Smart Disaster Resource Coordination Platform

Phase 3: Data Modeling & Relationships

Implementation Report

Executive Summary

Phase 3 established comprehensive data architecture supporting real-time disaster response coordination. Five core custom objects were created with strategic relationships, optimized field configurations, and mobile-ready layouts to enable efficient tracking of disasters, shelters, volunteers, resources, and requests.

Duration: 12 hours | **Objects Created:** 5 custom objects | **Relationships:** 4 strategic relationships | **Layouts:** 8 optimized layouts

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1. Custom Object Architecture

Data Model Strategy

The data model supports the complete disaster response lifecycle from initial declaration through resource allocation and volunteer coordination to response closure. Each object represents a critical emergency response component with strategic relationships enabling seamless coordination.

Object Relationship Overview

- **Disaster__c:** Central hub linking all response activities
- **Shelter__c:** Master-detail parent for requests, lookup relationships for volunteers
- **Volunteer__c:** Links to shelters and disasters for assignment tracking
- **Resource__c:** Referenced by requests for inventory management
- **Request__c:** Junction between shelters and resources with approval workflow

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2. Core Object Implementations

Disaster__c Object

Configuration: API Name: Disaster__c | Record Naming: DIS-{00000} | Sharing: Public Read/Write

Key Fields:

- **Disaster_Type__c (Picklist):** Earthquake, Flood, Hurricane, Wildfire, Tornado, Winter Storm, Pandemic, Industrial Accident
- **Severity_Level__c (Picklist):** Low, Medium, High, Critical - for resource allocation priority
- **Status__c (Picklist):** Declared, Active, Contained, Recovery, Closed - workflow automation
- **Location__c (Text 255):** Primary affected area | **Affected_Counties__c (Long Text):** Geographic impact
- **Start_Date__c/End_Date__c (Date/Time):** Timeline tracking | **Response_Commander__c (Lookup to User):**Incident command
- **Resource_Budget__c (Currency):** Allocated response budget | **Description__c (Long Text):** Incident details

Business Logic: Validation rule (end date > start date), workflow (Critical status email alerts), roll-up summaries (shelter/volunteer counts)

Shelter__c Object

Configuration: API Name: Shelter__c | Record Naming: SHE-{00000} | Sharing: Public Read/Write

Key Fields:

- **Shelter_Name__c (Text 80):** Facility identification | **Location__c (Text 255):** Full address
- **Facility_Type__c (Picklist):** School, Community Center, Church, Temporary Structure, Hotel
- **Total_Capacity__c (Number):** Maximum occupancy | **Current_Occupancy__c (Number):** Real-time count
- **Available_Capacity__c (Formula):** Total - Current | **Capacity_Utilization__c (Formula %):** Utilization percentage
- **Operational_Status__c (Picklist):** Available, At Capacity, Maintenance, Closed
- **Special_Needs_Support__c (Multi-select):** Medical, Elderly, Pets, Accessibility, Family Units
- **Contact_Person__c (Text 100):** Manager contact | **Phone_Number__c (Phone):** Communication number

Features: Mobile occupancy tracking, threshold alerts (80%/95% capacity), waitlist management

Volunteer__c Object

Configuration: API Name: Volunteer__c | Record Naming: VOL-{00000} | Sharing: Private with coordinator access

Key Fields:

- **Personal:** First_Name__c, Last_Name__c, Email__c (required), Phone_Number__c, Emergency_Contact__c
- **Skills:** Skills__c (Multi-select: Medical, Construction, Communication, Transportation, Food Service, Childcare, Translation, Technology, Administration), Certifications__c, Experience_Level__c (Beginner, Intermediate, Advanced, Expert)
- **Availability:** Availability_Status__c (Available, Assigned, Unavailable, On Break), Preferred_Shifts__c, Max_Hours_Per_Week__c, Transportation_Available__c
- **Assignment:** Current_Assignment__c (Lookup to Shelter), Assignment_Start_Date__c, Performance_Rating__c, Hours_Completed__c

Features: Automated skill matching, schedule optimization, performance tracking system

Resource__c Object

Configuration: API Name: Resource__c | Record Naming: RES-{00000} | Sharing: Public Read/Write

Key Fields:

- **Identification:** Resource_Name__c, Resource_Type__c (Food, Water, Medical Supplies, Blankets, Clothing, Tools, Hygiene Items, Baby Supplies, Electronics), Resource_Category__c (Essential, Important, Comfort, Specialized), Supplier__c
- **Stock:** Current_Stock_Level__c (required), Unit_of_Measure__c (Pieces, Boxes, Liters, Kilograms, Cases, Pallets), Minimum_Threshold__c, Maximum_Capacity__c
- **Logistics:** Storage_Location__c, Warehouse_Section__c, Expiration_Date__c, Cost_Per_Unit__c
- **Status:** Availability_Status__c (Formula: Available/Low Stock/Out of Stock), Last_Updated__c, Reserved_Quantity__c

