Bonus Features 3

Solution Walkthrough

Easy - Randomize Obstacles **2**

Medium - Double Jump! **15**

Hard - Dash Ability **17**

Expert - Game Start Animation **26**

Easy - Randomize Obstacles

1. Navigate to the Scripts folder and open up the script **SpawnManager.cs**. We will need to update the obstaclePrefab variable to be an array and add in a new variable for spawning a random obstacle.

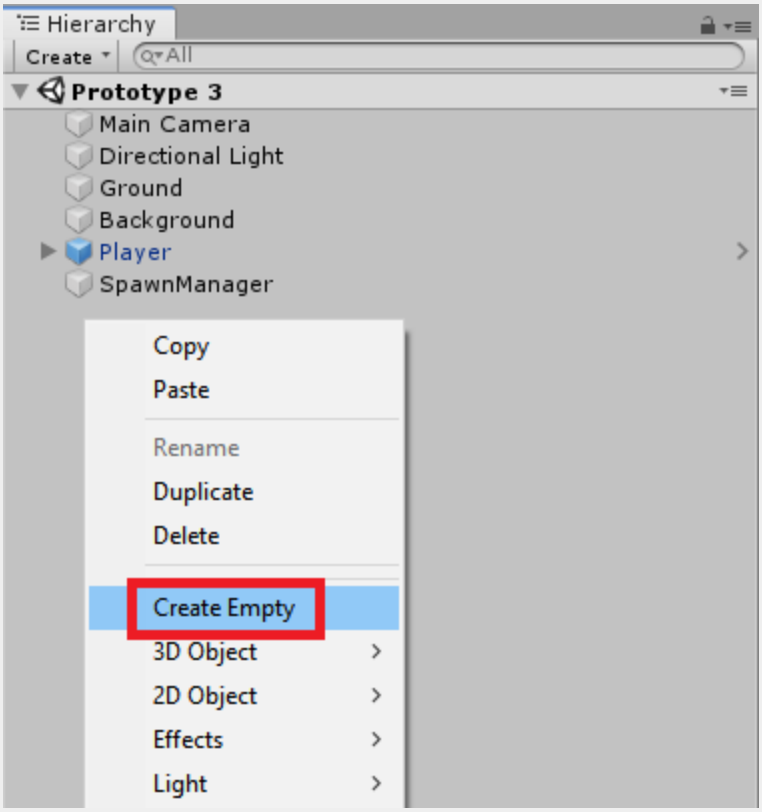
```
public GameObject[] obstaclePrefabs;
private Vector3 spawnPos = new Vector3(25, 0, 0);
private float startDelay = 2;
private float repeatRate = 2;
private PlayerController playerControllerScript;
private int randomObstacle;
```

2. We now need to update the **SpawnObstacle** method. First we will need to set the randomObstacle number, then spawn the object from that position in the array. The updated method will look like this:

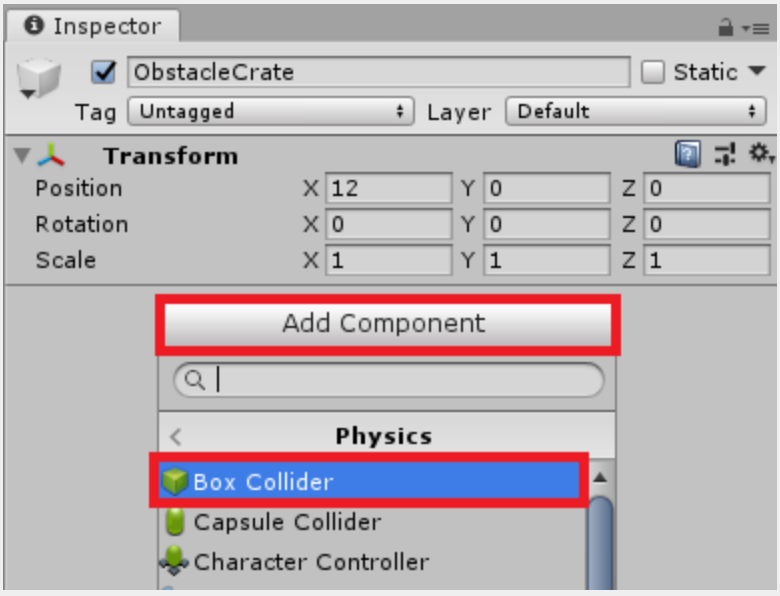
```
void SpawnObstacle ()
{
    if(playerControllerScript.gameOver == false)
    {
        randomObstacle = Random.Range(0, obstaclePrefabs.Length);
        Instantiate(obstaclePrefabs[randomObstacle], spawnPos,
obstaclePrefabs[randomObstacle].transform.rotation);
    }
}
```

Save the script and head back to Unity.

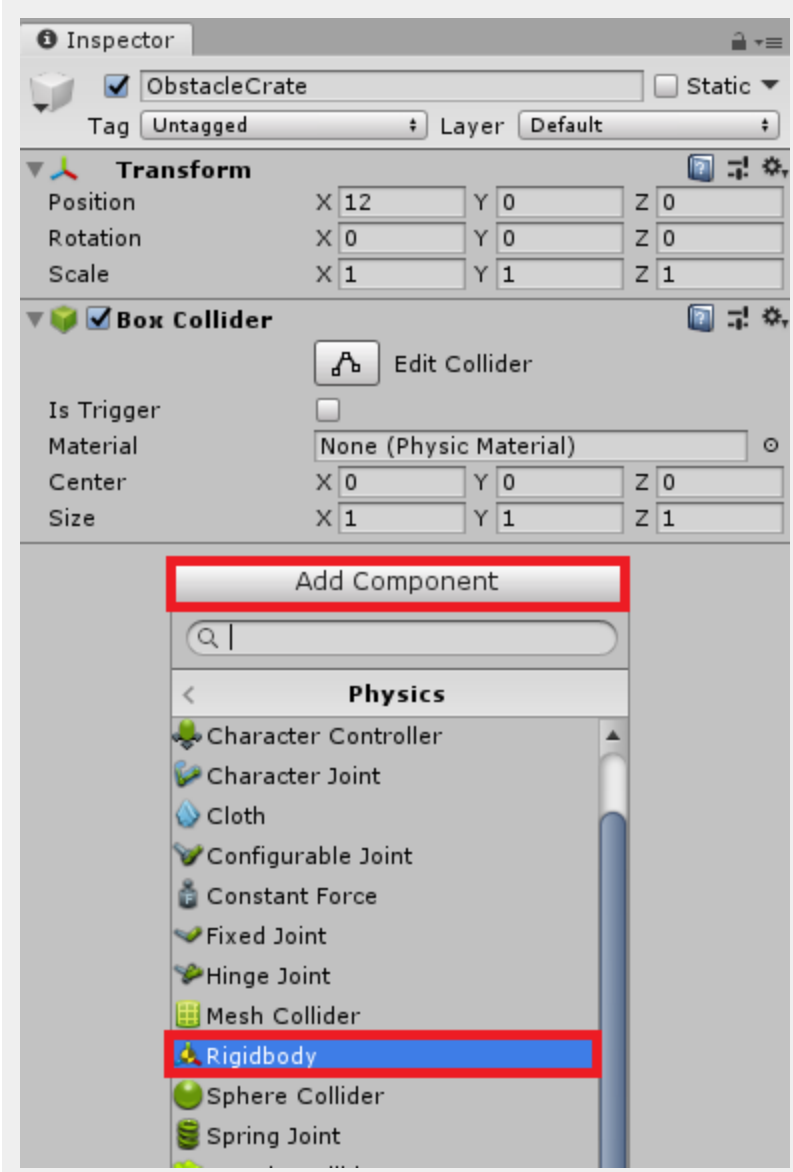
3. We now need to set up some more obstacle prefabs. First, create an empty GameObject by right-clicking in the Hierarchy and selecting **Create Empty**. Rename the new GameObject to *Obstacle_Crate*.



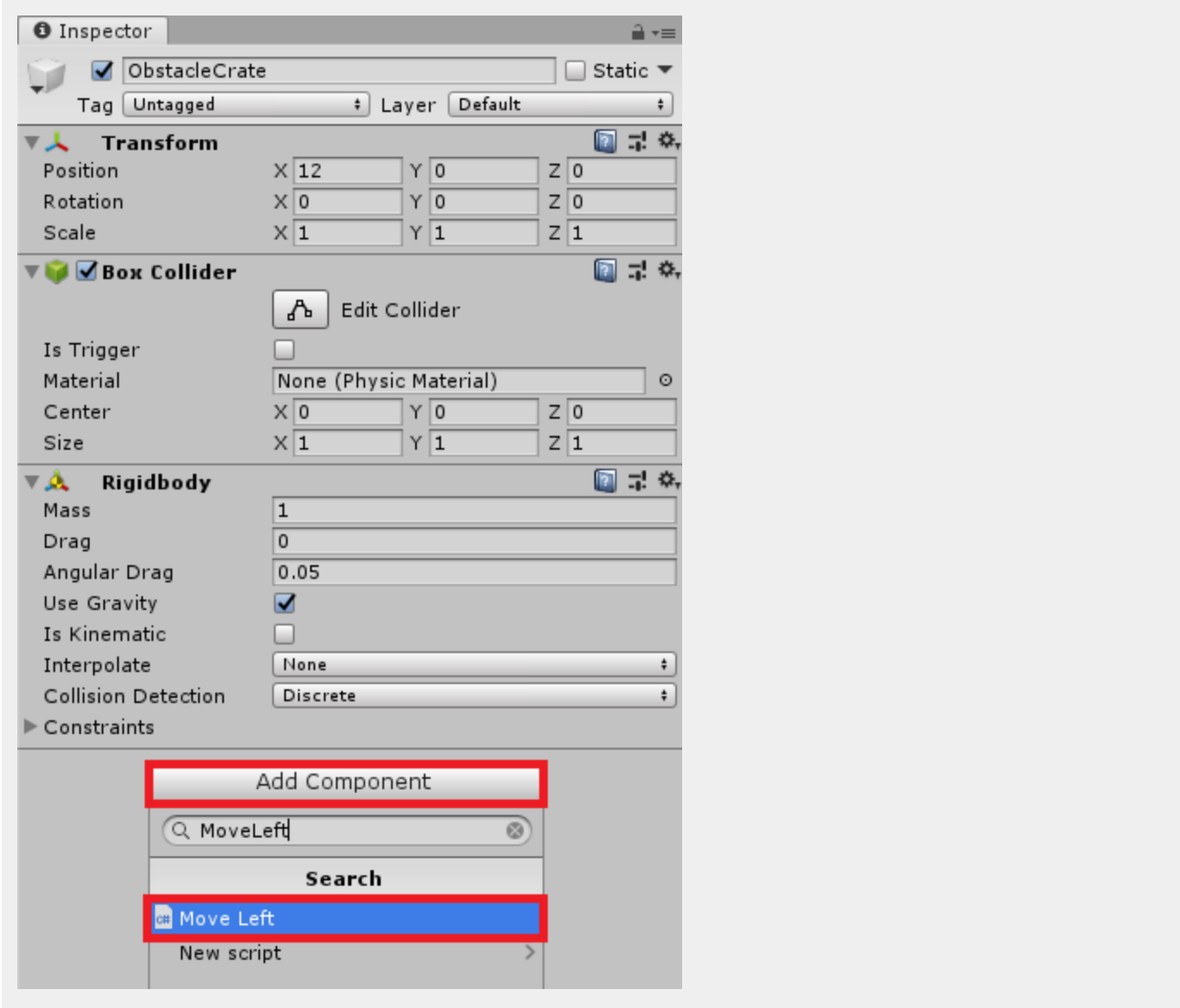
4. On the ObstacleCrate GameObject, add a Box Collider. We will adjust the size of this later. In the Inspector, click **Add Component** > **Physics** > **Box Collider**.



