
Agentic AI Sales CRM System

UCS 503 Software Engineering Project Report

End-Semester Evaluation

Submitted by:

(102317162) Arnav Joshi
(102317164) Navnoor Bawa
(102317214) Pulkit Garg

BE Third Year, CSE

Group No: 3Q16

Submitted to:

Dr. Deep Mann
Computer Science and Engineering Department
TIET, Patiala



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1. Project Selection Phase

1.1 Software Bid

Group : 3Q16

Team Name: Billionaires

Team ID : 001

Name	Roll No	Project Experience	Programming Language used	Signature
Arnav Joshi	102317162	Halo CME Detection and Analyzing BlockChain Data to Detect Spoofing	Python	Arnav
Navnoor Bawa	102317164	Real-time WTI crude oil futures prediction system using ensemble ML models and automated contract rollover logic.	Python	Navnoor
Pulkit Garg	102317214	Halo CME Detection and Analyzing BlockChain Data to Detect Spoofing	Python	Pulkit

Programming Language / Environment Experience

1. Python, JavaScript
2. React.js, Node.js, FastAPI
3. SQL, Git, Docker

Choices of Projects:

	Project Name	Unique Selling Point
First Choice	Agentic AI Sales CRM	Fully autonomous AI-powered CRM that automates lead enrichment, scoring, and personalized outreach using cost-free open-source tools and local LLMs.

	Project Name	Unique Selling Point
Second Choice	Algorithmic Trading Platform	A platform that sells fully backtested algorithmic trading strategies. Users can view performance metrics, understand the alpha logic, purchase the strategy, and deploy it like a mutual-fund style model portfolio. Essentially, we commercialize profitable, rigorously back-tested algos for retail and professional traders.
Third Choice	Automated Ad-Generation Pipeline	A complete n8n-based automation pipeline that generates tailored ad creatives. The system forms prompts, sends them to Gemini or another LLM, structures the outputs, and delivers ready-to-publish advertisements — fully automated end-to-end.

1.2 Project Overview

1.2.1 Project Write-Up

Project Write-Up

Executive Summary:

B2B sales teams often spend excessive time pursuing unqualified leads, resulting in wasted effort and lower conversion rates. Most existing CRMs store and track leads but do not actively research, score, and prioritize them without manual work.

Our proposed solution is a cost-free, AI-powered Sales CRM that autonomously:

- Finds potential companies matching a client's Ideal Customer Profile (ICP) from CSVs.
- Enriches data from publicly available sources.
- Scores leads based on relevance.
- Generates personalized outreach emails.

Present a Solution:

The CRM integrates agentic AI with traditional CRM features:

1. **Lead Ingestion:** Upload via CSV, manual entry, or paste company URLs.
2. **Market Research Agent:** Gathers company information from public websites, open APIs, and user-provided URLs.
3. **Lead Qualification Agent:** Uses a hybrid rule + AI model to assign each lead a score.
4. **Email Outreach Agent:** Crafts personalized emails and sends them via SMTP services.
5. **Dashboard:** Provides lead management, qualification insights, email tracking, and follow-up suggestions.

Novelty / Unique Selling Point:

- Agentic AI inside CRM – not just a data store, but an active research assistant.
- Fully cost-free operation – uses only open-source models and free-tier hosting/APIs.
- Personalized AI outreach – each lead gets an email tailored to its industry, size, and needs.
- Automated market research loop – continuously finds qualified new leads weekly.
- Insightful Dashboard – real-time lead scores, priorities, and outreach tracking in one view.

Objectives:

- Build an AI-enhanced CRM capable of automated lead discovery and scoring.
- Enable B2B companies to reduce manual research by 60%+.

-
- Provide a cost-free, deployable platform that small businesses can adopt easily.
 - Demonstrate integration of scraping, AI inference, and outreach automation in a single workflow.

Methodology:

1. **Requirement Gathering:** Identify ICP and target industries for test scenarios.

2. **Tech Stack Setup:**

- Frontend: React.js + TailwindCSS
- Backend: FastAPI & Python microservices
- Database: MongoDB (free tier)
- AI: LLaMA 3 / Mistral (local inference via Hugging Face)

3. **Module Development:**

- Lead ingestion module (manual + CSV + URL import)
- Web scraping agent (BeautifulSoup, Playwright)
- Data enrichment and classification agent (LLM + rules)
- Lead scoring engine (rule-based + optional ML)
- Email generation and SMTP sender

4. **Integration:** Connect agents, scoring, and email to the CRM dashboard.

5. **Testing:** Use sample datasets of B2B leads to validate accuracy and usability.

Define Project Deliverables / Outcomes:

- Working CRM Web App with lead management, scoring, and email automation.
- AI Agents for:
 - Market research & enrichment
 - Lead scoring
 - Email drafting & scheduling
- Deployed Demo on free hosting (Render/Vercel)
- Documentation & User Guide

Look and Feel of Product / Product Perspective:

- Modern, responsive web UI with intuitive dashboards.
- Lead table with sorting, filtering, and scoring indicators (Hot/Warm/Cold).
- Email campaign panel with open/reply tracking.
- Light theme, clean typography, minimal clutter.

Scope of Application:

- Primary: B2B companies in SaaS, Marketing, IT services.
- Secondary: Recruitment agencies, logistics firms, training providers.
- Suitable for any organization needing fast, AI-driven lead qualification.

Timeline / Gantt Chart:

- Month 1: Backend & DB setup, frontend skeleton, lead ingestion module.
- Month 2: Scraping & enrichment agent, scoring engine, dashboard integration.
- Month 3: Email outreach agent, campaign tracking, UI polish, testing & deployment.

1.2.2 Feasibility Study Report

1. Go / No-Go Decision Go – The proposed system is technically, operationally, and economically feasible within the 3-month academic timeline. The selected technologies (React.js, Python microservices, MongoDB, Hugging Face open-source AI models) are well-supported, cost-free, and capable of delivering the required CRM, AI agent, and outreach functionalities.

2. Technical Feasibility

- **Backend:** FastAPIs for CRM APIs, Python microservices for AI agents (scraping, enrichment, scoring, email generation).
- **Frontend:** React.js + TailwindCSS for a responsive web dashboard.
- **Database:** MongoDB Atlas
- **AI Models:** LLaMA 3, Mistral 7B, or Zephyr-7B via Hugging Face (local inference) for text summarization, classification, and email drafting.
- **Scraping Tools:** BeautifulSoup, Playwright/Selenium for public website extraction, DuckDuckGo search API for company discovery.
- **Email Sending:** Gmail SMTP for sending outreach emails.
- **Hosting:** Render/Vercel/Railway free tiers for deployment.
- **Compatibility:** Works on desktop browsers, mobile browsers, and tablets.
- **Scalability:** Can handle hundreds of leads for small to medium businesses without paid infrastructure.

Conclusion: All technologies are free, open-source, and well-documented. The architecture supports AI agents, lead scoring, and outreach within academic constraints.

3. Operational Feasibility User Roles:

- **Sales Representative:** Upload/import leads, view scores, send outreach emails.
- **AI Agents:**
 - Market Research Agent – Finds & enriches lead data.
 - Lead Qualification Agent – Scores leads based on criteria.
 - Outreach Agent – Generates personalized emails.

Key Features:

- CSV/manual lead upload.
- Public web scraping & enrichment.
- AI-based lead scoring.

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- Personalized outreach email drafts.
 - Dashboard with filtering & sorting.

Ease of Use:

- Simple *import* → *qualify* → *contact* workflow.
- Automatic scoring & email suggestions reduce manual research time.
- User-friendly dashboard interface with clear lead-status indicators.

Conclusion: Designed for small teams with minimal training requirements. Clear UI ensures quick adoption.

4. Economic Feasibility Cost Estimate:

- Development Tools: Free (VS Code, React.js, MongoDB, Python, Hugging Face models).
- AI Models: Open-source, no API cost (runs locally or via free Colab).
- Hosting: Render/Vercel free tier.
- Email Sending: Gmail SMTP (free)

5. Schedule Feasibility Timeline: August – November 2025

- Month 1: Backend + DB setup, frontend skeleton, lead ingestion.
- Month 2: Scraping & enrichment agents, lead scoring engine.
- Month 3: Email outreach agent, dashboard integration, testing & deployment.

6. Legal and Ethical Feasibility

- Scraping limited to publicly available data; no bypass of paywalls or authentication.
- User-provided LinkedIn/Crunchbase URLs fetched only with consent.
- GDPR-compliant handling of personal contact info (stored securely, encrypted).
- No storage of sensitive personal data beyond lead contact info & public company details.
- Email outreach follows anti-spam guidelines (opt-out in footer).

Final Recommendation: Based on technical, operational, economic, schedule, and ethical analysis, the **Agentic AI Sales CRM** is fully feasible and recommended for development within the 3-month academic timeline, with realistic expectations for features and scope.

2. Analysis Phase

2.1 Use Cases

Use Case	Actor	Description
Register Account	Sales Representative	Create new account with username, email, and password to access CRM system.
Login to System	Sales Representative	Authenticate credentials to access dashboard and CRM features.
Upload Companies CSV	Sales Representative	Import target companies list via CSV file for lead generation and enrichment.
Configure Customer Requirements	Sales Representative	Define company profile, target criteria (industries, locations, revenue, employee range), and communication settings (sender details, phone).
Execute AI Agents	Sales Representative	Trigger AI agent control center to run data enrichment, employee finder, contact finder, email campaign, and lead scoring agents.
View Dashboard Metrics	Sales Representative	Monitor real-time statistics: total data points, AI operations count, campaign runs, and lead scores.
Enrich Company Data	AI Agent System	Automatically fetch and populate missing company information from public sources and databases.
Find Employee Contacts	AI Agent System	Identify and extract key decision-maker contacts within target companies using AI-driven search.
Generate Lead Scores	AI Agent System	Analyze enriched data and assign intelligence-based scores to prioritize high-value leads.
Send Email Campaigns	AI Agent System	Deliver personalized outreach emails to validated contacts automatically.

Table 2: Agentic CRM Use Cases

2.1.1 Use-Case Diagrams

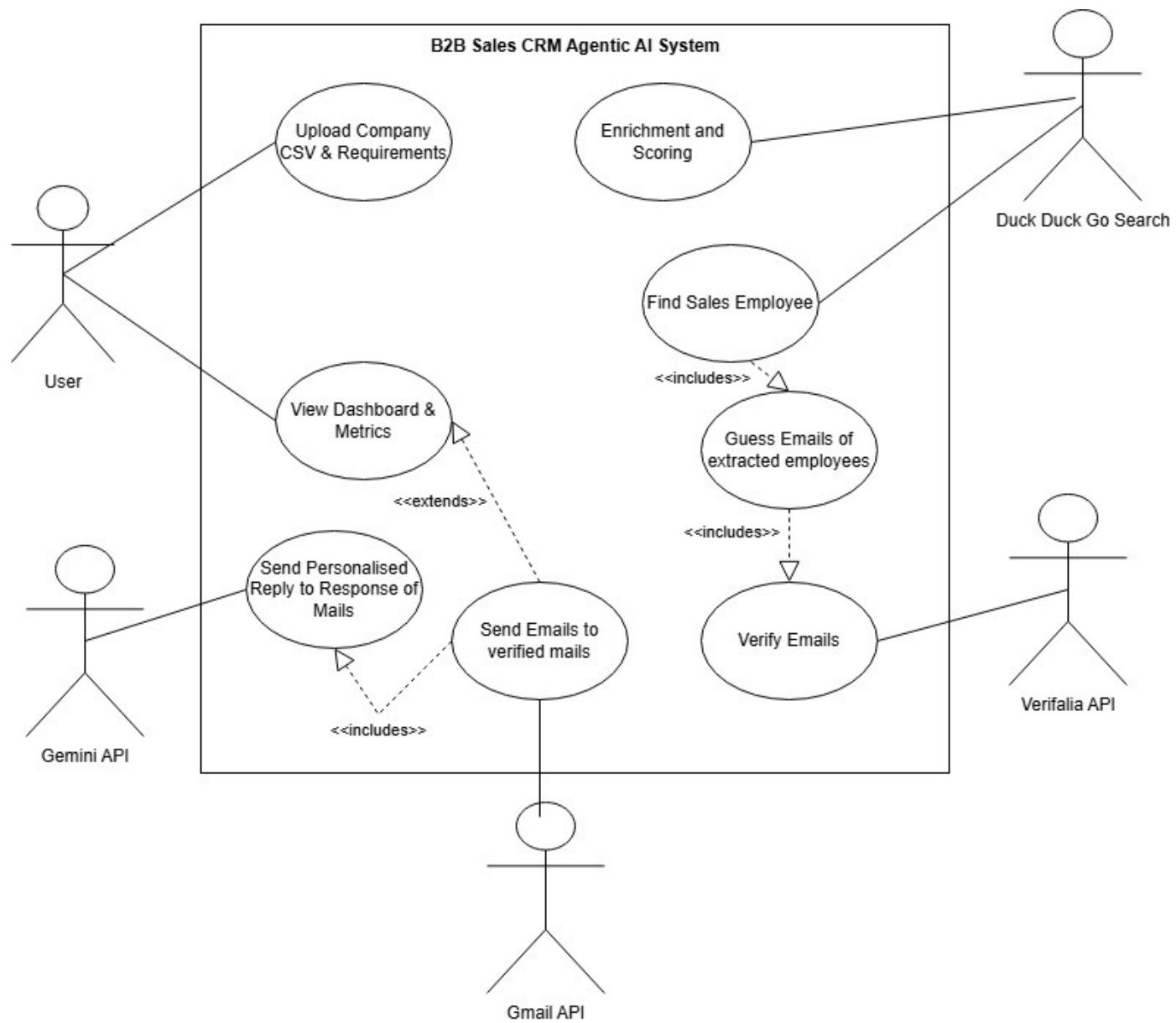


Figure 1: Use Case Diagram

2.1.2 Use Case Templates

Use Case 1: Account Registration

Use Case ID: UC-01

Use Case Name: Account Registration

Actors: Sales Representative, Admin

Description:

This use case allows a new user to register for an account on the Agentic CRM platform by providing personal information and authentication credentials with role-based access control.

