CS411

SOFTWARE ARCHITECTURE DESIGN

2025-2026 FALL

PROJECT # 2

You are asked to do the following staff as a team work:

You are tasked with developing a unified CRM (Customer Relationship Management) system that manages and optimizes every touchpoint across the entire customer journey for a large B2C services company. CRM acts as the single source of truth, unifying all functions (Sales, Marketing, and Service) under one intelligent platform. The system is organized into the following major modules:

1. Sales Automation (SA) Module

   1.1. Purpose: To manage the sales pipeline and automate key tasks to maximize deal closures.

   1.2. Key Features:

      1.2.1. Lead & Opportunity Management: Capturing, scoring, assigning, and tracking new prospects and existing opportunities through defined sales stages (e.g., qualification, proposal, negotiation).

      1.2.2. Forecasting: Providing sales leadership with revenue predictions based on pipeline weight, historical data, and sales rep performance.

      1.2.3. Incentive and Commission Tracking (Partner Relationship Management Component): Automating the calculation, approval, and payment of commissions for both internal sales staff and external partners/resellers.

2. Customer Service and Support Module

   2.1. Purpose: To manage all customer inquiries and support issues across multiple channels to ensure high levels of customer satisfaction and retention.

   2.2. Key Features:

      2.2.1. Case Management: Logging, prioritizing, assigning, and tracking customer service requests (tickets) until resolution, ensuring adherence to Service Level Agreements (SLAs).

      2.2.2. Knowledge Base & Self-Service: A searchable repository of articles, troubleshooting guides, and FAQs accessible to both agents and customers via Customer Portal.

      2.2.3. Omni-Channel Queueing: Routing incoming service requests (via phone, email, chat, social media) to the correct agent based on availability, skill, and customer priority.

3. Marketing Automation (MA) Module

   3.1. Purpose: To design, execute, and measure targeted campaigns and nurture leads to sales-ready opportunities.

   3.2. Key Features:

      3.2.1. Segmentation: Grouping customers and leads based on demographics, purchase history, and behavioral data for hyper-personalized messaging.

      3.2.2. Campaign Management: Automating email sequences, social media posts, and advertising campaigns based on customer lifecycle events and defined workflows.

      3.2.3. Marketing Analytics: Measuring campaign effectiveness, lead conversion rates, and attributing revenue generated directly back to marketing efforts (ROI).

4. Data Intelligence & Customer Insight Module

   4.1. Purpose: To leverage data to provide a 360-degree view and offer actionable, proactive recommendations to customer-facing teams.

   4.2. Key Features:

      4.2.1. Customer Lifetime Value (CLV) Scoring: Dynamically calculating the predicted long-term financial worth of a customer.

      4.2.2. Churn Prediction: Using predictive models to flag customers at high risk of cancellation, allowing for targeted intervention by the Service or Retention teams.

      4.2.3. Next Best Action (NBA): Delivering real-time recommendations to sales and service agents on the most effective product offer, retention tactic, or action to take during a customer interaction.

Based on the modules above, prepare your own CRM product with its software:

Architecture:

- List stakeholders and their expectations & contributions.

- Customers are asking for quality attributes such as security and data privacy as well as high performance and reliability.

- Write down the main requirements for the above needs and quality attributes.

- Prepare the high-level architecture for your CRM product. Within your architecture, do not forget to include different views that were discussed during the lectures. In your report, mention Module Styles, Component & Connector, and Allocation Styles.

- Write the rationale behind this architecture.

- Write the architectural pattern(s) in your architecture.

Implementation:

- Find a name and logo for your product.

- Implement only Marketing Automation Module: No need to implement whole CRM.

- You can adapt your Login Page that was implemented in Project #1.

- Code should be Python.

- Test your software based on your requirements.

- Compare (benchmark) your product with the examples in the market.

Report & Presentation:

- Prepare a report covering all the above tasks and follow the instructions below.

- Prepare a presentation covering all the above tasks.

Instructions

A-Report preparation:

The report should have the following properties:

- It should contain screenshots as well as diagrams of the actual application.
- It **should not exceed 25 pages** including the cover page.
- The report should be self-contained. That is, the reader shouldn't feel the need to refer to any code/web site for understanding what you have done, s/he only needs to refer to the reference if s/he feels curious about some implementation detail.
- It should contain screenshots of the implementation.
- It should contain important excerpts of the implementation code, explaining how those excerpts correspond to the requirements and architecture.
- Cheating is prohibited.
- Your own ideas and your own words are expected.
- Creativity is appreciated.

B-Report Submission details:

- Deadline: **11th of December, 23:59 PM.**
- Email subject: CS411 p#2 submission - [Name][Surname] (of the sender)
- Email body should contain: [Name] [Surname] - [Email address]-[Student ID] of all group members.
- Attach the report in (**pdf format only)** and send to *altunel@bilkent.edu.tr* and Section TA.

C-Code submission:

- Deadline: **11th of December, 23:59 PM.**
- The code can be submitted either as a separate zipped file (attached or a link to online storage) or as a link to an online code repository. The code directory *must* contain a README file with information about where to find the source as well as the test codes (or in case you send the whole project, the README file explains how the project is structured and instruction on how to run the code).

D-Presentation details:

Presentations should be prepared:

- Presentations **should not exceed 15 minutes**. All group members should present the project.

- The question & answer session **should not exceed 5 minutes, total of 20 minutes per group**. All group members should answer the questions.

- Following items are important:

    - Obeying the time limitation

    - Well organized presentation & slides

    - Demo of your Product

    - Answering the questions with proper details

    - Contribution of all team members

- Deadline of the presentation submission: **13th of December, 23:59 PM.**
- Oral presentation date will be announced later.

Good luck