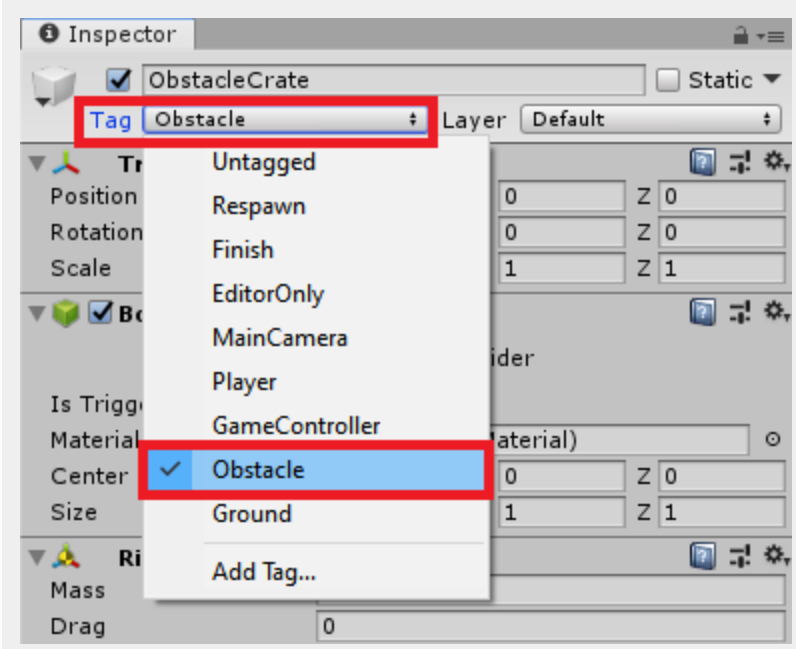
5. Next add a Rigidbody. In the Inspector, click **Add Component** > **Physics** > **Rigidbody**.



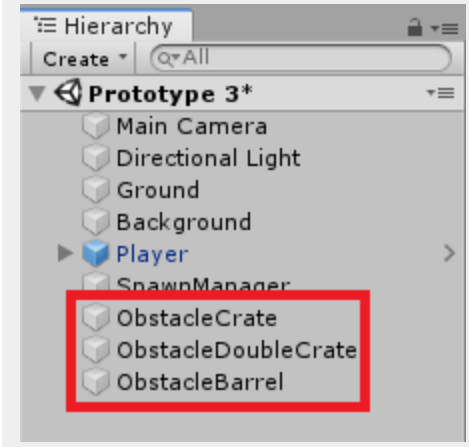
6. The last component we need on this GameObject, is the MoveLeft script. In the Inspector, click **Add Component** and search for **MoveLeft**, click on it to add it to the GameObject.



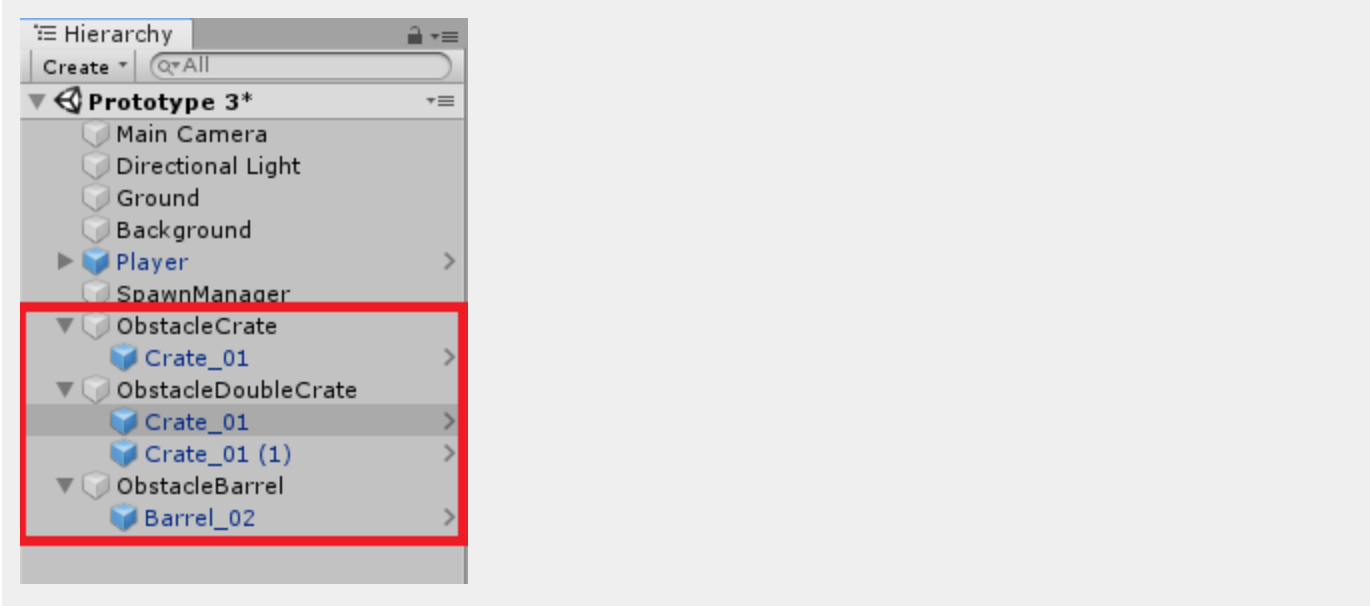
7. Change the Tag of the ObstacleCrate to **Obstacle**. This can be done by clicking on the **Untagged** dropdown and selecting **Obstacle.**



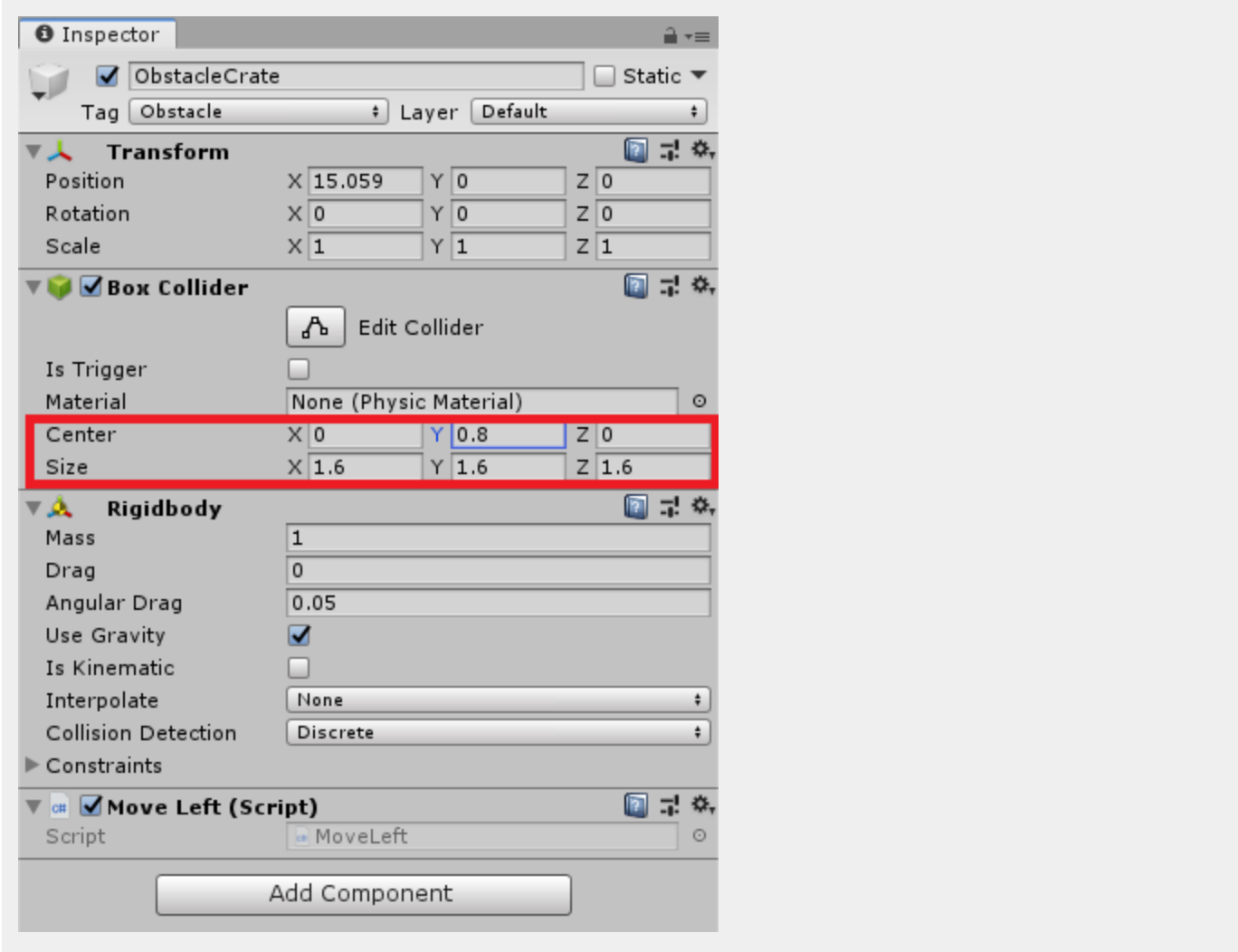
8. Now that we have the basis for our new Obstacles. Duplicate *ObstacleCrate* twice, rename one to *ObstacleDoubleCrate* and the other to *ObstacleBarrel*. You can duplicate a GameObject by either right-clicking on it and selecting **Duplicate** or selecting the GameObject and pressing **Ctrl + D** (PC) or **Cmd + D** (Mac).

