University of Nevada, Reno

Department of Computer Science and Engineering

CS 425 Software Engineering

Project Part 1: Concept & Project Management

Drift - Team 12

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1 - Abstract

Drift is a thrifting mobile application as well as a software service specifically for public users to buy and sell thrifting goods (I.e., an e-commerce app for thrifting specifically). Ultimately, individuals are going to be able to make an account, post items to their page for others to see/buy, and peruse the main pages to see what other sellers are putting up for sale. Drift is important because it will pave the way for a more sustainable thrifting experience while making it easier to buy/sell, connect with other thrifters, and discover all types of second hand items. This document is an overview of Drift, its significance, legal aspects / impacts, and overall timeline of our senior project.

2 - Project Description

Main goals and objectives

The main objective of this project is to create a more sustainable and ethical way of shopping. According to Roundup.org, annually, 100 billion garments are produced, 92 million tons of garments are wasted, 1% of clothes are recycled. Basically, there's a tremendous amount of textile waste compared to textile production! Our goal is to drift (no pun intended) away from fast fashion, and the overconsumption of clothes, through a mobile thrifting app where users can buy and sell secondhand clothes!

Intended audience

While the app is open to anyone to use, the target user group is students and the populations where thrifting is not readily available. This project will be beneficial to them because it provides an easier way to shop for second hand apparel and gear and/or bring in income from selling their own. The public interest in this product comes from the thrifting community that wants to support our mission of sustainability and creating an ethical path to shop.

Main functionality and characteristics

Our app features a bar with five tabs named as follows: Discover, Chat, Post, Saved Items, and Profile. The discover screen has a search bar, shopping cart icon, and a feed of clothes to peruse. From the feed of clothes, each item can be clicked on for more information and cart related functionality. The chat screen will have all the user's conversations with other users separated by thread made. The post screen will have fields to fill out for

putting an item up for sale to other users. The saved items screen will have the items saved by the respective user for their later reference. Finally, the profile screen will feature the user's information, items for sale, and any other items pertaining to the user.

Technology description

We have a react native frontend along with the use of react native paper library, a typescript middleware, and a SQL backend. We'll use Github to collaborate as it has helpful tools such as creating and merging branches. The Axios library is the main library used for connecting the frontend to backend. Since this is a mobile app, we are using Expo to test the app on our phones.

Dependability Properties

In terms of reliability, our product is planned to be consistently reliable to the end-user which will be achieved through continuous testing throughout the development process. We plan to implement great security through our login authentication flow by hashing passwords, integrating encryption wherever possible with data flow, and a stretch goal of having two-factor authentication. Safety around our application will be achieved through ensuring users are respectful when using the application; we plan to implement this through a reporting system (if time permits) that allows others to report users if they feel as if they are being disrespected or unsafe.

3 - Significance

The significance of our project lies in how our mission is both to pave the way for a more sustainable process for purchasing clothes and to create a virtual experience that puts thrifting in the palm of one's hand. Our plans in making a more ethical approach for textile shopping is what makes Drift worthwhile. Our project has proved interesting to pursue thus far due to the wide number of possibilities that are created with this idea and the community outreach that can happen. From a developers point-of-view, the interest comes from the wide amount of experience that this will bring us with mobile development and software engineering. The project will help our professional growth as the development stage allows us to gain skills and experiences that will be highly useful to us within industry. Such skills and experiences include version control, collaboration, programming, overall software development, database work, among a multitude of others.

A new characteristic that we brainstormed (and hope to implement) is finding a way to integrate users' local thrift stores to allow for the brick-and-mortar shops to get on board as well with Drift's mission which is hoped to build up the thrifting community altogether. For further development beyond CS 426, we have hopes to integrate artificial intelligence for making a sort of personal stylist that renders products up for sale to build an outfit matching the user's desired style; depending on the development pace and journey, this would be a stretch goal of ours to at least get to experiment with in our project. Some similar applications include ThredUp, Depop, and ebay [thredUP, 2024]. All related software has a similar mission in sustainability and bringing a more ethical way to shop to communities. For example, Depop presents a mission to be kinder to the world and people through being more sustainable and user friendly [About Depop, 2024]. Ebay is a more general related app in connecting sellers to buyers across several markets whereas the others are a bit more similar in functionality; however, Drift differs in that it is centrally a mobile application [eBay, 2024].

