Capstone Project Abstract

DALHOUSIE
UNIVERSITY

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Introduction

The rise of second-hand goods shopping has created a vibrant and dynamic marketplace in Canada. As more people adopt sustainable practices and look for affordable alternatives, second-hand transactions have become an integral part of the economy. These include purchases of household items, accessories, furniture, electronic gadgets, and even vehicles. Statistics highlight the growing trend: in 2016 alone, the second-hand economy accounted for $29 billion in transactions, underscoring its significant impact on consumer behaviour and financial sustainability.

Despite the growing popularity of second-hand shopping, the landscape remains overwhelmingly fragmented. Buyers often musts navigate multiple platforms such as Facebook Marketplace, Kijiji, Clutch, and Autotrader to find their desired items. This process is not only time-consuming but also inefficient, especially for individuals unfamiliar with these platforms. Such challenges are even more pronounced for international students, migrants, and immigrants, who may find it difficult to locate and compare items across different marketplaces. The lack of a unified platform to aggregate listings, coupled with inadequate filtering options, creates a frustrating experience for users, often leading to missed opportunities or settling for less-than-ideal purchases.

Project Plan and Timelines

Due Date	Task Name	Assignee	Status	Priority	Notes
2024-09-27	Project Plan Discussion Meeting	Rutvik Vengurlekar	Done	High	Discussion on finding the problem statement
2024-10-03	Project Proposal	Rutvik Vengurlekar	Done	Medium	
2024-10-10	Customer Validation and Interview	Rowena Sagaria	Done	High	
2024-10-17	Gather insights on user preferences	Rutvik Vengurlekar	Done	Medium	Filter options, alert systems, and UI expectations
2024-10-17	Google Survey	Rowena Sagaria	Done	Medium	
2024-10-24	Market analysis	Saransh Kotha	Done	Low	Analyze existing platforms like Facebook

					Marketplace and Kijiji
2024-10-24	Conduct Phase-1 Testing	Rowena Sagaria	Done	High	Major sections: Home, Search Results, Product Page, Alerts, Login Page, etc.
2024-11-07	Project progress report	Rutvik Vengurlekar	Done	High	
2024-11-07	Project progress presentation	Rowena Sagaria	Done	Medium	
2024-11-07	Web Development	Saransh Kotha	Done	High	
2024-11-18	First Prototype	Saransh Kotha	Done	Medium	Developed with API integration
2024-11-21	Review and iterate on prototypes	Rowena Sagaria	Done	High	
2024-11-24	Conduct usability tests	Rutvik Vengurlekar	Done	High	
2024-11-28	Final Project Presentation	Rowena Sagaria	Done	Medium	
2024-11-28	Project Report	Rutvik Vengurlekar	Done	Medium	

Problem Statement

The existing approach to second-hand shopping lacks cohesion and accessibility. With no centralized platform to bring together listings from diverse sources, users must manually search multiple platforms, each with its own set of navigation tools, filters, and user interfaces. For newcomers to Canada, this fragmented approach adds an unnecessary layer of complexity, making it difficult to find affordable and high-quality used products in a timely manner.

Proposed Solution

To address this challenge, we propose the development of a centralized platform that aggregates listings from various second-hand marketplaces into one intuitive, easy-to-use website. This platform will revolutionize the second-hand shopping experience by offering:

Comprehensive Aggregation: Users will have access to listings from multiple platforms, ensuring a wide variety of options in one place.
Advanced Filtering: Features such as filtering by price, location, condition, and category will allow users to refine their searches with ease.
Price Comparison: Real-time price comparisons across platforms will enable users to make informed purchasing decisions.
Personalized Alerts: Customizable notifications will help users stay updated on specific items of interest, enhancing convenience and efficiency.

Impact and Objectives

The platform aims to save users time, simplify the second-hand shopping process, and provide a seamless and satisfying experience. By leveraging cutting-edge technology, the proposed solution will not only address the challenges of fragmented marketplaces but also cater to the unique needs of international students, migrants, and immigrants in Canada.

The development of this platform aligns with the increasing adoption of second-hand shopping, driven by economic pressures and environmental consciousness. As inflation continues to rise, more people are turning to second-hand options as a means of cost-saving and sustainability. By creating a centralized solution, we seek to bridge the gap in the marketplace and empower users with tools to find the best deals efficiently.

