

University of Puerto Rico
Mayagüez Campus
Department of Science and Computer Engineering



Team 11 Proposal
INSO 4101: Introduction to Software Engineering
Section: 080
September 17, 2021

1. Informative Part:

1.1 General Information (Name,Place,Date)

- Human Instrumentality
- Mayagüez, Puerto Rico
- September 17, 2021

1.2 Partners

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1.3 Current Situation

The hobby of playing video games is one that has evolved and has impacted many people's lives in the past few decades. The ability to access and play such games from almost any device nowadays gives non-gamers an entry point to such a fun and entertaining hobby. This leads newcomers to the concept of skill-based games. One can argue that games are meant to be competitive by nature, though such an argument leaves non-gamers with a not so entertaining experience which does not correlate with the main purpose of this "supposed-to-be-fun" hobby. Non-gamers at times feel discouraged or lost as to what they can play with their fellow friends or family members. Commonly available competitive skill-based games make it harder for such individuals as these are hard to learn at first. Needing to constantly play to improve or at least have a chance at winning compounds the problem. This results in inexperienced players who've had the need to reallocate time or prioritize other tasks,

feeling that they will be unmatched in such high, skill-based games if they play less frequently. Even though player vs. player games are meant to be competitive, competitiveness should not necessarily require high skill.

1.4 Needs

- The team must understand the current situation and fully define the domain.
- The team will need a way to measure progress throughout the development process.
- Users need a way to enjoy playing video games without being discouraged from the idea that most games have skill as a significant factor that determines the winner.
- Have a space for players to personally select and interact with their game sessions.
- Non-regular gamers should be able to play with friends or family members at any point they want and still have an entertaining and fun experience.
- Users need a way to play such games without the need to download anything or worry about updates that will unabilitate them from playing.

1.5 Ideas

- Gather information about the interests of non-gamers.
- The team should survey the target audience to find interests and game type predilection to broaden the domain knowledge and ensure proper research.
- By documenting and managing time properly the team can ensure that progress is being made.
- An experience that allows a diverse range of players to interact and enjoy a variety of games on equal footing.

- To provide a wide selection of games, playable regardless of skill, with no need for a definite skill set or experience, and no time requirements to become proficient.
- Host a selection of games that do not require high skills or large time investment.
- Replace the skill-based games with other sets of activities, such as ones based on luck or strategy.
- Provide a fun, web-based environment for non gamers to play and allow them to interact with friends and family members without the need of downloading anything on their system.

1.6 Scope

- Games will be implemented and added to a library: a list where players can select the games they'd like to play.
- A profile system that will allow players to become registered users with the following implementations:
 - Customizable accounts
 - Record database of the user's statistics
 - Personalized leaderboard
 - Friend list

1.7 Span

- **Timespan:**
 - August 27, 2021 - Dec 1, 2021 (Approximately 14 weeks)
 - Team topic selection:
 - August 27, 2021
 - Team proposal:
 - September 17, 2021
 - Phase 1 report and demo:
 - October 8, 2021
 - Phase 2 report and demo:

- October 29, 2021
 - Final phase report and demo:
 - December 1, 2021
- Development process:
 - Research will be conducted to further understand the team's domain and make sure one can develop a system that will solve or at the very least help remedy the current situation.
 - The team must decide on a particular list of games that will be implemented into the system-to-be.
 - These will be thoroughly verified and picked depending on the level of skill required, how commonly known these are, entry level skill, et al.
 - They will also be tested in a variety of ways to ensure that they correlate to our needs and ideas (i.e. provide a fun, fair, and entertaining experience to non-gamers).
 - Implementation of the front-end.
 - What the user will see and interact with.
 - Should be understandable as possible for non-gamers and non tech savvy users.
 - Implementation of the back-end.
 - How the system works in the background.
 - Testing to ensure the system works as intended.
 - Deployment of system-to-be for further validation and verification.
 - Updates to the system-to-be depending on user feedback or results from verifications and testing to ensure the system works and helps remedy the problem as stated at first.

