Redefining the Digital Storefront

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Abstract

This report describes my efforts to develop a platform that offers merchants the functionality to manage all major aspects of their store online, while simultaneously helping them to process online transactions and drive foot traffic. Additionally, each individual section in this report details a different aspect of the platform by outlining the major features involved and how they end up working in sync with the platform as a whole.

Over the last three months, I've been able to finalize the majority of the code that will end up being the backbone of the project. Wireframes for the "Index", "Platform", and "Merchant" pages were drawn up in Sketch and implemented in React.JS and CSS. In order to manage React.JS states across the platform, I made use of Redux. For the database and resulting API, I planned out a viable structure for the former and implemented it using MongoDB, while the latter is written in Node.JS. The backend is currently written in both Express.JS and Node.JS. Authentication and "User" accounts will be managed by Passport.JS, while Google's Geolocation and Maps API is responsible for generating location data. In order to process payments and transactions, I'll implement Stripe's third-party API.

At the time of writing this report, the "Index", "Platform", and "Merchant" pages have been fully designed, developed, and tested extensively . A "User" can search for and view any "Merchant" listed on the platform. They can browse their inventory and add listed "Items" to their individual shopping carts. Both filtering and search functionality has also been implemented; a "User" can currently filter "Merchants" by "Location", "Category", "Pricing", "Rating", "Distance", "Tier", "Features", and "Tags". They can sort "Merchants" by either "Rating" or

"Distance". Overall, though, there's still a lot more work that needs to be done before anything is ready to launch.

Introduction

The Internet is clearly the future of business. The U.S. Department of Commerce (2019) reported that online transactions accounted for $146.2 billion in sales in just the second quarter of 2019. To improve consumer outreach, a small business must utilize this market. The current options for these businesses include either the development of their own company website or an online marketplace. While the former is perhaps the best option for an established business, business owners without the technical knowledge to build a custom site will end up using a black-box solution such as Shopify. Shopify, and similar alternatives, requires both monthly and transaction fees, and marketing is still necessary to generate 3 engagement and clicks. In contrast, an online marketplace such as Amazon can eliminate fees and still process transactions, but ultimately will not generate foot traffic or have an effect locally.

A poll conducted by Insureon (2018) of more than 2,400 small business owners found that 43% experienced "size-able revenue growth" after implementing a method to process online transactions. Therefore, for many small businesses, the solution to improved sales and outreach comes from expanding their digital footprint. However, without an established following, a business must decide to either invest in their own site and marketing or to forgo marketing and use an online marketplace to process transactions.

An alternative third-party platform that attempts to merge the advantages of both a business's custom site and an online marketplace may be the best solution. Any business or merchant

that creates an account can build a personalizable “digital storefront” explicitly intended to drive local foot traffic. They will gain the functionality to showcase their inventory, process online transactions, measure reception and engagement, and more. In lieu of targeted marketing beyond highlighting specific businesses, the platform will utilize Google’s Geolocation and Maps APIs to match businesses with local consumers, similar to platforms such as Postmates or Grubhub. Simply having a “Merchant” account on the platform will help drive awareness of a brand, as the business will be searchable to any consumer who enters a relevant query.

Gallery

This section will outline each of the wireframes designed for the platform. All were initially designed in Sketch and then implemented using React.JS and CSS. All functionality displayed, except links to dead pages and dummy text, is currently working and has been tested extensively. In lieu of full wireframes, each of the following figures displays a specific feature currently integrated into the platform, randomly ordered.

