

# Getting Started with Unity

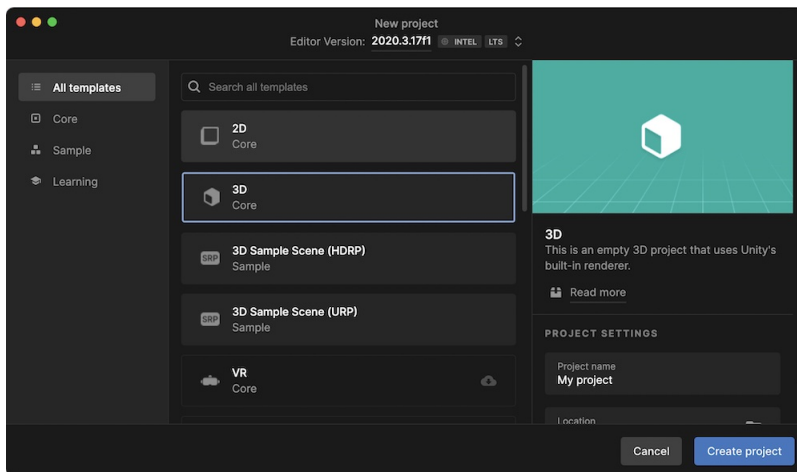
At the end of this guide, you'll be able to chat with friends and colleagues with realtime voice positioned in 3D. It will take around 20 minutes of your time to finish this guide.

## Info

**Please note:** Although it's not required to understand the basic concepts of ODIN to follow this guide, it's definitely helpful. We try our best to give some explanation in this guide, however, if you are not in a hurry, we recommend reading through the [introduction](#) first.

## Create an empty Unity project

First, you'll need to create an empty Unity project. Please note that ODIN requires **Unity version 2019.4 and later**. In this guide we used version 2020.3.17f1, but feel free to use what you have installed. We also used the Unity Hub version 3.0.0 - if you are using an earlier version of the hub your screen might look a bit different, but the steps are basically the same.



Creating a new 3D project in Unity with the Unity Hub.

Please choose the 3D template, choose a folder on your hard disk and click on **Create Project**. After a few moments the Unity Editor should fire up, presenting an empty scene in a new project.

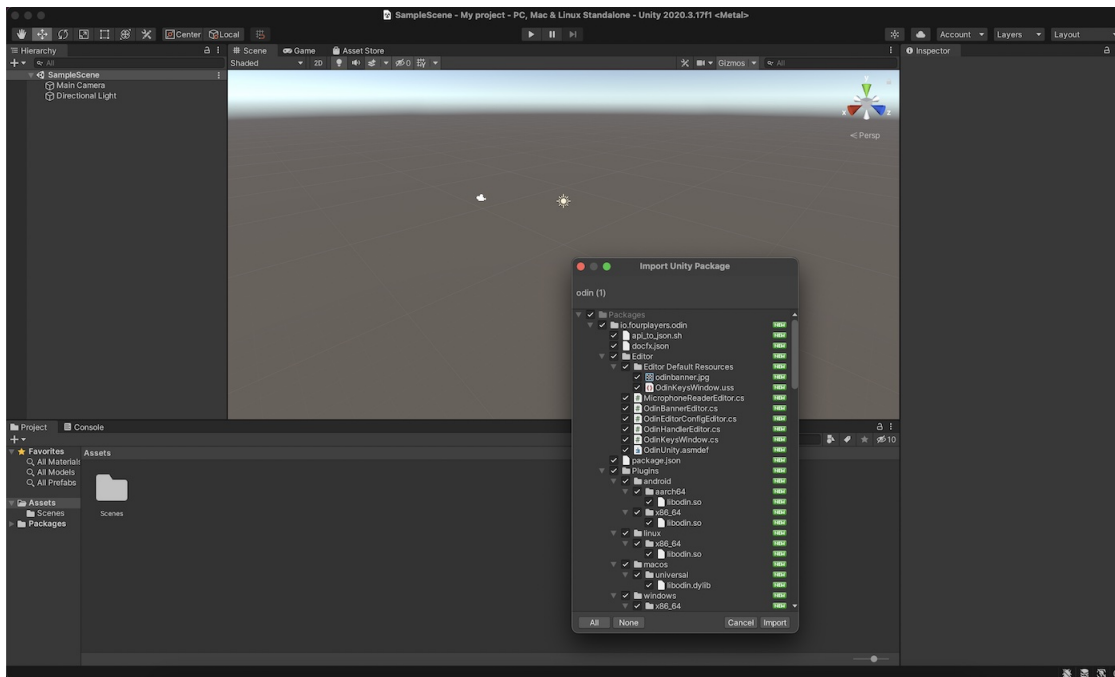
## Install ODIN SDK

Next step is to install the ODIN Unity SDK in the new project. Click on the download Unity SDK button, it will download the latest version of the ODIN SDK as a `unitypackage`.

△ 4Players ODIN supports Unity 2019.4 or any later version. The latest version is allways available [in our Github repository](#).

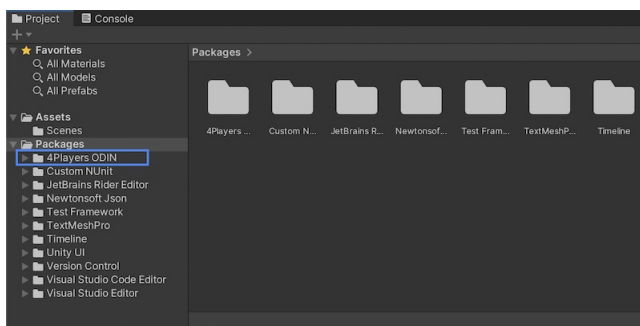
Download Unity SDK

Doubleclick the file (`odin.unitypackage`) that you just downloaded. Unity will now ask you to import the package.



