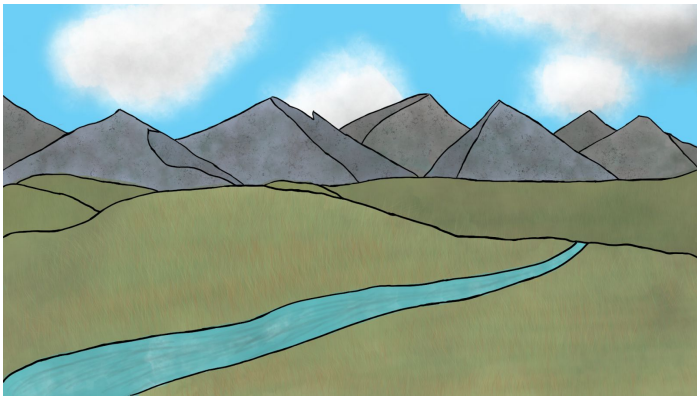
Guerilla Gardening Game

Client: The Giving Child

Final Report



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1 Introduction

The Giving Child is a non-profit organization that was started by two sisters with a vision of raising money for charities and raising awareness for the world's problems by creating apps for children. When one of the apps is purchased, 90% of the profits end up going to local charities and 10% is reinvested into creating a new app. Food deserts have become a serious problem in the United States and our client wanted to spread awareness of this to young children. They wanted to do that by creating an app that allowed its users to simulate gardens in different climates and areas that would demonstrate the unique challenges posed by each location.

2 Requirements

The game encompasses four different levels, and the player's task is to plant and maintain healthy gardens in various regions. The regions are: hills, rivers, mountains, and cities. The goal of the game is to bring awareness to the difficulties of obtaining food in food deserts and remote locations while also encouraging a healthy lifestyle and trying new foods. The target audience for this application is children, but it could be played by anyone.

2.1 Functional requirements

The game had a multitude of functional requirements that are necessary to ensure success of the final product. The app needed to be able to accurately register a tap on the screen in order to make the plants grow, as well as include a way to water plants to prevent them from wilting or dying after a whole day without watering. Also, a save function was needed to be implemented to keep track of user progress between play sessions, and a time feature that increments plant growth over a set period of time as well as indicating if a plant has not been watered recently. There was to be a seed bank and seed store that the user could navigate to in order to see what seeds they have currently and then purchase more seeds using the funds from their harvests. Finally, an onscreen counter was needed to display the number of times a user has tapped so they would not need to keep track on their own.

2.2 Non-functional requirements

The game also had a number of non-functional requirements. These are not necessary for game play but enrich the user's experience and increase the overall quality of the game. The artwork of all the backgrounds as well as the planter boxes and plants needed to be friendly and inviting as this game has a young target audience. Additionally, there needed to be clear

instructions for the user so that all ages can play the game without getting frustrated or lost. Finally, our client required there be a screen from the home screen that displayed provided food desert facts in order to educated the users.

2.3 Potential project risks

Our biggest concern with this project was not finishing the project within the 6 weeks allotted. We also had to remain in constant contact with our client with updates on the project to make sure we met and exceeded their expectations. The IDE to use for development was also a very important discussion the group had to make because we wanted something that was effective and would aid us in meeting the client's requirements. The client was also adamant about having the game posted on the Google Play Store, so we wanted to make sure we were able to complete the app and post it to the store without any issues.

2.4 Definition of done

There are a few requirements that were expected of the application upon completion; the game progresses through levels properly, the game counts taps properly and accurately, the game measures time properly even when it is not active on the phone, and the game is ideally posted onto the Google Play Store with a price of 99 cents, per the client's specifications. As mentioned before, we remained in constant contact with the client as we progressed through the project to verify that we were meeting their requirements and to ensure that the application was completed according to the definition of complete listed above.

3 Technical Design

3.1 Overview

The Guerilla Gardening Game contains 4 different locations with the task to create and maintain healthy gardens in each of the regions. The goal of the game is to bring awareness to the difficulties of growing a garden in certain areas such as cities and mountains, which are considered food deserts. It is also trying to bring awareness to the importance of maintaining a healthy lifestyle by eating different varieties of fruits and vegetables that children could easily plant in most areas in real life.

