DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

DETAILED DESIGN SPECIFICATION
CSE 4317: SENIOR DESIGN II
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STAR.JS
STAR SPONSORSHIP WEB-APP

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Revision History

Revision	Date	Author(s)	Description
0.1	03.11.2022	AB, JJ, SK, BP	detailed design specification draft
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1 INTRODUCTION

STAR Sponsorship Web App will host a variety of features to enhance the user experience. The core of the application will revolve around providing a platform that will connect sponsors with students who are in need of financial help. In order to achieve the goal, the web app will host a variety of features. Landing page or the home page will be one of the focal points during the website development. It will include a visually appealing interface with success stories of students associated with the organization. It will also include other vital information that will help the sponsors understand STAR Sponsorship program's vision. The landing page will be connected to "Success Stories" page which will further provide detailed information on each student. As stated before, those will be the core elements of the website. Other core elements include donation system, newsletters and blogs feature, and admin privileges.

2 SYSTEM OVERVIEW

The entire system can be broken down into Graphical User Interface(GUI), Back-end server, Database and Data controller. Components within the Back-end server interact with other three layers to store/retrieve/make changes to any form of data stored within the online database. The back-end server retrieves input data from the user which is then stored within the database. When the page is reloaded, the back-end server fetches the updated data from the database and displays it via the GUI. The back-end server also fetches from the Data controller and based on the type of data retrieved, the data is either displayed(example: Google Maps API) or used to perform operations(example: user authentication/donation).

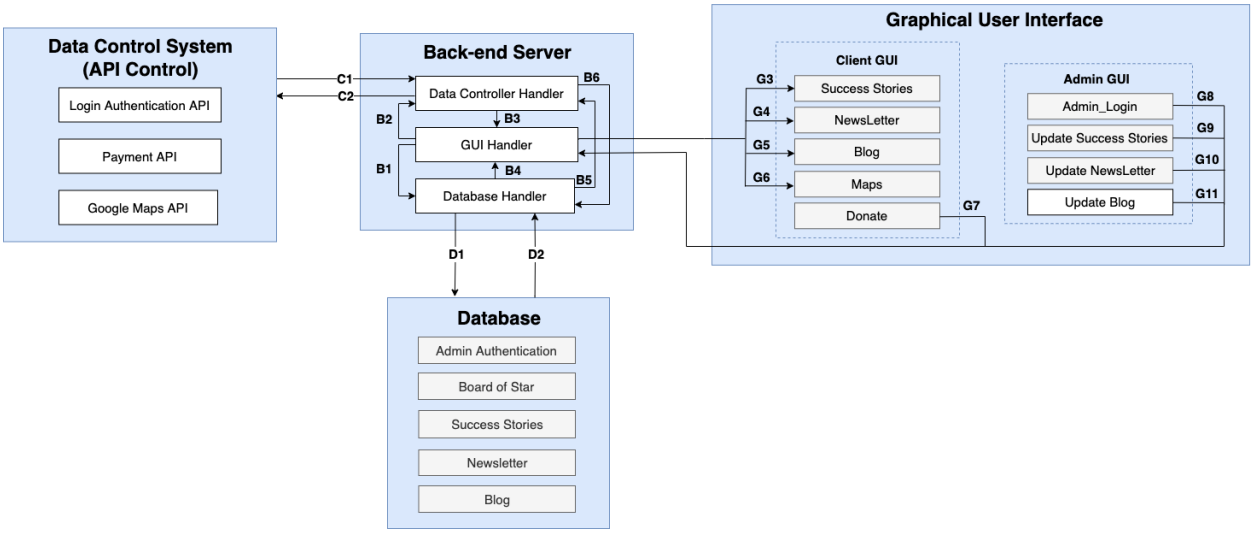

Figure 1: System architectural layer diagram

3 GUI Management System

This section describes the subsystems present in the GUI Layer of the web application. The GUI layer is divided into two parts: Client GUI and Admin GUI. The Client GUI includes subsystems that are applicable to a client, i.e. for a random user visiting the web application. It consists of 5 subsystems: Success Stories, NewsLetter, Blog, Maps, and Donate. The Admin GUI includes subsystems of a Admin level GUI. It consists of Login, Update Success Stories, Update NewsLetter, and Update Blog. For all the subsystems of GUI layer, the input comes from back-end server (data that is to be displayed) and output goes to back-end server (requests that are to be performed).

3.1 Layer Hardware

Not Applicable

3.2 Layer Operating System

Any operating system with an internet browser

3.3 Layer Software Dependencies

The software dependencies required for the layer are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.4 Success Stories

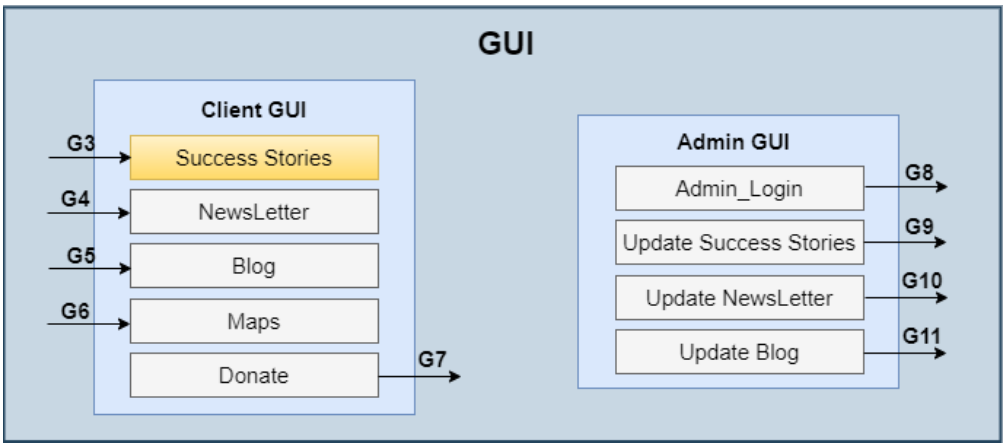

Figure 2: Success Stories subsystem description diagram

3.4.1 Subsystem Hardware

Not applicable

3.4.2 Subsystem Operating System

Any operating system with an internet browser

3.4.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.4.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.4.5 Subsystem Data Structures

