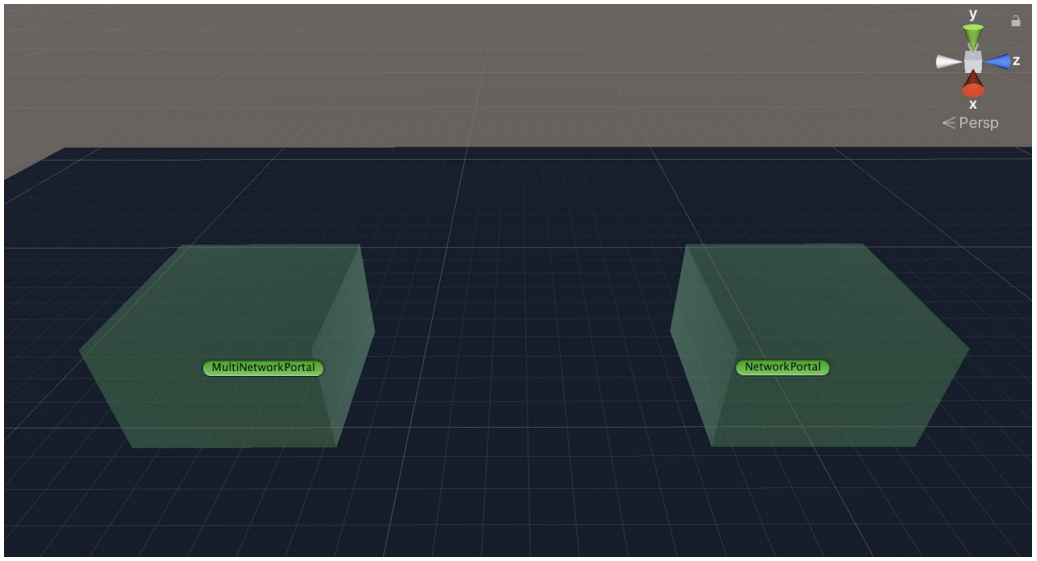
User Documentation

Game Designer User Guide

General Advice

Building an MMO is a daunting task that requires a lot of skill and motivation and can take an individual person easily a couple of years to complete. As the name “Groundwork” implies, “OpenMMO - Groundwork” provides you with the foundation for a MMO project. You still have to put a lot of effort into your MMO project and should view it like work in addition to an enjoyable hobby. This does not mean building your dream project is no fun though.

1. Make sure you followed the setup instructions in the “Quickstart Guide”.
2. Open up the ports 7777-7790 on both clients and the server. Also check your firewall and port forwarding settings.
3. Make sure that all scenes are added to your build before compiling a client or server. If you add or remove scenes, check your Build Settings again and add/remove them as well.
4. When you get unexpected behaviour like Nil Exceptions (Red Errors). Try to Re-Assign your scenes when you change them or when pulling the codebase from Github. Pulling code from Github is not the same as downloading a full project from the Unity Asset Store. It can happen that the “UI Scene” in NetworkManager has to be re-assigned for example.
5. Try to prevent empty spaces in filenames and paths if possible. Also do not use foreign or special characters.
6. Keep all Scriptable Object Templates in the Resources folder of your project. Do not put any other file, asset or prefab into the Resources folder. Also make sure the folder names on your Scriptable Object Templates are correct.
7. Keep all Spawnable Prefabs in the Spawnable Prefabs folder and make sure not to put any other files into that folder.
8. When playing in Host+Play mode it is always possible that the server does not have enough time to save your character properly when you quit. When this happens the server might lock you out of logging in for a minute.
9. It is a good idea to regularly delete your SQLite database file or wipe your mySQL database during development.
10. Some features (like the Portal Manager) only work with a compiled build of both a Server and a Client, they won’t work in Host+Play mode.
11. All Scriptable Object Templates feature a “Title” attribute that is used to display its name to your players. We never ever use the Scriptable Object Templates filename. This allows you to rename your titles (like Items etc.) without screwing up the database (in addition to several other reasons).

