
Diseño de Sistemas Interactivos

Curso 2023 - 2024

Profesor: José Manuel Velasco

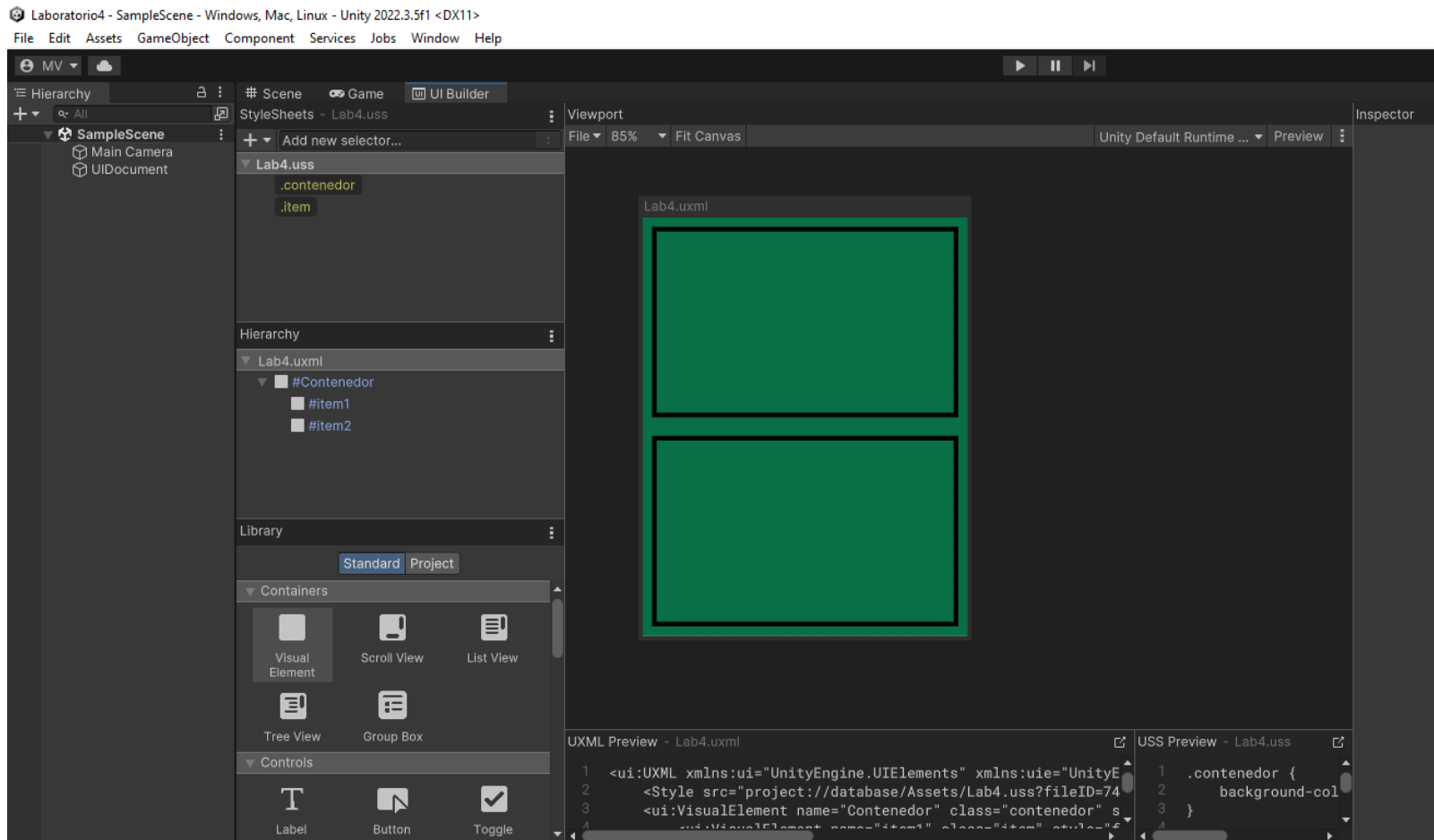
Despacho 309, 3ª planta. Facultad de Informática.

Laboratorio 4: Templates y Custom Controls in UI Toolkit.

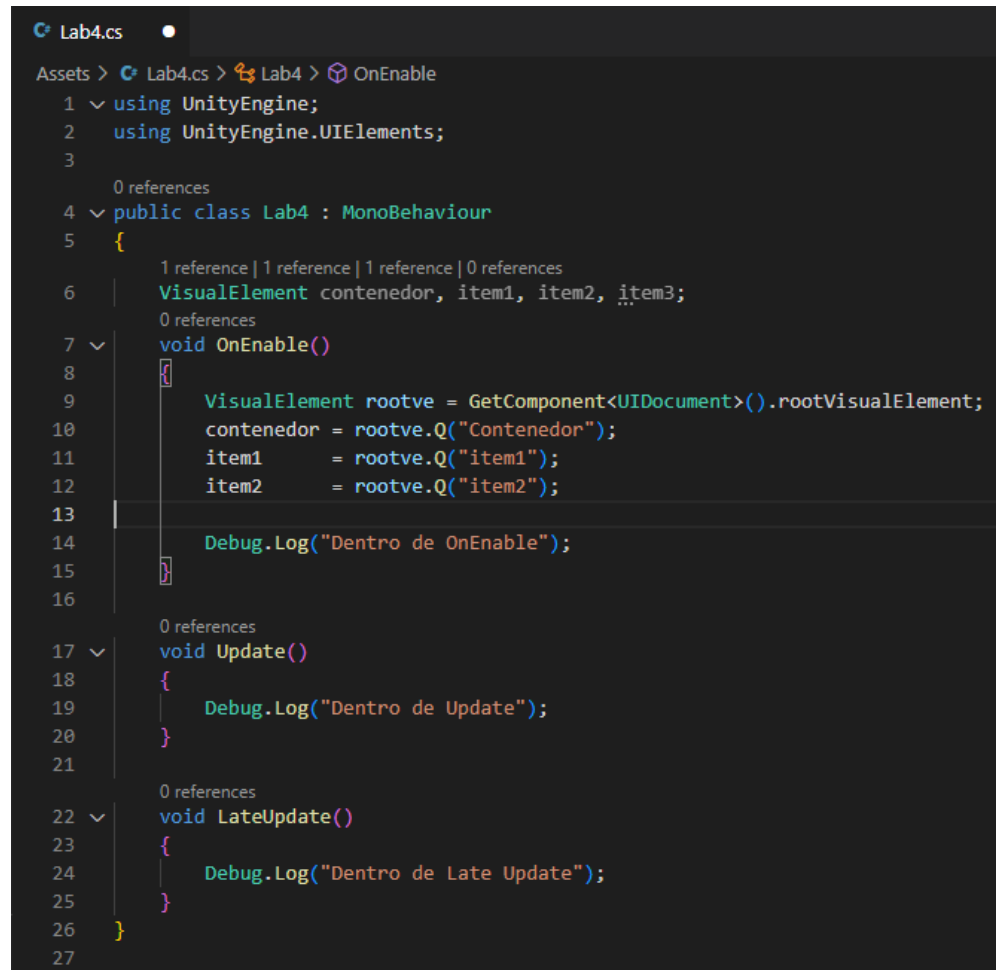
Índice

- **Debugging**
- Texto
 - Texto enriquecido
 - Gradientes de color
- Pseudo Classes
- Templates
- Custom Controls

Debugging → Visual Studio Code

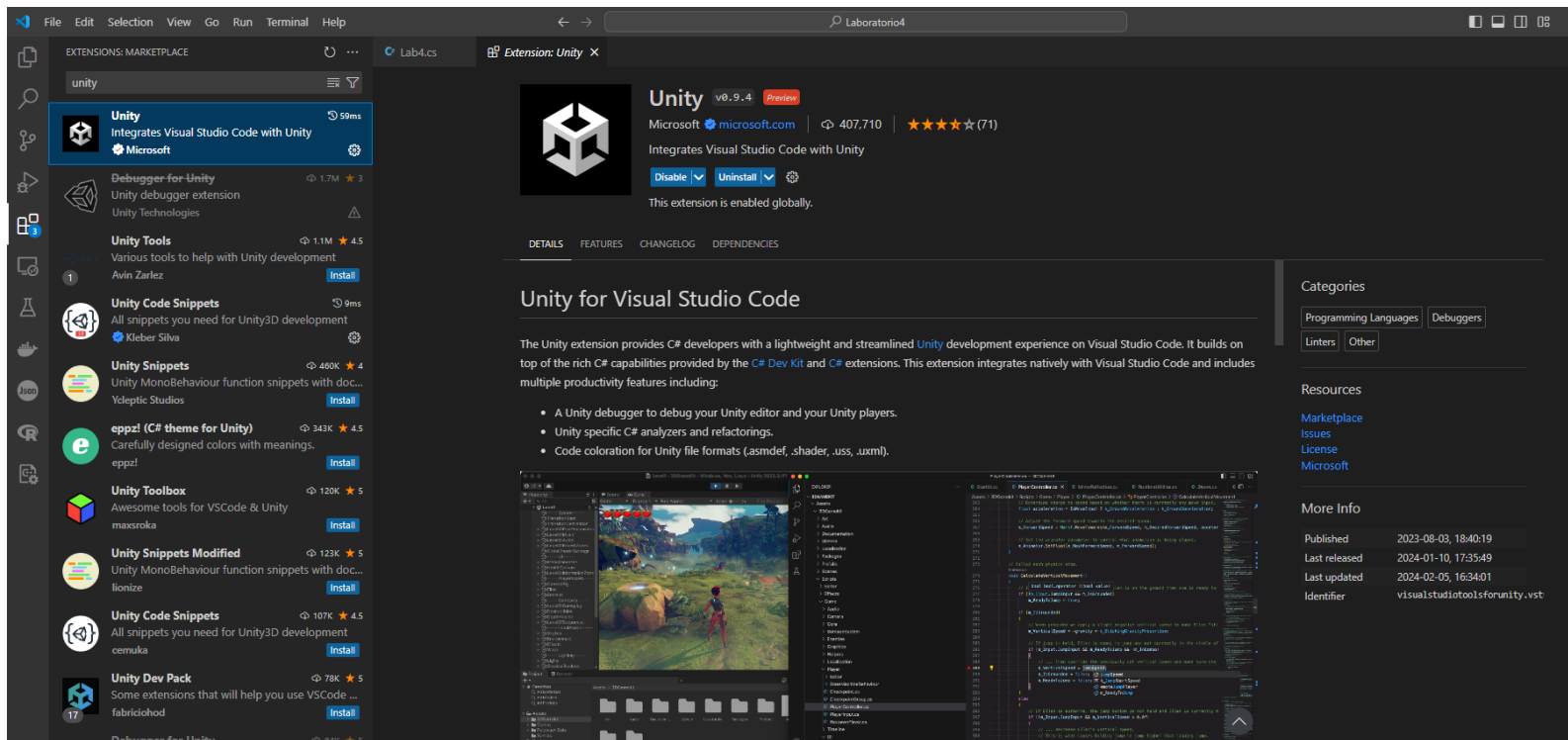


Debugging → Visual Studio Code

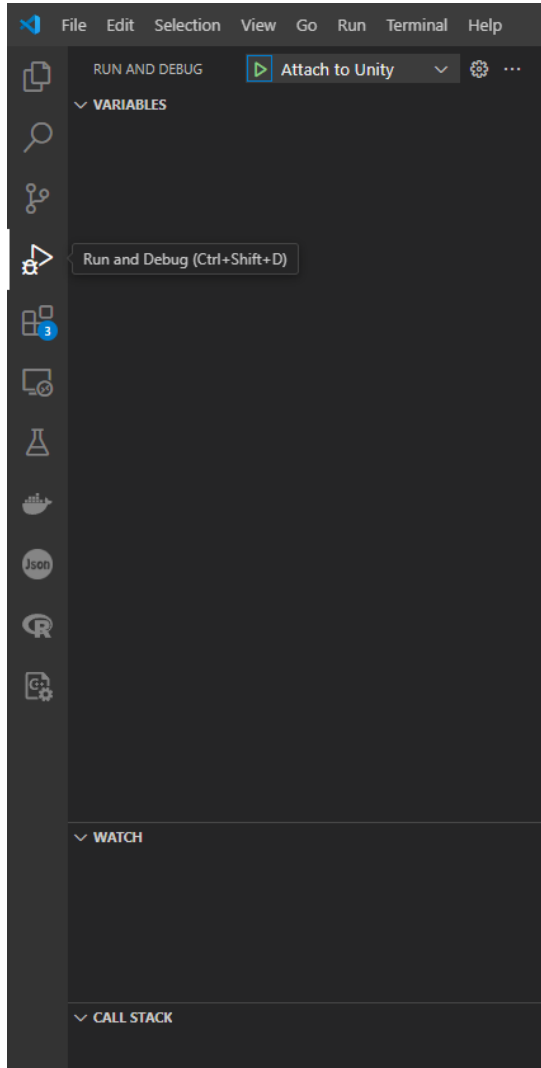


```
Assets > Lab4.cs > Lab4 > OnEnable
1  using UnityEngine;
2  using UnityEngine.UIElements;
3
4  public class Lab4 : MonoBehaviour
5  {
6      VisualElement contenedor, item1, item2, item3;
7      void OnEnable()
8      {
9          VisualElement rootve = GetComponent<UIDocument>().rootVisualElement;
10         contenedor = rootve.Q("Contenedor");
11         item1 = rootve.Q("item1");
12         item2 = rootve.Q("item2");
13
14         Debug.Log("Dentro de OnEnable");
15     }
16
17     void Update()
18     {
19         Debug.Log("Dentro de Update");
20     }
21
22     void LateUpdate()
23     {
24         Debug.Log("Dentro de Late Update");
25     }
26 }
27
```

Debugging



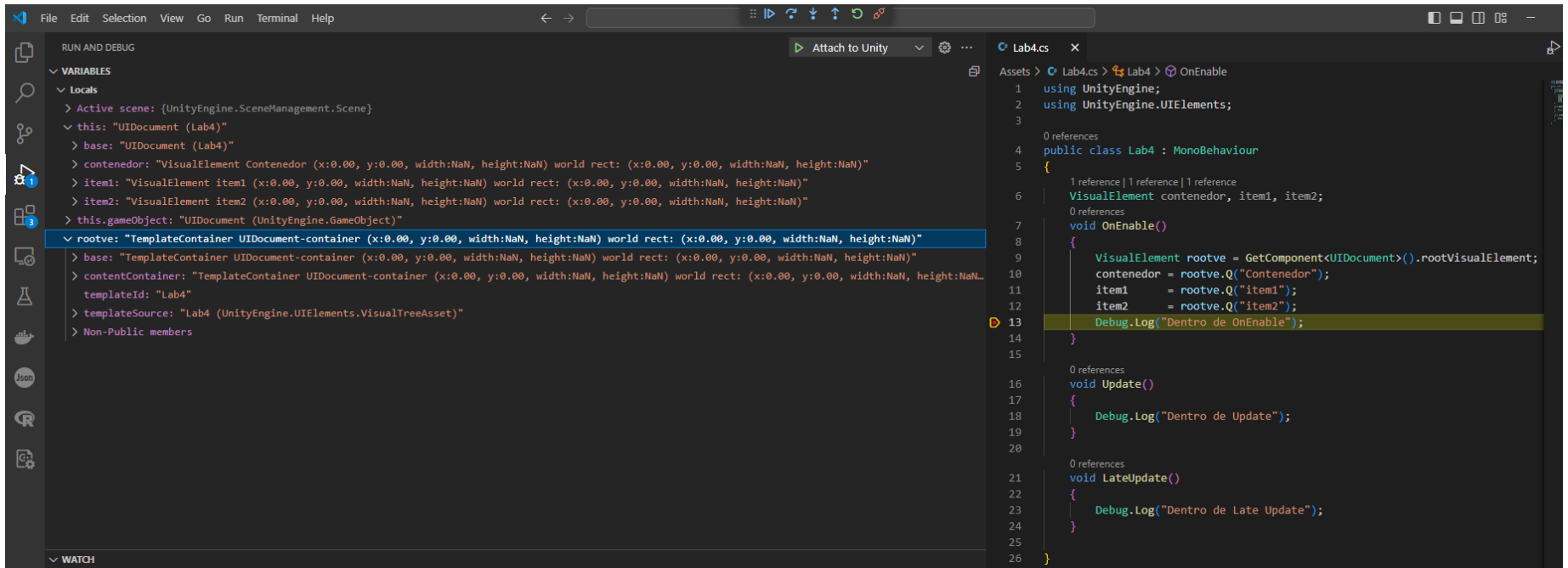
Debugging



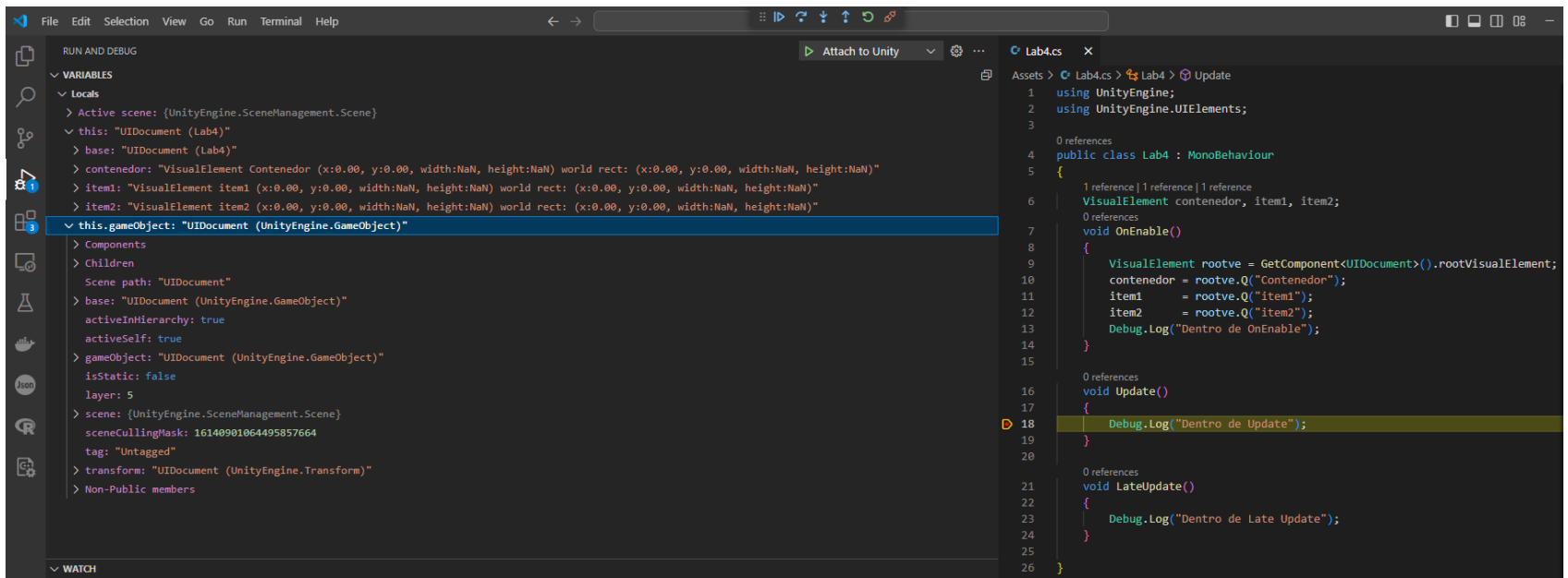
Hold on (busy for 35s)...

Application.EnterPlayMode
Waiting for Unity's code to finish executing.

