3D Virtual Environment Development

CS 6334

Virtual Reality

Unity Game Engine

‣ Download and install Unity 2018.1.4

  ▷ https://unity3d.com/get-unity/download/

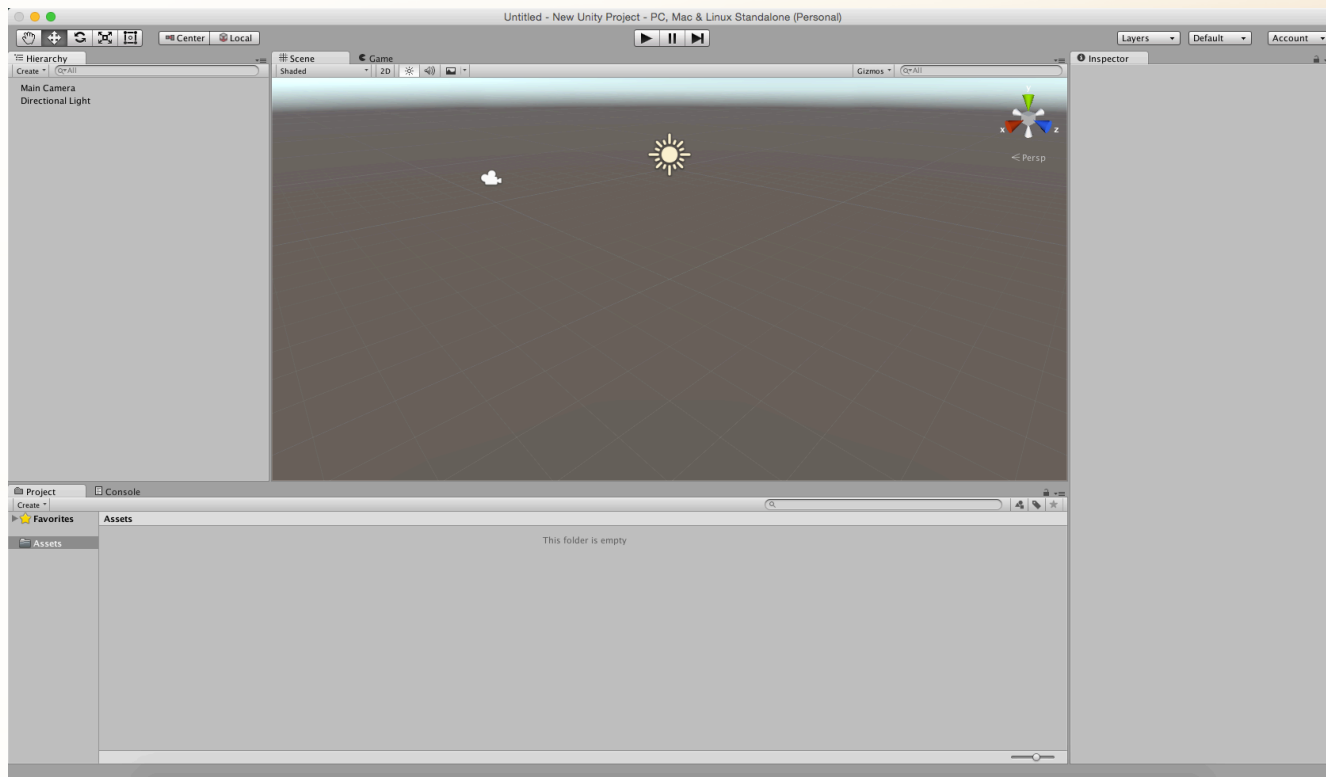‣ Do **NOT** use Unity 2017 or Unity 2018!

