Basic Scripting

CS 3540 – Game Programming

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Graphics Rendering in Unity

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Unity Graphics Rendering

Meshes

Materials

Shaders

Textures

3

Unity Graphics Rendering

Meshes
Main graphics primitive and define the shape of an object

Materials

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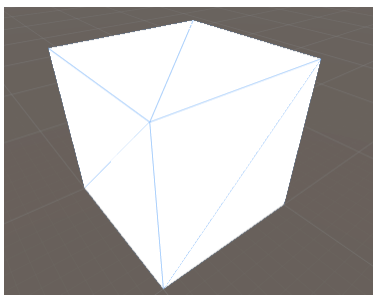
Textures



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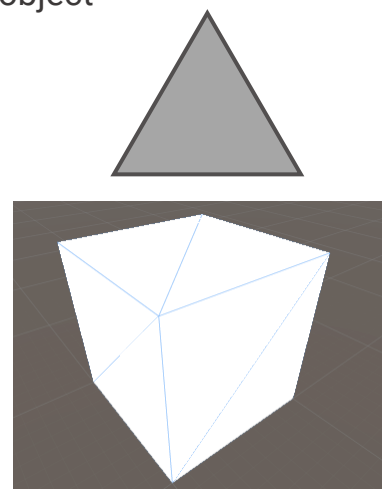

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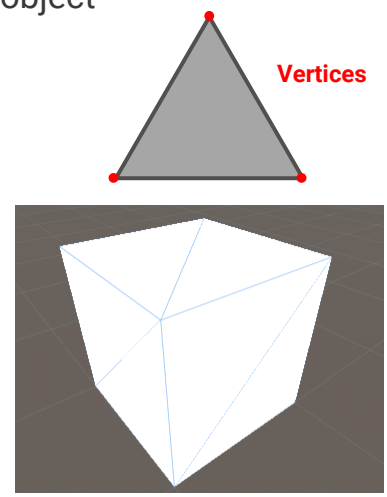

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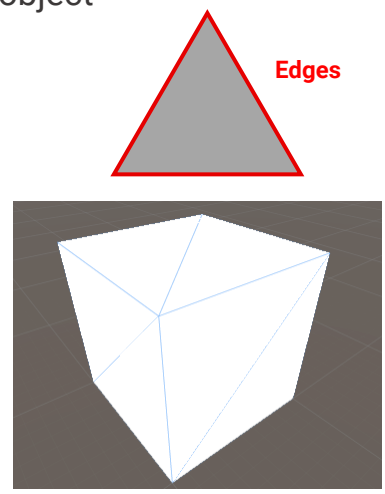

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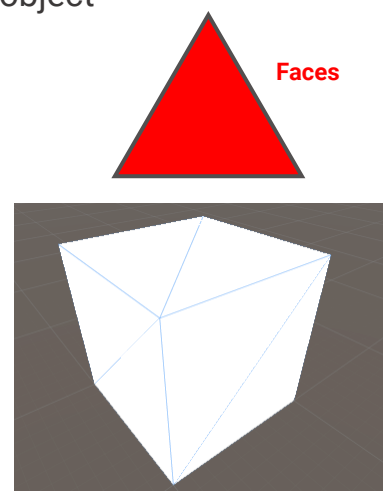

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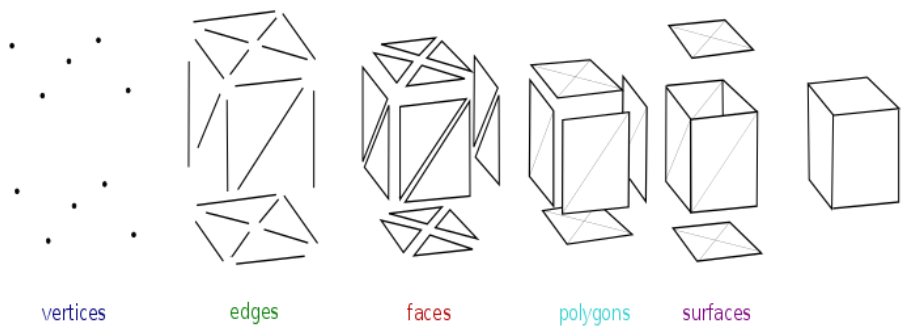
Meshes