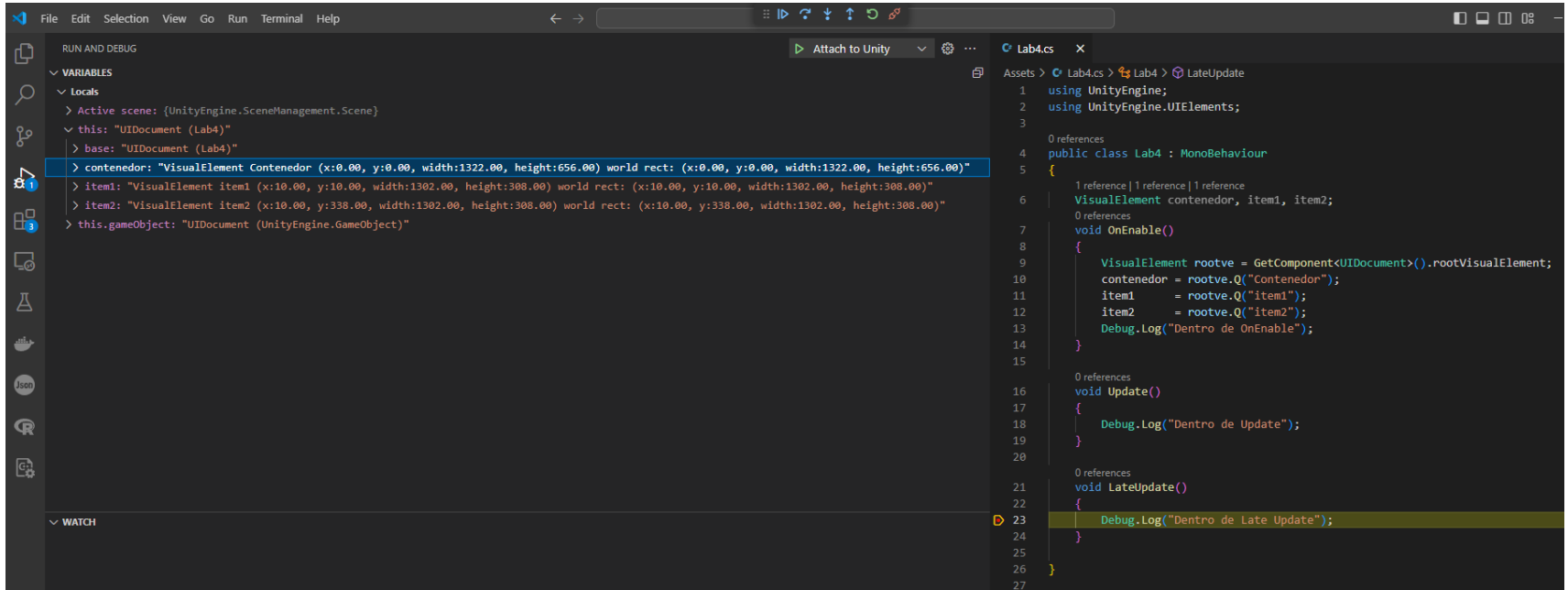
OnEnable



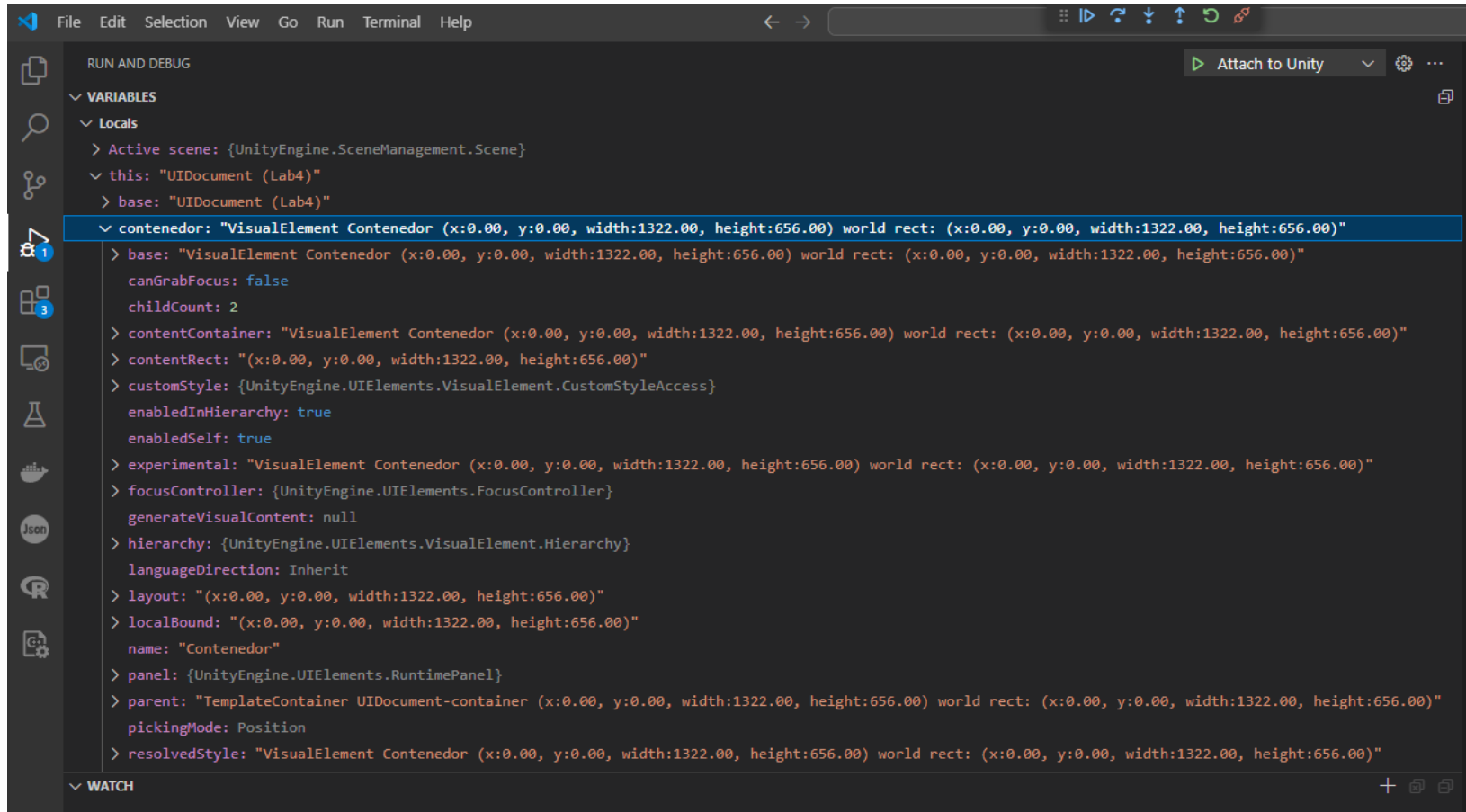
Update



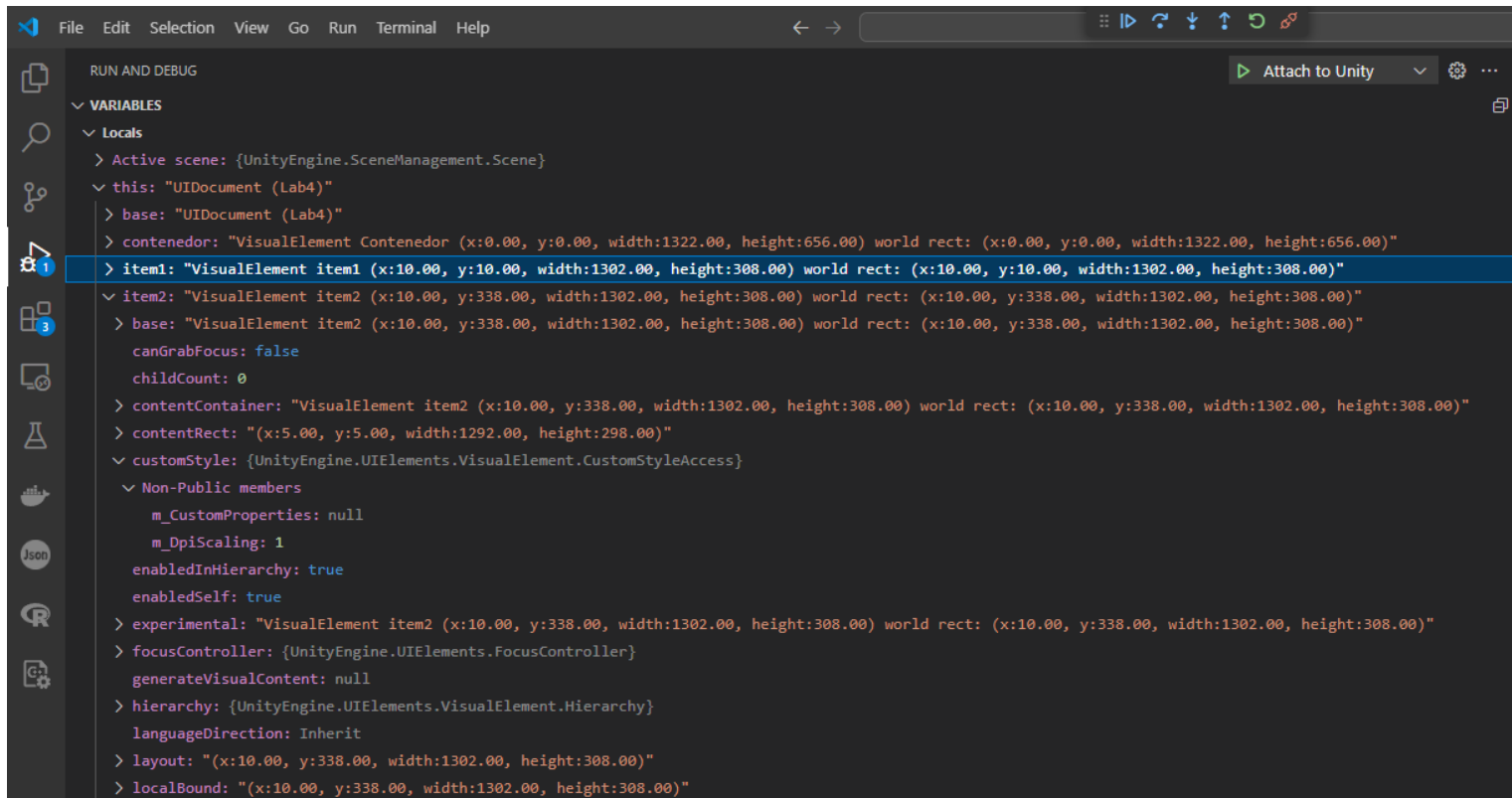
LateUpdate



LateUpdate

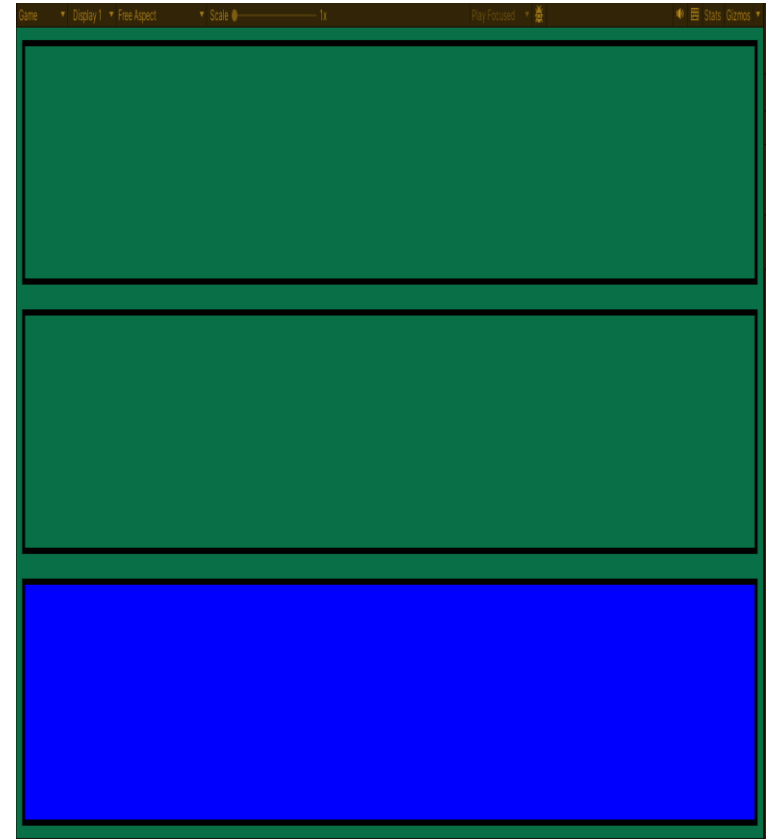


LateUpdate

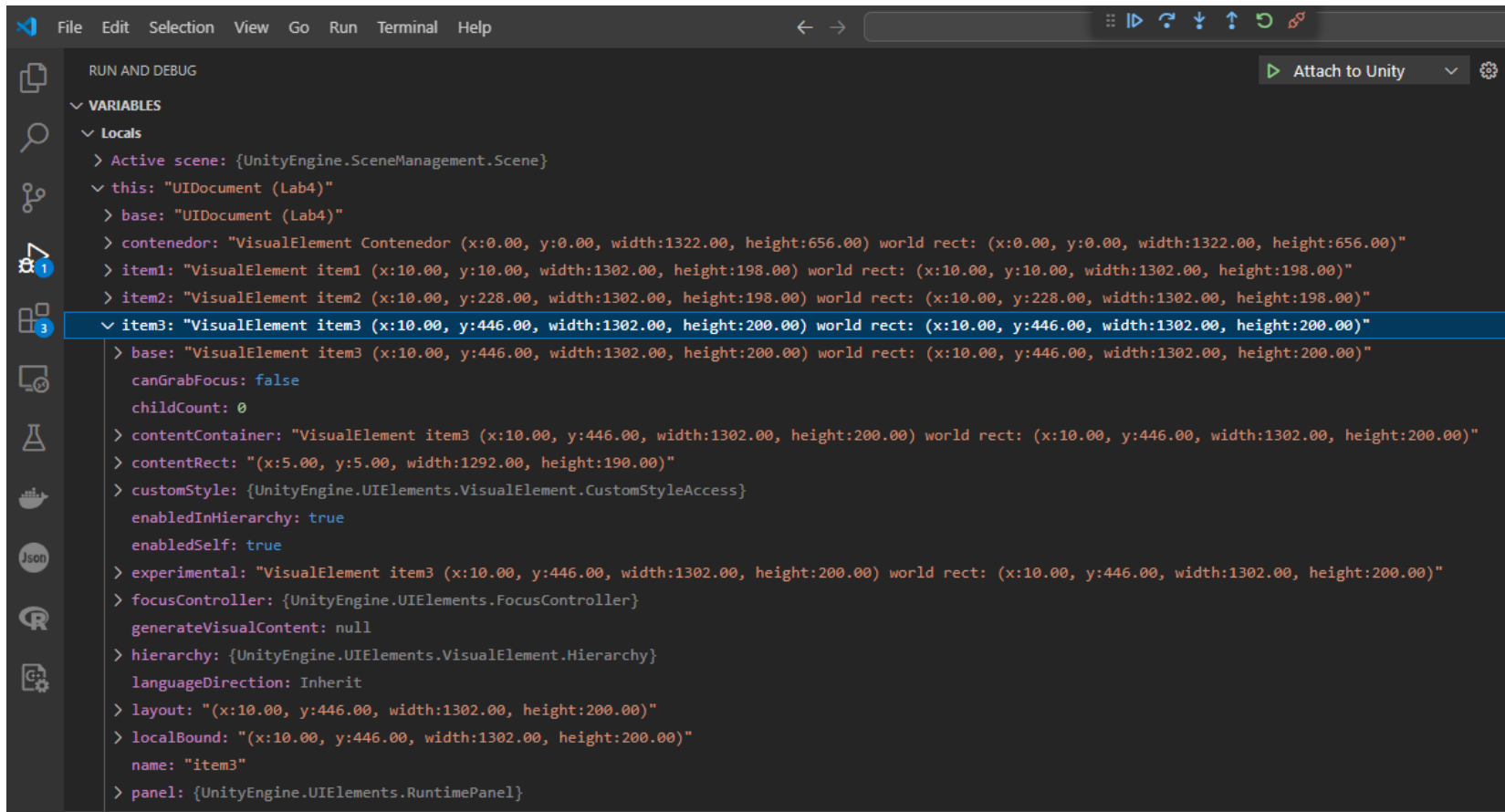


Item3

```
Lab4.cs
Assets > Lab4.cs > ...
1  using UnityEngine;
2  using UnityEngine.UIElements;
3
4  0 references
5  public class Lab4 : MonoBehaviour
6  {
7      2 references | 1 reference | 1 reference | 6 references
8      VisualElement contenedor, item1, item2, item3;
9      0 references
10     void OnEnable()
11     {
12         VisualElement rootve = GetComponent<UIDocument>().rootVisualElement;
13         contenedor = rootve.Q("Contenedor");
14         item1 = rootve.Q("item1");
15         item2 = rootve.Q("item2");
16
17         item3 = new VisualElement();
18         item3.name = "item3";
19         item3.AddToClassList("item");
20         item3.style.height = 200;
21         item3.style.backgroundColor = Color.blue;
22
23         contenedor.Add(item3);
24
25         Debug.Log("Dentro de OnEnable");
26     }
27
28     0 references
29     void Update()
30     {
31         Debug.Log("Dentro de Update");
32     }
33
34     0 references
35     void LateUpdate()
36     {
37         Debug.Log("Dentro de Late Update");
38     }
39 }
```



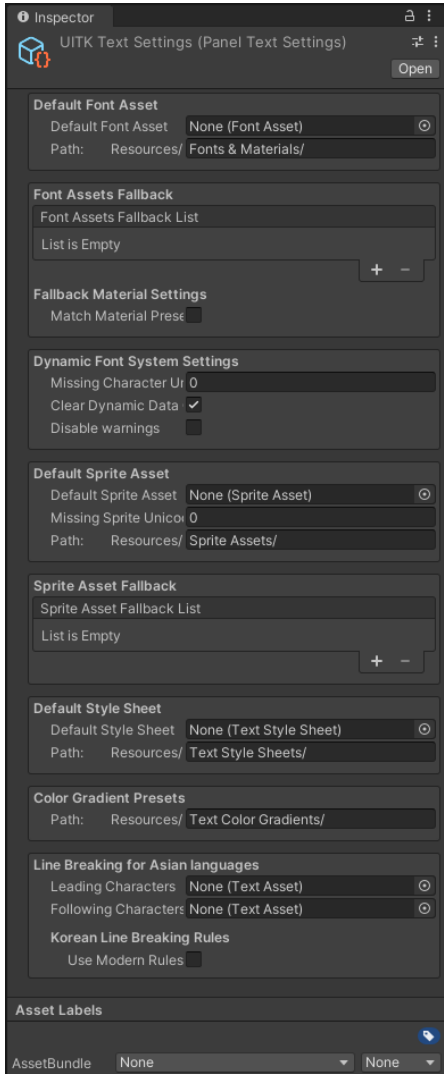
Item3



```
File Edit Selection View Go Run Terminal Help
RUN AND DEBUG
Attach to Unity
VARIABLES
Locals
Active scene: {UnityEngine.SceneManagement.Scene}
this: "UIDocument (Lab4)"
base: "UIDocument (Lab4)"
contenedor: "VisualElement Contenedor (x:0.00, y:0.00, width:1322.00, height:656.00) world rect: (x:0.00, y:0.00, width:1322.00, height:656.00)"
item1: "VisualElement item1 (x:10.00, y:10.00, width:1302.00, height:198.00) world rect: (x:10.00, y:10.00, width:1302.00, height:198.00)"
item2: "VisualElement item2 (x:10.00, y:228.00, width:1302.00, height:198.00) world rect: (x:10.00, y:228.00, width:1302.00, height:198.00)"
item3: "VisualElement item3 (x:10.00, y:446.00, width:1302.00, height:200.00) world rect: (x:10.00, y:446.00, width:1302.00, height:200.00)"
base: "VisualElement item3 (x:10.00, y:446.00, width:1302.00, height:200.00) world rect: (x:10.00, y:446.00, width:1302.00, height:200.00)"
  canGrabFocus: false
  childCount: 0
  contentContainer: "VisualElement item3 (x:10.00, y:446.00, width:1302.00, height:200.00) world rect: (x:10.00, y:446.00, width:1302.00, height:200.00)"
  contentRect: "(x:5.00, y:5.00, width:1292.00, height:190.00)"
  customStyle: {UnityEngine.UIElements.VisualElement.CustomStyleAccess}
    enabledInHierarchy: true
    enabledSelf: true
  experimental: "VisualElement item3 (x:10.00, y:446.00, width:1302.00, height:200.00) world rect: (x:10.00, y:446.00, width:1302.00, height:200.00)"
  focusController: {UnityEngine.UIElements.FocusController}
  generateVisualContent: null
  hierarchy: {UnityEngine.UIElements.VisualElement.Hierarchy}
    languageDirection: Inherit
  layout: "(x:10.00, y:446.00, width:1302.00, height:200.00)"
  localBound: "(x:10.00, y:446.00, width:1302.00, height:200.00)"
    name: "item3"
  panel: {UnityEngine.UIElements.RuntimePanel}
```

