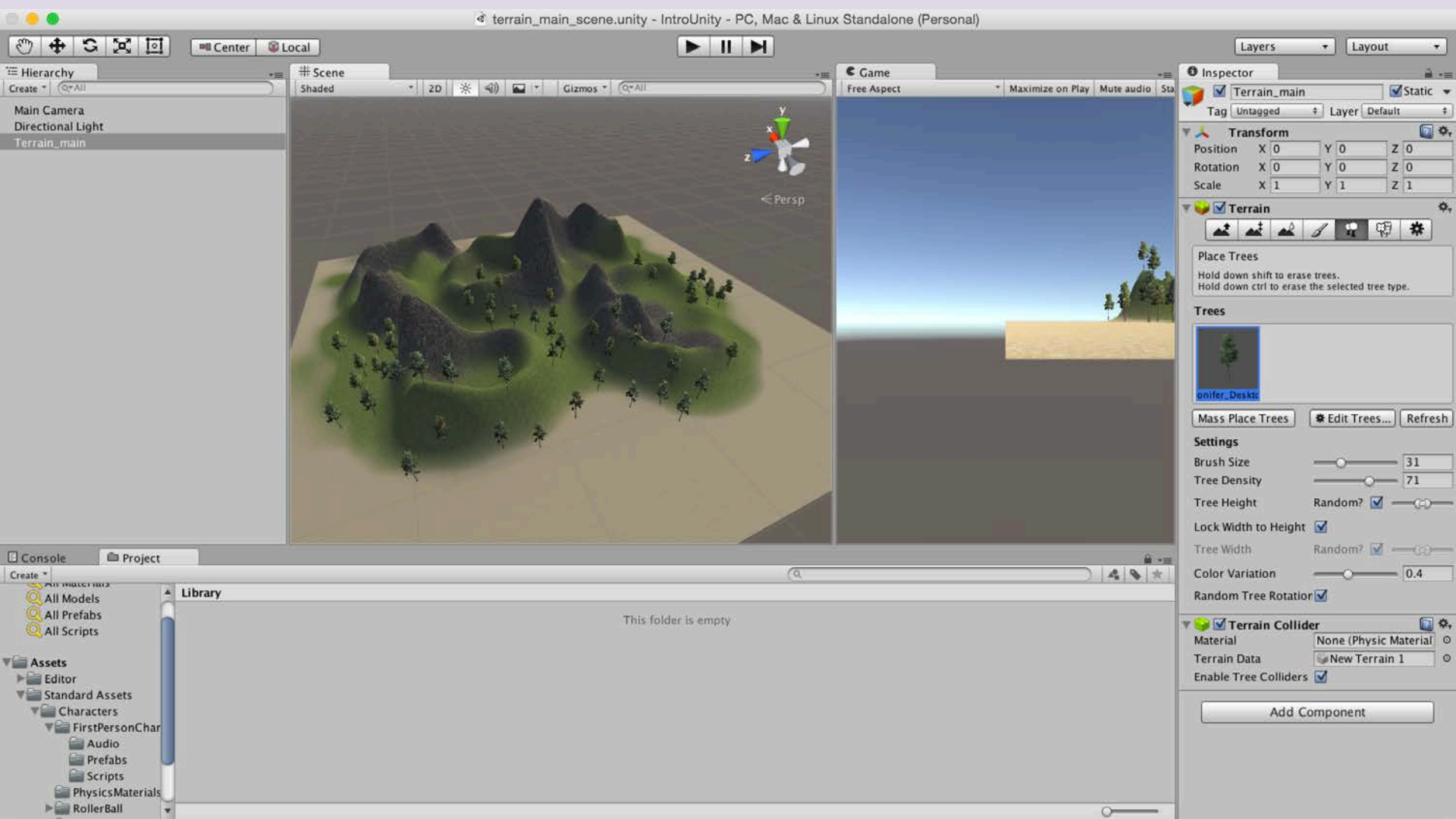

terrain_main_scene.unity - IntroUnity - PC, Mac & Linux Standalone (Personal)
Center
Local
Layers
Layout
Hierarchy
Create
Main Camera
Directional Light
Terrain_main
Scene
Shaded
2D
Gizmos
Persp
Game
Free Aspect
Maximize on Play
Mute audio
Inspector
Terrain_main
Static
Tag
Untagged
Layer
Default
Transform
Position
Rotation
Scale
Terrain
Place Trees
Hold down shift to erase trees.
Hold down ctrl to erase the selected tree type.
Trees
Mass Place Trees
Edit Trees...
Refresh
Settings
Brush Size
Tree Density
Tree Height
Random?
Lock Width to Height
Tree Width
Color Variation
Random Tree Rotation
Terrain Collider
Material
None (Physic Material
Terrain Data
New Terrain 1
Enable Tree Colliders
Add Component
Console
Project
All Models
All Prefabs
All Scripts
Assets
Editor
Standard Assets
Characters
FirstPersonChar
Audio
Prefabs
Scripts
PhysicsMaterials
RollerBall
Library
This folder is empty

Textures

Textures should be in the following format to enable ‘tiling’

Square and the power of two

128 x 128
256 x 256
512 x 512
1024 x 1024

Shaders control the rendering characteristics of textured surface

Prefabs

pre-fabricated objects

Prefabs store a game object together with its components (transforms, appearances, scripts, etc.) and configurations for easy duplication/reuse.

- trees
- bullets
- characters, and anything else

Unity makes it easy to move around a world interactively (either in a first person or third person perspective) using prefabs.

Prefabs

Object-oriented instances can be Instantiated at run time

At run time a script can cause a new object instance to be created (instantiated) at a given location with a given set of properties

Prefabs allow functional game objects to be reused in scenes or imported into other projects as external assets.

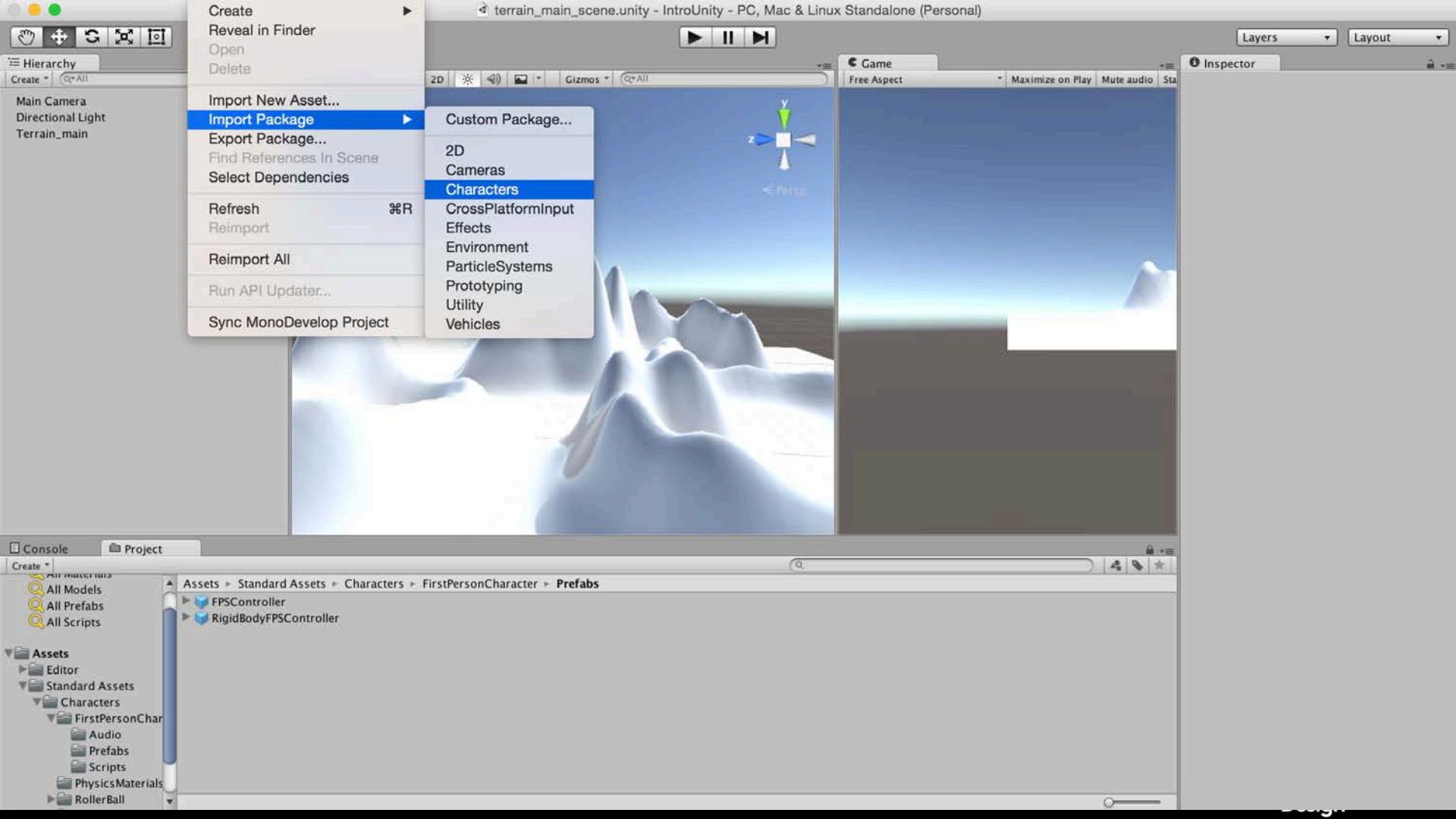
The First Person Controller

First Person Controller

20. Assets > Import Package > Character Controller

Project Window > Standard Assets folder
FP Character > Prefabs > FPController
drag the FP Controller onto your scene
delete the main camera
Preview the game

explore the terrain / look around with your mouse
move with WASD or the arrow keys / jump with the space bar


terrain_main_scene.unity - IntroUnity - PC, Mac & Linux Standalone (Personal)
Create
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Delete
Import New Asset...
Import Package
Export Package...
Find References In Scene
Select Dependencies
Refresh ⌘R
Reimport
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Run API Updater...
Sync MonoDevelop Project
Custom Package...
2D
Cameras
Characters
CrossPlatformInput
Effects
Environment
ParticleSystems
Prototyping
Utility
Vehicles
Hierarchy
Main Camera
Directional Light
Terrain_main
Game
Free Aspect
Maximize on Play
Mute audio
Inspector
Console
Project
Assets ▸ Standard Assets ▸ Characters ▸ FirstPersonCharacter ▸ Prefabs
FPSController
RigidBodyFPSController
All Models
All Prefabs
All Scripts
Assets
Editor
Standard Assets
Characters
Audio
Prefabs
Scripts
PhysicsMaterials
RollerBall

Scripting

MONO compiler

Scripts can be written in

- JavaScript
  - Majority of introductory tutorials are written in Javascript
- C#
  - Unity can be integrated with the Microsoft Visual Studio editor, to get full benefits of code completion, source version control, intergration, serious developers work in C#
- BOO (like Python)
  - Smaller development in this