3.2 Vision

Upon completion of this game, our group wished to deliver the following experiences to the player:

- **Difficulty:** The game will be easy but will also require a substantial time commitment to progress, in order to give the player a unique feeling of achievement when they grow a garden and harvest the plant for coins.

- **Fluidity:** The game should feel natural with controls that act as an extension of the player rather than a barrier to immersive gameplay.

- **Instinctive Gameplay:** This is the feeling of ease of access. The player should be able to understand how the game is played and what their purpose is in each level without spending hours finding out which buttons perform what tasks.

3.3 Gameplay

The game follows basic intuitive touch screen controls commonly associated with Android and iOS games. Rather than having difficult controls, the objective was to provide an easy interface between the game and player.

- **Movement:** The game is very simple to play and very self-explanatory. The player must tap the screen to progress through the levels and to complete the tasks associated with each level. These tasks include creating, planting, watering, and harvesting gardens.

3.4 Player

The user is in control of the gardens and has been tasked with overcoming the difficulties of growing a garden in different terrains. Each level is unique and has a specific number of taps the user must perform in order to sustain the gardens and continue the growth of the plants until they are ready to be harvested in exchange for coins.

In order to count taps, we created a custom TapCountView to represent each garden. Each of these views had an OnTouchEvent listener that would increment a private variable to determine the number of taps the user had performed. Once the appropriate number was reached, the image and other data for the TapCountView would be updated based on the action the user was trying to accomplish.

To save the game, we created two SQLite databases to be stored on the phone. One is to store each garden from all the different areas, and the other is to keep track of the number of each

seed type and the number of coins the user has. When the game is loaded, the information is read from the databases and put into singletons designed to contain the database information. This way, the databases only need to be read from once during gameplay, speeding up performance. Any changes to the gardens or number of seeds/coins directly modified the singletons, so that when the game is exited, the data can be taken from the singletons and put directly into the databases. This means that the databases are also written to only once during each gameplay.

3.5 Levels

There are four levels that represent the different regions for growing plants. Each of the levels has different requirements of the player and presents different challenges in regard to growing a successful garden. The game can be made to involve strategy but can also be played in a non-strategic way if the user is younger. In addition to the four location levels, there are four seed levels that dictate how long the seed will need to grow as well as where the seeds can be grown. Below the details for the farm and seed levels are outlined in more detail.

Location Levels

1. **River House**
    - 50 taps to build garden
    - 10 taps to plant garden
    - 1 tap each garden to water
    - 5 taps to harvest
    - Earn 5 seeds for every garden harvested
    - Max 15 gardens
    - Can only grow level 1 and 2 seeds

2. **Hill House**
    - 100 taps to build a garden
    - 2 taps to water
    - 40 taps to harvest
    - Earn 15 coins per harvested garden
    - Max 10 gardens
    - Can only grow level 2 and 3 seeds

3. **City House**
    - 30 taps to build a garden
    - 10 taps to plant
    - 1 tap to water
    - 1 tap to harvest

- Earn 10 coins per harvested garden
- Max 3 gardens
- Can grow level 1, 2 and 3 seeds

4. **Mountain House**
    - 500 taps to build a garden
    - 100 taps to plant
    - 10 taps to water
    - 200 taps to harvest
    - Earn 50 coins per harvested garden
    - Can only grow level 4 seeds

Seed Levels

1. **Level 1**
    - Can be grown in River and City levels
    - Are ready to harvest after 1 day
2. **Level 2**
    - Can be grown in City, River and Hill levels
    - Are ready to harvest after 2 days
3. **Level 3**
    - Can be grown in City and Hill levels
    - Are ready to harvest after 3 days
4. **Level 4**
    - Can be grown in Mountain level
    - Are ready to harvest after 4 days