Índice

- Debugging
- **Texto**
 - **Texto enriquecido**
 - **Gradientes de color**
- Pseudo Classes
- Templates
- Custom Controls



Texto enriquecido

Unity Documentation

Manual Scripting API

Search manual...

unity.com

Version: 2022.3

Language: English

Get started with or Toolkit

UI Builder

Structure UI

Style UI

UI Toolkit Debugger

Control behavior with events

UI Renderer

Support for Editor UI

Support for runtime UI

Work with text

Get started with text

Style text with USS

Style text with rich text tags

Supported rich text tags

Font assets

Style sheets

Include sprites in text

Color gradients

Panel Text Settings assets

Fallback font

Examples

Migration guides

Unity UI

Immediate Mode GUI (IMGUI)

Unity Services

XR

Unity's Asset Store

Platform development

Unity Search

Glossary

←

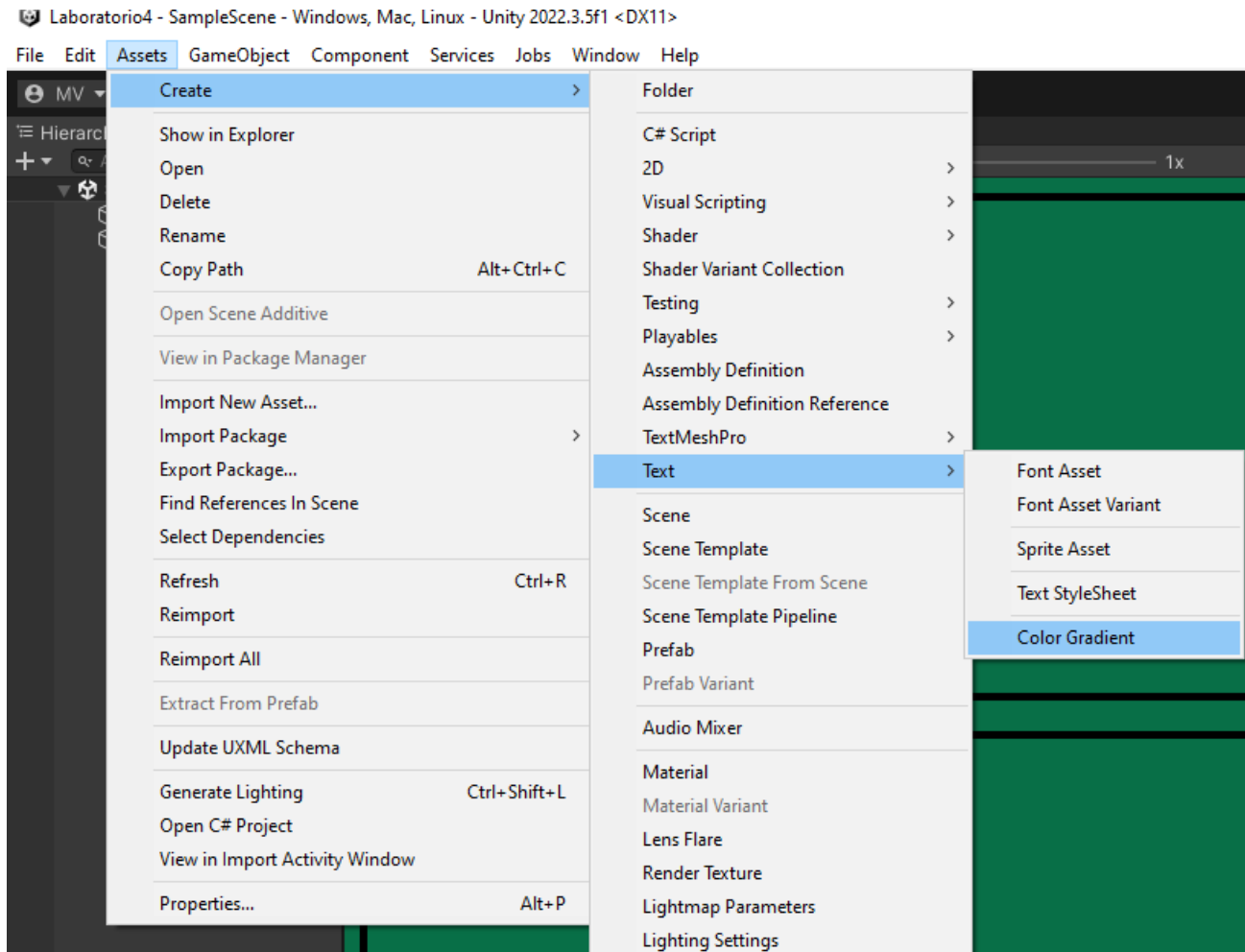
→

Supported rich text tags

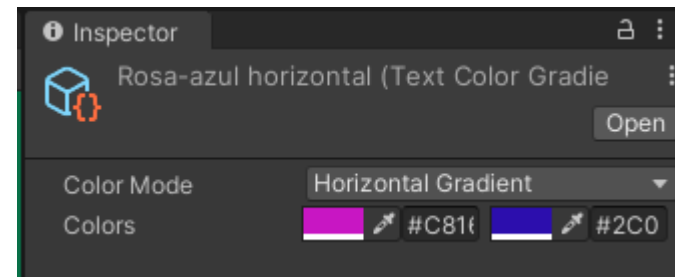
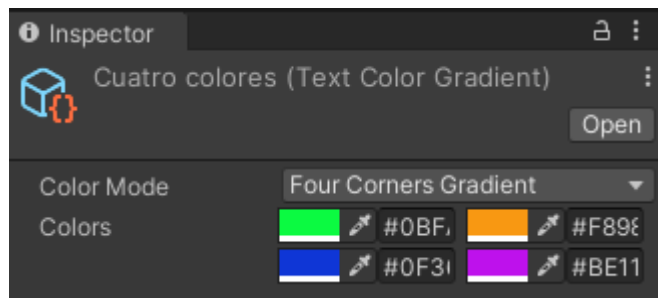
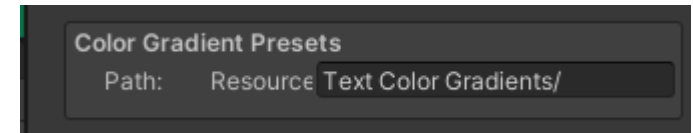
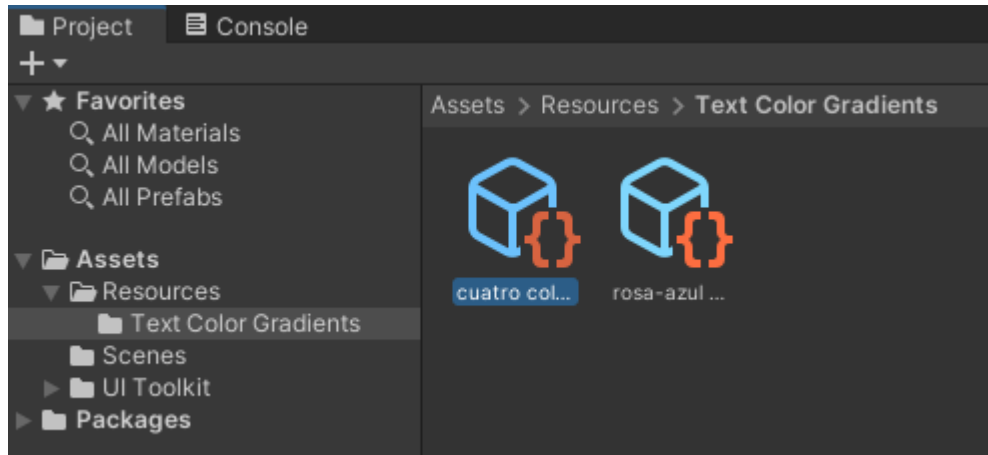
The following table lists all the supported rich text tags:

Tag	Description	Example
<code><a></code>	Define a hyperlink. Use the <code>href</code> attribute to define the hyperlink URL.	<code>Visit Unity!</code>
<code><align></code>	Change the text's horizontal alignment. The supported values are: <ul style="list-style-type: none"><code>left</code><code>center</code><code>right</code><code>justified</code><code>flush</code> If you put multiple alignment tags on the same line, the last one overrides the others.	<code><align="left">Left-aligned</align></code>
<code><allcaps></code>	Convert text to uppercase.	<code><allcaps>Alice and Bob watched TV.</allcaps></code>
<code><alpha></code>	Change text opacity. It works with hexadecimal values.	<code><alpha=#FF>FF <alpha=#CC>CC <alpha=#AA>AA <alpha=#88>88 <alpha=#66>66 <alpha=#44>44 <alpha=#22>22 <alpha=#00>00</code>
<code></code>	Render text in boldface.	The fox jumps over the <code>lazy dog</code>
<code>
</code>	Forces a line break in text.	Break the line here <code>
</code> New line starts
<code><color></code>	Change text color or color and opacity. It supports color names and hexadecimal values. If you apply successive tags in the same text, the last one takes precedence over the others until you either add another tag or use a closing tag to end the current color's scope.	<code><color="red">Red <color=#005500>Dark Green <#0000FF>Blue <color=FF000088>Semitransparent Red</code>
<code><ospace></code>	Change spacing between characters, either absolute or relative to the original font Asset. Use pixels or font units. Positive adjustments push the characters apart, negative adjustments pull them together.	<code><ospace=1em>Spacing</ospace> is just as important as <ospace=-0.5em>timing.</code>
<code></code>	Change text font.	Would you like <code><font="Impact SDF">a different font?</code>
<code><font-weight></code>	Change the text's font weight to any of the weights defined in the <code>font Asset</code> . If you haven't defined any font weights, you can still use <code>400</code> for normal, <code>700</code> for bold.	<code><font-weight="100">Thin</font-weight></code>

Gradientes de color

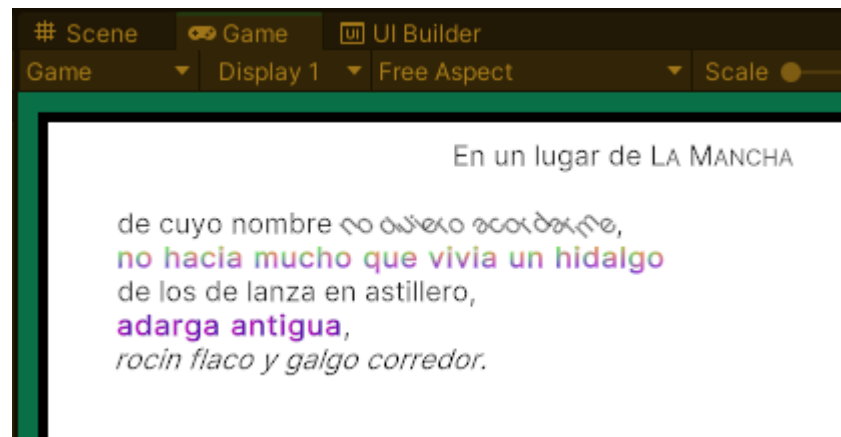


Gradientes de color



Texto enriquecido

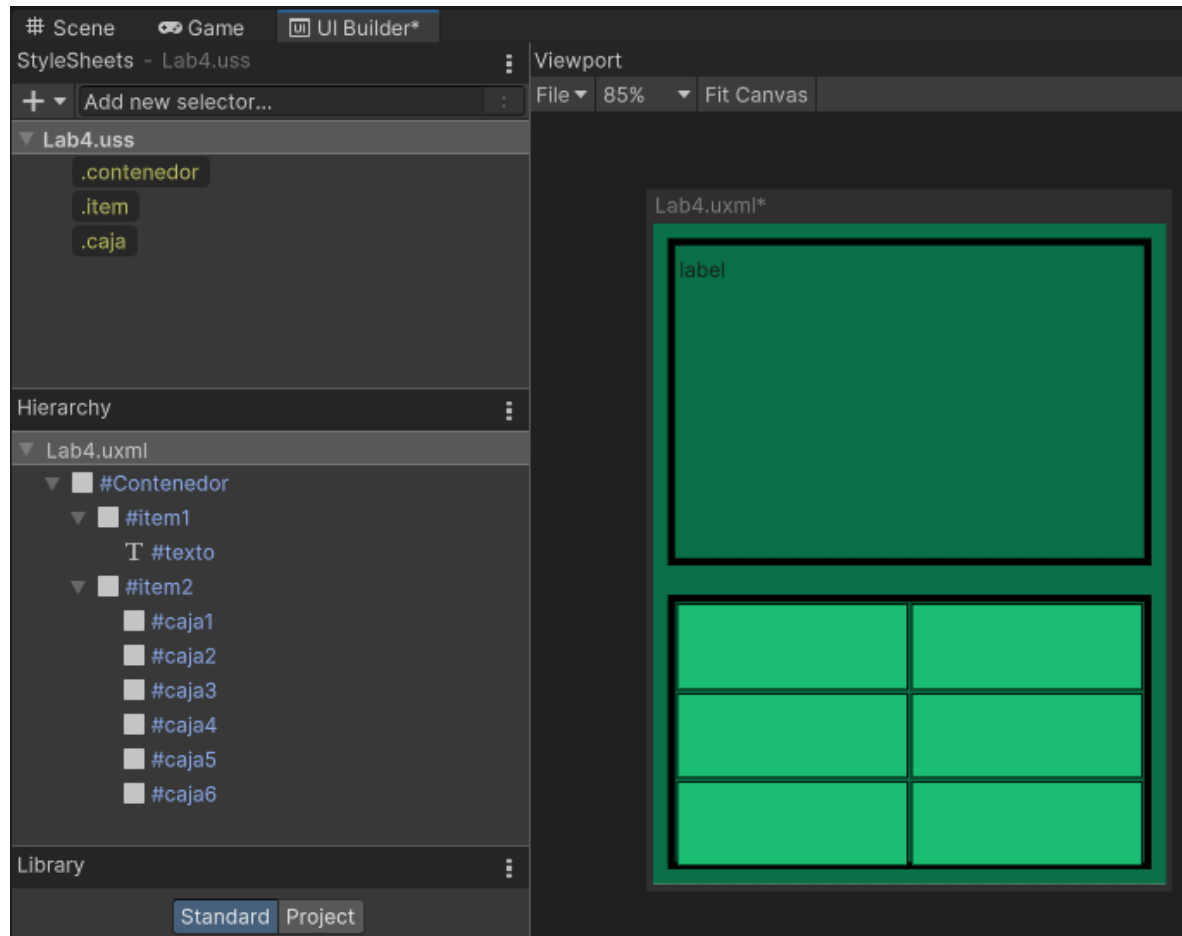
```
Label texto = rootve.Q<Label>("texto");
item1.style.backgroundColor = Color.white;
texto.text = @"<line-indent=15%>En un lugar de <smallcaps>La Mancha</smallcaps> </line-indent><br>
de cuyo nombre <rotate=""45"">no quiero acordarme</rotate>,
<b><gradient=""cuatro colores"">no hacia mucho que vivia un hidalgo</gradient></b>
de los de lanza en astillero,
<b><color=""black""><gradient=""rosa-azul horizontal"">adarga antigua</gradient></b>,
<i>rocin flaco y galgo corredor.";
```



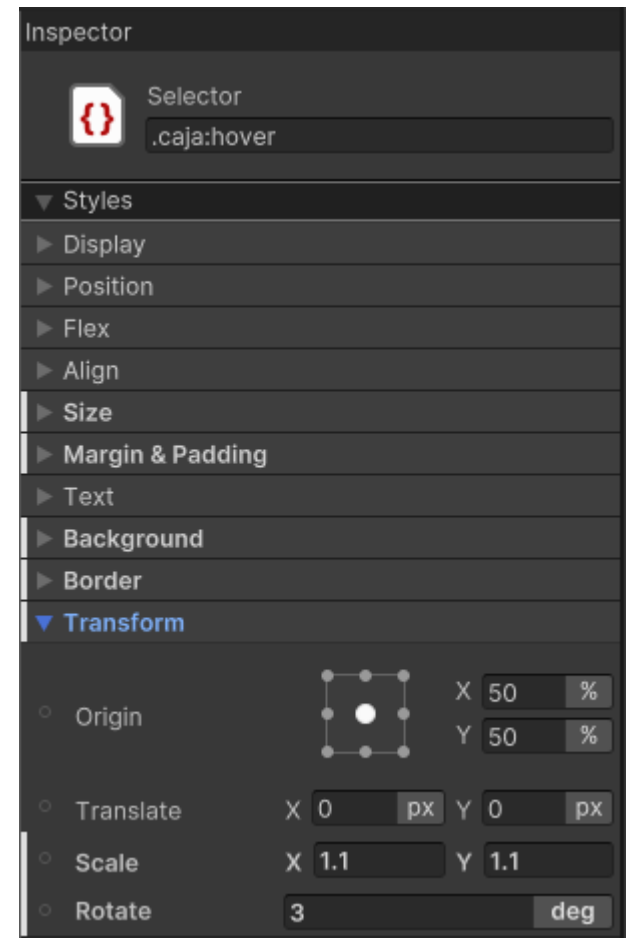
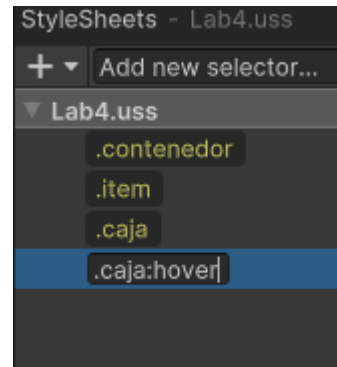
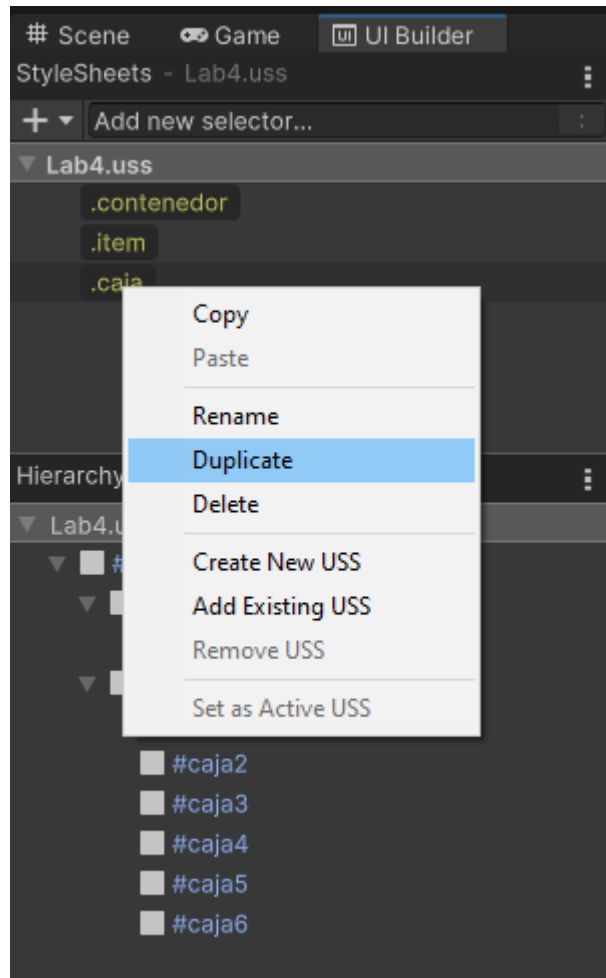
Índice

