 6:00 AM to 10:00 PM, Monday–Sunday



**• Holidays Configured:** Diwali, Republic Day, Independence Day



**➣Fiscal Year Settings**

The fiscal year is kept as Standard (Jan–Dec). This supports financial reporting aligned with city budget cycles and allows sustainability dashboards to reset annually.

**➣User Setup & Licenses**

Created representative users for key roles:

• Commissioner (System Administrator License)

• Operations Manager (Salesforce Platform License)

• Route Supervisor (Salesforce Platform License)

These simulate the different personas that interact with the system.

**➣Profiles**

Custom profiles were cloned from Standard User and modified:

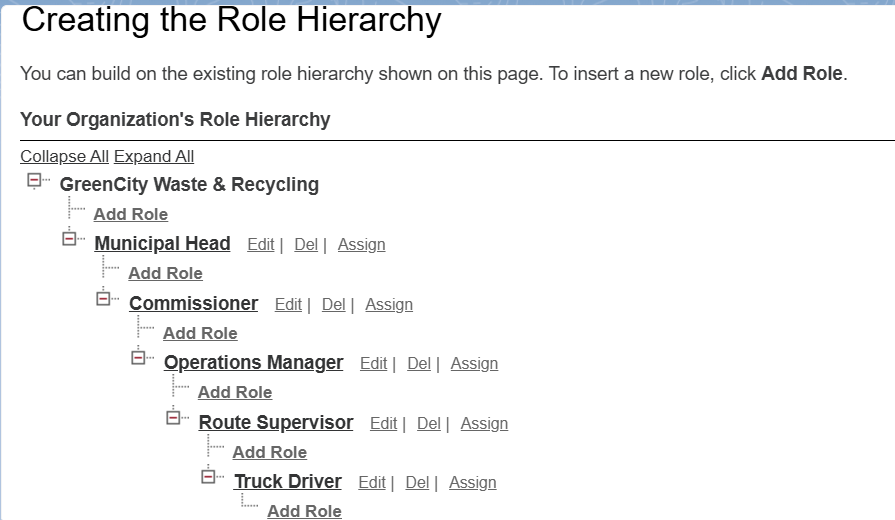
**• Operations\_Manager\_Profile** → Full access to bins, trucks, and pickups.

**• Route\_Supervisor\_Profile** → Moderate access; cannot delete.

**• Truck\_Driver\_Profile** → Limited to viewing bins and updating assigned pickups.

**➣Roles**

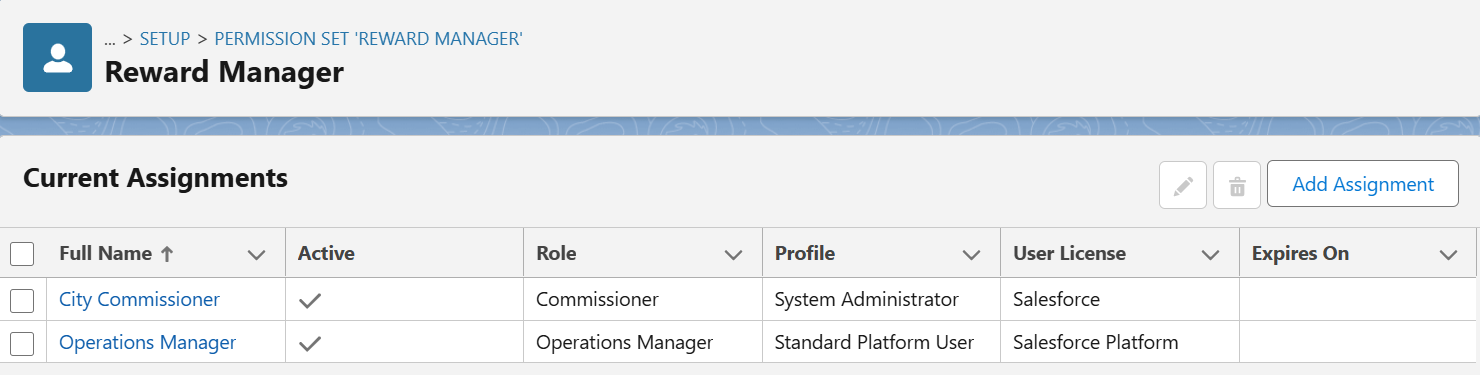
A role hierarchy was created to reflect municipal reporting.



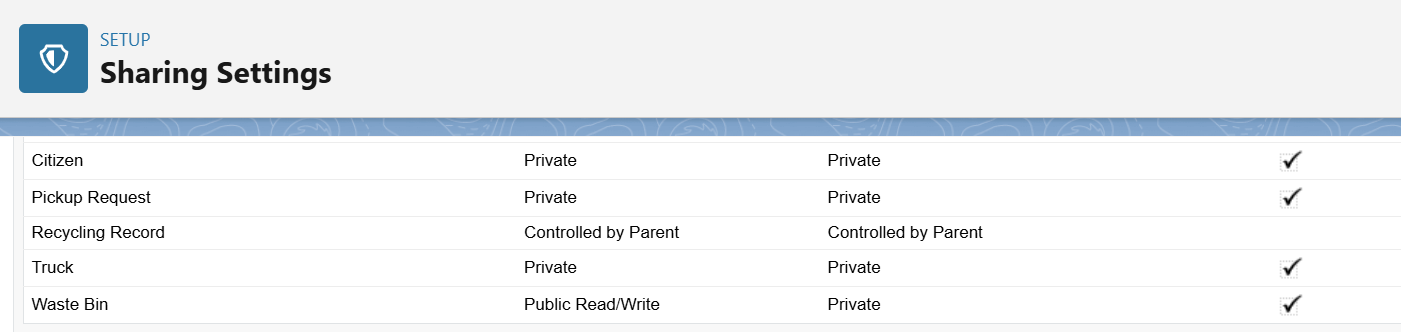
**➣Permission Sets**

**Reward\_Manager:** Grants edit rights on citizen reward points.

Permission sets were used instead of modifying profiles directly to keep security flexible.



**➣OWD (Org-Wide Defaults)**



This enforces least-privilege access while allowing collaboration on bins.

