CS673 Software Engineering
Team 1 - Trackr
Project Proposal and Planning

Team Member	Role(s)	Signature	Date
Timothy Flucker	Design / Implementation Leader	*Timothy Flucker*	05/10/2022
Jean Dorancy	Team Leader	*Jean Dorancy*	05/11/2022
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Revision history

Version	**Author**	**Date**	**Change**
0.1	**Timothy Flucker**	**05/12/2022**	**Adding content for assigned sections (1, 2, 3, 6b)**
0.2	**Jean Dorancy**	**05/13/2022**	**Code Review Process**
0.3	**Xiaobing Hou**	**05/13/2022**	**Configuration Management Plan**
0.4	**Weijie Liang**	**05/13/2022**	**Quality Assurance Plan**
0.5	**Jean Dorancy**	**05/14/2022**	**Management Plan and other edits**
0.6	**Weijie Liang**	**05/14/2022**	**Add details in Quality**

			Assurance Plan
0.7	**Jean Dorancy**	**05/15/2022**	**Risk Management**
0.8	**Jean Dorancy**	**05/16/2022**	**Minor Edits**
1.1	**Tim Flucker**	**05/27/2022**	**Updates to Requirements, minor edits.**
1.2	**Jean Dorancy**	**05/29/2022**	**Updated Timeline, GUI Requirements and other edits**

1. Overview

This project is directly inspired from financial services such as Mint and TrueBill, namely software that tracks transactions against a bank account. The purpose of this project is to have an informal way for users to enter information related to a bank account and transactions against it to understand their spending behavior and the amount of money deposited and withdrawn from their account.

A user will create an account for themselves which will provide them with credentials used for authorization and authentication for the other APIs. Once an account is created, the user will be able to enter in bank account information and then start to enter transaction information against that account. Once this information is entered into the system the user will be able to understand their spending behavior relative to that account.
This project is being developed using the Spring Boot and React Frameworks. Version control of the project will be handled by Git and the class organization GitHub account. An embedded H2 database will be used to contain an initial data set for the application as well as store any information entered by the user after they run the application, however this may be modified to use a PostgreSQL database later in development. As major development is completed, the application will be containerized using Docker and that container will be deployed using the Heroku platform.

2. Related Work

This application is based on applications such as Mint and Trubill that are used to help users view and understand how they spend their money. These applications are built by large financial institutions which provide users with many resources and features to help understand their spending habits, however it also floods them with ads for new bank accounts and credit cards which can be detrimental.

Our application is a much simpler approach to tracking spending behavior and only allows users to input data and view their transactions relative to their bank accounts.

3. Proposed High level Requirements

For the following features listed below, **point values are used to indicate the relative complexity of each feature**. Lower values indicate a feature that is easier to implement and larger point values indicate a complex story that will generally require more time and effort to fully implement. The scale for these point values is from 1 - 8 using a Fibonacci sequence (1, 2, 3, 5, 8) which is used in some Agile-Scrum projects.

- Functional Requirements
    - Essential features
        - User Management
            - Title: Create User API

        - Description: As a customer, I want to be able to create a user account for the application, so that I can have my data associated with my account.
        - Priority: 0 - Critical
        - Points: 5
        - Estimate: 7 - 10 hours
    - Title: Reset JWT Token
        - Description: As a customer, I want to be able to create a new JWT Token so that I can keep using the APIs after my original token expires.
        - Priority: 0 - Critical
        - Points: 5
        - Estimate: 8 - 12 hours
- Bank Account Management
    - Title: Create New Bank Account API
        - Description: As a user, I want to create a bank account record so that I can track deposits and withdrawal transactions after manually inputting those transactions.
        - Priority: 0 - Critical
        - Points: 5
        - Estimate: 6 - 8 hours
    - Title: Modify Bank Account API
        - Description: As a user, I want to modify my bank account record so that I can update its relevant information to be current.
        - Priority: 1 - Medium
        - Points: 3
        - Estimate: 5 - 8 hours
    - Title: Deactivate Bank Account API
        - Description: As a user I want to be able to deactivate a bank account record so that I no longer see that data.
        - Priority: 2 - Medium
        - Points: 3
        - Estimate: 3 - 5 hours
    - Title: View All of my Bank Account
        - Description: As a user, I want to be able to view all of my bank accounts, so that I can interact with all of the data I have entered.
        - Priority: 1 - High
        - Points: 3
        - Estimate: 3 - 5 hours
    - Title: View Specific Bank Account By ID