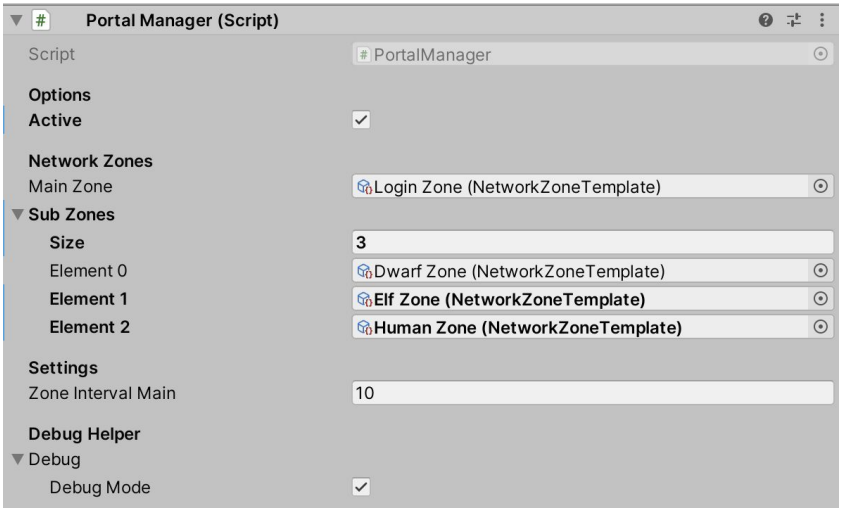


The Portal Manager

The Portal Manager allows you to setup Network Portals and Zone Servers, by using this system you can distribute your game over more than one Unity3d instance and therefore more than one scene. A complete Portal Manager setup is similar to what other assets refer to as “Master Server Setup”.

1. The Portal Manager (including Network Portals and Zone Servers) only works with a compiled Server and Client, it won’t work in Host+Play mode.
2. If all of your Zone Servers are on the same IP address, you can use SQLite database but it might happen that you run into issues.
3. It is recommended to switch to mySQL database once you start to work with the Portal Manager and Zone Servers. A mySQL database is networked and can be accessed from another IP as well. Note that if you host your mySQL database remotely it might suffer from increased access time.
4. Zone Servers are represented by a Unity3d instance each. Unity instances are heavy on resources and can easily require 1+ GB of RAM. It is therefore recommended to keep the amount of Zone Servers as low as possible. You can put a lot of content into one Zone Server, best is to see each Zone Server as a continent.

Setup
OpenMMO ships with the Portal Manager installed already, but there are a few things to keep in mind. First of all, locate the Portal Manager - it is always part of the Network Manager GameObject in your Login Scene.



1. **Active** - untick this box to deactivate Network Portals. This allows you to play your game in Host+Play mode again. Although you will be limited to the Login Zone.

   Note: All other options below "Active" only take effect if the checkbox is ticked.

2. **Main Zone** - This is the zone your players will connect to. This zone holds the login system and transfers the players to other zones. It can be described as your "Login Server".

   Note: This scene is never used for active game-play, just for login. You can decorate it at will but any GameObjects (like Monsters) can be removed.

3. **Sub Zones** - These are the zones your players can transfer to. Players can start in any Sub Zone and move from there to any other using a Network Portal. Players cannot directly connect to a Sub Zone.

