BetterSwipe

"Better Rewards, Better Savings, Better Swipe"

BLUE TEAM FALL 2023

CS410

Design Presentation

Table of Contents

The Team

Cody Cochran
- Algorithm Design
- Database Management

Devin Morgan

John Cartwright
- Database Management
- Backend Developer

Kyrie Champagne
- Document Specialist
- Backend Developer

Marcelo Vargas
- Webmaster
- Algorithm Design

There are too many rewards cards

- Credit Karma shows 116 rewards credit cards to choose from (Credit Karma, 2023)

- Lots of rewards cards make it hard to choose

  - There are 13 criteria to compare rewards credit cards with (NerdWallet, 2023)

- 69% of reward credit card holders are underutilizing their rewards (Lambright Black, 2023)

🍎 🍊 Comparing Apples to Oranges 🍎 🍊

|	● Wells Fargo Active Cash	● Capital One Venture	● Chase Sapphire Preferred
Initial Offer	$200 when spending $500 in the first 3 months	75000 bonus miles when spending $4000 in the first 3 months	60000 bonus points when spending $4000 in the first
Rewards on any purchase per dollar spent	2% cash back	2 miles	2 points
Rewards on food/groceries	2% cash back	2 miles	3 points
Rewards on proprietary affiliate purchases	N/A	5 miles	5 points

* Top 3 credit cards of each reward type according to NerdWallet (5)

Rewards from a 1 Week Trip:

- $500 plane ticket (Delta), $860 hotel (Holiday Inn), $300 car rental (Hertz)

- Wells Fargo Active Cash Card (18)
  - 2% cash back on total price = **$16.60**

- Chase Sapphire Preferred Card (19)
  - 5x points on hotel (IHG partner) (4300 points)
  - 2x points on flight / car rental (1600 points)
  - 1.25¢ per point: $5900 points total = **$73.75**

- Capital One Venture Card: (20)
  - 5 miles on hotel / car rental purchases (5800 miles)
  - 2 miles on flight (1000 miles)
  - 1¢ per mile: 6800 miles total = **$68.00**

- How would results change if other purchases were factored?

Savings Based on Spending Habits

- Chase Sapphire Preferred (16)
  - Typical: $1 → 1 pt → $0.01 (cash)
  - Max: $1 (Chase Travel) → 5x pts → 5x $0.018 (Virgin Atlantic Flying Club)

- Capital One Venture (17)
  - Typical: $1 → 2 miles → 2x $0.01 (cash)
  - Max: $1 (hotel/car rental) → 5 miles → 5x $0.014 (Air Canada)
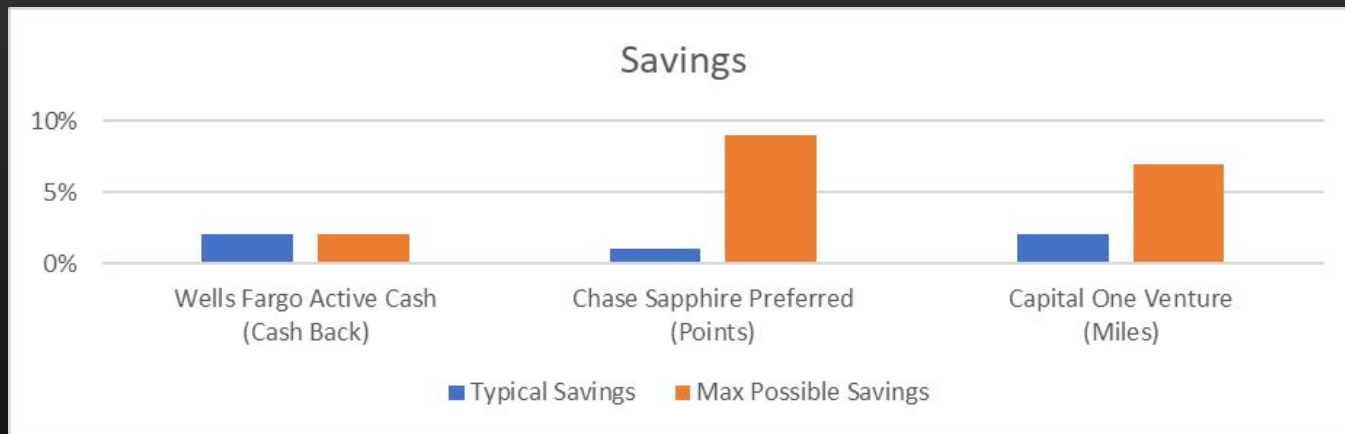
Rewards Cards Can Save You Money

- Consumers have a significant potential in savings through the use of rewards credit cards, but choosing the right card to maximize their savings is complicated.


usatoday.com

The Rewards Card Selection Conundrum

- Consumers need to manually determine which cards provide best advantage based on their spending profile/plans
- Reward Card advantages vary/determining rewards value is challenging:
  - Rewards systems (cash, points, miles)
  - Expense types (travel, food, etc.) have different reward values per dollar spent
  - True value of rewards can vary based on how they are redeemed
- Consumers spending habits/intended use should be a selection consideration

