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Flagway App for the Algebra & Young People's Project

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Problem

The goal of the Flagway Game is to create environments where very young students can practice and celebrate learning math. There are many different ways to create a cultural context in which mathematics emerges naturally from students' experience. One method used by the YPP and the Algebra Project is to create mathematically rich games and experiences. The Flagway Game was developed by Bob Moses in 1995 and patented in 1996.

- Players navigate a Flagway or course of radial "paths".
- Can be played without knowing underlying mathematical principles.
- We are assigned to develop a Flagway Android Game.

Current System

Status

Currently Flagway is played in physical track. In this game, Speed counts, so as students develop into skilled players several may be running through the course simultaneously, creating dynamics similar to that of a sporting event. But there is no computer or mobile application for this game. So this is version 1.0.

My Core Contributions

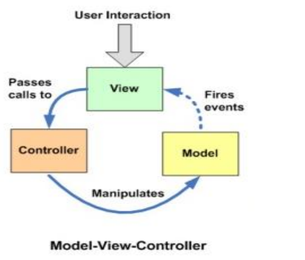
- General and initial game settings.
- 2 modes (A – informed, B – uninformed)
- User touch interaction.
- Gameplay Settings Development & Design
- Handle ranges of
- Assigned numbers Validation
- Basic scoring

Requirements

Functional & Non-functional Requirements

- A smartphone application
- Simple and child friendly UI
- Individual user profile
- Must have two modes
- Different levels and ranges
- Strictly simulate the Flagway rules
- All inputs should be accepted
- Feedback must be given at each try
- Feedback must be given in several steps while in level 1
- Underlying mathematical principles must be kept implicit
- Game score must be displayed

System Design



Model-View-Controller

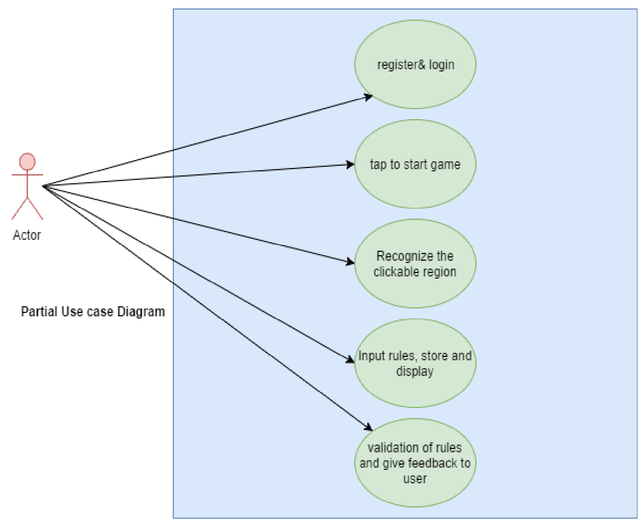
Models:
- Region where the player can tap
- Area to select color of a number
- Algebraic rule input box

Views:
- Render objects into the screen
- Get feedback after input
- Notification about state changes

Design Patterns:
- View and view group: Composite
- View holder: Singleton
- Intent: Factory

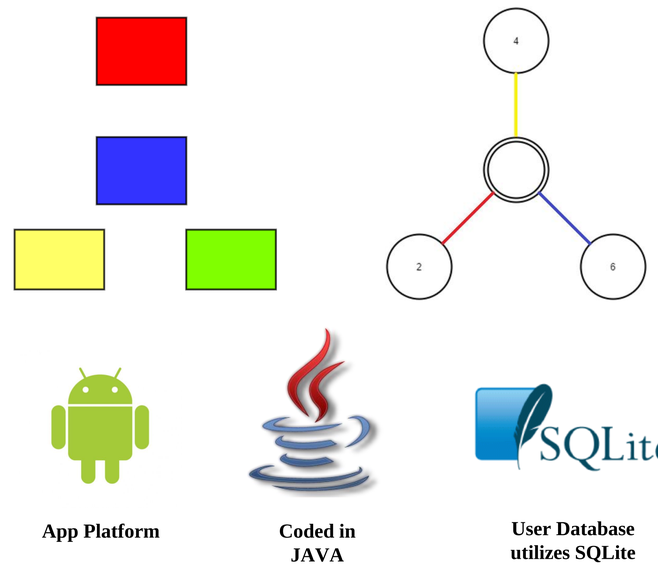
Controllers:
- Player's input handler
- Controller to process input
- Controller to perform actions

