CS/DES 427/450
Introduction to Unity

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Why is Unity

Unity is a cross-platform game engine developed by Unity Technologies in June 2005. Supports a variety of desktop, mobile, console, AR, and VR platforms. The engine can be used to create three-dimensional (3D) and two-dimensional (2D) games, as well as interactive simulations.

The engine has been adopted by industries outside video gaming, such as film, automotive, architecture, engineering, construction, and the United States Armed Forces.

Why is Unity

Unity is powerful, complete 3D environment development system

Create 3D objects / scenes / scripts in Unity

Or import objects created in 3D modelling packages

Use scripting to control animations / scene changes and interactivity

Export to CAVE2 virtual reality environment

Why is Unity

Integrated development environment (IDE)

Games and interactive 3D virtual environments development
Commercial game engine (Free and Pro)
Multi-platform
Popular
2.8 billion registered users
Large asset store (models, scripts)
Support (formal and community)

Unity Game Engine

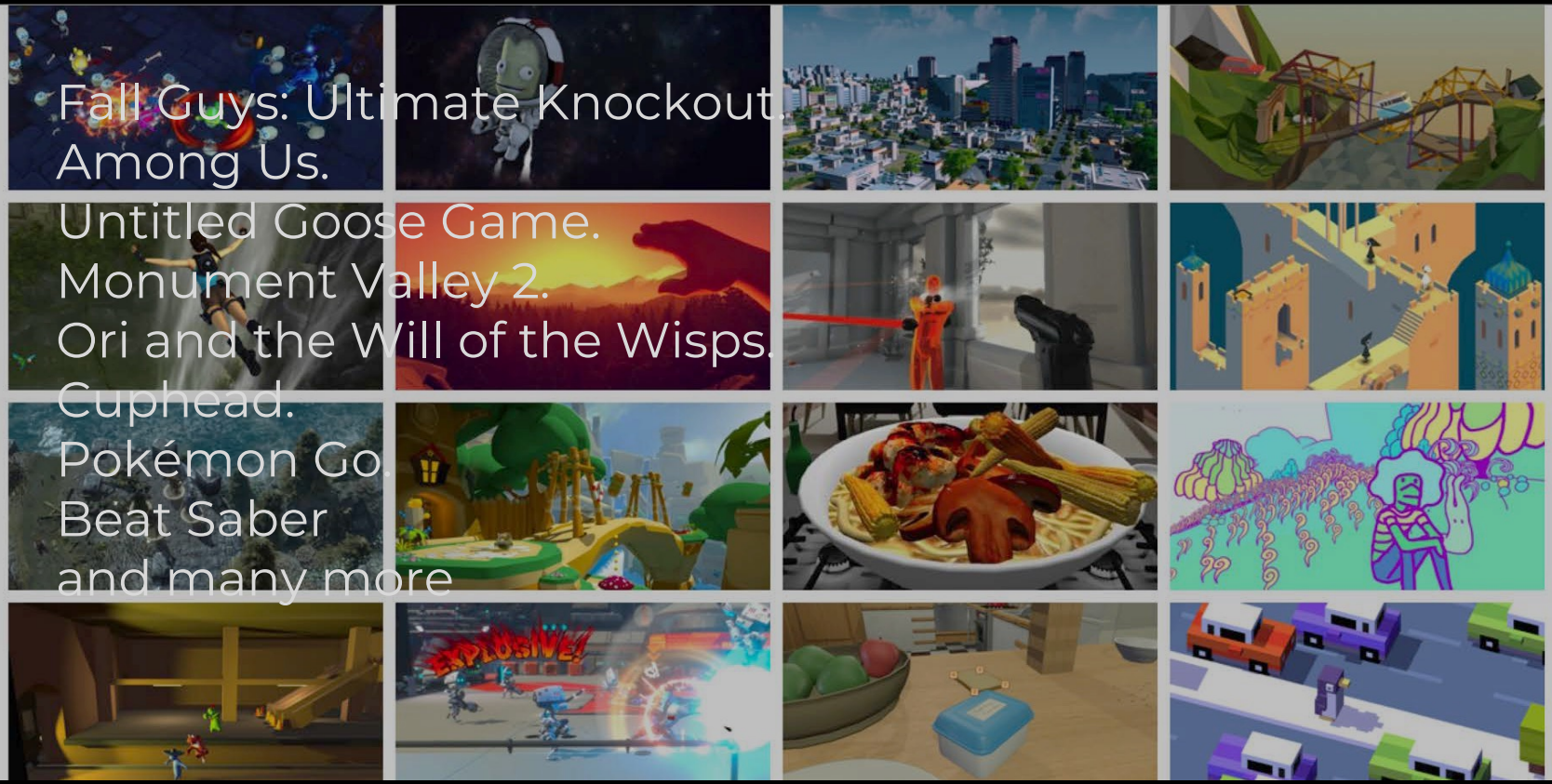
Simplify development of games.
Game Mechanics
– physics, AI, animation, scripting
Rendering Effects
– shadows, lighting
I/O Abstraction
– input devices – output devices
3D / 2D objects
Accompanying script editor
Visual Studio/ C#/ JavaScript (retired)/ Boo (very retired)
3D terrain editor
GUI system…

