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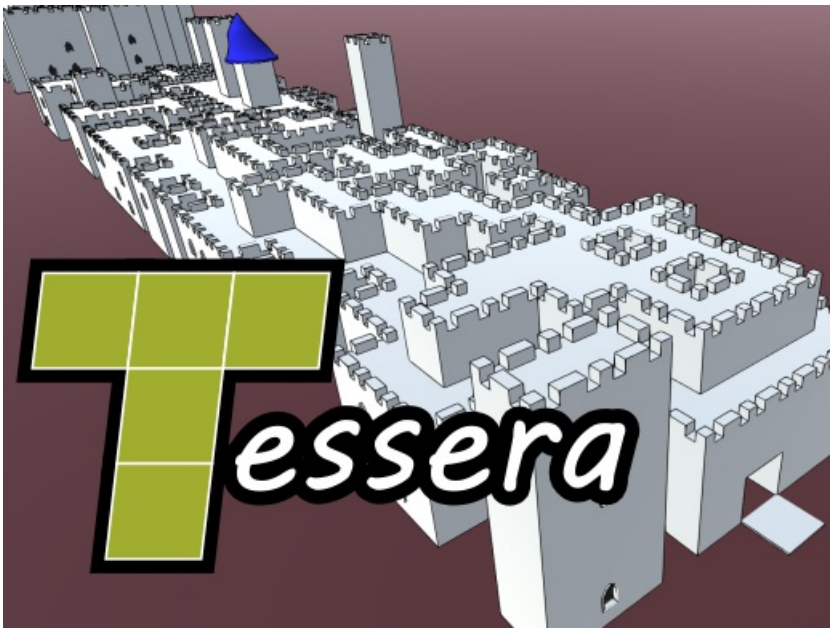


**Tessera** is a Unity addon for procedurally generating 3d tile-based levels and builds. Get it here.

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Tessera works by running the Wave Function Collapse algorithm. This algorithm is a powerful technique for generating maps from complicated tile sets with tight controls on behaviour.

For help, use Discord or post on the Unity forums.

To get started with Tessera 6.0.2, see the introduction.

# Introduction

**Tessera** is a Unity addon for procedurally generating 3d tile-based levels and builds.

Tessera works by running the Wave Function Collapse algorithm. This algorithm is a powerful technique for generating maps from complicated tile sets with tight controls on behaviour.

Tessera is available on the Unity asset store as two different packages. The basic version includes the fundamentals of generations and key features, while the Pro version contains more advanced features. These tutorials cover both, with pro-only features clearly marked.

Tessera has a lot of features. Try the following links for tutorials and an overview of what is available.

- Getting Started Written Tutorial
- Getting Started Video Tutorial
- List of Samples
- Autogenerated API Reference

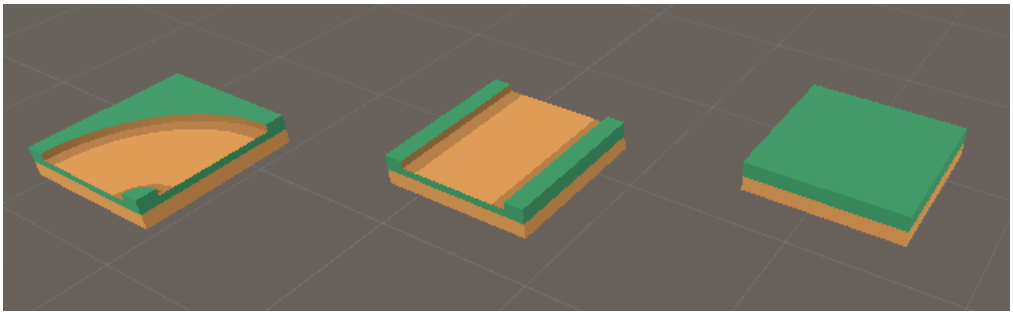
# Getting Started Tutorial

## Setup

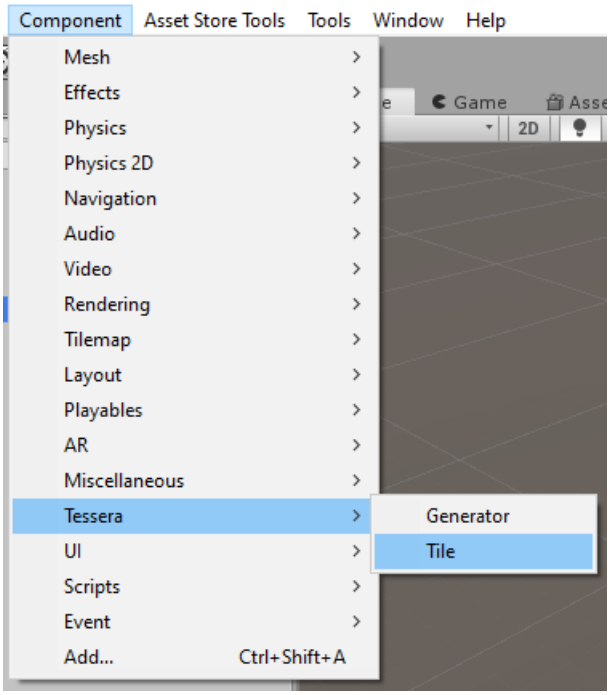
Start a new project. Then download Tessera from the Unity Asset Store and import it to your unity project. For this tutorial, we'll also use use Kenney's Tower Defense Kit so either download that or use the files included in `Samples/GrassPaths/Models`.

## Creating tiles

Lets create some tiles. From the tower defense assets, drag the prefabs for `tile`, `tile_cornerRound` and `tile_straight`. These tiles are a small selection of grass and path tiles.



Then, with those game objects selected, add the `TesseraTile` component from the menu.



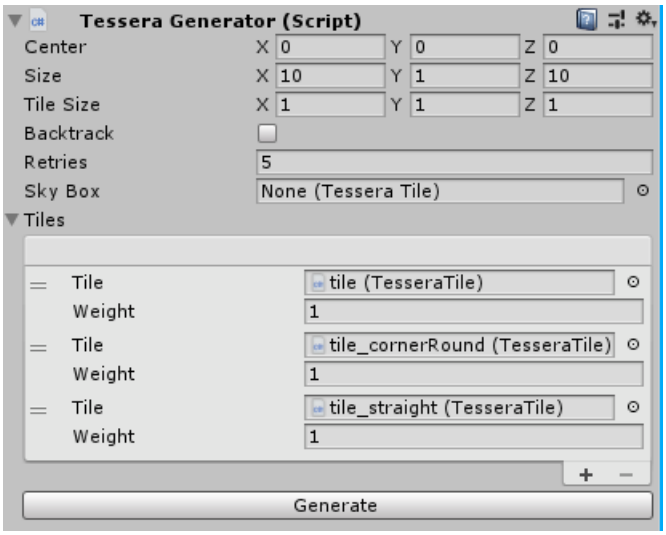

That's all for now, we'll configure the tiles later.

## Creating the generator

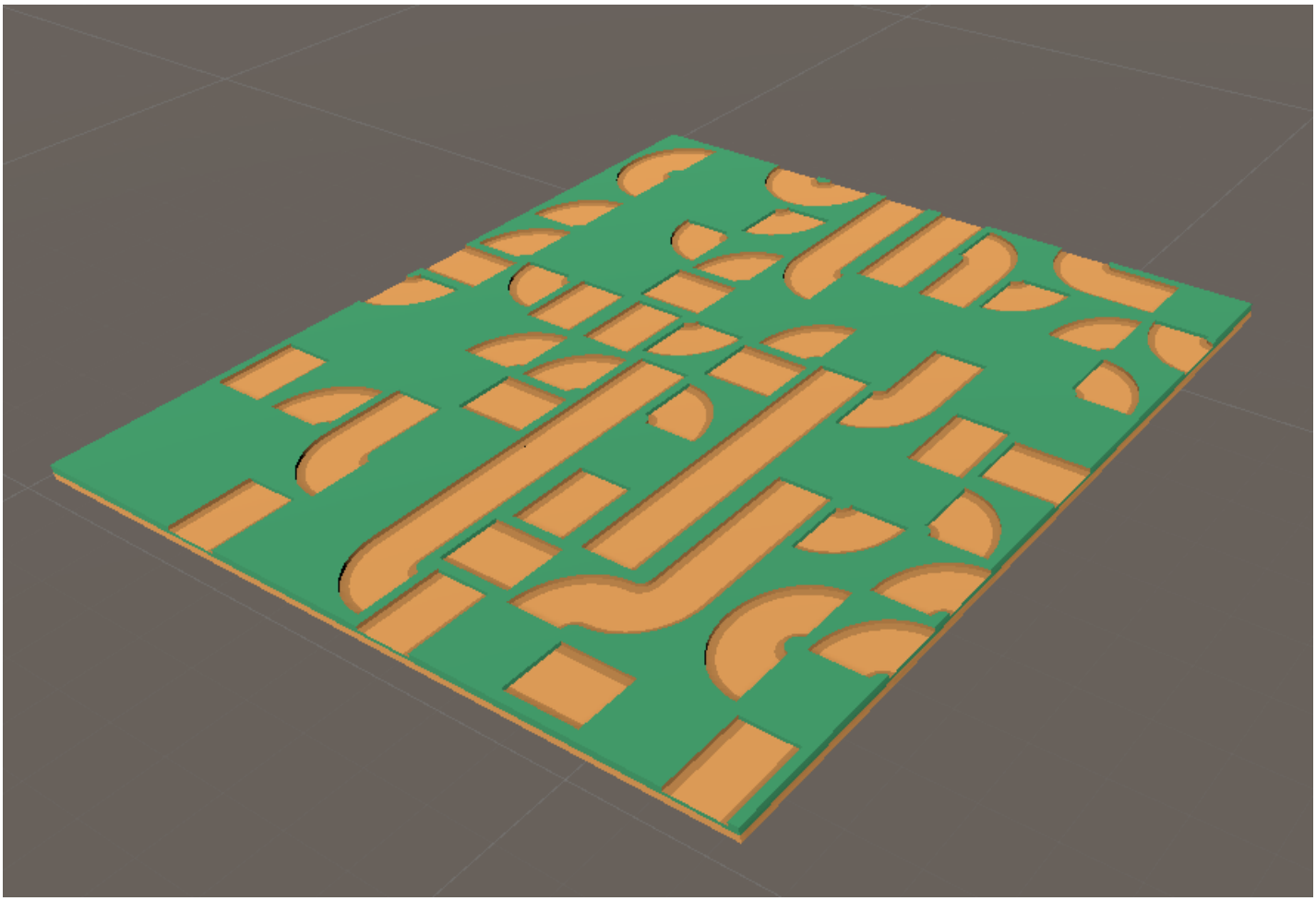
Next, create a new empty GameObject, and give it the `TesseraGenerator` component from the menu. Bring it up in the inspector. Add the tiles we created before to the list of tiles, either by dragging them from the hierarchy onto the Tiles section, or clicking the small plus button and selecting each tile.

Position the generator so that it does not overlap the tiles you created.

Afterwards, your configuation should look like this:




Now press the "Generate" button to create a new arrangement of those three tiles. You should get something looking like this:



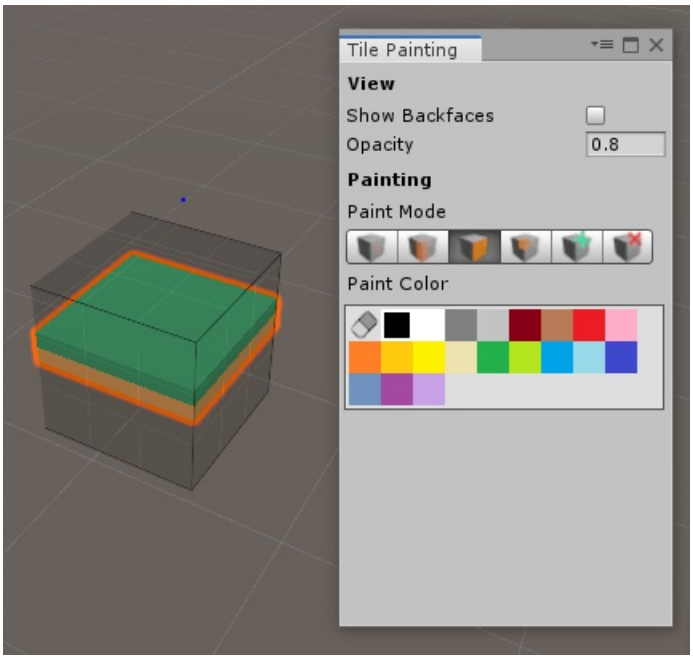
It's generated the tiles, but right now it doesn't know which tiles can be placed next to which other ones. So it has just placed them randomly. Hit undo to delete the created tiles.

To fix this, we need to paint the tiles.

## Tile painting

Select the first tile, called `tile`. In the inspector, click the "paint faces" button.  .

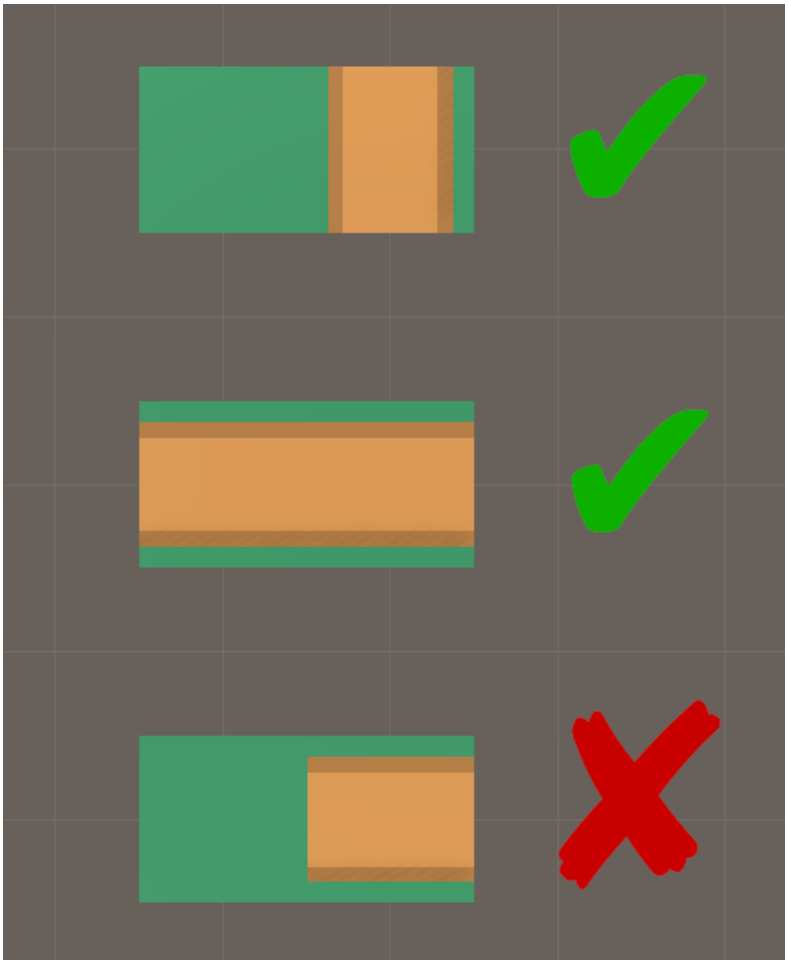
This should pop-up a "Tile Painting" window, and also show a semi-transparent cube around the tile.




You can use these tools to paint different colors onto the tile's cube. First, select a paint color from the palette, the click on the cube to apply that color. If you make a mistake, select the eraser from the palette and clear what has been painted.

**Tiles can only connect to each other if they have matching colors painted on their corresponding faces**. Specifically, each face is divided subdivided into 9 squares. A pair of adjacent tiles are compared by pairing up the squares on the opposing faces, and seeing if they match. Squares match if they are both the same color, or if either square is transparent, though this can be customized with a Palette.

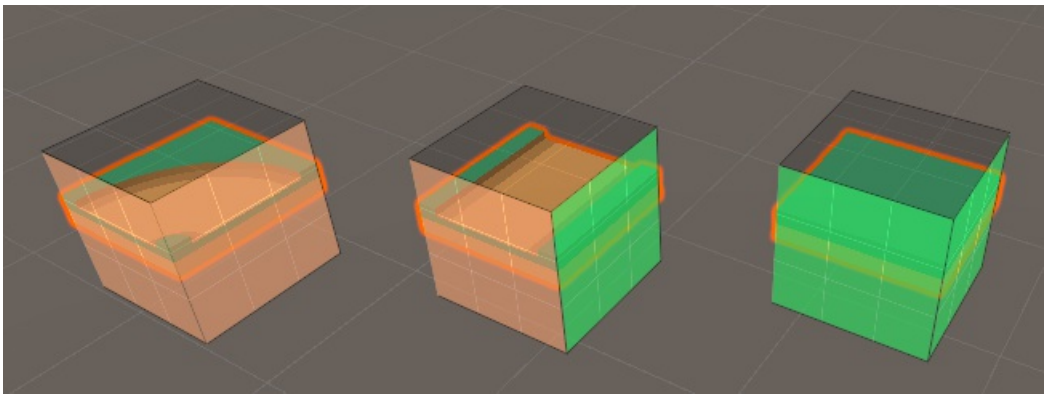
In this case, we want tiles to connect to each other if they are both grassy, or if they are both a path, but do not want paths to lead straight into grass.



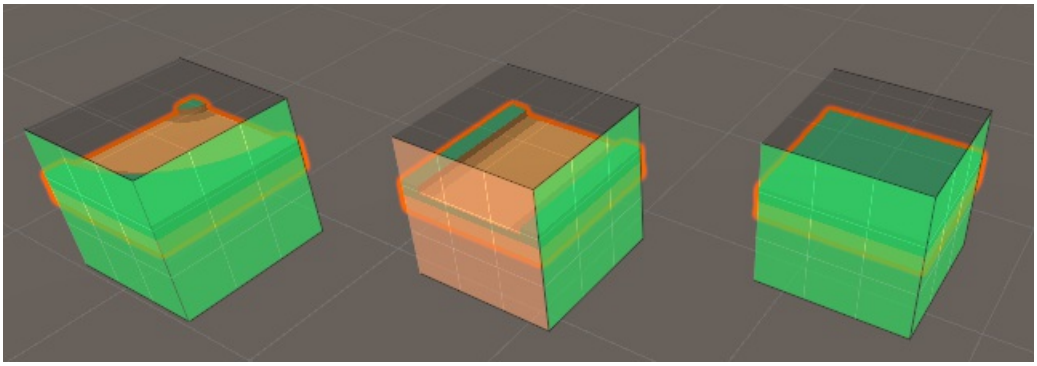
In order to achieve this, we will paint all the grassy faces of each tile green, and all the faces with paths brown. The top and bottom we will leave alone. That will connect grass to grass, paths to paths, and disallow grass connecting to paths.

Paint all 4 sides of the 3 tiles now. Afterwards, you should have three tiles that look like this.

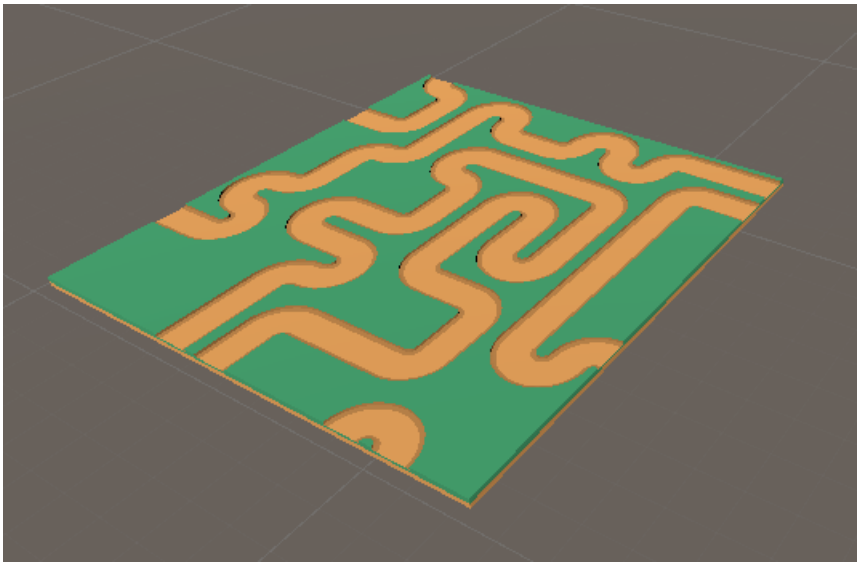
Front view:



Rear view:



Now we can go to the generator and press the "Generate" button again. Make sure you have deleted the tiles it created the first time around as it won't overwrite already generated tiles. If everything is set up correctly, it should look like this.



This concludes the tutorial. From here you can experiment with some of the settings in the inspector, try adding more tiles from the tower defense assets, or read the more advanced tutorials.

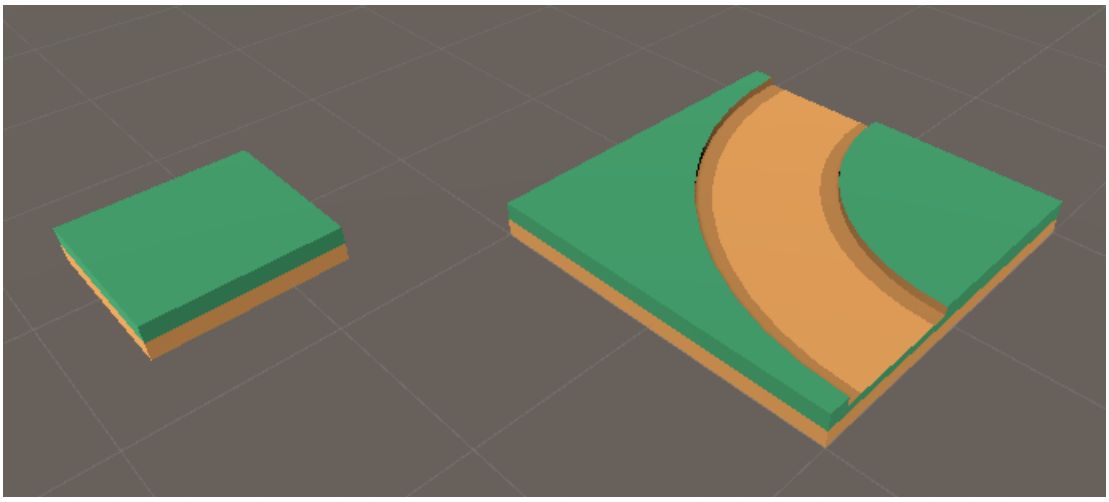
# Big Tiles Tutorial

*This tutorial continues from the Getting Started tutorial. It is recommended you complete that one before starting this.*

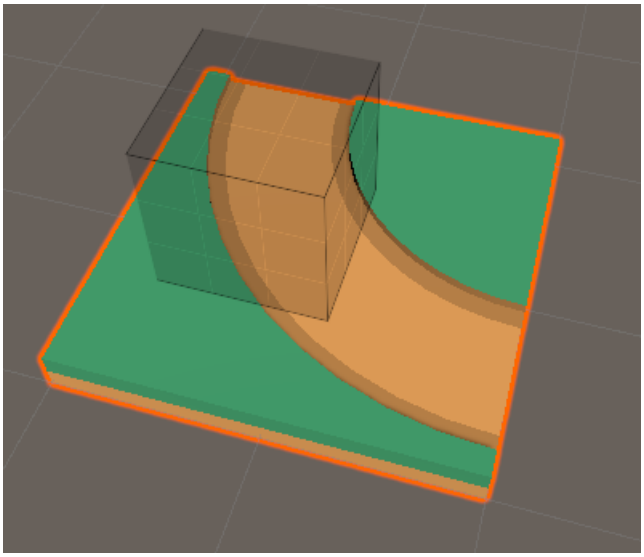
So far we've looked at generating game objects that all have the same size. That is convenient, but the clear grid structure is not always desired. Here we look at one way of addressing that. If normal tiles only occupy one cell in the output, the big tiles can straddle several cells. That means you can design a larger set piece cohesively.

> **NOTE**
>
> Big Tiles should only be used for tiles that are larger than your grid's tile size. If you are creating *every* tile using Big Tiles, you're better off just changing the grid.

Let's add a new tile from Kenney's Tower Defense Kit. This time, pick `tile_cornerLarge`. It is twice as bit as a regular tile in the X and Z dimensions, so it will occupy 4 cells in the final generation.



Lets set it up. As before, add the TesseraTile component. Then set the Center to (-0.5, 0, -0.5). This will place the paintable cube in one corner of the tile.

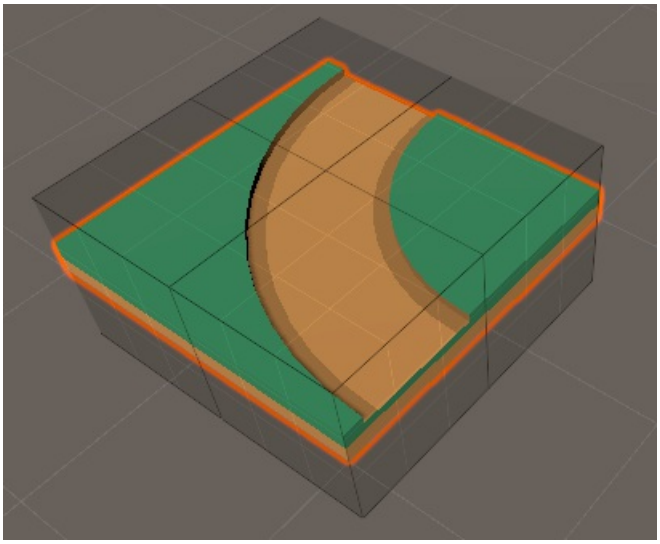


Then select the "Add Cell" tool from the paint menu  . You can now click on faces of the paintable cube to make a tile with multiple cubes in it. If you make a mistake, you can use the "Remove Cell" tool to delete them.

