

# Intro to Unity for MR development on the Magic Leap One

Natalie Perez  
[NPerez@NEDDTech.com](mailto:NPerez@NEDDTech.com)



# The NEDD Tech Team



Natalie Perez

Evelyn Skinner

Dave Noderer

Dwight Goins



Link to Slides:

[goo.gl/o8e54h](http://goo.gl/o8e54h)



# Today's Agenda

- What is AR/VR/MR
- Magic Leap Package Manager
  - ML Remote
- Unity Hub
  - Creating a new project
- Unity interface
- Mixed reality and build settings



# Agenda cont...

- Creating a game object
  - Adding a script to an object
- Play mode to test your app
- How to download/import from the asset store
  - Apply materials on a game object
- Terrain Engine



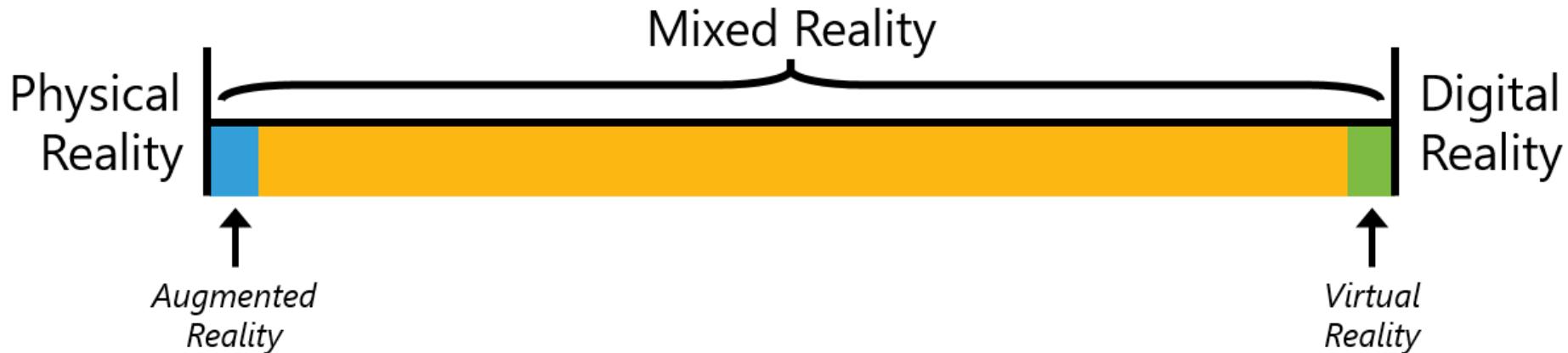
# Tutorials

- **Unity**
  - <https://unity3d.com/learn/tutorials>
- **Magic Leap**
  - <https://creator.magicleap.com/learn>
- **Windows Mixed Reality and HoloLens**
  - <https://developer.microsoft.com/en-us/windows/mixed-reality/academy>



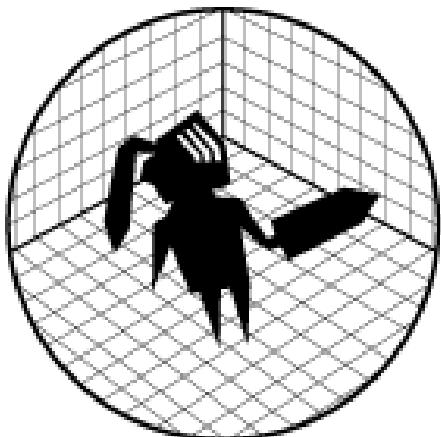
# What is VR/AR/MR

## Mixed reality spectrum



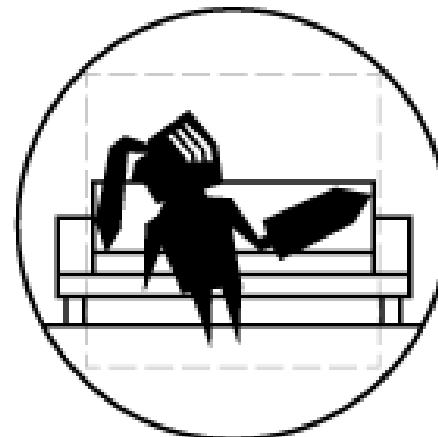


VR



Digital environments  
that shut out the real world.

AR



Digital content on top  
of your real world.



Digital content interacts  
with your real world and with you.



# Mixed Reality Portal

Mixed Reality Portal

Simulation

Headset  On

Body  
x: 0 yaw: -0.079  
y: 0  
z: 0

Head  
Default tracking  
yaw: 0  
pitch: 0.22  
roll: 0

Left Controller  On

Idle  
 x: -0.24 yaw: 0  
y: 1.4 pitch: 0  
z: -0.49 roll: 0

Touchpad Thumbstick



||



## INSTALLED PACKAGES

Collapse All

Update all (0)

## ▼ Common Packages

Package	Latest Version	Installed
---------	----------------	-----------

Lumin SDK	0.19.0	✓
-----------	--------	---

Visual Studio 2017 Extension	1.0.181012	✓
------------------------------	------------	---

## ▼ Lumin Runtime Packages

Package	Latest Version	Installed
---------	----------------	-----------

Lumin Runtime SDK	0.19.0	✓
-------------------	--------	---

## ▼ Unity® Packages

Package	Latest Version	Installed
---------	----------------	-----------

Unity® API Documentation	0.19.0	✓
--------------------------	--------	---

Magic Leap Unity® Package	0.19.0	✓
---------------------------	--------	---

# ML Remote



## Common Packages

Package	Latest Version	Installed
Lumin SDK	0.19.0	✓



## Lumin SDK

Available versions:

0.19.0 (Latest)

Uninstall

0.41 GB (1.2 GB extracted)

## Lumin SDK 0.19.0

- Lumin OS 0.94

Magic Leap's hardware and software is in a qualified developer release state right now. Some features or functionality of the Magic Leap hardware or software

[Open Release Notes](#)

[Open the Release Notes externally in a browser](#)

[Open Folder](#)

[Open the SDK folder in a file browser](#)

[Open Shell](#)

[Open a cmd.exe prompt in the SDK folder](#)

[Use ML Remote](#)

[Launch the frontend for zero iteration](#)



## Magic Leap Remote

 REMOTE SERVER OFF

Status	Name	Audio	Head	Eye	Gestures	Hands	Lifecycle	Input	Room	Graphics	Mesh	Planes	Ray	PCFs
--------	------	-------	------	-----	----------	-------	-----------	-------	------	----------	------	--------	-----	------

To zero iterate on a simulator, click Start Simulator.