        - Description: As a user, I want to be able to view a specific bank account using a unique identifier, so that I view its data and take any necessary action against it.
        - Priority: 1 - High
        - Points: 3
        - Estimate: 3 - 5 hours
- Transaction Management
    - Title: Create New Transaction API
        - Description: As a user, I want to create a transaction record linked to a bank account so that my bank account information is up to date.
        - Priority: 0 - Critical
        - Points: 3
        - Estimate: 8 - 10 hours
    - Title: Modify Transaction API
        - Description: As a user, I want to modify a transaction record so that I can update its relevant information to be current.
        - Priority: 1 - High
        - Points: 3
        - Estimate: 5 - 7 hours
    - Title: Void a Transaction API
        - Description: As a user I want to be able to void a transaction record so that I can reverse the transaction and update my bank account.
        - Priority: 2 - Medium
        - Points: 3
        - Estimate: 4 - 6 hours
    - Title: View All of my Transactions
        - Description: As a user, I want to be able to view all of my transactions against a bank account, so that I can see all of the activity of that bank account.
        - Priority: 1 - High
        - Points: 3
        - Estimate: 5 - 7 hours
    - Title: View Specific Transaction By ID
        - Description: As a user, I want to be able to view a specific transaction using a unique identifier, so that I view its data and take any necessary action against it.
        - Priority: 1 - High
        - Points: 3
        - Estimate: 5 - 7 hours
- Web GUI
    - Title: Create User Registration Page

    - Description: As a user, I want to have a web interface to register myself as a new user, so that I can interact with the application and its data using a web browser.
    - Priority: 0 - Critical
    - Points: 5
    - Estimate: 10 - 12 hours
- Title: Create User Login Page
    - Description: As a user, I want to have a web interface to log into the application so that I do not have to use the APIs.
    - Priority: 1 - High
    - Points: 5
    - Estimate: 10 - 12 hours
- Title: Create Dashboard Page
    - Description: As a user, I want to have a dashboard page that shows all of my relevant information so that I can interact with my data more easily.
    - Priority: 1 - High
    - Points: 5
    - Estimate: 10 - 12 hours
- Title: User Profile Page
    - Description: As a user, I want to have a profile page that shows information about my account so that I can make sure they are accurate.
    - Priority: 1 - High
    - Points: 3
    - Estimate: 3 - 6 hours
- Title: User Accounts Page
    - Description: As a user, I want to have an account page that shows all my accounts so that I can manage them.
    - Priority: 1 - High
    - Points: 5
    - Estimate: 8 - 10 hours
- Title: Transactions Table in Dashboard
    - Description: As a user, I want to have a transactions table in the dashboard which lists all transactions from all my accounts so that I can manage them.
    - Priority: 1 - High
    - Points: 8
    - Estimate: 10 - 12 hours
- Title: Bank Accounts List in Dashboard
    - Description: As a user, I want to have a list of all my accounts in the dashboard so that I can quickly check their balances.
    - Priority: 1 - High

            - Points: 3
            - Estimate: 3 - 5 hours
        - Title: Configure secure web browsing in the application
            - Description: As a user, I want proper authentication and authorization for all web pages so that the application is secured from malicious attacks and so that only I can access my data.
            - Priority: 0 - Critical
            - Points: 5
            - Estimage: 12 - 15 hours
    - Desirable Features
        - User Management
            - Title: User Password Reset
                - Description: As a user, I want to be able to reset the password of my account so that, if I forget my password I do not lose access to my account.
                - Priority: 1 - High
                - Points: 3
                - Estimate: 10 - 14 hours
    - Optional Features
        -
- Nonfunctional Requirements
    - Title: Create a Swagger document for the APIs
        - Description: As a developer, I want a swagger document which shows how my APIs are designed, so that I have a relevant technical project artifact.
        - Priority: 0 - Critical
        - Points: 1
        - Estimate: 8 - 10 hours
    - Title: Authenticate API requests
        - Description: As a user I want all of my API requests to be authenticated using a basic authentication strategy so that my data is protected from random and unsolicited access.
        - Priority: 0 - Critical
        - Points: 5
        - Estimate: 5 - 10 hours
    - Title: Authorize API requests
        - Description: As a user I want only API requests I send or from a system admin to be authorized to access my data so that only I can view my data.
        - Priority: 0 - Critical
        - Points: 5
        - Estimate: 5 - 10 hours