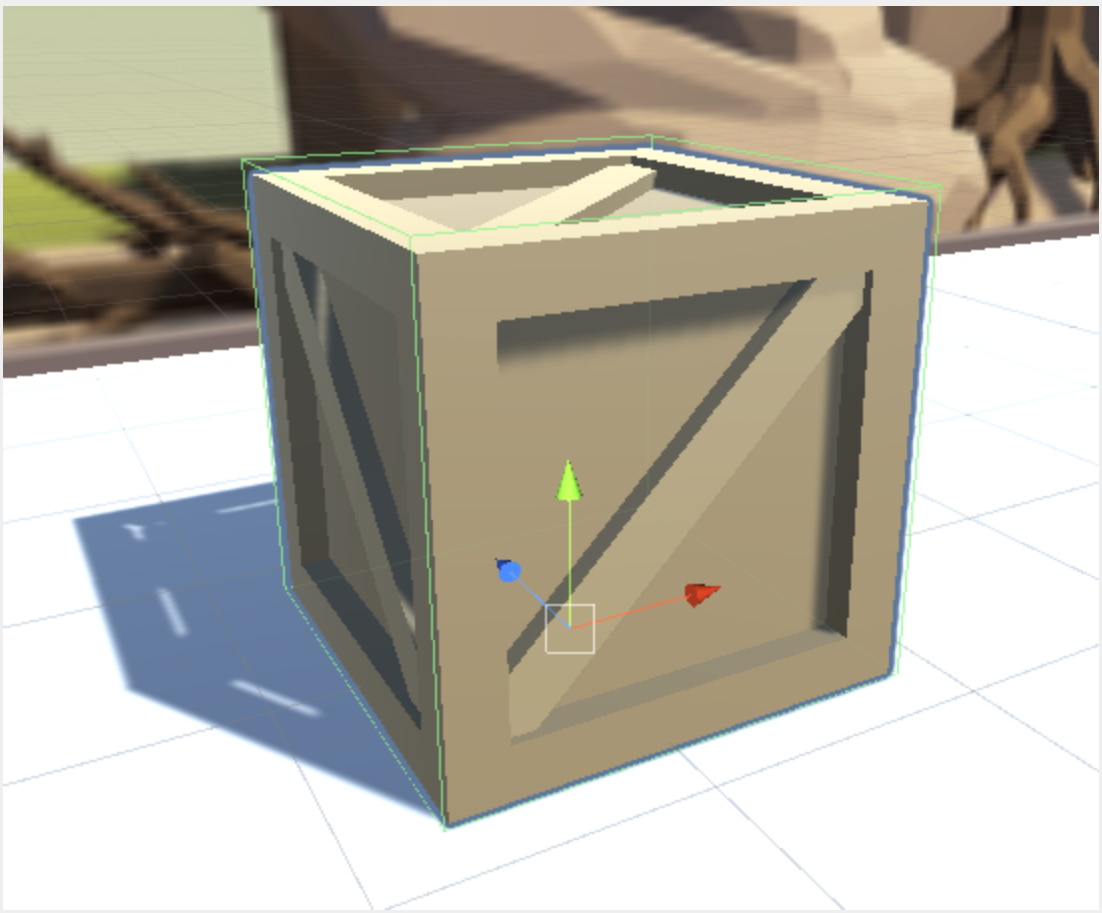


9. In the Project view, navigate to the *Obstacles* folder (*Course Library > Obstacles)*. Drag *Crate_01* into *ObstacleCrate* in the Hierarchy. In the *ObstacleDoubleCrate* GameObject, drag in *Crate_01* twice. In the *ObstacleBarrel* GameObject drag in either of the Barrels, we chose *Barrel_02*.

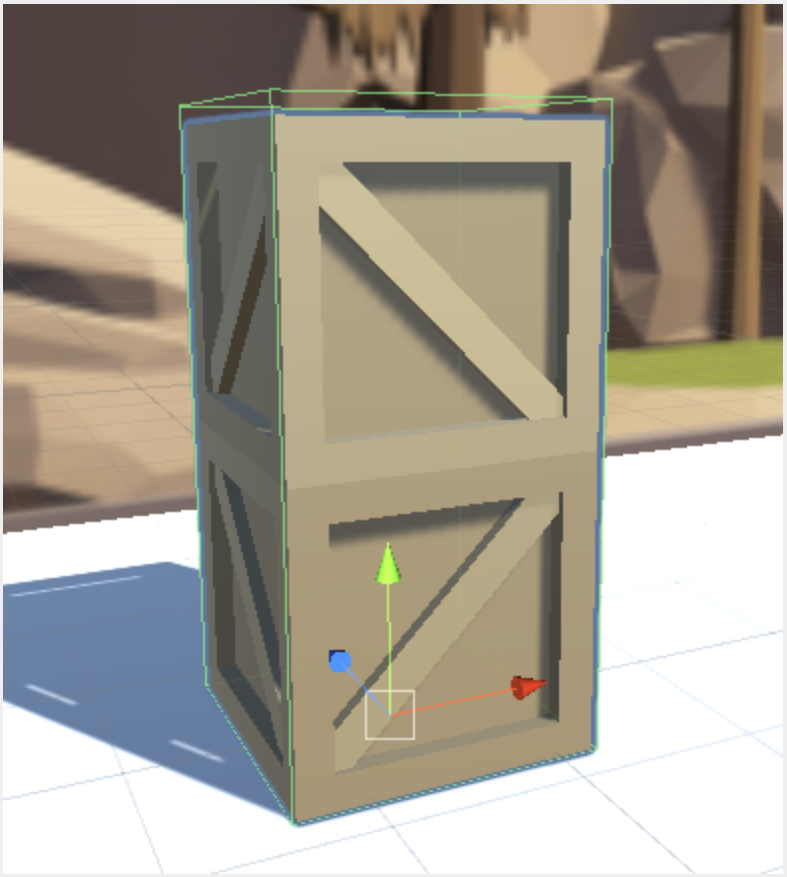


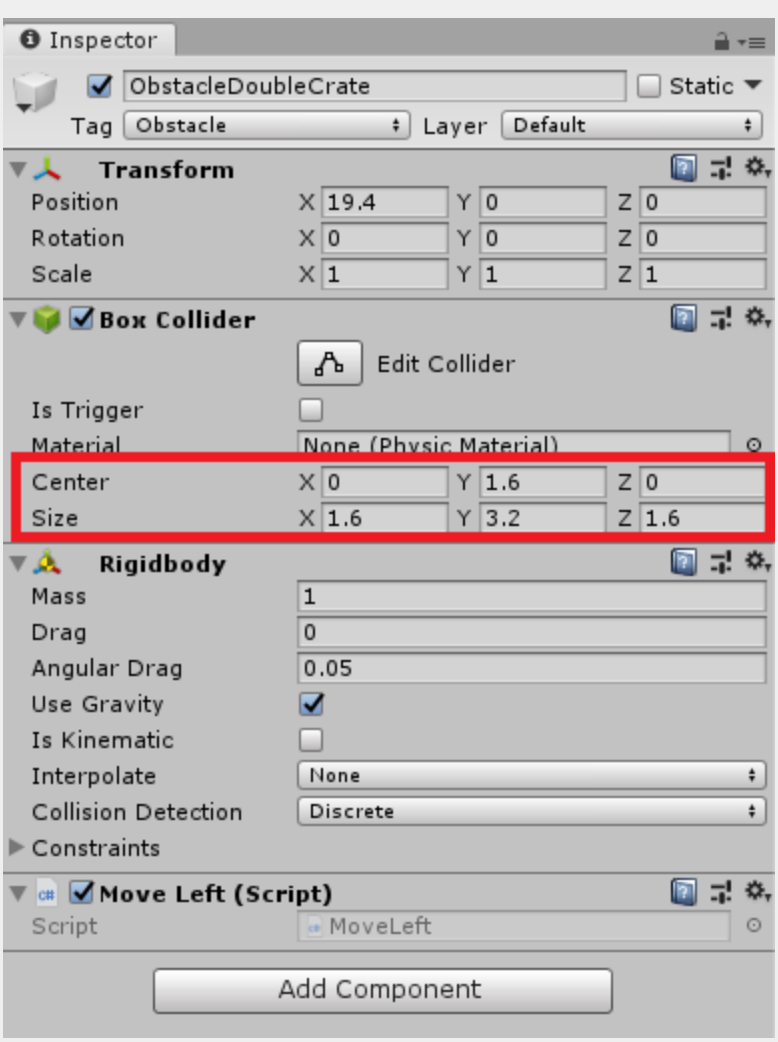
10. On the *ObstacleCrate* GameObject, Adjust the **Size** and **Center** of the BoxCollider so that it fits the crate.


