Product Management System –

Project Plan & Analysis

Core Requirements:

1. **Application Type:**

   o ASP.NET Core MVC Web Application

   o Two main pages: Product List and Report

2. **Product Entity:**

   o Product ID (Primary Key)

   o Name (string)

   o Category (string)

   o Price (decimal)

   o Stock (integer)

3. **Core Features:**

   o Complete CRUD operations for products

   o Category analytics:

     ▪ Average price per category

     ▪ Highest stock value category

4. **Technical Requirements:**

   o Service and Repository pattern

   o Code-first database approach with MSSQL

   o Stored procedures for calculations

   o Implement caching with two strategies:

     ▪ Long-term cache

   o Use delegates for callback methods

- o   UI using Bootstrap and jQuery

- o   Unit testing with MSTest and mocking

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2. Solution Approach

Architecture Design:

- ProductManagement.Web (MVC Project)
  - o   Controllers
  - o   Views
  - o   wwwroot
- ProductManagement.Core (Business Logic)
  - o   Entities
  - o   Interfaces
  - o   Services
  - o   Delegates
- ProductManagement.Infrastructure (Data Layer)
  - o   Data
  - o   Repositories
  - o   Migrations
- ProductManagement.Tests (Unit Tests)
  - o   Services
  - o   Repositories

Technology Stack:

- .NET 8.0

- Entity Framework Core

- SQL Server

- Bootstrap 5

- jQuery

- MSTest & Moq

3. Potential Issues and Solutions

1. Data Consistency:

- **Issue:** Cache invalidation when data changes

- **Solution:**

    - Implement cache removal on data modifications

    - Use delegates to notify them of changes

2. Performance:

- **Issue:** Database performance with large datasets

- **Solution:**

    - Implement efficient stored procedures

    - Use appropriate indexes

    - Implement pagination

3. Concurrency:

- **Issue:** Multiple users updating the same data

- **Solution:**

    - Implement optimistic concurrency

    - Use transaction management

4. Error Handling:

- **Issue:** Various types of failures

- **Solution:**

    - Global exception handling

    - Proper logging

    - User-friendly error messages