

Business Startup Game Project Report



***A map-based game used for developing business
startups with real world maps.***

***Prepared by Eric Leon, Alexis Urquiza,
Jakub Glebocki and Ahel Guerrero
for use in CS 440
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University of Illinois Chicago***

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Project Description

1 Project Overview

This Business Startup is a map-based game in which a player is able to start their own business. In this interactive game, a player will get the opportunity to develop and learn about the business world. Some features include being able to expand to different parts of the world, choose their choice of business, and build empires. A player will be in charge of distributing their product efficiently and be able to manage their money. In-game customers play an important role in the success of the player's startup. The player's job will be to keep their customers content and returning to buy more products. The player's success in the game is based on how effectively they can strategize their expansion throughout the world.

2 The Purpose of the Project

This project is being done to give users who enjoy "build your own" type of games a way to experience building a business from the ground up. This project is aimed towards people who want to get a sense of how business expansion works as well as enjoy playing games similar to "SimCity", and "Cities: Skylines." Since the game is geared towards expanding your business throughout the world, the project should help users get a sense of the geography of countries around the world other than their own.

2a The User Business or Background of the Project Effort

The client will be able to understand the whole concept of a business related setting. The client can use this application for educational purposes, getting involved into business, or having a mock setting for machine learning. Clients can also use this product as learning method to help familiarize themselves with the geography of other countries. Learning the geography would be helpful for those who tend to travel to many states/countries for business related things.

2b Goals of the Project

This project is being carried out to help the client become familiar with the modern geography of multiple countries around the world. This project is meant to also show clients how populations, likes, and dislikes of different cities affect how well the product they create is received. Lastly, the project is meant to create enjoyment for the clients who purchase the product.

2c Measurement

A way to measure the result and determine whether the goal of the project was met would be to conduct a survey for people who own the game and have played for a specified amount of hours. This survey would ask the users questions about any new things they learned about certain countries, cultures or business creation. The goals will also be considered complete when clients decide to give positive reviews of the game. This will be measured by the ratio of people who enjoyed or did not enjoy the game. If the ratio for people who enjoyed the game is significantly

higher than those who did not enjoy, then the goal of making sure people enjoyed the game is complete.

3 The Scope of the Work

The scope of the work includes the development of enterprise management. This work includes educating players with business strategies, money and customer management.

3a The Current Situation

At the moment a client is only able to learn about business through the internet or in a college setting. A client at the moment doesn't have an interactive way to learn about business start-ups and how they work. Instead many people just start their business without any idea of what it means to run a enterprise.

3b The Context of the Work

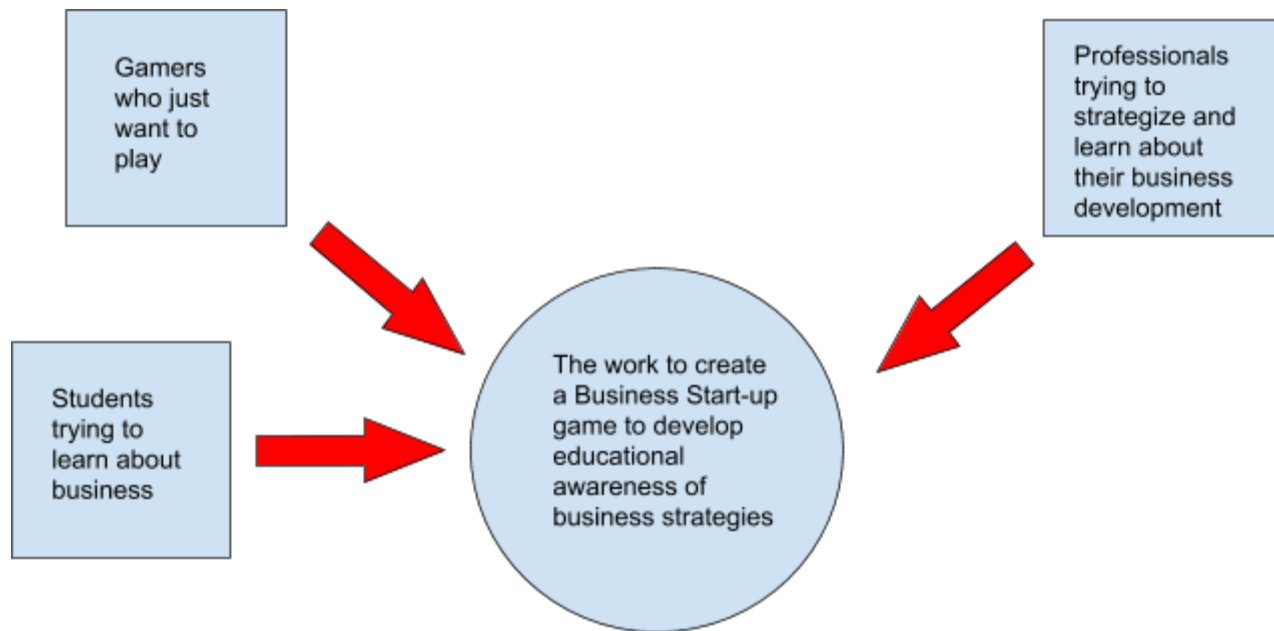


Figure 1.1

Here are two types of work that must be completed for the project. This is what is included in the work portion of the project. Something NOT included would be teachers and professors using this technology to teach and demonstrate to their students.

3c Work Partitioning

<i>EVENT NAME</i>	<i>INPUT & OUTPUT</i>	<i>SUMMARY</i>
<i>Students wanting to learn about business</i>	<i>new business ideas (in) business outcomes and consequences(out)</i>	<i>A student will have an idea for a business and will try to develop that business and see what outcomes come from it</i>
<i>Professionals trying to strategize their business and learn about their business development</i>	<i>new strategies to implement (in) Report from those strategies (out)</i>	<i>A professional would want to test their business strategy to see how their business strategies are affecting their current business model. Also trying to see how different parts of the world are affected by the business.</i>
<i>Gamers who just want to play</i>	<i>Random or funny business idea (in) Non-realistic outcomes or fun outcomes (out)</i>	<i>Here a gamer just wants to try out the game so he/she would make up a random or funny business idea to see how to make it work and achieve the games goals.</i>

3d Competing Products

“Business Inc. 3D: Realistic Startup Simulator Game”. It is a game that when glanced upon seems to have similar goals and ideas to what this product will have. The purpose to create this app is because that game does not allow to start your business worldwide or have many business worldwide. This product will contain more features that resemble real life encounters and will give a user the true experience of what it is like to startup a business. Flaws the other product contains is that it is very limited. This product will be the new better version.

To be better than other alternatives and be chosen over other business(future app that might exist) the product will be differentiated by couple of factors, one being that you are free to start wherever the user pleases. This gives the user a lot of options and will beat competitors. Since the product will be worldwide it requires many more factors that be fulfilled, as each place

is different, the cost is different, standard of living is different, and success of businesses upon statistics and sources is also different. Everything must be taken into consideration to make this product as close to a real life simulation.

4 The Scope of the Product

The proposed product would be used by at least three audiences. The first one would be in the learning field, where students are trying to learn about businesses and how they work. This product would be used as an external software to help educated students who curious about business strategies and development. The second audience would be business professionals who are trying to test out new strategies they might have in mind. These professionals could use the software to demonstrate to external business partners what the outcome of certain business strategies would be. The third audience would be an everyday gamer. This person is someone who is interested in the game and is curious about its mechanics. Another feature from the game are outcomes or consequences. In this game every decision will have a outcome/consequences and every audience have this in common. This is the main feature from the game that audiences want to experiment with.

4a Scenario Diagram(s)

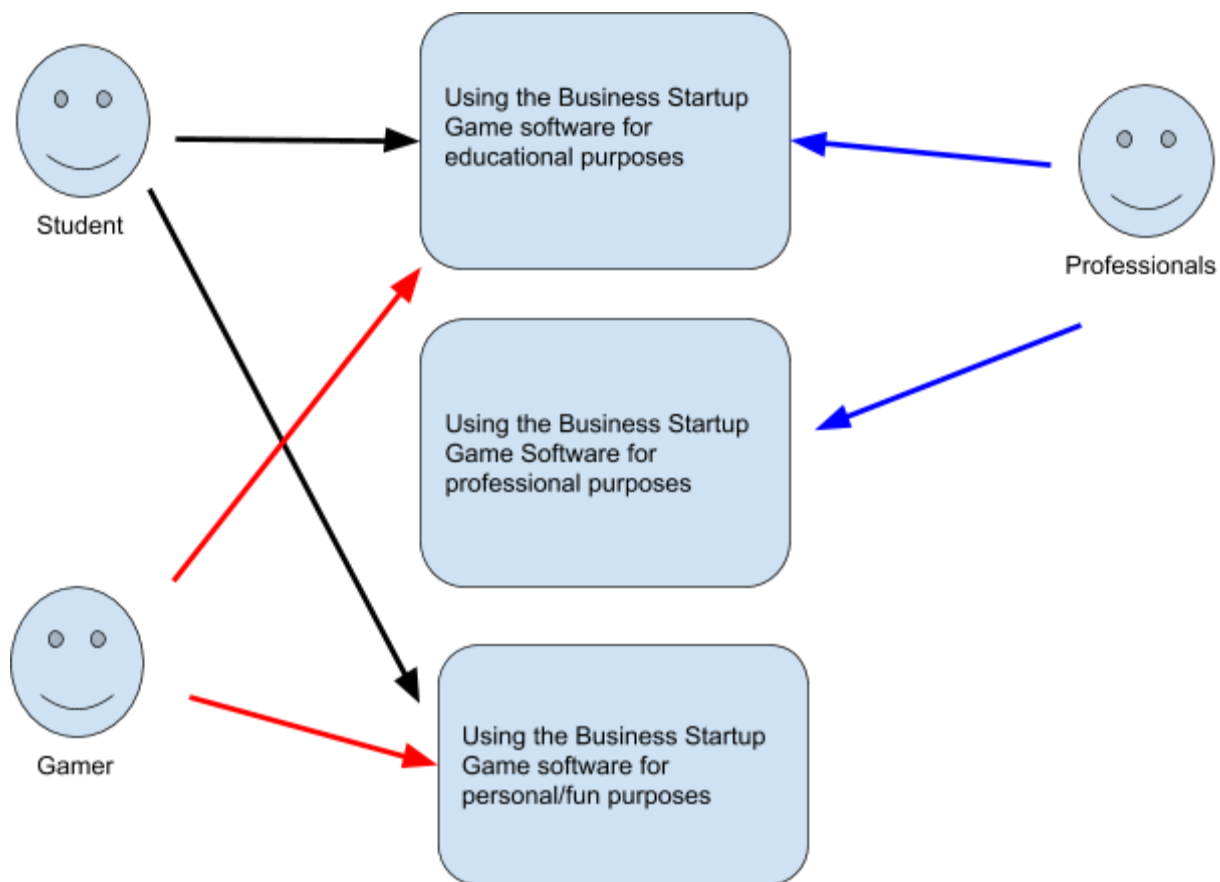


Figure 1.2

4b Product Scenario List

Scenario 1: Student wanting to learn about business expansions

In this scenario a student wants to learn about businesses and how to manage them. This student is interested in developing a business of their own or want to see outcomes from business ideas.

Scenario 2: Professional wanting to test a business idea or strategy

In this scenario a business professional wants to test or implement a business idea or strategy. This person might also want to demonstrate the outcomes from their business design.

Scenario 3: A non-professional and non-student just curious about the game and it's mechanics.

In this scenario a regular gamer wants to play the game and learn about how the game works. Usually this player just wants to play and are interested in seeing how the game turns out. This player also wants to explore all the features of the game.