Drowning in Research and Decisions
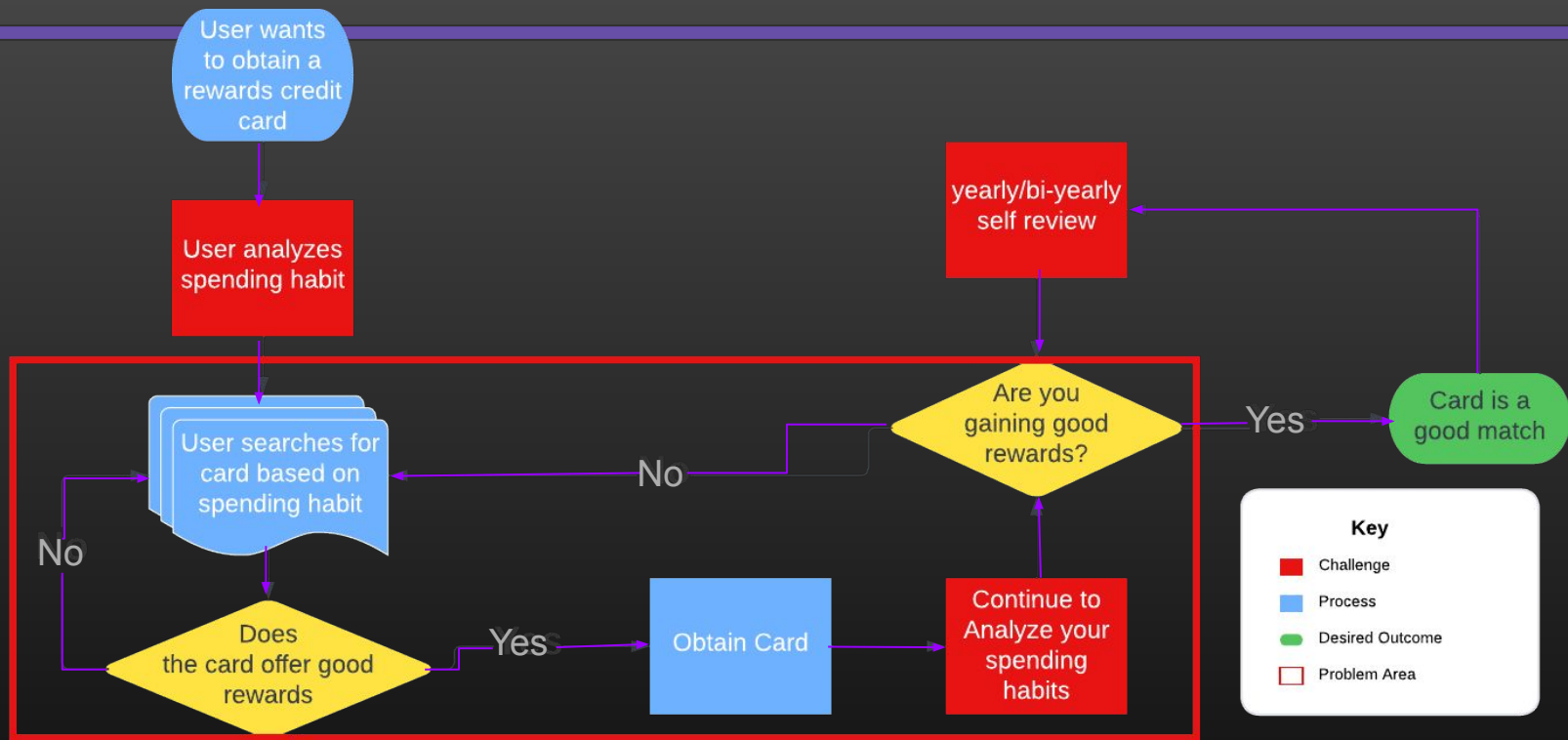
Solution Statement

BetterSwipe is a tool that provides individuals who are seeking to maximize their savings through the use of rewards credit cards by helping them make an informed decision based on their spending profile.

Solution Characteristics

- Build a spending profile from previous transactions.
- Continuous monitoring of spending habits
- Recommend rewards credit cards based on the spending profile that the user has developed
- Take the analysis work away from the user
- Simplifies the reward card selection process

I'd rather Multiple choice than fill in the blank

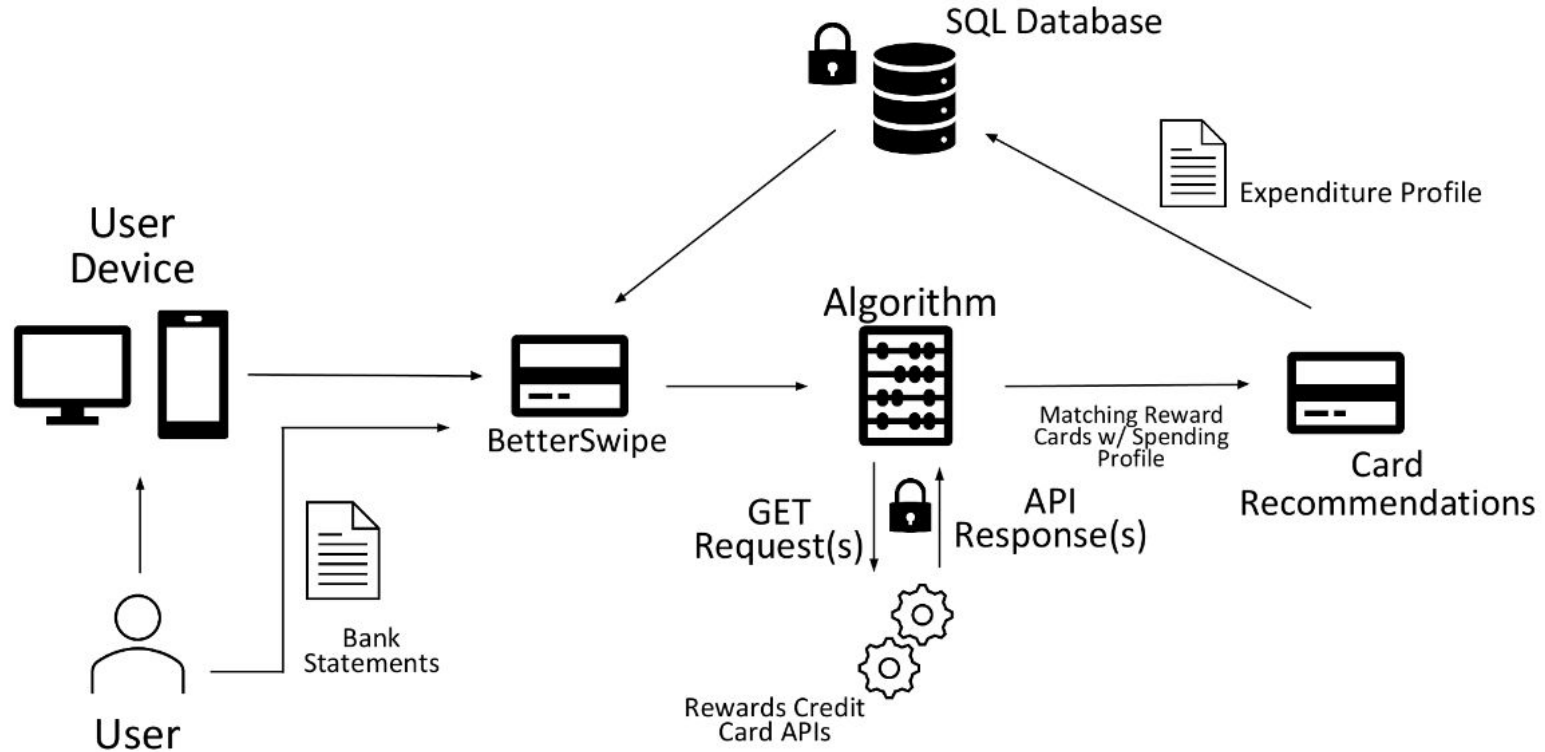User wants to obtain a rewards credit card