Object Design



Partial Use case Diagram

Implementation



App Platform | Coded in JAVA | User Database utilizes SQLite

Verification

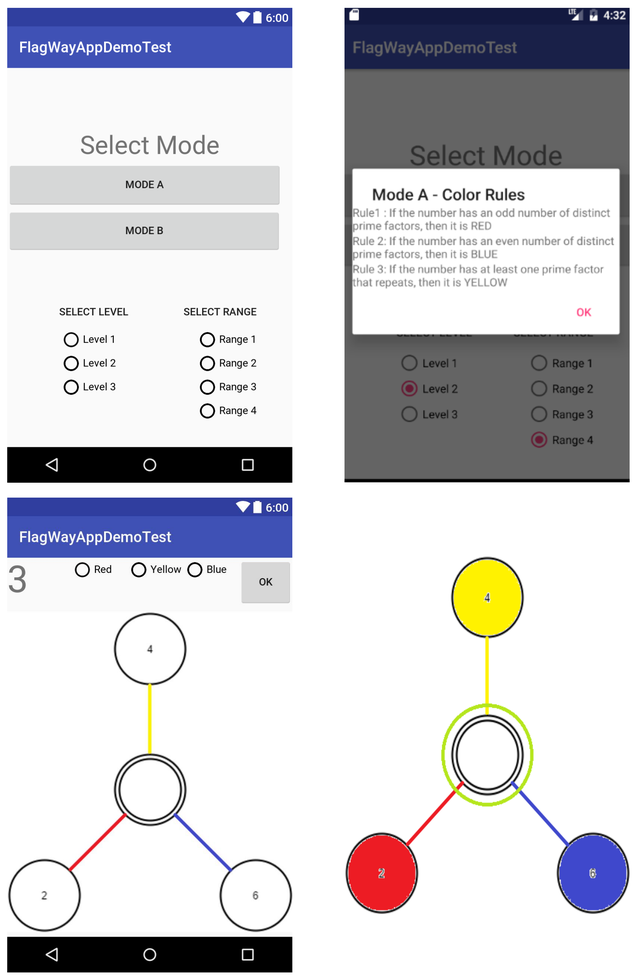
Test Case 1 (Game Mode Selection)

Purpose
Ensure that the user is able to select the game mode, level, and range initially.
Precondition
The user must be logged in and had just started the app.
Input
The user selects the level and range desired followed by tapping the mode button.
Expected Result
The game should proceed to the selected game mode and level. If mode A is selected, a screen containing the mathematical rules will be shown to the user. If mode B is selected, the game directly proceeds to the level selected. Finally, only numbers within the selected range can be given to the user.
Actual Result
The game proceeded as expected. Mode A leads to a screen showing the rules, followed by the game level selected, while mode B leads directly to the game level selected. The numbers shown to the user.

Test Case 2 (Number Assignment Verification)

Purpose
To ensure that the game verifies the user selection (rule selection) and provides appropriate feedback to the user.
Precondition
The user is in either mode A or B (any level and range). The user is prompted with a number and is asked to assign it to a color (red, blue, or yellow).
Input
The user selects the desired color and taps the submit button.
Expected Result
If the user made the correct selection, a feedback message will inform the user of a correct answer. Consequently, the number assigned must appear in the color circle box. If the selection is incorrect, the user will receive an appropriate feedback message asking for a retry.
Actual result
When the user made the correct selection, a feedback message was shown indicating a correct answer. Consequently, the number assigned appeared in the respective color-circle's box. When the selection was incorrect, the user received an appropriate feedback message asking for a retry.

Screenshots



Summary

The Flagway game app is now in its first version. The core gameplay and its supporting components have been completed for the first level of the game.

The Flagway game app, when completed, will be a powerful tool to implicitly convey key mathematical knowledge to students at an earlier age than it is possible with traditional teaching methods.

Future Work

The game will need to be extended to the second and third levels (using the same gameplay as the first level). The game UI will also need to be redesigned to be more user friendly and intuitive.

Acknowledgements

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