Problem Validation and User Testing

Problem Validation

To validate the problem of fragmented second-hand marketplaces and assess the need for a centralized platform, we conducted a survey targeting international students, migrants, and residents in Canada. The survey aimed to uncover the shopping habits, challenges, and preferences of users in their pursuit of second-hand goods. Below are the key findings and implications derived from the data:

Over 60% of participants reported frequently using second-hand marketplaces like Facebook Marketplace, Kijiji, or Craigslist. However, 40% of respondents had never used

such platforms, indicating a potential market segment that could be tapped with an optimized solution.

More than 70% of users spent 30 minutes to over an hour searching for products across multiple platforms. This highlights the inefficiency and time-consuming nature of the current fragmented system. While 65% of respondents use filters to narrow their search, most found the filtering options inadequate or not optimized to meet their needs. Users cited a lack of specific filters like price range, location, or product condition as a significant barrier to finding suitable items.

Although 85% of participants compare prices across platforms, the process was deemed time-consuming and often unhelpful due to differences in product descriptions and categories. Users expressed frustration over the absence of automated tools to streamline this process, with several stating they resorted to manual cross-comparisons or avoided it altogether.

90% of respondents indicated strong interest in an app that aggregates listings from multiple platforms and offers comparison capabilities. Users emphasized that such a platform would save them time, reduce frustration, and simplify their search process.

Recommended Features:
Participants suggested several features to optimize the experience, including

- **Advanced Filters:** Filters for category, price range, location, and condition.
- **Tailored Alerts:** Notifications for specific items or categories of interest.
- **Current Price Metrics:** Automated removal of outdated prices to ensure relevancy.
- **User-Friendly Design:** Clear navigation and a streamlined interface to enhance usability.

The survey results validate the need for a centralized platform to address the pain points of users in the second-hand goods market. The findings reveal that users prioritize ease of use, advanced filtering, and price comparison capabilities in their search for second-hand products. There is significant untapped potential in engaging individuals who have not previously used second-hand marketplaces, particularly through a platform that simplifies and enhances the shopping experience.

User Testing

Usability testing enabled us to collect user's insights, identify workflow inefficiencies, and evaluate user's experience of our project. We conducted two methods of usability

testing: in-class testing and a usability testing survey. The in-class usability testing was conducted during class time with our fellow classmates belonging to other groups. We introduced test scenarios and developed tasks to allow the testers to explore our low-fidelity prototype, followed by a brief survey. All testers provided positive feedback regarding our operability, layout and workflows.

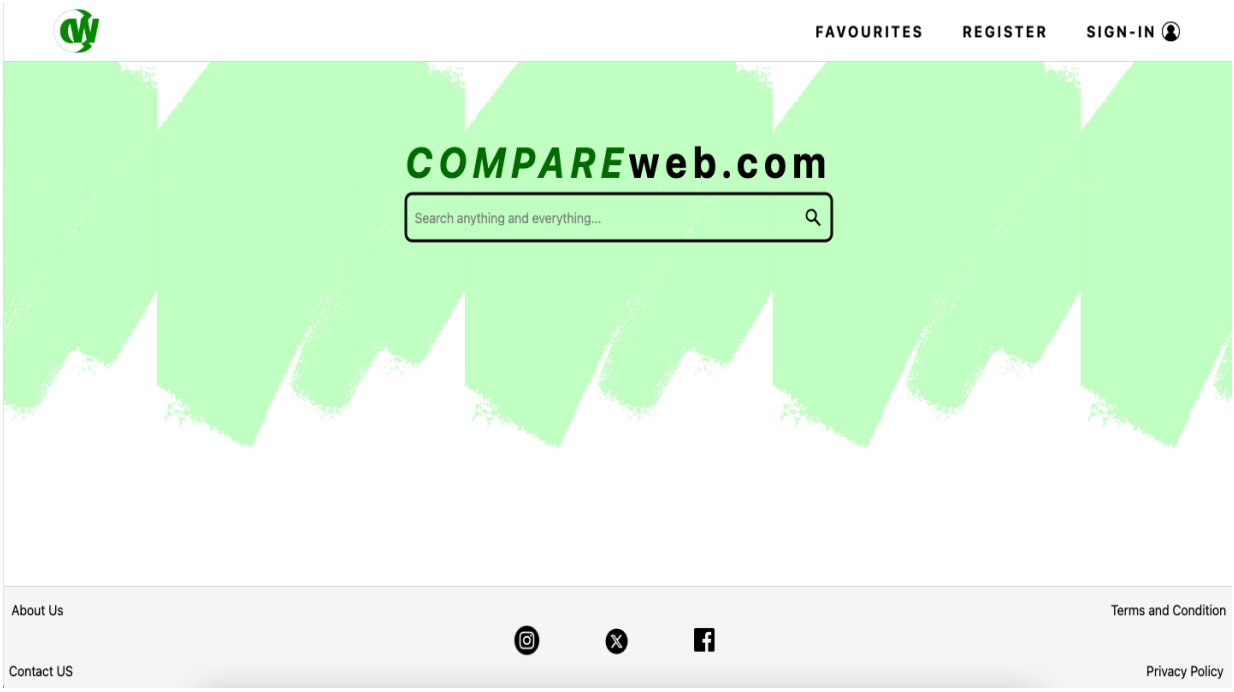
Key Findings:

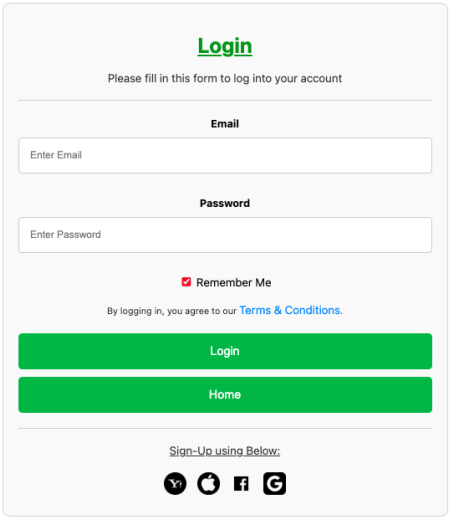
- **Positive Feedback**:
    - Participants found the prototype's layout intuitive and user-friendly. The fonts and colour schemes were described as visually appealing and easy to read. Navigation was seamless, and features such as the search bar and category filters were deemed helpful. All participants expressed their willingness to recommend the application to others.
- **Suggestions for Improvement**:
    - Participants noted that some features lacked clarity, particularly the filtering options and price comparison functions. They emphasized the need for better descriptions to guide users, especially first-time users.

Proposed Solution

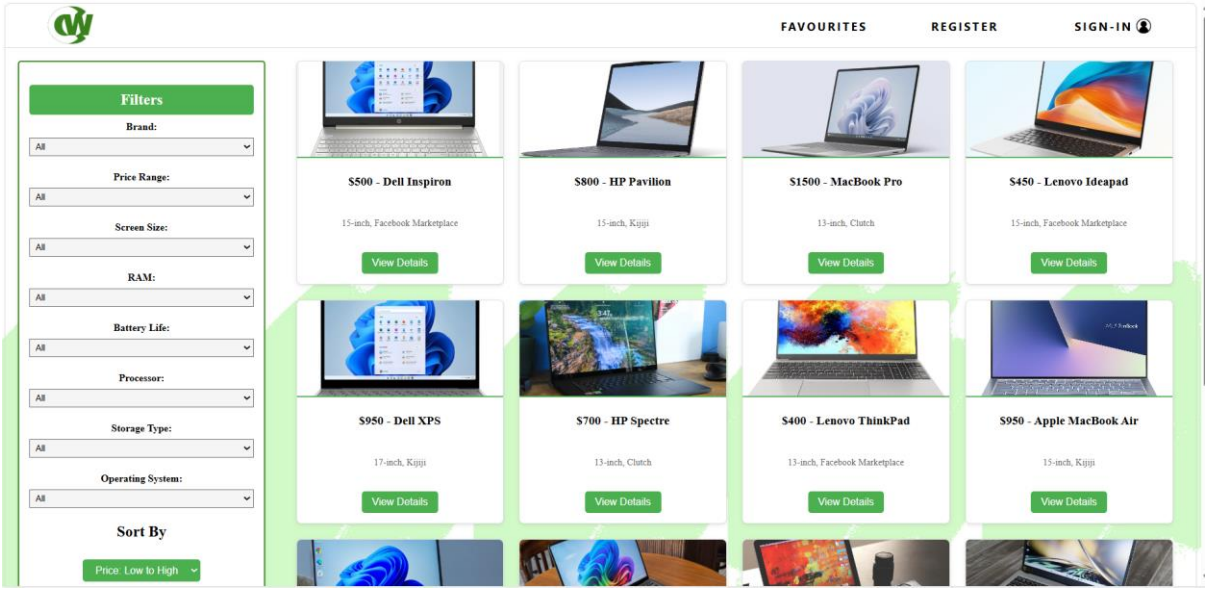
Our project aims to simplify and streamline the fragmented second-hand goods marketplace by creating a centralized platform that aggregates listings from various sources into a single, user-friendly interface. To achieve this, we have developed a fully functional website that provides users with an intuitive experience to search for second-hand products, filter results, and explore detailed listings.