**➣Sharing Rules**

**• Criteria-Based Rule:** Pickup Requests with Zone = “North” are shared with the North Route Supervisor role.

**• Owner-Based Rule:** Pickup Requests owned by the Pickup Requests Queue are shared with Route Supervisors

**➣Login Access Policies**

**•** “Administrators can log in as any user” enabled (for testing).

**•** Session timeout set to 30 minutes.

**•** MFA enabled for all admin and manager-level accounts.

**➣Dev Org Setup**

A Developer Edition Org was initialized with company info, roles, users, and OWD as described. This environment serves as the baseline for building custom objects, flows, triggers, and integrations.

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**Phase 3: Data Modeling & Relationships**

**➣Standard & Custom Objects**

For this project, the standard Contact object is used to represent citizens. Contacts are extended with additional fields such as Zone and Reward Points to capture recycling behavior. Alongside this, several custom objects were created:

**• Waste Bin (Waste\_Bin\_\_c):** Stores bin location, fill level, and IoT sensor details.

**• Truck (Truck\_\_c):** Represents collection vehicles, drivers, and capacity.

**• Route (Route\_\_c):** Defines service areas and schedules.

**• Pickup Request (Pickup\_Request\_\_c):** Created whenever a bin requires collection.

**• Recycling Record (Recycling\_Record\_\_c):** Logs citizen recycling contributions and calculates reward points.

**➣Fields**

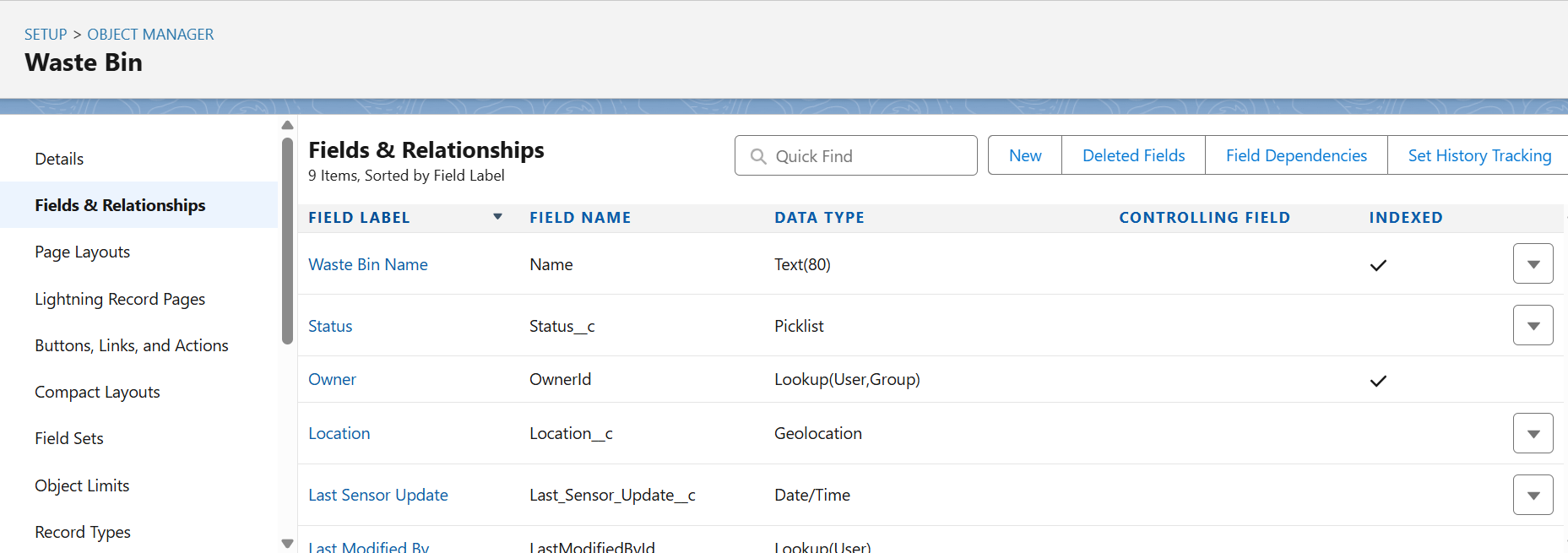
Custom fields were added to capture project-specific data:

**• Waste Bin:** Bin ID (Text), Location (Geolocation), Fill Level (Number), Status (Picklist).

**• Truck:** Truck ID (Text), Driver (Lookup to User), Capacity (Number), Current Load (Number), Status (Picklist).

**• Pickup Request:** Auto Number, Bin (Lookup), Assigned Truck (Lookup), Status (Picklist), Priority (Picklist), Scheduled Time (DateTime).

**• Recycling Record:** Auto Number, Citizen (Master-Detail), Material Type (Picklist), Quantity (Number), Points Earned (Number).