- Specific details:
 - The system will be a web app for easy access.
 - Mostly based on 1 vs. 1 games.
 - Will contain luck based games to provide a fun experience rather than a “frustrating” competitive one.
 - For example, Rock-Paper-Scissors is a game that is purely based on luck. The player has an equal chance of winning or losing as it contains a 50% win ratio.
 - Will contain games which require some amount of skill though are commonly known throughout the world.
 - E.g. checkers, tic-tac-toe, and others.
 - To further improve on the skill aspect of games, Players will be matched in a “skill match” fashion on the games mentioned on the last bullet point.
 - I.e. players will be matched by win/lose to make sure that they are paired up equally.

1.8 Synopsis

The project is to research and develop a domain model for games that require less time investments and are not as skill-based. The domain model is expected to cover a number of phenomena such as (i) the time investment: how much time a player is willing to spend on a certain game. (ii) learning curve or skill: the amount of skill required in order to play these games. As new players, Non gamers tend to have the need for simpler games as they do not have a lot of available time to commit to learning and practicing these games. Hence there is a need to provide a

standardization of games that do not require as much skill and time invested. This can be achieved by gathering information regarding the interest of these non gamers, this information can be gathered by surveys or observing the popular type of games among this group. When this information is gained, a platform can be made, one that implements a library of these games and successfully standardizes this market, providing ease of access.

2. Descriptive Part:

2.1 Descriptive Rough Domain Sketches

A college student called Timmy finds himself with a few hours a month available to engage in some casual, entertainment endeavor. Gaming piques his interest but he has a preconceived notion that all gaming requires playing experience and a significant time investment. The prospect of entering some kind of gaming environment is daunting for Timmy, since all gaming websites he knows of are very competitive and he would not be an asset to any team he could join online. He wonders if there were some type of gaming platform or web based application where everyone participating could be on equal footing from the get go. Also, he would prefer to come back at any time and not feel lost or inadequate as a game participant.

- Brainstorming:
 - Attractive environment for non gamers.
 - Wholesome, family oriented, stress free.
 - Search for a variety of games that are non competitive.
 - Beware of brands, copyright issues.
 - Differentiate from boardgamearena.com

- How will monetization/revenue impact design requirements down the line? Re: in-game purchases, ad displays, servers.
- Skill matching players for fairness.
- Can include luck based games.
- To verify the team can check if players that aren't playing as frequently still win as much as those who don't.
- Some of these games can be rock-paper-scissors, tic-tac-toe, connect 4, checkers, and others.
- Games should contain a section which will include clear instructions as to how these games are played.
- Most of these games will be 1 vs. 1, but adding games for more than one player can up the fun factor.
- Tournaments of these games are an option.
- The players should be able to launch private game sessions with their friends / family members.

2.2 Descriptive Domain Narrative

Let us envision an individual whom we shall call a player. This player has created an account, which hosts their custom information and statistics, after they completed their registration in the platform. The player peruses the game selection, which contains an updated set of games under different categories. To play with other players, the player must create a game lobby, which is a virtual room where players can join, and invite all desired players. Once the invited players join in, the player will choose what game everyone will participate in, and a game session starts in the lobby. During this time, players may have the choice to win or end a game if their opponent does not respond or is absent for a set

amount of time after the game starts. Game statistics for each player will be continually updated and players shall be able to rate the games played.

2.3 Domain Terminology

- Game:
 - Software that was created with the purpose of entertainment. Allows its users to give inputs (usually through a controller or keyboard), which allows interaction with the software.
 - Game properties:
 - Genre: Criteria by which games are categorized, they can be searched via filters conforming to the user's preference. Ex. Amount of players, board games, etc.
 - Game mode: A switch that allows users to pick from either a randomized selection of games, or search a specific game.
 - Behavior:
 - Action: Select game mode
 - Event: Game mode is selected
 - Game entities:
 - Player score: Keeps track of the points each player has obtained.
 - Round counter: States the round the players are currently playing.
 - Other game entities: The interactable pieces that compose the game (Example: Cards, Dice, etc).
 - Game library: A set that contains all the games available to play.
 - Behavior:
 - Action: Update Game library
 - Event: Game library is updated