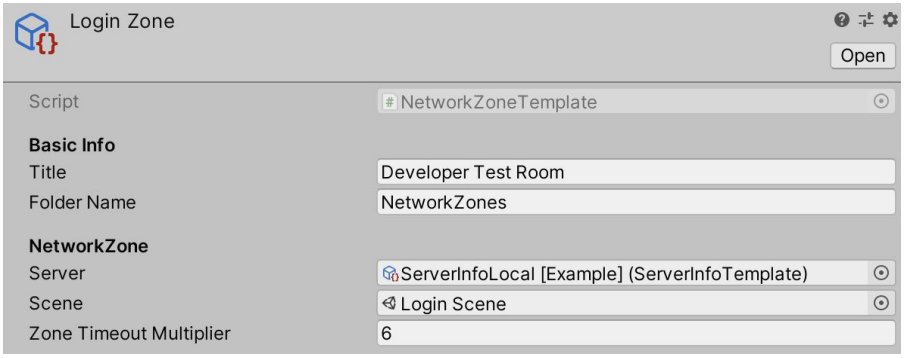
   Note: Sub Zones will contain your actual game-world and are presented by one scene each. You can put a lot of content into each Sub Zone, the scene in each of them can easily span several thousand unity units in size.

4. **Zone Interval Main** - How often (in seconds) the main zone is saved to the database. This is required to shut Sub Zones down, should the Main Zone go down. Otherwise you will have processes running on your server forever.

   Note: No Sub Zone without an active Main Zone.

Zone Template

The Zone Template is a Scriptable Object Template that allows you to define the Scene that a Sub Zone features. Each Unity instance holds exactly one Zone Template and each Zone Template holds exactly one Scene.



1. **Title** - The title displayed to your players. This is not the name of the Zone Template for various reasons.
2. **Folder Name** - Specify the exact folder name in your Resources folder here to greatly decrease load time.
3. **Server** - Represents the Server this zone is located on. You can customize it by editing the Server Info Template (see next paragraph below).

   Note: This allows you to put Sub Zones onto another physical machine and/or IP.

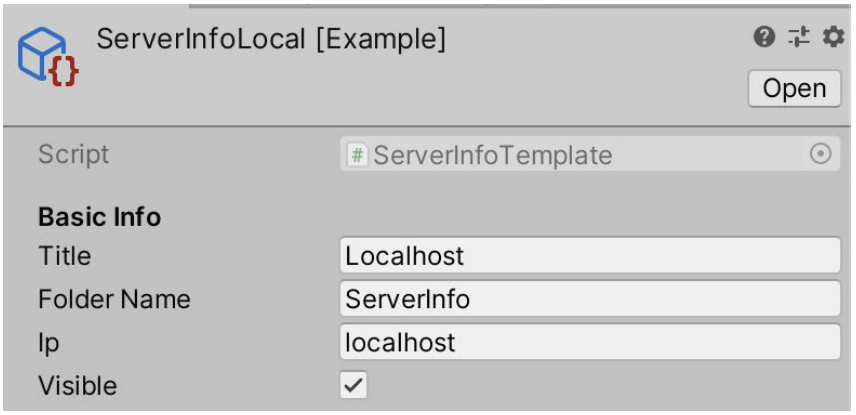
4. **Scene** - The Scene this Zone Server will load when launched.

   Note: Each Zone Server is a Unity3d instance that holds exactly one scene.

5. **Zone Timeout Multiplier** - Used to check when a Sub Zone is shutting down again. It uses a basic formula (Main Zone Time multiplied by Zone Timeout Multiplier). By default that is 10*60, which equals one minute. In other words, a Sub Zone will be shut down, when the Main Zone is unreachable for at least one minute.

Server Info

This Scriptable Object Template is part of core OpenMMO, but let us look at it again as it gains importance when used in combination with Network Portals.



1. **Title** - The name displayed to your players. This is not the Scriptable Object Template name for various reasons.

2. **Folder Name** - Put the exact name of this Scriptable Object Template subfolder here to greatly reduce load time.
3. **IP** - The IP address clients will use to connect to (usually in the format x.x.x.x for example: 127.0.01). If this is your local IP address you can also use “localhost”.

   When used in conjunction with the Network Zone Template (described in the paragraph above), you can distribute your Zone across various IP addresses.

   Note: Only clients make use of this, the server does not require it.

4. **Visible** - Will only show up on clients (to connect to) if the box is ticked.

