

Lab 1 - BetterSwipe Product Description

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Table of Contents

1. Introduction.....	3
2. BetterSwipe Product Description.....	4
2.1. Key Product Features and Capabilities.....	4
2.2. Major Components (Hardware/Software).....	5
3. Identification of Case Study.....	6
4. BetterSwipe Product Prototype Description.....	7
4.1. Prototype Architecture (Hardware/Software).....	8
4.2. Prototype Features and Capabilities.....	9
4.3. Prototype Development Challenges.....	11
5. Glossary.....	12
6. References.....	13

List of Figures

Figure 1: BetterSwipe Major Functional Component Diagram.....	5
Figure 2: BetterSwipe Prototype Major Functional Component Diagram.....	8

List of Tables

Table 1: Table of Comparison between RWP and Prototype.....	9
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1. Introduction

Rewards credit cards have the potential to save consumers a substantial amount of money. For every purchase that gets made, a certain portion of that cost can be earned back and reapplied toward other purchases that the consumer would otherwise have to pay for with their income directly. Unfortunately, the process of finding the best credit card is frustrating and time consuming due to several complicating factors. A nationwide survey conducted by Experian (2017) revealed that 61% of people in the United States are overwhelmed by the number of options available to them. 85 rewards credit cards were tracked by Credit Karma (2023) as of November 2023, and that number changes as new cards are made and older cards become obsolete.

Beyond the sheer quantity of cards, comparing these cards against each other becomes a challenge when three different reward systems are at play: cash back, points, and miles. These provide the card user with rewards for every purchase they make, but their systems are not interchangeable. Cash back rewards provide the consumer with cash directly which is proportional to the amount spent. Other cards do not have a direct cash value and instead offer a separate currency system of points or miles. Different spending categories can reward a different number of miles or points per dollar spent, and the cash value of those rewards depends on where they are spent. In Experian's survey (2017), 57% of the participants expressed difficulty in figuring out which cards would fit them the best. If a consumer's card provides rewards for categories that they rarely make purchases for, those rewards can become underutilized. It has been found that 69% of credit card holders have rewards that they are not utilizing (Black, 2022).

There is a clear need to filter credit card options that do not fit the consumer's lifestyle. Significant time and effort could be saved in their search and their choices would be better informed if they were shown which cards benefit their own expenditures. BetterSwipe is an application that aims to do just that. It utilizes expenditure profiles unique to each person to search for credit cards that would specifically benefit them.

2. BetterSwipe Product Description

BetterSwipe is an expenditure analysis and credit card recommendation tool. It continuously monitors the consumer's own spending history and available rewards cards in order to provide them with a list of credit cards that would give them returns with the greatest cash value. By removing all but the most viable options it substantially simplifies the reward selection process. Future expenditures such as upcoming travel plans can also be added to ensure the most suitable cards will always be recommended. BetterSwipe makes it easy to analyze rewards cards use, ensuring that the consumer is always aware of better alternatives as they arise.

2.1. Key Product Features and Capabilities

BetterSwipe provides the user with a secure and encrypted profile where they can easily analyze their purchases for reward opportunities. Purchases will be automatically categorized through bank and credit card statements uploaded by the user, which BetterSwipe will apply to the rewards criteria of credit cards to predict how much the user could save through their use. A side by side comparison of rewards credit cards and their effect on the user's spending profile can be viewed for analysis to make an informed decision on which to choose. Other reports like the user's purchase history and current rewards can be viewed for further analysis.