None

3.4.6 Subsystem Data Processing

None

3.5 NEWSLETTER

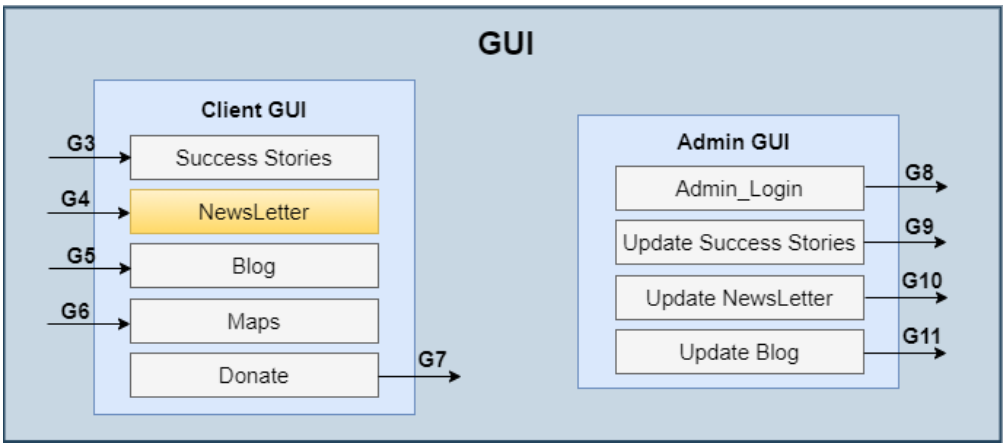

Figure 3: NewsLetter subsystem description diagram

3.5.1 SUBSYSTEM HARDWARE

Not applicable

3.5.2 SUBSYSTEM OPERATING SYSTEM

Any operating system with an internet browser

3.5.3 SUBSYSTEM SOFTWARE DEPENDENCIES

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.5.4 SUBSYSTEM PROGRAMMING LANGUAGES

HTML 5
CSS
Javascript ES6 2018

3.5.5 SUBSYSTEM DATA STRUCTURES

None

3.5.6 SUBSYSTEM DATA PROCESSING

None

3.6 Blog

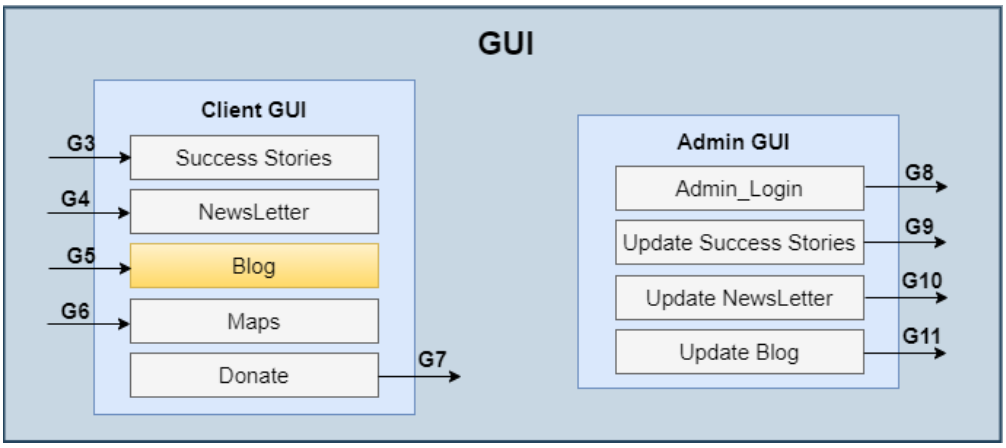

Figure 4: Blog subsystem description diagram

3.6.1 Subsystem Hardware

Not applicable

3.6.2 Subsystem Operating System

Any operating system with an internet browser

3.6.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.6.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.6.5 Subsystem Data Structures

None

3.6.6 Subsystem Data Processing

None

3.7 Maps

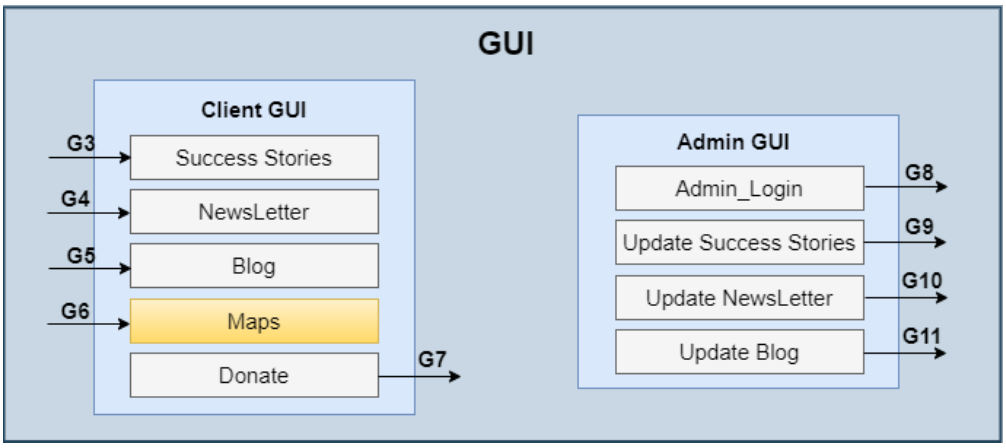

Figure 5: Maps subsystem description diagram

3.7.1 Subsystem Hardware

Not applicable

3.7.2 Subsystem Operating System

Any operating system with an internet browser

3.7.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.7.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.7.5 Subsystem Data Structures