The website's front end has been designed using HTML, CSS, and JavaScript, ensuring a responsive and visually appealing user interface. The core functionalities include a well-structured **homepage**, a **registration page**, a **login page**, and a **product page**. The homepage is equipped with a prominently displayed search bar that allows users to search for specific products quickly. Meanwhile, the product page dynamically displays product details and offers advanced filtering options such as price range, location, and product condition, enabling users to refine their search effortlessly.





To demonstrate the platform's potential, we have integrated the eBay API, which is currently operational but connected to their non-production database. While the API successfully displays our ability to integrate live data from external platforms, it does not display production-level product listings. To overcome this limitation for demonstration purposes, we have created a static product page. This static page illustrates how the website will display products dynamically when users search for specific items, such as laptops. Users can see different laptops with placeholder descriptions and filtering options, providing a clear vision of how the platform will function once live data is fully integrated.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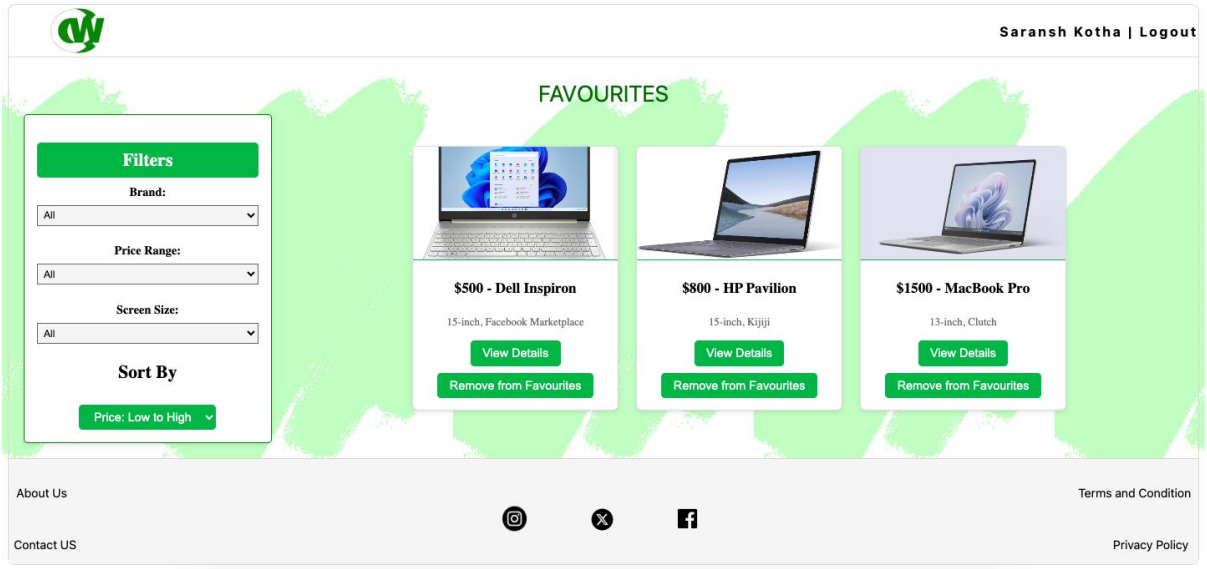
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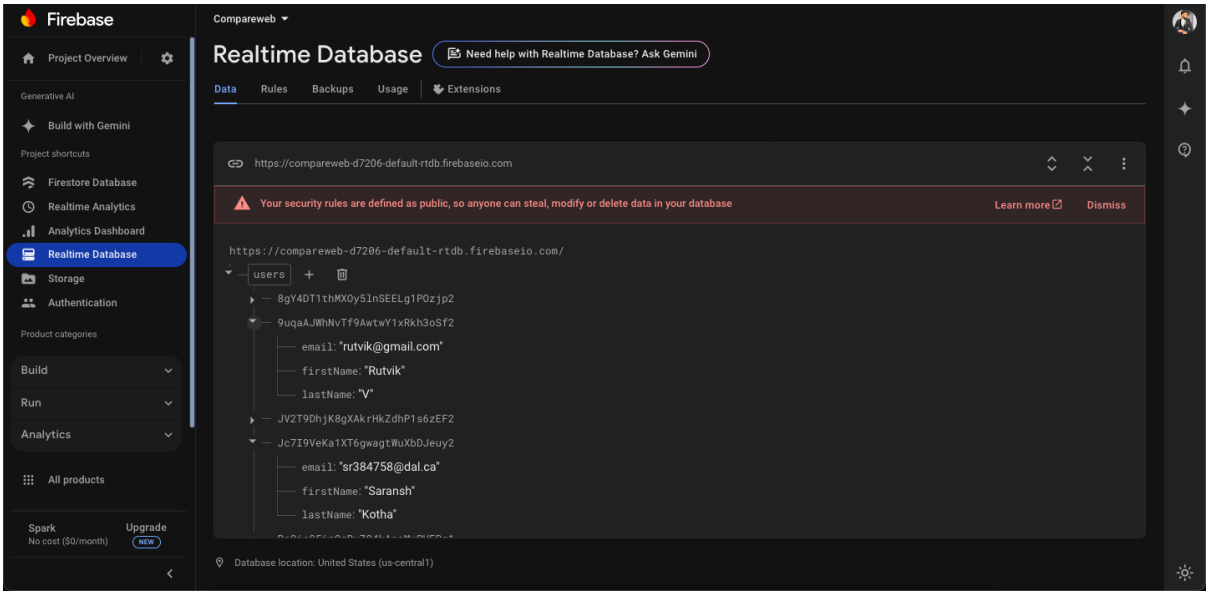
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Our platform addresses significant challenges faced by users in the second-hand market. By consolidating listings from various sources, we reduce the time and effort required to navigate multiple platforms. Furthermore, the intuitive filtering options and seamless interface enhance the overall user experience, making it easier to find relevant products. This solution not only simplifies the process of second-hand shopping but also provides a scalable foundation for future integrations with additional marketplaces.

