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Software Requirements Specification

For

E-Commerce with Sentiment Analysis

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version

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Introduction

Purpose

This Software Requirements Specification (SRS) document outlines the software requirements for the development of the project "E-Commerce Website with Sentiment Analysis". This document serves as a guide for developers, project managers, testers, and stakeholders involved in the project.

Intended Audience

- **Developers**: To understand the technical requirements and design considerations.
- **Project Managers**: To oversee the project's progress and resource allocation.
- **Testers**: To create test cases and ensure compliance with requirements.
- **Marketing Staff**: To understand the features and capabilities of the product.
- **Users**: To gain insights into the product's functionality.
- **Documentation Writers**: To create user manuals and guides.

The SRS is organized as follows:
Section 3 covers External Interface Requirements
Section 4 includes Analysis Models
Section 5 details System Features
Section 6 outlines Non-Functional Requirements
Section 7 addresses Other Requirements
Appendices A, B, and C contain additional supporting information.

Product Scope

The "E-Commerce Website with Sentiment Analysis" is a comprehensive online platform designed to offer a seamless shopping experience with the added capability of sentiment analysis for product reviews. This platform allows users to register, browse products, make purchases, and benefit from sentiment analysis insights on product reviews.

References

<List any other documents or Web addresses to which this SRS refers. These may include user interface style guides, contracts, standards, system requirements specifications, use case documents, or a vision and scope document. Provide enough information so that the reader could access a copy of each reference, including title, author, version number, date, and source or location.>

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Overall Description

Product Perspective

The "E-Commerce Website with Sentiment Analysis" is a standalone product, designed to provide end-to-end e-commerce functionality while integrating sentiment analysis capabilities for product reviews. It operates independently but may interact with external systems, such as payment gateways and sentiment analysis APIs.

Product Functions

The major functions of the product include:

- User Registration and Authentication
- Product Listing and Search
- Shopping Cart Management
- Checkout Process
- Sentiment Analysis of Product Reviews

Detailed descriptions of these functions are provided in Section 5 of this document.

User Classes and Characteristics

- **Customers:** These users represent the primary audience of the website. They vary in technical expertise and may have different levels of experience with online shopping. Characteristics include shopping preferences, browsing behaviour, and purchase history.

- **Administrators:** These users have technical expertise and are responsible for maintaining the website. They have privileged access to manage products, users, and the sentiment analysis system.

Certain requirements, such as user registration and shopping cart management, apply to all user classes. However, administrative tasks are specific to administrators.

Operating Environment

- **Hardware Platform**: The software will operate on standard web server infrastructure, which includes a web server and database server. The hardware requirements for these servers will be determined during the system architecture design phase.

- **Operating System and Versions**: The software will be compatible with commonly used operating systems such as Windows Server, Linux (e.g., Ubuntu), and cloud-based platforms (e.g., AWS, Azure).

- **Software Components**: The software will coexist with various software components, including web browsers (e.g., Google Chrome, Mozilla Firefox, Safari), web server software (e.g., Apache, Nginx), and database management systems (e.g., MongoDB, MySQL, PostgreSQL).

Design and Implementation Constraints

- **Hardware Limitations**: The software should be designed to work efficiently within the hardware limitations, including timing and memory requirements. Specific hardware requirements will be determined during the system design phase.
- **Interfaces to Other Applications**: The software may need to interface with third-party applications for payment processing and sentiment analysis. The integration must follow the APIs and protocols provided by these external systems.
- **Programming Languages and Technologies**: The development team is constrained to use specific programming languages and technologies, such as [Specify programming language], [Specify framework], and [Specify database system].
- **Security Considerations**: Stringent security measures must be implemented to protect user data, including secure communication (HTTPS), data encryption, and authentication mechanisms.
- **Corporate and Regulatory Policies**: The development must adhere to company policies regarding data privacy, security, and ethical data usage. Additionally, compliance with relevant regulations (e.g., GDPR, PCI DSS) is mandatory.

Assumptions and Dependencies

- Assumption 1: Assumption that the payment gateway and sentiment analysis APIs provide stable and reliable services.
- Assumption 2: Assumption that users have access to modern web browsers with JavaScript enabled.
- Assumption 3: Assumption that the hosting infrastructure will provide scalability and high availability.
- Dependency 1: Dependency on the availability and performance of the payment gateway API for secure payment processing.
- Dependency 2: Dependency on the sentiment analysis API for analyzing product reviews.
- Dependency 3: Dependency on external cloud hosting services for scalability and reliability.