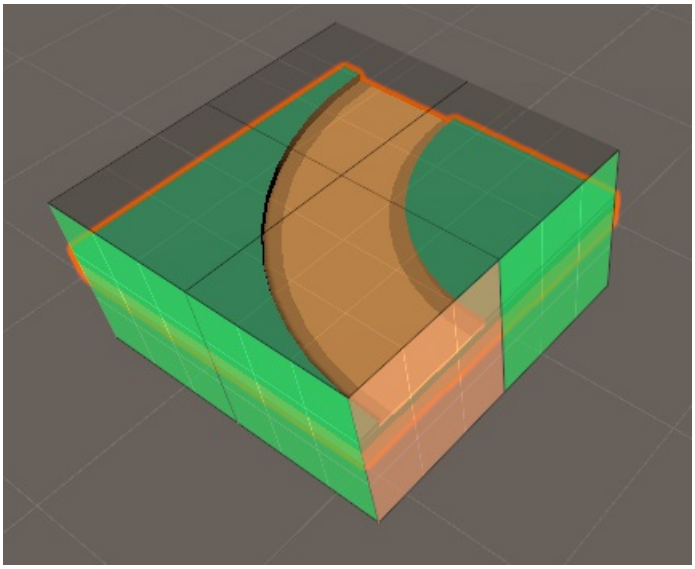
> **NOTE**

Big Tiles should have the same Cell Size as other tiles. You must use the Add Cell tool to make big tiles.

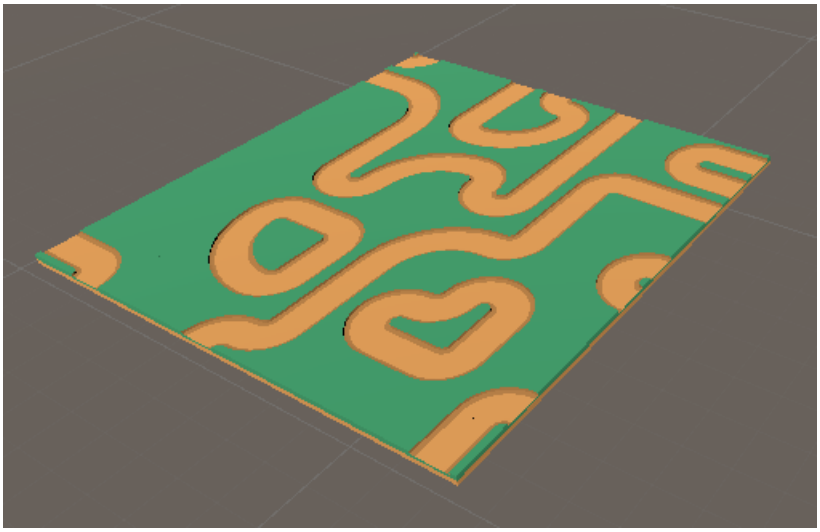
Add 3 extra cubes to the tile to cover it. This tile will now take up 4 cells worth of space, replacing 4 normal tiles.



Paint the sides of the new tile green and brown, like the original tiles, to indicate how it connects.



Now we're ready to add this cube to the list of tiles in the generator, and hit Generate. The new tile will be seamlessly mixed with the smaller tiles.



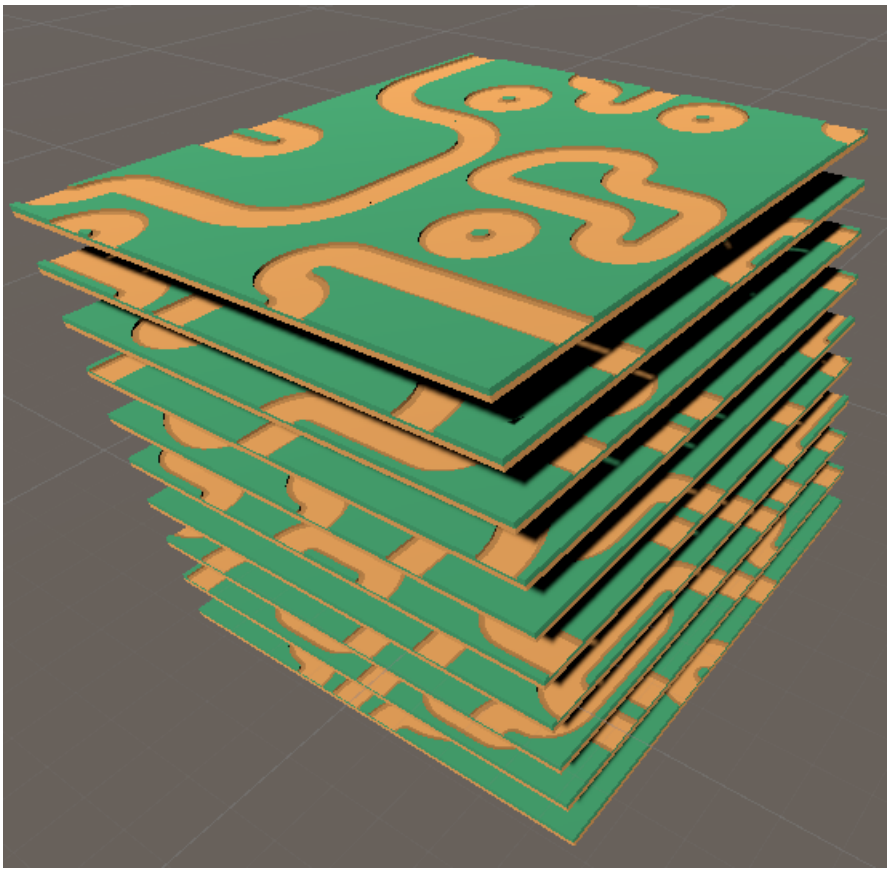
# Generating 3d layouts Tutorial

*This tutorial continues from the Big Tiles tutorial. It is recommended you complete that one before starting this.*

## Earth and air

So far we've only generated a single layer of tiles. But Tessera can work with 3d grids too. The principle is exactly the same - paint tiles to indicate how they connect and let Tessera do the rest.

Let's turn our previous example into a 3d example. First, go to the generator, and find the size setting and increase the Y size to 10. Now if we hit generate, we get something like the following:



There's two things to note:

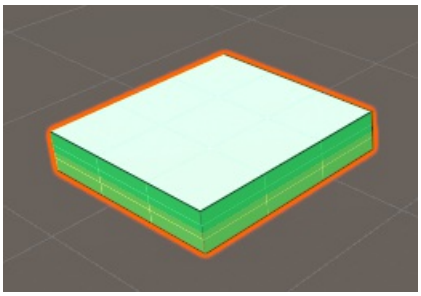
- Each layer is separated from the one above by 1 unit, even though our tiles aren't nearly that high.
- Just like in the first tutorial, Tessera doesn't know how things connect. We need to paint the tiles to indicate what can be put on top of what.

Let's fix those issues.

First, change the Tile Size property in the generator to (1, 0.2, 1). This is the size of the meshes we are using. Now do the same thing for the tiles. They should also have their center Y set to 0.1. All new tiles will want to share these same settings.

Second, let's paint tops and bottoms of the tiles. Paint the top faces of each tile as white, and the bottom ones as black. This will indicate above ground / below ground respectively.

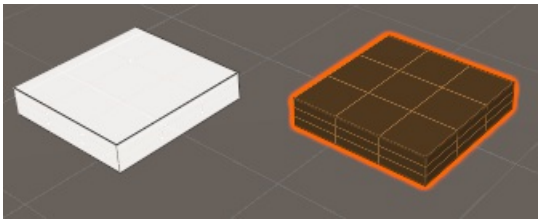
*NB: You can use "Show Backfaces" to easily see the far sides of cubes so you don't need rotate all the time to paint everything.*



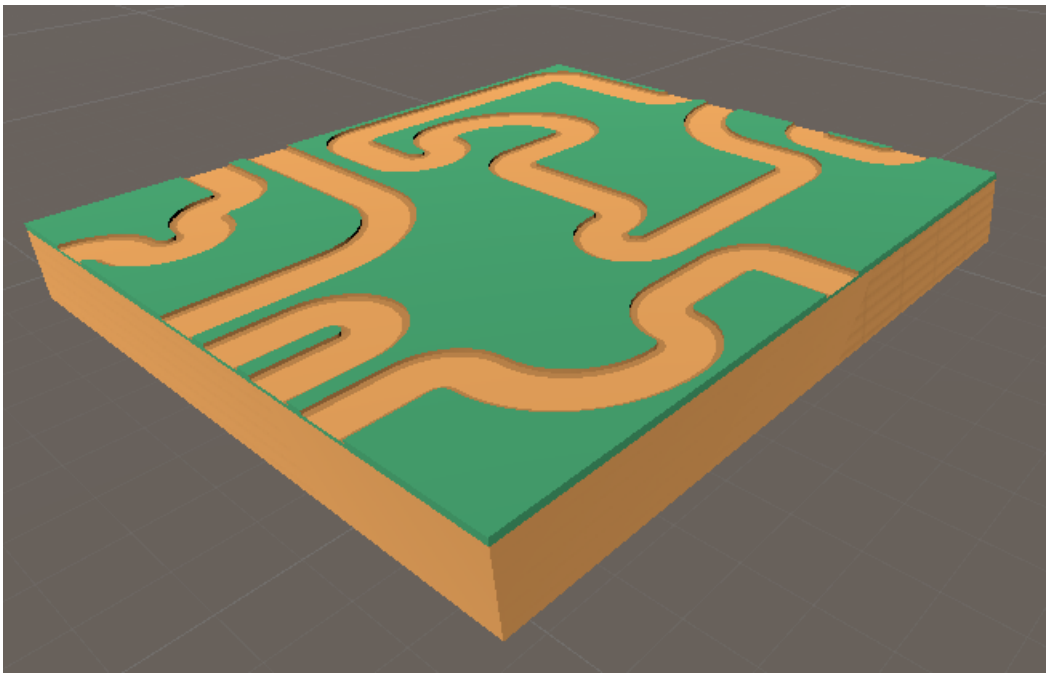
If we run the generation now, it will fail.


This is because we've colored the tiles so that they no longer stack, but we haven't provided anything to stack above or below them. Tessera tries to fill the *entire* generator bounds with tiles, and fails if it cannot do so. So we need some more tiles.

Create an empty called `tile_air` and from the assets load `tile_dirtHigh`. Give both of these the TesseraTile component, add them to the Generator's tile list, and set their Tile Size and Center as with the other tiles. Now paint them. `tile_air` should have all 6 faces painted white, and `tile_dirtHigh` should have all 6 faces painted black.



Now generation should be working again, and you'll get a 3d, if flat, landscape.

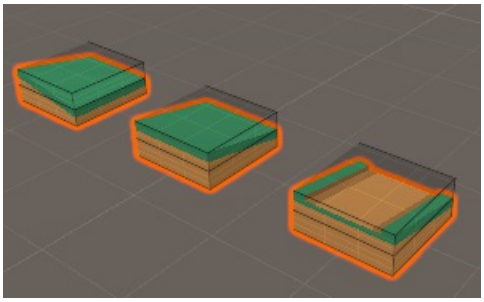


*NB: You may notice that instantiating this many tiles takes quite a bit of time. This can be undesirable for a game. If you select the air and dirt tile, and enable "Instantiate Children Only" then they will no longer be instantiated (as they have no children), speeding things up considerably.*

## Adding slopes

We need to add even more tiles before the surface can crinkle. Let's take 3 more from the tower defense assets: `tile_slope`, `tile_cornerOuter` and `tile_straightHill`. Again, TesseraTile component, Tile Size (1, 0.2, 1), Center (0, 0.1, 0).

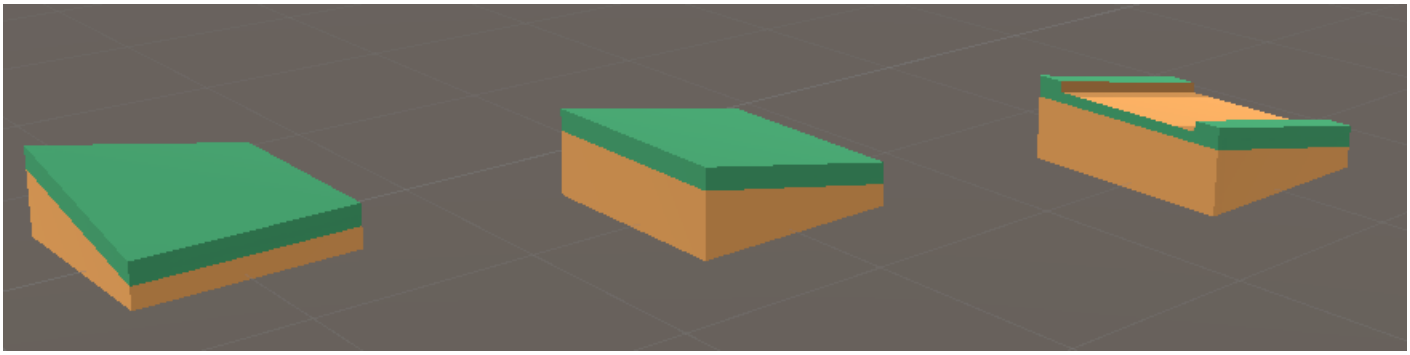
You'll notice that the tile meshes poke out the top of the paint cube. Use Add Cube to stack a second cube on top of the first so that the meshes are completely contained within. See the big tiles tutorial for details.



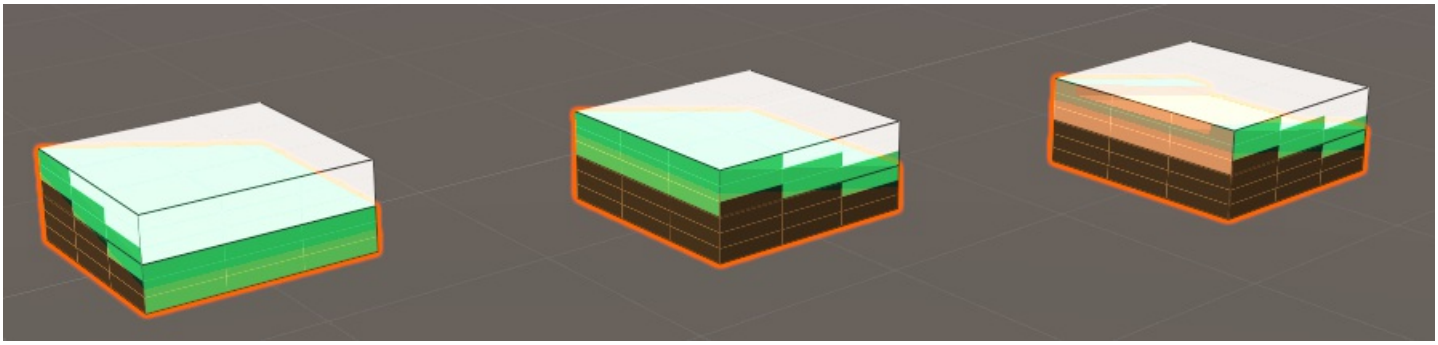
Now, we need to paint the cubes. We need to careful when painting them. We want to ensure that all our existing tiles connect to these new tiles at the correct places. And we need to make sure that the sloped sides can connect only to each other.

Rather than give the sloped sides an extra color, we will paint them with a recognizable pattern. That will serve as a reminder. Sometimes we'll paint the pattern, and sometimes the reflection, indicating which direction the slope is running. Tessera will recognize this, and connect them appropriately. You can use the "Pencil" tool  to paint patterns.

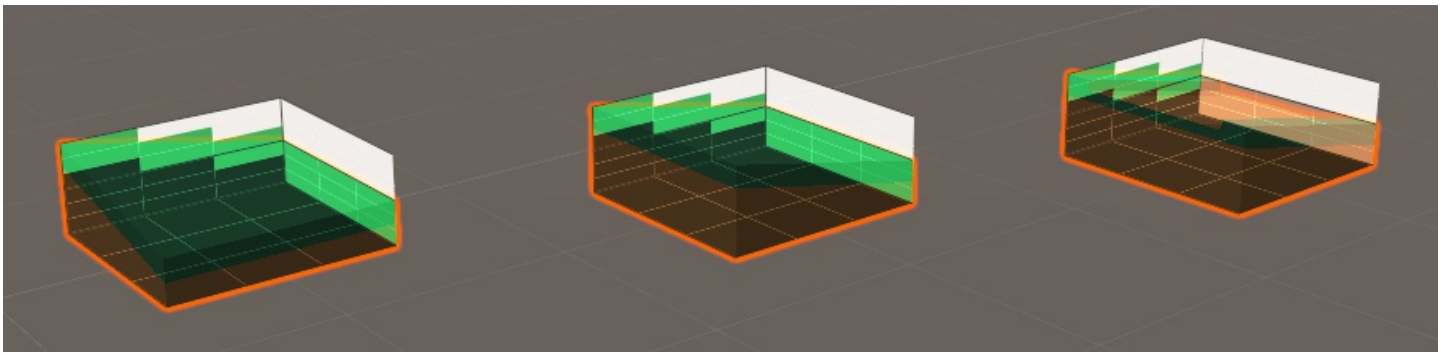
Paint the tiles. Before:



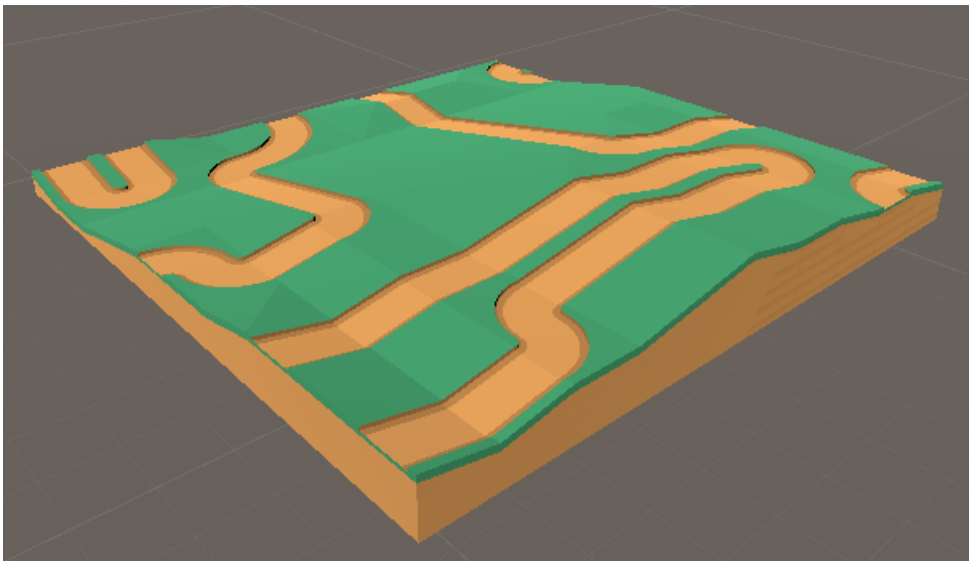
After painting:



After painting, showing backfaces:



Add the new tiles to the generator, and you should be rewarded with a undulating landscape:



## Adding a sky box

You may have noticed that sometimes the generator fills the entire volume with nothing but dirt, or nothing but air. There's nothing in what we've generated so far that prevents that. The generation algorithm will often suprise you out like that - anything that is a legal arrangement will occasionally be generated, and legal arrangements aren't always what you intended. One easy fix for this is adding a skybox to the generator. A skybox constrains what tiles can be placed on the boundary of the generated volume.

In this case, we want to force the top of the area to be air, and the bottom to be dirt, and we don't care about the sides. That will force there to be a surface somewhere between the top and bottom. Create an empty with the TesseraTile component, and paint the top face white and the bottom face black. Then assign it to the Skybox property of the generator. This will fix things as desired.

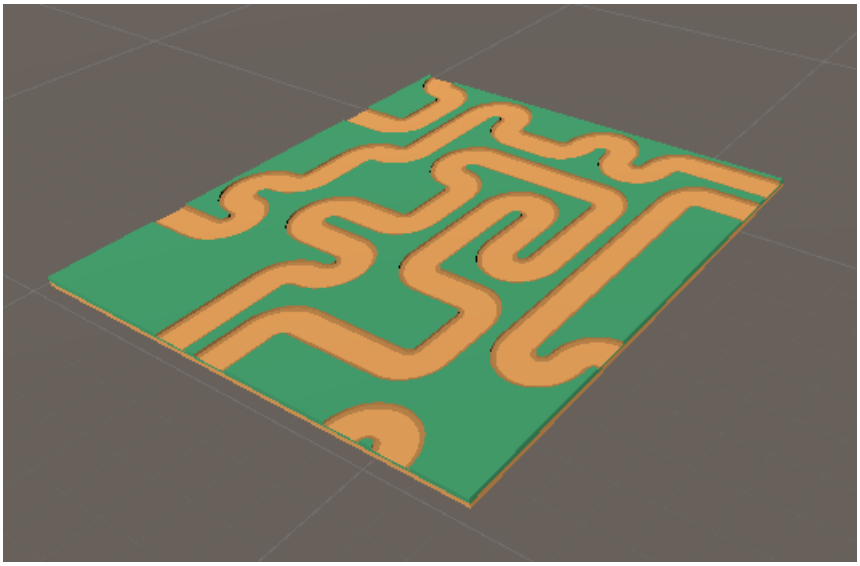
# Path Constraints Tutorial

*This tutorial continues from the Getting Started tutorial. It is recommended you complete that one before starting this.*

*The final result can be found in the sample scene GrassPathsWithPathConstraint.*

> **NOTE**
>
> Path constraints are only available in Tessera Pro

So far we succeeded in generating a level composed of grass and path tiles:



However, for many purposes, a level like the above is not acceptable. If the player is only able to walk along the path, then it's not possible for the player to walk over all the path tiles of the map, there is simply no route between them.

So far, all our generation has been *local* - that is, we've controlled what tiles are placed next to each other, without any regard for the overall structure. Now we are going to use the PathConstraint to assert some *global* behaviour on the map. The path constraint can be used in various ways, this is only an introduction.

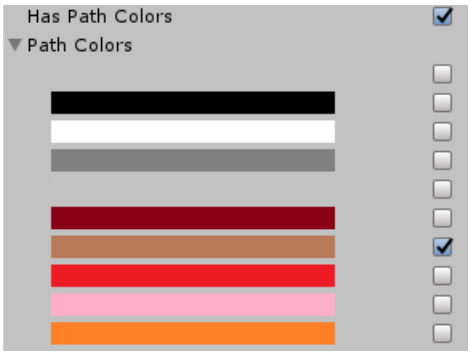
# Setup

First select the generator object. Enable the `backtrack` option. Backtracking makes the generator try harder to find a viable solution. It's necessary when using the path constraint as the generator can otherwise get stuck trying to find a valid path.


Next, add a `Path Constraint` component to the generator. We need to configure the constraint, by telling it what we consider a path.

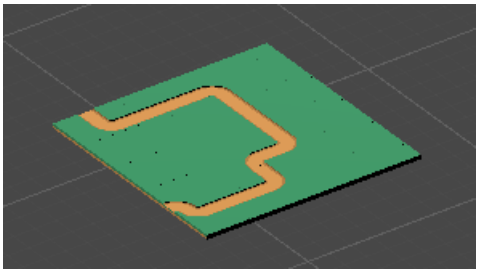
Recall that we colored the tile edge green if that edge was grassy, and brown if that edge had a path. We can give that information to the constraint.

Check the "Has Path Colors" checkbox, and then check the color corresponding to the path.



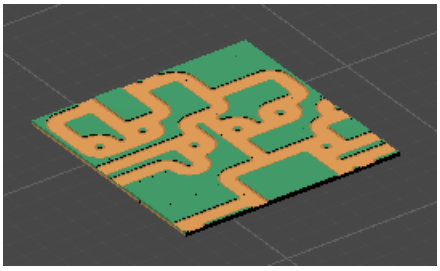

This tells the generator to search for all the sides of tiles that have that color painted in the center of the face. If two such sides connect together, then it considers there is a path between those two tiles. The constaint then ensures that all path tiles connect to each other.

If we run the generator now, it'll only ever generate a single path:



# Getting fancier

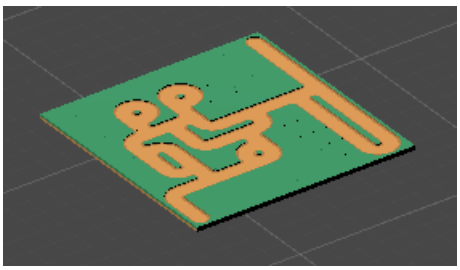
Let's add the `tile_split` tile to the generator, as you can get a lot more interesting paths once you allow junctions. The constraint will still ensure that it's always possible to walk accross the map.

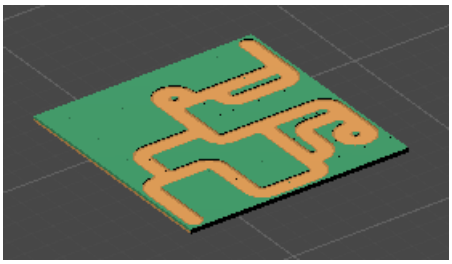


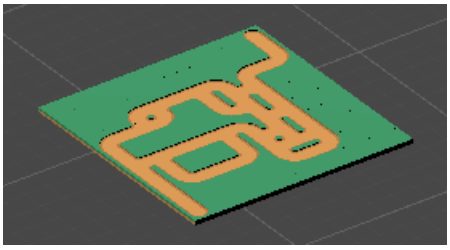
Add a `tile_endRound` to opposite corners of the generated area as a pinned tile. Pinned tiles are ignored by constraints (unless using PinType.Pin), but the brown painting on these tiles forces adjacent tiles to be paths, and thus the path constraint must connect them together.

A few last tweaks: Set the skybox to the `tile` object to stop the path going off the edge of the map. And set the weight of the `tile` object to 10, increasing the ratio of grass tiles to path tiles.

Now we have a generator that makes self-contained full navigable maps. Here's a few results.







## Additional options

The Path constraint default to ensuring all tiles are connected, but has several other options too.

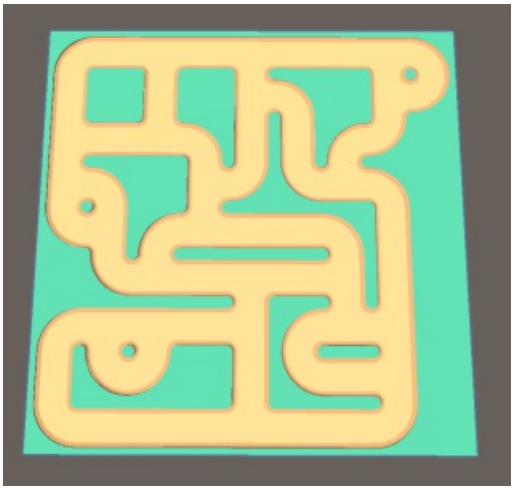
### Connected

When connected is true, then the constraint forces that all path tiles must have a contiguous path between them.