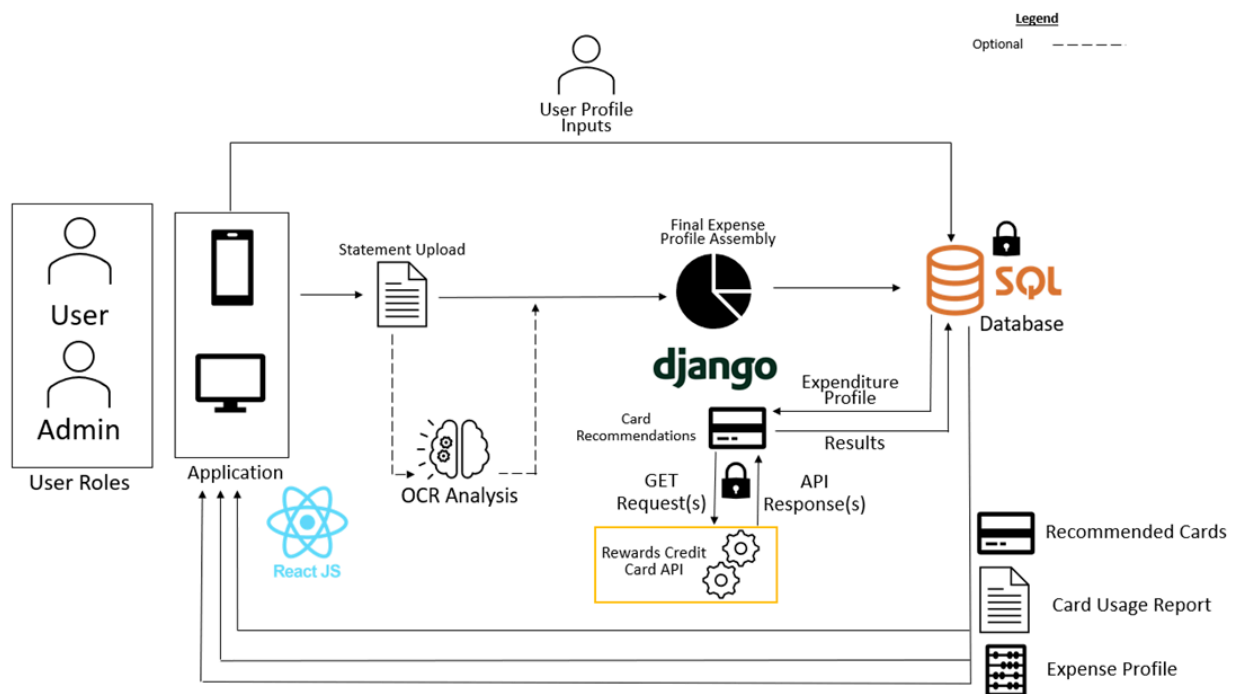
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2.2. Major Components (Hardware/Software)

BetterSwipe is a mobile and web application which can be run on computers and mobile devices with an internet connection. From the device the user will be able upload transaction data from their bank or credit card statements. The expenditures on these statements will be analyzed and categorized, and then assembled into a profile for the user. As shown in Figure 1 this user profile will be securely transferred and stored to an SQL database. The profile data from the database can be accessed by the user application, where it can be viewed in reports or modified for any corrections.

Figure 1

BetterSwipe Major Functional Component Diagram



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An interface with the Rewards Credit Card (Rewards CC) API downloads data for credit cards and stores their reward specifications in the SQL database so that they can be quickly searched and evaluated based on the user's spending profile to calculate the estimated reward value for the user. Card recommendations are established based on the spending profile and credit card rewards parameters, and those recommendations are stored in the database for report generation. The data saved on the database is accessible from the user application for viewing the user's profile, reports, and card recommendations.

3. Identification of Case Study

BetterSwipe is aimed to help consumers who are looking for new rewards credit cards because it will simplify their searching process. It is also aimed at consumers who wish to save their money, since it will offer the best rewards cards for that consumer and ensure that those rewards get utilized. Since it recommends cards based on purchases the consumer is already making, it can also be used by people who are looking to build up their credit responsibly.

College students are typically young-adults, which is a demographic that is only starting to build up credit. Since their experience in researching credit cards is limited, a tool like BetterSwipe would be highly beneficial. Participating students at ODU who are looking for credit cards to build up their credit can act as a case study by using BetterSwipe to recommend them a credit card and track its rewards.

Participants will create accounts and upload their purchases for the last month, and then select one of the recommended cards. Feedback will be collected from the participants pertaining to the quality of the recommendations, and what the discrepancies were. This will help us gauge what details about the user experience and rewards card recommendation behavior that BetterSwipe should focus on.

Once the participant obtains a rewards credit card that was recommended to them by BetterSwipe, they will enter the card into their profile so their purchase history and savings through the use of the card can be monitored. The participants will then provide feedback about the readability of the reports, how informative the data that they show is, and how accurate the rewards recommendations were. Based on their feedback we can adjust the report formatting and method by which reward uses are recommended.