Automation: Threshold alerts, expiration tracking, usage analytics for demand forecasting

Request__c Object

Configuration: API Name: Request__c | Record Naming: REQ-{00000} | Sharing: Controlled by Parent (Shelter)

Key Fields:

- **Request:** Requesting_Shelter__c (Master-Detail to Shelter), Requested_Resource__c (Lookup to Resource), Quantity_Requested__c, Priority_Level__c (Urgent, High, Medium, Low)
- **Management:** Request_Status__c (Submitted, Under Review, Approved, In Transit, Fulfilled, Denied, Cancelled), Requested_By__c, Request_Date__c, Needed_By_Date__c
- **Fulfillment:** Approved_Quantity__c, Approved_By__c, Approval_Date__c, Delivery_Date__c, Delivery_Notes__c
- **Documentation:** Justification__c (required), Special_Instructions__c, Denial_Reason__c

Workflow: Automated routing by priority/value, escalation rules, real-time notifications

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3. Strategic Relationship Design

Master-Detail Relationships

Request__c → Shelter__c

- **Purpose:** Ensures requests belong to specific shelters with cascade delete protection
- **Benefits:** Automatic sharing inheritance, roll-up summaries (request counts, total values, average priority), data integrity

Lookup Relationships

Volunteer__c → Shelter__c (Current_Assignment__c): Flexible volunteer-to-shelter assignments with reassignment capability and history tracking

Volunteer__c → Disaster__c (Assigned_Disaster__c): Links volunteers to specific disaster responses for coordination and reporting

Request__c → Resource__c (Requested_Resource__c): Identifies specific resources while maintaining master data for usage tracking and optimization

Disaster__c → User (Response_Commander__c): Assigns incident command responsibility with accountability and automated notifications

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4. Page Layout & Mobile Optimization

Optimized Page Layouts

Shelter Layout

- **Section 1:** Facility Information (Name, Location, Type, Contact, Phone)
- **Section 2:** Capacity & Status (Total/Current/Available Capacity, Operational Status)
- **Section 3:** Resources & Needs (Available Resources, Critical Needs, Special Support, Inspection)
- **Related Lists:** Active Requests, Assigned Volunteers, Activities

Volunteer Layout

- **Section 1:** Personal Information (Name, Email, Phone, Emergency Contact)
- **Section 2:** Skills & Availability (Skills, Certifications, Experience, Status)
- **Section 3:** Assignment Details (Current Assignment, Dates, Performance, Hours)

Resource Layout

- **Section 1:** Resource Details (Name, Type, Category, Supplier)
- **Section 2:** Inventory Management (Stock Level, Unit, Threshold, Location)
- **Section 3:** Status & Analytics (Availability, Last Updated, Cost, Reserved)

Request Layout

- **Section 1:** Request Information (Shelter, Resource, Quantity, Priority)
- **Section 2:** Processing Status (Status, Requested By, Dates)
- **Section 3:** Fulfillment Details (Approved Quantity/By, Delivery, Notes)

Mobile-Optimized Compact Layouts

Resource__c: Resource Name, Type, Stock Level, Location - instant inventory visibility **Shelter__c:** Name, Location, Occupancy, Status - quick capacity assessment
Volunteer__c: Name, Skills, Availability, Assignment - rapid identification **Request__c:** Resource, Quantity, Priority, Status - priority queue management

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5. Data Quality & Validation Framework

Implemented Validation Rules

- **Disaster Dates:** End date cannot be before start date
- **Shelter Capacity:** Current occupancy cannot exceed total capacity
- **Request Quantities:** Requested quantity must be greater than zero
- **Volunteer Hours:** Completed hours cannot exceed maximum weekly hours

Field Dependencies & Business Logic

- **Request Status:** Required fields based on status progression (approval fields for approved status)
- **Volunteer Skills:** Experience level determines available skill complexity options
- **Resource Categories:** Unit of measure options filtered by resource type for data consistency

Security & Sharing Implementation

- **Field-Level Security:** Sensitive financial and personal data restricted by profile
- **Sharing Rules:** Coordinator access to volunteer records, regional access to disaster data
- **Audit Trail:** All field changes tracked for compliance and analysis

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Phase 3 Outcomes & Achievements

Technical Accomplishments

Complete Data Architecture: 5 core custom objects supporting full disaster response lifecycle with strategic relationships ensuring data integrity and operational efficiency

Mobile-Ready Platform: All layouts optimized for field operations with offline capability, GPS integration, and quick-decision interfaces for emergency coordination

Workflow Foundation: Data structure prepared for automation including validation rules, approval processes, and Flow Builder implementations for next phase

Scalable Design: Object relationships support multi-regional operations with role-based access and performance optimization for high-volume emergency scenarios

Report Generated: September 2025 | **Phase Status:** Complete | **Implementation Time:** 4 hours | **Objects:** 5 custom objects with 4 strategic relationships | **Next Phase:** Process Automation