Connected is on by default.

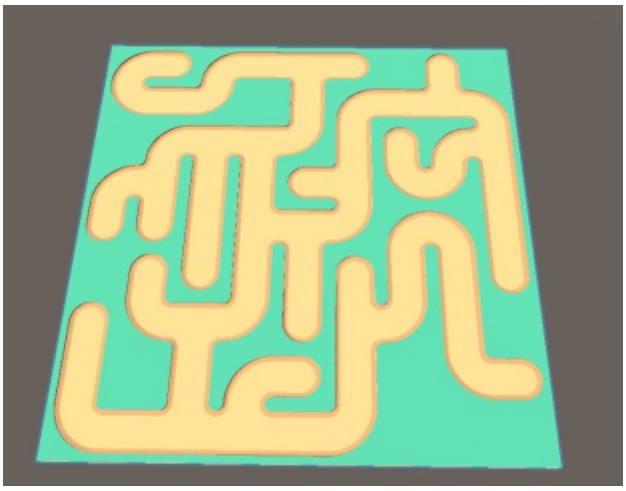
### Loops

Setting loop forces there to be at least two non-overlapping valid paths between any two connected path tiles.



### Acyclic

Setting acyclic to true bans all cycles, forcing a tree or forest.



### Prioritise

Prioritise is an experimental features. When true, Tessera prefers picking cells near the path for generation over other tiles. This can improve search quality.

### Parity

Experimental setting. Enable this if your path tileset includes no forks or junctions, it can improve the search quality.

# Generating on Mesh Surfaces Tutorial

*This tutorial continues from the Getting Started tutorial. It is recommended you complete that one before starting this.*

*The final result can be found in the sample scene GrassPlanet.*

> **NOTE**
>
> Generating on Mesh Surfaces is only available in Tessera Pro

By default, Tessera generates tiles in a regular grid - every cell is the same and shape, and placed in the same relation to each other.

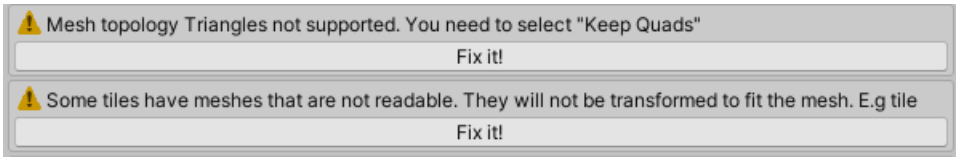
Surface mesh generation allows you to ignore this entirely. Instead, each tile will be placed in a cell corresponding to the face of a given mesh.

That means each cell will have a different shape, and the adjacency connections between cells are determined by the edges of the mesh. The local y-axis used when designing the tile will get rotated to match the normal of the face, and similarly the local x and z axes will point tangent to the face.

Let's make a micro-planet as an example.

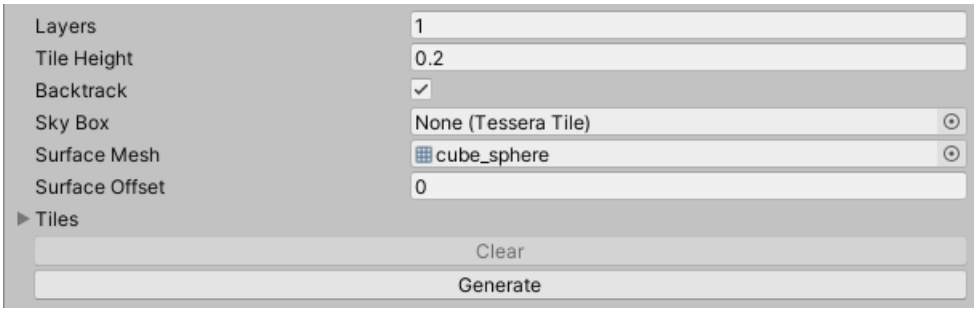
Start with the generator created in the previous tutorials and find the `Surface Mesh` property in the inspector. Click the  icon and select `cube_sphere`, a mesh that comes in the Samples folder of Tessera Pro. You can use any quad mesh (i.e. all the faces have exactly 4 edges).

Depending on which assets you use, you may see the following warnings:

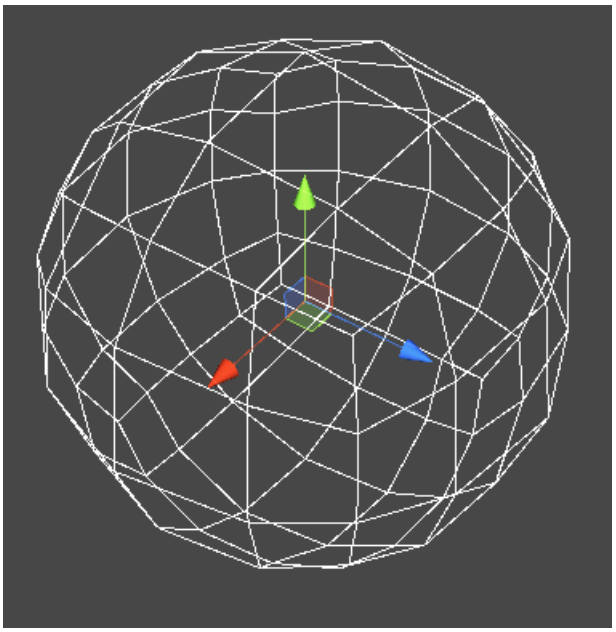



The surface mesh feature requires certain import settings to be configured. Press the fix it buttons will automatically change the assets as needed.

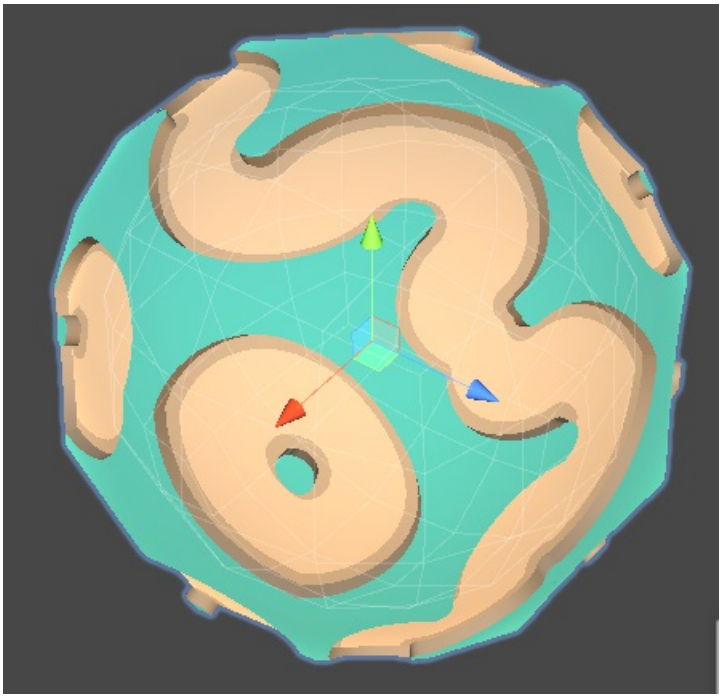
After setting a mesh, the inspector UI will have changed a little:




If you enable gizmos, you should be able to see a wire mesh.

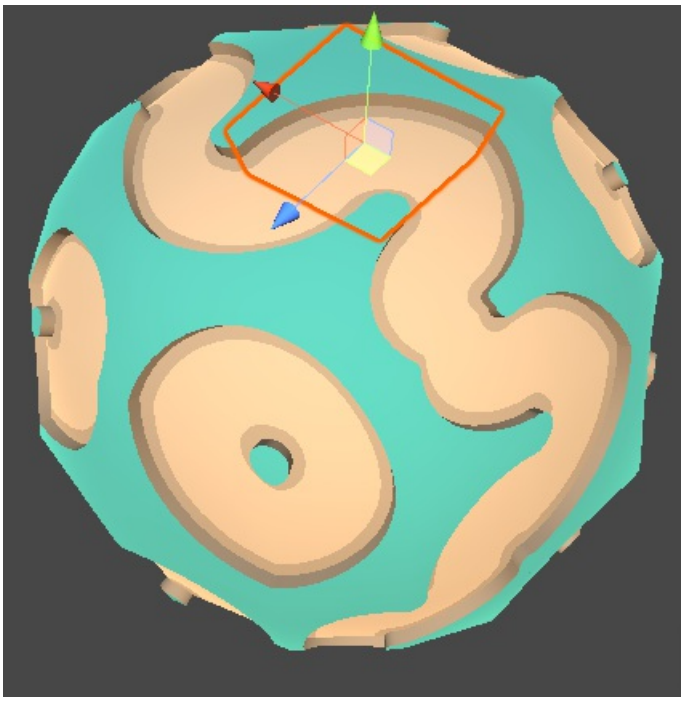


That's pretty much it. Hit generate, and see the results.



As you can see, one tile has been generated for each face of the mesh. Further, Tessera has transformed any meshes associated with the tile to make them fit the face. That gives us a totally seamless result with non square tiles, even though all the designed tiles were square.

Tessera will transform meshes found in MeshFilters, MeshColliders and BoxColliders. It'll also modify the position, rotation and scale, so the created GameObjects interact most compatibily with the other features of the game.



## Caveats

A few features do not work with meshes:

- You cannout use Tilemap Output as Unity Tilemaps expect a regular grid of tiles.
- The mirror constraint is not supported.

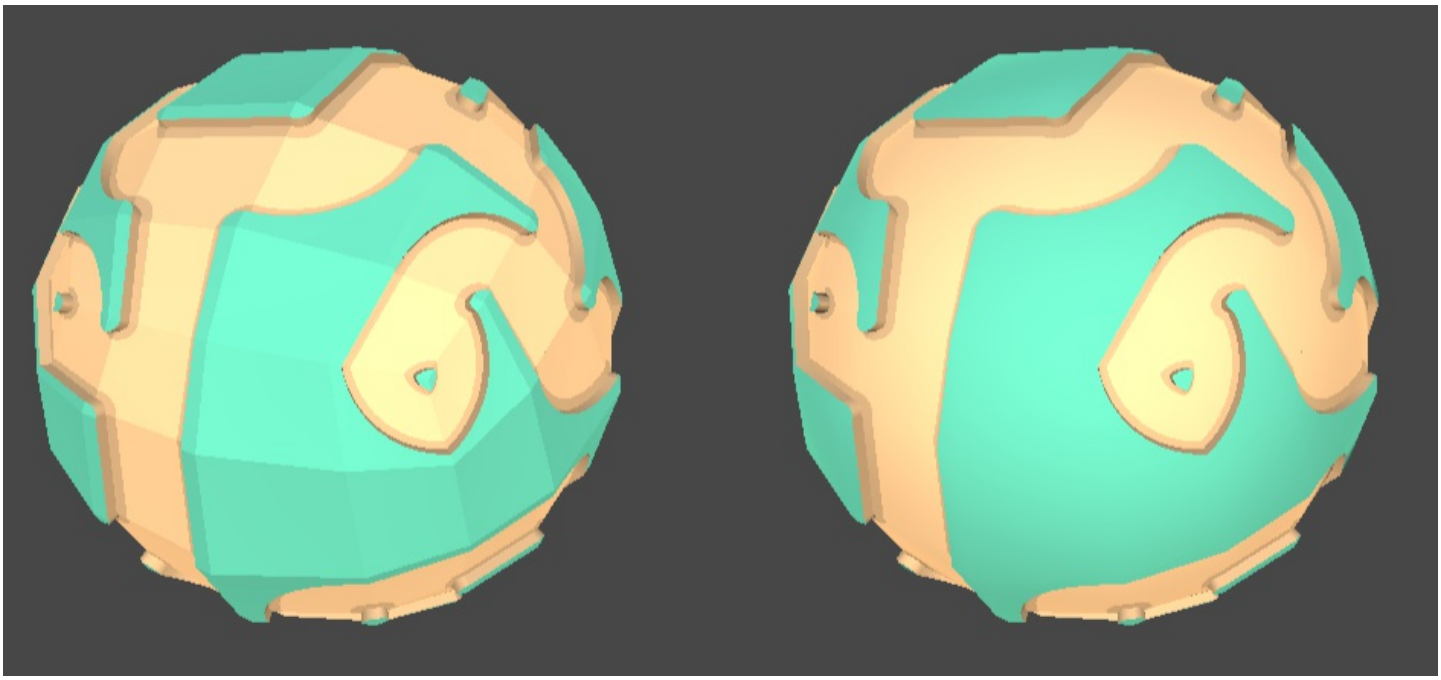
When pressing the Generate button in the Editor, it is not possible to undo the action as Unity can get extremely slow serializing all the transformed meshes.

The mesh distortion pushes around vertices, but never adds any. You may need to add extra vertices to your tile models so that adjacent tiles still line up after distortion.

You are recommended to use tiles with Reflectable and Rotatable enabled. It still works when they are turned off, but it can be hard to control the direction of each cell's local x-axis. It is determined by the order of vertices in the face of the mesh, and most editor programs do not let you easily manipulate this.

## Smooth normals

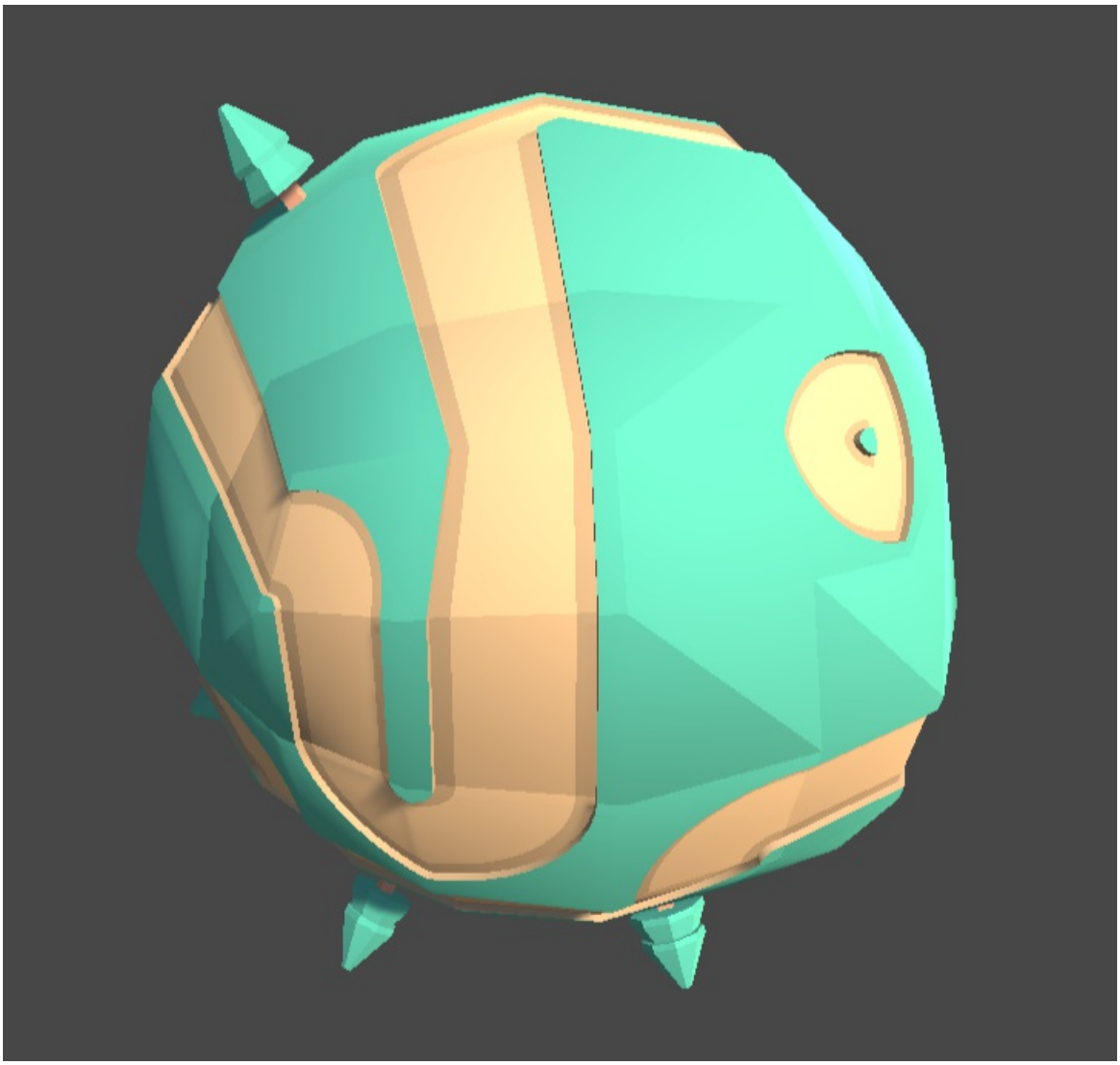
You can configure if normals should be smoothed between adjacent faces of the mesh. For smoothing to work, the surface mesh must have UVs configured.



## Multiple layers

Just as regular generators support a 3d layout of tiles, so does generating on a mesh surface. By setting the Layers property (or `size.y` in the API) to a value larger than one, you will stack multiple copies of the mesh surface above one another. Each layer is an expansion of the mesh along the vertex normals by the amount given in Tile Height (or `tileSize.y` in the API).

If you've set up your generator with the 3d tiles and skybox described in the 3d tutorial, then you can get results like the following on `cube_sphere`.



## Submeshes

If you are Mesh object you've selected for the surface has multiple submeshes, (i.e. multiple material slots), then you can filter which tiles are appropriate for which part of the submesh, similar to volumes, above.

The Generator inspector will automatically detect this case. Simply turn on "Filter By Submesh" and then select which tiles appear where.


Tessera Pro comes with a City example that demonstrates this.

# Triangle grids

The above tutorial demonstrated using cube tiles on a quad mesh. But if you use triangle tiles you can instead use triangle meshes.

# Multiple passes

*This tutorial continues from the Getting Started tutorial. It is recommended you complete that one before starting this.*

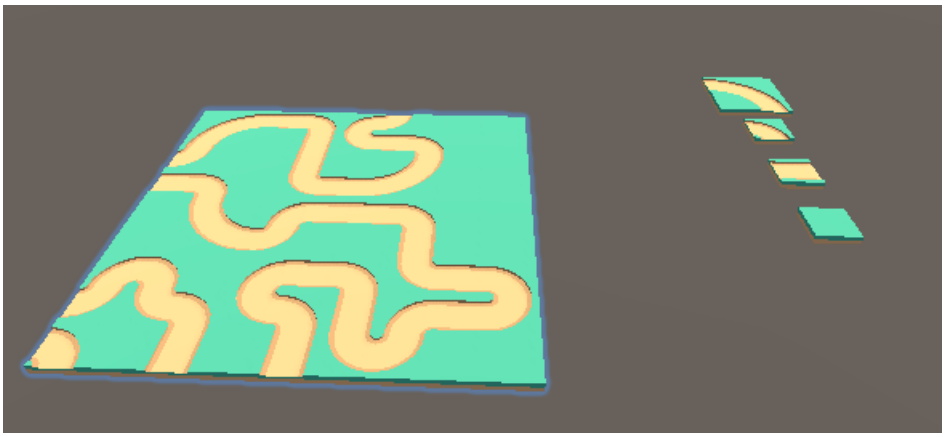
*The final result can be found in the sample scene GrassPathsMultipass.*

So far we've looked at running the generator once, and filling in the entirety of the tiles at once. As an *advanced* technique, it's possible to run multiple linked generators in the same scene, each configured differently. Running separate passes like this can achieve a variety of effects, and usually runs faster and more reliably than a single generator.

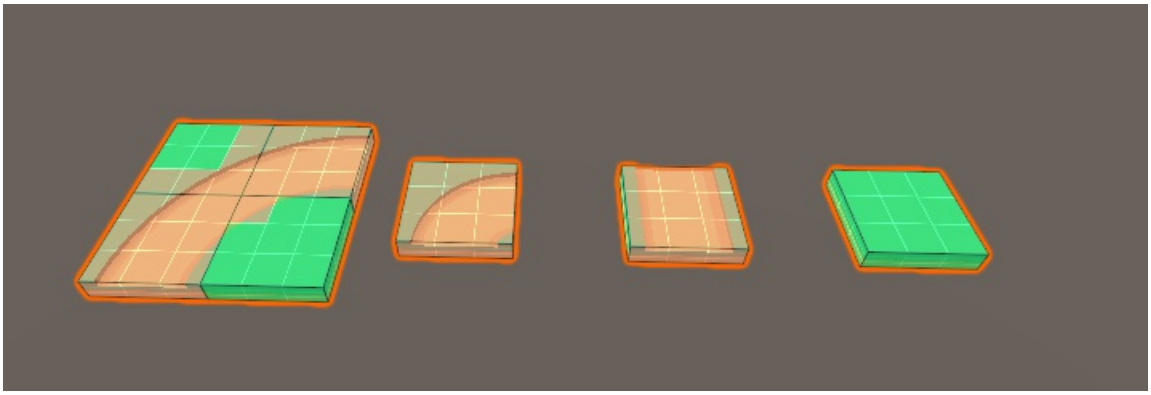
The key idea is that when you run a generator in Tessera, it creates additional game objects to fill the scene. Additionally, before the generator runs, it scans the scene for any relevant game objects that should constrain the generation. So if we run two generators sequentially, overlapping in space, then the output of the first will act as pins constraining the second.

This tutorial will show you how to generate ground tiles in one pass, then add decorations using a second. The decorations will be constrained to only attach to relevant tiles.

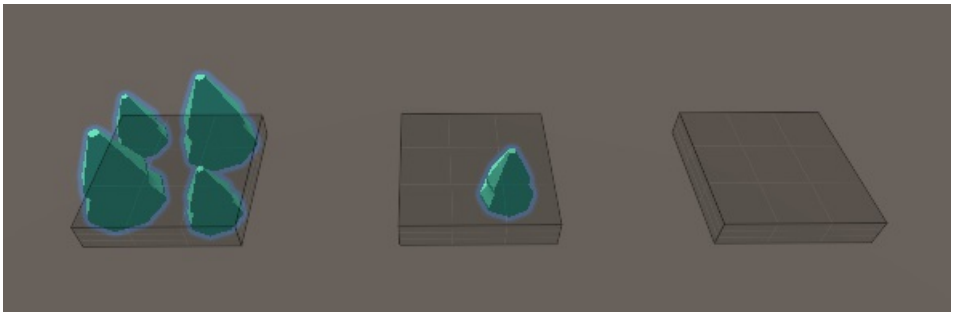
In the previous tutorials, we made a generator that generates a series of paths through a grassy plane.



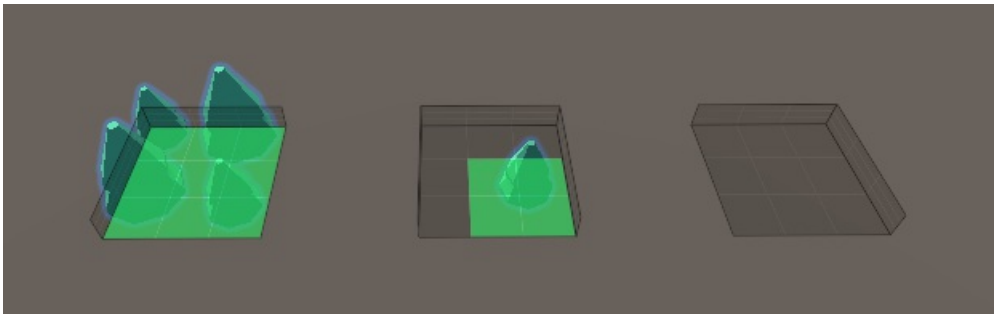
First, we'll add some extra paint on the top surface of the existing tiles to mark where is grassy, and where is path. We paint the entire top green/brown.



Now we need to make a new tileset for the decorations. With the assets supplied, make 3 tiles similar to the given ones.



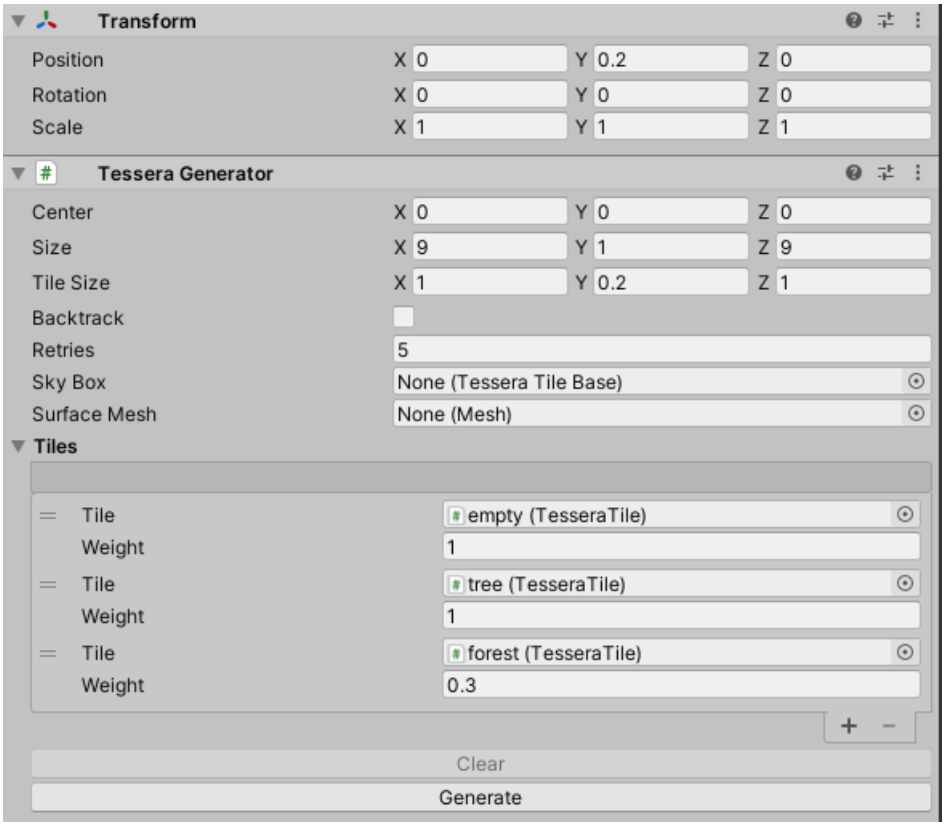
Then, using "Show Backfaces", paint the undersides of the tiles as indicated.



