Table of Contents

1. Introduction

1.1 Overview

This is an application developed for Android which is made accessible to the public via the Google Play Store. It is a game which is based on the popular British television show Countdown involving word and number puzzles. The show itself was the first show to air on Channel 4 in 1982, withstanding the test of time having over 77 seasons under its belt. This equates to over 6,500 episodes, proving itself to be popular among viewers

Players compete in three disciplines: letters rounds, in which the contestants attempt to make the longest word possible from nine randomly chosen letters; numbers rounds, in which the contestants must use arithmetic to reach a random target number from six other numbers; and the conundrum, a round in which the contestants compete to solve a nine-letter anagram.

The application contains design and sound cues reminiscent of the show in order to appeal to the user. It has a single player and multiplayer mode for your to play by yourself or with friends. It contains integration with the Google Play Games services in order to implement leaderboards as a means of tracking high scores amongst players. We track user input via a drop and drop feature, dragging letters and numbers over to their corresponding boxes. Scoring is done based on how long your correct word or how close your number is to the target to determine a winner.

1.2 Glossary

Letter Round: This is a round within the countdown game. A player must pick nine letters to be used by all players, choosing from either vowels or consonants for each individual letter. Then the thirty second timer begins and the players have to make the longest word they can from these characters in the allocated time.

Number Round: This is a round within the countdown game. A player must pick six numbers. They can choose between a set of large or small numbers. The most large numbers you can choose is four. A randomly generated three digit number is chosen. The players must now use the chosen numbers to reach the target number using addition, subtraction, multiplication, etc. This is to be done within the allocated time.

Conundrum Round: In this round nine random letters are shown. These letters are able to form a word. The letters must be rearranged in order to form the word and all letters must be used. This is to be done within the allocated time limit.

Google Play Game Services: This is what game developers use to create social leaderboards in order to let players compete against one another for the top score.

2. System Architecture

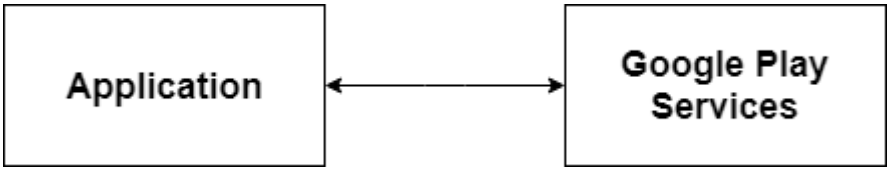


Fig 1.0

The system consists of a splash screen which leads into the home activity. The main intent from this home screen is to either choose to play single player or multiplayer. Either choice will bring you to the subsequent rounds as follows.

2.1 Google Play Services

Upon entering the home activity dependant on the users Google Play settings, they will either be automatically signed into Google Play Games or they will have the option to sign in via the home screen manually. This can be done before a game is initiated in the hoe activity or in the final screen. Upon signing in they will be able to access the leaderboards and also have the option to submit their new score in order to compete against friends.

2.2 Single Player

Upon initiating the single player game session the user will go through three rounds which are the Letter, Number and Conundrum. In between these rounds the user will be brought to a results screen in order to see their score before they progress to the next stage. The ability the use the back button on the device to go back to previous rounds is blocked in order to maintain fair play. You will be able to use the back button but that will only exit you from the game and bring you back to the home activity.

2.3 Multiplayer
This aspect of the game has the same playthrough as the single player version but each round is played through twice to allow both players to get a score. The only new activities is the screens to signal which players turn it is to play. The result screen is changed to show both players score in between each round as the game progresses.

3. Round Functionalities

3.1 Letter Round
In order to implement the letter round, we started off by handling the users input. This was done by having nine text boxes which are filled via buttons which is either vowels or consonants. Once the nine separate boxes are filled, the round automatically begins. The user has 30 seconds to form the longest word they can from the selection of letters. This is done with our drag and drop feature which is an on drag listener.

Once the letter is dragged into the appropriate box, it becomes unavailable for selection from the original nine letters chosen. This is repeated until the word is formed, where the time runs out or the user can submit their answer early. The submission is formed back into a string. A dictionary is read in from the assets directory and all the words in the file are compared to the submission to check for validity. This dictionary itself is taken straight from the scrabble official list of words. If a word the score given to the player is the length of the word, otherwise zero points.

3.2 Number Round
This round plays similar in terms of user input. Six text boxes which are filled via two buttons which is either large numbers or small numbers. The large numbers is made up of four numbers (25, 50, 75, 100) and the small numbers consists of the numbers 1 to 10. Once the numbers are picked the round begins.