Scripting

scripting is Unity's most powerful tool

gives you the ability to customize objects

control how they behave in the environment

- how to create and attach JavaScript scripts to objects in Unity
- Intro to the development environment MonoDevelop
    - Variables
    - Functions
    - Triggers
    - Collisions
    - Sounds
    - Colors

JavaScript vs C#

JavaScript

```
#pragma strict

var myInt : int = 5;
function Start ()
{
    myInt = MultiplyByTwo(myInt);
    Debug.Log (myInt);
}
```

C#

```
using UnityEngine;
using System.Collections;

public class
    VariablesAndFunctions :
    MonoBehaviour
{
    int myInt = 5;
    void Start ()
    {
        myInt = MultiplyByTwo(myInt);
        Debug.Log (myInt);
    }
```

Scripting

You can use both C# and Javascript in one project!
(one way communication only)

My Scripts Folder (Outside)
(Compiled last)

Script
Script
script

JavaScript

Standard Assets
(Compiled first)

Script
Script
Script

C#

JavaScript Variables

- A variable is a storage location and an associated symbolic name (an identifier) which contains some known or unknown quantity or information, a value

- variables are used to store information about any aspects of a project's state

JavaScript Variables

begin with a lowercase letter

no special characters, numbers, (#, %, etc.)

cannot contain reserved keywords such as “if”, “while”, etc.

case sensitive

descriptive

no spaces

Declaration/ Type/ Initialization

```
var  myVarBool : boolean = true;
var  myVarInt : int = 10;
```

Data Types

Float	0.75
Int	10
String	“Hello”
Boolean	true / false

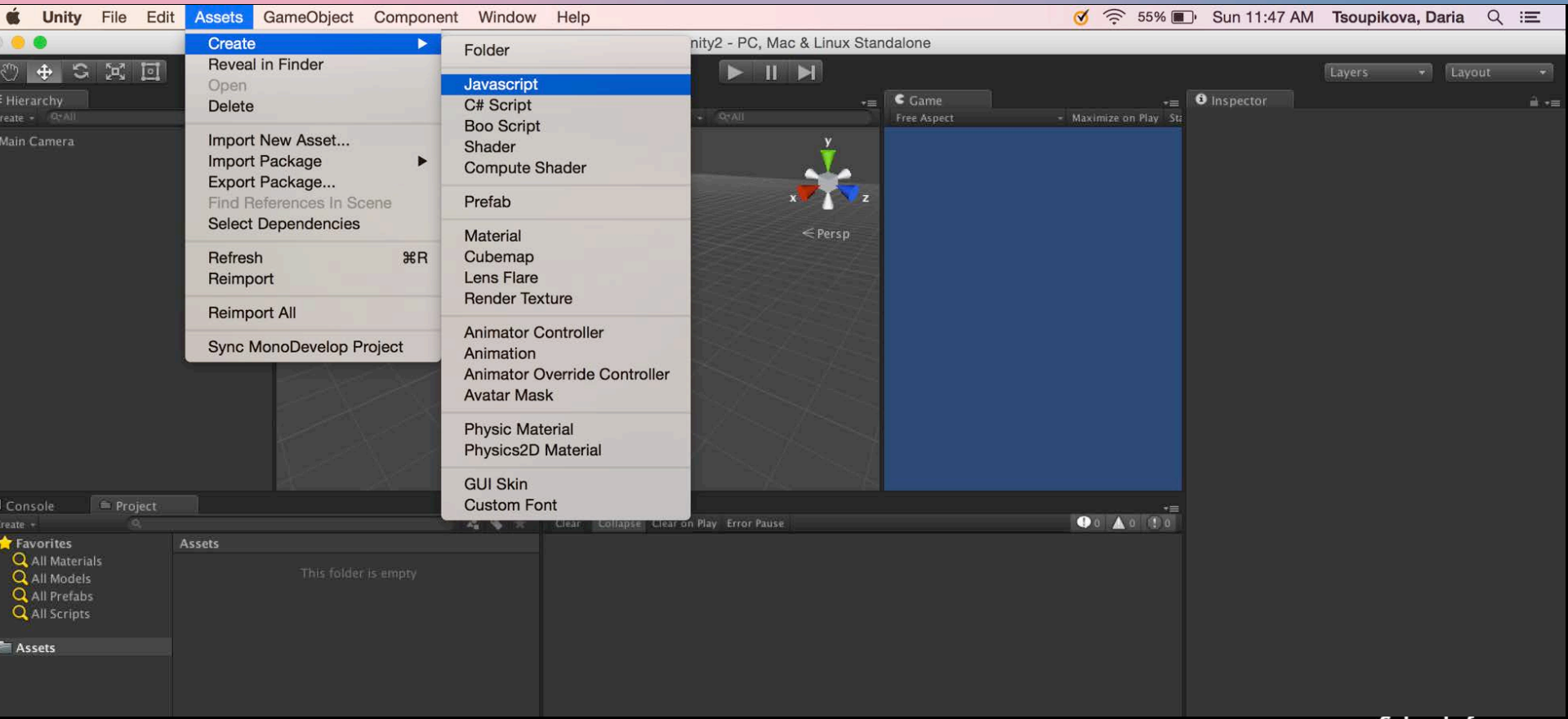
```
var  myVarBool : boolean = true;
var  myVarInt : int = 10;
Var myFloat :  float = 1.4;
```

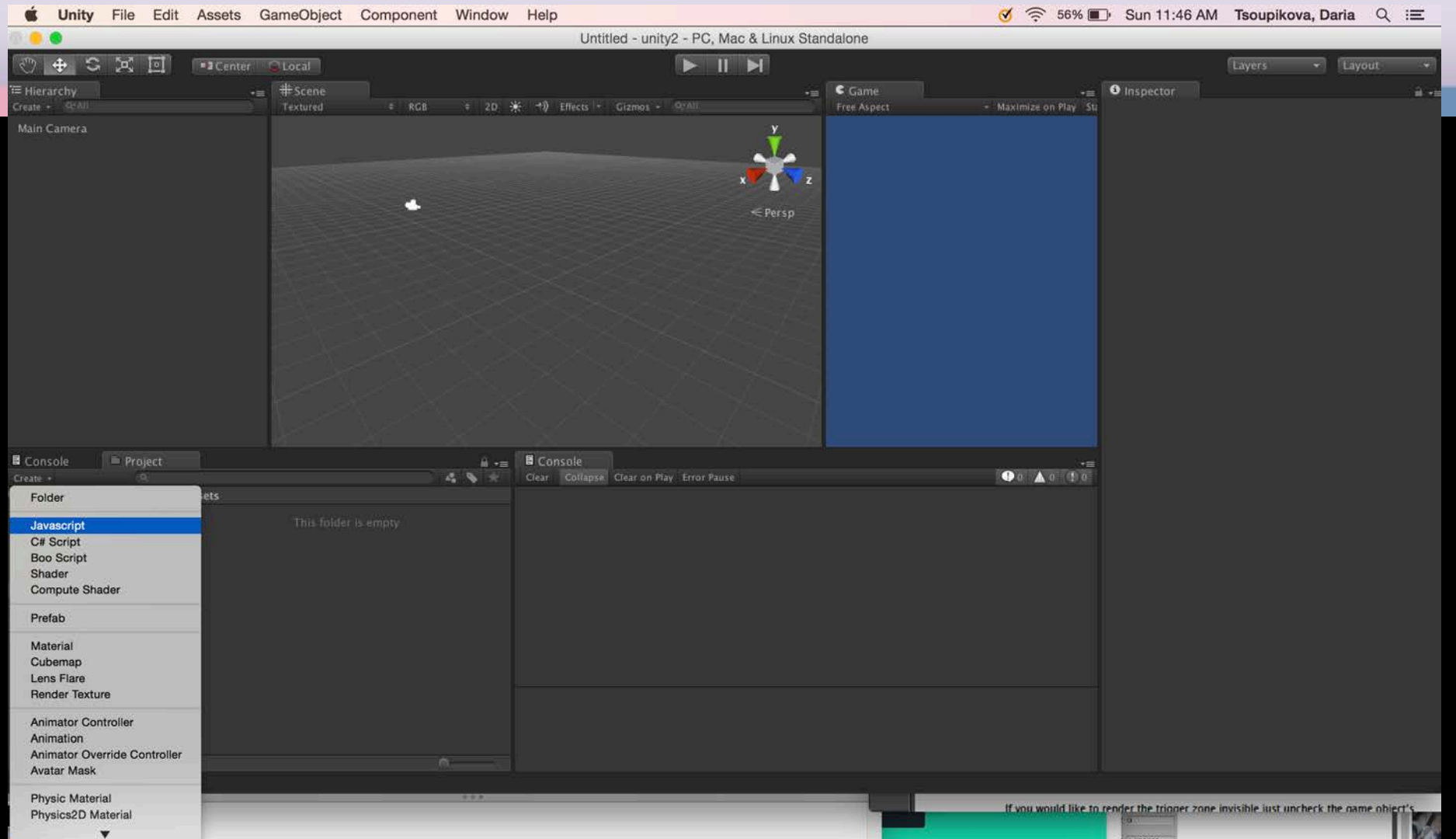
Creating scripts in Unity

- Project menu >Create > JavaScript
- Main Menu > Assets > Create Javascript
- Project window >RMC > Create > JavaScript
- Inspector >Add script
- Name the script in the Project/Assets window

- Assign the script to an object (drag and drop)
- Run and test
- Fix compiler errors

