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Excellence

Course	: 2D Game Programming
Effective Period	: September 2016

2D Game Programing
LAB 03

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Acknowledgement

These slides have been adapted from:

Pereira, V. (2014). Learning Unity 2D Game Development by Example, Packt Publishing, Inc. San Francisco. ISBN: 9781783559046

Chapter 4

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Learning Objectives

LO 1 : Create 2D game for PC platform

LO 3 : Design 2D game for PC platform

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Level design

- Great games are often games that contain beautiful environments. However, creating a nice looking level is not an easy task to accomplish, even in 2D. We will learn how to create a proper level.

TILED

We will be using a third-party tool named **Tiled** for this purpose. Tiled is a free 2D map editor that will save you a lot of time working on your levels. It is a tool that makes it much easier to create a 2D level, instead of doing it within Unity by duplicating game objects.

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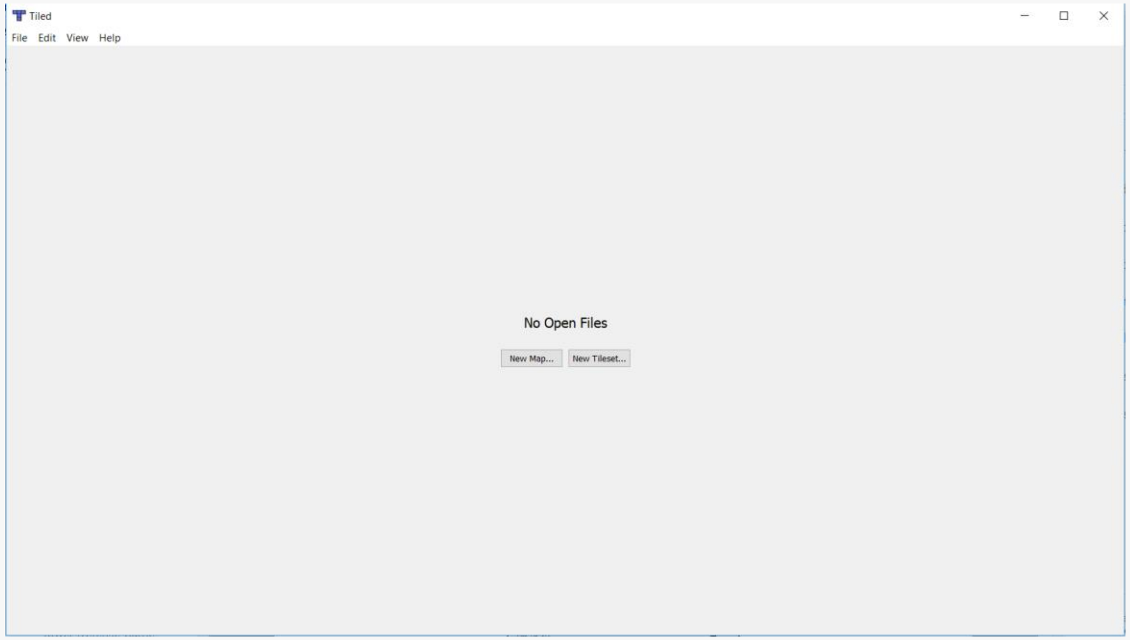
TILED

What you’ll see



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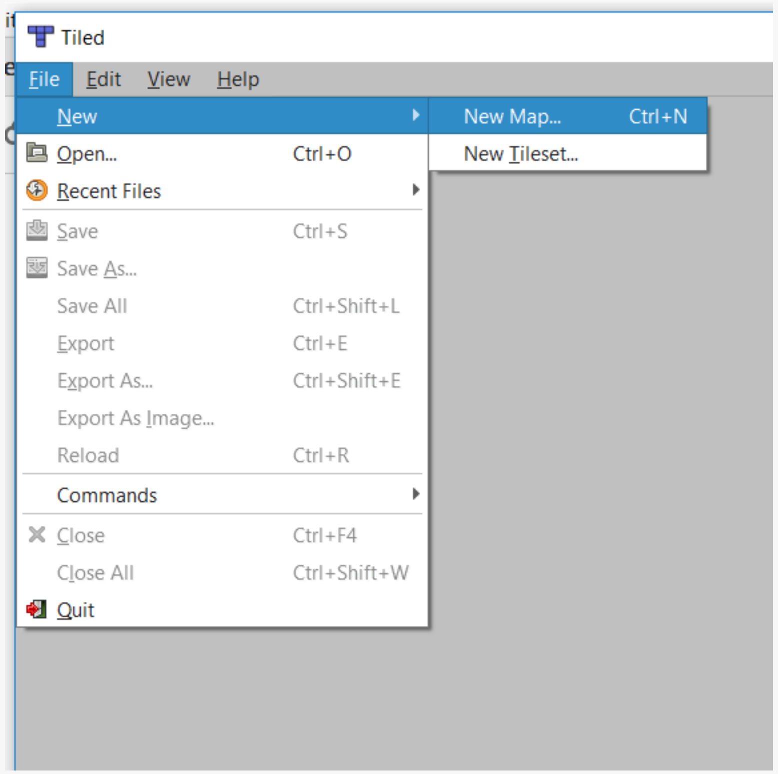
Create a new map



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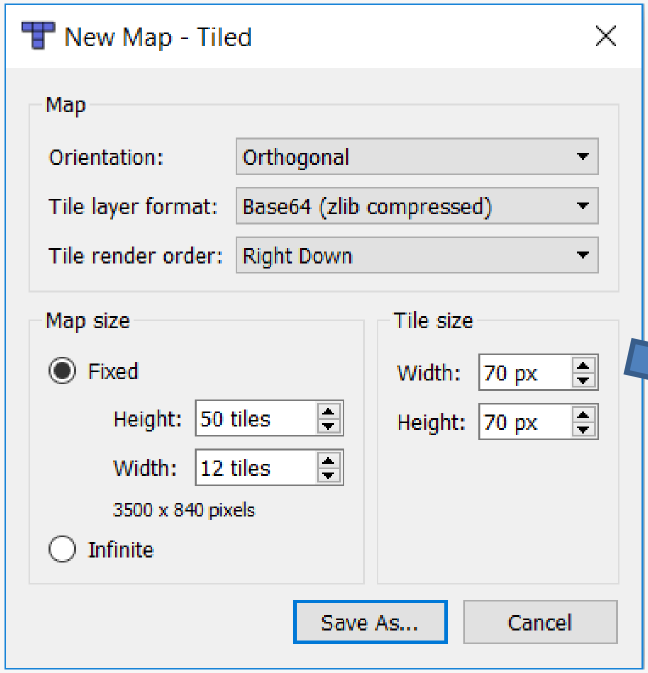
Settings for our new map



New Map - Tiled

Map

Orientation: Orthogonal

Tile layer format: Base64 (zlib compressed)

Tile render order: Right Down

Map size

[✓ Fixed]

Height: 50 tiles

Width: 12 tiles

3500 x 840 pixels

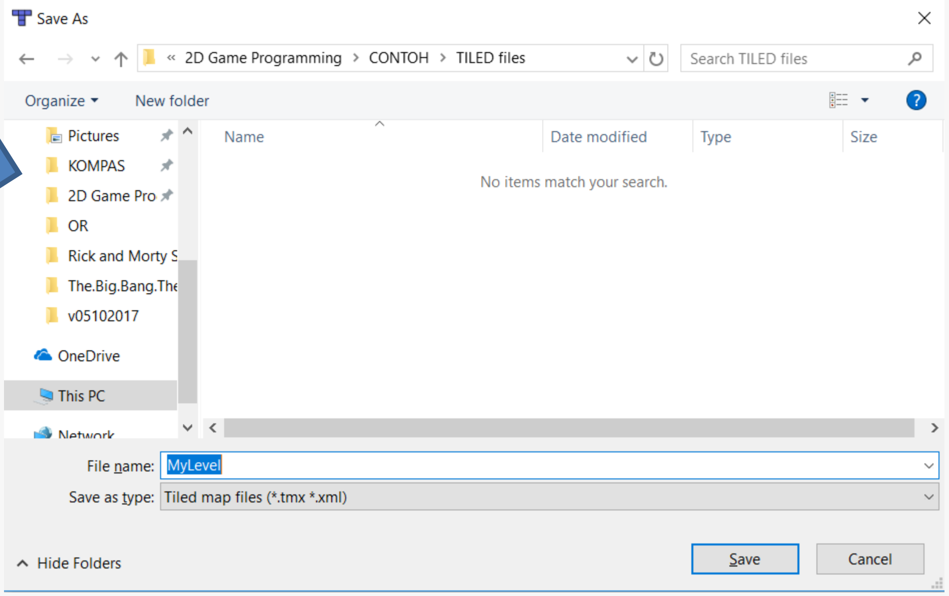
Infinite

Tile size

Width: 70 px

Height: 70 px

Name it as MyLevel



Save As

« 2D Game Programming › CONTOH › TILED files

Search TILED files

No items match your search.

File name: MyLevel

Save as type: Tiled map files (*.tmx *.xml)

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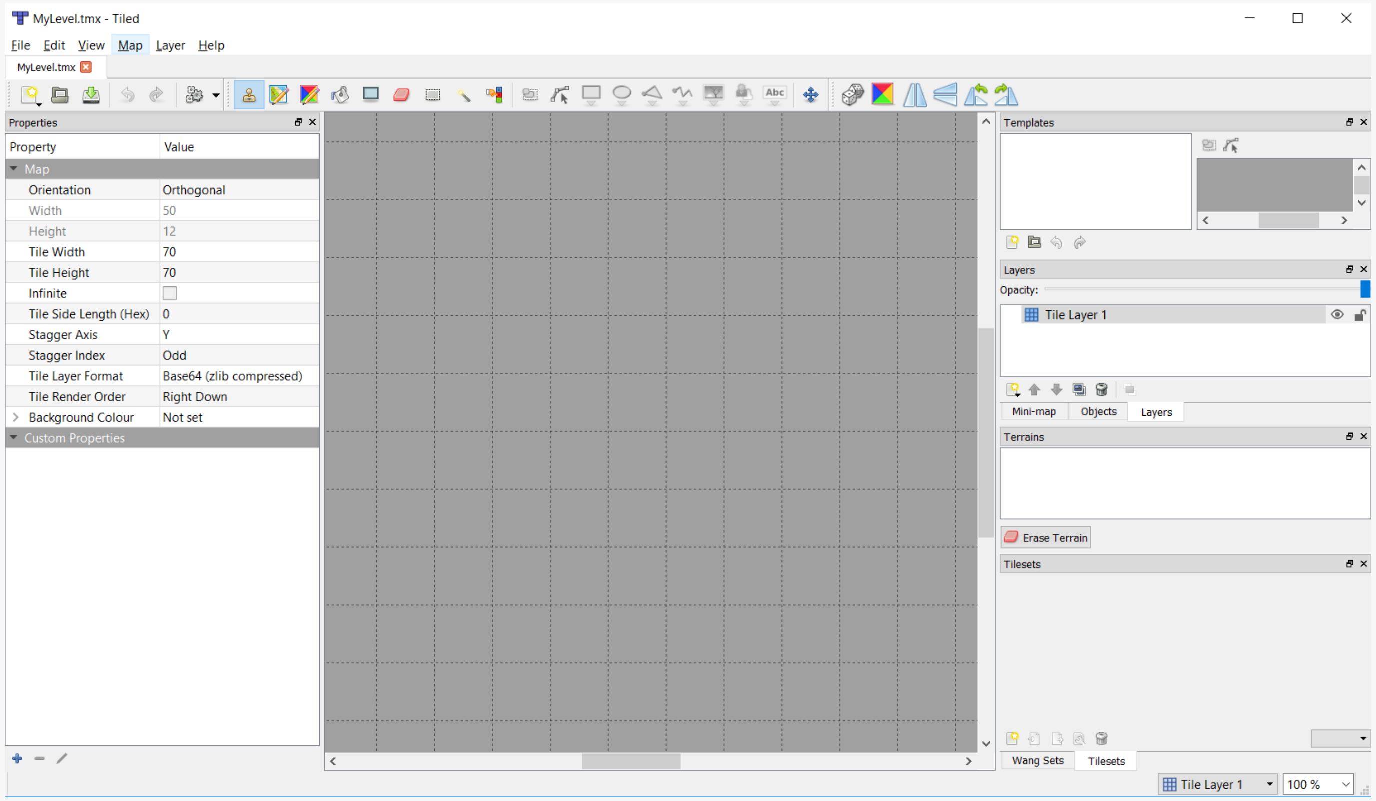
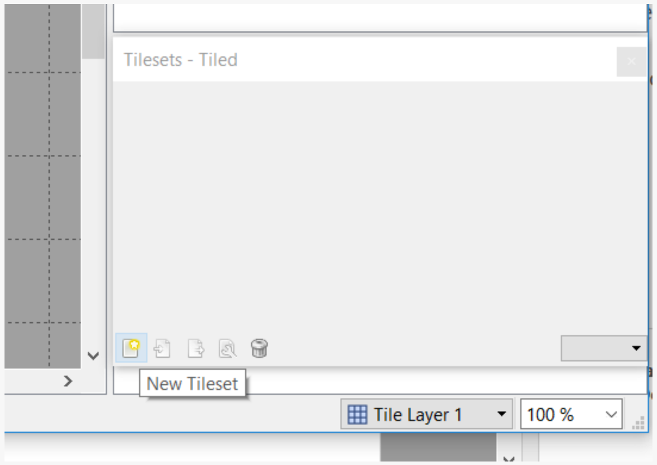
Voila!!!



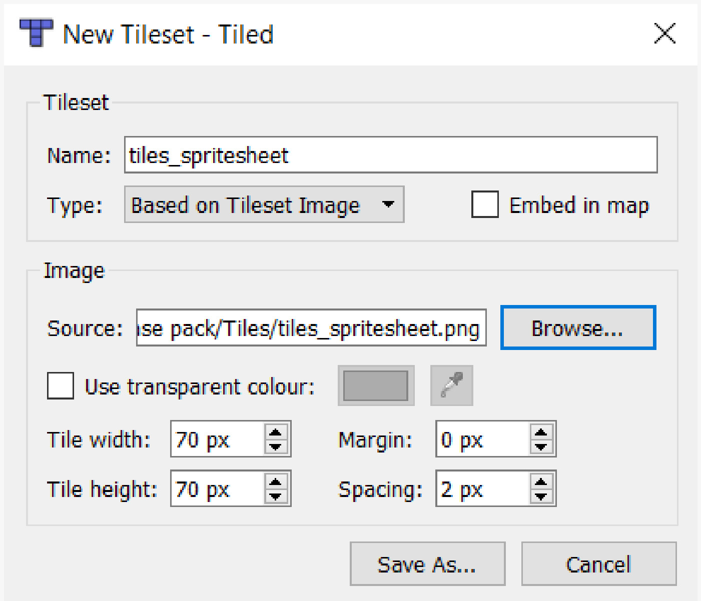
Property	Value
Map	
Orientation	Orthogonal
Width	50
Height	12
Tile Width	70
Tile Height	70
Infinite	☐
Tile Side Length (Hex)	0
Stagger Axis	Y
Stagger Index	Odd
Tile Layer Format	Base64 (zlib compressed)
Tile Render Order	Right Down
Background Colour	Not set
Custom Properties	

Let’s add a tilesheet

Click new tileset on the right bottom of the window.



