High Level Design Document
Version 1.0

Student Multi-Tool

10.06.2021

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Introduction

This high-level design document will give a comprehensive look at our solution from a general perspective and more mild technical terms.

Overview

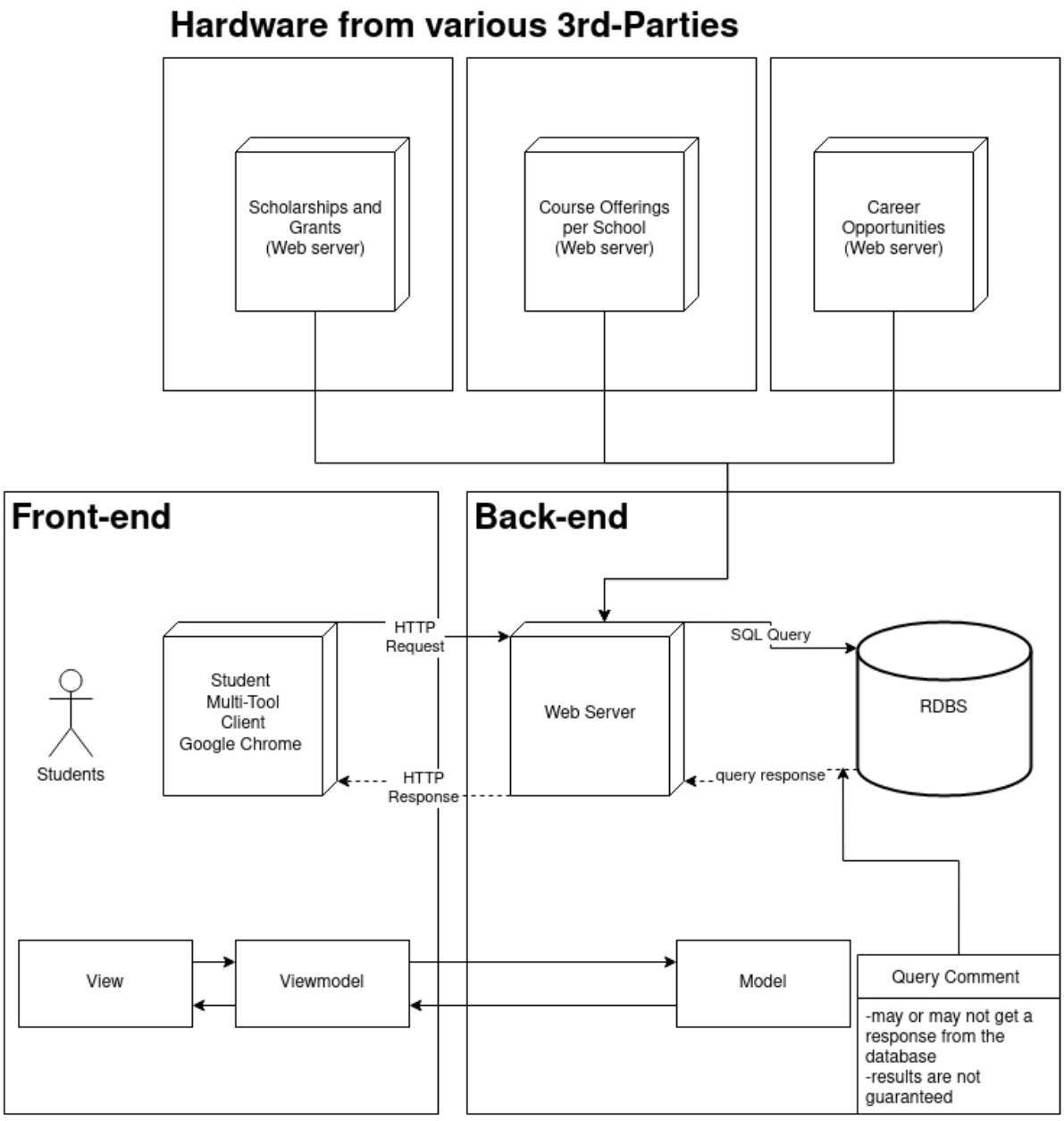
This document will provide the following information:

- Outlining our hardware architecture
- Our software architecture and how we utilize abstraction layers
- Our use of the MVVM pattern on a high-level

Hardware Architecture

Our product uses a 3-tier hardware architecture:

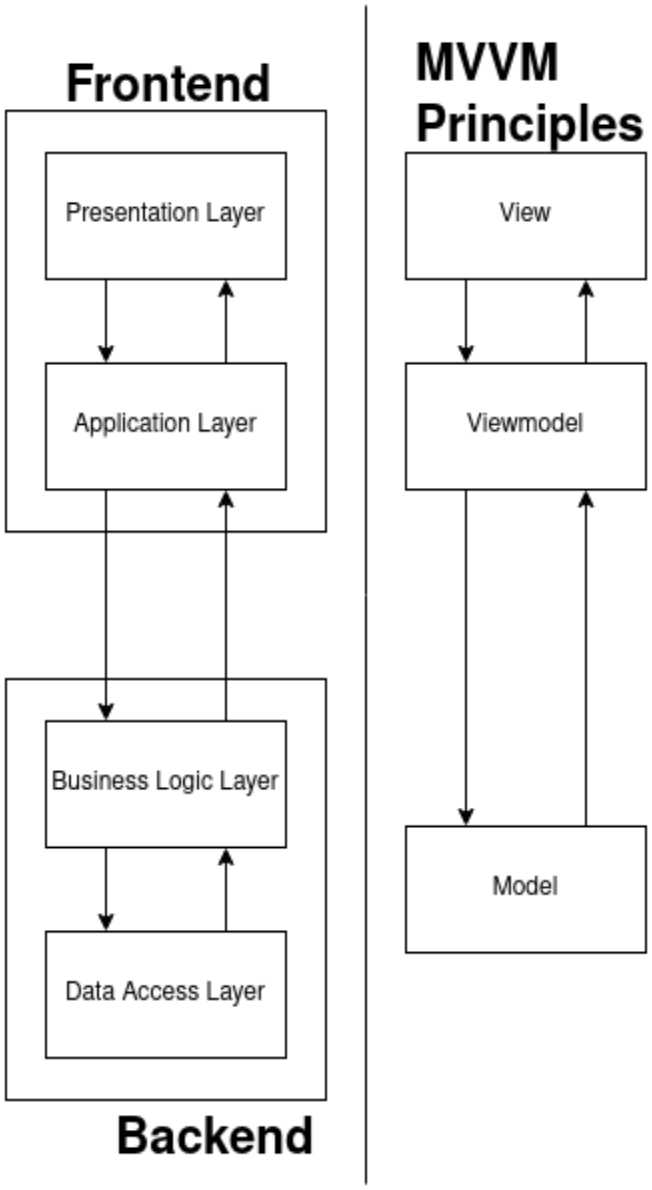
- Front end:
    - Client
- Back end:
    - Web Server
        - Communicates with other 3rd-party servers to retrieve external data
    - RDBS



Software Architecture

Our product will use a 4-layer software architecture:

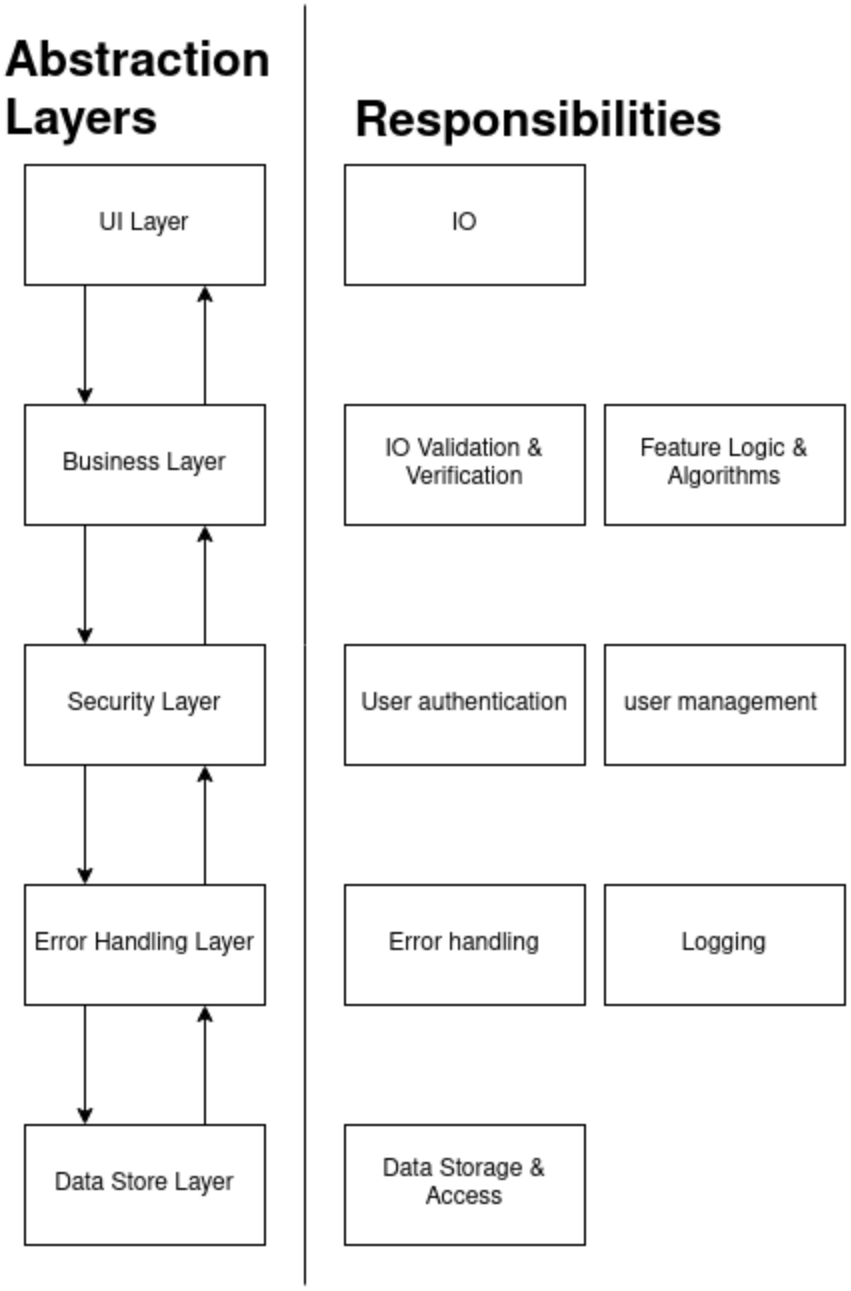
- Presentation Layer (front end)[1]
    - Receives user input
    - Displays error messages
    - Sends and receives information to and from the application layer
- Application Layer (front end)[1]
    - Performs input validation before sending data to the business layer
    - Performs client-side logic for schedule comparisons
- Business Layer (back end)[1]
    - Performs server-side logic for:
        - Multiple-user features: collaborative schedule building, matching, messaging, etc.
        - Single-user features: user authentication, student discounts, career opportunities, aid eligibility
    - Retrieves information from 3rd-parties to send to the data layer:
        - Course offerings from CSU and UC schools
        - Scholarship and grant information
        - Career opportunities
    - Sends information from the application layer to the data layer to be saved
    - Performs error handling and logging
    - Performs user authentication
- Data Layer (back end)[1]
    - Stores information and sends it to the business layer