Scripting

Scripts can be written in C#, JavaScript (archived)
Majority of introductory tutorials are available

Unity can be integrated with the Microsoft Visual Studio editor, to get full benefits of code completion, source version control, integration, serious developers work in C#

Unity Games


Fall Guys: Ultimate Knockout.
Among Us.
Untitled Goose Game.
Monument Valley 2.
Ori and the Will of the Wisps.
Cuphead.
Pokémon Go.
Beat Saber
and many more
EXPLOSIVE!

Beyond Games

Institute for Creative Technologies /Skip Rizzo- Medical VR

Creative Technologies

Research

Research Overview

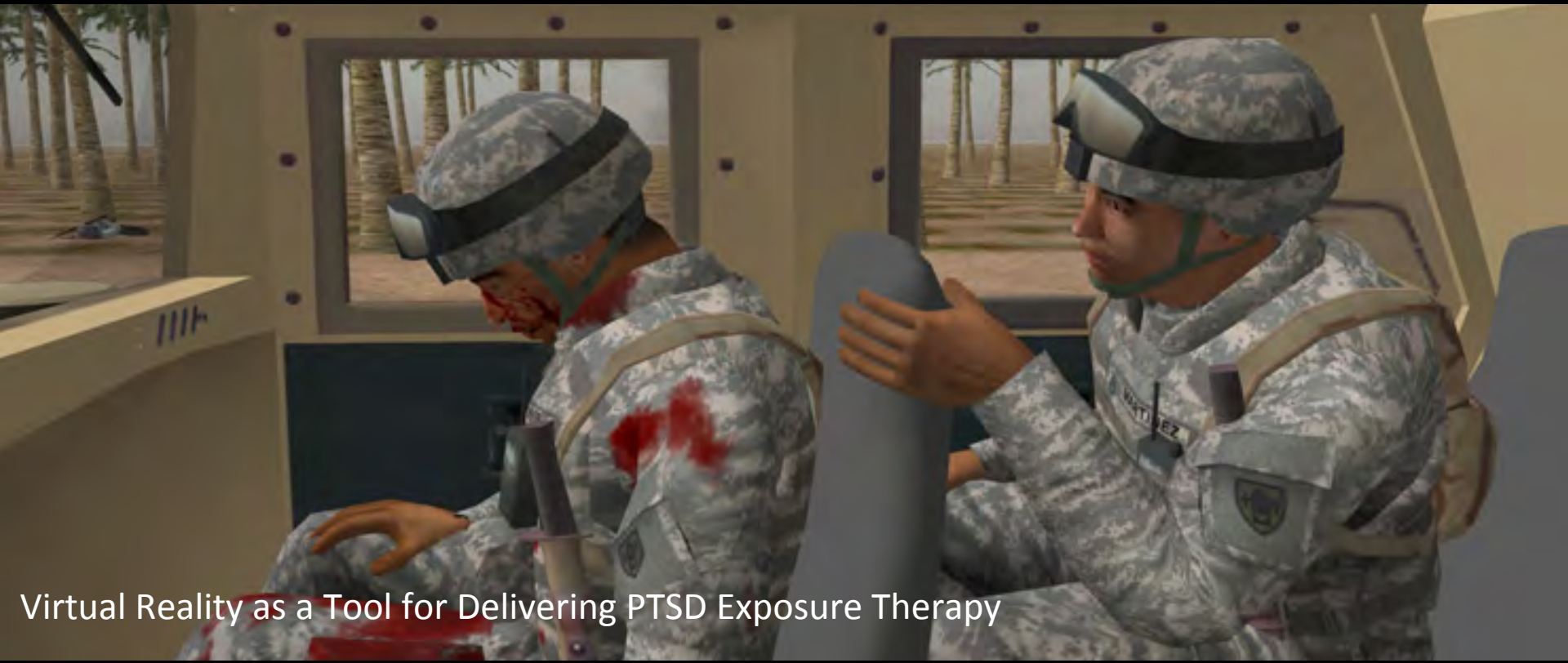
ICT is a multidisciplinary research institute at the University of Southern California focused on exploring and expanding how people engage with computers, through virtual characters, video games, simulated scenarios and other forms of human-