4c Individual Product Scenarios

Student Learning about business startups:

Jimmy wants to learn more about business startups and how they are managed. Jimmy then loads up the Business Startup game and starts setting his new business idea. He then selects characteristics that he wishes his business will have. Here Jimmy will then select where he would want his first business to be located. Using the Google API, Jimmy selects New York as his starting location. Then he selects what type of business he would like to do. Now that his first business is set up he then starts earning money and start expanding. Jimmy's goal at the moment is to earn a much money as possible while learning what outcomes come from making bad business deals. Jimmy starts expanding to several locations and starts investing more money into his businesses and products. Here Jimmy then starts learning valuable lessons as each decision affects his in-game business. Jimmy then starts to think of what decisions would make his business successful and prevent it from going bankrupt.

A business professional wants to implement a business strategy:

Lydia, a business professional, wants to implement a new strategy to evaluate the outcomes for her business. She wants to analyzing different business strategy to be able to select one and present it to her upper management. She downloads our Business Startup Game and starts her in-game business applying what she already knows. While working with the in-game business she can see statistics from the game which tells her how the business is developing throughout the course of the game. Seeing how her business strategy is either successful or failing determines what she will end selecting to use in her real business projects or product. Seeing the results from her in-game strategies she selects one and then decides to present it to her higher management.

A non-professional and non-student player interested in the game:

In this scenario, Jose a frequent video game player has discovered the Business Startup game. He is curious about what the game is about and downloads the application. Jose starts tinkering with all the features in the game and begins his journey to discover more about the game. At this moment, Jose's objective is to learn how to play the game and see how far he can develop his business. He builds his own business and starts making decisions based on what he feels like doing. Jose's objective isn't to learn more about business startups or even what the best strategy is. His objective is to have fun and play the game no matter what the outcomes are. Part of his objective would be just to see what kind of outcomes the game can have.

5 Stakeholders

The stakeholders most likely will be people who are interested in opening up a business, but are not sure how to get started so they resort to this product to for a "hands on experience" simulation on how opening a business, running it would look like. Another stakeholder might be the person or company funding this project.

Stakeholders usually would include the Client, Customer, etc.

5a The Client

The client in this case could be a variety of people. It could be a company that is interested in creating such a game for profit. It could be a person/company that wants to educate people on how to start up your business, or help them without having them go through all the struggle and embracing them if they do decide to create a business somewhere. The developing organization could also be the client, doing it for their own interests or the public's interests.

5b The Customer

The majority of the customers will be people who are interested in starting up their business but are not sure how to get started. There will be a huge diversion in age, sex, identity, and etc, as the product does not discriminate against anyone based on who they are and what they do. The customers will in fact be worldwide as you the customer is able to open up his/her business anywhere in the world. This will attract more customers towards the product from all over the world.

5c Hands-On Users of the Product

User name/Category: Educational systems, for the use of students who are attending school.

User Role: The user will need to keep all businesses running, deciding which business is better to make in different areas(product selling vs a service for example), be able to keep workers happy, as the happier the workers are the more income will be earned, and overall making sure the business does **not** become chaos.

Subject matter experience: The user's most likely will have minimal to no knowledge of how to run a business. The user will need to possess the ability to click on the phone and they will learn to think critically. The user will start off as novice and can upgrade as they progress in the game to earn other statuses.

Technological experience: The user must be have internet connection available to download the game. The user must be able to click in the game and think before clicking to make good business decisions as they are irreversible. It would be beneficial if the user has played other simulation type games, this would help the user learn quicker how to interact with the game.

Other user characteristics: The attitude of the user will be very important. If the user is greedy and wants to keep all the money for himself/herself the workers will be unhappy and that might have an adverse effect on the business. If on the other hand the user is too nice, he/she will not generate much profit and might not successfully build a business the way it was intended. The user must find a good balance and be able to take on hard decisions in game if any occur.

5d Maintenance Users and Service Technicians

Users who will install, maintain, update and service the product will be some third party company that has experience with such things. It might also be the developmental team if they choose to be the maintenance people.

The requirements for changes changes to happen must all be approved by the client and developing organization. Third-party maintenance aren't allowed to change anything without getting approval first. After it has been approved they can go in and update bugs, fixes, adding features, updating out of date material, etc. After changes it must be heavily tested making sure everything is working properly.

Characteristic of people who maintain the product should overall be motivated and have some area of interest in the business world. This allows to help overlooked ideas or scenarios in the game. Mostly people can report bugs and this will be a tremendous feedback to the maintenance people. They should filter out bugs that are in fact bugs that prevent a smooth experience of gameplay.

5e Other Stakeholders

Other stakeholders not previously mentioned are testers and marketing experts. Testers will need to heavily test the game and this might negatively impact them as they will probably dislike the game after many hours spent testing. Testers will need the full knowledge of the project, but only the interface and how to use the GUI. The degree of involvement will be a big contribution for these people.

Marketing experts(depending on the clients intentions) may have trouble advertising a game and earning money if no in-app purchases exist or ways to "speed up" or "help" in some

way grow a business. The degree of involvement towards the actual app will be minimal, for marketing the person only needs to know this is a simulator that could potentially benefit a lot of people and introduce them to the business aspect. The degree of involvement towards the project will be minimal as well, but they are welcome to play the app if they choose to.

5f User Participation

Actual user participation will not be included. Testers however, will try and put themselves into the shoes of a “user” and test the game heavily for any defects or bugs. This will allow us to test how well designed the product is and if it’s ready for publication or if it needs more work to be done.

5g Priorities Assigned to Users

Key Users: Users that want to learn how to run a business and how to start one from scratch will be the most important users. It does not matter whether there are school or non-school students. These will be the students that are most often using the product and learning as they progress through the game. These are the users that will report bugs more frequently as well as give more feedback about the game and how it could be improved. Type of users probability: 75%.

Secondary users: These are users looking to “kill time” while waiting for a meeting or on their way to school/work. These people possibly are trying to passively learn about the idea of business and acquire general knowledge. Type of users probability: 20%.

Unimportant Users: These are users who download the game and rarely play, or some small underaged children who cannot yet understand how the game works or what the purpose is. Type of users probability: 5%.

6 Mandated Constraints

6a Solution Constraints

1.

Description: The product must use the Google API to simulate the environment.

Rational: The Google API either must be bought or borrowed from Google sources.

Fit Creation: Client must contact Google to use this kind of API

2.

Description: The product must be created on a downloadable software application.

Rational: The user will have to eventually pay for the product.

Fit Creation: There won’t be any kind of servers.

3.

Description: The product must have keys in order to be looked up in the Database.

Rational: The user would not be able to share the software with anyone other than himself.

Fit Creation: Either host the Database yourself, or have a third party host the Database.

6b Implementation Environment of the Current System

Since its a software application, the application must be able to run on all computers. To be more precise, the computer must have all each of their own supporting libraries. With that said, this means that either use one programming language for the software that handles all computers devices or have one programming language for each computer device.

6c Partner or Collaborative Applications

The Google API must be implemented which indicates that there must be product key for the software API which can indicate that Google must have their shares of the product sales, or have some kind of deal with Google that benefits both parties.

6d Off-the-Shelf Software

Any kind of environment, such as Visual Studio or any kind of IDE, to develop the software as long as it meets the requirements. This kind of software might help organize the files that the project requires.

6e Anticipated Workplace Environment

Based on a working environment, this application should be used either in a classroom, tutoring room, business room, or at home. Each of these can be self-taught, or be taught to someone.

6f Schedule Constraints

If the program has a bug, there must be a team to patch the bug as soon as possible. So that the client would not have to worry about the software issues for a long time.

6g Budget Constraints

The cost of the project is determined by the size of the employers working on the project. As well as each them having accessing the database. Which implies that their might be a cost accessing the database

7 Naming Conventions and Definitions

7a Definitions of Key Terms

- Product: what type of product the player will sell to customers throughout the entirety of the game
- Happiness: The measurement of employee satisfaction that will be working for your business.
- Retention: The measurement of customer satisfaction towards your business as well as the product you are selling.

7b UML and Other Notation Used in This Document

For Figure 1.1 in section 3, The square boxes represent the users of the product and the circle represents the what users intend to learn with our product. For Figure 1.2 in section 3, the happy faces represent different users that the product might have. They all connect to different square boxes that each represent what a user might want to learn from playing our game.

7c Data Dictionary for Any Included Models

Data properties that will be important to this project would be that populations of states will be measured in the range of “small”, “medium”, and “large.” These ranges will determine the advantages/disadvantages that the player will be dealt with if they choose to expand their business to that state. data structures that are relative to this project will be files that contain the populations of countries, states, and cities. There will be files generated as the user continues to play the game that will act as a save file if he/she decides to close the application and access it at a later time. The format of the save file will have information regarding where the player currently has businesses at, the profit that his/her business has, the customer retention value, and the employee happiness. This kind of information is best stored in a JSON file format.

8 Relevant Facts and Assumptions

8a Facts

Real time data must be used in this program to more accurate representation of the world. As well use real time data of objects such as the cost to build and owning a property and the what the property might sell or if it will sell. Example will be the cost of apple given a market will be different on each store.

8b Assumptions

The user will start with some kind of loan or property and have the ability to choose what property to own.

II Requirements

1 Product Use Case

1a Use Case Diagrams

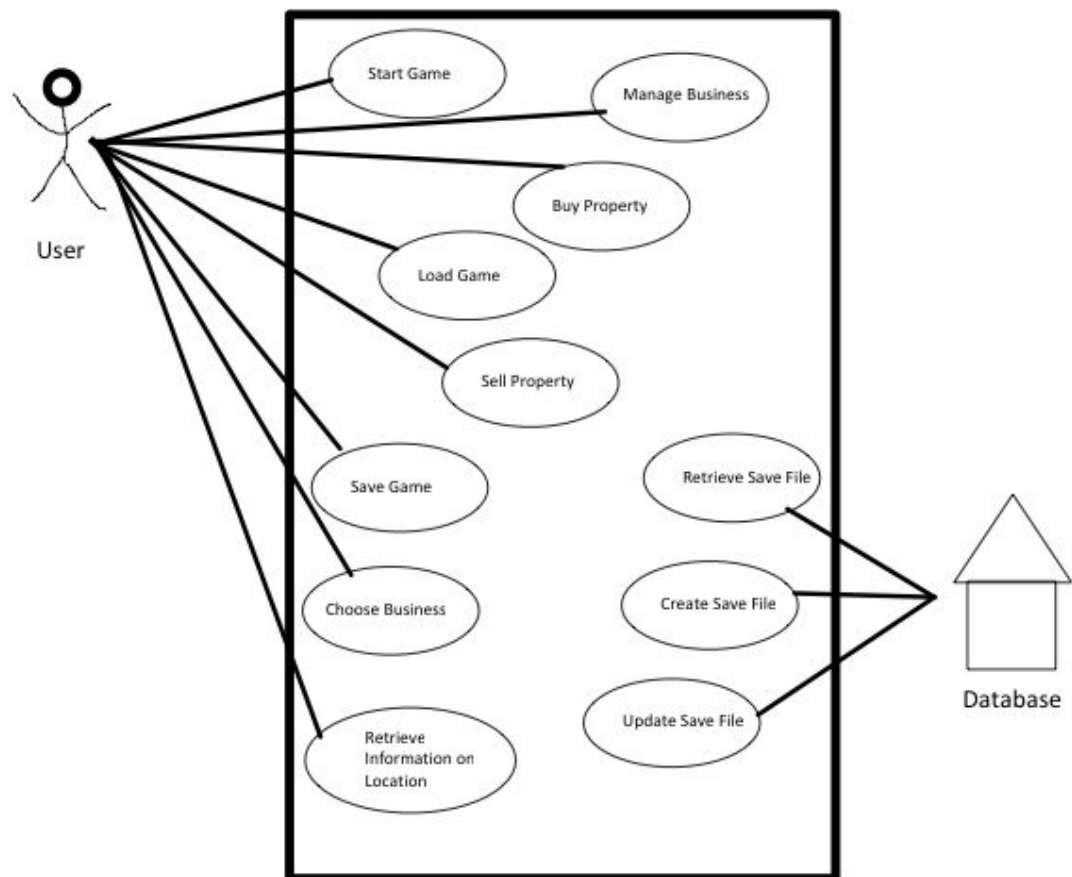


Figure 1.1 - Use case

1b Product Use Case List

Start Game - 01
Manage Business - 02
Buy Property - 03
Load Game - 04

Sell Property - 05
Save Game - 06
Choose Business - 07
Retrieve information on location - 08
Retrieve Save File - 09
Create Save File - 10
Update Save File - 11