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- Templates
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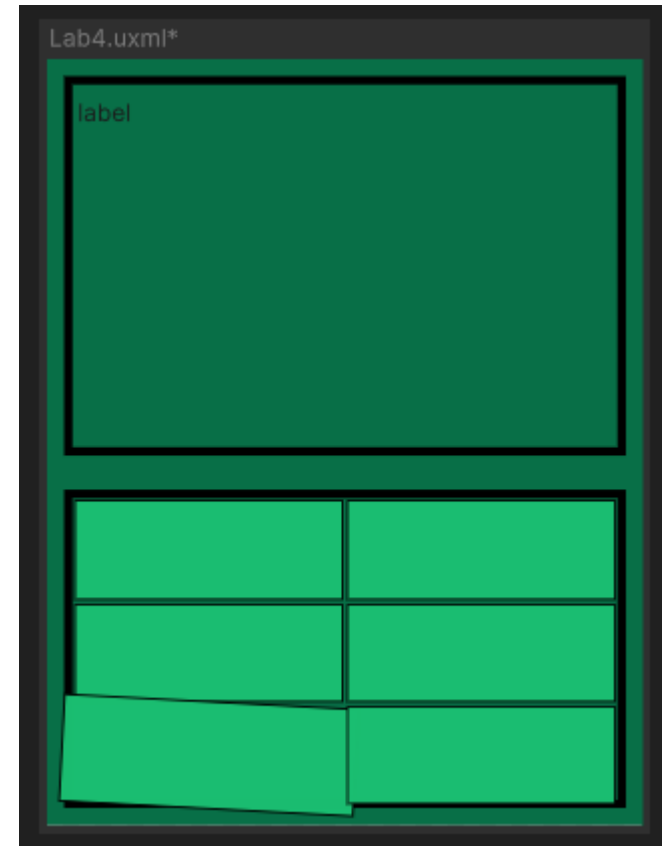
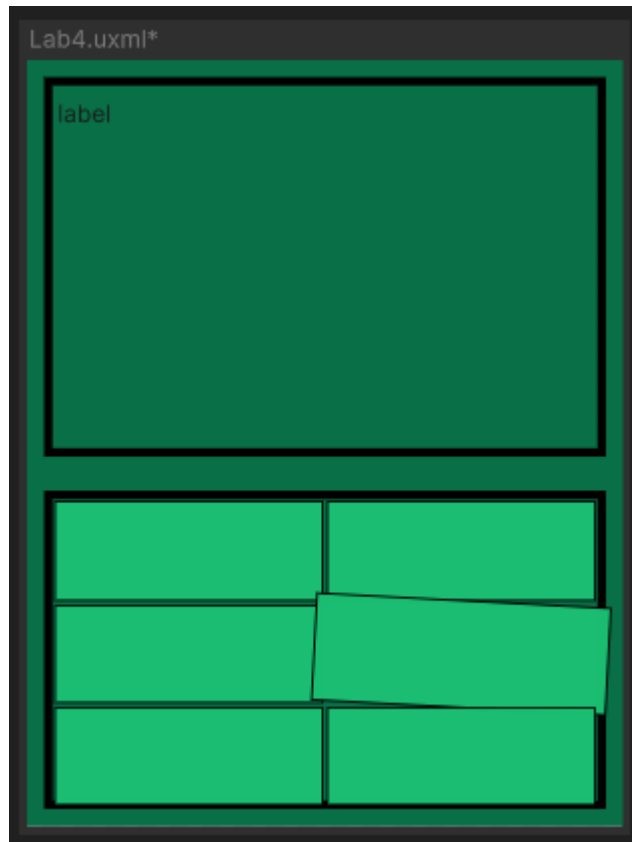
Pseudo Classes



Pseudo Classes



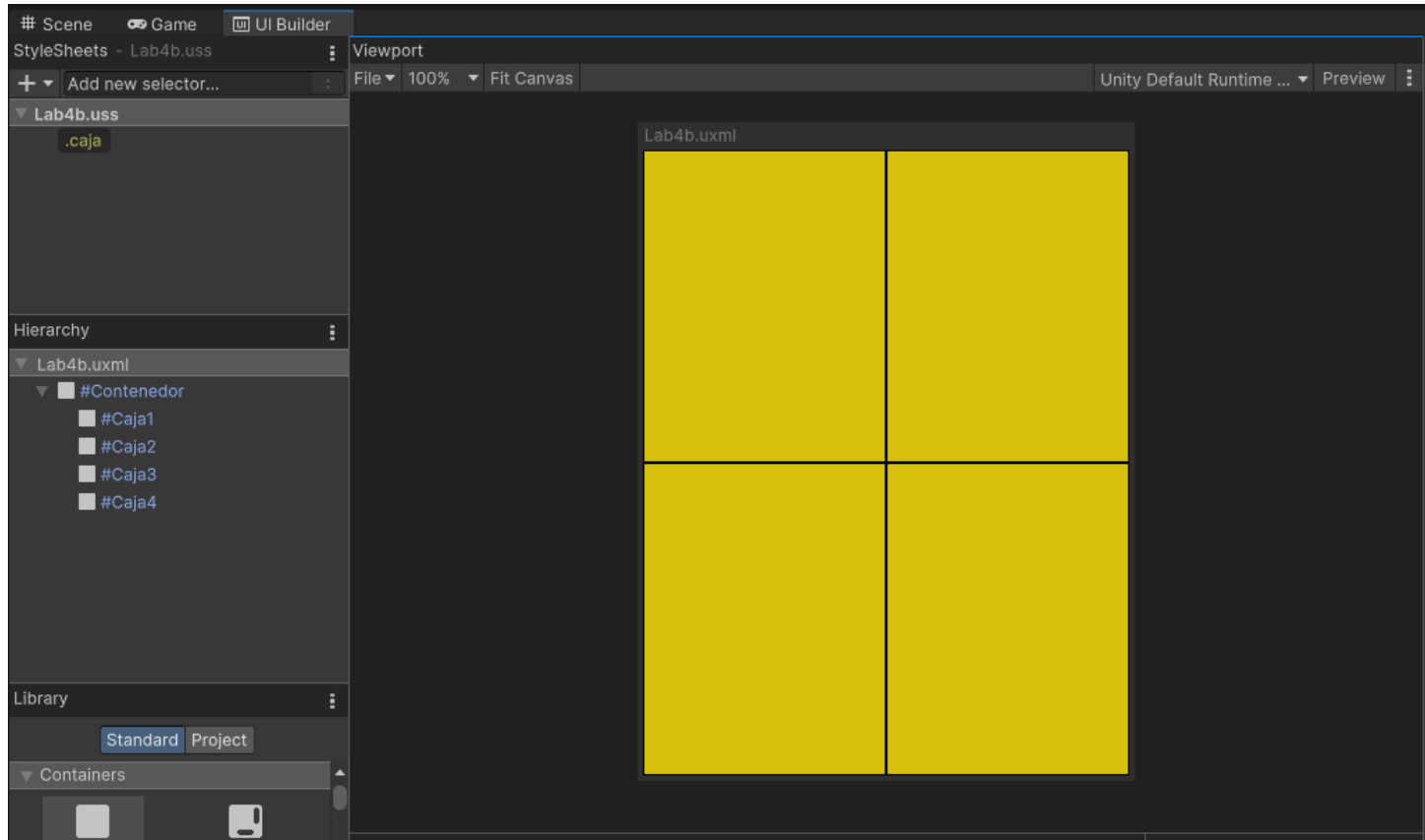
Pseudo Classes



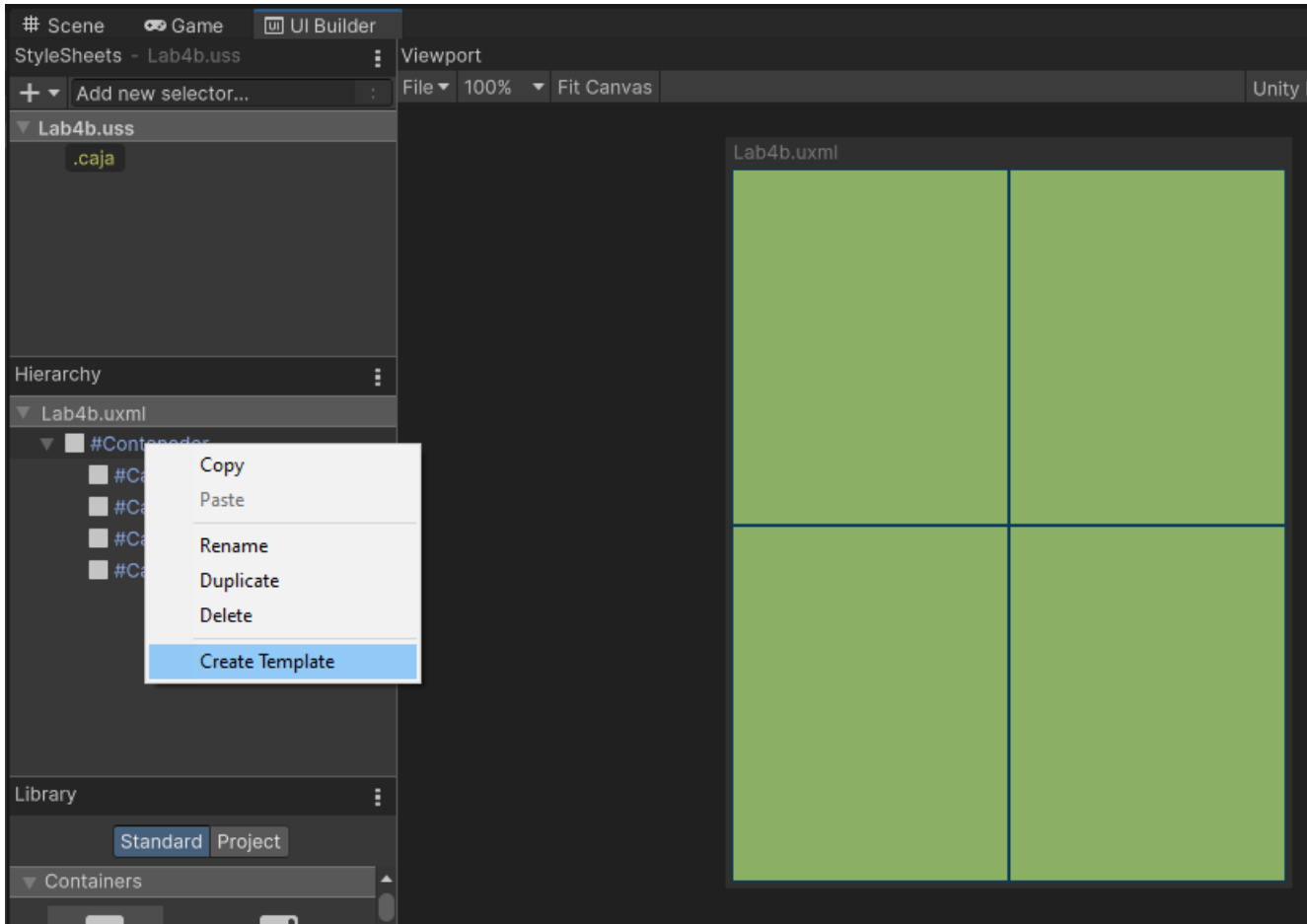
Índice

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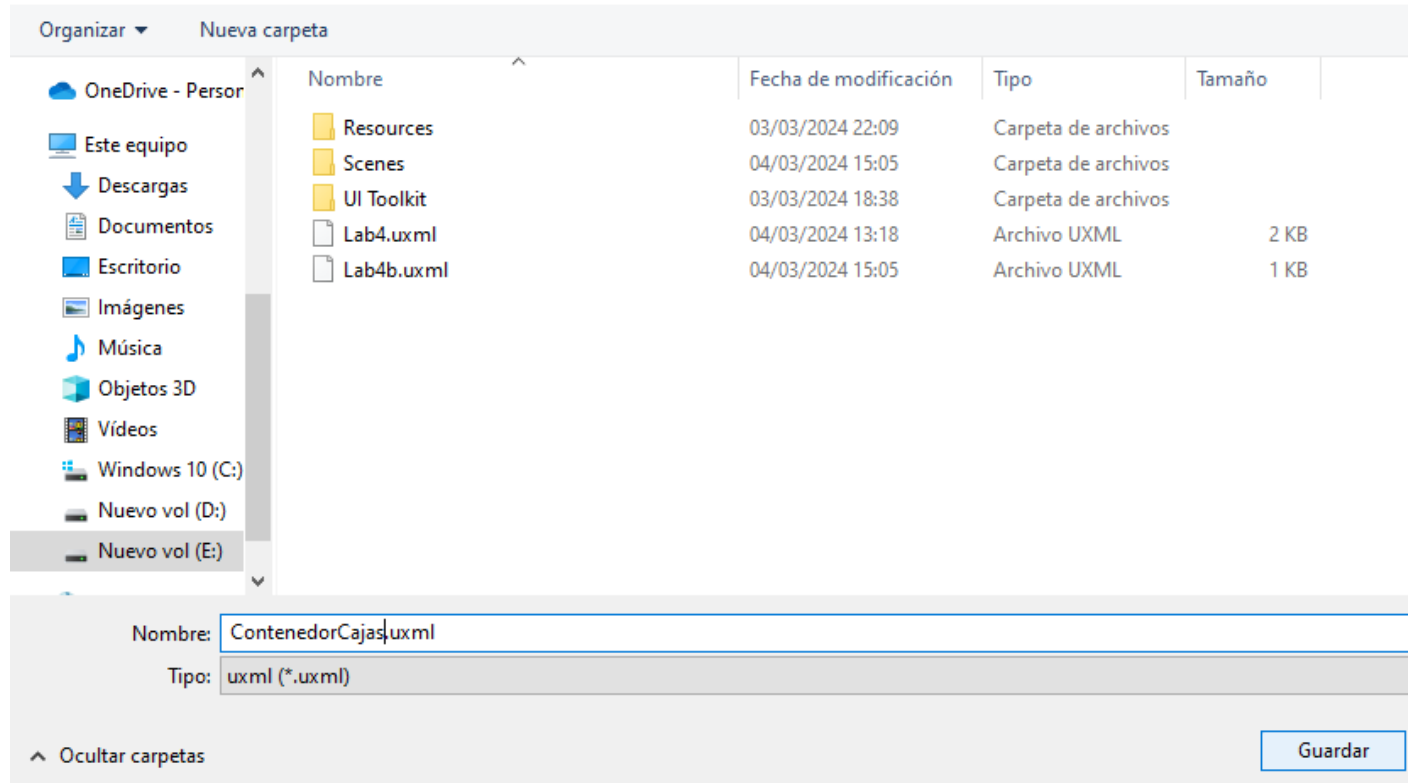
Templates



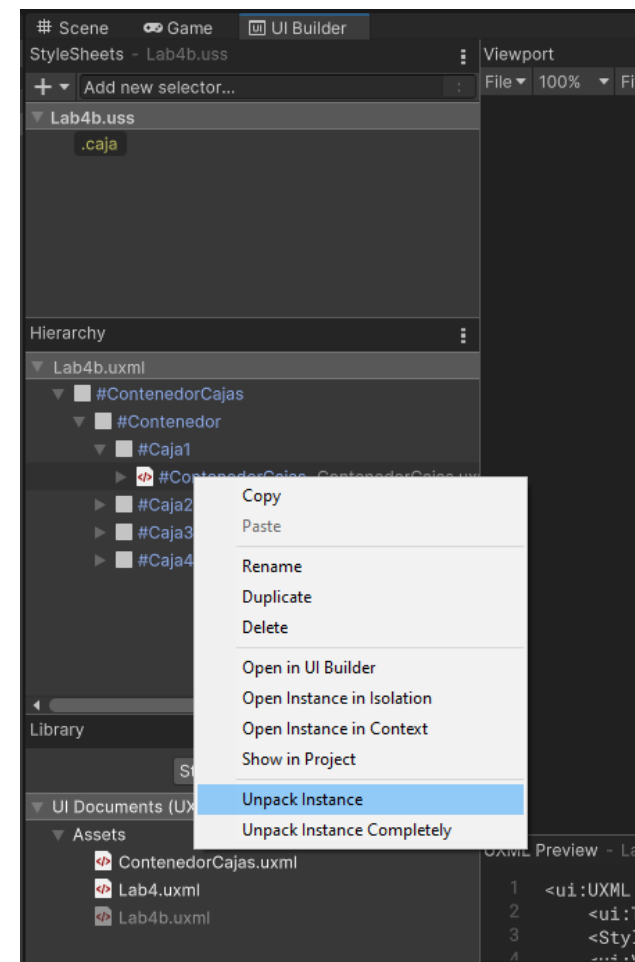
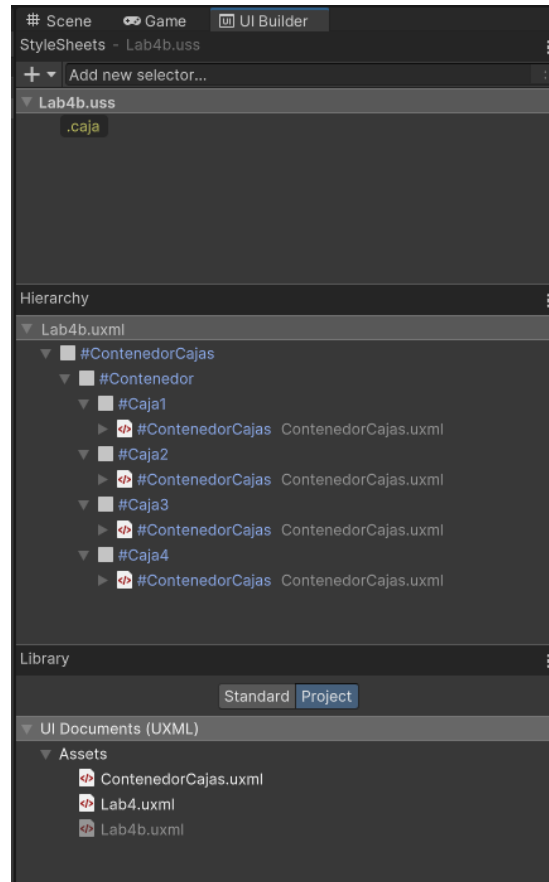
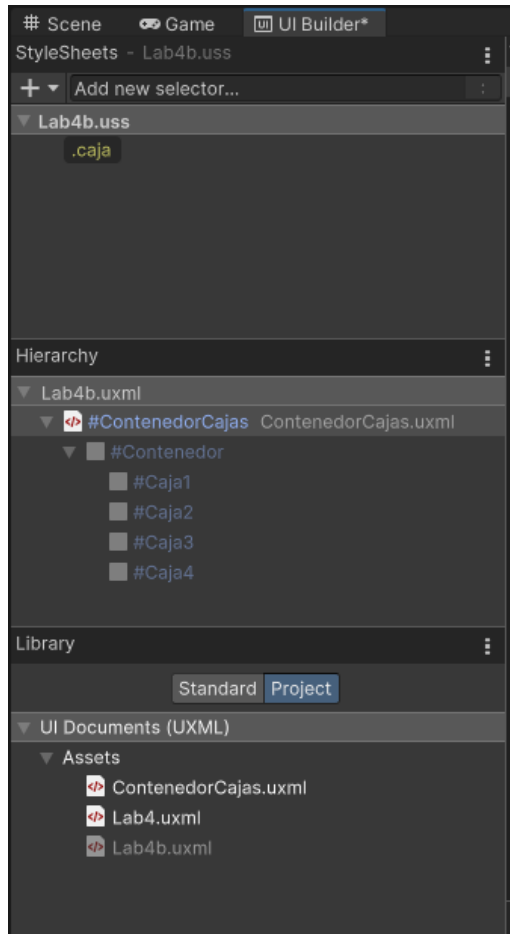
Templates



