

GAME DESIGN AND DEVELOPMENT

FLAPPY BIRD GAME (using Unity and C#)



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FLAPPY BIRD GAME

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History of game design

- The origins of game design can be traced back thousands of years, to the time of ancient board games like Senet and Go. With the introduction of electronic gaming in the 20th century, there was a notable change from the days of early computer games like Spacewar! to the massive popularity of Pong. The rise of classic games like Pac-Man and Super Mario Bros. in the ensuing decades contributed to the explosion of arcade and console gaming. As technology developed, 3D graphics, multiplayer capabilities, and immersive storytelling became standard elements of game creation. With the rise of independent and mobile games, game development become more accessible in the twenty-first century.



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Introduction

- Flappy Bird game using Unity and C# involves combining game development skills with programming expertise. Unity provides a robust platform for building 2D games, while C# serves as the programming language to bring gameplay mechanics to life.
- In this project, you'll learn to create a simple yet addictive game where players control a bird navigating through obstacles. By setting up the project, creating the player character and obstacles, implementing game logic, adding audio and visual effects, and refining the gameplay through testing, you'll gain hands-on experience in game development and enhance your skills in Unity and C#.
- This tutorial will guide you through each step, helping you understand the fundamentals of game design and programming within the context of a popular mobile game genre.



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Objective

- In the realm of game development, mastering Unity Basics is akin to laying the groundwork for a successful venture. This involves delving into Unity's interface, navigating through scene setup intricacies, importing diverse assets, and deftly manipulating GameObjects. As one progresses, the focus shifts towards 2D Game Development, a pivotal phase where creators immerse themselves in crafting intricate game environments. Here, attention to detail is paramount, from meticulously designing sprites to setting up captivating backgrounds and fine-tuning camera perspectives to ensure seamless player experiences.
- Player Controls emerge as a cornerstone of gameplay interaction, demanding precision and responsiveness. Implementing intuitive input mechanics allows players to seamlessly control characters, such as our bird protagonist, facilitating actions like jumping and simulating gravity realistically. Meanwhile, the challenge intensifies with Obstacle Generation, where developers engineer systems to dynamically spawn and move obstacles, like pipes, strategically.



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Objectives cont..

- These obstacles inject complexity into gameplay dynamics, fostering an environment of challenge and engagement for players seeking exhilarating experiences. Through adept integration of these elements, game creators craft immersive worlds where players can lose themselves in the thrill of adventure and discovery.
- Game Logic serves as the backbone of any gaming experience, orchestrating transitions between states like start, play, and game over seamlessly while tracking player scores and managing UI elements for a cohesive gameplay flow. Complementing this, Audio and Visual Effects elevate immersion by adding sound effects for player actions and events, coupled with visually captivating animations. However, a game's true refinement comes through rigorous Testing and Refinement. Playtesting identifies bugs and hones gameplay mechanics, ensuring a smooth and enjoyable experience.



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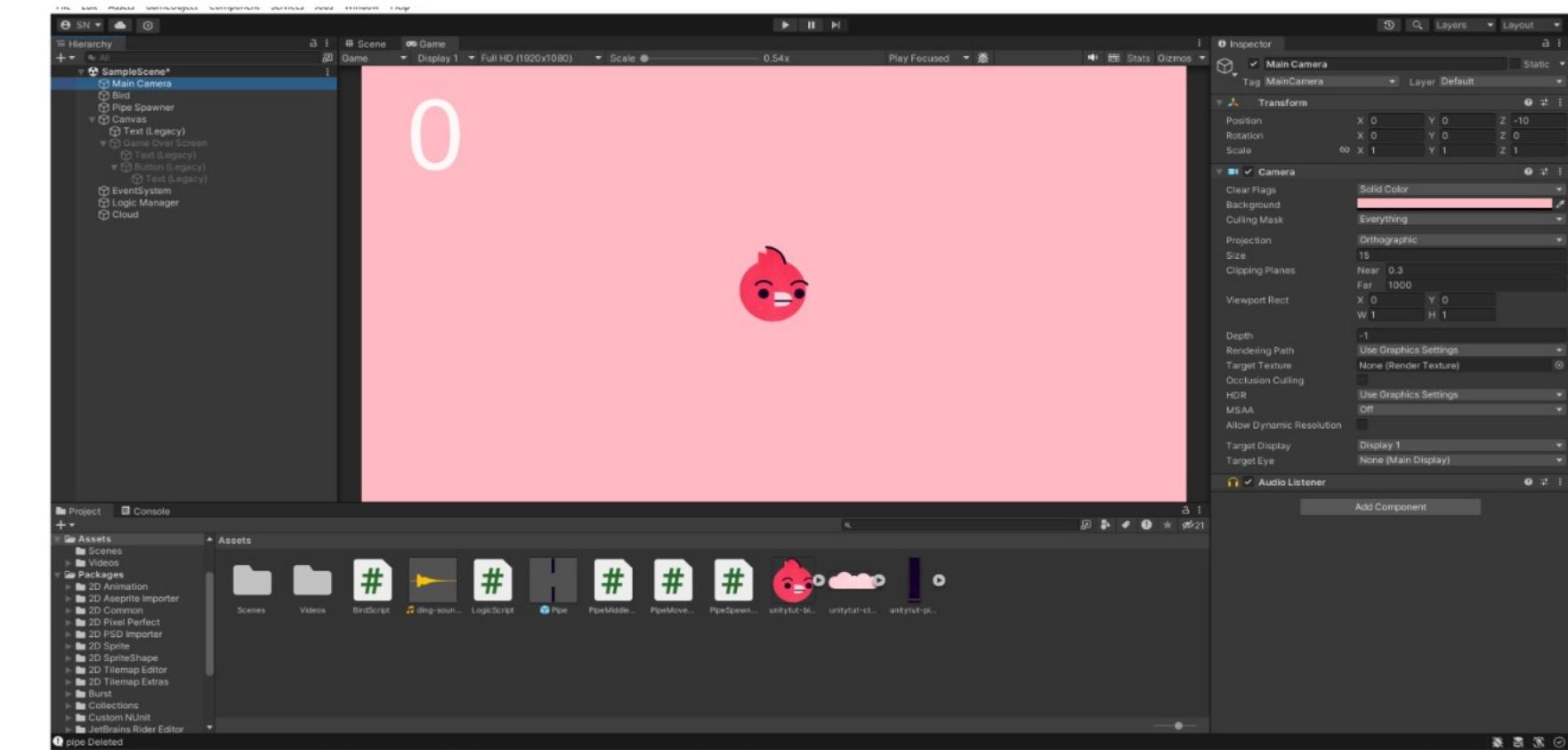
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Key Points Of Flappy Bird Game