1c Individual Product Use Cases

<p>Use case ID: 07 Name: Choose a business</p> <p>pre-conditions: The game starts up and shows the player the “Start new game” button</p> <p>post-conditions: The chosen business will remain permanent for the rest of the game.</p> <p>Initiated by: User</p> <p>Triggering Event: The player has pressed the button “Start new game”</p> <p>Additional Actors: NA</p>
<p>Sequence of Events:</p> <ol style="list-style-type: none"> 1. The user has pressed the “Start new game” button <ol style="list-style-type: none"> a. System creates a new game file format which will hold information on the state of the game and prompt user to choose a business 2. The user chooses one business from the various business options they can begin with. <ol style="list-style-type: none"> a. The System saves the option into the save file. and begins the game.

Alternatives: NA

Exceptions: NA

Use case ID: 01

Name: Start Game

pre-conditions: The user has clicked on the launcher that will launch the game

post-conditions: The new game will be saved to the database

Initiated by: User

Triggering Event: Player has clicked on the “Start new game” button

Additional Actors: NA

Sequence of Events:

3. The user has started the application
 - a. System starts up and listens for any button clicks
4. The user then presses the “Start new game” button
 - a. System prompts the database to create a new save file that is stored in the database

Alternatives: NA

Exceptions: NA

<p>Use case ID: 03</p> <p>Name: Buy Property</p> <p>pre-conditions: Player has enough money to afford the property</p> <p>post-conditions: Player now owns that specific property and can hire employees in that area as well as sell the product</p> <p>Initiated by: User</p> <p>Triggering Event: User clicks on “Buy properties” tab</p> <p>Additional Actors: NA</p>
<p>Sequence of Events:</p> <ol style="list-style-type: none"> 5. Player has clicked on the “Buy properties” tab <ol style="list-style-type: none"> a. System switches the focus of the app to show the different available properties in the world 6. The player clicks on a specific property to find out more information on it <ol style="list-style-type: none"> a. System retrieves all information about specific property such population in the area and possible competitors 7. Player clicks on “buy property” to buy the specific property <ol style="list-style-type: none"> a. System registers property as “bought” by the user and allows user to make changes to the property
<p>Alternatives: NA</p> <p>Exceptions: NA</p>

<p>Use case ID: 04</p> <p>Name: Load Game</p> <p>pre-conditions: Game application has started</p> <p>post-conditions: user can continue from where the last left off</p> <p>Initiated by: User</p> <p>Triggering Event: user has clicked on “Load game” button</p> <p>Additional Actors: NA</p>
<p>Sequence of Events:</p> <ul style="list-style-type: none"> 8. The user has started the application <ul style="list-style-type: none"> a. System starts up and listens for any button clicks 9. The user clicks on the “Load game” button. <ul style="list-style-type: none"> a. System retrieves all save files from the database 10. User chooses what game file to continue from and clicks on it <ul style="list-style-type: none"> a. System use file that was clicked on to load the game the way it was last left
<p>Alternatives: Player can click on the property in the world map and purchase it that way</p> <p>Exceptions: NA</p>

Use case ID: 05

Name: Sell Property

pre-conditions: Player owns the initial property

post-conditions: Player gets a certain amount of money by selling the property and can no longer change the property

Initiated by: User

Triggering Event: user has clicked on “Sell properties” tab

Additional Actors: NA

Sequence of Events:

11. Player has clicked on the “Buy properties” tab

- a. System switches the focus of the app to show the different properties the players owns.

12. Player clicks on “sell properties” to sell the specific property

- a. System registers property as “sold” by the user and pays the player a certain amount of money as well as making the property unchangeable by the player

Alternatives: Player can click on sell button on the world map

Exceptions: NA

Use case ID: 02

Name: Manage Business

pre-conditions: Own at least one property

post-conditions: The business can potentially become larger or smaller based on the player’s actions

Initiated by: User

Triggering Event: Player clicks on “Manage” button on an owned property

Additional Actors: NA

Sequence of Events:

13. Player will click on the “Manage” button on an owned property
 - a. System will show information on property regarding number of employees, employee satisfaction, income, and options to improve the property
14. Player can choose from the various options to improve the property. Once they choose how to improve the property, they will click on the specific property
 - a. System will update the statistics of the building as well as visually improve the state of the property

Alternatives: NA

Exceptions: NA

Use case ID: 06

Name: Save Game

pre-conditions: The player is currently in a game that was started or loaded up

post-conditions: The player can continue off where they last used the “Save” button after they close the application

Initiated by: User

Triggering Event: Player presses “Save” button

Additional Actors: NA

Sequence of Events:

15. Player will click on the “Manage” button on an owned property
 - a. System will show information on property regarding number of employees, employee satisfaction, income, and options to improve the property
16. Player can choose from the various options to improve the property. Once they choose how to improve the property, they will click on the specific property
 - a. System will update the statistics of the building as well as visually improve the state of the property

Alternatives: NA

Exceptions: NA

Use case ID: 08

Name: Retrieve information on location

pre-conditions: Player is connected to the internet, and the main screen is in view of the specific location.

post-conditions: Player can see information such as population, other business competition based on the product they’re selling, culture of the location and how likely they will buy the product.

Initiated by: User

Triggering Event: Player hovers over the area of interest

Additional Actors: NA

Sequence of Events:

17. Player hovers over the area of interest in the world that they might want to look into

a. System retrieves geographical information on the location.

18. Player can zoom into a specific location

a. System retrieves more in depth information such as the population of the location, culture, and business competition

Alternatives: NA

Exceptions: NA

Use case ID: 09

Name: Retrieve Save File

pre-conditions: There should be existing save files in the database

post-conditions: The System would be able to load the save file that was retrieved

Initiated by: Database

Triggering Event: when the user clicks on the “Load game” button

Additional Actors: NA

Sequence of Events:

19. Database retrieves all the save files through a query and returns them

a. System would use the information to display the save files to the user

Alternatives: NA

Exceptions: NA

<p>Use case ID: 10</p> <p>Name: Create Save File</p> <p>pre-conditions: The user is not currently in a game and has decided to start a new game</p> <p>post-conditions: A new file is stored in the database and can be queried by the user</p> <p>Initiated by: Database</p> <p>Triggering Event: User clicks on the “start new game” button</p> <p>Additional Actors: NA</p>
<p>Sequence of Events:</p> <ol style="list-style-type: none"> 20. System creates a new save file for the game and queries the database to be stored in a table <ol style="list-style-type: none"> a. Database adds the newly created file into the table
<p>Alternatives: NA</p> <p>Exceptions: NA</p>

<p>Use case ID: 11</p> <p>Name: Update Save File</p> <p>pre-conditions: The user is currently in a game and has decided to save the game state</p> <p>post-conditions: A current save file in the database is updated</p> <p>Initiated by: Database</p> <p>Triggering Event: User</p> <p>Additional Actors: NA</p>
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<p>Sequence of Events:</p> <ol style="list-style-type: none"> 21. System queries the database to update the currently selected file with the current game state the user is in <ol style="list-style-type: none"> a. Database updates the file
<p>Alternatives: NA</p> <p>Exceptions: NA</p>

2 Functional Requirements

ID# 01 - Name: Data Processing

Description: The app must be able to process data for the region the player has chosen. It must process the data, get statistics, and make a probability for the chances of a specific business becoming successful in that region.

Rationale: This functional feature is very needed as without it the game might not run and might not be entirely successful in teaching the player what it is like to make difficult decision based on given circumstances.

Fit Criterion: This requirement can be labeled a successful one when the app can analyze data either live or downloaded to create statistics and probabilities for players business.

Acceptance Tests: #01 - Gathering information Test, #02 - Calculations Test

ID# 02 - Name: Internet

Description: The user must be connected to the internet in order to be able to download the packet for his/her specific region

Rationale: This functional feature is needed because without it the game won't run and will likely crash. This needs to be handled so the game can gain intel to be able to play the game correctly.

Fit Criterion: This requirement can be labeled a successful one when the app throws an exception if there is not internet connection, notifying the user that he/she must be connected to at least download all necessary data.

Acceptance Tests: #01 Gathering information Test , #03 Connection Test

ID# 03 - Name: The player will be able to create an account(system/database)

Description: The system must be able to create and store the user information.

Rationale: This functional feature is needed because without it the game will not be able to keep statistics for the variety of players, such as how many workers they hired, where they started their business, what decisions they made, etc.

Fit Criterion: This requirement can be labeled a successful one when there is an account created, the system allows the user to create an account, and in case of a logout the system allows the user to log back in and retain all of his/her statistics.

Acceptance Tests: #04 - Accounts Test, #05 - Information Users Test

ID# 04 - Name: Rules

Description: The app must be able to contain a “help” button of some sort to explain to the user what he/she may or may not do, during business development.

Rationale: This would provide a simulation of real life restraints, such as you cannot spend more money without having it(unless you have a loan), and it would be universal for all players playing this app as well as rules that apply to real-life business, whether successful or unsuccessful.

Fit Criterion: This requirement can be labeled a successful one when the player/user is able to read the rules while playing the game and they understand, and which they don't understand should become clear to them throughout playing the game.

Acceptance Tests: #06 - Rule Test

ID# 05 - Name: Gameplay

Description: The app must be able to provide the environment for playing the game. It must also supply and enforce the rules as well as game logic. The game must be able to adapt to the user choices, meaning processing in real time.

Rationale: This functional feature is needed because without it the game won't be able to keep the attention of the player. It will leave them bored and will most likely result in the user never playing the game again.

Acceptance Tests: #07 - Logic Game Test

3 Data Requirements

ID# 06 - Name: Player transactions

Description: The system must be able to track player transactions between their business and customers.

Rationale: This is necessary in order to track player's business progress and customer satisfaction.

Fit Criterion: This requirement is meant to see the player's business revenue and customer ratings. If a business is doing well then we will see an increase in revenue and customers. This is a good indicator would be that the player transactions are being tracked effectively.

Acceptance Tests: #08 - Revenue Test, #09 - Satisfaction Test, #10 - Shopping Test

ID# 07 - Name: Location Statistics

Description: The System must be able to detect locations and certain statistic that apply there

Rationale: This requirement is necessary in order to provide feedback to the player's business based on where they decide to start it.

Fit Criterion: This requirement is met when a player's business is affected by the specific location their business is set up at.

Acceptance Tests: #11 - Location Consequences Test

ID# 08 - Name: Business Expenses

Description: The system must be able to store and collect information based on the player's business expenses on product, store taxes, and other business related expenses.

Rationale: This requirement is necessary in order to see how a player's business is set up and how much money a player would have to put into their business to start it.