User uploads statements to BetterSwipe

BetterSwipe parses doc and categorizes transactions

BetterSwipe Builds a spending profile

BetterSwipe matches profile with rewards card from the database

BetterSwipe provides rewards card options to user

User obtains card(s)

Card is a good match

BetterSwipe continuously maintains user profile

BetterSwipe maintains up to date database of rewards cards

Key
- Process
- Desired Outcome
- BetterSwipe Process

Major Functional Component Diagram
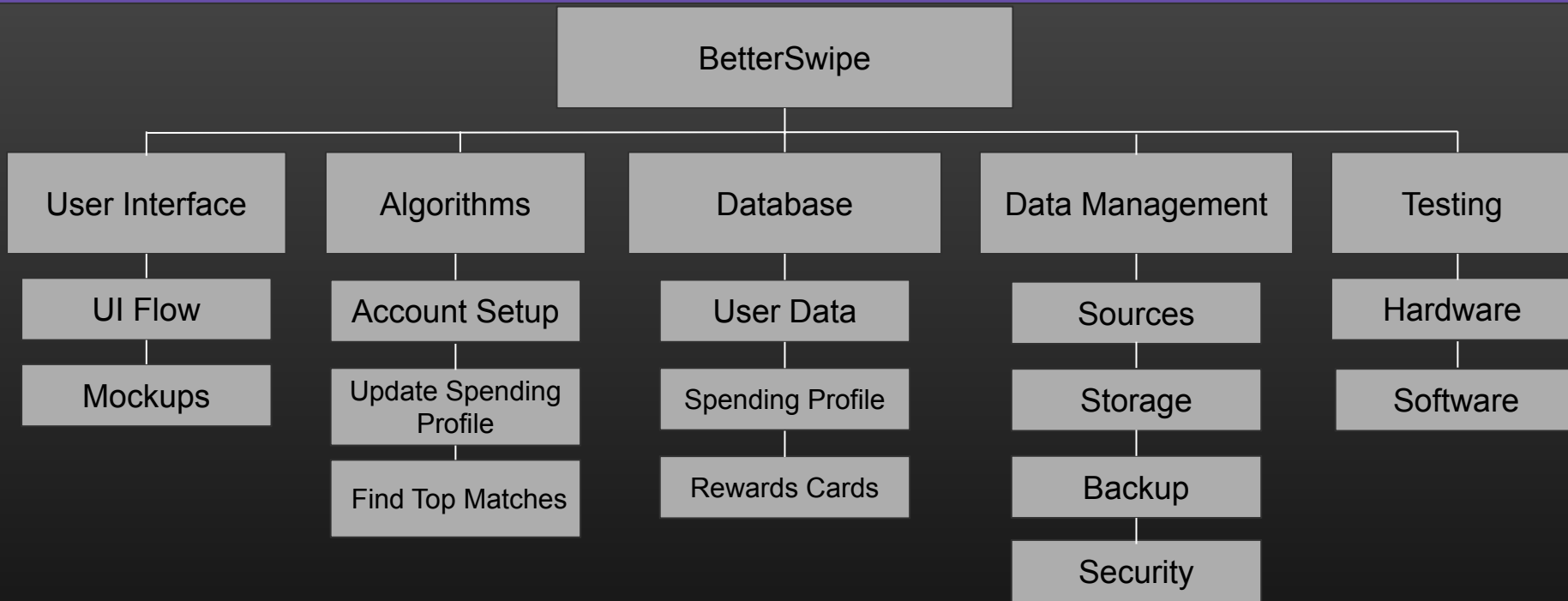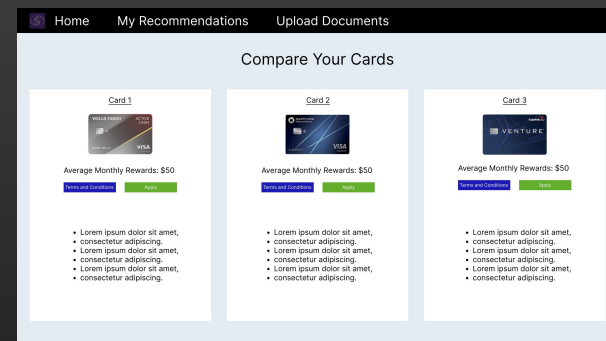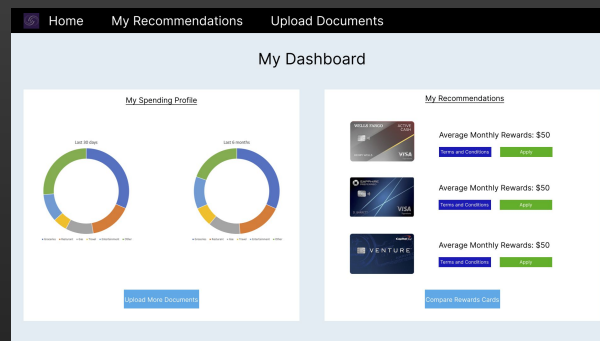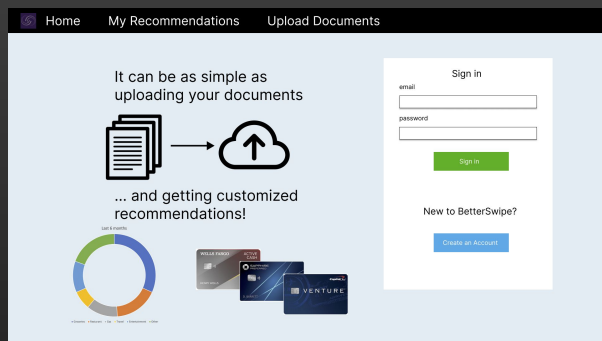
User Roles

- New Credit Card Users
  - Users who are skeptical of credit cards
  - Wants a handful of meaningful options

