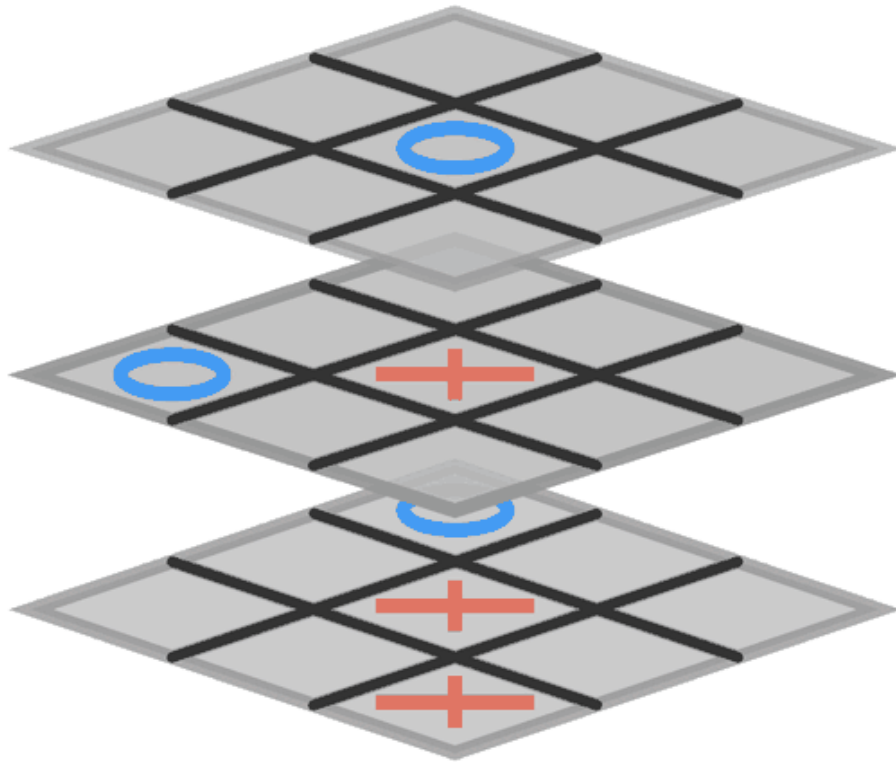


3D TIC TAC TOE



Group 30

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at the

University of Illinois Chicago

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Table of Contents

| | |
|-------------------------------------------------------------|----|
| Project Description..... | 4 |
| Project Overview | 4 |
| The Purpose of the Project..... | 4 |
| The User Business or Background of the Project Effort | 4 |
| Goals of the Project | 4 |
| Measurement | 5 |
| The Scope of the Work | 5 |
| The Current Situation | 5 |
| 4-DCheckers with 3-D Tic Tac Toe. | 5 |
| The Context of the Work | 6 |
| Work Partitioning | 7 |
| Competing Products | 8 |
| The Scope of the Product..... | 8 |
| Scenario Diagram | 9 |
| Product Scenario List | 10 |
| Individual Product Scenarios..... | 10 |
| Stakeholders..... | 12 |
| The Client | 12 |
| The Customer | 12 |
| Hands-On Users of the Product..... | 13 |
| Maintenance Users and Service Technicians | 13 |
| Other Stakeholders | 13 |
| User Participation | 13 |
| Priorities Assigned to Users | 14 |
| Mandated Constraints | 14 |
| Solution Constraints | 14 |
| Implementation Environment of the Current System..... | 15 |
| Partner or Collaborative Applications | 15 |
| Off-the-Shelf Software | 16 |
| Anticipated Workplace Environment | 16 |
| Schedule Constraints | 16 |
| Budget Constraints | 17 |
| Naming Conventions and Definitions..... | 17 |
| Definitions of Key Terms | 17 |
| UML and Other Notation Used in This Document | 18 |
| Data Dictionary for Any Included Models | 19 |

| | |
|--------------------------------------|----|
| Relevant Facts and Assumptions | 19 |
| Facts..... | 19 |
| Assumptions | 20 |

Project Description

Project Overview

3D Tic-Tac-Toe is an extension of the century old game of Tic-Tac-Toe. This game will be available on both mobile software (iOS and Android) and as a website for PC users. Each player will create an account with a unique user ID. This will track their progress in the game and their achievements. The new game will have all the rules from the original game and some more. 3D Tic-Tac-Toe will consist of up-to 4 players with every player trying to win the game before others. The game surface will be in a cube shape resulting in 6 total surfaces where the game can be played. A player needs to win on 2 total surfaces to be considered a winner. The game will have powerups/charms to make the game more exciting. It will be a free-to-play game with players earning or purchasing different power ups and avatars for their gameplay.