None

3.7.6 Subsystem Data Processing

None

3.8 DONATE

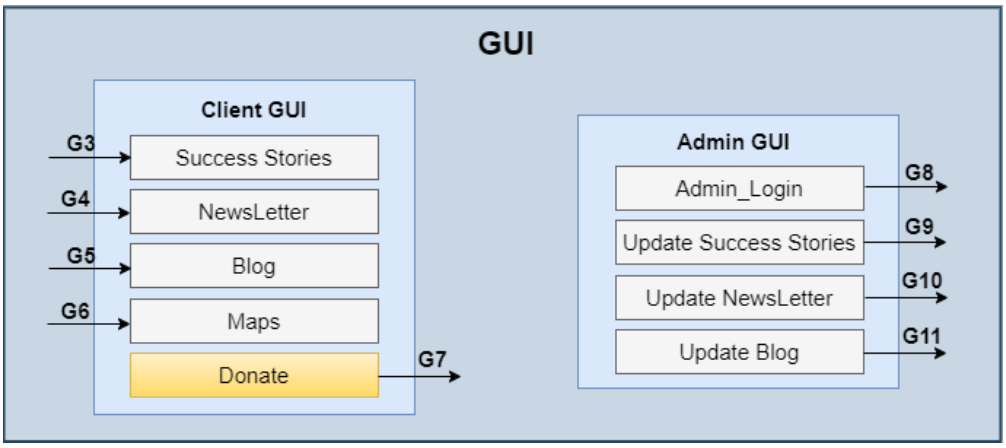

Figure 6: Donate subsystem description diagram

3.8.1 SUBSYSTEM HARDWARE

Not applicable

3.8.2 SUBSYSTEM OPERATING SYSTEM

Any operating system with an internet browser

3.8.3 SUBSYSTEM SOFTWARE DEPENDENCIES

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.8.4 SUBSYSTEM PROGRAMMING LANGUAGES

HTML 5
CSS
Javascript ES6 2018

3.8.5 SUBSYSTEM DATA STRUCTURES

None

3.8.6 SUBSYSTEM DATA PROCESSING

None

3.9 Admin Login

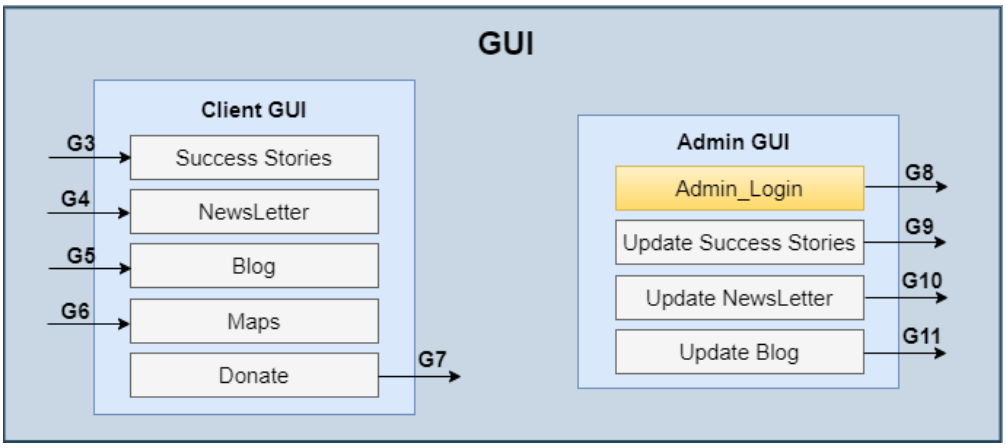

Figure 7: Admin Login subsystem description diagram

3.9.1 Subsystem Hardware

Not applicable

3.9.2 Subsystem Operating System

Any operating system with an internet browser

3.9.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.9.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.9.5 Subsystem Data Structures

