Vehicle Insurance Management System

1. Abstract

The Vehicle Insurance Management System is a full-stack enterprise web application designed to digitize and automate the end-to-end lifecycle of motor insurance operations. Traditional insurance systems often suffer from manual policy onboarding, delayed claim settlements, poor premium tracking, and limited analytical insights. These challenges create inefficiencies, reduce transparency, and impact customer satisfaction. The proposed system addresses these issues by providing a centralized, secure, and scalable digital platform for managing vehicle policies, claims, payments, and reporting.

The system is developed using ASP.NET Core Web API for the backend, Angular for the frontend, and SQL Server for database management. The backend follows a layered architecture implementing Controllers, Services, Repositories, DTOs, and EF Core Models, while applying SOLID principles and Clean Architecture practices. JWT-based authentication and role-based authorization ensure secure access for Admin, Agent, Customer, and Claims Officer roles. Entity Framework Core, LINQ, and asynchronous programming are used to ensure optimized performance and maintainable code.

The Angular frontend follows a modular structure with secure routing, reactive forms, and HTTP interceptors to interact with RESTful APIs. The SQL database is designed with proper primary and foreign key constraints, indexing, and aggregation queries to support reporting and analytics. The system is cloud-ready and designed for scalable deployment, providing a secure, efficient, and enterprise-grade solution for vehicle insurance management.

2. Objectives

1. To architect and develop a secure, scalable, and API-driven Vehicle Insurance Management System using ASP.NET Core Web API, Angular, and SQL Server.
2. To implement secure authentication and strict role-based authorization using JWT to ensure controlled access for Admin, Agent, Customer, and Claims Officer roles.
3. To provide customers with the ability to:
   •Securely register and access their accounts
   •Purchase, renew, and manage vehicle insurance policies
   • View policy coverage, premium details, and payment records
   • Submit insurance claims and track their real-time status
4. To enable agents to:
   • Facilitate policy creation and updates on behalf of customers
   • Manage customer policy records efficiently
   • Support customers throughout the policy lifecycle

5. To equip claims officers with:
   • Tools to evaluate and validate submitted claims
   • Authority to approve, reject, or process settlements
   • A structured workflow system to ensure timely claim resolution
6. To allow administrators to:
   • Manage users, roles, and permissions within the system
   • Oversee policy configurations and operational data
   • Monitor system performance and generate management reports
7. To implement structured policy lifecycle management covering the following stages: Draft → Active → Expired → Cancelled
8. To implement comprehensive claim lifecycle tracking including the stages: Submitted → Under Review → Approved/Rejected → Settled
9. To develop interactive dashboards and analytical reports that provide insights into policy distribution, claims statistics, premium revenue, and business performance.
10. To ensure system reliability and security through proper data validation, exception handling, middleware logging, and adherence to RESTful API standards.