

Hometown Bazaar

by

Jason Paul, Justin Meyer & Ekaterina Helton

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Jason Paul _____ <i>Jason Paul</i>	04/19/2019 _____ Date
Justin Meyer _____ <i>Justin Meyer</i>	04/19/2019 _____ Date
Katya Helton _____ <i>Katya Helton</i>	04/19/2019 _____ Date
Abdou Fall _____ <i>Abdou fall, Faculty Advisor</i>	04/19/2019 _____ Date

University of Cincinnati
College of
Education, Criminal Justice, and Human Services
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ABSTRACT

Since early 1800s, yard sales and sale types alike have been a great way to declutter your house, discover rare items, and find a good deal. According to the poll conducted by Statistic Brain Research Institute, the average number of self-arranged sales held weekly in the USA is 165,000. However, the method of advertising and promoting these sales has not kept up with modern technology. Introducing: Hometown Bazaar! This sophisticated, mobile-responsive web application allows buyers and sellers to take advantage of modern technology. It saves time and effort, maximizes profits while still promoting the small-town person-to-person interaction of personal item sales. Hometown Bazaar offers advanced search features and filtering, communication with the seller, customization, feedback options, and a community event organizational system. All of this is free of charge while providing functional performance, easy navigation and eye-appealing design, as well as ensuring high security of all transactions and personal information.

1. PROBLEM STATEMENT

1.1 Problem

Evolution of yard and private sale types alike date back to the early 1800s, and these types of events remain profitable, popular, and full of potential. Here are some statistics on these sales provided by Statistic Brain Research Institute (Wallas, 2013):

- Average number of yard sales held each week in the USA: 165,000
- Average number of people who buy an item at a garage sale each week: 690,000
- Total weekly revenue from yard sales: \$4,222,375

With the above facts, it is hard to deny the significance of these sales to both the seller and potential customers. However, selling items yourself takes a lot of time and effort. People who arrange a sale want to make the most profit and get rid of the things they no longer want or need. It is well known that, self-arranged sales (garage, yard, community, etc.) can be a haphazard collection of random objects which can overwhelm, confuse and possibly deter a potential buyer, leading to an unsuccessful sale.

A sale poll conducted by the Statistic Brain Research Institute points out the existing issues that need to be addressed:

- The best way to find the yard sale: yard sale signs
- 97% shoppers leave within 2 minutes if they don't see anything they like

Success of the event depends on many factors. First, people need to be aware of the ongoing sale in the neighborhood of their preference, yet the most common way of discovering a sale is running into a DIY sale sign. Some websites offer a zip code search function, but lack design, easy navigation, and category search. In addition, they do not provide a complete list of the objects that will be offered. Also, lots of unique items can be found during these events. However, even more of them are left unattended because it is easy to overlook something that could be a potential and valuable purchase. Our website will offer advanced category searching capabilities, so users can easily find what they are looking for and have no issues locating the items at the sale. Therefore, the overall yard/garage/estate/community/etc. sale experience and success would increase drastically

1.2 Solution

We created a web application with a mobile responsive design that would serve as an ultimate personal items' sale guide. It contains all the essential information about the date, time, and location of the event accompanied by pictures and item descriptions. The key features of the application are categorical item searching, community page development, buyer feedback through review/ratings, and direct communication with the seller through email and live chat. Potential buyers are also able to request items be put on hold and make arrangements with the seller on the terms of item pickup. The application provides up-to-date security features (user authentication, encryption) to ensure that access is limited to registered users only and sensitive information is protected.

1.3 Project Goals

Hometown Bazaar is the application that is smart, simple and easy to use. It is created with each user in mind to achieve the most important goal - give the users what they want. The lack of a web application that would provide sufficient information about the yard - and alike - sale types has diminished the purpose of these great events over the years. Hometown Bazaar will facilitate the process of both conducting and visiting an event by allowing users interact with the data such as date, time, location of the event, as well as categorized description and photos of the items that will be on sale. This web app is easy to navigate, enhanced with the security features, and serves as the ultimate yard sale guide.

1.4 Overview

The remainder of this final report outlines in detail how the project was completed. The report includes the following sections: design objectives, methodology, budget, timeline, problems encountered, and future recommendations.

2. DISCUSSION

2.1 Concept

The main goal of the project is to create an ultimate yard sale guide that will minimize the stress of both hosts and visitors by providing the most reliable, up-to-date, and easy to navigate web application. Hometown Bazaar is the application that will help make a sale happen, leaving both sides satisfied with their product and process.

The idea of creating Hometown Bazaar was a shared interest of all team members. Understanding how underestimated yard sales and sales type alike are nowadays and seeing the potential of bringing the sales effectiveness up, we conducted a research to find out what is offered to the users on the internet. Looking at the existing web apps, it becomes very clear that there is a lack of a good web application that would help resolve the issue.