Templates



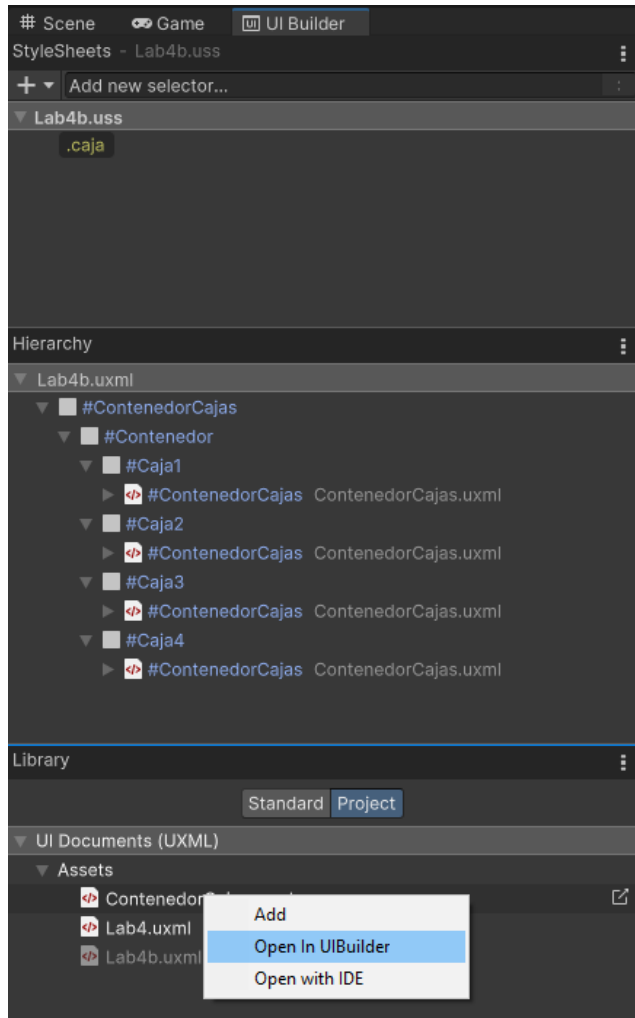
Templates



Templates

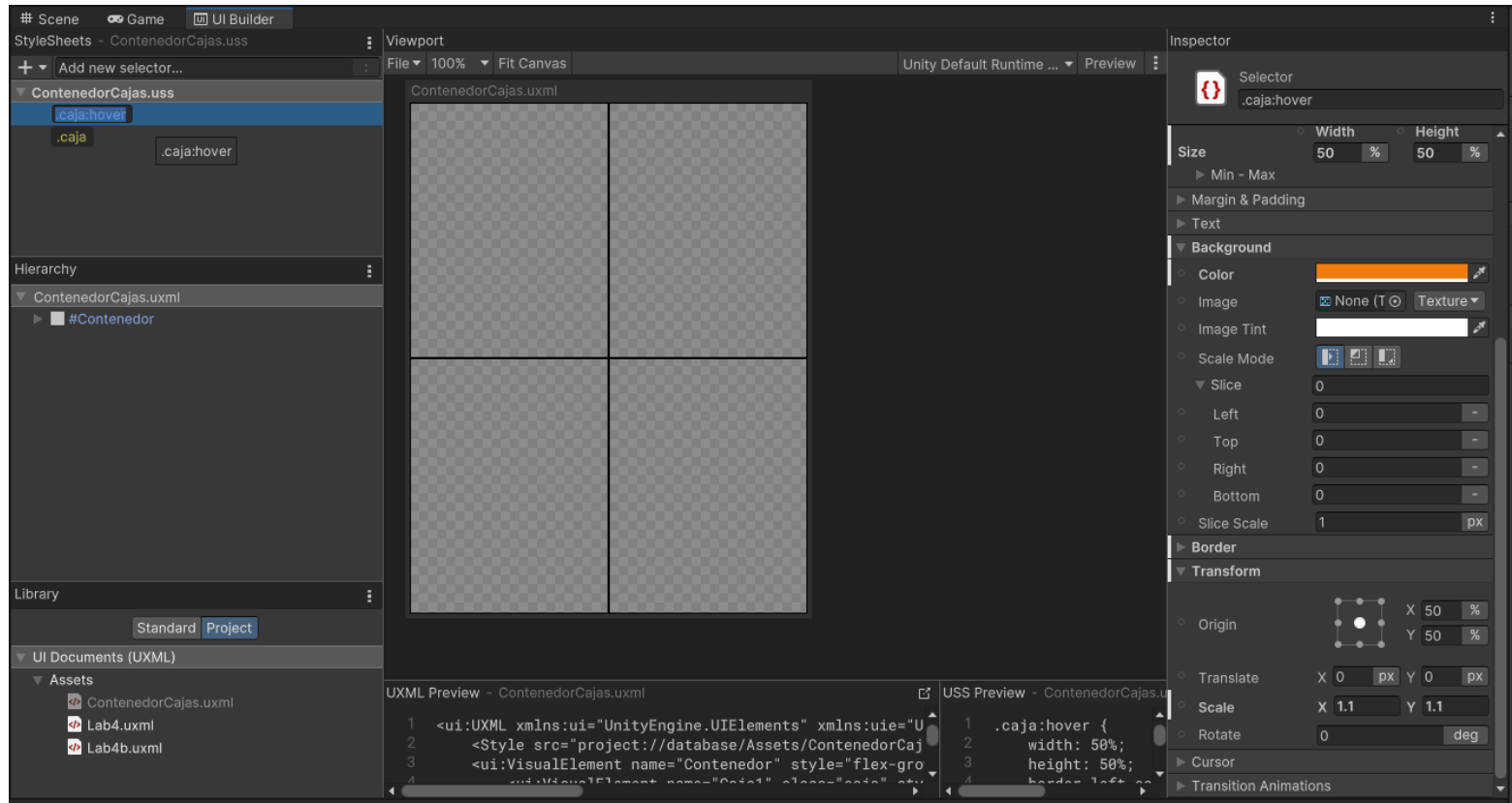
```
Assets > Lab4b.uss Lab4b.uxml X
1 <ui:UXML xmlns:ui="UnityEngine.UIElements" xmlns:uie="UnityEditor.UIElements" editor-extension-mode="False">
2   <ui:Template name="ContenedorCajas" src="project://database/Assets/ContenedorCajas.uxml?fileID=9197481963319205126&guid=78f8a091cf1e9b84cb2ea4b8ad4203c7&type=3#Contene
3   <Style src="project://database/Assets/Lab4b.uss?fileID=7433441132597879392&guid=b90aed668b24b6d43b99e544437f571c&type=3#Lab4b" />
4   <ui:VisualElement name="ContenedorCajas" style="height: 450px; width: 351px;">
5     <ui:VisualElement name="Contenedor" style="flex-grow: 1; background-color: rgba(0, 0, 0, 0); flex-wrap: wrap; flex-direction: row;">
6       <ui:VisualElement name="Caja1" class="caja" style="flex-grow: 1; width: 50%;">
7         <ui:Instance template="ContenedorCajas" name="ContenedorCajas" style="height: 224px; width: 175px;" />
8       </ui:VisualElement>
9       <ui:VisualElement name="Caja2" class="caja" style="flex-grow: 1;">
10        <ui:Instance template="ContenedorCajas" name="ContenedorCajas" style="height: 224px; width: 175px;" />
11      </ui:VisualElement>
12      <ui:VisualElement name="Caja3" class="caja" style="flex-grow: 1;">
13        <ui:Instance template="ContenedorCajas" name="ContenedorCajas" style="height: 224px; width: 175px;" />
14      </ui:VisualElement>
15      <ui:VisualElement name="Caja4" class="caja" style="flex-grow: 1;">
16        <ui:Instance template="ContenedorCajas" name="ContenedorCajas" style="height: 224px; width: 175px;" />
17      </ui:VisualElement>
18    </ui:VisualElement>
19  </ui:VisualElement>
20 </ui:UXML>
```

