COMP 504 - Final Project

Hotter = Harder

Kylan Race (ker7) & Fan Lyu (fl17)

Introduction

When designing our game, there were a couple of points we wanted to make sure to address besides the guidelines that were provided in class:

1. Communication must be a central focus point with a punishment for teams that choose to communicate less.
2. Players should have to decide their strategy in a “High-risk / High-reward” fashion.
3. Teams with more players shouldn’t necessarily have the advantage.

We plan on fully implementing our game “Hotter = Harder” with these guiding principles in mind. Over the next few sections, we will go over a brief overview of the game, win conditions, team organization, some important aspects of the game, a few sample strategies, and our design description.

Basic Game Overview

“Hotter = Harder” is a multi-team / multi-player game that rewards communication and punishes silence. During the game, players will be presented with a 3D representation of the earth. Situated all along the planet will be markers that will have a hidden question underneath. The questions will have varying difficulty and, as such, varying point values. The basic idea is that the closer the question is to the globe’s equator, the more difficult the question will be (e.g. “Hotter = Harder”).

Team Organization

For team assignment, we have decided that it would be best to take advantage of the newly added functionality of inviting users to the chatroom (that most API’s have now added) by way of automatic team assignment. After all potential players have joined a lobby (before the start of the game), team members will be automatically split up into teams based on the number of players in the lobby. If there is an odd number of players, that player will get added into one of the existing teams. To adjust for unequal player counts, point values obtained will be scaled based on the number of people on your team (e.g. if you have more people on your team, each question will be worth less). The reason we decided to go with automatic team assignment as opposed to allowing players to pick their teams was as follows:

1. Automatic team assignment encourages communication with people who you may not be familiar with. Not only does this introduce a level of difficulty when it comes to having to communicate with new people, but it also lets players meet new people (which we believe is quite valuable).
2. Automatic team assignment will avoid people “stacking a team” to a degree. Meaning, if multiple students have either 1. a strong working knowledge of the type of questions being asked, or 2. Have played the game before, they won’t be able to join the same team every game. Ideally, the random automatic team assignment should mix up the teams well enough that the same people won’t get matched together many games in a row.

Win Conditions

While there may be many strategies to winning (see the “Strategies” section below), selecting who won is actually pretty straightforward:

1. **Game Timer Runs Out**: If a team has the most points by the end of the game time-limit, they will be declared the winner.
2. **All Questions Get Answered**: If all of the questions on the globe have been answered (though this will be unlikely due to question difficulty and “question answering limit”... see “Important Game Aspects” for more information), then the game will be declared over (even if the game time-limit hasn’t expired) and a winning team will be declared based on which team has the highest points.
3. **The Golden Questions**: The final win condition is a concept that we thought might add an extra level of complexity / strategy to the game. The “Golden Questions” will appear in the game a certain number of times. The golden questions will be thoroughly difficult for the provided question answering time-limit and to actually get the large reward, each team member will have to answer one golden question throughout the course of the game. If this is done successfully, this is an automatic win for the team that does it.

Important Game Aspects

There are a couple of important details about the game that go beyond the “Basic Game Overview” section. They will be listed here.

1. **Game Rounds**: The game, once started, will be split into two main rounds: A Selection Round and a Question Round. Team members will be able to communicate with each other throughout both of these rounds by way of their team chat (either with text or images). These Rounds will be described below:
    a. **Selection Round**: The Selection Round occurs before each Question Round and lasts for 20 seconds. During this time, team members will be required to figure out what question on the map they want to answer (questions won’t be revealed until the start of the Question Round). Each member can select a question during this time period, but they don't have to (however, there are penalties to continuously not answering questions..see below in the “Penalties” section).

Once a question has been selected, it cannot be selected by anyone else during the Selection Round and as such will be disabled for "clicking."

b. **Question Round**: To make the game have a greater sense of urgency, there will be a time-limit for answering each individual question. This will be implemented by setting up what we see as "Question Round." The Question Round will occur after every Selection Round and will last 60 seconds. During the Question Round, each player on each team will have the opportunity answer the question that they initially selected during the Selection Round (if they did select one). There are 3 possible outcomes of the Question Round for the player:
    i. The player answers the question correctly so the question's point value gets added to his/her team's total.
    ii. The player answers the question incorrectly so the question's point value gets subtracted from his/her team's total.
    iii. The player doesn't answer the question at all during the time limit so half of the question's point value gets subtracted from his/her team's total.