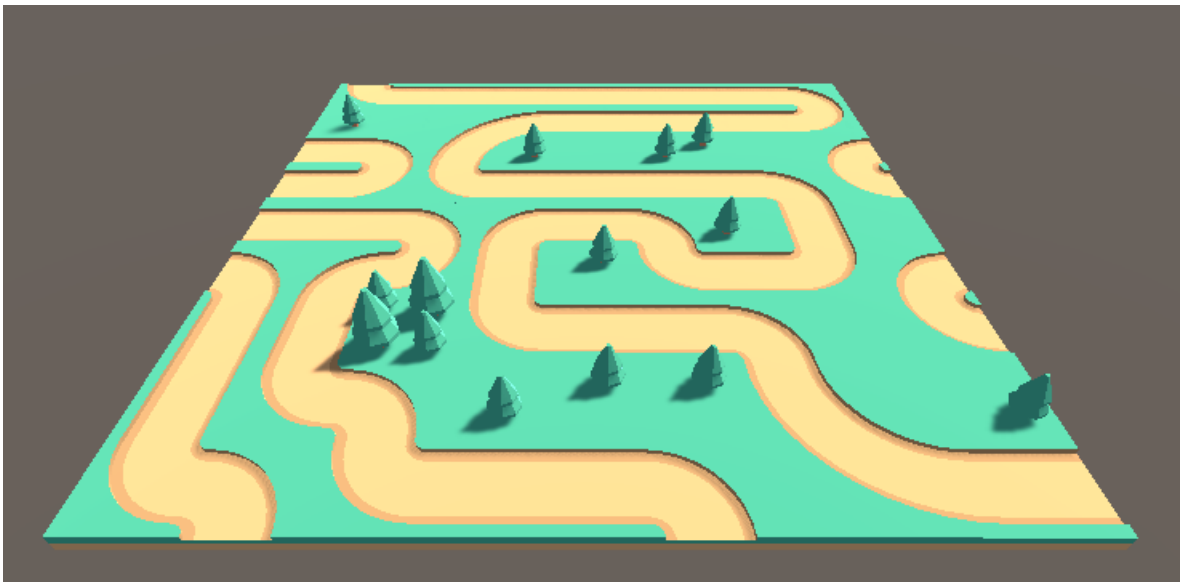
Most of the tile is left unpainted, as we don't care what it connects to. All we want to ensure is that the trees themselves are never placed directly above a path.

Now, create a second generator. This generator should be a new game object which is placed directly above the original one by 0.2 units.

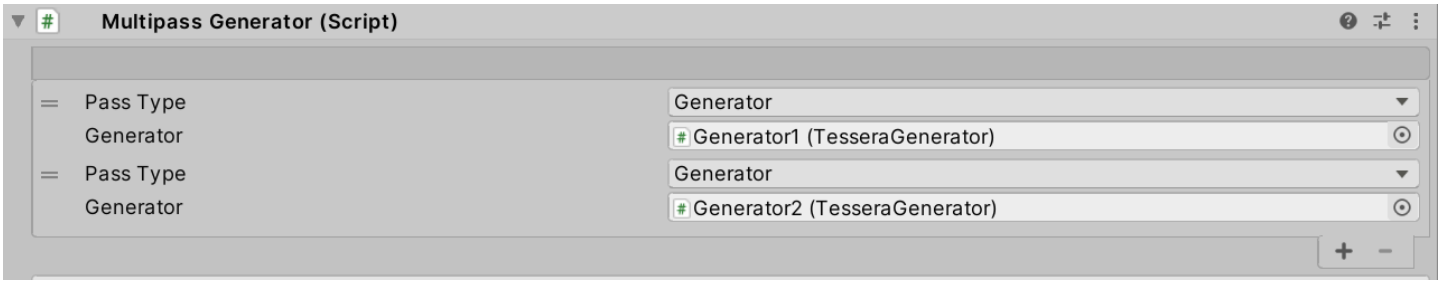
Set it up as follows.




Now run the two generators in order - starting with the path generator, then the tree generator. You should find that the trees are only generated where there is appropriate grass for them.



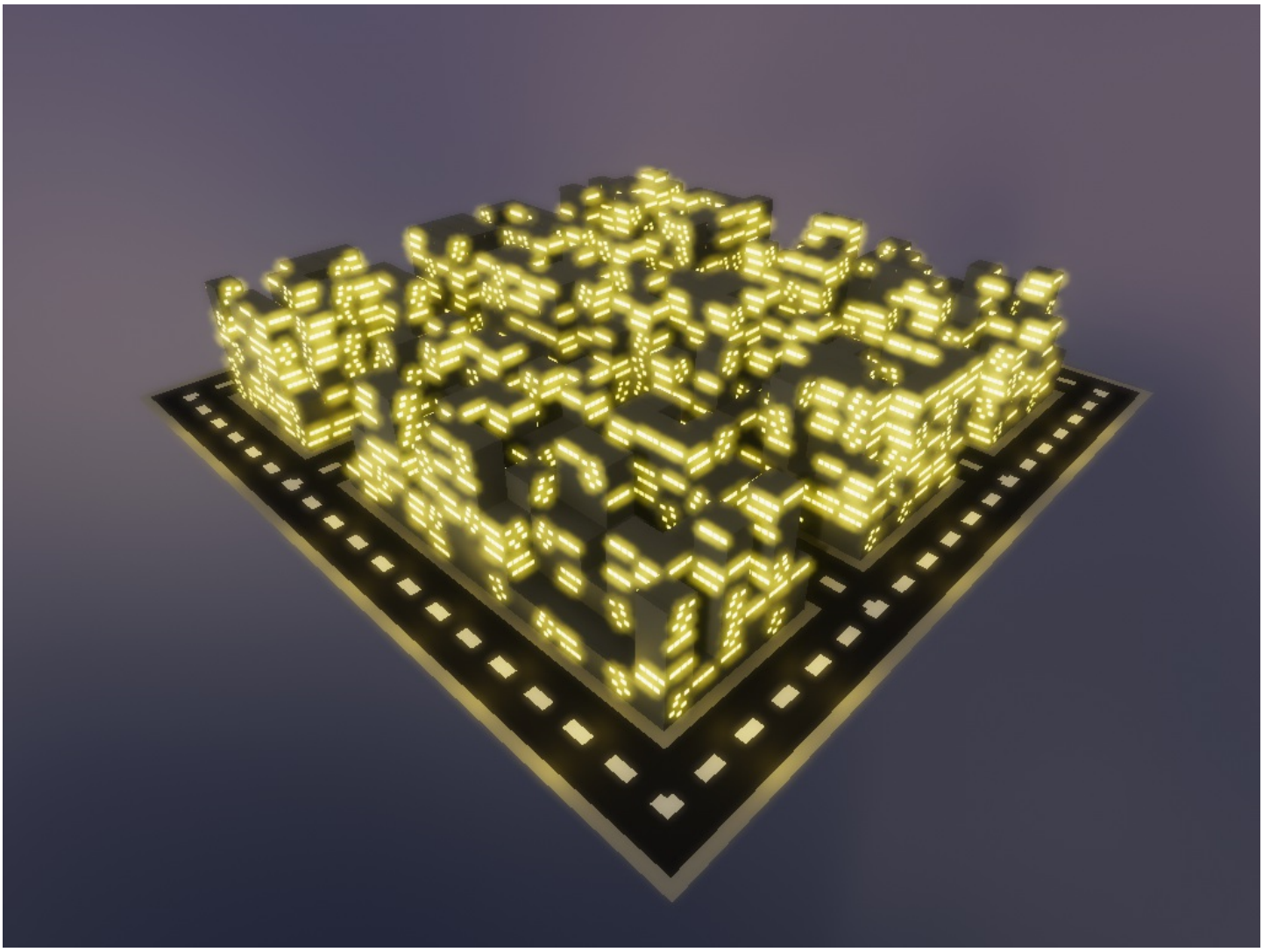
To make working with multiple passes easier, you can create a Multipass Generator that holds a reference to each of the generators you've just set up. This is a convenience for running both at once.



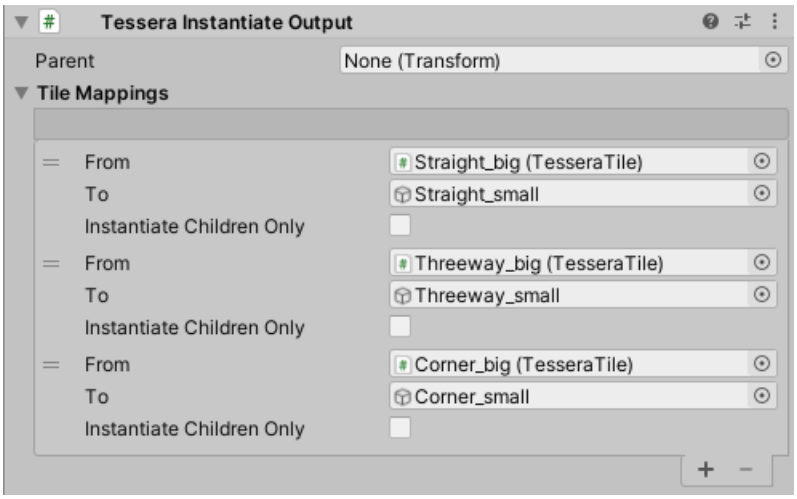

# Further customization

Multiple passes are even more powerful once you realize that *anything* created by the first pass will be used by the second pass. That means you are not limited to just adding extra tile paint as done above.

See the Skyscraper sample for an advanced usage.



In this sample, the road network is generated by one generator, then the skyscrapers are filled in by another. But the two generators use different grids: the buildings have a tilesize one third of the road tiles. To make this work, we instruct Tessera to replace the road tiles with big tiles that fit the smaller grid.




The sample also activates/deactiveates pins so they only apply to particular generators.

# Constraints

The basic configuration of a generator involves setting up tiles, and painting those tiles to show how they can be placed next to each other.

This page documents further configuration you can do to tightly control the generation process.

There are many constraints available in Tessera:

- Initial Constraints
  - Pins fix a particular tile in place
  - Volume constraints filter a particular area to a subset of tiles
  - Skyboxes controls how tiles on the boundary of the generation work
  - Submesh filters applies per material settings when working with surface meshes.
- Generator Constraints
  - CountConstraint - ensures the number of tiles in a given set is less than / more than a given number.
  - MirrorConstraint - ensures the output remains symmetric.
  - PathConstraint - detects contiguous paths between tiles, and ensures various properties about those paths, such as connectedness.
  - SeparationConstraint - ensures that the given tiles are spaced at least a certain distance apart

## Initial Constraints

Initial constraints configue the intial conditions of the generator. They generally set up by adding behaviours into the world.

- Pins fix a particular tile in place
- Volume constraints filter a particular area to a subset of tiles
- Skyboxes controls how tiles on the boundary of the generation work
- Submesh filters applies permaterial settings when working with surface meshes.

### Pins

Sometimes you just want to place a tile at a particular location without Tessera choosing for you. For example, you might want to place a entrace manually at one side, or write custom code to draw path ways for you. Pinned tiles lets you do this, and then have Tessera generate the rest of the tiles for you.

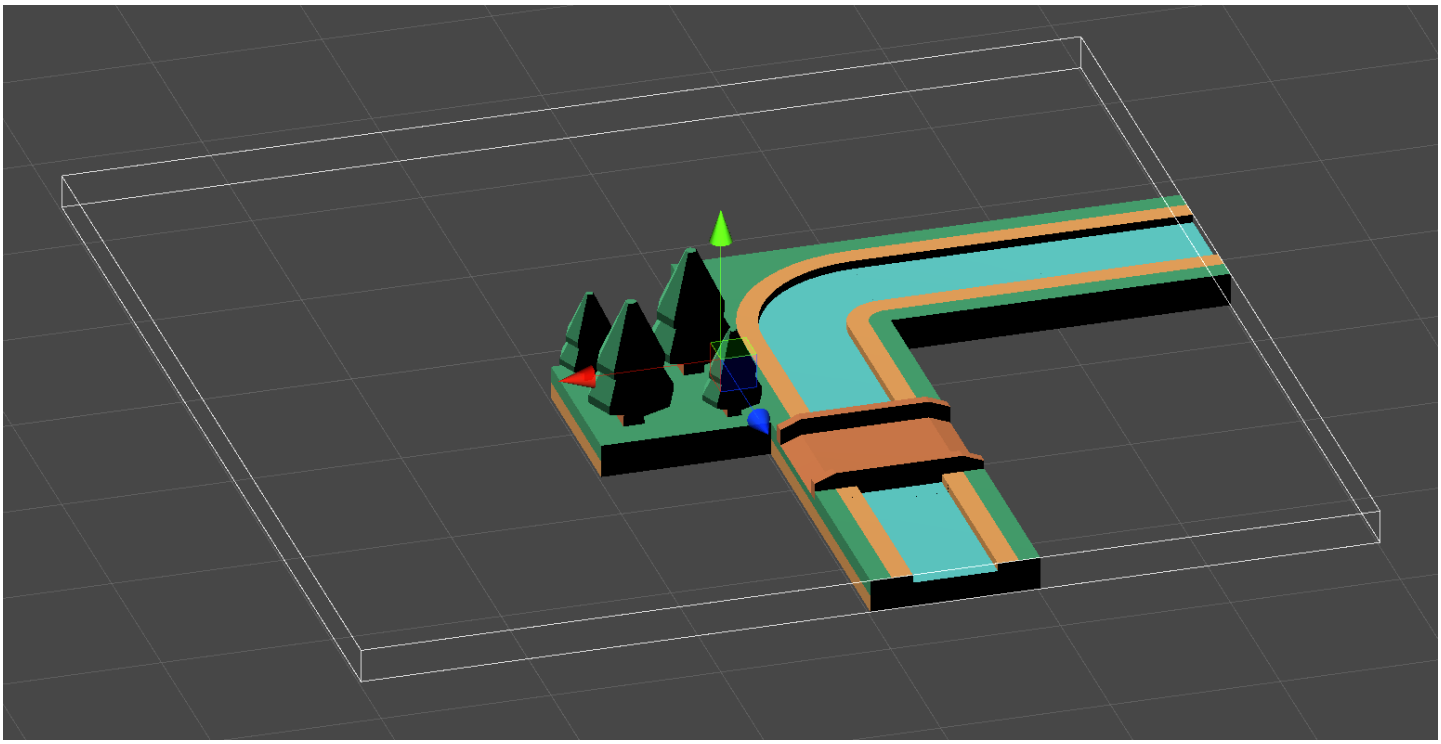
There's multiple ways to specify pins - all of them involve putting a game object inside or adjacent to the generator area, in the position of the cell you want to affect. They will be automatically detected and incorporated into the generation.

The most flexible way is to great a game object with the TesseraPinned component. You can then specify the PinType and the tile to pin as properties of that component.

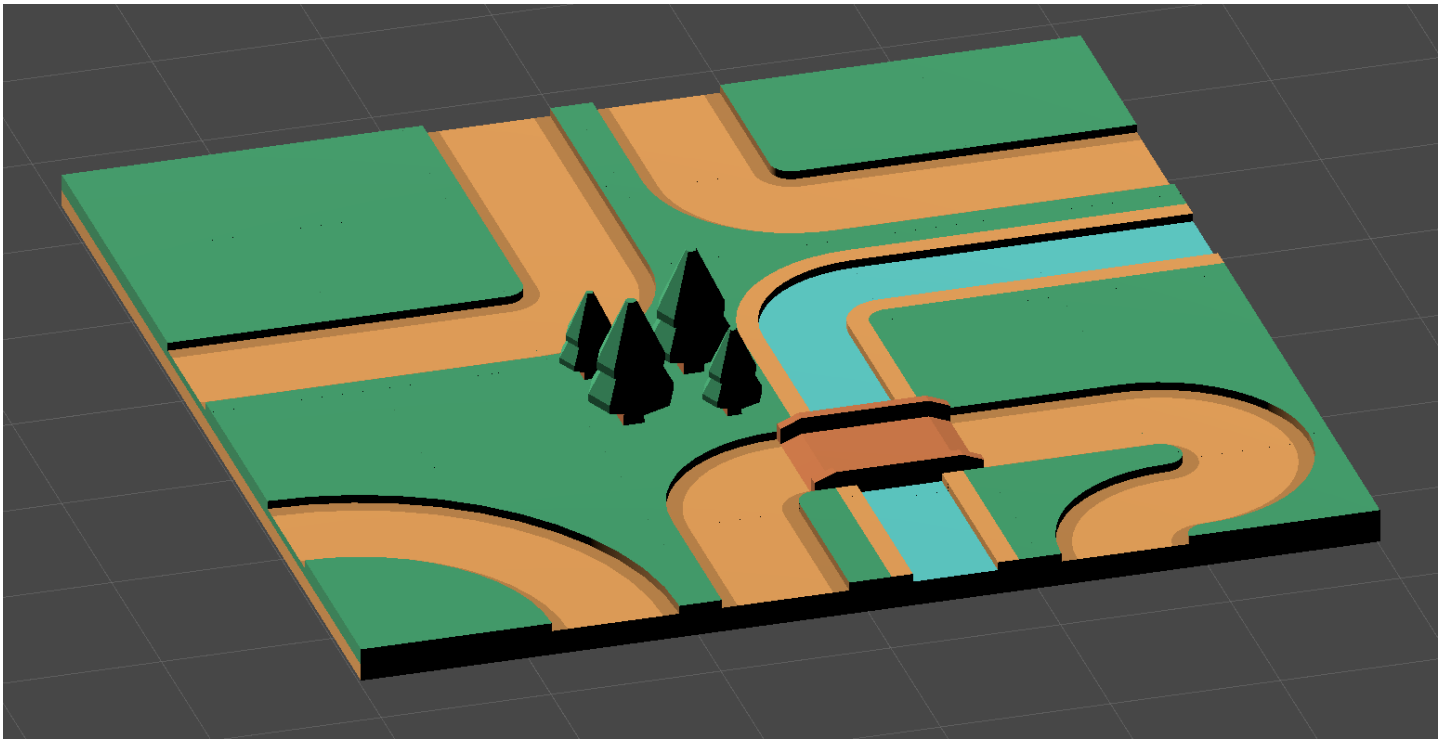
As a convenient short cut, you can also just place a Tessera tile directly. These will be interpreted the same as a TesseraPinned component that references that tile, and has pin type FacesAndInterior.

You can also place an object with both a Tessera tile component and a TesseraPinned component. The TesseraPinned will be assumed to reference the tile component on the same game object.

Here is an example. A generator is set up and a few tiles manually placed.



When the generator is run, the new tiles join up with the placed tiles.



### Configuring pins

TesseraPinned has two key properties:

- **Tile** determines what tile to use for pinning.
- **PinType** controls how exactly the pinned tile effeects generation.

These two values are inferred in some cases, as described above.

There are three types of pin:

#### PinType.Pin

With this pin type, the generator is forced to generate the referenced tile at the location of the pin.

The referenced tile must already be in the generator's tile list (though it can have weight 0).

#### PinType.FacesOnly

With this pin type, the faces of the referenced tile are used to constrain the cells adjacent to the location of the pin, and the generator is free to pick any tile for that cell.

#### PinType.FacesAndInterior

With this pin type, the faces of the referenced tile are used to constrain the cells adjacent to the location of the pin. Also the cells covered by the pin are masked out so no tiles will be generated in that location. You may therefore need to manually place a tile or other game object to fill the gap. Unlike PinType.Pin, the refenced tile *does not* need to be in the generator's tile list.

The different pin types can be used to generate a variety of effects. FacesOnly, for example, is good at restricting the generation along a given plane, without forcing any particular tile. FacesAndInterior allows you to put in custom tiles (often called "hero" pieces) that never otherwise appear in generation. And Pin is good for forcing a particular tile to be placed, while still allowing that cell to be part of generation. That can be important if you need the cell to interact with generator constraints or other Tessera features.

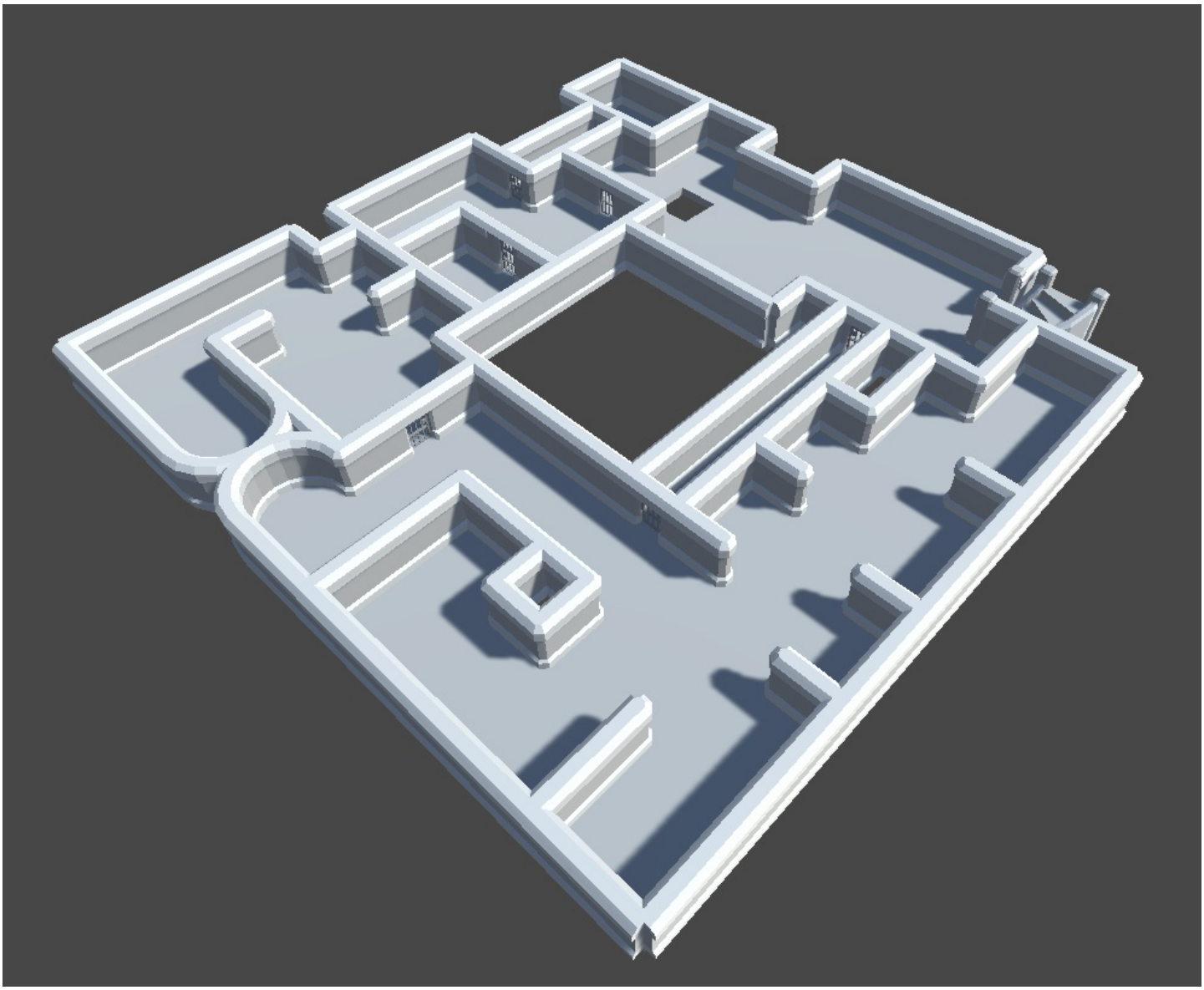
### Volumes

Add a GameObject with the Tessera Volume component to filter an area of cells to only use a subset of tiles.

To use it, add a game object with the volume component, and set the cells you want to filter to. You can optionally specify a generator for convenience, but it's not necessary.

Next add colliders to the game object to define the area selected. A cell is in the volume if its center is inside at least one collder.

Here's a dungeon generated with a box collider volume in the center, configured to filter to just an empty tile.



Unlike pins, volumes have no way to configure the rotation and reflection of the generated tile.

Volumes can also be used to remove tiles from the generator entirely, by setting the volume type to MaskOut. This behaves similarly to pinning tiles with FacesAndInterior - the missing cells interact differently with constraint.

### API

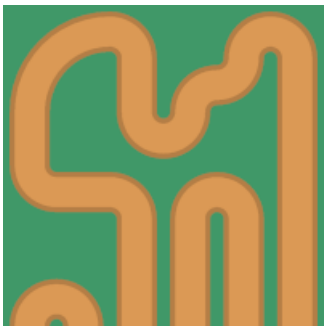
The default behaviour of generators is to search the scene for appropriate pins and volumes. This can be slow for large scenes, and it's not suitable for advanced customization. You can use the C# API to set pins and volumes directly.

First, disable the automatic detection by setting searchInitialConstraints to false. Then you can supply your own initial constraints by setting initialConstraints. You need to call GetInitialConstraintBuilder to get a utility to convert various objects to initial constraints.

### Skybox

Setting the skybox property of the generator will automatically constrain all tiles on the boundary of the tile area. The skybox should be a TesseraTile component. Whatever is painted on the top of the skybox, will constrain the top of every tile on the topmost layer of the generator. Similarly for the other sides of the cube.

In this example, the skybox has been used to force the bottom edge to be all paths, and the other edges to have no paths.



### Notes

The tile used for a skybox should not be a big tile, this will cause wierd behaviour.

If a pinned tile constraint and the skybox both apply at a particular location, the tile constraint takes precedence.

Note that a given skybox face is repeated as a constraint for *all* tiles which have a corresponding face on the boundary. This can sometimes cause counter-intuitive results. For example, if you have a 3d example like in this tutoral, then you cannot have a skybox that is "grass" on the sides. Doing so allows surface tiles, but would stop air and solid tiles from touching the boundary, which will cause the boundary to fail.

The solution to this is to make a new palette color just for the skybox. You can then set that color connect with *multiple* other colors, so that it's possible to place all the tiles that can abut the boundary.

### Submesh filters

> **NOTE**
>
> Submesh filters are only available in Tessera Pro

If you are generating on a mesh surface, and that mesh has multiple submeshes, (i.e. multiple material slots), then you can filter which tiles are appropriate for which part of the submesh, similar to volumes, above.

The Generator inspector will automatically detect this case. Simply turn on "Filter By Submesh" and then select which tiles appear where.