Add tiles_spritesheet.png from Kenney’s platformer art pack.
Please make sure you also have the same variables for the tileset and save it as tileset01



Tileset

Name: tiles_spritesheet

Type: Based on Tileset Image

Embed in map: ☐

Image

Source: ıse pack/Tiles/tiles_spritesheet.png

Use transparent colour: ☐

Tile width: 70 px

Margin: 0 px

Tile height: 70 px

Spacing: 2 px

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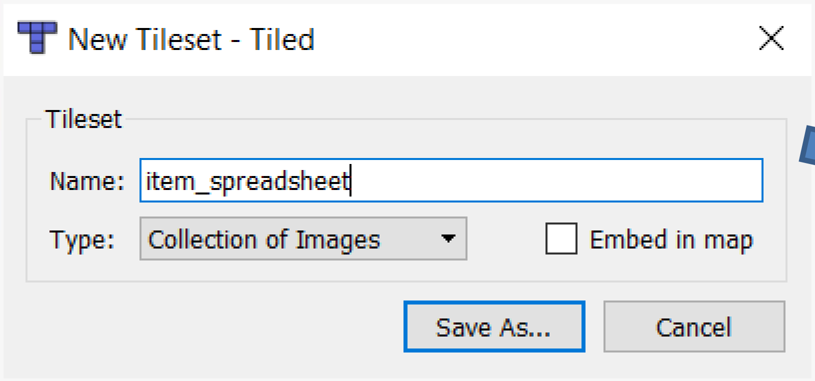
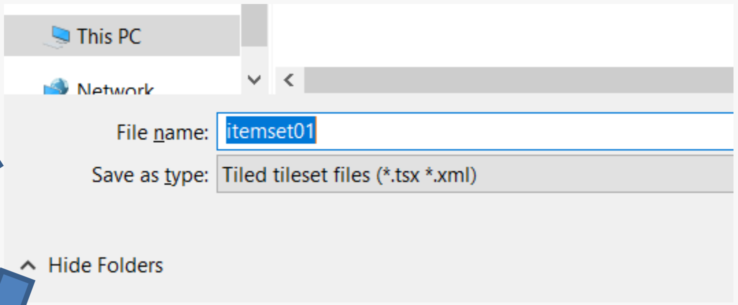
Let’s add another tilesheet

Create a new tileset with a name item_spreadsheet and Collection of Images as Type

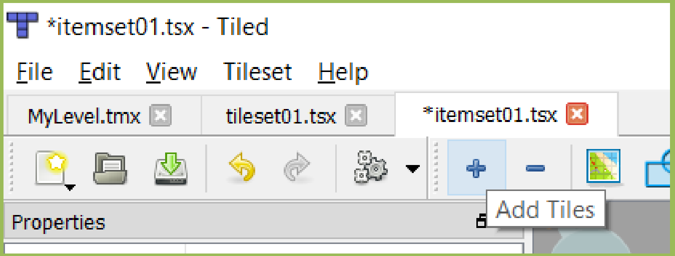

New Tileset - Tiled

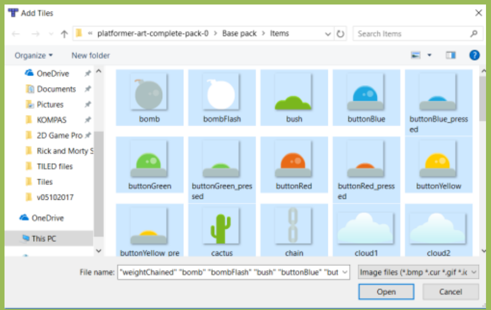
Tileset
Name: item_spreadsheet
Type: Collection of Images
Embed in map [ ]

Name it itemset01


File name: itemset01
Save as type: Tiled tileset files (*.tsx *.xml)

Add item images from items folder of Kenney’s platformer art pack.


*itemset01.tsx - Tiled


Add Tiles
platformer-art-complete-pack-0 › Base pack › Items
File name: "weightChained" "bomb" "bombFlash" "bush" "buttonBlue" "but
Image files (*.bmp *.cur *.gif *.ic

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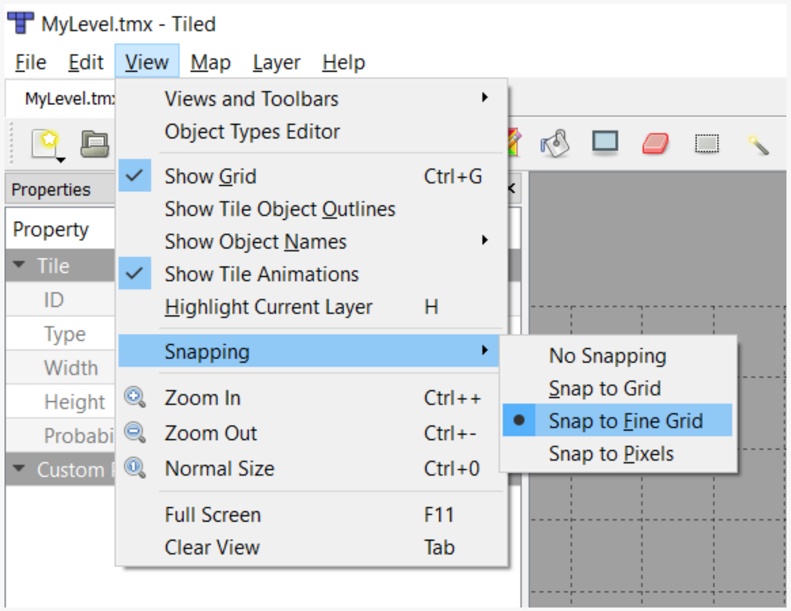
Open snapping settings and set it to Snap to Fine Grid



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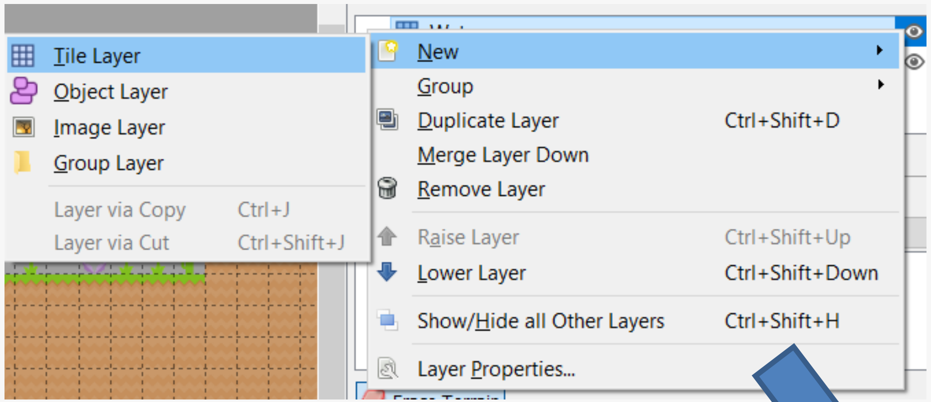
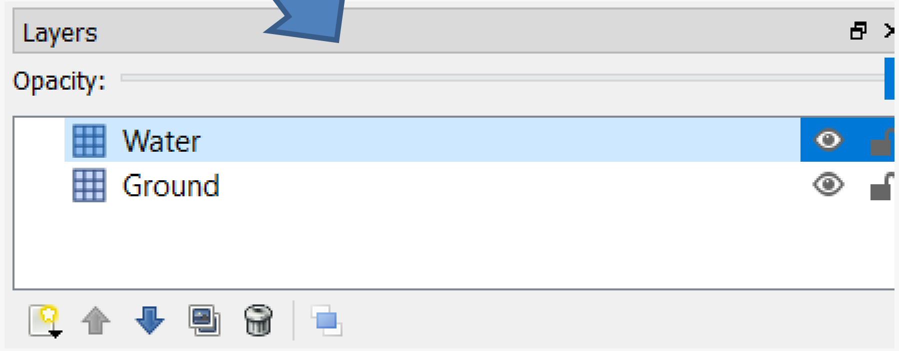
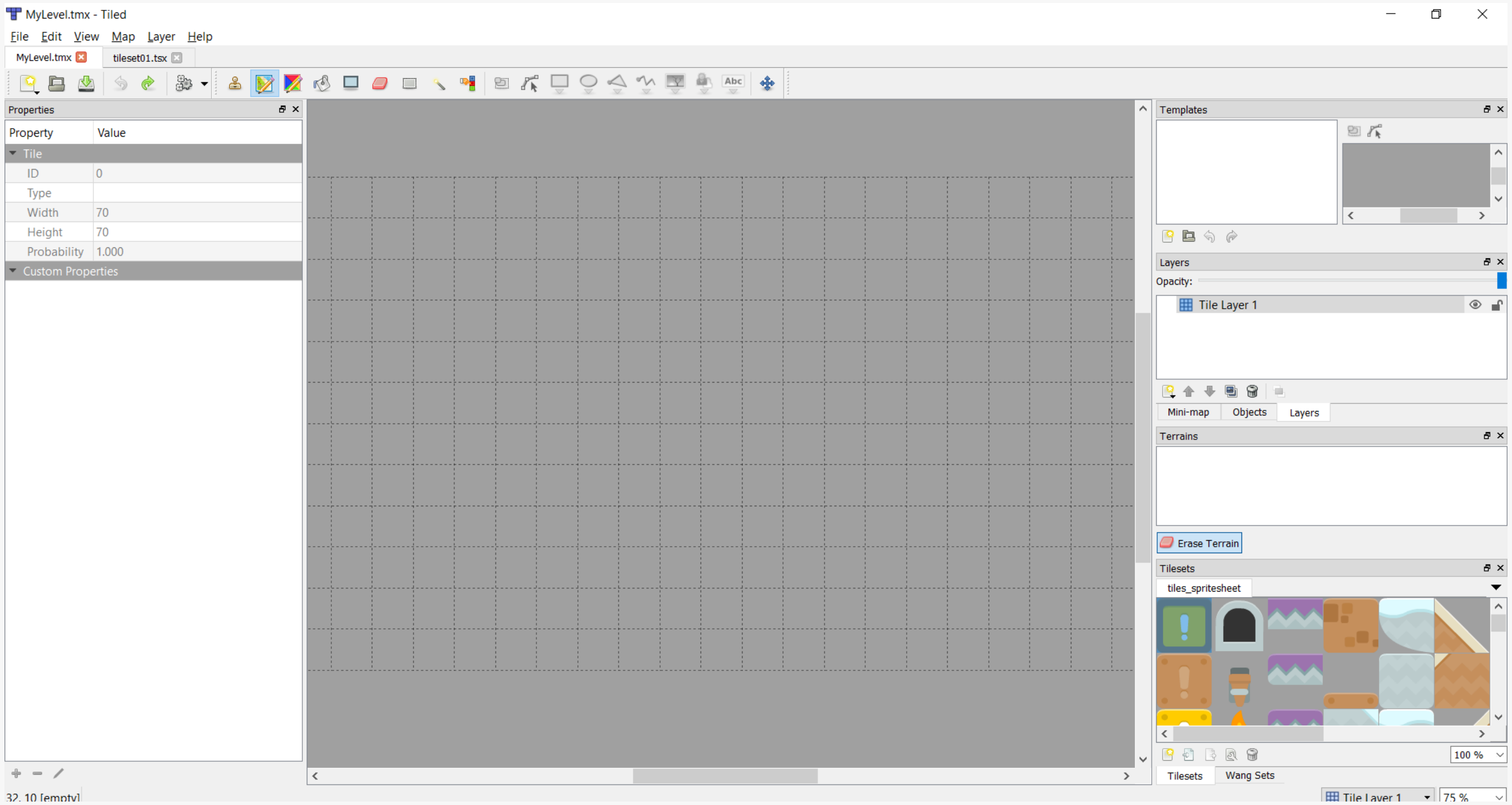
Create 2 layers


Tile Layer
Object Layer
Image Layer
Group Layer
Layer via Copy Ctrl+J
Layer via Cut Ctrl+Shift+J
New
Group
Duplicate Layer Ctrl+Shift+D
Merge Layer Down
Remove Layer
Raise Layer Ctrl+Shift+Up
Lower Layer Ctrl+Shift+Down
Show/Hide all Other Layers Ctrl+Shift+H
Layer Properties...

We will create a new layer and name it Water and Ground

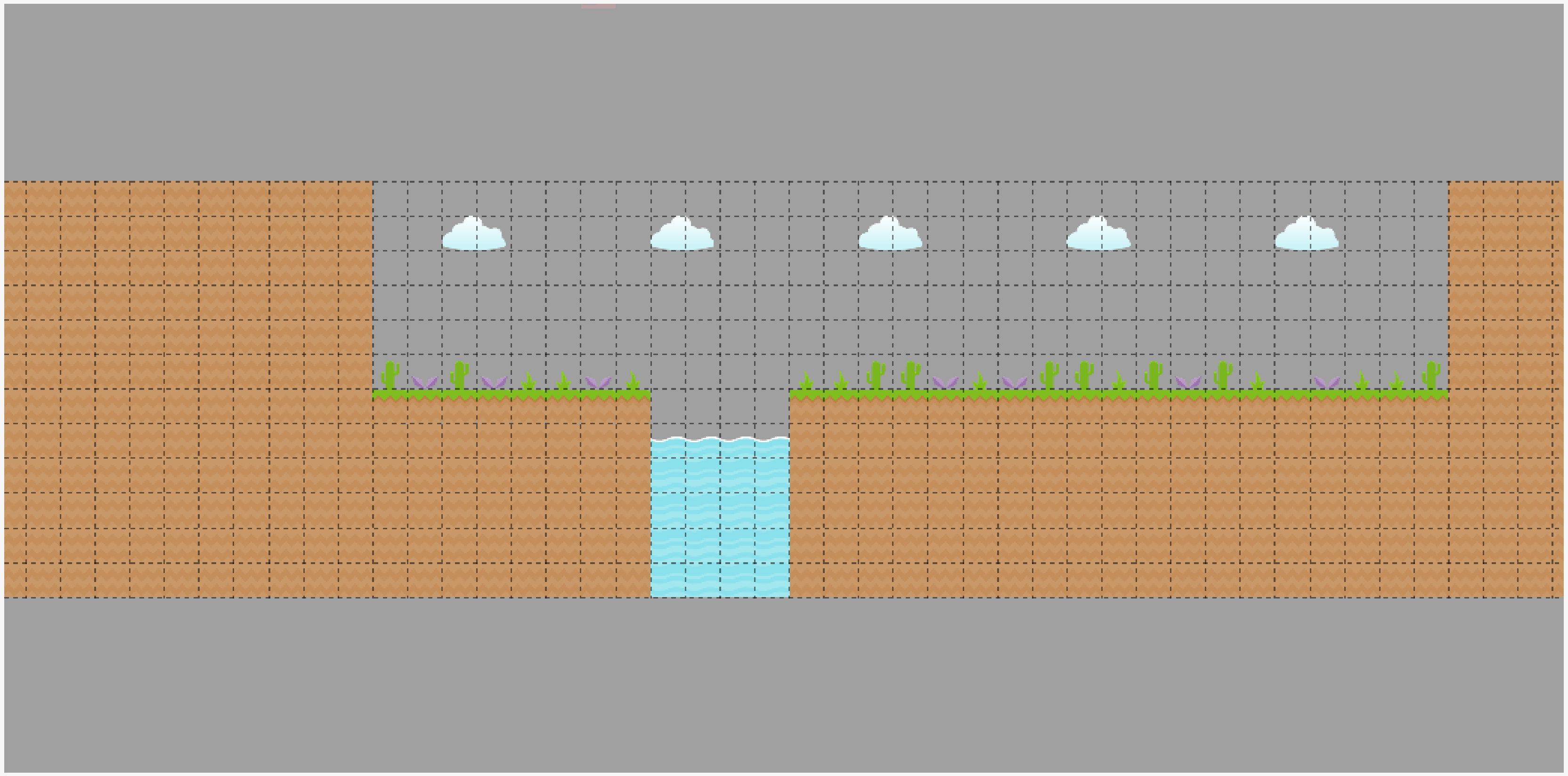


Get ready for level design!