External Interface Requirements

User Interfaces

The user interface will:

- Follow responsive web design principles to ensure compatibility with various devices and screen sizes.
- Adhere to GUI standards for consistent user experience.
- Include standard elements such as navigation menus, search bars, user registration forms, product listings, and shopping cart displays.
- Feature user-friendly error message displays and help functionalities.
- Be documented in a separate User Interface Specification document.

Software Interfaces

The software will interface with the following components:

- Database Management System: The software will interact with the database to retrieve and store user data, product information, and sentiment analysis results.
- Payment Gateway API: Integration with a payment gateway API for secure payment processing.
- Sentiment Analysis API: Integration with an external sentiment analysis API to analyze and provide sentiment insights for product reviews.
- Web Server: The software will be hosted on a web server that handles HTTP requests and responses.
- Operating System: Interactions with the underlying operating system for resource management.

Communications Interfaces

- HTTP/HTTPS: The software will use HTTP/HTTPS protocols for communication between clients and the web server.
- SSL Encryption: Secure Socket Layer (SSL) encryption will be employed to ensure secure data transmission.
- Email: The software will support email notifications and communication with users.
- RESTful API: RESTful APIs will be utilized for communication with external services, such as the sentiment analysis API.
- Message Formatting: JSON (JavaScript Object Notation) will be used for message formatting between components.
- Communication Standards: Standard communication standards such as FTP or HTTP will be employed as needed.

Analysis Models

The analysis models for the e-commerce website with sentiment analysis will include:
Use Case Diagrams: These diagrams will illustrate the interactions between various actors (users, administrators) and the system. They will help identify the primary use cases and system boundaries.
Entity-Relationship Diagrams (ERD): ERDs will depict the relationships between different entities within the system, such as users, products, orders, and reviews. These diagrams will aid in designing the database schema.

System Features

The major services provided by the e-commerce website with sentiment analysis are organized into system features. Below are some examples of these features:

System Feature 1

User Registration and Authentication

5.1.1 Description and Priority

This feature allows users to register on the platform and authenticate themselves.
It is of High priority as it is fundamental to user engagement and security.

5.1.2 Stimulus/Response Sequences

Stimulus: User clicks on the "Register" button.
Response: The system displays the registration form.
Stimulus: User submits registration details.
Response: The system verifies the information and creates a user account.

5.1.3 Functional Requirements

REQ-1: The system shall provide a user registration form with fields for username, email, password, and personal information.
REQ-2: The system shall validate user inputs and display appropriate error messages for invalid data.
REQ-3: The system shall securely store user credentials and personal information in the database.
REQ-4: The system shall provide user authentication functionality, including login and password recovery.

System Feature 2

Product Listing and Search

5.2.1 Description and Priority

This feature allows users to browse and search for products. It is of High priority as it is core to the shopping experience.

5.2.2 Stimulus/Response Sequences

Stimulus: User enters a search query.

Response: The system displays search results based on the query.

Stimulus: User clicks on a product.

Response: The system displays detailed product information.

5.2.3 Functional Requirements

REQ-5: The system shall provide a product listing page with search and filter options.

REQ-6: The system shall support keyword-based product searches.

REQ-7: The system shall display product details including images, descriptions, and prices.

REQ-8: The system shall provide sorting and filtering options for search results.

Other Non Functional Requirements

Performance Requirements

- Performance Requirement 1: The system shall respond to user interactions (e.g., product searches, page loads) within 2 seconds to ensure a responsive user experience.
- Performance Requirement 2: The system shall support concurrent user sessions, with a minimum of 500 simultaneous users, without significant degradation in performance.
- Performance Requirement 3: The database shall be optimized for efficient data retrieval, with query response times of less than 100 milliseconds for common queries.

Safety Requirements

- Safety Requirement 1: The system shall implement robust data validation and sanitization mechanisms to prevent security vulnerabilities such as SQL injection and cross-site scripting (XSS) attacks. This is to ensure the safety and security of user data.
- Safety Requirement 2: In case of unexpected system failures or errors, the system shall provide graceful error handling and fail-safe mechanisms to prevent data loss or corruption. This includes regular automated data backups and disaster recovery procedures.
- Safety Requirement 3: User-generated content, such as product reviews and comments, shall be monitored for inappropriate or harmful content. The system shall have content moderation features to prevent offensive, abusive, or harmful content from being published.
- Safety Requirement 4: Payment processing shall comply with industry-standard security practices, including Payment Card Industry Data Security Standard (PCI DSS) compliance. This is to ensure the safety of financial transactions and user payment information.
- Safety Requirement 5: The system shall enforce strict access control and authentication mechanisms to prevent unauthorized access to sensitive user data and administrative functionalities. This includes user session management and role-based access control.
- Safety Requirement 6: The system shall provide clear and accurate product information, including safety warnings and usage instructions, for products that may pose safety risks. This is to ensure that users are informed about potential hazards associated with certain products.
- Safety Requirement 7: In case of a security breach or data compromise, the system shall have a security incident response plan in place, including user notification procedures and legal compliance, to mitigate potential harm to users.

