The Barter Application

Interim Report

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Abstract

The waste problem in Hong Kong drives all of the existing landfills in Hong Kong to be full. The promotion of recycling and reusing is a strategy to solve the waste problem. This project, therefore, aims to create a platform for people in Hong Kong to have alternative ways to handle the unneeded goods, instead of throwing them away. The most critical part of the project is to design a simple and functional user interface for users to have a good user experience when using the application. The project is progressing as scheduled. Our current outcome is the researching and reviewing of similar products in the market. We will use the advantages and disadvantages of those products, as a reference, to guide the design of our application. The next step involves the testing of different Application Programming Interfaces for constructing the backend server of the application.
Acknowledgements

First, I would like to thank my supervisor, Dr. TW Chim, who had provided many ideas on this project. The guidance given by him is one of the essential parts to make this project keep working.

I would also like to acknowledge Dr. Anthony Tam, who had taught me the idea of constructing a backend server by Node.js and combining it with the database. This technique helps for efficiency in the project.

Last, I would like to thank my CAES 9542 lecturer Miss Mable Choi for helping in the project plan, interim report and the presentation.
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1. Introduction

According to the research made by the Friends of Earth in 2009 [1], there were 6.4 million tons of waste each year in Hong Kong. All existing landfills in Hong Kong are expected to be full. The Hong Kong government have tried to solve this problem, by building up more landfills and incinerators.

However, if the origin of this problem is not dealt with, this issue will occur again and again. One of the best ways to solve this problem is to reuse and recycle the things that are used to be thrown away. The importance of an item will be different for different people at different times. For example, if a person was having a number 2 in a public toilet but without toilet paper, if one can provide the person toilet paper, it will be a lifesaver for them. But if the toilet paper was provided at a different time, it would be completely meaningless for them. In Hong Kong, there are a lot of these cases happening. The mismatch of resources, or people are getting the resources at the wrong time. To solve this situation, a barter application will be a solution.

1.1. What is Barter

Barter is a trading system used before the modern economic principle [2]. Instead of using a medium of exchange such as money, both of the trading sides use goods or services to exchange for other goods or services. Figure 1.1 shows the concept of goods exchange. The barter application can let users use the things they do not need anymore, to exchange for things they need.

![Figure 1.1 Concept of barter](image-url)
1.2. Why Barter
The reason that barter is better than cash trade, is because when a trade involves money, there will be scalpers to affect the market. For example, when the iPhone 8 was first released on the market, since it was a limited sale, there were lots of scalpers selling the iPhone for three or four times the original price. Those scalpers will affect the market, preventing people from getting what they need in a timely manner. Furthermore, there will be scammers who will use the loophole of bank transfer or fake selling, to scam the money of the honest users. Therefore, using barter will be more suitable to reach the result of reusing and recycling secondhand goods.

1.3. Goals and Objective
In this project, we aim to build an application for people to recycle and reuse second-hand goods. The scope of this project can be divided into two parts, the first one is the backend system and database for storing user information, the second part is the user interface for providing users a good experience while using this application.

1.4. Project Contribution
The idea of recycling and reusing is a trend for solving the land problem in Hong Kong. The Hong Kong government has promoted this concept, by promoting the service “Green Community”, which will help recycling papers, cans and plastics. It is hoped that this project can collaborate with the Hong Kong government, enormously help people in Hong Kong, to have a good habit on handling unneeded goods.

1.5. Report Outline
This report is structured into five chapters. The first chapter introduced the current situation of wasting in Hong Kong. It further proposes the concepts and the advantages of barter and how it can solve the waiting problem. After that, It sets out the objective of this project and how this project can be contributed to Hong Kong.
Chapter two outlines the stories that inspired us to have this project. It also lists some similar products in the market, and analyzes the advantages and disadvantages of those products.

Chapter three analyses the methodology used in this project, the complete hierarchy of the application, including database, backend and frontend side. It also explains how users can use this platform to start a deal, and the details of the trade.