    These point values will be scaled based on the number of people on each team, as to make it fair for teams with less members.

    Once a question has been answered correctly, it will be permanently disabled and it will change to the color of whatever team the player that answered it correctly is apart of. If an question is answered incorrectly (or if they player runs out of time), the question will be re-enabled for other user's to select it. It is perfectly acceptable for multiple users of the same team to try the same question over the course of several Question Rounds if no one has answered it correctly at that point.

    This rule is only different for the "Golden Questions" mentioned above. With "Golden Questions" teams will only get a single point for answering each individual Golden Question. However, as mentioned before, if each team member successfully answers a Golden Question, their whole team will automatically win the game.

2. **Penalties**: There are a couple of penalties besides when a question is answered incorrectly (or not within the timelimit):
    a. **Not Answering Questions**: While players can skip rounds without selecting a question, this can prove to be a detriment for a player's team in the long run. This is due to the fact that not selecting anything 3 rounds in a row will deduct half of a player's team's current points. The question that is selected doesn't have to be answered correctly, but players <u>have</u> to at least select/attempt to answer a question once every 3 rounds to avoid this penalty.
    b. **Scaled Point Values**: While we did mention this before, we just want to reiterate this fact. Point values are scaled based on the number of people on each team, so this can be seen as a "penalty" for having the benefit of a larger team. Though, since players can select whether or not they end up on a larger team,

we want to still give them the benefit of being able to attempt more questions during each round (1 per player on the team).

Communication / Strategies

This section will be split into two sub-sections:

1. A communication section that details the necessity of communication in general for this game.
2. A strategy section that details some of the basic strategies that players could employ to work toward victory (though do note that these strategies will be relatively simple, as we don't want to give away all the game's secrets).

Communication

Communication is a key aspect of this game when it comes to creating a winning strategy. It is intertwined with every facet of our game in a couple of ways:

1. **Answering Questions**: In general, the questions will range in difficulty as they get closer to the equator. As such, communication will be important when it comes to actually figuring out the questions. Users will be able to send text and images to each other by way of a team chatroom. Users will be able to share general text, links, and even diagrams that they may find to help answer each other's questions. However, the time-limit will prove to be quite restrictive in regards to what players will be able to look up (especially if each player on the team is handling a question).
2. **Planning Question Selection**: Question selection is very important as only one question can be selected per player, per Question Round. Users must communicate to get an idea of what questions they will go for (high/low values). If one team member plans on focusing on the high-value targets (HVTs), then this needs to be made known to the rest of his/her team. This is because missing a single HVT can negate all of the hard work that other team members put in when focusing the low-value targets (LVTs) due to how the point deductions work (see "Question Round" section above). Besides this, teams will need to keep track of who on their team as skipped multiple rounds. To avoid the skip penalty, players may need to help their teammate who has been skipping to answer a question. Players also may want to change their selection strategy based on the actions of other teams. This
3. **Tracking Golden Questions**: Team will also need to communicate to keep track of the Golden Questions that have been answered successfully by their team members. As mentioned above, each team member has to answer a Golden Question correctly to initiate the win condition. Keep tracking of who answered a question and who hasn't can help team members with making sure which teammate gets the next Golden Question.

Strategies

Each strategy requires some form of communication to organize. Some of the basic strategies that could be employed are as follows:

1. **Think Small**: Teams could focus on only answering the the questions farthest away from the equator. The point gains here would be minimal, but they can definitely add up. This would most likely avoid the surprise of selecting a question that turns out to be quite difficult for the given time-limit.
2. **Think Big**: On the other side of the coin from "Think Small," teams could focus only on the large point value questions using a sort of "High Risk / High Reward" mindset. Obviously this should only be done if the team members are confident enough of their ability to answer the more difficult questions.
3. **A Little Bit of Both**: A mix of the last two strategies could be preferable. This is especially true if a team is trying to adapt their strategy according to how well / poorly other teams are doing.
4. **A "Golden" Focus**: Teams with multiple players have the benefit of being able to spread their members around. This is also true when it comes to how to deal with the Golden Question. Teams could possibly organize themselves so that one person of their team is always on the lookout for the Golden Question. This is a viable strategy as when a Golden Question does actually pop up, the first person to select it gets the chance to answer it, while other players (on other teams) do not. As such, players must be quick if they want to get a chance to earn a part of that 3rd win condition.

