

Hashi Puzzle (Islands and Bridges)

Final report Document

Created By:

Wojciech Teodorowicz

Technical Document



Student Number: C00193622

Supervisor: Joseph Kehoe

Institute of Technology, Carlow

2nd September 2018

Abstract

This is a Final report document this document covers my experience with the Hashi project

The document describes what have I done, the problems I have encountered and how I have solved them, also the document covers the images of the finished project.

Contents

Introduction	4
Problems Encountered.	4
How were the problems resolved?	5
What I have achieved?.....	5
What did I not achieve.....	8
What have I learned.	9
What would I do differently if I would start again.	9
Things I have change in the project process.	9
Additional Research.....	10
Testing.....	10

Introduction

This is the final project report of my application, this report will covered what I have achieved, not achieved, testing, what have I learned, data structures used and differences to the previous designs.

Problems Encountered.

The main problem that I have encountered was the logic of the game, the application a puzzle game and it was very difficult for me to understand how to code the logic of the game, also I had problems with finding the most reliable algorithm for my project, the algorithm I found was not very reliable for my project. I had encountered problems with android studio when I upgrade the version my design of the app changed without any code being change this has put me behind the schedule, I had also problems with trying to connect my app with AWS mobile services.

The timer has been crashing my application due to being implementing incorrectly I have spent a too much time fixing in.

The DFS algorithm that I have implemented has been giving me different kind of problems, the algorithm was stuck in a infinite loop, I was getting nullpointerexceptions.

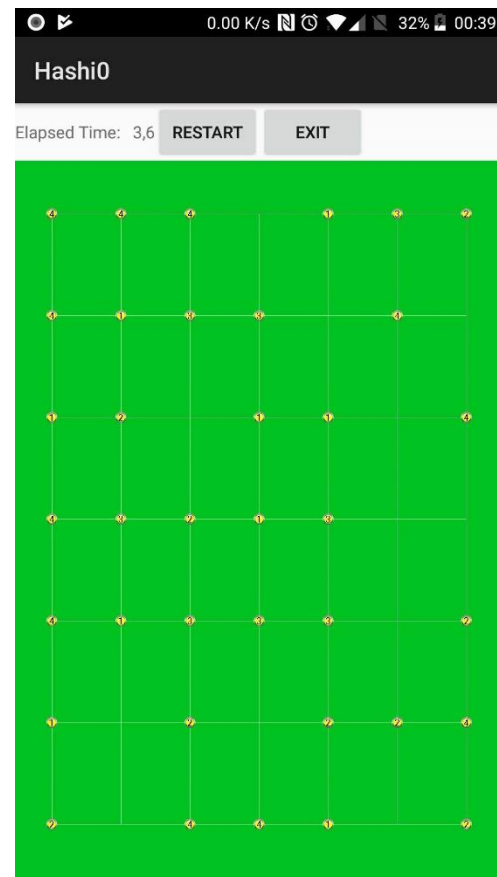
Android studio upgrade problem the design of me has changed after I upgraded the android studio to a newer version I did not change anything in my project.

What the app looked like before the update

After the update

Final Report

Islands And Bridges



How were the problems resolved?

I have resolved most of the problems by doing more research and talking to android developers, I have overcome the problem of the algorithm by researching a different recursive algorithm to spawn my nodes I have also set standards for the algorithm on what it should actually do.

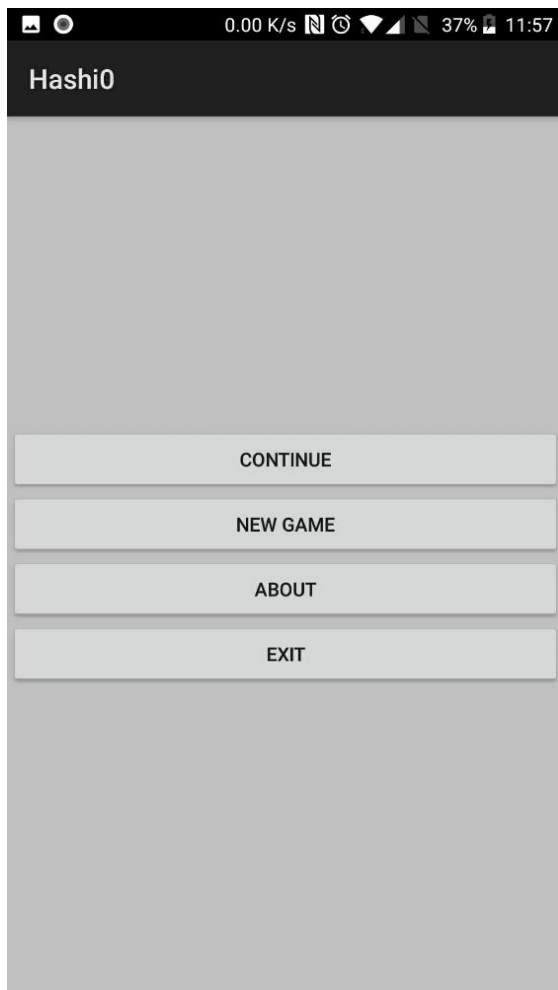
I have overcome the problem of the AWS mobile services by talking to the amazon team and following their documentation on how to work with AWS mobile services, it turned out to be quite simple to implement a backend with AWS mobile services.