Figure 1: Header

Figure 2: Footer

Figure 3: Location Autocomplete

Figure 4: Category Grid

Figure 5: Attribute Grid

Figure 6: Customer/Merchant Information

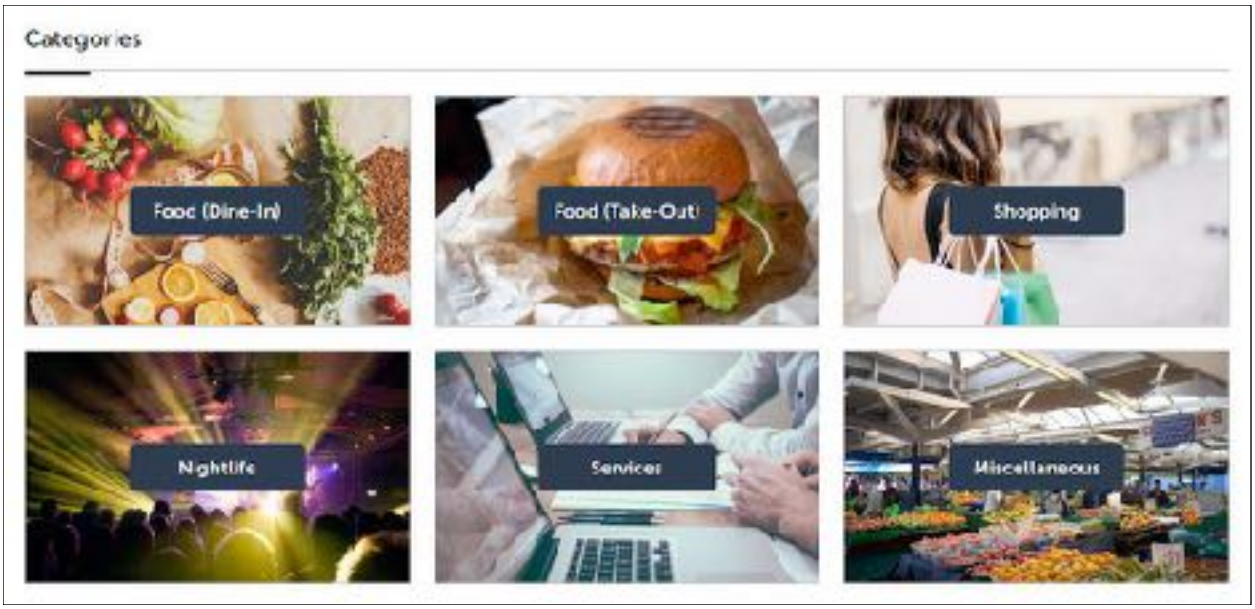

Figure 7: Category Grid

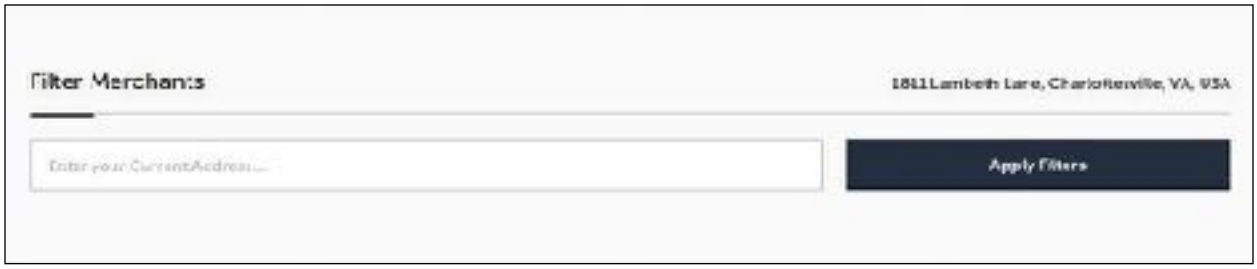

Figure 8: Location Autocomplete

Figure 9: Platinum-Tier Merchant Scroll

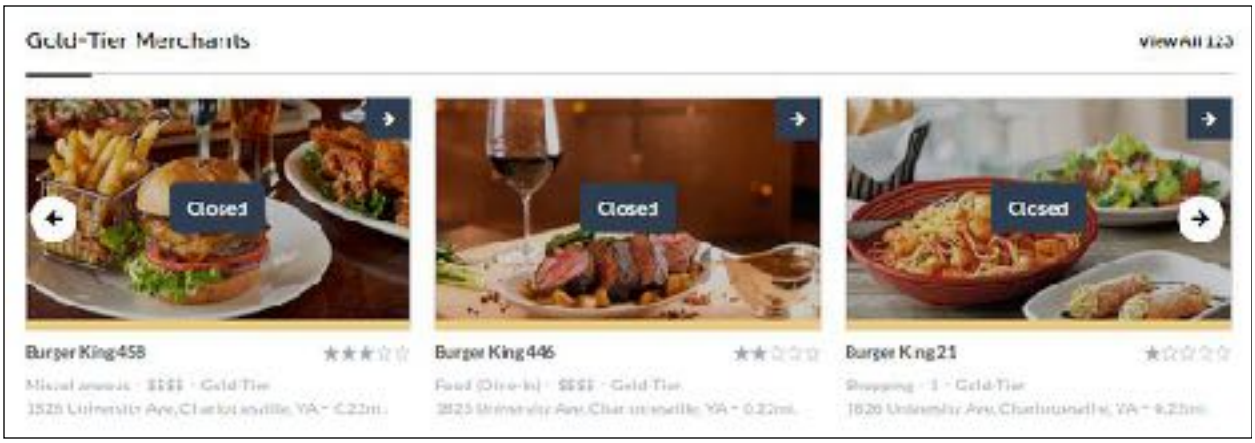

Figure 10: Gold-Tier Merchant Scroll