Property	Value
Tile	
ID	0
Type	
Width	70
Height	70
Probability	1.000
Custom Properties	

Create a similar one…



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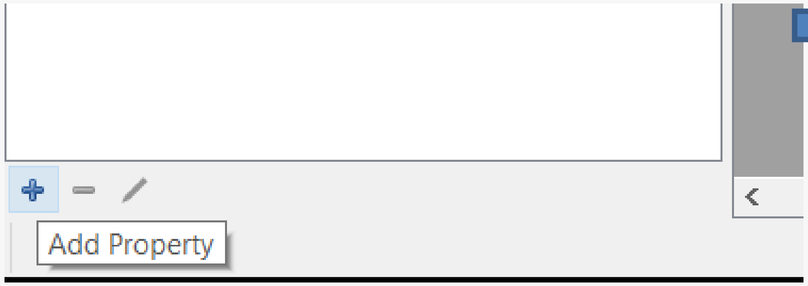
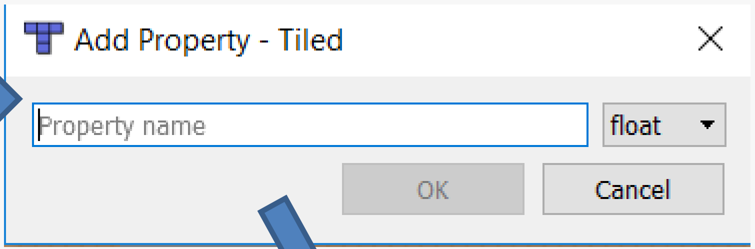
Add new custome properties

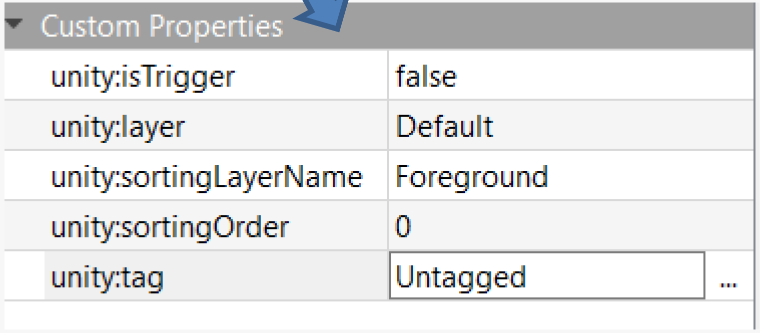
Make sure that the Ground layer is highlighted

Click “+” logo on the left bottom side of the window



Add these properties and use String as type





Custom Properties

unity:isTrigger	false
unity:layer	Default
unity:sortingLayerName	Foreground
unity:sortingOrder	0
unity:tag	Untagged

let's repeat these steps again for the the Water layer, but change the **unity:isTrigger** property to true instead of false. In fact, we will use this trigger later in the game to check if the player falls into the water gap.

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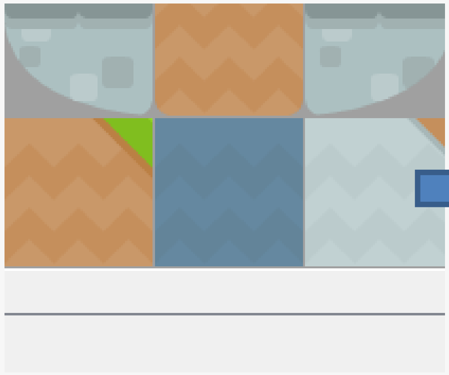
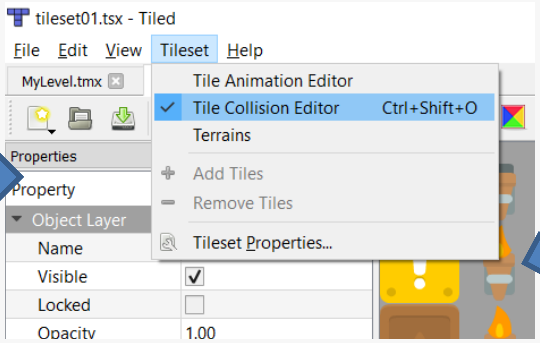
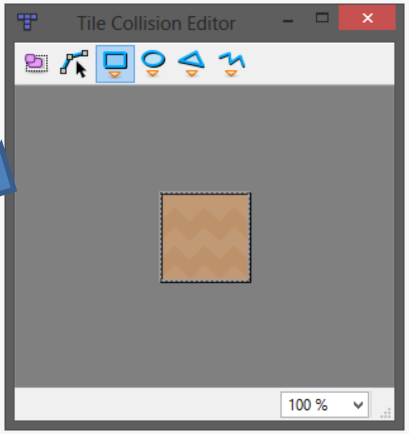
Add collider

Open your tilesheet tab, highlight the tile you use as ground and open the Tile Collision Editor





use the rectangle tool to fully enclose our tile.



Repeat the previous steps for all of the tiles we have added into the map, except for any decorative tiles such as grass or rocks.

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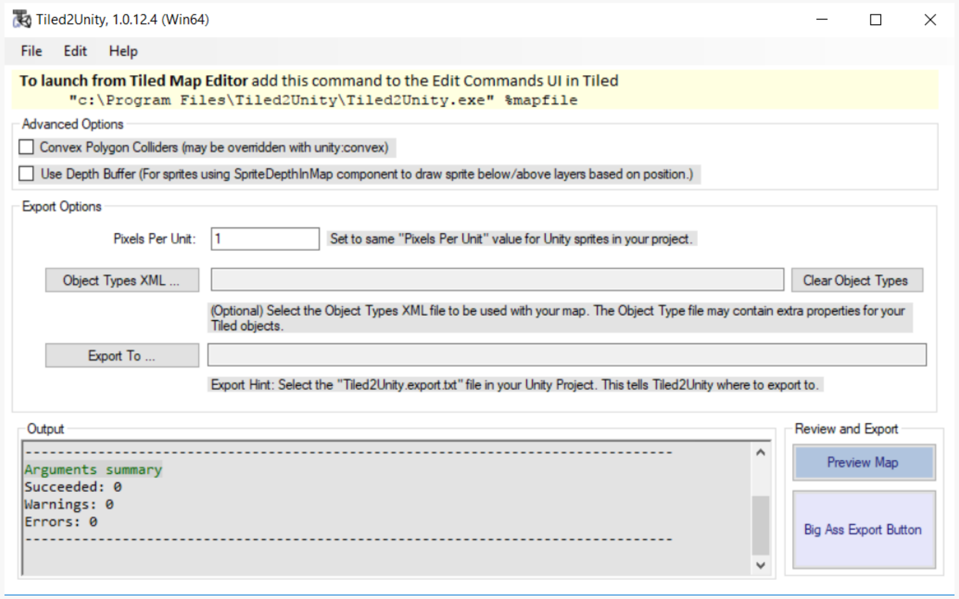
LET'S START IMPORTING YOUR MASTERPIECE!!!!!!

Open your Unity Editor and your project. After it is up and running, open the Tiled2Unity Application



To launch from Tiled Map Editor add this command to the Edit Commands UI in Tiled

```
"c:\Program Files\Tiled2Unity\Tiled2Unity.exe" %mapfile
```

☐ Convex Polygon Colliders (may be overridden with unity:convex)

☐ Use Depth Buffer (For sprites using SpriteDepthInMap component to draw sprite below/above layers based on position.)

Pixels Per Unit: 1 Set to same "Pixels Per Unit" value for Unity sprites in your project.

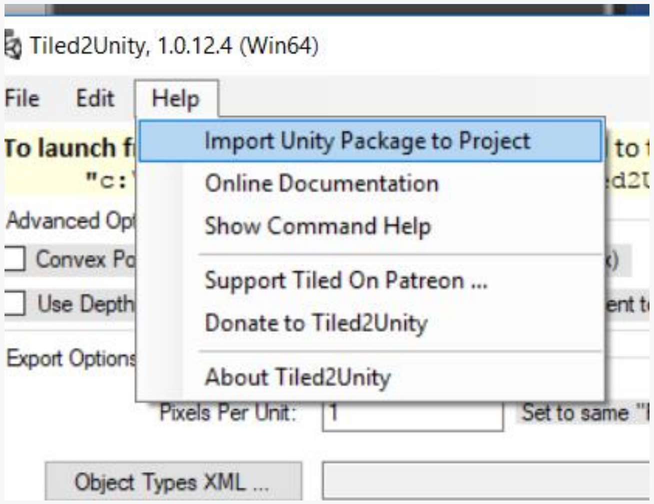
(Optional) Select the Object Types XML file to be used with your map. The Object Type file may contain extra properties for your Tiled objects.

Export Hint: Select the "Tiled2Unity.export.txt" file in your Unity Project. This tells Tiled2Unity where to export to.

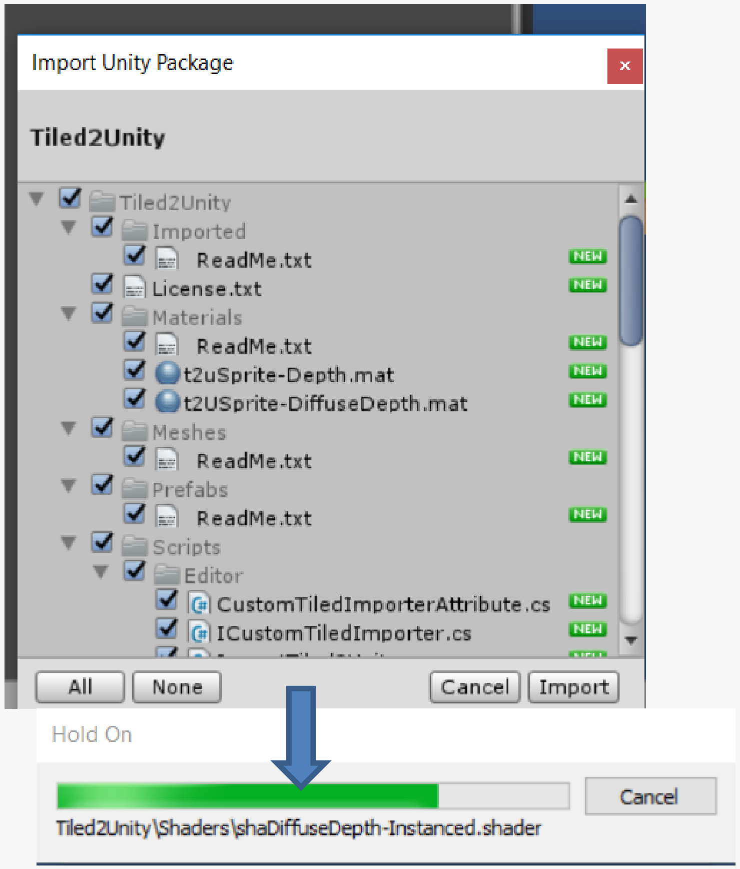
```
----------------------------------------------------------------------------------
Arguments summary
Succeeded: 0
Warnings: 0
Errors: 0
----------------------------------------------------------------------------------
```

Let’s get going

Lets import unity package to Project



Press import in the Unity editor



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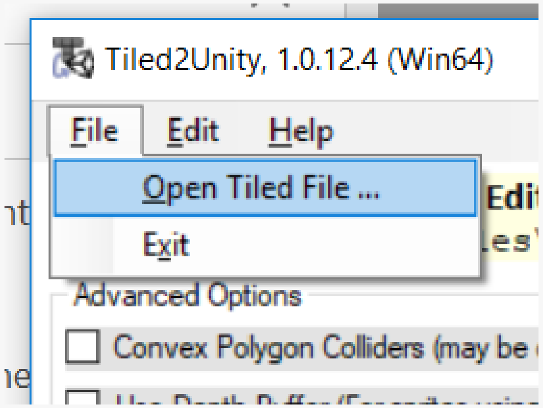
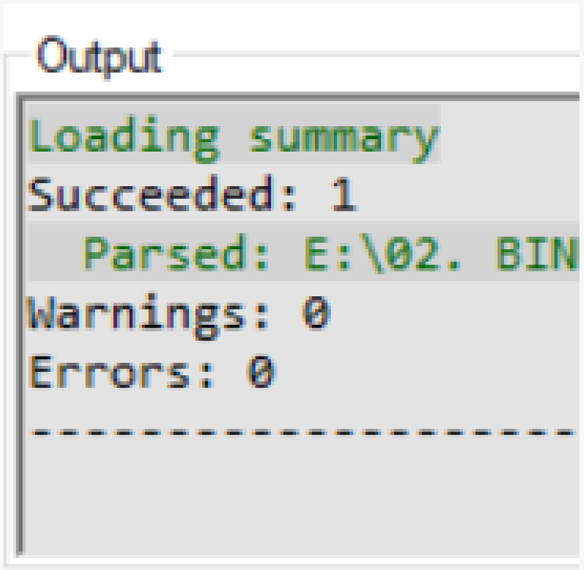
Continue On…

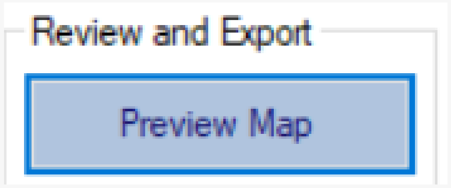

Tiled2Unity, 1.0.12.4 (Win64)
File
Edit
Help
Open Tiled File ...
Exit
Advanced Options
Convex Polygon Colliders (may be

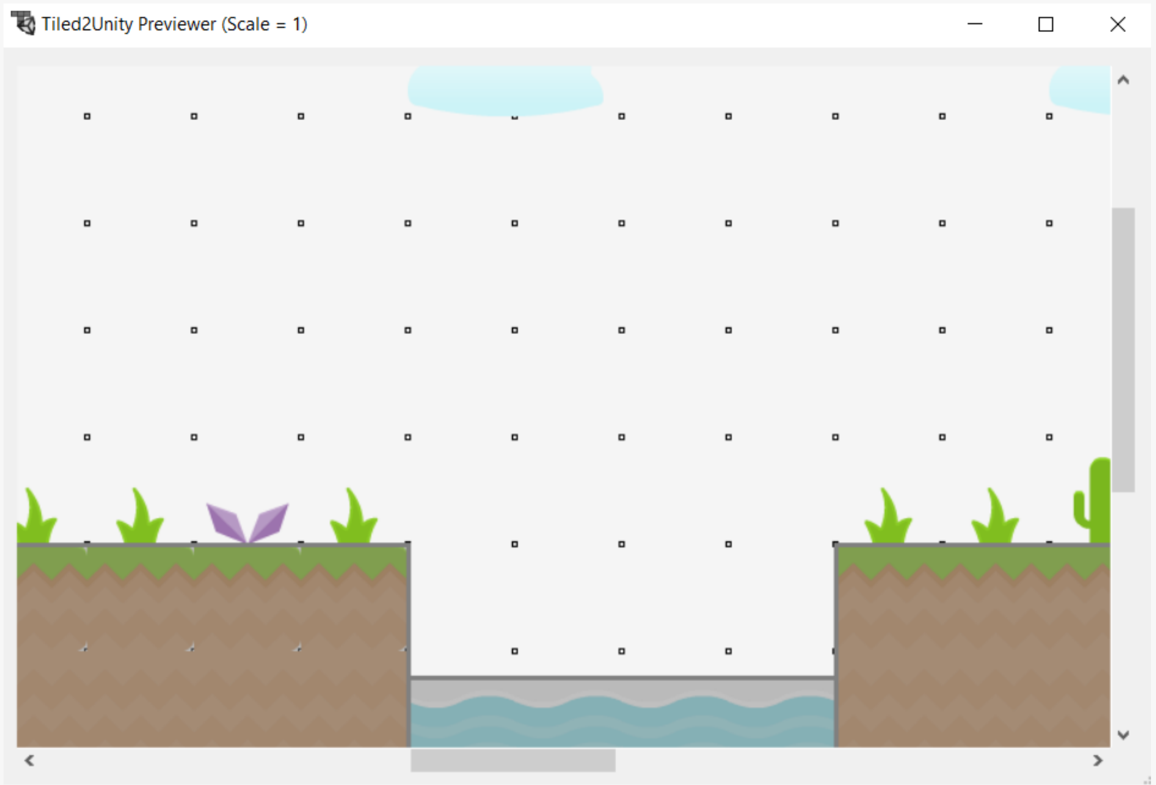
What this will do is import the plugin into Unity so that we will be able to use the files that come next in our scene. Next, go to **File** | **Open Tiled File** and select the saved file



```
Loading summary
Succeeded: 1
  Parsed: E:\02. BIN
Warnings: 0
Errors: 0
----------------------
```

Preview it?





