RUNTIME TERRAIN EDITOR V2

Thank you for buying this asset!
This documentation will explain the project structure and will walkthrough over how to modify and add custom content.

Getting Started

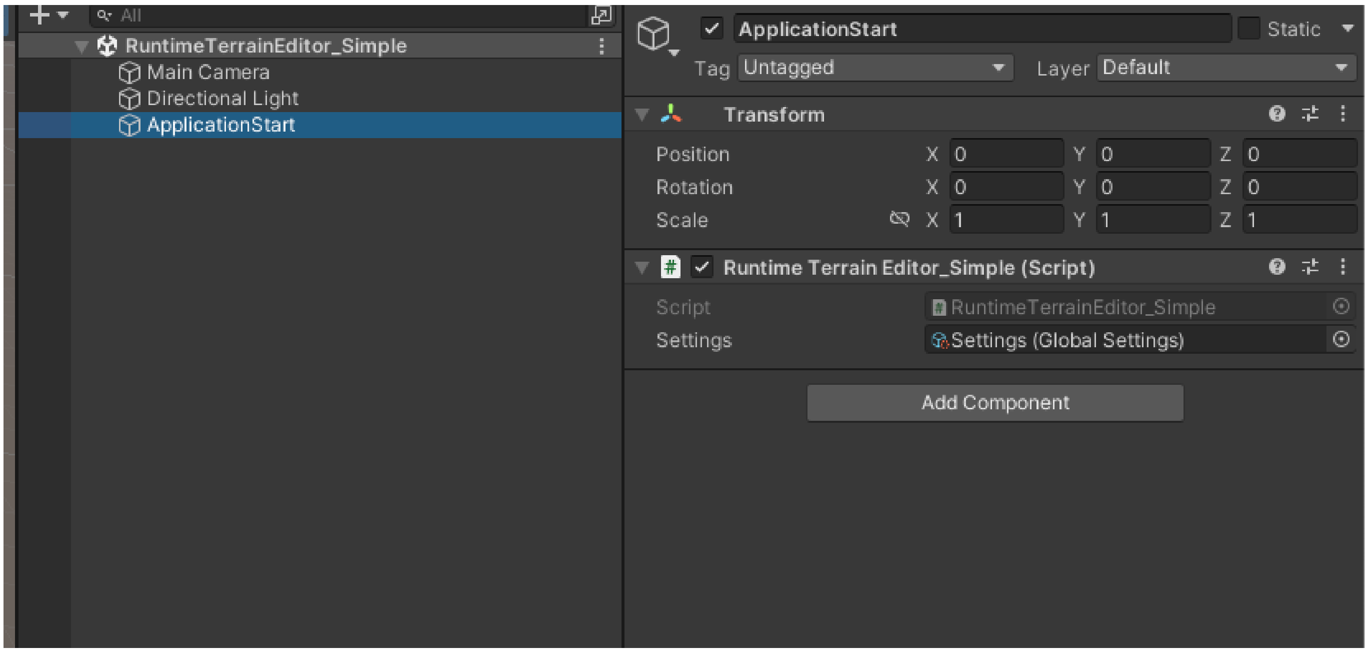
Unity Terrain is a rapid and powerful tool to create your project scene environment. But it's limited to Unity Editor itself. There is no official solution to use it in runtime/playmode.

This package aims to utilize the Unity Terrain API and demonstrate how to make a runtime terrain editor to achive the idea of providing such tools in runtime.

> This project uses Legacy Input and Legacy Unity UI components for the sake of simplicity.

Simple Scene Breakdown

Open the `RuntimeTerrainEditor_Simple` from the `Scenes` folder.



ApplicationStart
Tag Untagged Layer Default

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

Runtime Terrain Editor_Simple (Script)
Script RuntimeTerrainEditor_Simple
Settings Settings (Global Settings)

The simple scene is a programmatic example that demonstrates the basic features of the project.

Now if you play, you can raise heights with pointer.