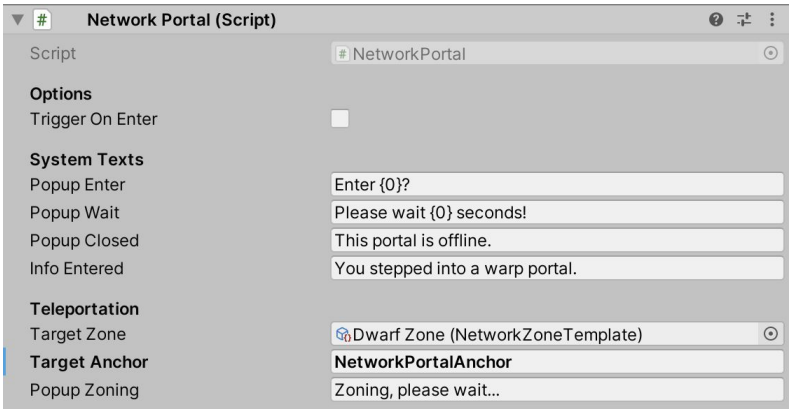
   Note: This allows you to hide a whole Server from your players and only use that server as network zone on its own IP.

Starting Zone
You find this setting in the “Player Component” of your player prefabs (it is only available to players). It defines the Sub Zone your players begin the game in. In addition you can use a Network Start Position to further define where your players are located at the start of the game.

Note: This setting is not used in Host+Play mode. All players start in the Login Zone in Host+Play mode.

Network Portals
Network Portals are GameObjects inside a scene and are the primary way for your players to travel to another Zone. These objects feature a basic look by default, you can customize it at will - as long as your players are able to step into the Network Portal and trigger the teleportation dialogue.

Note: Network Portals feature a cooldown to prevent abuse. Zone transfer is heavy on resources and could be exploited (harassing other players and/or fleeing from combat), so you should make good use of the cooldown timer available.



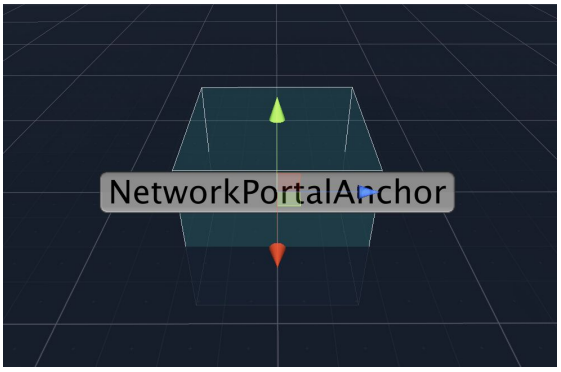
1. **Trigger on Enter** - Is the teleportation automatically triggered when a player steps into the portal, without asking first? This only happens if the player is actually allowed to use the portal.
2. **System Text** - Various feedback texts, edit at will. Note that some of them use a token that will be replaced with the name of the portals destination or the remaining cooldown time.
3. **Target Zone** - The Zone players will be teleported to, as defined by the Network Zone Template you assign here.
4. **Target Anchor** - Defines the position players will be teleported to. As we cannot link GameObjects in another scene, you put the name of a Network Anchor here instead (see next paragraph).

Note: Zoning is hack-safe and utilizes a random 4-digit token that is generated every time a player tries to teleport to another Zone. This ensures players cannot teleport at will using a manipulated client software.

Network Anchors

A Network Anchor is a very simple GameObject with no properties in it's inspector. We still need them to define the exact position a player will be teleported to. As we cannot link GameObjects that are part of another scene in the Inspector, you simply use the name of a Network Anchor instead. This also means that all Network Anchor names have to be unique.