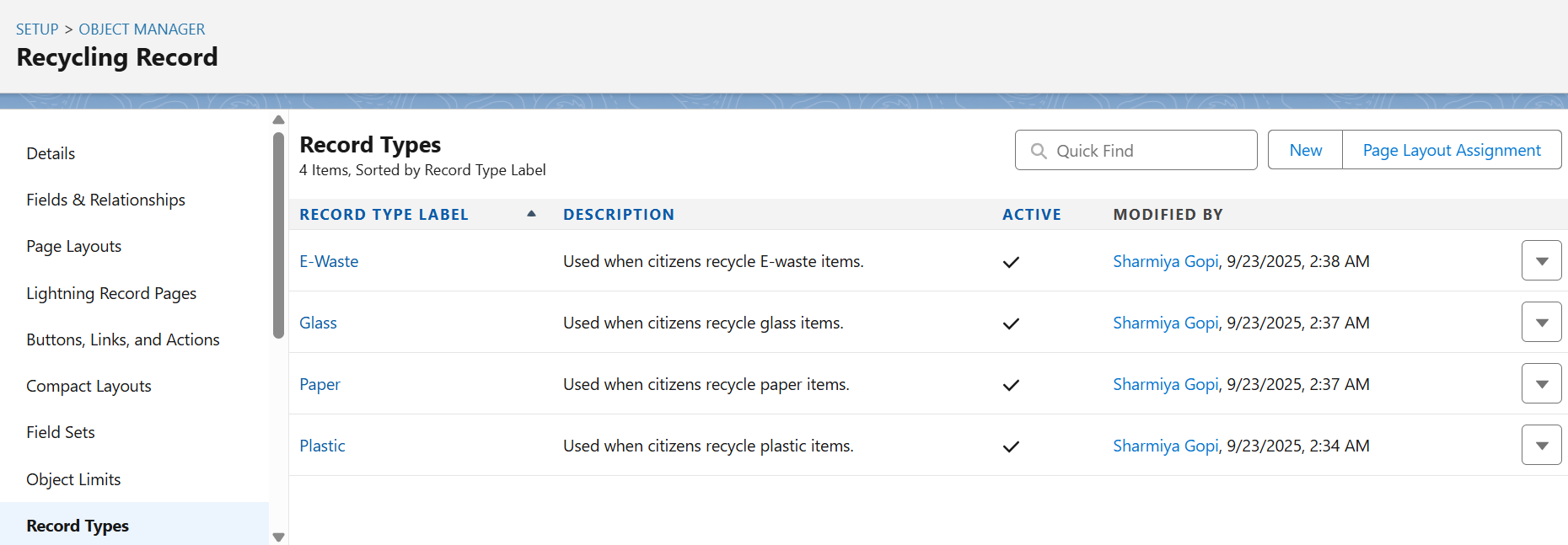
**➣Record Types**

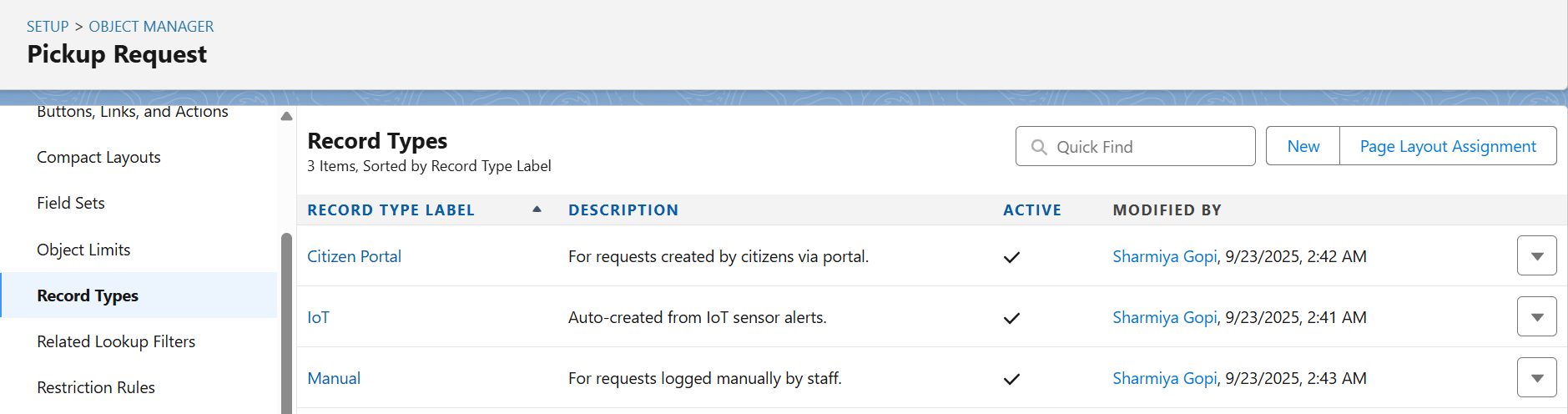
Record types were introduced to support process variations:

**• Pickup Request:** IoT, Citizen Portal, Manual.

**• Recycling Record:** Plastic, Paper, Glass, E-Waste.

Each record type uses different page layouts to tailor fields for the process.





**➣Page Layouts**

Page layouts were customized per object to group fields logically:

**• Waste Bin:** Bin details, sensor readings, collection history.

**• Truck:** Vehicle information, assigned driver, capacity tracking.

**• Pickup Request:** Request details, assigned truck/driver, scheduling.

**• Recycling Record:** Citizen details, material type, quantity, and points.

Related lists (e.g., Pickup Requests on Bin, Recycling Records on Contact) were also included.

**➣Compact Layouts**

Compact layouts were defined to optimize the mobile and record header view:

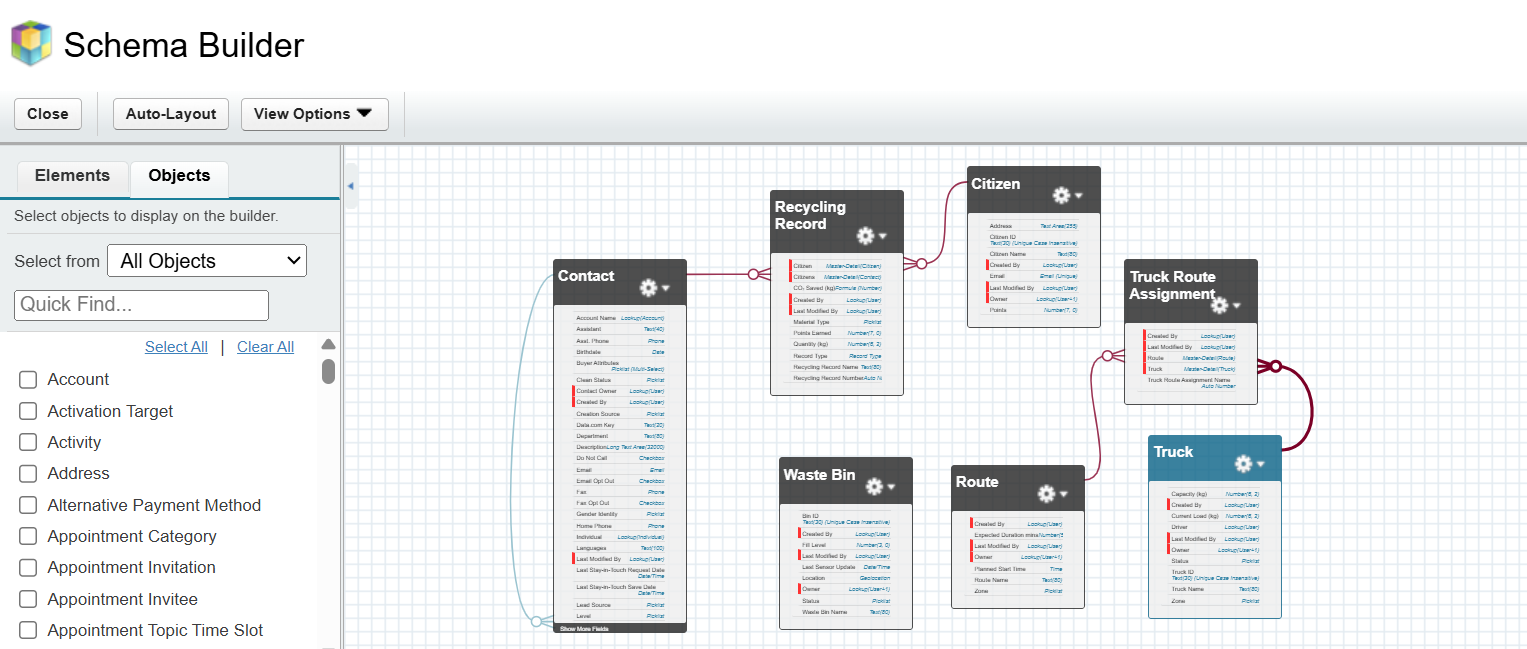
**•** Waste Bin Compact: Bin Name, Fill Level, Status.