Chapter four presents the current progress of the study associated with the system design. It will show the project schedule, the future steps that might be included in this project in the future, and the challenges we are facing at present.

Chapter five concludes the report. It sums up the major progress made until now and the next steps we are going to do as stated in chapter four. The current focus of the project would be the backend construction of the application.
2. Inspiration and Related Works

2.1. Introduction

In this chapter, the stories that inspired us to have this project will be presented. Also, it reviews some related products on the market, and analyzes the advantages and disadvantages of those products, to use as reference for making the project better.

2.2. Inspiration

2.2.1. Straw Millionaire

In Japan, there is an old Buddhist folktale known as “the Straw Millionaire”. In the story, the main protagonist is a hardworking young man named Daietsu-no-suke, who trades his way through life with a straw. The main protagonist uses the resources on his hand at the right time. For example, when he gets three oranges on his hands, he uses it to trade for silk cloth from a businessman who is suffering from hunger and thirst. Figure 2.1 shows the whole trading process of Daietsu-no-suke. The point of barter is letting both sides get the things they need at that time, Daietsu-no-suke make use of barter and trade his way to a house and rice fields, and finally become a millionaire [3].

![Figure 2.1 The whole trading process of Daietsu-no-suke](image)

2.2.2. One Red Paperclip

In 2005, a Canadian blogger named Kyle MacDonald (Figure 2.2), who did the exact same thing as the story in Straw Millionaire [4]. Inspired by a childhood game named
Bigger, Better, MacDonald decided to trade his way starting with a single red paperclip.

Over the course of a year, MacDonald made a total of fourteen online trades, from a red paperclip to a two-story farmhouse. The story of MacDonald has also inspired countless people attempting to trade their way up from a small item which people usually considered cheap.

![Kyle MacDonald and his house he traded for](image)

**Figure 2.2** Kyle MacDonald and his house he traded for

### 2.3. Related Works

#### 2.3.1. TradeDuck.com

In Hong Kong, there is a barter website platform named “TradeDuck.com” (Figure 2.3). Tradeduck.com started in 2005, and received a silver award from the Internet Professional Association (iProA). The barter platform helps people in public housing get things each other needs. Despite being a great hit in 2005, TradeDuck.com is gradually replaced by Carousell and Facebook groups due to the cumbersome user interface and the old-fashioned website design.
2.3.2. Carousell

Carousell is a trading mobile application based in Singapore, Figure 2.4 shows the interface of Carousell. Providing a marketplace for users to buy and sell both new and second-hand goods. After the application was launched to the market, it soon became a burgeoning application in Malaysia, Taiwan and Hong Kong. Nevertheless, Carousell was involved in numerous controversies. According to a report made by Singapore Police Force in 2019 [5], 70% of the e-commerce scams also took place on Carousell. Victims state that people fell victim to scams by fake sellers.

Figure 2.3 The interface of TradeDuck.com

Figure 2.4 The interface of Carousell
2.4. Summary

This chapter has reviewed similar products in the market, and pointed out that there are needs for a market of second-hand goods. Also, it highlighted the advantages and disadvantages of those products. To provide a better user experience, the application should avoid having a complex user interface, and need to have mechanisms to prevent scam users. The next chapter will show the methodology of the project.
3. Methodology

3.1. Introduction

This chapter presents the technology and platform used in the application, including the backend server, database structure and the frontend user interface. It also illustrates how users can request a deal and how they can finish a deal.

3.2. How a Deal Works

Every user should upload the things they want to trade with others to their inventory after they have registered. When the user finds anything interesting in the application, they can send a trade request to the object owner. After receiving the trade request, the object owner can take a look at the user's inventory. If the object owner finds any interested item in the user's inventory, they can select the item and complete the deal with the user. If there is nothing interesting for the object owner, they can choose to reject the deal. When both sides also agree on the item they chose, they can message each other to communicate for the exchange details. Figure 3.1 shows the brief idea of how a trade works.