To zero iterate on a device, connect an ML1 and then click Start Device.

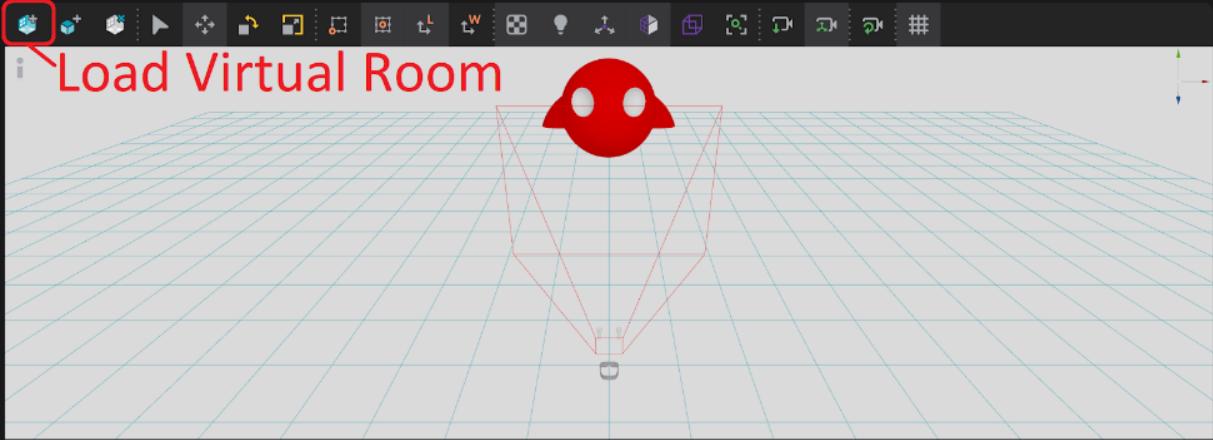
[Start Simulator](#)

[Start Device](#)



Interaction

## Mini Map



## Properties Configurations

Minimap Selection

Head Pose

Eye Tracking

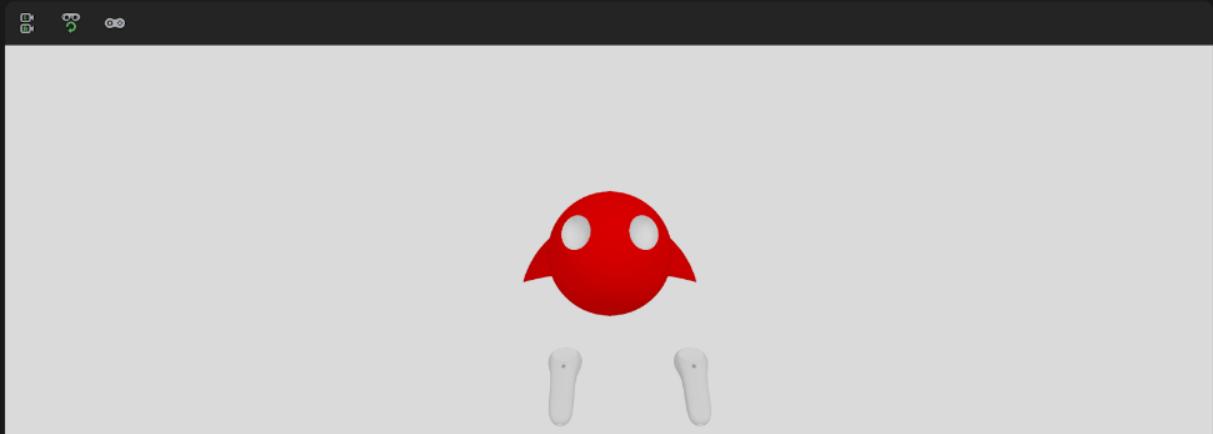
Input Controller

Hands

Image Tracking

Recording

## Eye View





# Load a Virtual Room

erez > MagicLeap > mlsdk > v0.19.0 > VirtualDevice > data > VirtualRooms > ExampleRooms

Name	Date modified	Type	Size
Couch Room.room	12/6/2018 6:02 PM	ROOM File	744 KB
DiningRoom.room	12/6/2018 6:02 PM	ROOM File	342 KB
Lounge.room	12/6/2018 6:02 PM	ROOM File	717 KB

<Lumin SDK> > MagicLeap > mlsdk > v#.#.#.# >  
VirtualDevice > data > VirtualRooms >  
ExampleRooms

[Projects](#)[Learn](#)[Installs](#) [New](#) [Open](#)

Sign in

[On my machine](#)**Unity 2018.3.0b8** ⓘ

Path: C:\Program Files\Unity\Hub\Editor\2018.3.0b8\Editor\Unity.exe

...

[Official Releases](#)**Unity 2018.2.14f1**

Path: C:\Program Files\Unity\Hub\Editor\2018.2.14f1\Editor\Unity.exe

...

