Mike LeBlanc

Mobi3002
Project #1
Unity #1

Mike LeBlanc

So, you want to make a game?

The world of game development is enticing, especially for those of us with a programming background already. We'd take one look at the systems in place and have a generally good idea of what's going on. That's fine and dandy, until you realize (if you're like myself,) "Dang, I can write the logic of this, but what's a pencil, and how do I get the pretty pictures on the screen?" or, "Why is it so silent? My kids must be into something. Do I have to write the music for this too?"

Great news ladies and gents! I have all your needs covered for the "Hello, world!" of making a video game.

ASSETS!

Here are a bunch of links, screenshot and save this for side projects if you wish.

https://develop.games/ - This is one of THE most important links.

https://itch.io/ - for all your indie game fixes and asset needs. 2d/3d/audio/sfx

https://sfx.productioncrate.com/ - Lots of free sound effects and background music.

https://opengameart.org – Another great asset location

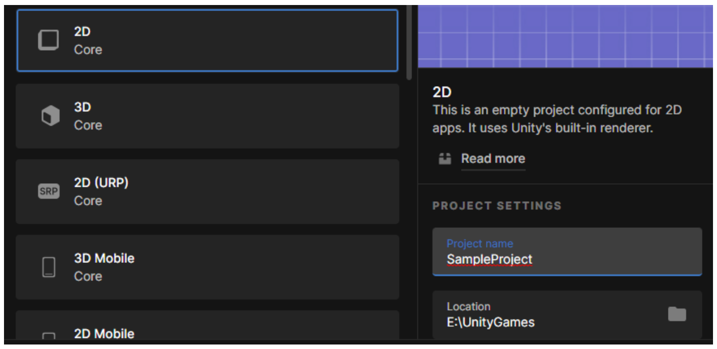
Also, lots of great, free assets on the Unity/Unreal/Godot asset stores.
(Unreal gives $250 - $400 in free assets away EVERY month. Mostly 3D assets).

Name of the game (heh) here in the early days is free assets, and what you can create. After you've gathered your assets, then its time to learn how to get it into the hands of the people.

Getting started (background)

(We're skipping this, Jeager will probably cover this, but I'll add it here.)

Okay, in Unity, after we've downloaded the program, we'll select new Project and Name it something, doesn't matter the name because we'd likely not publish anything with this project.

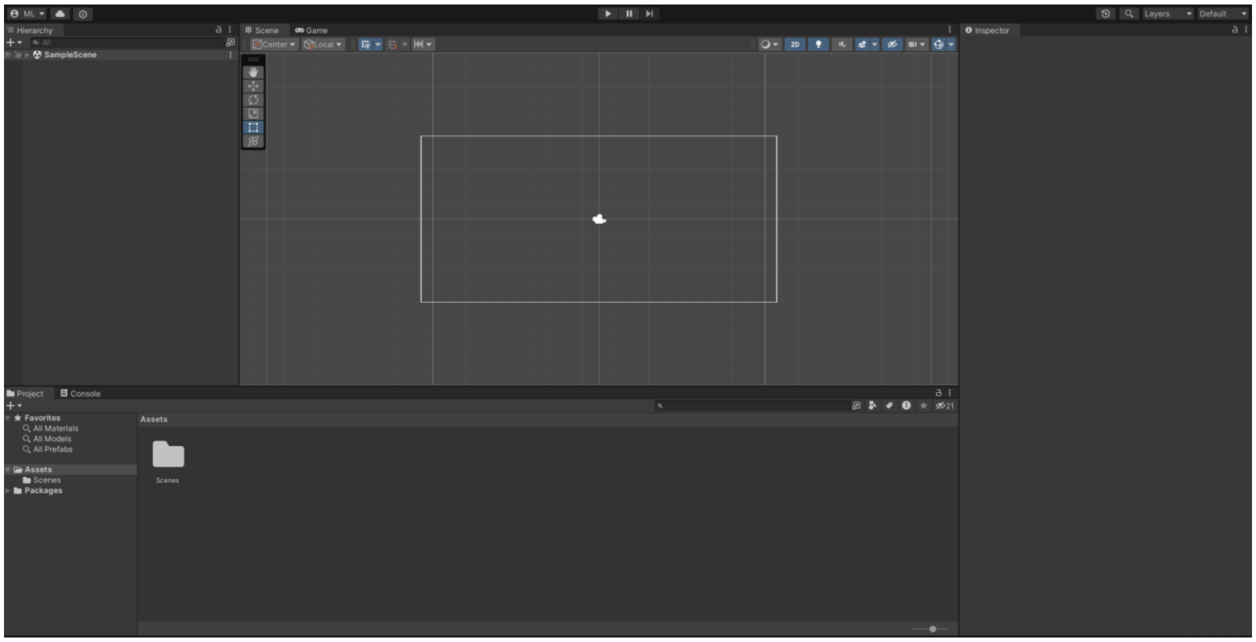


This is an empty project configured for 2D apps. It uses Unity's built-in renderer.

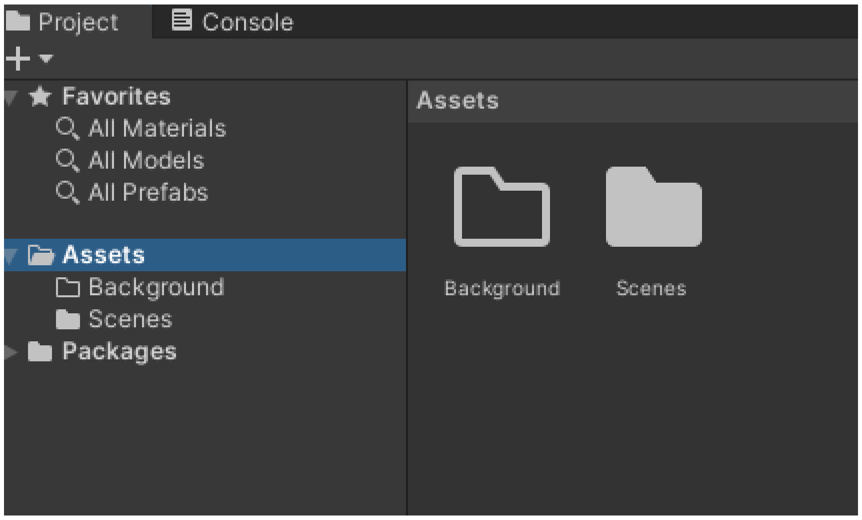
Project name
SampleProject

Location
E:\UnityGames

Once we're loaded in, we get a quite intimidating screen.

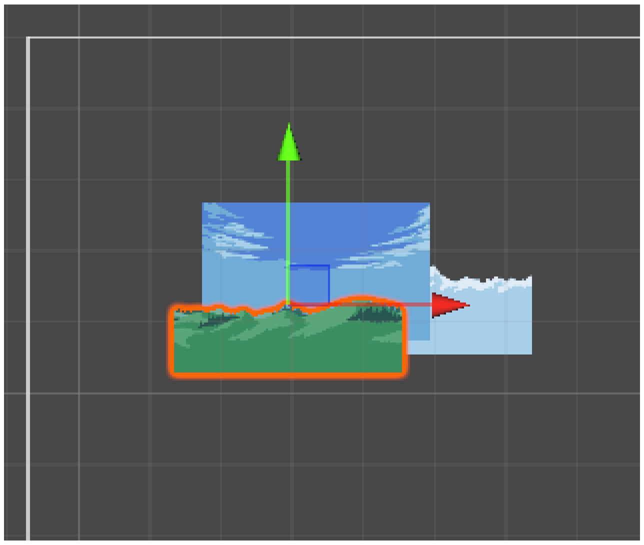


However, need not be discouraged, this will be easier to see once we get some stuff imported. Let's start easy by creating some folders to get some organization for our project. In the middle bottom of the screen, we create some new folders. Let's have a folder for our assets.