Inspector
ObstacleCrate
Static
Tag
Obstacle
Layer
Default
Transform
Position
X 15.059
Y 0
Z 0
Rotation
X 0
Y 0
Z 0
Scale
X 1
Y 1
Z 1
Box Collider
Edit Collider
Is Trigger
Material
None (Physic Material)
Center
X 0
Y 0.8
Z 0
Size
X 1.6
Y 1.6
Z 1.6
Rigidbody
Mass
1
Drag
0
Angular Drag
0.05
Use Gravity
Is Kinematic
Interpolate
None
Collision Detection
Discrete
Constraints
Move Left (Script)
Script
MoveLeft
Add Component

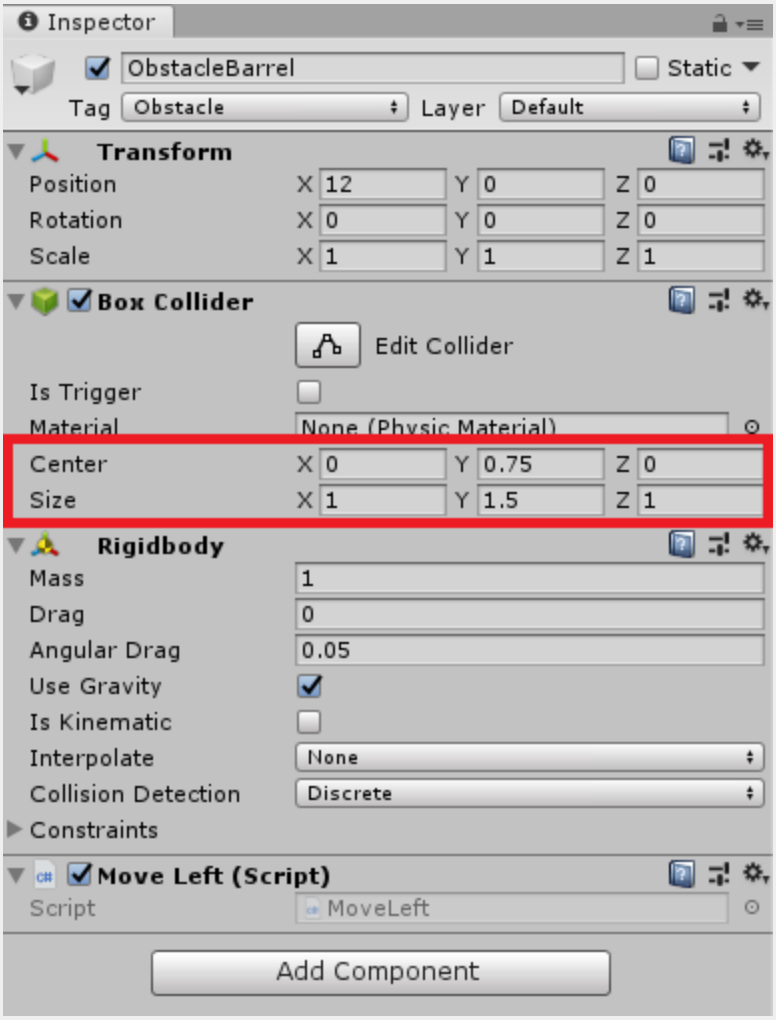


11. On the *ObstacleDoubleCrate* GameObject, adjust the crates so that one is stacked on the other. Then adjust the BoxCollider to fit around both crates.

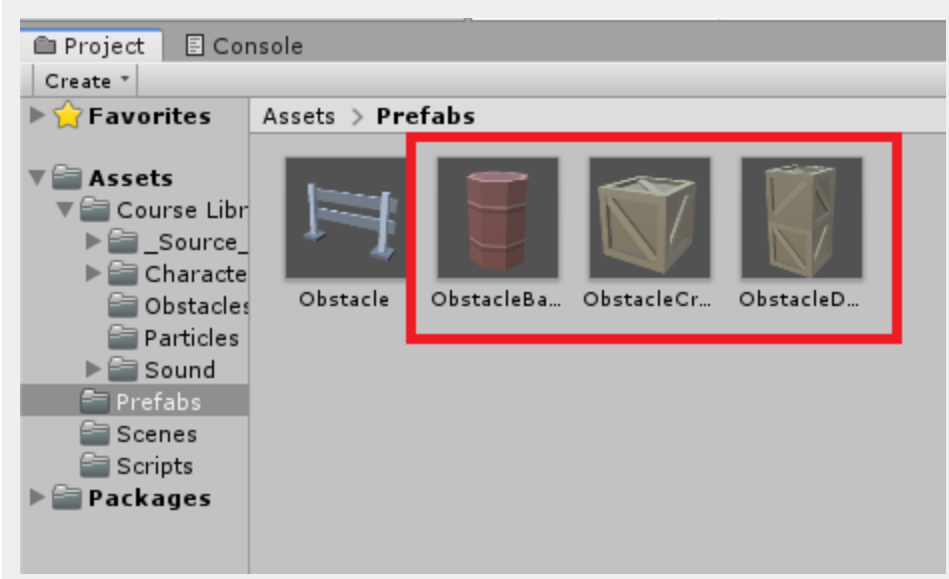




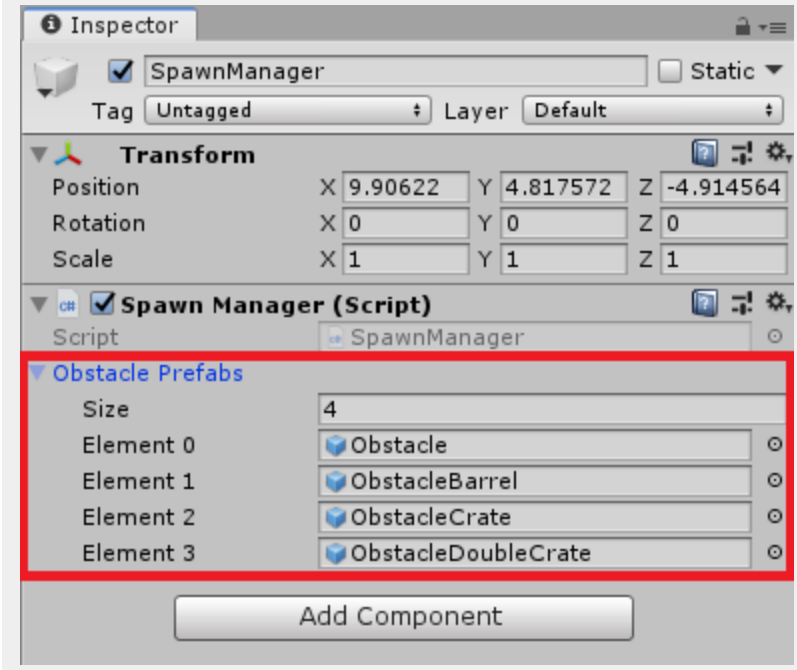
12. On the *ObstacleBarrel* GameObject, adjust the **BoxCollider Size** and **Center** to fit the barrel.



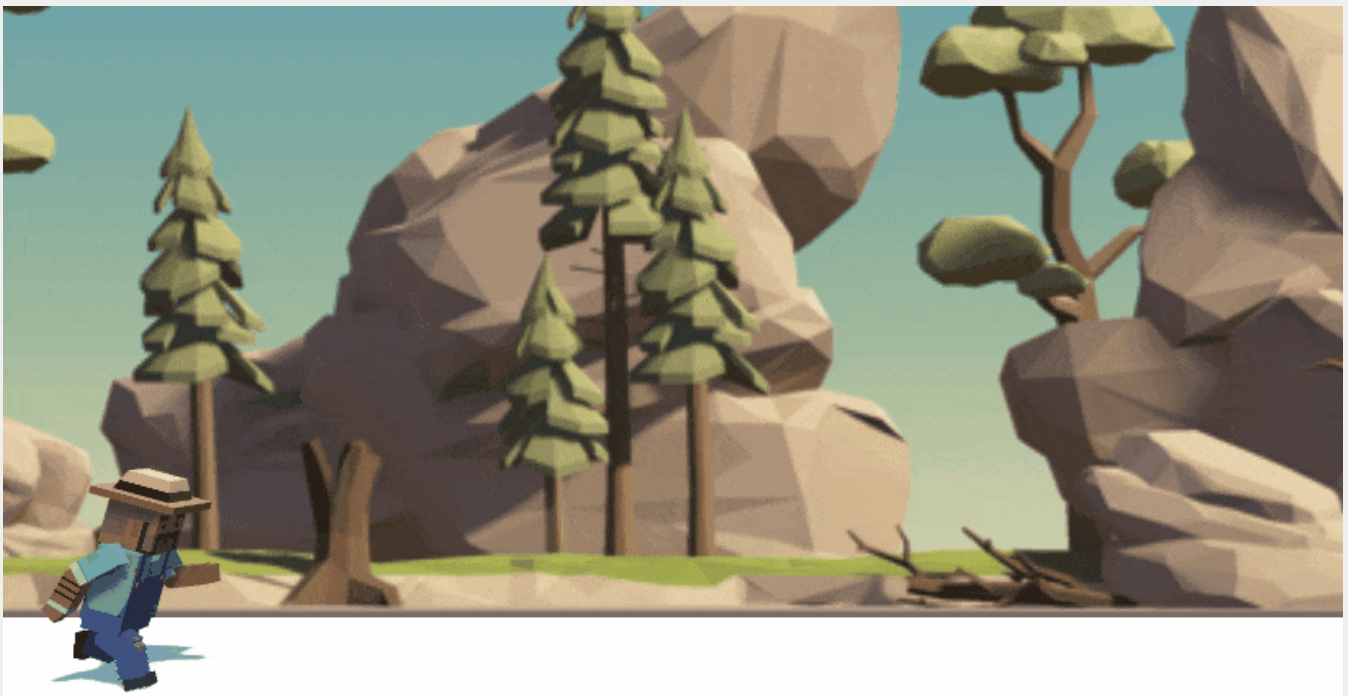
13. Navigate to the Prefabs folder in the Project view and drag the 3 new Obstacles from the Hierarchy to the Project view. Then delete the Obstacles from the Hierarchy.