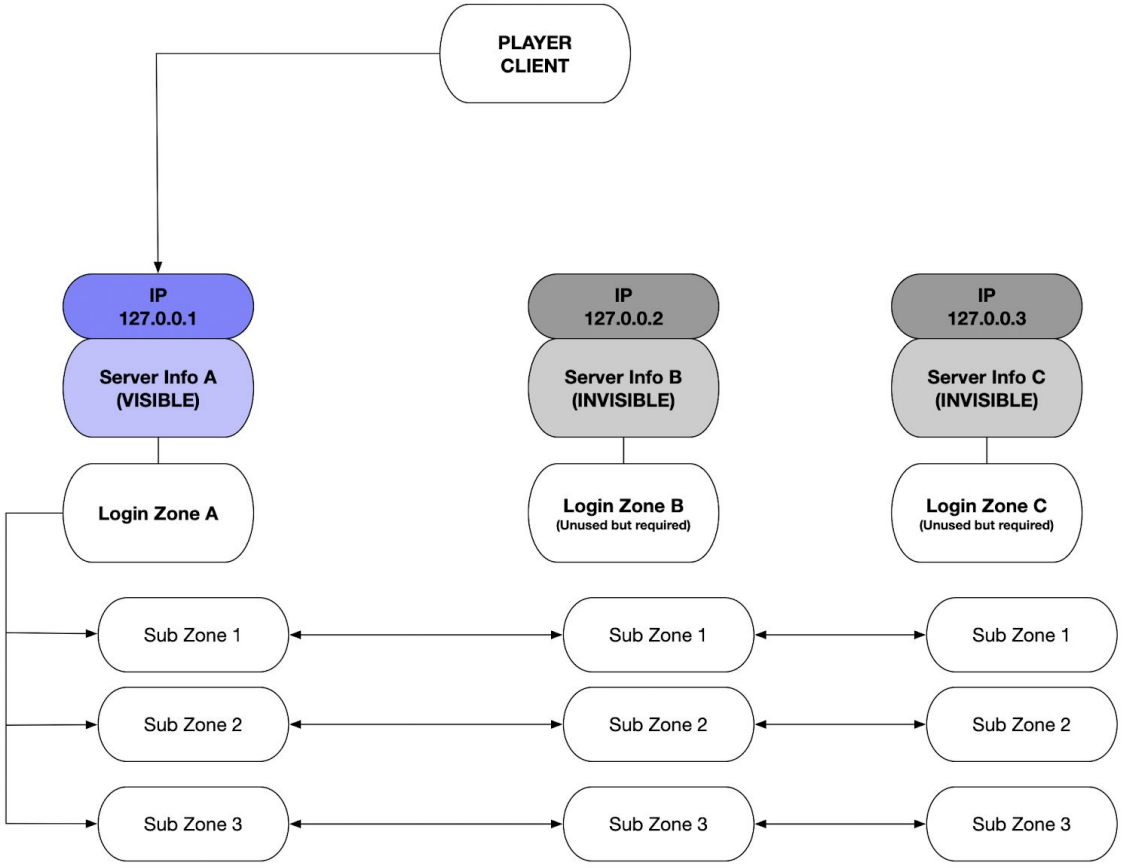
Note: In addition, Network Anchors are registered when a scene is loaded. This makes Network Portals hack-safe, as players cannot teleport anywhere by using a manipulated client software.