- Player:
 - Potential stakeholder who is currently playing games and receiving a score. Depending on their account they have the privilege of having previous games data stored.
 - Player types:
 - Gamer: A person who has a hobby in playing games, and regularly plays games. They are commonly more experienced than the non-gamers.
 - Non-gamer: Individuals who do not spend a lot of time playing games. These stakeholders are the target audience.
 - Player functions:
 - Log in/Log out: User state x credentials -> user state
 - Register: Player info x credentials -> player info
 - Add/Remove Friend: Player x friends list x friend to be added/removed -> friends list
 - Start game: User state x game selected x position in queue -> user state
 - Create/quit game lobby: Player x user state -> user state
- Player State:
 - Qualities, location and conditions of the player at any given moment during a game session.
 - Player state types:
 - Guest: Anonymous player without an account. They have all the basic privileges, but their data is not stored.

- Registered user: Player with a customizable account and have access to all privileges.
- Account:
 - Hosts the customized information of the user, leaderboard position, statistics, and their profile after they complete their registration.
 - Account elements:
 - Profile: Contains general information about the user, such as the username, picture, game statistics and other features.
 - Leaderboard: List of users that are ranked by the players with the highest scores in a set time. Is personalized according to the user's records.
 - Friend List: List of players that the user has befriended. They can be personally invited to game sessions.
 - Notifications: Messages that inform the users if a match has started or ended, has new games added, and leaderboard notifications, as well as friend invitations.
 - Behavior:
 - Action: Create account profile
 - Event: profile was created
 - Behavior:
 - Action: Update user and leaderboard data
 - Event: User and leaderboard statistics are updated.
- Game Session/Lobby:
 - Refers to a virtual room where players can join, play games together and customize the game experience as per the user's preference.
 - Game session elements:

- Library: Set of games to be categorized by their genres. Can be updated by the following function:
- Update library: Add/remove games available.
- Functions available in game sessions/lobbies:
 - Set timer: Sets an optional timer that allows a user to win or end a game if their opponent does not respond for a set amount of time.
 - Invite players: Player to invite x players in session x game session -> players in session
 - Update statistics: Player's score x (leaderboard -> leaderboard) & (account -> user statistics)
 - Game rating: Allows players to rate their experience within the game session to notify the team about the user's satisfaction.
 - Behavior:
 - Action: Create game lobby
 - Event: Game lobby is created
 - Behavior:
 - Action: Customize and begin game session
 - Event: A game session is customized and started
 - Behavior:
 - Action: Finish game and end session
 - Event: Game session ends
 - Behavior:
 - Action: Players rate game session
 - Event: Game session is rated

2.4 Domain Requirements

- The system must be able to create an account and store the players' profile information.
- The system must allow the user to select a specific game or select a game randomly.
- The system must be able to randomly allow the players to play any of the games in the library.
- The system must allow the user to select any of the specified game modes
- The system must be able to create and host a game lobby.
- The system must have a matchmaking system that matches each player accordingly.
- The system must notify players about the status of their wins and losses.
- The system must allow the player to select any game.