[Beta Releases](#)**Unity 2018.1.9f2-MLTP10** preferred ⓘ

Path: C:\Program Files\Unity 2018.1.9f2-MLTP10\Editor\Unity.exe

...

**Unity 2018.1.9f1-MLTP8.1**

Path: C:\Program Files\Unity\Hub\Editor\Unity 2018.1.9f1-MLTP8.1\Editor\Unity.exe

...

**Unity 2017.3.1f1**

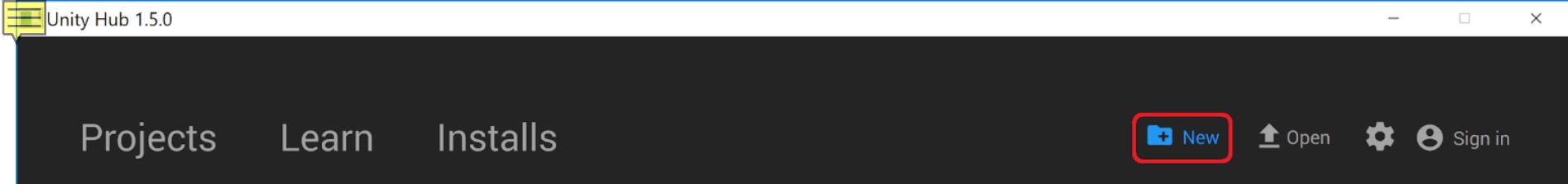
Path: C:\Program Files\Unity\Hub\Editor\2017.3.1f1\Editor\Unity.exe

...

[Find other  
versions in the  
Unity download  
archive](#)**Unity 2017.2.1p2**

Path: C:\Program Files\Unity\Hub\Editor\2017.2.1p2\Editor\Unity.exe

...



Project name

Intro to Unity

Unity Version

2018.1.9f2-MLTP10 - preferred

Location

C:\Users\npere\Documents\UnityF

...