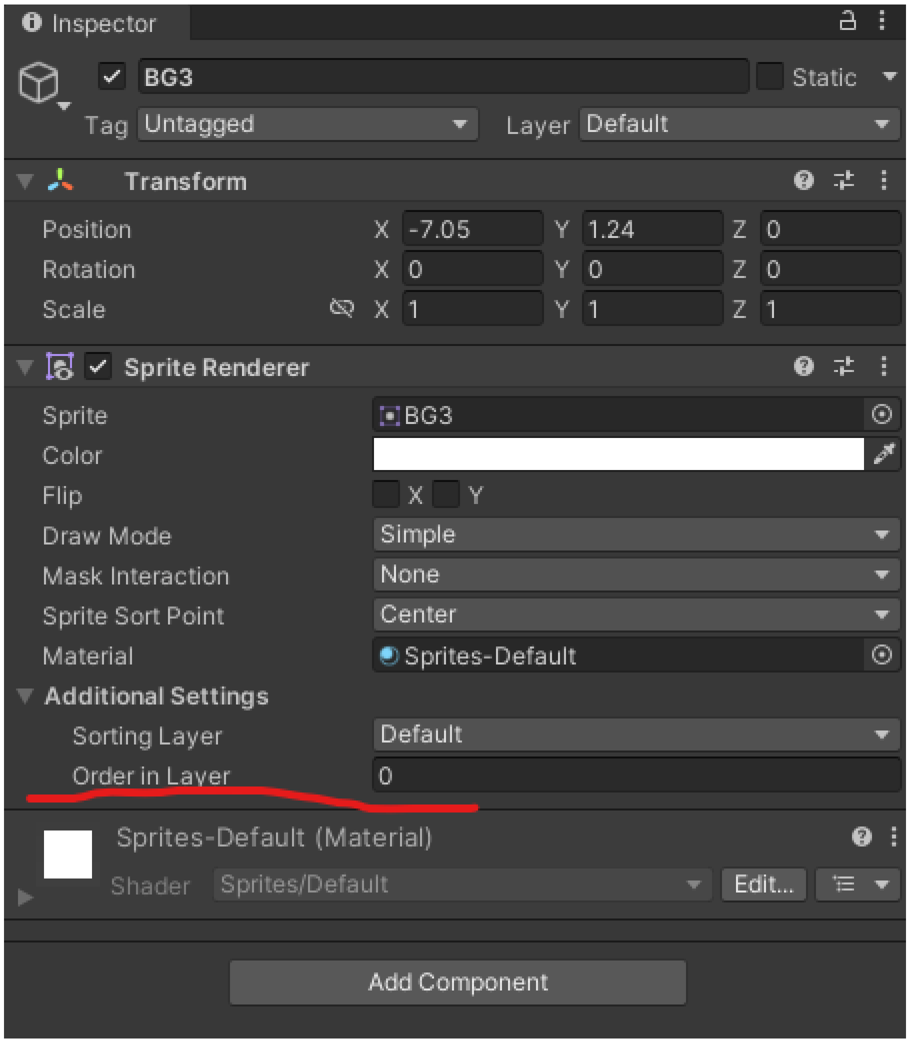


See? We're already at home. Let's pull our background asset in and put it in the folder.

Once they're in the folder, we can pull them up and into the scene.



We have the background in, it's a little small, but it doesn't seem to be in the right order. Thankfully, we have a setting on the right side of the program specifically for this.



Inspector

BG3 Static

Tag Untagged Layer Default

Transform

	X	Y	Z
Position	-7.05	1.24	0
Rotation	0	0	0
Scale	1	1	1

Sprite Renderer

Sprite	BG3
Color	
Flip	X Y
Draw Mode	Simple
Mask Interaction	None
Sprite Sort Point	Center
Material	Sprites-Default

Additional Settings

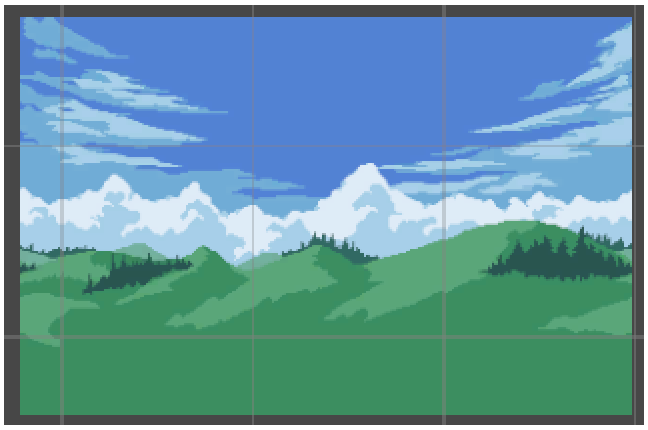
Sorting Layer	Default
Order in Layer	0

Sprites-Default (Material)

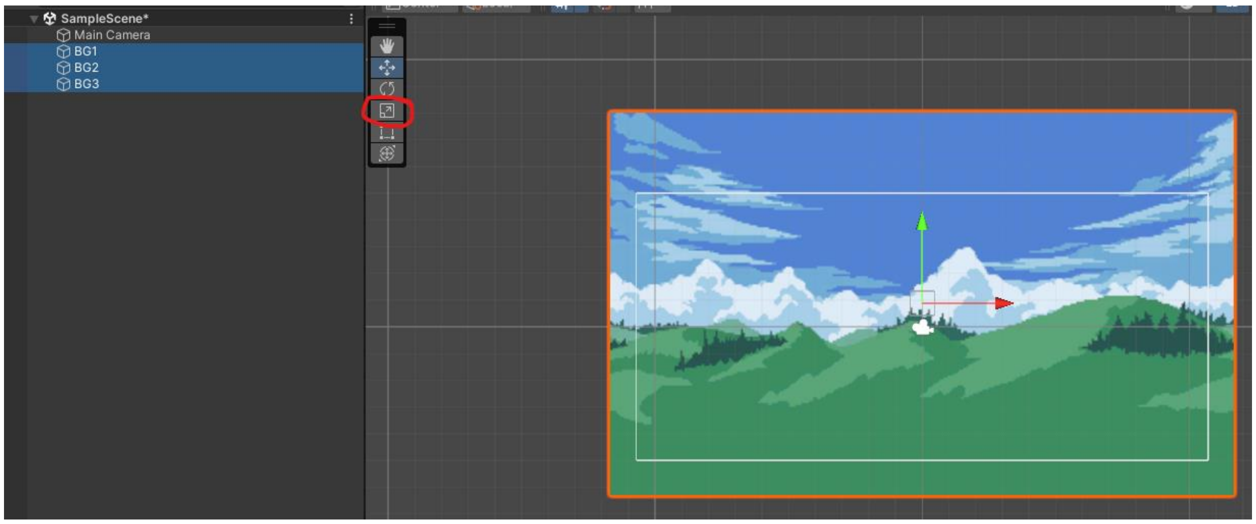
Shader Sprites/Default Edit...

Add Component

So, we'll put the sky as -3, the clouds as -2, and the grass as -1. In this order. And after that with a little bit of moving, we have a picturesque background!



Now we just need to scale our background to be bigger than the white lines for the camera. Not hard, just select the 3 backgrounds from our scene view on the left side of the program, and scale them up.

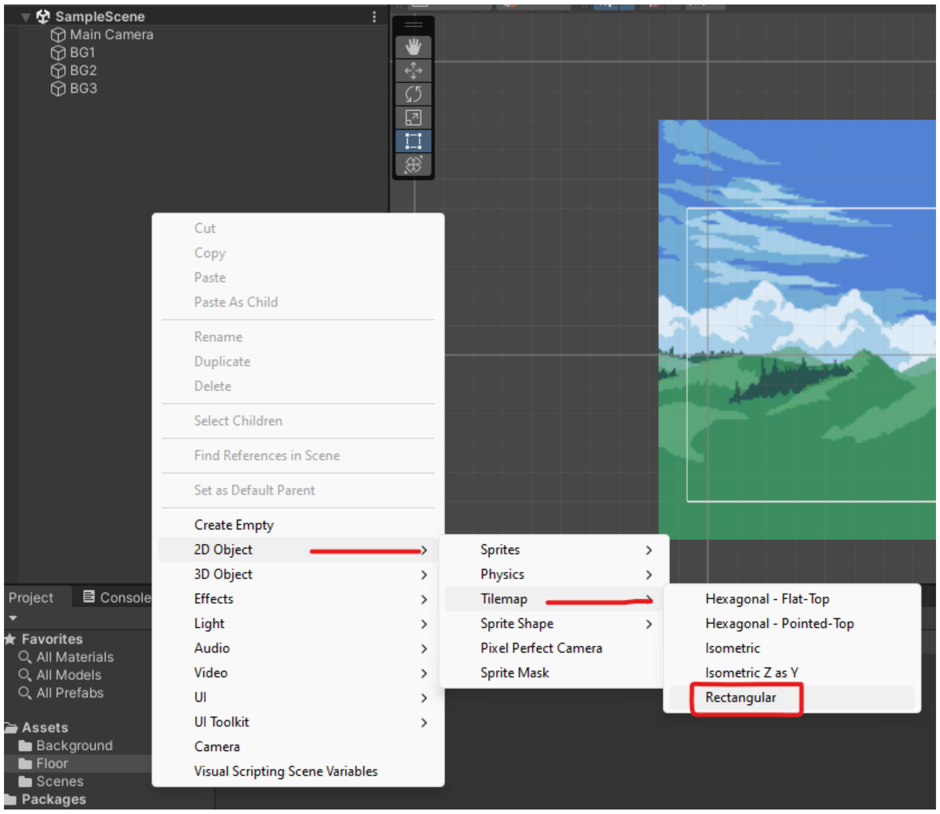


Tiles and the floor

Now, as we've established, I am no artist. Of any kind. At all.

But thanks to the power of the internet, I don't have to be. Let's grab our "Tileset" which contains the floor we're going to use and drag it into its own folder that we'll call 'floor'. Very intuitive.