14. Select the SpawnManager in the Hierarchy. In the Inspector, add in the obstacles from the Prefabs folder to the **Obstacle Prefabs** array on the **Spawn Manager** component.



15. Save the scene and press play. The new obstacles will now spawn



Medium - Double Jump!

1. Navigate to the scripts folder and open up the **PlayerController.cs** file. By the variable declarations, add the following variables.

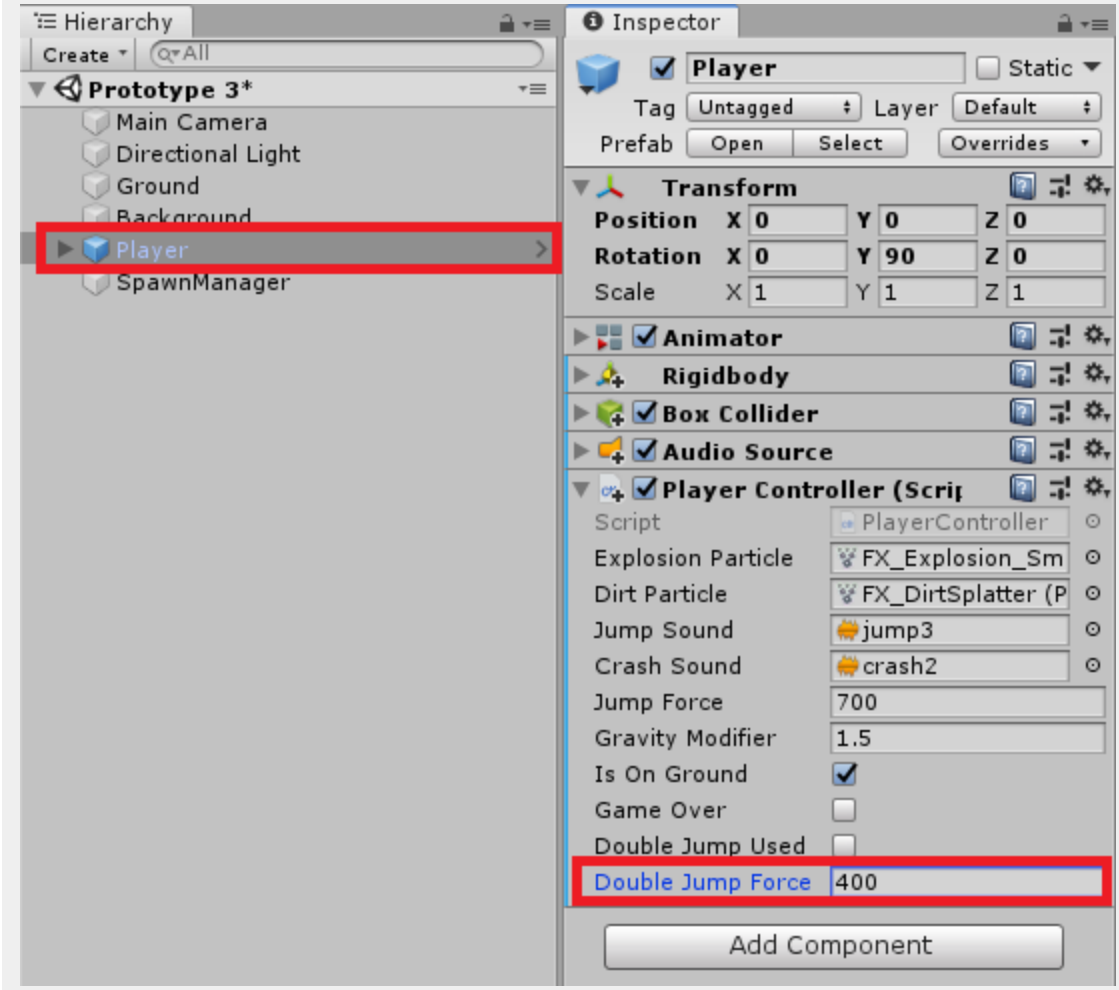
```
public bool doubleJumpUsed = false;
public float doubleJumpForce;
```

2. In the **Update** method, we first need to set the doubleJumpUsed boolean to false when the player does their first jump. We then check if the player has pressed the space key, doubleJump has not been used, and the player is in the air. If all of those checks pass, we will then add another force to the player like we did in the previous if statement and use the animation.Play() function to reset the jumping animation to the first frame. The updated **Update** method will look like this:

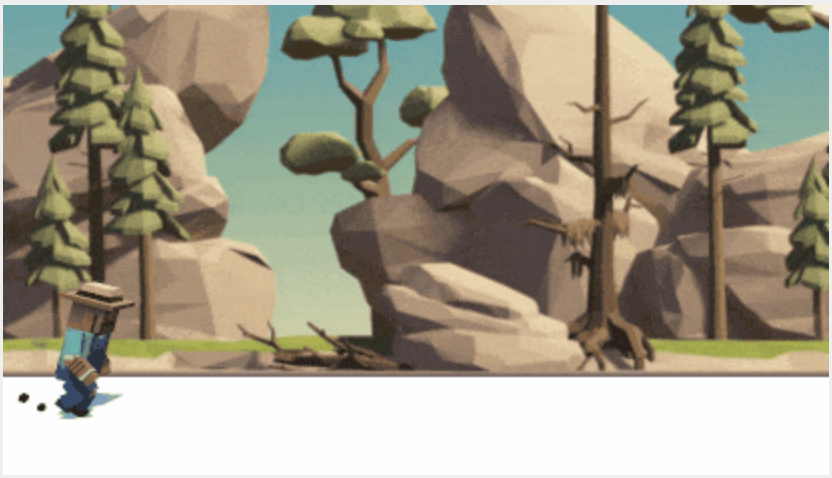
```
void Update()
{
    if (Input.GetKeyDown(KeyCode.Space) && isOnGround && !gameOver)
    {
        playerRb.AddForce(Vector3.up * jumpForce, ForceMode.Impulse);
        isOnGround = false;
        playerAnim.SetTrigger("Jump_trig");
        dirtParticle.Stop();
        playerAudio.PlayOneShot(jumpSound, 1.0f);

        doubleJumpUsed = false;
    }
    else if(Input.GetKeyDown(KeyCode.Space) && !isOnGround && !doubleJumpUsed)
    {
        doubleJumpUsed = true;
        playerRb.AddForce(Vector3.up * doubleJumpForce, ForceMode.Impulse);
        playerAnim.Play("Running_Jump", 3, 0f);
        playerAudio.PlayOneShot(jumpSound, 1.0f);
    }
}
```

3. Save the script and head back to Unity. In the Hierarchy, select the *Player* GameObject. In the Inspector for the *Player*, adjust the **Double Jump Force** value on the **Player Controller (script)** component. Try playtesting with different values to find one that you like.



4. Save the scene and test the game. You can now press the spacebar twice to get a higher jump.



Hard - Dash Ability

1. Navigate to the Scripts folder and open up the **PlayerController.cs** file. Below the variable declarations, add a new variable.

```
public bool doubleSpeed = false;
```

2. Next we will set this boolean within the **Update** method. After the jump code, add the following:

```
if(Input.GetKey(KeyCode.LeftShift))
{
    doubleSpeed = true;
    playerAnim.SetFloat("Speed_Multiplier", 2.0f);
}
else if (doubleSpeed)
{
    doubleSpeed = false;
    playerAnim.SetFloat("Speed_Multiplier", 1.0f);
}
```

This piece of code will check if the user has pressed down the left shift. If they have, it will set the doubleSpeed boolean to true, otherwise the boolean will be false. We also set the animator parameter *Speed_Multiplier* according to if *doubleSpeed* is true or not. This parameter will be set up a bit later on.

Save the script and head back to Unity.

3. Open up the **MoveLeft.cs** script. We will now tell the obstacles if the player is moving at double speed. We already have a variable for the player so all we need to do is to check the boolean we just created. Adjust the **Update** method to look like this.

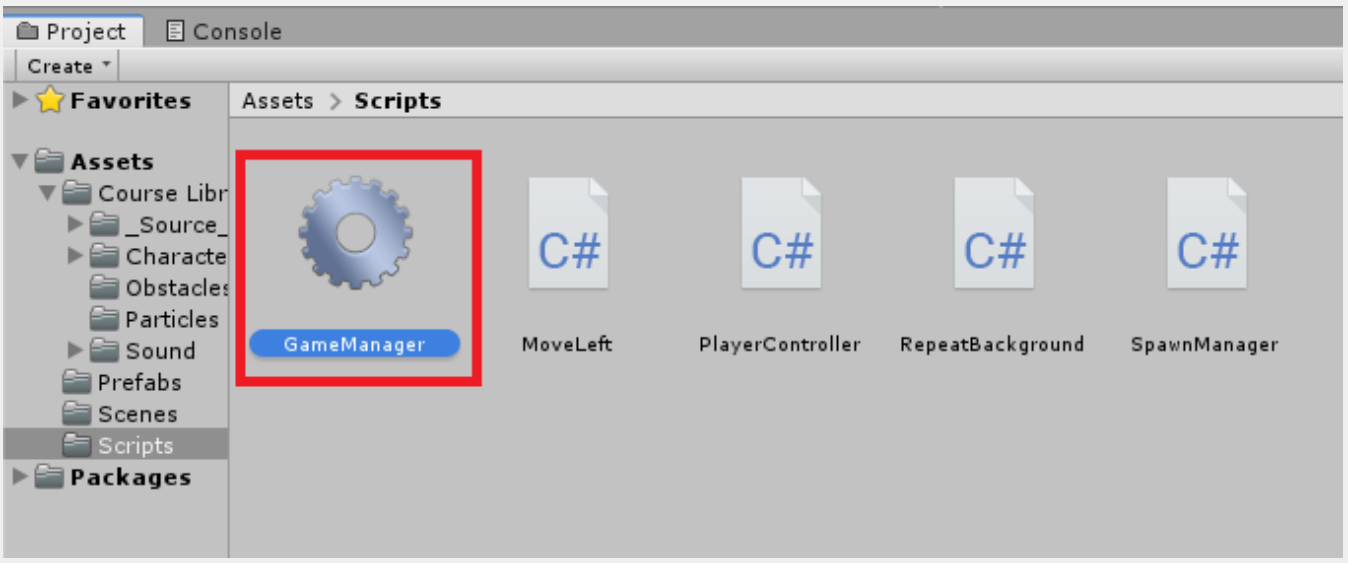
```
void Update()
{
    if (playerControllerScript.gameOver == false)
    {
        if (playerControllerScript.doubleSpeed)
        {
            transform.Translate(Vector3.left * Time.deltaTime * (speed * 2));
        }
        else
        {
            transform.Translate(Vector3.left * Time.deltaTime * speed);
        }
    }
```

```
    if (transform.position.x < leftBound && gameObject.CompareTag("Obstacle"))
    {
        Destroy(gameObject);
    }

}
```

Save the script and head back to Unity.