Template

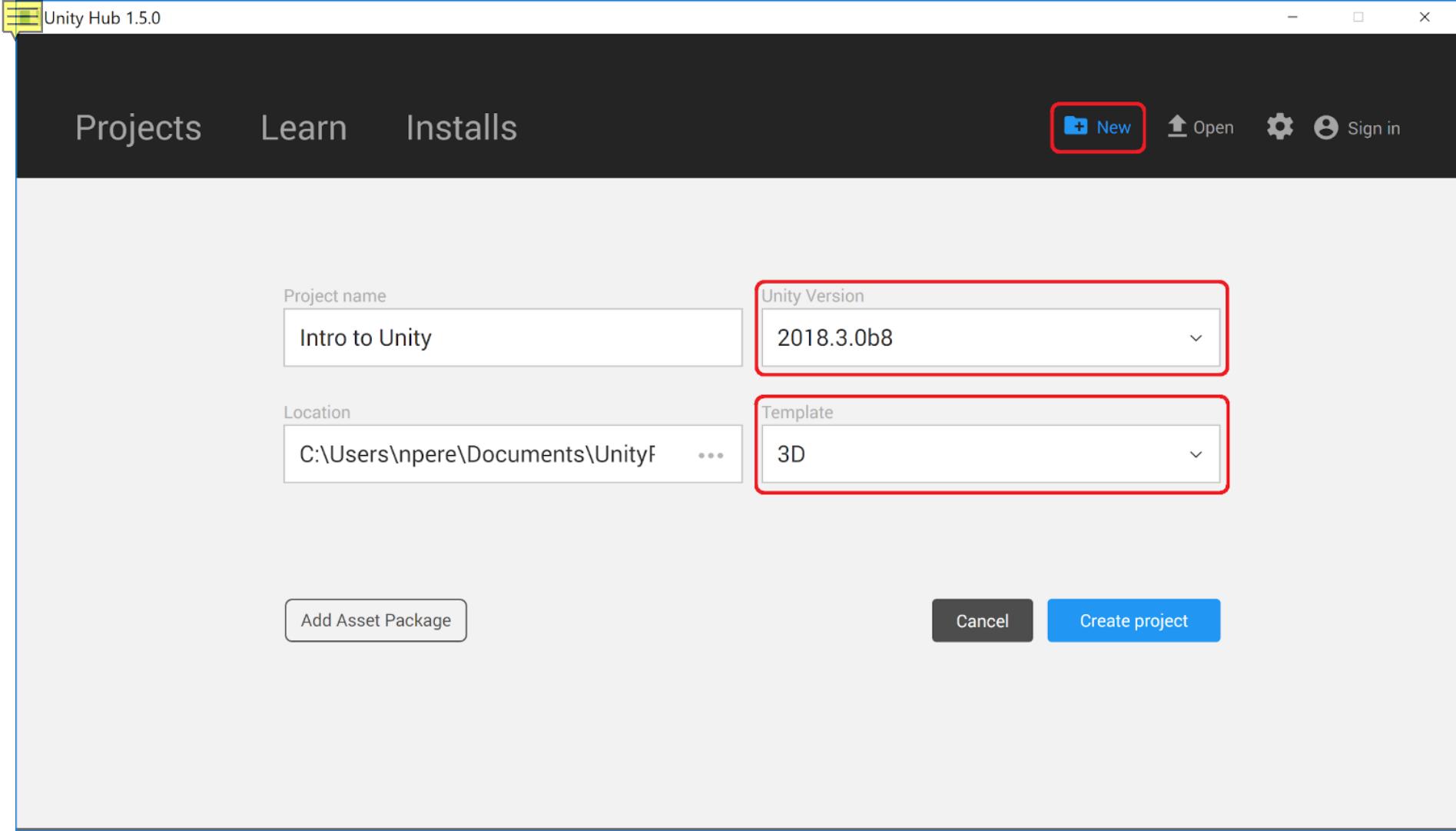
Magic Leap

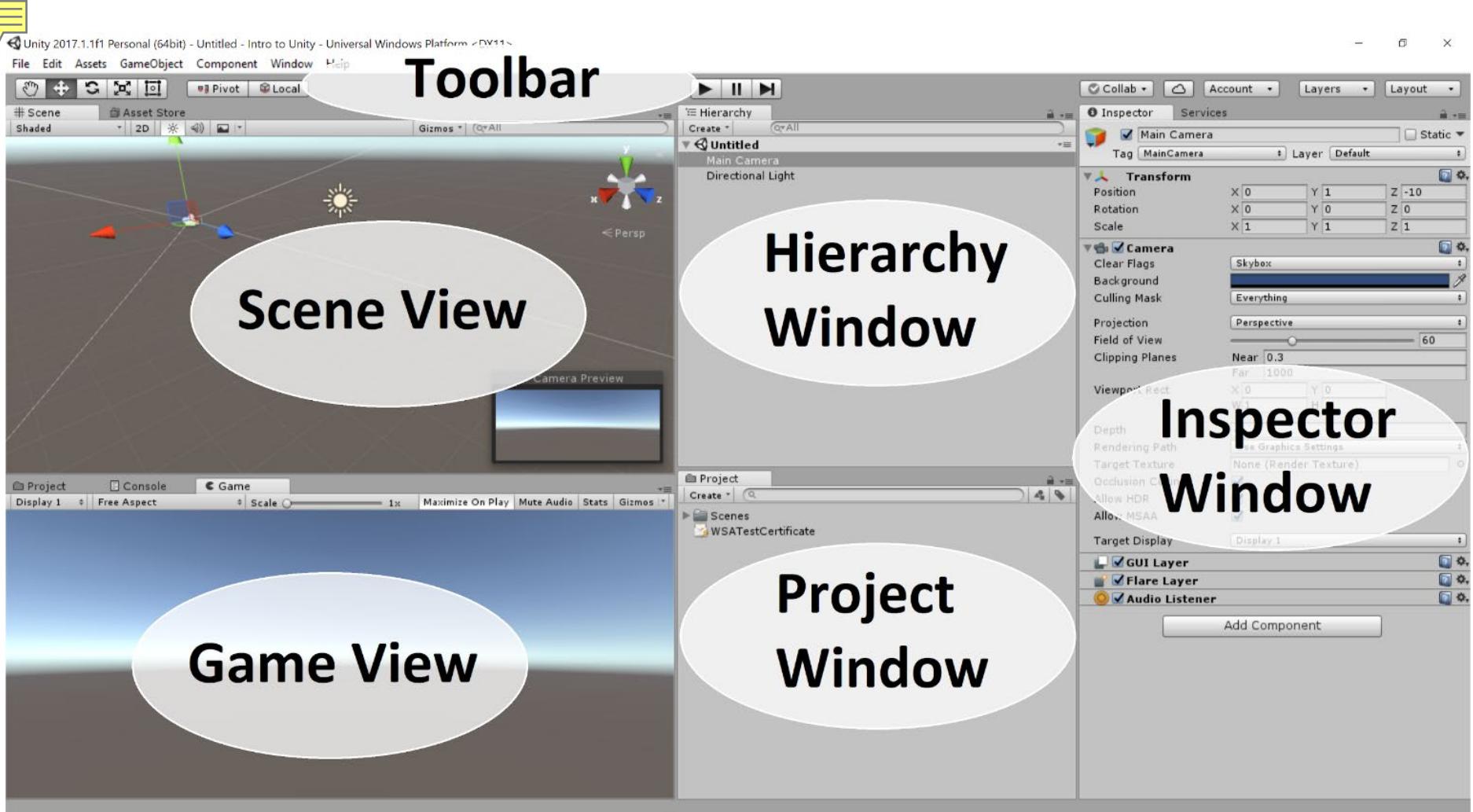
Scene to jump-start a Lumin developer

Add Asset Package

Cancel

Create project







# Navigating in the Scene View

## The Hand tool

When the Hand tool is selected (shortcut: **Q**), the following mouse controls are available:



**Move:** Click-drag to drag the Camera around.



**Orbit:** Hold **Alt**, and left-click and drag to orbit the Camera around the current pivot point. This option is not available in 2D mode, because the view is orthographic.



**Zoom:** Hold **Alt**, and right-click and drag to zoom the Scene view. On Mac you can also hold **Control**, and left-click and drag instead.

Hold down **Shift** to increase the rate of movement and zooming.



All Assets ▾

Type here to search assets



Plus/Pro

Impressive New Assets

Bundle Of The Week

## Top Paid Packages

[See more](#)

PARADOX NOTION

FlowCanvas

\$70 \$56

Plus/Pro



OPSIVE (UFPS)

UFPS : Ultimate FPS

\$75



DEVDOG

Inventory Pro

\$55



JOHN LEONARD FRENCH

Ultimate Game Music Col...

\$45 \$36

Plus/Pro

## Top Free Packages

[See more](#)



# Camera Properties

- Camera's position should be (X: 0, Y: 0, Z: 0)
- For AR/MR:
  - Set **Clear Flags** dropdown set to **Solid Color**
  - Set **Background** to the color **Black: RGB (0,0,0)**
- For VR:
  - Keep **Clear Flags** dropdown set to **Skybox**



# Don't forget to save

- File → Save Scene As
  - Create a subfolder called **Scenes**
  - Name the scene **Main**
  - Select **Save**
- *You will see this subfolder and scene in your Project Window*



# Camera Setup

The image shows the Unity Editor interface with two main windows: Hierarchy and Inspector.

**Hierarchy Window:** Shows a scene named "Untitled" containing a "Main Camera" (highlighted with a red box) and a "Directional Light".