- Utilizing Unity game engine and C# programming language, developers embark on creating a captivating Flappy Bird game set in a 2D environment. This journey involves crafting detailed sprites, backgrounds, and configuring the camera setup to immerse players in the experience. Player interaction is paramount, requiring precise implementation of controls for jumping and realistic gravity simulation for the bird character. To heighten the challenge, obstacle management comes into play, dynamically generating and moving obstacles like pipes to present gameplay challenges that keep players engaged and eager to navigate through the increasingly intricate obstacles.



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Key Points Of Flappy Bird Game

- In the realm of game development, Game Logic reigns supreme, orchestrating seamless transitions between states such as start, play, and game over, while diligently tracking player scores and managing crucial UI elements. Augmenting this foundation, Audio-Visual Feedback injects life into the gaming experience, enriching player immersion with carefully crafted sound effects for actions and events, accompanied by visually captivating animations. However, the journey to a polished final product doesn't end there. Testing & Refinement emerges as a critical phase, where developers meticulously playtest the game, identifying and debugging issues, fine-tuning mechanics, and optimizing performance to ensure a smooth and enjoyable gameplay experience for players. Through this iterative process of development, games evolve from mere concepts to fully immersive experiences that captivate audiences and stand the test of time.



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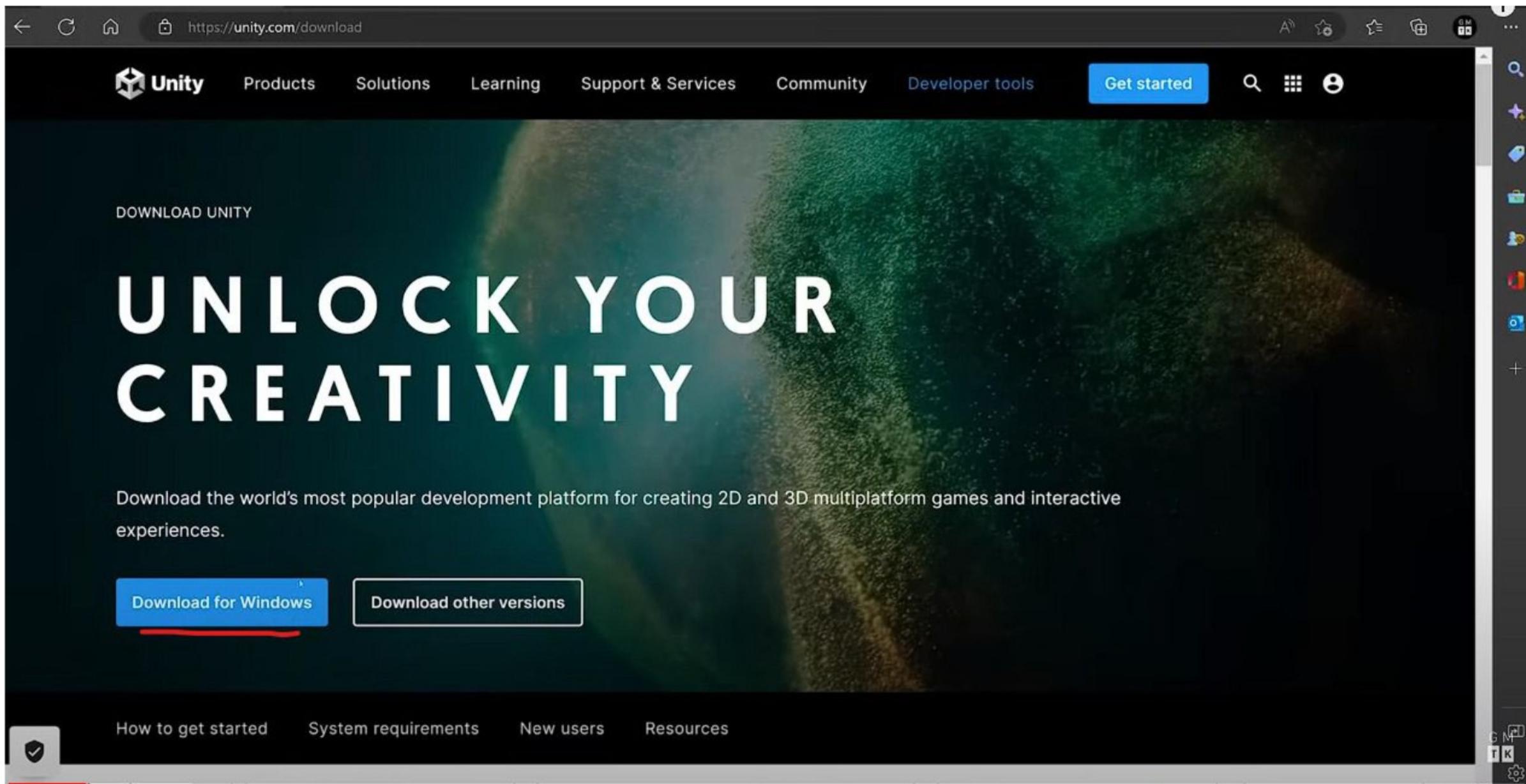
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Unity Installation