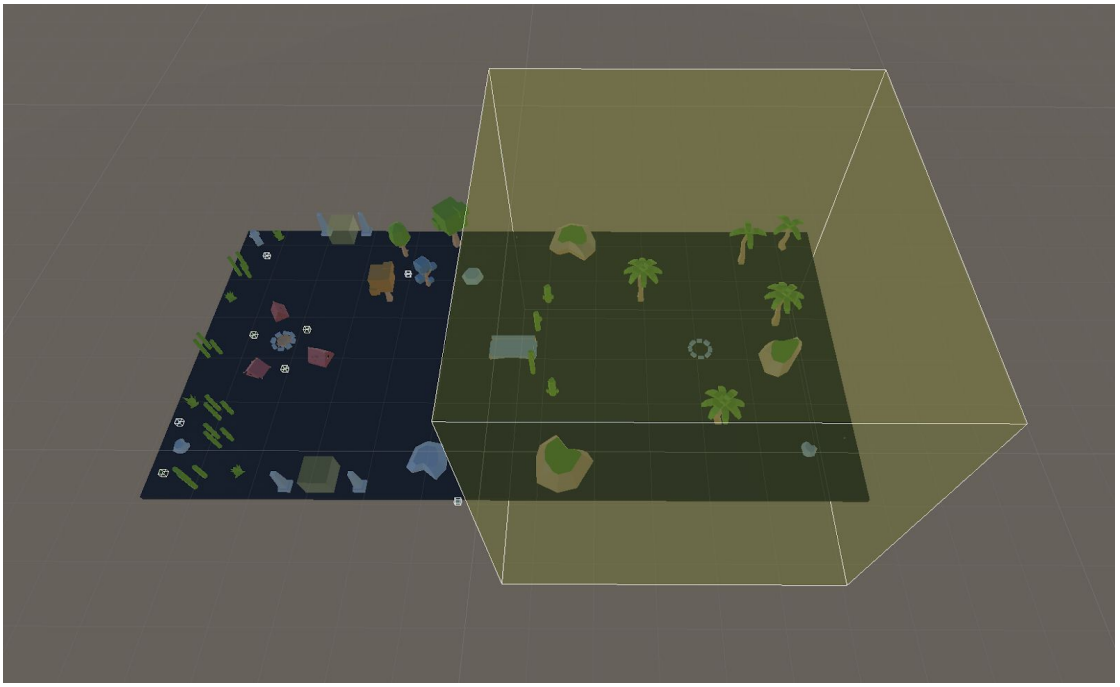


Multi Server Setup

It is possible to use the Portal Manager to distribute your game-world across several physical machines and IP addresses. Note that this advanced setup requires a lot of preparation and planning. It will also greatly increase your build-time, server deploy time and increase both development and testing time. You can add a multi server setup to your project at a later stage of development as well and don't have to worry about it in the beginning.

Note: Even if your main server is the only visible one (and therefore the only one your players can log in to), all other servers must feature a Main Zone as well. The Main Zone is responsible for launching it's Sub Zones and is therefore always required.