Featured Research

Graphics

The ICT Graphics Laboratory develops new techniques for creating and

Institute for Creative Technologies /Skip Rizzo- Medical VR



Pro vs Free

Pro offers:

Level of Detail
No Personal Edition splash screen
Profiler
Full screen post processing effects (Oculus) Team License
Unity Cloud Build Pro
Unity Analytics Pro...

Multiplatform and Multiplayer

Multiple Build Targets

- Windows
- Linux
- iOS
- Android
- Web player
- Oculus Rift
- Wii
- … and more!

Unity 2019.2.11

CAVE2 support

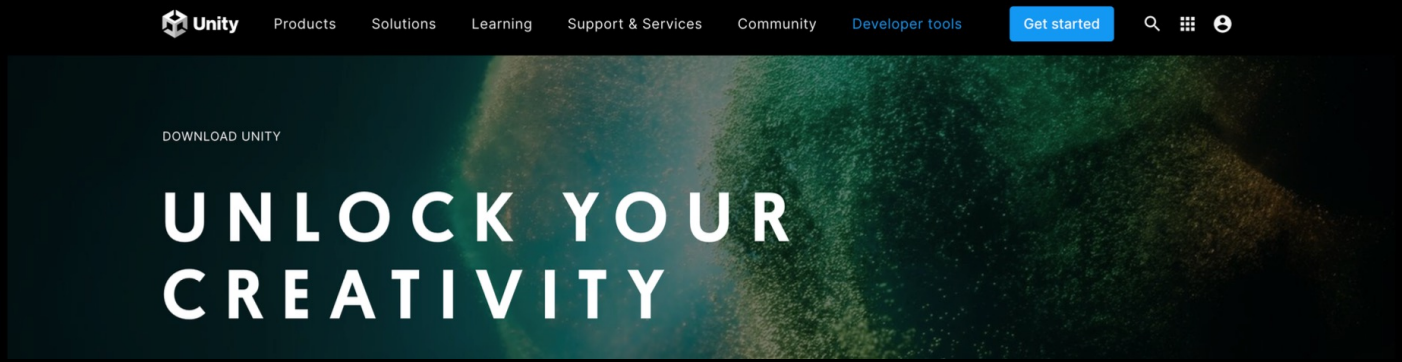
Other Game Engines

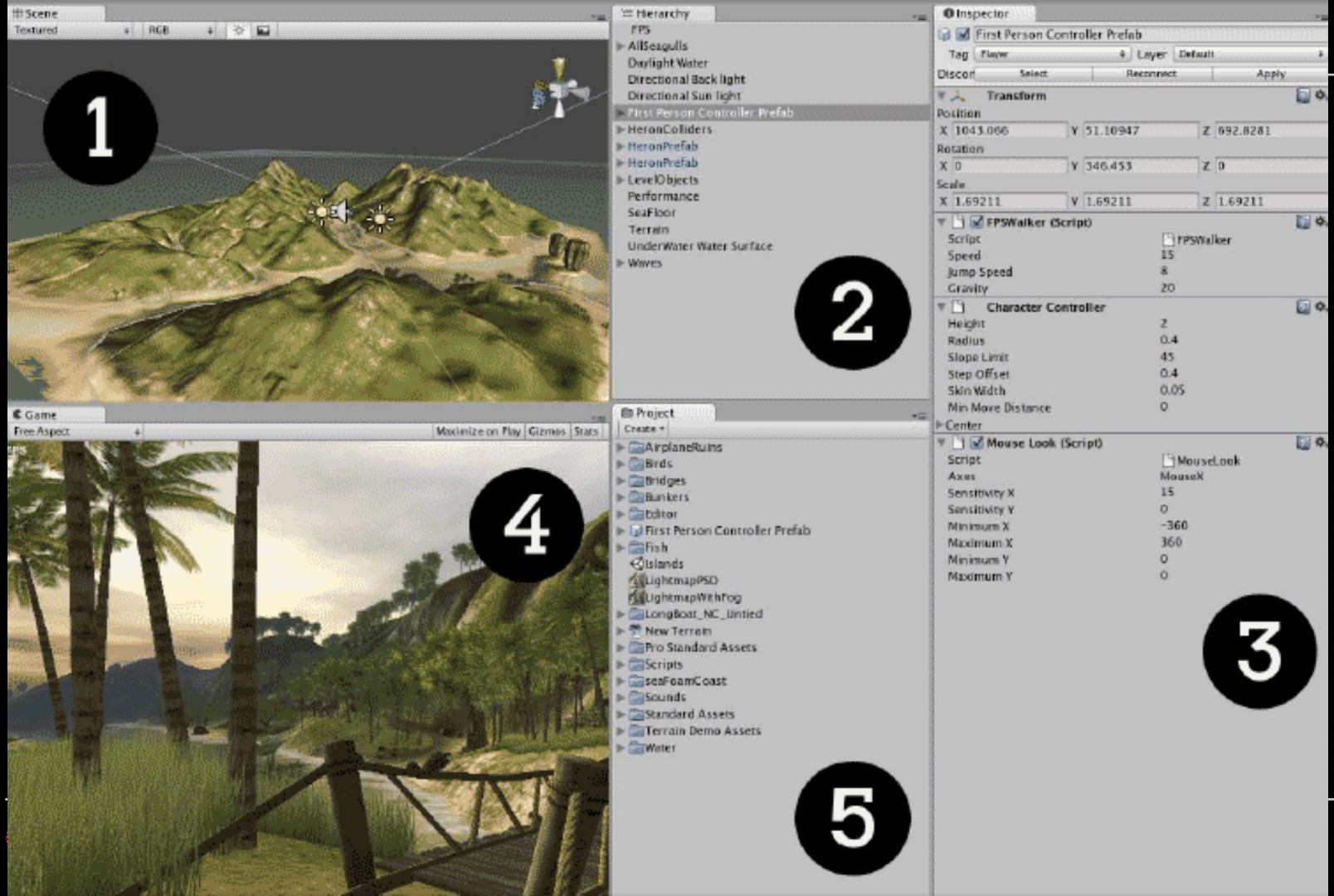
GODOT
Game engine

Installation

Install Unity Hub > Archives > Unity 2019.2.11

https://unity.com/download#how-get-started




Scene
Textured
RGB
1
Hierarchy
FPS
AllSeagulls
Daylight Water
Directional Back light
Directional Sun light
First Person Controller Prefab
HeronColliders
HeronPrefab
HeronPrefab
LevelObjects
Performance
SeaFloor
Terrain
UnderWater Water Surface
Waves
2
Inspector
First Person Controller Prefab