None

3.9.6 Subsystem Data Processing

None

3.10 Update Success Stories

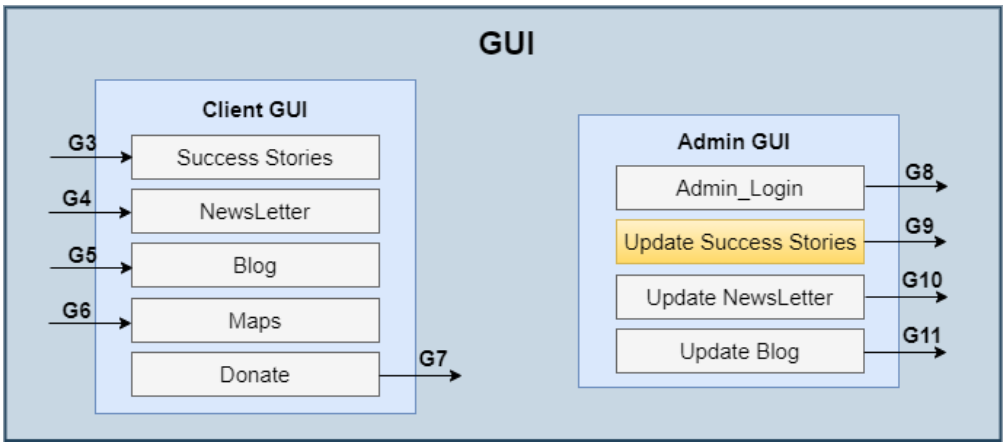

Figure 8: Update Success Stories subsystem description diagram

3.10.1 Subsystem Hardware

Not applicable

3.10.2 Subsystem Operating System

Any operating system with an internet browser

3.10.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.10.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.10.5 Subsystem Data Structures

None

3.10.6 Subsystem Data Processing

None

3.11 Update NewsLetter

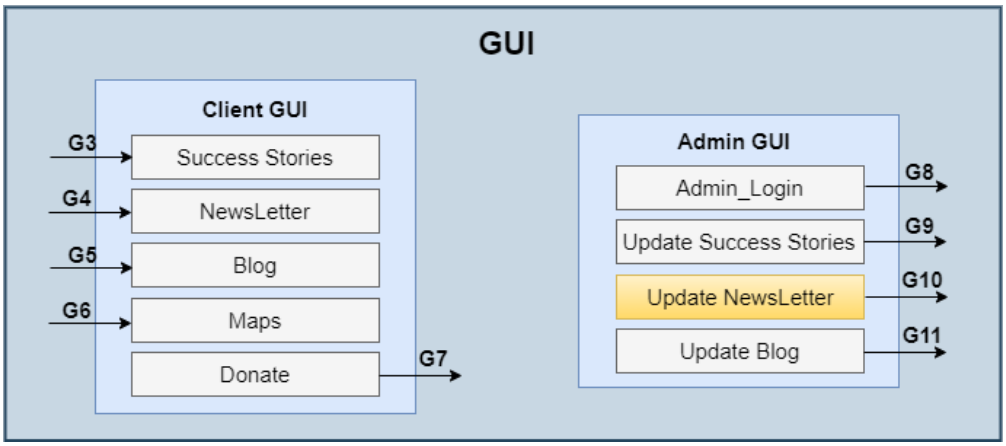

Figure 9: Update NewsLetter subsystem description diagram

3.11.1 Subsystem Hardware

Not applicable

3.11.2 Subsystem Operating System

Any operating system with an internet browser

3.11.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.11.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.11.5 Subsystem Data Structures

None

3.11.6 Subsystem Data Processing

None

3.12 Update Blog

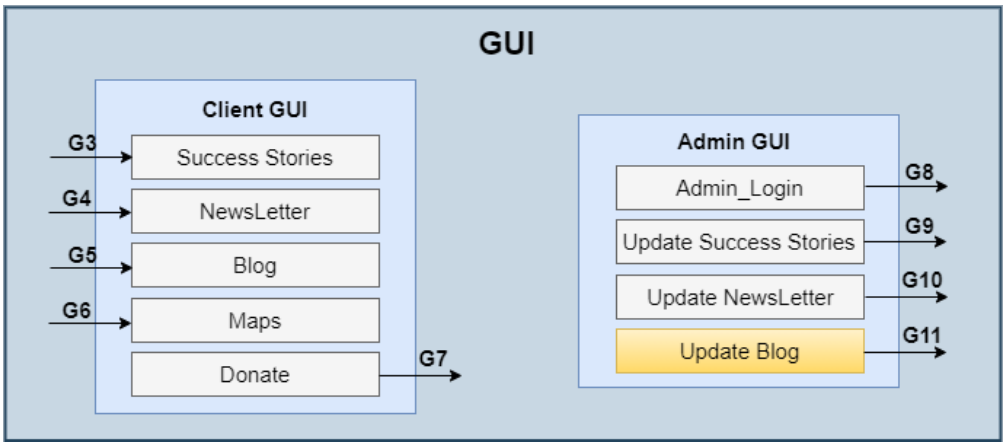

Figure 10: Update Blog subsystem description diagram

3.12.1 Subsystem Hardware

Not applicable

3.12.2 Subsystem Operating System

Any operating system with an internet browser

3.12.3 Subsystem Software Dependencies

The software dependencies required for the subsystem are:
bootstrap - v4.6.1
popper - v1.16.1
jquery - v3.5.1

3.12.4 Subsystem Programming Languages

HTML 5
CSS
Javascript ES6 2018

3.12.5 Subsystem Data Structures

None

3.12.6 Subsystem Data Processing

None

4 Database Management System

This section describes the database layer in the architecture design of the web application. The database management system stores and manages all the data required for the web application to operate. It has 5 subsystems each handling different category of data. Each data in the database can be retrieved, updated, or deleted by Database Controller in the back-end/server system to pass is to various other systems and subsystems. The description of each sub system of database management system is as follows:

4.1 Layer Hardware

Not applicable

4.2 Layer Operating System

Not applicable

4.3 Layer Software Dependencies

Firebase - v9.6.6

4.4 Admin Authentication

This entity in the database management system stores information to authenticate admin of the web application to manage various resources in the website.