Fit Criterion: This requirement will be met when we can calculate the amount money a user spends to start their business. Also calculate the revenue to amount spent ratio.

Acceptance Tests: #12 Investment Test, #13 Reinvestment Test

4 Performance Requirements

4a Speed and Latency Requirements

ID# 09 - Name: Launching App

Description: Upon launching the app, the app must load relatively quickly (less than a couple of seconds)

Rationale: Customers/players might be irritated with the long waiting time so show them feedback of game loading up(of some sort)

Fit Criterion: When the user is not irritated with the loading time or is impressed on how quickly the game loads up then this criterion has been satisfied.

Acceptance Tests: #14 - Smooth Test

ID# 10 - Name: Login

Description: Upon launching the app, the app must log in the users very quickly, and retrieve all their info such as game statistics.

Rationale: Customers/players might be irritated with the long waiting time, so we must make this fast so the user can enjoy the game and learn instead of be frustrated the app is loading for so long.

Fit Criterion: When the user is not irritated with the loading time or is impressed on how quickly the game loads up then this criterion has been satisfied.

Acceptance Tests: #15 - Player Information Test

ID# 11 - Name: System responsiveness

Description: The app must be very responsive and very fast when the user is playing the game, so the user experiences as smooth of a gameplay as possible.

Rationale: Customers do not like buggy, or laggy games, and thus will most likely uninstall the app if it is not as responsive as modern apps and games today are.

Fit Criterion: This criteria will be satisfied when menu's, games, decisions and etc are loaded relatively fast (milli-seconds on the clock).

Acceptance Tests: #14 - Smooth Test

ID# 12 - Name: Database

Description: Must be able to retrieve and update data relatively fast(within a couple of seconds) to not make the user wait too long

Rationale: We must update each players account. It will be best to update statistics as soon as they are possible to calculate, and then update the database every 5-10 minutes, or at the end of the game.

Fit Criterion: When the database is updated with users save data/progress relatively fast and user is able to retrieve this data fast onto his/her device then this criteria will be considered satisfied.

Acceptance Tests: #16 - Database Test

4b Precision or Accuracy Requirements

ID# 13 - Name: Statistics update

Description: After every game the statistics will be calculated and updated to the database where the users save data is stored(hence the whole point of containing a log in)

Rationale: To keep track of a person's progress throughout the game and his/her statistics.

Fit Criterion: This will be deemed satisfied when statistics are updated relatively fast (within 1-3 seconds), of where the data is sent, received, and updated accordingly

Acceptance Tests: #01 - Gathering information Test

ID# 14 - Name: statistics

Description: Statistics based on what the person did must be 100% accurate

Rationale: The user can use the statistics to further improve how they play. This may not be important to casual gamers, but may be important to business students wanting to improve.

Fit Criterion: When updating each person's account correctly is 100% accurate, then this will be deemed satisfied.

Acceptance Tests: #01 - Gathering information Test

ID# 15 - Name: Save everything upon exiting

Description: If the user leaves the game it must save the progress(a player will want to return to the business they began to build, and would like to start where they left off previously).

Rationale: Customers/players would be very dissatisfied if every time they opened up the app they would have to restart their business or make a new one because their data wasn't saved locally or to the cloud.

Fit Criterion: When the user is not irritated with the loading time or is impressed on how quickly the game loads up then this criterion has been satisfied.

Acceptance Tests: #17 - Gameplay saved

4c Capacity Requirements

ID# 16 - Name: Download all data for specific region

Description: In the event of a player playing/opening up multiple businesses at the same time the app must be able to download and process the different variety of regions and calculate statistics based on each place.

Rationale: We would not advise the user to just open up many business but if they choose to do so the app must be able to handle all requests and continue to run smoothly.

Fit Criterion: This will be deemed satisfied when a user chooses many different locations to start a business and all regions work properly as well as run in real time based on users choices(so the app is able to adapt to each business, even all at the same time).

Acceptance Tests: #18 - Data Loaded by region test , #19 - Multi Business Test

ID# 17 - Name: Players database

Description: It should be designed to handle at least a million players, if not more

Rationale: Database will be shared but needs to be able to handle everyone

Fit Criterion: This criterion is satisfied when there are a bunch of players and they all have their own accounts and everything flows smoothly.

Acceptance Tests: #20 - Big Data Test

ID# 18 - Name: Creating account

Description: Must be able to handle players creating accounts at the same time.

Rationale: If two users send a request to create an account at the same time, there will exist a way to handle such requests either sequentially or at the same time(parallel) in order to speed things up.

Fit Criterion: This is satisfied when 2 or more people decide to create accounts at the same time and the system successfully creates all accounts and doesn't crash.

Acceptance Tests: #21 - Database DeadLock Test

5 Dependability Requirements

5a Reliability Requirements

ID# 19 - Name: Backup

Description: There will exist a backup performed of the database backed up daily, so in case of an emergency most of the data will still be preserved for players.

Rationale: Accidents happen, Hackers hack, etc, thus must take extra steps just to be safe that if something happens all does not fail (aka players don't lose all their precious data).

Fit Criterion: This will be deemed satisfied when there is a backup performed everyday of the database.

Acceptance Tests: #22 - BackUp Test

ID# 20 - Name: Game failure(Benefit app developers)

Description: If the app crashes in anyway bugs will be sent as a report, so the maintenance people may patch up this bug as soon as possible.

Rationale: No one wants their game to crash, especially not mid-game. Thus all bugs will be reported immediately to ensure future reliability by working on today's problems.

Fit Criterion: This will be satisfied when bugs are reported automatically, sent as a log file.

Acceptance Tests: #23 - Bug Report Test

ID# 21 - Name: Game failure(Benefit for users)

Description: In case of the game crashing data will be preserved and so will be the progress of the game.

Rationale: Users don't want to lose their hard work due to a game crash which is not their fault.

Fit Criterion: This will be deemed successful if upon a crash user retains all of his/her progress.

Acceptance Tests: #24 - Crash Test

5b Availability Requirements

ID# 22 - Name: There will be updates,patches etc launched between 12am-6am

Description: This will allow the fixing of any bugs detected previously to ensure comfort for the user and reliability for the app.

Rationale: Updates and patches will always happen, whether its new content or patching up a couple of bugs.

Fit Criterion: This will be deemed successful when updates happen once a week and they fix problems which were reported previously.

Acceptance Tests: #25 - Patch Test

ID# 23 - Name: The database and server will be running 6 days a week, 24 hours

Description: The players want to be able to access their data whenever they start up the app, and thus the database needs to be constantly running.

Rationale: Nowadays information is available at all times, and thus our app will accommodate to this, to make the player happy,

Fit Criterion: When the server is accessible 6 days out of 7 days, this will be deemed a success.

Acceptance Tests: #26 - Stress DataBase Test

ID# 24 - Name: Performance improvement

Description: Besides fixing bugs software engineers must stay active and think of ways to increase the performance of the app whether that's the app itself, gameplay, or retrieving data from database.

Rationale: Updates and patches will always happen, whether its new content or patching up a couple of bugs.

Fit Criterion: This will be deemed successful when updates happen once a week and they fix problems which were reported previously.

Acceptance Tests: #27 - Updates Test

5c Robustness or Fault-Tolerance Requirements

ID# 25 - Name: Offline gameplay

Description: Users will continue to play the game IF their map was downloaded for their chosen region prior to a failure

Rationale: Players are able to play the game, just cannot create a new business at that exact time, but will be able to later.

Fit Criterion: This allows the player to play the game, and offers them a sense of security knowing that their progress will not be compromised or unsaved.

Acceptance Tests: #28 - Internet Shutdowns Test

ID# 26 - Name: Internet interruption(map-download)

Description: If this happens during a map download, the app will notify the user and wait for internet to come back online.

Rationale: Important to notify the user so they know what's going on, and so the app doesn't crash due to an error.

Fit Criterion: This will be deemed successful when a user mid-downloading a game loses internet and the app waits for internet to come back online to proceed with the download.

Acceptance Tests: #29 - Download on Hold Test, #28 - Internet Shutdowns Test

ID# 27 - Name: Internet interruption(User-data save)

Description: If there is a network error, the next time the app is launch or as soon the internet becomes available user data will become available and updated.

Rationale: People lose internet all the time and they want to keep their data.

Fit Criterion: This will be deemed successful when a user loses internet but does not lose any progress as a result.

Acceptance Tests: #30 - Client Update Server

5d Safety-Critical Requirements

ID# 28 - Name: Content will be PG-13

Description: There might be little children wanting to learn business at an early age, thus all content must be kept PG-13

Rationale: The game should be available to people older than 13. In order for this to happen, it must abide to the ESRB rating system.

Fit Criterion: This will be satisfied when the board will accept the game as PG-13, meaning no disturbing content or language.

Acceptance Tests: #31 - Age Acceptable Test

ID# 29 - Name: Long periods of playtime

Description: It is harmful to stare at any game for long periods of time and this players will be suggested to take a break from playing game every 3-4 hours.

Rationale: The app is designed to teach people about business, not to damage their life in any way, shape, or form. Thus reminders will be sent to take a break, do chores, etc.

Fit Criterion: This will be deemed successful when a user plays for 3-4 hours and then gets a pop up message asking if he/she would like to take a break.

Acceptance Tests: #32 - Play Time Test

6 Maintainability and Supportability Requirements

6a Maintenance Requirements

ID# 30 - Name: Reporting Bugs

Description: The system must be able to report bugs and send reports.

Rationale: This is a requirement because we want to be able to track bugs and issues with the software.

Fit Criterion: This requirement is met when developers are able to receive error/bug reports daily.

Acceptance Tests: #33 - Bug Report Test

ID# 31 - Name: Data Information

Description: The system must be able to update data and retrieve data in real time. Thus, the system must update locational data as well.

Rationale: This requirement is necessary in order to keep map statistics up to date for the player when selecting a city to start their business in.

Fit Criterion: This requirement is met when a specific map is able to adapt and change based on recent data acquired.

Acceptance Tests: #1- Gathering information Test, #2 - Calculations Test

6b Supportability Requirements -

ID# 32 - Name

Description: The Developers of this software must be able to patch and handle errors quickly.

Rationale: This requirement is necessary in order have the software updated and responsive.

Fit Criterion: This requirement is met when developers are able to effectively handle the errors.

Acceptance Tests: #34

6c Adaptability Requirements

ID# 33 - Name Multiple Browsers

Description: The game must be able to work on multiple browsers as it is an online game. Must also be compatible with IOS and Android devices.

Rationale: This is necessary in order to complete the cross-platform functionality of the game. The functionality must be efficient on Android and IOS devices.

Fit Criterion: This requirement is met when players are able to connect and play the game effectively on their device.

Acceptance Tests: #35 - Compatible Test

6d Scalability or Extensibility Requirements

ID# 34 - Name Handle Multiple Businesses

Description: As the game becomes more complex it should handle a variety of different types of businesses.

Rationale: This is important as we want to make the game as close to the real world as possible.

Fit Criterion: This requirement is met when the game is able to expand their variety of businesses that the player can select from.

Acceptance Tests: #36 - Multiple Ownership Test, #01 - Gathering information Test

6e Longevity Requirements

ID# 35 - Name: Expected to Last

Description: The game should be able to last and substantially stay updated.

Rationale: This is necessary when trying to develop future iterations or update of the game.

Fit Criterion: This requirement will be met when the game is able to handle updates.

Acceptance Tests: #14 - Smooth Test

7 Security Requirements

7a Access Requirements

ID# 36 - Name: Google API Maps

Description: The use of the google API can only be used with the interactive maps.

Rationale: No one should be allowed to access information about the usernames or comments.

Fit Criterion: Disabling the API selection for comments or user names will be a great ideal.