- Experienced Credit Card Users
  - Users who want unbiased card recommendations
  - Looking for real, data-based reward card options

- Admins
  - Users needing elevated privileges for testing and development

Work Breakdown Structure Overview

```
                          ┌──────────────┐
                          │  BetterSwipe │
                          └──────────────┘
    ┌──────────┬──────────┼──────────┬──────────┐
┌────────┐ ┌──────────┐ ┌────────┐ ┌──────────────┐ ┌────────┐
│  User  │ │Algorithms│ │Database│ │Data Management│ │Testing │
│Interface│└──────────┘ └────────┘ └──────────────┘ └────────┘
└────────┘
```

User Interface	Algorithms	Database	Data Management	Testing
UI Flow	Account Setup	User Data	Sources	Hardware
Mockups	Update Spending Profile	Spending Profile	Storage	Software
	Find Top Matches	Rewards Cards	Backup	
			Security	

General Pages

Registration Pages

Algorithms

```
                              ┌─────────────┬──────────────┬──────────────┐
                              │             │              │              │
                              ▼             ▼              ▼              ▼
```

Create profile	Load Statements	Analyze spending profile	Find top matches
Create new account	Read statement file	Calculate spending category averages	Calculate card scores
Log in	Parse spending data		Sort by highest score
	Categorize using AI/ML		Return top 3 to GUI

WBS Algorithms - Create Profile

Start

Prompt user to log in

Is there a profile associated with user Email?

No → User begins profile creation

User inputs basic user information to create account: email, user name, password,

Valid password and adequate data for user account?

No

Yes

User account created and entered into database.

Log into user account

Valid password for that account?

Yes

No → Request user to log in again

Yes
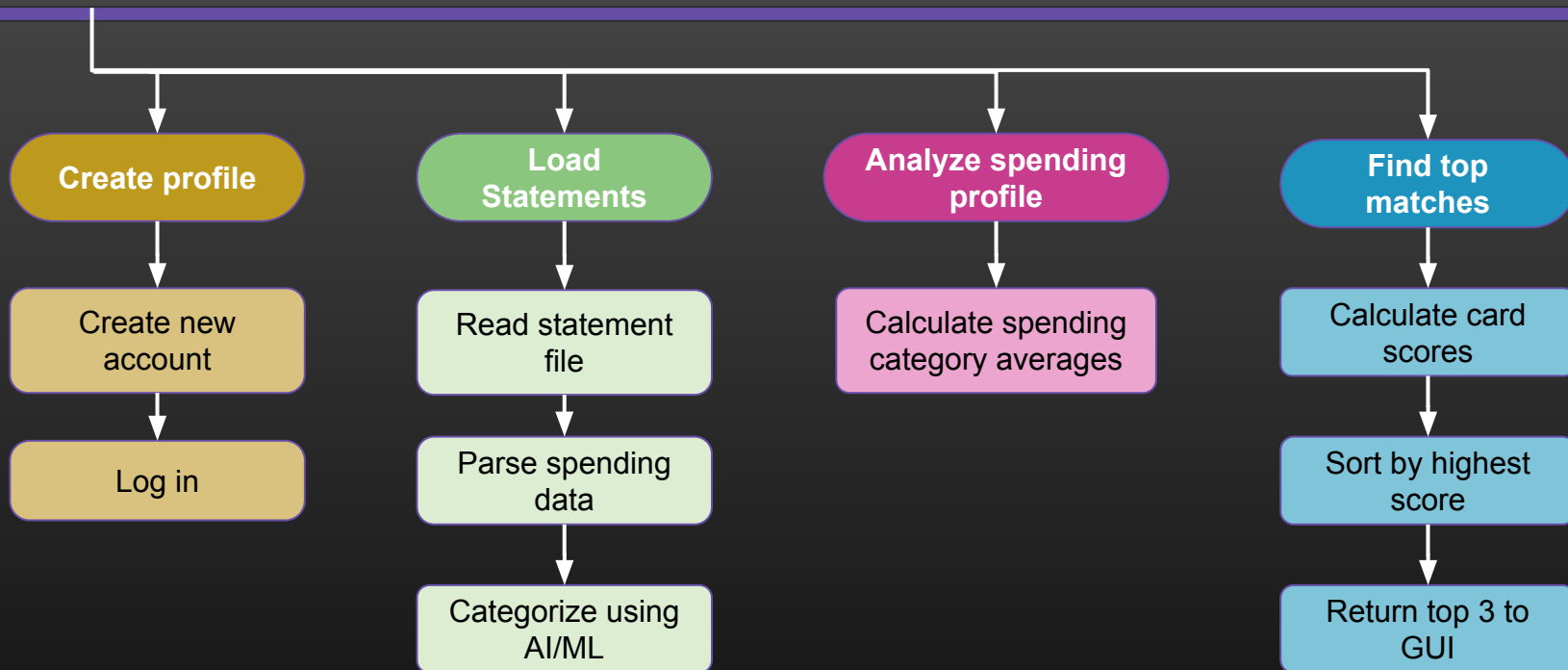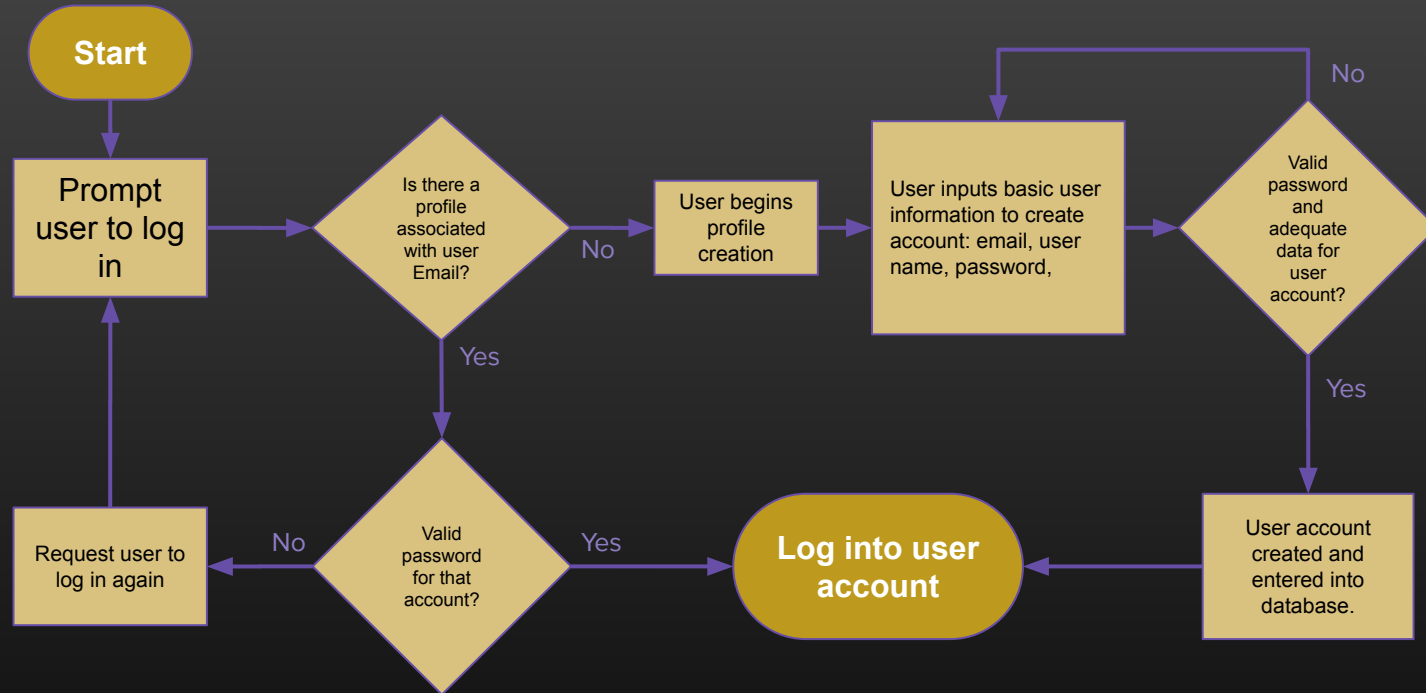
WBS Algorithms - Load Statements

```
Start → User prompted to input bank statements → Valid File Type? 
  No → (back to User prompted to input bank statements)
  Yes → Parse Text → Interpret each line as a transaction
  → Read transaction and place into a category using Machine Learning 
  → Save transaction to spending profile in database 
  → Has the Last transaction in the list been categorized?
    Yes → Finish
    No → (back to Read transaction and place into a category using Machine Learning)
```