The Purpose of the Project

The User Business or Background of the Project Effort

There are experienced fans of the original Tic-Tac-Toe game worldwide. Many adapt to the simple rules of the game and have an interest in gaming at a competitive level to where the stakes are higher and more than just 2 players can be involved. There is always a demand for new games and 'fan favorite' games that have a modern twist to it. We intend to sell this directly to gamers as the gaming industry is a large and growing one.

Goals of the Project

Our 2 primary goals are challenge fans of the original Tic-Tac-Toe game and allow multiple players to be involved. We want to bring a fresh new look to all the fans of the original game with new features, powerups, and perks as you continue your journey on this game. This will create an enjoyable multiplayer atmosphere that is popular in today's modern games as well as including perks that allow your player to improve and be rewarded. Allowing players to have these new features will allow the players to play the refreshed 3D version for a much longer time span than the original 2d tic-tac-toe.

Along with that, we will also be aiming for a good monetary benefit. Through the various in-app purchases users will be able to buy avatars, and different skins. This will help us in gaining profit while the users will be compelled to change up the look. This is a tried and true model that has worked for previous games and will translate to huge profits. The goal is to have a huge spike in the beginning but continue to have consistent improvement.

Measurement

We will measure the use of our product via feedback and reviews given by our customers. As we plan to have our game implemented in the apple store, google play store, and on our website, users will be able to provide real time feedback on the game to express how they are feeling. These ratings out of 5 stars will be a key indicator if our users are truly enjoying the game and all of its features. This data will allow us to determine what features of the game the players like and don't like, as well as informing us on any missing content they would like to have included in the game. After completing a game, the users will see a small pop up on the side that will ask if they wish to provide feedback/review on the game.

The Scope of the Work

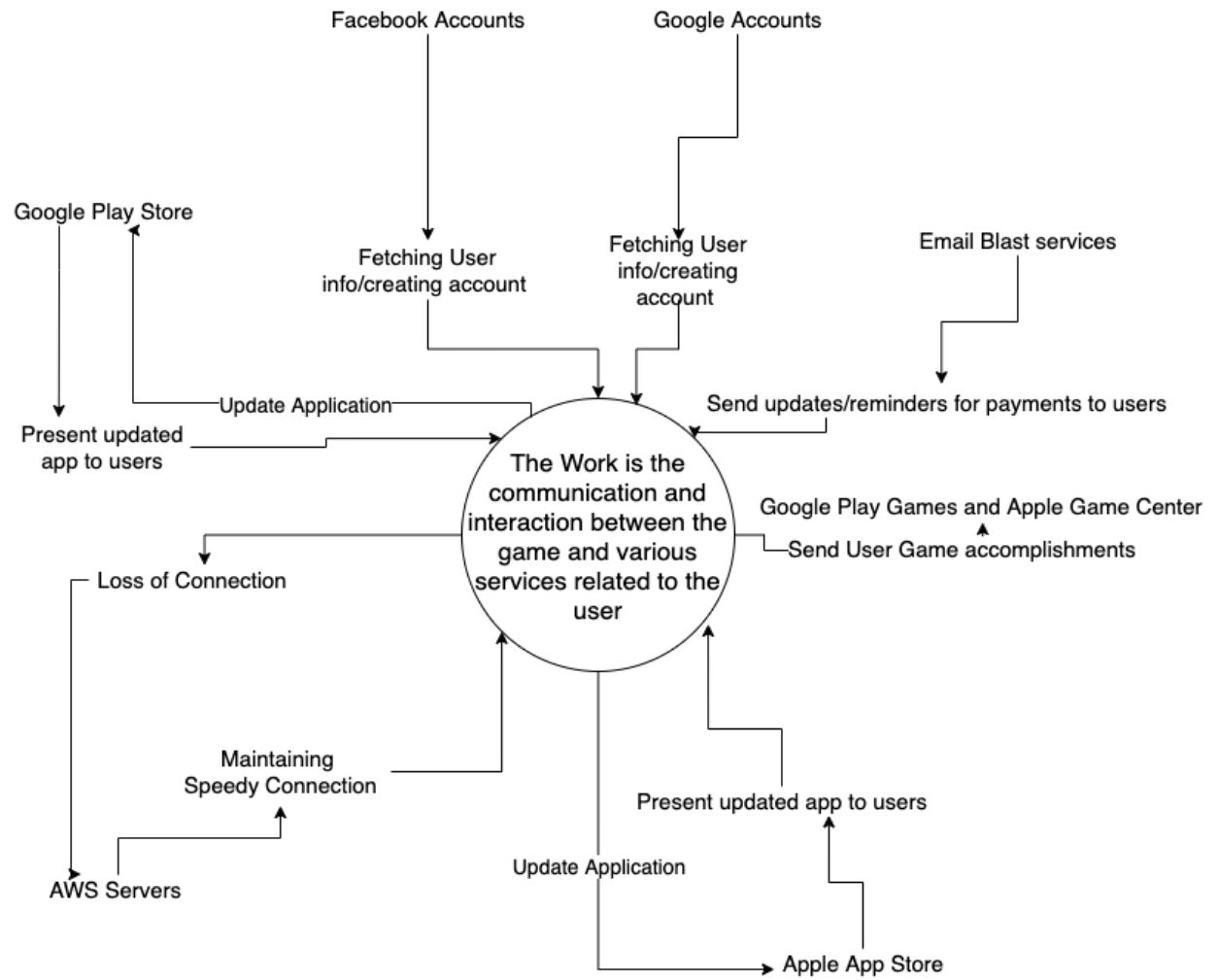
The "work" is the communication and interaction between the game and various services related to the user.