Acceptance Tests: #37 - Google API Privacy Test

7b Integrity Requirements

ID# 37 - Name: Application Corruption

Description: If the application have been corrupted, there should be a repair option.

Rationale: If the user for some reason corrupted the file, we will have a method where we can replace the application. The user may have not done it intentionally because it maybe from another source.

Fit Criterion: Create a separate application to fix the error.

Acceptance Tests: #38 - Restore Test

7c Privacy Requirements

See 7a.

7d Audit Requirements

Does not apply.

7e Immunity Requirements

Does not apply.

8 Usability and Humanity Requirements

8a Ease of Use Requirements

ID# 38 - Name: App accessibility

Description: Any user with a smartphone device will be able to download the game and play it on that device, as well as computer

Rationale: We want users of all types to be able to play the game, whether its from phone, laptop, desktop, ipad, etc.

Fit Criterion: When game is playable from different devices, it will be listed as a success.

Acceptance Tests: # 35 - Compatible Test

ID# 39 - Name: Usability

Description: The game will be easy to use, buttons and menus will have meaningful names so the player can infer what each things does.

Rationale: The user will use basic judgement that will allow to pick up on how to play the game(controls)

Fit Criterion: This will be successful when the average user is able to pick up rapidly on how the game is playable.

Acceptance Tests: #39 - User Interface Test

ID# 40 - Name: Improper usage

Description: The only real improper usage is by just randomly clicking things and not actually learning about business.

Rationale: Users must think before they make decisions. They must be willing to put time and effort into learning about business aspects.

Fit Criterion: This will be successful if a player goes through the whole game and wins without putting effort into the game.

Acceptance Tests: #40 - Game Mechanics

ID# 41 - Name: Guidelines

Description: In case the player cannot infer on what a button does there will be a little help icon that will explain everything the user sees on that particular page.

Rationale: Player must know how to play the game (the basic functionalities) in order to have a learning experience

Fit Criterion: This will be successful when a player can click the help button and it accurately describes to the player what each button/feature does.

Acceptance Tests: #41 - Icon Test

8b Personalization and Internationalization Requirements

ID# 42 - Name: Game languages

Description: The game will be available in different languages

Rationale: This will attract more users.

Fit Criterion: When the user may switch to another language and everything is translated correctly.

Acceptance Tests: #42 - Language Functionality Test

ID# 43 - Name: Account accessibility

Description: User will be able to access their account, customize nickname, picture, etc.

Rationale: Each user will have a unique experience with the game as each player gets to customize and personalize their accounts.

Fit Criterion: Ability to customize picture, nickname, etc.

Acceptance Tests: #43 - User Information Test

ID# 44 - Name: Region

Description: Based on the region and the money that is used (USD, EURO, etc...), the game will adjust in such a way. Or players will be able to choose what currency they would like to use.

Rationale: This will provide comfort for our players and help them not get mixed up with currency.

Fit Criterion: When user can specify what time of currency they would like to use.

Acceptance Tests: #44 - Currency Test

8c Learning Requirements

ID# 45 - Name: User must be able to read and comprehend what they are reading.

Description: This way the user can understand the game and its concepts which they are trying to learn about.

Rationale: If requirement does not exist, user cannot play the game the way it was designed to be played.

Fit Criterion: When user can read and comprehend what the game is telling/offering.

Acceptance Tests: #39 - User Interface Test

ID# 46 - Name: Game Rules

Description: These will exist in case the user does not understand how to play the game.

Rationale: Will help the user familiarize him/herself with the way the game is orientated to be played.

Fit Criterion: Successful when player can read rules and understand how to apply them throughout the game.

Acceptance Tests: #45 - Rules Test

ID# 47 - Name: Game Concepts

Description: Users will be able to read up on concepts of business, to make playing the game a bit easier(it is a learning game after all)

Rationale: This will help players learn about concepts in business

Fit Criterion: When user is directed to the appropriate place to learn business concepts

Acceptance Tests: #46 - Concepts Test

ID# 48 - Name: Basic computer/app/ipad skills are needed to play the game

Description: User will not have trouble interacting with the game unless they cannot read.

Rationale: If user can read then interacting with the game will be quite easy.

Fit Criterion: User can click buttons and understand what they are clicking, as well as why they made this choice.

Acceptance Tests: # 45 - User Interface Test

8d Understandability and Politeness Requirements

ID# 49 - Name: Personalization Monitoring

Description: Any name, image, word, or anything else that says inappropriate will not be allowed to contain within the game.

Rationale: Slurs, swearing, or racials of any sorts will not be tolerated and will either be banned or will be not allowed to be posted. This includes images, nicknames, etc, things that are not catchable at account creation.

Fit Criterion: We do not want our app to offend anyone and we also don't want anyone to offend anyone. Thus when everything is kept PG-13 then this requirement will be met.

Acceptance Tests: #47 - Behavior Test

ID# 50 - Name: Manual/Guide

Description: There will be a digital pdf manual available for players to read if they desire to do so. in there will exist basic functionality and concepts for the business itself.

Rationale: If someone is completely lost but is eager to learn how to play the game and make successful decisions, the Manual can steer them in the right direction

Fit Criterion: When user can refer to the manual and learn from it(concept, a game button, move, etc).

Acceptance Tests: #48 - Manual Game Test

ID# 51 - Name: Warnings

Description: If weird behavior is detected, such as possibly cruelty during running your business(trying to pay under minimum wage), consequences will be applied in game, such as would apply in real life.

Rationale: Player will be able to learn what his/her bounds are and only legal things are acceptable in the game.

Fit Criterion: When there is a reward/punish system for the player within the game.

Acceptance Tests: #49 - Inappropriate Test

8e Accessibility Requirements

ID# 52- Name: Internet & a device(and storage)

Description: Those three things are essential, otherwise the game will fail to play(or even install)

Rationale: These requirements must be met to ensure correct intended gameplay and usability of the app.

Fit Criterion: Success when user has those three things available for use.

Acceptance Tests: #50 - Installment Requirements Test

ID# 54 - Name: Text-to-Speech

Description: There will be a text-to-speech implementation one day for those who are blind

Rationale: We want everyone to enjoy the game, no matter what condition the person has or is in.

Fit Criterion: When people of different disabilities are able to play the game.

Acceptance Tests: #51 - Disability Test

ID# 54- Name: Subtitle

Description: This will allow for people with the hearing-disability to also be able to play the game.

Rationale: We want everyone to play the and everyone to feel equal within the game

Fit Criterion: When there are subtitle displayed to what's happening as the game is progressing.

Acceptance Tests: # 52 - Subtitle Test

ID# 55- Name: Lighting

Description: Lighting will be customized to not cause damage players/users. It will also be adjusted for people with fragile eyes so they are also able to play the game.

Rationale: This will help everyone in terms of decreasing eye-wear.

Fit Criterion: When lighting isn't vivid to hurt the eyes and takes into consideration fragile people with disabilities, and is adapted accordingly, then it will be a success.

Acceptance Tests: #53 - Light Test

8f User Documentation Requirements

ID# 56 - Name: Manual

Description: Included with the game to help players learn how to play the game game,

Rationale: Some people would like a better understanding of the game and a manual will help.

Fit Criterion: When a manual is supplied with the game.

Acceptance Tests: #48 - Manual Game Test

8g Training Requirements

ID# 57 - Name: No training is required

Description: Only basic everyday computer functionality is needed to be able to play this game

Rationale: Everyone should be able to play with no prior knowledge

Fit Criterion: When the user knows how to navigate computer or smartphone, then this requirement will be satisfied.

Acceptance Tests: #54 - Devices Test

ID# 58 - Name: Read Manual

Description: Only if the user is having severe difficulty, the person can resort to the manual on how to play the game

Rationale: This will help ensure that everyone knows how to use the game's functionality properly.

Fit Criterion: When the user knows how to navigate computer or smartphone, then this requirement will be satisfied.

Acceptance Tests: #55 - Readable Manual Test

9 Look and Feel Requirements

9a Appearance Requirements

ID# 59 - Name: Application Appearance

Description: Make sure that the appearance represents what the company is.

Rationale: Any controversial appearance is not acceptable. We want our customers to be happy with the product.

Fit Criterion: Make sure is not controversial.

Acceptance Tests: #49 - Inappropriate Test

9b Style Requirements

ID# 60 - Name: Attack on All Ages

Description: Make sure that the style all people are able to understand and act accordingly to the app.

Rationale: Not everyone were born in the generation of advanced technology, the application should be able easy to understand.

Fit Criterion: Having a group of people test the application.

Acceptance Tests: #42 - Language Functionality Test, #39 User Interface Test

10 Operational and Environmental Requirements

10a Expected Physical Environment

Does not apply.

10b Requirements for Interfacing with Adjacent Systems

ID# 61 - Name: Google API

Description: A lot of users will putting the google servers under stress.

Rationale: If for some reason that google servers break, notify user that the server are offline.

Fit Criterion: Will notify the user that issue is being fixed.

Acceptance Tests: #56 - Google API Test

10c Productization Requirements

ID# 62 - Name: Google Software

Description: Make sure that google requirements is met

Rationale: The API may be updated.

Fit Criterion: Make sure the program checks regularly for update on API.

Acceptance Tests: #56 - Google API Test

10d Release Requirements

ID# 63 - Name: Launch

Description: Release a description of the product, it could be downloadable service.

Rationale: When the date of release, we should promote our product every way possible.

Fit Criterion: Having thousands buy our product is having good business.

Acceptance Tests: #57 - Game Update Test

11 Cultural and Political Requirements

11a Cultural Requirements

ID# 64 - Name: People

Description: The app must not try to offend any race or ethnicity, including any region as this is a map based game and it takes many different regions into consideration.

Rationale: It must not try to offend or mock anyone or anything that might be seen as a racial issue. We want the product to be fair to everyone no matter the background.

Fit Criterion: When it does not intentionally offend anyone. Anything that seems inappropriate will be adjusted or fixed asap.

Acceptance Tests: #58 - Offensive Content Test

ID# 65 - Name: Release will be in english

Description: The initial release will be in english but when foreign markets begin to accept the app it will have the option of choosing a different language to adjust to the needs of foreign customers.

Rationale: Everyone should be able to play the game, from anywhere around the world.

Fit Criterion: When no offensive content exists and the app can be translated into many different languages.

Acceptance Tests: #59 - Readable Content Test

ID# 66 - Name: All Age Groups

Description: The game is for people of all age groups, and thus will not offend the young, the elderly, or anyone in between

Rationale: Everyday people learn new things throughout life. We would like our app to support all people.

Fit Criterion: When all age groups feel they can play the game without feeling uncomfortable.

Acceptance Tests: #60 - Age Qualification Test

11b Political Requirements

ID# 67 - Name: The product will not portray any region negatively

Description: How a region performs in terms of a specific business will solely be based on statistics, and not on opinions.

Rationale: Statistically speaking and historically speaking, it is best to use data rather than opinion if a business will be successful or not in specified region.

Fit Criterion: Business succeeds or fails based on analyzed data.

Acceptance Tests: #61 - Region Statistics Test

ID# 68 - Name: The product will be adjusted based on chosen location

Description: Different regions on a map have different rules in terms of what can/cannot be done in a business and this will have to be taken into account, such that everyone is playing fair by the rules

Rationale: It makes sense to adjust to rules for that specific region. After all if you a player opens up a business on the other side of the world, the player will have no choice but to abide by those rules, no matter where he/she resides.

Fit Criterion: Adaptive rules based on location. Success when rules are changed successfully and applied.