**•** Pickup Request Compact: Request Number, Status, Assigned Truck.

**•** Recycling Record Compact: Record Number, Points Earned, Material Type.

**➣Schema Builder**

The Schema Builder was used to visualize objects, fields, and relationships. Custom objects (Waste Bin, Truck, Route, Pickup Request, Recycling Record) were added to the canvas to verify relationships. This provided a clear diagram for validation and documentation.



**➣Lookup vs Master-Detail vs Hierarchical Relationships**

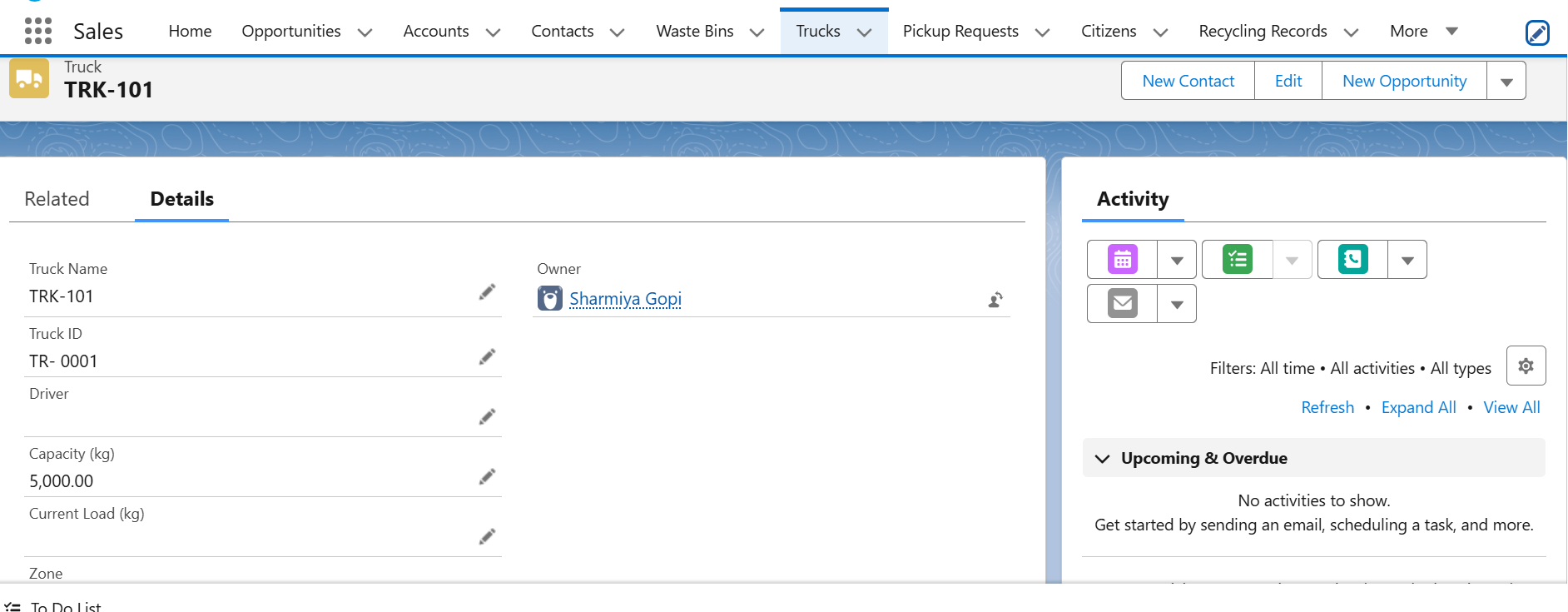
**• Master-Detail:** Used where strict dependency and roll-up summaries are required (e.g., Recycling Record → Contact, Truck Route Assignment → Truck and Route).

**• Lookup:** Applied where records are independent but linked (e.g., Pickup Request →Waste Bin, Pickup Request → Truck).

**• Hierarchical:** Salesforce only supports this on the User object and was not required in this project.

## **➣**Junction Objects

## A junction object, **Truck Route Assignment**, was created to model the many-to-many relationship between trucks and routes. This allows one truck to serve multiple routes and one route to have multiple trucks assigned.