4. Management Plan

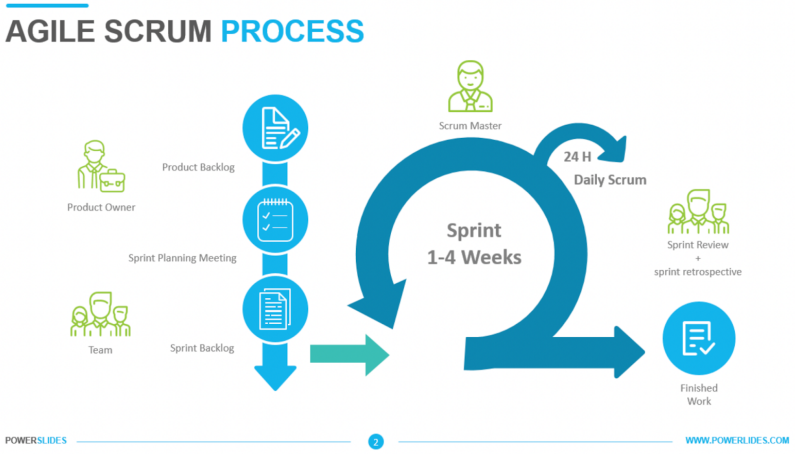
a. Objectives and Priorities

- Every student actively contributes and practices Scrum rituals.
- Opportunities for everyone to learn.
- Focus on best practices to maintain high quality.
- Bottom up unit-testing approach for all feature implementation.
- Complete all essential features without compromising software quality.
- Complete some desirable features.

b. Process Model

We are planning to use the Scrum framework as the process for developing this project. Based on student availability we are looking to implement all the scrum events.

- **Sprint**: We will have sprints of iteration length given the class short duration.
- **Daily Scrum**: Implemented virtually where each team member posts updates everyday between 7pm - 7:15pm.
    - What did you do yesterday?
    - What will you do today?
    - What blockers stand in your way?
- **Sprint Retro and Planning**: Briefly talk about the last iteration, estimate and decide on the goals for the sprint.



We only had two meetings for iteration 0. We are using PivotalTracker to manage our requirements. Everyone is expected to create user stories in the backlog which are discussed in the Sprint Planning.

c. Communication Plan

We are using **Zoom** for live classrooms hence it makes a natural choice for synchronous meetings. We have a **Discord** channel for instant messaging. In the team text channel we have two dedicated threads: A **Daily Scrum** thread where folks post updates every day between 7pm - 7:15pm. A **Pull Requests** thread that is used to post PR to be reviewed by the team. If we run into roadblocks, we post in the channel for help and if we can't find a solution then we reach out to the facilitator and lastly email the professor according to school policy.

d. Risk Management (need to be updated constantly)

The main risks we have identified for the project after filling the risk management sheet and ways to address them are as follows.

Risk Title	**Priority**	**Plan**
Constant requirements change	8	- Favor generic solutions that are adaptable - Embrace change and build the product using appropriate design patterns - Emphasize communication with stakeholders to ensure requirements are well understood
Unclear requirements	12	- Sprint review meeting with stakeholders - Constant communication with stakeholders - Stakeholders to review all requirements and answer questions.
Lack of motivation or responsibility	15	- Opportunities for everyone to learn - Everyone to work on things they are interested in - Practice the Scrum rituals which keeps the team engaged
Scope creep	16	- Meeting with stakeholders about increase of scope which might impact project schedule - Dropping some of essential features - Alternative technical solutions

Risk Management Sheet Link: here

e. Timeline

Sheet with detail estimates for each iteration: here

Iter	**Functional Requirements** **- Essential** **- Desirable** **- Optional**	**Tasks (Cross requirements tasks)**	**Estimated/ real person hours**	**Links**
1	- User Management - Bank Account Management - Transaction Management - GUI	- Architecture and design - Test plan - Spring Boot tutorial - Create a Spring Boot project - Deployment pipelines - DB schema for user - Implement create user - DB schema for bank account - Implement create new bank account - Implement modify bank account - Implement deactivate bank account - Implement view all my bank account - Implement view account by ID - Architecture and design - Test plan - Create pipeline to automatically run project tests on PR request - DB schema for transaction - Implement create new transaction - Implement modify transaction - Implement void a transaction - Implement view all of my transactions - Implement view transaction By ID - Setup project with React and Wepack - Home and user registration page - User login page - JS Code Sniff GitHub Action	85/50 (about 197 for the team)	Link to Video
2	- GUI - Configuration - Refactoring	- Implement user dashboard page - Implement transactions table in dashboard - Implement list of all accounts in dashboard page - Implement user profile page - Implement all accounts page - Implement Integration tests for UI - Refactor backend to use package by feature - Pipeline for running JS tests on PR - Pipeline for running Java tests on PR	90	