![Figure 3.1 Trading process](image-url)
3.2. Application Implementation

For the application design, the frontend of the application will be designed using Android Studio. Android Studio is an integrated development environment for designing android applications. The advantages of using Android Studio is that it can enable users to have fast coding and quick iteration, which can help develop the application in a more efficient way [6]. Also, the user interface will be designed as simplicity as it can. In the case of TradeDuck.com, a complex user interface will discourage users to keep using the platform. Therefore, a simple and clear user interface will help users to easily find the functions and items they need.

3.3. Behind the Application

3.3.1. Application Backend

The backend server of the application will be constructed by Node.js, which can provide a JavaScript engine based cross-platform environment for the server side. Compared to other environments, Node.js contains a higher performance and an easier scalability for modern applications. In addition, Node.js is an open-source language, which has attracted plenty of developers to hold conferences and events for enhancing the functions of Node.js. By far, there are over a thousand open-source libraries for Node.js. The high performing, easy scalability and open-source libraries of Node.js can help the development of the application server much easier and more consummate [7]. The connection between the frontend user interface and backend server is shown in figure 4.2.
For data storage, a database has to be installed to the backend of the application. MongoDB will be used in this case due to its own advantages. The unique technology of MongoDB allows the data stores in RAM, which can have quicker performance while executing queries. Also, MongoDB is a document-based database solution, which is suitable for users to upload the photos of their goods.

3.3.2. Data Management

There will be several types of information stored in the database. Each user will have their own user ID, account and password. Users need to enter their name and email to confirm their information. The rating and comments of others, search record and trade request list will also be stored inside the database. Moreover, each user will have their own inventory to store the item they want to trade. Inside the inventory, there will be items stored in it. Each item will contain item ID, name, description, tag, image and target trade item. The complete data structure is shown in table 3.1.

3.4. Summary

This chapter proposed the trading process for users to deal with other users. The application construction was defined, together with the detailed illustrations for the data structure, the relationship between frontend user interface, backend server and database. The next chapter will introduce the features of the application.
<table>
<thead>
<tr>
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<th>User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>User account</td>
<td></td>
</tr>
<tr>
<td>Password</td>
<td></td>
</tr>
<tr>
<td>User Name</td>
<td></td>
</tr>
<tr>
<td>User Email</td>
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<table>
<thead>
<tr>
<th>Inventory</th>
<th>Item</th>
<th>Item ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Item name    |      |         |
| Description  |      |         |
| Tag          |      |         |
| Image        |      |         |

<table>
<thead>
<tr>
<th>Rating and comments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Search record</td>
<td></td>
</tr>
<tr>
<td>Trade request list</td>
<td></td>
</tr>
<tr>
<td>Trade History</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.3 Data structure of users and items
4. Application Features

4.1. Introduction

In this chapter, the most significant functions of this project will be introduced. Including the home page, random suggestion and the rating system. It will also describe how these functions can help users to have better experiences.

4.2. Home Page

On the application front page, there will be three sections for users to find the things they need. “Recommended Items” will provide items that users might be interested in, based on the search records and view records of the users. “Newest Item” will provide the latest items that were registered to this platform. “Hottest” will provide users with the items that have the most trade requests.

Moreover, the application will suggest trades which can be done near the user's area. Some users might refuse to have trades because the trading position is too far away for them. “Things nearby” can provide users the possible trade which is near users based on the GPS function of the mobile phone.

4.3. Random Suggestion

To further encourage users to trade more, a random suggestion list will be put inside the application. Users can use gestures to control the list flow. For example, swipe up to the next item, swipe left for saving the item and swipe right for sending a trade request. The suggestion list will provide items randomly, users may find things they do not know they need before seeing it on the list. The random suggestion function can help promote trades to users. Figure 4.1 shows the brief idea of the gesture control.
4.4. Rating System

To prevent scammers and fake sellers, there will be a rating system for users to grade and comment on their trading partners. For example, user can grade 3 for the trading partner not being punctual, or he can grade 1 for the trading partner not showing up on the trade. Before users attempt to have a trade with others, they can have a look at the rating and comments of their trading partners. If the rating of the trading partner is low, they might consider if they really want to deal with the risk. In addition, users can report their trading partner if they found that it was a scam. The whole rating system can provide confidence for users that most of the trade in the barter application will be safe. Figure 4.2 shows an overview of a rating system.
4.5. Summary