Creating scripts in Unity




Unity File Edit Assets GameObject Component Window Help
56% Sun 11:46 AM Tsoupikova, Daria
Untitled - unity2 - PC, Mac & Linux Standalone
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Hierarchy
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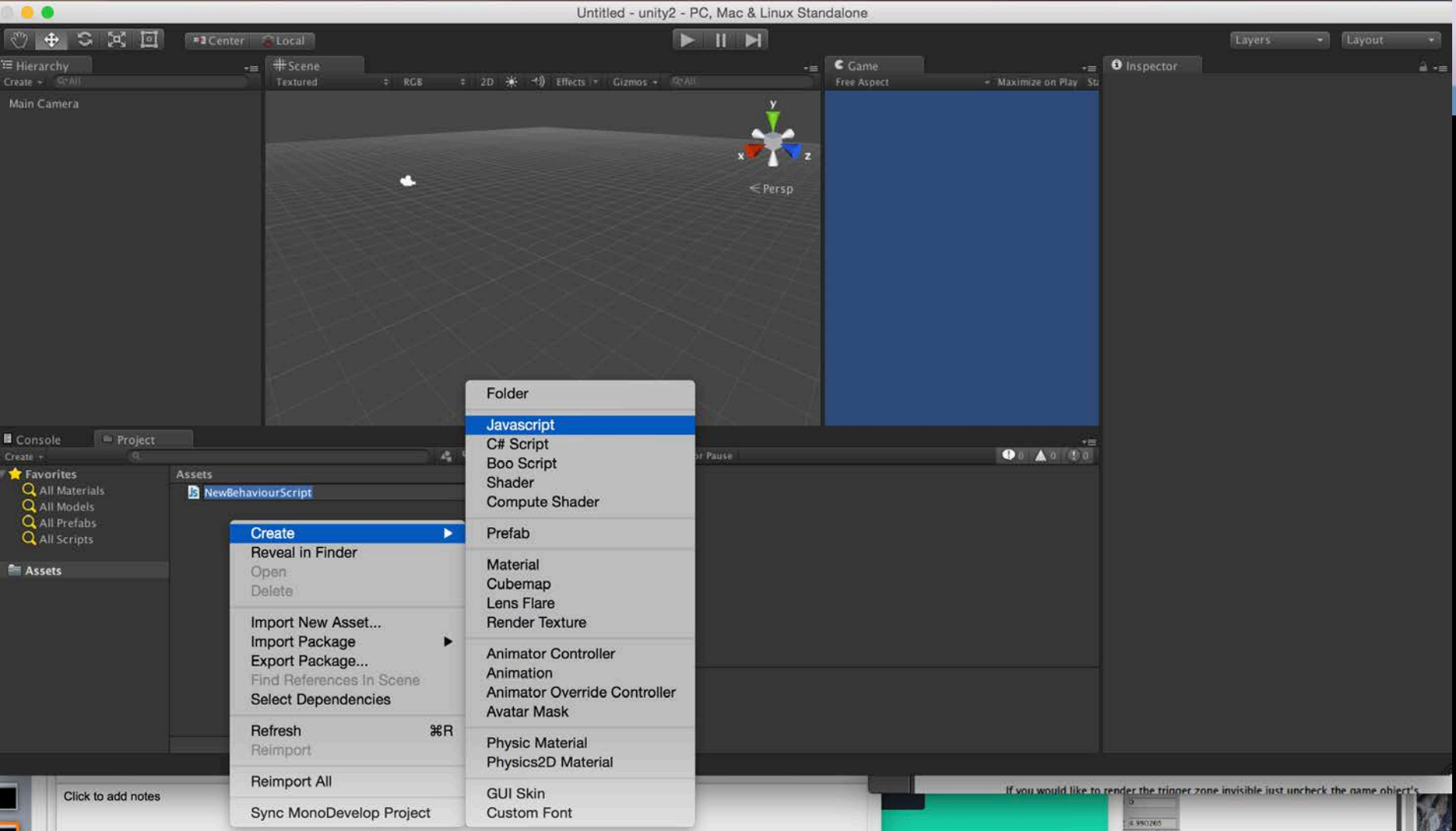
Javascript
C# Script
Boo Script
Shader
Compute Shader
Prefab
Material
Cubemap
Lens Flare
Render Texture
Animator Controller
Animation
Animator Override Controller
Avatar Mask
Physic Material
Physics2D Material
This folder is empty
Console
Clear Collapse Clear on Play Error Pause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Lens Flare
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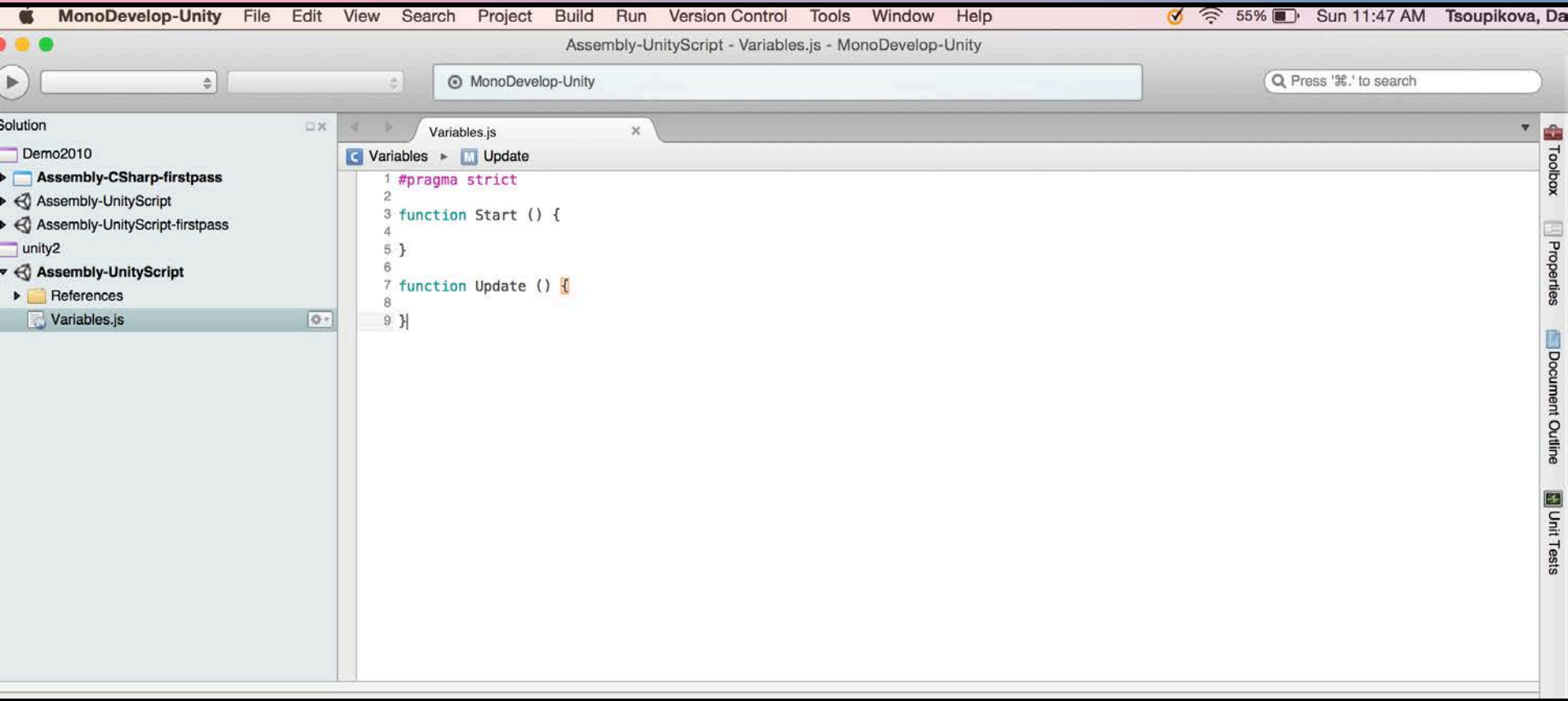
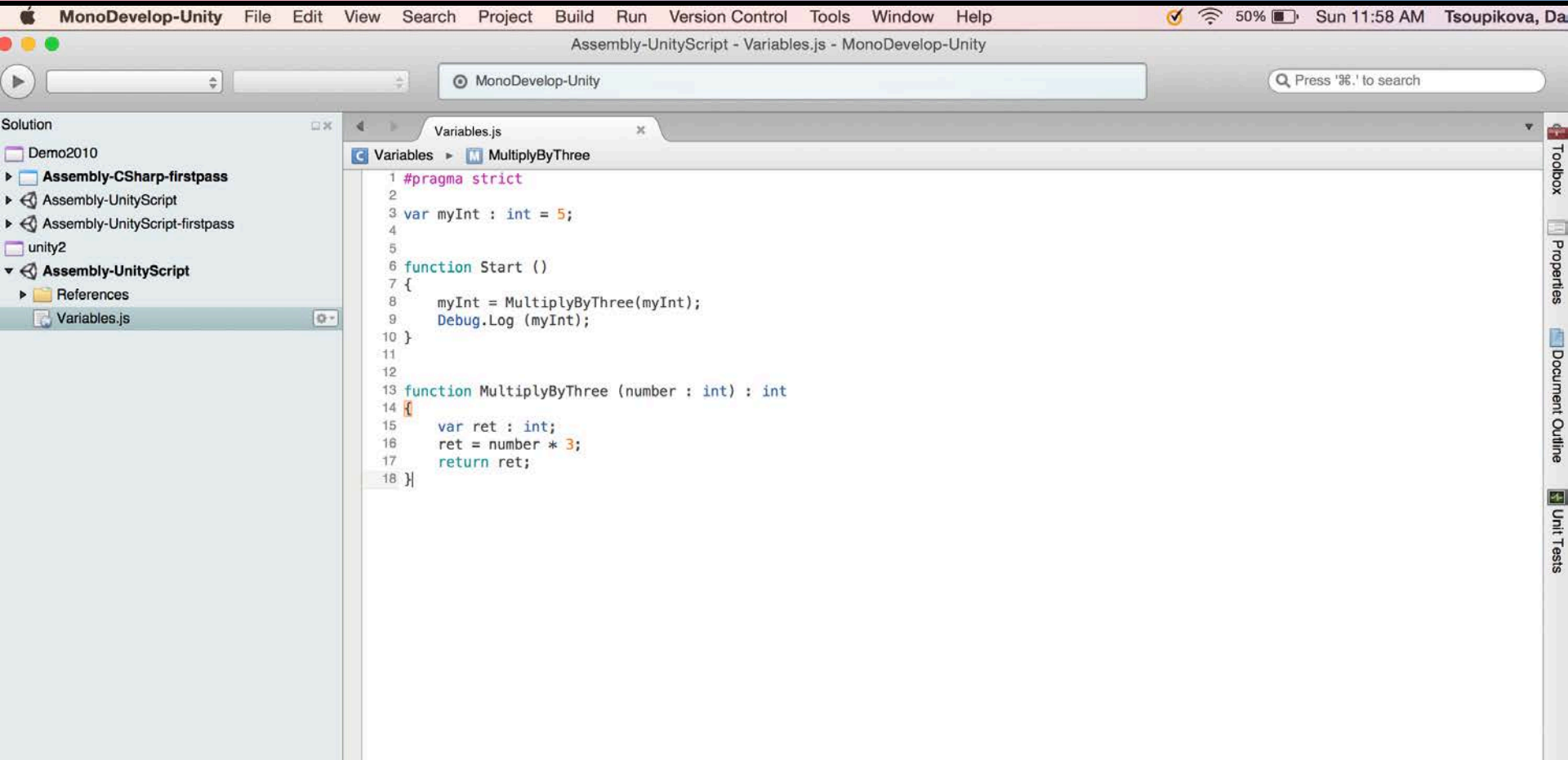
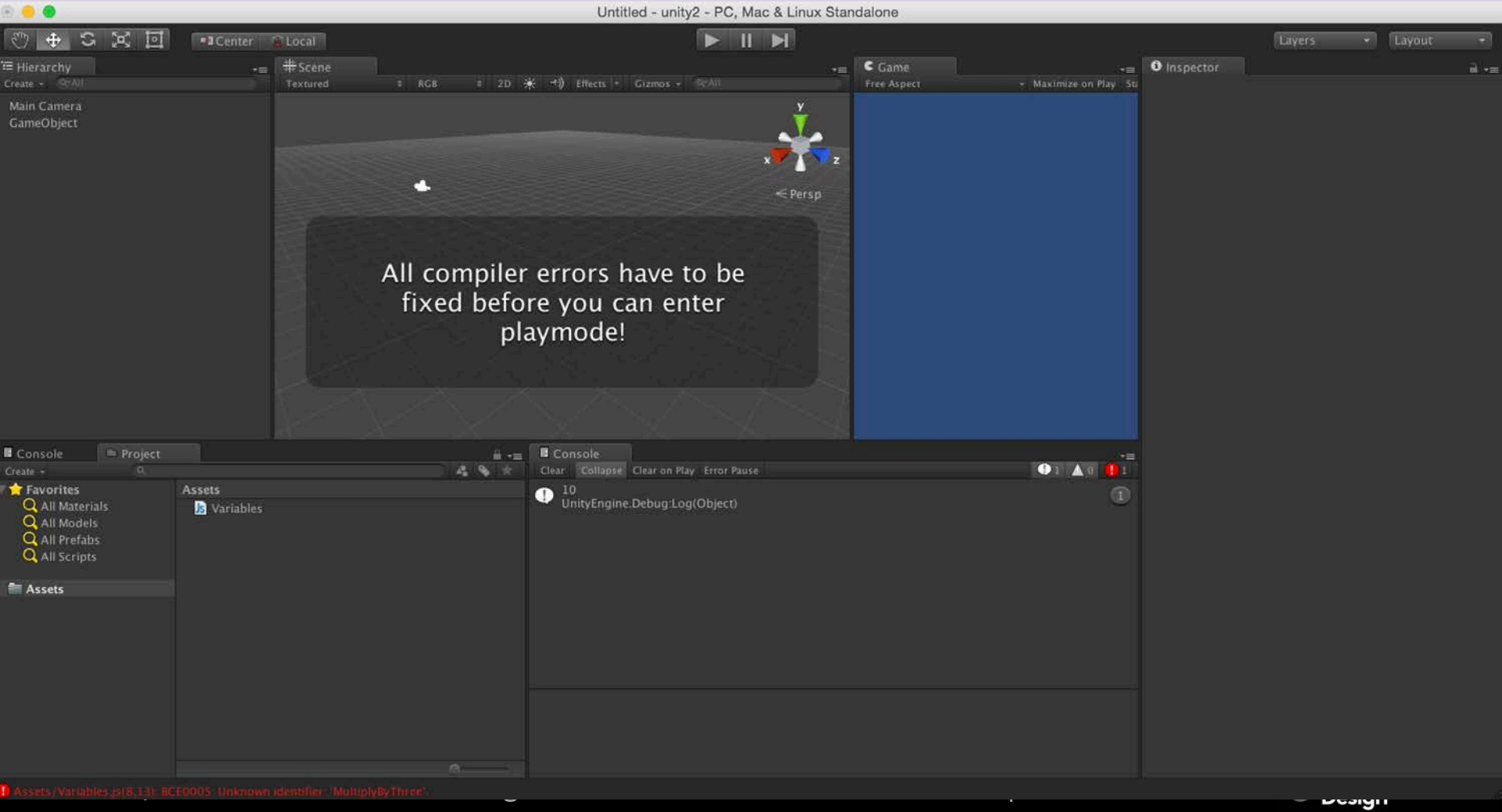
Animation
Animator Override Controller
Avatar Mask
Physic Material
Physics2D Material
GUI Skin
Custom Font
Click to add notes

