Politehnica University of Timișoara

Faculty of Automation and Computers

**Department of Computer and Information Technology**

**Split the Bill**

Bachelor Thesis

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1 **Introduction**

Problem Statement

Nowadays a lot of people move into the city, at first people think of getting their own place but it is rather expensive to do so, and for the sake of saving up money people search for rooms in shared flats. Living with more than three people in an apartment can become difficult, especially when it comes to sharing the expensies and splitting the money for the cleaning supplies that everybody uses. It is also difficult to keep track of who contributed to the cleaning of the common areas in the flat.

Conflict can arrise from tha lack of communication between the roommates, because of their busy schedule, and they have no time to check in with each other, thus making it hard to live with one another. Such as having some friends over without asking, or having forgotten that the landlord was coming and people did not know about it. These can lead to conflicts and missunderstandings, thus forcing some people to find a new place to live in.

In order to prevent such things the people who live in shared flats must well organized, and have to have a good money management skills, but a lot of people who live in shared flats are young adult who do not yet posses there skill sets, thus making it difficult to get along with other and split everything correctly.

1.2 Scope of the Project

The scope of the project is to help people who have roommates organize themselves more easily when it comes to trivial matters such as chores, or splitting the money for the cleaning supplies. For this reason I was thinking of develeping a mobile application, the reason for developing a mobile application is because nowadays people are on their phones all the time, and almost everybody has a smart device. Because of this reason it is easier to check the application if something has came up or something has changed or not.

The reason why I did not develop a web page is because users prefer native application instead of web applications. There are a lot of reasons why this is the case, one of the reason is that it is faster and native application are more easily personalized, and users tend to like personalizing their application. Another reason for prefering application is that is more secure, and they can work up until a point without internet connection.

The mobile application is called split the bill, this application helps with spliting the chores and cleaning supplies between the people living in the same flat, and it also has a billboard page for putting announcements for people to see. In short the application will be useful for people who want to keep track of the things above and help them organize themselves more easily.

2. Use cases

Use cases help in organizing system requriments, and services that the software product will provide. They help undestanding how the user will interract with the system, and how the modules of the system will interract with each other.

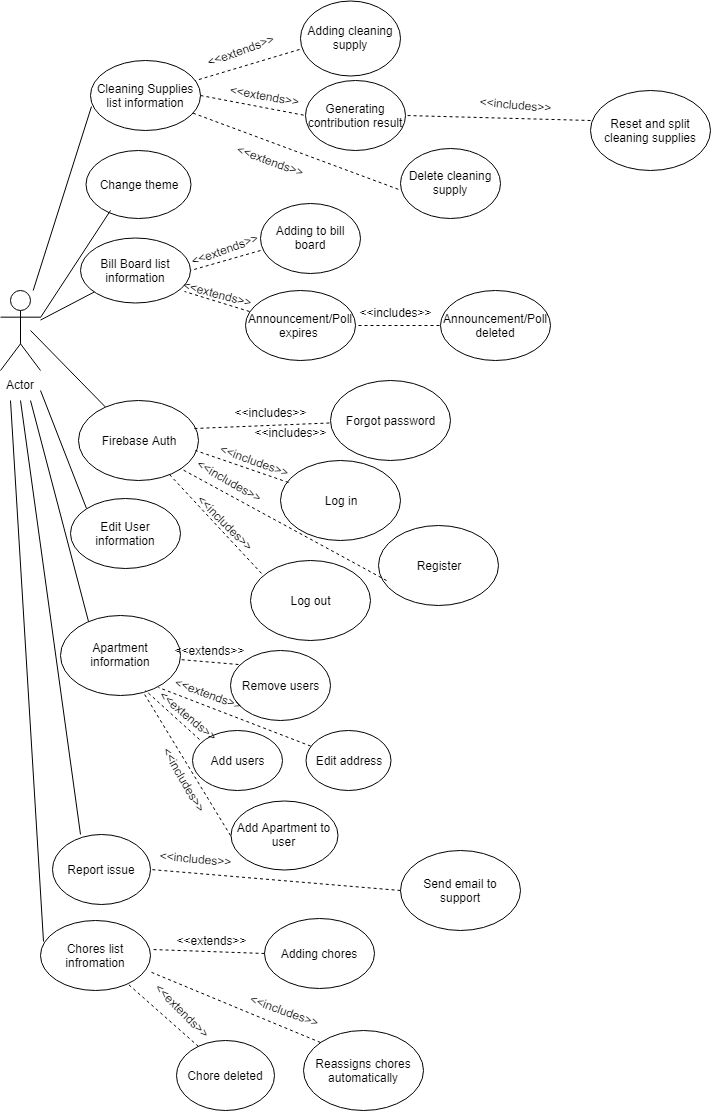
2.1 Application Description

The application is called Split the Bill, it’s main focus is to help mange money resources for people who live in shared accomodation, thus making their life easies when it comes to splitting equally the money for cleaning supplies.

The application offers more than this, it also helps the people living togheter organize themselves when it comes to spliting the chores, and again it help with time mangment. The chores will be reassgined automatically to different people after a certain amount of time that the users in the apartment set.