**Inspector Window:** Shows the properties for the selected "Main Camera".

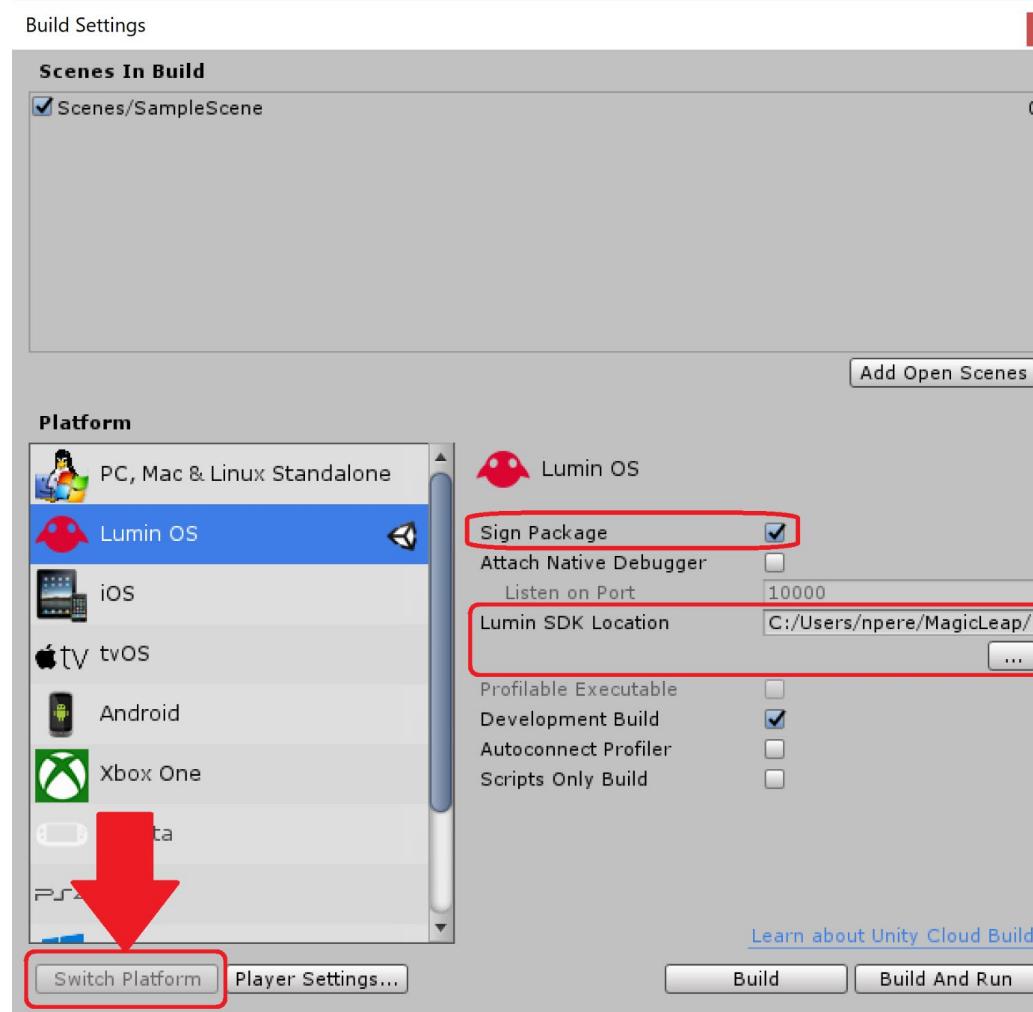
- Transform Section:** Position (X: 0, Y: 0, Z: 0), Rotation (X: 0, Y: 0, Z: 0), Scale (X: 1, Y: 1, Z: 1). The "Position" row is highlighted with a red box.
- Camera Section:** Clear Flags (Set to "Skybox"), Background, Culling Mask (Set to "Everything"), Projection (Set to "Perspective"), Field of View (Set to 60), Clipping Planes (Near: 0.3, Far: 1000). The "Clipping Planes" row is highlighted with a red box.



# Build Settings for Magic Leap

- File → Build Settings...
- Select the **Lumin OS Platform**
  - Set the **Lumin SDK Location** path. For example,  
C:\Users\<username>\MagicLeap\mlsdk\<version>
- Check **Sign Package**
- Add Open Scenes
- Select **Switch Platform**
- Open Player Settings...

# Magic Leap





# Windows Mixed Reality & HoloLens

Build Settings

**Scenes In Build**

Scenes/MainScene

**Add Open Scenes**

**Platform**

PC, Mac & Linux Standalone

Universal Windows Platform

iOS

tvOS

Android

Tizen

Xbox One

PS Vita

**Universal Windows Platform**

**Target device**: Any device

**Build Type**: D3D

**SDK**: Latest installed

**Build and Run on**: Local Machine

**Copy References**:

**Debugging**

Unity C# Projects:

Development Build:

Autoconnect Profiler:

Scripts Only Build:

[Learn about Unity Cloud Build](#)

**Switch Platform**

**Player Settings...**

**Build**

**Build And Run**



# Player Settings

- Alternate way to get to Player Settings:
  - Edit → Project Settings → Player
- Click on the **Magic Leap Icon**
- Expand the **Publishing Setting** group
- Add in your Magic Leap developer certificate
  - You can generate a certificate through the Magic Leap Creator Portal

Inspector

Services

Select

Default Cursor

None  
(Texture  
2D)

Select

Cursor Hotspot

X 0

Y 0



Settings for Lumin OS

**Icon**

**Resolution and Presentation**

**Splash Image**

**Other Settings**

**Publishing Settings**

ML Certificate

<No Certificate>

...