Templates

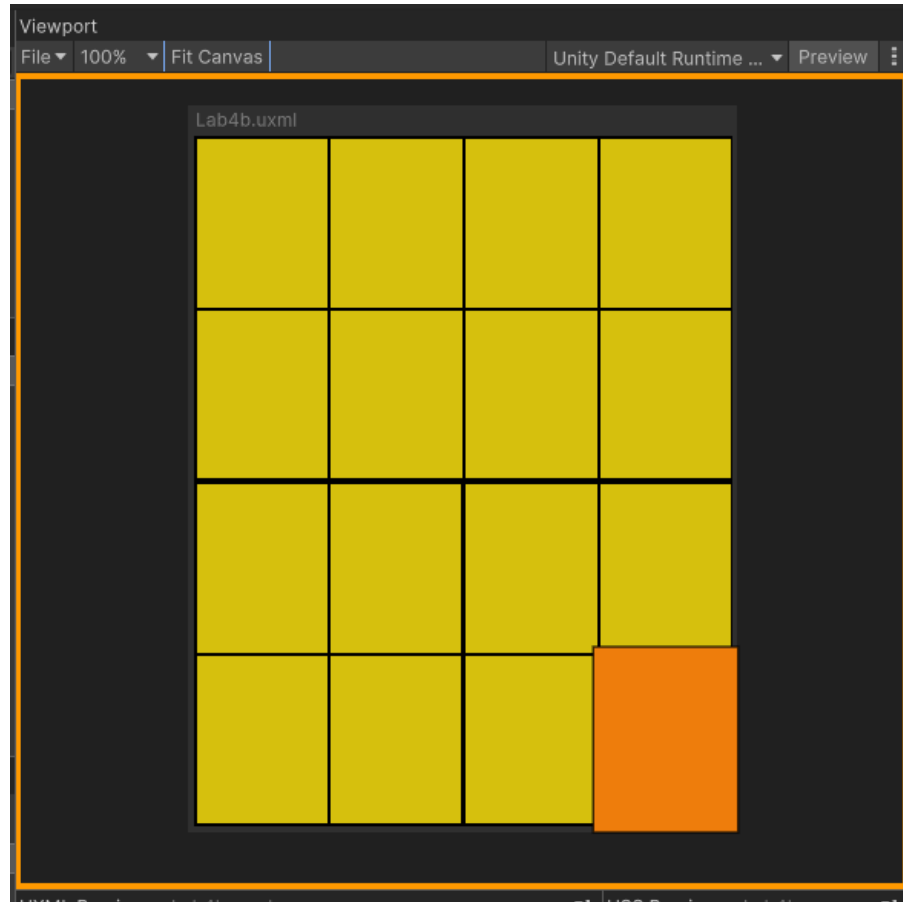


Para modificar el Template hay que abrirlo en el UIBuilder

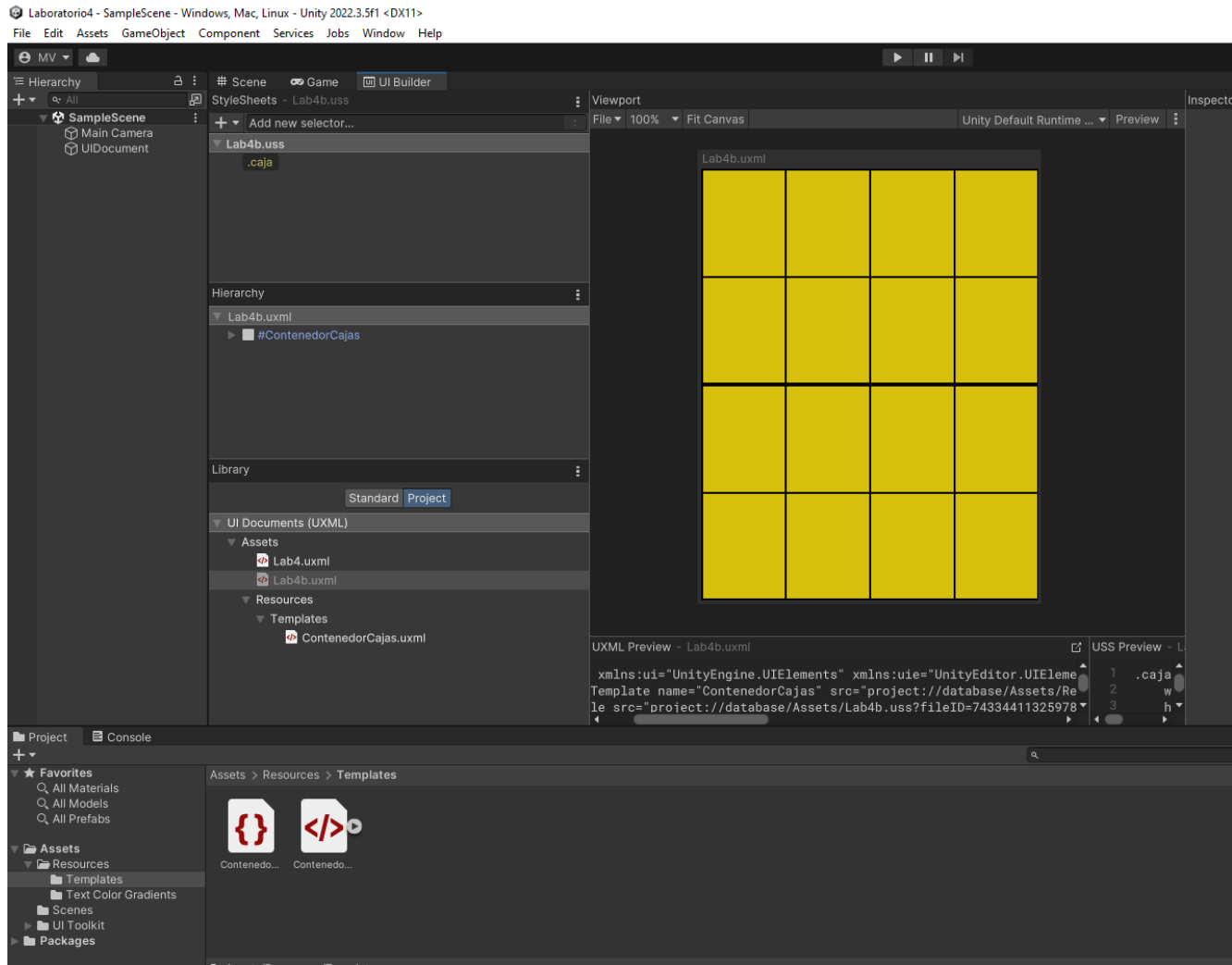
Templates



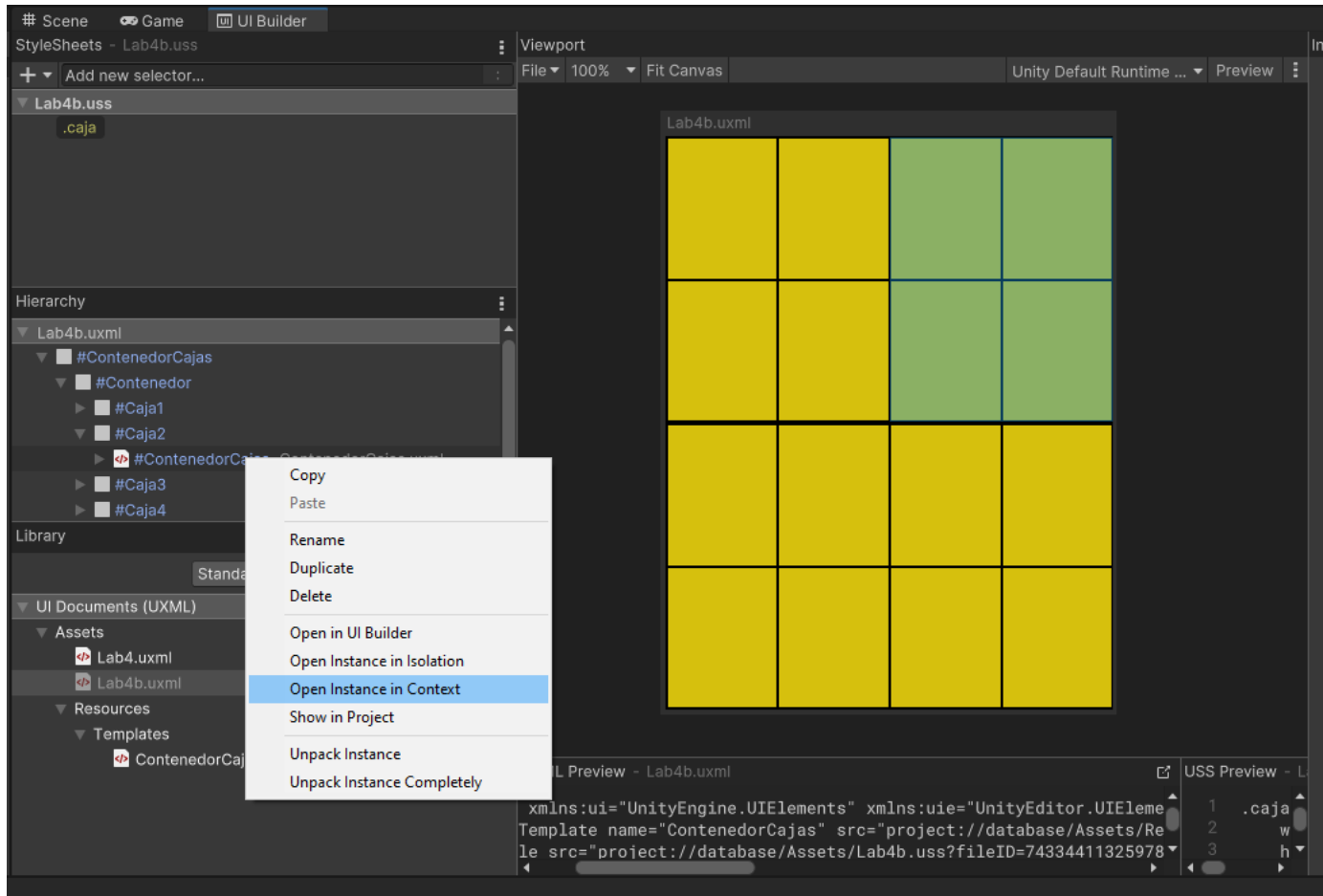
Templates



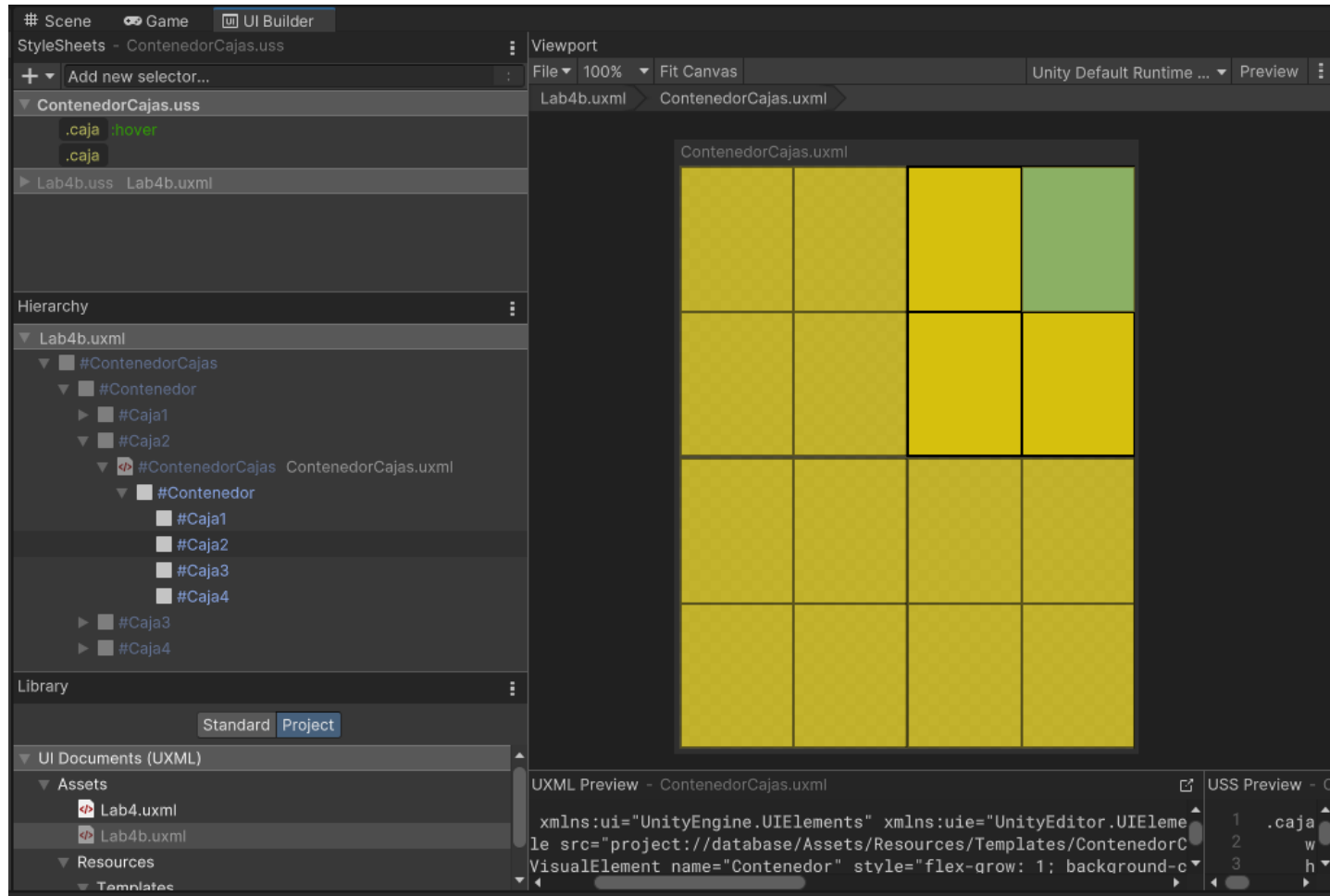
Templates



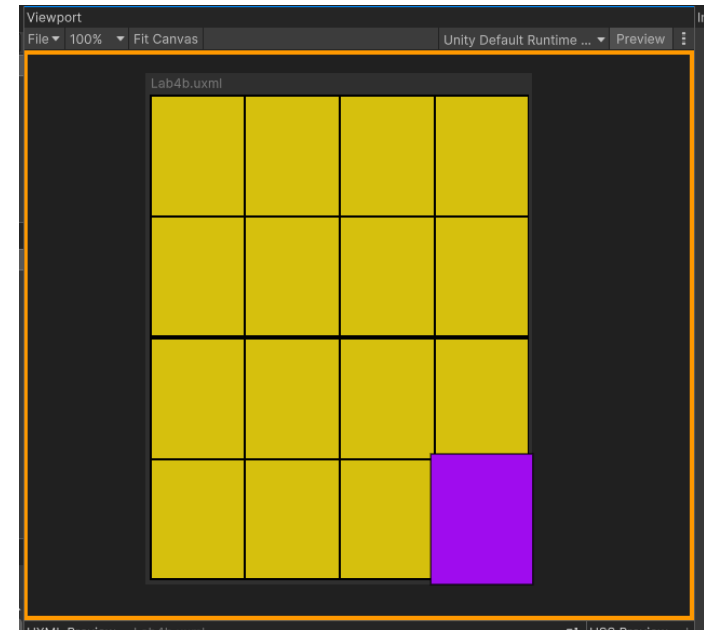
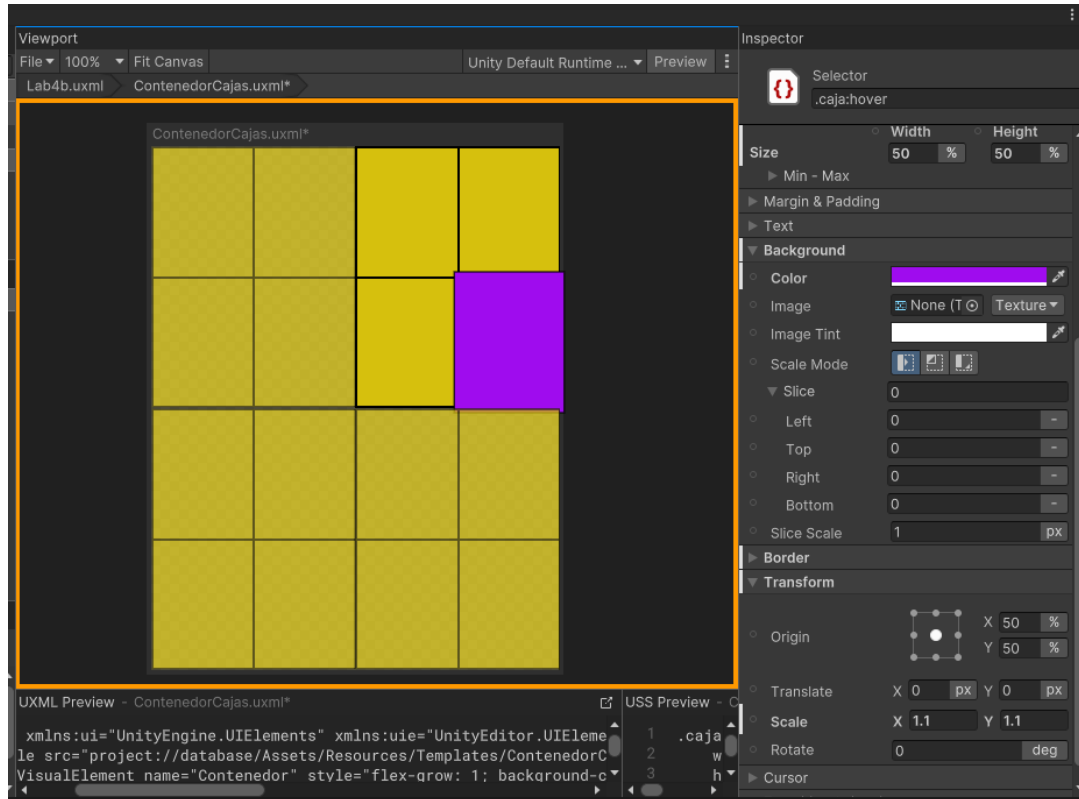
Templates



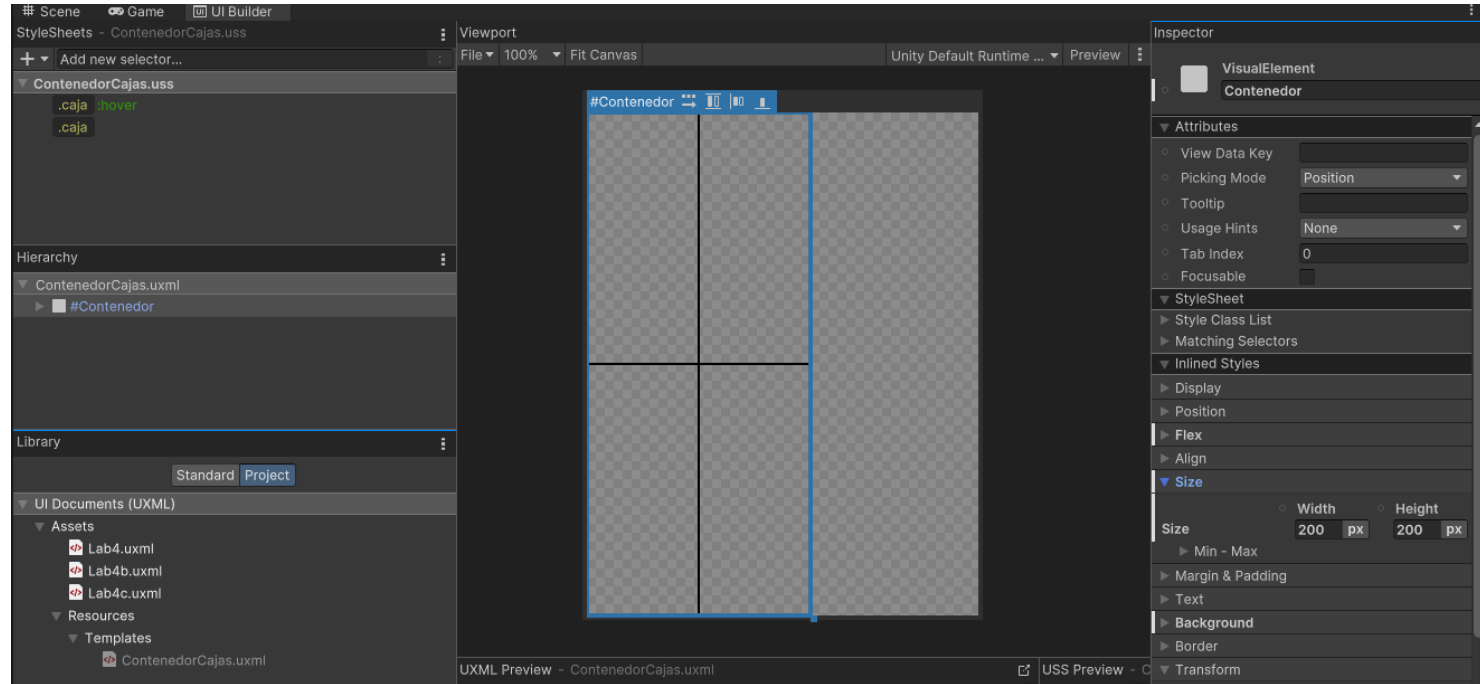
Templates



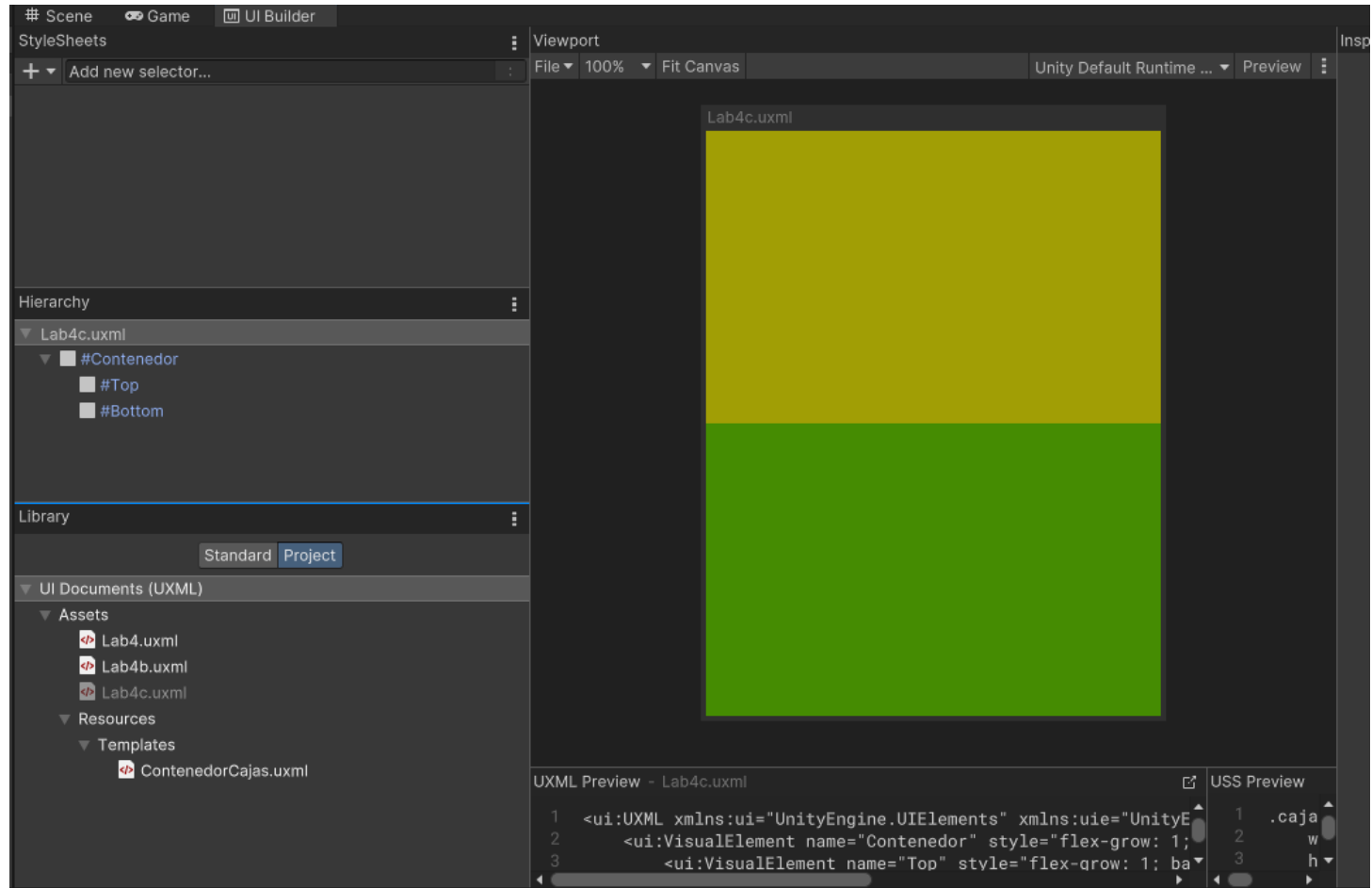
Templates



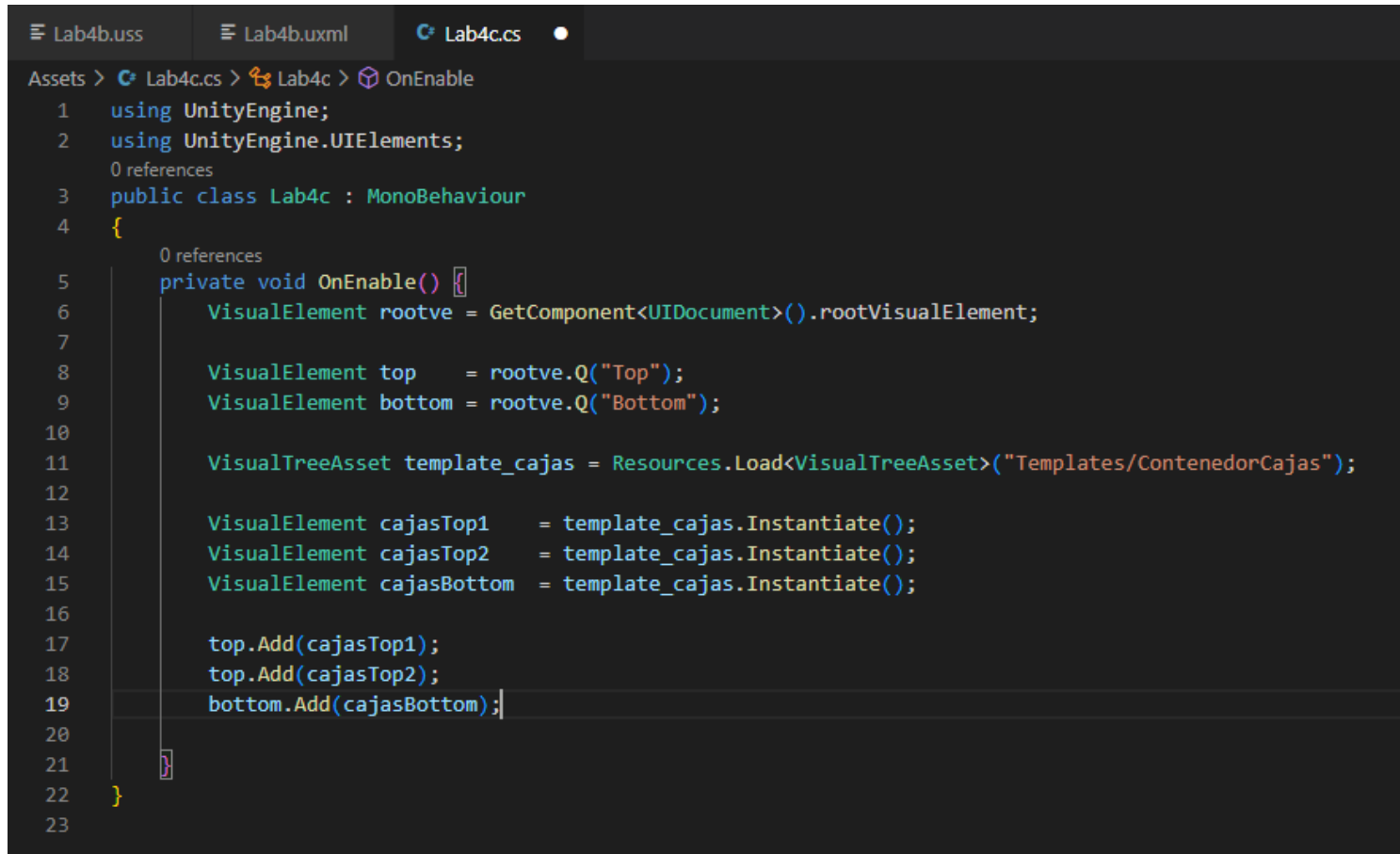
Templates



Templates



Templates → script



```
Assets > Lab4c.cs > Lab4c > OnEnable
1  using UnityEngine;
2  using UnityEngine.UIElements;
   0 references
3  public class Lab4c : MonoBehaviour
4  {
   0 references
5      private void OnEnable() {
6          VisualElement rootve = GetComponent<UIDocument>().rootVisualElement;
7
8          VisualElement top    = rootve.Q("Top");
9          VisualElement bottom = rootve.Q("Bottom");
10
11         VisualTreeAsset template_cajas = Resources.Load<VisualTreeAsset>("Templates/ContenedorCajas");
12
13         VisualElement cajasTop1    = template_cajas.Instantiate();
14         VisualElement cajasTop2    = template_cajas.Instantiate();
15         VisualElement cajasBottom  = template_cajas.Instantiate();
16
17         top.Add(cajasTop1);
18         top.Add(cajasTop2);
19         bottom.Add(cajasBottom);
20
21     }
22 }
23
```