Importing the ODIN SDK

Unity will have all files from the package selected. Those will be imported into your project. Just leave them all selected and click on the **Import** button.

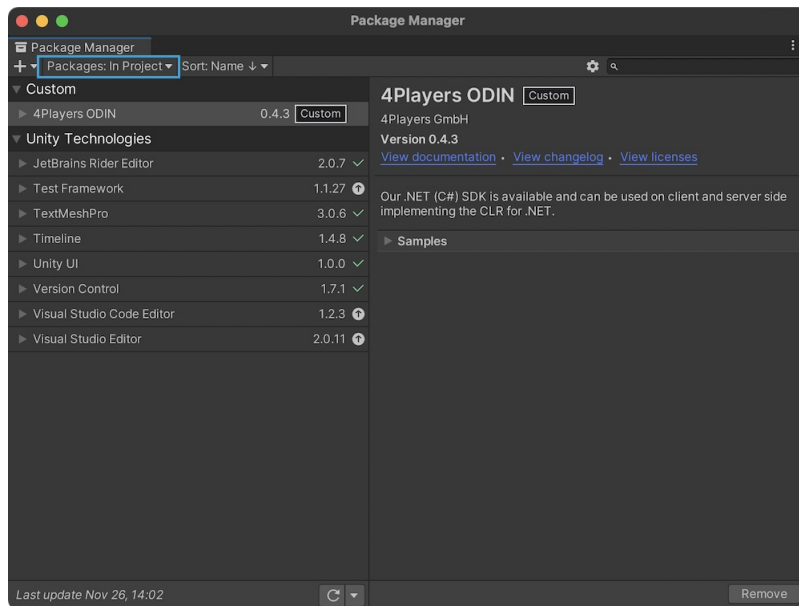


The ODIN SDK is imported

After the import is complete, you'll find the ODIN package in your asset browser in the **Packages/4Players ODIN** folder.

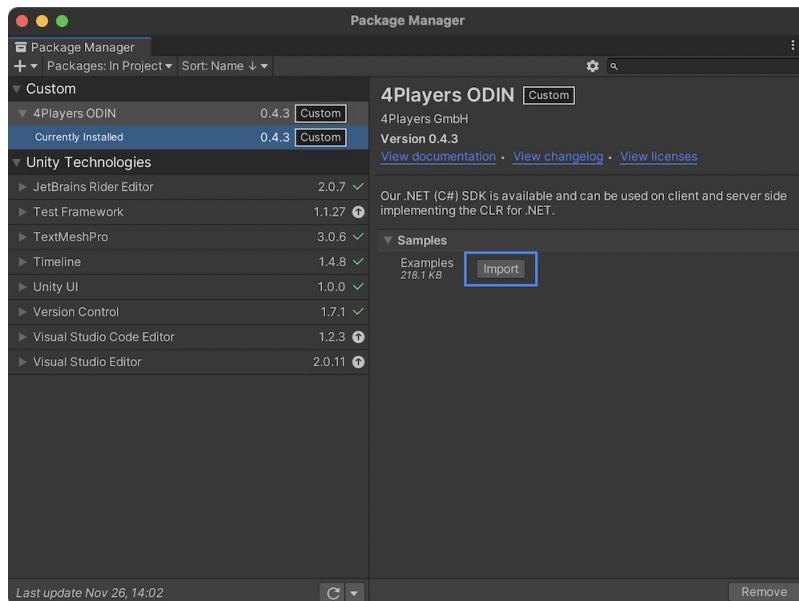
## Install the samples

In the next step, we need to install the samples so we can use them directly in the Unity editor. Open the Package Manager. Click on the menu **Window** and then **Package Manager**. A new window will pop up:



The Package manager

Make sure that **Packages: In Project** is selected in the dropdown (see highlighted box in screenshot above), otherwise click on it and choose **Packages: In Project** to show all packages installed in this project. In the list, you should see **4Players ODIN**.

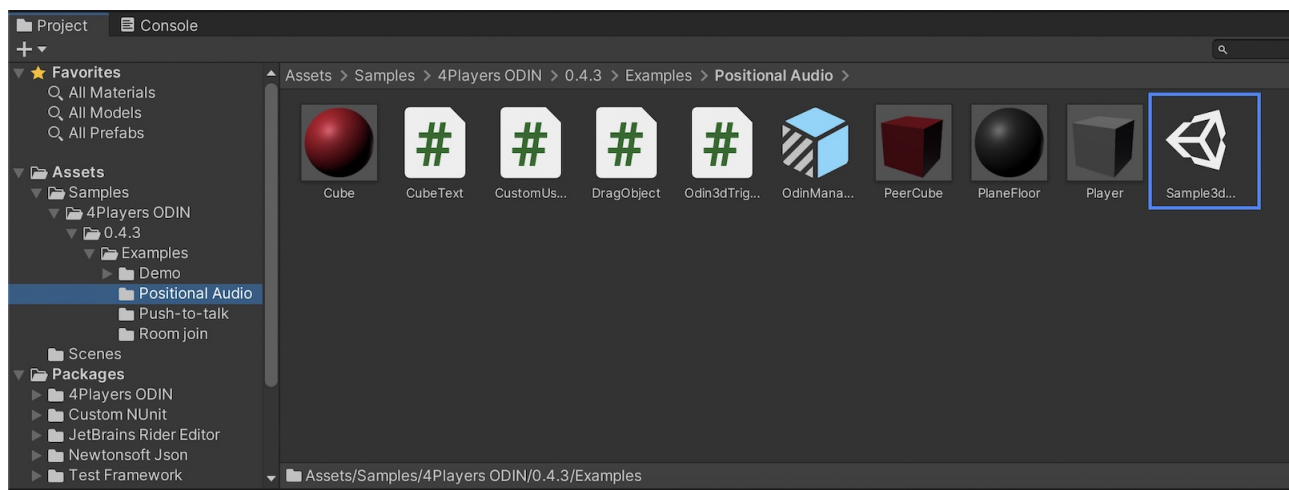


Importing the samples

Click on the **4Players ODIN** item in the list on the left side. You'll see some package details. Expand the **Samples** collapsable to reveal available examples and click on the **Import** button to install the samples.