Creating scripts in Unity



Creating scripts in Unity

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All compiler errors have to be fixed before you can enter playmode!
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Maximize on Play
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All Models
All Prefabs
All Scripts
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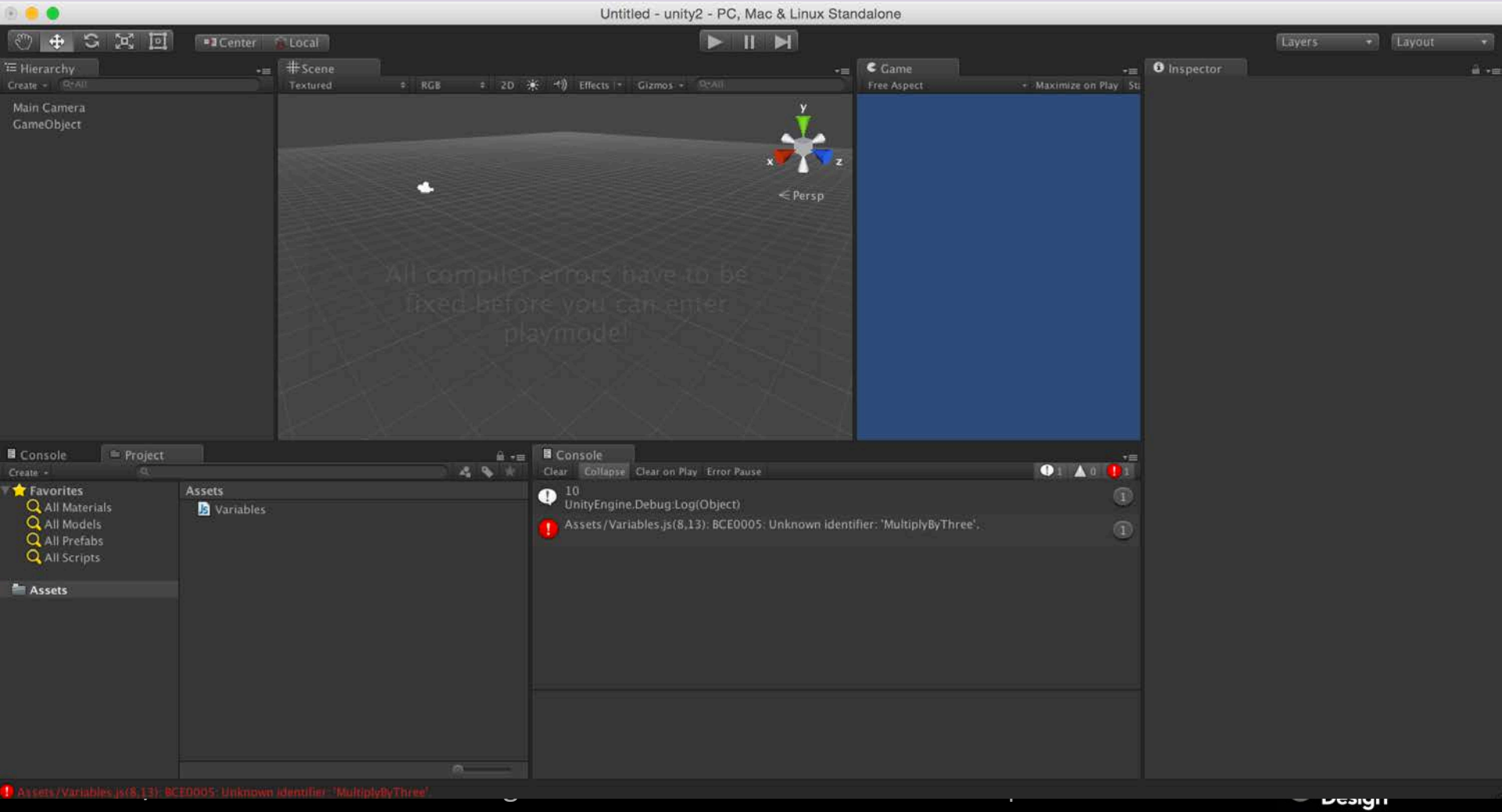
UnityEngine.Debug:Log(Object)
Assets/Variables.js(8,13): BCE0005: Unknown identifier: 'MultiplyByThree'.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10
UnityEngine.Debug:Log(Object)
Assets/Variables.js(8,13): BCE0005: Unknown identifier: 'MultiplyByThree'.
Assets/Variables.js(8,13): BCE0005: Unknown identifier: 'MultiplyByThree'

Functions

Function is a collection of statements to perform a task

Methods

Functions are blocks of code which are
written once and can then be reused as often as needed.

begin with an uppercase letter

```
function FuncName ()
        {
                statement1;
                statement 2;
        }
```

JavaScript Functions

Calling a function:

```
FuncName ();
```

```
myInt = MultiplyByThree(myInt);
```

Function Parameters

```
function MultiplyByThree (number : int) : int
{
    var ret : int;
    ret = number * 3;
    return ret;
}
```

Calling a function – myInt = MultiplyByThree(myInt);

Functions

Default functions

Start ()

executed only once before gameplay begins

helpful for initialization

Update()

executed every frame

for as long as the gameplay continues

Functions

Collections of tasks
Methods
Functions are blocks of code which are
written once and can then be reused as often as needed.
begin with an uppercase letter

```
function Start ()
{
myInt = MultiplyByThree(myInt);
Debug.Log (myInt);
}
```

Functions

```
var myInt : int = 5;

function Start ()
{
    myInt = MultiplyByThree(myInt);
    Debug.Log (myInt);
}
function MultiplyByThree (number : int) : int
{
    var ret : int;
    ret = number * 3;
    return ret;
}
```

Arithmetic Operators

+	addition
-	subtraction
/	division
*	multiplication
++	increment
--	decrement
%	modulus

Functions

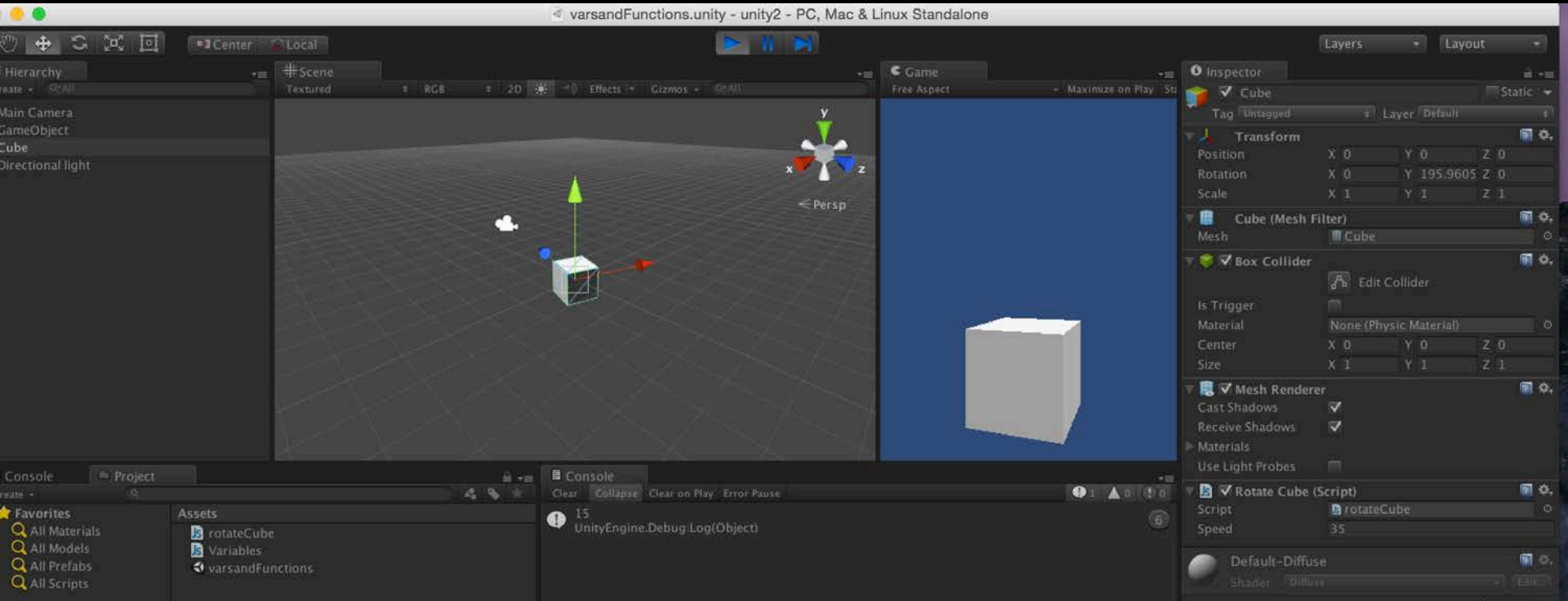
1) Create 3D object cube
2) create new Javascript “rotateCube”
3) Assign the script to the cube (drag and drop)

```
#pragma strict
var speed = 5.0;

function Start () {
}

function Update () {
transform.Rotate(0, speed*Time.deltaTime, 0);
}
```