WBS Algorithms - Analyzing Spending Profile

Start → Read transaction from database → Add to the cost sum of the category → Has the Last transaction in the list been categorized? →(Yes)→ Create a list of average sums for each category per month → **Return Category averages**

(No) loops back to Read transaction from database
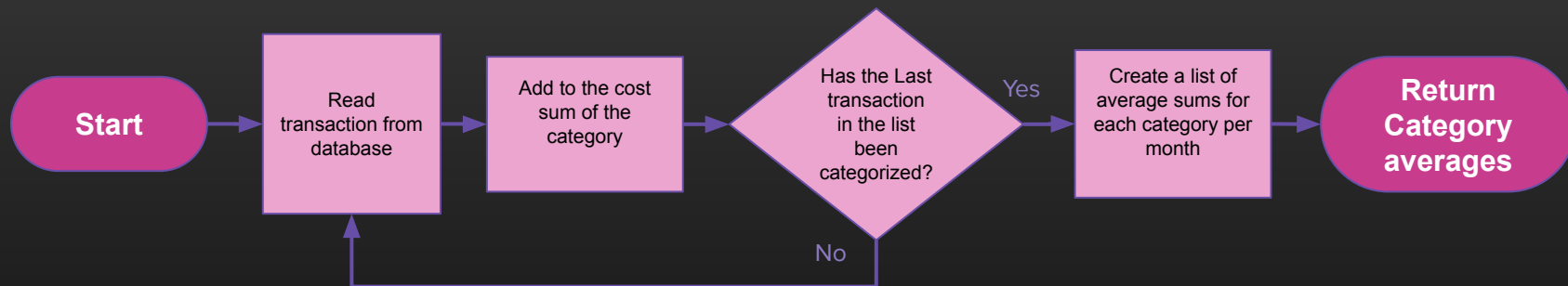
WBS Algorithms - Finding Top Matches

Start → Read averages for every category from user Spending Profile → List of rewards from credit cards → Plug in averages of categories to each credit card → Add value of rewards to list of rewards from credit cards → Sort list by value of rewards → Return the top 3 cards

Database Structure

spending_profile

user_id	integer
transaction_date	datetime
description	varchar
spending_category	enum
amount_spent	decimal

User_list

id 🔑	integer
username	varchar

owned_cards

card_id 🔑	integer
card_type_id	integer
owner_id	integer
card_name	varchar

rewards_earned

card_id	integer
reward_type	enum
reward_value	integer

card_reward_profile

card_id	integer
spending_category	enum
worth_per_dollar	decimal

Data Management

Data Sources

User Provided Inputs
- Credit Score
- Owned Cards
- Feedback
- Bank Statements

Non-User Provided Inputs
- RewardsCC API

Data Storage

Amazon Aurora MySQL database will store and retrieve data.