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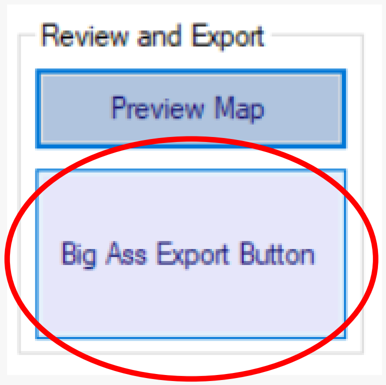
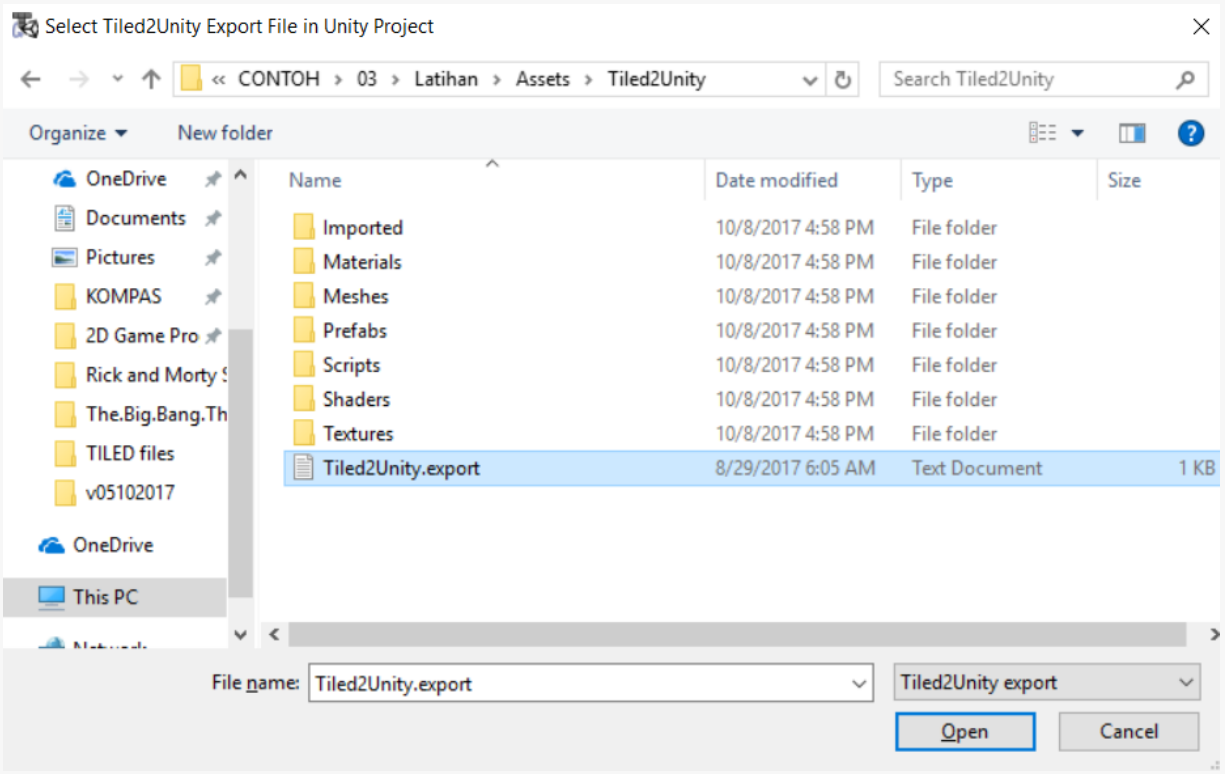
Export it to the project...




Select Tiled2Unity Export File in Unity Project

« CONTOH › 03 › Latihan › Assets › Tiled2Unity

Search Tiled2Unity

Organize ▾ New folder

OneDrive
Documents
Pictures
KOMPAS
2D Game Pro
Rick and Morty
The.Big.Bang.Th
TILED files
v05102017
OneDrive
This PC
Network

Name	Date modified	Type	Size
Imported	10/8/2017 4:58 PM	File folder	
Materials	10/8/2017 4:58 PM	File folder	
Meshes	10/8/2017 4:58 PM	File folder	
Prefabs	10/8/2017 4:58 PM	File folder	
Scripts	10/8/2017 4:58 PM	File folder	
Shaders	10/8/2017 4:58 PM	File folder	
Textures	10/8/2017 4:58 PM	File folder	
Tiled2Unity.export	8/29/2017 6:05 AM	Text Document	1 KB

File name: Tiled2Unity.export

Tiled2Unity export

Open Cancel

click on the **ExportTo** button and make sure it is set to the Tiled2Unity.export file inside the folder Assets/Tiled2Unity.

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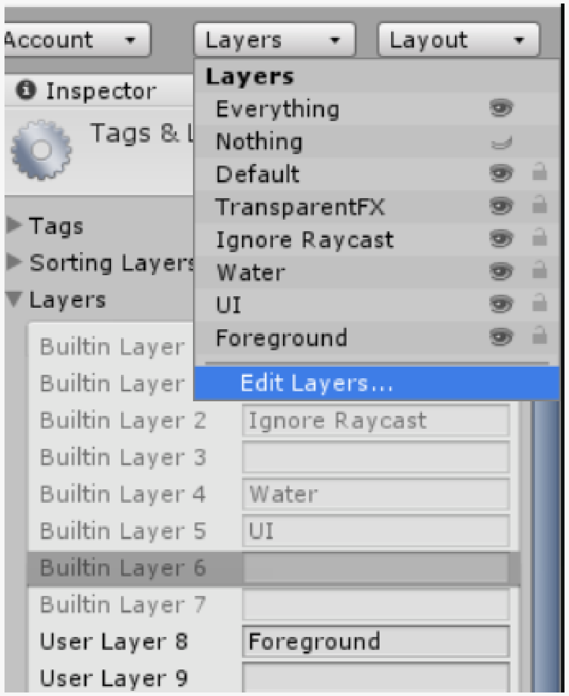
Error?



Builtin Layer
Builtin Layer
Builtin Layer 2 Ignore Raycast
Builtin Layer 3
Builtin Layer 4 Water
Builtin Layer 5 UI
Builtin Layer 6
Builtin Layer 7
User Layer 8 Foreground
User Layer 9

Let’s add a new layer named Foreground

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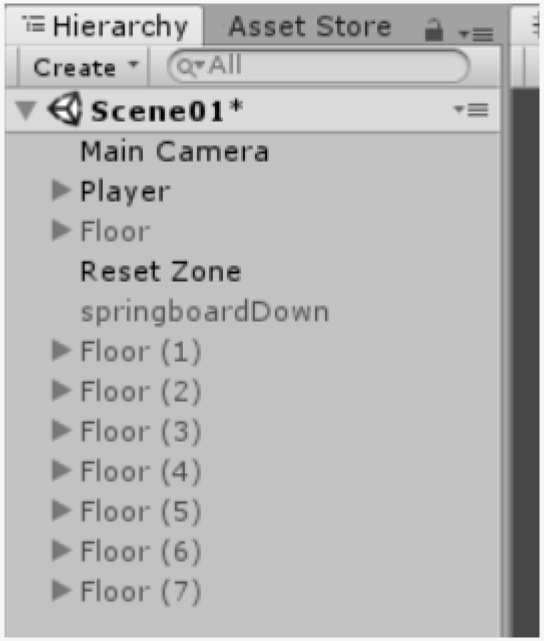
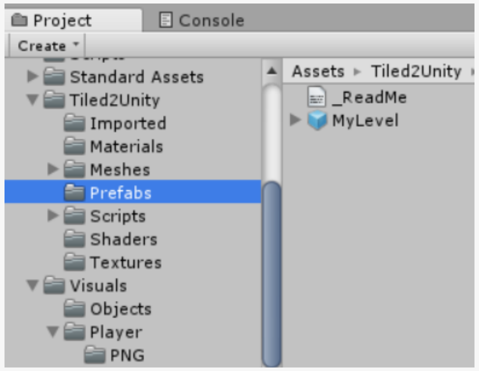
Before you move on...

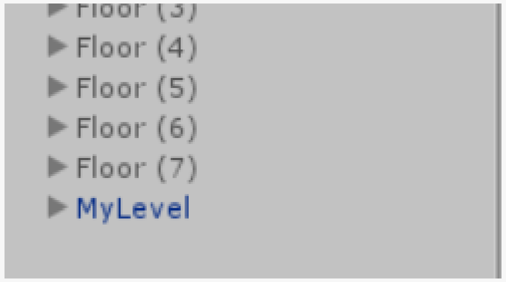
Disabled all the floors



Open prefabs folder on the Tiled2Unity folder



Grab the imported Prefabs and move it to the Hierarcy



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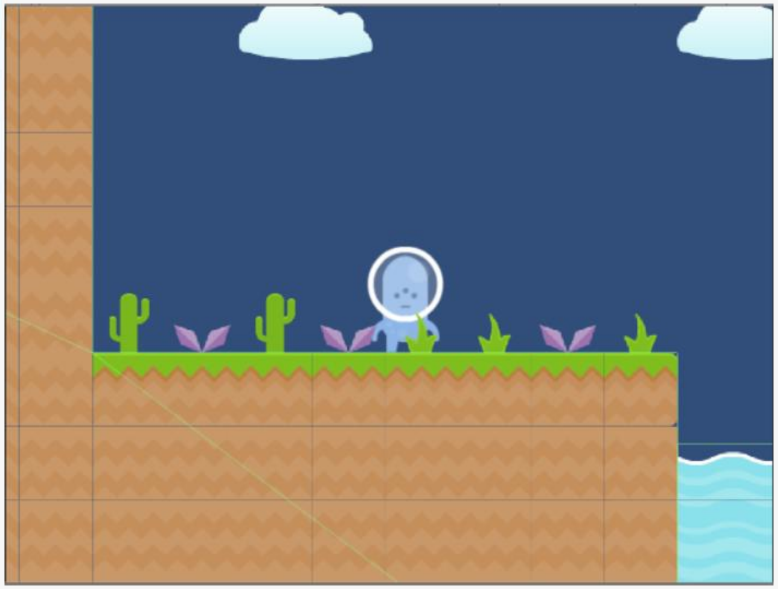
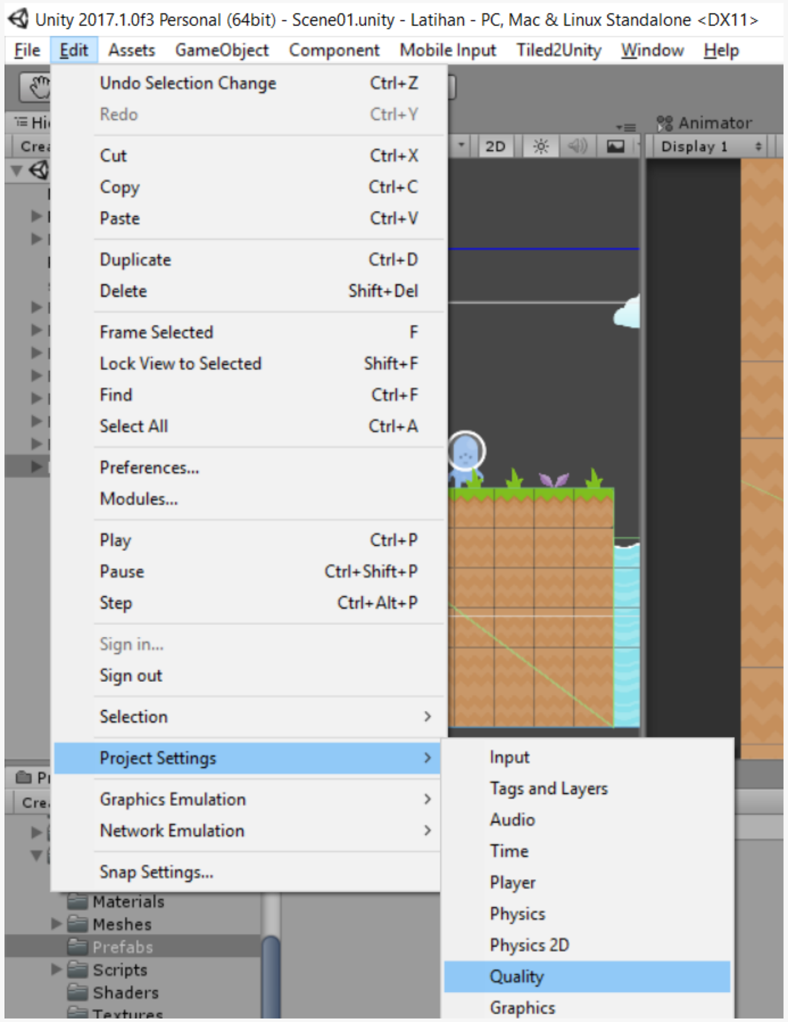
Yeah... The object is here...