2.2 Design Objectives and Methodology

Hometown Bazaar was created to pursue the following goals:

- **Easy Access:** Web Application can be easily accessed in web browsers such as Chrome, Firefox, Safari, etc.
- **Increase Awareness:** Hometown Bazaar serves an informational purpose to educate its users about the ongoing sales and products that will be offered during the event.
- **Security:** features like integrated data encryption, enforced content security policy, and managed user access will prevent unwanted data loss or security breach.
- **Communication:** integrated chat feature allows users to communicate with each other and get more detail on the product that they are interested in.
- **Customer Support:** improve customer satisfaction with the better service

2.3 Technical Approach

One of the philosophies in development for Hometown Bazaar was using the most up-to-date technologies found in 2018. Most of the technologies below were ones that our team was already familiar with to prevent unnecessary learning time, but we selectively implemented technologies that we weren't as familiar with to support our philosophy above.

Listed below is our technology stack.

Front-end technologies:

- Angular 7 JavaScript (JS) Framework
- Angular Material
- NPM package manager for JS.
- Webpack for Bundling and Minifying
- Karma and Protractor for Unit Tests and End-to-End testing respectively.
- Google Maps API
- HTML5, CSS
- SSL

Angular is an excellent JS framework that allows for rapid front-end development utilizing declarative templates, dependency injection, and built-in tools for easy unit and end-to-end testing. This framework was the foundation upon which the other front-end technologies were placed.

Angular Material is a UI component library geared towards the Angular framework. It includes common UI component functionality such as form buttons, fields, and dates. Its UI design is inspired by Google's Material Design spec.

The NPM package manager for JS allowed us to pull in our front-end technologies without having to worry about dependency management. As the project expanded in size, it became more useful as more plugins were added.

Webpack is a Bundler and Minifier that provided usefulness for not only performance, but for project structure. Bundling combined files together into a single file to reduce unnecessary HTTP requests. Since this file was done at the build process, we could separate files that aren't normally separated, such as having separate CSS files for a specific component in the UI. This helped speed up development and reduced code redundancy. Minifying improved initial load performance for users by reducing file sizes by removing comments, whitespace, and shortening variable names.

Karma and Protractor are JS testing utilities, with Angular working very nicely with both. This enabled us to write Unit Tests with Karma and End-to-End testing with Protractor.

The Google Maps API was used for location information regarding the posting of

sales. It was useful getting latitude and longitude information for radius based database lookups.

HTML5 and CSS were also used and are a staple of the web today. We ensured that both respective technologies adhered to correct syntax using online tools to verify them such as W3C's verifiers.

For security purposes, we obtained SSL Certificate and changed the protocol from HTTP to HTTPS. To achieve this, we purchased a certificate through an annual subscription, verified the certificate and installed it on the hosting account of our website making all necessary adjustments.

Back-end technologies:

- C# .Net Core
- Microsoft SQL using Microsoft SQL Server for database management
- Entity Framework 6

C# .Net Core is a robust Microsoft technology for back-end development. We used MSSQL and Microsoft SQL Server for the creation and management of our back-end database. For communication between front and back-end, we used Microsoft's Entity Framework 6. This powerful technology allowed dynamic query generation through linq-based method syntax, neglecting the need to write any SQL.

Server Hosting

Our team wanted Hometown Bazaar as a web application to scale depending on the traffic that visited the website. Merely hosting the website on a rented server wouldn't provide this flexibility. Therefore, we decided to go with the Microsoft Azure Cloud Provider to provide this functionality for us. It was an easy decision as our back-end stack was Microsoft-based and they provide an integrated way to publish through Visual Studio. However, getting this setup was made more difficult due to the separation of our front-end and back-end into separate projects in the same Visual Studio solution as Azure doesn't provide easy publishing of multiple projects in a solution.