Implementation Description

As per our implementation details, we plan on using HW08 as a major part of our game. In fact, up until the game has been sent to the users, the application itself will look very similar to a HW08 ChatApp. This is because even the lobby that we plan on using is simply a Chatroom that users will wait to receive the game in.

As stated in the "Team Organization" section above players will be automatically assigned to their teams. We plan on taking advantage of the added functionality of IUsers being able to receive messages (going by GroupE's API and several other groups') to handle these "team invitations." The idea is very similar to users simply joining rooms. However, the difference is that one is a Host telling a user that they will be in a specific team, while the other is a user requesting for a list of available teams, and joining the one they like.

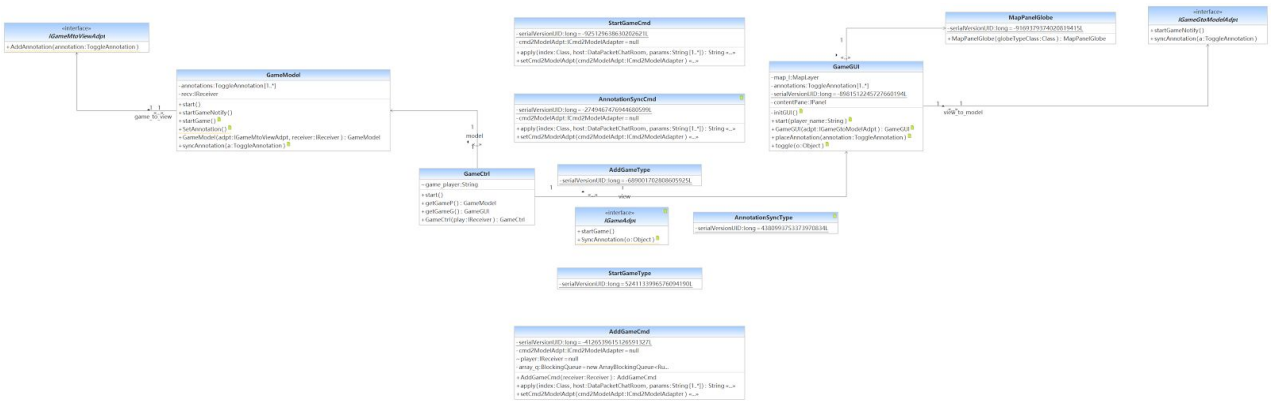
Our game itself will be based on a Peer-to-Peer architecture. The main reason we chose this was because it made the most sense to us, coming from working on the development of a Peer-to-Peer network API. At least for our implementation, we don't see a need of implementing a wholly separate server and client for running the game.

For allowing the use of inter-command communication, the MixedDataDictionary works perfectly. We have tested this already by adding an adapter (IGameAdpt) that can then be added to the command that handles the initial sending (and building) of the game MVC (AddGameCmd). From here we were able to add actions like syncing the starting of a game (StartGameCmd) and the clicking of annotations (AnnotationSyncCmd) so far (of course we will be adding more as we develop the game). In regards to Group E, this was done with the “MixedDataAdd()” and “MixedDataPull()”. Though most other groups have something that is the equivalent of this so it should be relatively easy to convert over should our API not win. We are trying different things, but our current implementation uses an ArrayBlockingQueue for storing these runnable events that are then run in turn.

As we add more to the game, we plan on using the same methods above for doing things like syncing timers and making visible annotations (like the Golden Question) to certain users but not others.