4 System Architecture

4.1 Level Layout

The below diagram, Figure 1, gives a general idea of how the game's difficulty and overall progression are supposed to flow. The River level is the easiest level and can have the level 1 seeds the player is initially given planted in it. It also has the most planter boxes and the fastest growing seeds which reflects that being near a river supplies fertile soil to grow plants. The Hill level is a bit harder as it cannot grow level 1 seeds and has fewer gardens. This reflects that being in a grassland still provides decent soil to grow crops in, but the lack of direct water source increases the difficulty of gardening. Both the city and mountain levels are meant to be the most difficult. The mountain level is difficult because only level four seeds can be grown

there and they generally cost the most of any level seed, as well as have the longest grow time and the most effort to plant a new garden. The city level can grow a variety of seeds, but is made difficult because there are only 3 planter boxes available. The user is free to choose any level to start but is constrained by the type of seeds they start with and the amount of boxes still available in each area.

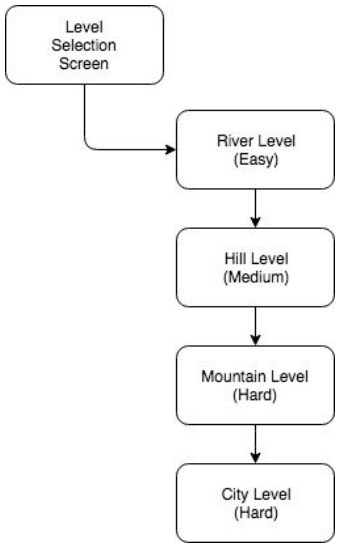

Figure 1: Game progression flow

4.2 App Flow

The diagram below, Figure 2, shows the general layout of the application using screenshots. The River level was used as an example here but the navigation to and from screens is the same for the remaining three levels. From the Welcome screen, at the top left, you can navigate to a How to Play section, an About page that features a link to The Giving Child website, the main game screen for level selection, the Inventory, and the Seed Store. The Store and Inventory are also accessible from the level screen along with a help screen that is specific to that level. Navigation on the level screen is done via the toolbar and icons at the top of the screen. The specific help screens list the number of taps required to complete game tasks in each level. The back arrows on each of the screens will take you to the previous screen all the way until the Welcome Screen is reached again.