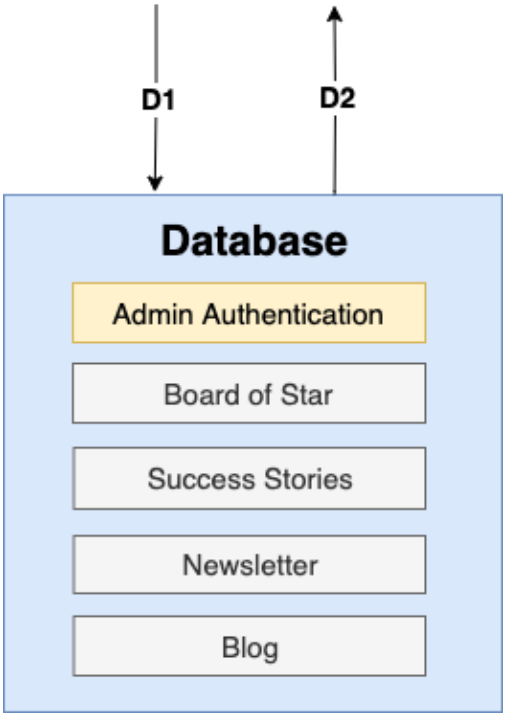

Figure 11: DBMS Admin Authentication subsystem description diagram

4.4.1 Subsystem Hardware

Not applicable

4.4.2 Subsystem Operating System

Not applicable

4.4.3 Subsystem Software Dependencies

Firebase - v9.6.6

4.4.4 Subsystem Programming Languages

Javascript ES6 2018

4.4.5 Subsystem Data Structures

JSON objects and arrays

4.4.6 Subsystem Data Processing

None

4.5 Board of Star

This entity in the database management system stores information about board members of the organization.

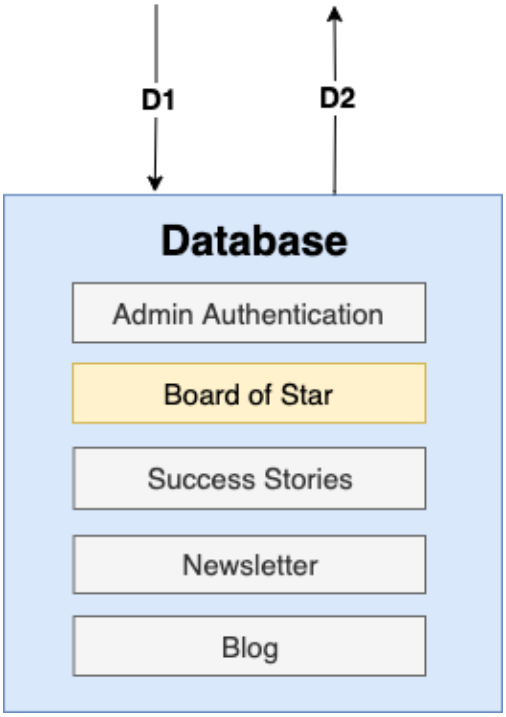

Figure 12: DBMS Board of Star subsystem description diagram

4.5.1 Subsystem Hardware

Not applicable

4.5.2 Subsystem Operating System

Not applicable

4.5.3 Subsystem Software Dependencies

Firebase - v9.6.6

4.5.4 Subsystem Programming Languages

Javascript ES6 2018

4.5.5 Subsystem Data Structures

JSON objects and arrays

4.5.6 Subsystem Data Processing

None

4.6 Success Stories

This entity in the database management system stores information about success stories of selected recipients.

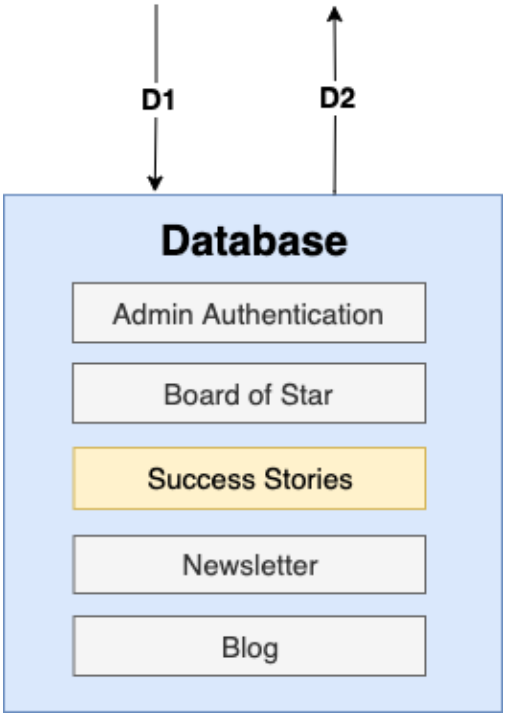

Figure 13: DBMS Success Stories description diagram

4.6.1 Subsystem Hardware

Not applicable

4.6.2 Subsystem Operating System

Not applicable

4.6.3 Subsystem Software Dependencies

Firebase - v9.6.6

4.6.4 Subsystem Programming Languages

Javascript ES6 2018

4.6.5 Subsystem Data Structures

JSON objects and arrays

4.6.6 Subsystem Data Processing

None

4.7 Newsletter

This entity in the database management system stores information newsletters to be presented in the web application.