Hometown Bazaar Technical Diagram

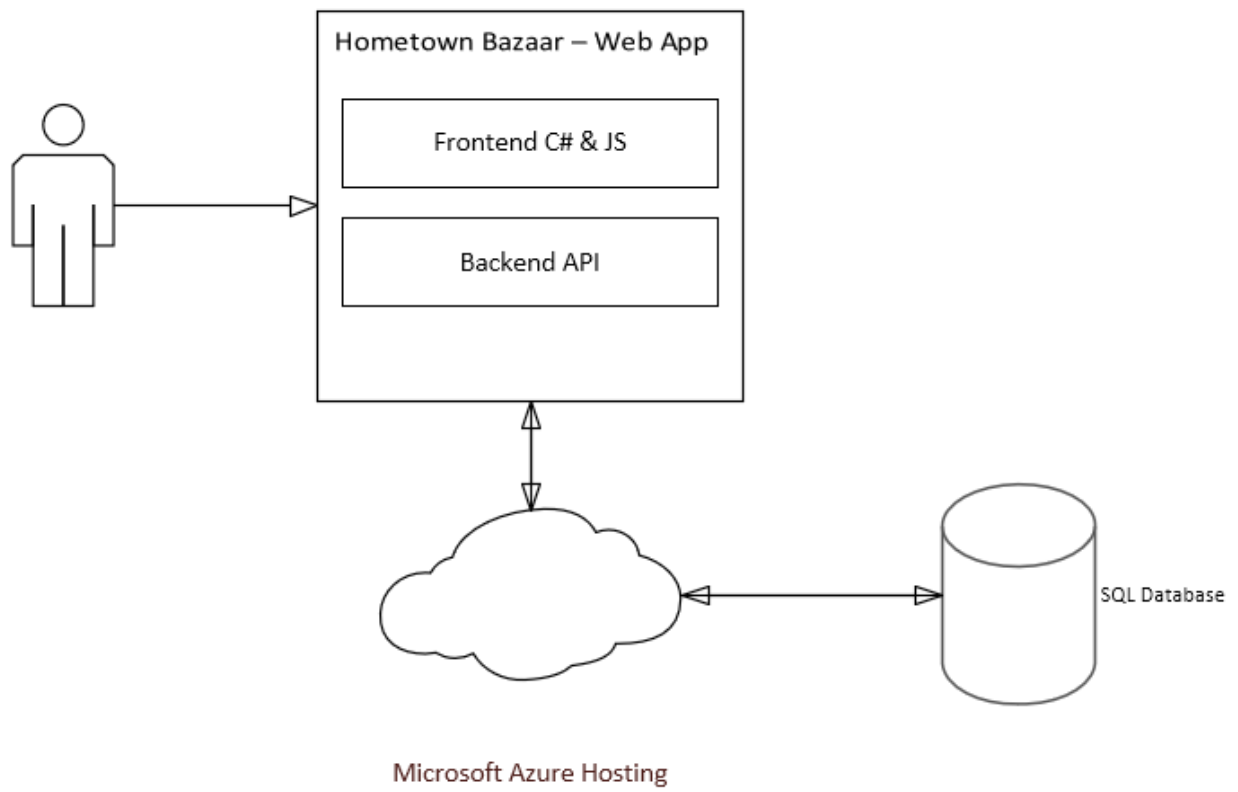


Figure 1: Technical Diagram

2.4 User Profile

Figure 2: User Profile, illustrates the user profile for the Hometown Bazaar application. It denotes potential users of the application, related experience and similar applications that the user may have encountered, the expected use of Hometown Bazaar per person, and key interface design requirements Hometown Bazaar will need to optimize the user experience.

PROJECT: Hometown Bazaar
POTENTIAL USERS: <ul style="list-style-type: none">• Anyone looking to promote their sale of household items• Anyone looking for sales or for individual items• Administrator(s)
SOFTWARE, INTERFACE, AND RELATED EXPERIENCE: <p>This project will be aimed towards everyone who has experience with buying/trading/selling items in a yard/garage sale type of environment, while taking advantage of the power and broad reach of the internet.</p>
EXPERIENCE WITH SIMILAR APPLICATIONS: <p>Hometown Bazaar's users may have had experience with the following applications:</p> <ul style="list-style-type: none">• OfferUp• Facebook Marketplace• Yard Sale Treasure Map• Garage Sale Map• Craigslist

TASK EXPERIENCE:

When navigating to the site, sellers will have the ability to post their sale. When choosing to post their sale, they will be prompted to log in. If they are new users, they will choose to create an account. Once logged in, they will use our standard template to advertise their sale by filling out our required criteria (Address, times, dates, item categories, photos, captions, etc.)

When navigating to the site, buyers will be able to search for items or sales based on multiple criteria (Location, category, sale dates, etc.). In order to view specific details about sales, the user will need to login and/or create an account. Once they are logged in they will have the ability to view additional information about their search including: Address, sale times, photos, contact information, etc.

Administrators will have the ability to login to the site with their secure login and gain access to the back-end data, as well as the user accounts and the feedback system. This will allow the admins to disable/enable accounts and/or delete any feedback that is deemed inappropriate. The admin will also have the ability to run reports based off the database in order to optimize and troubleshoot the site.

FREQUENCY OF USE:

This application is intended to be used frequently (multiple times a day, daily, weekly, monthly). Any time someone is looking for something or would like to sell multiple items, the users will visit the site. Admins will use the site when site reviews are necessary and whenever any flags or warnings are triggered. They will also be able to use the site anytime they would like to run ad-hoc reports.

Key Interface Design Requirements that the Profile Suggests:

- Simple, intuitive UI
- Fluid/Responsive design for accessibility on multiple devices
- Visually pleasing presentation with the use of images, hierarchical text formatting, etc.

Figure 2: User Profile

2.5 Use Case Diagram

Figure 3: Use Case Diagram presents the project use case diagram. Hometown Bazaar use cases consist of 2 parties and an authentication service. For the most part, the same level of functionality is available to both parties. These parties consist of the user and the administrator(s). Administrators have the expanded ability to manage user accounts, feedback and the data. Users can create an account and search/post items, as well as the other features of the application.

