College of Engineering

Computer Science and Software Engineering

California Polytechnic State University

San Luis Obispo

Texano Tire Shop Website

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CSC 492

Senior Project II

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Introduction:

I am an undergraduate student at California Polytechnic State University studying computer science. As part of my final senior project, I decided to develop a web application. This website is designed for a small tire shop business owned by a family member. Its main purpose is to help both the customers and owner of the business. Customers currently relied on Google reviews and Yelp to get information about the shop such as the phone number, business hours and services offered. However, sometimes they are not accurate and/or up to date with the newest information. My goal was to provide customers an easy place to find all of the relevant information about this establishment. Similarly, this website with help the owner and employees of the shop. The owner will not only be able to display the basic information of his business, but he will also be able to display the price and items that are currently in stock. This is not present in most of the small tire shop business and will provide a huger advantage over the competition. It will help both the customers and employees as no time will be wasted calling to ask if a certain tire is available and its price. The customer will be able to search and find out if they have the item that they are looking for much easier. Likewise, the owner will be able to easily keep track of the inventory and order more sizes as needed. In addition, the owner will be able to keep track of the expenses and revenues digitally using this web application. This will be a huge improvement as all the transactions are currently keep and recorded by hand on paper. This website will help modernize and make the experience of the customer and labor of the employer much easier.

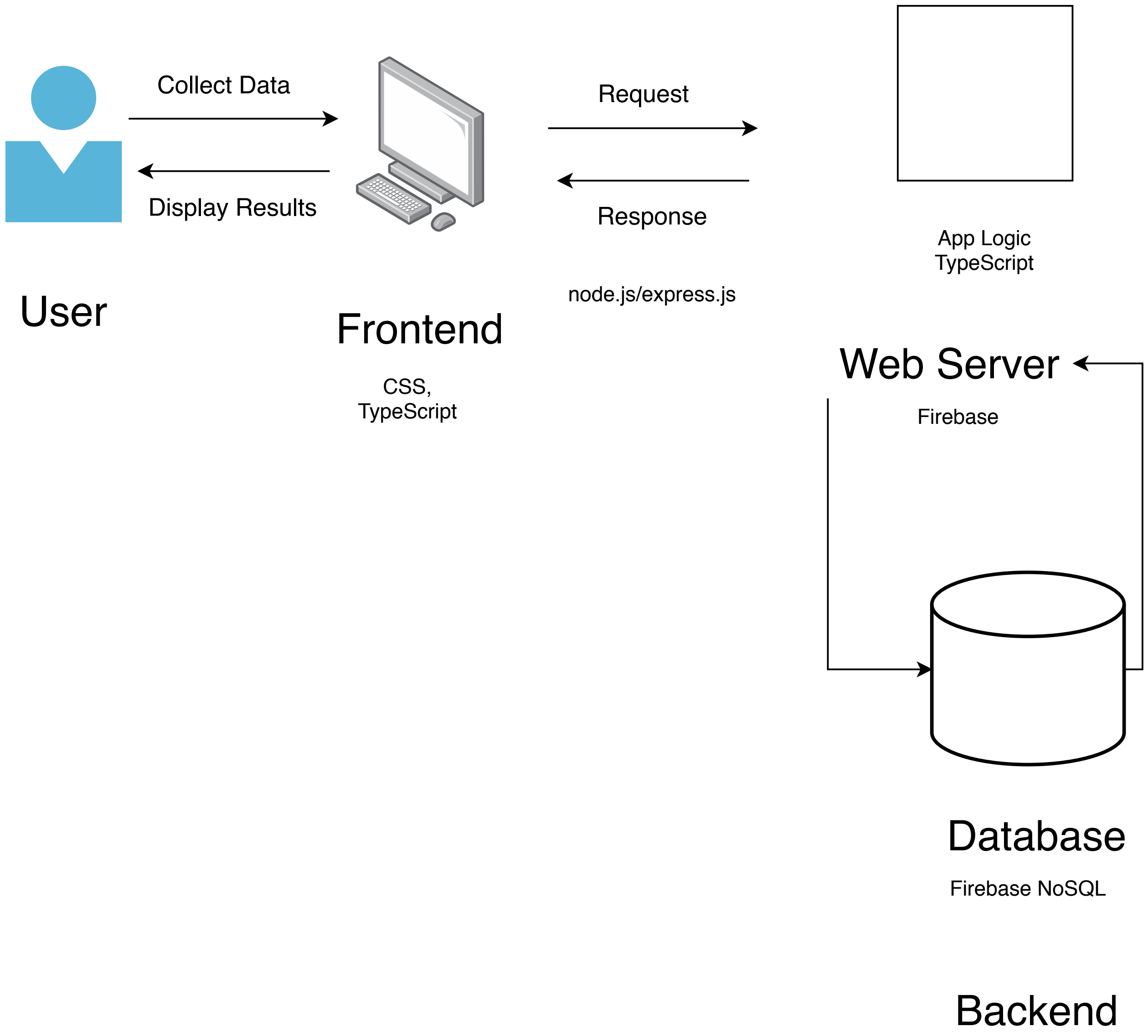
Regarding the technologies involved, from the engineering perspective, this project involved the following:

- Vue.js: User Interface
- TypeScript and Cascading Style Sheets (CSS): Programming Language
- Node.js: Backend
- Firebase, NoSQL: Database
- Firebase: Hosting
- Cypress: Testing

Also, I managed to write and execute accepting testing code and deploy the application to the cloud. These are skills that complemented my formal education from classes that I took. Having experience working with the front end, back end and writing tests are very valuable skills to have in the industry. You not only demonstrate that you can write new code but also that your new code will not break any previously implemented features.

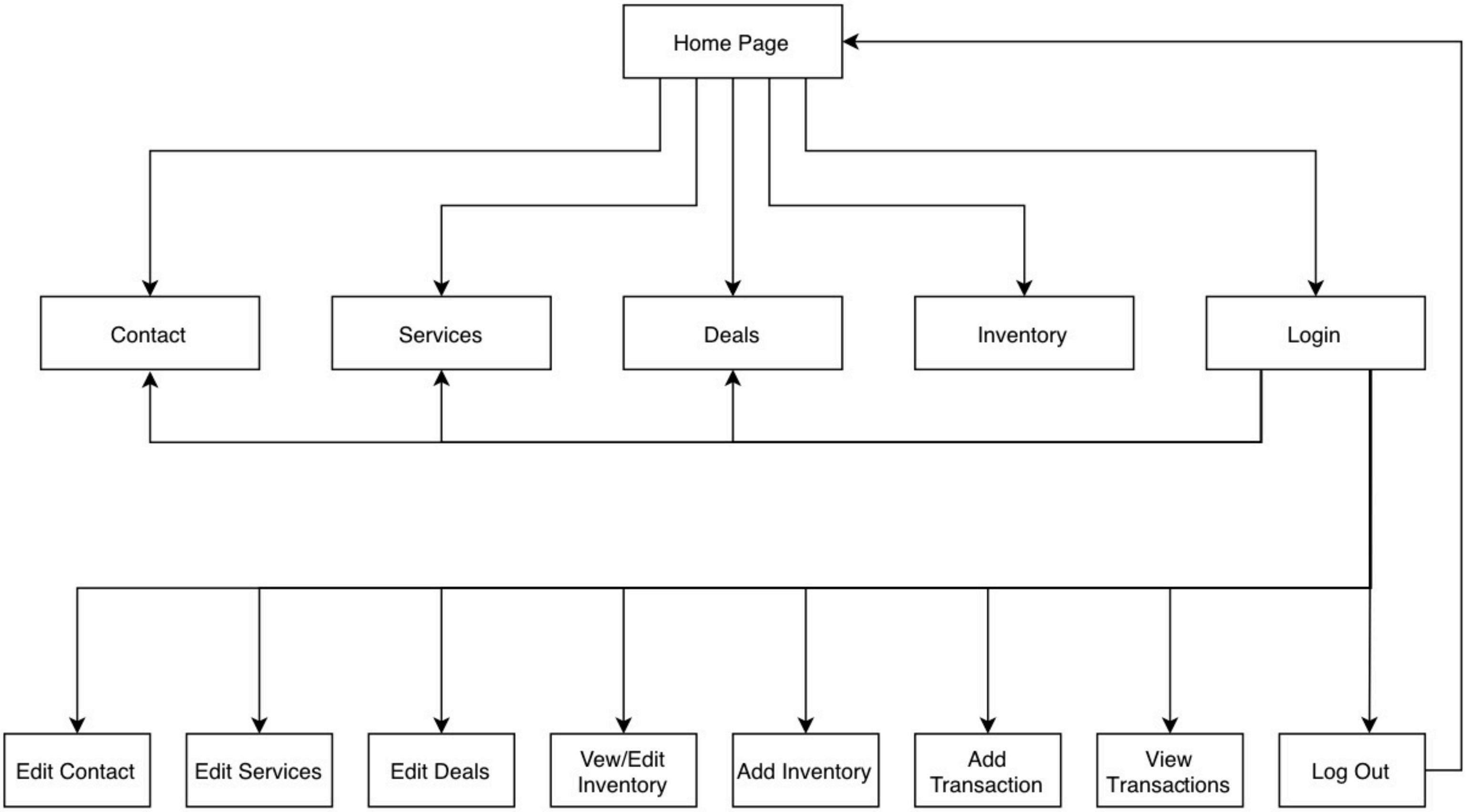
Project:

Architecture


Collect Data
Display Results
User
Frontend
CSS,
TypeScript
Request
Response
node.js/express.js
App Logic
TypeScript
Web Server
Firebase
Database
Firebase NoSQL
Backend

This web application was developed using three layers: the presentation layer with the view components implemented in Vue.js, the application layer with your backend functions exposed as REST API implemented in node.js/express.js and the data layer implemented as a document-based (JSON) database in Firebase.

Navigation Flow Chart



*All Pages Have Access To The Home Page

The diagram shows all of the pages in this website. From the home page you can easy navigate to all of them as long as you have permission. The customer can view the contact, services, deals, and inventory pages. Once you log in, you get owner privilege and can view all of the previously mentioned pages plus additional pages that give you editing capabilities. You also have access to the transactions page, as the owner, were you can keep track of all of the transactions and a summary of all of the sales. Take a look at appendix a to get additional information regarding the content and capability of each page.

Development Process:

I used GitHub to manage the version control of my code and also to manage tasks and the development sprints. In addition, I used Firebase to store all of the data. I broke up all of the tasks that had to be done to complete this website into smaller components and saved them as GitHub issues. Each issue had a description and a priority assigned to it. I also used the GitHub Project feature to plan each sprint and equally divide the work between them. I had a column for each sprint to easily help me visualize what I had to complete. I also kept a column for bugs that I encounter throughout the process. The project feature was very helpful to have everything nicely planned and organized.

Database Structure:

about:
{
id: number,
street: string,
city: string,
stateName: string,
zipCode: string,
phoneNumber: string,
mHour: string,
tHours: string,
wHours: string,
rHours: string,
fHours: string,
	deals [ ]:
	{
	id: number,
	title: string,
	description: string,
	expiration: string,
	}

saHours: string, suHours: string }	

services [ ]:
{
id: number,
seTitle: string,
sePrice: number,
seDescription: string
}
	user:
	{
	id: number,
	firstName: string,
	lastName: string,
	emailAddress: string,
	password: string,
	role: number
	}

transactions [ ]:
{
inventoryId: string,
category: string,
date: string,
amount: number,
quantity: number,
description: string
}
	inventory [ ]:
	{
	brand: string,
	size: string,
	category: string,
	image: string,
	price: number,
	quantity: number
	}

All of the data is stored in Firebase in a NoSQL format. Starting with the about page, the business hours are broken down by each day of the week and the address by the street, city, state and zip code to make it easier for the user when they need to update one of these fields. For the deals and services page, they include a title and description string as well as a price for the services and an expiration date for the coupon. The required fields for adding a new item to the inventory list are: brand, size, category, image, price and the quantity being added. For the transactions, you can reference an item from the inventory table with the inventoryId but will also include the category, date, amount, quantity and description of the transaction. Lastly, the user table contains the credentials of the owner of the business which will be compared to when trying to login in as the owner.