The Current Situation

The client, Board Games 2.0 INC, would like to explore this specific field as they see it having potential. This would build upon their series of n-D games such as 4-DChess and 4-DCheckers with 3-D Tic Tac Toe.

As for the current situation for the game itself, it is simply the basic game that can be played anywhere with pencil and paper. Its origination can be dated back to 1300 BC and yet it has stood against the test of time with children today playing the same game. While there are a multitude of individuals that have created this game, it cannot be attributed to any one single entity.

The Context of the Work



Business Event List

| Event Name | Input and Output | Summary |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1. Update application for Android | Publish updated app to Google Developer Console (out) Allow users to update app on their phone(in) | Update the code with new features, to account for policy change etc. Need to tell Google to update for all |
| 2. Update application for Apple | Publish updated app to Apple Developer (out) Allow users to update app on their phone(in) | Update the code with new features, to account for policy change etc. Need to tell Apple to update for all users |
| 3. Facebook integration with user's Accounts | User profile info (in) | Whenever a user signs in with a Facebook account, will have to re-direct to their website |
| 4. Email Service blast periodically | Send reminder emails for payments/new features (in) | Keep users updated with new features for the game and entice them back in |
| 5. Problem with AWS servers | Report problem of servers (out) Fix problem/find out who's problem it is | Servers needs to stay up 24/7 so problem needs to be fixed quickly |
| 6. Google integration with user's Accounts | User profile info (in)) | Whenever a user signs in with a Google account, will have to re-direct to their website. |
| 7. Update game info to Facebook account for user to share | Send game accomplishments to Facebook (out) | Give the user the ability to share their accomplishments through Facebook |
| 8. Google Play Games and Apple Game Center update to new rankings | Send game accomplishments to Google/Apple (out) | Using Google/Apple services, users can easily compare their accomplishments with their friends |