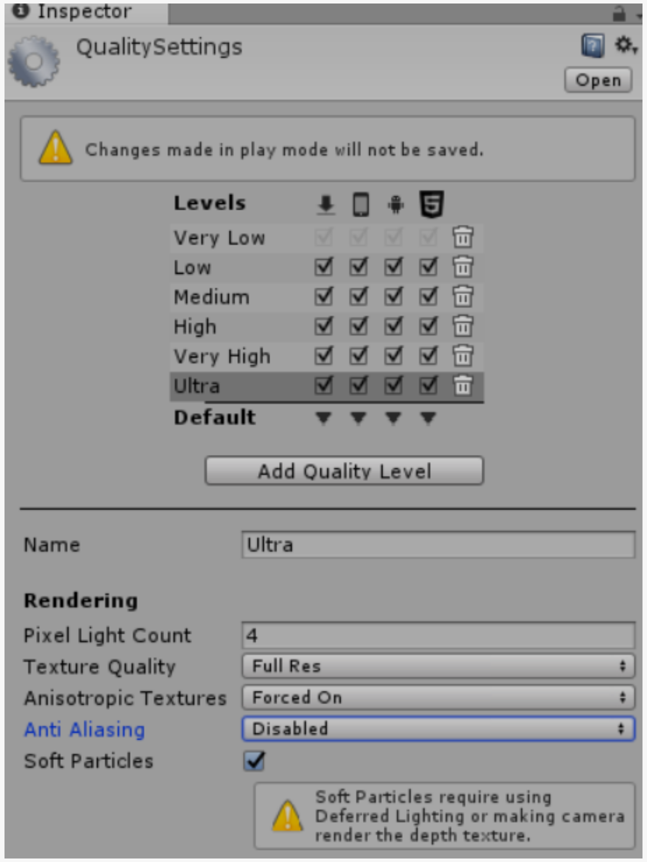
The object you made is there. Press play and move the player so that you can control it ☺

There's a gap between tile?
Do not worry!!

Open the quality of Project Settings



Disabled the anti-aliansing



Changes made in play mode will not be saved.

Name: Ultra

Rendering
Pixel Light Count: 4
Texture Quality: Full Res
Anisotropic Textures: Forced On
Anti Aliasing: Disabled
Soft Particles: ✓

Soft Particles require using Deferred Lighting or making camera render the depth texture.

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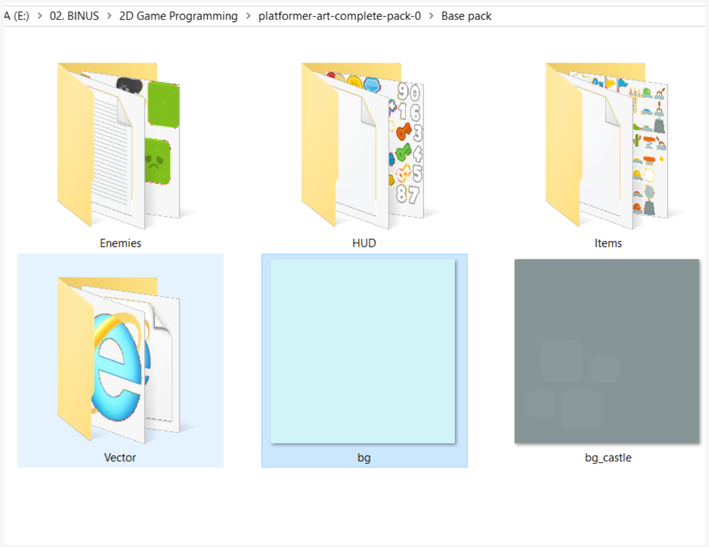
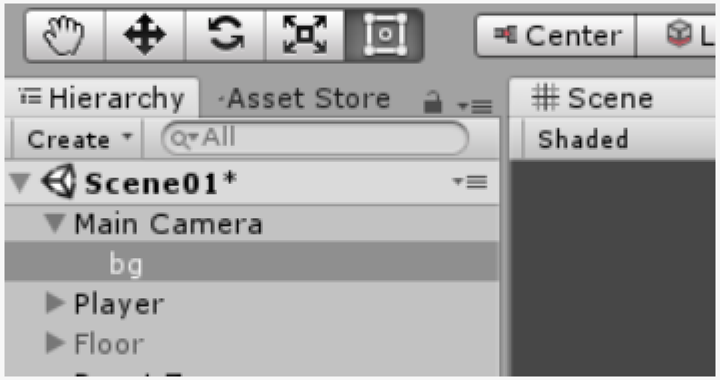
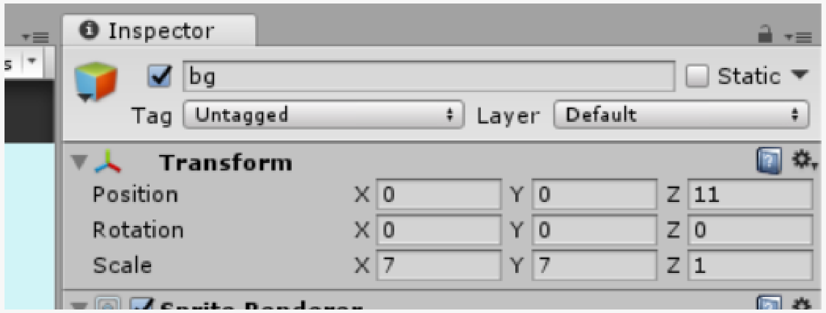

A (E:) › 02. BINUS › 2D Game Programming › platformer-art-complete-pack-0 › Base pack

Put some background

Grab bg from Platformer art pack, drop it in the main camera and change the transform




Inspector

bg ✓ Static
Tag Untagged Layer Default

Transform

	X	Y	Z
Position	0	0	11
Rotation	0	0	0
Scale	7	7	1

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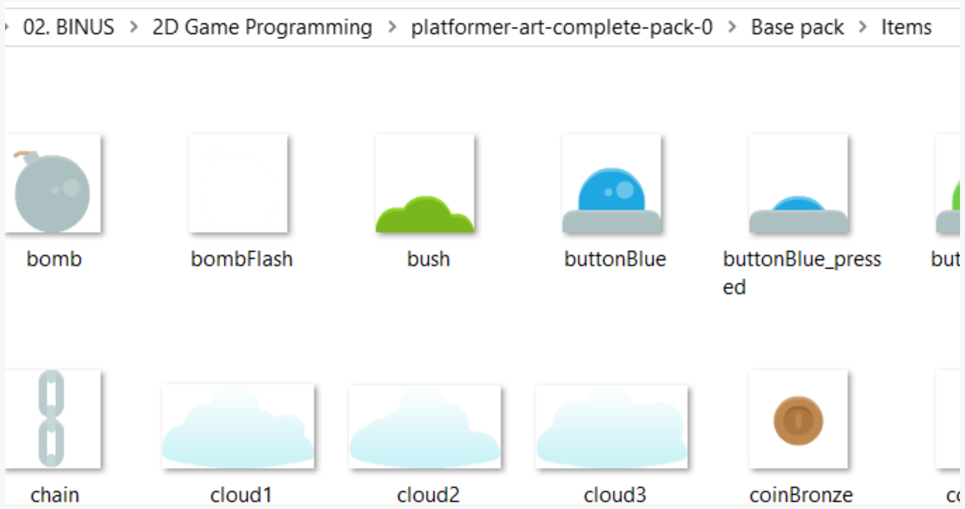
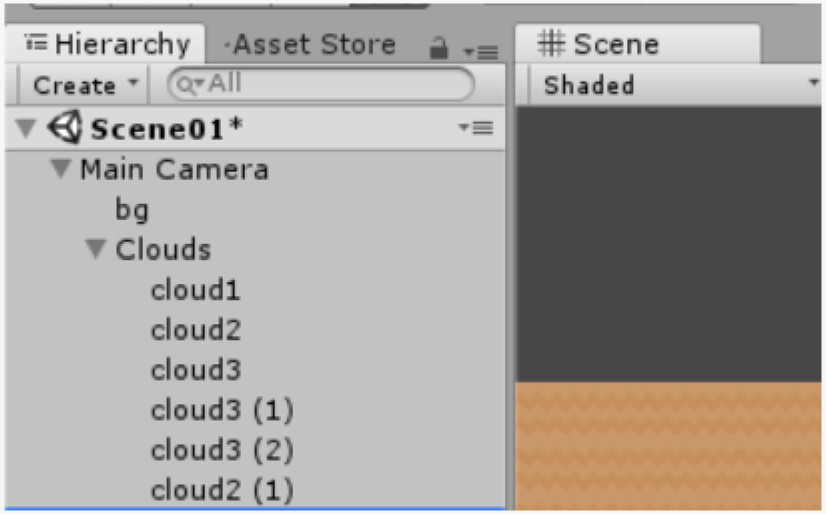
Add clouds


02. BINUS › 2D Game Programming › platformer-art-complete-pack-0 › Base pack › Items
bomb
bombFlash
bush
buttonBlue
buttonBlue_pressed
chain
cloud1
cloud2
cloud3
coinBronze

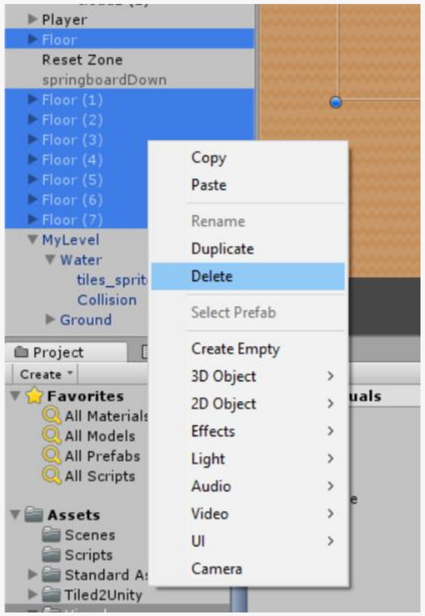
Grab cloud images from Platformer art pack, drop it in the main camera.



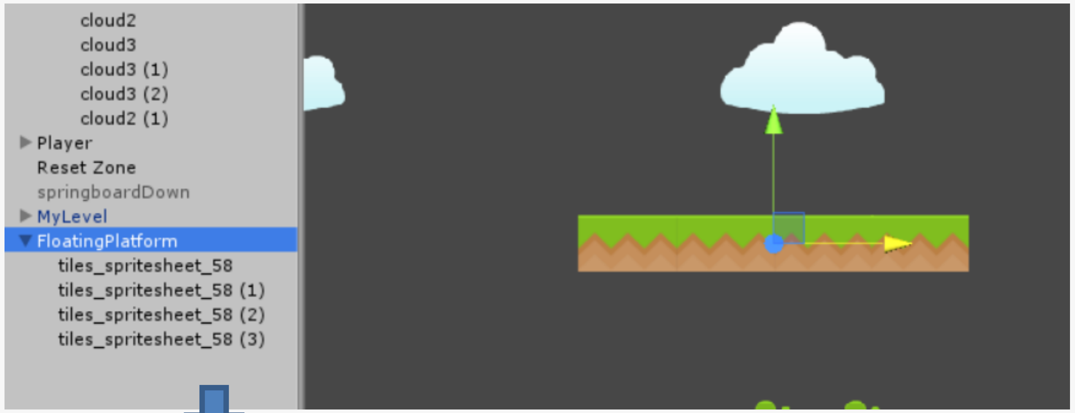
```
Scene01*
  Main Camera
    bg
    Clouds
      cloud1
      cloud2
      cloud3
      cloud3 (1)
      cloud3 (2)
      cloud2 (1)
```

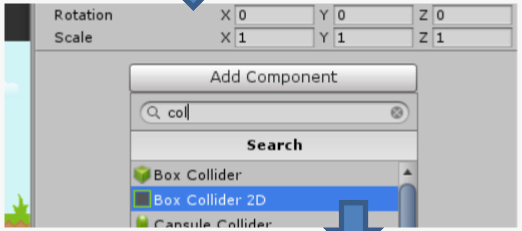
Add new platform

Remove previous Floors

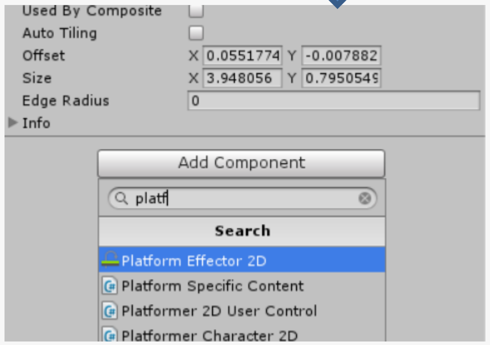


Create a new gameobject and name it FloatingPlatform. Adds tile_spritesheet_58 from Kenney's platformer art pack





Add only 1 collider to the Floating Platform



Add Platform Effector 2D to floating platform game object

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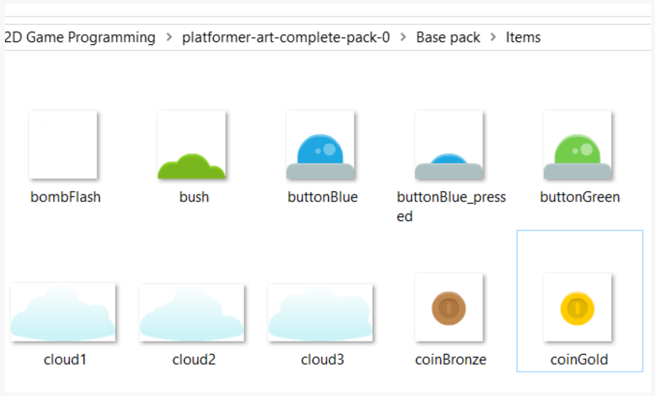
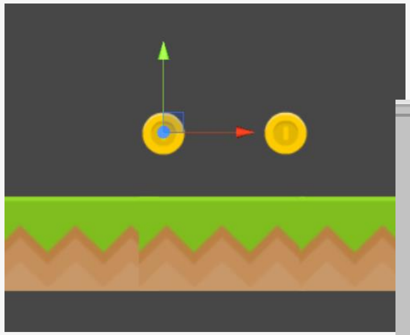
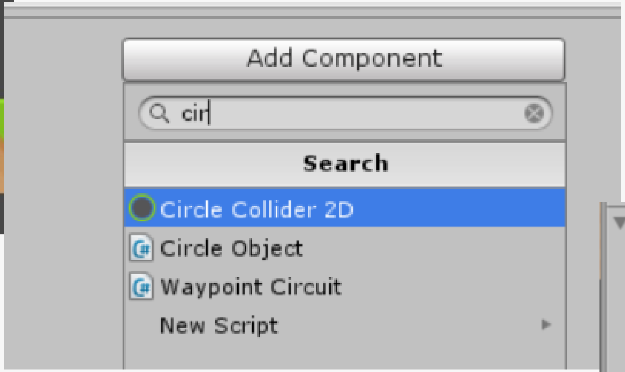
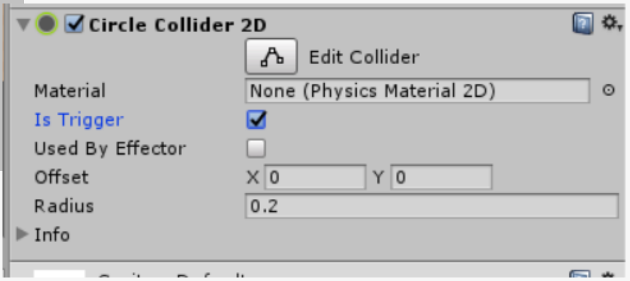
Add coins



Grab cloud images from Platformer art pack, drop it in the game scene. Add collider to the gameobject and turn on Is Trigger variable and name it Coin.





