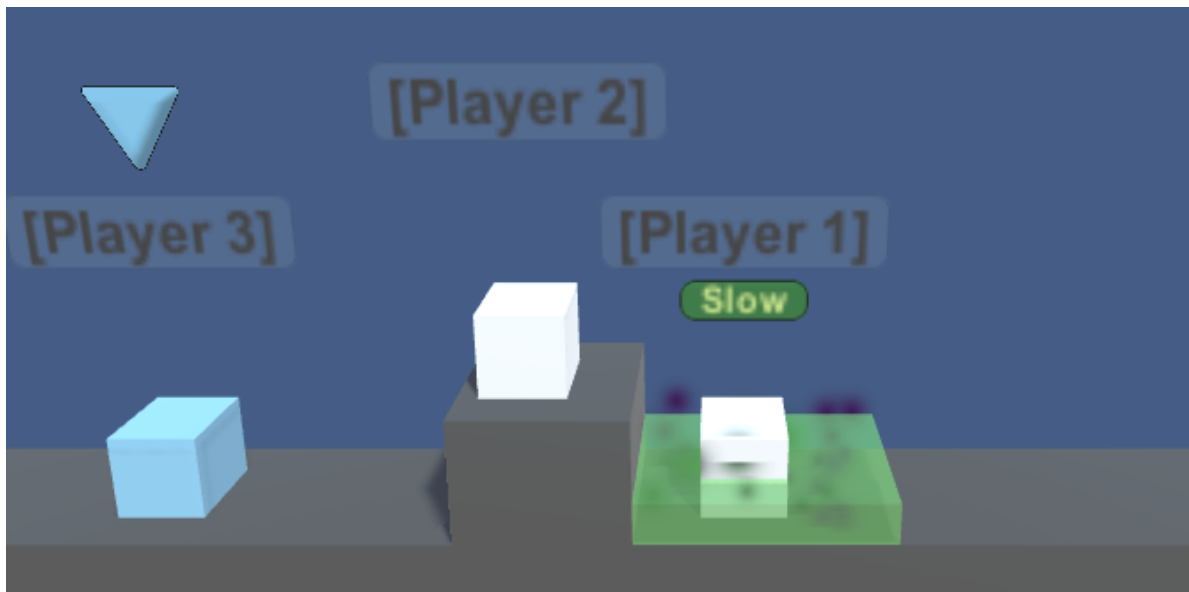


# ISA

Network programming



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## Beginning (april - july 2019)

After reading the important parts (for my project) of the Unity Documentations, where I skipped the less important parts to save time, I tried to do the tutorial given by Unity themselves. However I came to the discovery that these were removed. Unity was removing the HLAPI to replace it with a new system, a system which didn't have an official tutorial yet. I tried to look up for more information about the new system and find alternative tutorials on youtube. Unfortunately it was very hard to find anything when I started, so I decided to stick with the HLAPI first. I decided to raise my basic knowledge with the old system and study the new system another time.

I finally began to work on my game after I gathered enough information to get started. For this I had to work with Unity 2018 as HLAPI was already removed from Unity 2019.

When I started, I ran into problems immediately. I was unable to add the scenes to the lobby manager but this was resolved by adding them to the build first. I also had a lot of problems with the lobby player. I wanted them to be visible but this resulted in the game having duplicate characters for each player, a lobby player and an in-game player. I tried to figure out a way to remove the lobby player or to use only one of the two player types but this wasn't possible. After my research for this problem, I learnt that the lobby player is used to maintain the connection. I decided to change the lobby player to an empty GameObject with only network identity and network lobby player components attached.

Finally I was able to connect two local clients and have one character model visible for each player. They also were able to move independently and sync to each other's client.

To differentiate the player's character from others, I made the local player a different color from the other players as well as adding an arrow above it. Additionally I also gave the players names to state above them, E.g. "[Player 1], [Player 2]". However, placing and syncing the name didn't come without problems. I spent about three hours figuring out how this can be done nicely. I had problems getting the names in sync on the multiple clients and to have the name match with the player number. In the end I managed to get it working on one client while on the server client the name of the client wouldn't update. Just when I was about to complain to a friend about not understanding my problem, I realized a possible reason: "The names get updated before the client player on the host is loaded." I ran some debugs and figured out this was indeed the case. I fixed my problem by adding a coroutine which loops until all players are connected, and then assign the names.

The next problem for the players is that both players take the client camera, instead of each their own camera. To fix this problem, I disabled the camera in the prefab and enabled it in the code on the player who controls it.

Making the level and obstacles was just about the same as any normal game so I didn't struggle as much on this part.