➤ Step-1



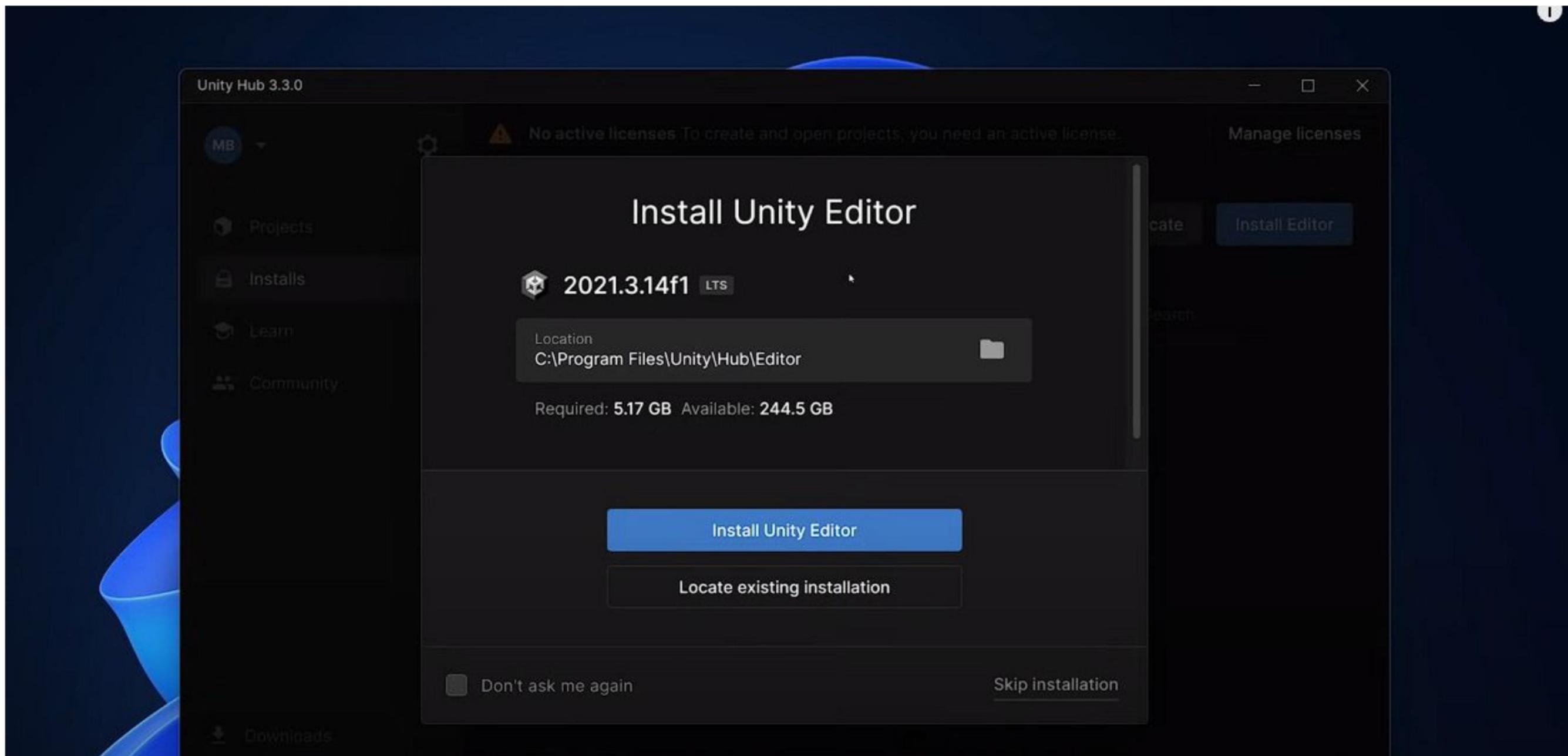
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➤ Step-2