Acceptance Tests: #62 - Region Fairness Test

12 Legal Requirements

12a Compliance Requirements

ID# 69 - Name: Distribution Of Product

Description: At any moment, the product cannot be distributed illegally.

Rationale: If the product is distributed, then the company will fail and will go out of business.

Fit Criterion: Product will not work if there is copied of it.

Acceptance Tests: #63 - Product ID Test

12b Standards Requirements

ID# 70 - Name: Operation Crackdown

Description: When data is received, it will not be used for any kind of malicious actions.

Rationale: Hatred, racism or any kind of wrong behavior is not acceptable for this application. We will not condone any such actions.

Fit Criterion: Product will notify any sort of illegal activity.

Acceptance Tests: #64 - Illegal Test

13 Requirements Acceptance Tests

13a Requirements – Test Correspondence Summary

[illegible]

The full table can be found [here](#)

13b Acceptance Test Descriptions

ID # 01 - Name: Gathering information Test

Description: Test whether the software is able to access information specific to a location.

ID # 02 - Name: Calculations Test

Description: Test whether the software is able to calculate statistics correctly and efficiently.

ID # 03 - Name: Connection Test

Description: Test whether the game is able to connect correctly to the internet

ID # 04 - Name: Accounts Test

Description: Test whether accounts are created correctly and stored in the database efficiently

ID # 05 - Name: Information Users Test

Description: Test whether information is retained from the users.

ID # 06 - Name: Rule Test

Description: Test whether rules are working correctly and are being applied to the users game.

ID # 07 - Name: Logic Game Test

Description: Test that game logic is being processed real time and gameplay flows correctly.

ID # 08 - Name: Revenue Test

Description: Testing if the revenue is increasing/decreasing

ID # 09 - Name: Satisfaction Test

Description: Testing if customers are satisfied

ID # 10 - Name: Shopping Test

Description: Testing how many customers visit a player's business

ID # 11 - Name: Location Consequences Test

Description: Testing whether the location has specific consequences for certain types of businesses and as well revenue

ID # 12 - Name: Investment Test

Description: Test whether a player has made back the money they spent

ID # 13 - Name: Reinvestment Test

Description: Test how much money they earn is used on business expenses

ID # 14 - Name: Smooth Test

Description: Test whether the game is reactive and runs easily.

ID # 15 - Name: Player Information Test

Description: Test whether the game is able to display player statistics and information.

ID # 16 - Name: Database Test

Description: Test whether the database updates each players account.

ID # 17 - Name: Gameplay saved

Description: Test to see if user exits the game whether the gameplay so far is saved.

ID # 18 - Name: Data Loaded by region test

Description: Test whether all data is downloaded for a specific user chosen region

ID # 19 - Name: Multi Business Test

Description: Test whether game is able to handle different businesses at once,

ID # 20 - Name: Big Data Test

Description: Test if database can hold 1 million accounts

ID # 21 - Name: Database DeadLock Test

Description: Check to make sure no deadlock occurs, and that accounts are created equally even in the worse case even of at the same time.

ID # 22 - Name: BackUp Test

Description: Test the weekly backups are properly being backed up with all most recent data.

ID # 23 - Name: Bug Report Test

Description: Test bugs reports are sent automatically when something isn't functioning properly.

ID # 24 - Name: Crash Test

Description: Test game failures and user data being saved.

ID # 25 - Name: Patch Test

Description: Test that patches and updates being made 12am-6am are being correctly applied

ID # 26 - Name: Stress DataBase Test

Description: Tests to see the database runs strong for 6 days, 24 hours and isn't showing signs of instability.

ID # 27 - Name: Updates Test

Description: Check regularly with employees of ways that the game could be improved in any aspect.

ID # 28 - Name: Internet Shutdowns Test

Description: Test to see if internet shuts down, the game still functions properly.

ID # 29 - Name: Download on Hold Test

Description: Test if internet is interrupted during download it will resume download correctly.

ID # 30 - Name: Client Update Server

Description: Test after app crash if data was not sent to update with server upon reopening the app it updates the user savedata.

ID # 31 - Name: Age Acceptable Test

Description: Test with random people to see if they believe the game is PG-13 appropriate.

ID # 32 - Name: Play Time Test

Description: Test to see if after 4 hours of playtime alert shows up to warn the player of side effects of playing too long.

ID # 33 - Name: Bug Report Test

Description: Test whether reports are being sent directly to developer.

ID # 34 - Name: Liability Test

Description: Test whether developers have the means to able to patch and support errors quickly.

ID # 35 - Name: Compatible Test

Description: Test whether the game is playable on the IOS/Android device and browsers.

ID # 36 - Name: Multiple Ownership Test

Description: Test whether the game can handle multiple businesses.

ID # 37 - Name: Google API Privacy Test

Description: Clicking on a specific location will not me see their username nor comments.

ID # 38 - Name: Restore Test

Description: Repair option must able to restore the game

ID # 39 - Name: User Interface Test

Description: Test with people of all ages to see if the app is easy to use(understand) interface.

ID # 40 - Name: Game Mechanics Test

Description: Test for improper usage and how it affects the game, the system, and the learning experience.

ID # 41 - Name: Icon Test

Description: Test to see if the help icon functions properly.

ID # 42 - Name: Language Functionality Test

Description: Test game in different game languages and can switch to all languages and keep functioning.

ID # 43 - Name: User Information Test

Description: Test if personalization is available for the account of nickname, picture, account etc.

ID # 44 - Name: Currency Test

Description: Test if different currency is being used depending on where in the world the user desires to play.

ID # 45 - Name: Rules Test

Description: Test to see if game rules exist, if all apply.

ID # 46 - Name: Concepts Test

Description: Test to see if all concepts are able to be read up on, if a concept is not understood in the game.

ID # 47 - Name: Behavior Test

Description: Test for inappropriate behavior or context throughout the game.

ID # 48 - Name: Manual Game Test

Description: Test that pdf manual guide will be attached for every person downloading the game.

ID # 49 - Name: Inappropriate Test

Description: Test for warnings and punishment is working properly in the game.

ID # 50 - Name: Installment Requirement Test

Description: Test for 3 essential components to get the game up and running

ID # 51 - Name: Disability Test

Description: Test to see if text-to-speech feature is available and ready to use. Should be able to talk to the phone and commands will be executed.

ID # 52 - Name: Subtitle Test

Description: Test to see if subtitle are active and working properly.

ID # 53 - Name: Light Test

Description: Test with a random sample (try to find people with sensitive eyes) and see if the lighting hurt their eyes.

ID # 54 - Name: Devices Test

Description: Test if everyday computer functionality exists within random people testing the game.

ID # 55 - Name: Readable Manual Test

Description: Test if manual is readable, clear, and understandable.

ID # 56 - Name: Google API Test

Description: Notify user that API is under maintenance.

ID # 57 - Name: Game Update Test

Description: Notify user that the game is being updated.

ID # 58 - Name: Offensive Content Test

Description: Test to see if people get offended by using the app, the content within it, the gameplay.

ID # 59 - Name: Readable Content Test

Description: Test to see if everything in English is written properly and understood properly.

ID # 60 - Name: Age Qualification Test

Description: Test to see if app qualifies for all age groups by doing a random sample test on people of all age groups.

ID # 61 - Name: Region Statistics Test

Description: Test to make sure regions are not portrayed according to opinions. They may only be portrayed according to statistics.

ID # 62 - Name: Region Fairness Test

Description: Test to see if game adjusts to region, in terms of all rules that go with starting and running a business in that specific region.

ID # 63 - Name: Product ID Test

Description: Valid Product ID Test when contacting to servers.

ID # 64 - Name: Illegal Test

Description: Software checks for any illegal activities.

III Design

22 Design Goals

We want to be able to reduce the amount of load time when getting information about specific locations. The game depends on the map information from map APIs, which may or may not cause lengthy loading times. Reducing the loading time would cause less inconvenience to the users, which would make them more immersed in playing the game. Another goal we want to accomplish is the complexity of enemy AI. we want to have AI that is competent enough to adapt to the changes that the user may due to increase their number of customers. This will bring more challenges to the user and cause them to think about what upgrades and actions they must take in order to better compete with the AI. Lastly, we want to make our UX as friendly as possible for the users. This will require multiple iterations before and after release. With each iteration, we will implement valuable user feedback to help with the UX. We will also use many methods to increase user usability, which includes learnability, efficiency, and safety.

23 Current System Design

There will be no pre-existing system.

24 Proposed System Design

24a Initial System Analysis and Class Identification

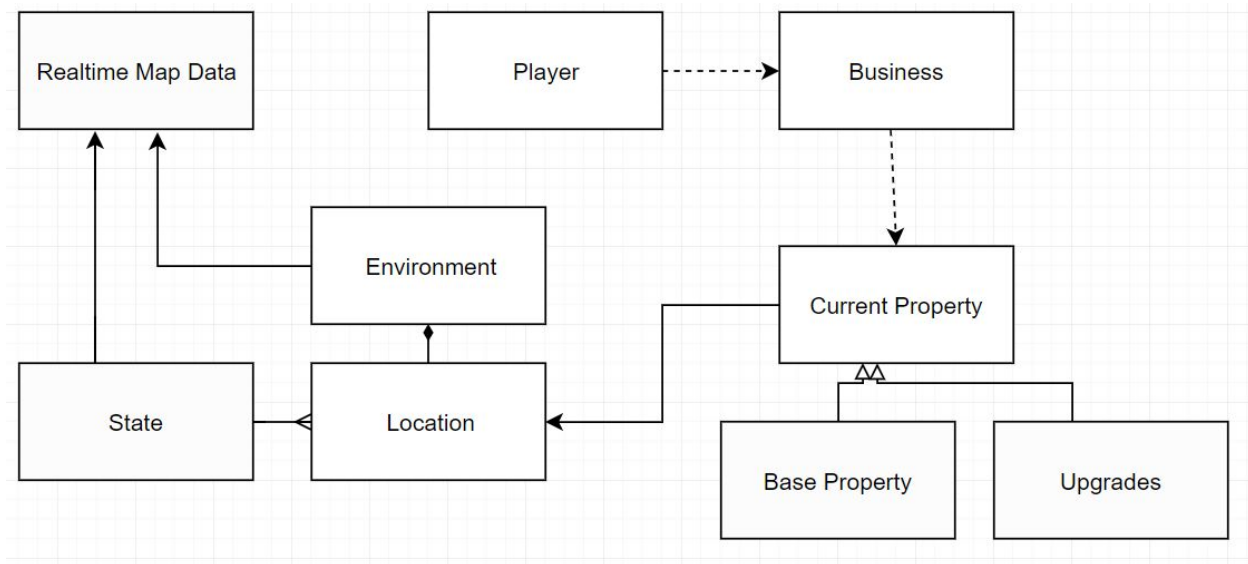


Figure 1.0: Class diagram

24b Dynamic Modelling of Use-Cases

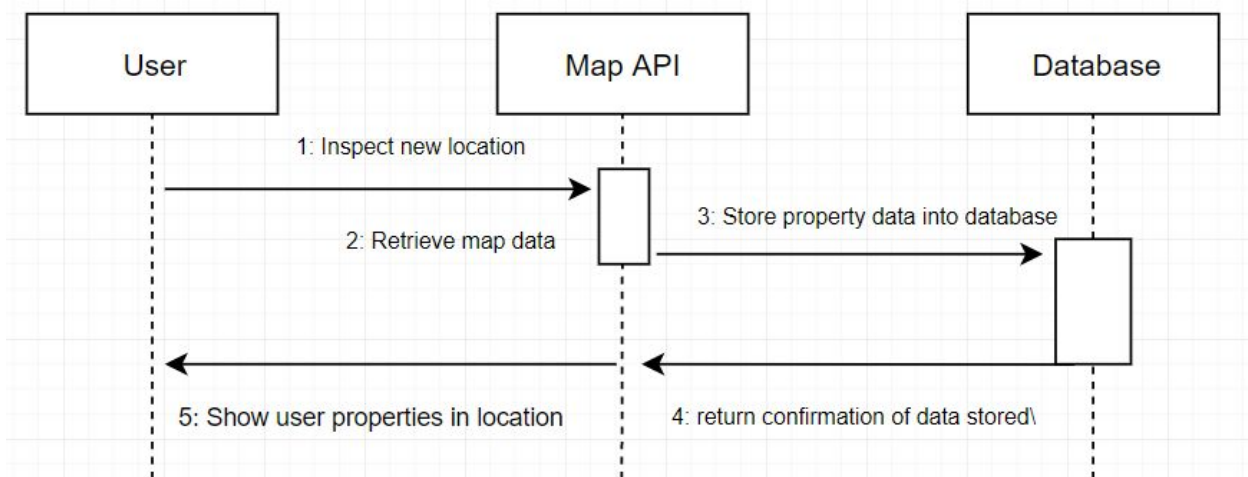


Figure 1.1: Sequence diagram for loading new properties

24c Proposed System Architecture

The software architecture needed for this project would be MVC. This would make the most sense because of the fact that this project is a serious video game. The user would be interacting with the their properties, the world, and and employees through the view. The model would be the various properties that the player can own as well as the environmental properties of certain states, cities, and towns. The controller will allow the user to modify the states of whatever the user sees in the view. An example would be that the user would use the view to see what properties they don't own and then proceed to purchase them, which will be updated and shown in the view for the user.