Tag
Player
Layer
Default
Select
Reconnect
Apply
Transform
Position
X 1043.066
Y 51.10947
Z 692.8281
Rotation
X 0
Y 346.453
Z 0
Scale
X 1.69211
Y 1.69211
Z 1.69211
FPSWalker (Script)
Script
FPSWalker
Speed
15
Jump Speed
8
Gravity
20
Character Controller
Height
2
Radius
0.4
Slope Limit
45
Step Offset
0.4
Skin Width
0.05
Min Move Distance
0
Center
Mouse Look (Script)
Script
MouseLook
Axes
MouseX
Sensitivity X
15
Sensitivity Y
0
Minimum X
-360
Maximum X
360
Minimum Y
0
Maximum Y
0
3
Game
Free Aspect
Maximize on Play
Gizmos
Stats
4
Project
Create
AirplaneRuins
Birds
Bridges
Bunkers
Editor
First Person Controller Prefab
Fish
Islands
LightmapPSD
LightmapWithFog
LongBoat_NC_Untied
New Terrain
Pro Standard Assets
Scripts
seaFoamCoast
Sounds
Standard Assets
Terrain Demo Assets
Water
5

Editor

1 – Scene
– Editable current scene with 3d 3D game objects where the game is constru

2 – Hierarchy
Text list of game objects and sub-objects in the current scene

3 – Inspector
Properties for currently selected asset/object

4 – Game