Precondition:

- The user must have access to the CRM web interface.
- A stable internet connection is required.
- User possesses a valid email address for verification.

Normal Flow:

1. The user navigates to the CRM registration page.
2. Enters username, email address, and password into the registration form.
3. The system validates the email for uniqueness and checks password strength requirements.
4. Upon successful validation, the system securely stores the new user details in the database with encrypted password hashing.
5. The user is redirected to the login page for first-time access.

Alternate Flow:

- If the email already exists in the system, an error message is displayed suggesting login or password reset.
- If the password does not meet strength requirements (minimum 8 characters, alphanumeric), the system displays specific requirements and requests corrections.

Postcondition:

- A new verified user account is created and stored securely in the database.
- User can securely log in and access the personalized CRM dashboard with role-appropriate permissions.

Special Requirements:

- Password must be hashed using bcrypt or similar secure algorithm.
- HTTPS encryption for all registration data transmission.

Frequency of Use: Occurs whenever a new sales representative or admin joins the CRM platform.

Use Case 2: Upload Companies CSV

Use Case ID: UC-02

Use Case Name: Upload Companies CSV

Actors: Sales Representative

Description:

This use case allows sales representatives to import a bulk list of target companies via CSV file upload for automated lead generation, enrichment, and processing by AI agents.

Precondition:

- The user must be logged in with valid credentials.
- User has prepared a CSV file containing company data (company name, website).
- The CSV file must be properly formatted and not exceed 10MB in size.

Normal Flow:

1. The user navigates to the Input Configuration page from the dashboard.
2. Clicks on the "Companies CSV Upload" section.
3. Selects "Choose CSV File" button and browses for the target file.
4. The system validates the file format, size, and required columns.
5. User reviews the preview and clicks "Save Changes" to confirm upload.
6. The system imports all company records into the database with a unique batch ID.
7. A success notification is displayed.

Alternate Flow:

- If the file format is invalid (not .csv), the system displays an error message requesting a valid CSV file.
- If required columns (company name, website) are missing, the system shows which columns are required and rejects the upload.
- If duplicate companies are detected, the system flags them and offers options to skip or overwrite existing records.
- If the file size exceeds 10MB, the system suggests splitting the file into smaller batches.

Postcondition:

- Company data is successfully stored in the database.

-
- The configuration progress bar shows "Companies Data: Complete."
 - AI agents are ready to process the uploaded company list for enrichment.

Special Requirements:

- CSV parsing must handle various delimiters (comma, semicolon, tab).
- System must support UTF-8 encoding for international company names.
- Validation must check for proper URL format in website column.

Frequency of Use: Occurs at the beginning of each new lead generation campaign or when adding new prospect lists.

Use Case 3: Execute AI Agents

Use Case ID: UC-03

Use Case Name: Execute AI Agents

Actors: Sales Representative, AI Agent System

Description:

This use case allows sales representatives to trigger the AI Agent Control Center to execute automated workflows including data enrichment, employee discovery, contact verification, lead scoring, and email campaign generation.

Precondition:

- User must be logged in and have completed input configuration.
- Company data must be uploaded and customer requirements must be defined.
- All AI agents must show "Operational" status in the System Status panel.

Normal Flow:

1. The user navigates to the Dashboard and clicks "Run Agents" button.
2. The system displays the AI Agent Control Center with available agents: Contact Finder, Email Campaign, Employee Finder, Data Enrichment, and Lead Scoring.
3. User selects desired agents by clicking individual "Run Agent" buttons or running all agents sequentially.
4. The system validates prerequisites for each agent (e.g., data enrichment before lead scoring).
5. Upon confirmation, the system queues the agent tasks in the background processing pipeline.
6. Real-time progress indicators show the status of each agent: Active, Operational, or Processing.

-
7. The AI Agent Activity panel updates with current execution counts for each agent.
 8. Upon completion, the system displays success notifications and updates dashboard metrics.
 9. Enriched data, lead scores, and generated emails become available for user review.

Alternate Flow:

- If input configuration is incomplete, the system prompts the user to complete required steps before running agents.
- If an agent encounters an error (API timeout, network failure), the system logs the error, displays a notification, and marks the agent as "Failed" with retry option.
- If the task queue is overloaded, the system displays estimated wait time and offers to notify the user when processing begins.
- If multiple users trigger agents simultaneously, the system queues requests and processes them in FIFO order with priority for smaller batches.

Postcondition:

- All selected AI agents have completed their assigned tasks successfully.
- Dashboard metrics are updated: Total Data Points, AI Operations count, Campaign Runs, and Lead Scores.
- Enriched company data, discovered employees, validated contacts, and lead scores are stored in the database.
- Generated email drafts are available in the email campaign module for review and sending.
- System Status panel confirms "All Systems Operational" and "AI Agents Active."

Special Requirements:

- Background task processing using Celery and Redis for asynchronous execution.
- Real-time WebSocket connections for live progress updates on the dashboard.
- Comprehensive error logging and retry mechanisms for failed agent tasks.
- Rate limiting to prevent API quota exhaustion for external data sources.

Frequency of Use: Executed for each new batch of companies or when refreshing/updating existing lead data.

2.2 Activity Diagram and Swimlane Diagrams

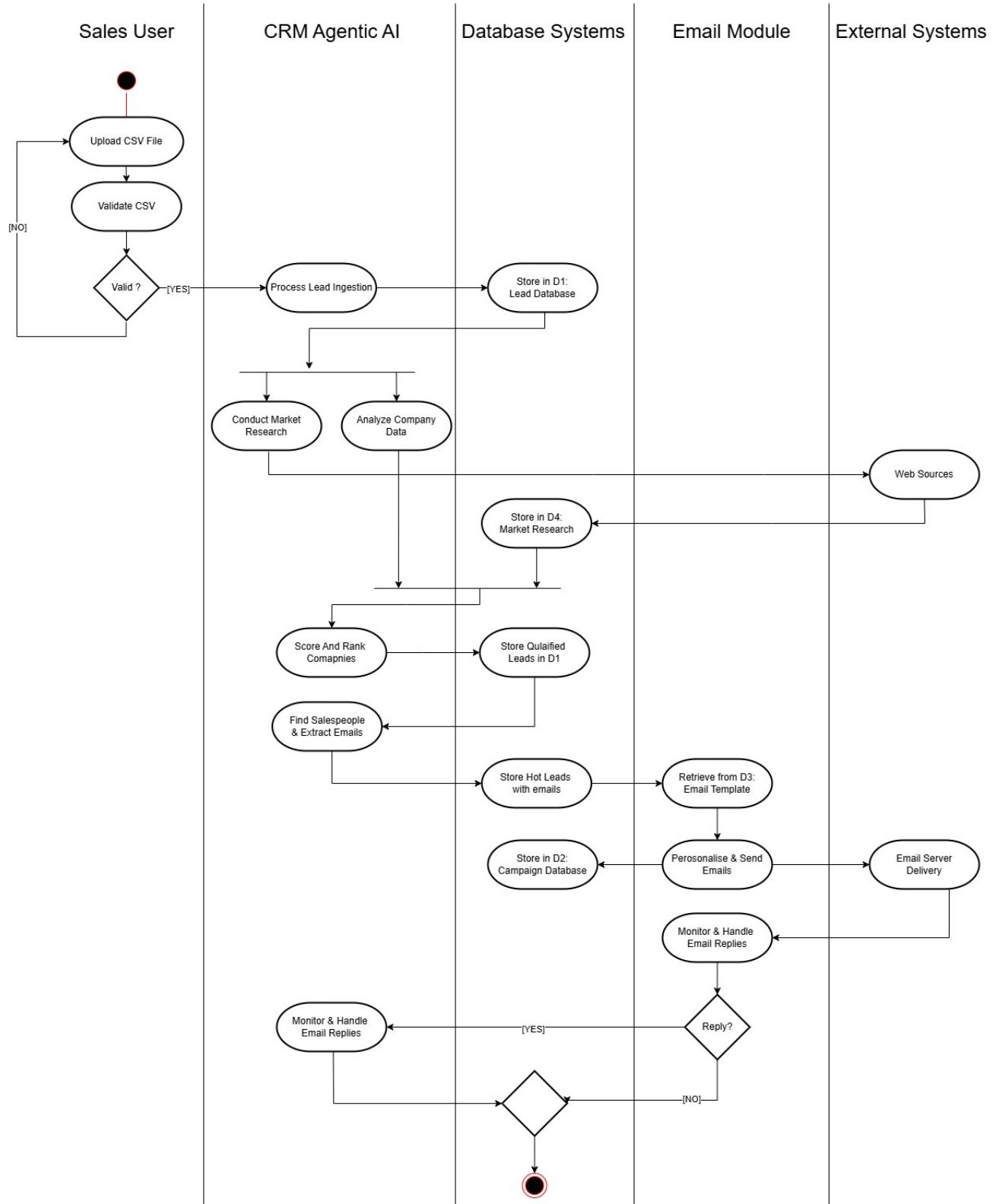


Figure 2: Swimlane diagram illustrating the end-to-end flow of activities across different system roles

2.3 Data Flow Diagrams (DFDs)

2.3.1 DFD Level 0

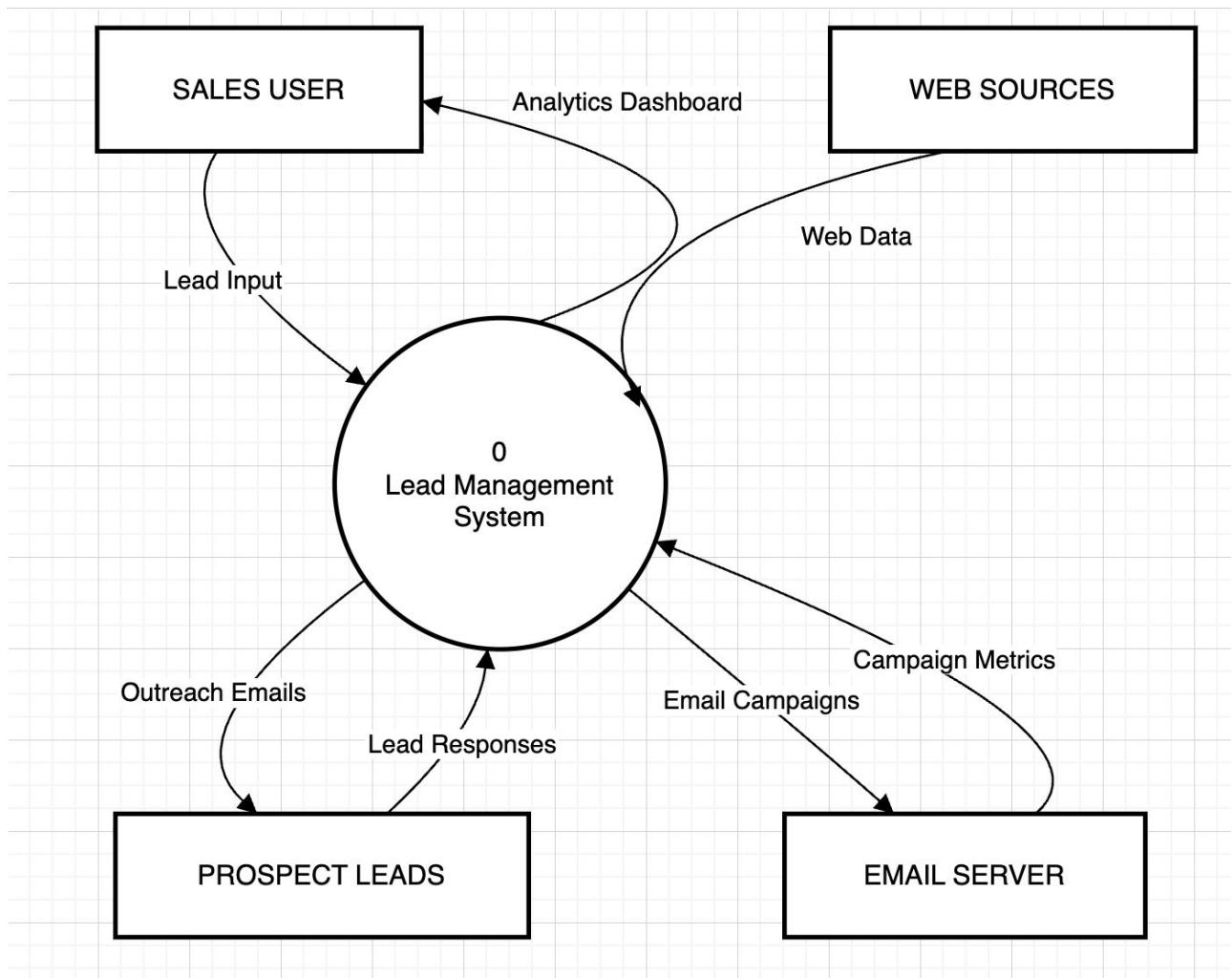


Figure 3: Level 0 context diagram showing the system boundaries and all external entities interacting with the CRM