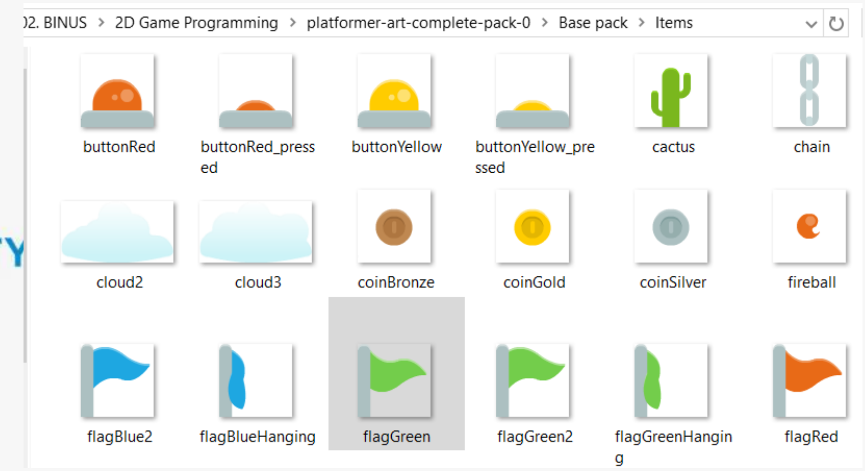


Circle Collider 2D

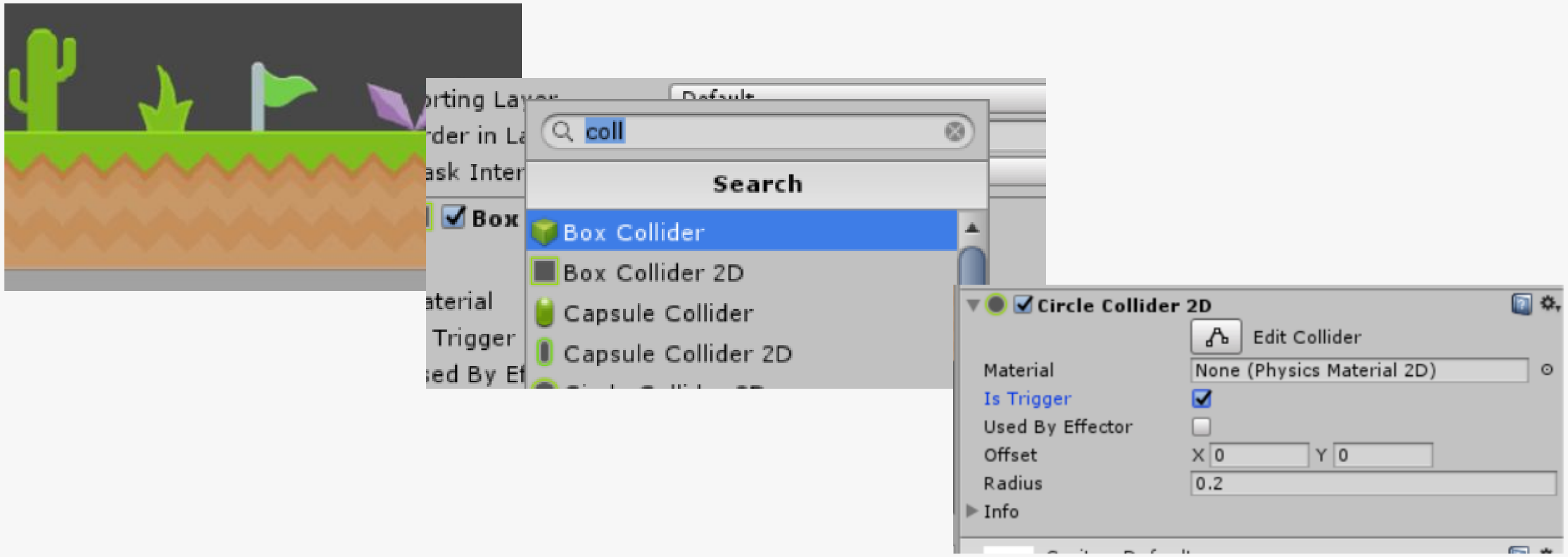
Edit Collider

Material	None (Physics Material 2D)
Is Trigger	✓
Used By Effector	☐
Offset	X 0 Y 0
Radius	0.2
Info	

Add exit



Grab flasgGreen image from Platformer art pack, drop it in the game scene. Add collider to the gameobject and turn on Is Trigger variable



Circle Collider 2D ✓

Material	None (Physics Material 2D)
Is Trigger	✓
Used By Effector	☐
Offset	X 0 Y 0
Radius	0.2
Info	

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Let’s add simple UI

To make our level a little more enjoyable, we should add some UI elements to indicate the player's health and score.

In order to add some UI elements, we need a canvas. A canvas is an area that all UI elements must be children of.

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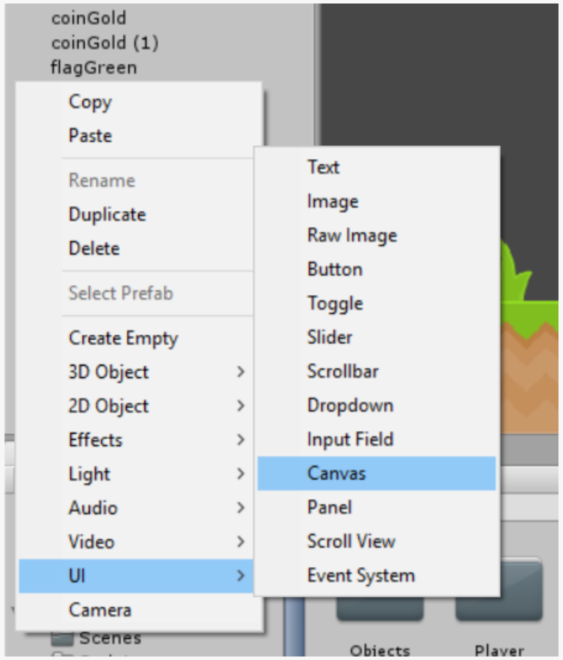
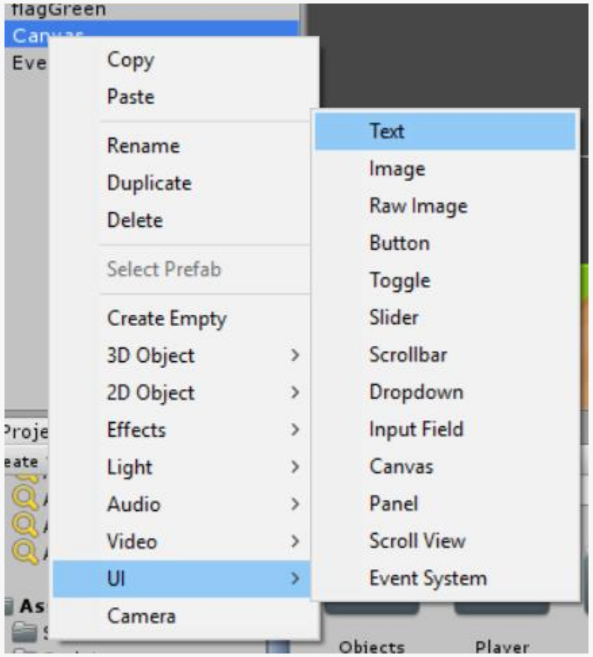
Add UI Canvas



Right click on the hierarchy and add Canvas



Right click on the canvas and add UI>Text

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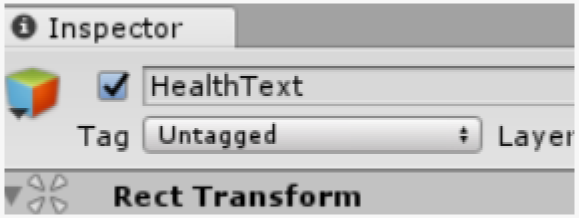
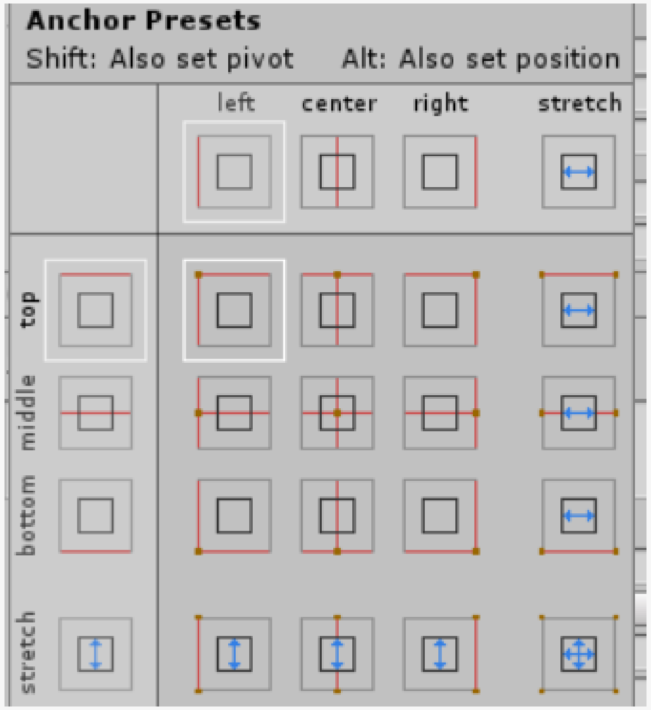
Edit the UI text



Rename the text game object into HealthText



Set the anchor into the top left

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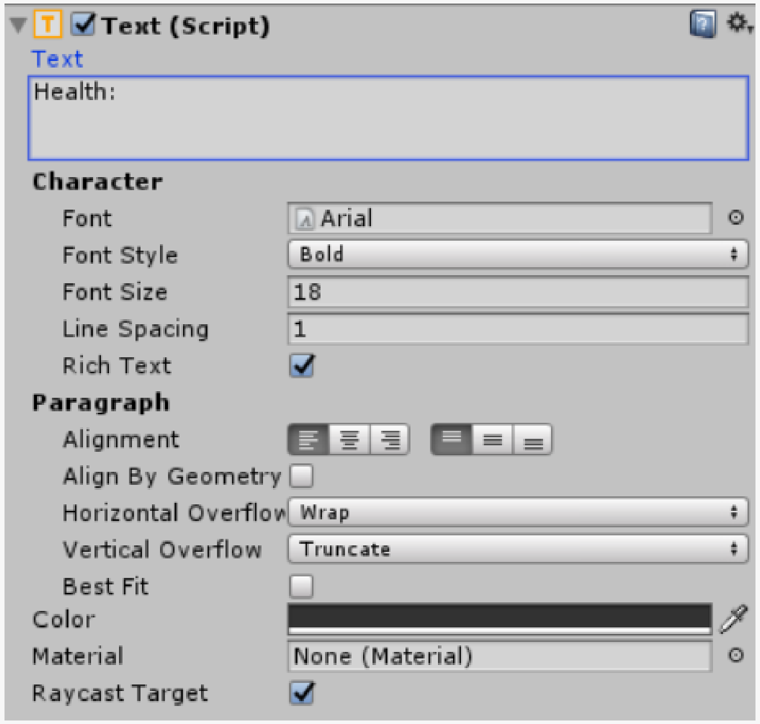
Edit the UI text

Set the Text component as follows



Text (Script)

Text
Health:

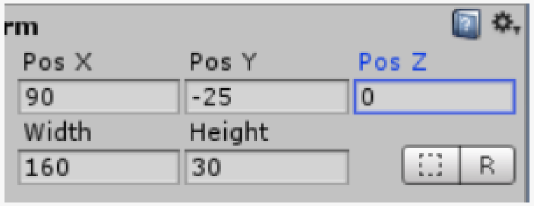
Character

Font	Arial
Font Style	Bold
Font Size	18
Line Spacing	1
Rich Text	✓

Paragraph

Alignment	
Align By Geometry	
Horizontal Overflow	Wrap
Vertical Overflow	Truncate
Best Fit	
Color	■
Material	None (Material)
Raycast Target	✓

Set the position as follows



rm

Pos X	Pos Y	Pos Z
90	-25	0
Width	Height	
160	30	

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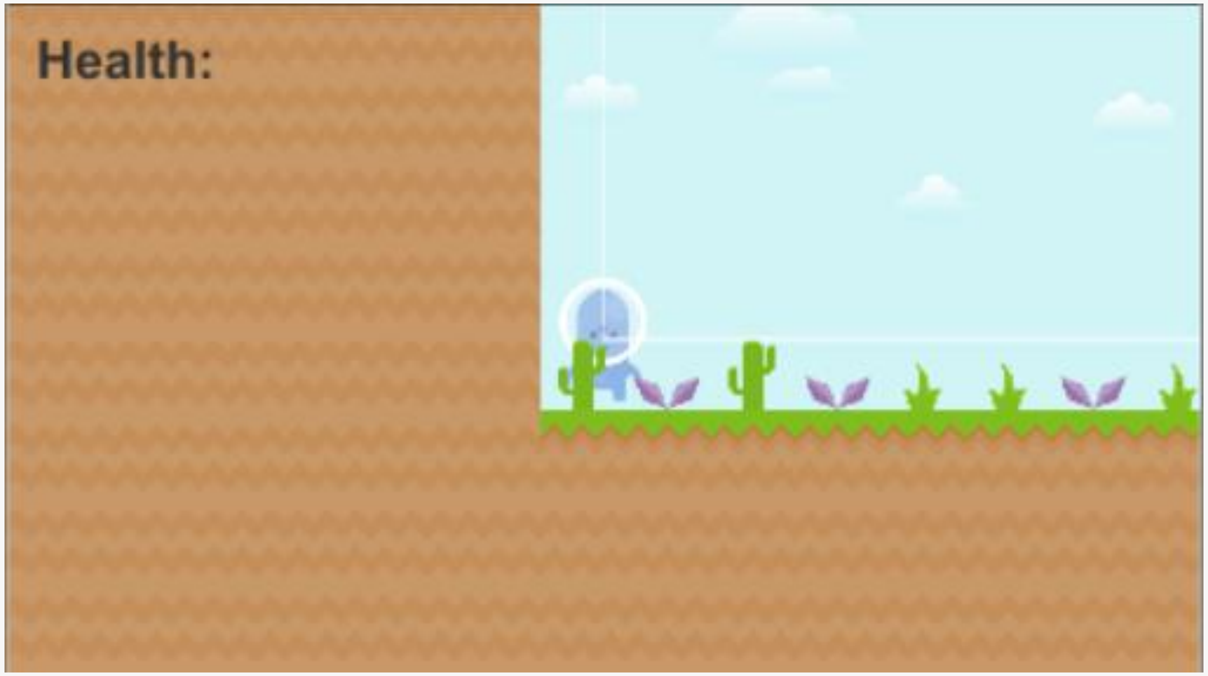
Where is the text?