Unity Basics

- ▸ Default Layout
- ▸ GameObjects
- ▸ Assets
- ▸ Scripts
- ▸ Terrain
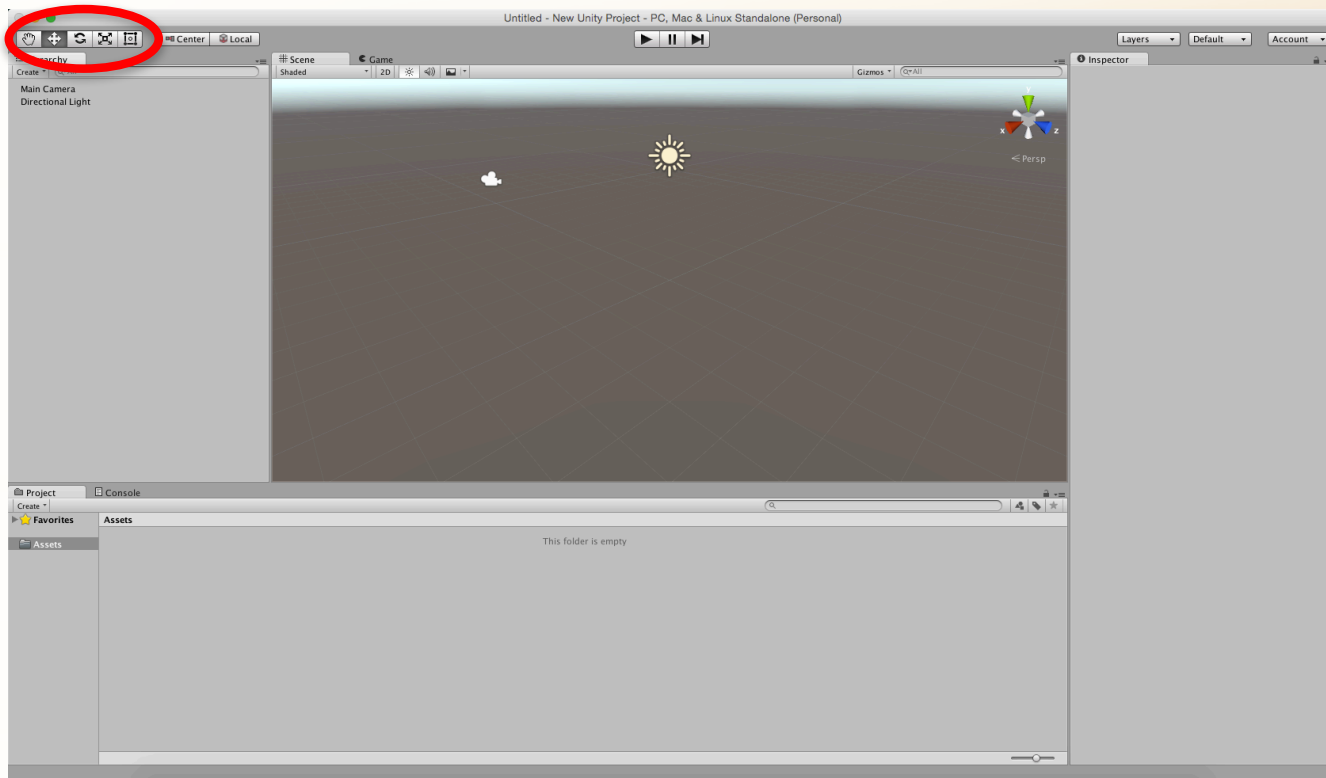
Unity Basics