4. Create a new script in the Scripts folder by either selecting **Assets > Create > C# Script** or right-clicking in the project view and selecting **Create > C# script**. Name the new script *GameManager*. Double-click the new script to open it.



5. Inside the class declaration, add two new variables. The first will store our score value, the second will be used to reference our player.

```
public float score;
private PlayerController playerControllerScript;
```

6. Next, inside the **Start** method, set the reference for the player and ensure the value of score is 0.

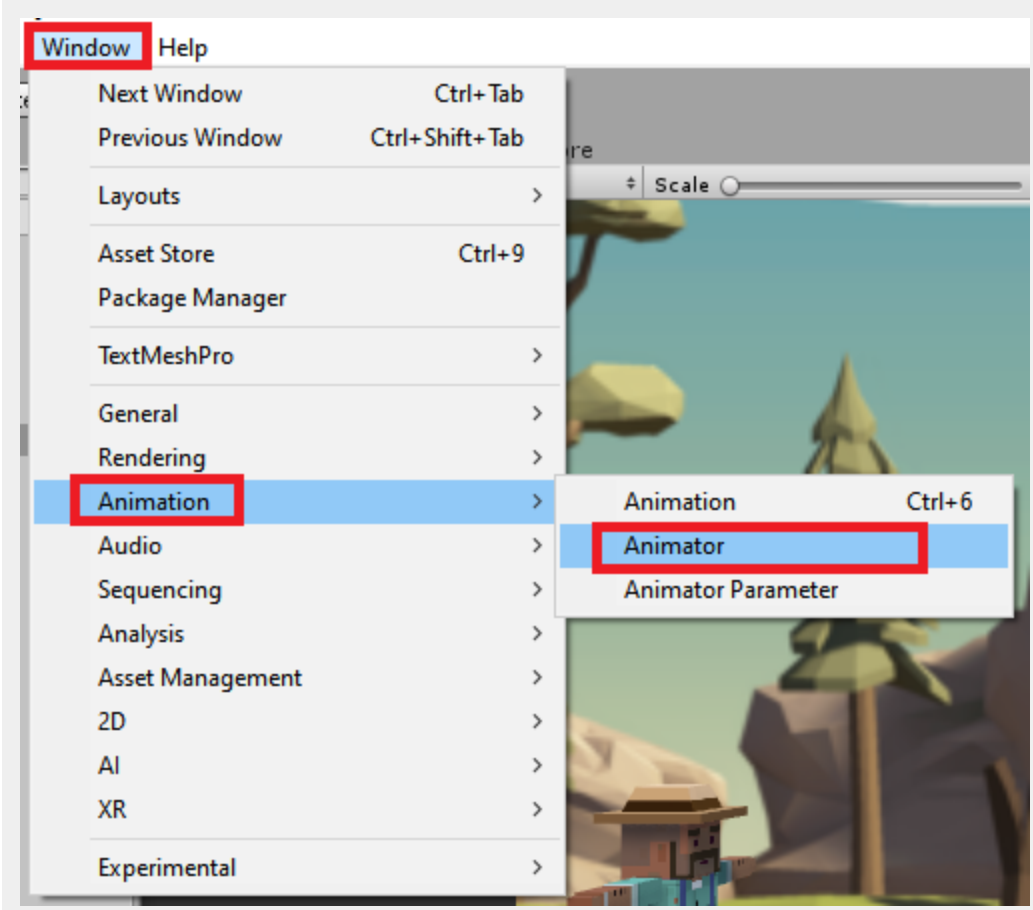
```
void Start()
{
    playerControllerScript =
GameObject.Find("Player").GetComponent<PlayerController>();
    score = 0;
}
```

7. The last thing we need to do in this script, is set up the **Update** method. We want to check if the game is over, if it isn't we will add to the score based on how fast the player is moving. We will also output to the console the current score.

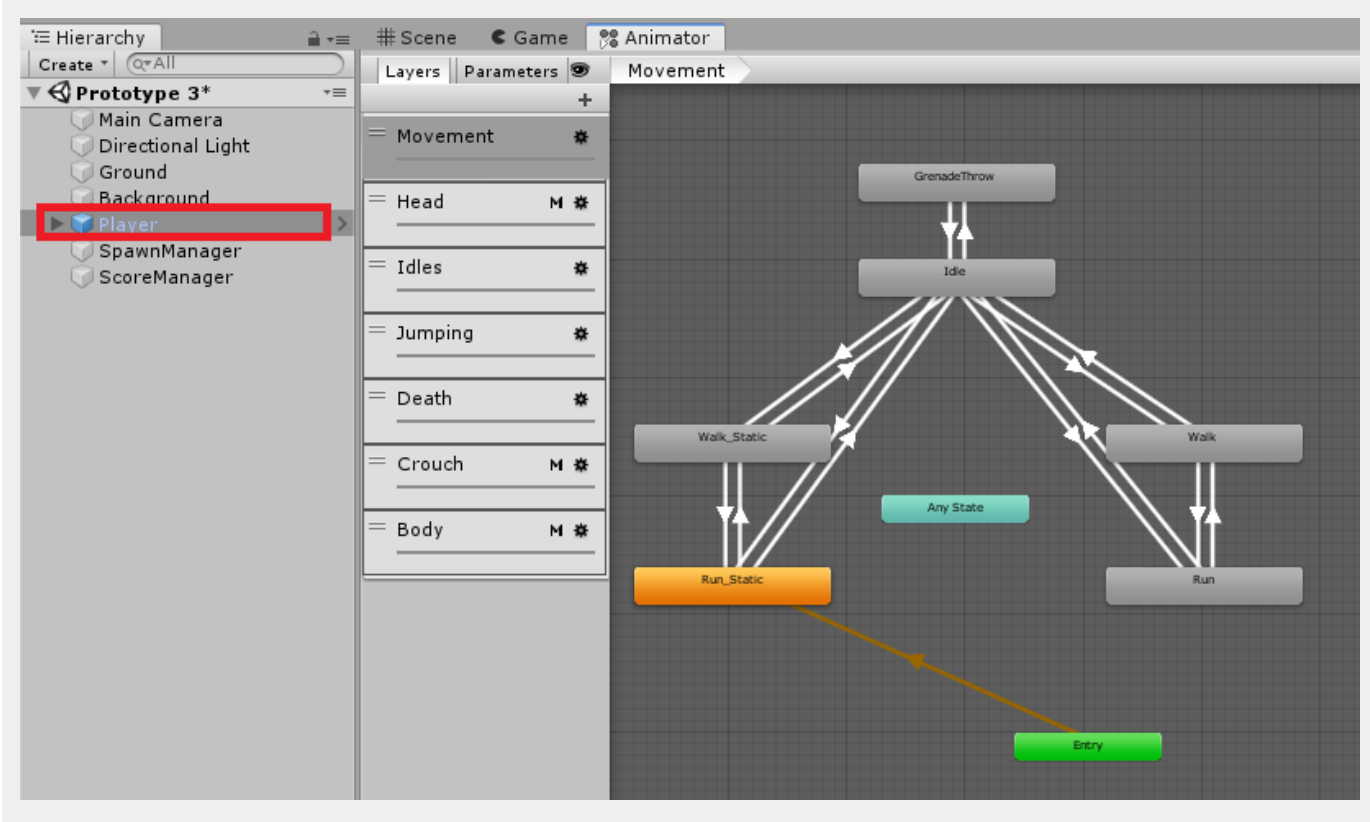
```
void Update()
{
    if(!playerControllerScript.gameOver)
    {
        if(playerControllerScript.doubleSpeed)
        {
            score += 2;
        }
        else
        {
            score++;
        }
        Debug.Log("Score: " + score);
    }
}
```

Save the script and head back to Unity.