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Unity Graphics Rendering

Meshes
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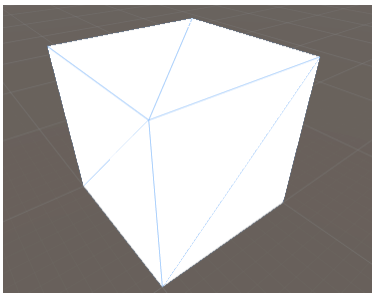

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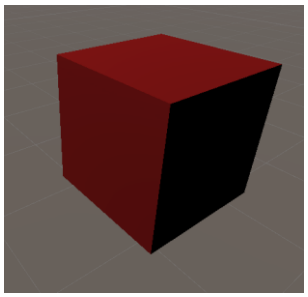
Unity Graphics Rendering

Meshes
Main graphics primitive and define the shape of an object

Materials
Define how a surface should be rendered

Shaders

Textures



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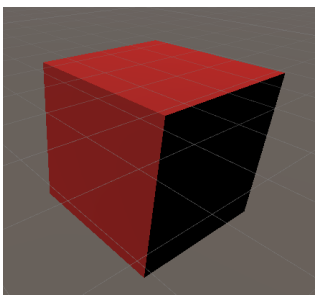
Unity Graphics Rendering

Meshes
Main graphics primitive and define the shape of an object

Materials
Define how a surface should be rendered

Shaders
Small scripts that do the lighting calculations for you

Textures



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Unity Graphics Rendering

Meshes
Main graphics primitive and define the shape of an object

Materials
Define how a surface should be rendered

Shaders
Small scripts that do the lighting calculations for you

Textures
Bitmap images applied over the mesh surface

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Making a Skybox

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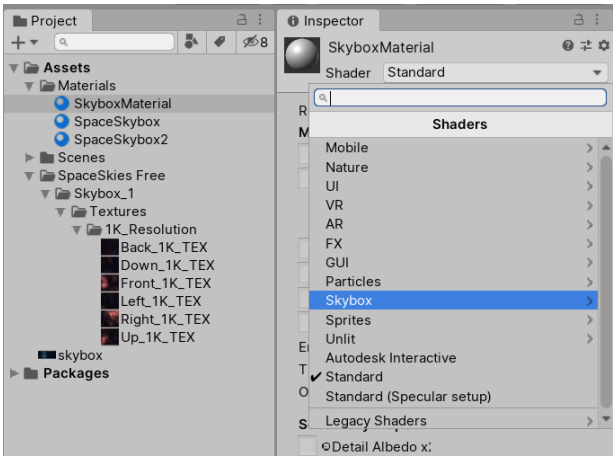
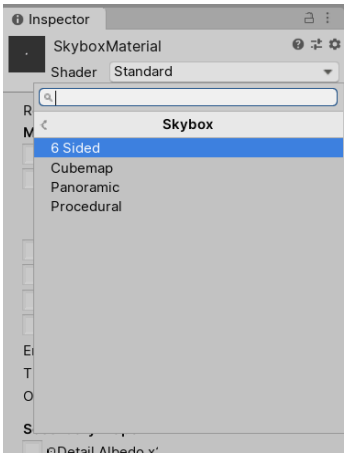
Making a Skybox

Change the Material's Shader to Skybox > 6 Sided





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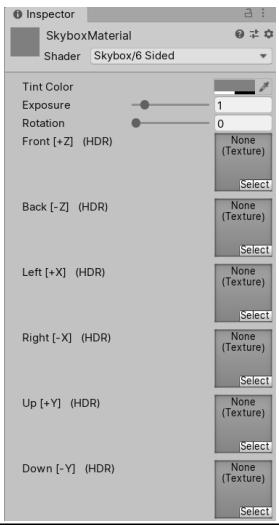
Making a Skybox