Functions

4) Change the value of var speed in the Inspector window (35)

5) Play and test



Triggers and Collisions

Triggers are methods to detect collisions

Triggers are useful for triggering other events in your project

- teletransportations
- automatic door openings
- displaying messages
- changing levels
- responsive events
- and many more

Triggers and Collisions

4) select the game object in the Hierarchy window

click on the little gear on the top right corner of the script property select “remove component”

5) Create new script “triggerScript”

```
var target : collider;
 function OnTriggerEnter(cubeTrigger : collider)
{
if (cubeTrigger == target)
{
print("Collision");
}
}
```

Triggers and Collisions

6) Assign script to our cube
7) Check property "Is Trigger" in the Inspector
8) Create 3D plane
9) Import Character Controller Package
10) Drag FPC controller to the scene
11) Drag and drop the FPC from the Hierarchy window onto the variable Target in the Inspector

Triggers and Collisions

checks if the position of the FPC
intersects with the position of the trigger zone (the cube)
prints out “Collision”

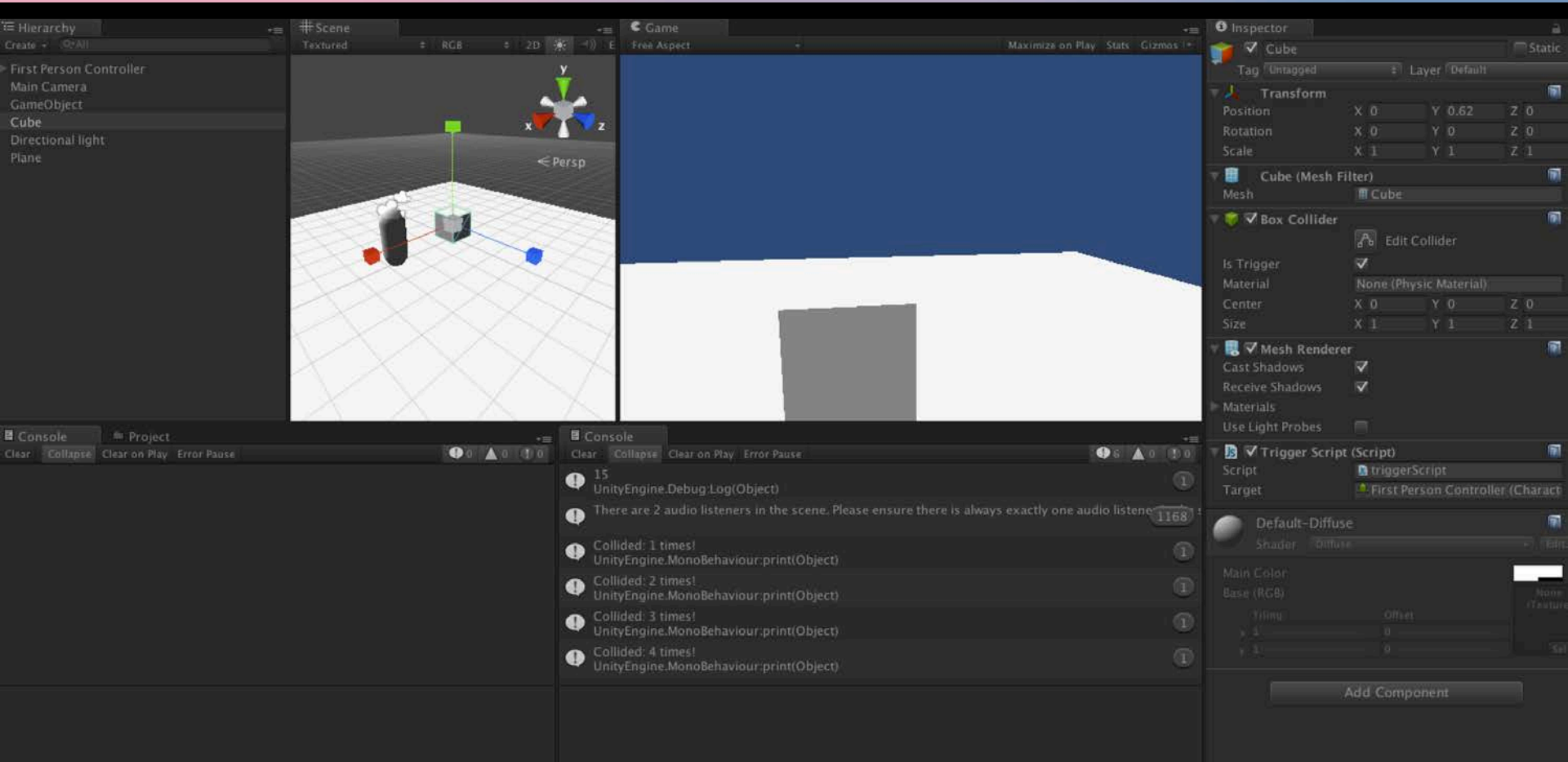
Triggers and Collisions

To add a counter to collision

Checks how many times collision happened

```
var target : Collider;
private var counter : int = 0;

 function OnTriggerEnter(cubeTrigger : Collider)
{
if (cubeTrigger == target)
{
counter = counter + 1;
print("Collided: " + counter + " times!");
}}
```

Triggers and Collisions



Triggers and Collisions

to create an invisible trigger zone

Select the object >
Inspector > remove Mesh Renderer Component

The object will be invisible but still allow collision detection

Sounds

Supported Audio Formats

MPEG layer 3 .mp3
Ogg Vorbis .ogg
Microsoft Wave .wav
Audio Interchange File Format .aiff / .aif
Ultimate Soundtracker module .mod
Impulse Tracker module .it
Scream Tracker module .s3m
FastTracker 2 module .xm

Sounds

13) Import new Asset (sound effect/s)

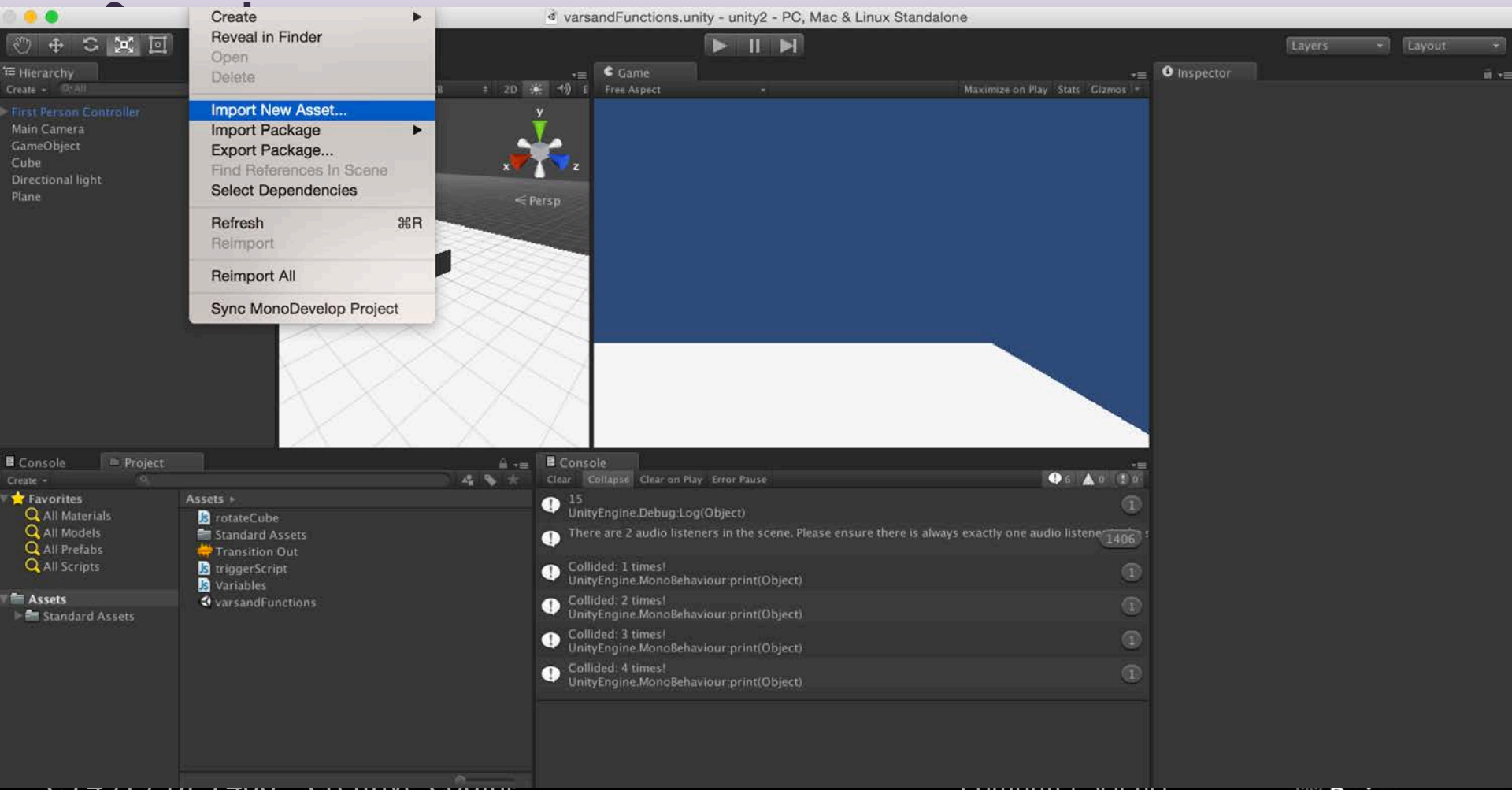
14) Add Audio Source to the Cube (Inspector>Add Component >Audio Source)