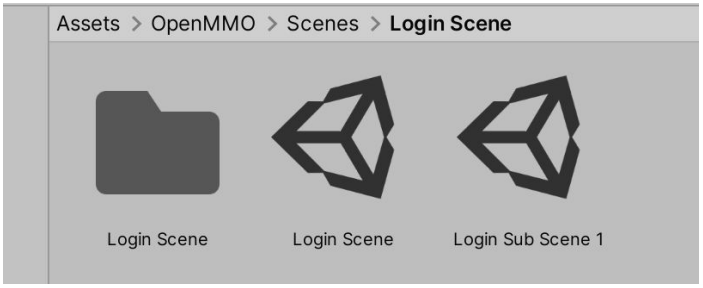




The Area Manager

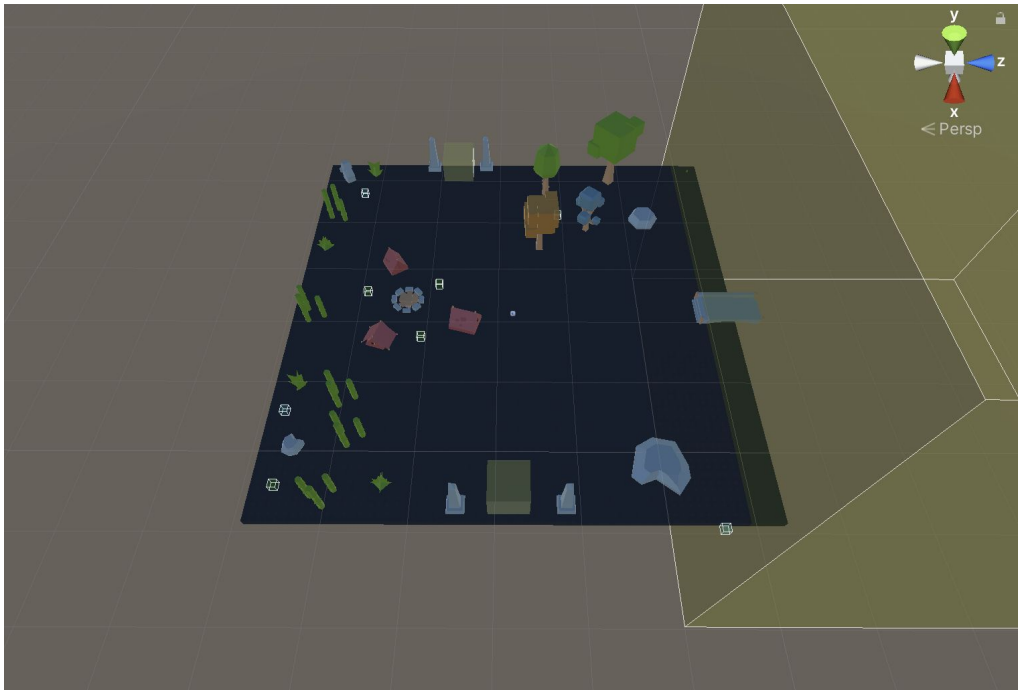
The Area Manager is another powerful tool that allows you to split one scene into several sub scenes to lessen the load client-side. By using the Area Manager you can easily create a huge scene and only have a part of that scene active on your clients, which will greatly improve performance - especially on mobile devices. The server on the other hand, always has the complete scene loaded as it has to manage all players, monsters and the navmesh. The Area Manager is fully compatible with the Portal Manager.

1. The Area Manager (including Sub Scenes and Area Portals) only works with a compiled Server and Client, it won't work in Host+Play mode.
2. The Area Manager is independent of the database system you use.
3. The Area Manager is independent of the Network Portals and can be used in combination or stand alone.
4. Contrary to the Network Portals, Areas are small, lightweight scenes. You can easily split your main scenes into dozens of smaller ones without much performance impact (it actually helps increasing performance).