In the future there is the potential for BetterSwipe to provide an analysis of user expenditures. Banks and credit card companies could use the analytics to see what influences consumers to get their cards, however care would have to be taken to maintain unbiased results in credit card searches. Businesses could also use it as a statistical tool to see which markets consumers are most active in.

4. BetterSwipe Product Prototype Description

The BetterSwipe prototype will model the user spending profile, expenditure categorization, capability of finding recommendations from a database of credit cards, and the ability to generate reports. Statement files will be limited to Excel-compatible spreadsheet formats. The credit card database will be simulated from a captured baseline from the Rewards CC API. Real-time changes to this resource will be simulated to demonstrate BetterSwipe's capacity to adapt to changes in credit card details and availability.

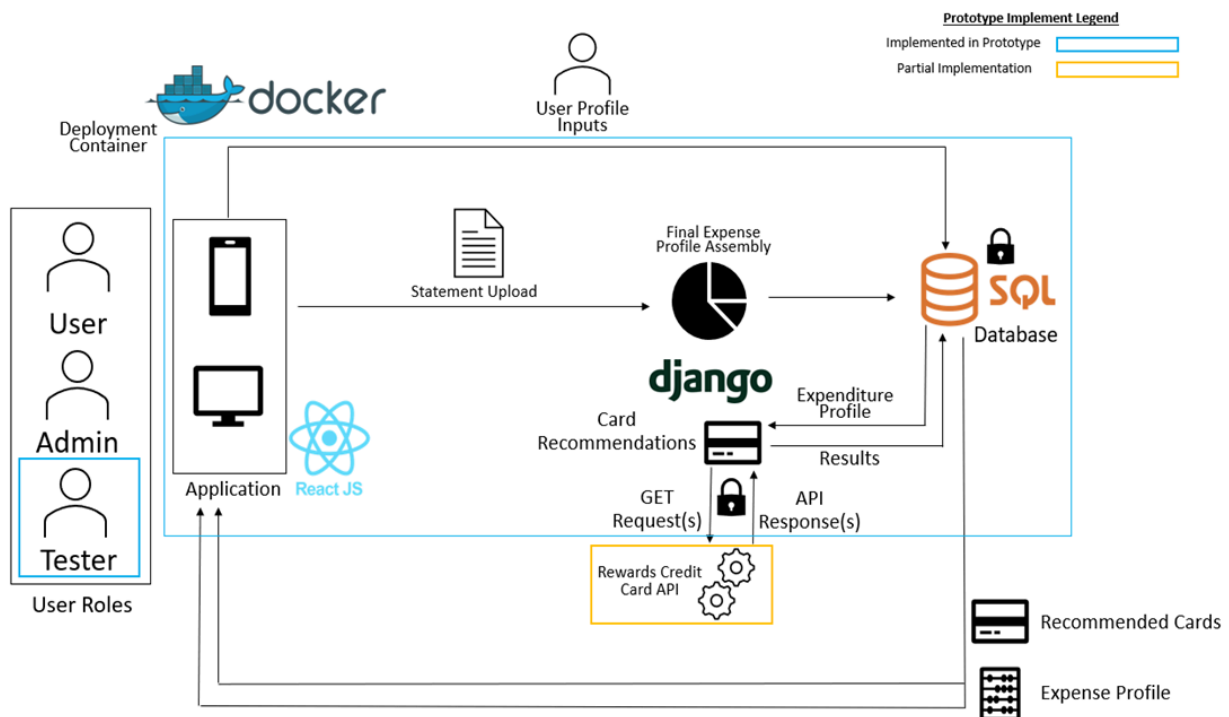
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4.1. Prototype Architecture (Hardware/Software)

The prototype will be written utilizing the React JavaScript library in the front-end of the application, and Django Python library for the back-end. They will be packaged in a docker container along with the SQL database to ensure a standardized testing environment. The prototype will not parse text in uploaded documents, so the documents will need to be formatted in a CSV file. Outside the container, the Rewards Credit Card API will be used to fetch data on current rewards credit cards, which will be captured in the SQL database. Since the API requires a subscription to access, an offline download of card information has been captured, which can be uploaded to the database in order to demonstrate the profile analysis and card recommendation functionality of the prototype.

Figure 2

BetterSwipe Prototype Major Functional Component Diagram



The profile assembly, reward calculations, and reports will be reflective of the final product, as well as the database to which the profile and card data will be stored. The addition of a tester role on the application will allow for testing and analysis of these primary features of BetterSwipe.