## Loading the sample scene

After a couple of seconds, the samples will be installed in your **Assets** folder as you can see in this screenshot:



ODIN sample

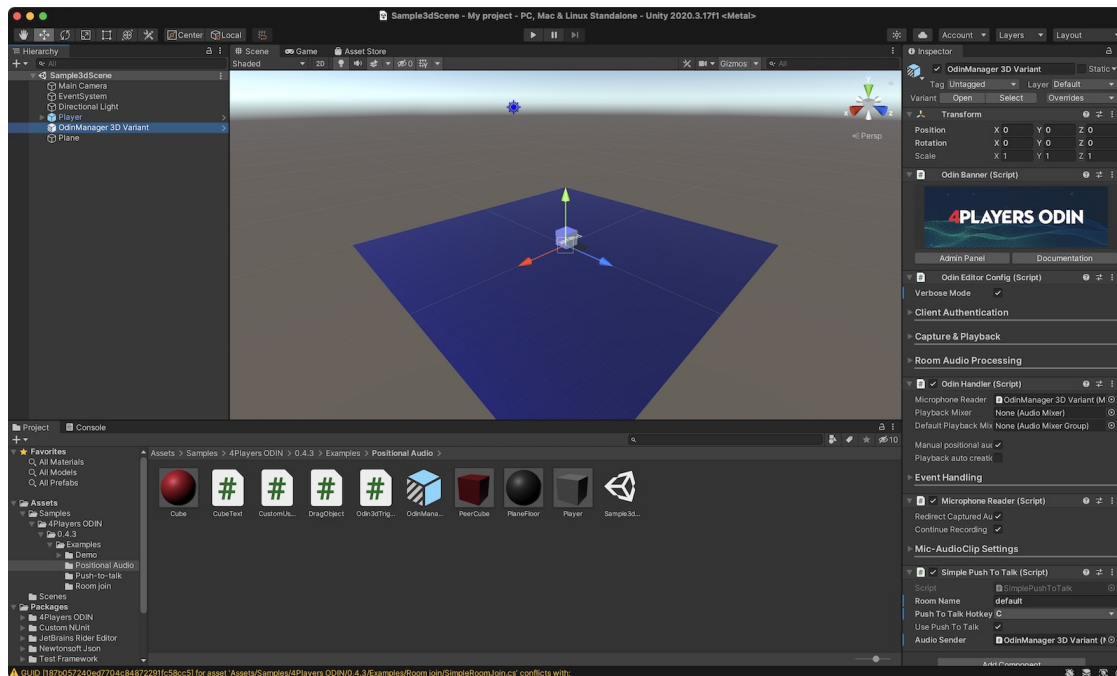
Navigate to the **Assets/Samples/4Players ODIN/\_\_\_VERSION\_\_\_/Examples/Positional Audio** folder in your asset browser.

### Tip

Please note, `___VERSION___` stands for the current version number of the ODIN SDK. As you can see in the screenshot above, the latest version number was `0.4.3` when this guide has been written.

Double click on the sample scene **Sample3dScene** to load the scene (highlighted in the screenshot) in the Unity editor.

## Understanding the scene



The sample scene loaded in the editor

The scene has a couple of Game Objects. Let's dig through them one after the other:

### Main Camera

This is the main camera of the scene.

### Event System

This sample requires an EventSystem (you can create it in your own project in the menu **GameObject -> UI -> Event System**)

### Directional Light

A light, otherwise it's kind of dark

#### Player

An instance of the *Player* prefab. You can find the prefab in the *Assets/Samples/4Players ODIN/\_\_\_VERSION\_\_\_/Examples/Positional Audio/Player.prefab* file. This object represents the player in this scene, i.e. the person sitting in front of the device. We'll have a closer look at this object later in this guide.

#### ODIN Manager 3D Variant

This object manages communication with ODIN servers and allows you to setup various settings. If you are curious, you can find a manual of all those settings [here](#)

#### Plane

The plane that acts as a simple "floor" in this scene.

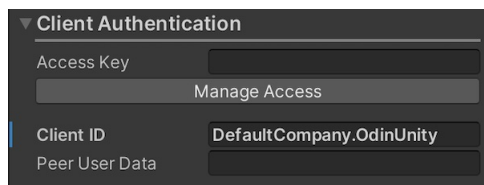
## Setting an ODIN access key

Select the *ODIN Manager 3D Variant* GameObject in the hierarchy. The inspector on the right side will reveal all ODIN settings. We now need to set an access key that will allow the client (in this case the Unity Editor) to connect to ODIN servers.

### Info

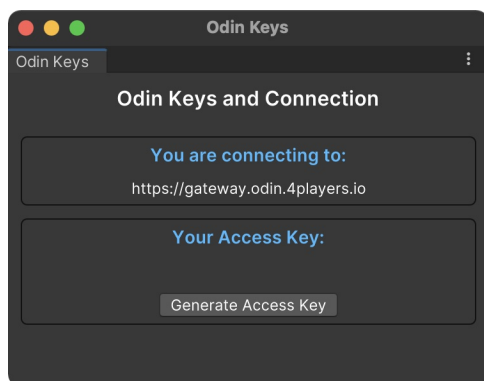
This is an important topic, that we don't want to dive in deeper right now, but you'll have to take a minute to understand that later. Check out our guide on this topic here: [Understanding Access Keys](#).