Specify the textures to be used for each side



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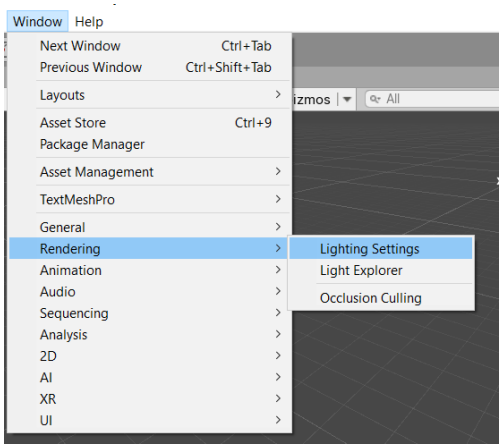
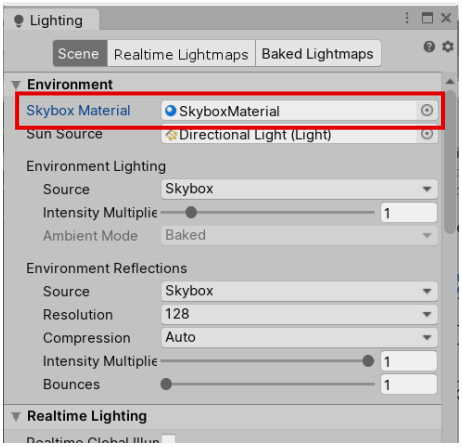
Making a Skybox

Need to apply the new material to the default Skybox in Unity

Window > Rendering > Lighting Settings





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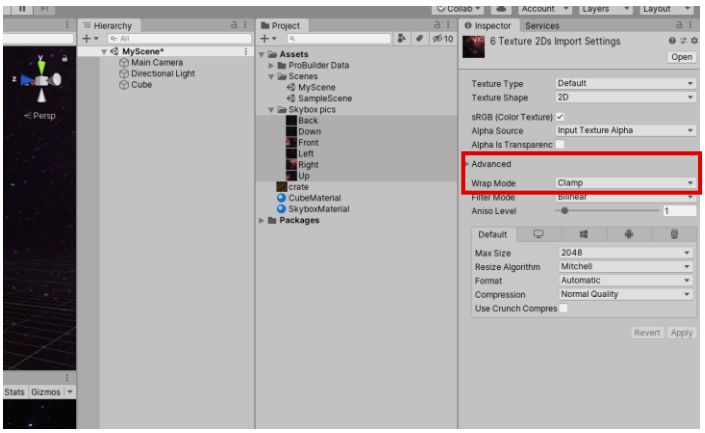
Making a Skybox

Need to change Wrap Mode to Clamp for all textures



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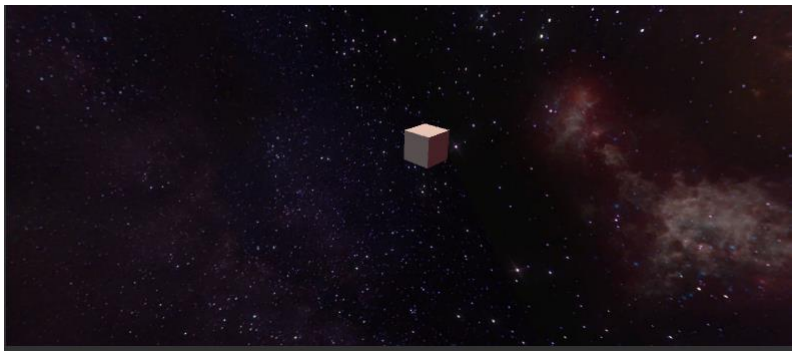
Making a Skybox



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Scripting in Unity

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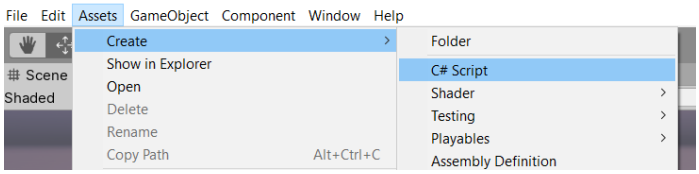
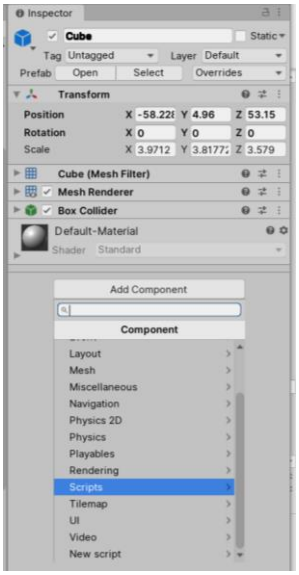
Unity 3D: Scripts

Scripts are Components too!