For marketing potential, Drift plans to take advantage of the increase in popularity that thrifting is taking on and run with promoting sustainability within fashion as a point of improving the business. According to a 2023 report by thredUP, the secondhand market is expected to double its current size by the year 2027, and online resale services constitute the fastest-growing sector of the secondhand market overall [thredUP, 2023]. Overall, this indicates the interest in shopping for secondhand apparel and the market potential that our project has. To reiterate, our project idea will have both social and environmental benefits by our effort to create a more sustainable way to shop. Thrifting is an avenue for individuals to buy items in a way that is better for the society and the environment. Our mobile application will create additional ways to thrift and help people do so in an effortless, ethical way.

4 - Legal and Ethical Aspects

With every project or new idea, comes potential challenges or legal issues. For Drift, some of these issues could be the legalities behind public sellers and buyers in preventing scam like situations. Such situations could be individuals buying from a seller that may not have the actual item that they are posting for sale and in result ripping off others by receiving the money and not sending the item in return. This could present lawsuits surrounding our application in being the medium of transaction; therefore, strategies need to be in place to try and prevent such occurrences to the best of our abilities. With more knowledge comes more responsibility, therefore we must also hold our project to the highest security standards due to it being an e-commerce app in which critical payment

information can be stored. This can be attack surfaces which can lead to legal issues if not approached with preventative security measures.

In accordance with the ACM code of ethics, we plan to ensure our product and its related modifications meet the highest professional standards by continually updating third party packages that our app may be using and by furthering our development experience and knowledge; this will allow us to enact best practices throughout the software lifecycle and development of Drift. These plans will allow us to ensure that our product is kept to the highest professional standards because of the effort that we are going to put forth in implementation and maintenance of our software. The key to ensuring this is to continually test our software through development and AppScans to seek out vulnerabilities for modifications as necessary. Furthermore, the maintenance part of the software development life cycle is also where our action comes in to ensuring that we fulfill the PRODUCT clause to the best ability.

5 - Changes and Progress Since Initial Project Concept

Since October 2020, we've had our app navigation set and the following screens panned out: login, discover, cart, and post item. Moreover, we established schemas for the items and users along with the api calls to retrieve certain information related to items and users. Our major changes were adding authentication and payment. Users can make their own account on the app and reliably re-login now. We just have to encrypt the user's password now. Additionally, we've made headway in the payment process using Stripe and Stripe's test business card.

For further development, we need to refine the payment process by also counting in factors such as shipping and tax which can be dependent on the area the item is being shipped from, item's weight, etc. The search bar is now available for users to search through the database of items; however, eventually we would like to make the discover page initially populate with a more personalized experience dependent on the users preferences. In regards to the database, the schemas and many of the api calls have been implemented. Other upcoming major developments include the chat and profile page. We want users to be able to communicate with each other whether its from a specific item or from another user's profile page. A user's profile page page should give the user a holistic view of all the items they're selling, ratings, followers, biography, username, and ways to change some of those attributes.

6 - Project Responsibilities

The main subsystems are as follows: Login/Signup Authentication Flow, User Information, Item Management, Cart & Checkout, Chat, Profile Management/Gamification, and Architecture & Database.