15) Uncheck button “Play On Awake”

16) Drag sound effect to the Inspector > Trigger Script >My sound

Sounds

```
var target : Collider;
private var counter : int = 0;
var mySound : AudioClip;

 function OnTriggerEnter(cubeTrigger : Collider)
{
if (cubeTrigger == target)
{
audio.PlayOneShot(mySound);
counter = counter + 1;
print("Collided: " + counter + " times!");
}
}
```


Create
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Import New Asset...
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varsandFunctions.unity - unity2 - PC, Mac & Linux Standalone
Hierarchy
First Person Controller
Main Camera
GameObject
Cube
Directional light
Plane
Game
Free Aspect
Maximize on Play
Stats
Gizmos
Persp
Inspector
Console
Project
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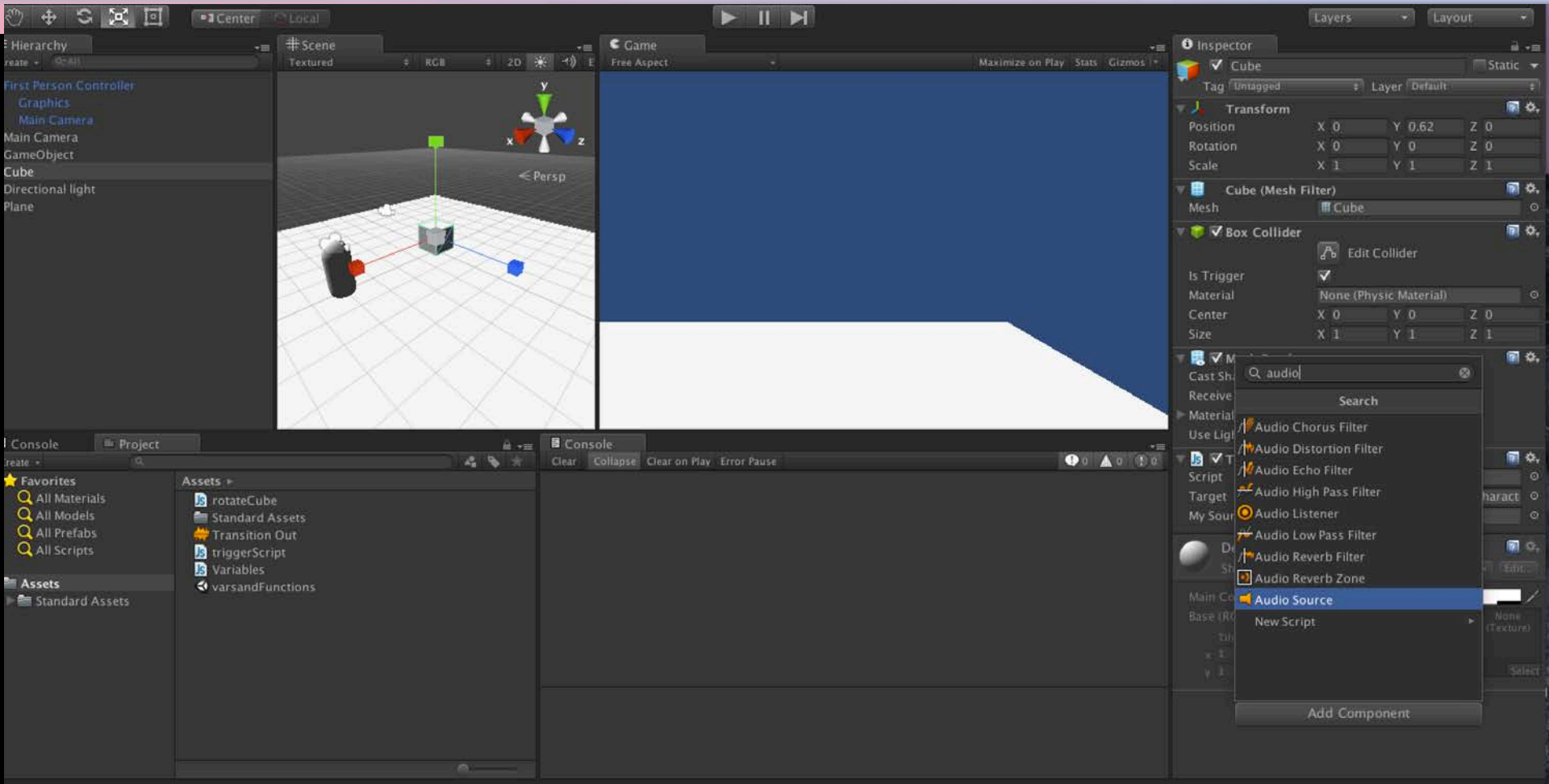
All Materials
All Models
All Prefabs
All Scripts
Assets
Standard Assets
rotateCube
Standard Assets
Transition Out
triggerScript
Variables
varsandFunctions
Clear
Collapse
Clear on Play
Error Pause
15
UnityEngine.Debug:Log(Object)
There are 2 audio listeners in the scene. Please ensure there is always exactly one audio listene
1406
Collided: 1 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 2 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 3 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 4 times!
UnityEngine.MonoBehaviour:print(Object)

Sounds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Main Camera
Main Camera
GameObject
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Directional light
Plane
Scene
Persp
Game
Free Aspect
Inspector
Cube
Transform
Position
Rotation
Scale
Cube (Mesh Filter)
Mesh
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
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Audio Chorus Filter
Audio Distortion Filter
Audio Echo Filter
Audio High Pass Filter
Audio Listener
Audio Low Pass Filter
Audio Reverb Filter
Audio Reverb Zone
Audio Source
New Script
Add Component
Console
Project
Favorites
All Materials
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All Scripts
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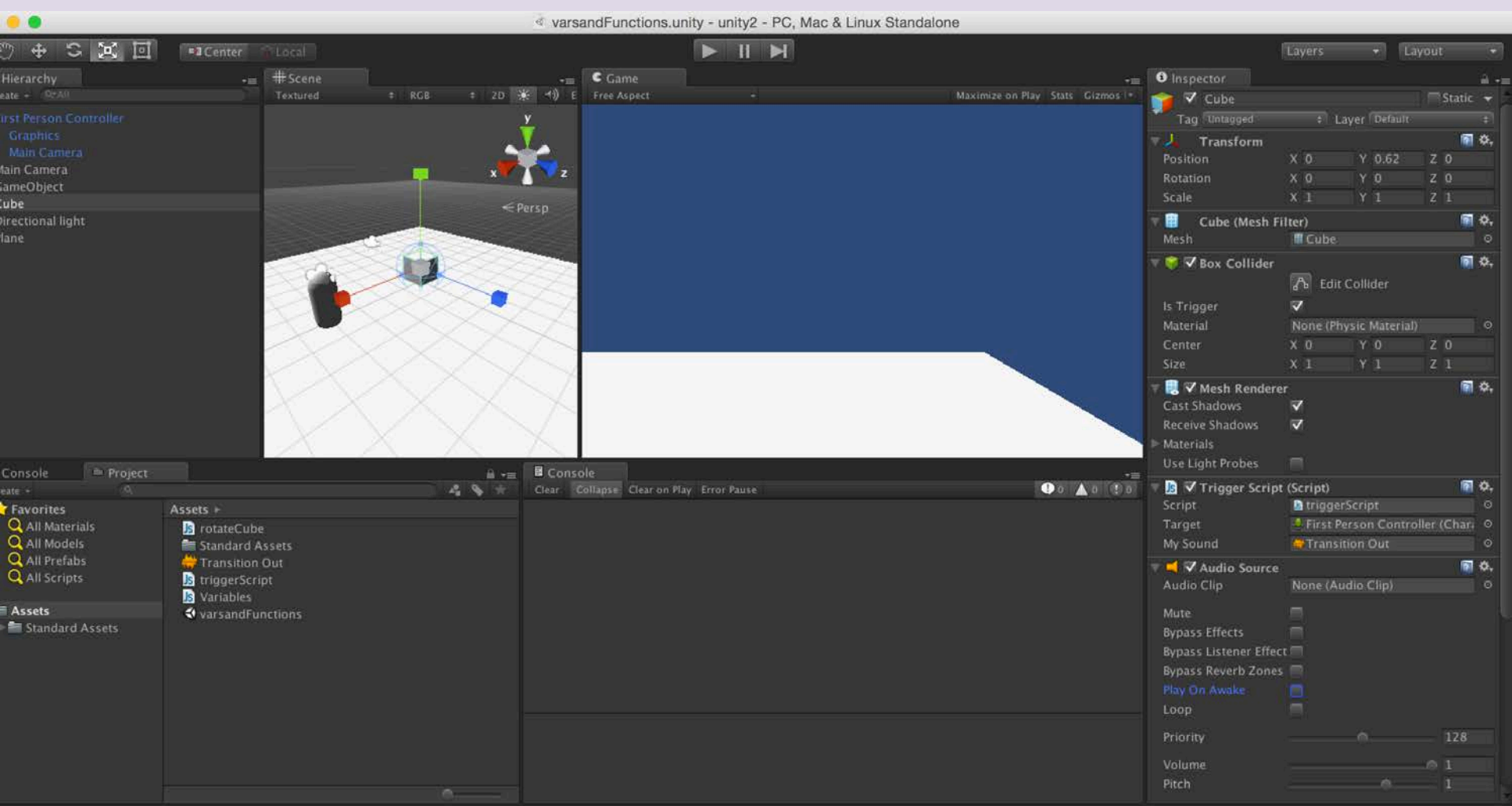
Standard Assets
Transition Out
triggerScript
Variables
varsandFunctions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Cube
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Untagged
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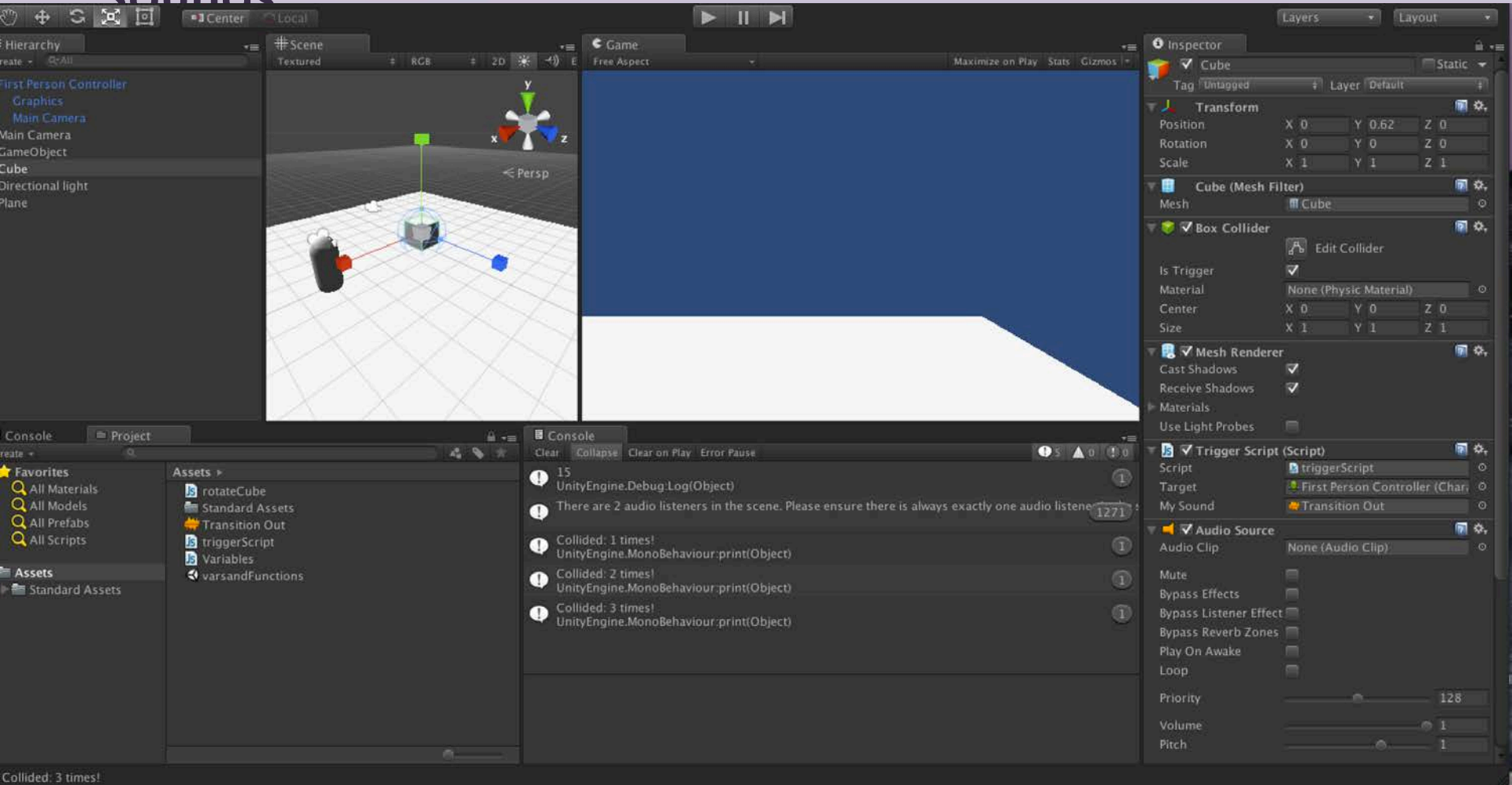
Rotation
Scale
Cube (Mesh Filter)
Mesh
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
Center
Size
Mesh Renderer
Cast Shadows
Receive Shadows
Materials
Use Light Probes
Trigger Script (Script)
Script
triggerScript
Target
First Person Controller (Chara
My Sound
Transition Out
Audio Source
Audio Clip
None (Audio Clip)
Mute
Bypass Effects
Bypass Listener Effect
Bypass Reverb Zones
Play On Awake
Loop
Priority
128
Volume
Pitch
Console
Project
Favorites
All Materials
All Models
All Prefabs
All Scripts
Assets
Standard Assets
rotateCube
Transition Out
triggerScript
Variables
varsandFunctions
Clear
Collapse
Clear on Play
Error Pause