As we want to keep things simple, you can generate an access key right from Unity. Expand the **Client Authorization** collapsable to reveal the authorization settings:



The client authentication settings

Click on the **Manage Access** button. You'll see a dialog like this:



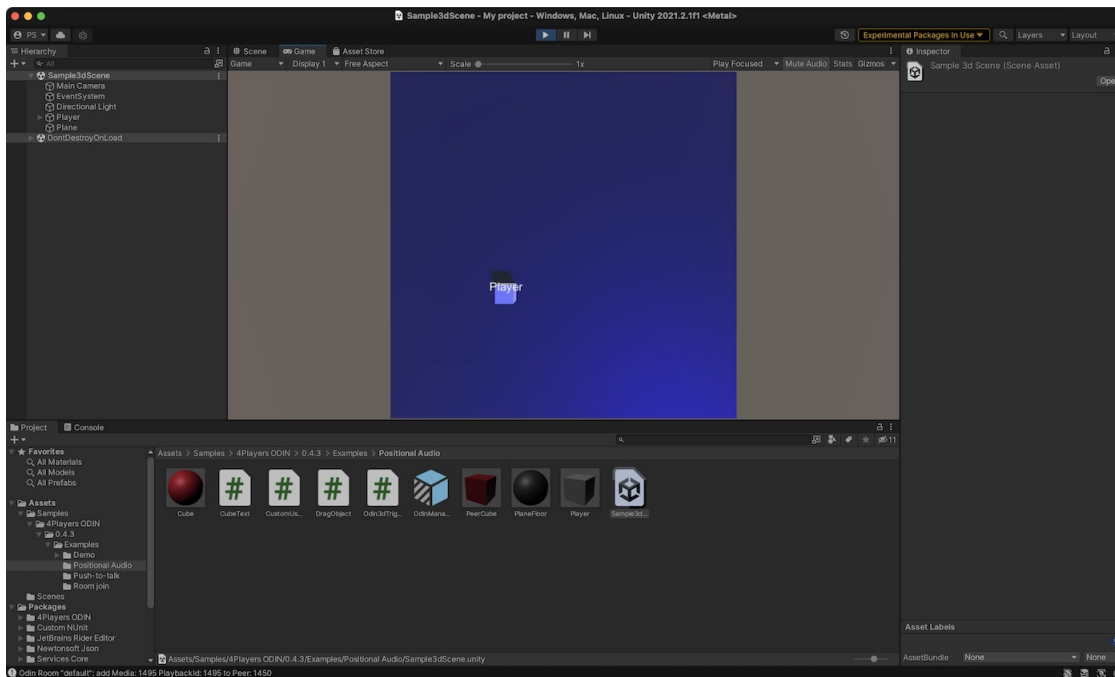
Generate an access token within Unity

Click on the **Generate Access Key** button to generate an access key for free. This will allow you to connect with up to **25 users**. Don't use this access key in production! More info on pricing and how to get a real access key: [4Players ODIN Pricing](#).

Close the Access Key Manager window and you should see the access key set in the *Client Authorization* inspector.

## Running the sample

Congratulations. Let's test the sample scene. Press the Play button in the Unity Editor. You should see something like that:



The example scene in Play mode

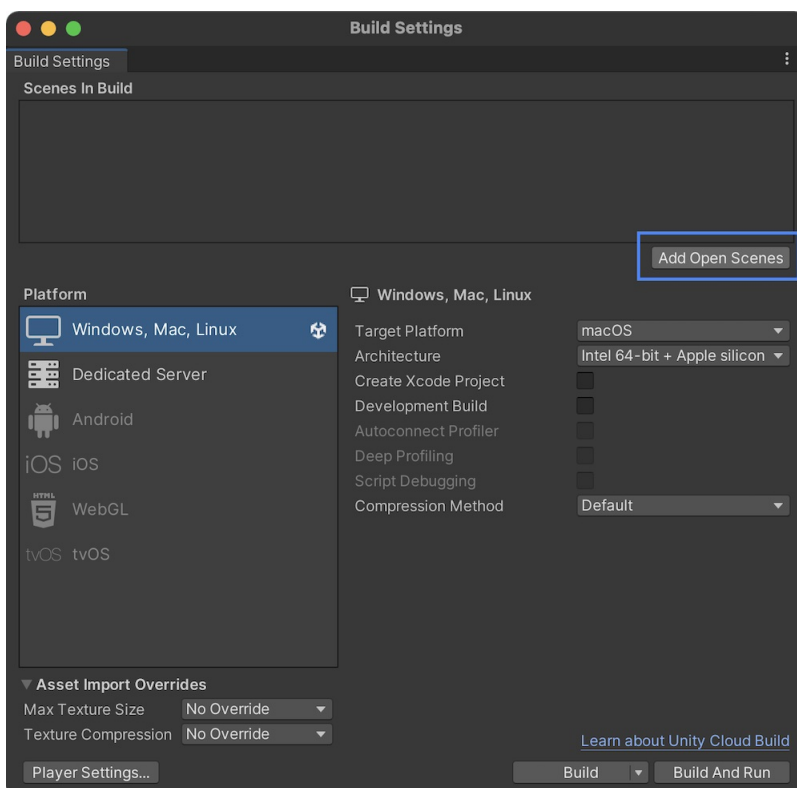
You'll see the *Player* GameObject from top and you'll notice eventually, that the microphone is recording (for example on Mac you might need to give Unity access to your Microphone).