- ▶ **Default Layout**
- ▶ GameObjects
- ▶ Assets
- ▶ Scripts
- ▶ Terrain

Default Layout
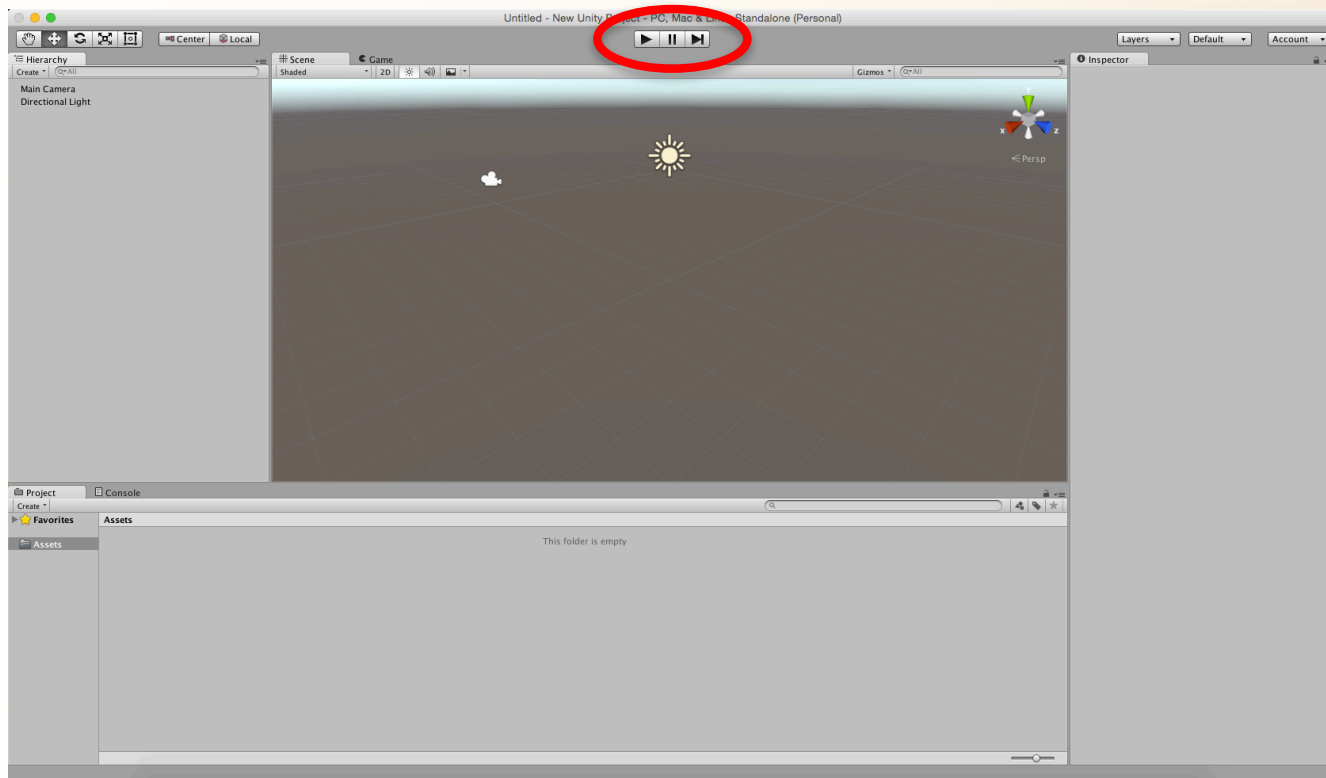
Default Layout

▸ Widgets

▷ Allow for quick manipulations of the scene or GameObjects
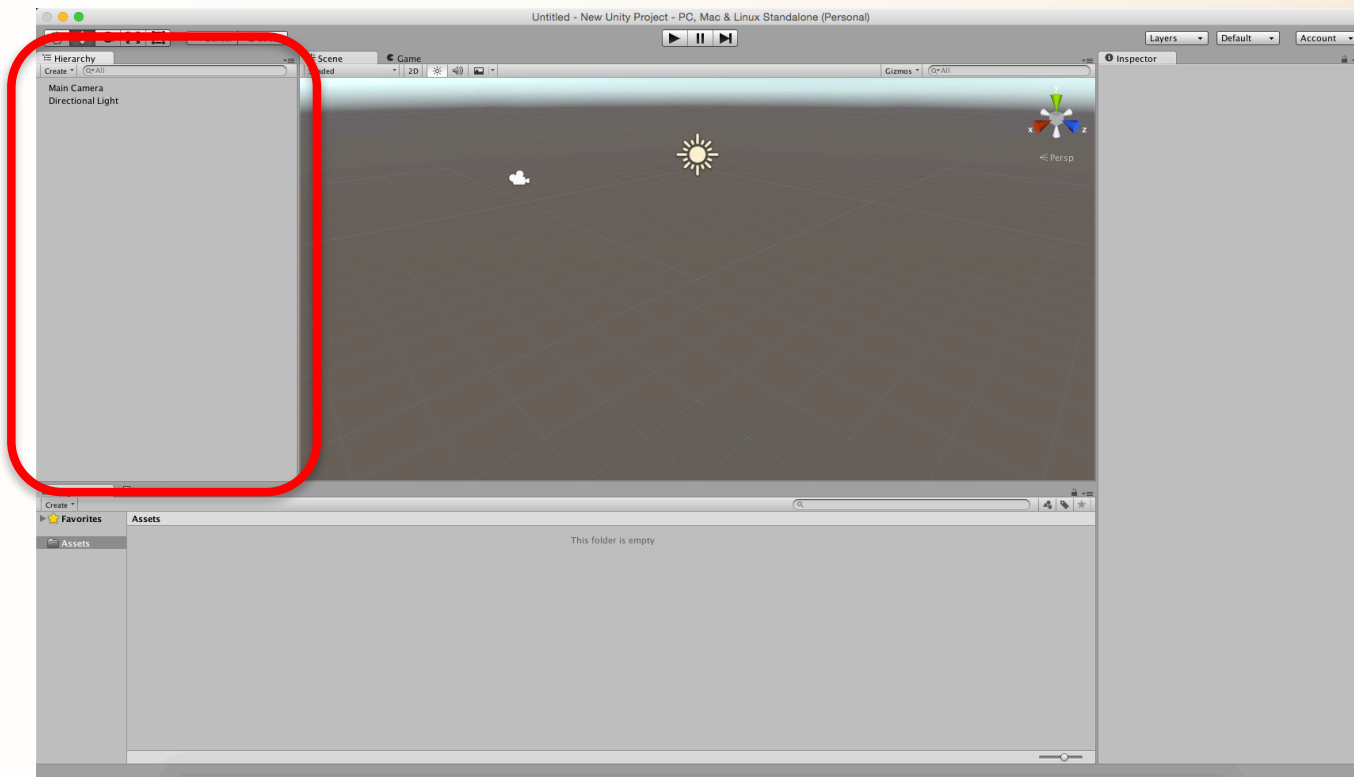
Default Layout