**Phase 4: Process Automation (Admin)**

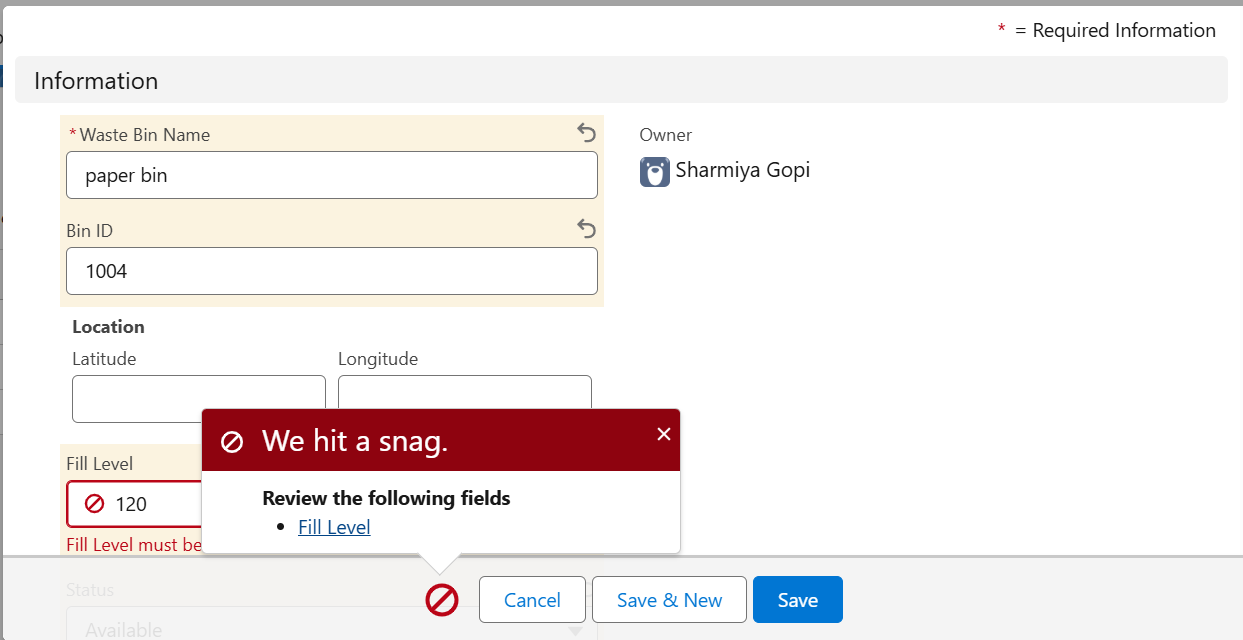
**➣Validation Rules**

Validation rules were used to enforce business rules and maintain data quality:

**• Truck Capacity Rule:** Prevents assigning a pickup request to a truck if the combined load would exceed its maximum capacity.

**• Bin Fill Level Rule:** Ensures IoT fill levels are always between 0% and 100%.

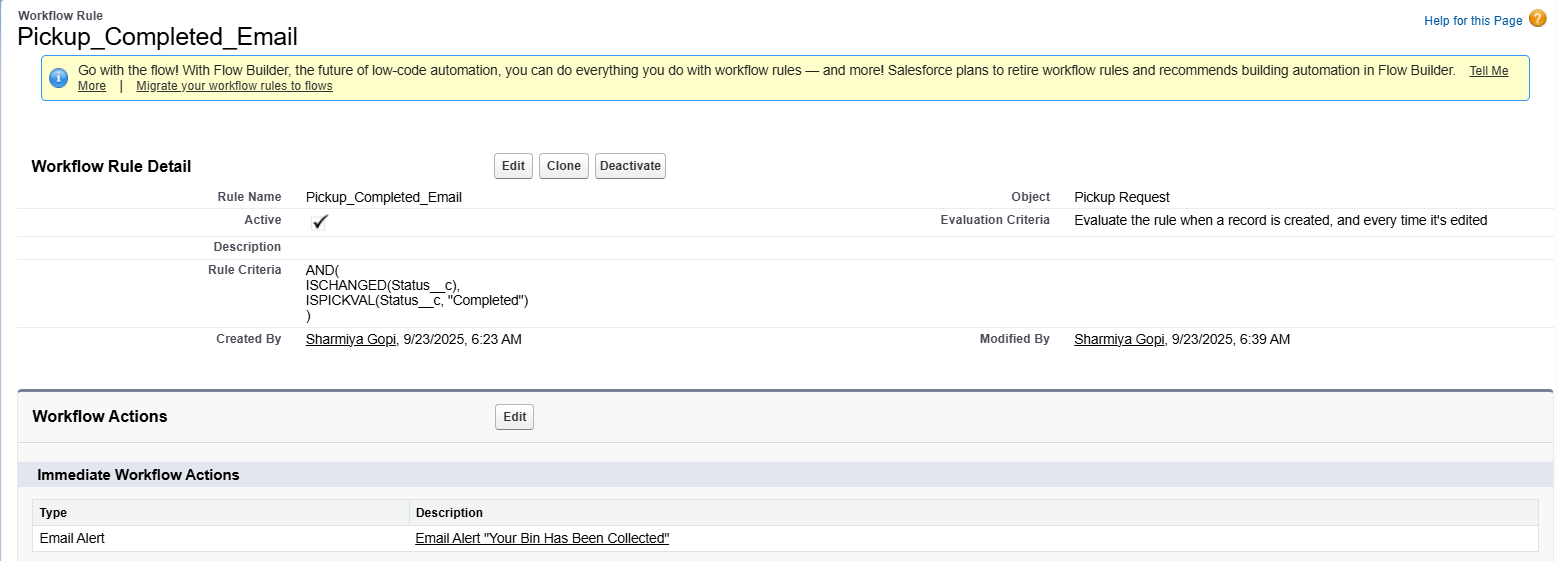
These rules reduce errors and prevent unrealistic data entry.



**➣Workflow Rules**

Although Workflow is legacy, a simple rule was created for demonstration:

**• Pickup Completion Notification:** When a pickup request status is changed to Completed, an automated email is sent to the citizen confirming the service.