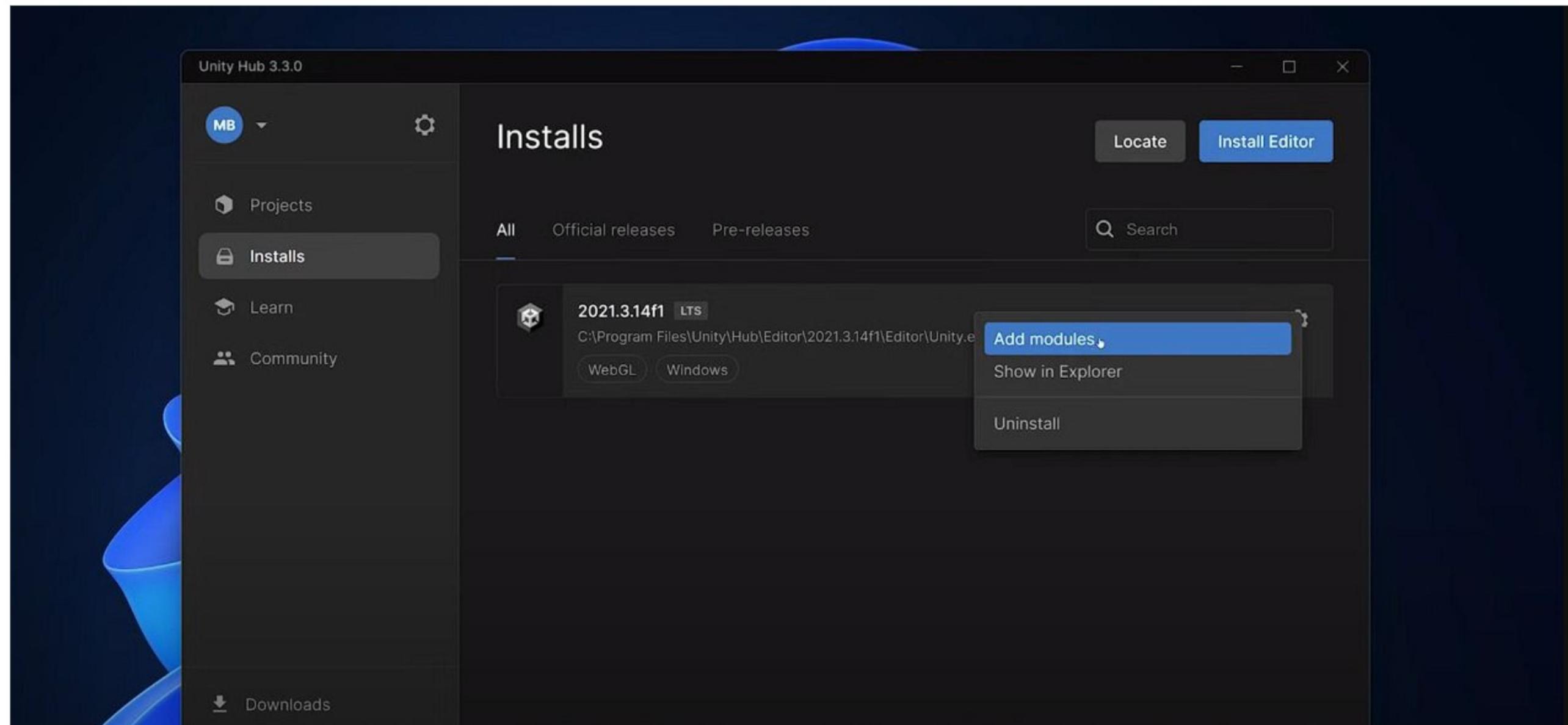
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➤Step-3



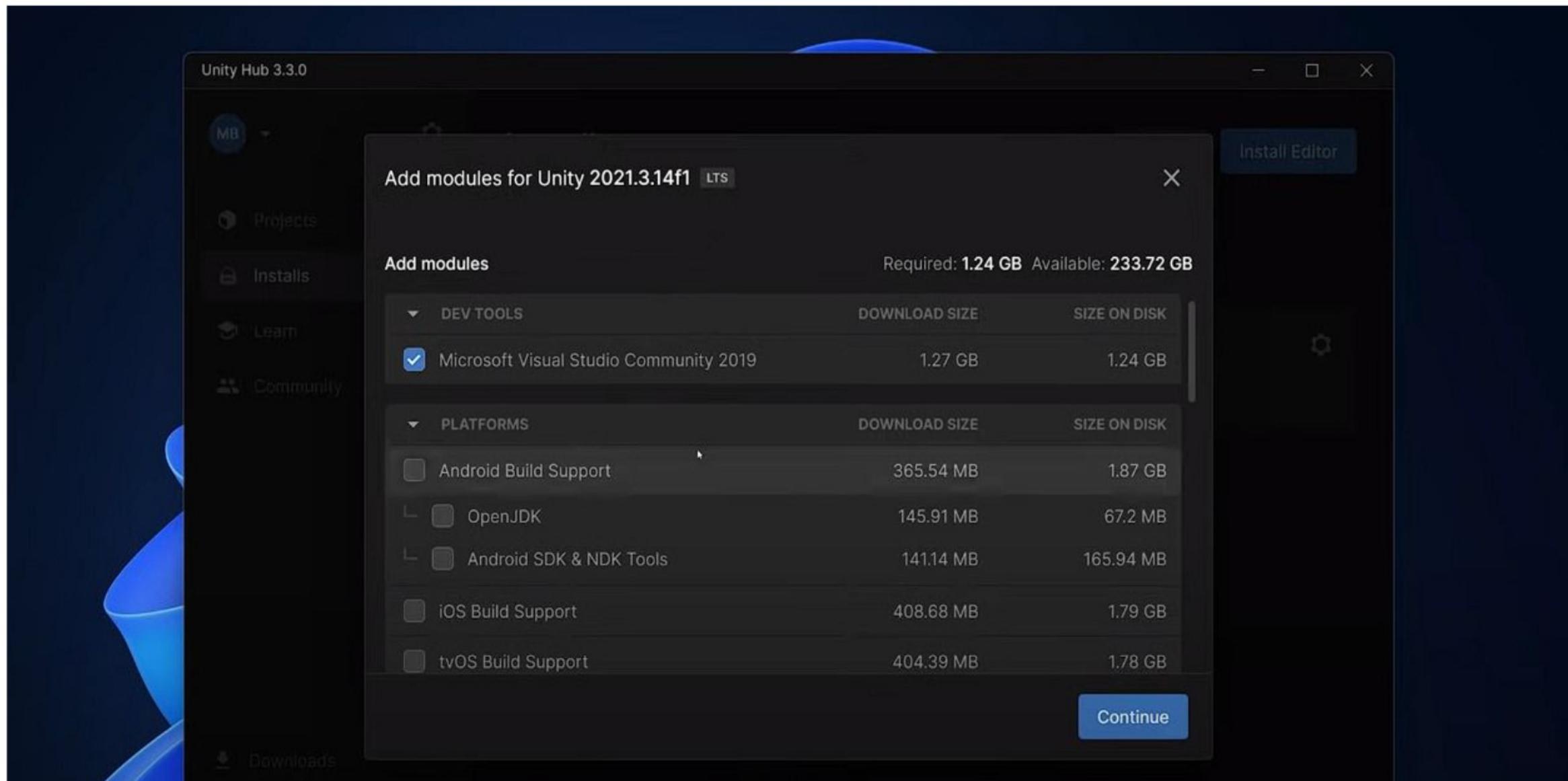
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➤Step-4