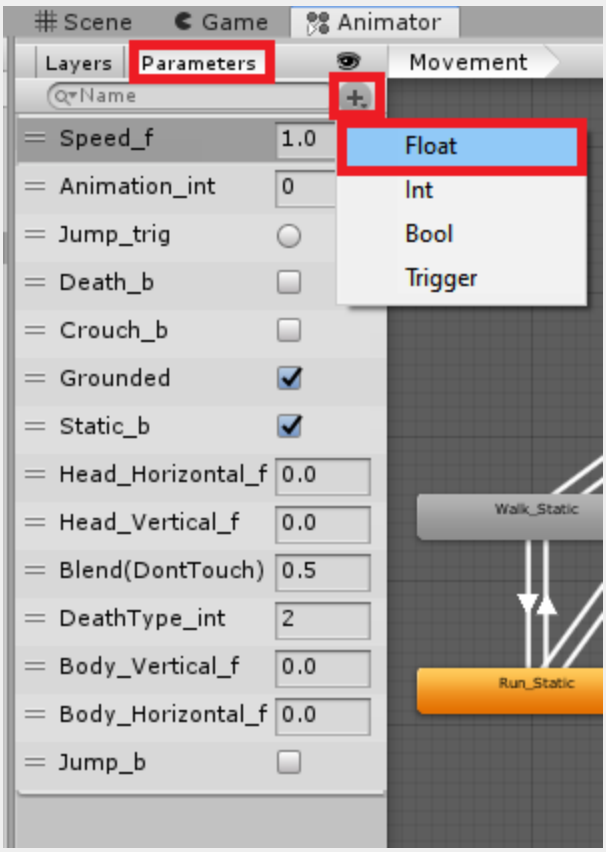
8. We now need to adjust the Player's Animator. Go to **Window** > **Animation** > **Animator** to open the animator window.



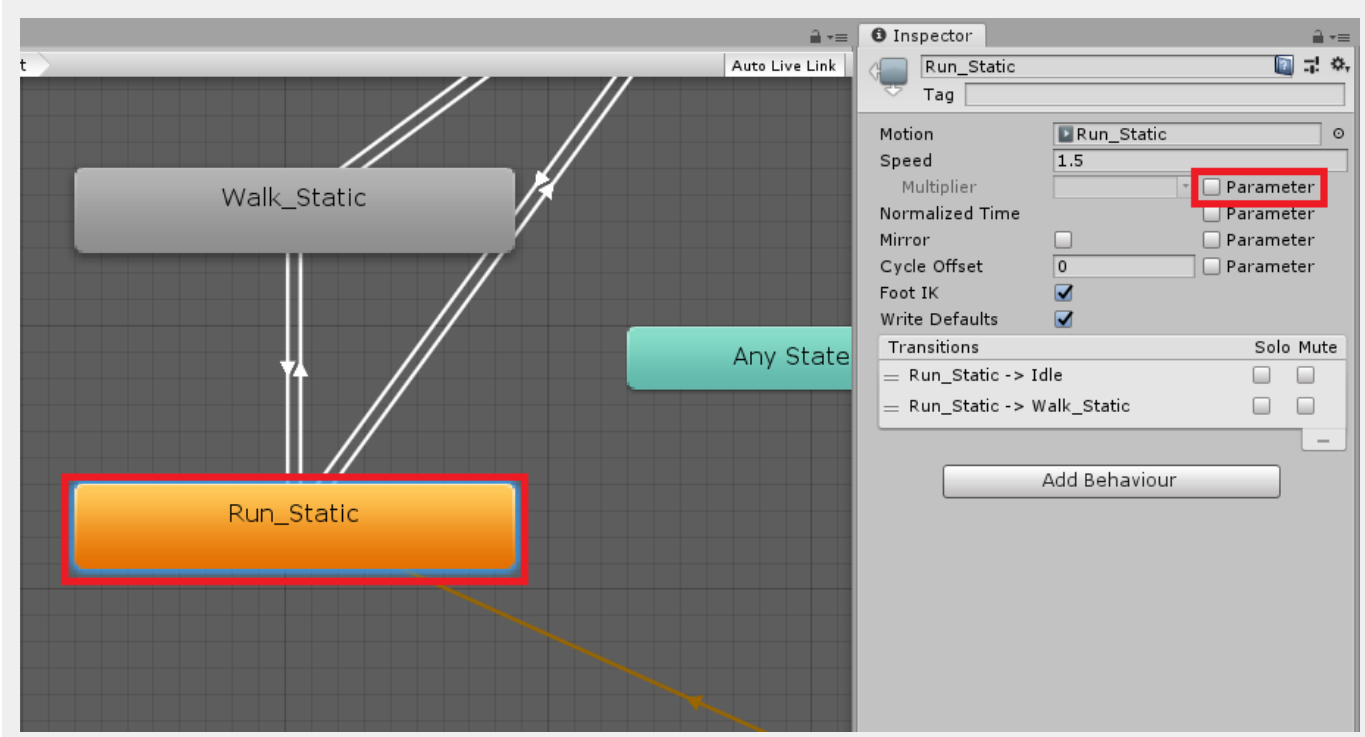
9. Once the window is open, dock it somewhere easy to access. Then select the player in the hierarchy



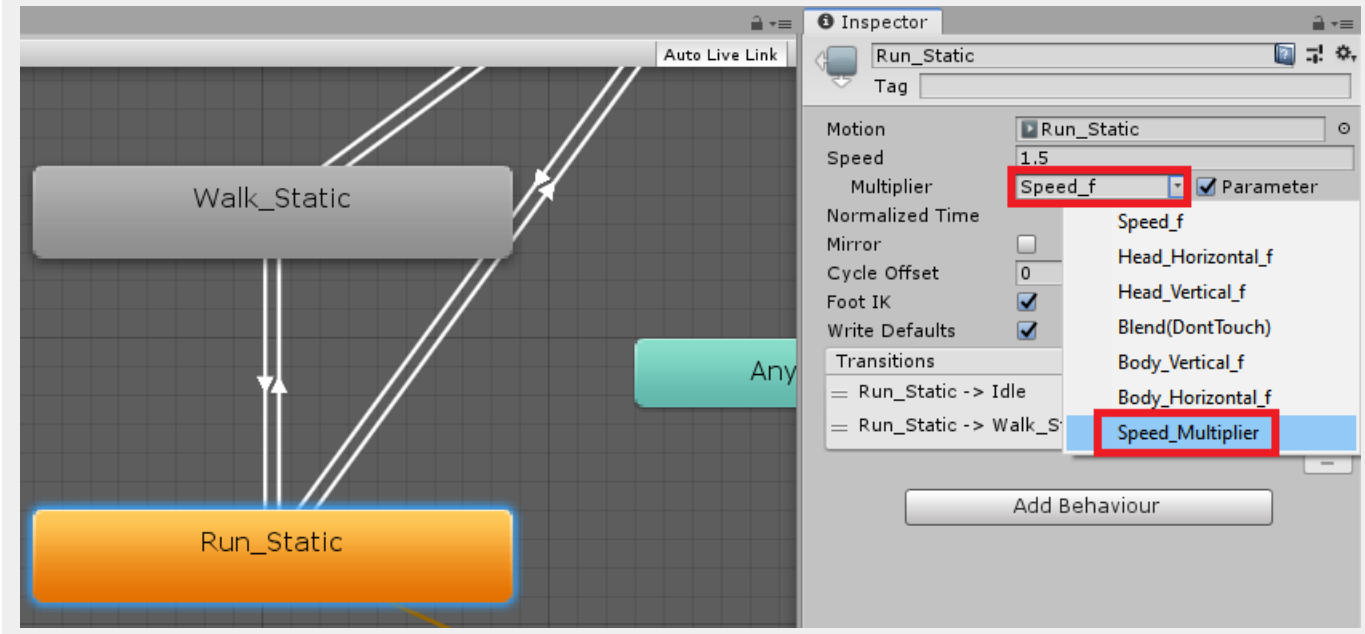
10. Inside the Animator window, select the parameters button. Next select the **+** button and select **Float**. Name the new parameter *Speed_Multiplier*. Set it's default value to **1.0**.



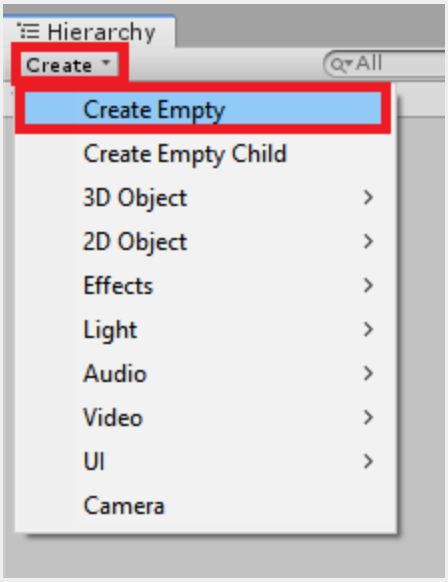
11. Next select the **Run_Static** state in the Animator window. In the Inspector, by the **Multiplier** parameter, check the **Parameter** checkbox.



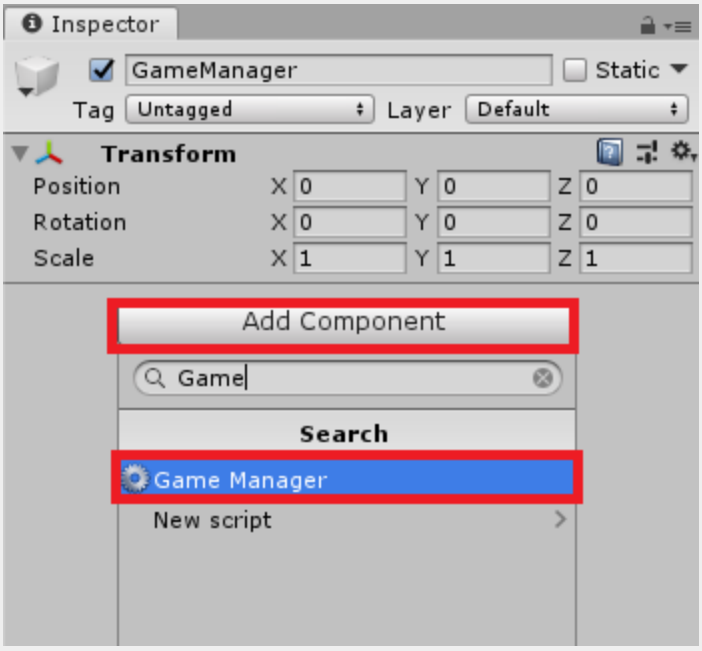
12. Once checked, you can then select the *Speed_Multiplier* parameter from the dropdown list.