You can drag & drop the *Player* cube with your mouse to position it somewhere else on the scene. That will become important later to experience 3D audio.

As always with voice chat, it's boring if you are alone. So let's get some other guys in the room.

## Building the project

To get in more users, we'll need to build the project so we can share the binary with friends or colleagues. Open the build settings window by navigation to the menu **File -> Build Settings**.



Unity Build Settings

Click on the **Add Open Scenes** button to add the current scene to the list. That's important, otherwise you cannot build the project.

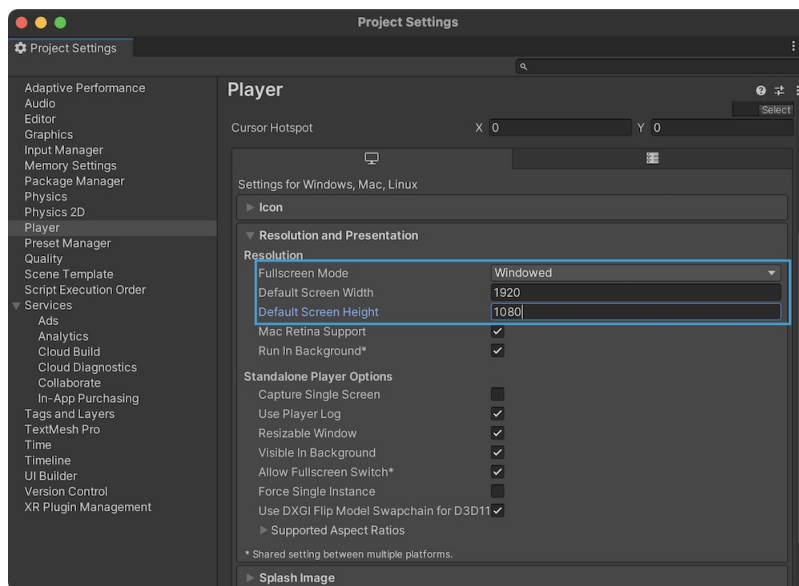
### ⚠ Warning

**Very important for Mac users:** If you want to build for macOS or iOS, you need to set a string for microphone usage in the player settings. Otherwise Unity editor will fail to build the target with obscure error messages. We have compiled a guide how to set that and you can find it [here](#).

Click on the **Build and run** button to build the current scene and running it on your own machine. You'll need to provide a folder on your hard disk where the binary will be created.

After some time, you should see the application running fullscreen on your machine. Unity typically defaults running things in fullscreen. It's a bit easier to test with multiple instances of the app if they run in windowed mode. Let's change that setting.

Navigate to the menu **Edit -> Project Settings**. The Project Settings Window will appear. Choose **Player Settings** on the left side and expand the **Resolution and Presentation** collapsable.

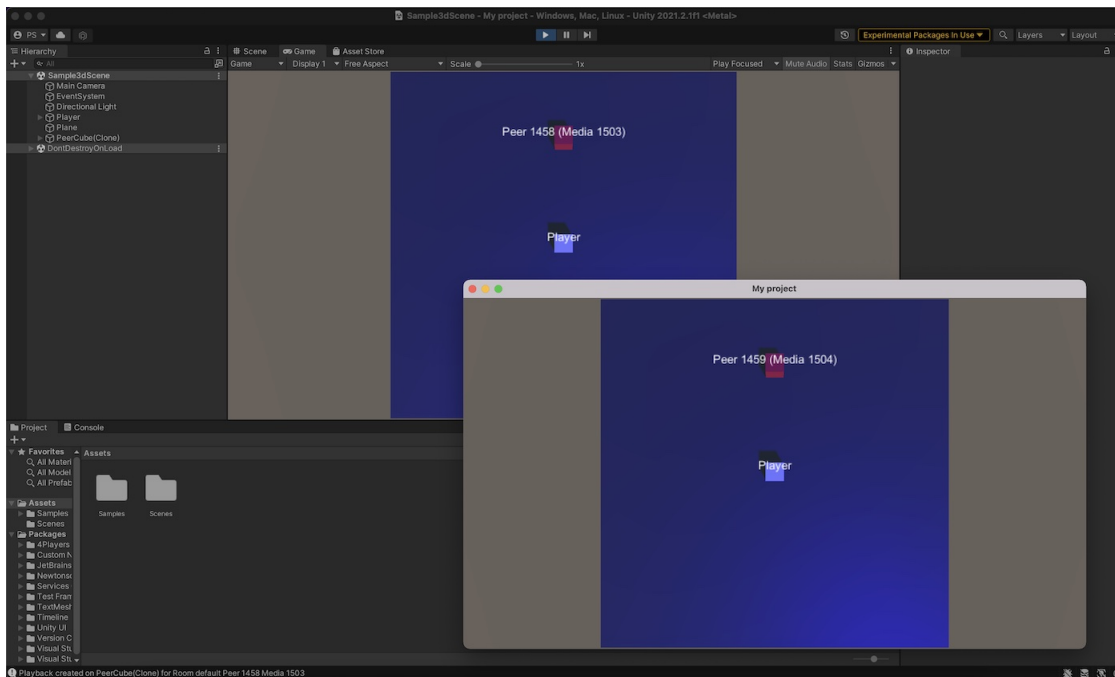


Setting windowed mode

## Testing ODIN

Ok, now that we optimized our app settings, let's build and run the app again. Choose **File -> Build and Run**. The app should run in windowed mode now.

Now, get back into the Unity Editor and click on **Play**.



Sample app running as app and in the editor

Now, finally, something interesting happens: You see another cube in the scene. If your volume are too high, or your mic is too sensitive, you might here an echo: That is, because both peers are running on the same machine with the same input - which does not make much sense but for testing its ok.