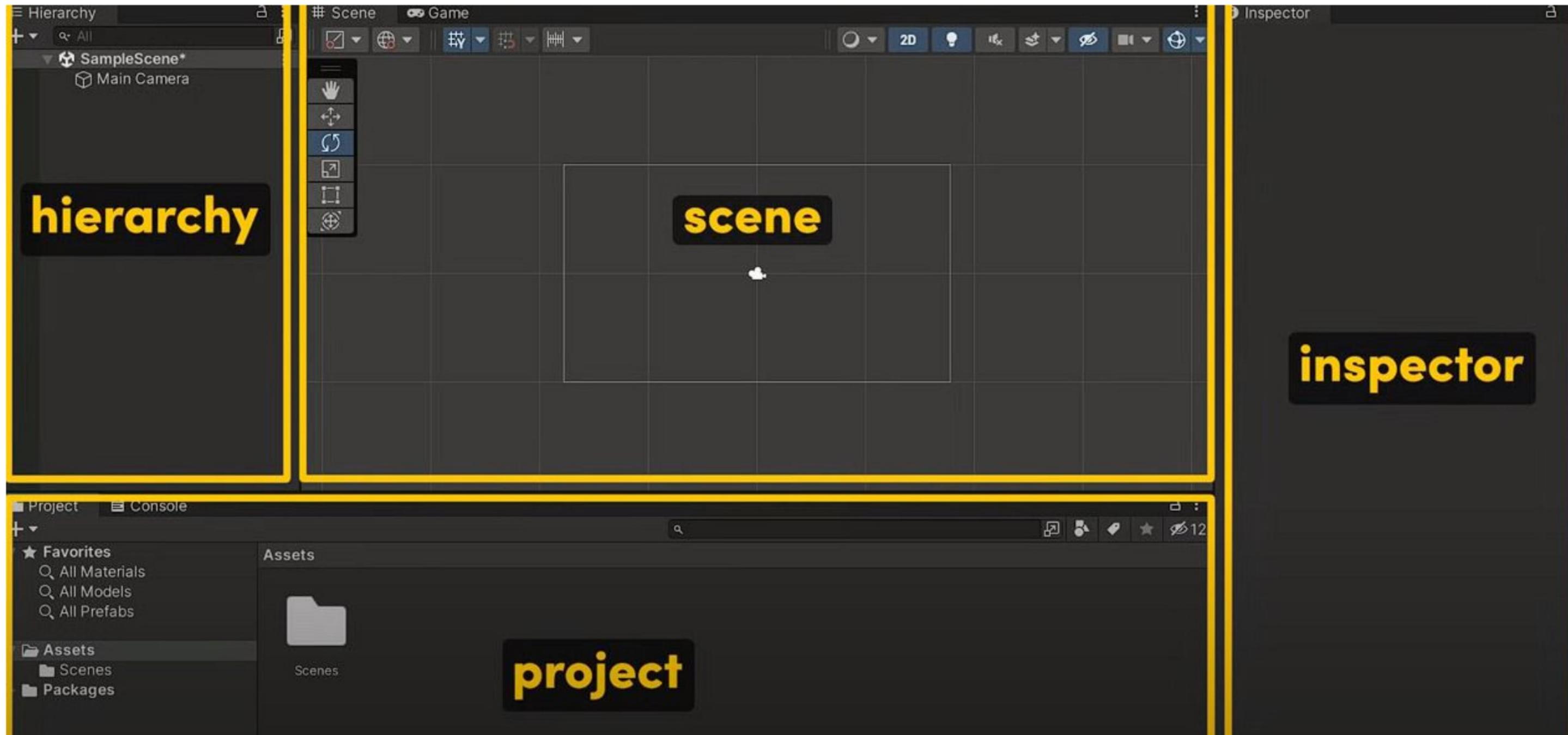
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➤Step-5