▶ Play Controls

▷ Allow for gameplay and testing within the Unity editor
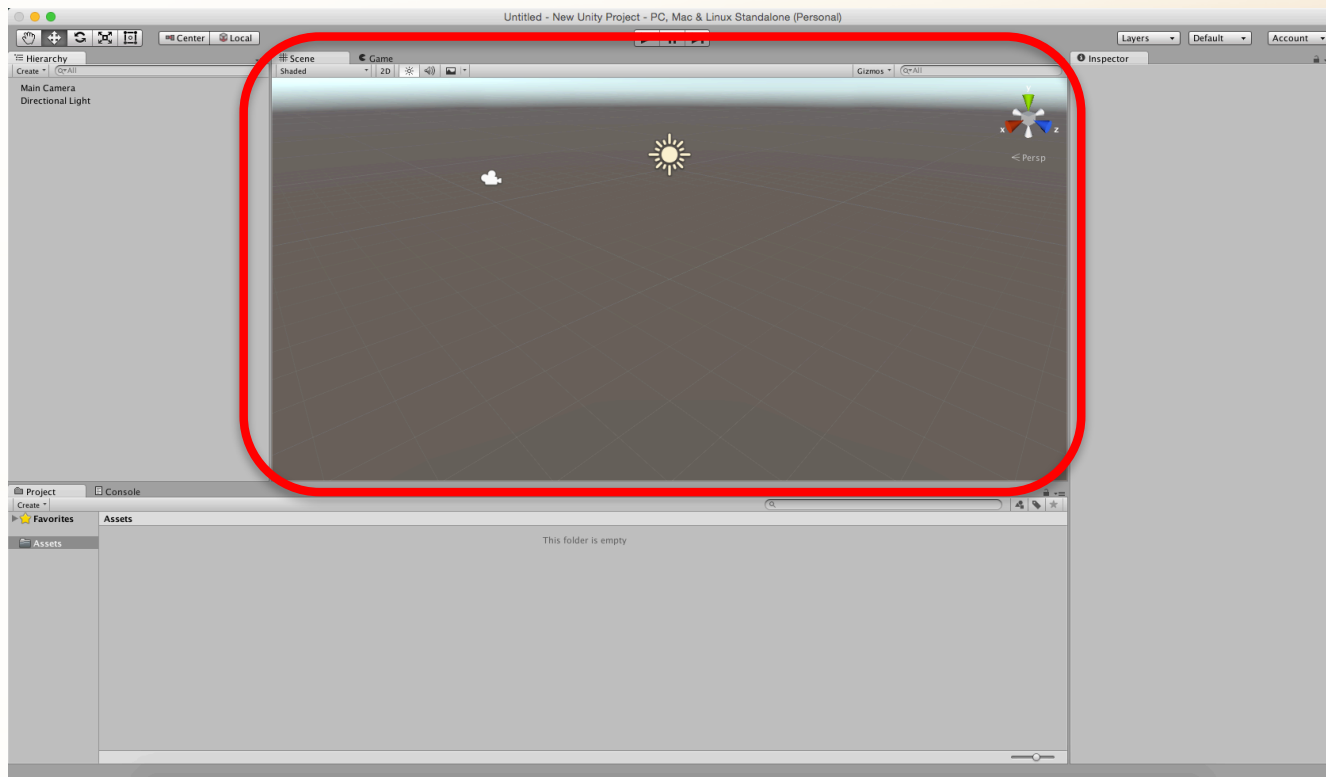
Default Layout

▶ Hierarchy

▷ Provides an overview of every GameObject within the scene
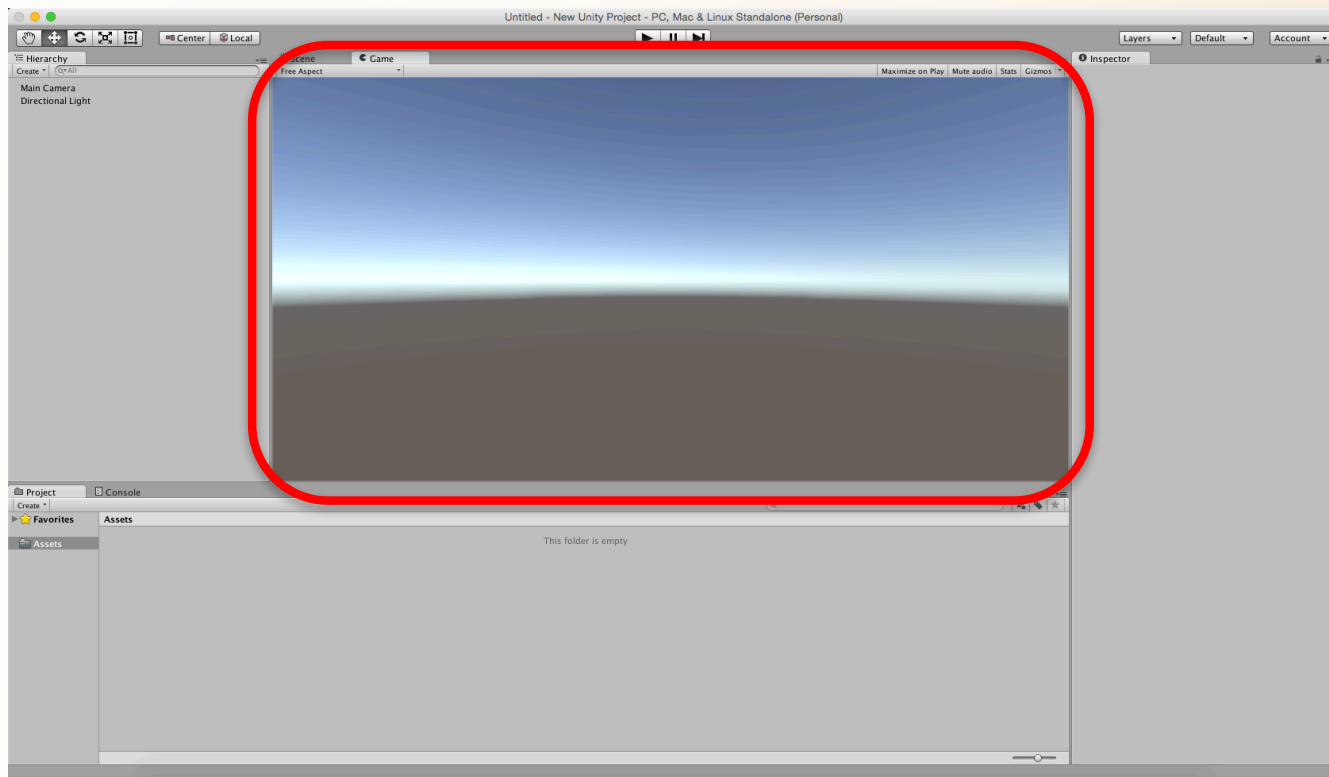
Default Layout

▸ Scene

▹ Allows the scene to be viewed from different perspectives

Default Layout
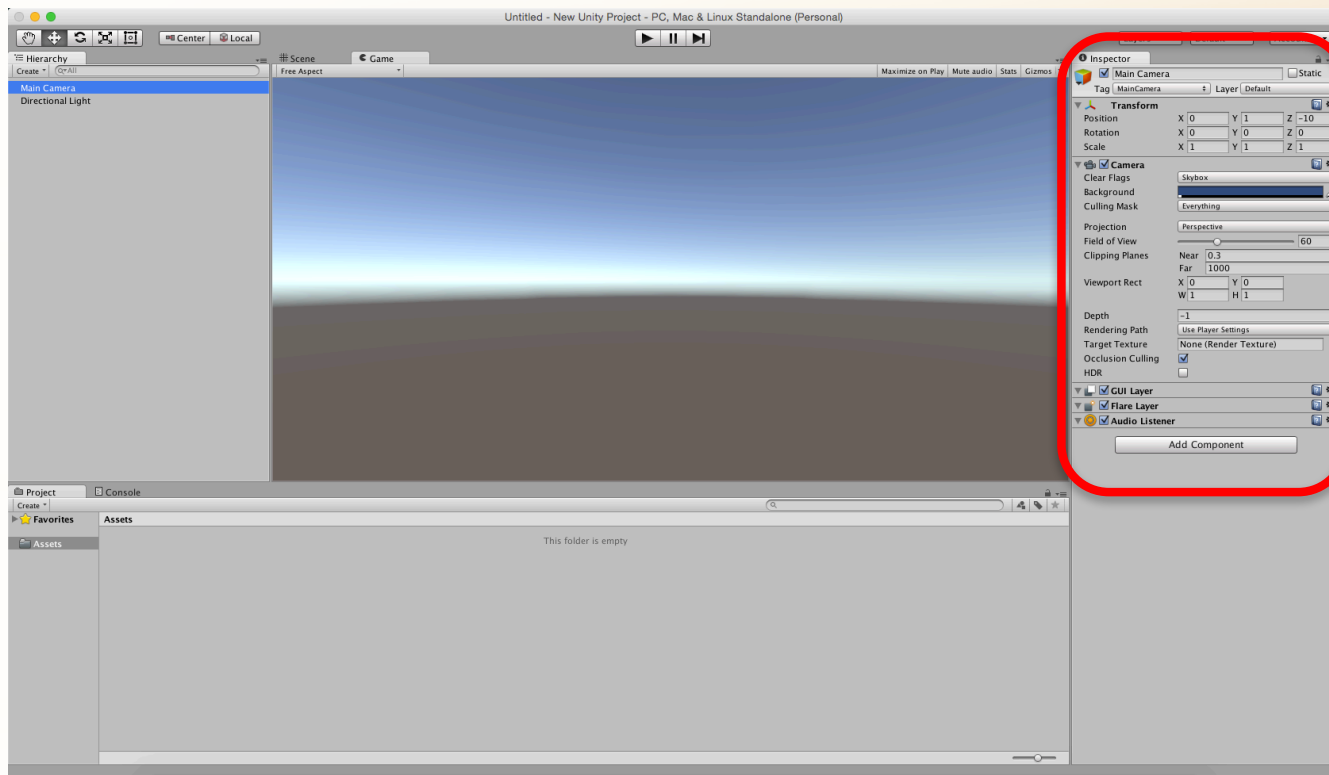
▶ Game

▷ Shows the scene as it would be seen during gameplay
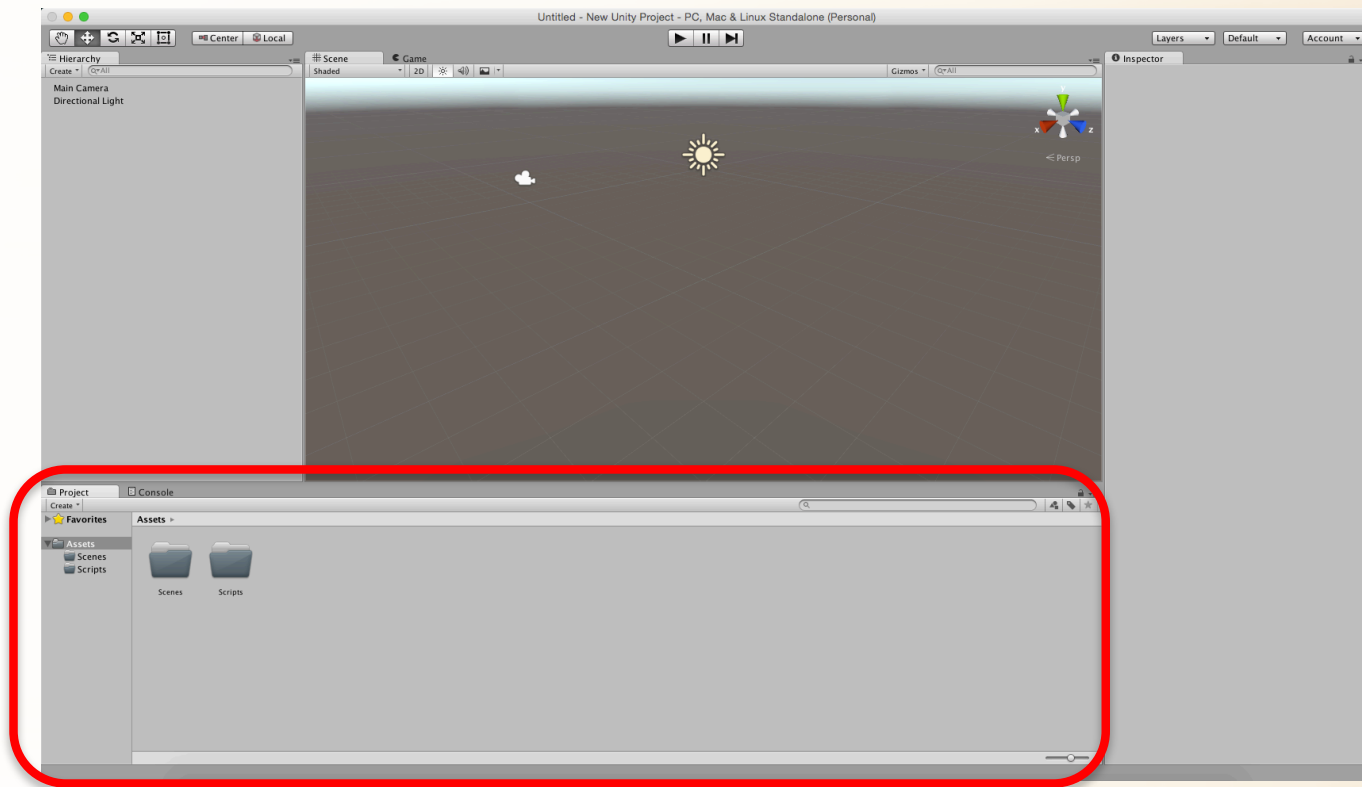
Default Layout

▸ Inspector

▹ Shows the properties of the currently selected GameObject

Default Layout

▸ Project

▷ Shows the hierarchy of project files and folders

Default Layout

▶ Console
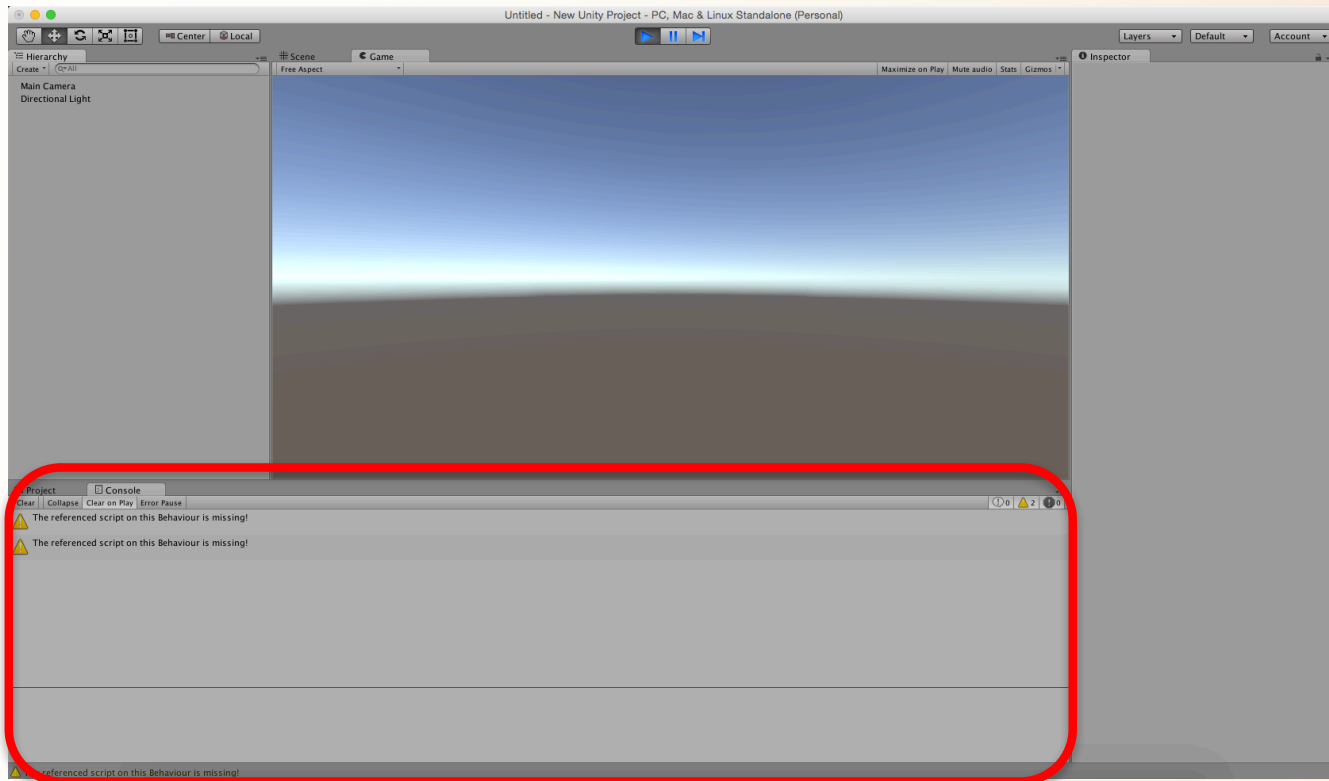
▷ Shows error, warning, and debug messages