Security Requirements

- Security Requirement 1: The system shall implement strong encryption (e.g., AES-256) for the transmission and storage of sensitive user data, including login credentials and payment information.

- Security Requirement 2: User authentication shall follow industry best practices, including the use of multi-factor authentication (MFA) for user accounts that access sensitive information.

- Security Requirement 3: The system shall regularly undergo security assessments and penetration testing to identify and remediate vulnerabilities. Vulnerability assessments shall be conducted at least once every quarter.

- Security Requirement 4: Access to administrative functions and sensitive data shall be restricted to authorized personnel only. Role-based access control (RBAC) shall be enforced to ensure that users can only perform functions appropriate to their roles.

- Security Requirement 5: The system shall maintain comprehensive audit logs of user activities, including login attempts, data access, and configuration changes. Audit logs shall be securely stored and periodically reviewed for security incidents.

- Security Requirement 6: Compliance with relevant privacy regulations, such as the General Data Protection Regulation (GDPR), shall be ensured. This includes obtaining user consent for data processing and providing mechanisms for data deletion upon user request.

- Security Requirement 7: The system shall have a robust incident response plan in place to handle security breaches, including notification of affected users, authorities, and regulatory bodies, as required by law.

Software Quality Attributes

- Availability Requirement: The system shall maintain an availability rate of at least 99.9% to ensure uninterrupted service to users.

- Reliability Requirement: The system shall be designed to minimize unplanned downtime and system failures. The Mean Time Between Failures (MTBF) target shall be no less than 12 months.

- Usability Requirement: The user interface shall be intuitive and user-friendly, with an average user satisfaction rating of at least 4 out of 5 in user surveys.

- Maintainability Requirement: The software shall be designed with modular and maintainable code structures to facilitate future enhancements and updates.

Business Rules

- Business Rule 1: Only registered and authenticated users can place orders.

- Business Rule 2: Discounts and promotions shall be applied based on predefined business rules and user eligibility.

- Business Rule 3: Product reviews shall be visible to all users, but only registered users can submit reviews.

Other Requirements

- Database Requirements: The system shall use a relational database management system (e.g., MySQL or PostgreSQL) for data storage, with data backup procedures in place.

- Internationalization Requirements: The user interface shall support multiple languages and allow users to select their preferred language.

- Legal Requirements: The system shall comply with all relevant national and international laws and regulations governing e-commerce and data protection.

Appendix A: Glossary

SRS: Software Requirements Specification - A document that outlines the requirements for a software project.

E-Commerce: Electronic Commerce : The buying and selling of goods and services over the internet.

Sentiment Analysis: The process of determining the sentiment or emotional tone of a piece of text, often used to analyze customer reviews.

UI: User Interface - The graphical layout and elements that users interact with in a software application.

API: Application Programming Interface - A set of rules and protocols that allows different software applications to communicate with each other.

HTTP: Hypertext Transfer Protocol - The protocol used for transferring data over the World Wide Web.

HTTPS: Hypertext Transfer Protocol Secure - The secure version of HTTP that encrypts data transmitted between the web server and the client.

JSON: JavaScript Object Notation - A lightweight data interchange format often used for data serialization.

PCI DSS: Payment Card Industry Data Security Standard - A set of security standards designed to ensure that all companies that accept, process, store, or transmit credit card information maintain a secure environment.

GDPR: General Data Protection Regulation - A regulation in EU law on data protection and privacy for all individuals within the European Union and the European Economic Area.

MTBF: Mean Time Between Failures - A measure of the reliability of a system, indicating the average time between failures.

RBAC: Role-Based Access Control - A method of regulating access to computer or network resources based on the roles of individual users.

SQL: Structured Query Language - A domain-specific language used in programming and managing relational databases.

GUI: Graphical User Interface - A type of user interface that allows users to interact with electronic devices through graphical elements.

ERD: Entity-Relationship Diagram - A diagram that illustrates the relationships between entities in a database.

API: Application Programming Interface - A set of rules and protocols that allows different software applications to communicate with each other.

Appendix B: Field Layouts

An Excel sheet containing field layouts and properties/attributes and report requirements.

Appendix C: Requirement Traceability Matrix

Sl. No	Requirement ID	Brief Description of Requirement	Architecture Reference	Design Reference	Code File Reference	Test Case ID	System Test Case ID