# ­­­­­­­­­­CS 255 System Design Document

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## UML Diagrams

### UML Use Case Diagram

A diagram of a diagram

Description automatically generated

### UML Activity Diagrams

### A screenshot of a computer Description automatically generated

### UML Sequence Diagram

A diagram of a purchase package

Description automatically generated

### A diagram of a user flow Description automatically generatedUML Class Diagram

## Technical Requirements

**Hardware Requirements:**

* **Server Infrastructure:**
  + High-performance cloud-based server infrastructure (e.g., AWS, Azure) to ensure scalability and reliability.
  + Dual-redundant server configuration with load balancing for high availability.
  + Servers with a minimum of 16GB RAM, quad-core processors, and SSD storage for optimal performance.
* **Database Server:**
  + A robust and scalable database server (e.g., PostgreSQL) with automated backups and disaster recovery capabilities.
  + Minimum 1TB storage capacity for data storage.

**Software Requirements:**

* **Operating System:**
  + CentOS 7 for the server operating system, with regular security updates applied.
* **Web Development Stack:**
  + Utilization of the LAMP (Linux, Apache, MySQL, PHP) stack for web development.
  + PHP 7.4 or higher.
  + Apache 2.4 for the web server.
* **Development Tools:**
  + Git for version control.
  + Docker for containerization and deployment.
* **Database Management System:**
  + PostgreSQL 13 for data storage and retrieval.
* **Web Framework:**
  + Use Django 3.2 as the web application framework for building and maintaining the web application.
* **Front-End Technologies:**
  + HTML5, CSS3, JavaScript, and React for creating a responsive and user-friendly interface.
* **Security Tools:**
* Implementation of security measures such as SSL/TLS certificates (HTTPS).
* Regular vulnerability assessments and penetration testing.
* Web Application Firewall (WAF) for additional security.

**Infrastructure and Tools Requirements:**

* **Database Backup and Recovery:**
  + Regular automated database backups to Amazon S3 with a retention period of 30 days.
  + Disaster recovery plan tested annually.
* **Monitoring and Logging:**
  + Implementation of Amazon CloudWatch for monitoring system performance and generating alerts.
  + Centralized log management using AWS CloudTrail and AWS CloudWatch Logs.
* **Development and Testing Environment:**
  + Separate development, testing, and production environments with automated deployment pipelines.

**Security Requirements:**

* **User Authentication:**
  + User authentication using username, password, and two-factor authentication (2FA) using TOTP.
  + Account lockout after five failed login attempts for a duration of 15 minutes.
* **Data Encryption:**
  + Full data encryption in transit and at rest using SSL/TLS and encryption at the database level.
* **Password Reset:**
  + Secure password reset mechanisms via email with a one-time use link.