Software Design Document
for
Plan Analysis Application

Version 1.0 approved

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Los Angeles County Department of Regional Planning

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1. Introduction

1.1 Purpose

The purpose of this document is to describe the design of the web application - the Plan Analysis Application (PAA). This document will include the modules worked on for displaying PDF’s and gathering data from the database.

1.2 Document Conventions

This document is based on the SDD template provided in the CS 4961 class. Typography standards are kept simple, Times New Roman, size 12 font, and bullet pointed lists to keep the document easy to read.

1.3 Intended Audience and Reading Suggestions

This document is intended for project managers, developers, testers, and documentation writers. Project managers and developers are recommended to look over project sections 2, 3, 4, 6, 7, 8, 9, and 10. Testers are recommended to look over project sections 8, 9, and 10. Documentation writers are recommended to look over project sections 2, 5, 6, 7, 11, and 12.

1.4 System Overview

The Los Angeles County of Regional Planning currently does not have an application that can centralize all the data related to Case Reports. PAA will enable users to view and search through a list of all the case records, as well as provide them with the functionality to look at case histories, generate case summary reports, and fill out permit forms electronically.
2. Design Considerations

2.1 Assumptions and Dependencies

The dependencies of the software would be the user/users needs to have internet access. The application will be live and not distributed locally onto hardware. Users will need to use a current browser. Internet Explorer will not be a priority for the application. Another dependency will be the database. If the database changes the application will need to be changed accordingly.

2.2 General Constraints

- Hardware/Software Environment
  - Computer capable of running modern versions of internet browsers (Chrome or Firefox)
  - Chrome or Firefox
- End-user Environment
- Availability/Volatility of Resources
  - LA County’s most up-to-date data
  - LA County’s Forms/Permits
- Standards Compliance
  - Color-blindness compliant
- Data Repository
  - LA County’s database
- Security Requirements
  - Secure access from the web application to the database

2.3 Goals and Guidelines

The end goal of the software is to be able to mainstream LA County’s forms/permits into the application to be filled out automatically. Our priority, with respect to the timeframe, is to complete autofilling features for a few of the forms/permits that LA County has provided.

2.4 Development Methods

The software approach we are going forward with is SCRUM Agile Framework. The web application is branched into smaller components where we have established goals in a limited time frame in order to have a better workflow. After each build of our application, we will demonstrate our progress to the clients and with their feedback, make any necessary revisions.
3. Architectural Strategies

I. JavaScript was chosen as our main programming language so that we could use a single programming language for developing our modules in the frontend and backend.

II. Backend
   A. Libraries, frameworks, and packages
      1. Node, a runtime that allows us to execute JavaScript on the server. It allows us to create an application capable of receiving HTTP requests and making database connections. Java was previously considered, but was abandoned due to the amount of boilerplate code needed to get an application up and running.
      2. Express, a minimalist web framework for Node. It allows us to eliminate even more boilerplate code when creating Web APIs.
      3. mssql, a Microsoft SQL Server client that allows us to connect and query information from the Department’s database servers.
      4. babel, is a transpiler for JavaScript. It allows us to use the most recent features of ECMAScript.
   B. Responsibilities
      1. Backend defines an API that the frontend application can send requests to get JSON responses that are easy to consume.
      2. Backend is also responsible for connecting to the database and querying database for information based on requests it receives from the frontend.
   C. Future plans
      1. Adding GraphQL Server would allow us to create less endpoints for getting information. It would allow the frontend application to request only the information it needs using a single endpoint.

III. Frontend
   A. Libraries, frameworks, and packages
      1. React, a JavaScript library for creating user interfaces. It allows us to display information and manage state.
   B. Responsibilities
      1. Frontend application is responsible for displaying information. It also allows the user to request additional information.
   C. Future
1. Finding a suitable library for generating documents auto filled with database information. Three options have been researched so far:
   a) react-pdf, which would require us to write and style the template documents that have already been created by the department.
   b) Microsoft Add-in JavaScript API, which would require us to insert tags that would be replaced by the data from the department’s database. This would require the user to install the Add-in and click a button inside the Word document to fill it with information.
   c) Plumsail Documents API, would also require us to insert tags. However, we would send the document and a JSON object as a request to the API and it would return the auto filled document to us as part of the response. This option would require the department to purchase a usage plan with Plumsail.
4. System Architecture

4-1: A Level 0 Data Flow Diagram (DFD) displaying user-application interactions

4-2: A Level 1 Data Flow Diagram (DFD) indicating the connections between the modules
5. Policies and Tactics

5.1 Choice of which specific products used
   I. React was chosen as the main library to work with due to its high demand in the industry.
   II. Docker is used for Apple users to ensure connection to the database.
   III. VirtualBox is used to run a Virtual Machine of Windows for Microsoft connectivity, as used by LA County.
   IV. SQL Server Manager is used to create and run the database.

5.2 Plans for ensuring requirements traceability
Meet with the authorities of LA County Department of Regional Planning who are responsible for ascertaining the requirements and approving the prototype designs.