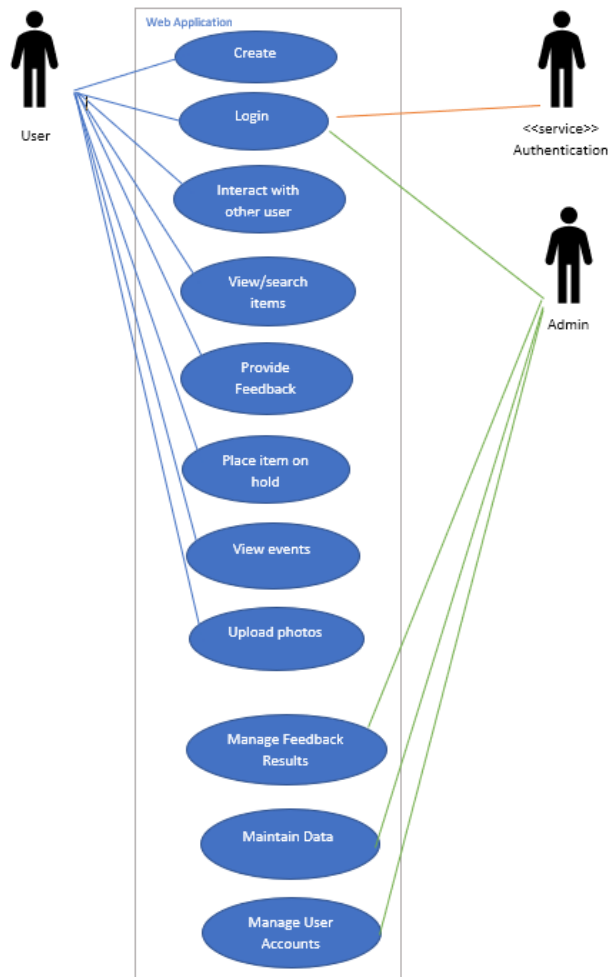


Figure 3: Use Case Diagram

2.6 Design Samples

Figure 4: Hometown Bazaar Home Page presents the final state of the site. In order to make the site quick and easy-to-use, we limited the page to two buttons: Search Sales and Post a Sale.

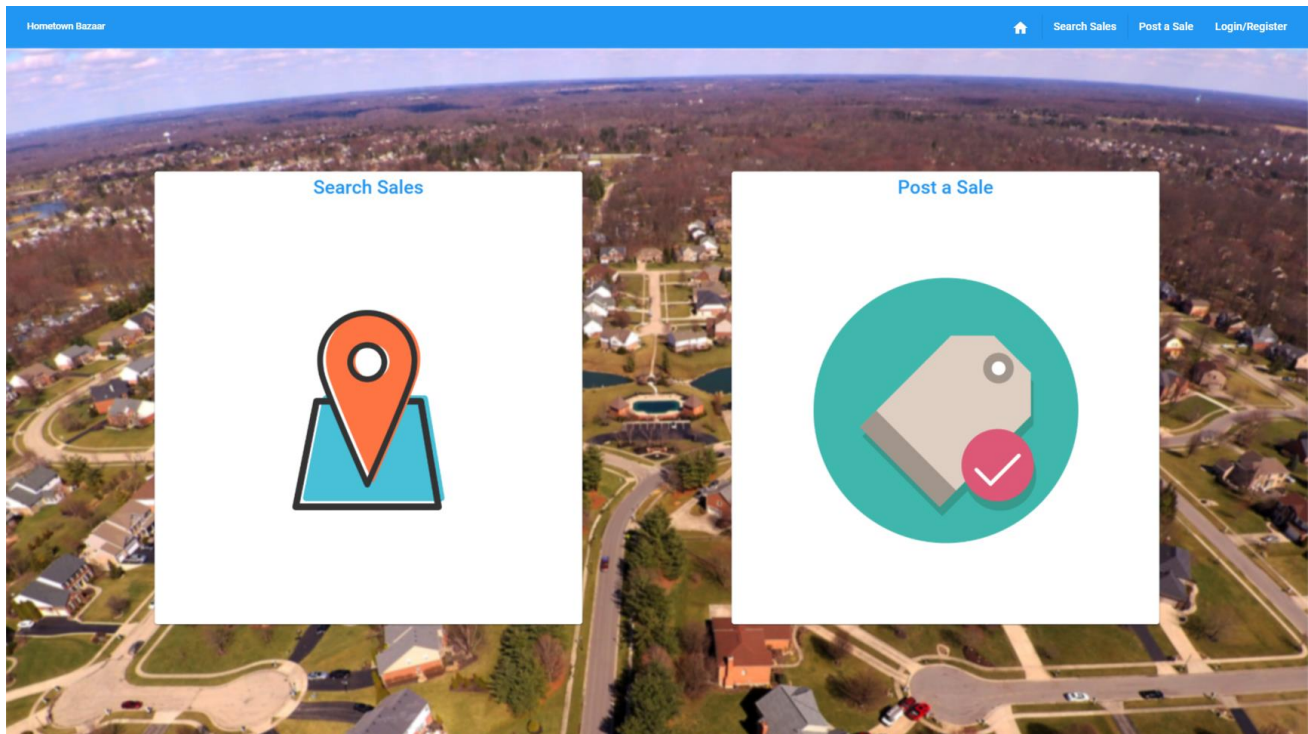


Figure 4: Home Page

Figure 4.1: Hometown Bazaar Responsive Design presents the final state of the site relative to responsive design. The site responds accordingly to the type of device it is being used on. This was crucial so people could use our site easily on mobile devices.