The target number is chosen at random in a range of 100 to 999. The player drags their numbers and operands to complete arithmetic operations in order to reach the target number which is all done via the drag listener. We then compare the users number to the target number and score according to how close it is. 10 for reaching it exactly, 7 for being 1-5 away, 5 for being 6-10 away.

3.3 Conundrum Round

Here a random word of a nine letter length is chosen at random from our dictionary file. Once the user initiates the round a function jumbles up the word. The user drags and drops the letters to try and form that particular word. If successful, nine points are applied.

4. High-Level Design

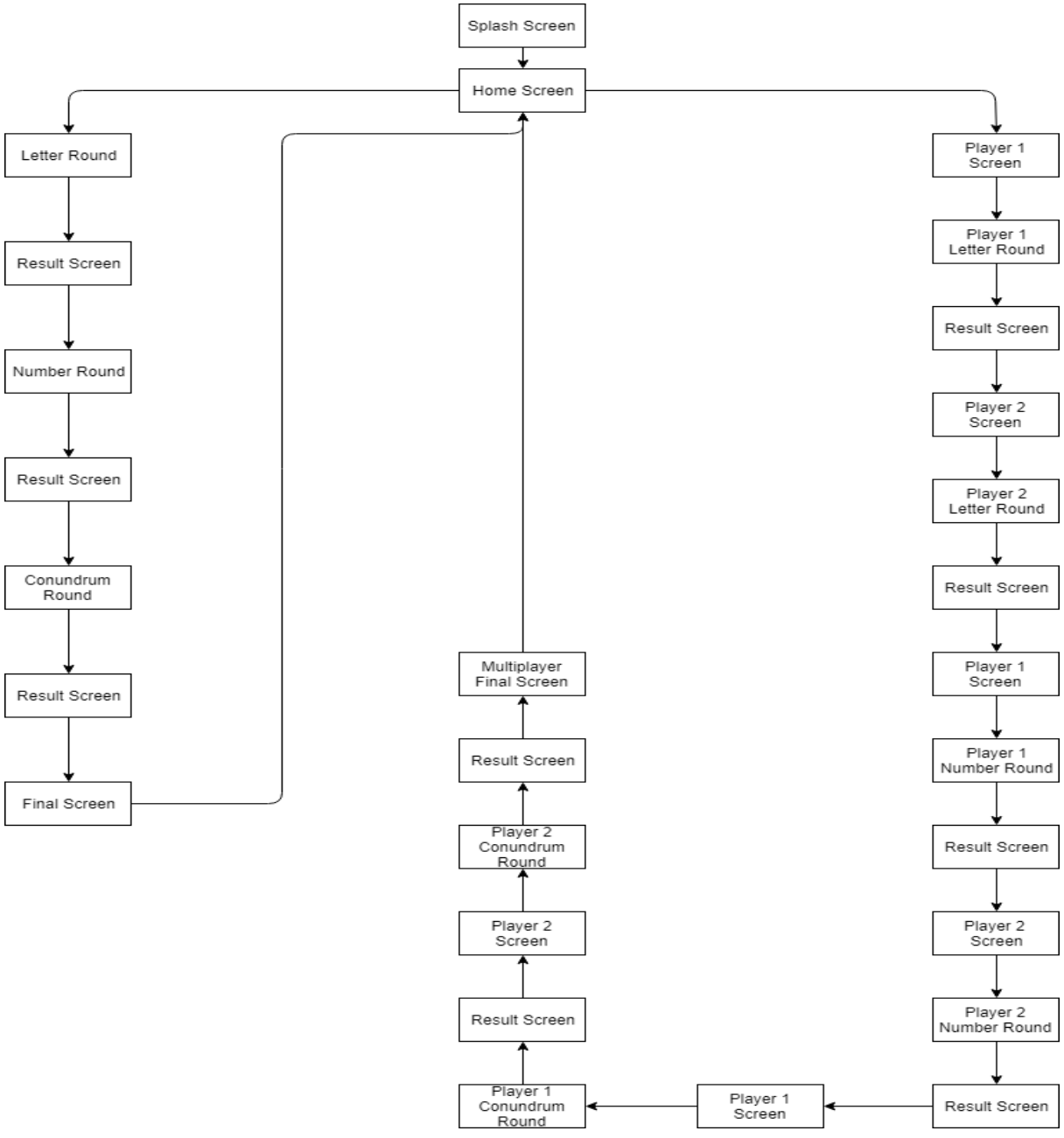


Fig 1.2

4.1 Description of High Level Design

- **Splash screen -** This is welcoming screen in for the application.

