Michael du Toit

2193161

Budgiecoin

SD6501 – Final Project Documentation

Contents

[Table of Figures 1](#_Toc74244053)

[Conceptual Framework 1](#_Toc74244054)

[Improvements, Features and Concepts applied: 2](#_Toc74244055)

[Constraints & Strategies 2](#_Toc74244056)

[Final Application Screenshots 3](#_Toc74244057)

[Instructional Material 7](#_Toc74244058)

[Summary & Recommendations 7](#_Toc74244059)

[Summary 7](#_Toc74244060)

[Recommendations 7](#_Toc74244061)

[Acknowledgements: 8](#_Toc74244062)

# Table of Figures

[Figure 1 - Login Activity 3](#_Toc74243912)

[Figure 2 - Register a new User 3](#_Toc74243913)

[Figure 3 - Biometric Login Prompt (Login) 4](#_Toc74243914)

[Figure 4 - Error message if no Username is entered 4](#_Toc74243915)

[Figure 5 - Main Activity with three buttons for primary actions 4](#_Toc74243916)

[Figure 6 - View Transactions Activity showing all the recorded transactions and the new Floating Action Button. 4](#_Toc74243917)

[Figure 7 - Create a Transaction Activity. With the updated Date and Time Pickers. 5](#_Toc74243918)

[Figure 8 - View Account Balances Activity with the new Floating Action Button 5](#_Toc74243919)

[Figure 9 - Add a new Account 5](#_Toc74243920)

[Figure 10 - Update an existing Account 5](#_Toc74243921)

[Figure 11 - the updated Settings Activity with options to update the Username and Pin of the person logged in or Delete them. 6](#_Toc74243922)

[Figure 12 - Updating the Username in the Settings Activity 6](#_Toc74243923)

[Figure 13 - Updating the PIN in the Settings Activity 6](#_Toc74243924)

[Figure 14 – Confirmation dialog for deleting the user 6](#_Toc74243925)

[Figure 15 - App Icon 7](#_Toc74243926)

[Figure 16 - App Icon on Activity 7](#_Toc74243927)

# Conceptual Framework

The Final Project built upon the BudgieCoin application that I have been developing throughout Assignments 1 and 2. BudgieCoin is a personal finance application for users to help keep track of their income, expenses, and balances of their accounts. This will help users become more financially literate by knowing where they are spending their money.

For the Final Project release of the application, the scope of Final Project was to tidy up the application and ensure all features from Assignments 1 and 2 where finished, implement further tests for the application, develop various documentation and prepare the application for deployment onto the app store.

The generated APK/AAB file can be found in the folder *app/release/*.

# Improvements, Features and Concepts applied:

One of the main goals of the Final Project was to tidy up the existing features and complete implementation of any features that had not been completed yet.

The following modules saw work during the Final Project:

**Refactored Date & Time** **implementations** – In both the Database & Source Code. As was noted in the Constraint section of Assignment 2’s documentation, the original method of storing date and time had issues when it came to updating transactions. To solve this issue, I ended up re-writing sections of the Database and App Source code to now handle the date and time values as long values that stored the time as seconds since the Unix Epoch. This solved the issues that were originally present, and transactions can now be updated without affecting their original time or date, their date or time can be updated properly, and they are now listed in a date and time ascending order on View Transactions activity. This refactoring had to be done in multiple files to handle the new data type and format.

**Settings Activity** – this activity had been present but underdeveloped since Assignment 1. For the Final Project I added the ability for a user to update their username and/or pin number. This included using Android’s SharedPreferences features to record which user had logged in and then only allow them to edit their details. Additionally, the user now has the option of deleting their account permanently.

**Login Activity** – Bug Fixes & minor improvements. If a user attempts to login with an empty username an error message is shown that the username input field cannot be empty. When a user logs in they are stored to the SharedPreferences as the current user.

**Testing** – I added Unit Tests for the Java object classes and added further Espresso UI Tests for testing the application. In addition to writing the Test code, I also completed documentation and screenshots of the test results. The file *SD6501\_FinalProject\_Testing\_Documentation\_MDuToit.docx* contains all the Testing documentation and screenshots.

**View Accounts Balances and View Transactions** – added Floating Action Buttons to these two Activities. The Floating Action Buttons open the AddAccountActivity and TransactionActivity respectively, allowing users to easily access those Activities from the views without having to open the Navigation Drawer.