2.5 Interface Requirements

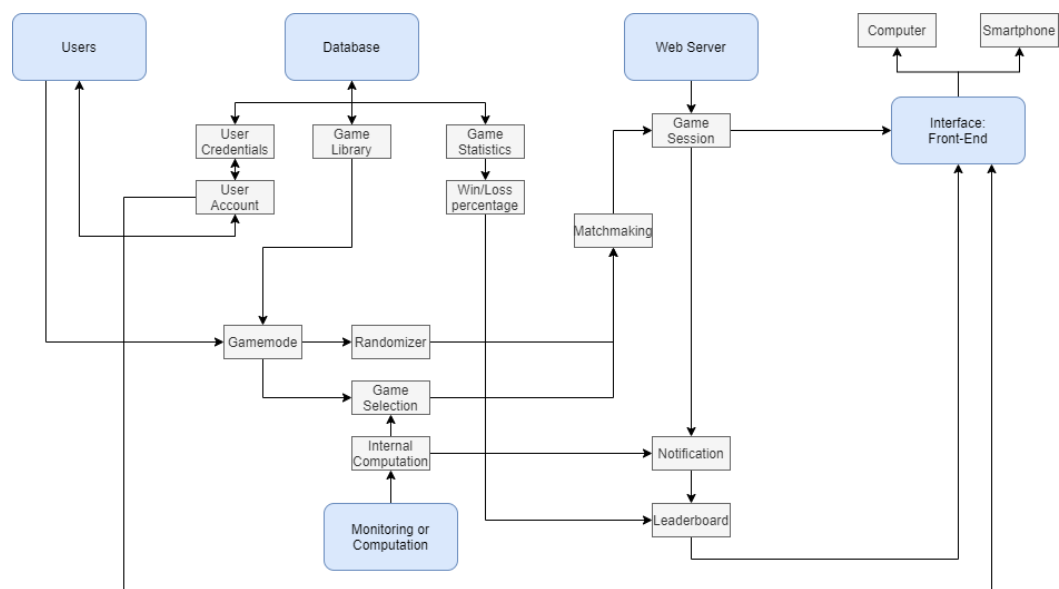
- The system must scale and display properly on any device.
- The system must display all the appropriate information once the player finishes a game.
- The system must display a list of all the top players; as well as their top games and win/lose ratio.
- The system must allow the player to see their profile information.
- The system must display a list of the available games.
- The system must display the leaderboard to players.

2.6 Machine Requirements

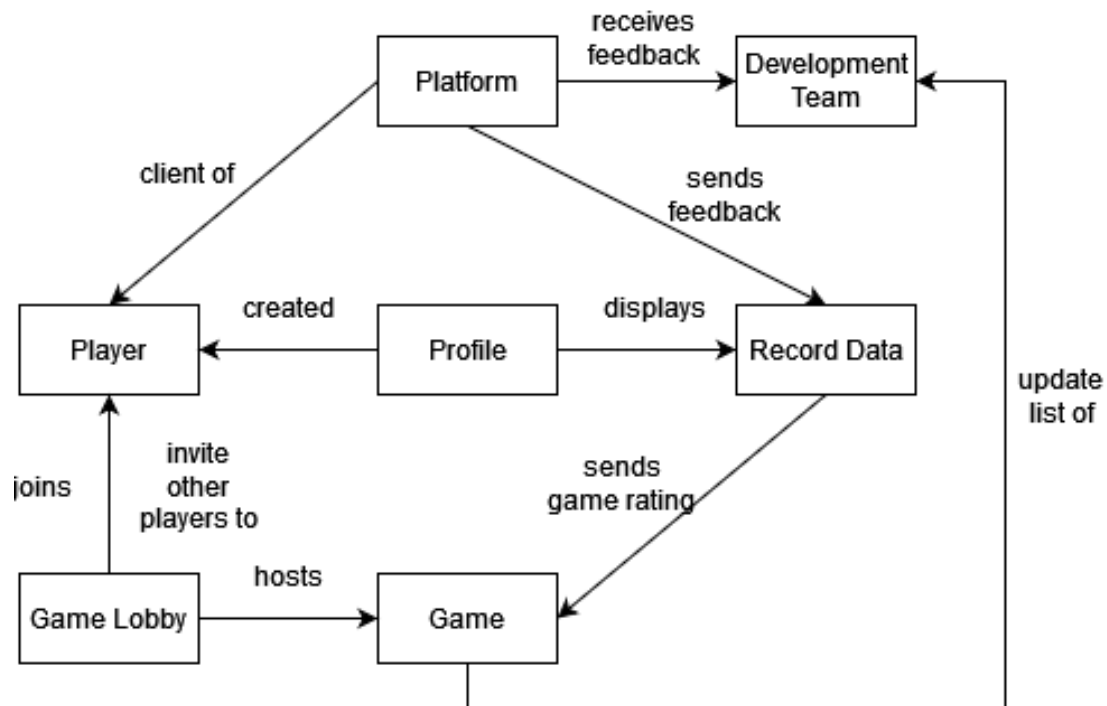
- The system-to-be must have the ability to be used on any web browser without the need of any downloads.