- **Home Screen -** This is the main screen with options to go to the leaderboard, Sign in and out of Google Play along with the single player and multiplayer modes.

- **Letter Round -** Players have to make the longest word they can using the letters selected within the 30 second timer.**:** One of the players is randomly selected to choose letters for the letter round.

- **Numbers Round -** Players must try reach the target number using the numbers selected and basic operators such as addition, subtraction, multiplication etc.

- **Conundrum Round -** Players must unscramble the word using the letters provided

- **Result / Multiplayer Screen -** Displays results screen of the round just played.

- **Player 1 Screen -** Player 1 round initiates.

- **Player 2 Screen -** Player 2 round initiates.

- **Final Screen -** Displays final scores along with option to submit scores to leaderboards.

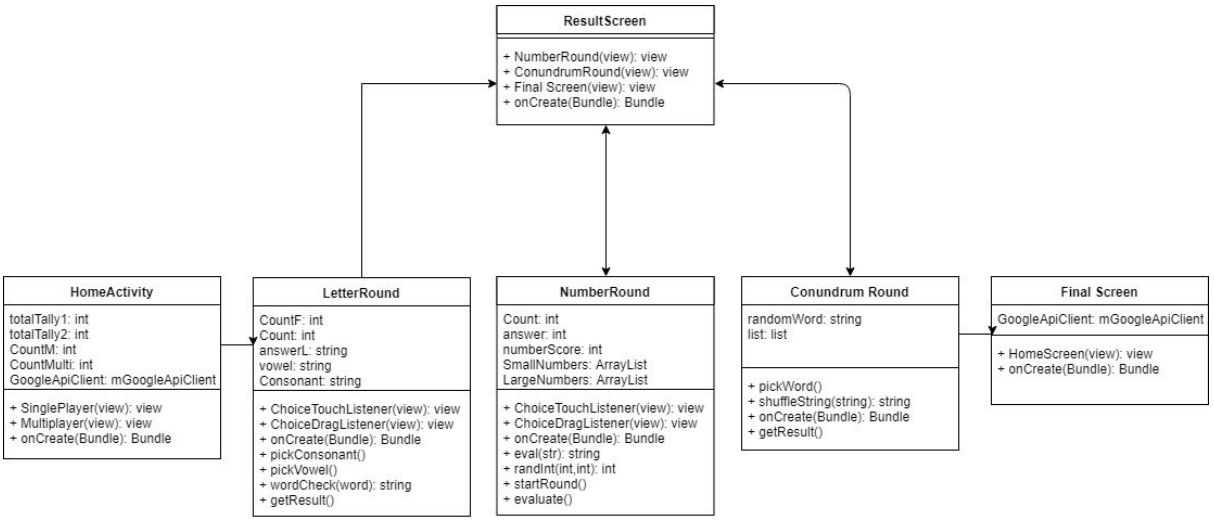


Fig 1.3

This is a class diagram showing the main classes and their methods used in the implementation of the game.

5. Problems and Resolution

5.1 Real Time Multiplayer

Problem - We encountered major problems in terms of implementing google play services but the main one being getting two players connected to a game in real time. We tried using multiple services we thought would help like firebase for example but found out they did not exactly apply to our situation in what they offered.

Resolution - Under the advice of our supervisor we agreed it would take too much valuable time to try and implement and could possibly waste our time if we were not able to do it at all. We scrapped the idea but came up with a compromise resolution of still delivering on the multiplayer experience by doing it locally.

5.2 Dictionary

Problem - Came into difficulty when validating words in terms of reading in the file. We initially tried to read it in as a regular file using the file path on the computer along with other methods.

Resolution - We then came across a tutorial that states you need to make an assets directory within the android project in studio. We implemented the steps and changed made sure it was reading in before using it to validate our words.

5.3 Pair Programming

Problem - For the first two weeks of the project we worked from separate locations in order to get our tasks for the week done. We found this to be extremely slow and inefficient in trying to complete all the tasks on our schedule for the week. Especially being on different pages with certain ideas that you may not discuss unless you are in person.

Resolution - We found that we worked a lot better when we were together. We had days of pair programming where one person would sit at a screen and another would watch on reviewing the code as it's made spotting mistakes and making suggestions, changing positions every hour. It was great in terms of discussing code on the spot and not both doing different things with different ideas in mind on a tangent.