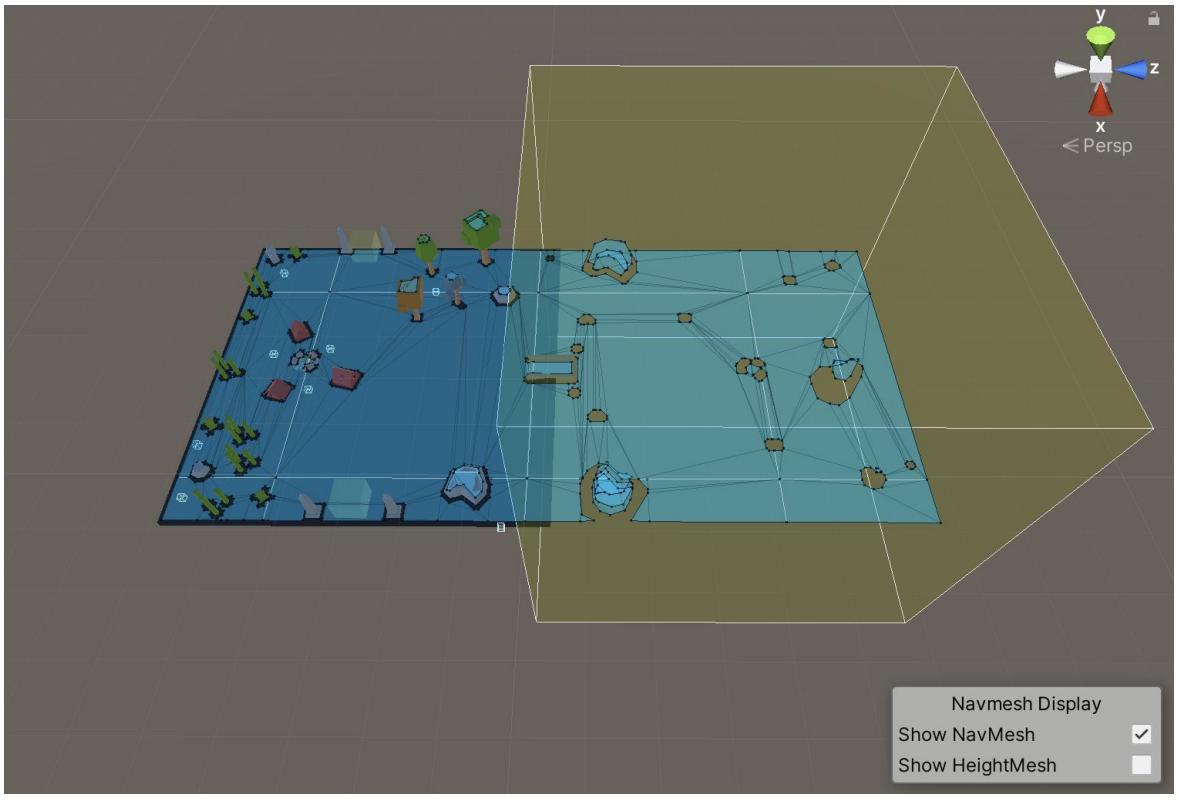


Setup
OpenMMO ships with the Area Manager installed already, there is no setup required. But you will have to keep a few things in mind:

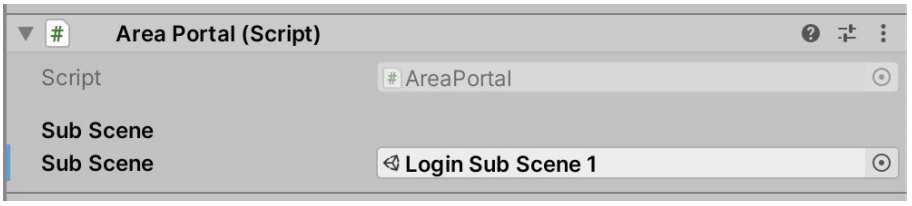
1. **Main Scene** - You always require a main scene that is always active. That is also the scene where your players start or where they are teleported to. You cannot put that main scene into a seperate scene. See it as a “Entrance”.
2. **Area Portals on Main Scene** - Area Portals are used to load/unload sub scenes when a player enters them. Those Area Portals must be present on the main scene as well and may not be part of a sub scene.
3. **Teleportation & Starting** - Players cannot start or teleport into a sub scene. They have to start and teleport into a main scene that is present at the time the scene is loaded.
4. It helps to take a look at the included scenes. The blue floor shows the main scene that is always active - players start there and teleport into it. The yellow area represents the Area Portal and the area where a new sub scene will be loaded onto:



5. **Navmesh** - The whole navmesh of the main scene and all sub scenes has to be present on the main scene. You will have to copy-paste all your sub scenes into the main scene and then bake your navmesh, removing the sub scenes afterwards again. Look at the example scenes - the “Login Scene” also contains the Navmesh of the “Login Sub Scene 1”:



6. **Portal Areas** - The yellow Area is a Portal Area and triggers loading/unloading of sub scenes when a player enters or leaves it. The inspector of a Portal Area has only one property: A scene. You simply assign a sub scene here that will be loaded/unloaded when the player enters or leaves the yellow area.
7. **Portal Area Size** - Your Portal Area should always be positioned so that it covers the whole sub scene. It should also be a bit bigger than the sub scene (about 5-15 units), so that it overlaps with it. Again: Make sure your Portal Areas are in the main scene, not part of the sub scene.



Conclusion
Using the Portal Manager and the Area Manager in combation you can easily create vast worlds that are capable of hosting hundreds (if not thousands) of players while spanning thousands (if not ten-thousands) of unity units in size.

The Instance Manager

ETA Second Half of 2020