E-Commerce Platform with AI-Powered Recommendation System

Project Report Submitted in partial fulfillment for the degree of  
MASTER IN COMPUTER APPLICATION (MCA)  
Kurukshetra University

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# Acknowledgement

I would like to express my sincere gratitude to my project guide for their continuous support, patience, and motivation throughout this project.   
Their immense knowledge and valuable guidance have been a source of inspiration and helped me in successfully completing this work.  
  
I also thank my faculty members and peers at Kurukshetra University who provided valuable feedback during the development phase.   
Finally, I extend heartfelt thanks to my family and friends for their encouragement and constant support during this project.

# Certificate

This is to certify that this project entitled “E-Commerce Platform with AI-Powered Recommendation System”   
submitted in partial fulfillment of the degree of MASTER IN COMPUTER APPLICATION (MCA) to the Kurukshetra University   
done by Mr. Ravi Kumar Sohal, Roll No. \_\_\_\_\_\_\_\_\_ is an authentic work carried out by him under my guidance.   
The matter embodied in this project work has not been submitted earlier for the award of any degree or diploma   
to the best of my knowledge and belief.

Signature of the Student: \_\_\_\_\_\_\_\_\_\_\_\_

Signature of the Guide: \_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_

# Synopsis / Abstract

Title of the Project: E-Commerce Platform with AI-Powered Recommendation System  
  
Problem Statement:  
With the rise of online shopping, users face difficulties in finding relevant products quickly.   
Existing platforms often fail to provide personalized recommendations, reducing user satisfaction.  
  
Why Chosen:  
E-commerce is a fast-growing domain with high demand for personalization using Artificial Intelligence.   
This project allows practical exposure to modern full-stack web technologies and AI-driven solutions.  
  
Objective & Scope:  
The project aims to design a scalable e-commerce system that enables users to browse products, manage carts,   
place orders, and receive AI-based personalized product recommendations.   
The system will also include an admin module for product, category, order, and user management.  
  
Methodology:  
The system is built using Java Spring Boot (backend), ReactJS (frontend), MySQL (database), and   
a Python/R microservice for recommendations. APIs ensure secure communication.   
Authentication and authorization are handled using JWT with Spring Security.  
  
Hardware & Software:  
- Hardware: Standard PC with 8 GB RAM, Intel i5 or higher  
- Software: Java Spring Boot, ReactJS, MySQL, Python/R, Postman, IntelliJ, VS Code  
  
Testing:  
Unit testing, Integration testing, and UAT (User Acceptance Testing) were performed.   
JUnit and Postman were used to validate APIs.  
  
Contribution:  
The project demonstrates integration of web development and AI, aligning with real-world industry practices.   
It provides a blueprint for scalable, secure, and intelligent e-commerce platforms.

# Main Report

## Objective & Scope of the Project

The primary objective is to build a secure, user-friendly, and scalable e-commerce platform with personalized recommendations.   
The scope includes two modules: Customer and Admin. Customers can browse, search, add to cart, place orders, and get recommendations.   
Admins manage products, categories, orders, and users.

## Theoretical Background

This project is based on modern full-stack development concepts, combining web technologies with AI.   
Spring Boot ensures a robust backend, ReactJS provides a responsive frontend,   
and AI recommendation models improve user engagement.

## Definition of Problem

Traditional e-commerce platforms lack personalization and often rely on static product listings.   
Users may get overwhelmed with large catalogs, leading to poor shopping experience.   
The problem is to create a system that enhances usability with personalized AI-driven recommendations.

## System Analysis & Design vis-a-vis User Requirements

User requirements were collected and analyzed. Customers require secure authentication, product search,   
recommendations, and seamless checkout. Admins require efficient management of catalog, categories, and orders.   
Design involved creating ER diagrams, DFDs, and flowcharts to define system modules.

## System Planning (PERT Chart)

System development was planned using Agile methodology with milestones for design, implementation, and testing.

## Process Logic of Each Module

- Auth Module: Handles login, signup, JWT authentication  
- Product Module: CRUD for products, product search  
- Category Module: Manage categories  
- Order Module: Place and track orders  
- Recommendation Module: Suggest products based on browsing and purchase history

## Methodology Adopted, System Implementation & Hardware/Software Used

Spring Boot, ReactJS, MySQL, and R/Python were used. APIs were built with REST principles. Security via JWT.

## System Maintenance & Evaluation

The system is designed to be scalable, maintainable, and secure. Future improvements include advanced ML-based recommendations.

## Cost and Benefit Analysis

Cost: Development time, infrastructure (hosting, DB), and testing tools.  
Benefit: Real-world industry-level platform, reusable modules, customer engagement, and learning advanced technologies.

## Detailed Life Cycle of the Project

Requirements → Design → Development → Testing → Deployment → Maintenance

## ERD & DFD

Entity Relationship Diagram and Data Flow Diagrams describe the structure and data flow of the system.

## Input and Output Screen Design

Frontend screens include Login, Product Listing, Cart, Checkout, Admin Dashboard. Outputs include invoices, reports, and recommendations.

## Testing

Unit testing with JUnit, API testing with Postman, and manual user testing for validation.

## User/Operational Manual

Includes access rights, security measures, admin controls, backup procedures, and user guidelines.

# Annexures

## Data Dictionary

Example:  
- Data Name: User\_ID, Type: INT, Size: 10  
- Data Name: Product\_Name, Type: VARCHAR, Size: 255  
- Data Name: Order\_Date, Type: DATE

## List of Abbreviations

API: Application Programming Interface  
DBMS: Database Management System  
ERD: Entity Relationship Diagram  
DFD: Data Flow Diagram  
JWT: JSON Web Token

## References / Bibliography

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2. ReactJS Documentation - https://react.dev/  
3. MySQL Documentation - https://dev.mysql.com/doc/  
4. LangChain & AI Recommendation Techniques