Technical Development

The technical development of our project involved the use of modern web technologies to build a functional and scalable platform. The **frontend** of the website was developed using **HTML, CSS, and JavaScript**, ensuring that it is visually appealing, responsive, and accessible across various devices. These technologies allowed us to design a structured homepage, user authentication pages (registration and login), and a dynamic product page for displaying search results.

To enable data aggregation, we connected the website to the **eBay API**. This integration serves as a proof of concept for fetching product data dynamically from external sources. Although the current API connection retrieves data from eBay's non-production environment, it demonstrates the feasibility of real-time product listing aggregation. The backend has been designed to accommodate additional API integrations in the future, enabling the platform to scale and include listings from other marketplaces such as Facebook Marketplace and Kijiji.

Given the limitations of live API data, we developed a **static demonstration page** to showcase the website's functionality. This page highlights how product listings, such as laptops, will appear on the platform. It includes key features such as advanced filtering by price, location, and product condition. The static implementation effectively simulates the user experience and validates the platform's design and usability.

The project also emphasizes modularity and scalability. The backend is designed to support future enhancements, such as incorporating **real-time notifications**, **rating and review systems**, and **tailored alerts** for specific product categories. For database management, we have used **MySQL**, which stores user data, product details of the products that are marked as favourites, and search history. Additionally, for robust integration and seamless data management, we are leveraging **Python** for API handling and web scraping, laying the groundwork for scalable and efficient backend operations.