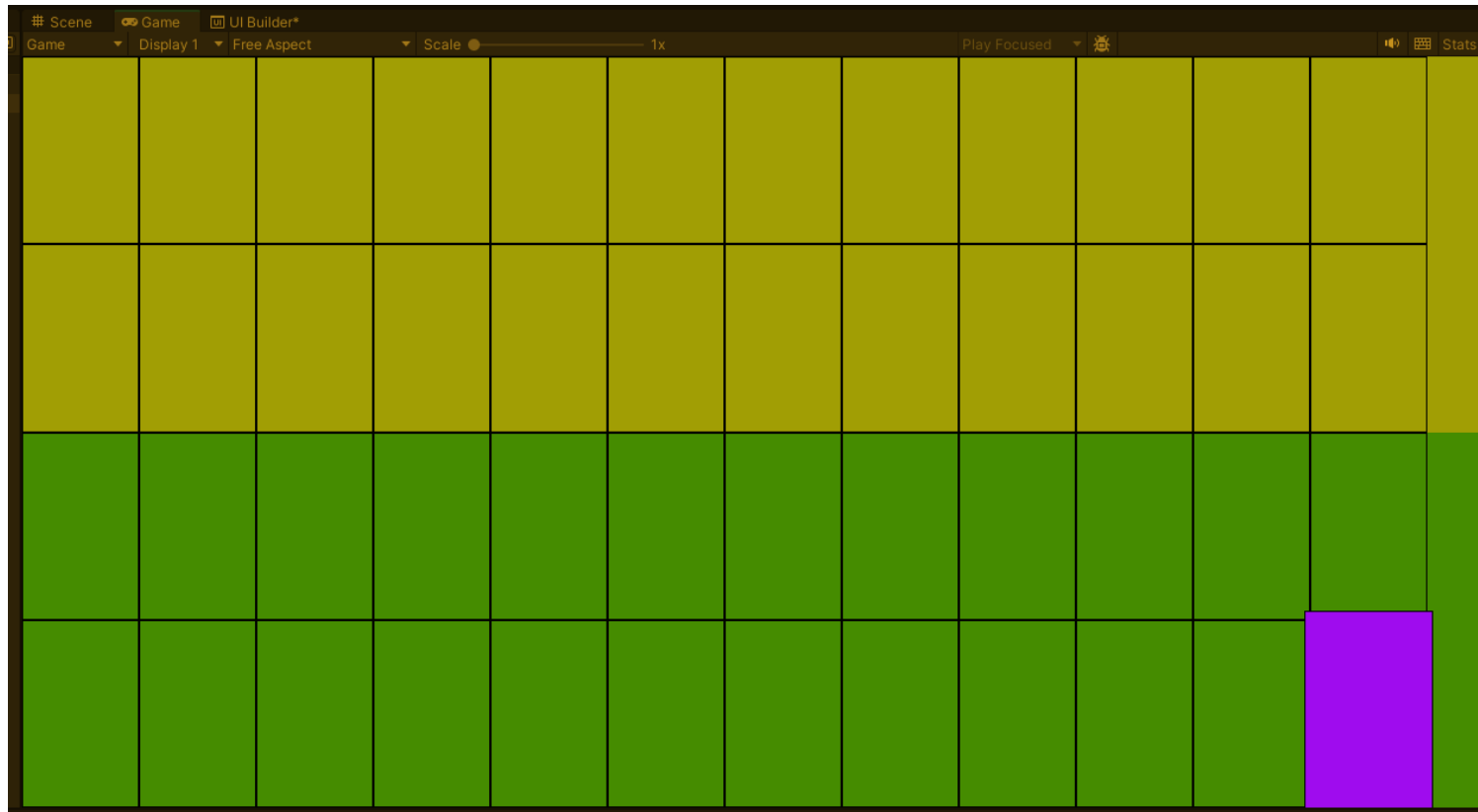
Templates → script



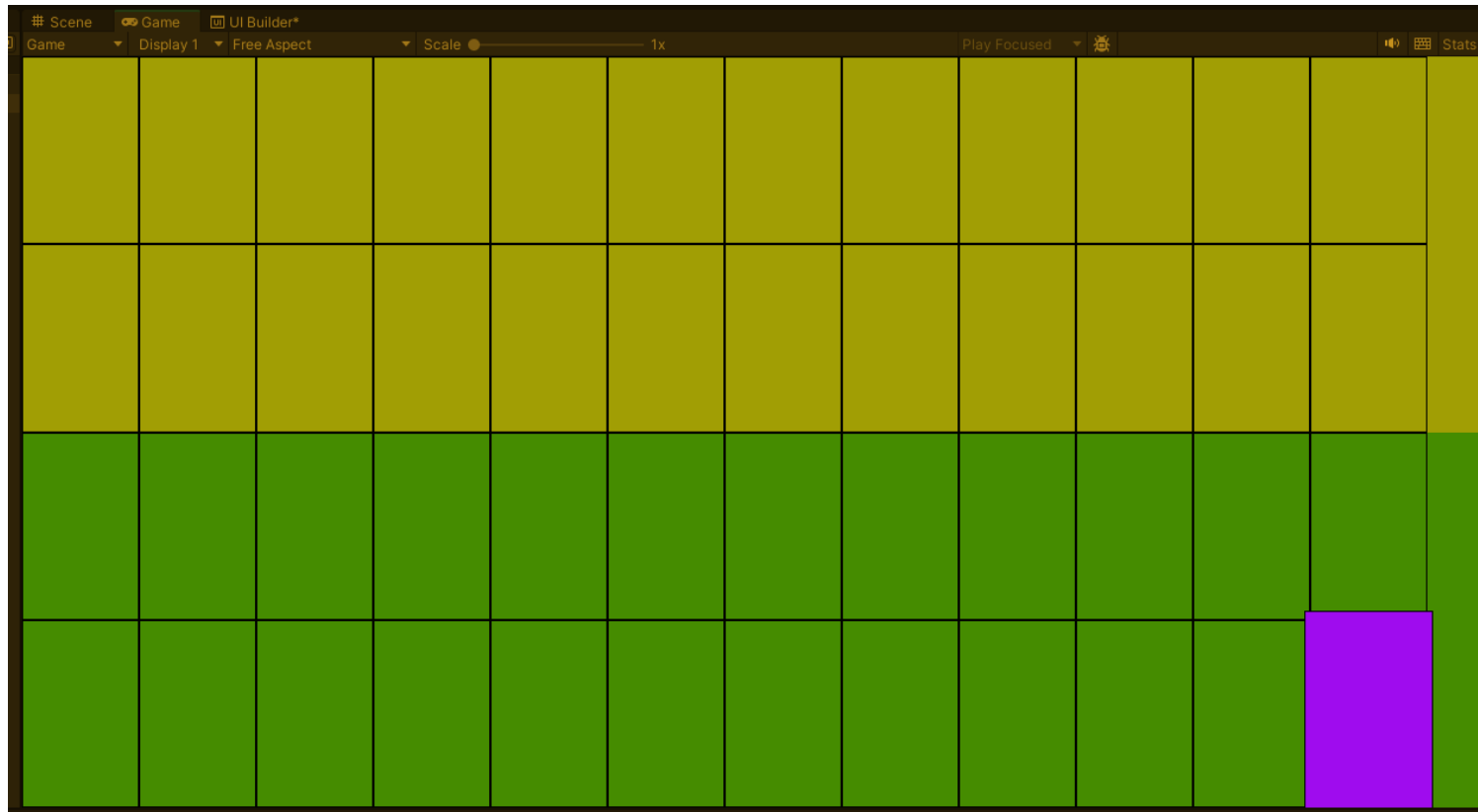
Templates

```
Lab4c.cs x
Assets > Lab4c.cs > ...
1 using UnityEngine;
2 using UnityEngine.UIElements;
  0 references
3 public class Lab4c : MonoBehaviour
4 {
  0 references
5     private void OnEnable() {
6         VisualElement rootve = GetComponent<UIDocument>().rootVisualElement;
7
8         VisualElement top    = rootve.Q("Top");
9         VisualElement bottom = rootve.Q("Bottom");
10
11         VisualTreeAsset template_cajas = Resources.Load<VisualTreeAsset>("Templates/ContenedorCajas");
12
13         /* VisualElement cajasTop1    = template_cajas.Instantiate();
14         VisualElement cajasTop2    = template_cajas.Instantiate();
15         VisualElement cajasBottom   = template_cajas.Instantiate();
16
17         top.Add(cajasTop1);
18         top.Add(cajasTop2);
19         bottom.Add(cajasBottom); */
20
21         for (int i = 0; i < 6; i++)
22         {
23             top.Add(template_cajas.Instantiate());
24             bottom.Add(template_cajas.Instantiate());
25         }
26     }
27 }
28
29
```

Templates



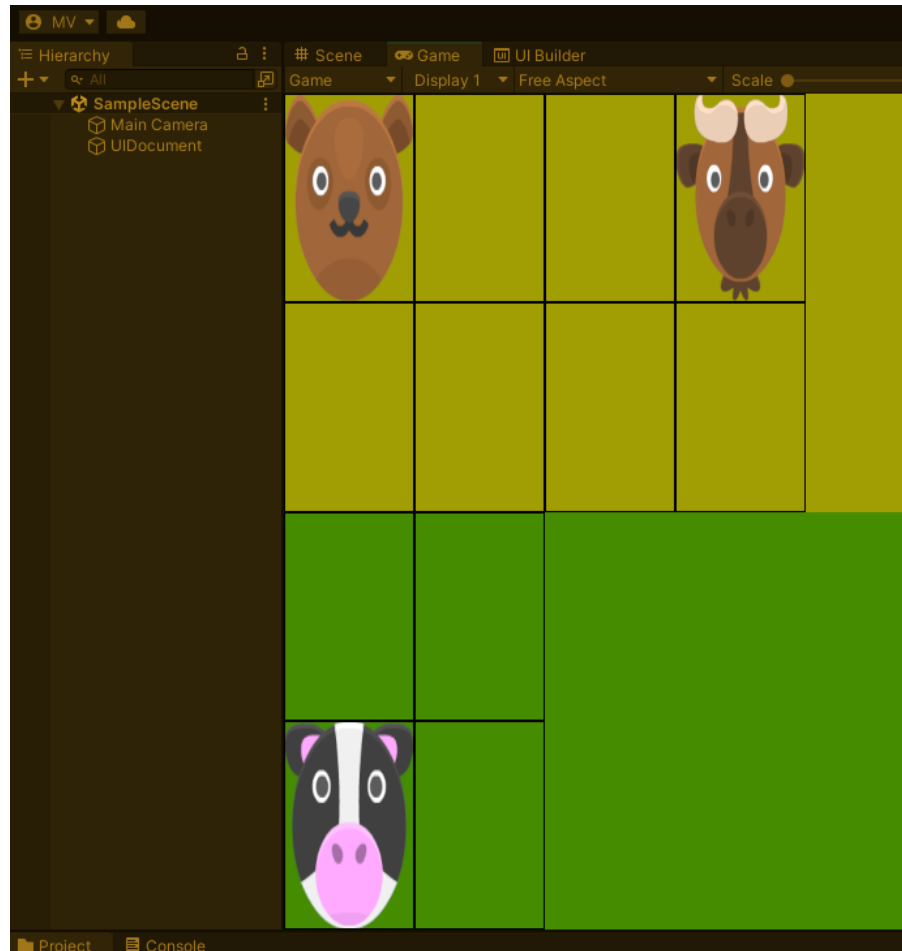
Templates



Templates

```
Lab4c.cs X
Assets > Lab4c.cs > Lab4c
1 using UnityEngine;
2 using UnityEngine.UIElements;
3 public class Lab4c : MonoBehaviour
4 {
5     private void OnEnable() {
6         VisualElement rootve = GetComponent<UIDocument>().rootVisualElement;
7
8         VisualElement top = rootve.Q("Top");
9         VisualElement bottom = rootve.Q("Bottom");
10
11         VisualTreeAsset template_cajas = Resources.Load<VisualTreeAsset>("Templates/ContenedorCajas");
12
13         VisualElement cajasTop1 = template_cajas.Instantiate();
14         VisualElement cajasTop2 = template_cajas.Instantiate();
15         VisualElement cajasBottom = template_cajas.Instantiate();
16
17         top.Add(cajasTop1);
18         top.Add(cajasTop2);
19         bottom.Add(cajasBottom);
20
21         Sprite img_bear = Resources.Load<Sprite>("Imagenes/bear");
22         Sprite img_buffalo = Resources.Load<Sprite>("Imagenes/buffalo");
23         Sprite img_cow = Resources.Load<Sprite>("Imagenes/cow");
24
25         VisualElement caja1 = cajasTop1.Q("Caja1");
26         VisualElement caja2 = cajasTop2.Q("Caja2");
27         VisualElement caja3 = cajasBottom.Q("Caja3");
28         caja1.style.backgroundImage = new StyleBackground(img_bear);
29         caja2.style.backgroundImage = new StyleBackground(img_buffalo);
30         caja3.style.backgroundImage = new StyleBackground(img_cow);
31         /* for (int i = 0; i < 6; i++)
32         {
33             top.Add(template_cajas.Instantiate());
34             bottom.Add(template_cajas.Instantiate());
35         } */
36
37     }
38 }
```

Templates



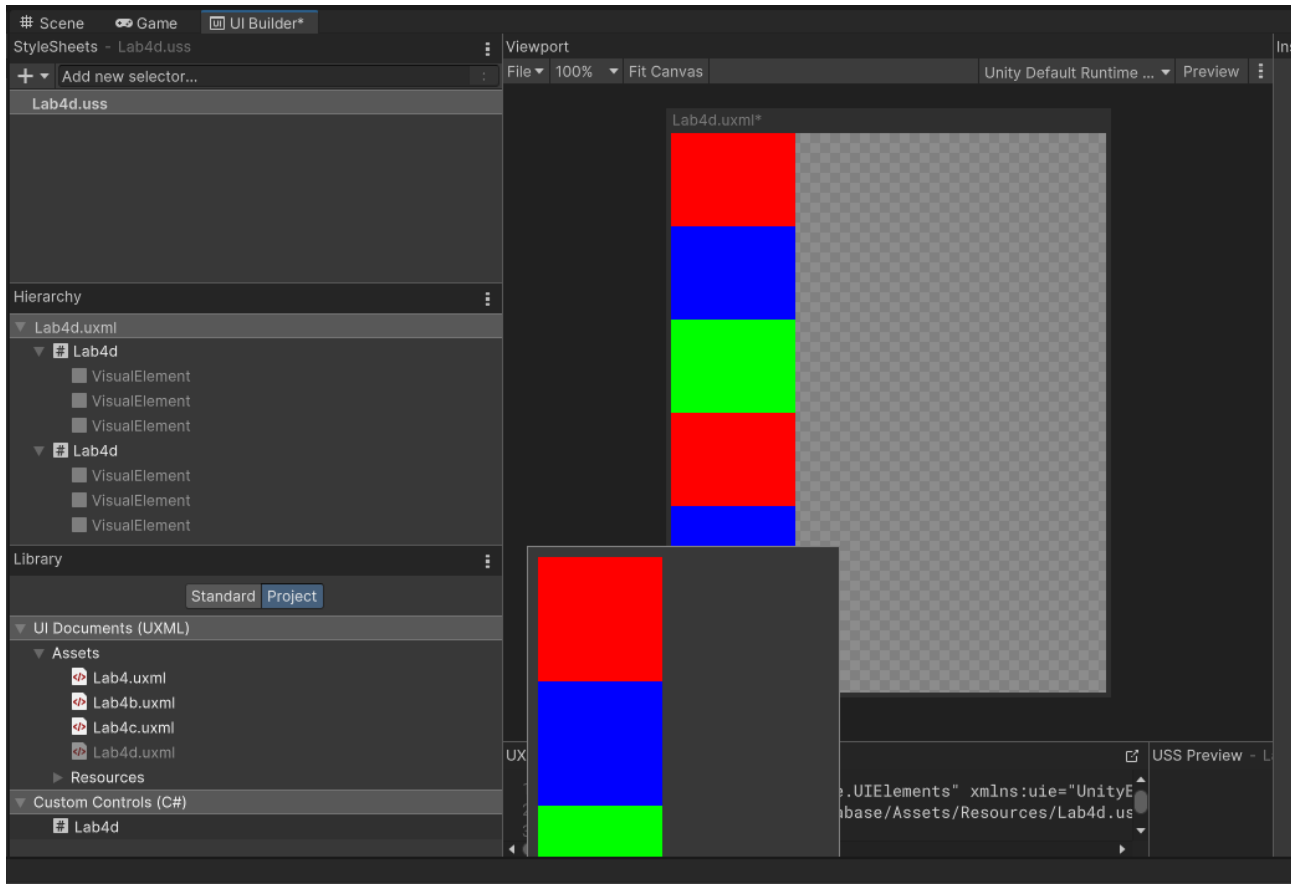
Índice

- Debugging
- Texto
 - Texto enriquecido
 - Gradientes de color
- Pseudo Classes
- Templates
- **Custom Controls**

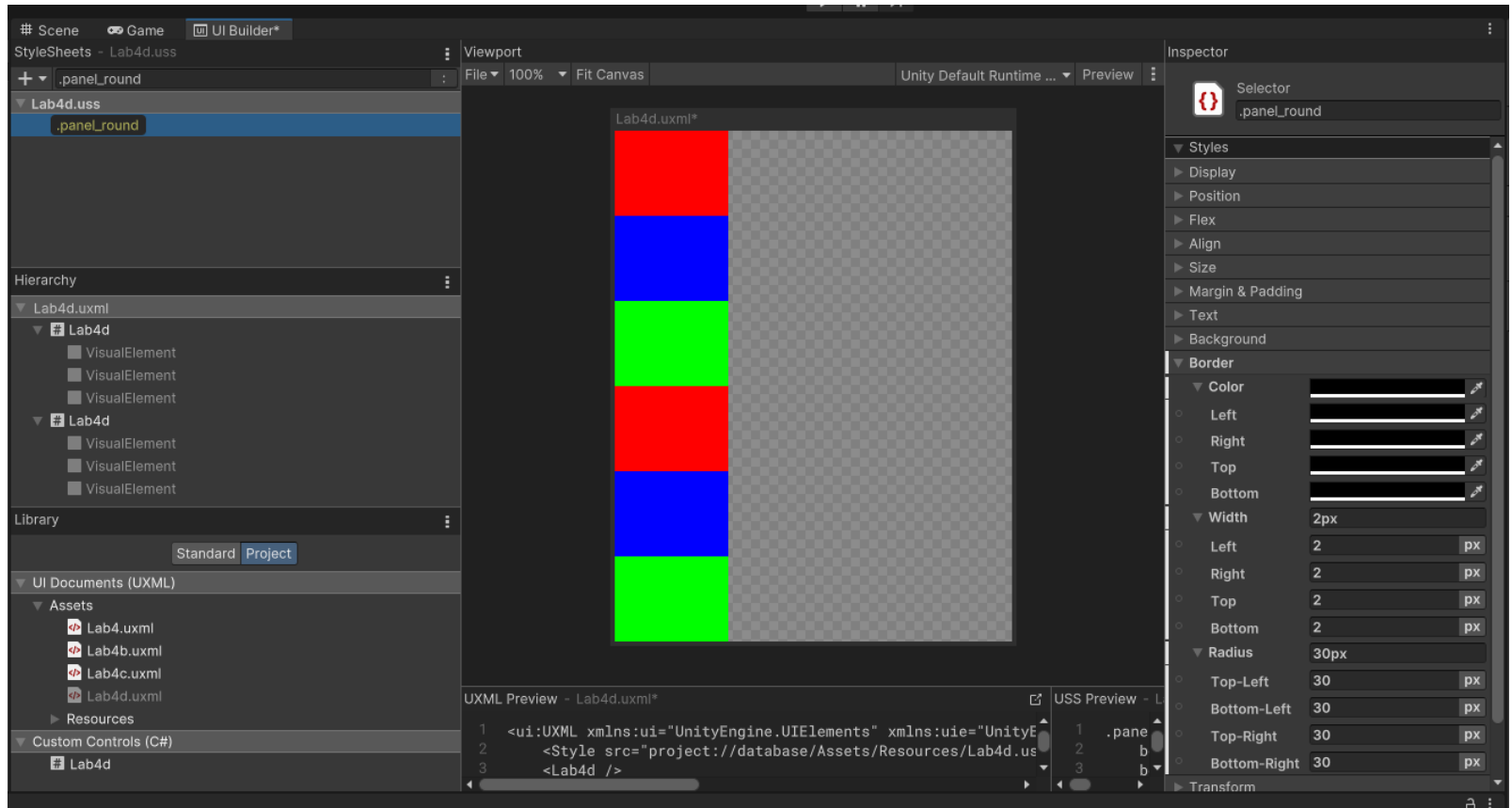
Custom Controls

```
Lab4c.cs  Lab4d.cs X
Assets > Lab4d.cs > ...
1  using UnityEngine;
2  using UnityEngine.UIElements;
3
4  2 references
5  public class Lab4d : VisualElement
6  {
7
8  0 references
9  public new class UxmlFactory : UxmlFactory<Lab4d>{};
10
11 0 references
12 public Lab4d()
13 {
14     VisualElement panelRojo = new VisualElement();
15     VisualElement panelAmbar = new VisualElement();
16     VisualElement panelVerde = new VisualElement();
17
18     panelRojo.style.width = 100;
19     panelRojo.style.height = 100;
20     panelRojo.style.backgroundColor = Color.red;
21
22     panelAmbar.style.width = 100;
23     panelAmbar.style.height = 100;
24     panelAmbar.style.backgroundColor = Color.blue;
25
26     panelVerde.style.width = 100;
27     panelVerde.style.height = 100;
28     panelVerde.style.backgroundColor = Color.blue;
29
30     hierarchy.Add(panelRojo);
31     hierarchy.Add(panelAmbar);
32     hierarchy.Add(panelVerde);
33 }
```