## Generator Constraints

> **NOTE**
>
> Generator constraints are only available in Tessera Pro

These constraints control the *global* behaviour of generation. They are very powerful, but can use generation to fail more frequently.

To use them, find the game object that has the generator, and add additional components to it from the `Component > Tessera` menu.

At present the constraints are:

- CountConstraint - ensures the number of tiles in a given set is less than / more than a given number.
- MirrorConstraint - ensures the output remains symmetric.
- PathConstraint - detects contiguous paths between tiles, and ensures various properties about those paths, such as connectedness.
- SeparationConstraint - ensures that the given tiles are spaced at least a certain distance apart

There is a tutorial on how to use path constraints.

# Count Constraint

The CountConstraint is a generator constraint that counts the number of tiles in a given set that are generated and ensures that the total in the final output is above/below a given number.

## Eager

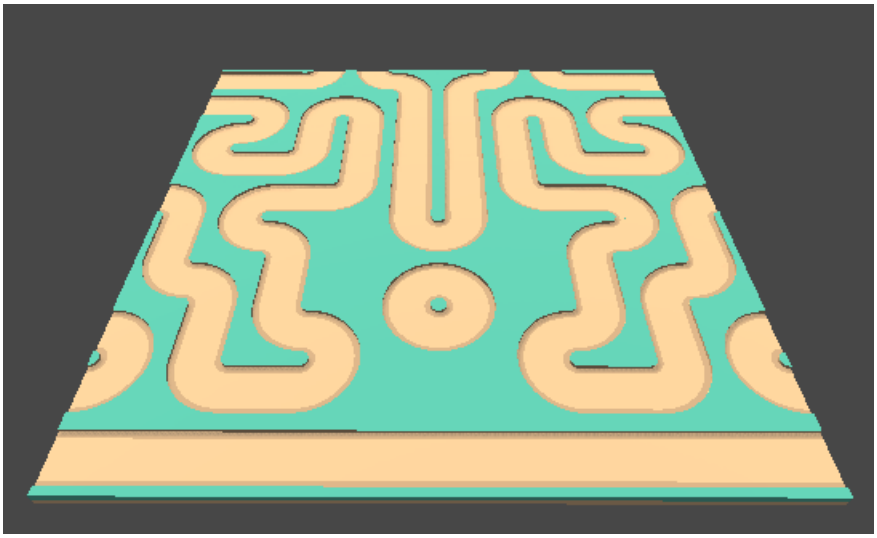
Normally, this constraint is run while generation occurs i.e. it'll count the tiles as generation occurs, and take action once the limit has been reached. This strategy generally works well, however in some cases it'll cause problems.

1. If a tile has a very high weight, but a low limit in the Count Constraint, then the limit will be reached early and the rest of the generation will have none of those tiles.
2. If the tile is very hard to place, and you've required at least a certain number of them, then the Count Constraint can wait too late before forcing placement, so the generation never succeeds.

These issues can be avoided by setting the constraint as "eager". When eager, it'll place the counted tiles first, before attempting to place any others, ensuring an even distribution, and priority positioning.

# Mirror Constraint

The MirrorConstraint is a generator constraint that ensures that the generated output is symmetric about a given axis.



You can select one axis, X, Y or Z. If you want symmetry about 2 axes, use two copies of this constraint.

The mirror constraint is unlikely to work very well unless you enable `reflectable` on your tiles.

If you have initial constraint tiles, then the empty cell that mirrors that is ignored by the mirror constraint.

## Odd vs evens

If the tile generator is an odd number of cells wide, then the center line reflects onto itself. All tiles placed on the center line must therefore be symmetric themselves. If the width is even, then there is less restriction as tiles on one side of the center line just have to connect to their own reflection.

## Specifying tile symmetry

By default, the constraint looks at the painted sides of each tile, and infers that the tile is symmetric in a given axis if the painted pattern is symmetric. It does not look at any other details of the tile. So, for example, if you had an asymmetric mesh, but with symmetric connectivity, you would need to override that.

To do so, enable "Override Symmetric Tiles" and check and uncheck which tiles should be considered symmetric. Marking a tile as symmetric means when it is placed in a cell, it'll also be placed in the mirrored cell, *with the same reflection and rotation*. Marking a tile as asymmetric means when it is placed in a cell, a mirrored copy of it will be placed in the mirrored cell. If the tile is marked as asymmetric and it does not have `reflectable` and `rotatble` set to enable that, then it cannot be placed at all.

Note that due to rotations, you may need to specify y and z symmetry even when reflecting on the x axis, and so on.

# Path Constraint

The PathConstraint is a generator constraint that forces there to be a connected path between all relevant generated tiles. See the tutorial for details on its usage.

# Separation Constraint

The SeparationConstraint is a generator constraint that forces a given set of tiles not to be placed too near each other. This can be useful to avoid things "clumping" too much, or as an alternative way of controlling the frequency of tiles, distinct from using a Count Constraint or setting the tile weight.

To use it, specify a tile or list of tiles to separate, and a distance. These tiles will never be placed within this many cells of each other. Distance is measured as individual steps from cell to cell (Manhattan distance), so on a square grid forms a diamond exclusion zone around each tile.

NB: Big tiles are not fully supported, and will always measure distances from one corner.

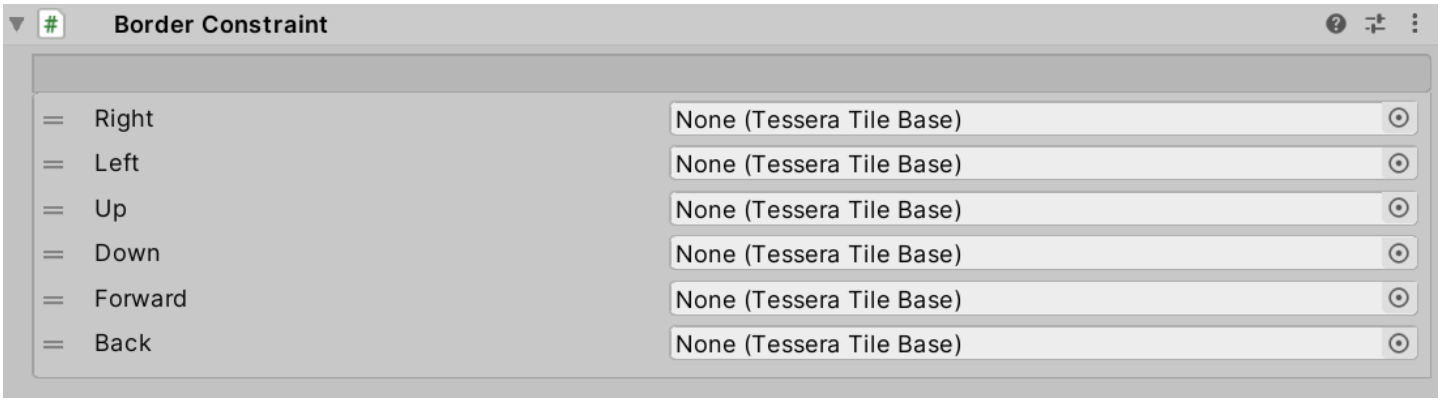
# Border Constraint

The border constraint restricts which tiles can appear on the outermost set of cells of the generator output.

It is similar to placing volume initial constraints, except it automatically works out which cells to affect.

## Usage

Simple add the border constraint to the generator, then select which tiles to use for each border.




You can re-order the sides. Whichever side comes first takes priority for cells that are on multiple sides, i.e. corners.

## Comparison with Skybox

The border constraint has very similar functionality to skyboxes. But they have different advantages.

| | SKYBOX | BORDER |
|---|---|---|
| Constrains cells | by matching the paint they have along the border | by tile |
| Controls tile rotation | Yes | No |
| Works with overlapping models | only if you add paint | yes |

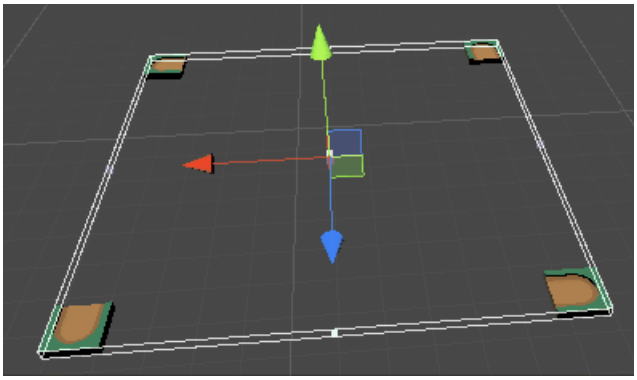
# Animation

> **NOTE**
>
> This feature is only available in Tessera Pro

This feature is for fun and debugging.

If you add the AnimatedGenerator to a generator, you can hit Start to run the normal generation process tile-by-tile instead of all at once. It works in both the Unity Editor and in-game.

This animation is much slower that generating all the tiles at once, but it looks cool, and it can show you where the generator is having difficulty. This can be handy if the generation takes too long, or keeps failing, due to not having the right sort of tiles.



`Seconds Per Step` indicates how long to pause between each step and `Progress Per Step` inidcates how many units of work to do in a step.

Each each unit of work is one of the following:

- Add a tile, and work out all other tiles that are implied by it.
- Backtrack once, done when the current configuration is impossible (if backtracking is enabled).

`Uncertainty Tile` should be a game object to use to indicate that Tessera is still thinking about a particular tile. The size of the tile indicates how many possibilities still remain. If the tile used has a TesseraUncertainty component, it'll be filled with useful info about WFC progress.

# Infinite Generator

> **NOTE**
>
> This feature is only available in Tessera Pro

Tessera's generator only builds finite levels. This utility can be used to lazily generate infinite levels by repeatedly applying the generator.

It works by splitting up the space into an grid of chunks. Then it works out which chunks need to be generated, and fills each one with the output of the configured generator.

# Configuration

`generator` - sets the generator that is used to fill the chunks. It also determines the size of each chunk.

`parallelism` - the number of chunks that can be generated concurrently. Note that turning this up can cause slightly worse quality output.

`watchedColliders` - determines the volume in which chunks should be generated. You typically want to use a large trigger collider following the player or camera, to ensure that everything nearby is generated.

`infiniteX` - You can set each of X, Y and Z to repeat infinitely. If this is false, you can specify the min/max chunk to give a limit to the amount of chunks generated.

## Chunk Cleanup

By default, chunks are never removed. This can cause memory usage to grow unboundedly as your game runs. You can enable chunk cleanup to resolve this. The generator will periodically scan for chunks that haven't been near a watched collider recently, and clean them up according to ChunkCleanupType:

- None - Chunks are never removed.
- Memoize - Remove the GameObjects, but keep tile data so they can be recreated exactly
- Full - Remove everything associated with the chunk.

Memoize is usually desirable if players can return to a chunk later, otherwise Full is more memory efficient.

In either case, you can set chunkPersistTime to control how long chunks stick around for when not needed, and cleanupInterval to control how frequently to scan for chunks.

## Caveats

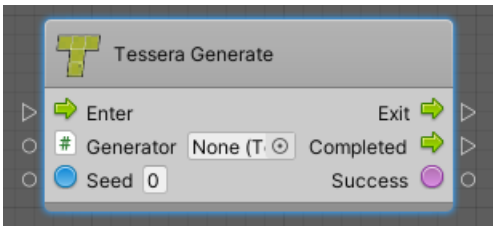
- Only works for square and cube grids
- Only works at runtime
- Generator constraints may not behave intuitively as they only operate on each chunk.
- Scene based constraints are ignored (as scanning for them quickly becomes extremely expensive as the level gets too large).
- Even with a fixed seed, this generation is non-deterministic, as it depends on the order of chunk evaluation.

# Bolt Support

Tessera includes some additional support for Bolt, Unity's visual scripting language.

To enable it, first install Bolt, select `Assets > Import Custom Package...` and select TesseraBolt.unitypackage from the Tessera folder. Finally, go to `Tools > Bolt > Build Unit Options` to load the package.

After doing this, a Unit called `Tessera Generate` should be in the fuzzy finder.




This unit will run a particular generator. It works with events run in coroutine mode.

You can also enable Bolt's autogenerated reflection by adding Tessera to the Bolt's assembly list, but this is not recommended as the full API is a bit complicated to use from a visual scripting language.

## Ports

**Generator**

The TesseraGenerator to run. The default is Self.

**Seed**

Fixes the random generation to particular values. The default is 0, which means a new seed each run

**Initial Constraints**

This port is only visible if you enable `Set Initial Constraints` in the Unit Inspector. Otherwise, the usual generator behaviour of searching the scene for initial constraints occurs.

A `List<GameObject>` specifying TesseraTile and TesseraVolume to constraint the generation by. The default is the empty list.

**Exit**

Runs immediately after Enter.

**Completed**

Runs when the generation is actually completed.

**Success**

Set after completion, to indicate if the generation was successful.

# Samples

This is a list of all samples that come with Tessera / Tessera Pro, and what they demonstrate.

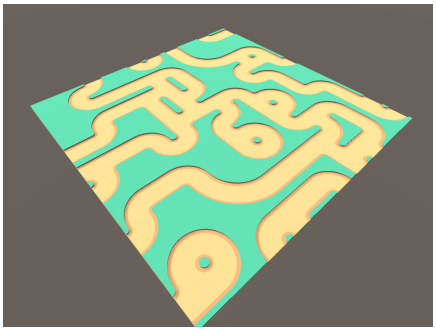
Please note that most samples do not use prefabs as they are more self contained that way. But you are encouraged to make your tiles prefabs in practice.

## GrassPaths

GrassPaths contains a collection of samples that all share a very basic tileset. They demonstrate many Tessera features in as simple a context as possible.

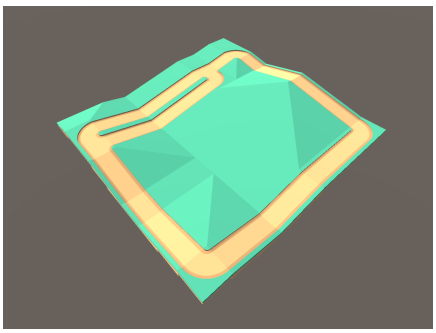
### GrassPaths

Demonstrates configuration of some simple tiles showing a brown path running through a green field of grass. Includes one big tile that occupies the space of 4 normal tiles. This sample serves the basis for the getting started and big tile tutorials.



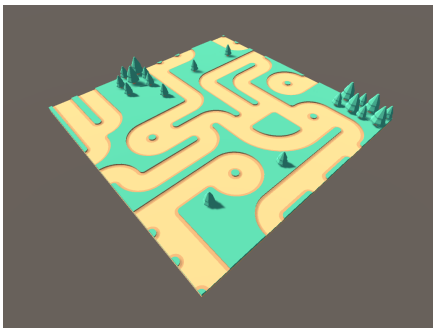
### GrassPaths3d

Adds sloped tiles to GrassPaths.scene, and extends the generator vertically into the 3rd dimension.



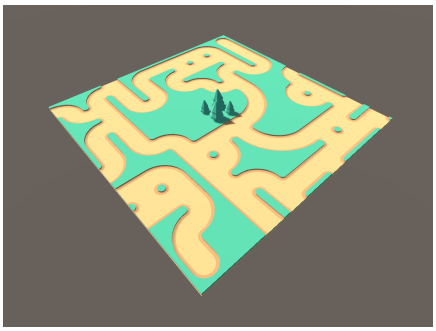
### GrassPathsMultipass

Adds a second generator to GrassPaths.scene, which builds on the first generator by adding vegetation in appropriate places. This is described more in multipass.



### GrassPathsWithPins

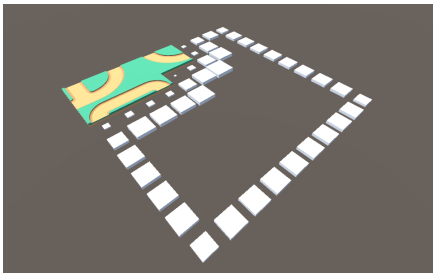
Includes some pins to GrassPaths.scene, showing how you can fix part of the generation manually.



GrassPathsAnimated

**Pro only**

Adds a Animated Generator to GrassPaths.scene.

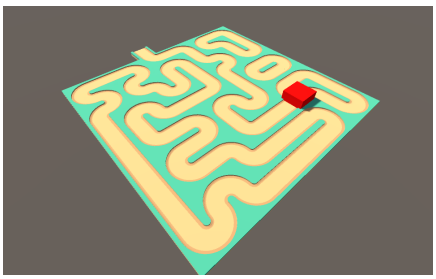


GrassPathsContradiction

**Pro only**

Configures the generator to always fail, so you can see uncertainty tiles in use.

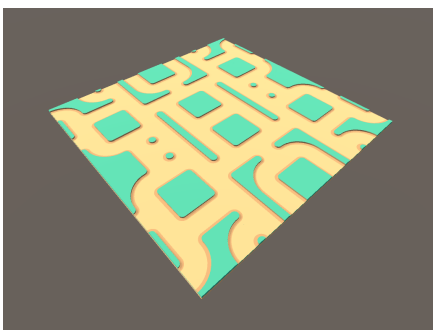
Try fiddling with the `Failure Mode` setting on the generator.



GrassPathsWithMirror

**Pro only**

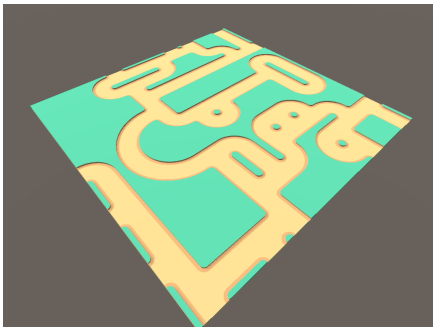
Adds a mirror constraint to GrassPaths.scene.



GrassPathsWithPathConstraint

**Pro only**

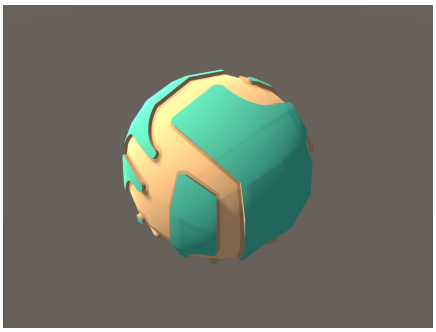
Adds a path constraint to GrassPaths.scene.



GrassPlanet

**Pro only**

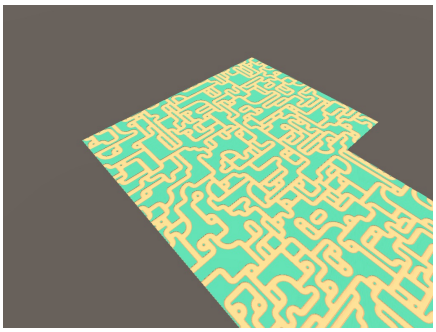
Configures GrassPaths.scene with a mesh surface to make a spherical planet.



GrassPathsInfinite

**Pro only**

Configures GrassPaths.scene with an infinite generator that lazy generates tiles near a collider.



GrassPathsOverlapping

**Pro only**

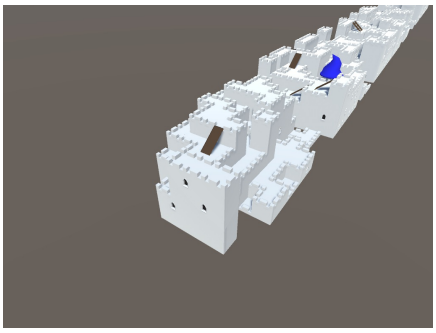
Uses the overlapping feature to generate an image from a given sample.

Generated

Sample

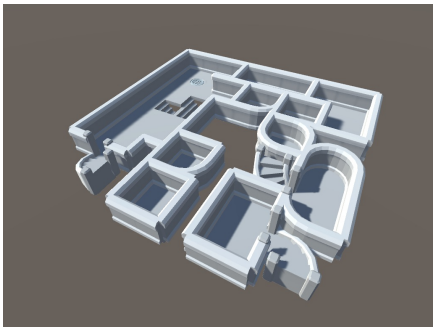
# Castle

A 3d generation showing multiple useful techniques. The tile paint in this sample is based off of Marching Cubes, a popular way of doing auto-tiling. This sample also comes with a small script showing how Tessera can be used to lazily construct infinite generators. (see also GrassPathsInfinite if you have Tessera Pro).



# Dungeon

A generator that creates Diablo-esque dungeons. Inclues a volume constraint that forces empty space in the center of the generator.

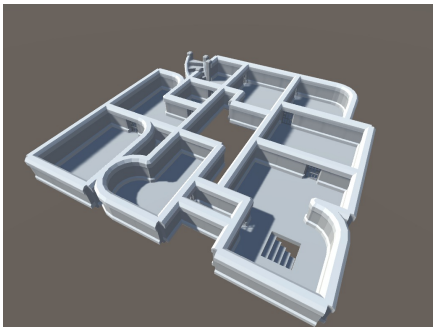


DungeonWithGeneratorConstraints

**Pro only**

Adds several constraints to Dungeon.scene to encourage the level to be more realistic and playable:

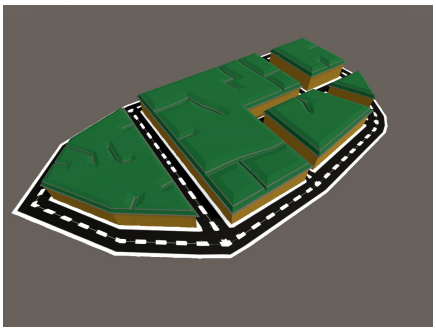
- The level must be fully navigable
- Exactly one staircase up and down.



# City

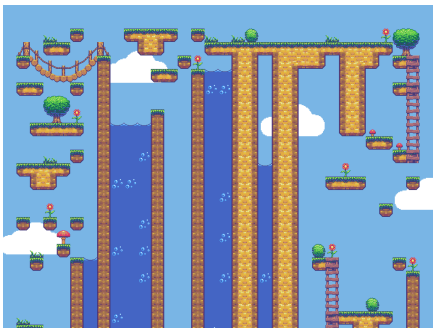
**Pro only**

Uses a mesh surface to map out several city blocks, with different mesh materials representing roads and housing.



## Platformer

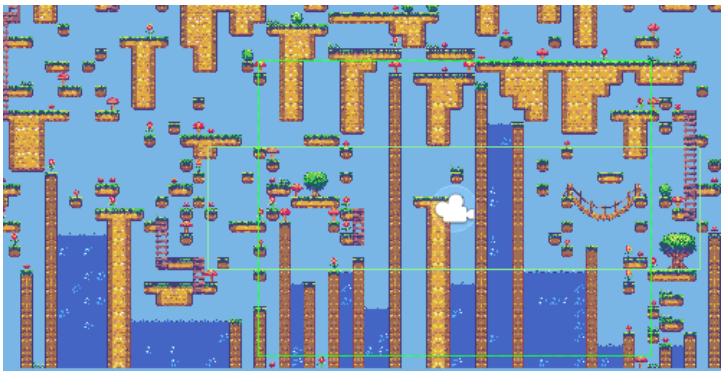
Demonstrates using square tiles instead of cubes. In Tessera Pro, this sample also demonstrates writing to a Unity tilemap.



## PlatformerInfinite

**Pro only**

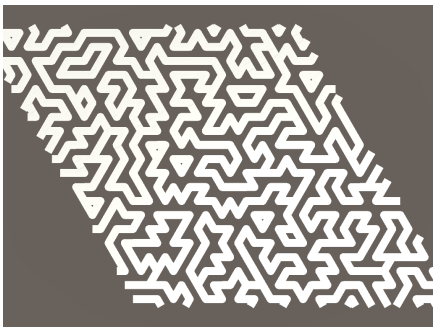
Uses the same tiles as Platformer, but with an infinite horizontal scroll.



## Hexes

**Pro only**

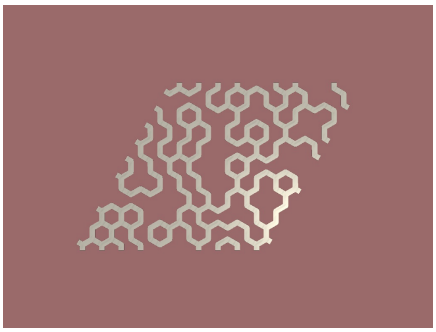
Simples set of tiles demonstrating using Hex Prism tiles.



# Triangles

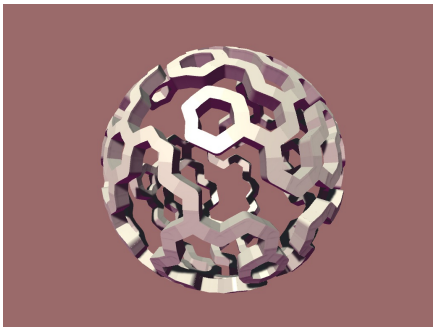
**Pro only**

Simple set of tiles demonstrating using Triangle Prism tiles.



TriangleSphere

Configures Triangles.scene with a mesh surface to make a spherical example.

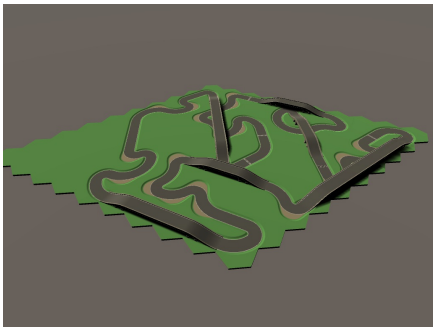


# Hex Raceway

**Pro only**

An example with hex tiles and a path constraint. This is a 3d generator, with height 2, allowing bridges over the track.

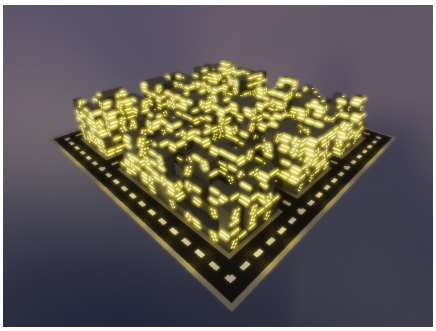
The path constraint has the "Parity" setting on which is specially designed for pathways with no forks, such as this circular track.



# Skyscrapers

**Pro only**

An advanced multipass example. The road network is generated in the first pass, and the skyscrapers generated as the second pass.