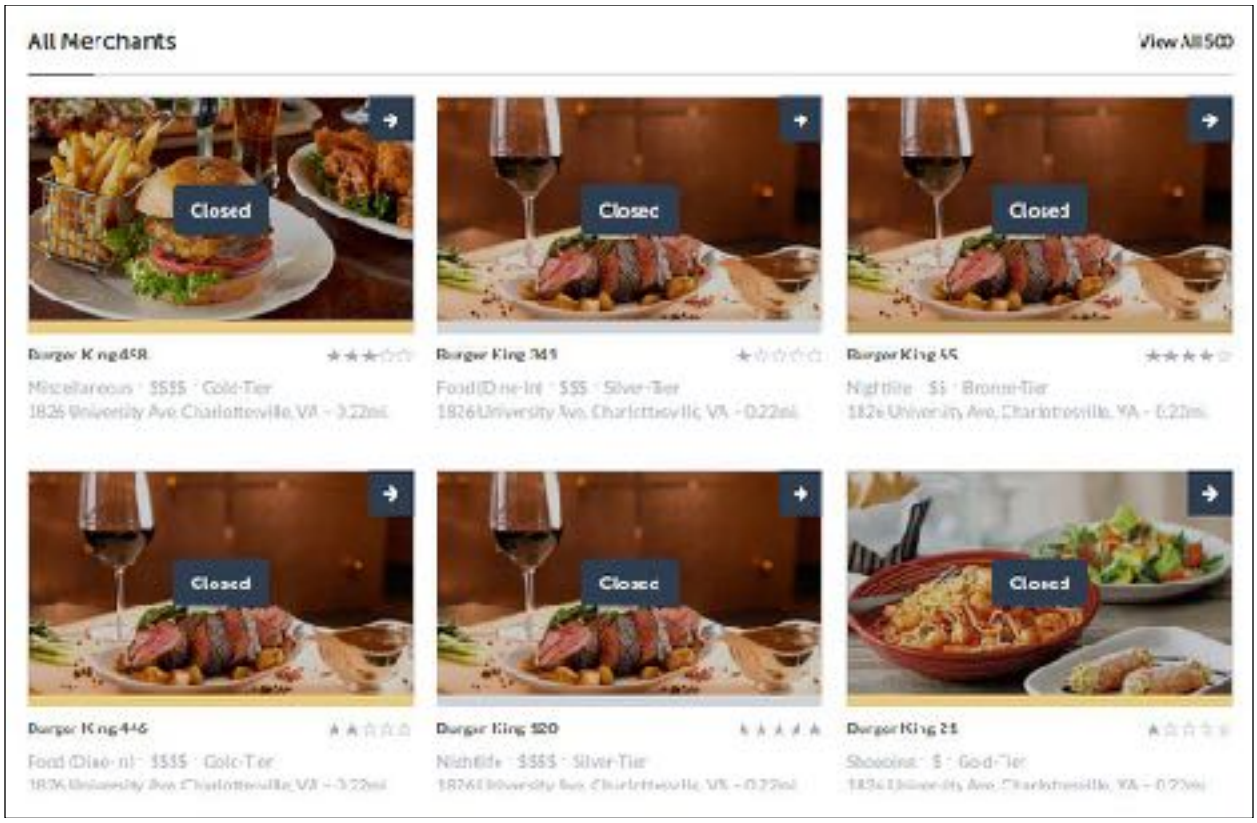

Figure 11: Merchant Grid

Figure 12: Merchant Header

Figure 13: Merchant Attributes

Figure 14: Merchant Information

Figure 15: Merchant Inventory

Platform

This section will focus on outlining the platform rationale and the framework that makes up its codebase. It will go in-depth about what distinguishes this idea from those similar and also give a bit of context to some of the design choices made.