If you say something, you'll here your own voice. Now, begin to drag & drop the cubes around and notice how the direction changes depending on the relative position each cube has to each other.

You can send the binary to your friend or colleague to test ODIN in a more realistic scenario.

### Warning

Please note: The position of the cubes is not synced over the network, as we want to keep things as simple as possible in this example. So, every peer can drag & drop the boxes around and will here the voices from a direction that he has setup on screen! Please keep that in mind when testing, i.e. if you ask your colleague: "Do you here me from right", he might here you from front or from the left, as he might have different cube positions on his screen. That shows, that ODIN is a pure client side and deep engine integration - and thus very flexible and easy to use.

## How does it work?

Congratulations, you now have a working example of ODIN integrated with 3D audio. Let's dig a bit deeper to understand how everything works.

ODIN is a client-server solution, which means that ODIN clients, i.e. in this case applications built with Unity or the Unity Editor itself are connecting to ODIN servers and joining rooms. Every client connected to the same room can listen to all audio streams of the other clients connected to a room. Every client may send audio in the room, but must not do so. They may be muted or may just listen to the audio streams (i.e. spectators).

These days, everyone is talking about 3D spatial audio (for example Apple AirPods use this technology). What that means is, that the audio solutions tries to replicate how things work in the real world. Humans know from which direction sound comes from, and they can even estimate the distance because sound is louder if closer and silent if far away.

The opposite would be a phone call with headphones on your ears. It does not make any difference how far the other person on the line (i.e. in the same room in ODIN terminology) is, it's always coming from the same "direction" it sounds like right in front of you and the volume is the same.

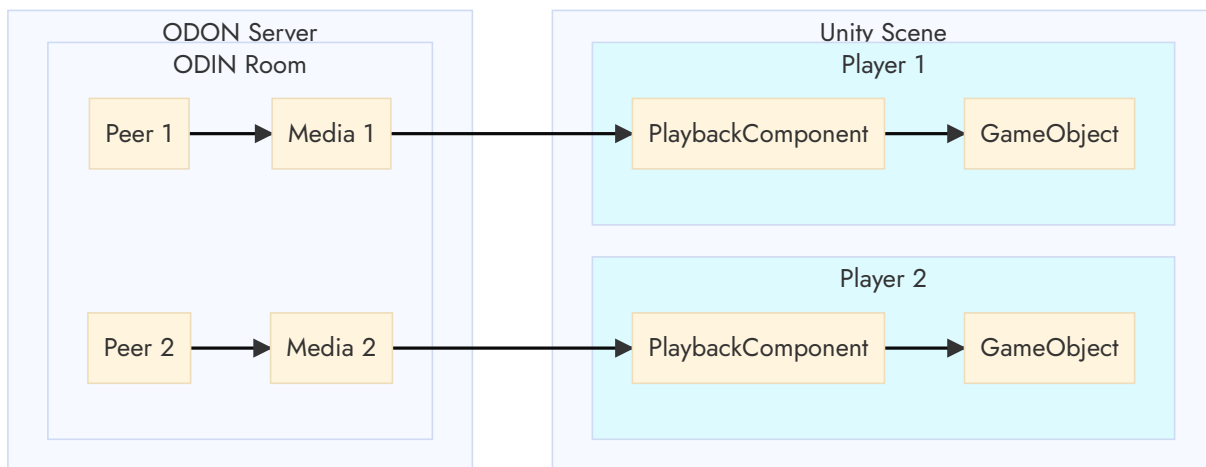


With ODIN, you can replicate both variants, or even mix them. There is only one setting in Unity that makes the whole difference: `spatialBlend` available in `AudioSource`.

ODIN is deeply integrated into the game engine instead of being a layer above. ODIN therefore uses core Unity technology:

- `AudioListener`: This is the players ear within the scene. The position of the `GameObject` is important if you are using 3D spatial (positional) audio. Typically, this is attached to the player `GameObject` or the camera if you are not using 3D audio for voice.
- `AudioSource`: An `AudioSource` in Unity is the “speaker” generating sound within the scene. `AudioSource` has a setting `spatialBlend` which defines if the `AudioSource` should be a 3D source or of the position does not make any difference. If you want the object to be included in the 3D world, set it to `1.0` if you want the object to be heard in the same volume everytime (i.e. the sound which is played when collecting a coin for example) then set it to `0.0`.

Every peer and attached media on ODIN servers need to be replicated within Unity at runtime as shown in the diagram below. Every peer in ODIN is typically replicated (depending on the use case) in Unity as a `GameObject`, this can be just a player name in a list in a chat application or a `Player` object in a multiplayer game. Every media (i.e. microphone) attached to a peer within an ODIN room is replicated in Unity with a `PlaybackComponent` which is typically a child of the player object being the `AudioSource` of the microphone linked to that peer.



To build this hierarchy we need to listen on certain events and handle them. Don't worry, it's super easy and just requires a couple lines of code.

In the next section we'll have a closer look how this is done:

## The ODIN Manager Object

The first object that we'll have a closer look is the `OdinManager 3D Variant` object. You already know that object as you used it to set your access key.



The scripts attached to the Player object

If you look closer, you'll notice there are a couple of script attached to this GameObject:

#### Odin Editor Config

The [Odin Editor Config](#) script allows you to setup ODIN within your game and handles client authorization and is part of the ODIN SDK.

#### Odin Handler

This script does all the event handling and exposes various settings for the microphone and audio effects. See the manual of [Odin Handler](#) for a documentation of all the settings available and how to use the API. This class is also part of the ODIN SDK.