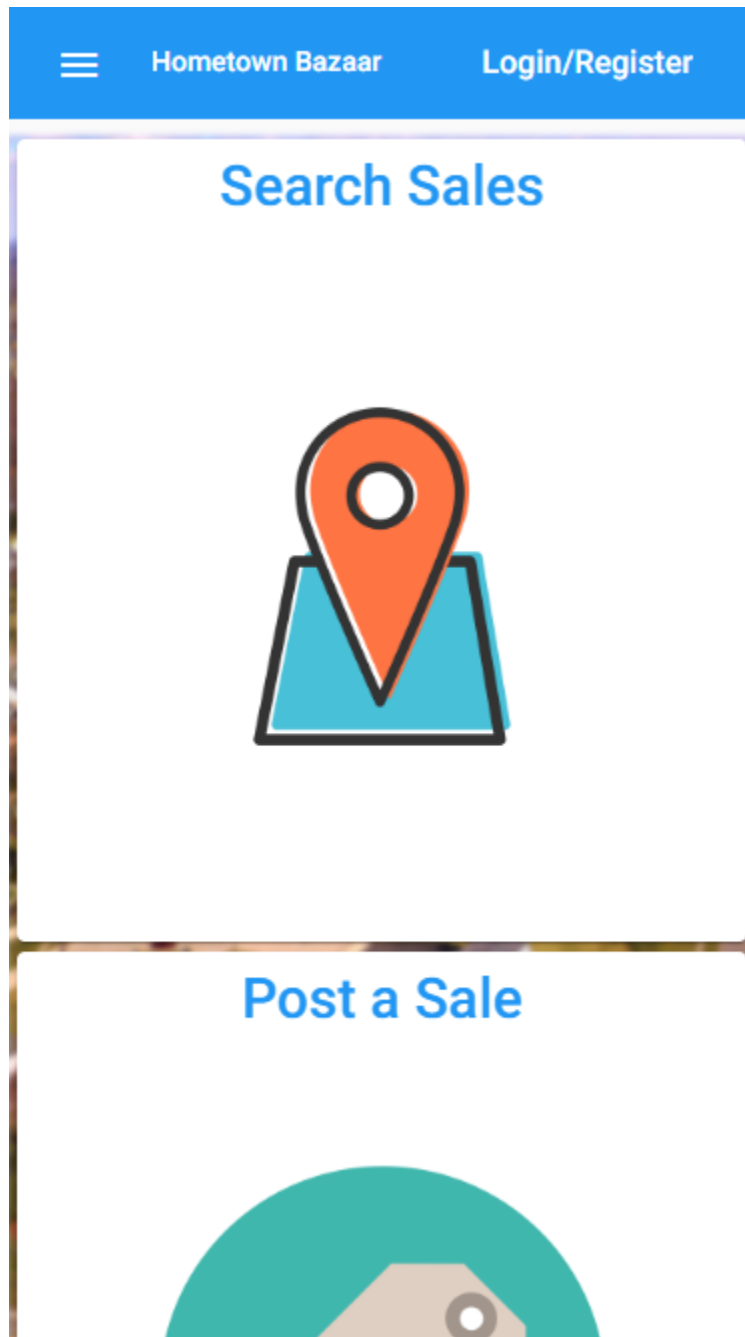


Figure 4.1: Responsive Design

3. Testing

3.1 Overview

This section will explain the testing methodology for the Hometown Bazaar web application and should be used by the following individuals:

• Project Managers	• Developers
• Quality Assurance	• Beta Testers
• Systems Analysts	• Business Analysts

Due to the nature of this web application, which incorporates a front and back-end, it made sense for us to test the data transfer capabilities. We also concentrate heavily on the user experience because this is an application that will be used multiple times by the user, so emphasis on the usability of the application will require rigorous testing to insure a pleasant user experience.

3.2 Scope

The scope of testing is to validate the overall functionality of the web application, as well as, individual segments of the application. Testing is also to be completed on all supported web browsers and a variety of mobile devices to insure a consistent experience.

3.3 Objective

The objective of testing the Hometown Bazaar application is to ensure that each function of the code operates as expected. These tests are designed to find bugs during and after each cycle of the development process. If and when issues are found, the tester will document the steps leading up to the error and notify the development team. Product developers will also run tests for the components they have worked on and the team will participate in the overall functionality of the application to insure an accurate and consistent user experience while using the application.

3.4 Entry and Exit Criteria

Entry Criteria:

- Environment Availability
- Testable code against requirements
- Test data loaded and transferred between front and back-end

Exit Criteria:

- Passing test cases
- Running all tests
- Bugs are documented and corrected

3.5 Logging Test and Reporting

If a bug or abnormality is found during the test, the individual will document the bug including:

- The abnormal system behavior witnessed
- The expected result of the action that was taken
- Steps immediately leading up to the bug
- Screenshot of the bug &/or error that was produced

This documentation will be submitted to the development team immediately and the developers will try to recreate the bug and discuss the severity of the issue.

3.6 System Testing

System Testing will be performed by developers as they have completed major segments of the application. Developers will also be required to test the application as a whole once it is deemed complete. This will insure accuracy as the project progresses, as well as the overall functionality of the application as a whole.

3.7 Testing Procedures

The following are the steps needed for application testing:

- Create all test cases and testing scenarios.
- Creation of the testing document which outlines the steps necessary to conduct the test. This will include the expected results and the actual results from the testing that was performed.
- Specify the bugs on the correct report.

Tests to be performed:

- **Unit Testing** – The developers will conduct unit tests on the individual segments of code as they are completed.
- **Stability Testing** – This test will focus on the stability of the application on multiple web browsers and a variety of mobile devices.
- **User Interface/Experience Testing** – This test will focus on the overall user experience of the application as a whole.
- **Back-End Testing** – The developers will insure that data is transferring correctly between the layers of the application and that secure data is being encrypted correctly.