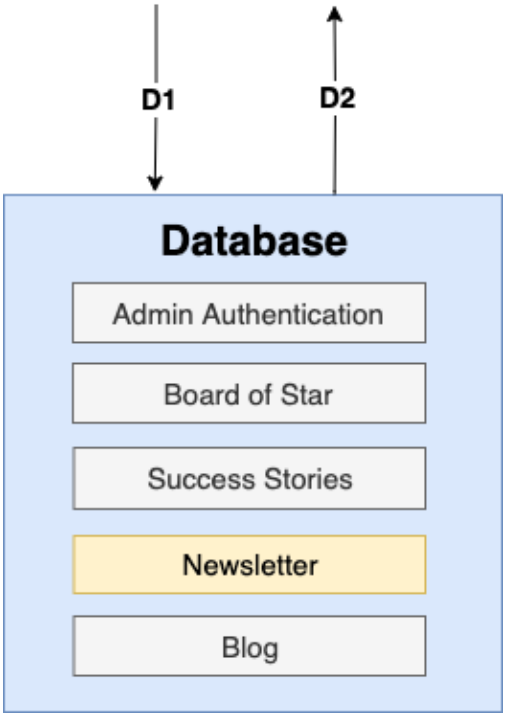

Figure 14: DBMS Newsletter subsystem description diagram

4.7.1 Subsystem Hardware

Not applicable

4.7.2 Subsystem Operating System

Not applicable

4.7.3 Subsystem Software Dependencies

Firebase - v9.6.6

4.7.4 Subsystem Programming Languages

Javascript ES6 2018

4.7.5 Subsystem Data Structures

JSON objects and arrays

4.7.6 Subsystem Data Processing

None

4.8 Blog

This entity in the database management system stores blogs of the organization.

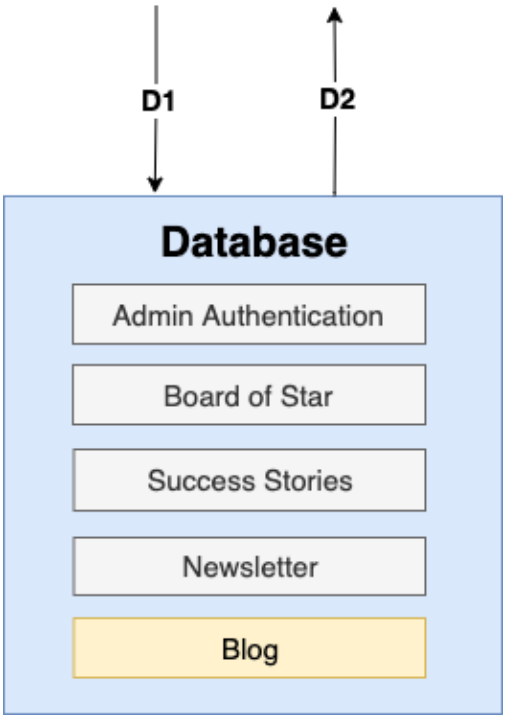

Figure 15: DBMS Blog subsystem description diagram

4.8.1 Subsystem Hardware

Not applicable

4.8.2 Subsystem Operating System

Not applicable

4.8.3 Subsystem Software Dependencies

Firebase - v9.6.6

4.8.4 Subsystem Programming Languages

Javascript ES6 2018

4.8.5 Subsystem Data Structures

JSON objects and arrays

4.8.6 Subsystem Data Processing

None

5 Data Controller System

This section describes the Data Controller System in the architecture design of the web application. The control system manages the API's that will be used to authenticate login sessions, make donations, and integrate Google Maps services. This system will directly communicate with the back-end server to initiate requests for retrieval of data and information located in the database.

5.1 Layer Hardware

Not applicable

5.2 Layer Operating System

Not applicable

5.3 Layer Software Dependencies

Firebase - v9.6.6
Cornerstone API v1.0
Google Maps JavaScript API v3.48

5.4 Login Authentication API

Login API communicates with the back-end server to validate administrator credentials.

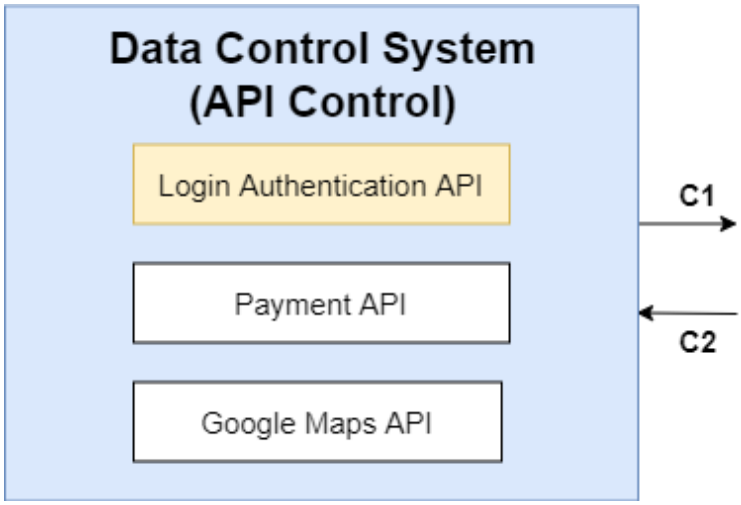

Figure 16: Data Control System - Login Authentication Diagram

5.4.1 Subsystem Hardware

Not applicable

5.4.2 Subsystem Operating System

Not applicable

5.4.3 Subsystem Software Dependencies

Firebase v9.6.6

5.4.4 Software Tools

Firebase CLI v10.2.2

5.4.5 Server Environment

Node.js v16.14.0

5.4.6 Subsystem Programming Languages

Javascript ES6 2018

5.4.7 Subsystem Data Structures

JSON objects and arrays

5.4.8 Subsystem Data Processing

None

5.5 Payment API

Payment API communicates with back-end server to process payments.