Sounds


Hierarchy
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Main Camera
Main Camera
GameObject
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Stats
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Inspector
Cube
Static
Tag
Untagged
Layer
Default
Transform
Position
Rotation
Scale
Cube (Mesh Filter)
Mesh
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
Center
Size
Mesh Renderer
Cast Shadows
Receive Shadows
Materials
Use Light Probes
Trigger Script (Script)
Script
triggerScript
Target
First Person Controller (Char
My Sound
Transition Out
Audio Source
Audio Clip
None (Audio Clip)
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Bypass Listener Effect
Bypass Reverb Zones
Play On Awake
Loop
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Assets
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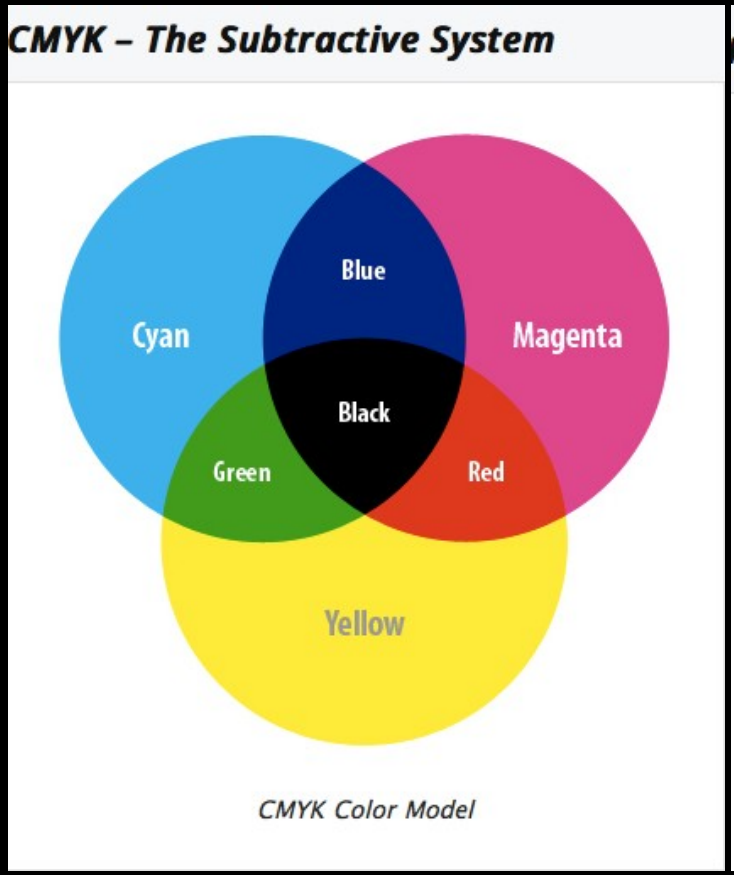
1271
Collided: 1 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 2 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 3 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 3 times!

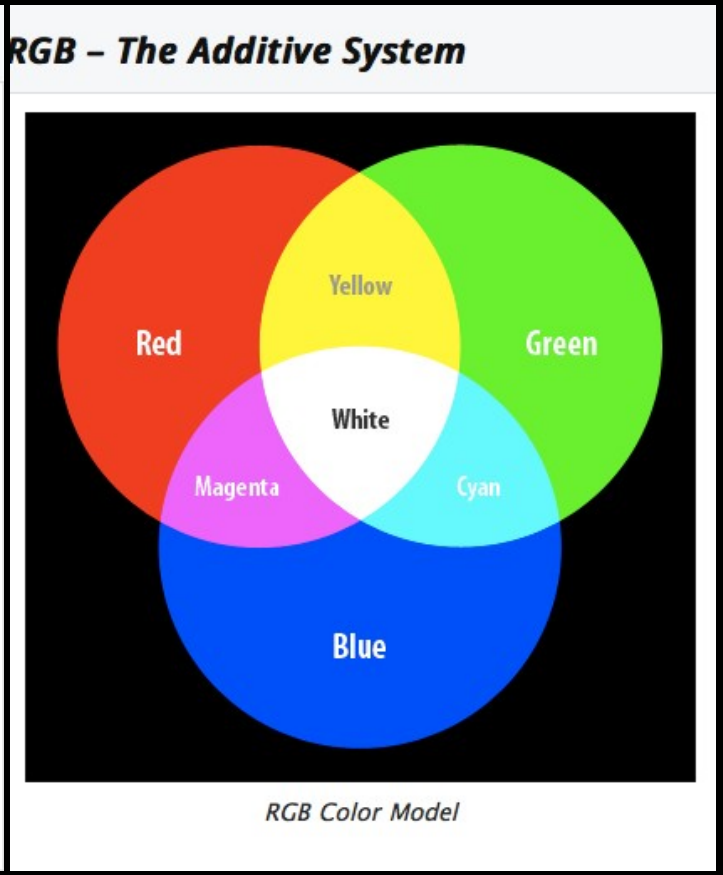
Colors

17) Create new material and add trasnparent/diffuse shader
18) Add material to the cube
19) Modify the script to add new material:

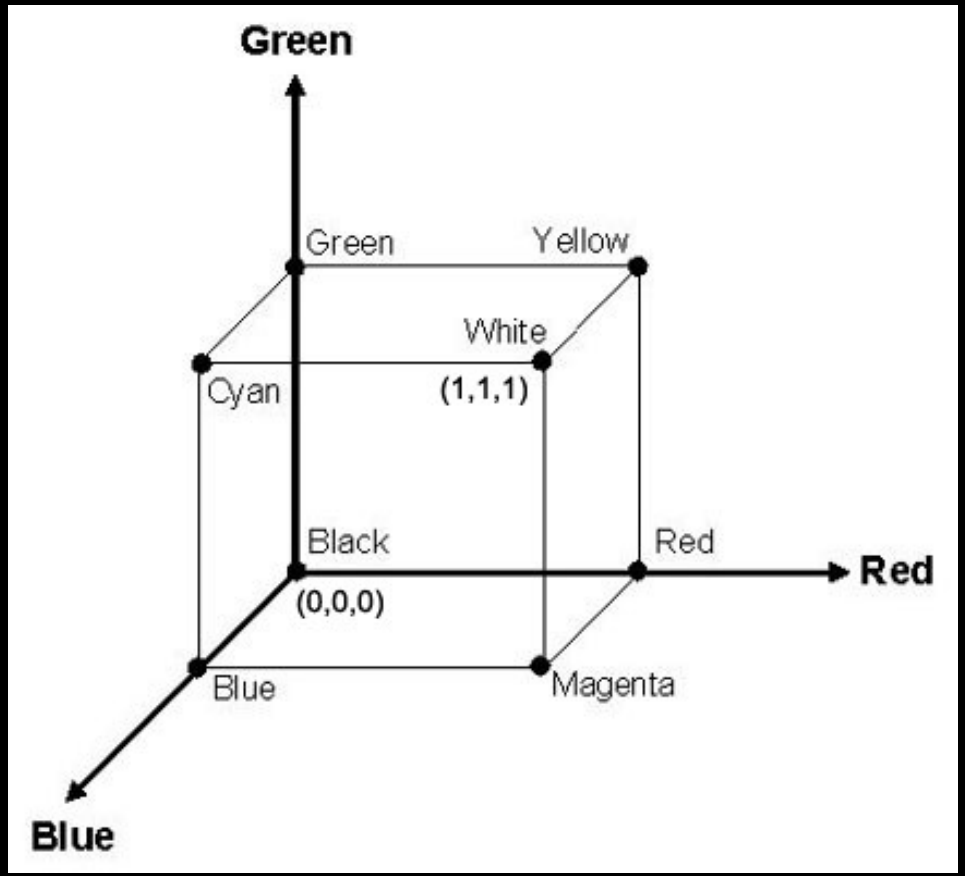
```
private var orange : Color = Color(0.8, 0.4, 0.0, 0.3);

renderer.material.color = orange;
```