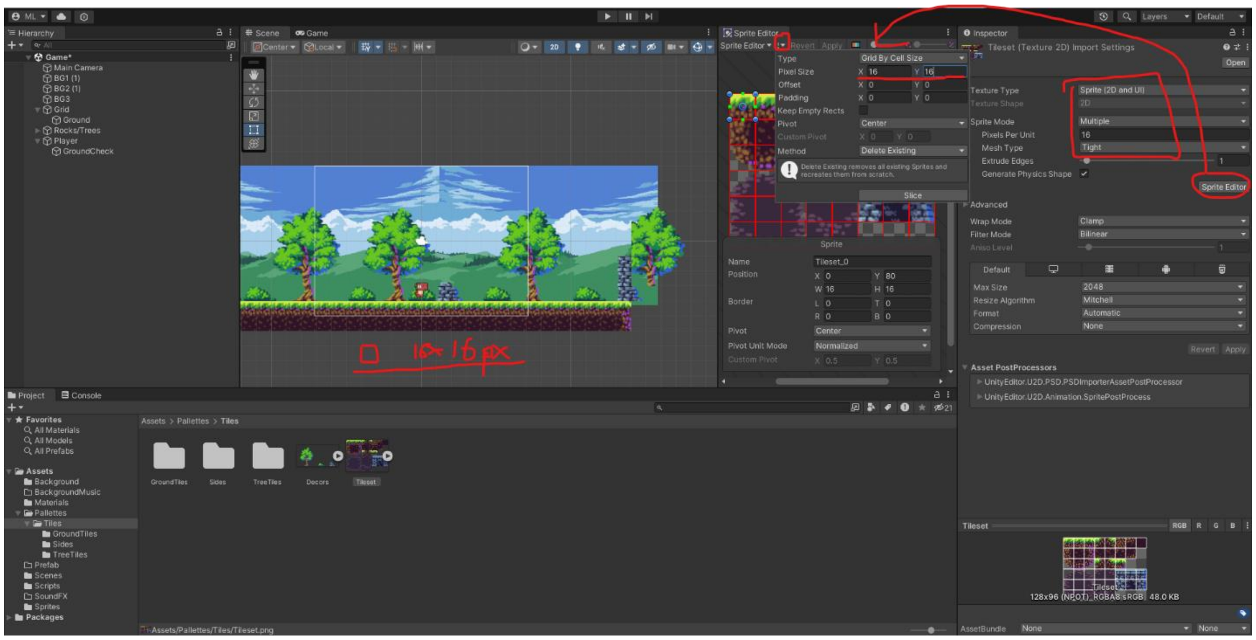
Now, lets create something that's called a Tilemap. This is important because we'll be able to essentially paint our floor tiles onto our scene and in front of our background.



We'll call this asset appropriately 'floor'.

Next is extremely important, and is a small learning curve, and unless you knew to look for it, will be difficult to just fumble into.

Look at this next picture carefully because there is a lot of info.



Type: Grid By Cell Size
Pixel Size: X 16 Y 16
Offset: X 0 Y 0
Padding: X 0 Y 0
Keep Empty Rects
Pivot: Center
Custom Pivot: X 0 Y 0
Method: Delete Existing

Delete Existing removes all existing Sprites and recreates them from scratch.

Sprite
Name: Tileset_0
Position: X 0 Y 80 W 16 H 16
Border: L 0 T 0 R 0 B 0
Pivot: Center
Pivot Unit Mode: Normalized
Custom Pivot: X 0.5 Y 0.5

Tileset (Texture 2D) Import Settings
Texture Type: Sprite (2D and UI)
Texture Shape: 2D
Sprite Mode: Multiple
Pixels Per Unit: 16
Mesh Type: Tight
Extrude Edges: 1
Generate Physics Shape: ✓
Advanced
Wrap Mode: Clamp
Filter Mode: Bilinear
Aniso Level: 1
Default
Max Size: 2048
Resize Algorithm: Mitchell
Format: Automatic
Compression: None
Asset PostProcessors
UnityEditor.U2D.PSD.PSDImporterAssetPostProcessor
UnityEditor.U2D.Animation.SpritePostProcess
Tileset
128x96 (NPOT) RGBA8 sRGB 48.0 KB
AssetBundle: None None

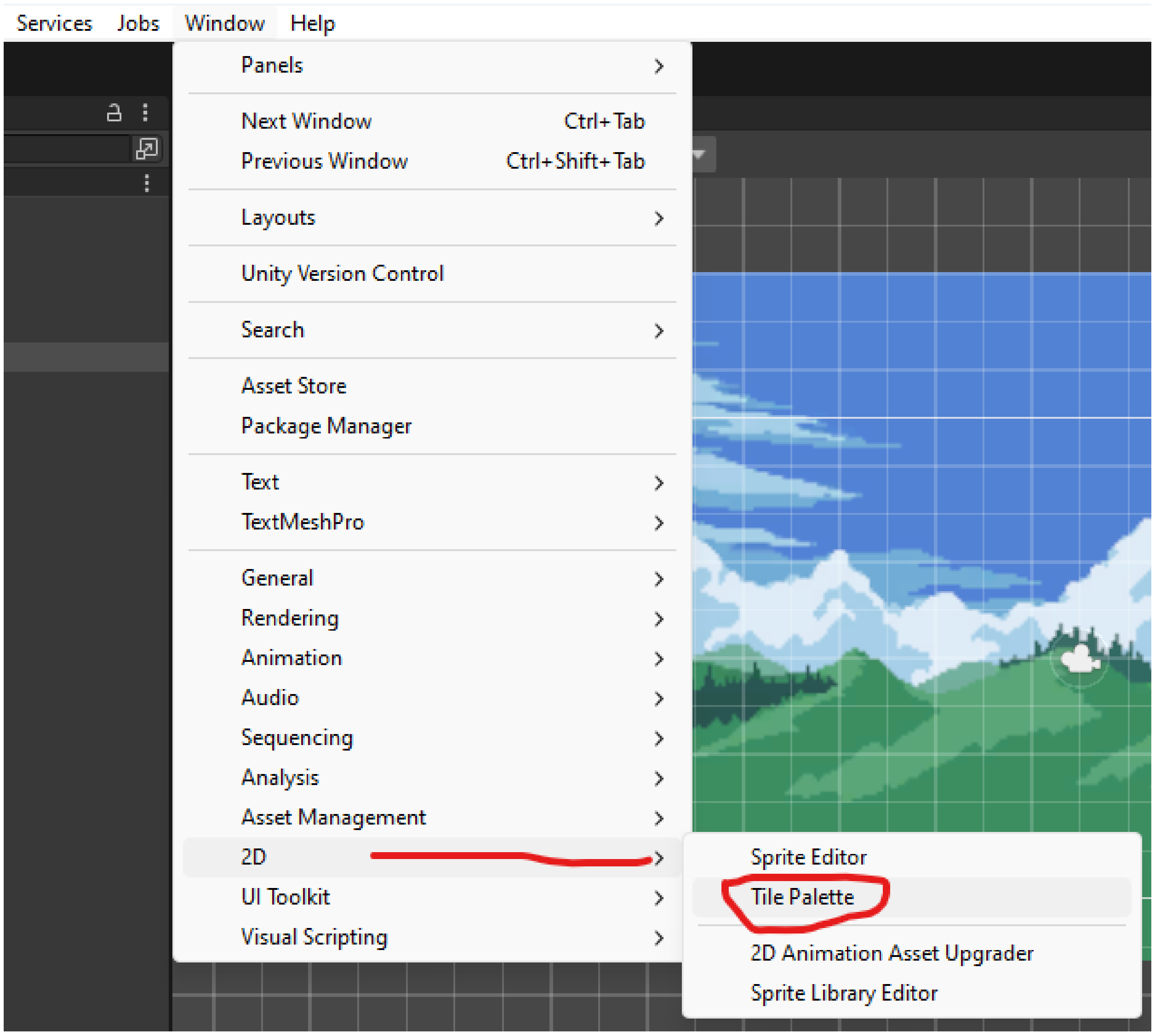
After selecting the tile set in our project folder, we have some settings in the inspector that we need to change. First, we must ensure that the Texture Type at the top is set to Sprite, Sprite Mode must be set to 'Multiple' as we have more than 1 sprite in the tile set. Most importantly, Pixel per Unit must be set identically to the squares that appeared where our background is.

By default, these squares are 16 by 16 pixels each, so our Pixels per Unit must also be set to 16.

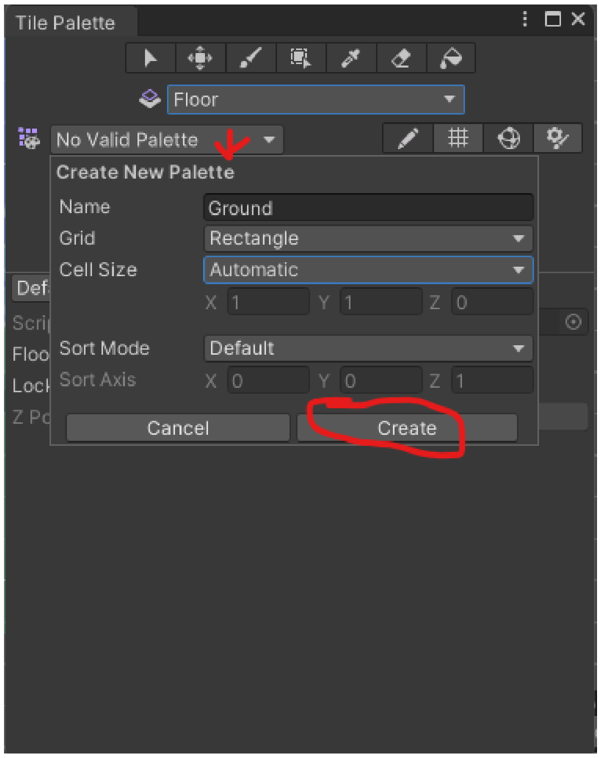
Now we can hit Sprite Editor, and a new window will pop up. It's important to change the Type at the top from 'Automatic' to 'Grid by Cell Size'. And, as you may have guess, just below we are going to set our grid size to 16 x 16 to match up with our cells in our background.