Let's take a look into code.

```
//  Scripts/Examples/RuntimeTerrainEditor_Simple.cs
public class RuntimeTerrainEditor_Simple : MonoBehaviour
{
    //  contains terrain configurations
    public GlobalSettings settings; //  assigned from the scene

    private RuntimeTerrain _rt;
    private void Start()
    {
        //  add component
        _rt = gameObject.AddComponent<RuntimeTerrain>();    //  1

        //  assign settings and initiliaze
        _rt.settings = settings;                            //  2
        _rt.Init(Camera.main);

        //  configure brush
        _rt.SetMode(BrushMode.RAISE);                       //  3
        _rt.SetBrushSize(40);
        _rt.SetBrushStrength(Constants.MAX_BRUSH_STRENGTH);

        //  terrain created callback
        _rt.OnTerrainCreated += OnCreated;                  //  4

        //  create a grid of terrain by size
        _rt.SetTerrainSize((int)TerrainSize.Size128);

        //  create a 4x4 grid (total 512 x 512)
        _rt.CreateGrid(4, 4);                               //  5

        //  or create a single terrain 512 x 512
        // _rt.SetTerrainSize((int)TerrainSize.Size512);
        // _rt.CreateTerrain(0,0);                          //  6
    }

    private void OnCreated(Terrain terrain)
    {
        terrain.name = "Terrain " + _rt.Terrains.Count;
    }

    private void FixedUpdate()
    {
        //  left mouse click
        if (Input.GetMouseButton(0))
        {
            //  stroke brush
            _rt.UseBrushAtPointerPosition();                //  7

            //  or provide which terrain to modify
            //  and the modify position(as world position)
            // _rt.UseBrush(someTerrain, somePosition);     //  8
        }
    }
}
```

1. Add `RuntimeTerrain` to the gameObject.
2. Set settings and initiliaze. Component will use settings file values to initialize the defaults.

> Without settings object RuntimeTerrain will raise an exception.

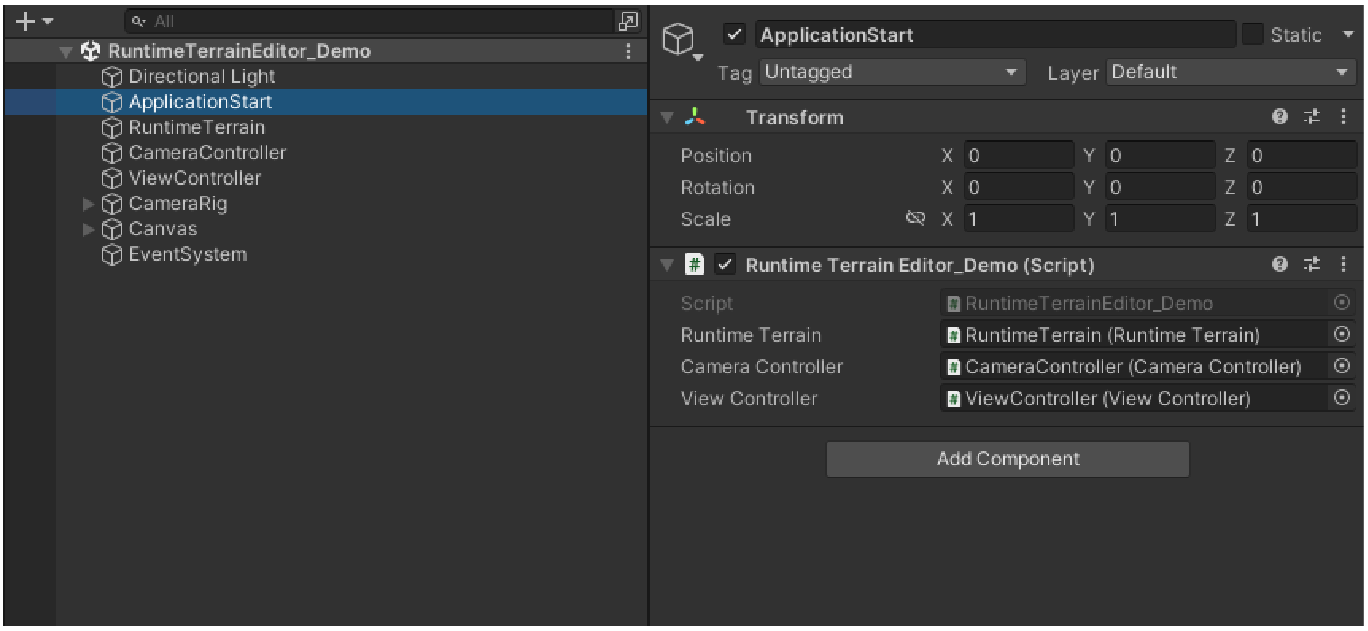
3. Set modify mode, change brush size and strength.
4. Set a callback to notified when a terrain created.
5. Create a grid of terrain.
6. Alternative to CreateGrid method. Create terrain patches manually.
7. Use brush with current mode and properties by Input.mousePosition and raycast.
8. Alternatively handle modifying manually. You might need to use it other than pointer position.