Color Systems





Color Cube


Green
Green
Yellow
White
Cyan
(1,1,1)
Black
Red
Red
(0,0,0)
Blue
Magenta
Blue

RGBA Color

Representation of RGBA colors

Values for red, green, blue and alpha are floating point values with a range from 0 to 1

Alpha component (a) defines transparency

alpha of 1 is completely opaque, alpha of zero is completely transparent

Black RGBA is (0, 0, 0, 1)

blue RGBA is (0, 0, 1, 1)

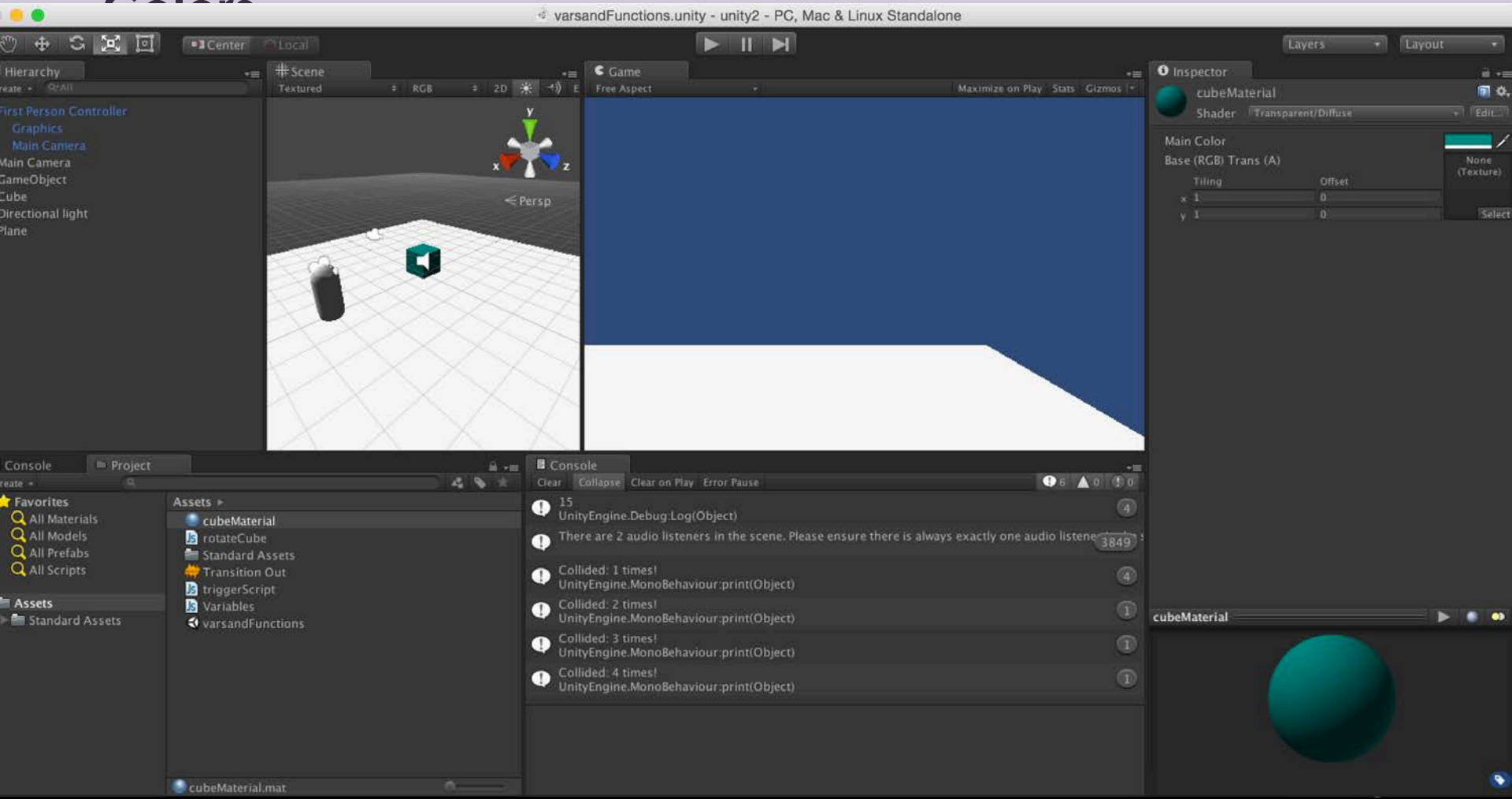
Gray RGBA is (0.5, 0.5, 0.5, 1)

Clear Completely transparent. RGBA is (0, 0, 0, 0)

RGBA Color

Black RGBA is (0, 0, 0, 1)
 blue RGBA is (0, 0, 1, 1)
Gray RGBA is (0.5, 0.5, 0.5, 1)
Clear Completely transparent. RGBA is (0, 0, 0, 0)

Magenta?
Yellow?
cyan?


varsandFunctions.unity - unity2 - PC, Mac & Linux Standalone
Center
Local
Layers
Layout
Hierarchy
First Person Controller
Graphics
Main Camera
Main Camera
GameObject
Cube
Directional light
Plane
Scene
Textured
RGB
2D
Persp
Game
Free Aspect
Maximize on Play
Stats
Gizmos
Inspector
cubeMaterial
Shader
Transparent/Diffuse
Edit...
Main Color
Base (RGB) Trans (A)
None (Texture)
Tiling
Offset
Select
Console
Project
Favorites
All Materials
All Models
All Prefabs
All Scripts
Assets
Standard Assets
Assets
cubeMaterial
rotateCube
Standard Assets
Transition Out
triggerScript
Variables
varsandFunctions
cubeMaterial.mat
Console
Clear
Collapse
Clear on Play
Error Pause
15
UnityEngine.Debug:Log(Object)
There are 2 audio listeners in the scene. Please ensure there is always exactly one audio listene
3849
Collided: 1 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 2 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 3 times!
UnityEngine.MonoBehaviour:print(Object)
Collided: 4 times!
UnityEngine.MonoBehaviour:print(Object)
cubeMaterial

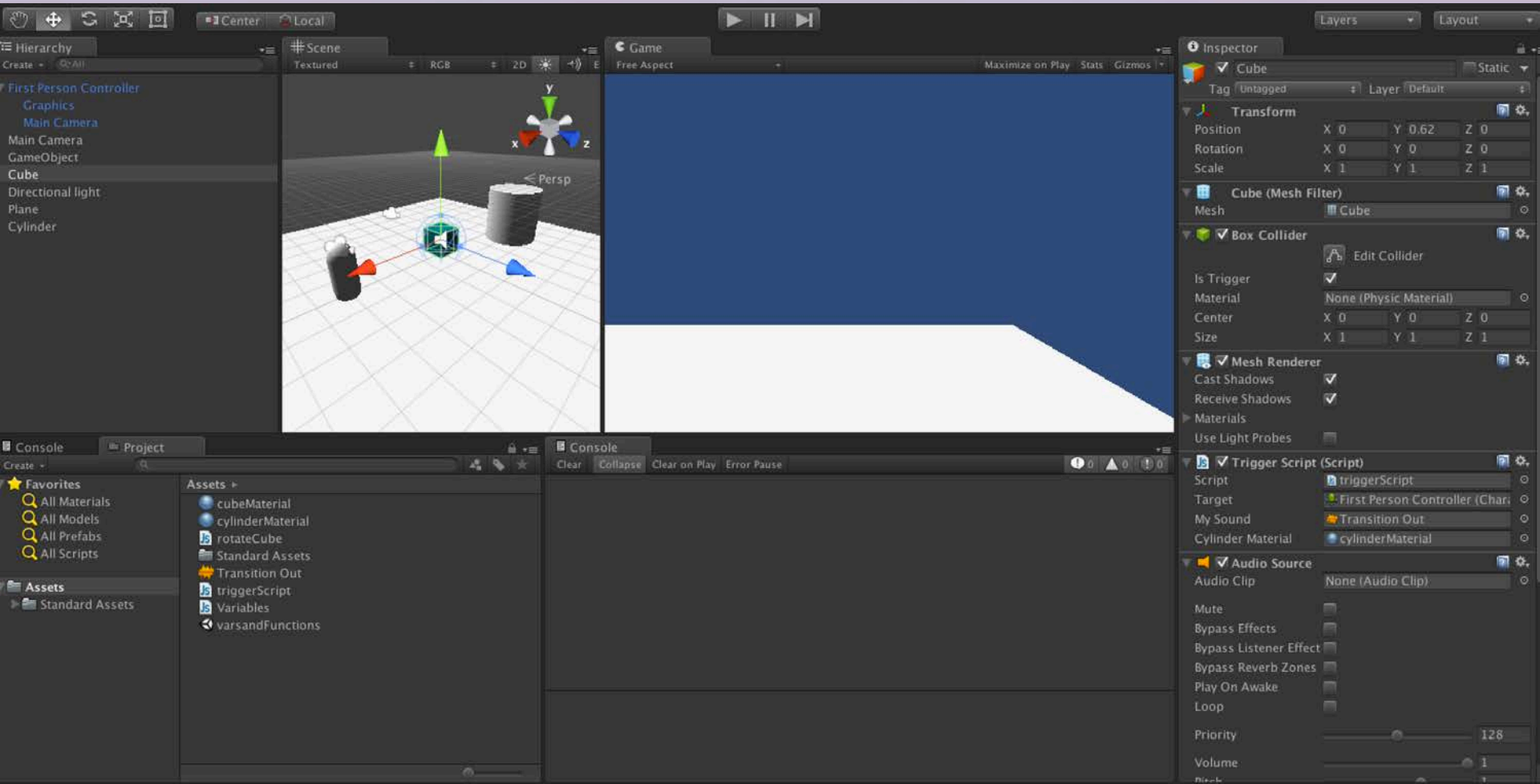
Colors

20) Create new material and add trasnparent/diffuse shader
21) Create new 3D object - cylinder
22) Add material to the cylinder
23) Modify the script to add new material:

```
var cylinderMaterial : Material;

cylinderMaterial.color = orange;
```

24) Assign cylinderMaterial to the var cylinderMaterial in the inspector

Colors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Main Camera
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Cylinder
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2D
Persp
Game
Free Aspect
Maximize on Play
Stats
Gizmos
Inspector
Cube
Static
Tag
Untagged
Layer
Default
Transform
Position
Rotation
Scale
Cube (Mesh Filter)
Mesh
Cube
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
Center
Size
Mesh Renderer
Cast Shadows
Receive Shadows
Materials
Use Light Probes
Trigger Script (Script)
Script
triggerScript
Target
First Person Controller (Chara
My Sound
Transition Out
Cylinder Material
cylinderMaterial
Audio Source
Audio Clip
None (Audio Clip)
Mute
Bypass Effects
Bypass Listener Effect
Bypass Reverb Zones
Play On Awake
Loop
Priority
128
Volume
Console
Project
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Favorites
All Materials
All Models
All Prefabs
All Scripts
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cylinderMaterial
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