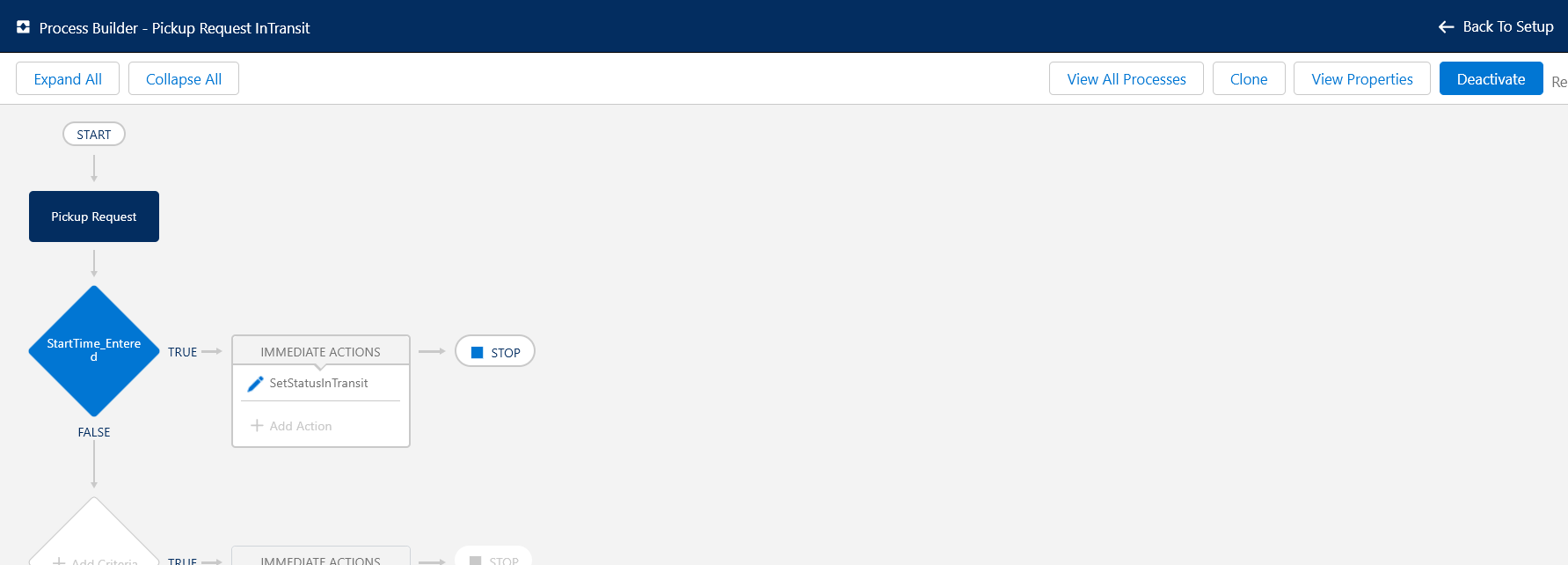


**➣Process Builder**

Process Builder was applied for lightweight updates before migrating logic to Flow:

**• Pickup Request In-Transit:** Automatically updates the pickup request status to In Transit once a driver logs a start time.

This showcased Salesforce automation prior to Flow Builder adoption.



**➣Approval Process**

An approval process was configured to handle escalation scenarios:

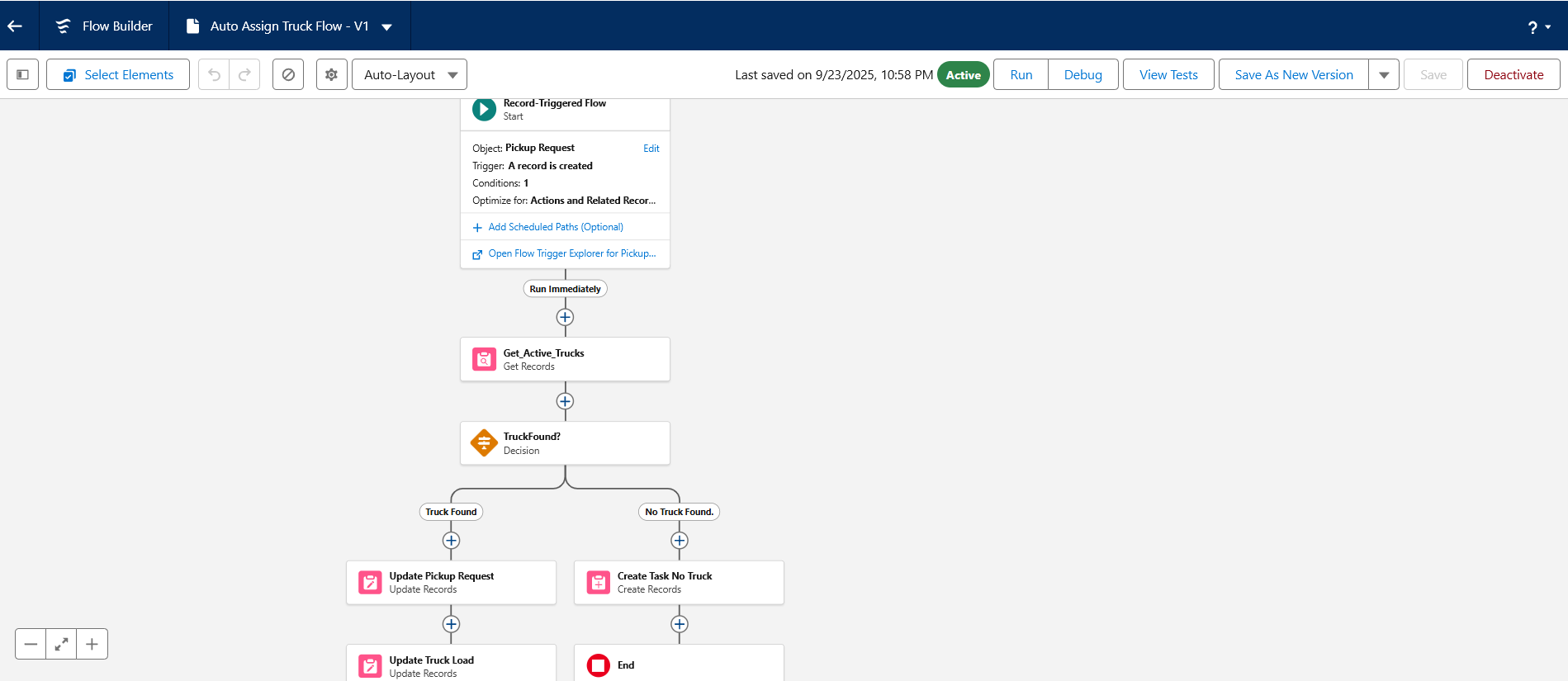
**• Emergency Pickup Approval:** If a pickup request is marked Emergency or the estimated load exceeds a threshold, it requires approval from the Commissioner before dispatch.