Competing Products

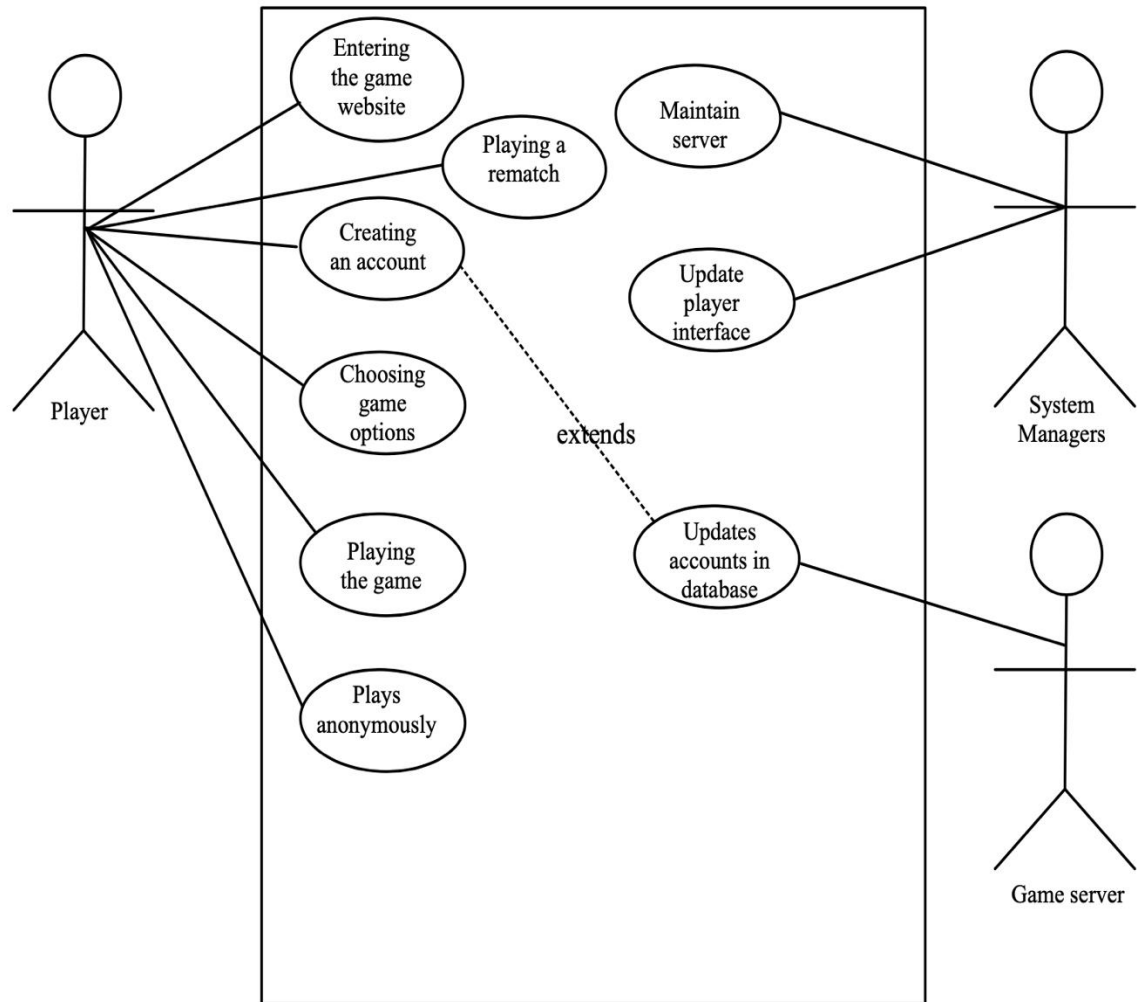
There are different attempts at a game of 3-D Tic Tac Toe but none as elaborate as this one. One simple search comes with multiple examples of these attempts.

However, they are played on various websites with multiple other games and no features for collaboration/competition. It is not a complete experience for the user, rather they are all very basic in nature with subpar graphics. Through various communication features, customization features, and Artificial Intelligence we will be revamping the whole game with a new set of rules while retaining the simplistic foundational nature which made it so enjoyable in the first place. It will give users the experience of a full-fledged game while also challenging themselves to get better at it.

The Scope of the Product

3D Tic-Tac-Toe is a modified version of the traditional 2D game, the proposed product addressed the need of the online game business to be constantly innovating and developing new products, of providing entertainment, bringing the player's community together and encouraging interaction and competition among gamers. 3D Tic-tac-toe would achieve this work by creating a game platform (online, android and iOS Apps) with a front-end interface where user interact with the system and a back-end server that connects the players, runs the games logic, provides AI players, keeps gamers scores, their account info, accomplishments, provides messenger services and system/game help. System maintenance and updates to the game will performed on a schedule by the system managers.

Scenario Diagram



Product Scenario List

| Scenarios | Users |
|------------------------------------------|-----------------|
| Pre-Game Scenarios | |
| 1. Entering the game website | Players |
| 2. Creating an account | Players |
| 3. Playing anonymously (without account) | Players |
| 4. Choosing game options | Players |
| Gameplay Scenarios | |
| 5. Playing the game | Players |
| 6. Playing a rematch | Players |
| Post-game Scenarios | |
| 7. View profile and accomplishments | Players |
| System Maintenance Scenarios | |
| 8. Maintain server | System managers |
| 9. Update player interface | System managers |

Individual Product Scenarios

- Entering the game website:** If Joe want to play online, he will open a web browser and enter the game website address via email invitation or advertised link. The system will serve a welcoming page to Joe with the options to create an account, login or play anonymously. Joe will know that he is in the right page by seeing the company logo and game name.
- Creating an account:** On the welcoming screen Mary will click on create account button, she will be redirected to another screen where she would be asked to enter her name, chosen username, phone number for account recovery(optional),

password, credit card information and billing address(optional) Once Mary enters her information, she will have the option of creating a game avatar. She would have the choice of customizing the avatar's face, body and attire. The game server will add the account to the database and serve Mary with the game lobby screen.