4.2. Prototype Features and Capabilities

The primary goal of BetterSwipe is to provide users with recommendations for rewards credit cards that they will have the greatest chance of benefiting from. As shown in Table 1, the ability to create an expenditure profile, receive matching card recommendations, and view reports will be demonstrated in the prototype. This will demonstrate BetterSwipe's ability to produce quantified recommendations of the cards that produce the best benefits for the user, based on its analysis of the user's profile and the current card offerings on Rewards CC.

Table 1

Table of Comparison between RWP and Prototype

Functional Element	Real World Product (RWP)	Prototype	Reason
Web and Mobile Interfaces	Fully Implemented	Partially Implemented	Only web app for prototype
Register/Authentication	Fully Implemented	Fully Implemented	
MFA	Fully Implemented	Eliminated	Not required for prototype
Credit History Inputs	Fully Implemented	Fully Implemented	
Statement Upload	Fully Implemented	Partially Implemented	Only accepts Excel-compatible formats
Expenditure Analysis	Fully Implemented	Fully Implemented	
Data-at-Rest Encryption	Fully Implemented	Fully Implemented	
Data-in-Transit Encryption	Fully Implemented	Partially Implemented	Dependent on API
OCR/ML Analysis	Fully Implemented	Eliminated	Not required for prototype
Card Recommendations	Fully Implemented	Fully Implemented	
Continuous Monitoring	Fully Implemented	Fully Implemented	

While the RWP will have the ability to parse text from a range of formats including scanned images, the prototype will be limited to reading files that are in a spreadsheet format. Our goal is to demonstrate how BetterSwipe utilizes the data that it is given, while allowing a greater range of formats is simply a matter of convenience for the consumer. Categorizations will be made using a machine learning model, but the model's training will be limited during the prototyping stage. To mitigate the risk of a miscategorization, the user will have the ability to modify the categorizations of their purchases, which will be fed back into the model to give it better recognition of future purchases. This should be particularly effective for repetitive everyday purchases such as gas or groceries.

The connection to the Rewards CC database will be simulated using prefetched data, which will demonstrate a saved cache of cards from the database. This data will then be modified to simulate changes to the database. Rewards credit cards will come and go and the cards in the database will be ever changing, so it is essential that BetterSwipe is able to adapt to whatever credit cards it is provided externally. Once this is demonstrated in the prototype, the RWP can be connected to the Rewards CC API to make its decisions on the most up to date collection of available cards.

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4.3. Prototype Development Challenges

The team has limited knowledge on the major libraries being used on the project: React, Django, and SQL. One of the key challenges for this project will be overcoming the learning curve required to effectively utilize these tools. Collaborating in teams for each module may help to speed up the process by allowing knowledge to be shared between members. Knowledge on the setup and use of Docker containers is also limited on the team.

Scheduling will be another hurdle for the development. The team members have varied schedules, making it difficult to meet at a single time. This can be mitigated by breaking the project into smaller teams that can coordinate more easily to collaborate on the development of specific functional components. Clear communication between the teams would need to be established to keep the project cohesive. Team leaders will be established to report between teams so that the expectations for the interfaces remain clear.

5. Glossary

Application Programming Interface (API): software intermediary that allows two applications to talk to each other. APIs are an accessible way to extract and share data within and across organizations.

Artificial intelligence (AI): development of computer systems capable of performing tasks that historically required human intelligence, such as recognizing speech, making decisions, and identifying patterns.

Annual Percentage Rate (APR): is the cost you pay each year to borrow money, including fees, expressed as a percentage. The APR is a broader measure of the cost to you of borrowing money since it reflects not only the interest rate but also the fees that you have to pay to get the loan.

Amazon Web Services (AWS): is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered, pay-as-you-go basis. Clients will often use this in combination with autoscaling.

Graphical User Interface (GUI): a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicators.

Machine Learning (ML): a branch of AI and Computer Science which focuses on the use of data and algorithms to imitate the way humans learn, gradually improving its accuracy.

Optical Character Recognition (OCR): the process of extracting text from an image so that it can be read and interpreted by a machine.

Rewards Credit Card: credit cards which offer you some type of “reward”—typically cash back, points, or travel miles—for every dollar you spend, sometimes up to certain limits.

6. References

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