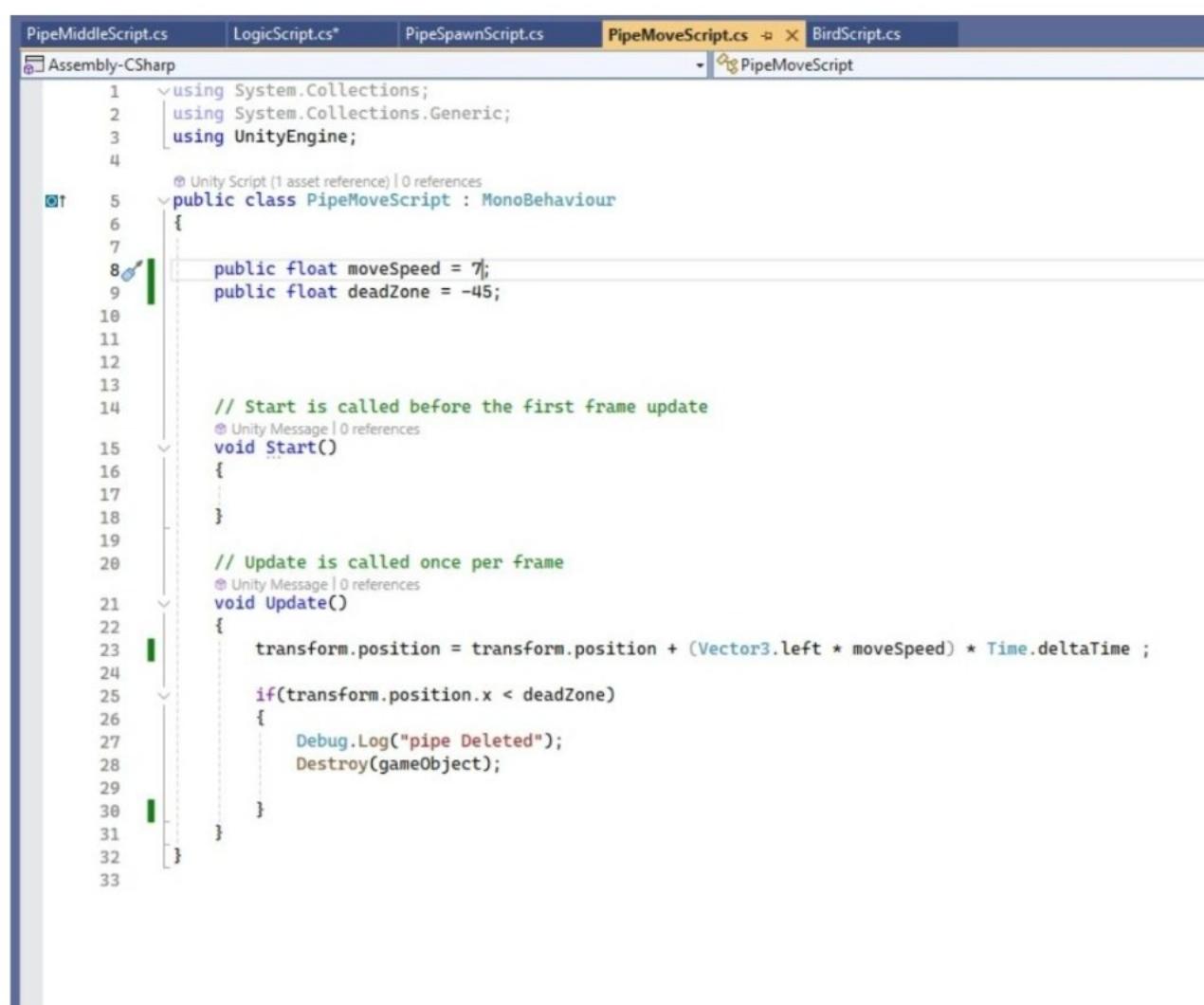
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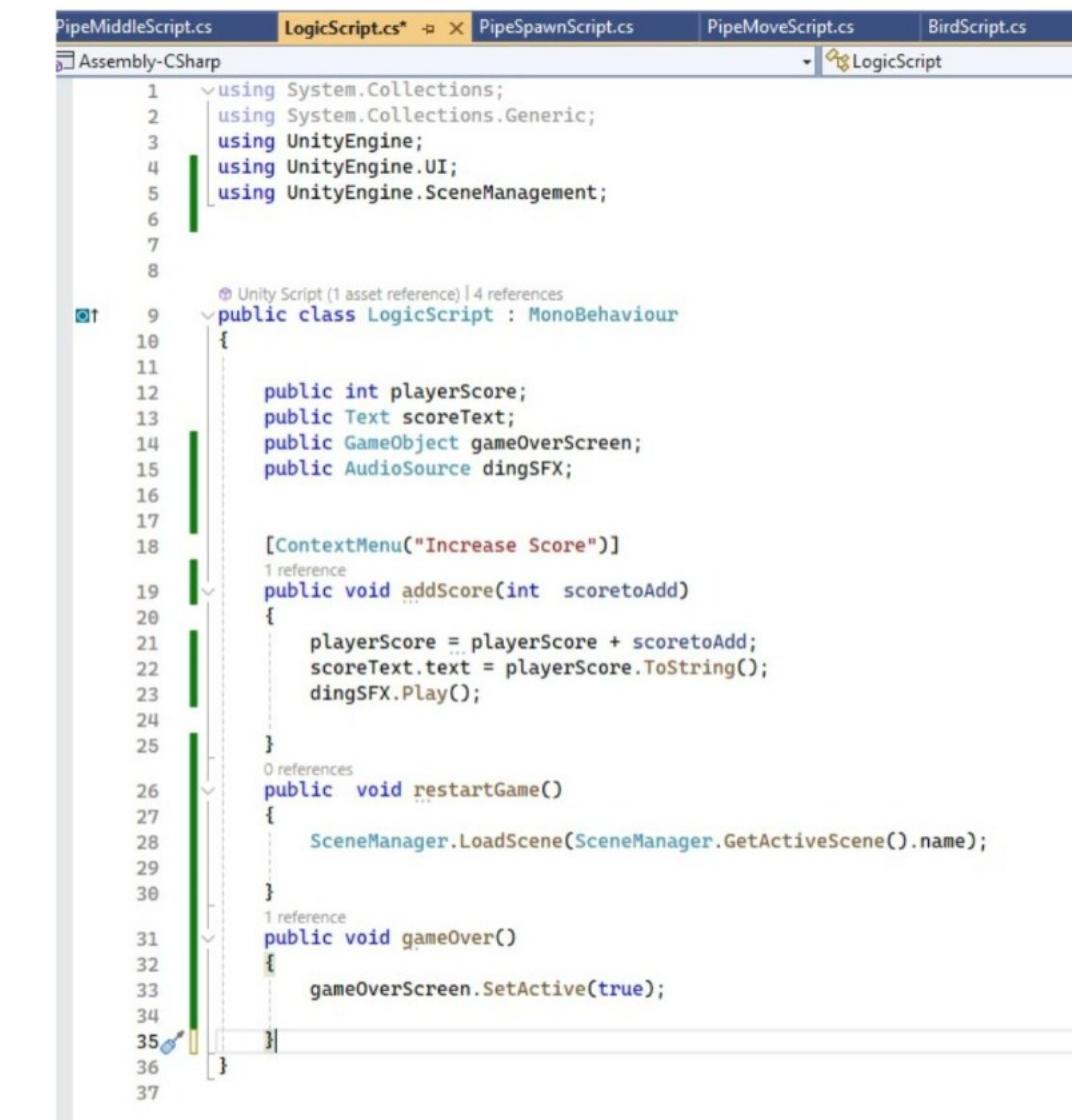
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Implementation(methods used in code)



```
Assembly-CSharp
1  using System.Collections;
2  using System.Collections.Generic;
3  using UnityEngine;
4
5  public class PipeMoveScript : MonoBehaviour
6  {
7
8      public float moveSpeed = 7;
9      public float deadZone = -45;
10
11
12
13
14     // Start is called before the first frame update
15     void Start()
16     {
17
18     }
19
20     // Update is called once per frame
21     void Update()
22     {
23
24         transform.position = transform.position + (Vector3.left * moveSpeed) * Time.deltaTime ;
25
26         if(transform.position.x < deadZone)
27         {
28             Debug.Log("pipe Deleted");
29             Destroy(gameObject);
30         }
31     }
32 }
33
```



```
Assembly-CSharp
1  using System.Collections;
2  using System.Collections.Generic;
3  using UnityEngine;
4  using UnityEngine.UI;
5  using UnityEngine.SceneManagement;
6
7
8
9  public class LogicScript : MonoBehaviour
10 {
11
12     public int playerScore;
13     public Text scoreText;
14     public GameObject gameOverScreen;
15     public AudioSource dingSFX;
16
17
18     [ContextMenu("Increase Score")]
19     public void addScore(int scoreToAdd)
20     {
21
22         playerScore += scoreToAdd;
23         scoreText.text = playerScore.ToString();
24         dingSFX.Play();
25
26     }
27
28     public void restartGame()
29     {
30
31         SceneManager.LoadScene(SceneManager.GetActiveScene().name);
32
33     }
34
35     public void gameOver()
36     {
37         gameOverScreen.SetActive(true);
38     }
39
40 }
```