## Settings for Lumin OS

### Icon

### Resolution and Presentation

### Splash Image

### Other Settings

#### Rendering

Color Space\*

Linear

Static Batching



Dynamic Batching



Graphics Jobs (Experimental)\*



Lightmap Encoding

Normal Quality

Virtual Reality moved to XR Settings

#### Identification

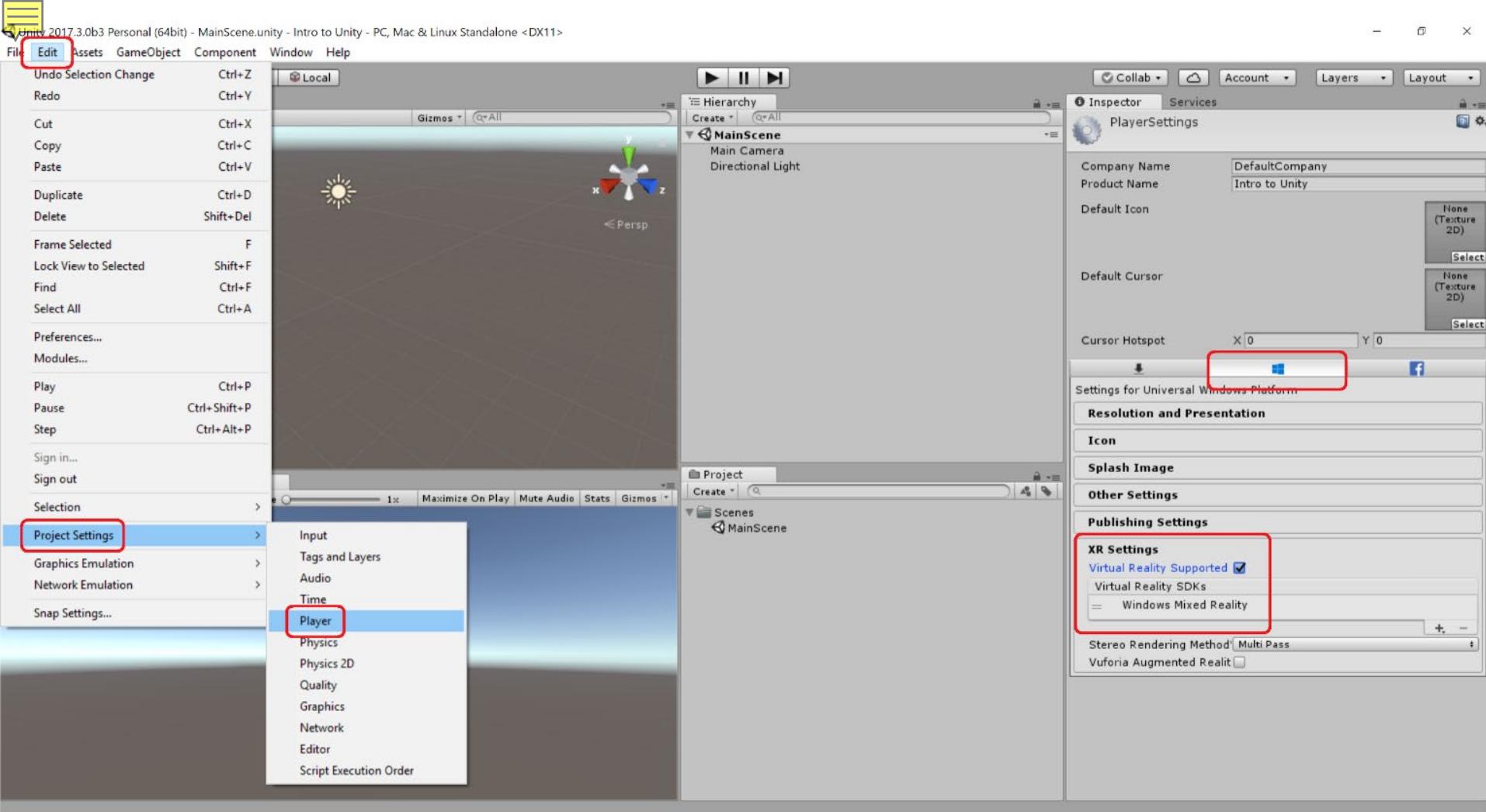
Bundle Identifier

com.magicleap.hellocube

Version Code

1

Version Name





# MixedRealityToolkit

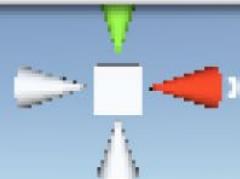
- Formerly known as the HoloToolkit
- <https://github.com/Microsoft/MixedRealityToolkit>