3. **Playing anonymously:** On the welcoming screen Tom will click on the play anonymously button. The server will redirected Tom to the game lobby screen. The game server will automatically generate a username for Tom that he can only use once. Tom would not be able to take advantage of any of achievements or point system of the game. Tom is ready to set his desired game options and start playing.
4. **Choosing game options:** Hana would be presented with the game lobby screen, she would have to set the following options,
 - i. Type of game: Hana could play against other players, or against AI. She could choose to play a ranked tournament, or a practice run.
 - ii. She could play with up to 4 players.
 - iii. Hana must choose a difficulty level between easy, medium, hard or expert. Only on ranked games Hana will earn points. The higher the difficulty the more point the Hana earns. The system would place Hana with other players with similar points and ranking.

Once Hana is finished setting these options, she would be able to start the game by pressing the start game button. The system would start looking for other players depending on her chosen settings and would display to Hana an approximate wait time. Hana would decide if she wants to wait the displayed time or change her options. Once the system finds players with similar settings as Hana, they will be bundle into game group and sent to the gameplay screen.

5. **Playing the game:** Harman is now in the gameplay screen. Harman will see a 3D game board were players can enter their move via the player interface, his score, ranking and power ups. Harman will play according to the game rules. Once Harman wins, he would get his awarded points, badges and avatar options (he would only have these awards if he has a game account) If the system declares a game tie, there would be no awarded points or badges. In both cases Harman would be redirected to the game lobby to start another game or quit.
6. **Playing a rematch:** After the system declares a winner or a tie game Gloria would be redirected to the game lobby screen where she and the other players are bundle as a game group, here Gloria can choose to quit the game group or choose a rematch. If Gloria decides to quit the game but the other players decide to stay the new game would only have the remainder players without Gloria. If she decides to stay in the group and play a rematch, her game group would be redirected to the gameplay screen for another match.

7. **View profile and accomplishments:** On the game lobby webpage Patricia will have a “player profile” button. Once she clicks the button, she would be presented with a pop-up window showing her players statistics composed of the number of games she played, the games she won and lost, her accumulated point, award badges, remaining power charms and game ranking based on her points. Patricia would also see her user id and customized avatar.
8. **Maintain the server:** Hugo a system manager would be required to do a system maintenance once a month. He would schedule the maintenance based in user’s utilization of the system. After Hugo identifies the times where system utilization is below 3% he will schedule a systemwide maintenance. Tina, a player, would be notified via pop up message next time she logs in about the maintenance. During the maintenance no user would be able to log in or play the game. System downtime should not exceed more than two hours and Hugo should schedule it at least 3 weeks in advance. Hugo would be able to maintain the server through the back-end software that he can accesses through the web portal with his username and password.
9. **Update player interface:** Enrique, a system manager, would be able to update the game interface through the back-end software. He will log in the system through the web portal with his username and password. Enrique would then change layouts, colors, graphics and the game UI according to developers’ specifications. Once the updates are completed Hugo will click on a button to update the server. There should not be system downtime for these types of updates. After Hugo completes the updates, they are pushed to the front-end user interface. The next time Tina, a player, logs into the system she would be presented with the new updated UI.

Stakeholders

The Client

The client is our parent company Board Games 2.0 INC (refers as the company). The company is privately own with a market capitalization of 10 million dollars and around 250 employees. The company’s main goal is to develop new games based on old board games augmenting their capabilities with new rules, graphics, gamer interaction and award systems. The company has had great success with 4D chess and 4D checkers growing their business and market capitalization by 100% within the past 5 years. The company develops and releases new games in a two-year schedule. 3D tic-tac-toe is one of the projects for the 2020-2022 development run.