**App Icon** – As part of preparing the application for deployment, I selected an appropriate icon from Freepik.com and used it to generate an App Icon for the application.

# Constraints & Strategies

**Espresso Testing with no Emulator**

To run the Espresso Tests, Android Studio needs to use either the emulator or a physical device. As previously noted, the Android Emulator on my laptop either fails to work or is extremely slow. Thus, to do the Espresso Testing I had to connect my phone to my laptop, in Developer mode and disable Animator, Transition and Window animation scales. The phone’s screen also had to stay active otherwise the tests would not run. Having to disable the animation scales to run the tests (and then re-enable them after I finished testing), and ensuring the device remained unlocked to start testing, was a bit tedious at times.

**A randomly Failing Espresso Test**

I had one specific Espresso Test that was failing for a period. The specific test only failed when the whole test class was being run, if the test was run individually it passed. The error message was not very helpful, and I did not find a resolution to the problem. However, after some time the issue seemed to have resolved itself and the test no longer fails.

**Date and Time**

As previously mentioned, the original format of storing date and time as strings ended up not being viable. To resolve the issues that arose, I had to refactor the date and time implementations. I tried and tested a few different methods and implementations, such as the LocalDateTime, DateTime, Calendar and Date classes. Eventually I settled on using the Calendar class in combination with long values as the solution to my problem.

# Final Application Screenshots

|  |  |
| --- | --- |
| Graphical user interface, application, Teams  Description automatically generated  Figure - Login Activity | Graphical user interface  Description automatically generated  Figure 2 - Register a new User |

|  |  |
| --- | --- |
| Graphical user interface, application, Teams  Description automatically generated  Figure 3 - Biometric Login Prompt (Login) | Graphical user interface, application  Description automatically generated  Figure 4 - Error message if no Username is entered |

|  |  |
| --- | --- |
| Graphical user interface, application  Description automatically generated  Figure 5 - Main Activity with three buttons for primary actions | Text, table  Description automatically generated with medium confidence  Figure 6 - View Transactions Activity showing all the recorded transactions and the new Floating Action Button. |

|  |  |
| --- | --- |
| Graphical user interface, application, Teams  Description automatically generated  Figure 7 - Create a Transaction Activity. With the updated Date and Time Pickers. | Graphical user interface  Description automatically generated with medium confidence  Figure 8 - View Account Balances Activity with the new Floating Action Button |

|  |  |
| --- | --- |
| Graphical user interface, application, Teams  Description automatically generated  Figure 9 - Add a new Account | Graphical user interface, application, Teams  Description automatically generated  Figure 10 - Update an existing Account |

|  |  |
| --- | --- |
| Figure 11 - the updated Settings Activity with options to update the Username and Pin of the person logged in or Delete them. | Graphical user interface, application  Description automatically generated  Figure 12 - Updating the Username in the Settings Activity |

|  |  |
| --- | --- |
| Graphical user interface, application  Description automatically generated  Figure 13 - Updating the PIN in the Settings Activity | Figure 14 – Confirmation dialog for deleting the user |

|  |  |
| --- | --- |
| A picture containing text, nature  Description automatically generated  Figure 15 - App Icon | Graphical user interface, application, website  Description automatically generated  Figure 16 - App Icon on Activity |

# Instructional Material

A short instructional video can be found in the *Documentation/Final Project Documentation* folder that demonstrates the main functionalities of the application.

# Summary & Recommendations

## Summary

The BudgieCoin application had a lot of potential scope and features. To give an idea of the potential scope of this type of project, it got turned down as a viable project for the Capstone course. Features that could have still have been built into the application include retirement calculators, charts, full budgeting, predictive algorithms and/or bank statement uploads.

I am happy with everything I achieved in the development of the app, it is possibly not the most pretty or featureful but gave me the opportunity to learn and successfully implement Android features and concepts, and provided a strong foundation for me to carry on developing Android applications.

## Recommendations

If you are going to be working with date and time values with SQLite (regardless of the project), it is probably best to store them as a Unix Epoch long value in the database. This makes it easier to convert to proper date-time values when called by the codebase.

Be careful with your time management and start working sooner rather than later. Implementing some of the features took longer than expected and small setbacks used ended up using more time than expected. Sometimes finding viable solutions to issues also took longer than expected, or where harder to implement than expected.

# Acknowledgements:

Bird Icon made by Freepik from <https://www.flaticon.com/>