		- Pipeline for running SonarQube checks for Java		
3	- User Management - Create a Swagger document for the APIs - Web GUI	- Architecture and design - Test plan - Update user DB schema if needed - Implement password reset page	25	

5. Configuration Management Plan

a. Tools

Dev Tools

- Java (1.8, Download here)
- Swagger (api design, online editor here)
- Lombok (java dependency, website to download and install here)
- Maven (java build tool / dependency management, download here)
- NodeJS with NPM
- Webpack

Version Control Tools

- Git (Download here)
- GitHub (Sign up here and our project here)

IDE Tools

- IntelliJ (Download here)

Project Management Tools

- PivotalTracker (Our project here)
- Google Drive (Our project here)

Test Tools

- Postman (Sign up here)
- JUnit5 (documentation and how to use here)
- Mockito(documentation here)

Deployment Tools

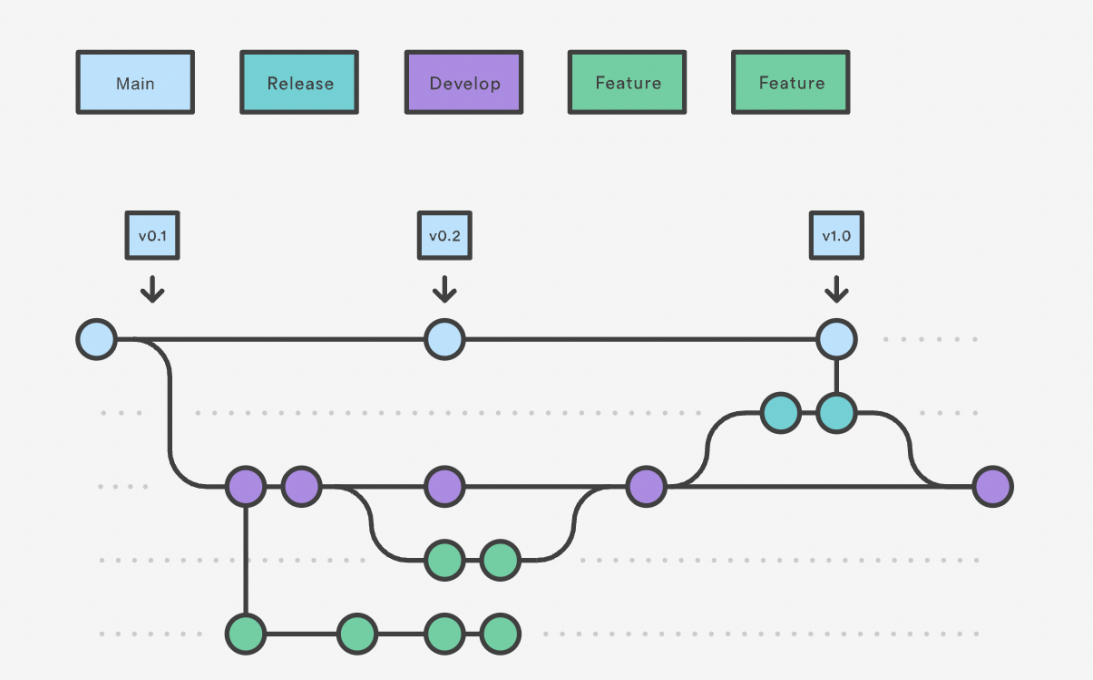
- Heroku (Our project here)

Meeting and Dissemination Tools

- Zoom
- Discord

b. Code Commit Guideline and Git Branching Strategy

There are two protected branches: **main** and **development**. They both require approval by another team member before any changes are merged. The main branch is where we perform the releases and deployment to production. The development branch is used to stabilize changes and integrate multiple personal feature branches. Everyone will create a feature branch from the development to work on and create a PR which targets development later. When merging to main or development branches we squash commits so we can have a single commit with a description of the work done. This is particularly useful if we need to revert so we can just revert a commit.



Following the Git workflow as explained above a PR will need to be created and formatted with the following sections.

- **Summary**: Section about what the change and link any design or document.
- **Testing**: This section describes how the change was tested.

    a. **Manual**: Add information about manual tests that were performed.
    b. **Automated**: Add information about automated tests that were added.
- **Code Reviews Checklist:** checklist of items that the PR is related to. Based on the following standard.

c. Deployment Plan

Platform

- Heroku (Deploy with Git)

Necessary Preparation

- Install Git
- Install Heroku CLI
- Create a Heroku Apps
    - Development App for development changes
    - Production App which is customer facing and deployed with changes from main.