Preview how game will look when exectuting

5 – Project
Contents of Project ‘assets’ folder (i.e. files in that folder) library of scripts, digit

Navigating the Scene Window

The scene view is what allows you to look around and move the visual assets you import into Unity. It's how you'll assemble your levels and place important things like lighting, trigger zones, audio, and much more.

Being able to control the camera is important if you want to do anything at all with it.

Editor

Navigating the Scene Window

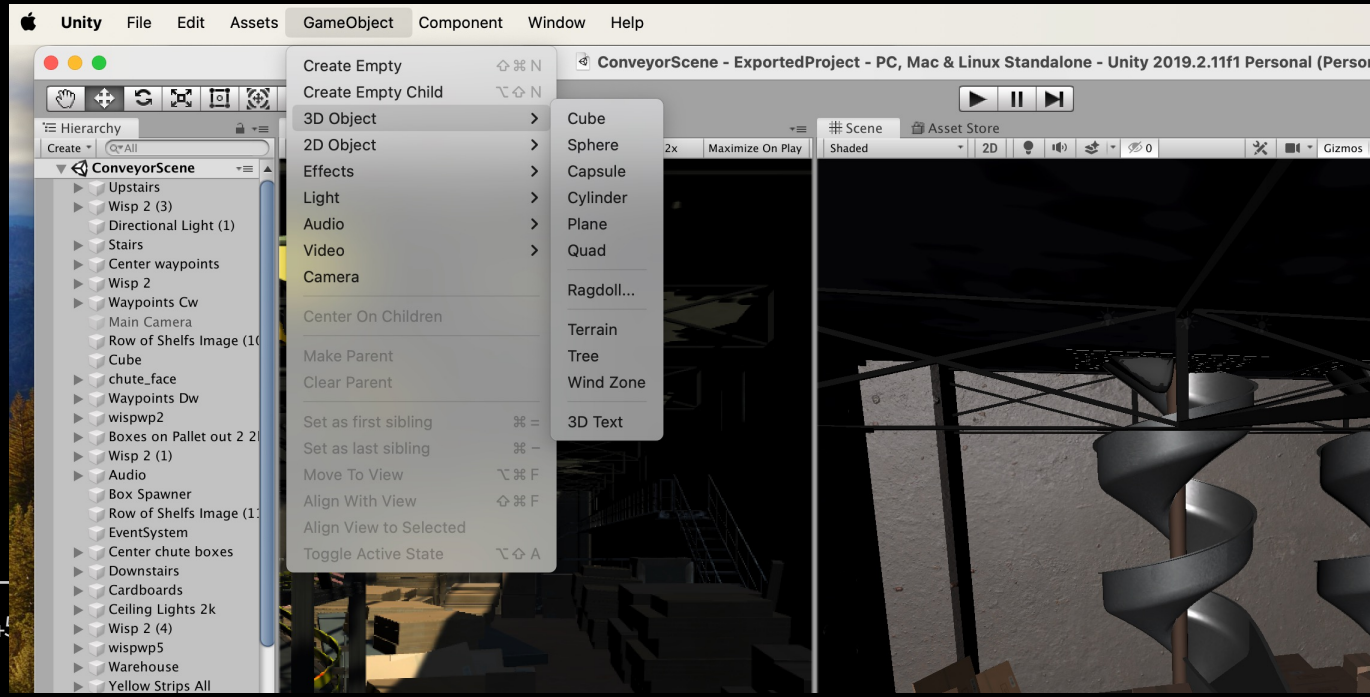
Hand Tool drag around in the scene to pan your view.
Holding down alt+drag will rotate the view, Ctrl.+drag will allow you to zoom.
Does not move anything in the scene, just your point of view.
Translate Tool active selection tool, enables to drag an object's
axis handles in order to reposition it.
Rotate Tool using handles to allow you to rotate an object around either of its
Scale Tool works the same as the previous two tools, allows scaling of an objec
Rectangle Tool
Custom Tool