24d Initial Subsystem Decomposition

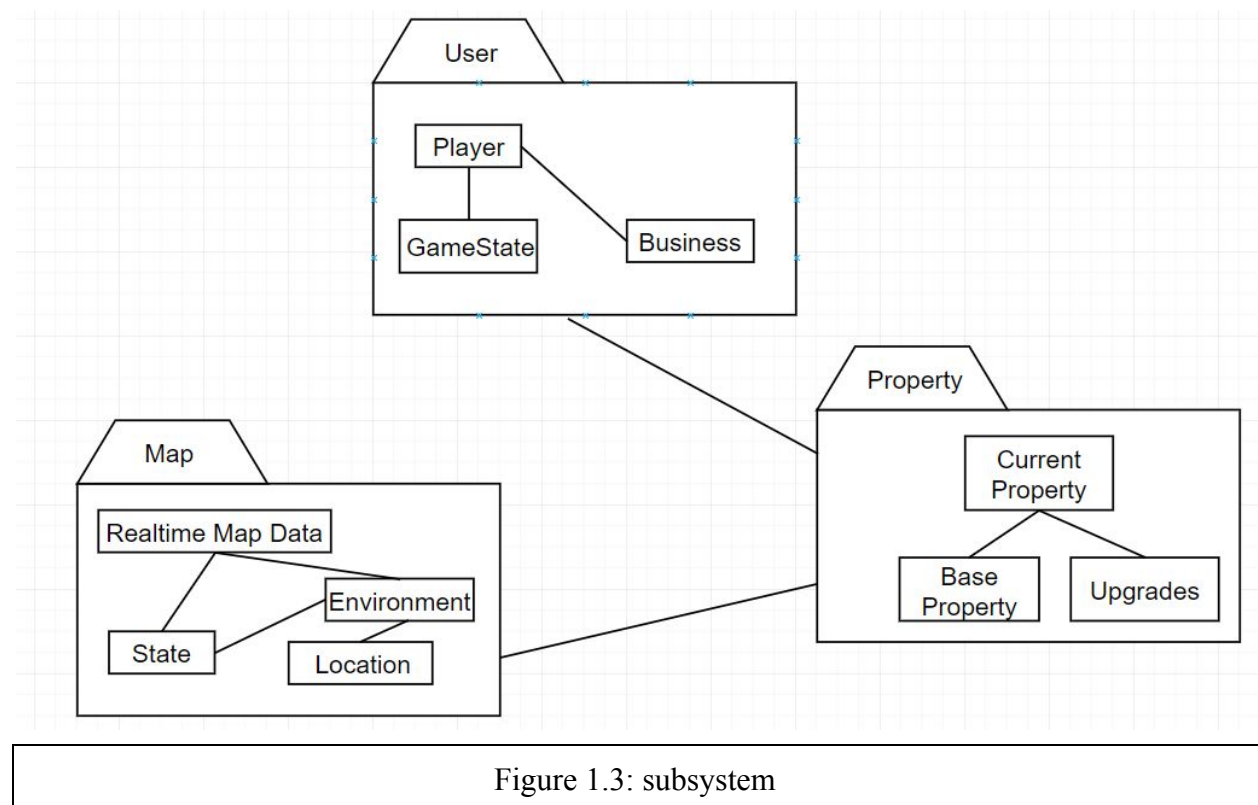


Figure 1.3: subsystem

- The user subsystem will deal with the specific state of the game as well as what type of business the player will have throughout the game. This is also where UI aspects will be shown.
- The map subsystem will deal with gathering the real time data from desired map api and formatting it in such a way that can be used in the game to show properties that the user can buy as well as the environments of the properties.
- the property subsystem will deal with the management of each owned property of the player. each property may have different sets of upgrades leading to many properties

being unique from each other as well as their own revenue and employee satisfaction rating.

25 Additional Design Considerations

An addition, we can include extra interfaces such as having multiple Environment factors going on the map. Assuming that the map information is correct, the environment should be dynamic what is based on the data being represented.

25a Hardware / Software Mapping

The only hardware that we might to occupy is the google-maps-api, and data logistics of each individual country's resources, and environment. So it's up to them to ensure that the servers are working. On our end, we should implement a check whether the servers are online or not. Give information to the user

25b Persistent Data Management

There is an underlying issue where there is a lot of information to be tracked of so the based the easy solution is to have an auto-save functionality implemented. The only things that needs to be tracked of is the business class and the current property class being owned not the data.

25c Access Control and Security

Their shouldn't be any concerns about security issues developing the game because this only playable offline but with real time data. User won't be accessing any other data or storing data in a server. Only information about the game should be stored.

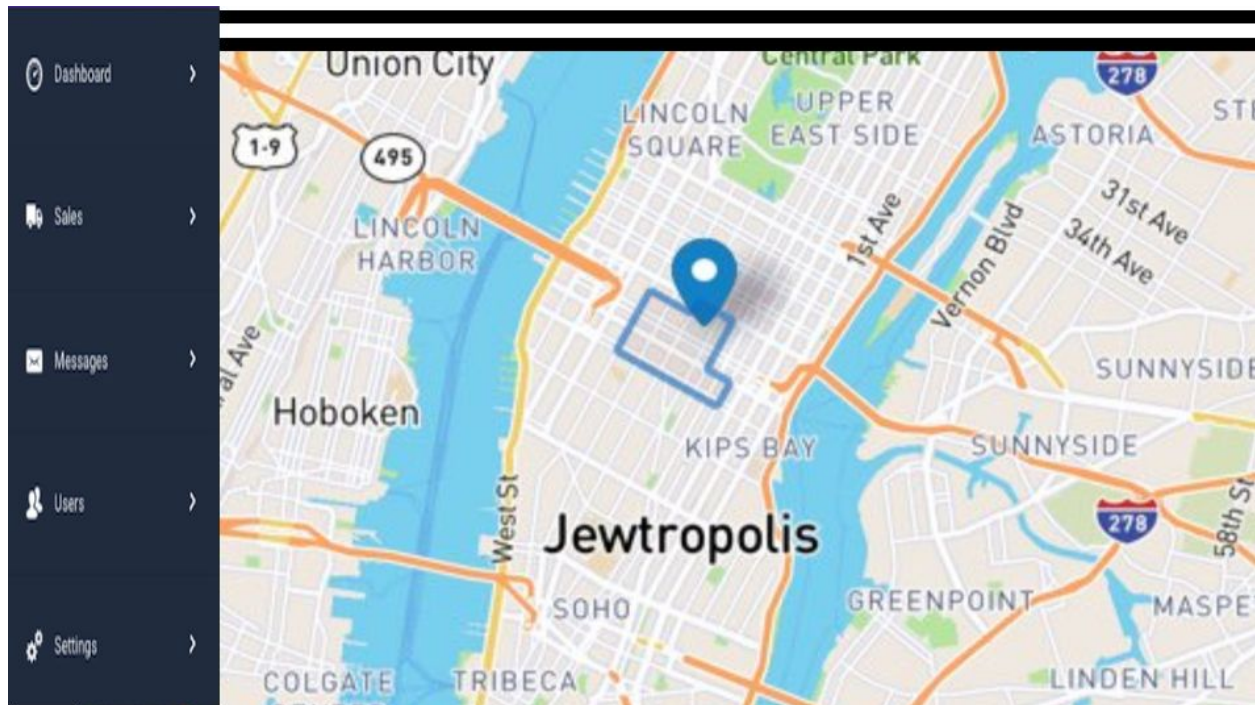
25d Global Software Control

Like stated, any information that is not being sent to the user. Like in Figure 1, the Real Time Map Data class should throw exception to the other classes using this class. This way the user should be notified.

25e Boundary Conditions

Unexpected shutdown should not be a concern because their should be an autosave functionality.

25f User Interface



Assuming that the person has a business already set up, the figure above should give a small representation what the user should see (doesn't have to be exact). The line above should be the stocks of companies surrounding your area (It doesn't not show, but that is the plan). User should be able to click in the area and should be able to see their surroundings as well. Making sure the Google's Api is working. As well as clicking your company and being able to add any new features that you may want.

25g Application of Design Patterns

We presented an UML diagram showing a decorator pattern. The pattern is used for leveling up or have upgrades on your business. Depending on your business, it can have multiple structures of business. It may or not be limited restrictions on the users business; it depends on your location. Other design patterns may be used, but they are not discussed. It's up to the developer to figure out any other design patterns that needed to be implemented.