Once we hit 'Slice' at the bottom of the popup window, it will prompt us to use a folder to save all our new assets. Go ahead and make a new folder called 'FloorTiles' and save them in there for safe keeping.

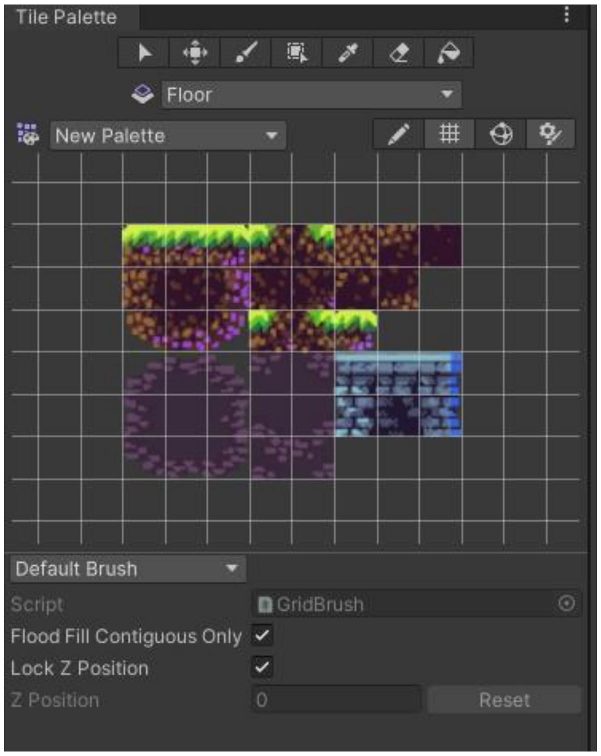
To effectively paint our tiles into our Scene (where our background is currently) we need to open a tile palette, this is easy and quick to do, I'll show you!



Once we open this up, lets make a new palette, and then drag the tile set we just spliced into the Tile Palette and get ready to paint.

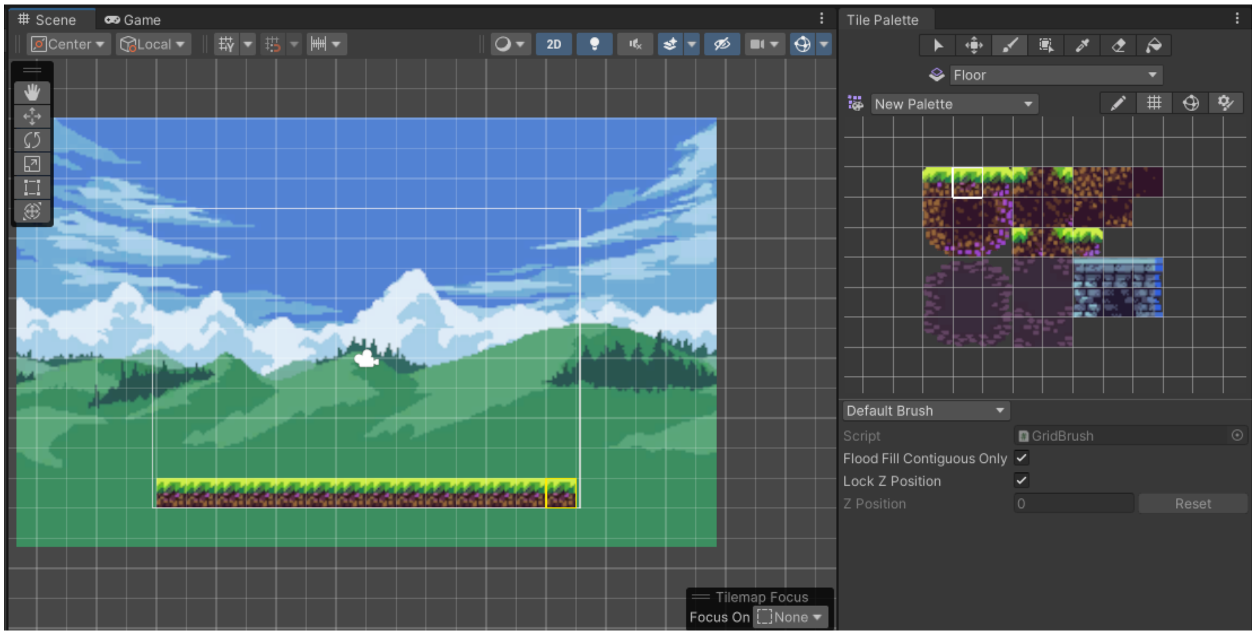

Tile Palette
Floor
No Valid Palette
Create New Palette
Name Ground
Grid Rectangle
Cell Size Automatic
X 1 Y 1 Z 0
Sort Mode Default
Sort Axis X 0 Y 0 Z 1
Cancel
Create

When you get that done, your Tile Palette should look something like this:


Tile Palette
Floor
New Palette
Default Brush
Script GridBrush
Flood Fill Contiguous Only ✓
Lock Z Position ✓
Z Position 0
Reset

This is lengthy, so let's wrap this up. Shall we?

At the top of the Tile Palette, there is a brush icon. Select that, and now select the tile underneath that you want to paint with, and then paint away in your scene!



Default Brush
Script: GridBrush
Flood Fill Contiguous Only ✓
Lock Z Position ✓
Z Position: 0
Reset

We have just completed our first floor! Congratulations!

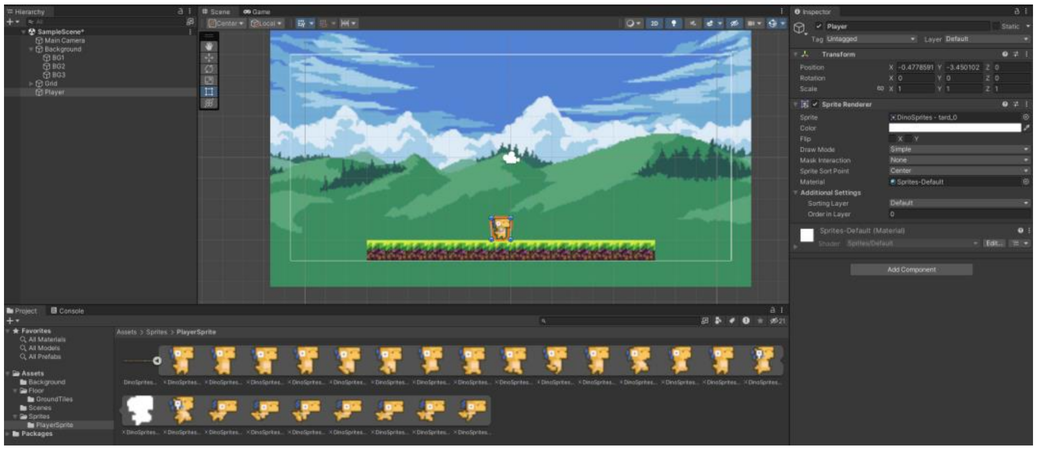
(If Jeager explains this, we won't. Hopefully we won't because this is way over 10 minutes!)

Player Sprite and collision detection!

I really am hoping this PDF isn't too long winded and Jeager has finished by now. But let's continue.

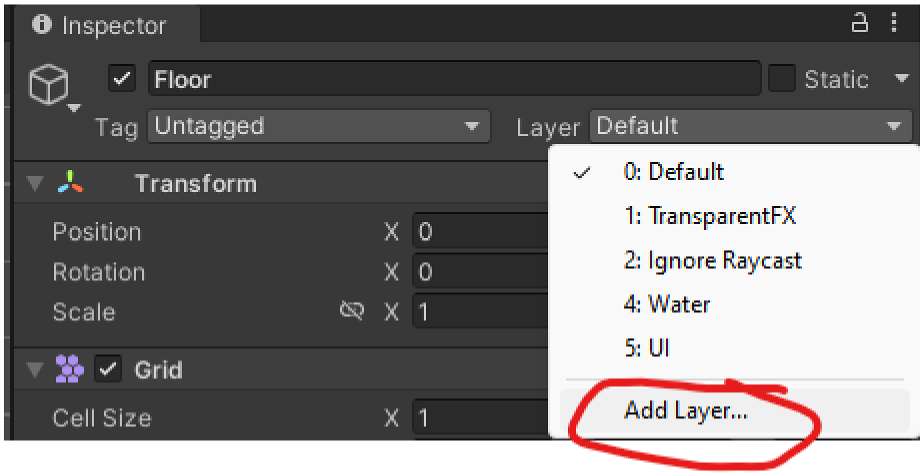
We can follow the same steps as before for importing our player sprite. Find a good-looking character asset from one of the stores above, and create a new folder called 'PlayerSprite' or something to that effect. Then select the asset, make sure the settings are correct, and then slice them up appropriately. Usually, your first player sprite will be 1 tile (unlike the floor, where we can paint a bunch of them).

Here's what we look like after that: (Also, don't forget to put the Order to 1 in the Sprite Renderer!!)

