# Software Architecture (40353103-1)

## Assignment #2

Deadline: 26/05/2025

Building on the work from Assignment 1, this assignment focuses on extending the The Online Banking System / Digital Wallet web-based application by introducing new architectural challenges, patterns, and quality considerations. You are required to adapt and evolve the previously designed architecture to meet additional requirements.

### Task 1: Extend the Architecture

 Existing **Components (from Assignment 1)**:

* Client Presentation: Web access to account/balance/transactions.
* Servers and Web Services:
  1. Application Server (banking system, ATM services).
  2. WS1: User Account Management.
  3. WS2: Payment/Transfer Service.
  4. WS3: Transaction History / Reporting.
* DB Server: 5. C1: Secure Banking DB (account, balance). 6. C2: REST APIs for internal access.
* Extras: HTTPS, FTP (statement downloads), caching (dashboard data), load balancing.

** New Requirements:**

* Integrate a third-party fraud detection service (external API).
* Add a notification service (e.g., email/SMS for transaction alerts) using an event-driven approach.
* Ensure fault tolerance with redundancy and failover mechanisms.
* Enhance security with encryption and authentication for all interactions.
* Optimize for scalability to handle 10x user growth.

Your tasks:  
- Redesign the architecture to incorporate the UBA module.  
- Ensure compatibility with existing modules and optimize performance.  
- Provide detailed descriptions of the new components and their interactions.

### Task 2: Analyze Architectural Trade-offs

Evaluate the impact of the following architectural patterns on the updated system:  
- Microservices Architecture  
- Layered Architecture  
  
For each pattern, discuss:  
- Scalability  
- Availability   
- Security  
 **Provide a recommendation based on your analysis.**

### Task 3: Quality Attribute Analysis

Assess the system's quality attributes based on the extended architecture. Specifically:  
- Define measurable metrics for performance, scalability, and reliability.  
- Suggest strategies to improve each attribute.  
- Highlight any trade-offs introduced by these improvements.

### Task 4: Comprehensive Documentation

Document the updated architecture with the following:  
- Component and Connector (C&C) diagrams  
- Descriptions of each module, including their roles and interactions