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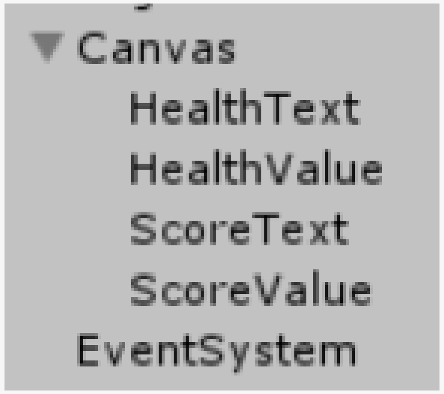
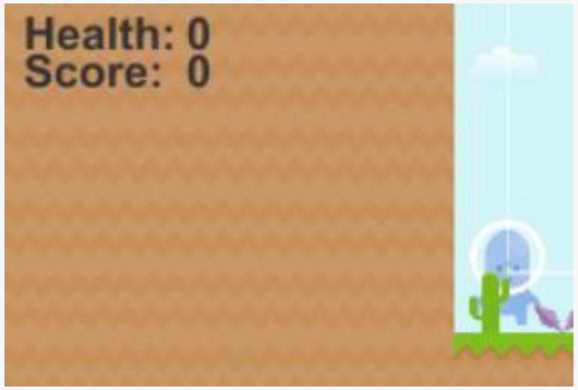
Add more UI Text


```
▼ Canvas
    HealthText
    HealthValue
    ScoreText
    ScoreValue
  EventSystem
```

Add more three more game object HealthValue, ScoreText and ScoreValue


```
Health: 0
Score:  0
```

Arrange the text similar to above.

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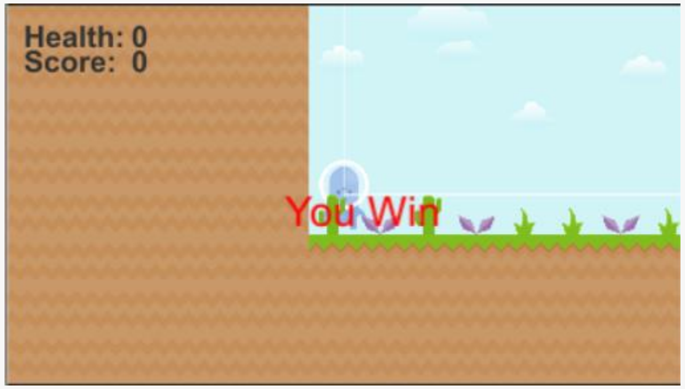
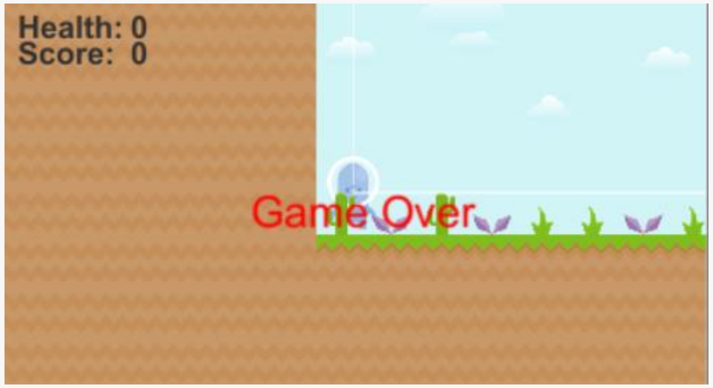
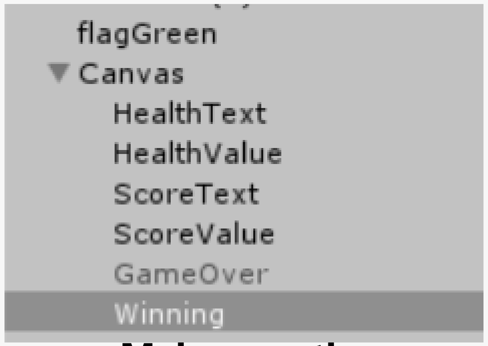
Add winning and losing title







Make sure the gameobject is turned off

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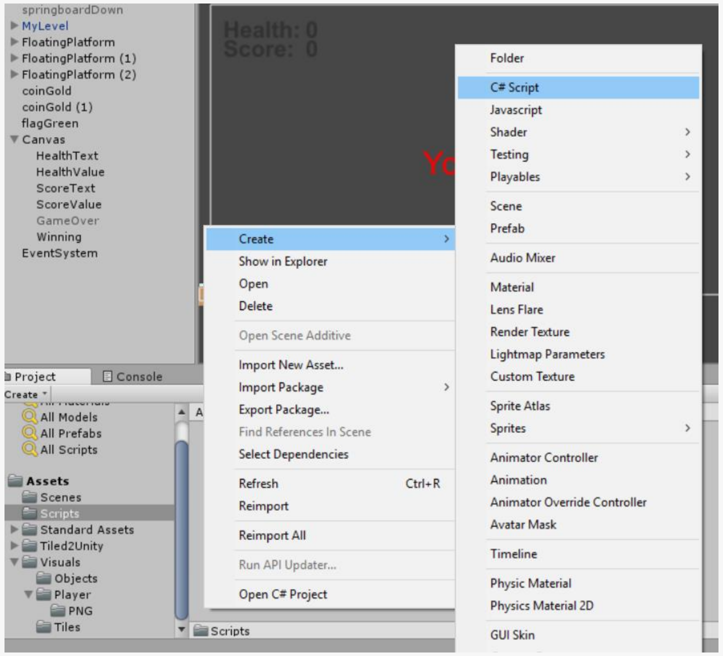
Create GameHandler script

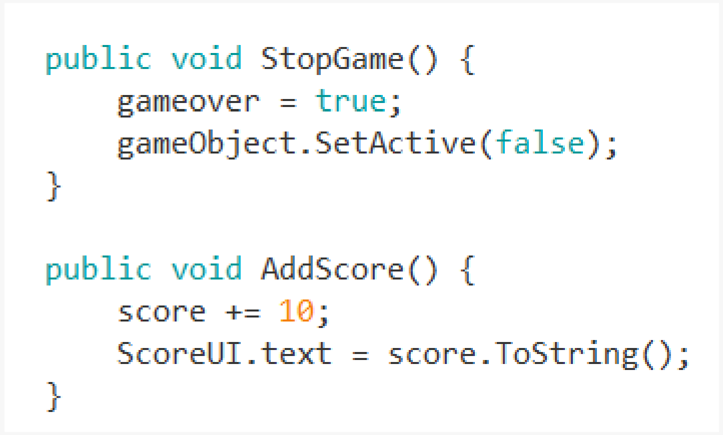


Add a new script named GameHandler on the Scripts folder

```
public class GameHandler : MonoBehaviour {

    //Variable Value
    public float health = 2;
    public float score = 0;

    //Check if win
    public bool gameover = false;

    //Reference our UI elements
    public UnityEngine.UI.Text healthUI;
    public UnityEngine.UI.Text ScoreUI;
    public GameObject gameOverUI;
    public GameObject youWinUI;
```

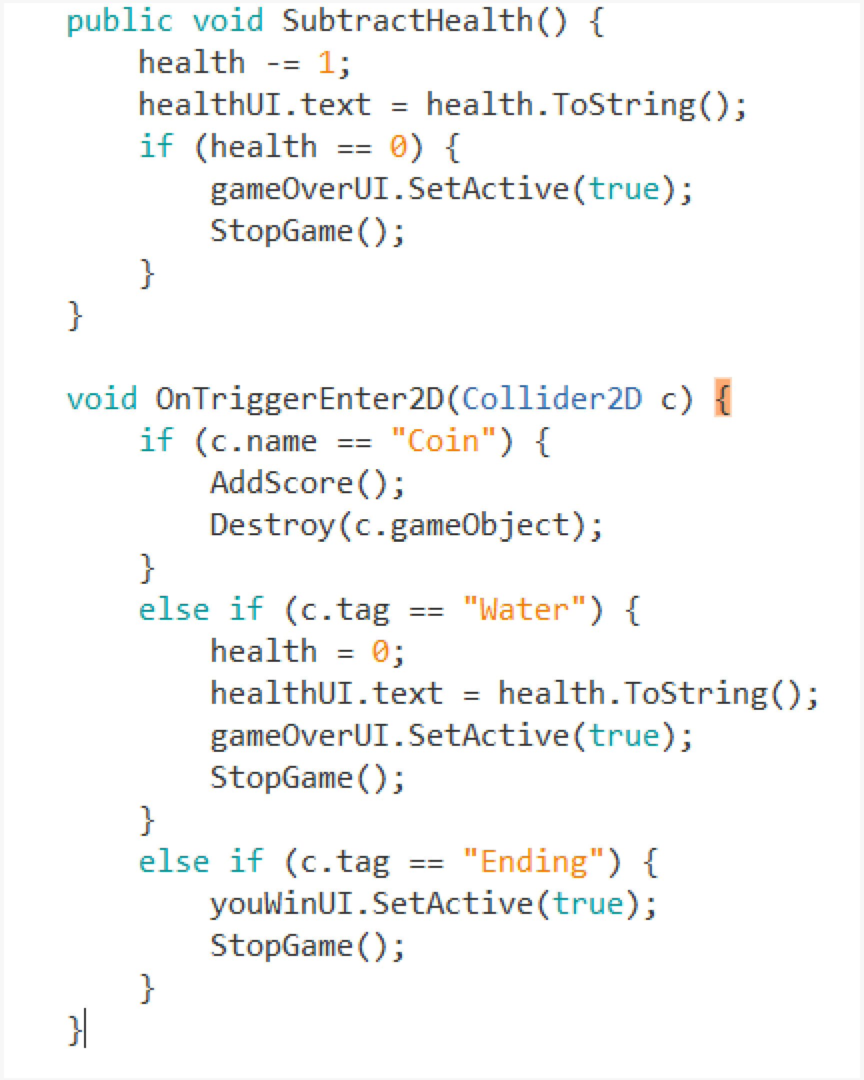
Add a new script named GameHandler on the Scripts folder

Create GameHandler script (2)



```
public void StopGame() {
    gameover = true;
    gameObject.SetActive(false);
}

public void AddScore() {
    score += 10;
    ScoreUI.text = score.ToString();
}
```

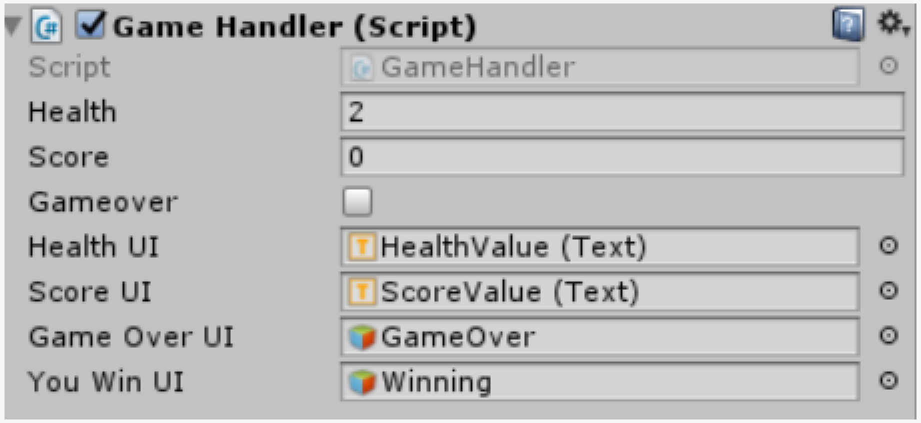
Add function that will show gameover and update score.



```
public void SubtractHealth() {
    health -= 1;
    healthUI.text = health.ToString();
    if (health == 0) {
        gameOverUI.SetActive(true);
        StopGame();
    }
}

void OnTriggerEnter2D(Collider2D c) {
    if (c.name == "Coin") {
        AddScore();
        Destroy(c.gameObject);
    }
    else if (c.tag == "Water") {
        health = 0;
        healthUI.text = health.ToString();
        gameOverUI.SetActive(true);
        StopGame();
    }
    else if (c.tag == "Ending") {
        youWinUI.SetActive(true);
        StopGame();
    }
}
```

Add a new script named GameHandler on the Scripts folder

Update the gamehandler variable


Game Handler (Script)

Script	GameHandler
Health	2
Score	0
Gameover	☐
Health UI	HealthValue (Text)
Score UI	ScoreValue (Text)
Game Over UI	GameOver
You Win UI	Winning

Highlight the player object and set the variable based on the corresponding game object.

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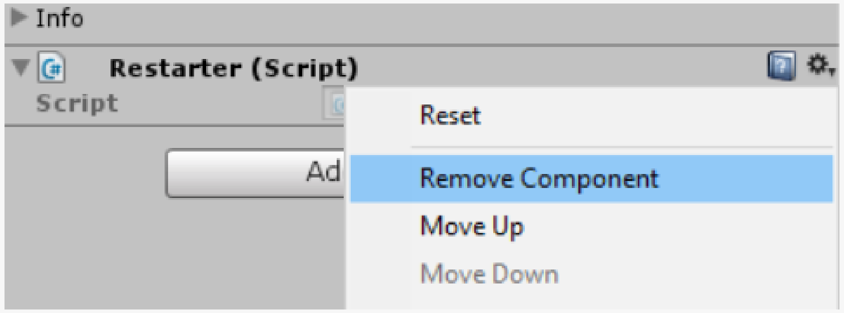
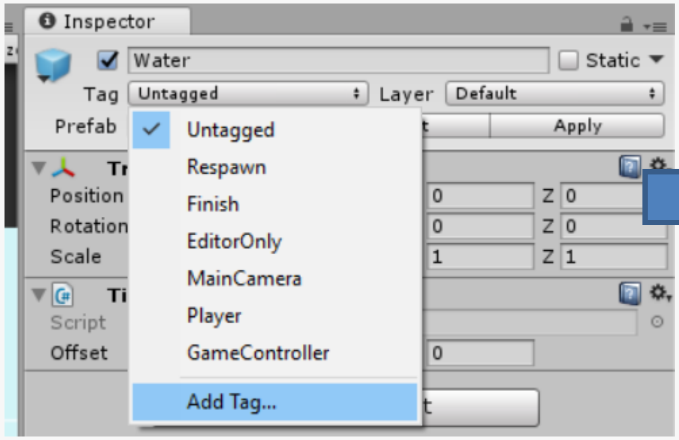
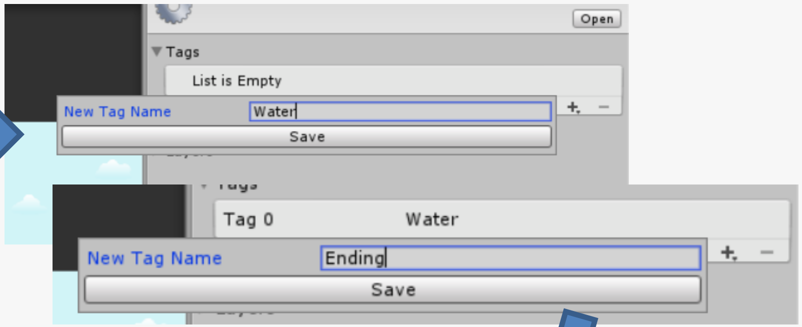


Go to the water gameobject, highlight the collision game object and remove the Restarter script.

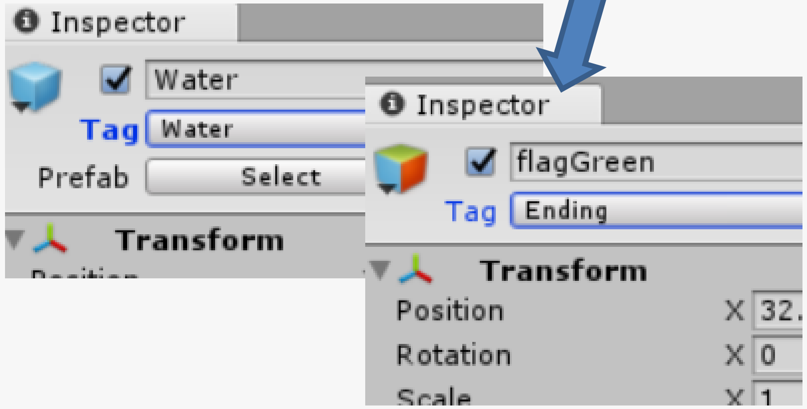
Add new tag



Add new tag...