# MixedRealityToolkit

Component Mixed Reality Toolkit Window Help

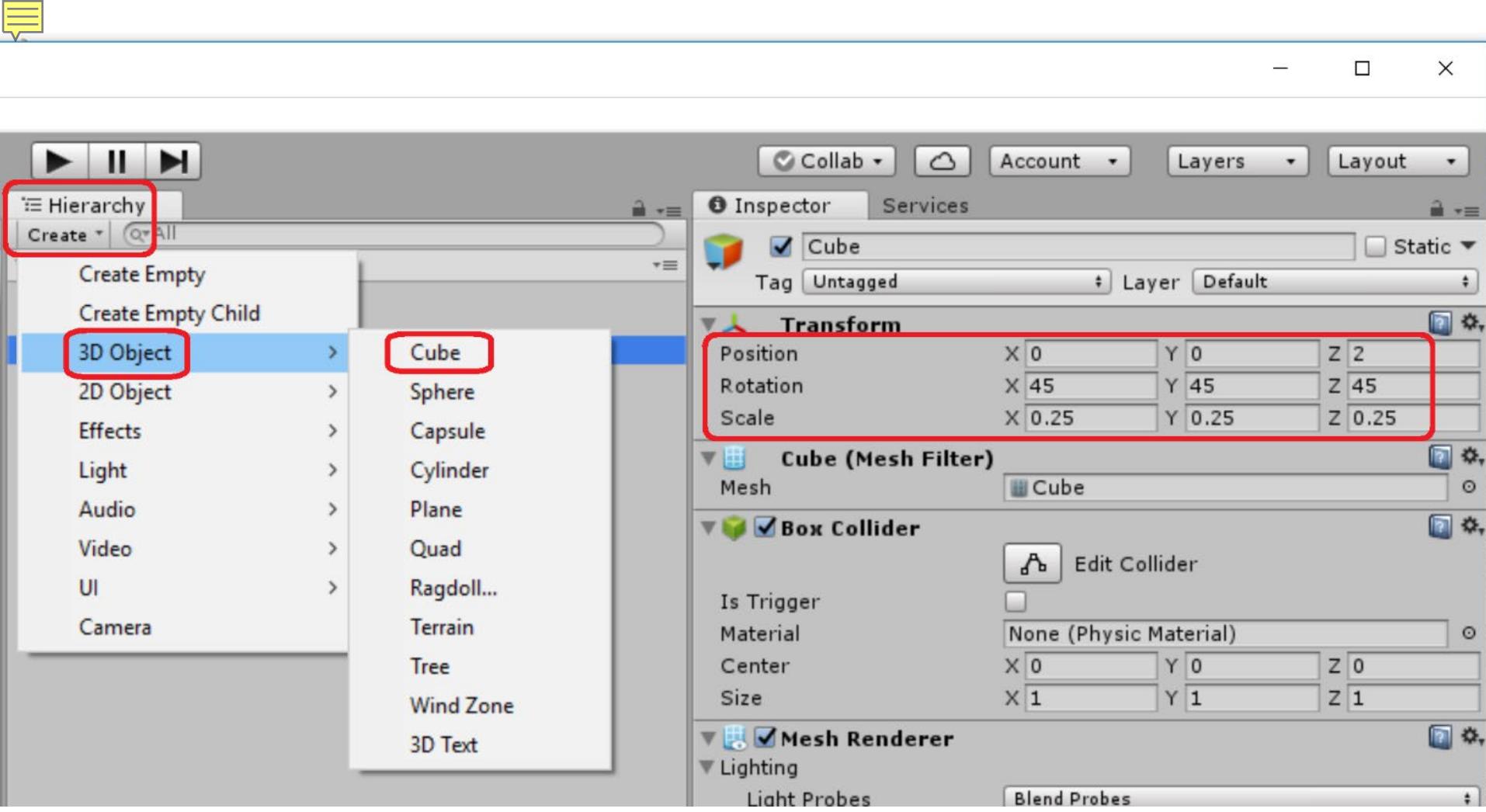
- [Configure >](#)
  - [Apply Mixed Reality Project Settings](#) Shift+Alt+P
  - [Apply Mixed Reality Scene Settings](#) Shift+Alt+S
  - [Apply UWP Capability Settings](#) Shift+Alt+C
  - [Show Help](#)
- [Sharing Service >](#)
- [UAudioTools >](#)
- [Export >](#)





# Creating a Cube

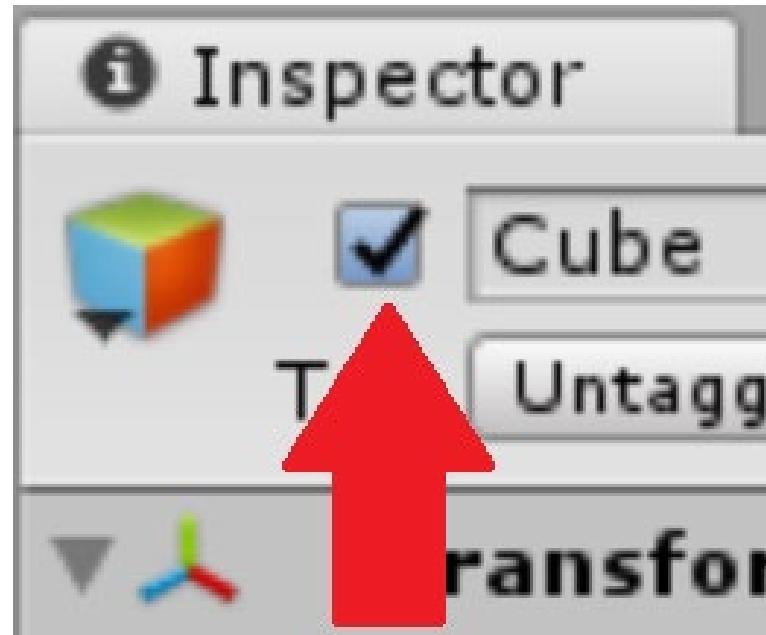
- In the **Hierarchy** panel, select the **Create** dropdown
  - **3D Object > Cube**
- Select the Cube and in Inspector find the Transform component and change:
  - **Position to (X: 0, Y: 0, Z: 2)**
  - **Rotation to (X: 45, Y: 45, Z: 45)**
  - **Scale to (X: 0.25, Y: 0.25, Z: 0.25)**





# Deactivate and Reactivate Game Objects

- Hide the Cube by unchecking the box in the Inspector window to the left of its name
  - This is the checkbox to activate or deactivate the game object in the scene
  - Objects can also be activated/deactivated in a script by using its `activeSelf` property





# Create a Script

- Select the cube in the hierarchy and go to the Inspector window and choose **Add Component** → **New Script** and title it **Rotator**
- In the project window create a **Scripts** folder to add your script into it
- Open the script in your code editor
  - You can change your editor by going to  
Edit → Preferences → External Tools
- In the Update function add the following code:  
**transform.Rotate (new Vector3 (15, 30, 45) \* Time.deltaTime);**
- File → Save Scene

Version: 2018.3 (switch to [2019.1b](#) or [2017.4](#))

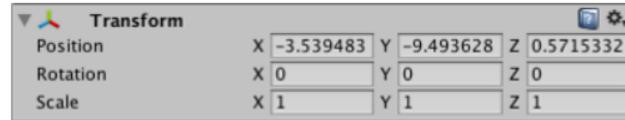
Language: English

- Scenes
- GameObjects
  - GameObject
  - Introduction to components
  - Using Components
  - Transform**
    - Creating components with scripting
    - Deactivating GameObjects
    - Tags
    - Static GameObjects
    - Saving Your Work
- + Prefabs
- + Input
- Transforms
- + Constraints
- Rotation and Orientation in Unity
- Editor

# Transform

[SWITCH TO SCRIPTING](#)[Leave feedback](#) [Other Versions](#)

The **Transform** component determines the **Position**, **Rotation**, and **Scale** of each object in the **scene**. Every **GameObject** has a Transform.