## Finishing up (jun - aug 2023)

Finally came around to finish this project that has been left untouched for a few years. Everytime I tried to continue on this project I just either just didn't have the time because of other homework or couldn't find the motivation because it's been so many years. I had a hard time getting started as I couldn't remember where I left off and what I was doing. I had to collect all my notes and read through all the existing code. This made me realize how important comments are, which I already knew but being directly affected by the lack thereof makes it all the more clearer.

Working on such an old project also made me realize how much I've grown in the past few years as my old code felt like one big mess. For some odd reason I even had most of the code in one script, which I split up when I cleaned most of the old code. It did help to gain a bit more motivation when I realized my growth after I always thought I didn't really learn that much. However networking is still a bit difficult for me and it made me realize that this just might not be my thing, which in itself is valuable to learn.

I struggled a lot through the whole process and spent a lot of time on looking things up and trying things that didn't work. Due to time constraints I had to sadly scrap a few extras that had nothing to do with the code, like music or art. Since the main purpose of this project was to work on my programming skills.

However I still ran short on time so I also had to abandon the idea of making a chat system as it proved to be too difficult for me. As well as having to alter my leaderboard system. I hoped to have a real time leaderboard that updates which player is the closest to the finish line, but in the end decided to make a leaderboard who finished instead.

When I thought I finally finished everything I noticed I ran into a small problem with the finish screen as well. Instead of it showing up to only the player who finished, it would show up for every player. I added many debug checks to locate the problem and couldn't figure it out at first until I realized I forgot an important part. All I had to do to solve my problem was to add an extra check to see whether the finishing player was the localplayer.

## Conclusion

When I started this project, the topic was still a bit too difficult for me. It was hard for me to fully understand what I was doing and I had to scrap a lot of my ideas either because I couldn't figure it out or because there simply was no time for it. And it still remains a bit hard for me at this date.

It also didn't help that I neglected the project for many years as I struggled with motivation and other homework. The longer I waited, the harder it became to pick it up again and every time I tried to pick it back up I had to look through my code and notes to remember what I was doing. This caused me to lose a lot of time and caused me to struggle to continue.

That being said, the topic interested me a lot and by stepping out of my comfort zone I learnt a lot. It is too bad that the system I worked with, has already been removed from the newer versions of unity. However, the experience I got is still valuable.

If I decide to continue with a similar project in the future, I will research the new unity network systems and will surely try to make a chat system happen. I probably want to try to make an open lobby as well where characters can freely move in a small confined space. If a text chat is still too hard, I could try to make an emoticon communication system first. Where the player can select from a few emoticons to express their feelings. If i were to make a race type multiplayer game again in the future, I want to add a real time leaderboard as well. Which I'd probably make with a dictionary and Linq but I'll have to see when the time comes.

## PMI

### Plus

Being able to work on a project of choice was really enjoyable. It makes it easier to be creative and focus on what you want to learn. I am glad I was able to finish this in the end.

### Min

Choosing a project of which I later figured out we would get a class later in the 2nd year lowered the motivation for a long time. At first when I failed to finish it in the first year, I chose to just wait it out until the class started so I could work on both at the same time. But then the class was a bit different so I ended up waiting longer and longer and it kept making it harder to continue. Next time I should finish a project earlier or start over with a new project.

### Interesting

It was interesting to learn more about programming with networking as I always was a fan of multiplayer games since highschool. However, doing this project I learnt that I don't quite enjoy making them as much as playing them which in itself was a valuable lesson as well.




## Hours spent

I first spent 9 and a half hours looking up information before starting. After which I already used about 20 to 25 hours to work on the game back in 2019 along with about 2 hours on the documentation and maybe an hour or two on bug fixing.

After starting the project back up I first had to waste about 5 hours to get started back in the process. Looking through my old code and notes and testing the part that was done and figuring out what to work on to finish the project. Afterwards I spent about 8 to 10 hours finishing the last things I wanted to add and in total about 3 to 4 hours on bug fixing. Finishing off the documentation took another 4 hours extra.

So in total I spent about 32 to 38 hours back in 2019 and another 20 to 23 hours this year in 2023

## Sources

- [Unity - Manual](#)
-  Unity 5.5 Tutorial for UNET (HLAPI) Lobby - Quickstart and Flow
-  Addressing HLAPI / LLAPI UNet deprecation for Network Transport
-  Connected Games: Building real-time multiplayer games with Unity and Google...
- [\[YouTube Playlist\] Simple Multiplayer Game - Unity 5.3](#)
- [\[YouTube Playlist\] GTGD S1 Multiplayer Tutorial Unity 2017](#)