Online Banking System

Technical Design Document

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1. Project Overview:

The "Online Banking System" project aims to develop a secure and user-friendly online platform for managing personal finances and conducting banking transactions. This includes building a backend microservice for account management and a user-friendly frontend using Java's Spring Boot framework and Thymeleaf for templating. Trainees will gain hands-on experience in backend development, security implementation, UI design, and frontend-backend integration using Java technologies.

2. Project Duration and Scope:

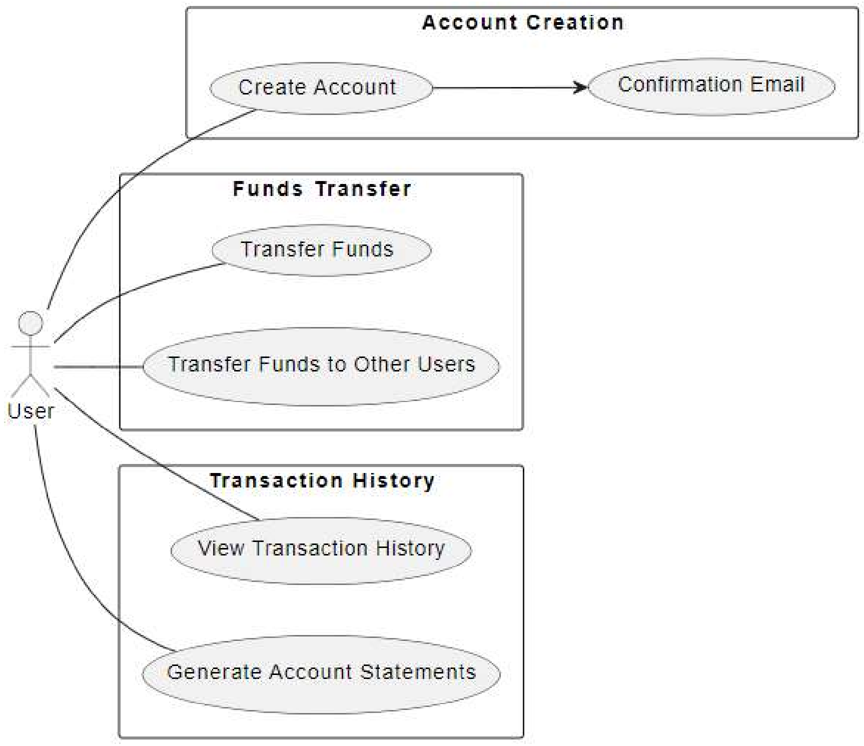
The project spans 120 hours over five weeks. It involves designing and implementing the backend for account creation, funds transfer, and transaction history. Participants will also create a user-friendly and responsive frontend using Thymeleaf templates.

3. Business Problem:

Customers face challenges in managing their finances efficiently due to the lack of a user-friendly and secure online banking platform. This project aims to address these challenges by providing a comprehensive online banking system.

4. Project Requirements:

4.1. Functional Requirements:



User Story 1: Account Creation

- As a user, I want to create a bank account online and set up login credentials.

Acceptance Criteria:

- Users should be able to create an account by providing personal information and choosing a username and password.
- Users should receive a confirmation email upon successful account creation.

User Story 2: Funds Transfer

- As a user, I want to transfer funds between my accounts or to other users.

Acceptance Criteria:

- Users should be able to initiate fund transfers between their linked accounts.
- Users should also be able to transfer funds to other users within the bank.

User Story 3: Transaction History

- As a user, I want to view my transaction history and account statements.

Acceptance Criteria:

- Users should be able to view a detailed transaction history for each account.
- Users should be able to generate and download account statements.

4.2. Non-functional Requirements:

- **Security:** Implement secure authentication, authorization, and encryption of sensitive data.
- **User Experience:** Develop a responsive and user-friendly UI using Thymeleaf templates.
- **Integration:** Establish communication between the frontend and backend using RESTful APIs.