## Properties

**Property:** **Function:**

<b>Position</b>	Position of the Transform in X, Y, and Z coordinates.
-----------------	---

| **Rotation** | Rotation of the Transform around the X, Y, and Z axes, measured in degrees. |



## Scripting API

- [UnityEngine](#)
  - + [UnityEngine.Accessibility](#)
  - + [UnityEngine.Advertisements](#)
  - + [UnityEngine.AI](#)
  - + [UnityEngine.Analytics](#)
  - + [UnityEngine.Android](#)
  - + [UnityEngine.Animations](#)
  - + [UnityEngine.Apple](#)
  - + [UnityEngine.Assertions](#)
  - + [UnityEngine.Audio](#)
  - + [UnityEngine.CrashReportHandler](#)
  - + [UnityEngine.Diagnostics](#)
  - + [UnityEngine.Events](#)
  - + [UnityEngine.EventSystems](#)
  - + [UnityEngine.Experimental](#)
  - + [UnityEngine.iOS](#)
  - + [UnityEngine.Jobs](#)

# Transform

class in [UnityEngine](#) / Inherits from: [Component](#) / Implemented in: [UnityEngine.CoreModule](#)

[Other Versions](#)[Leave feedback](#)[SWITCH TO MANUAL](#)

## Description

Position, rotation and scale of an object.

Every object in a Scene has a Transform. It's used to store and manipulate the position, rotation and scale of the object. Every Transform can have a parent, which allows you to apply position, rotation and scale hierarchically. This is the hierarchy seen in the Hierarchy pane. They also support enumerators so you can loop through children using:

```
using UnityEngine;

public class Example : MonoBehaviour
{
    // Moves all transform children 10 units upwards!
    void Start()
    {
        foreach (Transform child in transform)
```



## Test your app

- Make sure the Magic Leap **ML Remote** is open
- In Unity, click Magic Leap → **Enable Zero Iteration**
- Press the Play icon in the toolbar and you will see your rotating cube





# Asset Store

- Import from the asset store
  - Tileable Pack 01



2D > Textures & Materials > Floors

MAFUBASH

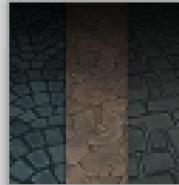
Tileable Pack 01

★★★★★ (54)

FREE

# Import Unity Package

x



## Tileable Pack 01

### ▼ Tileable\_Pack\_01

#### ▼ Materials

Brick.mat

NEW

Cracked\_Earth.mat

NEW

Fanned\_Brick.mat

NEW

Wavy\_Sand.mat

NEW

#### ▼ Textures

Brick.png

NEW

Cracked\_Earth.png

NEW

Fanned\_Brick.png

NEW

Wavy\_Sand.png

NEW

All

None

Cancel

Import



# Asset Store

- In your Project Window, open the **Tileable Pack 01** folder
  - Open the **Materials** folder
  - Select **Brick** and drag & drop onto your cube in the scene view or hierarchy window
- Press **Play** to test



2D > Textures & Materials > Floors

MAFUBASH

Tileable Pack 01

★★★★★ (54)

FREE



Version: 2018.3 (switch to [2019.1b](#) or [2017.4](#))

Language: [English](#)

 [Terrain Engine](#)

-  [Creating and editing Terrains](#)
-  [Terrain tools](#)
-  [Terrain Layers](#)
-  [Brushes](#)
-  [Trees](#)
-  [Wind Zones](#)
-  [Grass and other details](#)
-  [Working with Heightmaps](#)
-  [Terrain settings](#)
-  [Tree Editor](#)
-  [Particle Systems](#)
-  [Post-processing overview](#)
-  [Advanced Rendering Features](#)
-  [Procedural Mesh Geometry](#)
-  [Optimizing graphics performance](#)
-  [Layers](#)
-  [Graphics Reference](#)
-  [Graphics HOWTOs](#)

# Terrain Engine

[Leave feedback](#) [Other Versions](#)



Unity's Terrain system allows you to add vast landscapes to your game. At runtime, Terrain **rendering** is highly optimized for efficiency. The Unity Editor provides a selection of tools to create Terrain quickly and easily. This section explains the various



# Build Settings

- File → Build Settings...
- Build And Run
- Create a new subfolder titled “App”
- Name your project and select Save

## Build Settings

x

### Scenes In Build

Scenes/SampleScene

0

Add Open Scenes

### Platform

PC, Mac & Linux Standalone

Lumin OS

iOS

tvOS

Android

Xbox One

PS Vita

PS4

Lumin OS

Sign Package



Attach Native Debugger



Listen on Port

10000

Lumin SDK Location

C:/Users/npere/MagicLeap/



Profilable Executable



Development Build



Autoconnect Profiler



Scripts Only Build



[Learn about Unity Cloud Build](#)

Switch Platform

Player Settings...

Build

Build And Run

# Q & A



Link to Slides:

[goo.gl/o8e54h](http://goo.gl/o8e54h)