The Customer

3D tic-tac-toe is intended for the online gamers market. In 2010 there were around 1 billion gamers worldwide and in 2020 there are around 4.5 billion. This vast market is composed of persons ranging from the ages of 15 to 54. This year revenues projection for the industry are around \$196 billion. Demand for online board games has increased 10-fold in the past 5 years. These customers are looking for new and traditional games

that have been modified to play online. The most popular and successful games are those that provide the gamers community with competitions and interactions among players as well as rewards and tournaments systems. 3D tic-tac-toe will have all these features and would be updated according to new game trends and technologies.

Hands-On Users of the Product

The main users of the product are our current game platform subscribers and the online gamer community at large. Their main responsibility is to play the game at least once a week, participate in tournaments and interact with other players. These actors must be journeyman of online gaming, be in the 10 to 55 years old bracket and be novice of traditional tic-tac-toe.

Maintenance Users and Service Technicians

System operators and managers will be in charge of deploying the game in the different platforms, of maintaining and updating the system. They are in-house actors with a deep and extensive understanding of the system front and back end (full stack developers) They have worked in close contact with the developing team to understand the game and its functionality. They must have experience in games and product software development.

Other Stakeholders

Sponsor: The company will be sponsoring and promoting the product on their other game platforms.

Testers: There would be a beta testing phase where current users of our other game products will be invited to try and test the game as well as to give feedback.

Business analysts: Our in-house business analyst and game researchers will be providing support and feedback on our competitors and current products success.

Marketing experts: Our in-house marketing will also use the product to advertise new games and product releases.

Legal experts: Our in-house legal team will provide support on the privacy laws and legal framework in the countries where the product will be released.

User Participation

Our research and business analyst team will provide the developers with inside on our current product successes and failures, what has worked vs. what has not. They will also provide the knowledge of the latest trends in game features and player satisfaction. They will provide answers to our questions, what do players look for during gameplay? what kind of interactions? This input will help the development team in their UI and features design.

Current users of our game platforms will provide through our beta releases knowledge of interface prototyping and as well as usability requirements. They will be required to play the game for at least 20 hours.

Priorities Assigned to Users

We identified the following priorities in our users,

- Key users: Current company game platform users and subscribers. Currently our platform has 5.1 million players worldwide.
- Secondary users: The online gamers community, system owners and managers.
- Unimportant users: Any user that is not familiar with online gaming. Users that play the game once or have no knowledge of how to play tic-tac-toe.

Mandated Constraints

These are the non-negotiable necessities of the project in question.

Solution Constraints

Description: The product shall be available on the Google Play Store, Apple App Store, as well as a website

Rationale: There are different cohorts of people in all three of those categories and we want this available to as many people as possible so we will target all three audiences.

Fit Rationale: Consistent design between the two applications on the respective mobile devices, and the same theme applied to the Website. Performance should be similar regardless of the device.

Description: The product shall have full cross-platform capabilities. No matter what device the user is using, they should be able to communicate and interact with other players.

Rationale: One of the most enticing features is to play with friends, so different devices should not be the restricting factor for friends to play with each other