This chapter has introduced the main features of this application and how those functions help users to have a better user experience when using the application. Also, it has introduced the rating system and highlighted how the system can help users to prevent scam and provide confidence for users to keep using the application. The next chapter will show the current process of the project.
5. Project Schedule

5.1. Project Planning

Table 5.1 shows the project schedule. We have finished researching and literature reviewing similar products in the market. The project plan afterward is stated as follows.

<table>
<thead>
<tr>
<th>Time Periods</th>
<th>Task</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
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<td>Sep - Oct</td>
<td>Researching and literature reviewing:</td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>- Similar application in the market</td>
<td></td>
</tr>
<tr>
<td>Oct - Nov</td>
<td><strong>Deliverable of Phase 1:</strong></td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>- Project plan and schedule</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Project website</td>
<td></td>
</tr>
<tr>
<td>Nov - Dec</td>
<td>Testing on different Application Programming Interface(API):</td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>- Server client connection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Image uploading</td>
<td></td>
</tr>
<tr>
<td>Dec - Jan</td>
<td>Completing the backend of the application</td>
<td>Pending</td>
</tr>
<tr>
<td>Jan - Feb</td>
<td><strong>Deliverables of Phase 2:</strong></td>
<td>Pending</td>
</tr>
<tr>
<td></td>
<td>- Preliminary implementation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Detailed interim report</td>
<td></td>
</tr>
<tr>
<td>Mar - Apr</td>
<td>Completing the frontend and user interface of the application</td>
<td>Pending</td>
</tr>
</tbody>
</table>

Table 5.1 Project schedule
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<tr>
<th>Apr - May</th>
<th>Deliverables of Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Finalized tested implementation</td>
</tr>
<tr>
<td></td>
<td>- Final report</td>
</tr>
<tr>
<td></td>
<td>Debug and final tune the application</td>
</tr>
<tr>
<td></td>
<td>Summarize the work into the report and PowerPoint</td>
</tr>
<tr>
<td></td>
<td>Prepare Demo/ Demo video for final presentation</td>
</tr>
<tr>
<td></td>
<td>Prepare for the project exhibition and project competition</td>
</tr>
<tr>
<td>May</td>
<td>Project exhibition</td>
</tr>
<tr>
<td></td>
<td>Pending</td>
</tr>
</tbody>
</table>

5.2. Future Plan

As we are discussing the application design part, expect more for this application. One of the fundamental parts is to design the IOS version of the application. Since android is not the only operating system in mobile devices, IOS is also one of the most occupied operating systems in the market. An IOS version is needed for more users to be able to use this application.

In addition, a website version can be developed afterward. Users might not only want to use mobile devices to access this platform. Some of the potential users might want to use computers to access this application. Therefore a website version can help this platform to draw more users.

5.3 Challenges

The application requires users to use an email account for logging in and registering, an email address can only register for one account. However, some users might make up a fake email account for registration and use the fake account for scamming other users. Firebase, which is a hosting service which provides databases, content and social authentication (including Google, Facebook, Twitter and Github). Using firebase to modify the login and registration system will be a way to help screen out potential scam users [8].
6. Conclusion

Due to the issue of the wasting problem, the existing landfills in Hong Kong are expected to be full. Under this situation, the recycling and reusing of unneeded items can help to reduce the number of waste. This project aims to build a mobile application to provide a platform for users to exchange from things not needed to things in need.

After completing the research and reviewing the similar products in the market, we have finished the analysis on the similar products on the market, and we have highlighted the disadvantages of those products. The next step is to start the testing of different Application Programming Interfaces that are suitable for the users to upload their items. The roadblock we encounter now is the possibility for scam users to register by using fake email accounts. We decided to use firebase provided by Google to authenticate the email account user provided.
7. References