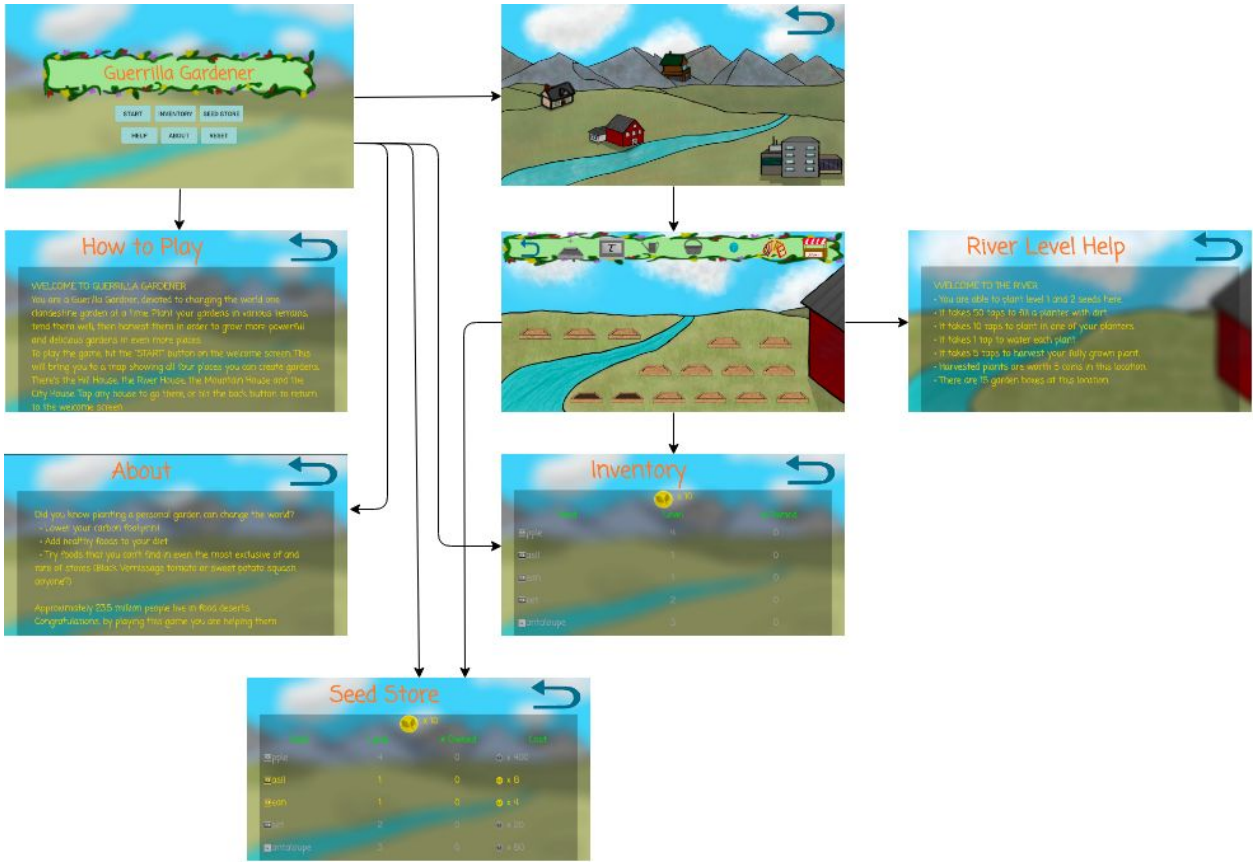

Figure 2: App layout

5 Design Decisions

At the beginning of field session we made our first decision on the development platform we were going to use in order to be successful for this project. We decided collectively that we would use Android Studio because a group member of ours already had experience programming with it. Two weeks into our project, our client had asked us to try to code the game to be compatible with iOS. However, we had already completed a large portion of the game structure so as a group we decided and informed them that we would run out of time and the quality of the game wouldn't meet their expectations if we tried expanded to iOS.

Another decision we made was whether or not we were going to use the images the client provided for the game graphics or if we were going to hand draw the graphics ourselves. Since Liz Boyle (Graphic designer) had experience drawing in a digital medium we decided that we would hand draw everything in the game to give it a more personal and friendly feel.

The client gave us few details on how the game should be played, so we needed to make a lot of small technical decisions during the development that we thought would make the game more interesting and would provide a smoother user experience. Some of these technical decisions we made were:

- Instead of buying the seeds with seeds we decided to have the player buy seeds with coins to prevent confusion.
- We changed the time intervals between plant growth so as the levels became harder we increased the time the plant needed to grow.
- For the seed bank we also decided to have all the seeds listed on a separate page rather than a drop down menu.

Finally, we decided to solely keep the game in landscape mode. It allows for a fuller use of the screen than would be available in portrait mode. Also, with the way the gardens are laid out we needed to use as much screen as possible in order to make the game a pleasant experience to play.

6 Results

This project is meant to be an educational phone application for children to teach them about the difficulties that people living in food deserts might face. The game was initially going to be deployed both to the Google Play Store and the Apple App Store but due to the platform we decided to use for development, and the already steep learning curve with the Android development, we decided to only deploy to Google Play. We also had to make minor changes to some of the initial ideas about how the game mechanics would actually work so they would make more sense to our target audience of young children. This included some adjustments to how gardens are built and how the reward system for harvesting seeds would operate. So far, the only testing has gone successfully and all bugs we have run into have been dealt with. In the future, the game would implement more levels and plants to grow, and would ideally be developed on an Apple compatible platform so it could be deployed to their App Store.

6.1 Lessons learned

- Android Studio is a very effective app development software. Also, since one of our group members was familiar with it, the rest of the group was more easily able to learn and understand how to use it.
- We all worked very well together we all helped each other stay on task and get work done effectively.

- We all also learned a lot about how to make sure to manage a project properly with no guidelines and how to stay constantly in contact with the client in order to make sure their expectations were met.

7 Appendices

- All graphics were completed by members of our group; Elizabeth Boyle, Ashley Hutson, Austin Lionette, Arthur Mayer, Ramy Elzarad, Joe Graff, and Sam O'Connell.
- Application is available for purchase on the Google Play Store.
- All rights to the game belong to The Giving Child Organization.