Collider

```
-- 
11  void Start()
12  {
13      logic = GameObject.FindGameObjectWithTag("Logic").GetComponent<LogicScript>();
14  }
15
16
17 // Update is called once per frame
18 void Update()
19 {
20 }
21
22 private void OnTriggerEnter2D(Collider2D collision)
23 {
24     if(collision.gameObject.layer == 3)
25     {
26         logic.addScore(1);
27     }
28 }
29
30 }
```



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Controls

```
11
12
13
14 // Start is called before the first frame update
15     Unity Message | 0 references
16 void Start()
17 {
18     logic = GameObject.FindGameObjectWithTag("Logic").GetComponent<LogicScript>();
19 }
20
21
22 // Update is called once per frame
23     Unity Message | 0 references
24 void Update()
25 {
26     if (Input.GetKeyDown(KeyCode.Space) == true && birdIsAlive ==true)
27     {
28         myRigidbody.velocity = Vector2.up * flapStrength;
29     }
30 }
31
32     Unity Message | 0 references
```



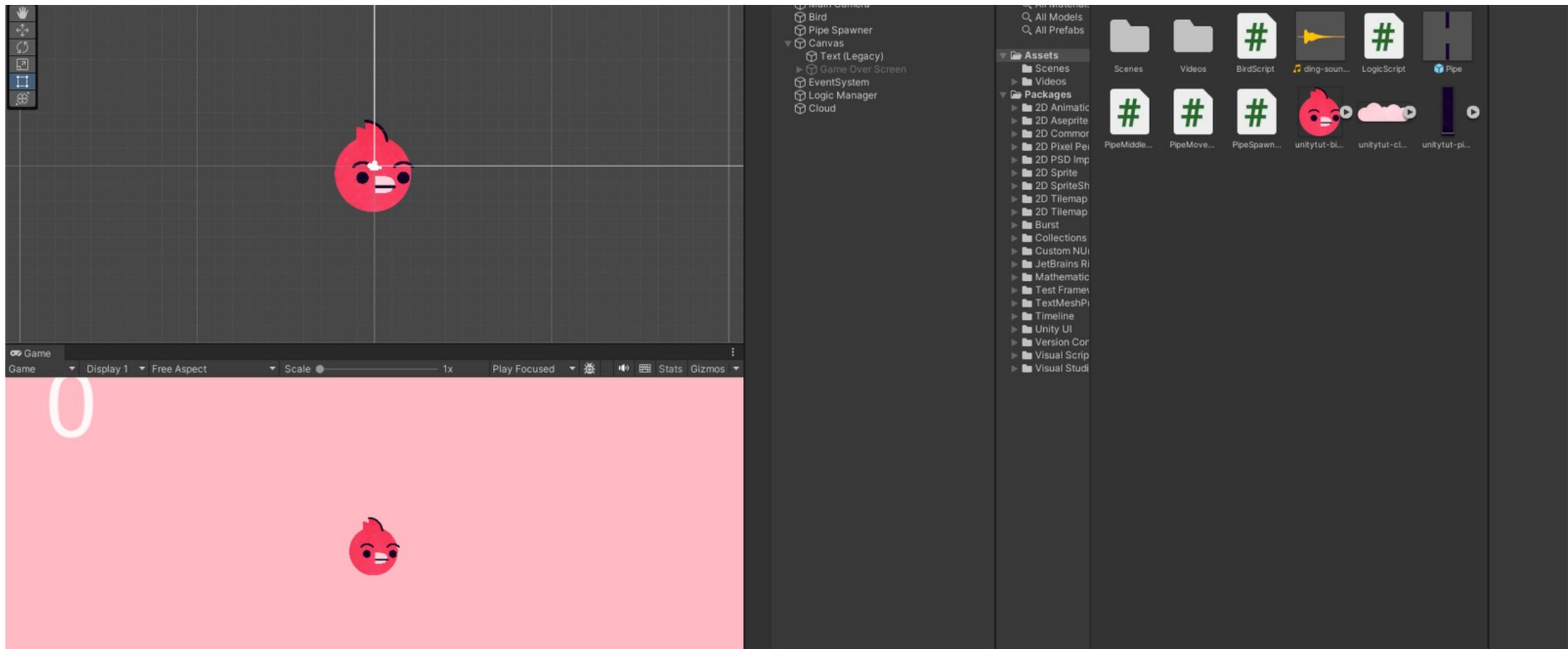
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The hierarchy pane