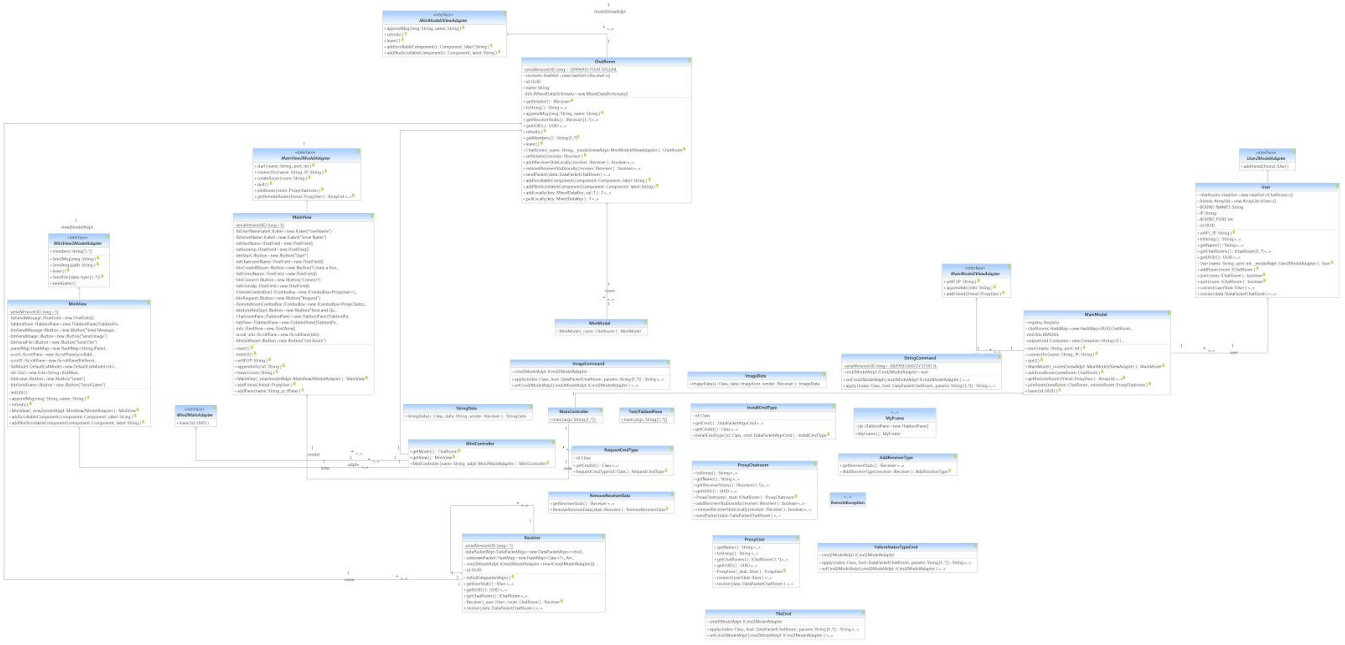
UML Diagram

Game Application Diagram



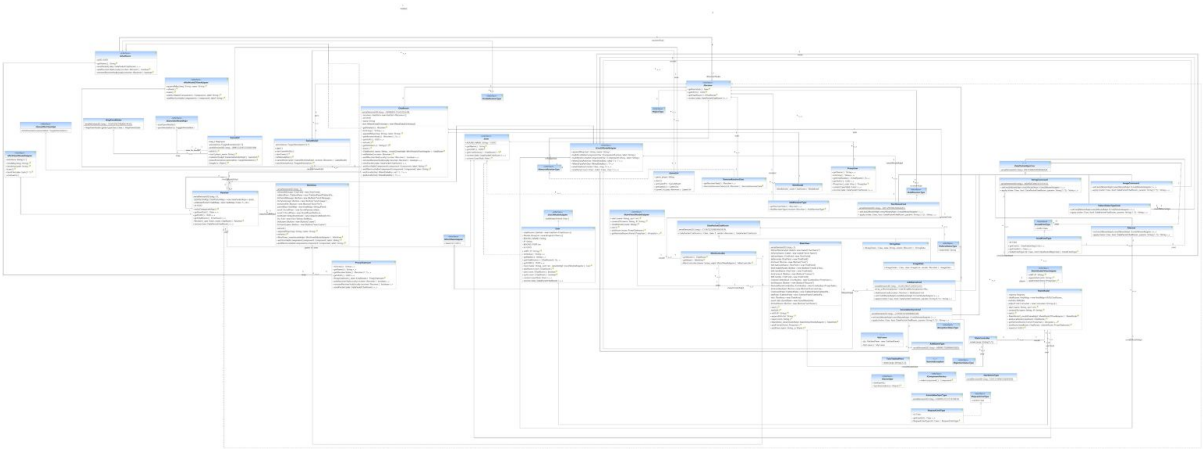
[Click to see Game Application Diagram]

Chat Application Diagram



[Click to see Chat Application Diagram]

Diagram for Final Milestone 1



[Click to see Diagram for Final Milestone1]