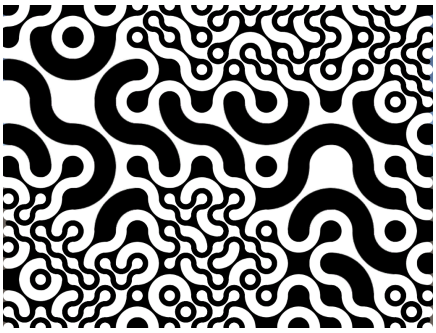


# Truchet

Implements multi-scale truchet tiles, using two different techniques.

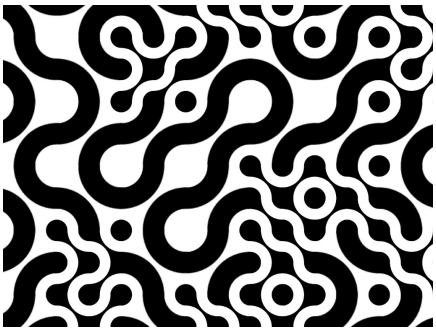
### Truchet Big

Uses Big Tiles to support multiple scales of tile in one generator.



### Truchet Multipass

Runs two different generators, one for each scale of tile.



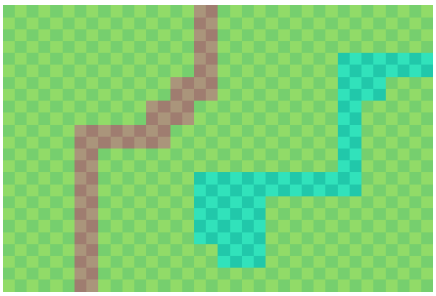
### Plains

**Pro only**

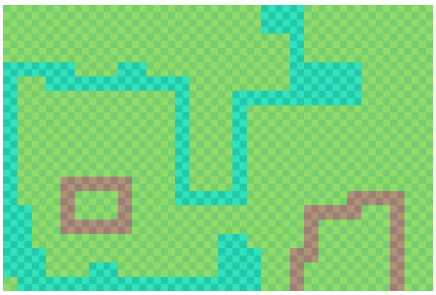
A complicated example using overlapping model with a Unity Tileset based sample, and multiplass.

This shows how Tessera can be used for a simple sort of auto-tiling - the first pass picks the basic terrain type, then the second pass choses a tile appropriate for the nearby terrain.

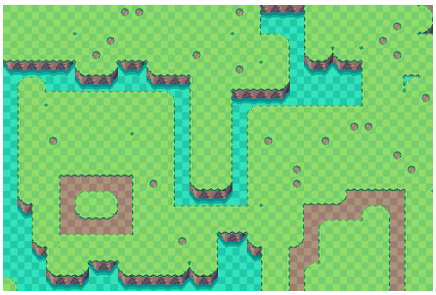
Sample



Pass1



Pass 2



# Palettes

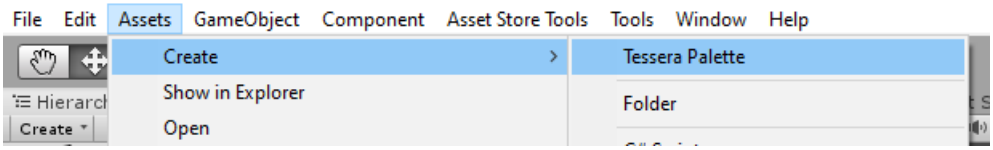
Palettes are an asset type for Tessera that lets you customize which colors you can paint onto tiles, and also controls how colors match.

By default, Tessera comes with a palette of 18 colors (plus transparent). Each color has a short name to help you identify it.

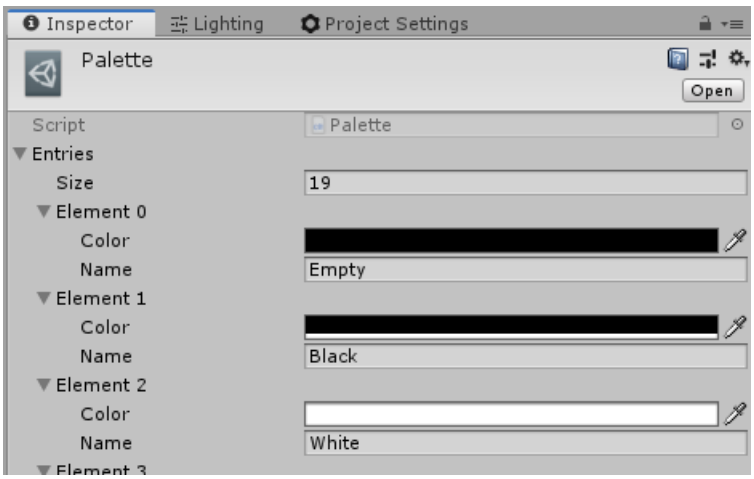
The default palette is configured so that two opposing squares "match" if the colors of those squares are the same, or one is transparent. Recall that two tiles can be placed next to each other if all 9 squares on the face of one tile match with the 9 squares of the opposing face.

## Creating a palette

To customize the palette, create a new Tessera Palette asset from the Assets menus.



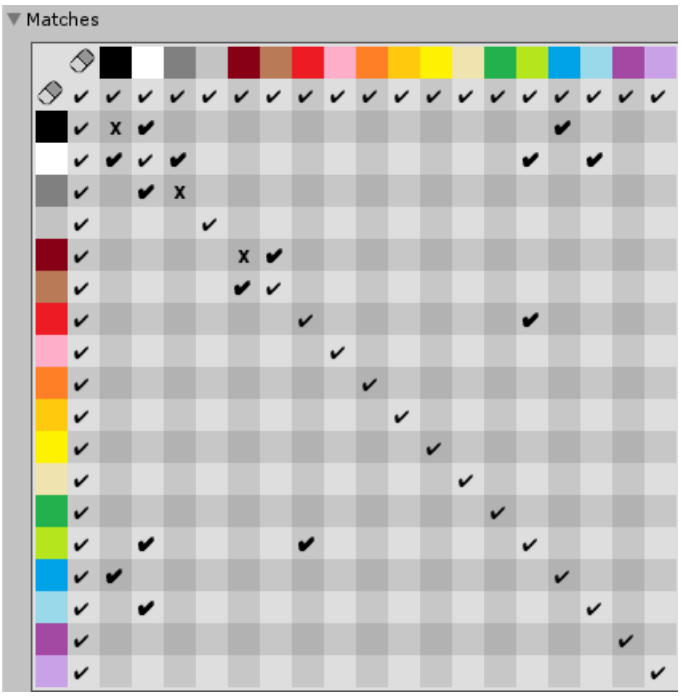

This will create a new asset in your project. You can then select the asset and customize the colors in the inspector.




To use the palette, select your tiles and assign the new asset to the palette field.

## Customizing the matching rules

Near the bottom of the inspector, you can see an grid of checkboxes.




You can click any cell to toggle if that pair of colors matches.

For example, in the image above, black does not match with itself, but does match with white. That means if we had a tile colored black, and another tiled colored white, the generator cannot place two black tiles adjacent to each other, but can otherwise intermix black and white.

If you open the platformer example, you can see an example of this in practise. E.g. walls (black) cannot directly face another wall, but can face onto air (white) or water (blue). I made a second wall color (grey), that works similarly, but lacks the water matching. That allows us to control exactly where water can be placed.

# Cell Types

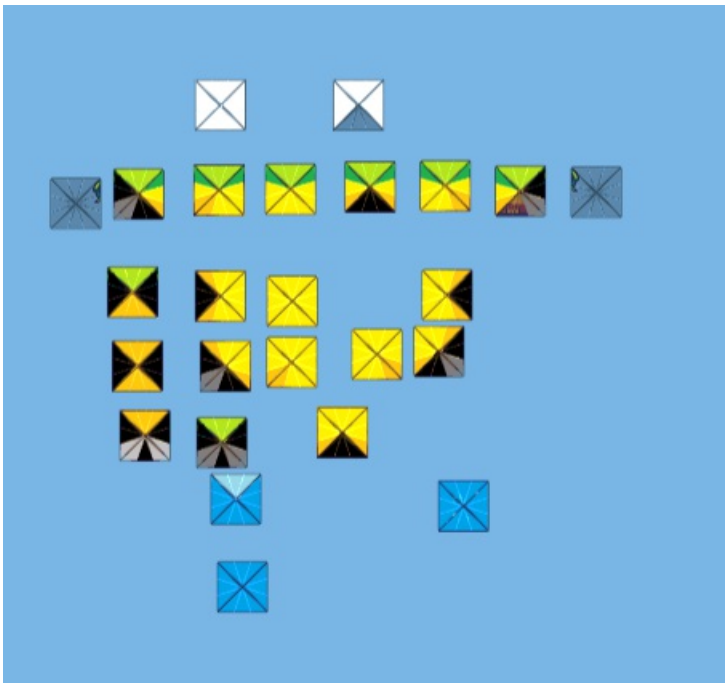
> **NOTE**
>
> Cell types other than cube and square are only available in Tessera Pro

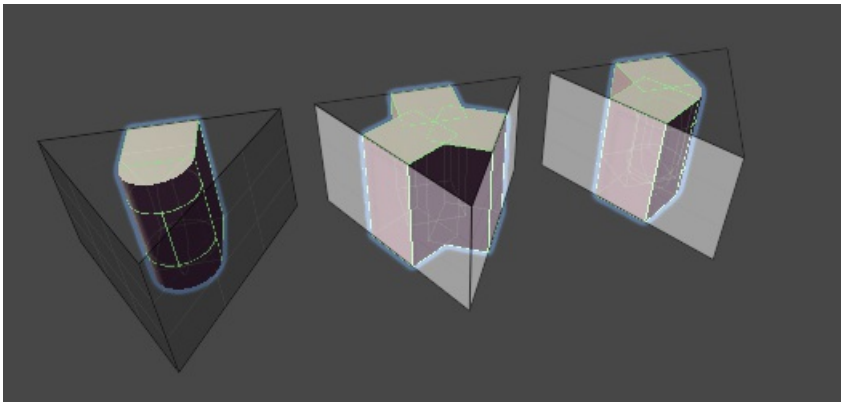
Tessera generally assumes you are working with cube grids, however square, hexagonal and triangular grids are also supported.

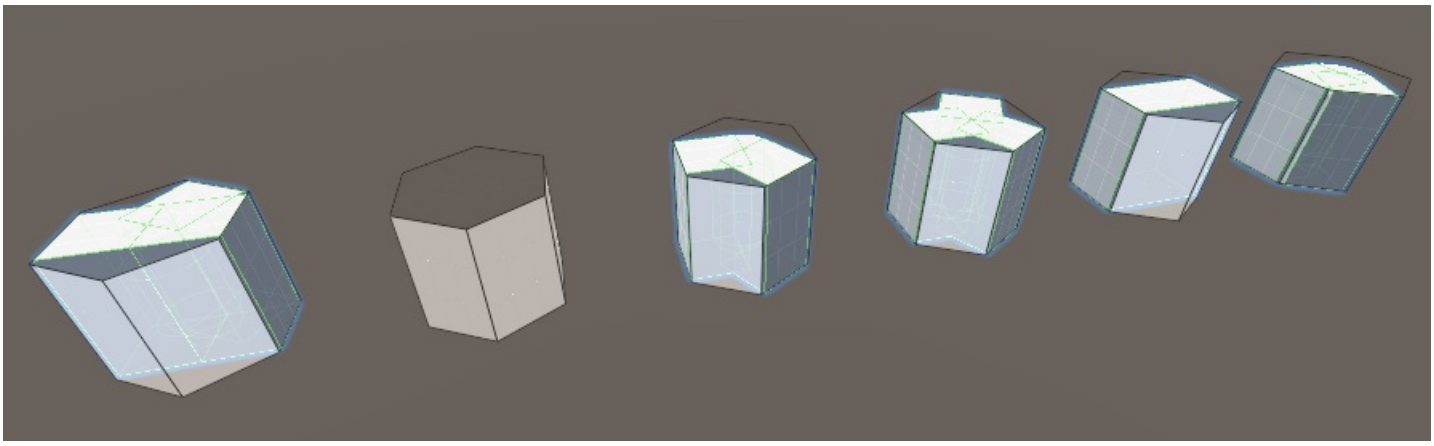
To use this, simply use TesseraSquareTile, TesseraHexTile or TesseraTrianglePrismTile instead of TesseraTile.

As usual, you can paint the sides of the tiles, and the generator will automatically rotate and place the tiles into cells connecting the sides.

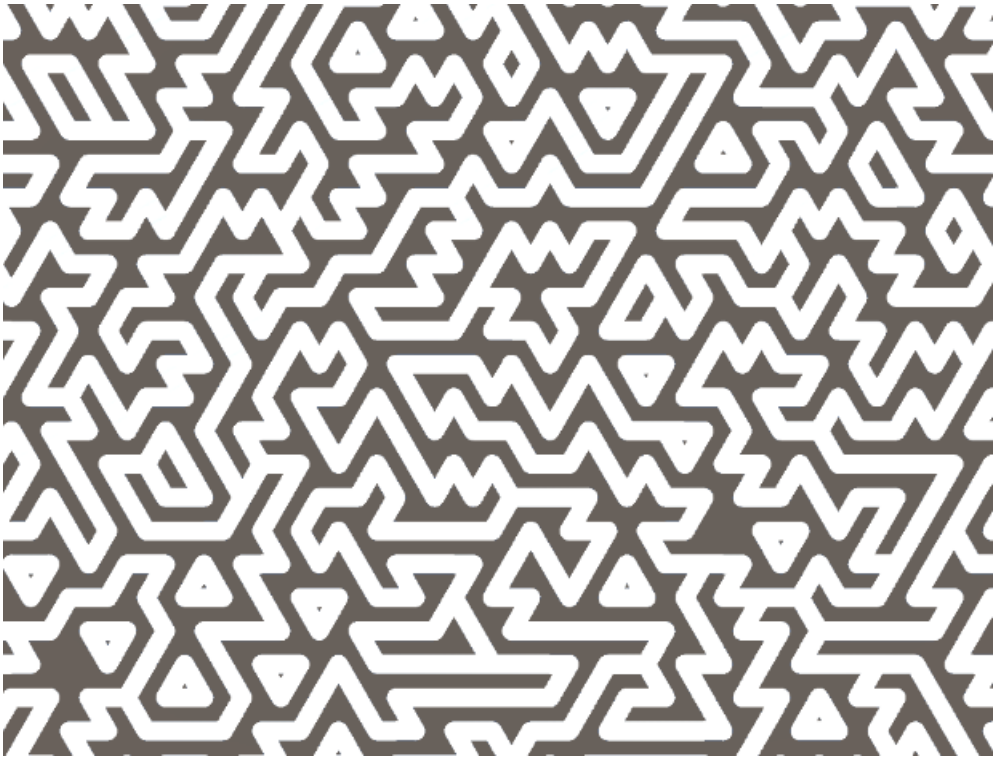
The different tiles in paint mode:







The result of running the generator.



## Caveats

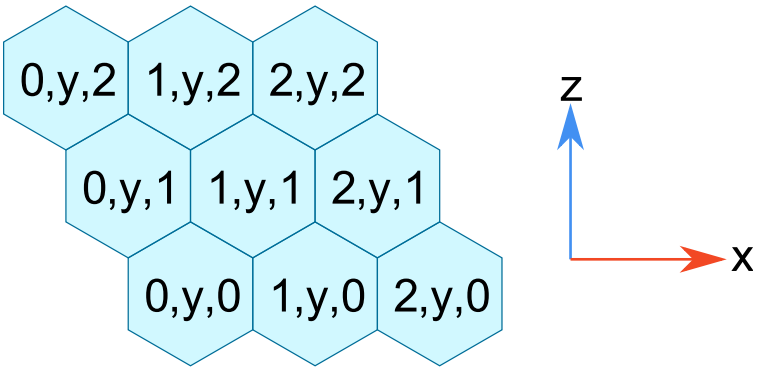
- Only cubes support 3 axes of rotations. Other cell types only rotate in a single plane.
- Triangles generally need rotations enabled, otherwise you must make separate "points up" and "points down" tile variants.
- Different cell types cannot be mixed in a given generator.

## Co-ordinates and measurements

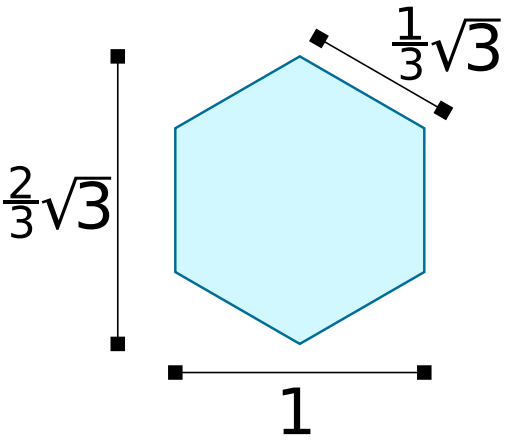
Hexes

Hexes are laid out in the XZ plane. The Y-axis is used to stack hexes vertically. Hexes are pointy topped, not flat topped. If you need other axes or styles, simply rotate the generator appropriately.

Each hex is referred to using the following co-ordinate scheme:




For a hex of size one, you may find the following measurments helpful.

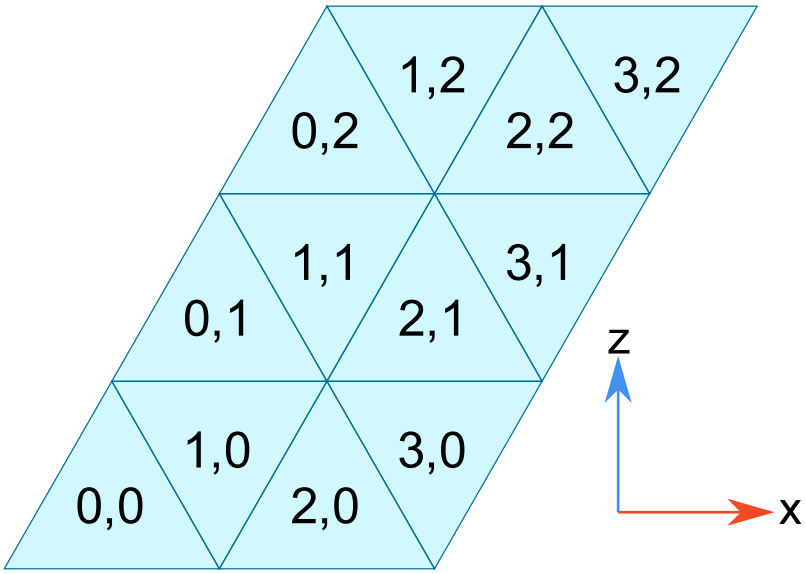



The distance between any two adjacent hex centers is 1.

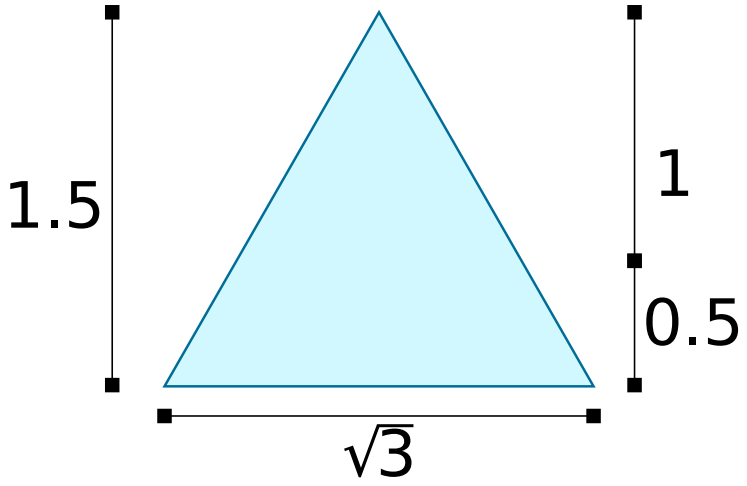
### Triangles

Triangles are laid out in the XZ plane. The Y-axis is used to stack triangles vertically. Triangles point up/down, not left right. If you need other axes or styles, simply rotate the generator appropriately.

Each triangle is referred to using the following co-ordinate scheme:




For a triangle of size one, you may find the following measurements helpful.




The distance between any two adjacent triangle centers is 1.

# Overlapping models

> **NOTE**
>
> This feature is only available in Tessera Pro

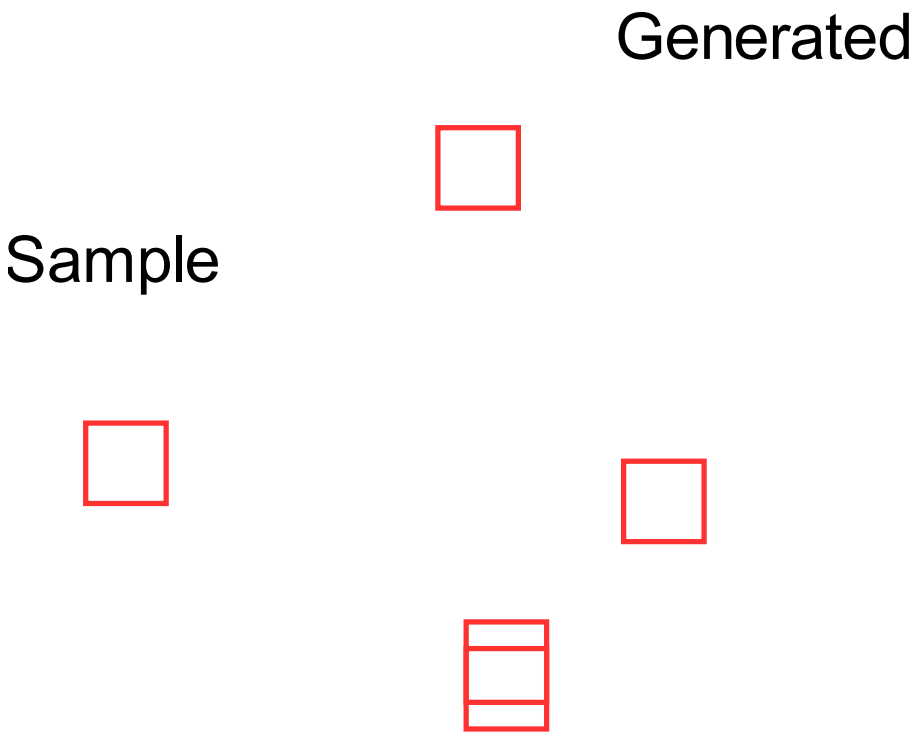
Tessera's main generation algorithm is called WaveFunctionCollapse (WFC), which is responsible for choosing which tiles can be placed in the output.

WFC can be run in two different models: adjacent (aka "simple") and overlapping. By default, Tessera uses the adjacent model. This model forces that pairs of adjacent tiles must connect together, as specified by the tile paint.

There is **experimental** support for overlapping mode. In an overlapping model, you supply samples, which are pre-made levels that the model will learn from. The generator will then ensure that every rectangle in the output matches a rectange found in one of the sample levels. This can copy the style of the sample level quite faithfully. More details on how it works can be found at https://github.com/mxgmn/WaveFunctionCollapse or https://twitter.com/exppad/status/1267045331004469248.

**Example**

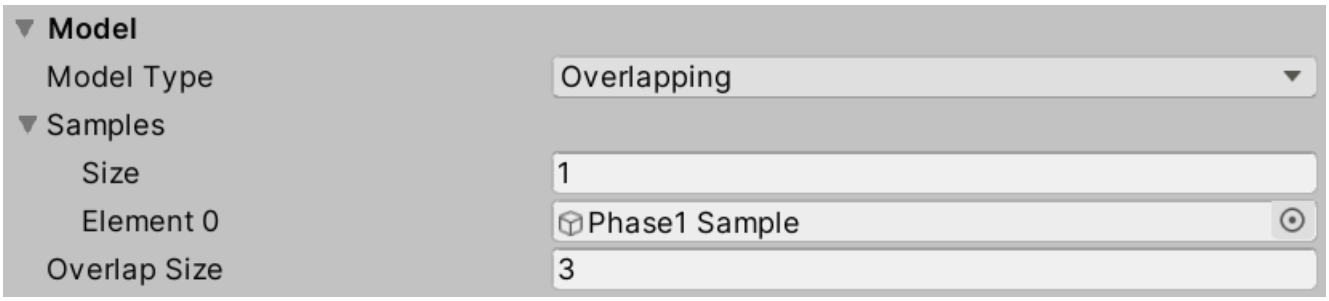
On the left, a small 6x7 map of tiles has been specified as the sample, and a larger map has been made from it. Every 2x2 rectangle in the output comes from somewhere in the input, with the red box showing one particular patch.




## Usage

In the generator settings, set the Model Type to Overlapping.

You can then supply a list of samples, and the overlap size.




## Creating samples

To create a sample, create an empty game object and add it to the samples array of the generator.

Then add objects as children of the sample. The children objects should be arranged in a grid with spacing matching the tile size. The children don't need a TesseraTile component, they need to be "linked" to the original tiles instead. Tile are linked by either:

- The name of the child matching the name of a configured tile (suffixes are ignored)
- The child having a TesseraPinned component, with the tile property set to the tile in question.

Using grid alignment tools such as ProBuilder can help set up your sample.

For 2d grids, you can also use a Unity TileMap as the sample input. The tiles should have names that correspond with configured Tessera Tile objects. See the "Plains" sample for details.

#### Clone Sample

Getting Tessera to detect your sample can be a bit finickity. Use the `Clone sample` button that appears in the inspector to get Tessera to dump out it's internal view of the sample. If you've got everything right, it should look like the original. If not, see what's different.

#### Rotation

If the tiles have rotation / reflection on, then reflected / rotated copies of the sample will also be used. It's highly recommended you enable the symmetric option if you have rotatable tiles, as overlapping model copes much less well than the adjacent model with redundant tile rotations. This feature requires tile paint.

## Caveats

- It is much slower than adjacent models. Using overlapSize greater than 3 is not recommended.
- Overlapping model is a strict constraint - *every* output rectangle must come from a sample. You will often need to make samples quite large and detailed to get sufficient variety for a good quality output.
- It supports cube and square grids only
- You must manually create sample levels.
- Overlapping interacts stangely with irregularly shaped outputs. You are recommended to avoid pins other than PinType.Pin, and to avoid the MaskOut feature of Tessera volumnes.
- Tile paint is not used for the model, but it will still be read by many other Tessera features such as rotational symmetry, pinned tiles, the path constraint and skyboxes. Thus you will likely need to paint the tiles in addition to making samples.