Data Backup

MySQL has multiple methods for data backup and recovery (full, incremental, online, offline, physical, logical, local, and remote).
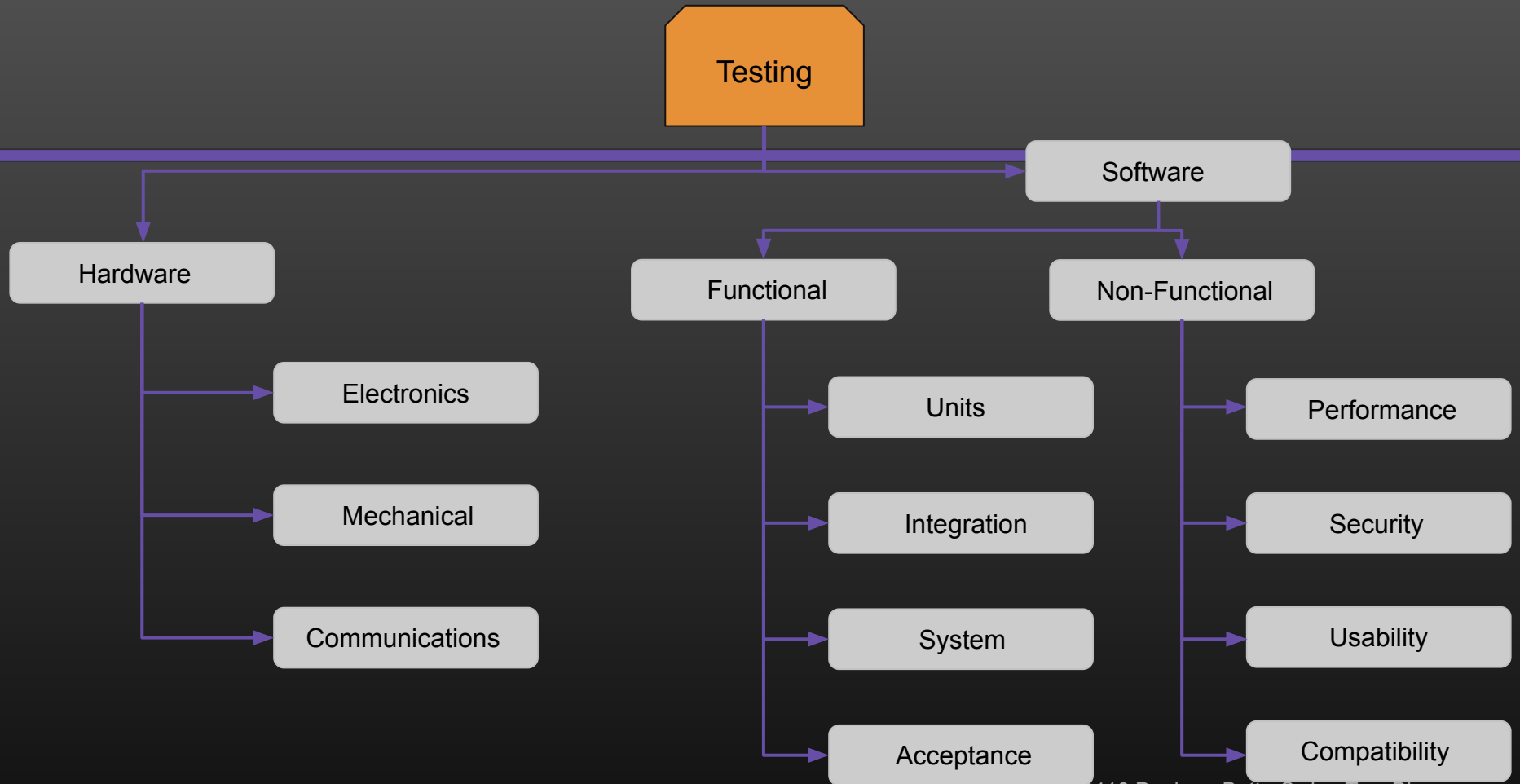
Data Security

Data-at-Rest
- AES-256

Data-in-transit
- TLS

Hardware and Software

Hardware

- Available on Desktop (Windows, macOS, Linux)
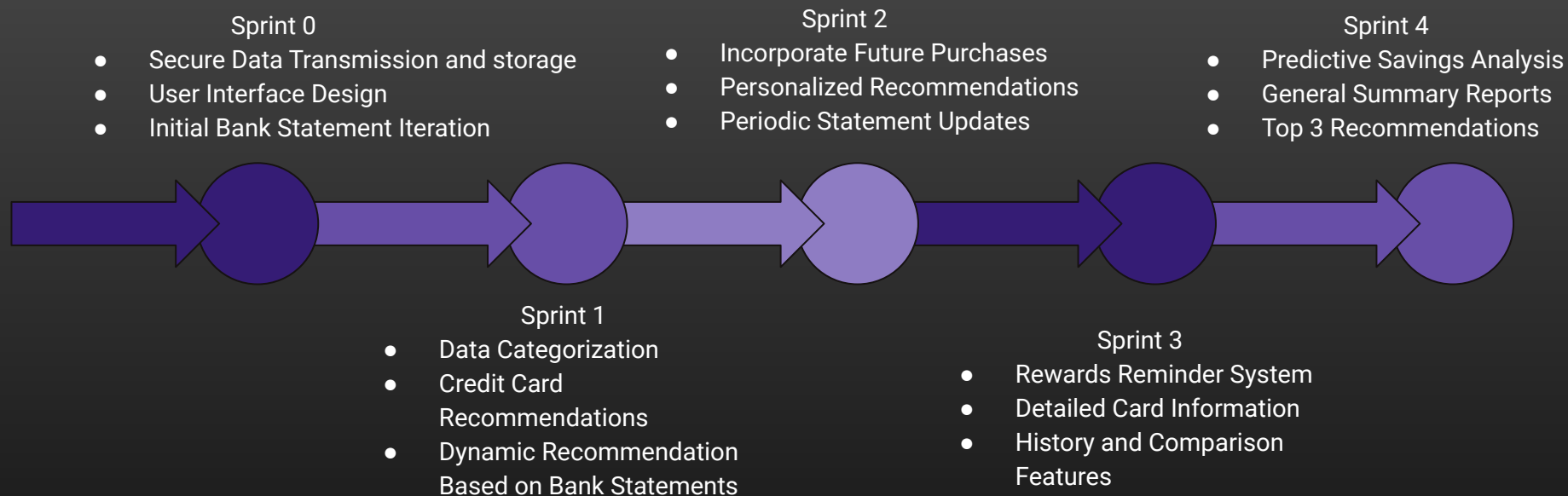- Available on Mobile (Android, Apple)
- Server system(s) required for hosting

Software

- Internet Browser(Google chrome, Bing, Safari, etc)

Development Tools

Category	Web Application
Version Control	Git
Issue Tracking	Github
Languages	HTML/CSS/JS/Python
Database	Amazon RDS with MySQL
IDEs	Visual Studio
Components, API	RewardsCC API
Testing	pytest

Agile Sprints

Sprint 0
- Secure Data Transmission and storage
- User Interface Design
- Initial Bank Statement Iteration

Sprint 2
- Incorporate Future Purchases
- Personalized Recommendations
- Periodic Statement Updates

Sprint 4
- Predictive Savings Analysis
- General Summary Reports
- Top 3 Recommendations

Sprint 1
- Data Categorization
- Credit Card Recommendations
- Dynamic Recommendation Based on Bank Statements

Sprint 3
- Rewards Reminder System
- Detailed Card Information
- History and Comparison Features