3.8 Pass/Fail Conditions

If any test case created against the Hometown Bazaar application is failed, the development team must correct, pass and approve the condition prior to release.

3.9 Schedule of Team Member Testing

Team Member	Completion Timeline	Frequency
Project Manager	10/25/2018 – 4/9/2019	Weekly
Developers	10/25/2018 – 4/9/2019	Weekly
Analysts	1/14/2019 to 4/9/2019	Weekly

Figure 4.2: Team Member Testing

3.10 Schedule of Round Table Testing

Round Table	Completion Timeline	Frequency
Project Manager	10/25/2018 – 4/9/2019	Weekly
Developers	10/25/2018 – 4/9/2019	Weekly
Analysts	1/14/2019 to 4/9/2019	Weekly

3.11 Lessons Learned

During the testing phases of the project we learned that we initially wanted to do too much with the project, too fast. As the testing progressed, it became clear that not everything we wanted could be included in the initial launch. In the future, it would be helpful to use this experience in order to have a better idea of realistic expectations with a given timeline.

4. PROJECT MANAGEMENT

4.1 Budget

Table 1: Project Budget represents the budget for the project. Although it shows the real cost of \$12,650 (provided the project was developed under a sponsorship), the total is \$0 considering this was the senior design project which was not being sold. Hometown Bazaar’s development was not sponsored; therefore, the project was created utilizing personal time and resources of the developers, no compensation involved.

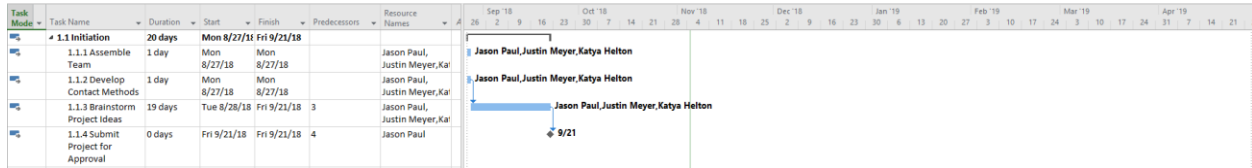
Table 1: Project Budget

NO.	Item Description	Unit (hours)	Unit (price)	Line Item Total
NETWORKING				
1	Labor	450	\$25	\$11,250
2	Annual	8	\$25	\$200
SOFTWARE				
3	External		\$70	\$70
4	Annual		\$25	\$25
5	SSL Certificate		\$15	\$15
6	Annual Renewal		\$200	\$200
HARDWARE				
7	External		\$800	\$800
8	Annual		\$90	\$90
			<i>Subtotal</i>	<i>\$12,650</i>
			Total	\$0

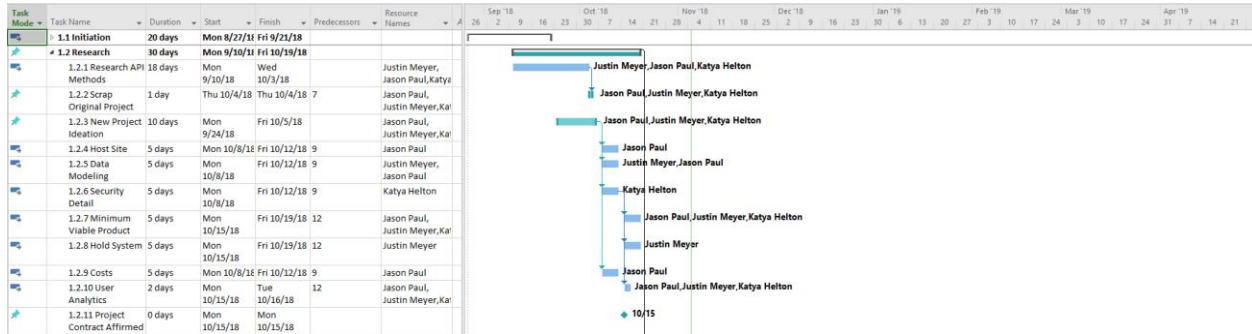
4.2 Project Schedule

Figure 5: Project Schedule and Gantt Chart is our project schedule with the major milestones listed and broken down by phases.