Frontend
Presentation Layer
Application Layer
Business Logic Layer
Data Access Layer
Backend
MVVM Principles
View
Viewmodel
Model

Abstraction Layers

- User Interface Layer
    - Displays information for user in a variety of forms
    - Receives input from buttons and forms
- Business Layer
    - Handles the logical processing of data.
        - I.e valid characters
    - Determines matching schedules, carpool, and other activities.
    - Determines user's free time by comparing schedules
    - Determines difficulty of classes
    - Searches and posts student discounts
    - Determines user's aid eligibility estimation
    - Searches for student career opportunities
    - Displays the schedule of classes by semester
    - Sends and receives messages among users
    - Determines which information and actions are necessary to be logged, and in what manner
    - Implements search capabilities of logged information
    - Receives information from the internet
- Security Layer
    - Authenticates user information
    - Authorizes users
    - User management performed here
    - Sign-in and sign-out functionality
- Error Handling Layer
    - Processes error information to determine appropriate response.
    - Logs necessary error information
    - Sends system messages to user if necessary
    - Handles different levels of severity
        - **Critical (S1)**: error affects critical data or functionality of the system.
            - Causes:
                - A complete failure of a feature
                - A blocked functionality
            - Actions:
                - Web browser displays a critical-error message
                - Web browser logs the error/data in the system
                - Web browser shuts down and nothing can proceed
                - Web browser is functional until the error is fixed
        - **Major (S2)**: error affects major data or functionality of the system.
            - Causes:
                - A defect in the system
                - A feature is not functional
            - Actions:

            - Web browser displays a major-error message
            - Web browser logs the error/data in the system
            - User is prompted to shut down the program to try to fix the error
            - Web browser is not fully functional until the error is fixed
        - **Minor (S3)**: error affects noncritical data or minor functionality of the system.
            - Causes:
                - Sometimes cosmetic errors (must be fixed)
                - A minor feature is not functional, but the system is functional
            - Actions:
                - Web browser displays a minor-error message
                - Web browser logs the error/data in the system
                - Other feature(s) can be used to perform the same task(s)
                - The system is functional, but features must be improved
        - **Low (S4)**: error does not affect data or functionality of the system
            - Causes:
                - Sometimes cosmetic errors (do not need to be fixed)
                - Spelling/grammatical errors
                - Enhancements in the existing design
            - Actions:
                - Design improvements
                - Grammatical corrections
                - The system is functional, but features can be improved
    -
- Data Store Layer
    - Sends and retrieves data to and from the other layers
    - Gives each record the basic CRUD capabilities (Create, Read, Update, Delete) along with any other necessary features



References

1. https://en.wikipedia.org/wiki/Multitier_architecture, accessed 1 Oct. 2021