It is also useful because the people who use this application can also make announcements and polls that the other can see. The announcements are for example when the landlord is coming over to collect the rent, and people need to be home, and someone writes this announcements in the bill board page of the application. People can also ask their roommates question if they can have some friends over, or if they can host a party, and the other people can vote with yes or no.

These are the main features of the application that the application is trying to solve and help people get along more easily, and helps them organize themselves more efficently.

2.2. Use case

2.3 Application Features

In the table bellow there is the list of features that the application should contain for it to be able to function well.

1. Users should be able to register to the application, and when doing so they should give some information about themselves.
2. Users should not be able to use the application without being autheticate
3. In case users should forget their password they are able to reset it.
4. Whe user encounter some problems they can report via gmail.
5. Personalizing the theme of the application.
6. Editing user information is editable in some of the information changed.
7. The application has a bottom navigation drawer, and has multiple pages.
8. The application is functional on android as well as ios platform
9. The application allows the user to add and delete chores, cleaning supplies and billboard announcements
10. The application also generates the contribution of each user in percantage and calculates it is total contribution
11. The billboard announcements can be of two types, simple or a poll, where users can vote with yes or no.
12. The chores are automatically reassigned to the users after a give amount of time.
13. The billboard announcements expires after a given amount of time and they are automatically deleted.
14. The aparment, user, chores, billboard and cleaning supplies information for each element is places on cards as a UI element.
15. Technologies

4.1 Flutter SDK

Flutter is an open source  cross-platform mobile app development framework, with which the developers can create native applications  for both the Android and IOS platform, thus the framework has one codebase from which it generates two native application. For Android the generated code is in Java and for IOS the generated code is Swift. This framework is created by Google. The programming language used by Flutter is called Dart.

The framework doesn’t depend on the widgets that are used by the platforms, because it only needs the canvas to draw it’s own rendering.

Flutter implements the OOP principle of the composition over inheritance. Composition and inheritance are both fundamental concepts of object-oriented programming. Composition means that a class has a reference to some other class, thus establishing a HAS-A relationship between these two classes. Inheritance on the other hand is a process where the class that inherits the super class and it’s public and protected methods and fields, this principle establishes an IS-A relationship between the parent and the child class.

A flutter application consists of a widget tree, so the application consists of small widgets which creates a complex user interface. A widget can be of two types. Stateless Widget which doesn’t change thus it is a final widget, and the Stateful Widget, this type of widget changes states by calling the function setState() which notifies the listeners that the state of the widget has changed thus the widget is redrawn.

Because flutter is open-source there are a lot of packages that the developer can use to build the application faster, these packages can be added in the pubspec.yaml file of the projects, thus these packets will be added only to the current project not to flutter. In my diploma project I used packets such as these, for example the scope\_model, percent\_indicator, http, url\_launcher packets. In the above mentioned you can also add other dependencies such as the assets. Assets are considered to be images, or fonts etc.

* + 1. Dart

Dart is an object oriented programming language that uses both JIT(Just In Time) compilation and as well as AOT(Ahead-Of-Time) compilation.

Just In Time compilation is a technique that converts the bytecode that was generated by the compiler into native machine code at run time thus getting the name just in time compilation.

Ahead of Time compilation is a different compilation technique this one compiles the code into native machine code before the code starts to run in the environment.

* + 1. Scope Models

As mentioned before the Scope Model is one of the third-party packages that can be installed by adding the dependency into the pubspec file. This package helps pass data within the widget tree from the parent to the child nodes. And when the data is changed these child nodes will be updated and redrawn.

The Scope Model can be accessed in two ways, by using the widget ScopeModelDescendant, in which case the widget that is the descendant of the model will be rebuilt, or by statically accessing the ScopeModel.of(context) method.

Firebase

Firebase is a platform created by Google, that can be categorized as BaaS (Backend as Service). Firebase offers a lot of features, these features help developers to create application that respond fast, thus creating a great user exprience.

This platform offers a lot of analytics, these are categorised into tree group the development group, which consists of a NoSql real time database, authetication, cloud messaging, storage, hosting, test las and crash reporting. Another of the grpups is the grow froup which focuses on the notifications, remote config, app indexing, dynamic links, invites, adWords. The last category is the earn group which consists of AdMob, so that developers can earn money from in-app adds.

4.2.1 Authentication

For the diploma project I used the authetication, for users to be able to log in to the application, using firebase so that i do not save the user passwords into the database, and letting firebase handle user authetication.

**// diagram from home**

4.2.2 Real Time Database

Another feature that was used in my diploma project is the real-time database, this type of database is a NoSql database, this means that the data is stored in a file with the JSON format.This mean that the datamodel is structured as a tree, and the data is saved by adding children to the parent node. The actual data that the user saves can be found at the leafs of the data model.

One of the main benefit of this type of database is that the data is synchonised in a few ms, thus making the mobile application responsive. When users are using a moblie application they like it to be fast, andto get the data as fast as possible. If an application is slow users tend to search for other options, ones that are faster.

Another great feature of firebase is when that device looses it’s connection to the internet the events are still fired, so when the device goes back online the data will be merged to the database.