This ensures high-impact cases are reviewed by leadership.

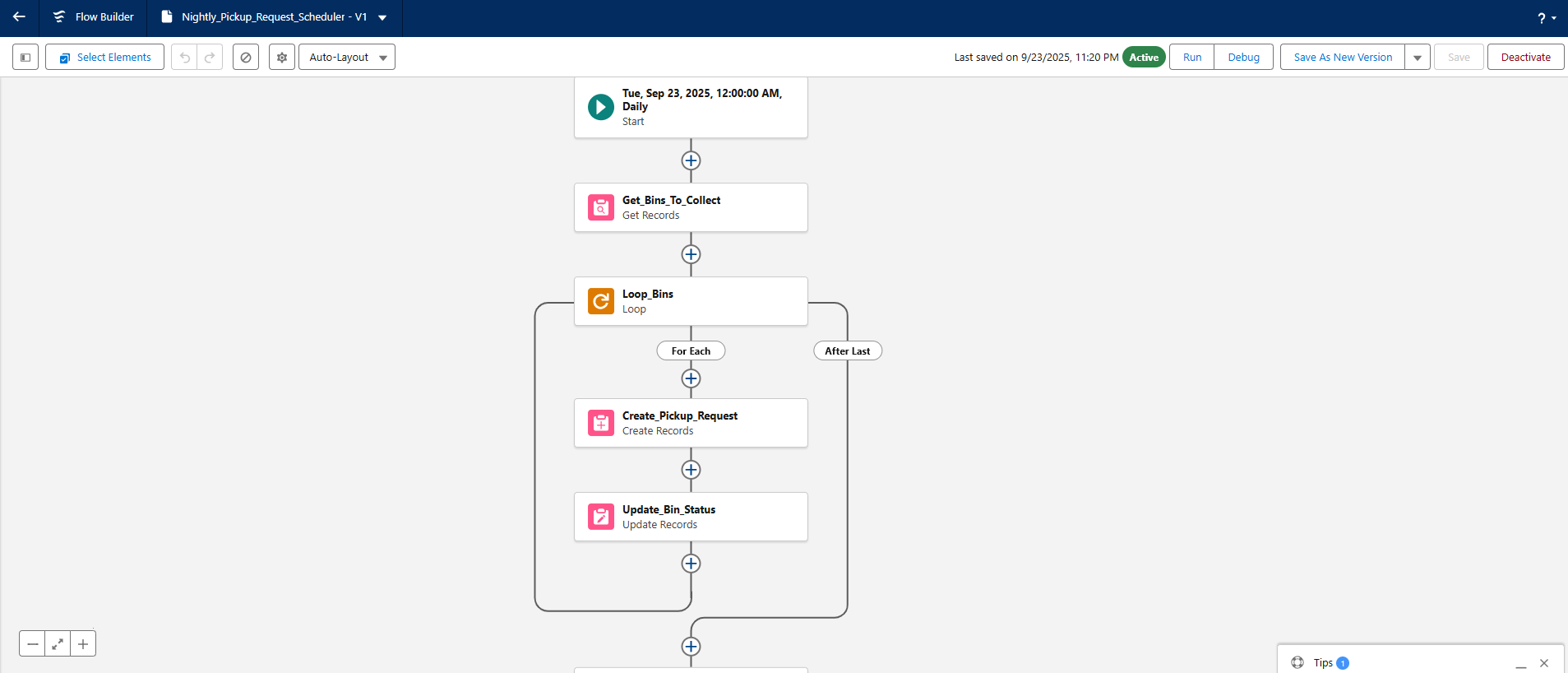
**➣Flow Builder**

Flow Builder was the core automation tool, covering multiple scenarios:

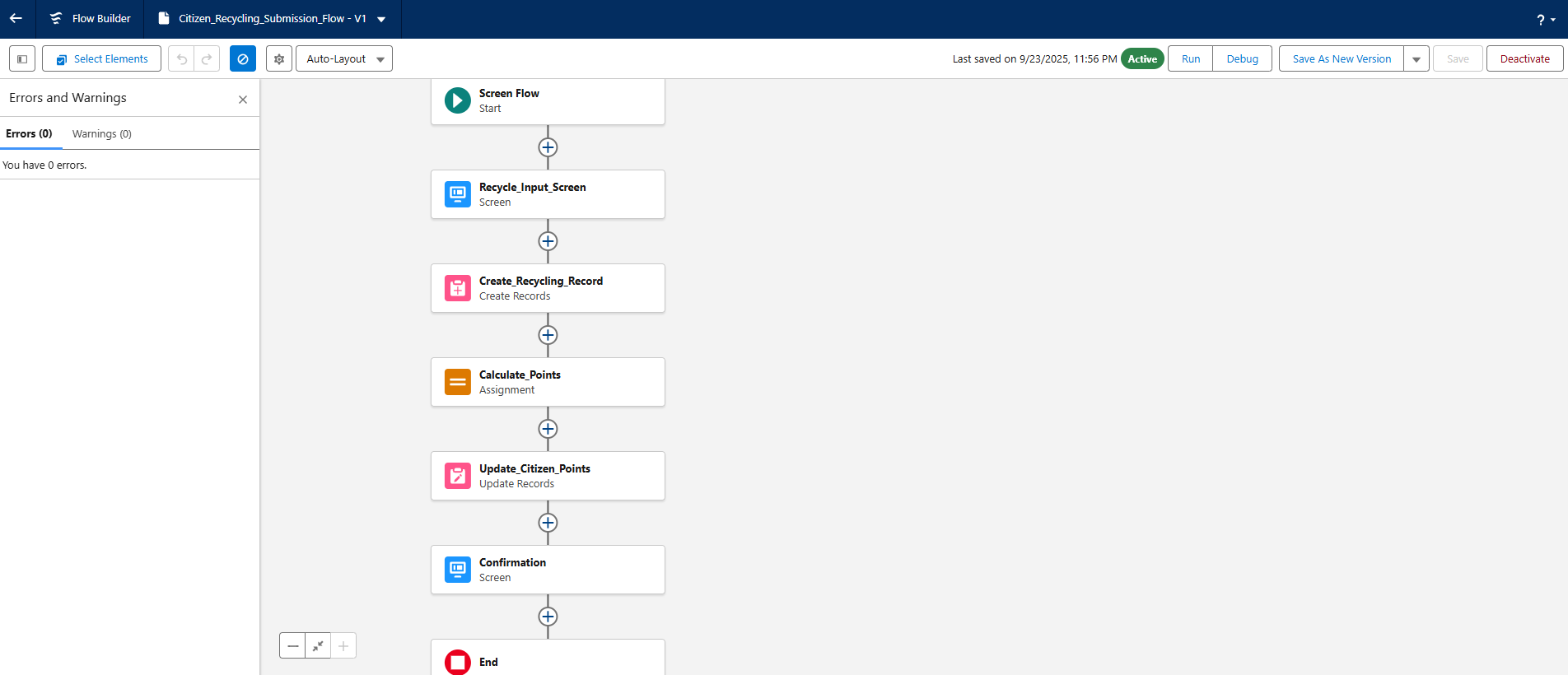
**• Record-Triggered Flow:** Auto-assigns the nearest available truck when a pickup request is created, updates the truck’s load, and notifies the driver.