Next Steps

Moving forward, our project aims to enhance its current functionality and broaden its scope to address real-world challenges while remaining scalable for future growth. One

of our primary objectives is to integrate additional marketplaces such as Facebook Marketplace, Kijiji, and Craigslist through API integrations. This will allow us to consolidate listings from multiple platforms, creating a comprehensive second-hand marketplace that eliminates the need for users to search across multiple websites. To support this, we plan to develop algorithms that harmonize data from various sources, ensuring a consistent presentation of listings and enabling seamless comparisons for the users.

Another key focus is to implement advanced filtering and search capabilities to make the platform more efficient and user-friendly. Features such as dynamic filters for brand, price range, location, and seller ratings will allow users to refine their searches and quickly locate the products they need. Additionally, we aim to incorporate Natural Language Processing (NLP) techniques to interpret user queries more effectively, enhancing the relevance of search results. These features will address one of the major pain points expressed by users: the lack of adequate filtering options in existing platforms.

To increase accessibility, we plan to expand the platform into a mobile application. By leveraging cross-platform development frameworks like React Native, we can create a mobile app compatible with both iOS and Android devices. The app will feature push notifications, location-based searches, and a streamlined interface tailored for mobile users, offering convenience and on-the-go access to the platform.

To build trust and transparency, we intend to introduce user reviews and ratings for products and sellers. This feature will allow users to provide feedback and read insights from others, fostering a community-driven approach to quality assurance. Alongside this, secure payment options and delivery integrations will streamline transactions and logistics, further enhancing the user experience. By collaborating with logistics providers, we plan to offer shipping solutions, including tracking and insurance, making the platform a one-stop solution for buying second-hand goods.

Machine learning will play a pivotal role in future development. By analyzing user behavior, machine learning models will provide personalized product recommendations, improving engagement and user satisfaction. These models will adapt continuously to reflect changing user preferences and market trends, ensuring that the platform remains relevant and effective.

In addition to expanding the platform’s core functionalities, we aim to explore niche markets such as vintage clothing, rare collectibles, and refurbished electronics. Dedicated sections for these categories will attract a broader audience and position the platform as a comprehensive marketplace for specialized goods. To further enhance the platform's utility, we will develop data analytics and reporting tools. Users and sellers

will have access to dashboards displaying metrics such as search trends, price comparisons, and listing performance, empowering them to make informed decisions.

Finally, we intend to align the platform with sustainability initiatives. By promoting the environmental benefits of second-hand shopping, such as reducing waste and minimizing carbon footprints, we aim to appeal to eco-conscious consumers. Features like sustainability badges for products and sellers adhering to green practices will underscore our commitment to the environment.

Conclusion

The development of our centralized second-hand marketplace platform marks a significant step toward addressing the inefficiencies and fragmentation in the existing second-hand goods ecosystem. By consolidating listings from multiple sources, integrating advanced filtering options, and creating a seamless user experience, we aim to simplify the process of finding and purchasing second-hand products. Our platform not only reduces the time and effort users need to invest but also ensures they have access to a diverse range of options tailored to their preferences.

Through user validation and usability testing, we identified key pain points and incorporated valuable feedback into our design and functionality. The integration of static product demonstrations, coupled with our eBay API proof of concept, highlights the scalability and potential of our solution. Furthermore, by planning future enhancements, such as additional API integrations, advanced search capabilities, personalized recommendations, and secure payment systems, we have laid the groundwork for a robust and scalable platform.

This project not only addresses practical challenges faced by international students, immigrants, and residents in Canada but also aligns with the growing emphasis on sustainability and cost-effective shopping. By promoting second-hand transactions, our platform encourages environmentally responsible consumer behavior, further adding to its societal value.

In conclusion, our platform is designed to cater to the diverse needs of second-hand shoppers while positioning itself as a one-stop solution for second-hand goods. With a focus on usability, accessibility, and future scalability, this project has the potential to transform how users engage with the second-hand economy. By continuously iterating and expanding on our solution, we aspire to set a new standard for second-hand shopping, making it more efficient, enjoyable, and sustainable for users across Canada and beyond.

References

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