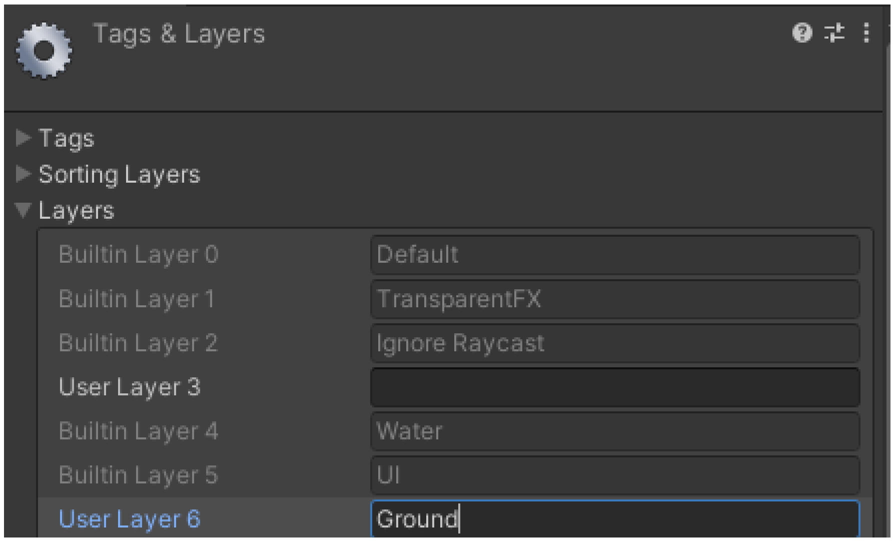


Player ✓ Static
Tag: Untagged Layer: Default
Transform
Position X -0.4778591 Y -3.450102 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1
Sprite Renderer ✓
Sprite: DinoSprites - tard_0
Color
Flip X Y
Draw Mode: Simple
Mask Interaction: None
Sprite Sort Point: Center
Material: Sprites-Default
Additional Settings
Sorting Layer: Default
Order in Layer: 0
Sprites-Default (Material)
Shader: Sprites/Default Edit...
Add Component

Now, we're going to work with this player sprite and the ground to create some collision and movement scripts. We'll take it one step at a time, so there's no need to rush. It's like learning to fly. (There's a song from yesteryear.



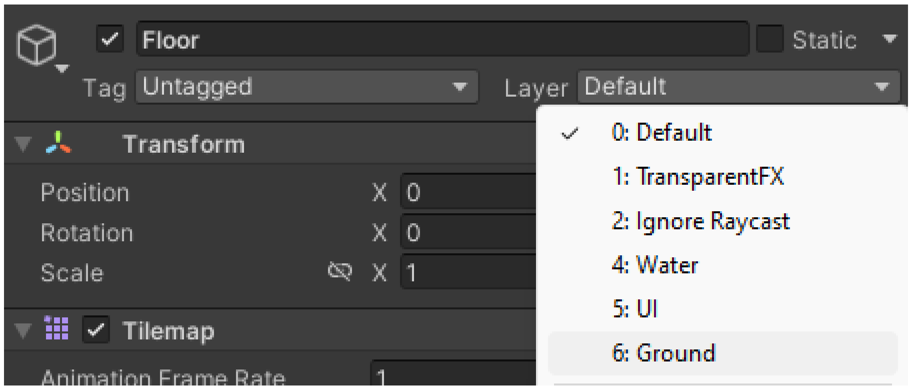
First, we'll want to make a new layer, this isn't important now, but an easy thing to forget.


Tags & Layers

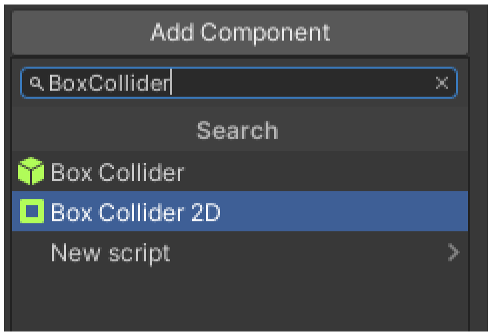
- Tags
- Sorting Layers
- Layers

Builtin Layer 0	Default
Builtin Layer 1	TransparentFX
Builtin Layer 2	Ignore Raycast
User Layer 3	
Builtin Layer 4	Water
Builtin Layer 5	UI
User Layer 6	Ground

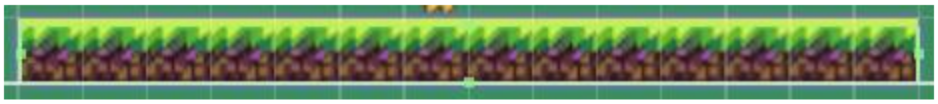
Now we go back and select 'Ground' as the layer. Done!



Now, still working with the ground, we must add a new component to it. We'll want a 2D Box Collider.



Great! Now we have a weird green box around our camera. We'll want to hit the 'Edit Collider' button and adjust the green square to the place on the floor that we'd like to collide with.

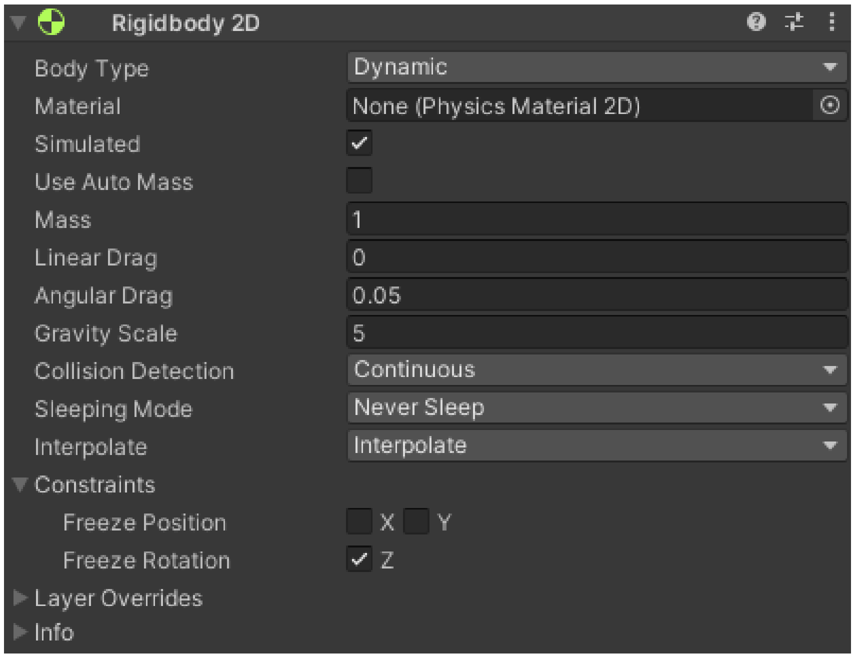


Kind of hard to see, but its there. Notice I put the collision box a little from the top of the grass, this is just preference, you can honestly put it wherever you'd like your player to collide with or not.

Before we go colliding with the floor, we must set up 4 items on the player. These items are a 2D Box Collider, a RigidBody2D, a player movement script we'll write ourselves, and a material so we don't stick to the floor.

Starting with what we know, go ahead, and set up another Box Collider and move the green box to around our little character we brought in.

2nd component is also easy, Let's add a new component called RigidBody 2D, and set the following settings:

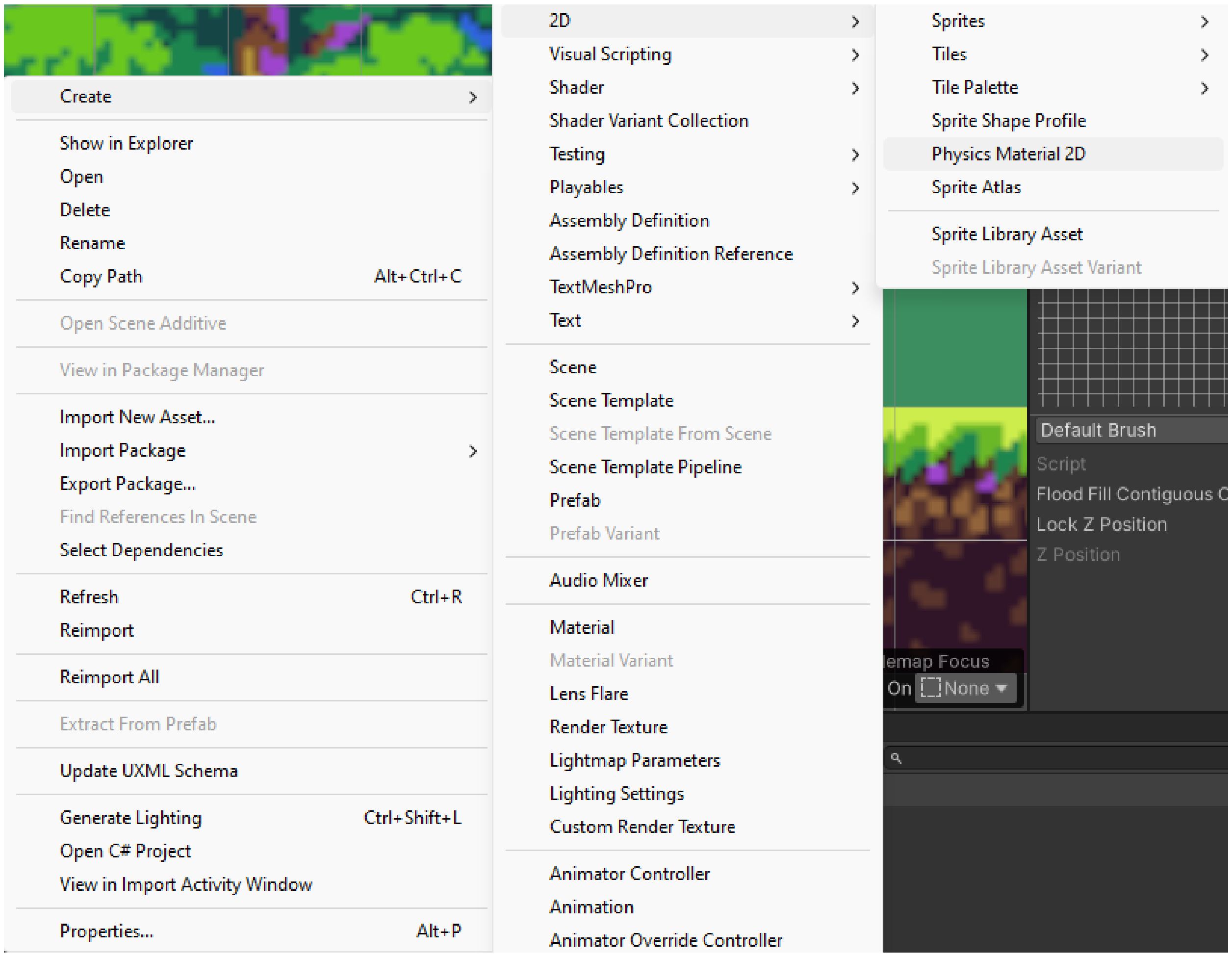


Rigidbody 2D

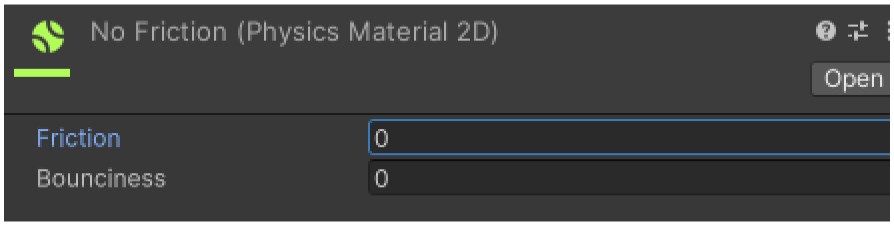
Body Type	Dynamic
Material	None (Physics Material 2D)
Simulated	✓
Use Auto Mass	
Mass	1
Linear Drag	0
Angular Drag	0.05
Gravity Scale	5
Collision Detection	Continuous
Sleeping Mode	Never Sleep
Interpolate	Interpolate
Constraints	
Freeze Position	X Y
Freeze Rotation	✓ Z
Layer Overrides	
Info	

The mass in our situation doesn't apply, but the one thing to note is in the constraints. We do not want to lock our position on the X or Y axis, meaning we can move both up and down. Secondly, we don't want this sprite to rotate on the Z axis, so we can lock that.

The next easiest thing to do is we're going to make a new folder under our root workspace we'll aptly name 'Materials'. Now, as you may have guessed, we'll make a new material, specifically a new Physics Material 2D. And name this one 'NoFriction', the intent as you may guess, is to have no friction to the floor.



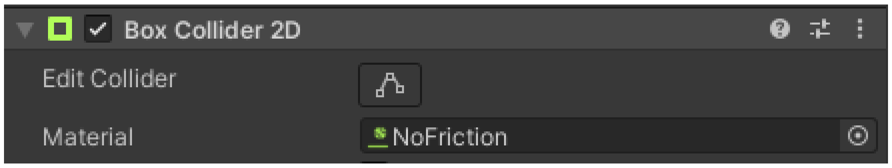
Now, just set Friction to 0. Easy enough.



No Friction (Physics Material 2D)

Friction 0
Bounciness 0

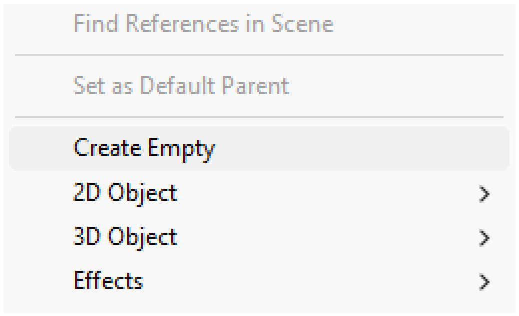
And finally, drag our 'NoFriction' material onto the Box Collider 2D where it says Material. Like this:



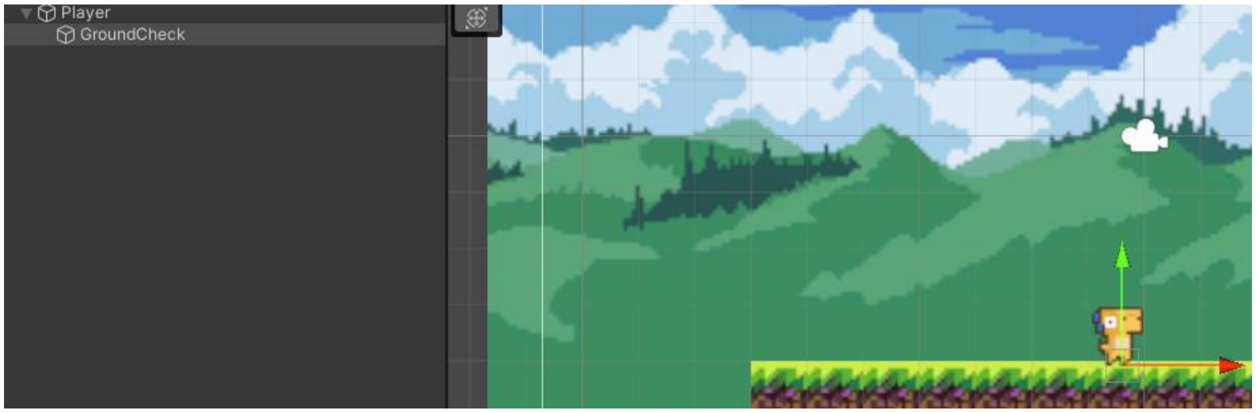
Material: NoFriction

Great! I lied when I said like 4 things. It takes a little bit to get the 'Hello World' of game dev. But I promise we are almost there! (1500 words later)

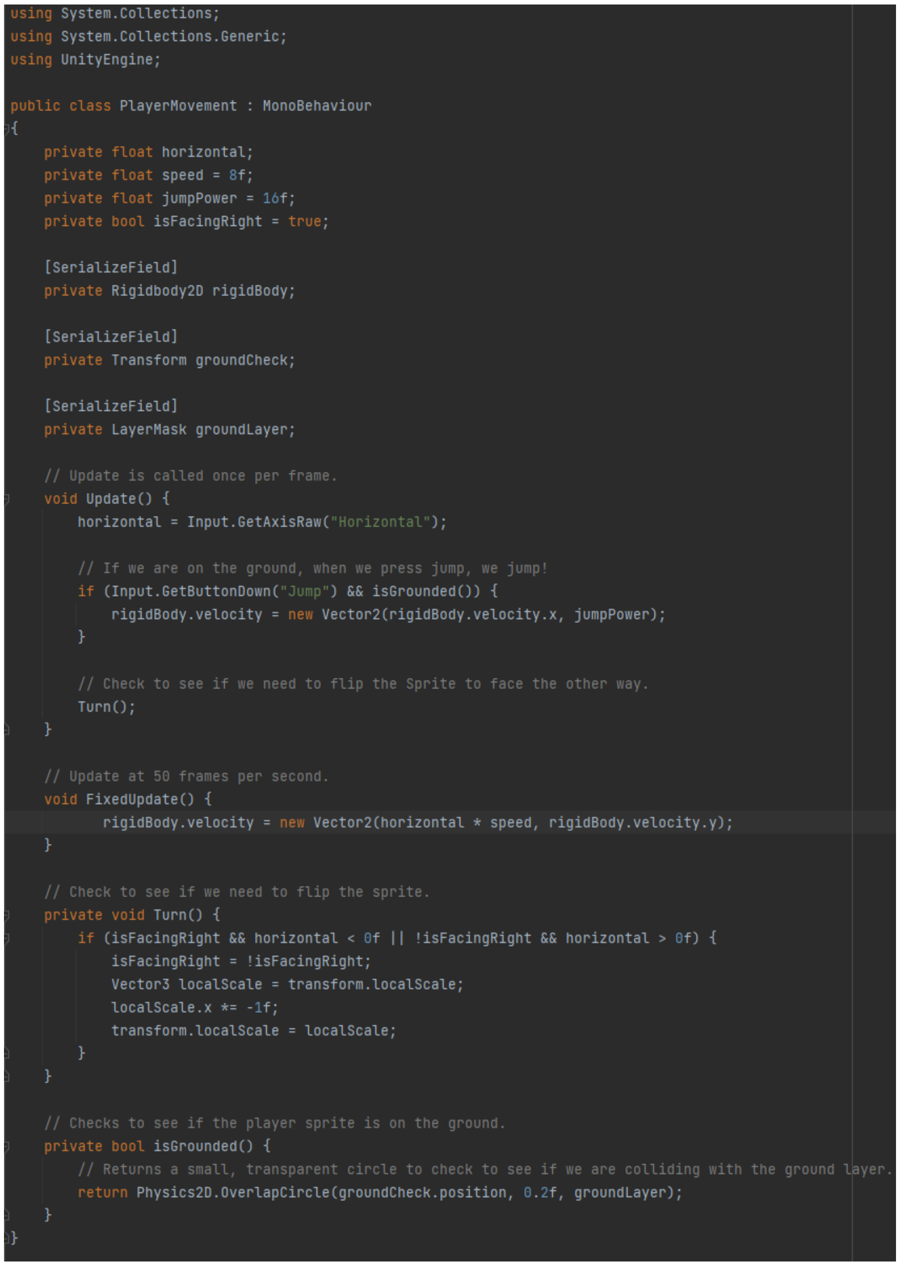
One last thing before we get into the script. On the left, lets create a new empty object, and attach it to our player object in the Hierarchy (left hand side).