Subsystem Responsibilities by Person:

- Jordan
    - Login/Signup Authentication Flow - This subsystem manages the entrance and exit to the app. User's login data should be encrypted and users shouldn't have to worry about re-login after exiting the app as this system should also track user sessions.
    - User Information - Each user's experience with the app should be personalized to them based on their own data. For instance, the cart page should only hold items that they wanted to buy. This subsystem is responsible for organizing the user information and being reliable to give out any needed information to certain screens to create a personalized user experience.
    - Architecture & Database - This subsystem should be trusted to keep the app's data safe which includes user and item information. This subsystem has special procedures trusted in dealing with such information.
- Fiorina
    - Chat - This subsystem allows users to message each other on the app. Users can message each other based on an item or just based on the profile. This subsystem should keep track of the order and time of messages in a conversation, let a user chat with another user, and allow the user to easily view all their conversations on a screen.
    - Profile Management - This subsystem is the user's own profile where they can see everything they're selling, their ratings, followers, username, biography, and private user information.
    - Saved - This subsystem helps the user to freely organize any items they saved (even if they didn't add it to their cart). Users are free to make "folders" to organize the items and this subsystem should help maintain the integrity of that organization.
- Christian
    - Item Management - Items have various different states in the app such as being sold, newly posted, in the cart, saved, or available. Additionally, items have many attributes such as colors, size, category, and more. This subsystem is responsible for maintaining the correct states/attributes of the

item for the best experience in thrifting. These states can dictate what can be shown in other screens or not. For instance, a user shouldn't accidentally buy a sold item. Another example is that filters for blue shirts shouldn't generate pink shirts as the search result. Another important part of this subsystem is allowing new items to join the app.

- Cart & Checkout - This subsystem is responsible for keeping track of the items a user wants to buy along with the actual buying of an item with the help of Stripe. It should determine things like the total, taxes, and shipping costs. Moreover, the user's financial information should be encrypted.

7 - Project Monitoring and Risks

We plan to monitor the project's progress by holding a team meeting each Thursday (after our section's class time) to discuss individual contributions made since the week prior. We will also go over our list of functional and nonfunctional requirements each week to identify which ones still need to be completed, so that we can list the necessary steps and delegate the responsibilities for each requirement to relevant team members. In this way, we can maintain a sustainable pace for reaching the end of the semester with a product we have all equally contributed to and are proud of. We will also be sure to discuss any possible risks related to the development of our project, and how we can work to prevent them from holding us back.

Risk 01 - API Failures / Changes

In our frontend and middleware, we are using several free libraries and APIs to assist with various processes, such as Stripe for processing transactions. In the case of changes to these APIs and libraries making our app dysfunctional, we will have robust and descriptive error handling implemented throughout our code so that issues can be identified and resolved quickly, avoiding a major setback.

Risk 02 - Compliance Issues

Since our project is expected to be of industry standard, we need to be careful that we are not conflicting with any relevant compliance policies. We will be sure to review the terms of service of the APIs we are using, any legal requirements related to e-commerce, and standards for user data privacy before we fully finish connecting our frontend and backend.

Risk 03 - Image Handling & Storage

In the event of scaling our platform, the volume of image files on our servers would greatly increase, as would the resources required to manage and store them. To mitigate this risk, we plan to integrate a client-side image compression library in React Native to limit the resolution of uploaded product images.

Risk 04 - UI and Usability Faults

After developing an app for so long, it can be easy to become so familiarized with its layout and performance to the point where analyzing it for intuitiveness and usability becomes impossible. This is why we plan to ask advisors, friends, and the teaching team for any issues they can see in the UI patterns we may have come to dismiss or ignore.

Risk 05 - Cross-platform Compatibility

Certain implementations of our frontend may work totally fine on iOS, but are broken on Android (or vice-versa). To mitigate this risk, we will test each iteration of our project on both Android and iOS emulators so we make compatibility adjustments where needed.

Risk 06 - Data Consistency

Through transactions with the frontend, middleware, and backend, data objects such as users, products, and orders go through many operations and mutations. To ensure data remains consistent, we will continue to implement robust error handling and be meticulous with endpoint creation.

Risk 07 - Concurrency Issues

Our app presents the possibility of several types of concurrency issues if the correct prevention measures aren't implemented correctly. For example, if one user adds a product to their cart at the same time as another user and both users attempt to checkout, there needs to be logic in place to prevent two orders being made for the same product. We plan to brainstorm other possible race conditions and implement working concurrency control mechanisms in the backend.