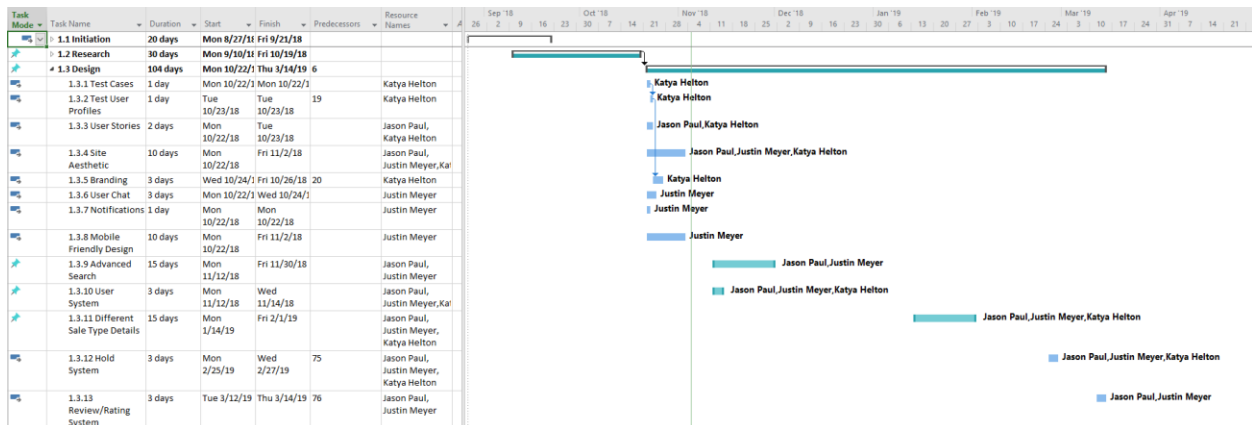
Initiation Phase



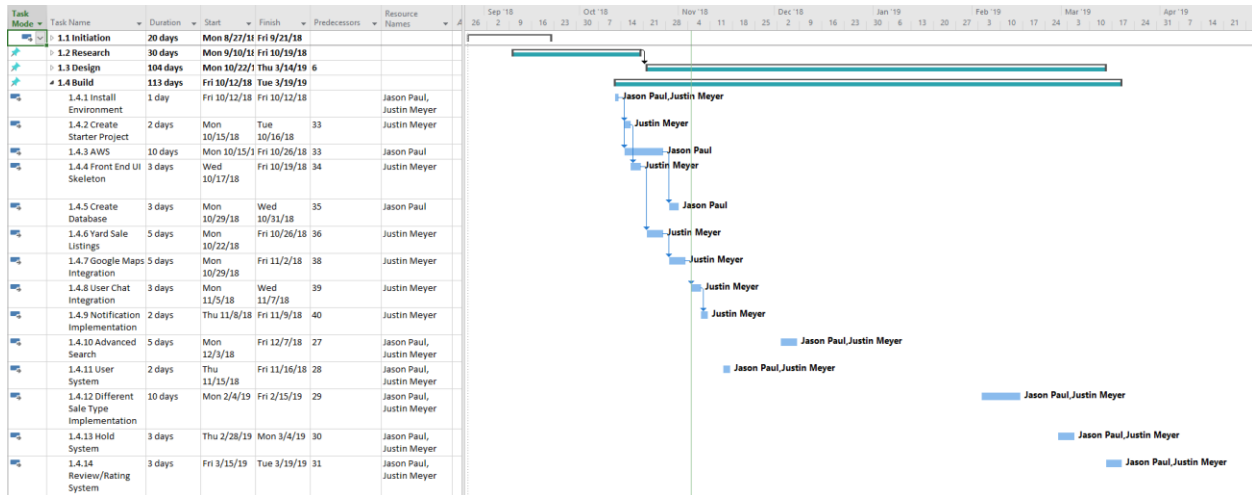
Research Phase



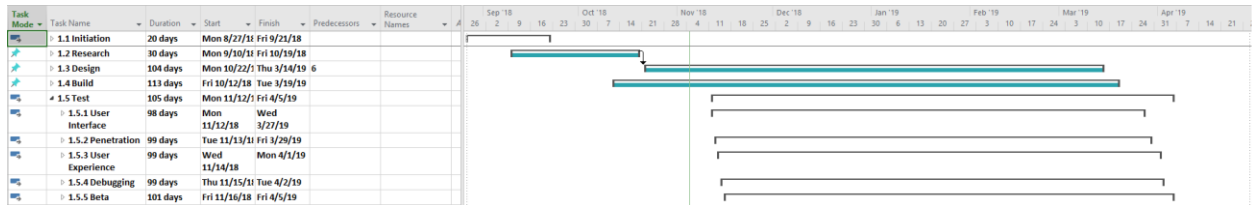
Design Phase



Build Phase



Test Phase



Documentation Phase

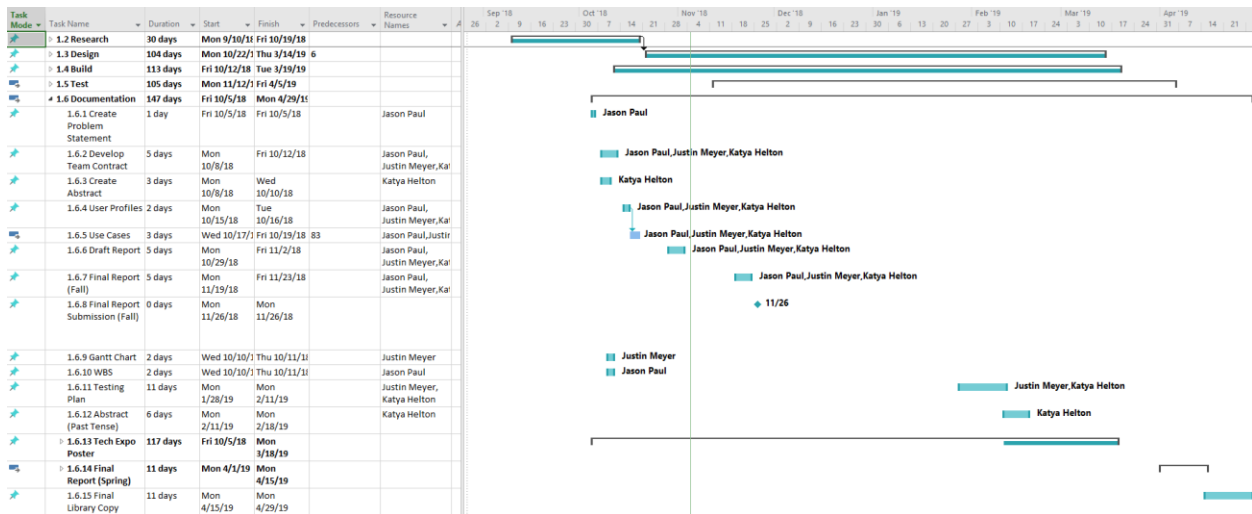


Figure 5. Project Schedule Gantt Chart

4.3 Problems Encountered

One of the problems we encountered forced us to change the direction of our project. This was due to the fact that we didn't do enough research on our original project idea. Once we dug into the details of the project, we found out that there weren't any API's available for the services we wanted to use, and those services had pretty strict policies around accessing information from their site. We solved this problem by collectively deciding to abandon the idea and do something related to buying and selling, but different.

4.4 Future Recommendations

If our team had to develop the senior design project again, we would have immediately started developing Hometown Bazaar application instead of working on our initial idea of a selling platform and realizing that we cannot proceed because of the API issues we encountered (as was described in section 4.3. Problems Encountered). That would allow our team to have more time for brainstorming and coming up with a desired outcome of the senior design project, meeting essential deliverables and would grant us more time for testing, and working on enhancing and broadening the features of the Hometown Bazaar.

5. CONCLUSION

5.1 Fall Semester 2018

The focus and progress of the project during the fall was educating ourselves on our project and the competitors like it. We needed to determine what we wanted our application to do and had to determine what functionality our users would be looking for, so we could create a successful application. We enhanced our skills relative to the actual building of the application (IDE, programming languages, etc.) and developed a better understanding of working as a virtual team. For the spring semester, we plan to enhance the application and refine the overall user experience.

5.2 Spring Semester 2019