Set Up and Run Environment:

You can learn how to set up and run the environment in the README file in my GitHub repository: https://github.com/jjsalaz14/businessWebpage
You can access the web application on the cloud using this link:
https://texanotireshop.firebaseapp.com/

Testing:

I used end-to-end testing to test the flow of my application from start to end. The purpose of this type of testing is to simulate the real user scenario and validate the system under test and its components for integration and data integrity. In addition, the main reason for carrying out this testing is to determine various dependencies of an application as well as ensuring that accurate information is communicated between various system components. I used Cypress to conduct the testing. You can create automated tests that simulate a real user scenario very fast and efficiently. I wrote a test for every single page testing valid and invalid case. An invalid case being entering the wrong username/password, missing a required field, or entering the wrong data type. I also tested adding, updating and deleting deals, services and inventory items. However, I still need to write automated tests to test the filter-by options to ensure that they are filtering the items correctly. The last thing that I need to test is when adding an item from the inventory to the transaction table. In other words, I need to test that the number of items added to the transaction table are less than or equal to the number of items in stock of that particular item and then verify that they were correctly added to the transaction page.

- You can learn how to run the end-to-end acceptance testing in the README file in my GitHub repository: https://github.com/jjsalaz14/businessWebpage

Conclusion:

This web application will provide a major advantage to the owner of this business because it will help to attract more customers. The customer will benefit as they will be able to easily find more up-to-date information about the shop without having to contact them directly. In addition, the owner will see a huge benefit from having all of the transaction digitally compared to having them on paper. In the future, I will add another important feature that will help reduce the customers waiting time. I will add another page that will allow the customers to schedule an appointment. This will be very beneficial for the customers who do not have an emergency and can plan to go whenever they want. They can schedule an appointment and avoid potentially long waiting times.

Regarding my learning experience, I learned how to implement all of the components required to designed, build and host a web application. I acquired experienced in both the front end and back end of the website. Not only that, but I also learned how to write tests to ensure that my website is working correctly and that the new features are not breaking any previous code. Task management was an essential part of successfully completing this project. GitHub issues are very useful as breaking down the entire project into smaller components helps in terms of developing, bug fixing and testing the code. The skills that I acquired by working with firebase's database and hosting services will be very useful for my future workplace when working with other database and hosting services.

Appendix A

- Home Page
    - Business name and phone number
    - Access to all the pages based on permission (customer vs owner)
    - Carousel with pictures of shop
- Contact
    - Phone number, address, hours and map of the business.
- Services
    - List of services offered with price and description of the service
- Deals
    - List of coupons with description and expiration date
- Inventory
    - List of all the items.
    - Each item has: size, brand, price, picture, and category (new, used, wheel)
    - Can filter items by brand, size and category
- Log In
    - Get owner permission after putting correct login credentials (username and password)
- Edit Contact
    - Owner can edit phone number, address and business hours.
- Edit Services
    - The owner can add a new service
    - The owner can edit a current service
    - The owner can delete a current service
- Edit Deals
    - The owner can add a new coupon
    - The owner can delete a current coupon
- View/Edit Inventory
    - List of all the items were the owner can edit and delete any of them
    - Can filter the items by brand, size and category
- Add Inventory
    - The owner can add a new item to the inventory
- Add Transaction
    - The owner can add a new transaction to the cart
    - The owner can select an item from the inventory and add it to the cart
    - Items in the inventory can be filter by brand, size, and category
    - “complete order” button finalizes the transaction
- View Transaction
    - The owner can view all of the transactions and get a summary of the total revenue, total expenses, and total profit
    - Can filter transaction by category (expense or revenue) and start and end date
- Log Out
    - Loose owner permission and access to owner pages