Let's name that object 'GroundCheck' and it will be crucial that we either now, or after the completion of the script, to move it to the bottom of our Sprites feet. Our script will check for this object to see if we collide with the ground or not.



Okay. Now for the bit where we know what is happening and can read. We need a new script for player movement. So hit that Add component button while our player sprite is selected and let's choose a script. Name this 'Player Movement' to let us know what's up.



```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class PlayerMovement : MonoBehaviour
{
    private float horizontal;
    private float speed = 8f;
    private float jumpPower = 16f;
    private bool isFacingRight = true;

    [SerializeField]
    private Rigidbody2D rigidBody;

    [SerializeField]
    private Transform groundCheck;

    [SerializeField]
    private LayerMask groundLayer;

    // Update is called once per frame.
    void Update() {
        horizontal = Input.GetAxisRaw("Horizontal");

        // If we are on the ground, when we press jump, we jump!
        if (Input.GetButtonDown("Jump") && isGrounded()) {
            rigidBody.velocity = new Vector2(rigidBody.velocity.x, jumpPower);
        }

        // Check to see if we need to flip the Sprite to face the other way.
        Turn();
    }

    // Update at 50 frames per second.
    void FixedUpdate() {
          rigidBody.velocity = new Vector2(horizontal * speed, rigidBody.velocity.y);
    }

    // Check to see if we need to flip the sprite.
    private void Turn() {
        if (isFacingRight && horizontal < 0f || !isFacingRight && horizontal > 0f) {
            isFacingRight = !isFacingRight;
            Vector3 localScale = transform.localScale;
            localScale.x *= -1f;
            transform.localScale = localScale;
        }
    }

    // Checks to see if the player sprite is on the ground.
    private bool isGrounded() {
        // Returns a small, transparent circle to check to see if we are colliding with the ground layer.
        return Physics2D.OverlapCircle(groundCheck.position, 0.2f, groundLayer);
    }
}
```

Here is a snippet of all the code we'll need. Notice the [SerialzeField] in square brackets. What this does is allow us to kind of 'plug in' components into the script like we did with the 'NoFriction' material. Very neat! We can also get this effect by using 'public' variables, but that's not good coding standards.

It's important to note that the FixedUpdate function is called by unity every 0.02 seconds. This is the length of time of the frame. So currently we are getting about 50 frames per second.

Its important to note that Unity has a lot of movement already set up. WASD to move the cardinal directions and space to jump. Not entirely sure of the others yet.

From top of the script to the bottom, we have 4 private variables that we'll initate and use and we have 3 fields to plug into this script for 3 different components that we need, and you'll remember setting these up already. RigidBody 2d, our Ground Layer that we made, and the empty Ground Check object that is attached to the player Sprite.

Every 0.02 seconds (frame) we have to check to see if the space bar was pressed or if we turned. If space is pressed and we are on the ground, we need to add some vertical like our boy King James! So, we need a new Vector2 (makes changes to the x and y axis only (2D Space)) that takes the current value of our x axis and adds our jump power to create a nice jump effect! If we want to turn to go the other way, we want our Sprite to flip and look the other way as well, no walking backward here!

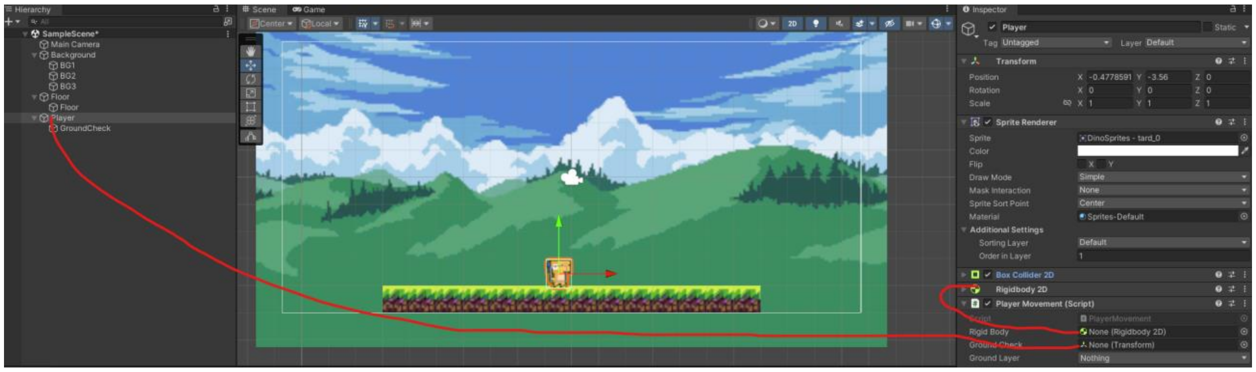
So as long as we are horizontal, we want to flip our boolean to be not what it was before, then we want a vector3 (3D space) to transform the x axis of the sprite image from 1 (looking right) to -1 (looking left) and multiplying our x value by -1 will always achieve this transformation.

In the FixedUpdate function, we are just moving our sprite based on the directional button. Taking the horizontal value, multiplying our speed, then updating.

The boolean checking to see if we are grounded refers to the empty object we attached to our player sprite. This create a small transluscent circle that returns true if it collides with the box collider we set up earlier, thus, disallows our Sprite from just falling through our floor.

Save, but don't close this file. IF there are any errors, nothing will compile and you can't test your little game if you don't have everything just right. And this is where our knowledge of programming REALLY drives us forward.

Okay, that was a lot, and maybe a lot of frustration. Now the easy part.



Player
Tag Untagged Layer Default

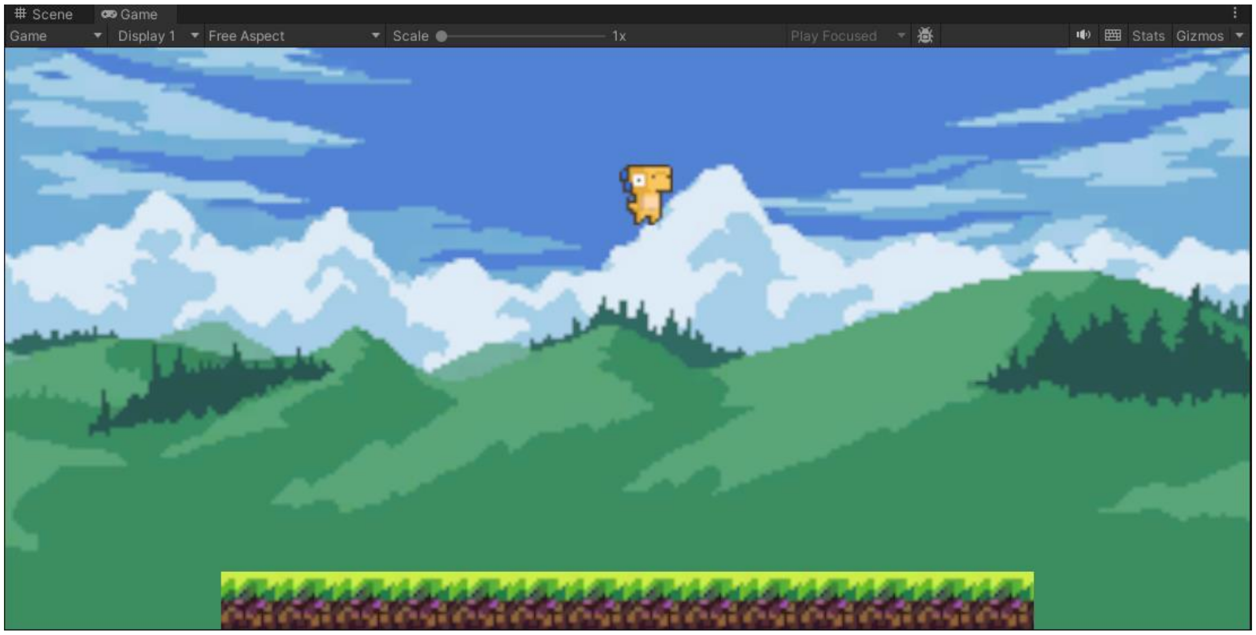
Transform
Position X -0.4778591 Y -3.56 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

Sprite Renderer
Sprite DinoSprites - tard_0
Color
Flip X Y
Draw Mode Simple
Mask Interaction None
Sprite Sort Point Center
Material Sprites-Default
Additional Settings
Sorting Layer Default
Order in Layer 1

Box Collider 2D
Rigidbody 2D
Player Movement (Script)
Script PlayerMovement
Rigid Body None (Rigidbody 2D)
Ground Check None (Transform)
Ground Layer Nothing

Drag your RigidBody2D component to its spot, and the GroundCheck object to its spot. For the Ground Layer, use the drop down to select our layer we created earlier.