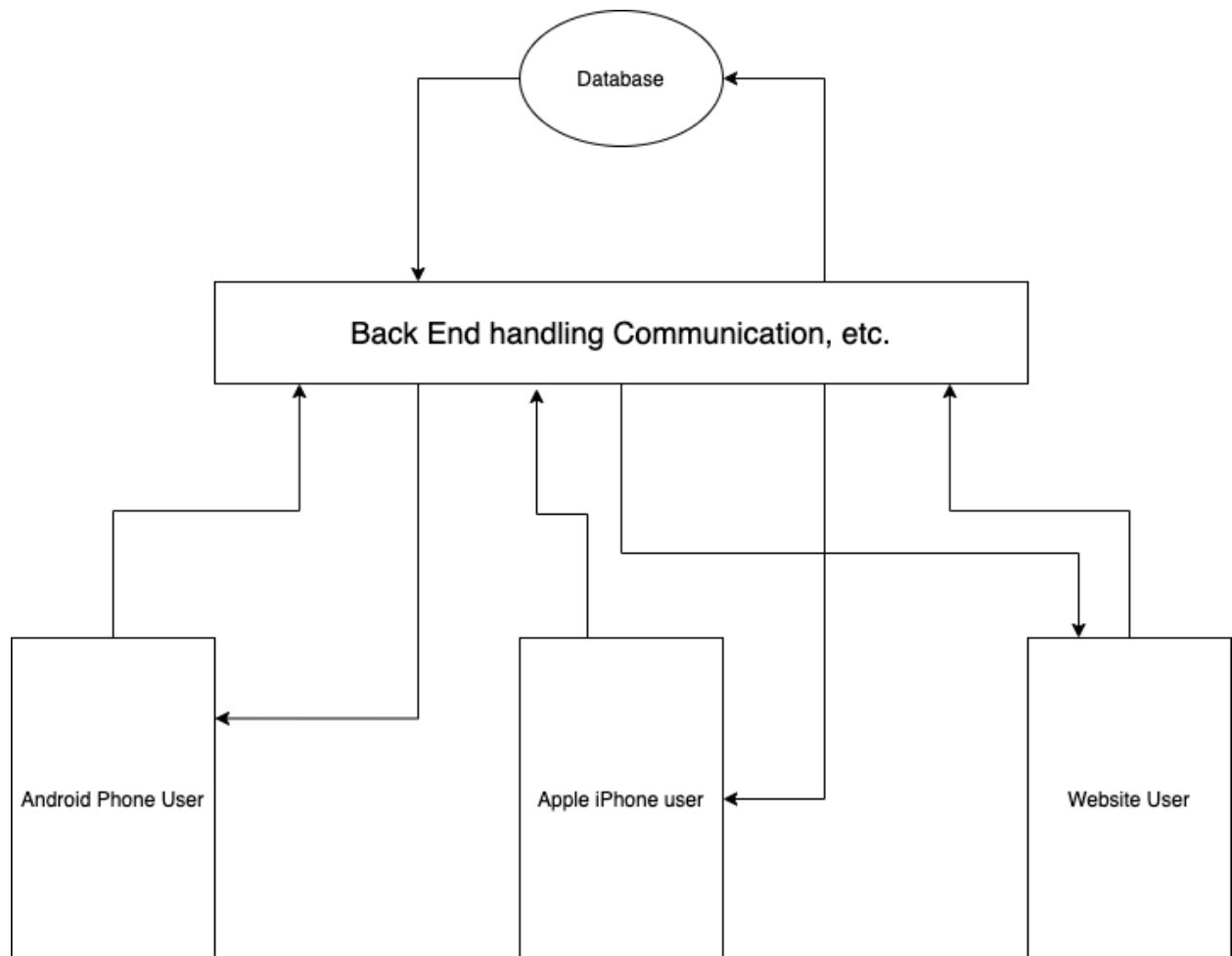
Fit Rationale: Fast connectivity between the three options

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Rationale: One of the most enticing features is to play with friends, so different devices should not be the restricting factor for friends to play with each other

Fit Rationale: Fast connectivity between the three options needs to be the standard, it is unlikely that they will keep on coming back if they have connection issues.

Implementation Environment of the Current System



Users on the different platforms are allowed to communicate with each other and play games together. This requires all of the respective Hardwares to be able to access a common server and share data between each other.

Partner or Collaborative Applications

- Option to export game data to a Microsoft Excel sheet which will show improvement by means of a graph. This allows the user to have access to their statistics and do what they like with it
- Option to share information with the user's available applications
 - Share scores on social media

- Automated text messages to invite other people to play
- Email blast service to keep data organized and send account updates/features update/policy changes
- Work with 4D Chess and 4D Checkers to promote 3D Tic Tac Toe

Off-the-Shelf Software

Google Play Store – It is a necessity for any business creating an application to publish on the Google Play store to give easy access to all the Android users.

Apple App Store – It is a necessity for any business creating an application to publish on the Apple App store to give easy access to all the iPhone users.

AWS Servers – Maintaining user data in a safe place will require the user of Amazon Web Services. They will be retrieved and kept safe through Amazon's services.

Anticipated Workplace Environment

- The messaging of other players should not interfere with the gameplay of a user.
- Any reminders by email should not be frequent such that users think they are spam.
- The product must have simple big and easy directions to help the user navigate
- The product must start off easy to encourage the user to get better at the game
- The product must be visually appealing as that is involved in customer retention

Schedule Constraints

- Window of opportunity: (to take into account)
 - With Corona forcing everybody to spend unprecedented amounts of time in front of a screen, this opportunity needs to be availed. However, the product that is released needs to be top notch and high quality to match the Client's needs
- Deadlines:
 - Initial marketing start: Jan 2021
 - Program sent to testers for functionality: Sept. 2021
 - Hype Buildup/People reviewing the game: Feb 2022

- Release: Jun 2022
- Notes:
 - Important to release in a Summer since the younger demographic will be off from school and have a lot of free time.
 - Need to create a “Hype Train” with marketing, working with influencers, etc. before final release.