Security Risk Matrix

Security Risks | **Mitigations**

S1..Risk of Personal Identifiable Information (PII) and sensitive information being accessed

S1. Follow the currents standards for protecting PII according to National Institute of Science and Technology Privacy Framework
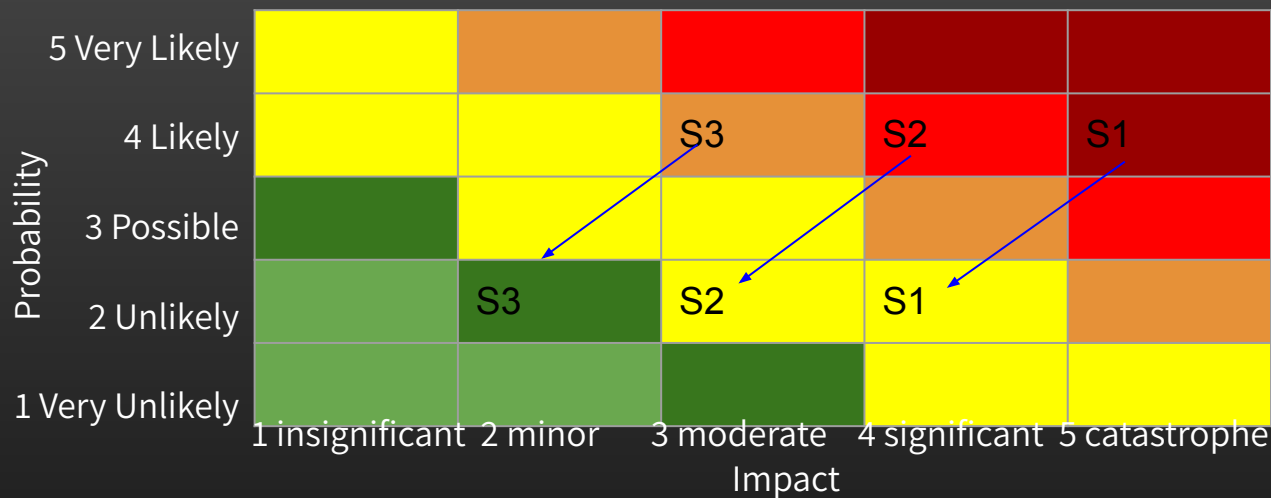
S1. Encrypt data-at-rest and ensure encrypted API calls

S2..Unauthorized user(s) accessing profile(s)

S2. Implement Multi-Factor Authentication (MFA) and strong password requirements

S3..Use of API(s)

S3. Implement API Gateway and SSL/TLS

Probability	1 insignificant	2 minor	3 moderate	4 significant	5 catastrophe
5 Very Likely					
4 Likely			S3	S2	S1
3 Possible					
2 Unlikely		S3	S2	S1	
1 Very Unlikely					

Impact

Customer Risk Matrix

Customer Risks | **Mitigations**

C1. Customer does not find satisfactory solution

    C1. Test thoroughly for multiple profile cases

C2. Customer adds erroneous inputs.

    C2. Implement input validation and allow user to confirm choices

C3. Customer chooses card(s) they are not approved for

    C3. Allow for user to input estimated credit score and other metrics (WHAT?)

Probability	1 insignificant	2 minor	3 moderate	4 significant	5 catastrophe
5 Very Likely					
4 Likely		C1	C2		
3 Possible		C3			
2 Unlikely		C1	C2		
1 Very Unlikely		C3			

Impact

Technical Risk Matrix

Technical Risks | **Mitigations**

T1. App unable to access API(s)

   T1. Test API(s) and cache responses

T2. Data from credit card providers not up to date

   T2. Consistently monitor API(s) for updates and implement most up-to-date card information
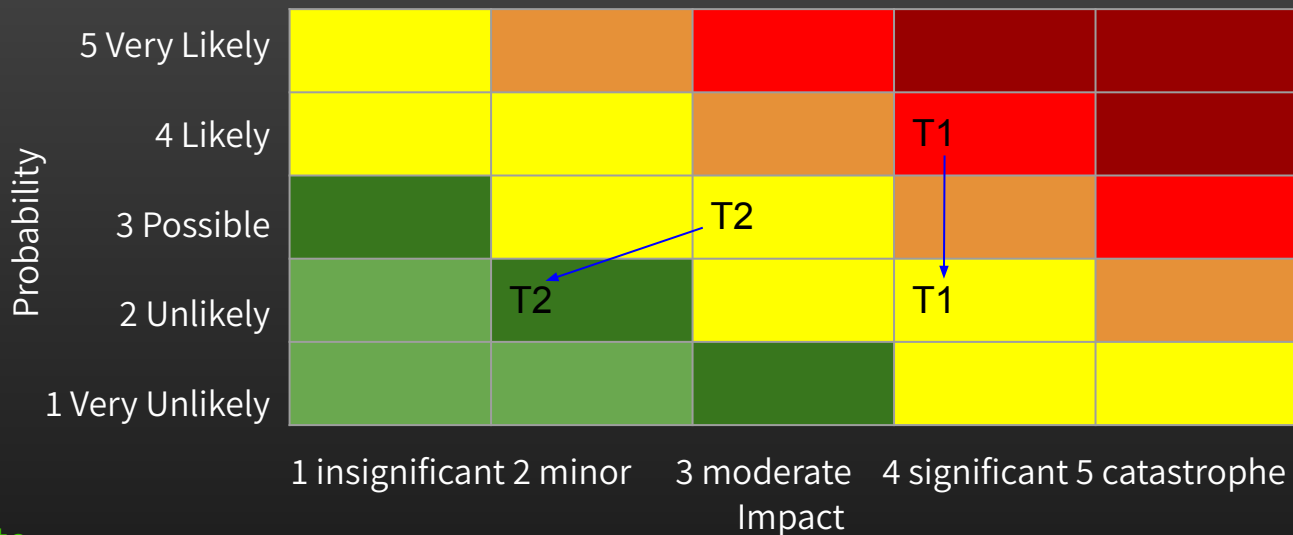
Competition Matrix