The focus and progress of the project during the spring was to build and test the application. We needed to get the front and back end of the project communicating as well as getting the data to transfer to and from the database. We also needed to get the project hosted on Microsoft Azure, which proved to be more complicated than we thought due to the complexity of the project. In completing these tasks we learned a lot about project design and hosting. If we had it to do over again, we would probable design our project architecture a little differently in order to make the whole process smoother. We were able to successfully implement and host the web application in time for Expo and the application worked as expected.

Expo taught us to present to a judging panel and to work under pressure since we had a deadline to be ready for. It also taught us to work under the pressure of having people constantly walking by and asking questions as we were trying to prepare. Then, as the Expo officially opened, we had to learn to work as a team as different groups would approach our booth at the same time and we had to divide-and-conquer in order to answer their questions.

APPENDIX A. ADDITIONAL INFORMATION

The team contacted the following professionals for clarification and additional insight.

1. Abdou Fall, Technical Advisor
2. Jim Scott, Professor
3. Expo Poster (Below)

Hometown Bazaar

Jason Paul, Justin Meyer & Ekaterina Helton

Team 4

University of
CINCINNATI

College of Education, Criminal Justice, & Human Services – School of Information Technology

Technical Advisor - Professor Abdou Fall

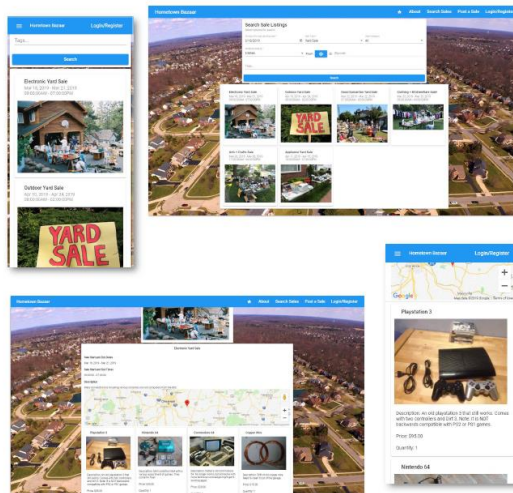
Problem

Advertising and promoting self-arranged types of sales has not kept up with modern technology. These events are often overwhelming, stressful, and confusing to both seller and buyer.

Solution

Hometown Bazaar is a mobile-responsive web application designed to maximize profit and promote small-town person-to-person interaction. Key features include:

- Date, time, and location of the event
- Item description with photos
- Item search by category
- Community page development
- Buyer feedback via review/ratings
- Chat option and email communication between the seller and buyer
- Up-to-date security features.



Conclusion

Hometown Bazaar has been created with each user in mind – smart, simple, and easy to use. It is an ultimate self-arranged sales guide which facilitates the process of both organizing and visiting a sale event to ensure the buyer does not overlook a great deal and leave empty-handed.

Technology



Acknowledgement

Special thanks to Professors Abdou Fall, James Scott, friends and family.

APPENDIX B. REFERENCES

Wallas, I. (2013). Yard Sale Stats and Facts. *Infographic Journal*. Retrieved from <https://infographicjournal.com/yard-sale-stats-and-facts/>