# Controlling Output

> **NOTE**
>
> Output control is only available in Tessera Pro

By default, after doing generation, `TesseraGenerator` will instantiate copies of all the tiles as child objects.

This is usually what you need, but it is possible to customize it further. To do this, you need to attach one of these behaviours to the generator:

- TesseraInstantiateOutput - Finer control over what gameobjects/prefabs are instantiated
- TesseraMeshOutput - Merge all the tiles into a single mesh. Often much faster than creating each tile separately.
- TesseraTilemapOutput - Write the output into a Unity Tilemap.

## Handling the output in code

If none of the built in behaviours above are appropriate, you can handle output yourself.

When invoking the Generate method, you can set onComplete or onComplete to completely replace the the default behaviour with your own code. There's an example in the API docs.

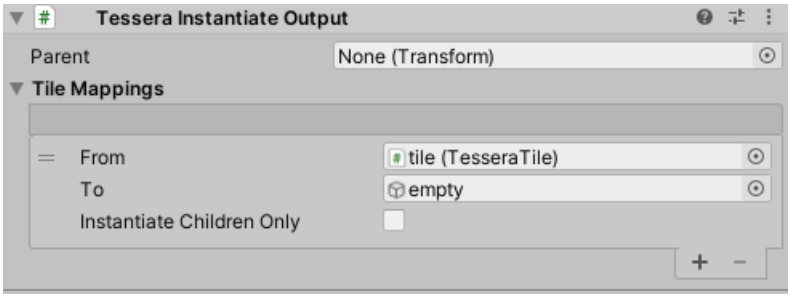
# Creating instances

By default Tessera will instantiate each tile as a child of the generator. If you want to customize this, you can use a TesseraInstantiateOutput.

When using TesseraInstantiateOutput, instead of creating a copy of the tile itself, you can specify a different prefab to be instantiated instead.

Each mapping lists `From`, which must be a tile in the Generators list of tiles, and `To`, which is the prefab that should be instantiated whenever that tile is generated.

You can also set `Instantiate Children Only` which works the same as the equivalent setting on the Tile components.



# MeshOutput

> **NOTE**
>
> `TesseraMeshOutput` is only available in Tessera Pro

You can use TesseraMeshOutput to write directly to a mesh. Your tiles objects must have a MeshFilter and MeshRenderer, unless you check Instantiate Children Only, in which case the children must have a MeshFilter and Mesh Renderer.

## Materials

Because Tessera is merging multiple tiles, the resulting mesh will often need multiple materials. There are different options for how to handle this.

- **Single** - Ignore the materials set on the tiles, and just use the specified material instead
- **Unique** - Use every material found on any tile.
- **UniqueByName** - Use every material found on any tile, deduplicating materials if they share the same name.

## Colliders

Mesh output has 3 settings for handling colliders:

- **None** - No colliders are output
- **ReuseRenderMesh** - A mesh collider is set up, which uses the same mesh as the MeshFilter.
- **Merge** - The meshes of all the mesh colliders of the tiles are merged together.

## Other components

Because mesh output does not create unity game objects for each tile, all other behaviours are lost. You can use the C# API to add them back if needed.

## Chunking

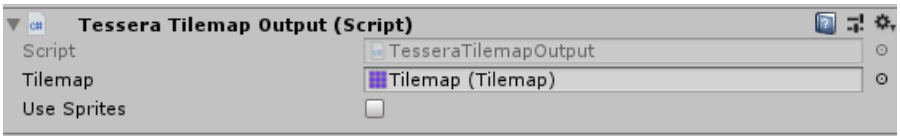
By default, mesh output writes to a single MeshFilter on the generator itself. This can get awkward for large generations. By enabling chunking, the tiles will be split into small groups, and a separate MeshFilter/MeshRenderer created for each.

# Tilemap Output

> **NOTE**
>
> `TesseraTilemapOutput` is only available in Tessera Pro

Unity comes with a Tilemap component that lets you store sprites and components in a regular grid.

To enable this, select the game object with the `TesseraGenerator` component, and add the TesseraTilemapOutput component. Then set the `Tilemap` property to the tilemap component. Then instead of instantiating objects, it will find the appropriate for cell fo the tilemap, and fill that in instead.




> **NOTE**
>
> You must ensure that the grid spacing of the Tilemap and of the generator are aligned.

Tessera comes with a sample called Platformer that demonstrates writing to Tilemaps.

If you check the `Use Sprites` property, then Tessera will attempt to detect game objects that contain a sprite, and write the sprite directly to the tilemap. This is considerably more efficient that inserting the entire game object into the tilemap, but you lose any other components.

# Quality, Performance and Debugging

Tessera uses Wave Function Collapse as its core algorithm, though with many custom enhancements. This is a constraint solving based approach to generation, and it is very powerful, but it comes with some limitations. The algorithm searches through the space of possible tile choices to find one that fits all the constraints and adjacency rules required.

If there's no possible solution, Tessera will fail, reporting a contradiction. And if there's only a few possible solutions there are, the more Tessera will struggle to find one. Tile adjacency is Turing complete, so there are inputs that will just take forever to generate.

This page gives some advice on how to get the most out of Tessera.

## Backtracking

Backtracking is a critical feature of most constraint solvers, though normally WFC doesn't feature it. With backtracking off, the generator will give up the moment it encounters any difficulty. With it on, it will instead undo the last tile generated, and try again with a different option.

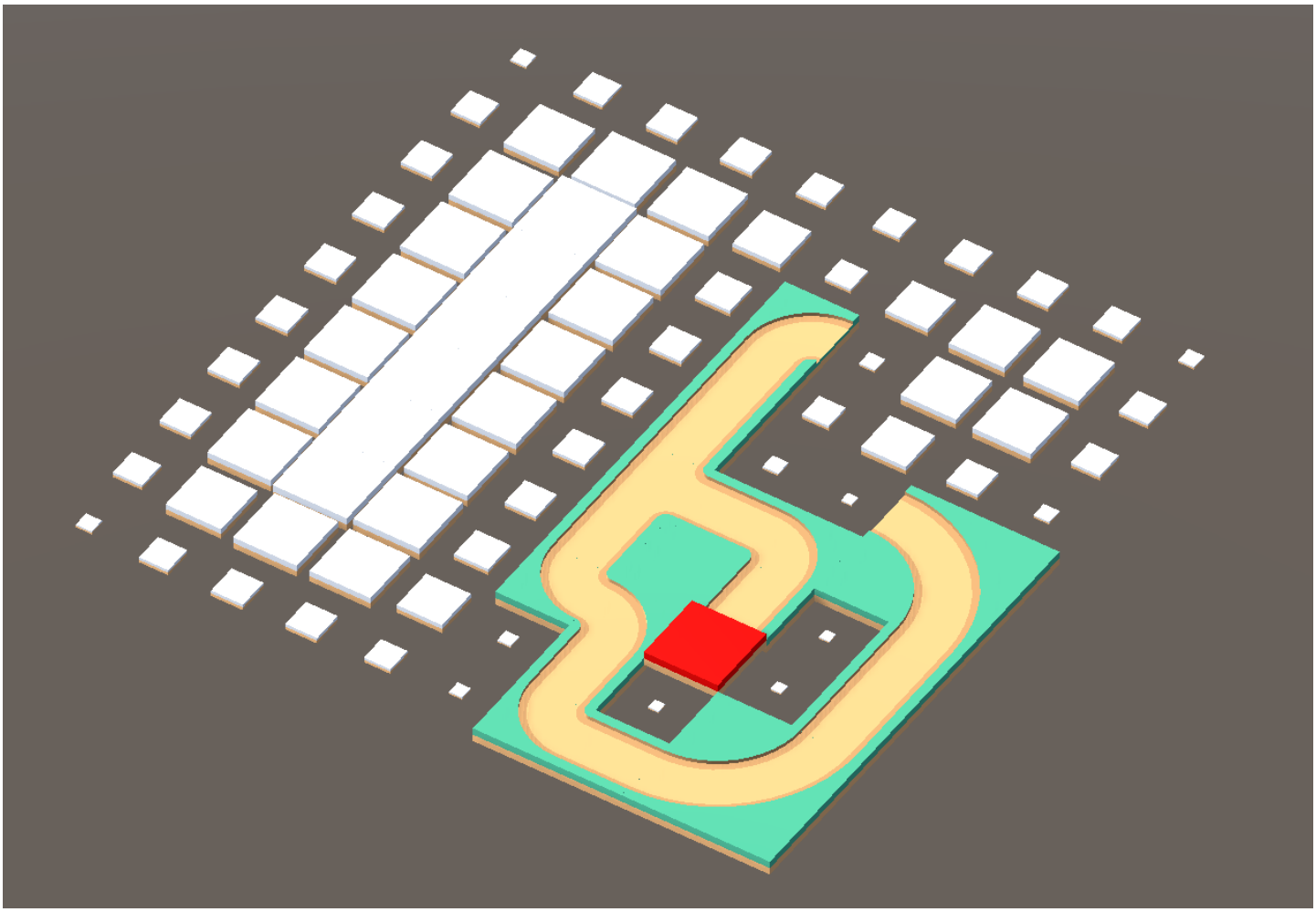
Enabling backtracking can therefore make the solver work much harder at finding a solution. The downside is that it can run *forever* looking for a solution, and can sometimes get stuck exploring possibilities that will never work.

To get the best of both worlds, you can introduce a Step Limit. This will allow some backtracking to occur, but after a fixed amount of computation it will automatically retry with a fresh generation.

## Errors and contradictions

Not all setups for the generator have a solution at all. When the generator fails to find a solution, it'll log a warning detailing what has gone wrong.

To enable more diagnostics, set Failure Mode to Last, and add prefabs to Uncertainty Tile / Contradiction Tile. This will cause the generator to output a clearer picture of the problem.



The above picture shows a failed generation, with white tiles indicating what has yet to be generated, and the red tile indicating where the contradiction occured. You will have to infer what the specific problem is. In the above case, the generator wasn't set up with a dead end tile, so there's no way for the path to complete.

Here are some other tips to help determine what is going wrong:

- You can use a fixed seed to make any issues reproducible.
- You can select uncertainty tiles in the Inspector, they have some additional information attached.
- Try disabling the constraints (both initial constraints and generator constraints) until things start working.
- If you have no constraints, try removing tiles that are difficult to fit in, such as Big Tiles.
- Conversely, sometimes adding tiles can help. You can try adding a tile without any faces painted and with very low weight, which means it can be placed anywhere in the generator as a last resort.
- (Pro only) Use AnimatedGenerator to display the generation in realtime. This can be useful when backtracking is on, highlighting areas that cannot be successfully completed.

# Performance Tips

If you have very large levels, or a particularly hard to generate setup, then you may find Tessera's performance starts to become a problem. Here are some suggests to combat that.

### Disable "Record Undo"

This option is on by default, and affects TesseraGenerator when you run it by clicking the "Generate" button in the Inspector panel. Recording undo information is painfully slow in Unity, and will cause the Editor to freeze temporarily while creating all the generator tiles. This setting has no effect at runtime.

### Change generation algorithm.

Tessera's default constraint resolution algorithm is called "AC4", which resolves all constraints every step. You can instead try

"OneStep", which only resolves nearby constraints. It can be faster in some circumstances, but also has less lookahead so is more likely to fail or backtrack.

### Reduce the number of tiles

Doubling the number of tiles makes Tessera approximately 4x as slow, so it's worthwhile minimizing tiles. The easiest way of doing so is enabling the symmetric setting and avoiding similar/duplicate tiles.

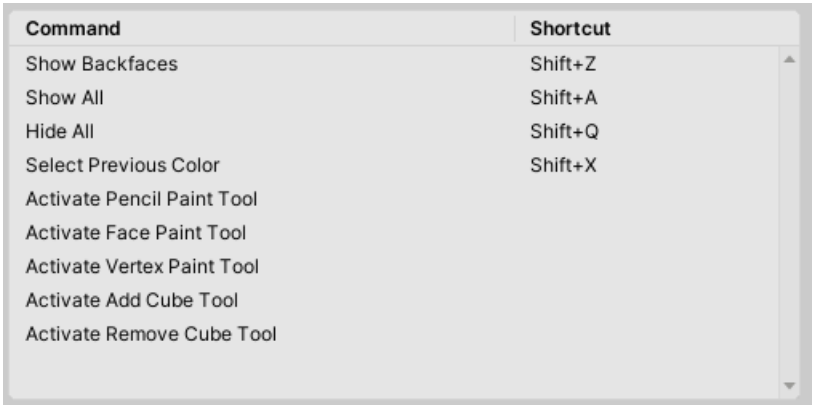
### Path constraints

The Path constraint is very expensive compared with the rest of Tessera. Avoid if it possible, for example, by pre-generating your path and using pins to make Tessera use it.

The path constraint does come with two experimental settings, prioritize and parity that improve search quality, so you may want to try enabling those.

# Keyboard Shortcuts

All shortcuts are used while in tile painting mode. The key combinations can be changed from the defaults using Unity's Shortcut Manager.



| Command | Shortcut |
| --- | --- |
| Show Backfaces | Shift+Z |
| Show All | Shift+A |
| Hide All | Shift+Q |
| Select Previous Color | Shift+X |
| Activate Pencil Paint Tool | |
| Activate Face Paint Tool | |
| Activate Vertex Paint Tool | |
| Activate Add Cube Tool | |
| Activate Remove Cube Tool | |

Righct licking while using a paint tool will erase the highlighted area, instead of painting it the selected color.

# Using the API

The other tutorials have shown you how to set up a tiles and a generator, without any coding. But now you need to hook up the generation to the rest of your level.

## Starting the generator

The easiest way to start working with Tessera is to press the Generate button on the inspector.

However, when it comes to running it in a game, you'lll need to actually launch it programatically. There's two methods for this, Generate and StartGenerate.

Generate will start the generation, wait for it to complete, and the return some details about the result. This is easy to use, but can cause Unity to freeze briefly while the generation runs.

```
using UnityEngine;
using Tessera;
using System.Collections;

public class MyBehaviour : MonoBehaviour
{
    private TesseraGenerator generator;

    void Start()
    {
        generator = GetComponent<TesseraGenerator>();
        var completion = generator.Generate();
        Debug.Log(c.success);
    }
}
```

StartGenerate instead runs the generation asyncrhonopusly (if the platform supports it). It is intended for use in coroutines.

```
using UnityEngine;
using Tessera;
using System.Collections;

public class MyBehaviour : MonoBehaviour
{
    private TesseraGenerator generator;

    void Start()
    {
        StartCoroutine(MyCoro());
    }

    public IEnumerator MyCoro()
    {
        // Start the generation
        var run = generator.StartGenerate();
        // Waits for it to run
        yield return run;
        // Get the details of the run.
        var completion = s.Result;
        Debug.Log(completion.success);
    }
}
```

To do so, you need to call or StartGenerate. Generate will run synchoronously, and return details about the generation. It's easier to use, but can cause noticable stutter if you are doing a big generation. StartGenerate behaves exactly the same, but can be used

from a Unity coroutine.

Because co-routines cannot return information, you can instead supply various callbacks using TesseraGenerateOptions. Most commonly, you'll want to set onCreate to replace the behaviour for instantiating new tiles. The default behaviour instantiates them all at once, which can cause stutter.

```
using UnityEngine;
using Tessera;
using System.Collections;

public class MyBehaviour : MonoBehaviour
{
    private TesseraGenerator generator;

    void Start()
    {
        generator = GetComponent<TesseraGenerator>();
        StartCoroutine(MyCoro());
    }

    IEnumerator MyCoro()
    {
        var options = new TesseraGenerateOptions { onCreate = MyCreate };
        yield return generator.StartGenerate(options);
        // Any following code will be run after the generation
    }

    void MyCreate(TesseraTileInstance instance)
    {
        Debug.Log("Creating " + instance.Tile.gameObject.name);
        // Do the default behaviour
        TesseraGenerator.Instantiate(instance, generator.transform);
    }
}
```

# Generation options

TesseraGenerateOptions lets you customize the generation in much greater detail than the options in the inspector.

`onCreate`

A callback called for each newly generated tile. By default, is used.

This can be used to customize the output of Tessera (in addition to the output settings).

`onComplete`

A callback called when the generation is complete. By default, checks for success then invokes `onCreate` on each instance.

This can be used to complete replace the behaviour of Tessera after a run has completed.

`progress`

A callback called with a string describing the current phase of the calculations, and the progress from 0 to 1. Progress can move backwards for retries or backtracing.

> **NOTE**
>
> `progress` can be called from threads other than the main thread.

`cancellationToken`

Allows interuption of the calculations

`seed`

Fixes the seed for random number generator. By defult, random numbers from from Unity.Random.

`multithreaded`

If set, then generation is offloaded to another thread stopping Unity from freezing. Requires you to use StartGenerate in a coroutine. Multithreaded is ignored in the WebGL player, as it doesn't support threads.

`initialConstraints`

If set, overrides TesseraGenerator.initialConstraints and TesseraGenerator.searchInitialConstraints.

This setting is discussed further below.

## onComplete example

Here's an example of overriding onComplete, to so we can create the tiles one at a time rather than all at once:

```
using UnityEngine;
using Tessera;
using System.Collections;
using System.Collections.Generic;


public class MyBehaviour : MonoBehaviour
{
    private TesseraGenerator generator;

    void Start()
    {
        generator = GetComponent<TesseraGenerator>();
        StartCoroutine(MyCoro());
    }

    IEnumerator MyCoro()
    {
        IList<TesseraTileInstance> instances = null;
        var options = new TesseraGenerateOptions
        {
            onComplete = completion =>
            {
                if(completion.success)
                {
                    // Store the tile instances for instantion later.
                    instances = completion.tileInstances;
                }
            }
        };
        yield return generator.StartGenerate(options);

        if(instances != null)
        {
            // Loop over every object that we want to create.
            foreach(var instance in instances)
            {
                TesseraGenerator.Instantiate(instance, generator.transform);
                // Wait for next frame.
                yield return null;
            }
        }
    }
}
```

# Initial constraints

By default, Tessera scans the scene for pins, placed tiles, and volumes, which serve as constraints on generation. Collectively, these are known as "initial constraints". They are described more here.

Scanning the scene for objects, can be quite slow and inconvenient, so Tessera has an API specifically for setting up initial constraints in the generator without instantiating anything.

To use it, create an builder using TesseraGenerator.GetInitialConstraintBuilder.

The builder then has many methods on it for creating `ITesseraInitialConstraint` objects. Store as many of these as you like in a list, then pass that list into the generator options (described above) when running the generation.

Example:

```
var builder = generator.GetInitialConstraintBuilder();
var initialConstraints = new List<ITesseraInitialConstraint>();
// Pins a tile at a given position.
// The tile doesn't need to be in the scene, it can be a prefab.
initialConstraints.Add(builder.GetInitialConstraint(tile, localToWorldMatrix));

// Set up and run the generation.
var generateOptions = new TesseraGenerateOptions();
generateOptions.initialConstraints = initialConstraints;
generator.Generate(generateOptions);
```

## TesseraCompletion

After a run is finished, a TesseraCompletion object is returned.

This gives a complete description of what has been generated. It's also used in the `onComplete` callback.

TesseraCompletion has the following properties.

`success`

True if all tiles were successfully found.

`tileInstances`

The list of tiles to create.

Big tiles will be listed a single time, and each TileInstance has the world position set.

`tileData`

The raw tile data, describing which tile is located in each cell.

`retries`

The number of times the generation process was restarted.

`backtrackCount`

The number of times the generation process backtracked.

`contradictionLocation`

If success is false, indicates where the generation failed.

`isIncremental`

Indicates these instances should be added to the previous set of instances.

`grid`

Describes the geometry and layout of the cells. See separate Sylves documentations for more details.

`gridTransform`

The position of the grid in world space. (Sylves grids always operate in local space).

## GetGrid

The grid that Tessera uses is available via GetGrid. This gives a `Sylves.IGrid` object lets you easily work out the position of each cell, convert positions to cells, and many other operations. The grid is also available in the TesseraCompletion object.

Tessera grids are handled by Sylves, an open source library. You can refer to its own docs for how to use it.

> **NOTE**
>
> In many places, Tessera uses Vector3Int, which needs to be explicitly cast to a Sylves.Cell when working with Sylves' API.

> **NOTE**
>
> If you are using a Mesh Surface based grid, then GetGrid() can be quite slow, and you are recommended to cache the result of it.

# Developing Tessera

Tessera's source is available in Pro versions for you to make changes to, however it's a large and complex project. Feel free to make private details public if you need them for your game, but you are not recommended to attempt major modifications.

If you cannot achieve what you want in the editor, check if it can be done with the C# API or ask on Discord for support.

That said, this page gives a rough overview of how the project internals works, if you want to understand in further details.

## Sylves and DeBroglie

Much of the core logic of Tessera is open source!

**DeBroglie** is the library that handles the core WaveFunctionCollapse algorithm and constraint solving.

**Sylves** handles the grid logic, and is how Tessera generalizes to several sorts of grids.

These libraries are separately documented and you are recommended to familiarize yourself with them before dealing with Tessera code.

Tessera supplies these libraries as pre-build dlls, but you can find full source on github.

## Translating to DeBroglie

Most of Tessera is translating the Unity configuration into terms that DeBroglie can understand, running DeBroglie, then translating back.

This is mostly the resonsibility of TesseraGeneratorHelper. It creates a DeBroglie TilePropagator, and sets it up with all the details it needs:

- A tile model describing the tessera tiles and how they connect.
- A topology describing the grid to output to.
- Tessera constraints are replaced with DeBroglie constraints
- Various settings get passed through to DeBroglie

## ModelTiles

DeBroglie requires that tile are one-to-one with the cells that they are in, and that there is a unique tile for every rotation. Tessera tiles can cover multiple cells, and support multiple rotations. Therefore, every Tessera tile is cut up into multiple smaller tiles for DeBroglie, called a "model tile". Model tiles have 3 pieces of information:

- Tile - the tessera tile that this model tile subdivides
- Rotation - the specific rotation of the tile ile.
- Offset - which subdivision of the tile this model tile refers to (see below)

After DeBroglie is run, ModelTiles are merged together and converted back into a form more convenient for users, TesseraTileInstance.

Offsets

Each tile basically has a mini grid associated with it, and `offset` gives the co-ordinate of the cell in that grid corresponding to the subdivision.

You can access this grid with SylvesCellGrid, but for performance reasons, this grid is *not* scaled to match the settings of the the tile. Instead, you need to do that translation and scaling every time you access the grid. There are convenience functions for this in `SylvesExtensions.GetCellCenter` and `SylvesExtensions.GetCellSizeTransform`

# Spaces

In Unity, there are the concepts of "world" space and "local" space. These are different co-ordinate systems. It's useful to track which space a vector is associated with, as you can convert vectors between them with the appropriate matrix.

Tessera internally uses a similar terminology, for handling things.

- **World space** - as in unity
- **Generator space** - local space, for the TesseraGenerator object.

  The grid of the generator is always specified in local space.

  You can transform to worldspace via `generator.localToWorldMatrix`
- **Tile space** - local space for a TesseraTileBase object.

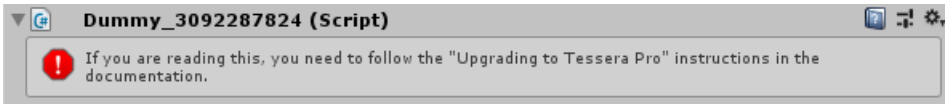
  You can transform to generator space via the properties of TesseraCellInstance. Note that this is a non-linear transform (a `Sylves.Deformation`) in some cases.
- **Cell space** - sometimes called canonical space, this is the space of a single cell in a tile. It's a translated/scaled version of tile space.

  You can convert from to tile space with `SylvesExtensions.GetCellCenter` and `SylvesExtensions.GetCellSizeTransform`.

# Upgrading from Tessera to Tessera Pro

Unfortunately, it's not possible to preserve compatibility in Unity when replacing a .dll with a set of scripts.

If you previously developed a game with Tessera, and you have now downloaded Tessera Pro instead, you'll see the following error.




Don't panic. All your data is still there.

To fix it, please backup your project, then run `Tools > Tessera > Upgrade Scene to Tessera Pro`.

If you like, you can delete all the "dummy" files in the Tessera folder - these files only exist to simplify this transition.

# Advanced

If you don't like upgrading scene by scene, you can edit Unity's yaml directly. The following instructions replace the main script references.

Find: `fileID: -65694588, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: e3ad2bf01b7a6b7409eb683402aa8669`

Find: `fileID: 2003858105, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: 8a3f7e4cbfb5a184b8e397a0175d7112`

Find: `fileID: -96226770, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: 333e56fb2e5d1ff4bb53c10611586ded`

Find: `fileID: 1044799892, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: d1efb6dc65363b7479c2f8be4b856e61`

Find: `fileID: 1700055444, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: eae741d319c3bff43839bad0f95dceca`

Find: `fileID: -758439564, guid: 5ec9deea42ffdf94eae3261973878f98`
Replace: `fileID: 11500000, guid: b6f7252aa33bd554b9de1f6d885c2d7d`

Save your changes, then reload the scene in Unity. If done correctly, the scripts should now work.

# Downgrading

Downgrades can be done by following the Advanced instructions, reversing Find and Replace.

# Release notes

## 6.0.2

- Fix prefab links to no longer attempt to link objects that are not the root of the prefab
- Fix handling of rotated tile constraints in the scene
- Fix tile constraints for triangle prism grids
- Fix height of triangle prism grids

## 6.0.1

- Fix interaction between MaskOut volumes and other volumes
- Fix submseh filter / City sample

## 6.0.0

- **Moved files, you'll need to delete the Tessera directory and reload from scratch**
- Min supported version now Unity 2019.4.
- Extensive internal changes, Tessera now uses Sylves internally.
- Tessera no longer has to be placed in the root `Assets/` folder.
- Generating in-editor will connect instances to prefabs.
- Provided an `.asmdef` file for faster compilation and avoiding namespace clashes (Pro only).
- Fix for Smooth Normals (Pro only).
- Added Clone Sample button for diagnosing issues with overlapping model (Pro only).
- Overlapping samples are a bit less fussy about exact placement.
- Improve error message when using native models.
- Users are now warned if tiles are marked as Static.
- Shortcuts now use Unity's Shortcut Manager.
- Tiles are now automatically resized to match the generator.
- Added samples:
  - GrassPathsAnimated (Pro only).
  - GrassPathsContradiction (Pro only).
- Add TesseraUncertainty to better debug issues (Pro only).
- Fixed InfiniteGenerator to allow the root object to be rotated (Pro only)
- Using AnimatedGenerator no longer slows the editor over time (Pro only)
- TesseraMeshOutput has been revamped (Pro only):
  - Better support for multiple materials
  - Supports breaking the mesh into multiple chunks
  - Handles colliders
- Small tweaks for Dark Mode

## 5.2.0

- Fix errors with nesting Foldout Headers in later Unity versions.
- Added a separate build for Unity 2021.2+. This fixes various failures and warnings Unity generates (non-Pro only)
- Add Border Constraint for setting the tiles on the border of the generation.