Unity Basics

▶ Default Layout

▶ GameObjects

▶ Assets

▶ Scripts

▶ Terrain

GameObjects

▶ Empty
  ▷ Provide grouping of GameObjects and other purposes
▶ 3D Object
  ▷ Provide basic shapes (e.g., cube), terrain, and 3D text
▶ Light
  ▷ Provide different types of lighting
▶ Audio
  ▷ Provide methods to deliver audio
▶ UI
  ▷ Provide methods to create 2D user interfaces
▶ Particle System
  ▷ Provide ways to create advanced visuals

Unity Basics

▶ Default Layout

▶ GameObjects

▶ Assets

▶ Scripts

▶ Terrain

Assets

▸ Allow for other GameObjects, scripts, and plugins to be imported and used in a project

▸ Adding an external asset:

1. Drag the external file into the Project directory
2. Drag any textures into the Project directory
3. Drag the new asset into the Scene
4. Expand any shaders, click on Albedo maps, and select textures

Unity Basics

▶ Default Layout

▶ GameObjects

▶ Assets

▶ Scripts

▶ Terrain

Scripts

▸ Highly recommend using only C# scripts

▸ Script filename must match the class name within the script

▸ The **Start** function gets called once, before the first frame update

▸ The **Update** function gets called every frame

▸ There are other standard functions that get called, such as **LateUpdate** and **OnGUI**

Scripts

▶ Public variables are shown within the Inspector

▶ If edited within the Inspector, the new values will supersede the original values within the script

▶ This allows the same script to be used for multiple purposes

Unity Basics

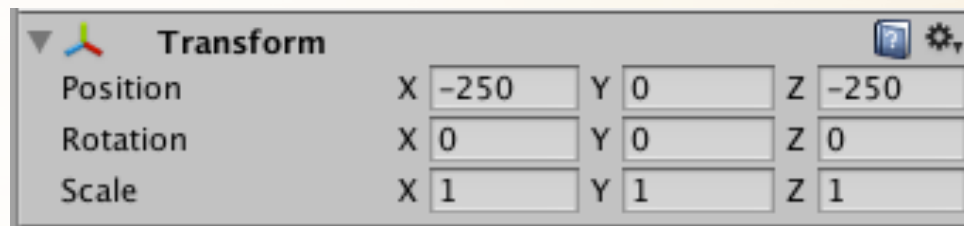▶ Default Layout

▶ GameObjects

▶ Assets

▶ Scripts

▶ Terrain

Terrain

- *GameObject* system menu
  - *3D Object*
    - *Terrain*
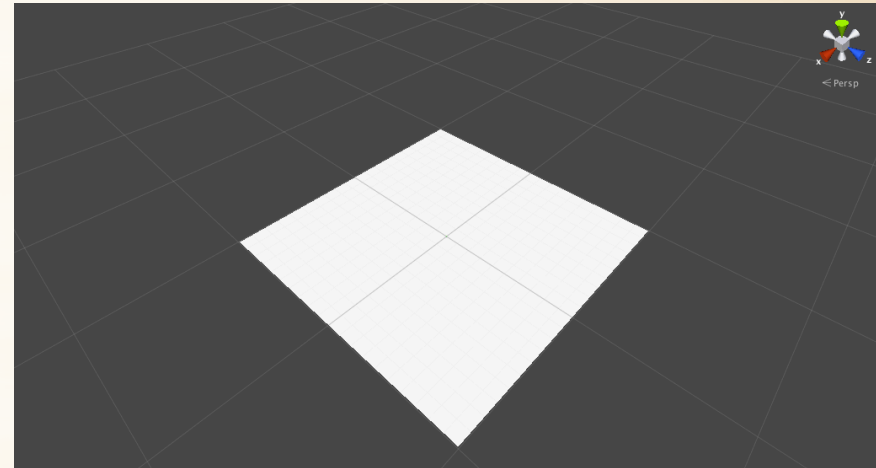
- By default, terrain is 500 x 500 meters
- Center terrain by repositioning transform to