3D primitives

1. Game Object > 3D Object > Cube

basic game objects Unity can create without Importing external assets

- lights
- particle systems
- cameras
- 3D objects
- 2D objects



3D primitives

Scale: X: 25, Y: 1, Z: 25
Move camera a little back and point it downward to see the box

3. Assign the sphere a rigid body component Select the sphere
Component > Physics > Rigid Body

4. Preview the game (Play)

3D primitives

sphere should fall, but not bounce yet

5. Create a physic material, which will provide the material properties to make the game object bouncy
Asset > Create > Physics Material

6. Drag the new physics material from the Asset window onto the Sphere game object in the Hierarchy window or directly onto the sphere in the Scene window

3D primitives

7. In inspector adjust the parameters
Bounciness to 0.8 and Bounce Combine to Maximum

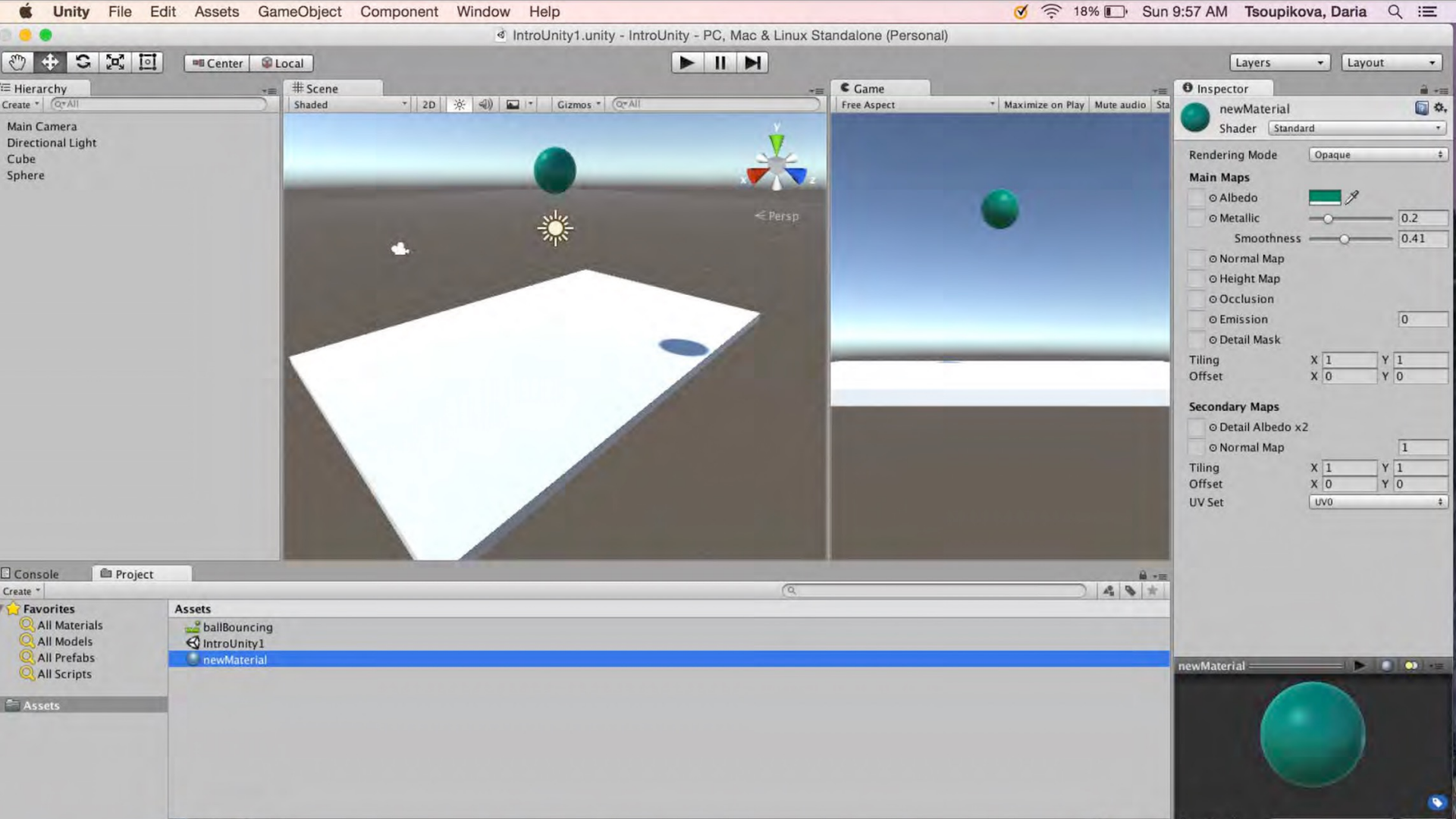
8. Preview the game
the sphere should bounce similar to a rubber ball

9. experiment with different heights and different angles

Materials

10. Assets > Create > Material
double click the color swatch next to Main color and choose
a different color tweak the material's properties by experimenting
with different shaders from the shader drop-down menu