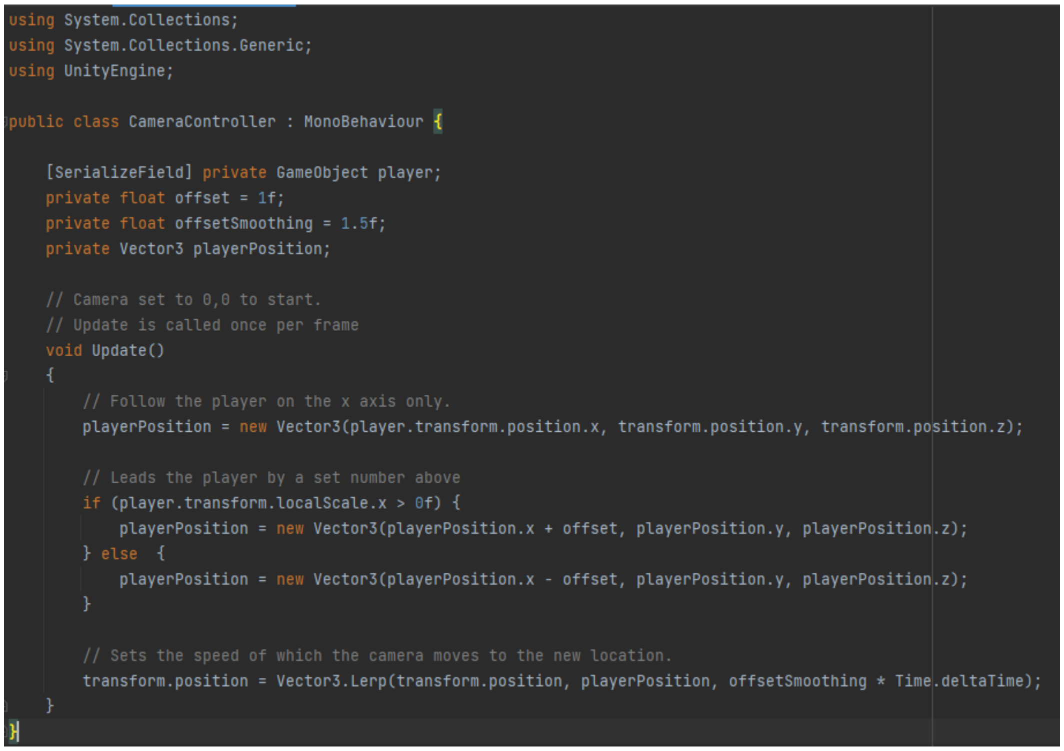
Okay. Moment of truth. The MONEY SHOT! Hit the play button at the top middle of Unity. And, if everything is just right, YOU CAN PLAY YOUR LITTLE GAME!!!!



YES! THIS IS SO GOOD! Now, its not much yet, but the world is your oyster with this. This is a big feat if you haven't done this sort of thing before. I'm proud of you, because it's the small victories that count (all victories count, so give yourself some credit!).

Camera Movement

I love everything about this and what you've been able to do. To kick things up into high gear and add some depth to our level here, lets add the ability for our camera to be able to follow the sprite left and right and allow us to see a little further than what we can now.



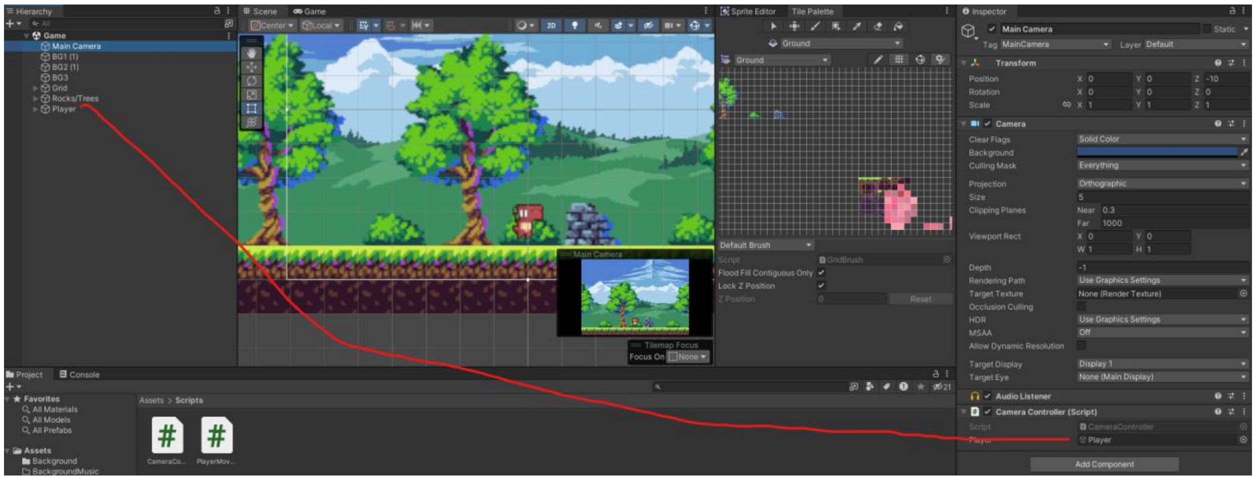
```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class CameraController : MonoBehaviour {

    [SerializeField] private GameObject player;
    private float offset = 1f;
    private float offsetSmoothing = 1.5f;
    private Vector3 playerPosition;

    // Camera set to 0,0 to start.
    // Update is called once per frame
    void Update()
    {
        // Follow the player on the x axis only.
        playerPosition = new Vector3(player.transform.position.x, transform.position.y, transform.position.z);

        // Leads the player by a set number above
        if (player.transform.localScale.x > 0f) {
            playerPosition = new Vector3(playerPosition.x + offset, playerPosition.y, playerPosition.z);
        } else  {
            playerPosition = new Vector3(playerPosition.x - offset, playerPosition.y, playerPosition.z);
        }

        // Sets the speed of which the camera moves to the new location.
        transform.position = Vector3.Lerp(transform.position, playerPosition, offsetSmoothing * Time.deltaTime);
    }
}
```

29 lines is all it takes. Let's go over this script. From top to bottom, we have another [SerializeField] for our player (sprite), an offset and offset smoothing float, as well as the vector3 for the player position.

We set our player position vector 3 to the current x, y, and z values. Then, we set the camera to the x position plus our or minus the offset depending on which way we are facing.

Finally, we transform the position of the camera to a new vector3 using its Lerp function to the new position, and so the camera doesn't snap (and snap our necks with whiplash too) we add some smoothing. The offset smoothing is multiplied by the difference in time. Higher smoothing means slower time to get to the new position.

So, like before, we can create a new script on the Main Camera object this time, (don't forget to make a spot for your custom scripts to live.)



Main Camera
Tag MainCamera Layer Default

Transform
Position X 0 Y 0 Z -10
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

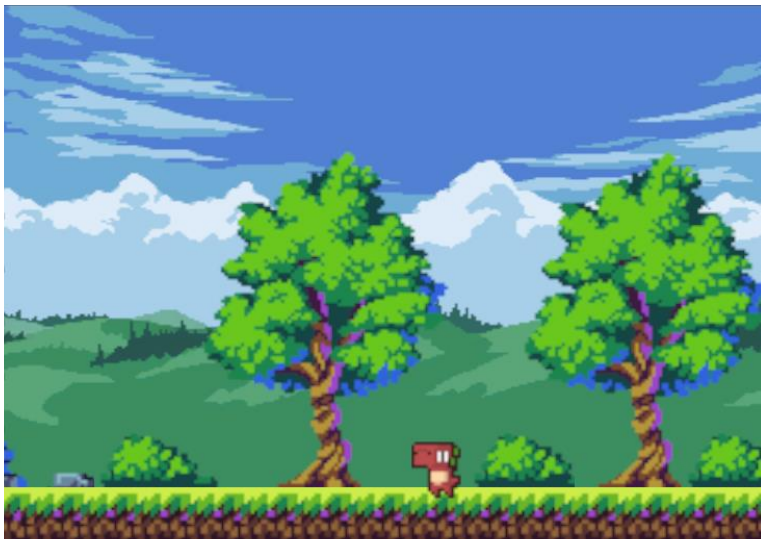
Camera
Clear Flags: Solid Color
Culling Mask: Everything
Projection: Orthographic
Size: 5
Clipping Planes: Near 0.3, Far 1000
Viewport Rect: X 0 Y 0 W 1 H 1
Depth: -1
Rendering Path: Use Graphics Settings
Target Texture: None (Render Texture)
HDR: Use Graphics Settings
MSAA: Off
Target Display: Display 1
Target Eye: None (Main Display)

Audio Listener

Camera Controller (Script)
Script: CameraController
Player: Player

And drag our Player object down and in. Easy!

Now, this is what our camera will look like when we run our game and test it:



Notice our camera is no longer center and will follow us around the map! Go you!