26 Final System Design

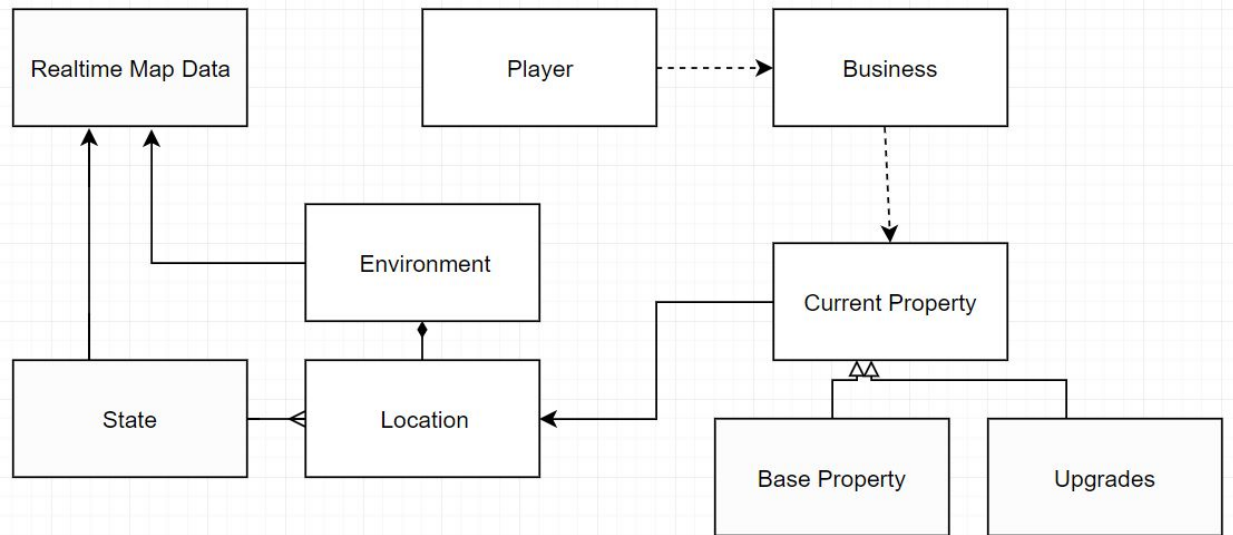


Figure 1.0: Class diagram

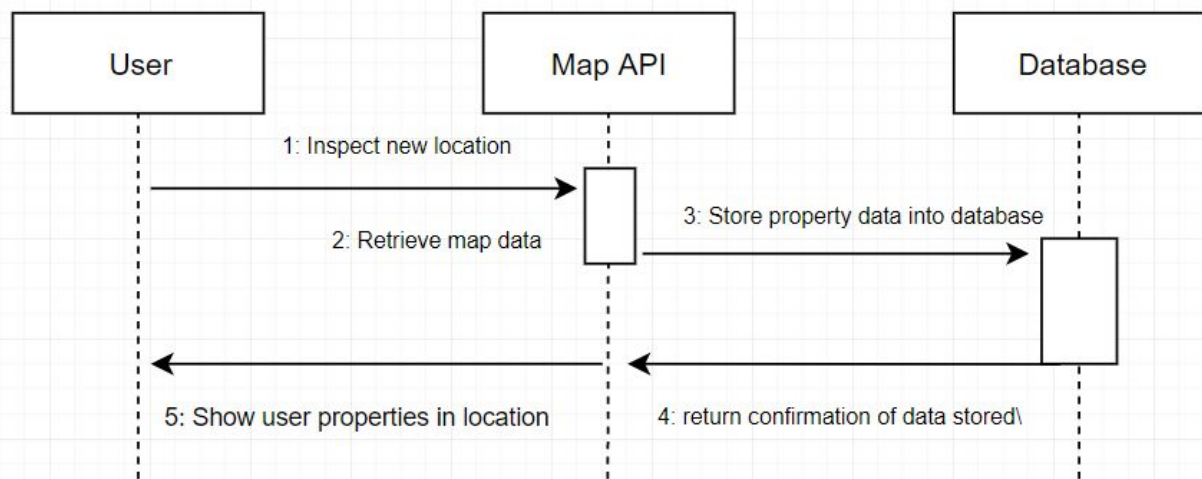
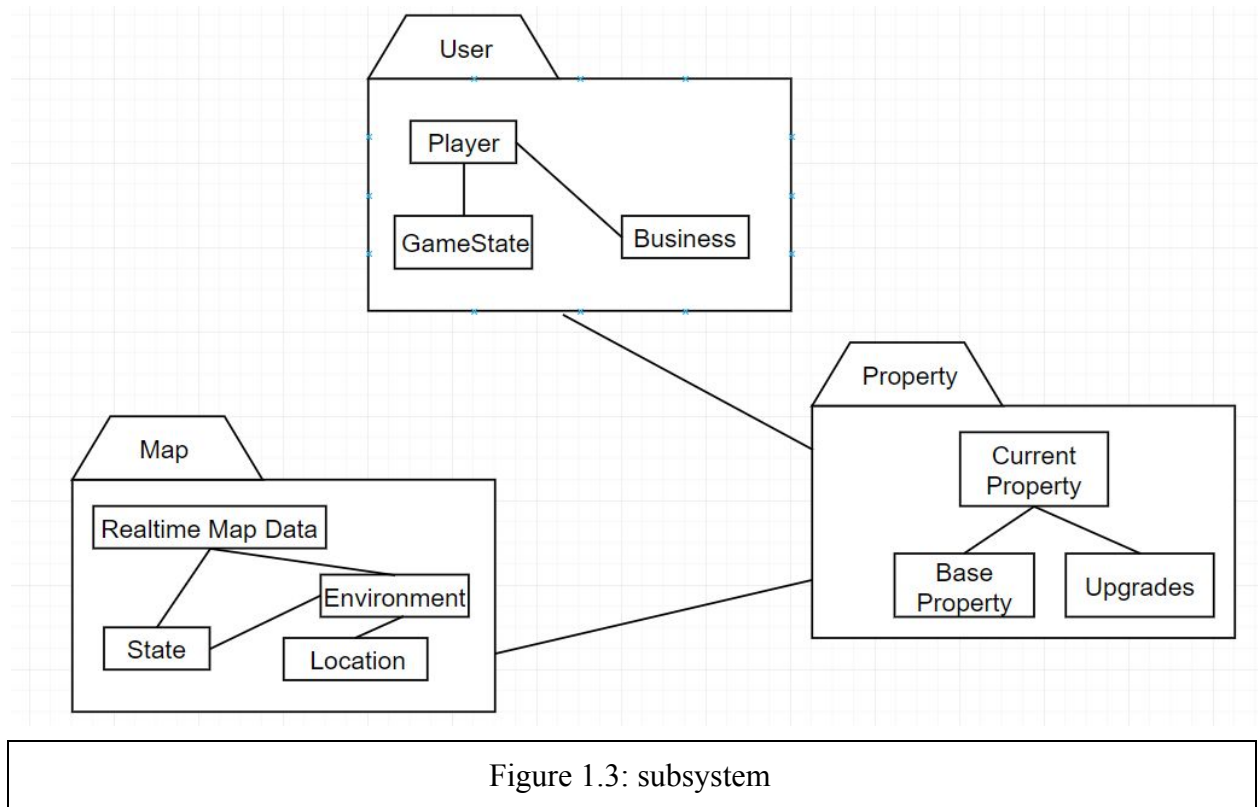


Figure 1.1: Sequence diagram for loading new properties



27 Object Design

27a Packages

Some of the classes and packages include Real-time Map Data, State, Environment, Location, Player, Business, Current Property, Base Property, Upgrades, and Game State.

27b Subsystem I

The User Subsystem for user interaction.

27c Subsystem II

The Property Subsystem for property functionalities.

27d etc.

Some other subsystems include Map Subsystem for real time data.

IV Project Issues

28 Open Issues

Some open ended issues in this project include the multiplayer aspect of the game. We haven't discussed what functionalities multiplayer will have and how it affect the user experience. Another issue we didn't get a chance to resolve would be what to do when the user gets incredibly far in the game and there isn't anything left to do. Another issue we never got a chance to discuss or resolve would be deciding what actually happens when a user ends fails at their start up. We state that certain conditions occur but we never actually define what those conditions are. Another issue we failed to resolve was dealing users who want to start their company in an area that we have not set up yet. Since we want to let users select anywhere in the world, this means that we need to implement conditions for all major parts in the worlds. On a larger scale we don't know how to solve this scalability of the project. These are some of the major issues.

29 Off-the-Shelf Solutions

Pre-existing products/components which we have currently available is business information we can incorporate into our applications. We do not need to rebuild everything from scratch, we can take and incorporate world-wide accepted definitions and flow of starting a business based on talking to people who own multi-millionaire corporations, giving us their synopsis of how they attained it.

29a Ready-Made Products

As a team we can possibly look into simulators that already exist on the market and try to improve and create something better than them, but still using the same concepts(as all the simulations will be using similar business concepts overall). We cannot use same design as other simulators, but we can use the same main idea(main idea) to create a good simulation to improve our app.

29b Reusable Components

There will need to exist different licenses for IDE that will be used to construct the game. Since it is a mobile app game either the team will use Java or Kotlin, using android studio. Kotlin is slowly coming into play so the team might lean more towards that.

29c Products That Can Be Copied

Since there is no past development from our group of engineers, there is so sensible data or code that can be reused. Everything must be created from scratch and make sure we are no copying anybody else's code.

30 New Problems

We need to discover problems fast and deal with them efficiently. We need to develop a new mechanism to detect problems early too. Being able to deal with problems as they arise is ideal for making the game more robust.

30a Effects on the Current Environment

Implementing or updating the systems will have adverse effects on the user experience. For example, the way the user's location is affected by the surrounding areas could change the user experience. Another way the system could affect the working environment could be when the user is determining where to expand their business. Updating the system could change the outcome for the user when selecting where to expand their businesses.

30b Effects on the Installed Systems

There wouldn't be much effects on the hardware systems. However, on software systems there would be effects on the user experience. Many of the new software systems would be extended or update versions of the older systems. Some features could be affected while others could remain the same. For example, the different techniques a user does to increase their profits won't change. However, the way the user expands could be different from the older software systems.

30c Potential User Problems

Users of the new system could feel some effects from the new updates. However, we believe overall that the user experience will be great. The functionalities will still be there and although there would be some new updates, most users will be satisfied. As the system progresses there will be new and newer updates that hopefully enhances user experience.

30d Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

At the moment there aren't any external factors that could limit or inhibit the new product since this is a game meant to be played online with multiple users or one user.

30e Follow-Up Problems

At the moment there are always follow up problems but most of them will appear as the game develops. A follow up problem is how the user will be able to play with multiple users and how the game mechanics would work. Would the player be against opponents in real time? Will there be teams of businesses vs other businesses? or Will this just be a single player game?

31 Migration to the New Product

Not applicable.

32 Risks

- Data Management for all regions- Each region has a different economy and thus each needs to be taken into account
- Figure out how to analyze data from all over the world to correctly adjust to the game and its algorithm
- Make sure people stayed focused on the project
- There are different laws associated with different regions
- Quick games response and fairness
- Different language incorporation

33 Costs

The costs vary depending on what is truly implemented. If our fully functional game is implemented then it would be incredibly expensive in terms of software and development. Given all the requirements and requirements to come when actually developing, it can easily start scaling largely. First off, there would need to be multiple teams of developers to break the program into multiple parts. Second, there would need to be investment into statistical software to examine and analysis player's patterns and see what businesses are profitable in specific areas. We would need at least one team to focus mainly in the statistics of all regional areas that the users can select from. Rounding up all this manpower and hours of developing will create a very large cost. We are talking about in the billions. Our full game implementation will take generations to develop for it be fully functional and operation at efficient rates. Developing this game is not for the faint of heart.

34 Waiting Room

- Adding more businesses than just the standard ones
- 3D view of the map incorporated.
- Multiple database points to get quicker downloads and access.
- Improved security for accounts
- Possibly more and improved job positions for the businesses
- Tough decision making
- Possibly different modes of opening up a business

35 Ideas for Solutions

Some ideas for solutions include being able to let the user play in a multiplayer world or sandbox to let he/she play against other businesses in real life. We would allow the user to be able to see their ranking across the board and how they stand up against other players. Another solution could be to allow users to only select from certain areas instead of selecting any random area. Doing this will allow the software game developers to handle smaller locations and not have to worry about developing every single location that a user can select.

36 Project Retrospective

What worked well for the project was having a full document/description of what the requirements are for a particular section, as well as examples given. Stretching out the section a bit more would be better management, as opposed to assigning a whole Part(I, II, III, IV, V) to be due in about a weeks times. Some sections depending on whether the document pertains to needing those particular section could possibly be taken out.

VI References / Bibliography

[1] M. Fowler, UML Distilled, Third Edition, Boston: Pearson Education, 2004.

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NOTE for Future CS 440 Students:

- Good luck!!
- If you made this far you're amazing! your team will do wonders in 440! We believe!
- Make sure to give Professor Bell a big hug!
- "The smallest bugs teach the greatest lessons"
- "There is beauty in the struggle, ugliness in its success"
- "You are confined only by the walls you build yourself"