Allow you to write your own Components

Enable you to customize GameObjects





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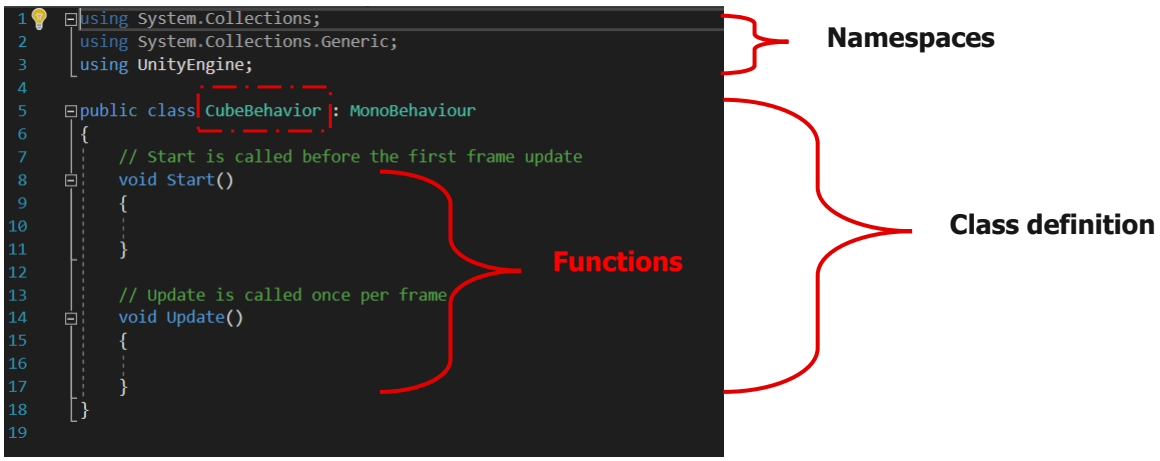
Anatomy of a Script File

All scripts, and thus classes, derive from the built-in class MonoBehaviour



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Start() Function

Called only once on the lifetime of the object

Used for initializing game parameters

Called before the Update() function

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Update Function

Called every frame

Used for regular updates:
- Moving non-physics objects
- Receiving input
- Simple timers

Update interval times vary

Delete Update() functions from scripts where they are not used

Performance issues

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C# Primer

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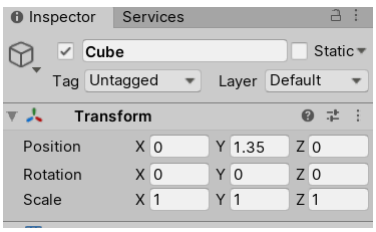
Rotate Method

Rotates GameObjects in a variety of ways



Can rotate around x, y, and z axes

To rotate the current GameObject

transform.Rotate(x_angle, y_angle, z_angle);

```
void Update()
{

    transform.Rotate(0, -5, 0);

}
```

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Variables

Public variables are accessible by other classes and code

```
public float someFloat = 1f;
private int someInt = 1;

public string someString = "HelloCube";
public bool someBool = false;

public GameObject someObject;
public Transform someTransform;
public Vector3 someVector = new Vector3();
public Camera someCamera;
```

Private variables can only be accessed within the class they are declared in

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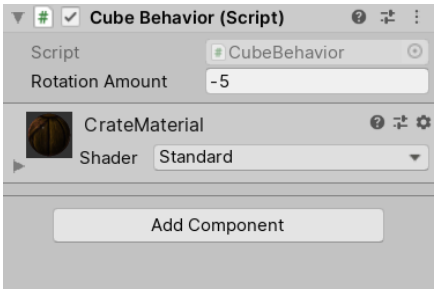
Variables in the Inspector

Public variables are accessible from the Inspector

```
public class CubeBehavior : MonoBehaviour
{
    // Start is called before the first frame update

    public float rotationAmount = -5f;
```



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Basic Keyboard Input

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Keyboard Input: Input.GetKey

GetKey:

Returns true while the user holds down the key identified by name.