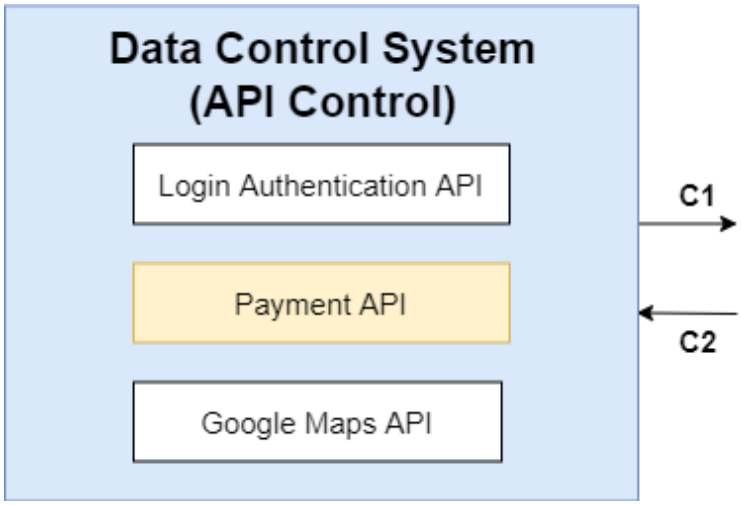

Figure 17: Data Control System - Payment Diagram

5.5.1 Subsystem Hardware

Not applicable

5.5.2 Subsystem Operating System

Not applicable

5.5.3 Subsystem Software Dependencies

Cornerstone API v1.0

5.5.4 Subsystem Programming Languages

Not applicable

5.5.5 Subsystem Data Structures

Not applicable

5.5.6 Subsystem Data Processing

None

5.6 Google Maps API

Google Maps API returns directions and map information of the Star Sponsorship Program to the back-end server.

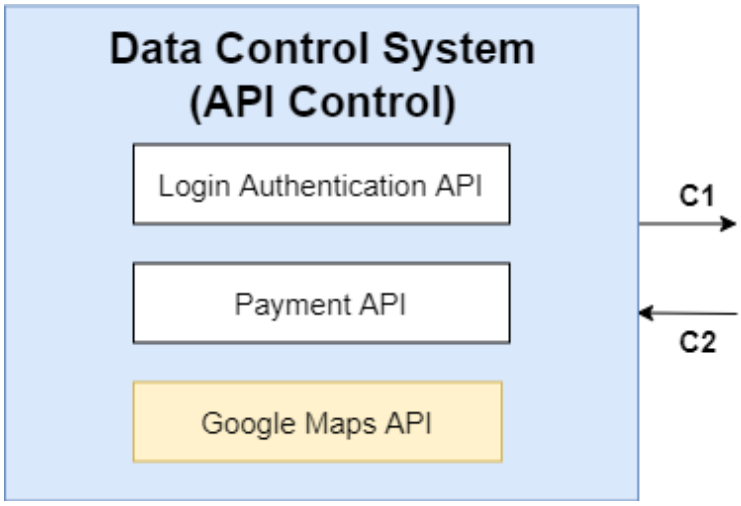

Figure 18: Data Control System - Google Maps Diagram

5.6.1 Subsystem Hardware

Not applicable

5.6.2 Subsystem Operating System

Not applicable

5.6.3 Subsystem Software Dependencies

Google Maps JavaScript API v3.48

5.6.4 Subsystem Programming Languages

Javascript ES6 2018

5.6.5 Subsystem Data Structures

Not applicable

5.6.6 Subsystem Data Processing

None

6 Back-End Server

This section describes the Back-end Server System in the architecture design of the web application. The Back-end server will process, organize, and facilitate the retrieval and sending of data and information located in the database. It will accomplish this by having a handler for Data Controller, GUI, and Database.

6.1 Layer Hardware

Not applicable

6.2 Layer Operating System

Not applicable

6.3 Layer Software Dependencies

Firebase - v9.6.6

6.4 Data Controller Handler

The Data Controller Handler will communicate with the Data Control System layer to process API requests. If it is the Login Authentication API, then it will send back a validation for the login information. If it is the Payment API, then it will begin the payment process based off the input from the API. If it is the google maps API, then it will send back information for directions and map information for display. It also communicates with the database handler and GUI handler.