5. Data Model / Entity Description:

5.1. User Entity:

Attributes:

- UserID (Primary Key)
- FirstName
- LastName
- Email
- Username
- Password (Hashed)

5.2. Account Entity:

Attributes:

- AccountID (Primary Key)
- UserID (Foreign Key)
- AccountNumber
- Balance
- AccountType (Checking, Savings, etc.)

5.3. Transaction Entity:

Attributes:

- TransactionID (Primary Key)
- FromAccountID (Foreign Key)
- ToAccountID (Foreign Key)
- Amount
- TransactionDate

6. Architecture Design Guidelines:

- **Communication:** Implement RESTful APIs for communication between frontend and backend components.
- **Database:** Utilize a PostgreSQL database for storing user, account, and transaction data.
- **Deployment:** Deploy the backend using Spring Boot and host the frontend on a web server.

7. Technology Stack:

Backend (Java)	
Programming Language	Core Java 12
Framework	Spring Boot
Database	MySQL
Authentication	JWT
Backend (.NET)	
Programming Language	C#
Framework	ASP.NET Core Web API
Database	SQL Server
Authentication	JWT
Frontend	
Framework	Choose either Angular or React for frontend development.
UI Components	Develop interactive UI components for account management, fund transfer, and transaction history.
Communication	Use REST APIs to communicate with the backend microservice.

8. Evaluation Criteria:

- Successful implementation of functional requirements on both frontend and backend.
- Effective integration of frontend and backend components.
- Security measures for data transmission, user authentication, and authorization.
- User-friendly UI design, responsiveness, and navigation.
- Code quality, documentation, and error handling.
- Project presentation and demonstration.

9. Deliverables:

- Source code for the backend microservice and the Thymeleaf-based frontend.
- Comprehensive API documentation detailing endpoints, request-response formats, and authentication mechanisms.
- Unit tests with sufficient code coverage for backend services.
- Logging and proper exception handling in the backend code.
- Deployment instructions for both backend and frontend components.
- Project summary report discussing challenges and solutions.

10. Timeline:

- Days 1-2: Project setup, technology selection, and architecture design.
- Days 3-5: Backend microservice development and API implementation.
- Days 6-9: Frontend UI development and UI component implementation.
- Days 10: Integration of frontend and backend components.

11. Resources:

Backend(Java)	Core Java	https://www.geeksforgeeks.org/java/
	Spring Boot Microservices	https://www.geeksforgeeks.org/java-spring-boot-microservices-example-step-by-step-guide/
	Data JPA	https://spring.io/guides/gs/accessing-data-jpa/
	Unit Testing	https://www.springboottutorial.com/unit-testing-for-spring-boot-rest-services
Backend(.NET)	C#	https://www.geeksforgeeks.org/csharp-programming-language/
	ASP.NET Core Microservices	https://www.c-sharpcorner.com/article/microservice-using-asp-net-core/ https://learn.microsoft.com/en-us/dotnet/architecture/microservices/multi-container-microservice-net-applications/data-driven-crud-microservice
	Entity Framework Core	https://www.tektutorialshub.com/entity-framework-core-tutorial/
	Unit Testing	https://learn.microsoft.com/en-us/aspnet/core/mvc/controllers/testing?view=aspnetcore-3.1
Frontend (Angular/React)	Angular	https://angular.io/docs
	React	https://react.dev/learn

Integration (Java + Angular/React)	Spring Boot REST API + Angular	https://www.javaguides.net/2021/01/angular-spring-boot-rest-api-example.html
	Spring Boot REST API + React	https://reflectoring.io/build-responsive-web-apps-with-springboot-and-react-tutorial/
Integration (.NET + Angular/React)	ASP.NET Core +Angular	https://levelup.gitconnected.com/kubernetes-angular-asp-net-core-microservice-architecture-c46fc66ede44
	ASP.NET Core +React	https://learn.microsoft.com/en-us/visualstudio/javascript/tutorial-asp-net-core-with-react?view=vs-2022

12. Support and Communication:

- Regular progress updates through daily stand-up meetings.
- Communication and assistance available through designated communication channels.

13. Change Log

Version Number	**Changes made**			
V<n.n>	*<If the change details are not explicitly documented in the table below, reference should be provided here>*			
	Page no	Changed by	Effective date	Changes effected