I have fixed the timer by researching more on how to implement it correctly after few hours of figuring out I have correctly implement the timer function for my application

What I have achieved?

I have successfully implemented a user-friendly interface, that allows the user to read about the rules of the game and navigate through the menu easily, the menu allows the user to choose their level of experience by providing them with a option to choose either easy, medium or hard level of the game based on their skill.

Final Report
Islands And Bridges



I have implemented a “drag bridge” meaning that the user can select an island and drag the bridge to the corresponding island, I have achieved this by using the fingerprint function.

I have successfully implemented a application that creates a map using a recursive algorithm, the map is being created by random meaning using a 2d array, meaning that the algorithm takes random string values, and displays them back to the user in a grid/matrix format where a positive number represents an Island and 0 or null is an empty space.

Final Report
Islands And Bridges



I have successfully connected my backend AWS mobile services to my project using java and the Docs provided by AWS, I have successfully implemented a leader board backend to my project by using a NoSQL database provided by AWS mobile hub.

I have successfully implanted a 7x7 map that generates the map and all the Islands(Nodes) at random making a unique puzzle board every time a user wishes to play.

Final Report

Islands And Bridges

The screenshot shows the AWS Mobile Hub console for an application named 'Hashi'. The breadcrumb navigation is 'Mobile Hub > Hashi > Database'. The page title is 'NoSQL Database', powered by Amazon DynamoDB. Below the title, it says 'Store data in a fully managed cloud database.' A central question asks 'Do you want to add a database to your app?' with two options: 'No database' (disabled) and 'Enable NoSQL' (active). Below this is a table of existing tables:

Name	Partition key	Sort key	Items	Capacity	
LeaderBoard	userId		0	3 / 3	Edit Remove

At the bottom of the table area, there are two buttons: '+ Add Table' and 'Download Models' with a dropdown arrow.

What did I not achieve

Unfortunately, the time passed by quicker than I thought, and I didn't get to complete every function of the application. One of the biggest parts I didn't get completed was on the algorithm side of things. I did get the application working however the map is still not solvable as the algorithm is not perfected, The map is generated however the algorithm sometimes recursively does the search but at the end I have been getting a `EmptyStackException`, after few different approaches to check for null exceptions I have failed to achieve the algorithm that I wanted.

What have I learned.

First of all, I have learned a lot about android development, how all the libraries work together how to design styles for the application etc. I have learned about android studio as I only had 1-day experience with the IDE I have researched about the IDE a lot and learned about it more each day.

I have learned how to implement a recursive algorithm in java, I had previous experience with java but on a basic level.

I have learned about the AWS mobile services and AWS in general, in my opinion AWS is was a quite good option for my project because the documentation that the AWS provide to connect your app and also the user interface of the mobile hub is very easy to navigate around, I have learned how to create a NoSql database inside the mobile hub.

I learned how to create a basic responsive and user-friendly UI by reaching different types of designs and how to implement them.

What would I do differently if I would start again.

The first and most important thing that would do differently is to learn about the DFS algorithm a bit more before starting to code it, this would allow me to get a better understanding of the DFS functionalities, which would lead to a successful implementation.

If I would start again I would create a time management for the project, create a timetable for each 3 hours a day, I would have approached the project differently by researching more about the algorithms and the logic of the game, I would have started with a simple hard coded array and try to create a checker for that array and the implement the 2d array for random generations of the nodes.

I wouldn't lose anytime on trying to learn kotlin. Learning kotlin has put me behind the schedule because I spent a lot of time trying to learn kotlin and at the end I had not have used it.

I would start with creating a good restful api for my project.

I would use more of an agile approach for the project.

I would have focused more on the algorithms and the backend, to get the application as functional as possible before I start to add random maps and design.

Things I have change in the project process.

In my previous documents I have stated that I will use java with kotlin, I have decided to leave kotlin out of my project because I have no previous experience with kotlin and it would take me a lot of time to learn the language although kotlin was a better choice than java for my project I have stayed with java because I had learned java for the first two years of my college studies.

Additional Research

I had to research more about the algorithm and how to display the maps Nodes at random, also I had to do a lot of more research about android studio as I only have used in ones before. I had research more about the logic of the game and how to construct it, I researched many different applications on the web and I have picked out what I think was the best UI design for my application.

I had to research more about the AWS and how to connect it with my application.

Testing.

The testing I did for my project was to try and use different type of arrays and algorithm to generate a random map, first I had an String array that had a hardcoded solvable puzzle map, the map was being generated successfully but the nodes where not changing every time a user tried to access the game, at this point I have tested the application with a String array just to see if it actually works, This game me an idea of the how the application can generate a random map using an 2 dimensional array, first I have tested the array with a just simple 0, 1 input where 0 is empty cell and 1 is a island this game me a matrix looking like this.

```
0 1 0 1 0 1 0 1
```

```
0 1 0 1 0 1 0 1
```

```
0 1 0 1 0 1 0 1
```

At this point I just added more strings to the array and the map generated successfully.

The probability of the same matrix accruing twice is very low, that means that the user will not get the same map twice.