How is it Unique?:

While the idea of a global database of merchants isn't exactly unique, the functionality inherent in the proposed platform helps to separate it from the rest. Most other sites find themselves in the role of an onlooker, keeping themselves responsible for the upkeep of merchant pages as they're forced to personally check that content is current and relevant. This platform, however, aims to insert itself into the ecosystem not as an onlooker, but as a service through which merchants can easily manage their online engagement and sales. Rather than the platform itself creating and managing merchant pages, merchants themselves will create accounts, showcase their current inventory, and ensure that content is both relevant while simultaneously managing their business.

If merchants currently want to grow their online brand, there are three main options: developing a custom website, using an online marketplace, or establishing a presence on another third-party platform. Each of these have benefits and drawbacks, but none truly provide a similar service to the one proposed in this report. A custom website requires an initial investment, and upkeep may not be feasible for the non-technically inclined. An online marketplace, such as Amazon or EBay, will not drive local traffic. Other third-party platforms focus individually on either the "transactions" or "marketing" aspects of running a business, but do not offer a solution

that does both simultaneously. Yelp, for example, focuses mainly on community engagement and feedback, but has not successfully marketed a solution for transactions. The Yelp Transactions Platform, launched in 2013, is still limited to a few categories of business and solely works through third party services acquired by the company.

Platform Framework:

Although there are quite a few other languages represented in the platform's codebase, the bulk of the code is primarily Javascript and Javascript frameworks. The breakdown of how each of these individual frameworks were used is as follows:

- *Express.JS*: Implements the server architecture for the platform, as well as the main bridge between the MongoDB database, the React.JS FE, and the API alongside both.
- *HTML/CSS*: Works in sync with React.JS to render and display the user interface.
- *MongoDB*: The BE database; it manages all information used and rendered on the platform for display.
- *Mongoose*: Main form of communication between Express.JS BE and MongoDB database. It helps to maintain database architecture and ensure proper translation between Node.JS code and MongoDB objects through schemas.
- *Passport.JS*: Used to implement the core functionality behind authentication sessions and tokens for user login and account functionality.
- *React.JS*: Works to render and display each of the individual components that make up the user interface of the platform. It's also used to manage states and transitions between pages while making up the majority of the FE codebase.

- *Redux*: Responsible for keeping specific React.JS states consistent across the entire platform, ensuring immutability, proper state management, and a global store of information.

The platform also makes use of a few third-party SDKs in order to manage information that's not as easily accessible during development, such as location or payment processing. Both Google and Stripe have capabilities far beyond that which I could hope to aspire at this moment, and as such using their external APIs are a necessary step.

- *Google's API*: Manages all location data on the platform, including all instances where computing coordinate data is necessary. It hosts the functionality behind both "Autocomplete" components on both the "Index" and "Platform" pages
- *Postmates/UberEats API*: Manages all forms of delivery functionality for the platform. This will not be implemented on launch, but it may end up being a necessary feature.
- *Stripe API*: Manages all instances of payment processing or transactions on the platform.

User Experience

This section will focus on detailing the user experience and the main features that will end up being available to the "User" on the finished build of the platform. The features outlined may change at any point if deemed necessary.

Pick-Up:

The main functionality of the platform is to allow for merchants to process online transactions. However, the aspect of delivery is something that the platform won't support, at least

natively. This may 11 end up changing in the future. As such, whenever a “User” buys an item from a “Merchant”, the two parties will take it upon themselves to complete the facilitated transaction. The “User” must go pick-up their item from the address that the “Merchant” specifies, and the “Merchant” will flag the transaction when the item is ready to be picked up. In spite of the other features that may end up defining the platform, this functionality is currently the main reason behind development.

Delivery APIs:

In spite of “pick-up” being the method most supported by the initial platform, it would be wrong to say that people do not expect “delivery” functionality in some form. While I have no intention of building this functionality into the app natively, Postmates and similar platforms have established APIs through which I can utilize their services. It won’t take that much work to build a section of the platform that checks if a “Merchant” is connected to a Postmates (or a similar platform) account, and if so, the “User” checking the site will have the option to have their items from a transaction delivered. I don’t expect to have this functionality completed in the initial build of the platform, however.

Filtering:

One of the main features currently integrated into the platform is the act of filtering individual “Merchants”. It stands to reason that those browsing the platform will need some way to search for specific “Merchants”, or at least some way to tailor their search to a specific set of properties so that they can find what they’re looking for. Each individual “Merchant” has dis-

cernible properties set to distinguish them from the rest when a search or filter is made by a "User".