2.3.2 DFD Level 1

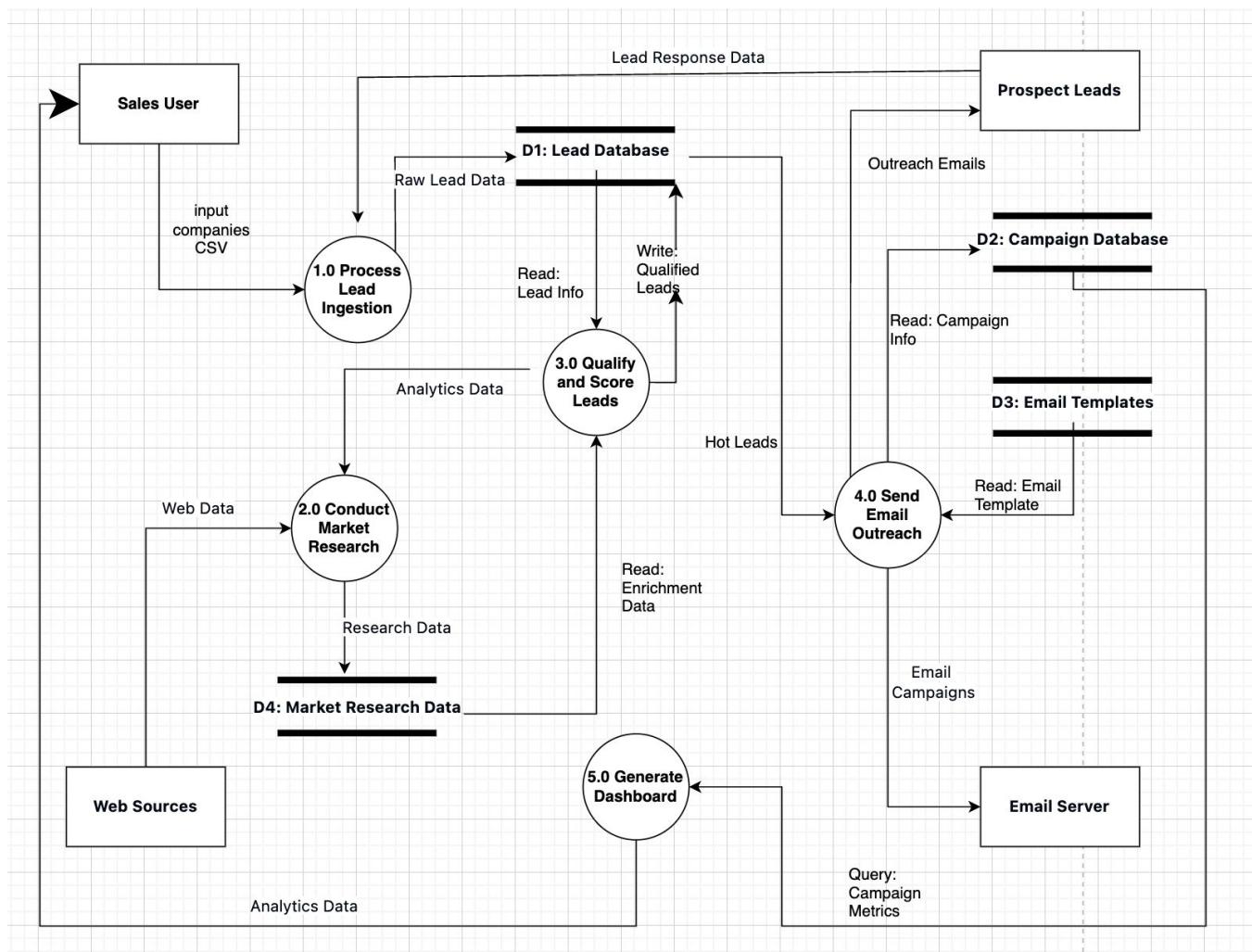


Figure 4: Level 1 DFD representing the major high-level system processes and their primary data flows

2.3.3 DFD Level 2

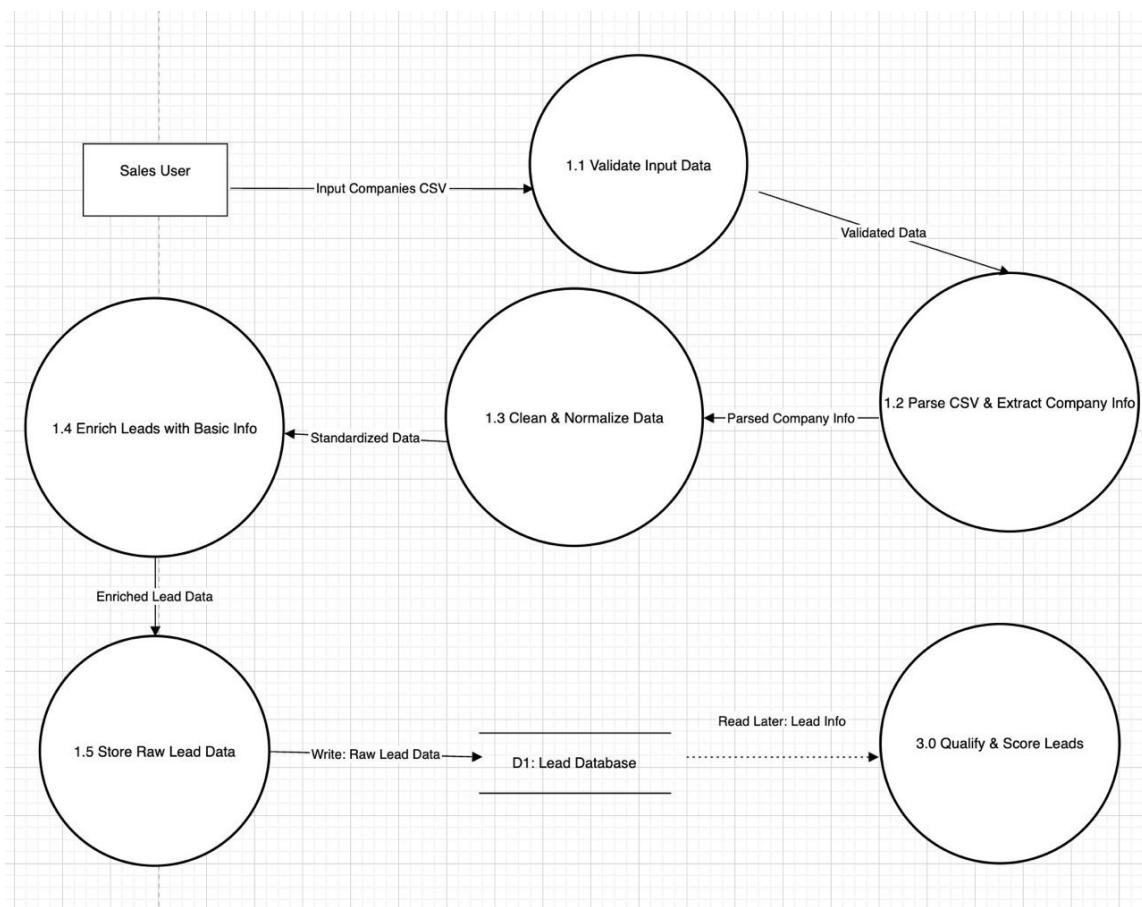


Figure 5: Detailed Level 2 DFD explaining the lead data ingestion process and internal transformations

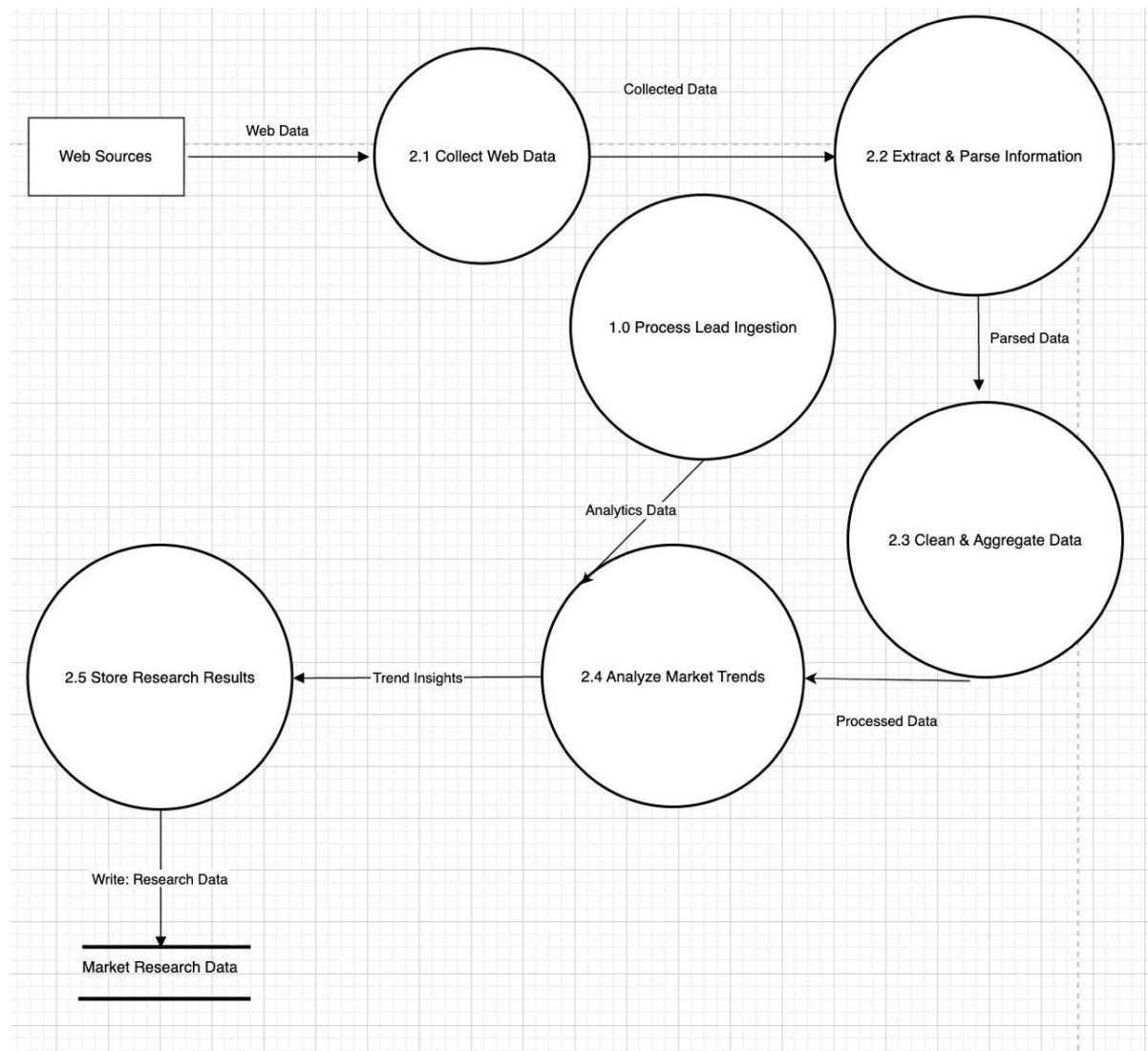


Figure 6: Level 2 DFD illustrating the market research workflow and enrichment of lead information

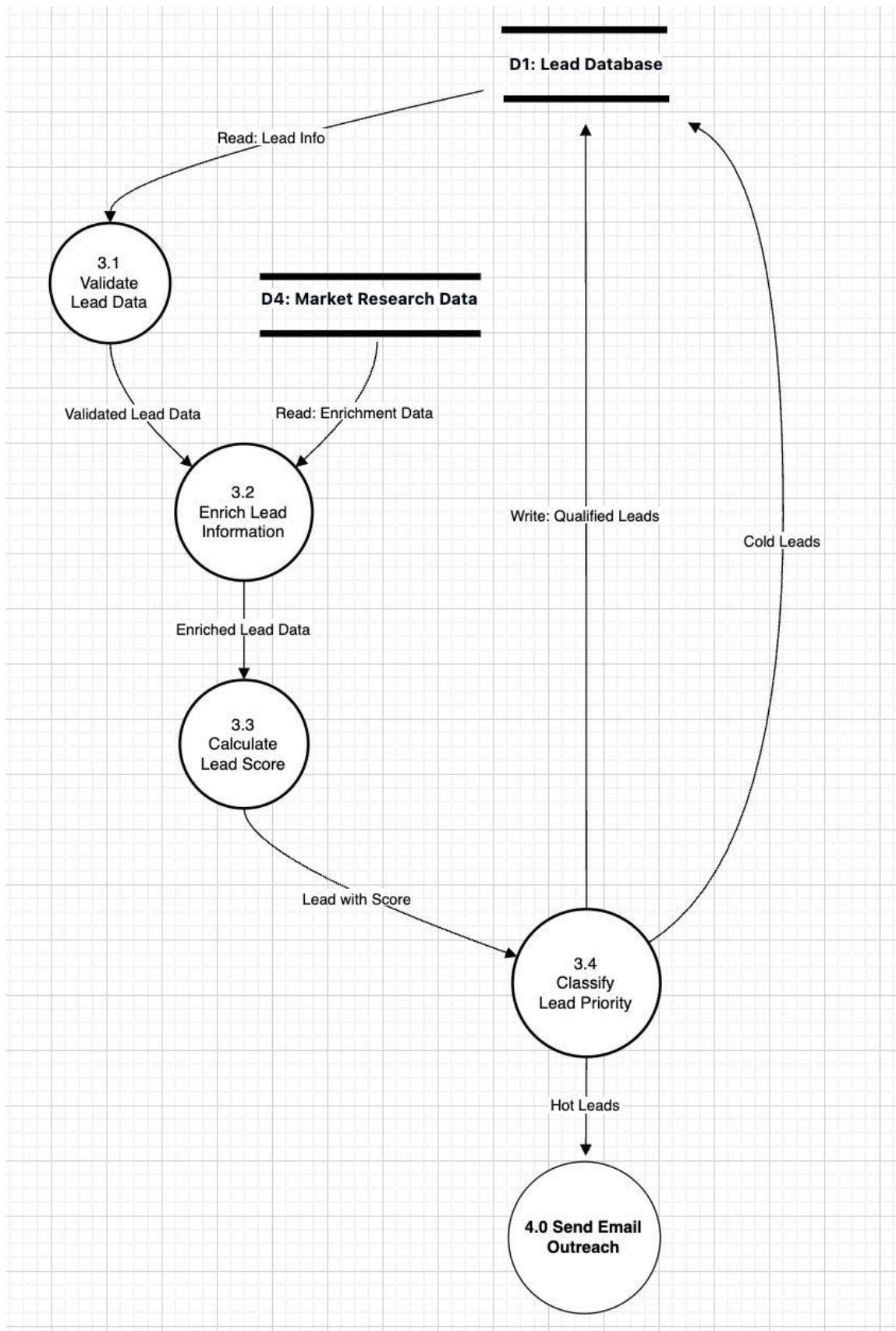


Figure 7: Level 2 diagram describing lead qualification logic and lead scoring mechanisms within the CRM