Multiple Environments

- Development Environment
    - Auto deploy when changes are merged to the development branch to the development environment.
    - All PRs have to be deployed to development before they can be merged.
- Production Environment
    - Auto deploy when changes are merged to the main branch to the production environment.
    - Only changes from main are deployed to production.

6. Quality Assurance Plan

a. Metrics

Metric Name	**Description**
Number of features	Number of features that were implemented; shows the complexity of the project.
Number of Defects	Number of defects reported in the project; shows the reliability and completion of the project.
Total Man Hour	The total time spent on or preparing for the project. This will allow us to track the total amount of effort spent in support of the project.

Test Passing Rate	Number of tests passed. This metric will be measured during each iteration, and the types of tests include unit tests and manual tests.
User Story Counts	Number of user stories created in Pivot Tracker. The number of completed user stories will be tracked in every iteration.

b. Coding Standard

Our team will be adhering to the Google Java coding standard found here. We will actively achieve this by configuring our IDE to implement the formatting of this coding standard (link).

c. Code Review Process

The team will work collaboratively on all the documents and review them in GSuite before they are exported and committed to the Git repository. GSuite comments will be used to open issues in the documents then comments will be marked done after issues have been resolved. When it comes to code, reviews will be done in GitHub via Pull Requests (PR) and **one** approval will be required before the changes are merged. If there are conflicts they will need to be resolved before any changes are merged to the main or development branch. Everyone on the team will be encouraged to **review all changes** to the repository and comments to open issues or ask clarifying questions. The reviewer will check the code and use the following review checklist.

1. Manageability
2. Architecture
3. Maintainability
4. Correctness
5. Invalid input/states
6. Usability
7. Reusability
8. Object-Oriented Analysis and Design (OOAD) Principles

After the PR is ready for review it should be posted in the group Pull Requests Thread in the group chat in Discord. It's everyone's responsibility to monitor the thread for review requests and promptly review the changes. The Git repository has the GitHub PR template committed so when a new PR is created it starts all the sections to be filled and the review checklist listed for the reviewer.

d. Testing

1. **Unit testing**: Unit testing will be conducted by the developer responsible for writing the code for each core method before submitting a pull request. The

test methods and results can be recorded in the test report. We will be developing unit tests using a combination of Junit5 and Mockito. This will allow us to follow current industry standards and ensure that our tests are not adding / modifying data in our deployed codebase.

2. **Manual testing**: QA Leader performs manual testing of the core functionality after each iteration. The test methods and results can be recorded in the test report. A set of test API calls will be included in the codebase in the form of a Postman Collection. This JSON document can be imported into your local copy of Postman and provide a user with a set of predefined API calls to the system.

e. Defect Management

1) Defect Type:

- High Priority Defect:
  - Defects that halt the whole program from running, should be fixed as soon as possible.
- Median Priority Defect:
  - Defects that impact some of the functions in the program, should be fixed before iteration.
- Low Priority Defect
  - Defects that are hard to notice and do very little impact to the program, can be fixed anytime.

2) Defects Tracking:

The QA Leader will use Pivot Tracker to track fixed and unfixed defects and the fix rate at the end of each iteration.

3) Defect Resolution Process

i. Any team member who finds a defect will create a ticket in Pivot Tracker and assign it to the developer responsible for the feature with the following information.

- Severity level markers (High, Median, Low Priority)
- Description and screenshots of the defect
- Expected results

ii. Developers fix the defect and create a pull request with an "error" tag. The developer can have the teammate who found the defect specifically review this pull request and approve it.

7. References

- **The Ultimate Code Review Checklist**
  https://www.codegrip.tech/productivity/the-ultimate-code-review-checklist/?utm_source=website&utm_medium=blog&utm_campaign=best-practices-for-code-review-process

- **Java Coding Standard**
  https://google.github.io/styleguide/javaguide.html

- **Atlassian Git Workflow**
  https://www.atlassian.com/git/tutorials/comparing-workflows/gitflow-workflow

- **Generate Project Name and Logo**
  https://namelix.com/

- **Agile Scrum Process**
  https://powerslides.com/powerpoint-business/project-management-templates/agile-scrum-process/

8. Glossary

- **PR**: Pull Request
- **IDE**: Integrated Development Environment
- **CI**: Continuous Integration
- **CD**: Continuous Development
- **QA**: Quality Assurance
- **API**: Application Programming Interface
- **CLI**: Command Line Interface
- **GUI**: Graphical User Interface
- **DB**: Database
- **SQL**: Structured Query Language
- **JSON**: JavaScript Object Notation
- **JWT**: Java Web Token