Currently, functionality is implemented for filtering by "Location", "Category", "Pricing", "Rating", "Distance", "Tier", "Features", and "Tags". "Users" can also sort "Merchants" by either "Rating" or"Distance". In order to filter by "Location", all that's necessary for a "User" is to enter their current address. For "Category", "Users" can currently differentiate between the main six categories, which are "Food (Dine-In)", "Food (Take-Out)", "Shopping", "Nightlife", "Services", and "Miscellaneous". For "Pricing", it's separated into "$", "$$", "$$$", and "$$$$", with each representing different price tiers for "Merchants". For "Rating", the platform currently uses a "star" system that scores "Merchants" from 0 to 5 based on "Reviews" received. "Distance" is primarily just a feature that checks to see if "Merchants" are "<25mi.", "<10mi.", "<5mi.", or "<2mi." away. "Tier" is a filter that builds off one of the gamified aspects of the platform, and sorts "Merchants" into individual ranks based on their platform usage. "Merchants" are currently one of either "Platinum-Tier", "Gold-Tier", "Silver-Tier", or "Bronze-Tier". For "Features", "Users" can currently determine whether they want their "Merchants" to either "Accept Reservations" or be "Open Now". Finally, for "Tags", "Users" can essentially search for individual 12 "Merchants", as this feature searches all "Merchants" titles, tags, and descriptions to see if any are the same as the entered query.

Favoriting:

Being able to return to "Merchants" visited is an important feature that needs to be present in some aspect of the platform, both for the "Merchant's" sake in regards to retention and

online presence but also for the “User” in the instance that they really like the “Merchant” in question. Essentially, all this feature entails is the ability to “favorite”, or “star” specific “Merchants” that the “User” likes and appreciates, so that they can find them much more easily on their next visit to the platform.

Merchant Reviews

For “Users” in particular, the ability to see how good or bad a “Merchant” is needs to be present. While it would be extremely simple to just pull information from Yelp or another third-party source, the platform will instead have its own reviewing methodology so that “Merchants” can specifically build up their presence on it rather than the aforementioned third-party source. If the platform is ever to get true traction, it shouldn’t necessarily rely on any outside source beyond Google for location data and Stripe for transactions and payments.

For “Merchants”, a “Review” by a “User” will consist of a short string of text describing their recent interactions as well as a numerical “score” between 0 and 5 that categorizes their interaction numerically. Each of these “Reviews” will be averaged together in order to return a combined “score” that allows other “Users” to get a sense of how good or bad the “Merchant” truly is.

Notifications

Both “Users” and “Merchants” need some aspect of the platform that notifies them when some thing concerns them, whether they’ve accomplished a task or have their “Items” waiting for pick-up. Not only will this promote further engagement, but it also allows for the platform to

send them emails ensuring that they view their notifications. It's important to ensure that both "Users" and "Merchants" have reasons to check and engage with the platform regularly.

For the "Merchant", notifications will be tailored to their shop in general. They may include instances of a pending transaction, a written "Review", reports of their progress and transactions, messages from "Users", and more. On the other hand, "Users" will be notified of instances where "Merchants" have 13 finished processing their transactions, the community engagement on any of their "Reviews", updates about "Merchants" that they've recently visited or ordered from, and more. Notifications, in general, will be mainly responsible for promoting engagement and will be tailored to do so. The scope of such will change as the platform gets further into development.

Merchant Experience

This section will focus on detailing the merchant experience and the main features that will end up being available to the "Merchant" on the finished build of the platform. The features outlined may change at any point if deemed necessary

Reservations

One important feature that would help "Merchants" manage their business is the ability to allow "Users" to reserve "Items" from their inventory as necessary. Given that the main functionality of the platform is to pick-up "Items" from "Merchants", it will be helpful to ensure that an "Item" is held if the "User" isn't specifically able to make the drive to the "Merchant's" address. However, it stands to reason that this feature also has the capability to be quite annoying if

abused. As such, every “Merchant”, if they want to support such a feature, can toggle its functionality as active when they choose. Not only this, they can also choose which reservations to accept or decline.

Reward Programs

To promote further engagement, “Merchants” will be given the functionality to create a “Reward Program” for “Users” who provide them business. The parameters of the program can vary, but at its core, when setup, any “Item” that a “User” buys from a “Merchant” can be provided with individual “points” which can be redeemed only at the specified “Merchant”. This system is still a work-in-progress, and can still be changed if deemed necessary.