in the Inspector window

11. Drag new material from the Project window onto the game object
in the Hierarchy window


Unity File Edit Assets GameObject Component Window Help
18% Sun 9:57 AM Tsoupikova, Daria
IntroUnity1.unity - IntroUnity - PC, Mac & Linux Standalone (Personal)
Center Local
Layers Layout
Hierarchy
Create
Main Camera
Directional Light
Cube
Sphere
Scene
Shaded 2D Gizmos
Persp
Game
Free Aspect Maximize on Play Mute audio
Inspector
newMaterial
Shader Standard
Rendering Mode Opaque
Main Maps
Albedo
Metallic 0.2
Smoothness 0.41
Normal Map
Height Map
Occlusion
Emission 0
Detail Mask
Tiling X 1 Y 1
Offset X 0 Y 0
Secondary Maps
Detail Albedo x2
Normal Map 1
Tiling X 1 Y 1
Offset X 0 Y 0
UV Set UV0
Console
Project
Create
Favorites
All Materials
All Models
All Prefabs
All Scripts
Assets
Assets
ballBouncing
IntroUnity1
newMaterial
newMaterial

Textures

Textures should be in the following format to enable ‘tiling’
Square and ideally the power of two

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

Shaders control the rendering characteristics of textured surface

Our VR projects

Unity game engine
CAVE2 template

Typography
Primitives
Terrain
Textures
Materials
Sounds
Limited number of imported assets (with approval)
FXs
Physics
GUI (given)