Transform						
Position	X	-250	Y	0	Z	-250
Rotation	X	0	Y	0	Z	0
Scale	X	1	Y	1	Z	1

Editing Terrain

▶ Use Terrain (Script) to

  ▷ Raise / Lower Terrain

  ▷ Paint Height

  ▷ Smooth Height

  ▷ Paint Texture

  ▷ Place Trees

  ▷ Paint Details (i.e., grass)

  ▷ Terrain Settings

Unity Tutorials
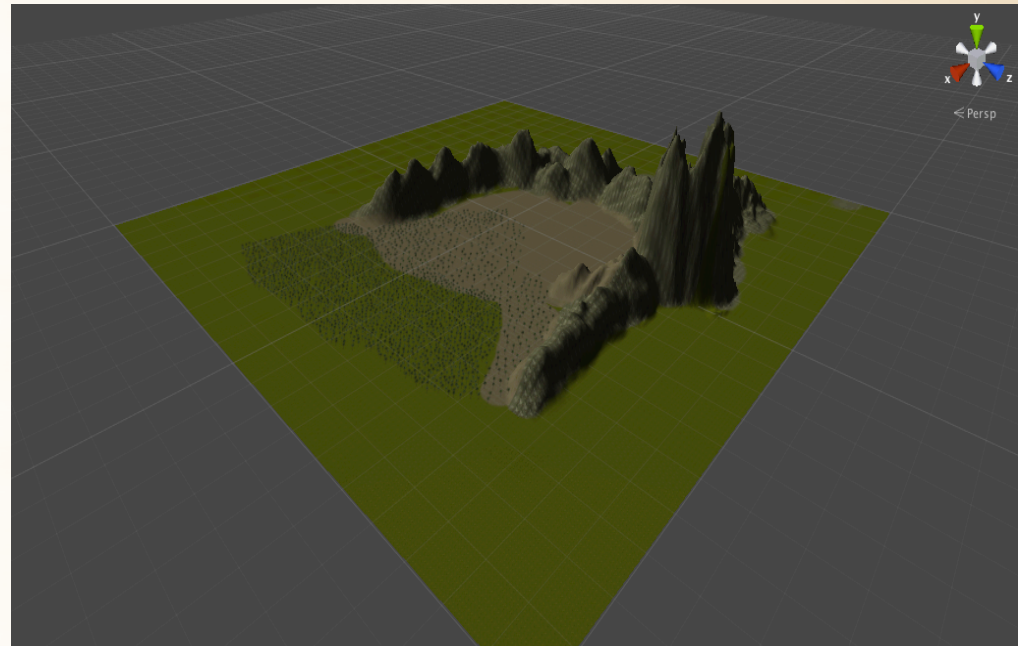
▶ https://unity3d.com/learn/tutorials

▶ Recommended Topics:

▷ Interface & Essentials

▷ Scripting

▷ Graphics

▷ Physics

▷ Audio

▷ Animation

▷ Virtual Reality

SteamVR Plugin

▸ Encapsulates the latest scripts and libraries required to develop for the HTC Vive

▸ Download and import through the Asset Store or

▹ https://www.assetstore.unity3d.com/en/#!/content/32647

5UDE

- Future Immersive Virtual Environments Unity Development Environment
- Developed in the FIVE Lab
- Simplifies VR development
- Provides a desktop-based simulator to alleviate development bottlenecks
- Software:
  - On eLearning, under "Software"

Getting Started

HW #1: 3D Virtual Environment

- **Due Sunday, Sep. 9 at 11:59pm CT**
- Credit: 10 points
- Purpose:
  - Learn how to use Unity and the 5UDE to develop a 3D virtual environment appropriate for VR.
- Specification:
  - On eLearning, under "Homework"

Acquiring Assets

▶ Four recommended places for acquiring assets:

▷ Unity Asset Store:

▶ https://www.assetstore.unity3d.com/en/

▷ TurboSquid:

▶ https://www.turbosquid.com

▷ CGTrader:

▶ https://www.cgtrader.com

▷ Make your own with Maya or Blender

▶ https://www.autodesk.com/products/maya/overview

▶ https://www.blender.org

Online Quiz #1: Chapter 5

- **Due Tuesday, Aug. 28 at 2:30pm CT**
- Credit: 2.5 points
- Read:
  - Chapter 5 on Output Hardware
- Online Quiz:
  - On eLearning, under "Online Quizzes"
  - You can use the book while taking the quiz

Online Quiz #2: Chapter 6

▶ **Due Thursday, Aug. 30 at 2:30pm CT**

▶ Credit: 2.5 points

▶ Read:

▹ Chapter 6 on Input Hardware

▶ Online Quiz:

▹ On eLearning, under "Online Quizzes"

▹ You can use the book while taking the quiz

Upcoming Classes

▸ Next Tuesday

 ▹ **Online Quiz #1: Chapter 5 due before class!**

 ▹ Output Hardware

▸ Next Thursday

 ▹ **Online Quiz #2: Chapter 6 due before class!**

 ▹ Input Hardware (guest lecture)