#### Microphone Reader

This class is part of the ODIN SDK and captures the audio input from the microphone connected to the players PC and sends it to ODIN servers once the client joined an ODIN room. See the [Microphone Reader](#) for more info on this component.

#### Simple Push To Talk

This script is part of the sample code and uses the ODIN SDK to implements joining a room and "Push to Talk" (i.e. the microphone is always muted, and you need to press a button to unmute while talking). We'll have a closer look at this script in the next paragraph.

## Simple Push To Talk

Let's have a look at the [SimplePushToTalk.cs](#) script provided with the sample. It uses various APIs provided by the ODIN SDK to join a room and to implement push to talk logic.

```
using System;
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

using OdinNative.Unity.Audio;

namespace OdinNative.Unity.Samples
{
    public class SimplePushToTalk : MonoBehaviour
    {
```

```

public string RoomName;
[SerializeField]
public KeyCode PushToTalkHotkey;
public bool UsePushToTalk = true;
public MicrophoneReader AudioSender;

private void Reset()
{
    RoomName = "default";
    PushToTalkHotkey = KeyCode.C;
    UsePushToTalk = true;
}

// Start is called before the first frame update
void Start()
{
    if (AudioSender == null)
        AudioSender = FindObjectOfType<MicrophoneReader>();

    OdinHandler.Instance.JoinRoom(RoomName);
}

// Update is called once per frame
void Update()
{
    if (AudioSender)
        AudioSender.RedirectCapturedAudio = UsePushToTalk ? Input.GetKey(PushToTalkHotkey) : true;
}
}

```

As said before, we need to join a room so that we can chat with other peers in that same room. To do this, the **SimplePushToTalk** script takes the **RoomName** parameter given in the Inspector and connects to that room with the **JoinRoom** [function](#) of the instance of the **Odin Handler** [function](#).

The **OdinManager 3d Variant** also has a **Microphone Reader** [script](#) attached. This script handles microphone input and sends it to all ODIN rooms that the player has joined. But, as we only want to send audio input when a specific button is pressed, we'll get a reference to the **MicrophoneReader** instance in the **Start** function and sets the **RedirectCapturedAudio** [property](#) to **true** if audio should be sent (i.e. if Push to Talk is activated and selected button is pressed) or **false** if no audio should be sent to the server.

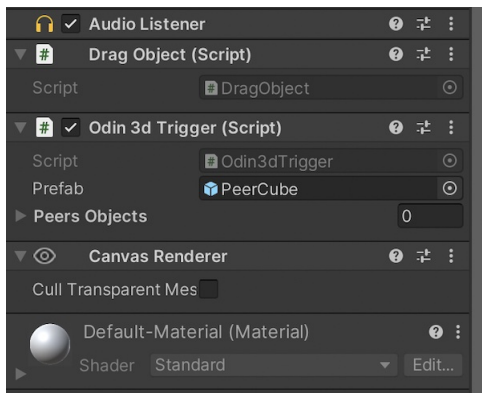
So, that's it. As you can see, the ODIN 3D Manager handles a couple of settings like client authorization (access key), handles microphone input and sends data to the server if the user has pressed a button.

### **i** Info

Please note: Per default, ODIN has **RedirectCapturedAudio** [property](#) set to **true** which means that microphone input is always sent to ODIN servers. You need to change the setting in the inspector or use a script like shown above to customize that to your needs. Push to talk is just one example.

## The Player Object

The second object, that we want to look closer is the **Player** object in the scene. Highlight it, and you'll notice a couple of scripts attached to this object:



The scripts attached to the Player object

### Audio Listener

In many games, the audio listener is attached to the camera. In this case, we want the players “ear” to be at the players position, which is important as we want Unity to calculate audio from other sources relative to the players position and not that steady camera above the scene. Please note, the [AudioListener](#) is a standard Unity component.

### Drag Object

This is just a simple script that allows you to drag & drop the cube around. We’ll not go into detail how this is implemented, but feel free to have a look in your preferred IDE.

### Odin 3d Trigger

This script handles some ODIN events and creates the peer cubes. We’ll dive into this script in a minute.

## Odin 3d Trigger

The [Odin3dTrigger.cs](#) script is handling a couple of ODIN events and creates the peers whenever a peer connects. It’s a bit longer, so we go through it step, by step.

In the [Start](#) function, we’ll listen to some ODIN events. In this example we do it by code, but please feel free to connect them via the Unity Inspector (see [Odin Handler](#) manual for more info on that).

```
void Start()
{
    OdinHandler.Instance.OnCreatedMediaObject.AddListener(Instance_OnCreatedMediaObject);
    OdinHandler.Instance.OnDeleteMediaObject.AddListener(Instance_OnDeleteMediaObject);
    OdinHandler.Instance.OnRoomLeft.AddListener(Instance_OnRoomLeft);

    var SelfData = OdinHandler.Instance.GetUserData();
    //Set Player
    GameObject player = GameObject.FindGameObjectsWithTag("Player").FirstOrDefault();
    if (player != null)
    {
        TextMesh label = player.GetComponentInChildren<TextMesh>();
        label.text = CustomUserDataJsonFormat.FromUserData(SelfData)?.name ?? player.name;
    }
}
```

So, we listen on the [OnCreatedMediaObject](#) , [OnDeleteMediaObject](#) and [OnRoomLeft](#) events:

### OnDeleteMediaObject

Triggered whenever a peer stopped sending audio data

### OnRoomLeft

Triggered when a peer left a room.

We also get the [User Data](#) of the user and set the text label of the player object to the player name (if available).