5.3 Plans for testing the software
   I. Planners will test the application and provide feedback to developers on additional features and fixes.
   II. Unit and behavior testing using a JavaScript development testing framework.
6. Detailed System Design

6.1 Main Control Module

6.1.1 Responsibilities
6.1.1.1 Shall be the main page for the user
6.1.1.2 Shall be a central hub for the users and forms

6.1.2 Constraints
6.1.2.1 Shall be written using React

6.1.3 Composition
6.1.3.1 Shall include buttons
6.1.3.2 Shall include a search bar

6.1.4 Uses/Interactions
6.1.4.1 Shall connect to the user related modules
6.1.4.2 Shall connect to form related modules

6.1.5 Resources
6.1.5.1 Shall utilize React

6.1.6 Interface/Exports
6.1.6.1 Shall allow the user to navigate to other modules

6.2 User Login Module

6.2.1 Responsibilities
6.2.1.1 Shall allow the user to input their credentials
6.2.1.2 Shall allow the user to retain their data
6.2.1.3 Shall connect to the database to verify credentials

6.2.2 Constraints
6.2.2.1 Shall be written using React

6.2.3 Composition
6.2.3.1 Shall include text fields
6.2.3.2 Shall include buttons
6.2.4 Uses/Interactions

6.2.4.1 See 6.2.1

6.2.5 Resources

6.2.5.1 Shall utilize React
6.2.5.2 Shall connect to the database

6.2.6 Interface/Exports

6.2.6.1 See 6.2.3

6.3 User Registration Module

6.3.1 Responsibilities

6.3.1.1 Shall allow the user to create an account
6.3.1.2 Shall connect to the database for retaining user information

6.3.2 Constraints

6.3.2.1 Shall be written using React

6.3.3 Composition

6.3.3.1 Shall include text fields
6.3.3.2 Shall include buttons

6.3.4 Uses/Interactions

6.3.4.1 See 6.3.1

6.3.5 Resources

6.3.5.1 Shall utilize React
6.3.5.2 Shall connect to the database

6.3.6 Interface/Exports

6.3.6.1 See 6.3.3

6.4 Form Creation Module

6.4.1 Responsibilities

6.4.1.1 Shall allow the user to view permit forms
6.4.1.2 Shall allow the user to fill out the forms
6.4.1.3 Shall connect to the database to extract case information

6.4.2 Constraints
6.4.2.1 Shall be written using React

6.4.3 Composition

6.4.3.1 Shall include text fields
6.4.3.2 Shall include buttons

6.4.4 Uses/Interactions

6.4.4.1 See 6.4.1

6.4.5 Resources

6.4.5.1 Shall utilize React
6.4.5.2 Shall connect to the database

6.4.6 Interface/Exports

6.4.6.1 See 6.4.3

6.5 Case View Module

6.5.1 Responsibilities

6.5.1.1 Shall allow the user to view case reports
6.5.1.2 Shall connect to the database to extract case information

6.5.2 Constraints

6.5.2.1 Shall be written using React

6.5.3 Composition

6.5.3.1 Shall include buttons
6.5.3.2 Shall include a document viewer

6.5.4 Uses/Interactions

6.5.4.1 See 6.5.1

6.5.5 Resources

6.5.5.1 Shall utilize React
6.5.5.2 Shall connect to the database

6.5.6 Interface/Exports

6.5.6.1 See 6.5.3

6.6 Case Search Module
6.6.1 Responsibilities

6.6.1.1 Shall allow users to search through case reports
6.6.1.2 Shall connect to the database to find case information

6.6.2 Constraints

6.6.2.1 Shall be written using React

6.6.3 Composition

6.6.3.1 Shall include text fields
6.6.3.2 Shall include filter checkboxes
6.6.3.3 Shall include buttons

6.6.4 Uses/Interactions

6.6.4.1 See 6.6.1

6.6.5 Resources

6.6.5.1 Shall utilize React
6.6.5.2 Shall connect to the database

6.6.6 Interface/Exports

6.6.6.1 See 6.6.3
7. Detailed Lower level Component Design

Not applicable
8. Database Design

Plan Analysis Application uses a database already provided by the LA County Department of Regional Planning.
9. User Interface

9.1 Overview of User Interface

User will be able to see a lineup of a number of cases that includes a quick preview. User will be able to view an in-depth case report. User will be able to search for a specific case using a filtering widget. User will be able to input data into an editable permit application.

9.2 Screen Frameworks or Images

Below is a mockup of the UI layout for the web application.

9.3 User Interface Flow Model

The user will navigate to the application’s homepage and view a list of all the case records with a profile report. There will also be a search widget for the user to click on to filter out the cases being shown. The user may then select any case to go into more detail and have access to fill out electronic permit forms pertaining to each case.
# 10. Requirements Validation and Verification

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<th>Requirement Description</th>
<th>Module Corresponding</th>
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<td>User shall be able to see a list of all plans at the url /plans</td>
<td>Case View Module</td>
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<td>1.2</td>
<td>User shall be able to click a plan and be able to see all information associated with a plan at the url /plans/[planId]</td>
<td>Case View Module</td>
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<tr>
<td>1.3</td>
<td>User shall be able to see a list of template documents he or she can click at the url /plans/[planId]</td>
<td>Case View Module</td>
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<td>1.4</td>
<td>User shall see a preview of the document he or she has clicked filled with information of plan at the url /plans/[planId]/[document]</td>
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<td>1.5</td>
<td>User shall filter the search for planId’s</td>
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<td>1.6</td>
<td>User shall see the forms they can choose from for a specific plan</td>
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<td>User shall filter forms while searching</td>
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## Backend

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<td>2.1</td>
<td>Backend application shall be able to connect to the Department’s Microsoft SQL Server</td>
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<tr>
<td>2.2</td>
<td>Backend application shall return a list of plan ids for the page via the url route: /api/plans?page=[pageNumber]</td>
<td>Database</td>
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<tr>
<td>2.3</td>
<td>Backend application shall return all information related to a plan via the url route: /api/plans/[planId]</td>
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11. Glossary

Not applicable
12. References

https://www.cs.purdue.edu/homes/cs307/ExampleDocs/DesignTemplate_Fall08.doc

EnerGov - TylerTechnologies
https://www.tylertech.com/products/energov

GIS - Los Angeles County, Department of Regional Planning
http://planning.lacounty.gov/gis

Docker - Docker
https://www.docker.com/

React - React
https://reactjs.org/