> Note that position must be world position, internally it'll check brush size and will modify neigbors if needed.

Demo Scene Breakdown

Open the RuntimeTerrainEditor_DemoScene from the Scenes folder.

Let's take a look into the scene hierarchy.



RuntimeTerrainEditor_Demo
- Directional Light
- ApplicationStart
- RuntimeTerrain
- CameraController
- ViewController
- CameraRig
- Canvas
- EventSystem

ApplicationStart — Static
Tag: Untagged — Layer: Default

Transform

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

Runtime Terrain Editor_Demo (Script)

Script	RuntimeTerrainEditor_Demo
Runtime Terrain	RuntimeTerrain (Runtime Terrain)
Camera Controller	CameraController (Camera Controller)
View Controller	ViewController (View Controller)

Add Component

ApplicationStart

Demo entry point. Initializes the controllers and RuntimeTerrain.

Let's follow the code and scene setup.

```
//  Scripts/Examples/RuntimeTerrainEditor_Demo.cs
public class RuntimeTerrainEditor_Demo : MonoBehaviour
{
    //  scene referecences
    public RuntimeTerrain runtimeTerrain;
    public CameraController cameraController;
    public ViewController viewController;

    private InputController _inputController;

    private void Start()
    {
        Application.targetFrameRate = 60;

        runtimeTerrain.Init(Camera.main);                       //  1
        cameraController.Init(Camera.main);
        viewController.Init(runtimeTerrain);
        _inputController = new InputController(runtimeTerrain);

        runtimeTerrain.OnTerrainCreated += OnTerrainCreated;    //  2

        int startColumn = runtimeTerrain.settings.startColumnCount;
        int startRow    = runtimeTerrain.settings.startRowCount;
        int startSize   = (int)runtimeTerrain.settings.size;

        runtimeTerrain.CreateGrid(startColumn, startRow, startSize);//  3
    }

    private void OnTerrainCreated(Terrain terrain)
    {
        //  set terrain custom properties here
        //  name, material, etc.
        terrain.name = "Terrain_" + runtimeTerrain.Terrains.Count;
    }

    private void FixedUpdate()
    {
        //  check if player is interacting with a ui object(input field
etc.)
        if (EventSystem.current.currentSelectedGameObject != null)
        {
            return;
        }

        _inputController.ListenInputs();                        //  4
    }

    private void LateUpdate()
    {
        cameraController.ListenInputs();                        //  5
    }
}
```

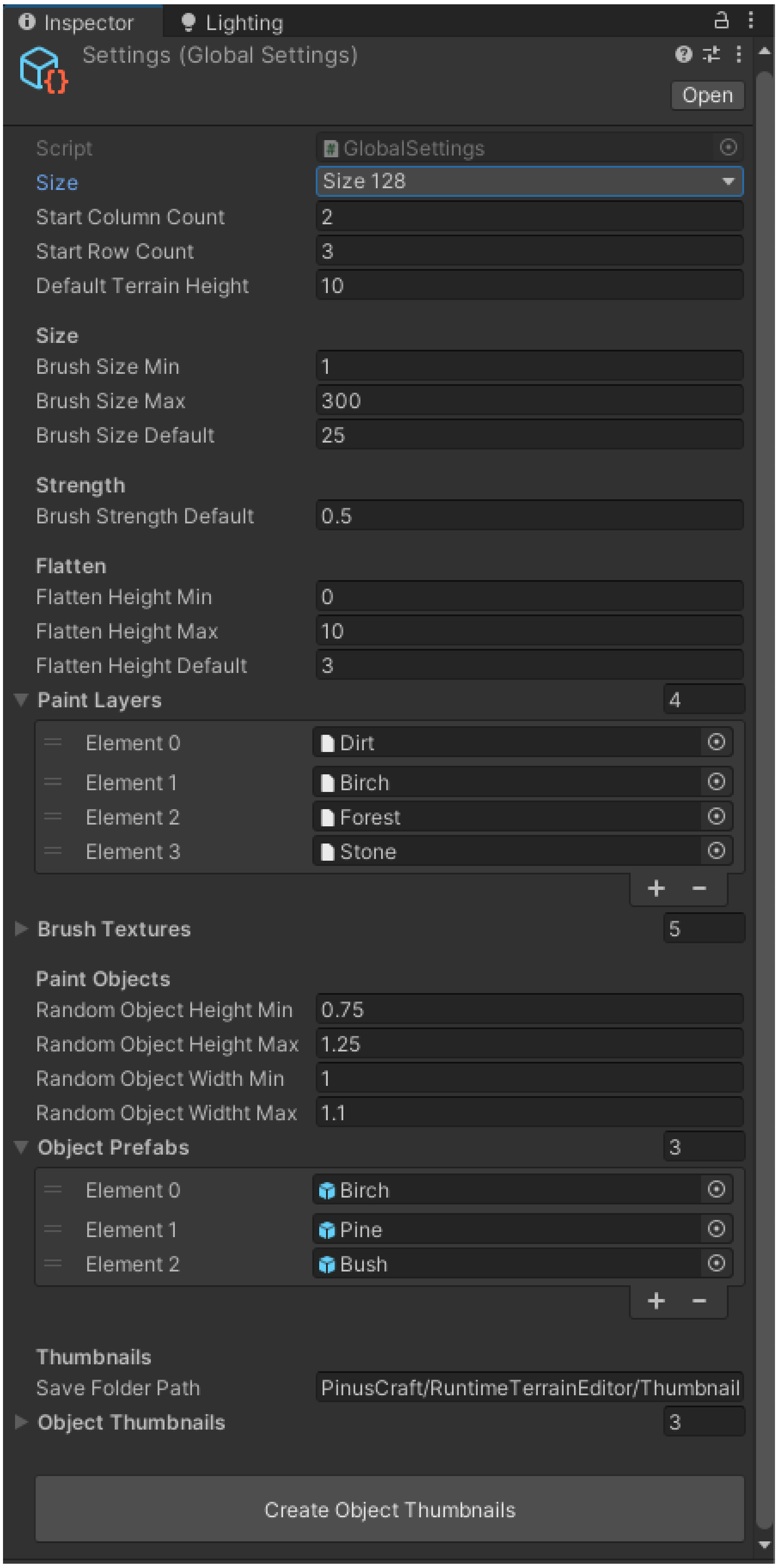
1. Initiliaze controllers.
2. Set a callback to get notified when a terrain created.
3. Get size values from settings and generate a grid of terrain.
4. Listen modify inputs.
5. Listen camera inputs.

Fundamentaly, this scene follows the same flow as simple scene. But in this scene,

- `CameraController` handles camera movement.
- `InputController` listens inputs and registering undo-redo stack by `CommandHistory`.

- `ViewController` handles ui inputs, populates ui values by settings and applies ui inputs to `RuntimeTerrain`.

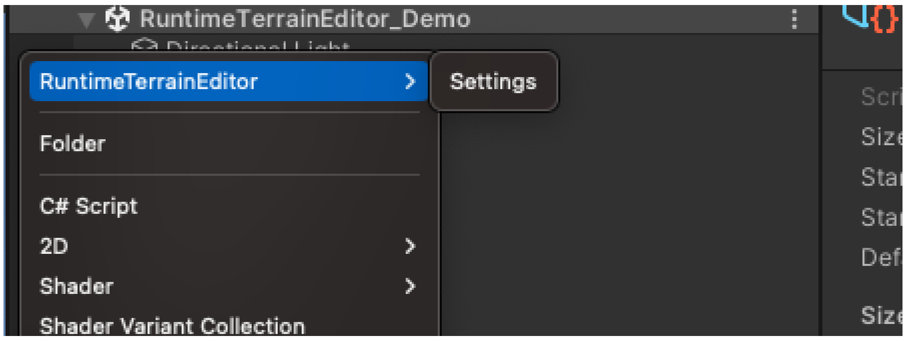
Settings



Script	GlobalSettings
Size	Size 128
Start Column Count	2
Start Row Count	3
Default Terrain Height	10
Size	
Brush Size Min	1
Brush Size Max	300
Brush Size Default	25
Strength	
Brush Strength Default	0.5
Flatten	
Flatten Height Min	0
Flatten Height Max	10
Flatten Height Default	3
Paint Layers	4
Element 0	Dirt
Element 1	Birch
Element 2	Forest
Element 3	Stone
Brush Textures	5
Paint Objects	
Random Object Height Min	0.75
Random Object Height Max	1.25
Random Object Width Min	1
Random Object Widtht Max	1.1
Object Prefabs	3
Element 0	Birch
Element 1	Pine
Element 2	Bush
Thumbnails	
Save Folder Path	PinusCraft/RuntimeTerrainEditor/Thumbnail
Object Thumbnails	3

Settings is an asset available as ScriptableObject to provide editing functionality. `ViewController` and `RuntimeTerrain` initializes the settings values.

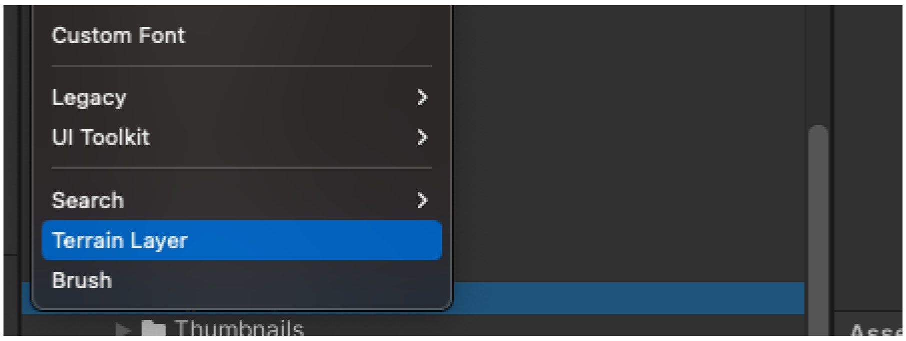
It is also possible to create multiple settings asset in your project. You can create a new settings asset from create menu shown below:



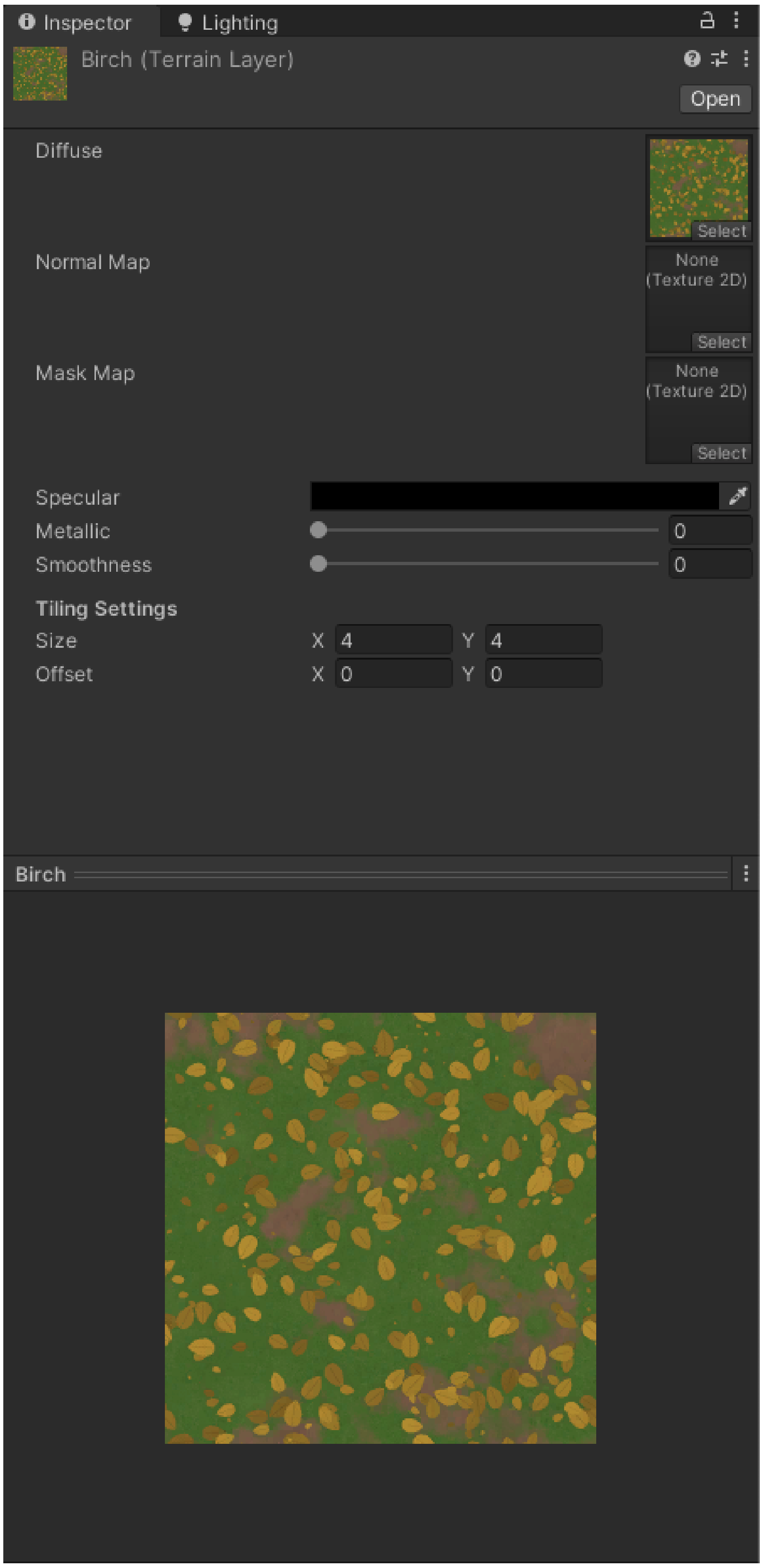
Paint Layers

This project uses standart Unity Terrain Layers for paint. This list will be appear in view by order.

To create a new layer, open Create menu in project panel and click Terrain Layer like shown below:



Here is an example terrain layer shown below at `Terrain/Layers/Birch`


Inspector
Lighting
Birch (Terrain Layer)
Open
Diffuse
Select
Normal Map
None (Texture 2D)
Select
Mask Map
None (Texture 2D)
Select
Specular
Metallic 0
Smoothness 0
Tiling Settings
Size X 4 Y 4
Offset X 0 Y 0
Birch

Brush Textures

`RuntimeTerrain` will read grayscale information from the source texture. This list will be appear in view by order.

Any texture resolution could be used since active brush texture will be scaled down or up by current brush size.

Object Prefabs

This project uses TreePrototype to register prefabs to Terrain and TreeInstance to place on terrain.

You can add your custom prefabs to use in editor.

Note that Unity Terrain requires LOD setup to place any GameObject. This prefabs will appear in `ToolView` in order of this list.

Object Thumbnails

Thumbnail textures will be used by prefab index. If no index found, it will appear white color.

To create thumbnails, you can use `Create Object Thumbnails` button. Generated textures will be saved to path provided at settings(`Save Folder Path` field), afterwards they'll be initialized to this list.

Save and Load

Default save file extension is ".RUNTIMEMAP".
Default save file directory is `Application.persistentDataPath`

See `Constants.cs` file to modify default values.

Serialization

`Serialization` is a static class which can serialize and deserialize any object.
Check for more information `BinaryFormatter`.

Here is a simple example:

```
class MyClass
{
    public int someValue;
    public string[] someOtherValues;
}


var example = new MyClass()
{
    someValue = 22,
    someOtherValues = new string[] { "any", "info", "here"}
}

bytes[] bytes = Serialization.Serialize<MyClass>(example);

...

Myclass result = Serilalization.Deserialize<MyClass>(bytes);
```

> `Serialize` method uses compression to lower the result file size. For more info `GZipStream`.

Maps with size lower than 1024 will likely result a file size below 1MB.

FileUtility

This class provides helper methods to read, write and delete files. Example below shows the save, load and delete process of a map.

```
//  ViewController.cs
private void OnSave()
{
    var path = GetSavePath(savePanelView.nameField.text);
    var data = _runtimeTerrain.Export();
    var bytes = Serialization.SerializeCompressed<TerrainFileData>(data);

    FileUtility.SaveToPath(path, bytes);

    ReloadMapFiles();
}

private void OnLoad(FileInfo info)
{
    var bytes = FileUtility.LoadFromPath(info.FullName);
    var map = Serialization.DeserializeCompressed<TerrainFileData>(bytes);

    _runtimeTerrain.Import(map);
    CheckAndDisplaySize(map.mapSize);
}

private void OnDelete(FileInfo info)
{
    FileUtility.DeleteFileAtPath(info.FullName);

    ReloadMapFiles();
}
```