Budget Constraints

Total Budget: \$300,000

- Top notch Artificial Intelligent robot. Will need to create a robot based on various models that understands the game and can play it at varying difficulty levels.
- Graphic Designing for logos, and animations for applications/website
- Android and iOS programmers respectively
- Website programmer and designer
- Maintaining server and databases

Naming Conventions and Definitions

Definitions of Key Terms

Users/players are use interchangeable in use cases and they refer to any person that plays the game.

System owners are persons that maintain or update the system from the back-end server.

All terms are used in this document:

Avatar: A player’s customizable character

Rank: The position in hierarchy based on a players wins

Points: Rewarded by completing certain milestones during games

Badges: Rewards granted after reaching a certain number of points

Power-charms: Special abilities a player can use during the game to get an advantage over other competitors

Google Accounts: Any account created through the Gmail service by the user which they have the option to connect to their User account on our platform.

Facebook Accounts: Any account created through the Facebook service by the user which they have the option to connect to their User account on our platform.

Google Play Store: The App store that the application will be published on for users that have Android Phones.

Apple App Store: The App store that the application will be published on for users that have iPhones.

AWS Servers: Servers to hold our data

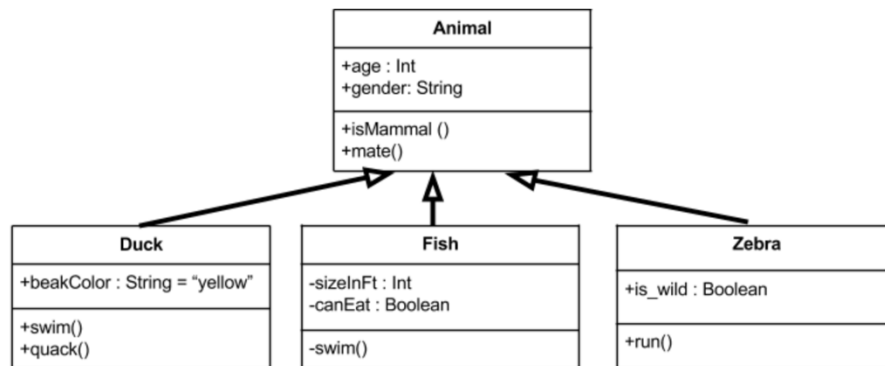
Google Play Games: The social application provided by Google, giving users the ability to compare scores with their friends and get accomplishments.

Apple Game Center: The social application provided by Apple, giving users the ability to compare scores with their friends and get accomplishments.

UML and Other Notation Used in This Document

We will be using the standard UML notations as described in UML Distilled by Martin Fowler. An example UML will be shown below via the Medium article where all basic UML class diagrams elements will be present.

| Class Name |
|----------------------------------------------------|
| Class Attributes/variables |
| Class methods + = public - = private |



Data Dictionary for Any Included Models

Database: Table to store the perks and power-charms that are available in the game. The database will also have the user requests when they perform a certain move in the game.

Cloud: The cloud will be where vital information of the user will reside. This includes usernames/email, password, guest account, and in game purchases. We will also store the information of the latest clothes on the avatar and their gaming record of wins, losses, etc.

Relevant Facts and Assumptions

Facts

Requirements:

The user must agree to the terms and services which will clearly let the user know what type of data is collected. The data collected will not have their personal data except their name, email, and password. We will collect the data that are required to run the game. For example, score, wins, in game purchases, and their rank.

Audience:

There are around 4.5 billion gamers in the world with that number steadily increasing at around 5.9% each year.

Game Economy:

The global market of online gaming is more than 165 million dollars and will reach around 300 million dollars by 2025. Globally, 44 percent of gamers reported they would subscribe to a service, with gamers ages 18-45, aspiring professionals and expert gamers the most interested. Too high pricing and poor performance are the top obstacles to subscribing. Our game is catered towards young audience as well so making it free-to-play with buy ins in the game is more beneficial for the earnings and profits our investors will get.

Assumptions

We are hoping to work on a subscription-based model of the game at the same time which will have everything from the free-to-play model and some more additional features for the enthusiasts. The game will be primarily in English with future works on different languages. We expect the game to be played on Android 5.0 and iOS 13 at the least. 4G, 5G, and Wi-Fi compatibility will be required to connect to our servers to play the game.