Add water and ending



Apply Water tag to the Water>Collision gameobject and Ending tag for the flag

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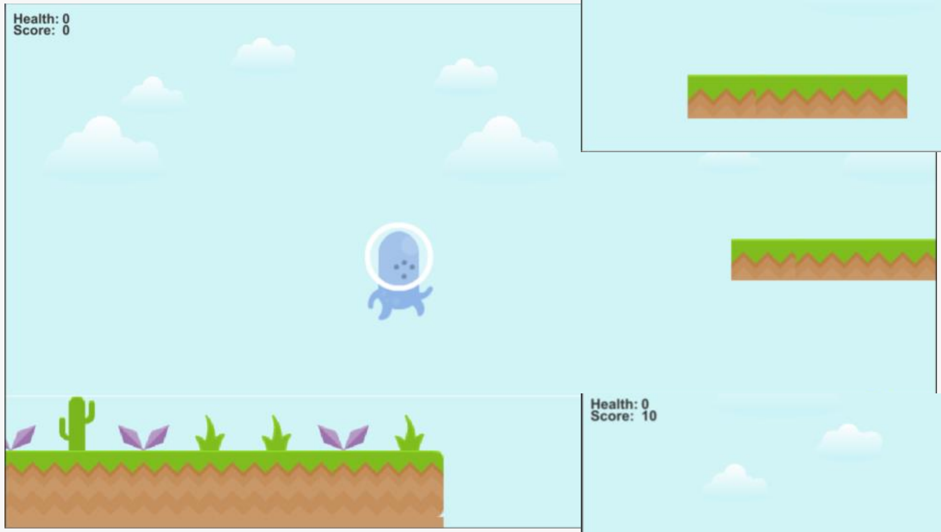
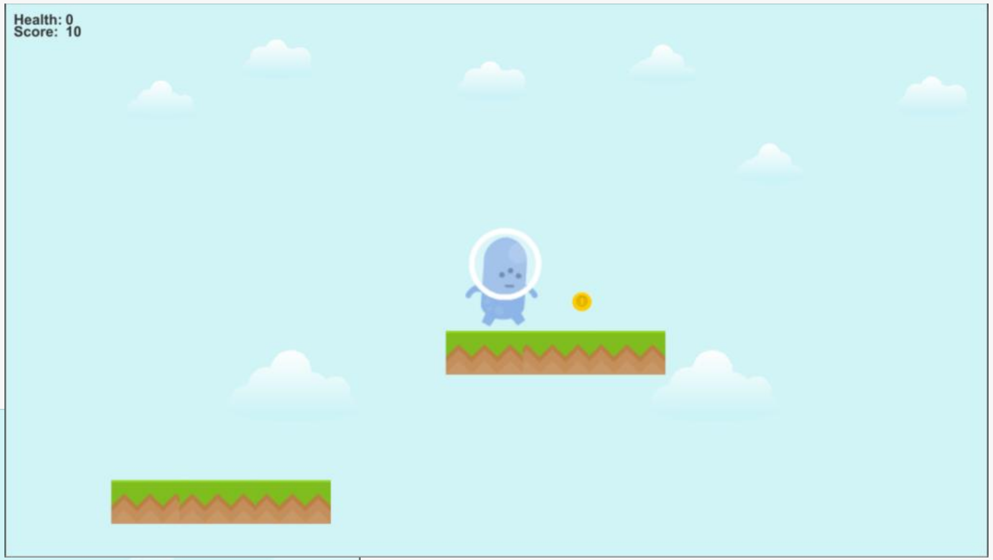
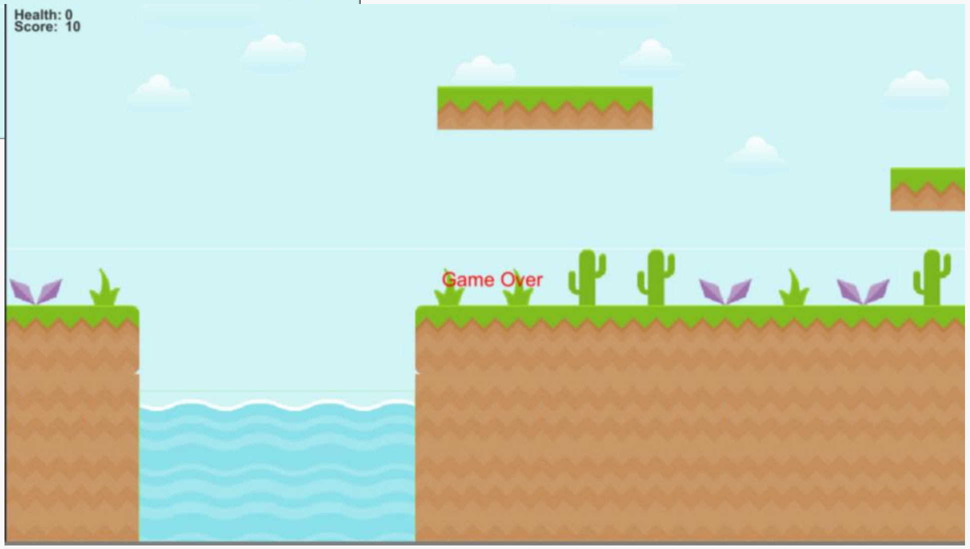
TRY IT OUT







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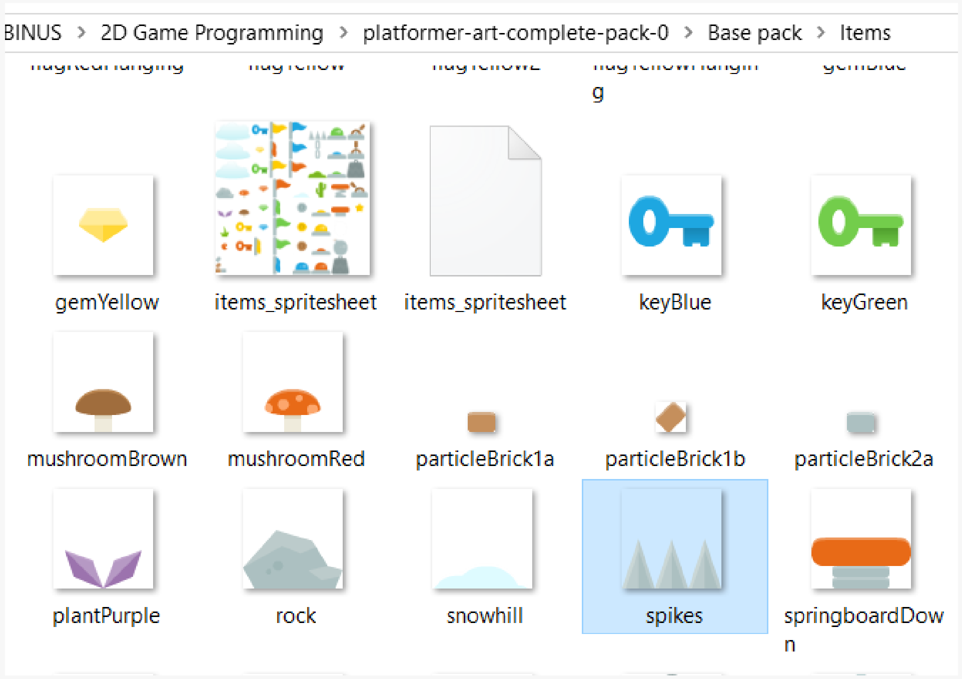
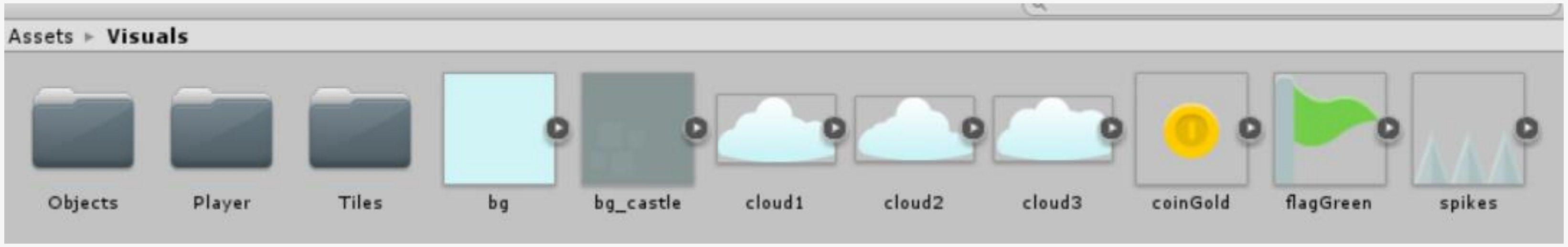
Add Obstacles



Grab the spikes and put it in the project



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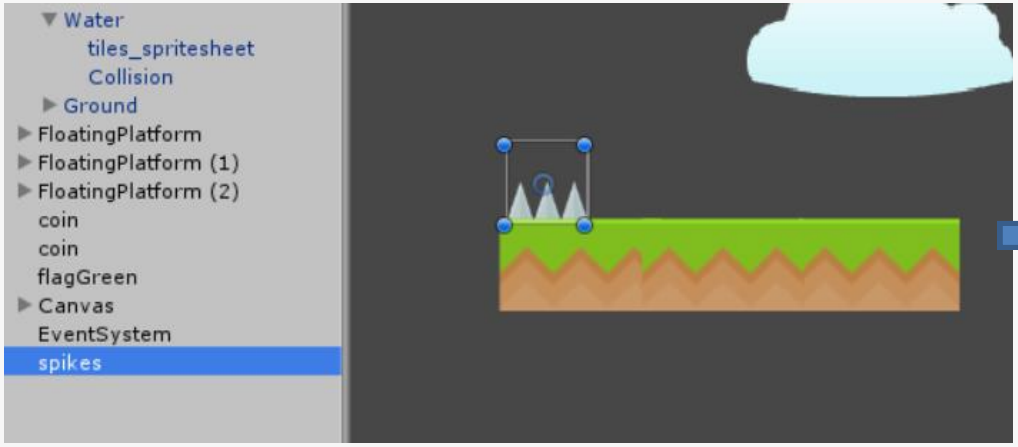
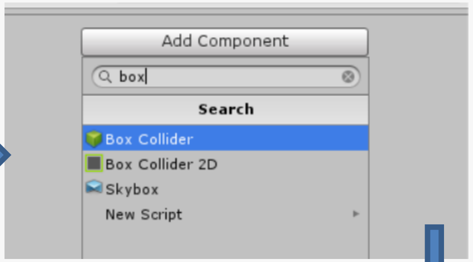
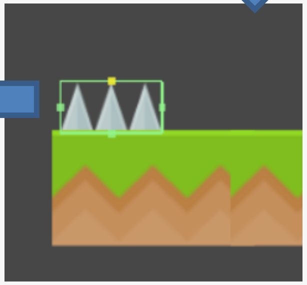
Add spikes to an area



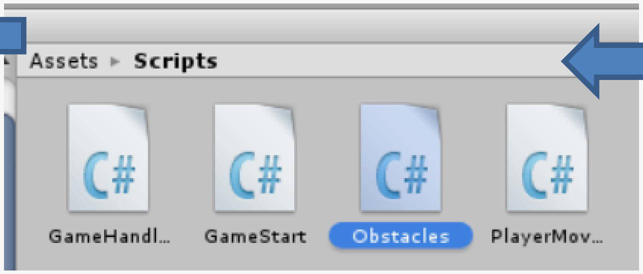
Add spikes to the game



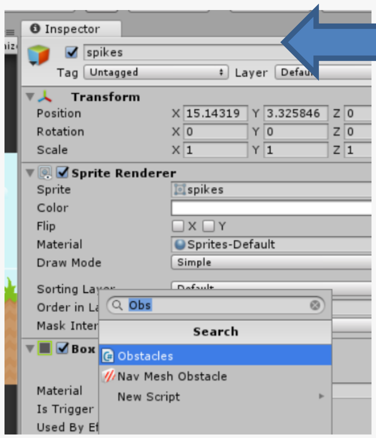
Add box collider 2



Resize the collider accordingly

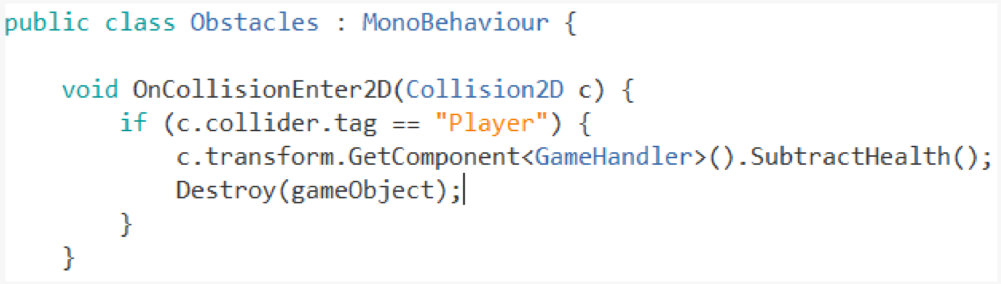


Create Obstacles script on the scripts folder



Add the script to the object

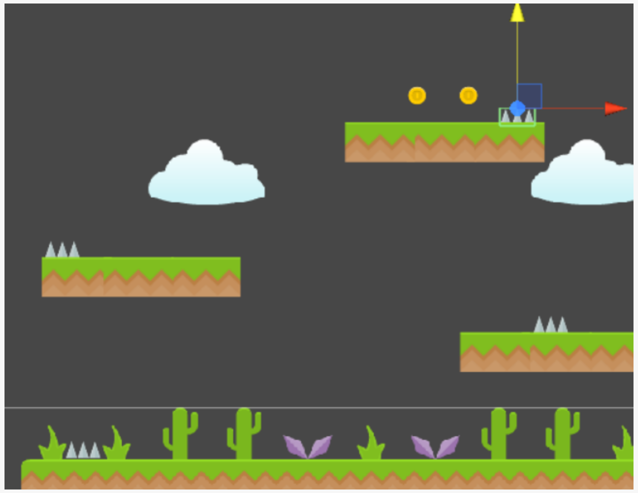
Update the script and the level



```
public class Obstacles : MonoBehaviour {

    void OnCollisionEnter2D(Collision2D c) {
        if (c.collider.tag == "Player") {
            c.transform.GetComponent<GameHandler>().SubtractHealth();
            Destroy(gameObject);
        }
    }
```

Add logic to the script



Add more spikes

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Your Assignment

- Add more level…
- Add more stuff…
- You know all the basic… Improve it to make your own!

References

Freeman, J. (2015). Unity’s New 2D Workflow

Vidyasagar. (2014. Unity and C#: Game Loop.CodeProject

Pereira, V. (2014). Learning Unity 2D Game Development by Example. Packt Publishing, Inc. San Francisco. ISBN: 9781783559046