- The system-to-be must be able to handle at least 10,000 users simultaneously.
- The database used must store large amounts of information such as all of the account information from every user with at least 15% of space left.
- The database must be able to send user information and other types of data in at least 500ms.
- The system-to-be must have the ability to allow users from mobile and web browsers with the addition of cross platform.
- System-to-be must be able to connect users in as little time as possible depending on the amount of users in the queue.

2.7 Software Architecture Design



2.8 Software Component Design



2.9 Selected Fragments of Implementation

- We would need to have an enum denoting what administrative level you are at:
 - Guest
 - Can browse/play games
 - Can create game lobbies
 - User
 - Can do everything a guest can do
 - Can register an account
 - Email - String
 - Password - String
 - Username - String
 - Friends - List<User>
 - Games Played - Map<Game, Integer>
 - Games Won - Map<Game, Integer>
 - Games Lost - Map<Game, Integer>

- Admin
 - Can do everything the user can do
 - Can add/remove new games to the tool (new entries)
 - Ban players from being able to participate in future matches
- Notification:
 - Message - String
- Game:
 - Name - String
 - Website URL - URL/String

3. Analytic Part:

1. Concept Analysis

Any players, be them gamers or non-gamers, fall into the category of player for our purposes, since skill is not a characteristic that defines these entities.

One of the main localities a player may find themselves in is a lobby. A game session is a type of virtual room where players are in to play games.

Several actions in the domain are not directly related to the game session: join, invite players, set timer, update statistics and rate game sessions. These could be grouped as administrative actions.

2. Validation

Validation of the future system will be done by all the different parties involved in the project.

- Expert Consultants
 - Provide an expert's opinion and thoughts throughout the project's span.

- The Expert consultants can be divided into
 - Marko Schütz-Schmuck (Professor): Reviews the documentation and proposals and gives his insight.
 - Janilet Rodriguez, Ricardo Velez-Davila(Consultants): Direct consultants on the project, they give feedback on the situation and answer any questions regarding the project.
 - Team members (Project developers): Designers and developers of the project, they compare the finished project relative to the original vision. Validating if it was a success or not.
- Audience:
 - The main target audience can give direct feedback on the games and point out any issues regarding the project.
- End Users:
 - Every player utilizing the app, through a forum they can address any complaints or successes of the application, validating if the project is working.

3. Verification

Throughout the duration of the project, various methods such as A/B testing, unit testing, and model-checking, will be applied to verify if the project is performing as expected. To be more specific, the use of each method will, but is not limited to, be used for the following:

- A/B Testing: A small percentage of users will be given early access to features with the goal of finding out if said feature would be beneficial

to implement for all users. It could be small changes such as whitespace between games in game selection, or new UI features.

- Unit Testing: Make sure that all functions and classes work as intended **individually**, considering all edge cases that come to mind. For example: making sure that, when choosing a random game to play, all games have an equal chance of being chosen, instead of having some games appear more than others.
- Model-Checking: Make sure that all functions and classes work as intended in a big picture sense, working together in tandem, and that all features are fully implemented, and not just partially

To verify that skill is not a huge factor in determining the winner in any of our games, we will verify that all players who have played **more** than x amount of games, where x is a number of our choosing, have similar win/loss ratios for the games they have participated in.

- For a game with a **constant** n number of players, the win-loss ratio **should** be $100/n\%$ for each player.
 - For example, all users who have played Rock-Paper-Scissors **should** have around a 50% win ratio in Rock-Paper-Scissors ($n=2$)
- For a game with an **average** n number of players, the average win-loss ratio should be $100/n\%$ for each player.
 - For example, **assuming each # of players has an equal chance of happening**, the win-loss ratio for Chinese Checkers should be around 25% (average is 4 players)

- We will not measure W/L ratio for 1-player games, as it does not contribute towards the goal of removing the skill cap from **multiplayer** games since there is no competitiveness if you play on your own.
- The frequency of user engagement will serve as another method of verification, meaning a high frequency would imply that there are users being attracted to this concept.
 - For example, if a certain user creates an account and stops playing, it would imply that our concept was not successful.