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List of scripts

PipeMiddleScript.cs

LogicScript.cs

PipeSpawnScript.cs

PipeMoveScript.cs

BirdScript.cs



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Score

```
15     public AudioSource dingSFX;  
16  
17  
18     [ContextMenu("Increase Score")]  
19     1 reference  
20     public void addScore(int scoretoAdd)  
21     {  
22         playerScore = playerScore + scoretoAdd;  
23         scoreText.text = playerScore.ToString();  
24         dingSFX.Play();  
25     }  
26     0 references  
27     public void restartGame()  
28     {  
29         SceneManager.LoadScene(SceneManager.GetActiveScene().name);  
30     }
```



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Important Screenshots

```
10
11
12     public int playerScore;
13     public Text scoreText;
14     public GameObject gameOverScreen;
15     public AudioSource dingSFX;
16
17
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24         dingSFX.Play();
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27             myRigidbody.velocity = Vector2.up * flapStrength;
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22 {
23     transform.position = transform.position + (Vector3.left * moveSpeed) * Time.deltaTime ;
24
25     if(transform.position.x < deadZone)
26     {
27         Debug.Log("pipe Deleted");
28         Destroy(gameObject);
29     }
30 }
31 }
```



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```
11
12
13 // Start is called before the first frame update
14     Unity Message | 0 references
15 void Start()
16 {
17     spawnPipe();
18 }
19
20 // Update is called once per frame
21     Unity Message | 0 references
22 void Update()
23 {
24     if (timer < spawnRate)
25     {
26         timer = timer + Time.deltaTime;
27     }
28     else
29     {
30         spawnPipe();
31         timer = 0;
32 }
```



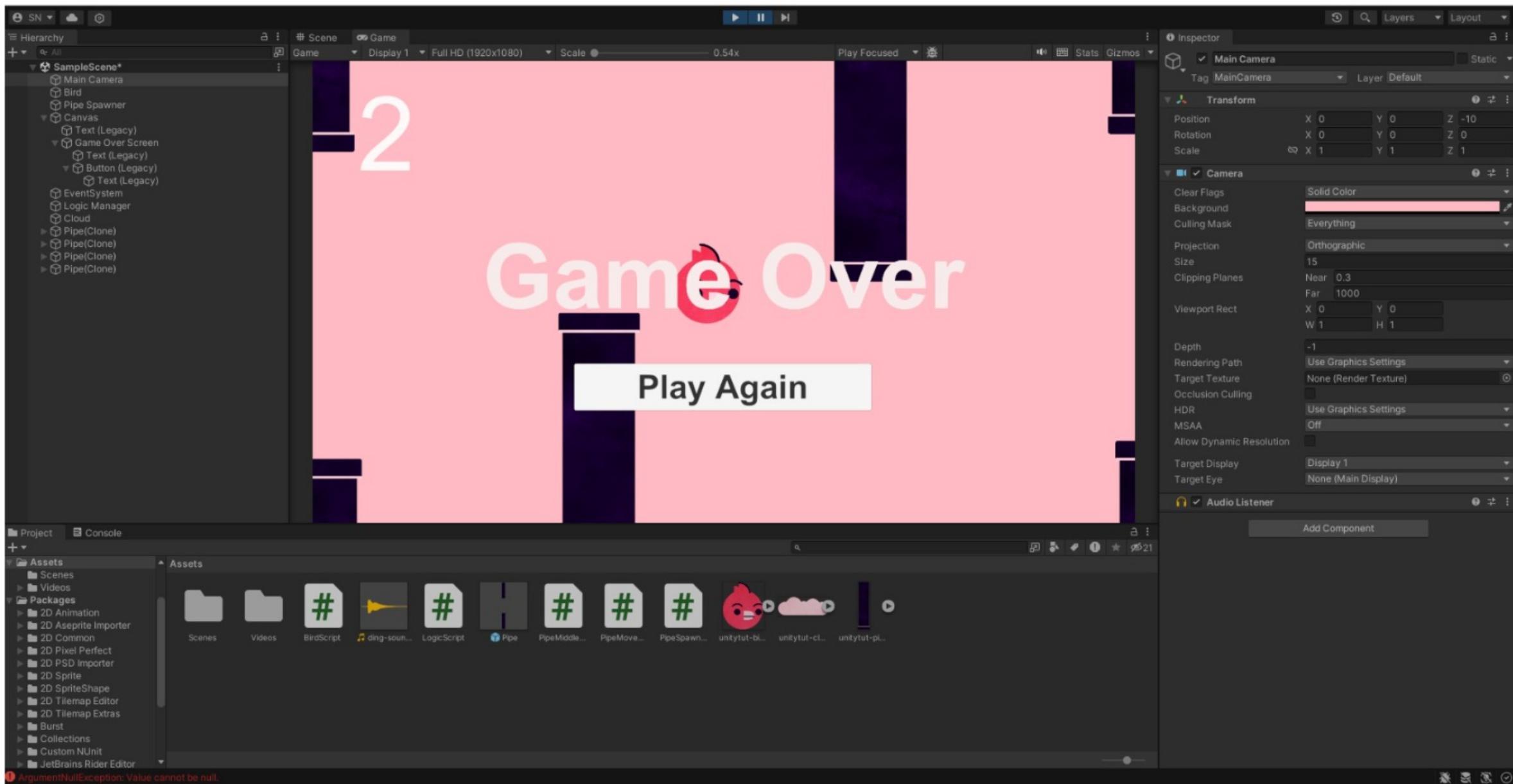
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Output



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References

<https://youtu.be/XtQMytORBmM> flappy bird tutorial



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