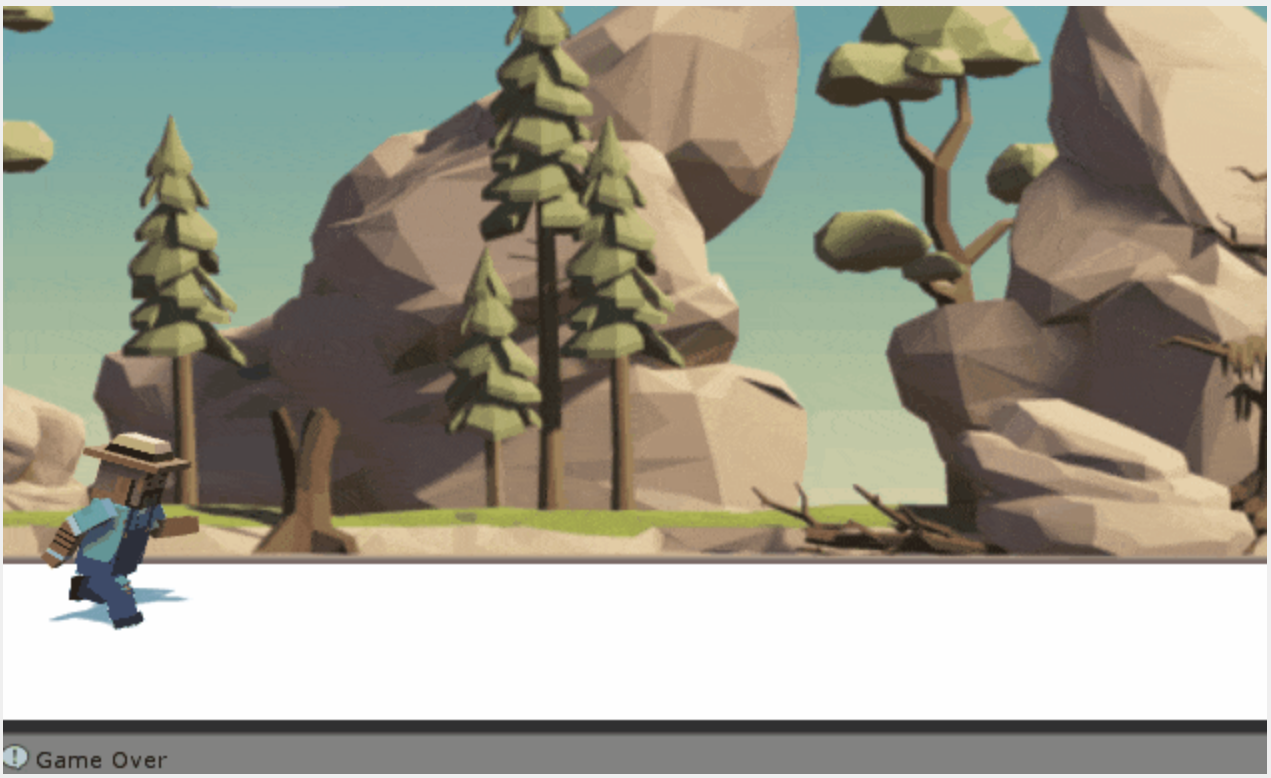
13. In the Hierarchy, create a new empty GameObject by either clicking **Create** > **Create Empty** or right-clicking and selecting **Create Empty**. Name the new GameObject *GameManager*.



14. In the Inspector for the *GameManager*, click **Add Component** and search for **GameManager**, select the **GameManager** script to add it to the GameObject.



15. Save the scene and press play. When you hold the shift key, the player will run faster and the objects will appear quicker!


Game Over

Expert - Game Start Animation

1. Navigate to the Scripts folder and open up the **GameManager.cs** script. By the variable declarations, add the following variables:

```
public Transform startingPoint;
public float lerpSpeed;
```

2. Update the **Start** method to look like the following:

```
void Start()
{
    playerControllerScript =
GameObject.Find("Player").GetComponent<PlayerController>();
    score = 0;

    playerControllerScript.gameOver = true;
    StartCoroutine(PlayIntro());
}
```

3. Below the **Update** method, create a new method called **PlayIntro**. This new method will move the player to the starting point.

```
IEnumerator PlayIntro()
{
    Vector3 startPos = playerControllerScript.transform.position;
    Vector3 endPos = startingPoint.position;
    float journeyLength = Vector3.Distance(startPos, endPos);
    float startTime = Time.time;

    float distanceCovered = (Time.time - startTime) * lerpSpeed;
    float fractionOfJourney = distanceCovered / journeyLength;

    playerControllerScript.GetComponent<Animator>().SetFloat("Speed_Multiplier",
0.5f);

    while (fractionOfJourney < 1)
    {
        distanceCovered = (Time.time - startTime) * lerpSpeed;
        fractionOfJourney = distanceCovered / journeyLength;
        playerControllerScript.transform.position = Vector3.Lerp(startPos, endPos,
fractionOfJourney);
        yield return null;
```

```
    }

    playerControllerScript.GetComponent<Animator>().SetFloat("Speed_Multiplier",
1.0f);
    playerControllerScript.gameOver = false;
}
```

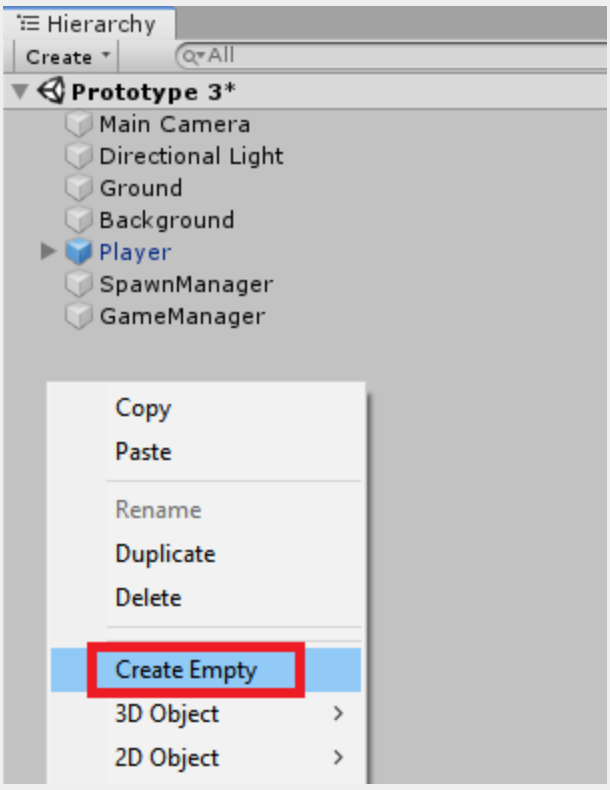
Let's break this method down. First we determine what the start and end positions are for our movement. Next, we determine what the length of the journey is. After that, we determine the distance we have covered so far, and what the fraction of the distance over the journey length is. We then do that calculation within a while loop to move the player forwards.
We can adjust the value of the lerpSpeed variable to determine how fast the movement happens.

Within this method we are also adjusting the speed of the player's animation using the Speed_Multiplier variable we created earlier.

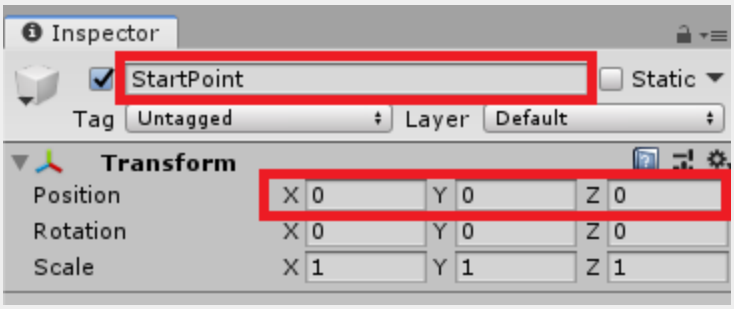
After the movement has been completed, we set the gameOver variable to false to allow the player to move.

Save the script and head back to Unity.

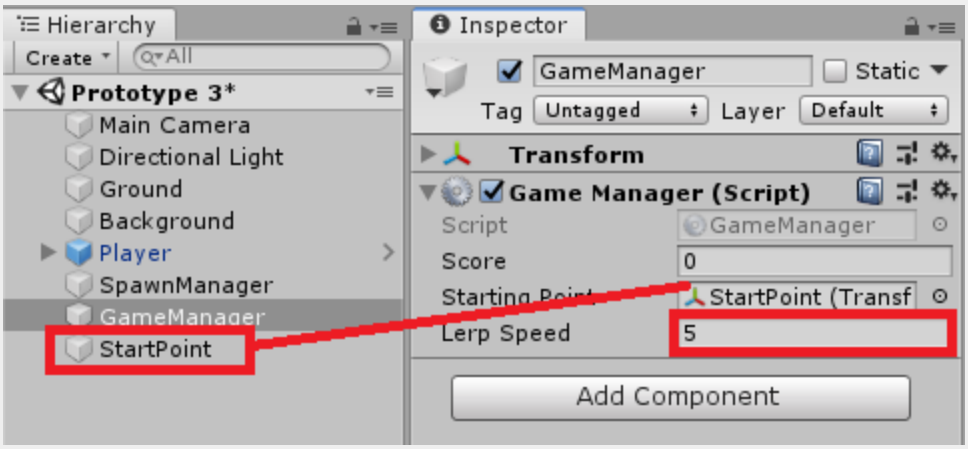
4. In the Hierarchy, right-click and select **Create Empty**.



5. Select the new GameObject, rename it to **StartPoint**. Adjust the **Position** of the StartPoint to **0,0,0**.



6. We will now set up the variables for the GameManager. In the Hierarchy, select the **GameManager**. Drag the **StartPoint** from the Hierarchy into the **Starting Point** field. Adjust the **Lerp Speed** variable to be **5**.



7. The last thing we need to do is adjust the players position. Select the Player in the Hierarchy. Adjust its position to -5,0,0.

8. Save the scene and press Play. The player will now run in from the left before the game starts.