5.4 Sounds

Problem - We implemented two main sounds into the game, the clock countdown for the rounds and the general theme tune that is always played in the opening and closing of the show to. We implemented it and thought it was fine but upon user feedback, found that many people did not enjoy the actual theme tune. They thought it was in line with the show but it was actually quite annoying the more games they played

Resolution - We simply took out the sound, we found out that in this case, less is more.

6. Installation Guide

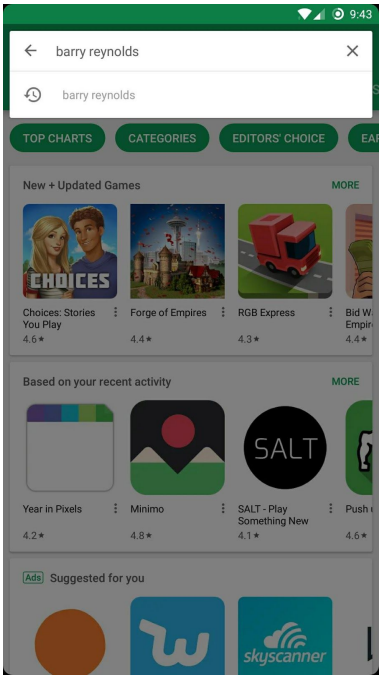
This application is only available on android from the Google Play Store.

6.1 Prerequisites

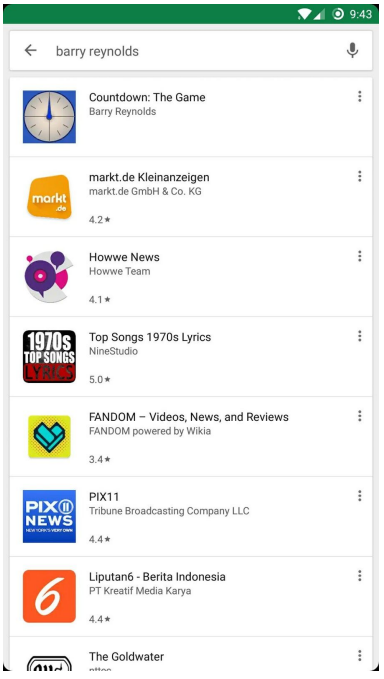
- It is only available in devices in Ireland.
- The application supports Android 4.0 Ice Cream Sandwich or above.
- Contains a PEGI 3 rating.

6.2 How To Install

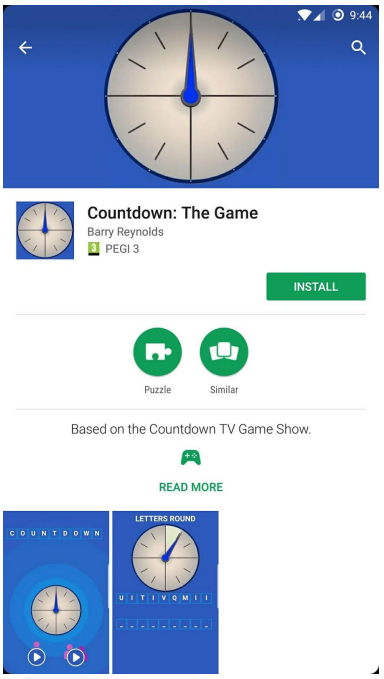
1. Open the Play Store application and type in “Barry Reynolds” into the search bar on the top of the screen.



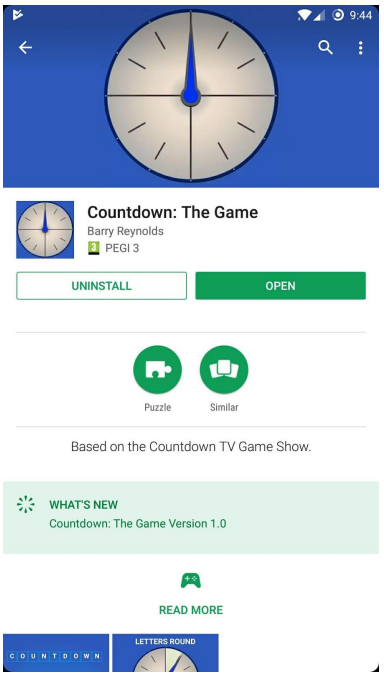
2. Click onto the first item in listed results called “Countdown: The Game”.



3. Click on the “install” button.



4. The application is now installed, you can now access it by pressing the “open” button on the screen.



7. Appendices

- http://www.umlet.com/
- https://en.wikipedia.org/wiki/Countdown_(game_show)
- https://developer.android.com/distribute/console/index.html
- https://developers.google.com/android-publisher/