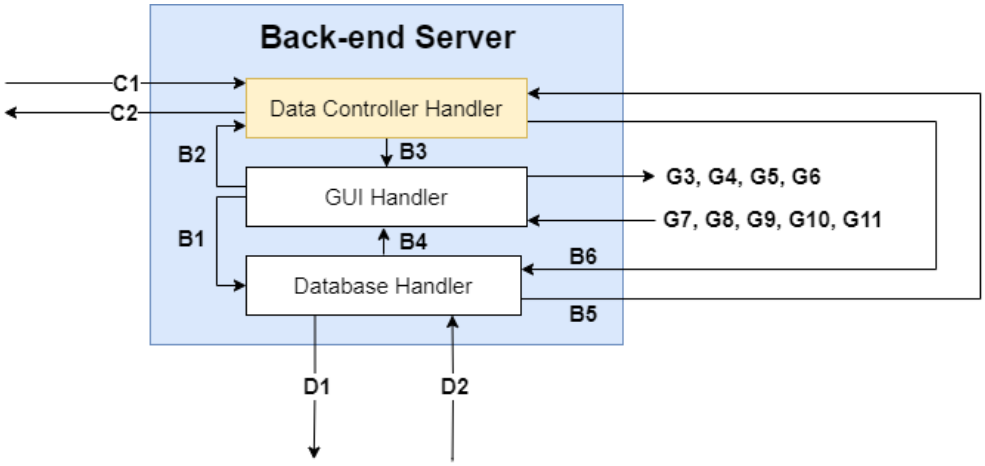

Figure 19: Back-End Server - Data Controller Diagram

6.4.1 Subsystem Hardware

Not applicable

6.4.2 Subsystem Operating System

Not applicable

6.4.3 Subsystem Software Dependencies

Firebase v9.6.6

6.4.4 Software Tools

Firebase CLI v10.2.2

6.4.5 Server Environment

Node.js v16.14.0

6.4.6 Subsystem Programming Languages

Javascript ES6 2018

6.4.7 Subsystem Data Structures

Not applicable

6.4.8 Subsystem Data Processing

None

6.5 GUI Handler

The GUI Handler will communicate with the GUI in order to relay data and information that is to be put on display on the GUI. The GUI Handler will request data and information from the Data Controller and Database to send to the GUI to display.

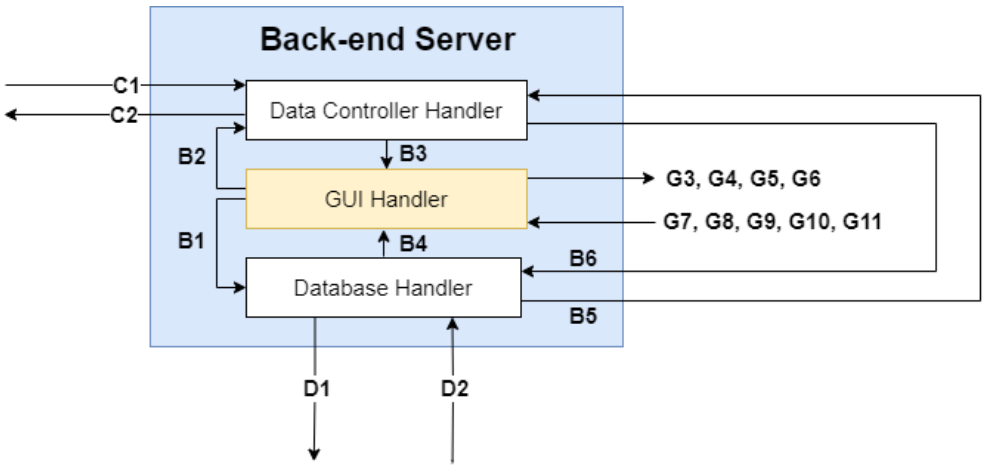

Figure 20: Back-End Server - GUI Diagram

6.5.1 Subsystem Hardware

Not applicable

6.5.2 Subsystem Operating System

Not applicable

6.5.3 Subsystem Software Dependencies

Firebase v9.6.6

6.5.4 Software Tools

Firebase CLI v10.2.2

6.5.5 Server Environment

Node.js v16.14.0

6.5.6 Subsystem Programming Languages

Javascript ES6 2018

6.5.7 Subsystem Data Structures

Not applicable

6.5.8 Subsystem Data Processing

None

6.6 Database Handler

Whenever any request is made that requires data or information stored in the database, the Back-end server will get a request from the Data Controller or GUI and communicate with the Database Handler in order to retrieve the necessary data. The Back-end server will check with the Database and see if the information will be used for validation, given to the Data Controller, or to be displayed on the GUI.

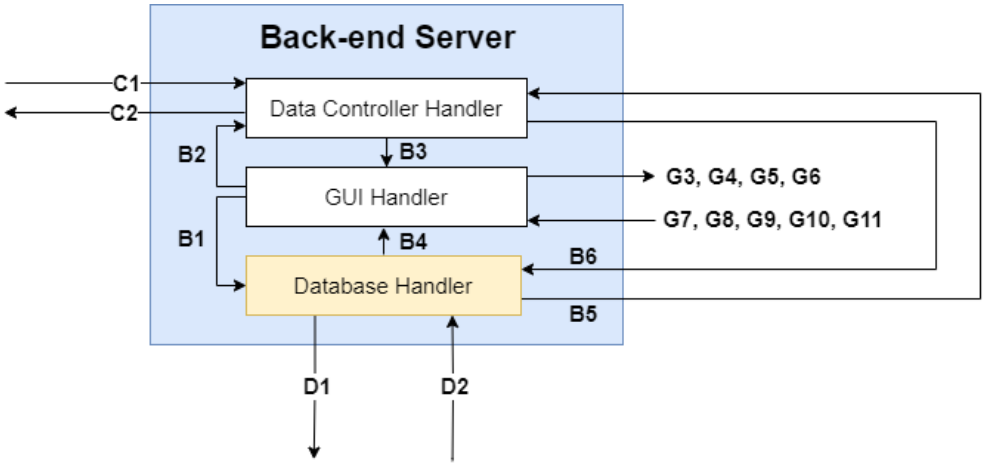

Figure 21: Back-End Server - Database Diagram

6.6.1 Subsystem Hardware

Not applicable

6.6.2 Subsystem Operating System

Not applicable

6.6.3 Subsystem Software Dependencies

Firebase v9.6.6

6.6.4 Software Tools

Firebase CLI v10.2.2

6.6.5 Server Environment

Node.js v16.14.0

6.6.6 Subsystem Programming Languages

Javascript ES6 2018

6.6.7 Subsystem Data Structures

Not applicable

6.6.8 Subsystem Data Processing

None