Now, as you can see, we need to have some callback methods for these events, let’s have a look step by step:

## Handling On Media Created Events

This event is triggered whenever a peer joined a room and started to send audio data. There is a difference between a peer joining a room and media added to that room for that peer, because peers may only join a room without sending their own data (i.e. spectators). So, to simplify things we just handle the case when a player joined to the room starts sending audio (which is the `OnCreatedMediaObject` event):

```
GameObject CreateObject()
{
    return Instantiate(prefab, new Vector3(0, 0.5f, 6), Quaternion.identity);
}

private void Instance_OnCreatedMediaObject(string roomName, ulong peerId, int mediaId)
{
    Room room = OdinHandler.Instance.Rooms[roomName];
    if (room == null || room.Self == null || room.Self.Id == peerId) return;

    var peerContainer = CreateObject();

    //Add PlaybackComponent to new dummy PeerCube
    PlaybackComponent playback = OdinHandler.Instance.AssignPlaybackComponent(peerContainer, room.Config.Name, peerId, mediaId);
    playback.OnPlaybackPlayingStatusChanged += TalkIndicator; // set function for talking indication by status

    //Update Example
    //playback.CheckPlayingStatusInUpdate = true; // set checking status per frame active
    //InvokeRepeating Example
    playback.CheckPlayingStatusAsInvoke = true; // set checking status as MonoBehaviour.InvokeRepeating active
    playback.PlayingStatusDelay = 1.0f; // (default 0f)
    playback.PlayingStatusRepeatingTime = 0.3f; // (default 0.2f)

    //Some AudioSource test settings
    playback.PlaybackSource.spatialBlend = 1.0f;
    playback.PlaybackSource.rolloffMode = AudioRolloffMode.Linear;
    playback.PlaybackSource.minDistance = 1;
    playback.PlaybackSource.maxDistance = 10;

    //set dummy PeerCube label
    var data = CustomUserDataJsonFormat.FromUserData(room.RemotePeers[peerId]?.UserData);
    playback.gameObject.GetComponentInChildren<TextMesh>().text = data == null ?
        $"Peer {peerId} (Media {mediaId})" :
        $"[{data.name} (Peer {peerId} Media {mediaId})]";

    PeersObjects.Add(playback.gameObject);
}
```

This callback does four things:

- Instantiate a peer cube (from the peer prefab) which represents the peer in the scene as a cube with the `CreateObject` function.
- Attach the audio source for that peer to the instantiated peer GameObject. ODIN SDK provides a function `AssignPlaybackComponent` for that. It creates a `PlaybackComponent` and attached it to the peer cube GameObject. The function also returns the `PlaybackComponent` instance so that we can customize it in the next step.
- The `PlaybackComponent` uses a Unity `AudioSource` for “sending” audio into the scene. You can get your hands to that audio source using the `PlaybackSource` property. In this sample, the `spatialBlend` value is set to `1.0` to activate 3D spatial audio for peers and a couple of other settings like the volume attenuation is set.
- Use the `User Data` of the peer to get it's name and set the label of that peer to that name. This allows us to identify the peers in the scene.

## Some experiments

Let's do some experiments with the sample that we have right now to showcase the power of ODIN and to give you an idea what you can do with it in your game.

In the `Odin3dTrigger.cs` script, in the `Instance_OnCreatedMediaObject` function adjust some settings made to the `PlaybackComponent.PlaybackSource`. As this is a standard Unity `AudioSource` [object](#), you'll find the component in the Unity documentation. Here are a couple of things you can try:

## Switching to “gods voice”

Change the line where `spatialBlend` is set into this:

```
playback.PlaybackSource.spatialBlend = 0.0f; //Disable 3D audio
```

This just disables 3D audio and every ODIN `AudioSource` in the scene will have always the same volume. That is basically the same experience as if all players would use an external voice chat solution like TeamSpeak or Discord. The voice is “decoupled” completely from the game play. It may be useful if you want to replicate phone calls or CB communication between team members.

Please note, that `spatialBlend` is a float value. You can also set it to `0.5f` to have something in between.

## Adjusting voice attenuation

Right now, peers can only be heard up to 10 units. Reduce that to 2 and you'll only hear peers that are very close to you. You can use these properties to implement “sound damping” dependent on the current location of the peer relative to the player.

```
playback.PlaybackSource.minDistance = 1;  
playback.PlaybackSource.maxDistance = 2;
```

## Summary

1	<b>ODIN SDK</b>	<a href="#">Install</a> the ODIN SDK into your project.
2	<b>Add ODIN Manager</b>	<a href="#">Drag &amp; Drop</a> the ODIN Manager Prefab into your scene.
3	<b>Access Key</b>	<a href="#">Create and set an access key</a> in the Unity inspector.
4	<b>Handle ODIN events</b>	Handle some ODIN events like shown above and use <code>AssignPlaybackComponent</code> <a href="#">object</a> to create the other players audio sources and attaching them to player objects in your scene.

That's it. There is not much more to do to integrate ODIN into any project. Of course, there are many APIs to customize the experience to your own liking. As you note, ODIN integration is pure Unity. You just work with Unity as you always do, not strange APIs or sending additional data to other servers.

Of course, if you are working on a multiplayer game, things are a little bit more complex, but just a little bit. We have created a guide where you create a complete multiplayer game with Mirror Networking and add ODIN to it. After a couple of minutes you'll have the same example as this one, but player positions will be synced between all peers.

## Next steps

Now that you have a working example find out more about the components ODIN has to offer.

- Check out the [Unity manual](#) with more info on the components and what the various settings are for.
- Check out the [API Reference](#) with a comprehensive documentation on all classes and interfaces exposed by the ODIN SDK.

- Follow our [guide on how to add Unity to a Mirror Networking based multiplayer game](#). After 20 minutes you'll have a fully working multiplayer game with 3D positional voice chat and synced player positions

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