GetKeyUp:

Returns true during the frame the user releases the key

GetKeyDown:

Returns true during the frame the user starts pressing down the key

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C# Selection Statements

```
if(condition)
{
    //do something
}
```

```
if(condition)
{
    //do something
    //executes when condition is true
}
else
{
    //do something else
    //executes when condition is false
}
```

```
if(condition1)
{
    //do something
    //executes when condition1 is true
}
else if(condition2)
{
    //do another thing
    //executes when condition2 is true
}
else
{
    //do something else
    //executes when none of the conditions is true
}
```

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Conditional AND (&&) Operator

The **&&** (conditional AND) operator works as follows:

```
if(condition1 && condition2)
{
    //do something
    //executes when both condition1 and condition2 are true
}
```

The combined condition is true if and only if *both* simple conditions are true.

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Conditional OR (||) Operator

The || (conditional OR) operator works as follows

```
if(condition1 || condition2)
{
    //do something

    //executes when at least
    //one of the conditions is true
}
```

The complex condition evaluates to `true` if either or both of the simple conditions are true

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Keyboard Input: GetKey

Input.GetKeyDown(Keycode.Space)

Returns true when the user starts pressing down the Space key

```
if(Input.GetKeyDown(KeyCode.Space))
{
    transform.Rotate(0, -5, 0);

}
```

34

Translate Method

Moves the GameObject (transform) in a variety of ways

Can move along x, y, and z axes

To move the current GameObject

transform.Translate(x_amount, y_amount, z_amount);

35

OnMouseDown

Built-in function used as an event trigger

Called when the user has pressed the mouse button while over a GameObject or GUI element

```
private void OnMouseDown()
{
    Debug.Log("GameObject Clicked!");
}
```

36

Destroy

Removes a GameObject, component, or asset

Destroy(gameObject);

gameObject is a reference to the current GameObject to which the script component is attached

Can specify time delay

Destroy(gameObject, 3f);

```
private void OnMouseDown()
{
    Destroy(gameObject);
}
```

37

SetActive

Activates/deactivates the GameObject

Based on the boolean parameter passed in, true or false

gameObject.SetActive(false);

The GameObject is still in Hierarchy, but is disabled in the scene

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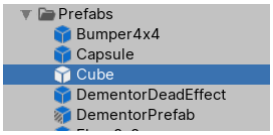
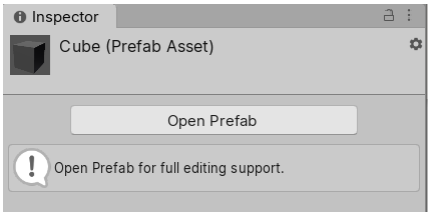
Unity 3D: Prefabs

Allows you to create, configure, and store a GameObject with all its components

Can be thought of as templates

Can use multiple instances of a prefab in your scene





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Readings

1. https://docs.unity3d.com/Manual/Components.html
2. https://docs.unity3d.com/Manual/Materials.html
3. https://docs.unity3d.com/Manual/ScriptingSection.html
4. https://docs.unity3d.com/Manual/Prefabs.html
5. https://docs.unity3d.com/Manual/HOWTO-UseSkybox.html
6. https://docs.unity3d.com/ScriptReference/MonoBehaviour.Start.html
7. https://docs.unity3d.com/ScriptReference/MonoBehaviour.Update.html
8. https://docs.unity3d.com/ScriptReference/Transform.Rotate.html
9. https://docs.unity3d.com/ScriptReference/Input.GetKey.html
10. https://docs.unity3d.com/ScriptReference/KeyCode.html
11. https://docs.unity3d.com/ScriptReference/Transform.Translate.html
12. https://docs.unity3d.com/ScriptReference/MonoBehaviour.OnMouseDown.html
13. https://docs.unity3d.com/ScriptReference/Object.Destroy.html
14. https://docs.unity3d.com/ScriptReference/GameObject.SetActive.html

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