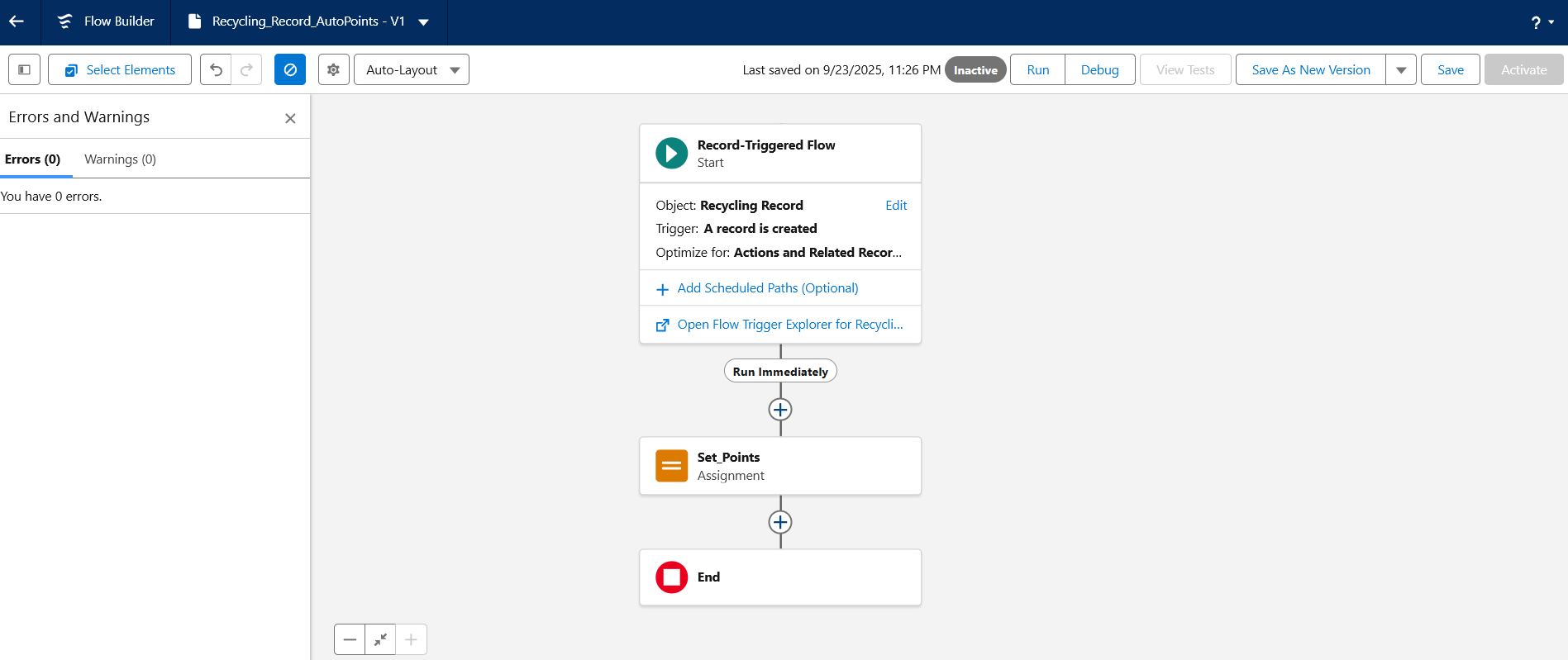
**• Scheduled Flow:** Runs nightly to check for bins with fill level above 80% and auto-creates pending pickup requests.



**• Screen Flow:** Embedded in the Citizen Portal to allow residents to submit recycling records and instantly update their reward points.



**• Auto-launched Flow:** Used for backend calculations, such as awarding recycling points when a record is logged.



Flows reduced the need for custom code while handling complex automations.

**➣Email Alerts**

Email alerts were linked with workflow rules and flows:

**•** Citizens received confirmation when their bin was collected.

**•** Drivers and supervisors received alerts for newly assigned pickups.

**➣Field Updates**

Automatic updates kept data synchronized:

**• Recycling Record:** Auto-calculates reward points based on material and quantity.

**• Contact (Citizen):** Updates cumulative reward points whenever a new recycling record is added.

**➣Tasks**

Automated task creation was used for driver reminders:

**•** When a pickup was assigned, a task was created for the driver with due date and bin details.

This ensured accountability and scheduling support.

**➣Custom Notifications**

Custom in-app/mobile notifications were built using Notification Builder:

**• Driver Assignment Notification:** Sent instantly when a truck driver is assigned a new pickup request.

**• Operations Alert:** Triggered if no trucks are available for a pending pickup request.

These real-time notifications improved responsiveness for staff and citizens.

**Phase 5: Apex Programming (Developer)**