Networking Documentation

My game is a top-down 2D shooter, think Space Invaders. The main goal is to reach as high of a score as possible in the allotted time by killing the enemies that spawn in at random intervals (between 1 and 4 seconds), and after the allotted time you get shown your score.

I implemented a **timer**, **chat**, player **movement**, player **shooting**, and **score system** for the game.
The timer works by taking a network variable float that decides the time the player(s) have to get the highest score possible, and it reduces the time by removing Time.deltatime every update, and since the time left is a network variable it checks every time the value gets changed and then updates the text on screen. Then when the timer reaches 0 (or less than 0) it stops the timer and calls a function that stops enemy spawning and tells the UI to switch to the final score UI. The player(s) and enemies also have a functionality that checks if the time left is equal to or less than 0, and then despawns them if it's true.
The chat functions by having an input field that when the player presses enter calls a function that takes the text entered and sends it to the server, and then to everyone with an update to the Chat text on screen.
Player movement is implemented with Unity's input system & the move input is sent to the server. The movement is synchronized with the help of Unity's Network Transform & Network Object components. **The shooting** is also implemented with the input system. When the player shoots it spawns the projectile with the Spawn function on its network object. The projectile has its own script that, when it's spawned, applies a velocity to its rigidbody2D, and then whenever it enters a trigger it checks if it's the enemy, and if it is then tells the enemy to take damage and destroys the projectile by despawning it.
The Score system is built into the UI system that gets a call from when an enemy dies that then sends that to a function in the UI which adds the points to the score and updates it for everyone by an update on the screen.

One of the few big struggles I had was with the projectiles hitting the enemies, spending a while on trying to fix it and debug it. Got help from teacher but even then not a lot of progress was made until I randomly found the cause of the issue. And it turned out to be an issue caused by the Network Rigidbody2D. What was happening was that it made the Rigidbody2D on both the enemy and projectile Kinematic instead of dynamic, thus not letting them trigger each other with collisions. The 2 solutions I thought of was to either force the rigidbody2D into dynamic in their respective scripts, or disable the network rigidbody2D so the changing wouldn't happen in the first place. I ended up going with disabling the network Rigidbody2D.
Another issue I stumbled upon was the fact that when the player gets spawned it's at 0,0,0 and I tried to spawn it closer to the bottom of the screen by settings it's transform on Start, Awake, and OnEnable but nothing worked for me, whether that be because I did something wrong programming wise or it just doesn't work like that with networking I don't know. But I resolved it by simply moving the camera up to make it look like the player doesn't spawn at 0,0,0.
Most small issues, like not knowing how to efficiently optimize and deal with latency,

stems from not working a lot with networking before this so naturally I will struggle with those things.

Reflecting on this whole process I feel like I definitely could do better with most things. Some things are because I am still learning programming, so I don't know the best way to do everything, and some things are because I am rusty with Unity, especially since we've worked with Unreal a lot recently, so a lot of Unity proficiency got slowly lost as I was learning Unreal and how to work in Unreal. Switching between engines I feel will have that happen, especially when still in a learning phase. Having a teacher guide us through the basics of networking in Unity has been a real help, especially as before this course I always feared networking but now I don't really fear it as much and feel as if it's a concept I can at least fundamentally grasp and am interested in learning more about it.