Sales/Discounts

With a standard inventory, it’s not rare to see a “Merchant” provide regular sales or discounts on specific items to incentivize “Users” to buy them. This may be done for many reasons, whether to cut down on the “Item’s” supply or as a tool to increase revenue through a spike in sales. Either way, it’s an important tool in a “Merchant’s” arsenal that a lot of other online platforms do not provide. On these other platforms, prices are primarily fixed and given that the “Merchant” doesn’t specifically control the account, must be manually changed.

On the platform, there will be a dedicated page for a “Merchant” to select specific “Items” from their inventory. Once selected, the “Merchant” can determine how much to discount them by just by entering either a percentage or the new price. Not only this, they will be able to view the amount of increased engagement from the sale and adjust the price as necessary.

When they decide that the sale should end, all that's necessary is to click a button and remove the "Item" from the list.

Not only this, "Merchants" will easily be able to generate individual discount codes for "Users" to enter when purchasing "Items" for a discount. This will allow for the "Merchant" to easily advertise these discounts to their consumers while simultaneously pushing them towards the platform. There, the "Merchant" will be able to view the amount of times that the code is used as well as how successful the campaign ends up being.

Merchant Tiers

To promote "Merchant" engagement on the platform, a gamification strategy will be implemented that rewards the "Merchant" for meeting specific milestones by upgrading their "Tier". While these milestones have not yet been selected, as a "Merchant" progresses through the different "Tiers", they will be eligible for greater visibility on the platform, discounts on advertising, the ability to have a larger inventory showcased, and more. The current "Tier" breakdown is as follows:

- *Bronze-Tier*: The initial "Tier" that every new "Merchant" acquires when they end up creating their account. This "Tier" will provide no additional rewards or benefits for the "Merchant", and will mainly be used for inactive accounts as it won't be that difficult to reach "Silver-Tier".
- *Silver-Tier*: The second "Tier" for "Merchants". This "Tier" won't be too difficult to reach, and will provide "Merchants" with an achievable milestone to promote the platform's usage. There will be a few benefits that come from reaching this "Tier", but they'll

mostly be limited to visibility and the size of their inventory. It wouldn't be prudent to give too many benefits for an easily reachable milestone. Most of the active "Merchants" using the platform will be this "Tier".

- *Gold-Tier*: The third "Tier" for "Merchants". This "Tier" should be reached only after the "Merchant" has spent a decent amount of time using the platform. "Merchants" who reach this "Tier" will 15 be privy to most of the benefits mentioned above, as well as an increased inventory size and visibility surpassing the "Silver-Tier".
- *Platinum-Tier*: The final "Tier" available for "Merchants" to reach. It will be very difficult for any "Merchant" to reach this "Tier"; the milestone will only be hit by those "Merchants" most dedicated to the platform. Any "Merchant" who reaches this "Tier", however, will be bestowed all the benefits mentioned. Their listings will be displayed at the top of the "Platform" page, only under those of "Featured Merchants".

Conclusion

As of right now, the main "Index", "Platform", and "Merchant" pages have been fully designed, developed and tested extensively. In spite of dummy data populating the platform, a "User" can browse and filter any of the "Merchants" on the platform by "Location", "Category", "Pricing", "Rating", "Distance", "Tier", "Features", and "Tags". They can also sort individual "Merchants" by either rating or distance. Each individual "Merchant" on the platform also has a dummy inventory. "Users" can browse each individual "Category" in the inventory, view individual "Items", and add their desired "Items" to their shopping cart for later purchase.

In spite of all this current functionality, one major piece of the platform that still needs to be implemented is authentication. I will be using Passport.JS in order to fulfill this necessity, but until this is complete, I won't be able to start working on any of the features described in the user or merchant experience mentioned above. As such, there's still plenty of work that needs to be done before the platform becomes anywhere usable. I expect to be working on this project for years to come.

By the end of this project, though, I hope to have a working prototype of this concept available online. I want to set aside some time after functionality is completed to refactor the entirety of the codebase as well as to componentize the architecture used. After finalizing development, I will need to either learn more about individual server architectures or hire a dev-ops engineer to maintain the server before hosting. Ultimately, I want this service to end up becoming a startup so that I can begin to go and market it extensively

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