Custom Controls



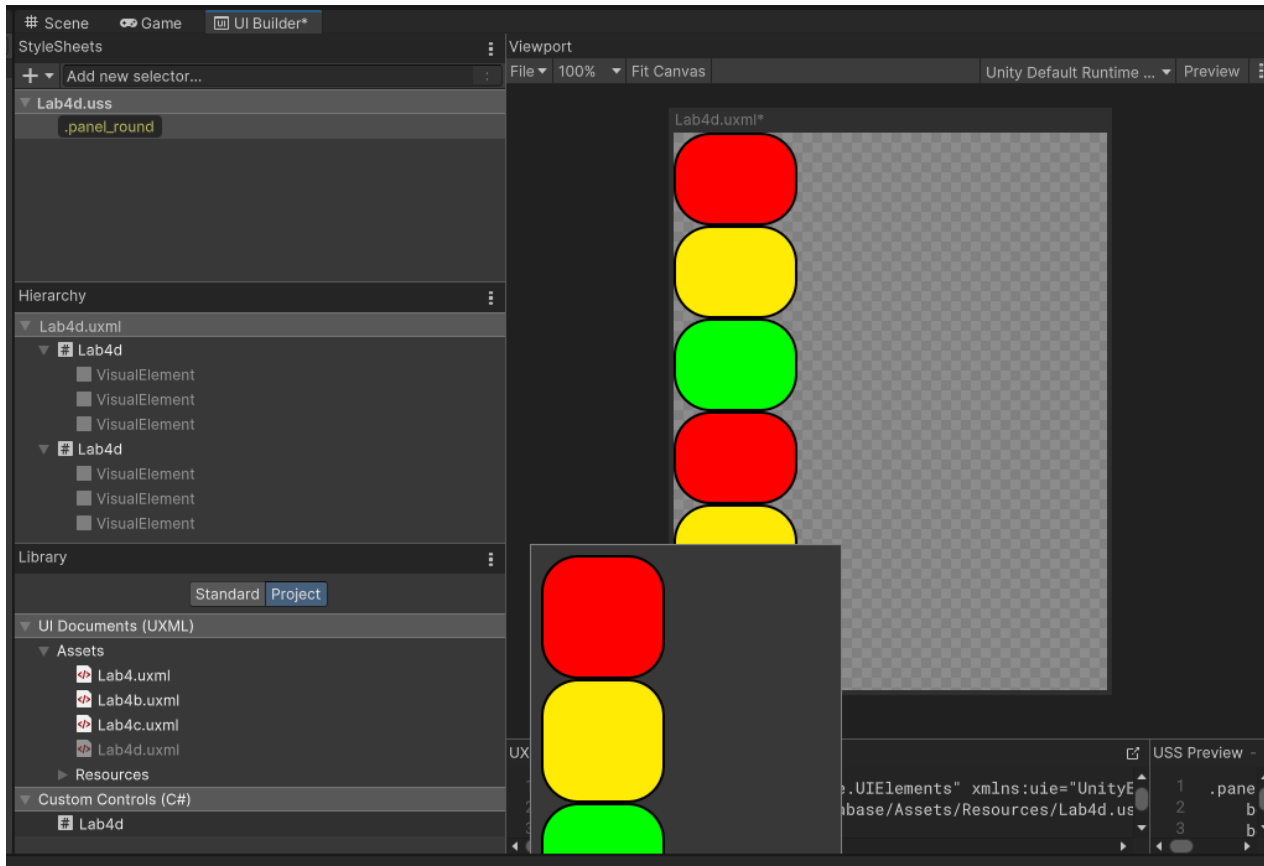
Custom Controls



Custom Controls

```
Lab4c.cs  Lab4d.cs  X
Assets > Lab4d.cs > Lab4d
1  using UnityEngine;
2  using UnityEngine.UIElements;
3
4  2 references
5  public class Lab4d : VisualElement
6
7  0 references
8  public new class UxmlFactory : UxmlFactory<Lab4d>{};
9
10 0 references
11 public Lab4d()
12 {
13     VisualElement panelRojo = new VisualElement();
14     VisualElement panelAmbar = new VisualElement();
15     VisualElement panelVerde = new VisualElement();
16
17     panelRojo.style.width = 100;
18     panelRojo.style.height = 100;
19     panelRojo.style.backgroundColor = Color.red;
20
21     panelAmbar.style.width = 100;
22     panelAmbar.style.height = 100;
23     panelAmbar.style.backgroundColor = Color.yellow;
24
25     panelVerde.style.width = 100;
26     panelVerde.style.height = 100;
27     panelVerde.style.backgroundColor = Color.green;
28
29     styleSheets.Add(Resources.Load<StyleSheet>("Lab4d"));
30
31     panelAmbar.AddToClassList("panel_round");
32     panelRojo.AddToClassList("panel_round");
33     panelVerde.AddToClassList("panel_round");
34
35     hierarchy.Add(panelRojo);
36     hierarchy.Add(panelAmbar);
37     hierarchy.Add(panelVerde);
38 }
```

Custom Controls



Semáforo

```
Assets > Lab4d.cs > Lab4d > Estado
1 using UnityEngine;
2 using UnityEngine.UIElements;
3
4 public class Lab4d : VisualElement
5 {
6     VisualElement panelRojo = new VisualElement();
7     VisualElement panelAmbar = new VisualElement();
8     VisualElement panelVerde = new VisualElement();
9     int estado;
10    public int Estado
11    {
12        get => estado;
13        set{
14            estado = value;
15            encenderColor();
16        }
17    }
18    void encenderColor()
19    {
20        panelRojo.style.backgroundColor = new Color(0.27f,0f,0f);
21        panelAmbar.style.backgroundColor = new Color(0.27f,0.27f,0f);
22        panelVerde.style.backgroundColor = new Color(0f,0.27f,0f);
23
24        if (Estado==0){panelRojo.style.backgroundColor = Color.red;}
25        if (Estado==1){panelAmbar.style.backgroundColor = Color.yellow;}
26        if (Estado>1){panelVerde.style.backgroundColor = Color.green;}
27    }
```

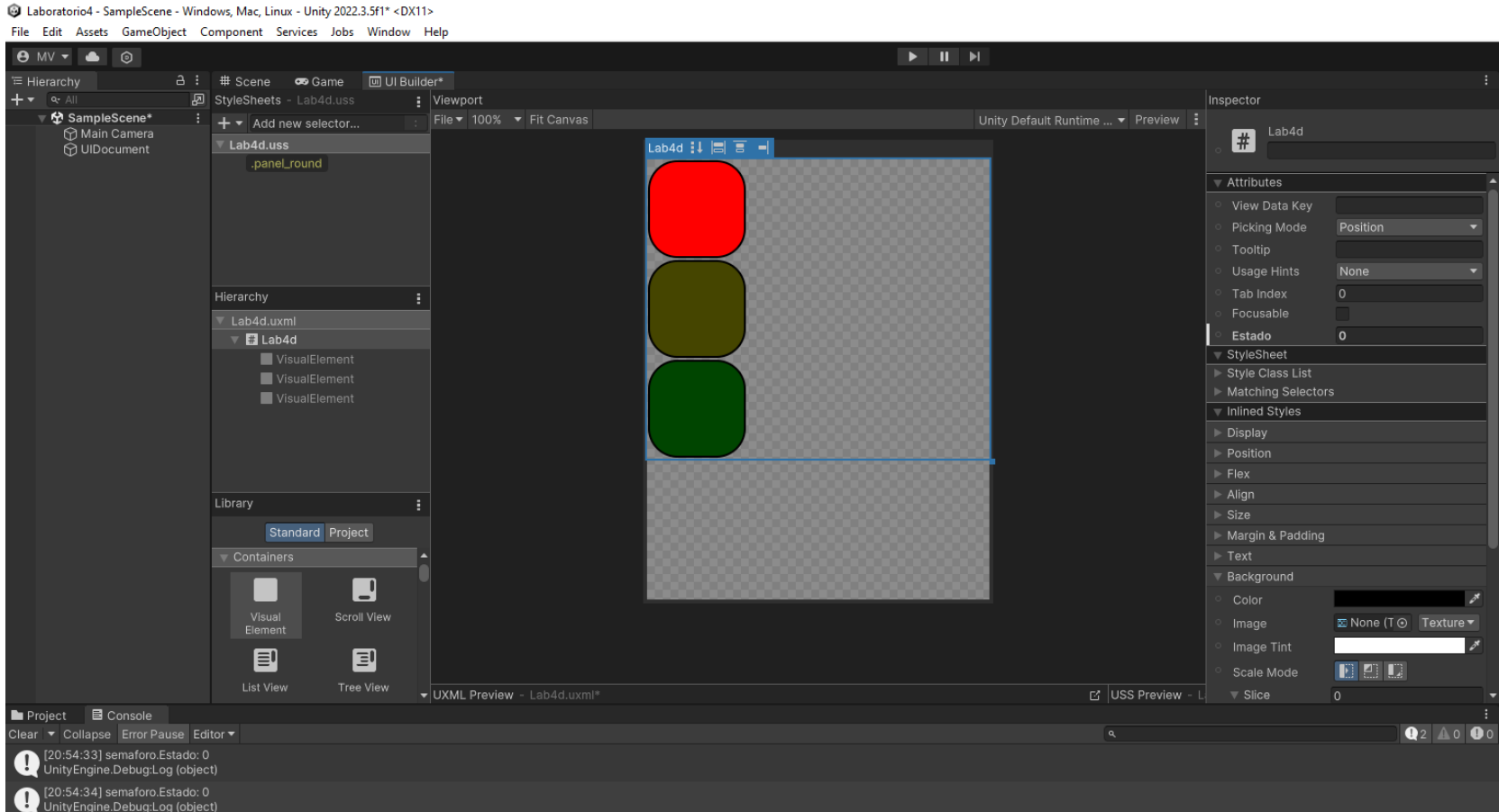
Semáforo

```
0 references
28 public new class UxmlFactory : UxmlFactory<Lab4d, UxmlTraits>{};
29
1 reference
30 public new class UxmlTraits : VisualElement.UxmlTraits
31 {
    1 reference
32     UxmlIntAttributeDescription myEstado = new UxmlIntAttributeDescription{name = "estado", defaultValue = 0};
33
    0 references
34     public override void Init(VisualElement ve, IUxmlAttributes bag, CreationContext cc)
35     {
36         base.Init(ve, bag, cc);
37         var semaforo = ve as Lab4d;
38         semaforo.Estado = myEstado.GetValueFromBag(bag, cc);
39         Debug.Log("semaforo.Estado: " + semaforo.Estado);
40     }
41 }
```

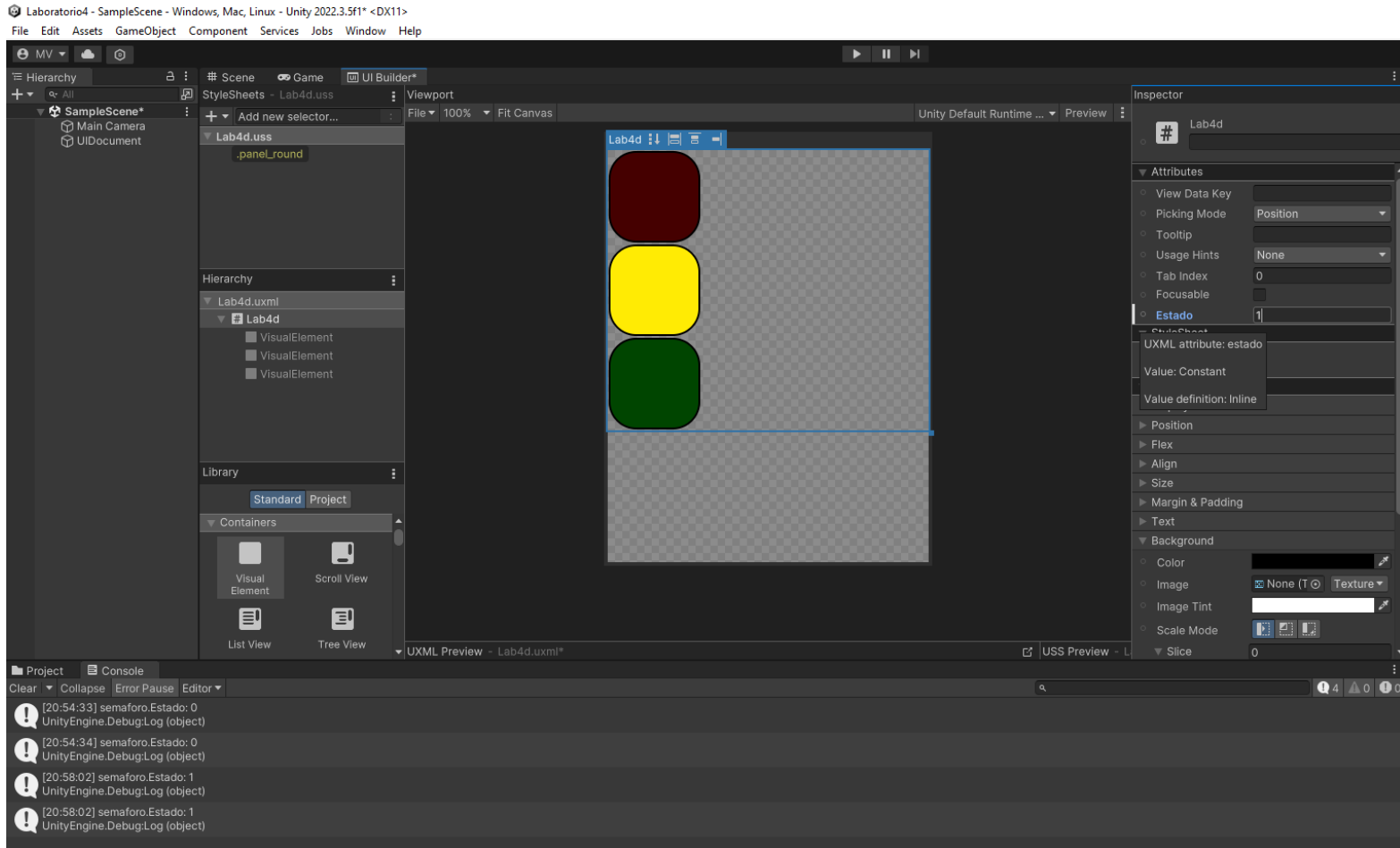
Semáforo

```
0 references
42 public Lab4d()
43 {
44
45     panelRojo.style.width           = 100;
46     panelRojo.style.height          = 100;
47
48     panelAmbar.style.width           = 100;
49     panelAmbar.style.height          = 100;
50
51     panelVerde.style.width           = 100;
52     panelVerde.style.height          = 100;
53
54     styleSheets.Add(Resources.Load<StyleSheet>("Lab4d"));
55
56     panelAmbar.AddToClassList("panel_round");
57     panelRojo.AddToClassList("panel_round");
58     panelVerde.AddToClassList("panel_round");
59
60     hierarchy.Add(panelRojo);
61     hierarchy.Add(panelAmbar);
62     hierarchy.Add(panelVerde);
63 }
64
65 }
66
```

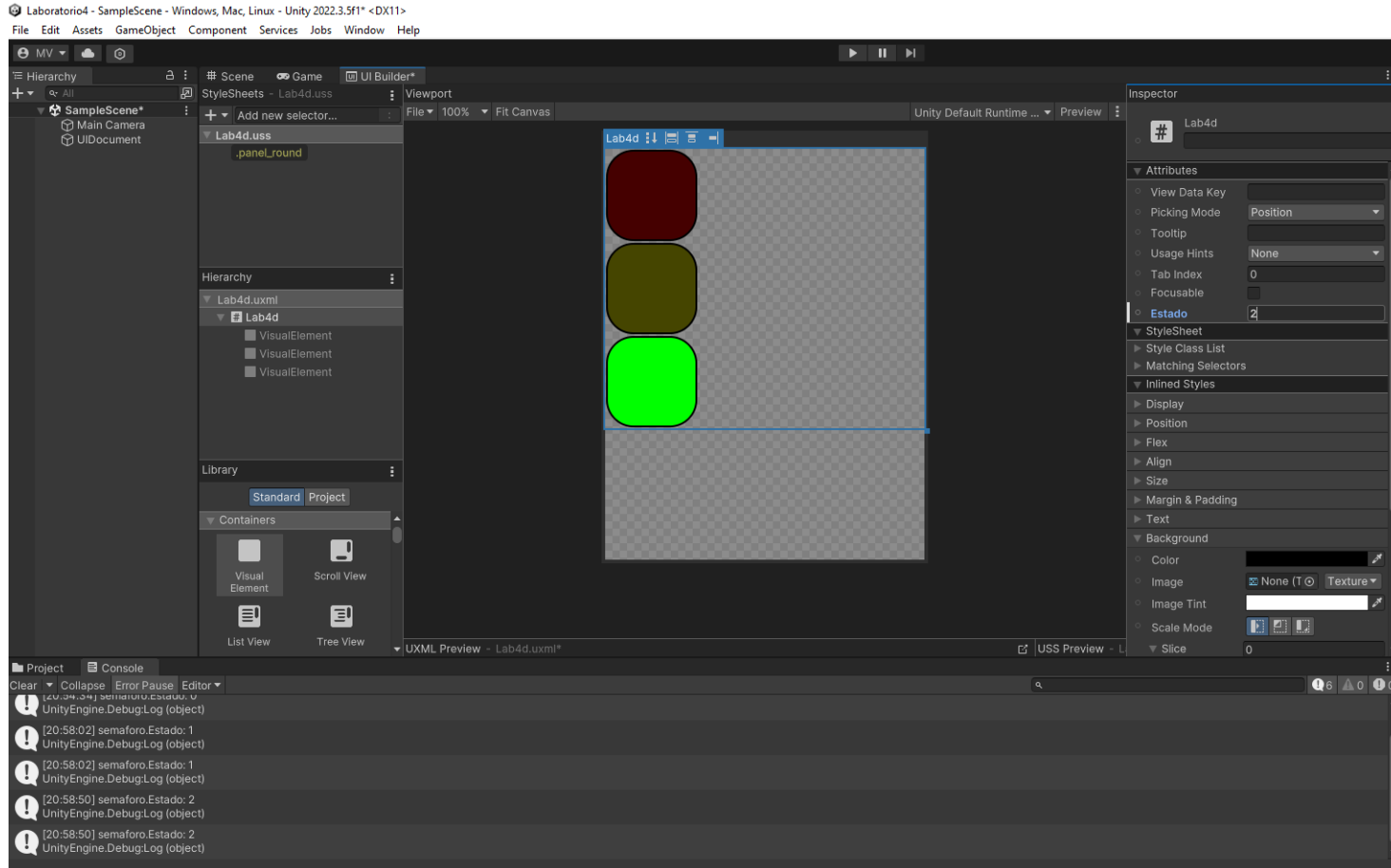
Semáforo



Semáforo



Semáforo



Práctica 4

- Agregar texto enriquecido al proyecto de la práctica 1.
- Crear un *Template* con varios elementos visuales y utilizando pseudo-classes para animar.
- Crear un *Custom Control* para visualizar características de los personajes con un atributo entero que puede variar de 0 a 5 y un atributo string que llevará el nombre del archivo gráfico que usaremos.

- Ejemplos:

- Defensa 3:



- Ataque 2:

