RTS Building Placement System

Version 2.0

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Change History:

-Changed a lot of code while maintaining functionality.
-Merged PlaceableHighlighter.cs into PlaceableCollisionDetector.
-Added a new “Highlight” layer.
This let us highlight other buildings in the scene only when they collide with the selected building.
-Added drag and drop, NGUI demo scene and mobile support.

Overview:

RTS Building Placement system is a useful system for handling the placement of buildings in tower defense and real-time strategy games.
The system is divided into several components for easy expansion and customization as i tried to decouple the components as much as i can.

System Components:

Placement Manager.cs

The Placement Manager is responsible from setting up the parameters of the system and instantiating the building prefab when the **SelectBuilding(name)** is invoked.
Also the caching of every materials array in every renderer found in the placeablesList are cached at the Start() function.

Grid Snap	A boolean variable for enabling/disabling grid snapping
Grid Size	Grid spacing offset
Max Gradient Angle	Maximum allowed terrain slope under selected building
Highlight Color	Color used to highlight illegal building place
Rotation Key	Keyboard key used to rotate the building 45 degree
Placement Layer	Layer used to ignore terrain or ground collision
Highlight Layer	Only objects with this layer will be highlighted
Placeables List	An array containing building prefabs that you want to place

Placeable.cs

The placeable component is sort of like a controller of the placement process.
The first task is to continuously update the position according to mouse position.
The next task is to communicate with all the required components (slope detector, collision detector and highlighter) and when place is legal, the selected building is placed. And last task checks for keyboard keys like rotate building key and cancel placement key.

PlaceableCollisionDetector.cs

Responsible from detecting collisions and highlight the selected building.

PlaceableSlopeDetector.cs

is the script that is responsible from detecting terrain slope by using and calculating multiple slope angles that are placed on the borders of the building box collider and comparing each angle with the maximum gradient angle that is set at the manager component. If any of the angles is greater than the maximum angle then the slope is illegal and therefore no building placement is allowed.
The component notifies the highlighting component about the illegal slope so that a highlighting is applied whenever our building is above steep terrain.

Highlighting

The highlighting/unhighlighting is done based on informations received from slope and collision detection systems.
Highlighting conditions:
1-Steep terrain: highlight the selected building.
2-Collision: highlight selected building and other collided building/s.
3-Steep terrain and collision: highlight the building once and highlight other buildings.

highlighting the placeable building is done in collision detector component, where highlighting other buildings in the scene is done in OtherHighlighter.cs

BuildingConstruction.cs

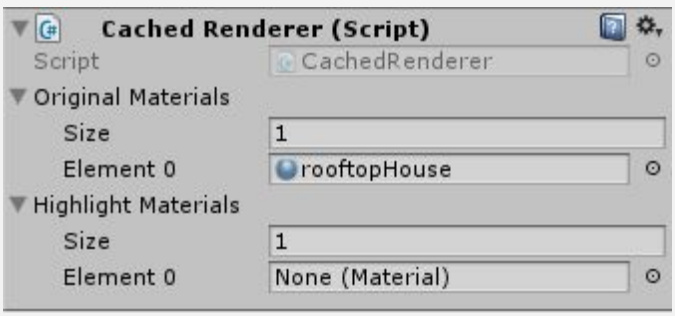
The building construction component is divided into two parts:
1- UI slider:
The **UI slider** animates the construction progress starting from **0** up to **construction time** value that is set in BuildingInfo.cs**.**
The UI slider is configured to be placed above the building BoxCollider top y bounds.
2- construction prefabs:
Construction prefabs animate the construction progress using four prefabs that is instantiated every 25% of total construction time, starting from 0 to give a more realistic construction animation just like in famous strategy games.

*If you don't want construction prefabs animation for a building just set the Boolean "Enable Stages" to false and "construction Stages" to 0 in the inspector of BuildingInfo.cs

Or you can skip both the slider and prefabs animation by deleting this code **gameObject.addComponent<BuildingConstruction>()** from Placeable.cs

BuildingInfo.cs : Store building construction information such as time to complete construction and construction prefabs that is used to animate building progress.

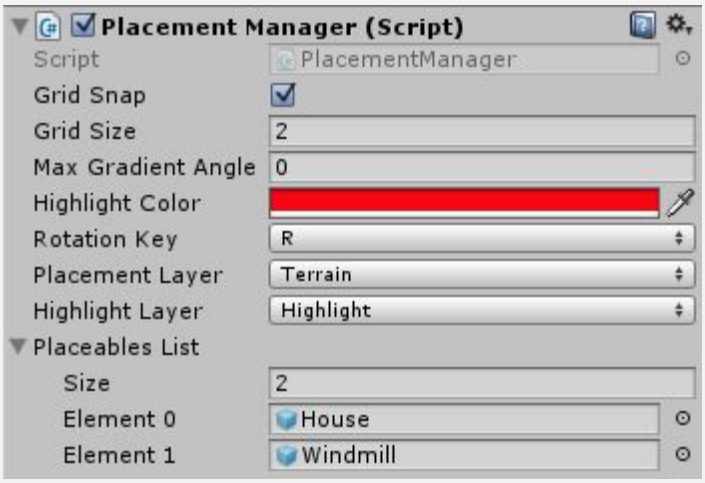
CachedRenderer.cs :
This script is attached to each renderer in a gameobject and its childrens.
It contains two arrays, one for storing the original materials and another one for storing highlighted materials.
The caching of the materials is done using a function called **CacheMaterials()**
Caching placeable buildings is done in PlacementManager.cs, which cache each renderer in a gameobject (including children) found in the placeables List before the game starts.
For other buildings in the scene, the OtherHighlighter.cs is responsible from caching the renderers materials.



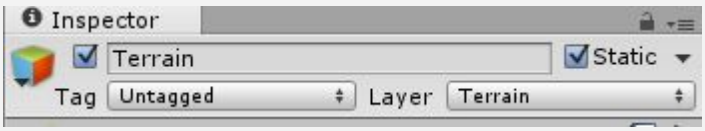
PlacementUtilities.cs : A set of functions used by the tool.

How to use:

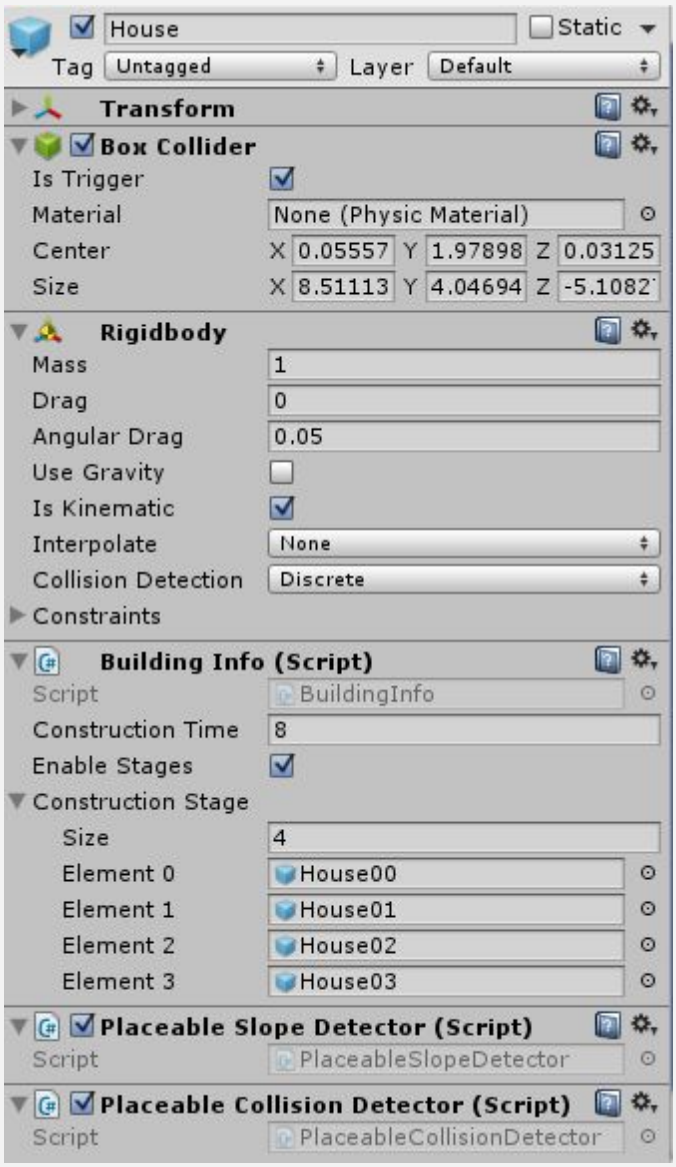
1-Setup the placement manager
this manager is mandatory for any style of placement, so add the PlacementManager.cs to an empty gameObject in the hierarchy and make sure you setup the layers and the prefabs



2-Setup your terrain layer to “Terrain”



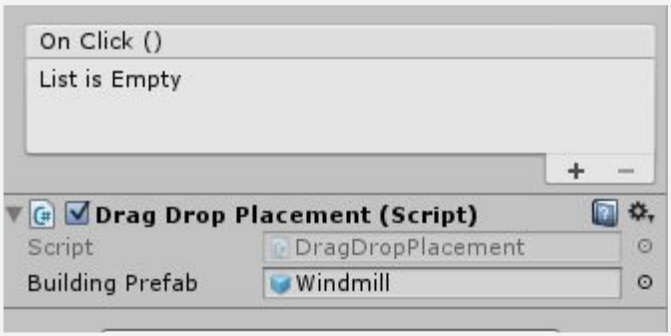
3-Prefabs configuration:
add the following components to your own custom building prefab
-BoxCollider and adjust the size of it, also make sure you tick the isTrigger
-Rigidbody and uncheck useGravity and make sure you tick the isKinematic
-attach buildingInfo.cs script and set the construction time. Tick the enableStages and assign your prefabs if you want construction progress.
-add PlaceableSlopeDetector.cs and PlaceableCollisionDetector.cs



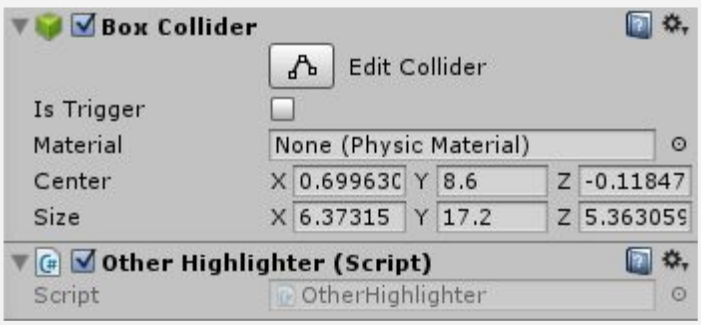
-add the Construction_Canvas(Unity UI) prefab as a child to your building prefab if you want construction progress bar, your prefab hierarchy should be something like this:

your placeable building prefab are now ready!

4-Drag and drop style
attach the DragDropPlacement.cs script to a Unity UI Button, and then assign your building prefab.



5-Highlighting
The highlighting for the placeable building is done automatically, you need to configure the other buildings in your scene that you want to be highlighted upon placeable building collision.
1-Attach the OtherHighlighter.cs script to every gameobject (parent only) that you want to be highlighted.
2-Attach a BoxCollider to the gameobject and adjust its size.



Common issues:

-Placeable not following mouse and is stuck at the world origin:
make sure your terrain layer are set to “Terrain” and are selected in the placement manager inspector.

Support information:

Feel free to contact me at this email any time:
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Best regards,
Fayyad