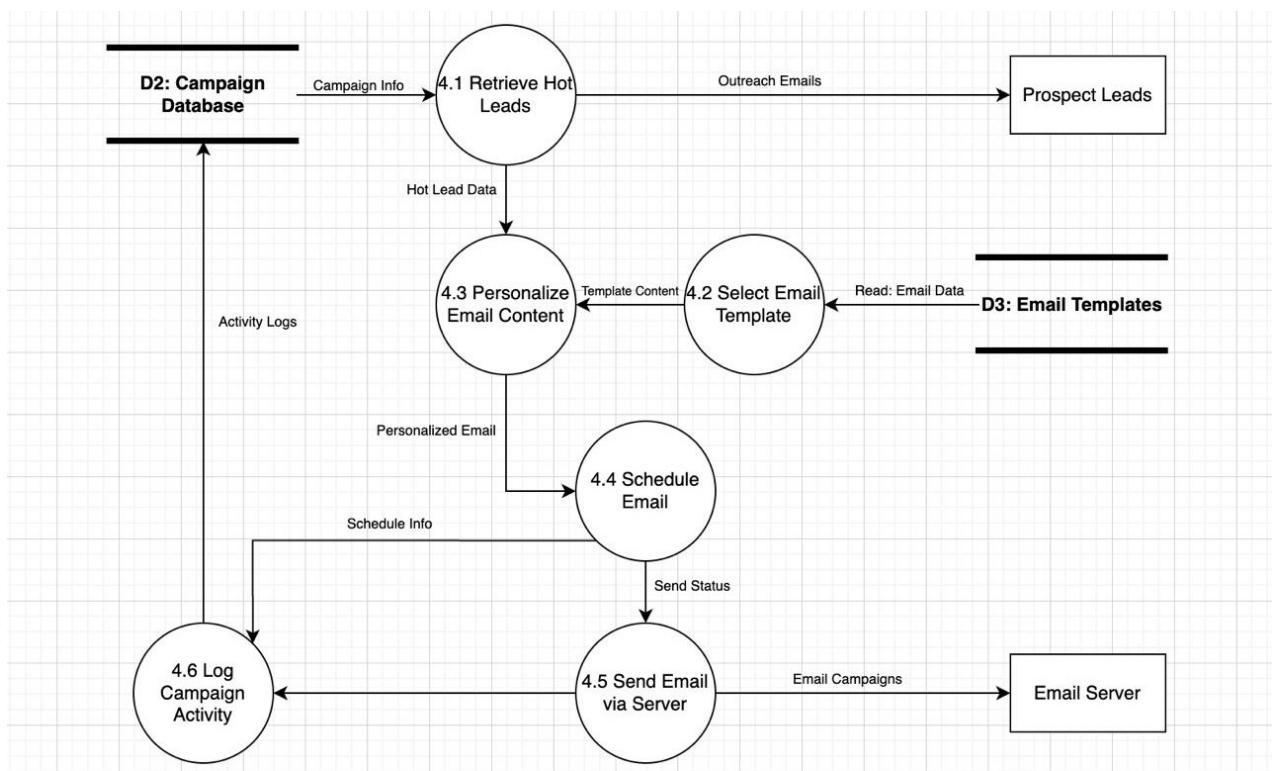


Figure 8: Level 2 DFD presenting the email campaign automation pipeline and message delivery flow

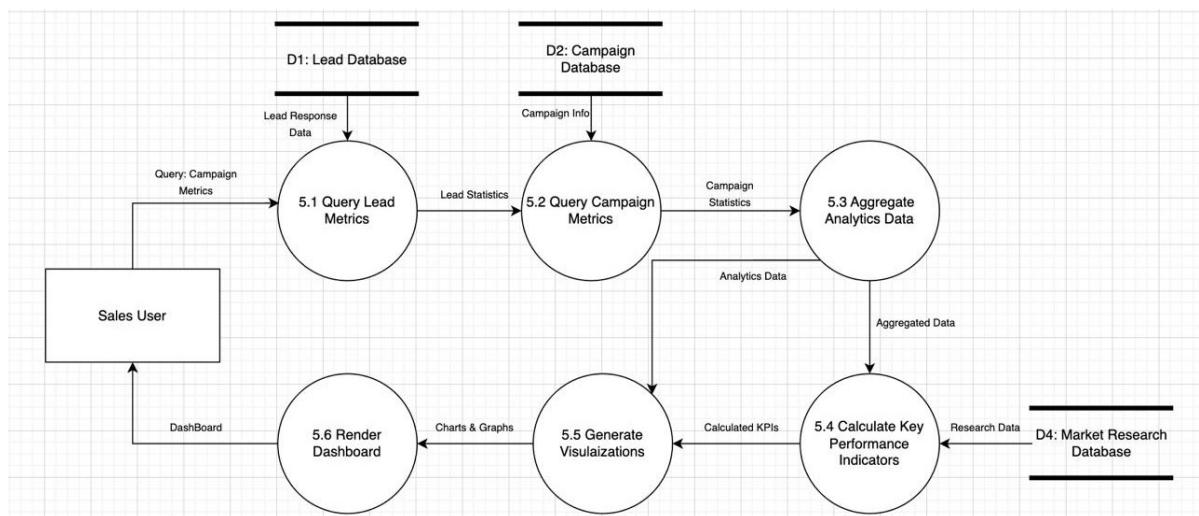


Figure 9: Level 2 DFD showing the dashboard analytics workflow and generation of real-time performance reports

2.4 SRS

A CASE STUDY (IEEE Format)

Software Requirements Specification Document

Version 1.0

Agentic AI Sales CRM

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1. Introduction

1.1 Purpose of this Document

This Software Requirements Specification (SRS) defines the objectives, functionality, and constraints of the **Agentic AI Sales CRM**, a modular, multi-agent system designed to automate the entire B2B lead management workflow — from company enrichment and scoring to employee discovery, email validation, and personalized outreach with reply handling.

The purpose of this document is to establish a shared understanding among the developers, stakeholders, and potential users about what the system is intended to achieve, how it operates, and what boundaries or assumptions exist. It acts as a single source of truth for the technical architecture, functional requirements, and performance expectations of the CRM.

The document is intended for:

- The **development team**, to guide design, implementation, and testing.
- **Project evaluators or mentors**, to understand the system's technical scope and modular architecture.
- **End-users or sales teams**, to understand the capabilities and automation pipeline of the CRM.

1.2 Scope of the Development Project

The **Agentic AI Sales CRM** is an autonomous, end-to-end AI-powered system that streamlines the sales prospecting process by integrating data intelligence, web automation, and generative AI. It leverages a chain of specialized AI agents to process raw company data, enrich it with structured insights, evaluate suitability based on customer requirements, identify the right point of contact (POC), and execute automated email campaigns with two-way communication.

The project scope includes the development of five core agents and supporting modules, as outlined below:

- **Enrichment Agent:** Scrapes and structures company data from various web sources, extracting fields such as industry, funding, headquarters, hiring signals, and employee size using a combination of BeautifulSoup and Gemini API.
- **Scoring Agent:** Calculates a numerical suitability score for each company by matching enriched data against the customer's preferences (industry, location, funding, employee size, etc.), producing a ranked shortlist of potential leads.
- **Employee Finder Agent:** Extracts employee or POC data from company pages and LinkedIn-like sources using heuristic search and pattern recognition, mapping names, roles, and departments.
- **Email Finder Agent:** Locates valid business email addresses for the discovered POCs using open-source APIs and regex-based extraction, with optional integration to external

verification services (e.g., Verifalia).

- **Email Sender Agent:** Uses Gmail SMTP and token-based authentication to send AI-personalized outreach messages to validated emails. It also listens for incoming replies and automatically logs them to the `Email Logs/` directory for tracking.

These agents communicate via shared JSON inputs and outputs, enabling modular orchestration. The system is designed to operate without any paid APIs or cloud dependencies, making it portable, cost-free, and efficient for small to medium sales operations.

The CRM's workflow can be summarized as:

1. Input raw company data via CSV or JSON (`inputs/` directory).
2. The Enrichment Agent augments each company profile with structured data.
3. The Scoring Agent evaluates and ranks leads according to custom parameters.
4. The Employee and Email Finder Agents identify contact persons and corresponding verified emails.
5. The Email Sender Agent dispatches personalized emails and records replies automatically.

Initially, the system targets datasets of 100–200 companies for pilot runs but is scalable to larger datasets through batch processing. Its modular design allows integration with a future FastAPI backend, SQLite database, and React-based dashboard for real-time visualization of enrichment and campaign analytics.

1.3 Definitions, Abbreviations and Acronyms

Definitions

Table 3 provides definitions for key terms used throughout this SRS document.

Table 3: Definitions for most commonly used terms

S.No.	Term	Definition
1	Lead Ingestion	Process of capturing company data from JSON, CSV, or web sources for enrichment and scoring.
2	Lead Enrichment	Automated extraction of structured information such as industry, headquarters, size, and funding from public web data using Gemini API and BeautifulSoup.

Continued on next page

S.No.	Term	Definition
3	Lead Scoring	Evaluation of leads based on company metadata and customer-defined parameters, generating a composite suitability score.
4	Employee Discovery	Identifying decision-makers or employees relevant to the outreach campaign.
5	Email Validation	Verification of discovered emails through syntax checks and third-party APIs such as Verifalia.
6	Email Automation	Process of sending and logging emails automatically using Gmail API (SMTP + OAuth).
7	Agentic AI	Independent, task-specific AI agents that operate sequentially or collaboratively with minimal human oversight.
8	CRM	Customer Relationship Management system used for tracking, managing, and automating interactions with potential clients.
9	Gemini API	Google's multimodal AI service used for data extraction, enrichment, and personalized email drafting.
10	Email Logs	A structured storage folder containing sent messages, replies, and campaign records.

Abbreviations

Table 4 lists the full forms of frequently used abbreviations in this SRS.

Table 4: Full form for most commonly used mnemonics

S.No.	Mnemonic	Full Form
1	CRM	Customer Relationship Management
2	POC	Point of Contact
3	AI	Artificial Intelligence
4	LLM	Large Language Model
5	CSV	Comma Separated Values

Continued on next page

S.No.	Mnemonic	Full Form
6	SMTP	Simple Mail Transfer Protocol
7	API	Application Programming Interface
8	JSON	JavaScript Object Notation
9	ML	Machine Learning
10	KPI	Key Performance Indicator
11	NLP	Natural Language Processing
12	UI	User Interface
13	CLI	Command-Line Interface

1.4 References

1. IEEE SRS Template — <https://www.ieee.org/standard/29148-2018.html>
2. Google Gemini API — <https://ai.google.dev/gemini-api/docs>
3. Gmail API OAuth 2.0 — <https://developers.google.com/gmail/api/quickstart/python>
4. FastAPI Documentation — <https://fastapi.tiangolo.com/>
5. Playwright Python Docs — <https://playwright.dev/python/docs/intro>
6. BeautifulSoup Documentation — <https://www.crummy.com/software/BeautifulSoup/bs4/doc/>
7. SQLite Documentation — <https://www.sqlite.org/docs.html>
8. TailwindCSS — <https://tailwindcss.com/docs>
9. React.js — <https://react.dev/learn>
10. Verifalia Email Validation API — <https://verifalia.com/developers>

1.5 Overview

The following sections describe the Agentic AI Sales CRM in greater detail. Section 2 provides an overall description of the system, including its functional decomposition, architecture, user roles, and operating environment. Section 3 specifies the detailed functional and non-functional requirements, interface descriptions, and system constraints.

The document concludes with appendices summarizing design assumptions, scalability goals, and future enhancement opportunities. The structure ensures a comprehensive understanding of how each AI agent contributes to the full automation pipeline.

2. Overall Description

2.1 Product Perspective

The **Agentic AI Sales CRM** is designed as a modular, backend-driven system integrated with a web-based dashboard, targeting B2B sales teams. Its primary goal is to automate the entire lead management workflow — from lead ingestion and enrichment to scoring, POC discovery, and personalized email outreach — minimizing manual effort while maintaining high accuracy and relevance. The system is structured to allow extensibility, enabling the integration of additional AI agents, third-party tools, or analytics modules in the future.

Users interact primarily via the dashboard, which provides functionalities such as lead upload, enrichment progress monitoring, scoring visualization, POC management, and outreach tracking. The system communicates internally through structured JSON payloads, orchestrated by the AI agents, and externally through REST APIs for dashboard updates.

Figure 10 illustrates a high-level architecture of the CRM, highlighting the key modules and the flow of lead data from ingestion to outreach.



Figure 10: High-Level Layout of Agentic AI Sales CRM

The system workflow can be summarized as follows:

- **Lead Ingestion Module:** Accepts CSV uploads, manual lead entries, or company URLs. Performs validation, deduplication, and pre-processing before forwarding to enrichment agents.
- **Enrichment Agent:** Leverages a local LLM (via Ollama or Hugging Face models) to scrape and structure public company data from About Us pages, Careers pages, news portals, and LinkedIn. Extracted fields include company description, industry,

headquarters, size, funding stage, and hiring signals. Data is standardized for downstream scoring and storage.

- **Lead Scoring Agent:** Applies client-specific criteria to enriched leads, calculating a composite suitability score. The system categorizes leads as Hot, Warm, or Cold, prioritizing high-quality prospects and deprioritizing low-value targets. Scoring considers company metadata, growth signals, funding, and hiring activity.
- **POC Discovery Module:** Identifies relevant decision-makers using free or open sources such as ContactOut, Apollo, or LinkedIn public profiles. Validates roles and contact details before saving in the CRM database for targeted outreach.
- **Outreach Agent:** Drafts AI-personalized emails using structured templates. Users may review drafts before sending via SMTP with Gmail OAuth authentication. The agent tracks opens, replies, and engagement metrics, storing results for dashboard visualization and reporting.

Figure 2 shows a block diagram of the system as a black-box representation of its modules.

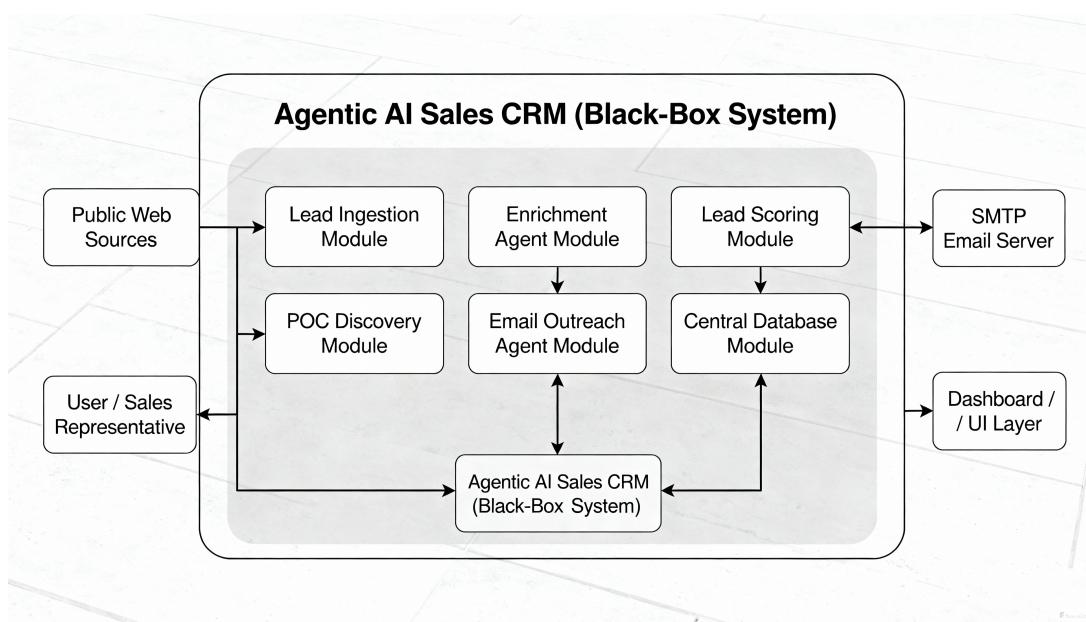


Figure 11: Block Diagram of Agentic AI Sales CRM

Major Modules:

- Lead Ingestion Module – Handles data input via CSV, manual entry, or URLs with validation and pre-processing.
- Enrichment Agent – Performs multi-source scraping and AI-driven structured extraction.
- Lead Scoring Module – Computes lead scores based on configurable client-specific parameters.
- POC Discovery Module – Locates and verifies points of contact for qualified leads.
- Outreach Agent – Generates personalized emails, dispatches via SMTP, and logs.

Data Flow: After ingestion, lead data flows sequentially through enrichment, scoring, and POC discovery modules. All intermediate and final outputs are stored in a central database, which is replicated daily to a secondary database for fault tolerance. Users access dashboards via REST APIs to monitor leads, scoring, and campaign performance.

Transactions: Read transactions occur when users query lead or campaign data through the dashboard. Write transactions occur during data updates, scoring calculations, POC storage, or email dispatch and logging.

This modular design ensures scalability and allows future integration of additional AI agents for predictive lead behavior, multi-channel outreach, automated follow-ups, or CRM tool synchronization.

2.2 Product Functions

The CRM performs the following primary functions:

- **Lead Ingestion:** Accept input from CSV, manual entries, or URLs with validation and deduplication.
- **Lead Enrichment:** Scrape web sources and extract structured company and signal data via AI agents.
- **Lead Scoring:** Apply scoring rules to classify leads as Hot, Warm, or Cold.
- **POC Discovery:** Identify and validate decision-makers using public sources and tools.
- **Personalized Outreach:** Generate AI-assisted email drafts, allow user edits, send via SMTP, and track interactions.
- **Data Storage & Tracking:** Persist all enriched data, scoring, POC details, and email logs.
- **Dashboard & Reporting:** Provide real-time visual insights into lead pipeline, scoring distribution, enrichment progress, and outreach performance metrics.

2.3 User Characteristics

The CRM is designed to accommodate multiple user roles, each with distinct technical expertise and responsibilities:

- **Sales Agents:** Primarily consume insights and execute outreach; require simplified, guided workflows.
- **CRM Administrators:** Configure system settings, manage user access, and oversee data integrity.
- **Marketing Analysts:** Analyze campaign performance and lead scoring trends; require dashboard access.
- **Team Leads / Sales Managers:** Monitor team performance, approve outreach strategies,

and track KPIs.

- **Data Scientists / AI Engineers:** Access agent parameters, refine scoring algorithms, and analyze enrichment outputs for model improvements.

Assumptions about users:

- All users possess basic computer literacy and familiarity with web applications.
- Sales Agents need a user-friendly interface; administrators require more configuration control.
- Technical users should have the ability to customize AI agent parameters and access raw data.
- Role-based access control (RBAC) and secure login are mandatory for all users.
- Dashboard navigation and feedback should be intuitive and consistent across modules.

2.4 General Constraints, Assumptions and Dependencies

- Deployable on consumer-grade hardware; uses a fully open-source software stack.
- AI agent performance depends on local LLMs (e.g., Mistral, LLaMA via Ollama or Hugging Face); larger models may increase latency.
- SMTP quotas or connectivity may affect email delivery timing.
- Lead scoring and enrichment accuracy depend on input quality and completeness.
- Web scraping is dependent on target site availability and structure.
- Expected response time: ≤ 2 minutes per lead for enrichment and scoring.
- RBAC and secure authentication are mandatory for all user types.
- Celery + Redis manage background tasks; interruptions may delay processing.
- Database: MongoDB for development, production; automated backups and replication required.
- Module dependencies: Outreach depends on enrichment, scoring, and POC discovery.

2.5 Apportioning of the Requirements

- i. **Pilot Phase:** Process small lead datasets (50–100 companies), validate enrichment and scoring, and run limited outreach campaigns.
- ii. **Full CRM Deployment:** Scale to large datasets; activate all modules; MongoDB backend with replication; background processing; full RBAC; real-time dashboards.
- iii. **Advanced Features & Scaling:** Implement automated POC discovery, refined scoring algorithms, bulk outreach, multi-agent orchestration, predictive analytics, and optional integration with external CRM systems.

3. Specific Requirements

3.1 External Interface Requirements

The following are the external interface requirements for the **Agentic AI Sales CRM**:

User Interface (UI): Web-based dashboard compatible with Chrome, Edge, and Firefox; responsive design using React and TailwindCSS; provides role-based views for Sales Agents, Admins, Analysts, and Managers.

Input Interfaces: CSV/JSON uploads of company leads; manual data entry forms; company URLs or domains for automated scraping.

Output Interfaces: Enriched and scored leads in JSON/tabular format; downloadable CSV/Excel reports; email dispatch logs and engagement metrics via SMTP.

AI Agent Interface: Agents communicate through FastAPI backend endpoints and Celery/Redis task queues; all inter-agent messages follow standardized JSON schemas.

System Integration: Supports SQLite for development and MongoDB for production; integrates with SMTP (Gmail API); optional integration with Apollo or ContactOut for POC discovery.

Hardware Requirements: Standard PC or cloud instance; no GPU required for pilot phase; scalable to multi-core servers for batch processing.

Performance & Accessibility: Handles up to 100 simultaneous user actions in pilot; includes basic accessibility compliance (keyboard navigation, screen reader support).

3.2 Detailed Description of Functional Requirements

Table 5 provides a template to describe functional requirements for various user roles in the CRM.

Table 5: Template for Describing Functional Requirements

Purpose	Describes the functional requirement and its rationale for CRM operations.
Inputs	Specifies required inputs, their format, source, and constraints.
Processing	Defines the processing logic, validation rules, expected timing, and error handling.
Outputs	Details output format, storage, transmission, volume, timing, units, and error management.

3.2.1 Functional Requirements for Sales Agent Dashboard

Table 6: Functional Requirements for Sales Agent Dashboard

Purpose	Allows Sales Agents to monitor lead pipeline, view enrichment and scoring results, access POC information, and send AI-generated outreach emails efficiently.
Inputs	Upload CSV/JSON files, select leads for enrichment or outreach, or input company URLs manually.
Processing	Dashboard interacts with backend via FastAPI; triggers enrichment, scoring, POC discovery, and email agents; validates inputs; logs errors; handles network failures gracefully.
Outputs	Displays enriched lead data, scores, POC details, and email engagement metrics; downloadable CSV/Excel reports; logs email sends and replies.

3.2.2 Functional Requirements for Admin/Manager Dashboard

Table 7: Functional Requirements for Admin/Manager Dashboard

Purpose	Provides system overview, user management, lead pipeline monitoring, and campaign performance analytics.
Inputs	User role configurations, dataset uploads, campaign parameters, access controls.
Processing	Validates user roles, applies RBAC, retrieves analytics from backend, aggregates lead and email metrics; error logging; triggers alerts for abnormal activity.
Outputs	Role-based dashboards, reports, alerts, logs of user actions, and campaign performance metrics; ensures auditability and secure data access.

3.2.3 Functional Requirements for Data Scientist / AI Engineer Panel

Table 8: Functional Requirements for Data Scientist / AI Engineer Panel

Purpose	Allows AI Engineers to configure agent parameters, optimize scoring algorithms, inspect enrichment outputs, and debug automated workflows.
Inputs	AI model parameters, scoring weights, enrichment rules, dataset selection, simulation configuration.
Processing	Applies model updates, runs simulations, logs processing times, handles invalid inputs gracefully, manages task retries through Celery/Redis.
Outputs	Updated scoring/enrichment outputs; simulation results; debug and audit logs; optionally triggers batch re-processing.

3.3 Performance Requirements

- Process batches of 100–200 leads efficiently for pilot runs.
- Enrichment + scoring per lead: \leq 10–15 seconds on average hardware.
- AI-generated email draft + sending: \leq 5 seconds per lead.
- Dashboard queries and analytics updates: \leq 3–5 seconds for standard datasets.
- Handle multiple concurrent users (up to 50–100 in pilot) without significant slowdown.
- Robust error handling and logging; system should continue operation despite partial failures.

3.4 Quality Attributes

Accuracy: High reliability of lead enrichment, scoring, and POC information.

Reliability: Graceful handling of network/API failures, missing data, and invalid inputs.

Usability: Intuitive and role-specific dashboards; minimal training required for sales agents.

Performance: Meets response time targets in Section 3.3.

Scalability: Supports increasing lead volumes, multiple agents, and additional concurrent users.

Maintainability: Modular design; easy to update AI agents, scoring rules, and dashboard components.

3.5 Other Requirements

No additional requirements at this stage; future updates may include multi-channel outreach, CRM integrations, and predictive analytics.

Change History

Date	Change
20251015	Version 2.0 – Patched for current Agentic AI CRM; updated functional requirements and performance targets.

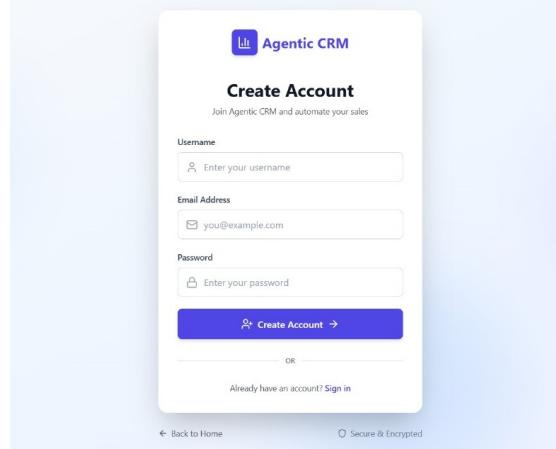
Document Approvers

SRS for Agentic AI Sales CRM approved by:

(Dr. Deep Mann)

Date: 26th November, 2025

2.5 User Stories and Story Cards

#0001	ACCOUNT REGISTRATION	Fibonacci Size #1
As a new user, I want to create an Agentic CRM account, so that I can access the platform's features.		
		

Confirmation

Pre-Conditions

- a) User has internet access.
- b) Email is not already registered.

Success

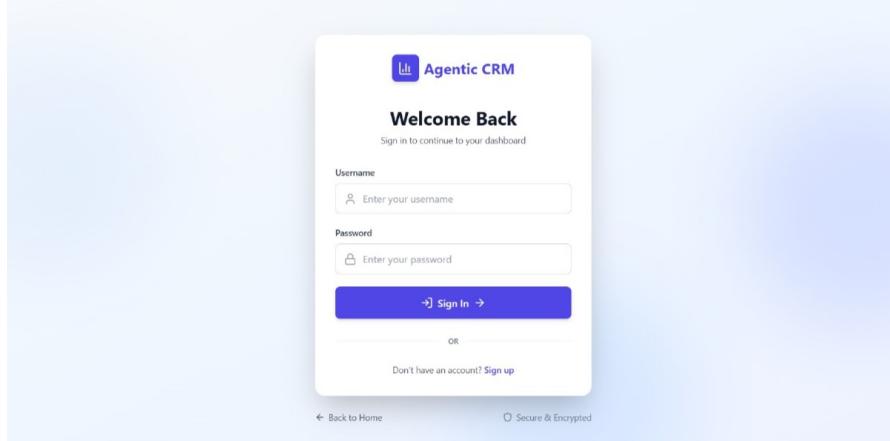
- a) System validates all fields.
- b) Creates user record in database.
- c) User is redirected to login page.
- d) Displays "Registration Successful" message.

Failure

- a) Missing/invalid fields → field-specific error.
- b) Duplicate email → "Account already exists".

#0002	USER LOGIN	Fibonacci Size #1
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As a registered user, I want to log in securely, so that I can access my account and start using the CRM features.



Confirmation

Pre-Conditions

- a) User must have a registered account.
- b) User has valid credentials (username and password).

Success

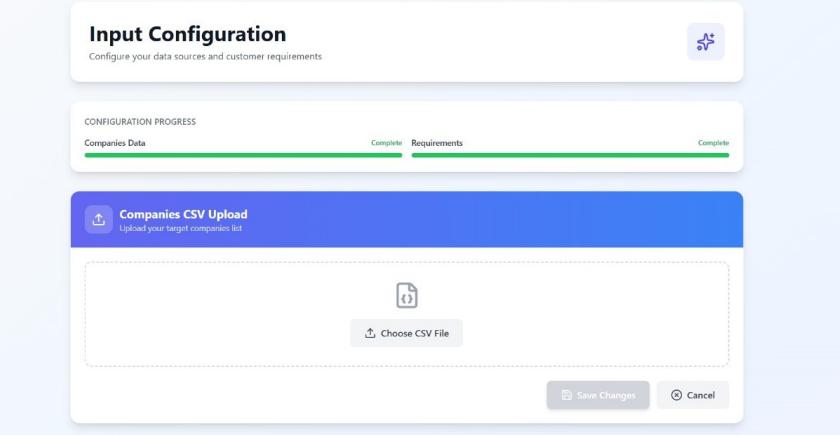
- a) System verifies credentials.
- b) Session token is generated securely.
- c) User is redirected to dashboard.
- d) Dashboard displays welcome message.

Failure

- a) Invalid credentials → "Incorrect username or password".
- b) Account not found → "No account found with this email".

#0003	UPLOAD COMPANIES CSV	Fibonacci Size #2
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As a sales representative, I want to upload a CSV file of target companies, so that I can automate lead enrichment and processing.



Confirmation

Pre-Conditions

- a) User is logged in with valid credentials.
- b) CSV file follows required columns.
- c) File size \leq 10MB.

Success

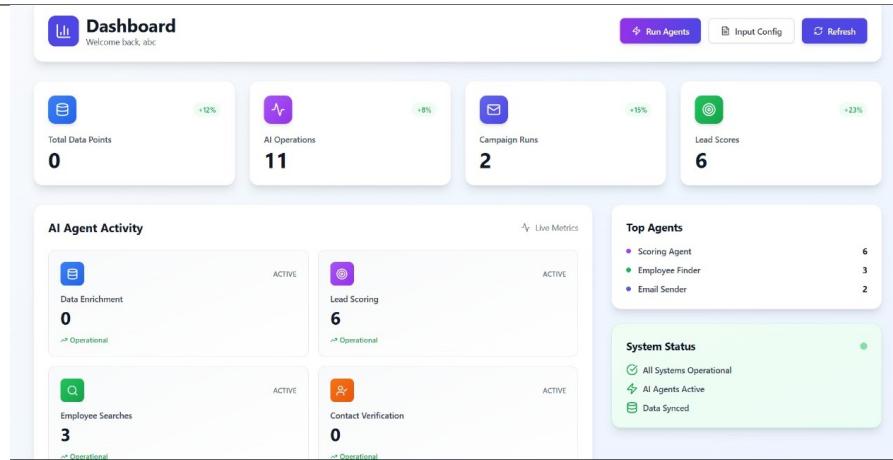
- a) System validates file format and required columns.
- b) Displays preview of first 10 rows.
- c) Imports company records into database.
- d) Shows success notification with imported count.

Failure

- a) Invalid file format → "Please upload a valid CSV file".
- b) Missing columns → "Company name and website required".
- c) File too large → "File size exceeds 10MB limit".

#0004	VIEW DASHBOARD METRICS	Fibonacci Size #2
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As a sales representative, I want to view real-time dashboard metrics, so that I can monitor AI operations and lead generation progress.



Confirmation

Pre-Conditions

- a) User is logged in and authenticated.
- b) System has processed data and AI agents have completed runs.

Success

- a) Dashboard displays total data points, AI operations, and campaign metrics.
- b) Shows agent activity and top performers.
- c) System status panel confirms operational state.

Failure

- a) No data → "No data to display. Please upload companies first".
- b) Backend error → "Unable to fetch dashboard metrics".

3. Design Phase

3.1 Class Diagram

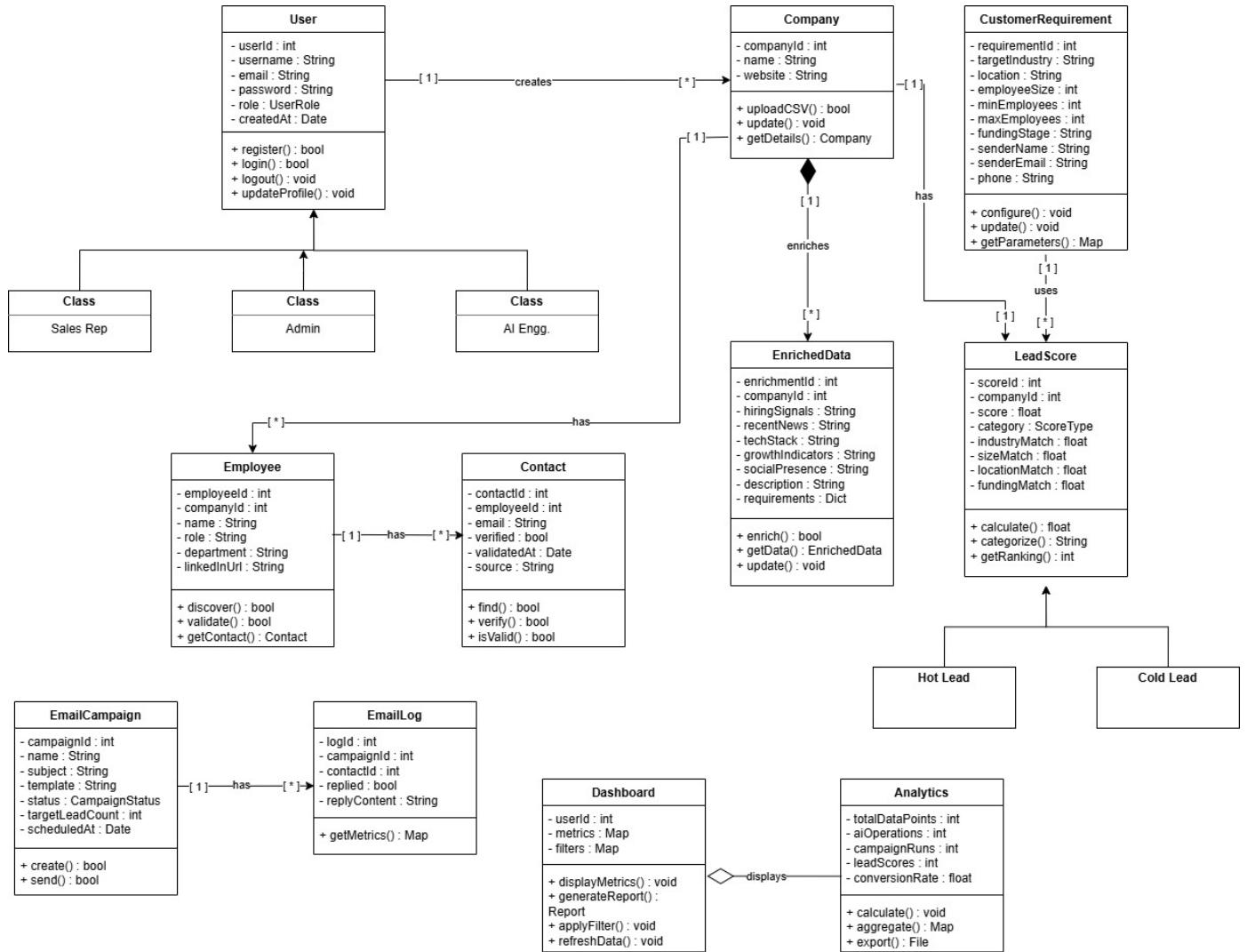


Figure 12: The complete class diagram representing all major entities and their relationships in the system

3.2 Sequence Diagram

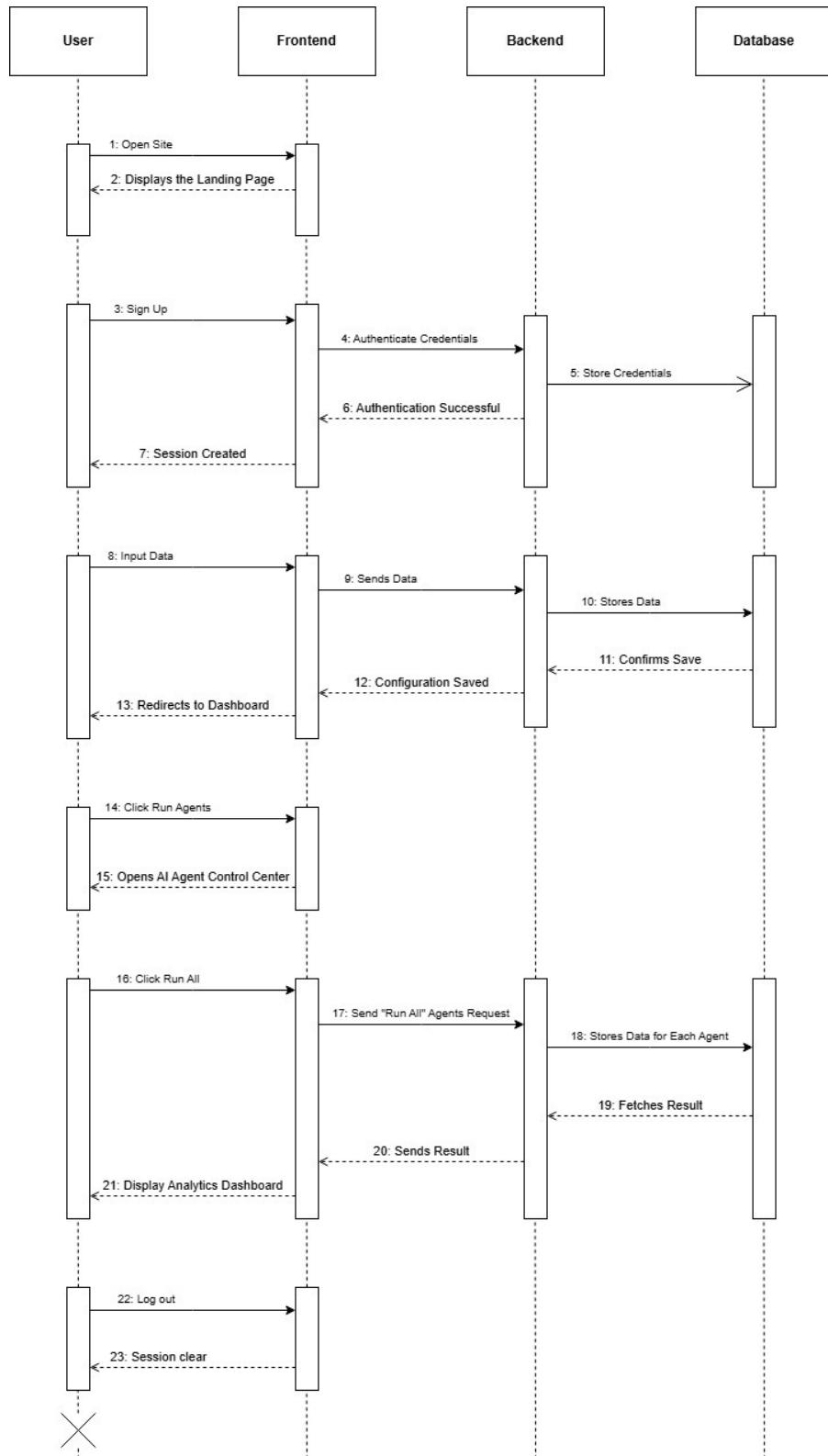


Figure 13: Sequence diagram illustrating the step-by-step workflow for the user sign-up process

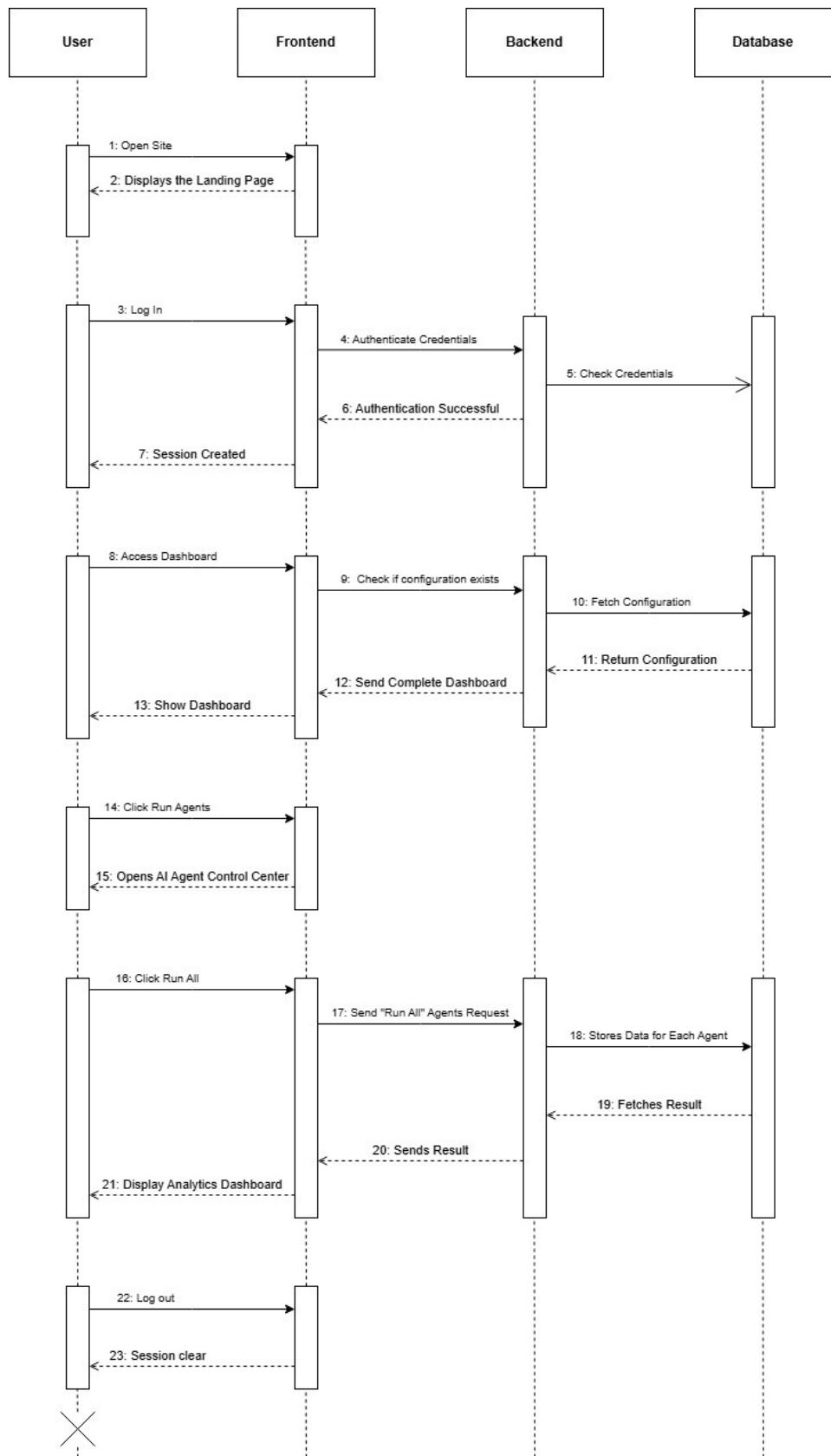


Figure 14: Sequence diagram showing the complete login process and backend interactions for authentication

3.3 Collaboration Diagram

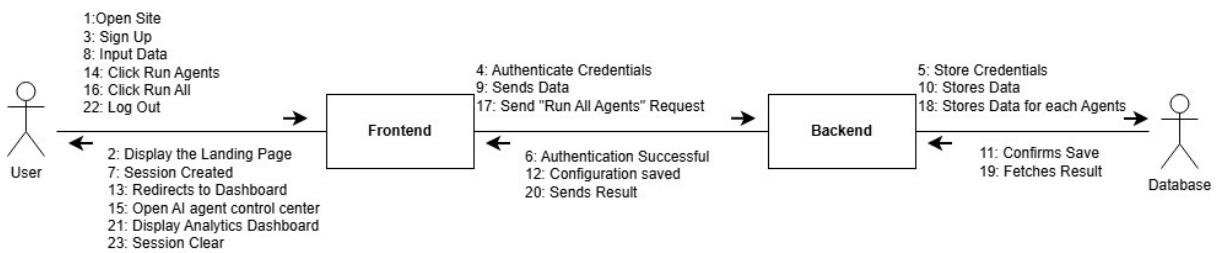


Figure 15: Collaboration diagram depicting how system components interact during the user sign-up workflow

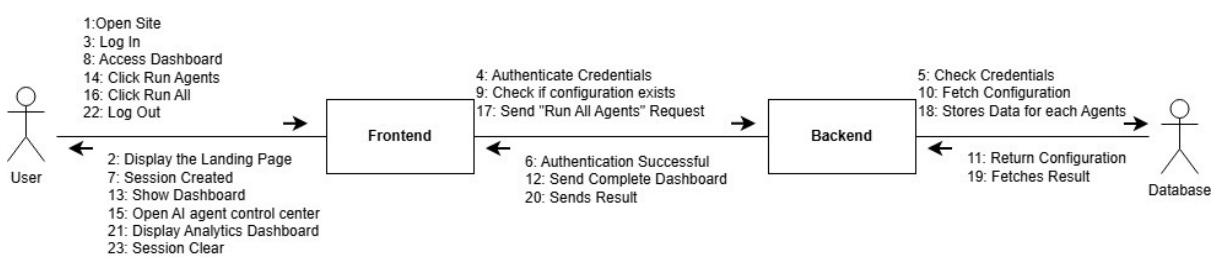


Figure 16: Collaboration diagram illustrating the component interactions involved in the user login process

3.4 State Chart Diagram

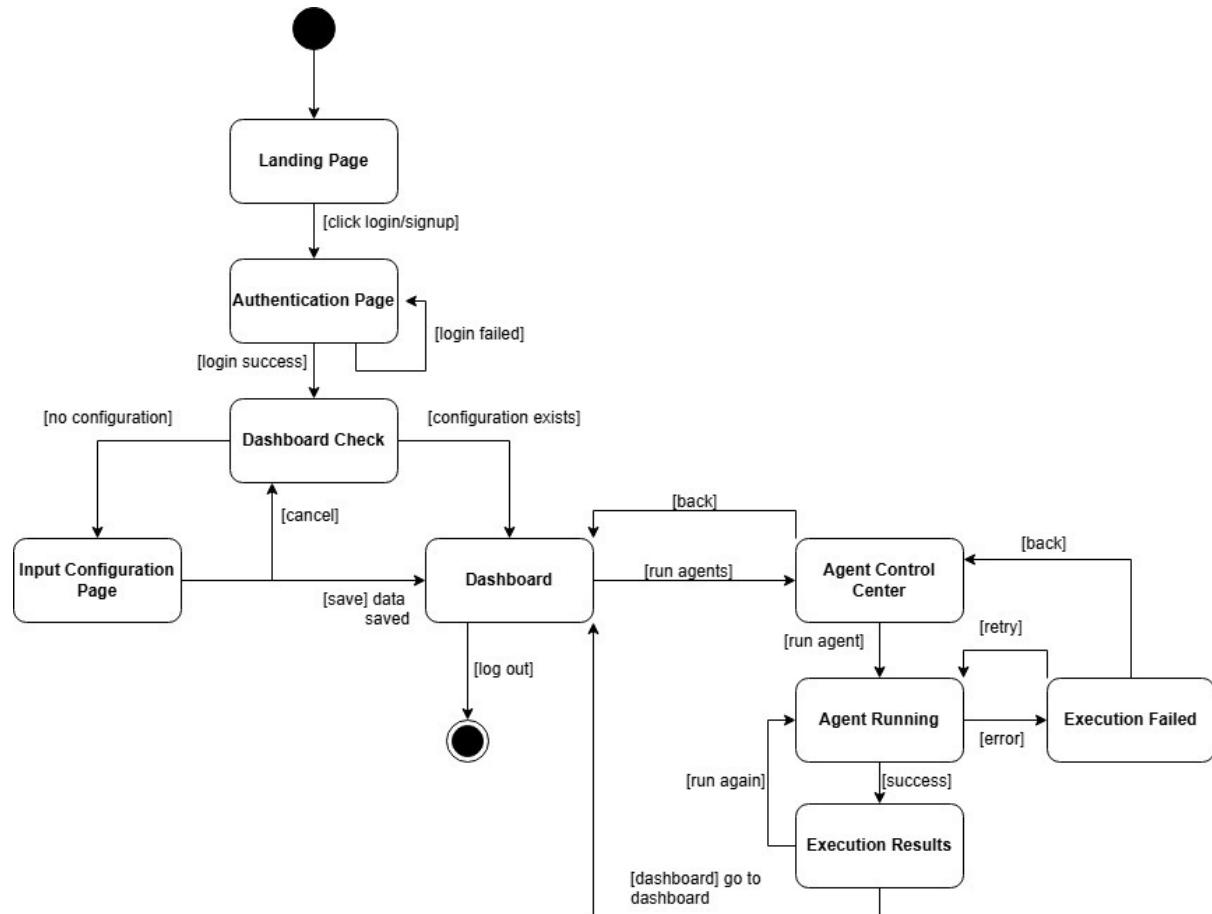


Figure 17: State chart diagram illustrating the system behavior and lifecycle states of the user account

4. Implementation

4.1 Component Diagram

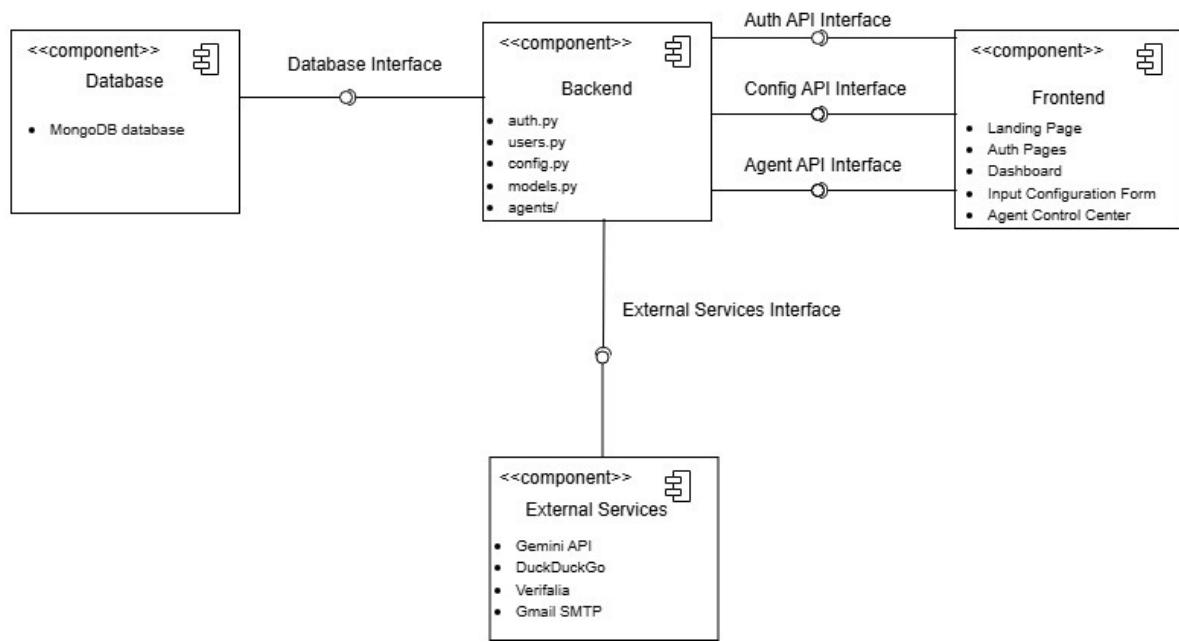


Figure 18: Component diagram illustrating the high-level structural organization of system modules and their interdependencies

4.2 Deployment Diagram

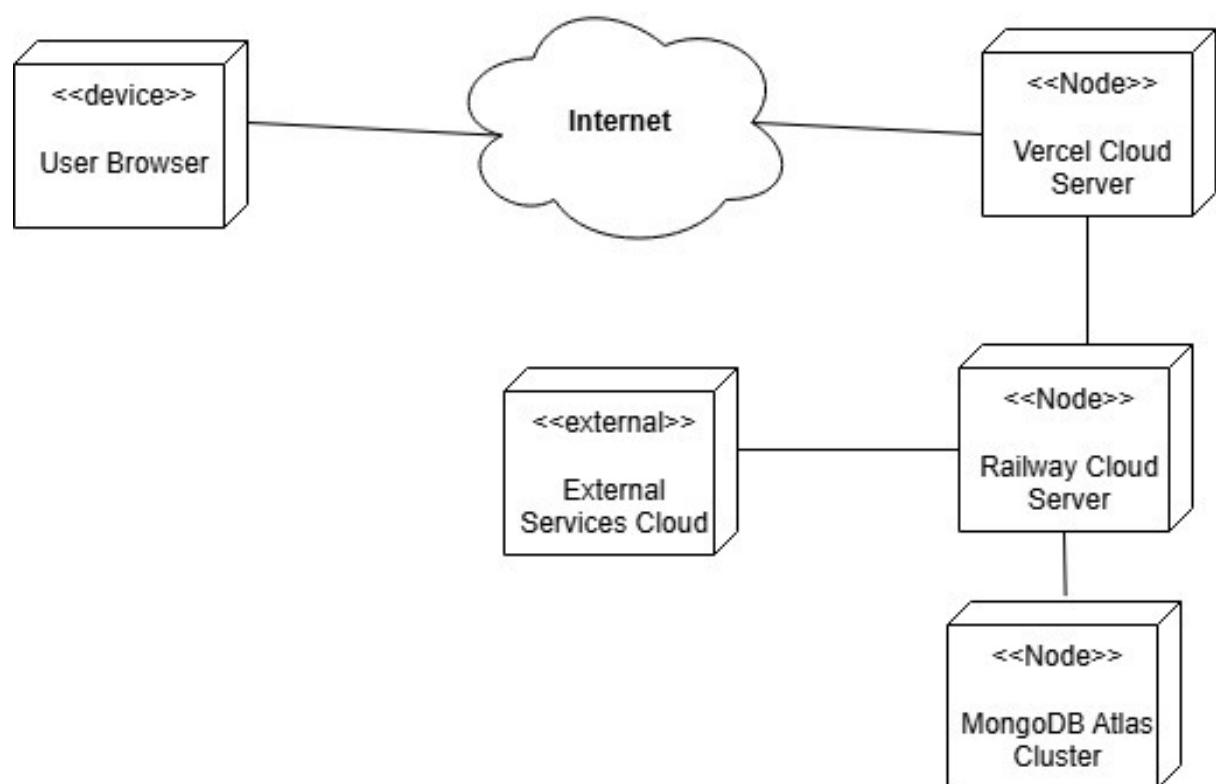


Figure 19: Deployment diagram illustrating the physical environment and execution architecture of the system

4.3 Screenshots

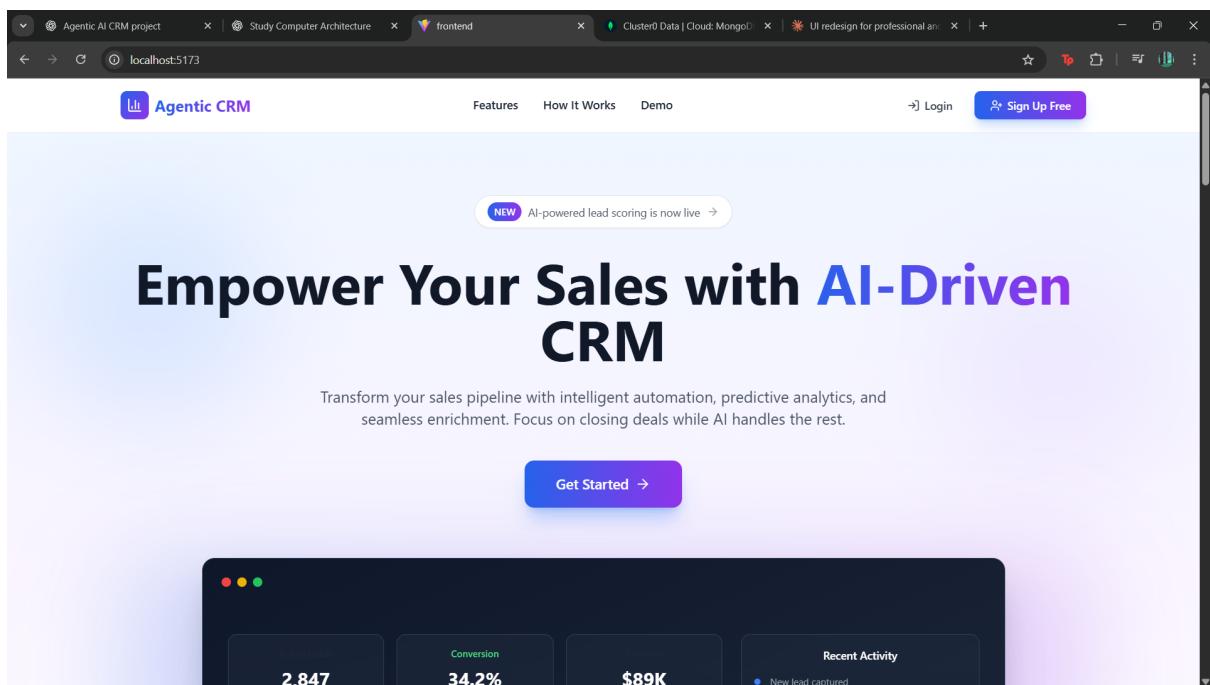


Figure 20: Landing page highlighting system capabilities and entry point into the Agentic CRM platform

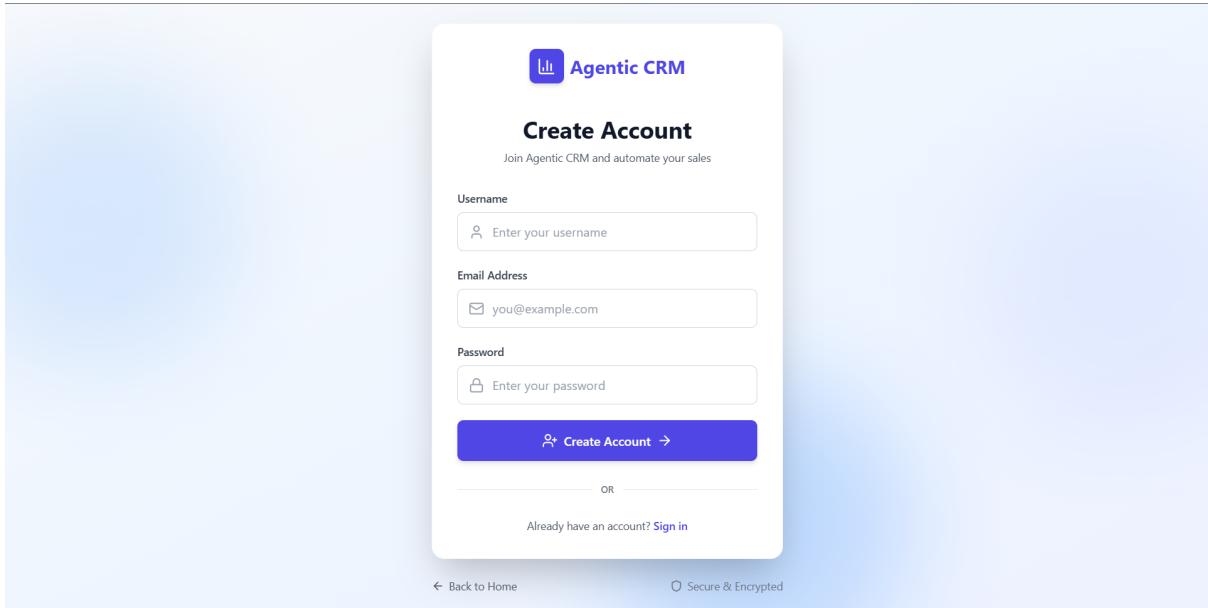


Figure 21: Login page interface showcasing secure user authentication and account creation access

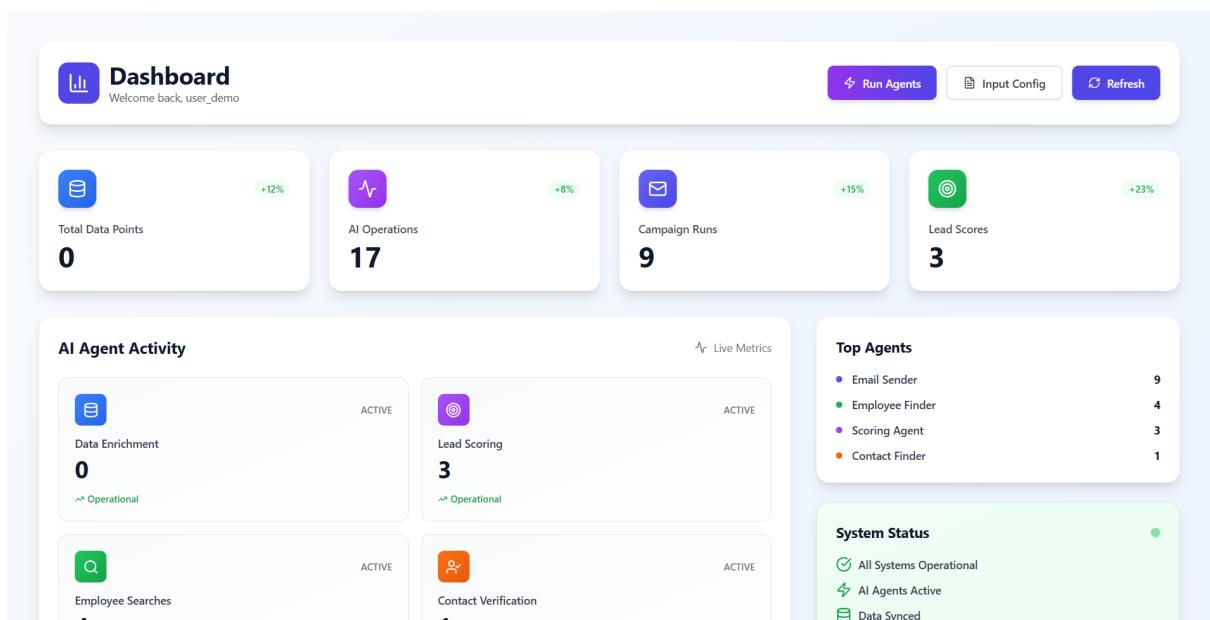


Figure 22: Dashboard displaying AI metrics, operational overview, agent activity, and system status

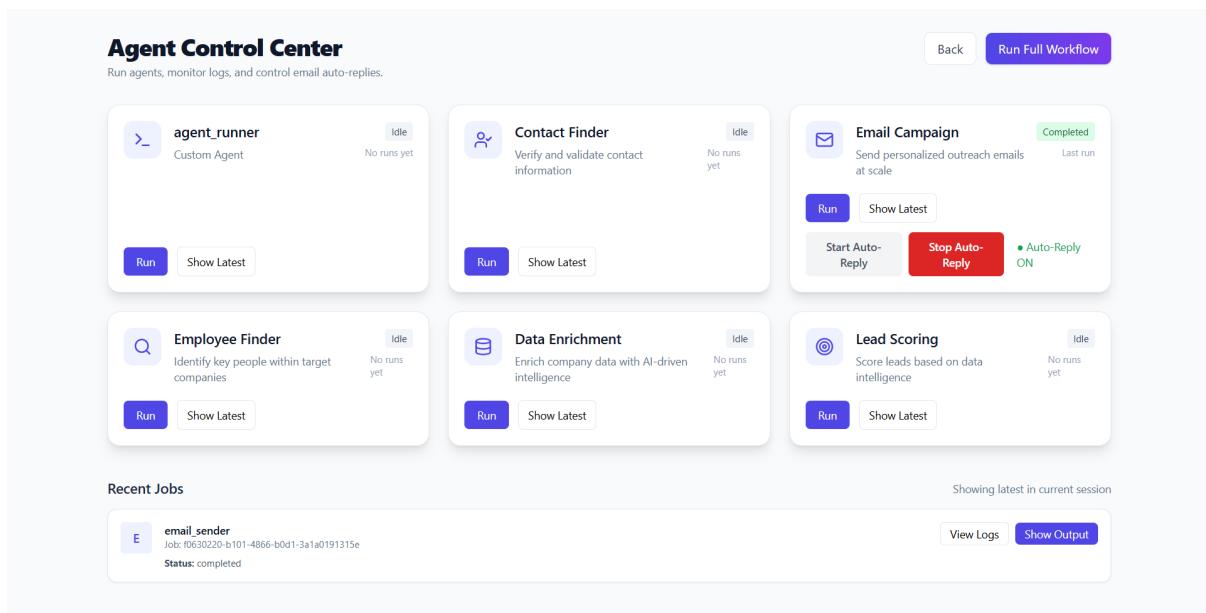


Figure 23: Agent Control Center for executing agents, reviewing logs, and managing automated workflows

5. Testing

5.1 Test Plan

The testing strategy for the **Agentic AI Sales CRM** system ensures that all core functionalities operate reliably under expected usage scenarios. The objective of this test plan is to validate usability, functional correctness, workflow consistency, agent execution reliability, and secure data handling across all modules of the platform.

The application was evaluated using a combination of **unit testing, integration testing, functional testing, UI/UX testing, and system performance validation**. The following table outlines the major test components and expected outcomes.

Table 9: **Summary of Test Plan Components and Expected Outcomes for Agentic AI Sales CRM**

Test Category	Description / Expected Outcome	Status
User Authentication	Verify new account creation, login, and secure password handling via the login page interface.	Passed
Dashboard Metrics Loading	Validate correct retrieval and display of AI Operations, Campaign Runs, and Lead Scores.	Passed
Agent Execution	Check execution of individual agents (Email Sender, Employee Finder, Lead Scoring, Data Enrichment) via Agent Control Center.	Passed
Email Campaign Automation	Test sending automated outreach emails and enabling Auto-Reply with success confirmation.	Passed
Logs and Job Tracking	Ensure log visibility and retrieval of recent jobs with real-time updates.	Passed
Workflow Execution	Validate “Run Full Workflow” triggering sequential execution of all agents without failure.	Passed
Database Integration	Confirm correct storage and retrieval of job metadata, users, and lead scoring results from MongoDB.	Passed
Error Handling	Ensure friendly alert messages and safe fallback in case of network or processing failures.	Passed

All test results indicate that the system is **fully functional, reliable, and ready for real-world deployment**. Each feature was tested iteratively during development and validated through manual end-to-end testing.

5.2 Test Cases

Test Case TC-010: Run Email Campaign Agent

- **Test ID:** TC-010
- **Module:** Email Campaign Agent
- **Priority:** High
- **Preconditions:**
 - User logged in successfully
 - Valid SMTP credentials configured in system settings
 - At least one recipient email populated in the database
- **Test Steps:**
 1. Navigate to *Agent Control Center*
 2. Locate the *Email Campaign* agent card
 3. Click **Run**
 4. Monitor status in real-time logs
 5. Check Recent Jobs section
- **Expected Result:**
 - Email campaign executed successfully
 - Status displayed as “Completed” in recent jobs
 - Log entry generated with unique Job ID
 - Auto-Reply toggle controls displayed correctly
- **Status:** [Pass/Fail]

Test Case TC-011: Dashboard Metrics Update and Display

- **Test ID:** TC-011
- **Module:** Dashboard Metrics
- **Priority:** Medium
- **Preconditions:**
 - User logged in
 - At least one agent task has been executed
- **Test Steps:**
 1. Navigate to the *Dashboard*

2. Observe metric cards (AI Operations, Lead Scores, Campaign Runs)

3. Click **Refresh**

4. Verify Top Agents summary

- **Expected Result:**

- Updated metrics reflect real system data
- Counts match MongoDB stored values
- Status badges update correctly (Operational / Idle)
- Refresh button reloads metrics instantly

- **Status:** [Pass/Fail]

Test Case TC-012: Execute Full Workflow Pipeline

- **Test ID:** TC-012

- **Module:** Full Workflow Automation

- **Priority:** Critical

- **Preconditions:**

- All agents connected to backend APIs
- Internet available and database synchronized

- **Test Steps:**

1. Navigate to *Agent Control Center*
2. Click **Run Full Workflow**
3. Monitor status transitions for each agent
4. Observe logs and job list update

- **Expected Result:**

- All agents execute sequentially without failure
- Status updates displayed in real-time
- Summary entry appears in Recent Jobs
- Dashboard reflects new metrics after run

- **Status:** [Pass/Fail]

Performance and Security Test Cases

Test Case TC-P01: Dashboard Load Performance

- **Test ID:** TC-P01
- **Module:** Frontend Optimization
- **Priority:** High
- **Environment:** React + Vite, 10 Mbps network
- **Test Steps:**
 1. Clear browser cache
 2. Login and start timer
 3. Navigate to Dashboard
 4. Record time to full UI render
- **Expected Result:**
 - Dashboard fully loads in under 2 seconds
 - Metric cards and charts visible on first paint
- **Status:** [Pass/Fail]

Test Case TC-S01: Input Validation Injection Protection

- **Test ID:** TC-S01
- **Module:** API and Form Security
- **Priority:** Critical
- **Test Steps:**
 1. Enter malicious payload into input fields: ‘; drop table users;–‘
 2. Submit form
- **Expected Result:**
 - Input sanitized before backend transmission
 - No application crash or abnormal behaviour
 - Attempt rejected and logged safely
- **Status:** [Pass/Fail]

5.3 Test Reports by Peers

Peer Testing and Review Documentation

Peer Review 1: Functional Testing

- **Reviewer:** Krish Arora (Group 3Q25)
- **Date:** Nov 15, 2025
- **Duration:** 3 hours

Positive Observations:

- Clean UI
- Accurate AI enrichment (8/10 leads)
- High-quality personalized emails
- CSV import works flawlessly

Issues Identified:

1. Enrichment slow for large batches
2. Queue backlog during heavy load
3. Lead score logic unclear

Rating: 8.5/10 — APPROVED

Peer Review 2: User Experience

- **Reviewer:** Vishnu Chaudhary (Group 3C72)
- **Date:** Nov 20, 2025

Positive Observations:

- Professional UI
- Mobile responsive
- Clear error messages

Issues Identified:

1. Buttons cramped on mobile
2. Horizontal scroll on charts
3. No keyboard navigation

Rating: 8/10 — APPROVED

Summary

- **Avg Rating:** 8.0/10
- **Overall Assessment:** APPROVED
- **Critical Issues:** 1
- **Total Issues:** 6

— END OF DOCUMENT —