Product Category	Better Swipe	NerdWallet	Bankrate	Finder
Rate Cards	❌	✅	✅	✅
Search for best of each type	✅	✅	✅	✅
Find cards based on credit score	✅	✅	✅	✅
Match cards based on intention	✅	✅	✅	❌
Match cards based on spending profile	✅	✅	✅	❌
Compare cards side by side	✅	✅	❌	❌
Continuous monitoring for lifestyle changes	✅	❌	❌	❌
Reminders for reward use	✅	❌	❌	❌
Automatic input with bank statements	✅	❌	❌	❌

Constraints

- Will not check users' credit scores

- Will not apply to a given card for the user

- Will not manage how user utilizes chosen card(s)

Conclusion - Key Points Summary

- Searching for credits cards has become problematic over the years with the addition of credit card rewards.
- The differences of credit card rewards and the amount of them are what make this issue and problem to be solved
- BetterSwipes goal is to make this process easier and allow people to find a credit card tailored to their needs
  - Using Artificial Intelligence to read bank statements to tailor credit card options
  - Educating customers on how to properly using credit cards for their benefit
- There is some risk to using this software
  - Potential Personal Identification Information being wrongly accessed and leaked
  - Constant updates of the credit card companies information for customer choices

"Better Rewards, Better Savings, Better Swipe"

Questions?

References

1)   Bankrate. (n.d.). How to choose a rewards credit card., from https://www.bankrate.com/finance/credit-cards/choose-rewards-credit-card/

2)   Bankrate. (n.d.). Are rewards credit cards worth it?, from https://www.bankrate.com/finance/credit-cards/are-rewards-credit-cards-worth-it/#pros-cons

3)   Dodgson, L. (2018, October 4). Why Too Much Choice Is Bad. Business Insider. https://www.businessinsider.com/why-too-much-choice-is-bad-2018-10

4)   ScienceDirect. (2014). The Effect of Too Many Choices on Consumer Satisfaction in Online Sales Environments. https://www.sciencedirect.com/science/article/pii/S2212567114002007/pdf?md5=26ae6e12a34221c1f26fe30622e afbee&pid=1-s2.0-S2212567114002007-main.pdf&_valck=1

5)   NerdWallet. (2023, July 7). How to Read the Schumer Box on a Credit Card. Retrieved October 11, 2023, from https://www.nerdwallet.com/article/credit-cards/how-to-read-schumer-box

6)   Lambright Black, M. (2022, August 15). Study: Millions Leave Credit Card Rewards Unredeemed. LendingTree. Retrieved October 11, 2023, from https://www.lendingtree.com/credit-cards/study/unused-rewards/

7)   Pokora, B. (2023, March 9). Credit Card Statistics: 23 Must-Know Data Points for 2023. Forbes. Retrieved October 11, 2023, from https://www.forbes.com/advisor/credit-cards/credit-card-statistics/

References

8)   Fontinelle, A. (2021, May 17). Credit Cards vs. Debit Cards: What's the Difference? Investopedia. Retrieved October 11, 2023, from https://www.investopedia.com/articles/pf/10/credit-card-debit-card.asp

9)   GÜL, Z., & İŞCAN, O. (2022). Understanding Consumer Behavior towards Credit Card Usage in Bangladesh. ISARDER. Retrieved October 11, 2023, from https://isarder.org/index.php/isarder/article/view/1693/1642

10)   DOI.org. (2023). International Journal of Finance and Managerial Research, 05(03). https://dx.doi.org/10.36948/ijfmr.2023.v05i03.2874

11)   Bankrate. (n.d.). Are rewards credit cards worth it?, from https://www.bankrate.com/finance/credit-cards/are-rewards-credit-cards-worth-it/#pros-cons

12)   Akash Chauhan, & Anshu Goal. (2023). Comparative study between debit card & credit card users in Greater Noida City.

13)   The Motley Fool. (2020). Credit and Debit Card Market Share by Network and Issuer. Retrieved from https://www.fool.com/the-ascent/research/credit-debit-card-market-share-network-issuer/

References

14)   NerdWallet. (2023). What's the Value of Chase Ultimate Rewards Points? Retrieved from https://www.nerdwallet.com/article/travel/chase-ultimate-rewards-points-value#:~:text=Based%20on%20our%20most%20recent,Ultimate%20Rewards%C2%AE%20redemption%20options.

15)   NerdWallet. (2023). What's the Value of Capital One Miles? Retrieved from https://www.nerdwallet.com/article/travel/capital-one-miles-value#:~:text=Capital%20One%20miles%20are%20worth,transfer%20partners%20at%201.4%20cents.

16)   Wells Fargo. (2023). Wells Fargo Active Cash Card. Retrieved from https://creditcards.wellsfargo.com/cards/active-cash-credit-card/?product_code=CC&subproduct_code=AC&FPID=0126D7IDF40000&vendor_code=LS&sub_channel=AFF&siteID=SWlnSnn6x54-VBFI3LHxdVpqwHmPYdNihg

17)   Chase. (2023). Sapphire Preferred. Retrieved from https://creditcards.chase.com/a1/23Q3a/sapphirepreferred/compare?CELL=6H8X&AFFID=SWlnSnn6x54-uFq.wEnPmd6AIGJp3kVUng&pvid112b6c9a7e784f3fba5eec3490744a4b&jp_cmp=cc/1431835/aff/15-31715/na

18)   Capital One. (2023). Venture. Retrieved from https://applynow.capitalone.com/?irgwc=1&external_id=IRAFF_ZZce293c61587c41c29a64c5685cb78e40_USCIR_K170911_A344893L_C0bcf2f83N684a11ee9b4547fc6474d6a_S_P&transid=&marketingChannel=P23235&oC=COh7rTP9h&productId=24919

Image Source

- https://shourai.io/blog/2020/07/17/web-application-development-the-basic-concepts/
- https://www.allerin.com/blog/what-is-mobile-app-integration
- https://credit.org/blog/the-benefits-of-having-credit-cards/
- https://www.quicken.com/goals/see-where-my-money-is-going/
- https://www.usatoday.com/money/blueprint/credit-cards/how-many-credit-cards-should-i-have/
- https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.sharecare.com%2Fmental-health-behavior%2Fstress-management%2F8-warning-signs-of-too-much-stress&psig=AOvVaw3YHRcYnBJ3YixeBKOiTGpJ&ust=1697662494403000&source=images&cd=vfe&opi=89978449&ved=0CBAQjRxqFwoTCLCTv-T7_YEDFQAAAAAdAAAAABAL