Risk 08 - Security Concerns

Users are asked for several types of sensitive information on our platform, such as credit card information, DOB, name, email, and a password. If a breach of security were to occur, it would have very negative consequences for our users. To mitigate this risk, we will continue to use secure authorization practices, industry approved APIs for interacting with payment info, proper encryption practices, and secure communication methods.

Risk Register					
Risk ID	Risk	Likelihood (/5)	Impact (/5)	Severity (/5)	Mitigation Strategies
R01	API Changes	1	4	3	-Robust error handling
R02	Compliance Issues	3	2	3	-Review ToS of APIs, e-commerce legal requirements, standards for data security
R03	Image Handling	2	2	2	-Implement client-side image compression
R04	UI Faults	4	3	3	-Conduct testing with friends and advisors
R05	Cross-platform compatibility	4	4	4	-Test project on both Android and iOS emulators
R06	Data Consistency	3	5	4	-Robust error handling -Test endpoints
R07	Concurrency Issues	5	5	5	-Implement concurrency control mechanisms in backend
R08	Security Concerns	3	5	4	-Use secure authorization and encryption practices -Use secure

Risk Register					
					communication methods during development -Use industry approved APIs and libraries

8 - Accessibility

Mobile applications need to be developed with considerations in mind for all types of differently abled users. With our project Drift, we want to ensure that the appropriate measures are taken to make our project accessible for these users.

For users with visual impairments, text of smaller font sizes, small buttons, and small product images may be difficult to see. We plan to continually ensure that our font choice and font size settings are in line with the typography standards outlined by the U.S. Web Design System (USWDS) [USWDS, 2023]. These standards supply us with some specific nonfunctional requirements to check the design of our app against. Our current font for the app is Roboto on Android and San Francisco for ios, both of which adhere to the USWDS standards for readability, and we use a font size of at least 16px (considered to be the minimum recommended font size) throughout the pages of the app. Furthermore, we plan to use the Contrast Checker from WebAIM to confirm our text, button, and background colors are readable to users with color blindness [WebAIM, 2024]. For users who require the assistance of screen readers, we plan to continue to utilize the appropriate props in React Native for screen reader compatibility, and ensure that meaningful and descriptive labels are given to buttons, images, screens, forms, and other interface elements. As for a functional requirement, we will add accessibilityLabel properties to touchable components that may benefit from more detailed descriptions for users with screen readers.

For users with cognitive and learning disabilities, we will ensure that our navigation and UI patterns remain consistent throughout the pages of the app. Our main buttons for navigating between pages remain at the bottom of each screen throughout use of the app, and for each instance of a back button (for example, in the Shopping Cart Page) we place it

on the upper left side of the screen. Furthermore, we maintain a usage of concise, simple, and intuitive language for placeholder texts in input elements and page names (Discover, Chat, Post, Saved, Profile). These consistent nonfunctional design choices reduce the cognitive load for users who experience difficulty with mobile app navigation and usage.

For users with low bandwidth or internet connectivity issues, we plan to continue to implement functions optimized for efficient data handling, such as asynchronous functions. Also, we will continue to implement screens using data efficient render methods, such as the FlatList prop in our Cart Page and Discover pages. FlatList props are often used when a large list of objects are to be rendered in a single view, resulting in a scrollable environment [React Native, 2023]. The objects' data, when rendered in a FlatList, is only loaded as the components are made visible on the screen, which greatly reduces bandwidth usage. We plan to utilize this prop on the Profile page of Drift as well.

9 - Contributions of Team Members

Team Members	Time Worked on Project Part	Specific Activities Worked On
Jordan Rood	15 hours	- Abstract & Project Description - Significance - Legal & Ethical Aspects - Project Responsibilities
Fiorina Chau	1 hours	- Changes and Progress Since Initial Progress Concept - Project Responsibilities
John Christian Jackson	10 hours	- Project Monitoring & Risk - Accessibility - Cart Page and Transactions

10 - References

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