## 5.1.1

- Fix Tiles list not displaying in recent Unity versions

- Fix for AnimatedGenerator not backtracking properly
- Improved Inspector GUI for AnimatedGenerator
- Fix issue with Path constraint in DeBroglie

# 5.1.0

- Added Overlapping model support (Pro only)
- Added samples:
  - GrassPathsOverlapping (Pro only)
  - Plains (Pro only)
- Generator output now available in new tileData format.
- Generator seed can now be set in the UI.
- AnimatedGenerator now respects stepCount.
- Fix issues with square tiles/grids
- Fix issue with pins and big tiles
- Fix hex/triangle vertical adjacencies
- Performance improvement for long tile lists in the Inspector

# 5.0.0

- **Moved files, you'll need to delete the Tessera directory and reload from scratch**
- Added symmetry option improving performance in some cases.
- Added multipass generator
- Added infinite generator (Pro only)
- Added instantiate output (Pro only)
- Reworked MirrorConstraint somewhat (Pro only)
- Warn if palette is set inconsistently.
- Added sample docs describing what demos are available.
- Added more samples:
  - GrassPathsInfinite
  - GrassPathsWithPathConstraint
  - PlatformerInfinite
  - Skyscrapers
  - Truchet
- Added some keyboard shortcuts, Shift-Click, A, Shift+A and X.
- Fix pin constraints for square cells.

# 4.3.0

- Fixed warnings about obsolete APIs (Pro only)
- Fixes for hexagon and cube rotations, causing misaligned tiles.
- Fix Tessera Bolt integration.
- Fix MirrorConstraint editor exceptions (Pro only)

# 4.2.0

- Added TesseraSquareTile and updated the Platformer sample to use it
- Added failureMode and other options for diagnosing issues.
- Fixed using AnimatedGenerator and TileOutput at the same time. (Pro only)
- Fixed Regenerate function in play mode
- Fixed exceptions when using masking.

# 4.1.1

- Fix stack overflow error when using Path constraint on large maps

# 4.1.0

- Add multipass sample and tutorial
- Add HexRaceway sample (Pro only)
- Added many PathConstraint options (Pro only):
  - loop
  - acyclic
  - parity
- Added many extra generation options:
  - stepLimit
  - algorithm
  - recordUndo
- Added notes on quality and performance
- Fixed issue with normals when generating on mesh surfaces (Pro only)

# 4.0.0

- Hexagonal and triangular tiles are now supported. (Pro only)
- Triangle mesh surfaces now supported (instead of just quad meshes) (Pro only)
- AnimatedGenerator has some support for multithreading (Pro only)
- Major internal refactoring
- Some performance improvements
- Worker thread now registers with Unity's profiler
- Improvements to provided samples
- Better support for Unity 2020
- Now easier to access the completion object after calling StartGenerate.
- Fixes some issues with Big Tiles on mesh surfaces (Pro only)
- Fix surface meshes reflecting every tile by default (Pro only)
- Removed TesseraGenerator.initialConstraints (use TesseraGeneratorOptions.initialConstraints)
- Fixed using `instantiateChildrenOnly` with `TesseraMeshOutput`

# 3.4.1

- Instantiated tiles now have names that include their cell location.
- Fix exception in PathConstraint when Prioritize is on.
- Fix Volumes
- Fix rare issue with big tiles on mesh surfaces.
- Warn if meshes are not readable and using Mesh Output.

# 3.4.0

- Performance improvements with pins and volumes
- Volumes can now be set to MaskOut
- Refactored GetInitialConstraint methods and TessaraVolumeFilter (breaking)
- Fixed exception with out of bounds palette indices
- Fixed interaction between big tiles and path constraint (Pro only)

# 3.3.0

- Pinned Tile Constraints now work on Surface Meshes (Pro only).
- Refactored some code, changed API of ITesseraTileOutput (Pro only) (breaking)
- Added "Fix It" for inconsistent tile sizes.
- Added TesseraPinned for more initial constraint options.
- Added extra samples
- Added "Upgrade to Tessera Pro" utility (Pro only)

# 3.2.0

- Tile rotations no longer confined to XZ plane
- Added tooltips to inspector
- Mirror constraint now supports on all 3 axes (Pro only)
- Add support for Bolt

# 3.1.2

- Fixed Instantiate Only Children to work with mesh deformations
- Fixed "BoxColliders do not support negative scale or size" warning.
- Fixed generation on mesh surfaces with multiple layers
- Volumes work with generation on mesh surfaces
- Improved Smooth Normals setting

# 3.1.1

- Asset can now be loaded in Unity 2019.1 and 2019.2
- Fixed the missing script in the Castle sample

# 3.1.0

- Add Tessera Volume
- Dungeon example now demos Volumes
- WebGL builds now ignore the multithreaded option
- Can now choose whether normals should be smooth or not when generating on a surface (Pro only)
- Can now filter tiles per-submesh when generating on a surface (Pro only)
- Add Prioritize option to PathConstraint (Pro only)
- Add Separation constraint (Pro only)
- Added City example to Samples (Pro only)
- Fixed bug in AnimatedGenerator
- Fixed bug when normal smoothing

# 3.0.0

- Various api changes, larger internal refactorings (breaking)
- Support generation on surface of a mesh (Pro only)
- Paint tools no longer switches off when you click children of tiles
- Add Clear and Regenerate methods
- Improved validation messages
- Fixed exception for Mesh Output when materials are missing

# 2.3.0

- Tessera Palette now serializes correctly
- Fix some Inspector display glitches in Unity 2019.3
- Mesh output can now be animated (Pro only)

# 2.2.0

- Generation can now be animated (Pro only)
- Tilemap output (Pro only)
- Mesh output (Pro only)
- Added "Show all" view option when painting.

# 2.1.0

- Added a palette asset that lets you:
  - Customize the paint colors Tessera uses
  - Name the colors (shows in tooltips)
  - Control what colors match each other
- Added a new sample, Platformer
- Fixed a bug that prevented the use of big tiles as fixed tile constraints
- A warning is now emitted if inconsistent tileSizes are used
- Multithreading can now be disabled, for platforms that don't support it.

# v2.0.0

- Some performance improvements
- Visible source code (Pro only)
- Added CountConstraint (Pro only)
- Added MirrorConstraint (Pro only)
- Added PathConstraint (Pro only)
- Seeds have changed (breaking)
- Removed `defaultParent` (breaking)
- Added a new sample, Dungeon.

# v1.1.1

- Fixed issue with reflected tiles using incorrect rotation for bottom face

# v1.1.0

- Fixed "BeginLayoutGroup must be called first" errors.
- Fixed issue with rotated initial tile constraints.
- Fixed a display glitch in orthographic views
- Added keyboard shortcuts:
  - Delete to remove tiles from the generators list.
  - Z to toggle backfaces.
- Added another scene to samples.
- Improved documentation on constraints.
- Added contradictionLocation

# v1.0.1

- Removed a Debug.Log line
- Random seed can now be set. Default from Unity.Random.
- "Clear Children" button on Generator component.
- Fix spurious exceptions when calling Generate.

# v1.0.0

- Initial release

# Namespace Tessera

Classes

### AnimatedGenerator

Attach this to a TesseraGenerator to run the generator stepwise over several updates, displaying the changes so far.

> **NOTE**
>
> This class is available only in Tessera Pro

### BiMap<U, V>

Represents a 1:1 mapping between two types

### BorderConstraint

Forces cells near the edge to be a particular tile. Compare with skyBox.

> **NOTE**
>
> This class is available only in Tessera Pro

### BorderItem

### CountConstraint

Keeps track of the number of tiles in a given set, and ensure it is less than / more than a given number.

> **NOTE**
>
> This class is available only in Tessera Pro

### CubeDirExtensions

### CubeFaceDirExtensions

### EnumeratorWithResult<T>

An IEnumerator that also records a given result when it is finished. It is intended for use with Unity coroutines.

### FaceDetails

Records the painted colors for a single face of one cube in a TesseraTile

### HexGeometryUtils

> **NOTE**
>
> This class is available only in Tessera Pro

### HexPrismDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

### HexPrismFaceDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

### InfiniteGenerator

### InstantiateOutput

### MeshUtils

Utility for working with meshes.

> **NOTE**
>
> This class is available only in Tessera Pro

### MirrorConstraint

Ensures that the generation is symmetric when x-axis mirrored. If there are any tile constraints, they will not be mirrored.

> **NOTE**
>
> This class is available only in Tessera Pro

### PaletteEntry

### PathConstraint

Forces a network of tiles to connect with each other, so there is always a complete path between them. Two tiles connect along the path if:

- Both tiles are in pathTiles (if hasPathTiles set); and
- The central color of the sides of the tiles leading to each other are in pathColors (if pathColors set)

> **NOTE**
>
> This class is available only in Tessera Pro

### PrefixLookup<T>

Stores key-value pairs, with efficient searching for the longest key that is a prefix of a given string.

### SeparationConstraint

### SquareFaceDirExtensions

### SquareFaceExtensions

### SylvesConversions

Utilities for converting legacy Tessera enumerations to Sylves equivalents

### SylvesExtensions

### TesseraCompletion

Returned by TesseraGenerator after generation finishes

### TesseraConstraint

Abstract class for all generator constraint components.

> **NOTE**
>
> This class is available only in Tessera Pro

### TesseraGenerateOptions

Additional settings to customize the generation at runtime.

### TesseraGenerator

GameObjects with this behaviour contain utilities to generate tile based levels using Wave Function Collapse (WFC). Call Generate(TesseraGenerateOptions) or StartGenerate(TesseraGenerateOptions) to run. The generation takes the following steps:

- Inspect the tiles in tiles and work out how they rotate and connect to each other.
- Setup any initial constraints that fix parts of the generation (initialConstraints).
- Fix the boundary of the generation if skyBox is set.
- Generate a set of tile instances that fits the above tiles and constraints.
- Optionally retries or backtrack.
- Instantiates the tile instances.

### TesseraHexTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

### TesseraInitialConstraint

Initial constraint objects fix parts of the generation process in places. Use the utility methods on TesseraGenerator to create these objects.

### TesseraInitialConstraintBuilder

Utility for creating ITesseraInitialConstraint objects, which describe a variety of different constraints.

### TesseraInstantiateOutput

Attach this to a TesseraGenerator to control how tiles are instantiated.

> **NOTE**
>
> This class is available only in Tessera Pro

### TesseraMeshOutput

Attach this to a TesseraGenerator to output the tiles to a single mesh instead of instantiating them.

> **NOTE**
>
> This class is available only in Tessera Pro

### TesseraMultipassGenerator

### TesseraMultipassPass

### TesseraPalette

### TesseraPinConstraint

### TesseraPinned

### TesseraSquareTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

### TesseraTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

### TesseraTileBase

### TesseraTileInstance

Represents a request to instantiate a TesseraTile, post generation.

### TesseraTilemapOutput

Attach this to a TesseraGenerator to output the tiles to a Unity Tilemap component instead of directly instantiating them.

> **NOTE**
>
> This class is available only in Tessera Pro

### TesseraTransformedTile

Definesa Unity tile that has a specific transform applied to it. Used by TesseraTilemapOutput

### TesseraTrianglePrismTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

### TesseraUncertainty

If this is set on the "uncertainty tile" used by TesseraGenerator/AnimatedGenerator, it will be populated with data about which tiles are actually possible.

### TesseraVolume

### TesseraVolumeFilter

### TileEntry

Specifies a tile to be used by TesseraGenerator

### TileList

### TileMapping

### TrianglePrismDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

### TrianglePrismFaceDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

### TrianglePrismGeometryUtils

> **NOTE**

This class is available only in Tessera Pro

TRS

Rerpresents a position / rotation and scale. Much like a Transform, but without the association with a unity object.

UnityEngineInterface

Structs

CubeRotation

HexRotation

Represents rotations / reflections of a hexagon

**NOTE**

This class is available only in Tessera Pro

ModelTile

Actual tiles used internally. There's a many-to-one relationship between ModelTile and TesseraTile due to rotations and "big" tile support.

OrientedFace

Legacy class used when serializing. You should use SylvesOrientedFace instead. Records the painted colors and location of single face of one cube in a TesseraTile

SquareRotation

Represents rotations / reflections of a square

SylvesOrientedFace

Records the painted colors and location of single face of one cube in a TesseraTile

TriangleRotation

Represents rotations / reflections of a hexagon

**NOTE**

This class is available only in Tessera Pro

Interfaces

IEngineInterface

ITesseraInitialConstraint

ITesseraTileOutput

Enums

AnimatedGenerator.AnimatedGeneratorState

CellFaceDir

Legacy class used to represents a particular face of a generic cell when serializing. You should use Sylves.CellDir instead.

CellRotation

Legacy class used to represents a rotation of a generic cell when serializing. You use use Sylves.CellRotation instead.

ChunkCleanupType

CubeFaceDir

Enum of the 6 faces on a cube.

FaceType

FailureMode

HexPrismFaceDir

Enum of the 8 faces on a hex prism.

> **NOTE**
>
> This class is available only in Tessera Pro

MirrorConstraint.Axis

ModelType

Different models Tessera supports. The model dictates how nearby tiles relate to each other.

PinType

RotationGroupType

SquareFaceDir

Enum of the 4 sides of a square.

SylvesHexPrismDir

SylvesTrianglePrismDir

TesseraMeshOutputCollider

TesseraMeshOutputMaterialGrouping

TesseraMultipassPassType

TesseraWfcAlgorithm

TrianglePrismFaceDir

> **NOTE**
>
> This class is available only in Tessera Pro

VolumeType

# Class AnimatedGenerator

Attach this to a TesseraGenerator to run the generator stepwise over several updates, displaying the changes so far.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

AnimatedGenerator

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class AnimatedGenerator : MonoBehaviour
```

## Fields

### multithread

If true, use threading to avoid stalling Unity. (ignored on WebGL builds)

Declaration

```
public bool multithread
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### progressPerStep

Declaration

```
public float progressPerStep
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### scaleUncertainyTile

If true, the uncertainty tiles shrink as the solver gets more certain.

Declaration

```
public bool scaleUncertainyTile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### secondsPerStep

Declaration

```
public float secondsPerStep
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### uncertaintyTile

Game object to show in cells that have yet to be fully solved.

Declaration

```
public GameObject uncertaintyTile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

## Properties

### IsStarted

Declaration

```
public bool IsStarted { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### State

Declaration

```
public AnimatedGenerator.AnimatedGeneratorState State { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| AnimatedGenerator.AnimatedGeneratorState | |

## Methods

### PauseGeneration()

Declaration

```
public void PauseGeneration()
```

### ResumeGeneration()

Declaration

```
public void ResumeGeneration()
```

### StartGeneration()

Declaration

```
public void StartGeneration()
```

### Step()

Declaration

```
public void Step()
```

### StopGeneration()

Declaration

```
public void StopGeneration()
```

# Enum AnimatedGenerator.AnimatedGeneratorState

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum AnimatedGeneratorState
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Initializing | |
| Paused | |
| Running | |
| Stopped | |

# Class BiMap<U, V>

Represents a 1:1 mapping between two types

Inheritance

Object

BiMap<U, V>

Implements

IEnumerable<(T1, T2)<U, V>>

IEnumerable

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class BiMap<U, V> : IEnumerable<(U, V)>, IEnumerable
```

Type Parameters

| NAME | DESCRIPTION |
| --- | --- |
| U | |
| V | |

## Constructors

### BiMap(IEnumerable<(U, V)>)

Declaration

```
public BiMap(IEnumerable<(U, V)> data)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEnumerable<(T1, T2)<U, V>> | data | |

## Properties

### Count

Declaration

```
public int Count { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Item[U]

Declaration

```
public V this[U u] { get; }
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| U | u | |

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| V | |

### Item[V]

Declaration

```
public U this[V v] { get; }
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| V | v | |

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| U | |

## Methods

### GetEnumerator()

Declaration

```
public IEnumerator<(U, V)> GetEnumerator()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IEnumerator<(T1, T2)<U, V>> | |

## Explicit Interface Implementations

### IEnumerable.GetEnumerator()

Declaration

```
IEnumerator IEnumerable.GetEnumerator()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IEnumerator | |

## Implements

System.Collections.Generic.IEnumerable<T>
System.Collections.IEnumerable

# Class BorderConstraint

Forces cells near the edge to be a particular tile. Compare with skyBox.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TesseraConstraint

BorderConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class BorderConstraint : TesseraConstraint
```

## Fields

### borders

Declaration

```
public BorderItem[] borders
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| BorderItem[] | |

# Class BorderItem

Inheritance

Object

BorderItem

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class BorderItem
```

## Fields

### cellDir

Declaration

```
public Sylves.CellDir cellDir
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellDir | |

### tile

Declaration

```
public TesseraTileBase tile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

# Enum CellFaceDir

Legacy class used to represents a particular face of a generic cell when serializing. You should use Sylves.CellDir instead.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum CellFaceDir
```

# Enum CellRotation

Legacy class used to represents a rotation of a generic cell when serializing. You use use Sylves.CellRotation instead.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum CellRotation
```

# Enum ChunkCleanupType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum ChunkCleanupType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Full | Remove everything associated with the chunk. |
| Memoize | Remove the GameObjects, but keep tile data so they can be recreated exactly |
| None | Never cleanup chunks |

# Class CountConstraint

Keeps track of the number of tiles in a given set, and ensure it is less than / more than a given number.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object
TesseraConstraint
CountConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class CountConstraint : TesseraConstraint
```

## Fields

### comparison

How to compare the count of tiles to count.

Declaration

```
public CountComparison comparison
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| CountComparison | |

### count

The count to be compared against.

Declaration

```
public int count
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### eager

If set, this constraint will attempt to pick tiles as early as possible. This can give a better random distribution, but higher chance of contradictions.

Declaration

```
public bool eager
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### tiles

The set of tiles to count

Declaration

```
public List<TesseraTileBase> tiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TesseraTileBase> | |

# Class CubeDirExtensions

Inheritance

Object

CubeDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class CubeDirExtensions
```

## Methods

### Forward(Sylves.CubeDir)

Declaration

```
public static Vector3Int Forward(this Sylves.CubeDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.CubeDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | The normal vector for a given face. |

### Inverted(Sylves.CubeDir)

Declaration

```
public static Sylves.CubeDir Inverted(this Sylves.CubeDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.CubeDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CubeDir | Returns the face dir with the opposite normal vector. |

### Up(Sylves.CubeDir)

Declaration

```
public static Vector3Int Up(this Sylves.CubeDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.CubeDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | Returns (0, 1, 0) vector for most faces, and returns (0, 0, 1) for the top/bottom faces. |

# Enum CubeFaceDir

Enum of the 6 faces on a cube.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum CubeFaceDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Back | |
| Down | |
| Forward | |
| Left | |
| Right | |
| Up | |

# Class CubeFaceDirExtensions

Inheritance

Object

CubeFaceDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class CubeFaceDirExtensions
```

## Methods

### Forward(CubeFaceDir)

Declaration

```
public static Vector3Int Forward(this CubeFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | The normal vector for a given face. |

### Inverted(CubeFaceDir)

Declaration

```
public static CubeFaceDir Inverted(this CubeFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CubeFaceDir | Returns the face dir with the opposite normal vector. |

### Up(CubeFaceDir)

Declaration

```
public static Vector3Int Up(this CubeFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | Returns (0, 1, 0) vector for most faces, and returns (0, 0, 1) for the top/bottom faces. |

# Struct CubeRotation

Inherited Members

ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public struct CubeRotation
```

## Properties

### All

Declaration

```
public static readonly IEnumerable<CubeRotation> All { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| IEnumerable<CubeRotation> | |

### Identity

Declaration

```
public static readonly CubeRotation Identity { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### IsReflection

Declaration

```
public readonly bool IsReflection { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### ReflectX

Declaration

```
public static readonly CubeRotation ReflectX { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### ReflectY

Declaration

```
public static readonly CubeRotation ReflectY { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### ReflectZ

Declaration

```
public static readonly CubeRotation ReflectZ { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### RotateXY

Declaration

```
public static readonly CubeRotation RotateXY { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### RotateXZ

Declaration

```
public static readonly CubeRotation RotateXZ { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### RotateYZ

Declaration

```
public static readonly CubeRotation RotateYZ { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

## Methods

### Equals(Object)

Declaration

```
public override bool Equals(object obj)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Object | obj | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

Overrides

ValueType.Equals(Object)

### GetHashCode()

Declaration

```
public override int GetHashCode()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

Overrides

ValueType.GetHashCode()

### Invert()

Declaration

```
public CubeRotation Invert()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

## Operators

### Equality(CubeRotation, CubeRotation)

Declaration

```
public static bool operator ==(CubeRotation a, CubeRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | a | |

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Implicit(CellRotation to CubeRotation)

Declaration

```
public static implicit operator CubeRotation(CellRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CellRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### Implicit(CubeRotation to CellRotation)

Declaration

```
public static implicit operator CellRotation(CubeRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CellRotation | |

### Inequality(CubeRotation, CubeRotation)

Declaration

```
public static bool operator !=(CubeRotation a, CubeRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | a | |
| CubeRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Multiply(CubeRotation, BoundsInt)

Declaration

```
public static BoundsInt operator *(CubeRotation r, BoundsInt bounds)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | r | |
| BoundsInt | bounds | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

### Multiply(CubeRotation, CubeFaceDir)

Declaration

```
public static CubeFaceDir operator *(CubeRotation r, CubeFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | r | |
| CubeFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CubeFaceDir | |

### Multiply(CubeRotation, CubeRotation)

Declaration

```
public static CubeRotation operator *(CubeRotation a, CubeRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | a | |
| CubeRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CubeRotation | |

### Multiply(CubeRotation, Vector3)

Declaration

```
public static Vector3 operator *(CubeRotation r, Vector3 v)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | r | |
| Vector3 | v | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### Multiply(CubeRotation, Vector3Int)

Declaration

```
public static Vector3Int operator *(CubeRotation r, Vector3Int v)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CubeRotation | r | |
| Vector3Int | v | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

# Class EnumeratorWithResult<T>

An IEnumerator that also records a given result when it is finished. It is intended for use with Unity coroutines.

Inheritance

Object

EnumeratorWithResult<T>

Implements

IEnumerator

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class EnumeratorWithResult<T> : IEnumerator
```

Type Parameters

| NAME | DESCRIPTION |
| --- | --- |
| T | |

## Constructors

### EnumeratorWithResult(IEnumerator)

Declaration

```
public EnumeratorWithResult(IEnumerator e)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEnumerator | e | |

## Properties

### Current

Declaration

```
public object Current { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Object | |

### Result

The value returned by this enumerator. This will throw if you attempt to access it before fully iterating through the enumerator.

Declaration

```
public T Result { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| T | |

## Methods

### MoveNext()

Declaration

```
public bool MoveNext()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Reset()

Declaration

```
public void Reset()
```

### TryGetResult(out T)

The value returned by this enumerator. This will return false if you attempt to access it before fully iterating through the enumerator.

Declaration

```
public bool TryGetResult(out T result)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| T | result | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Implements

System.Collections.IEnumerator

# Class FaceDetails

Records the painted colors for a single face of one cube in a TesseraTile

Inheritance

Object

FaceDetails

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class FaceDetails
```

## Fields

### bottom

Declaration

```
public int bottom
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### bottomLeft

Declaration

```
public int bottomLeft
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### bottomRight

Declaration

```
public int bottomRight
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### center

Declaration

```
public int center
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### faceType

Declaration

```
public FaceType faceType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| FaceType | |

### hexBottomRightAndRight

Declaration

```
public int hexBottomRightAndRight
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexLeftAndBottomLeft

Declaration

```
public int hexLeftAndBottomLeft
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexRightAndTopRight

Declaration

```
public int hexRightAndTopRight
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexTopLeftAndLeft

Declaration

```
public int hexTopLeftAndLeft
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### left

Declaration

```
public int left
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### right

Declaration

```
public int right
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### top

Declaration

```
public int top
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### topLeft

Declaration

```
public int topLeft
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### topRight

Declaration

```
public int topRight
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Properties

### hexBottomLeft

Declaration

```
public int hexBottomLeft { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexBottomLeftAndBottomRight

Declaration

```
public int hexBottomLeftAndBottomRight { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexBottomRight

Declaration

```
public int hexBottomRight { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexCenter

Declaration

```
public int hexCenter { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexLeft

Declaration

```
public int hexLeft { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexRight

Declaration

```
public int hexRight { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexTopLeft

Declaration

```
public int hexTopLeft { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexTopRight

Declaration

```
public int hexTopRight { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### hexTopRightAndTopLeft

Declaration

```
public int hexTopRightAndTopLeft { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Methods

### IsEquivalent(FaceDetails)

Checks if two FaceDetails have the same values. This is an exact match, with no reflection built in. See TesseraPalette.Match for a fuzzier match.

Declaration

```
public bool IsEquivalent(FaceDetails other)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| FaceDetails | other | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## ToString()

Declaration

```
public override string ToString()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

Overrides

Object.ToString()

# Enum FaceType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum FaceType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Edge | |
| Hex | |
| Square | |
| Triangle | |

# Enum FailureMode

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum FailureMode
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Cancel | If a failure occurs, don't output anything |
| Last | If a failure occurs, output the progress so far |
| LastGood | If a failure occurs, backtrack to the last safe point. |
| Minimal | Examines the progress so far for the minimal set of tiles that cause an issue |

# Class HexGeometryUtils

**NOTE**

This class is available only in Tessera Pro

Inheritance

Object

HexGeometryUtils

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class HexGeometryUtils
```

## Methods

### CubeRotate(HexRotation, Vector3Int)

Declaration

```
public static Vector3Int CubeRotate(HexRotation rotation, Vector3Int cc)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| HexRotation | rotation | |
| Vector3Int | cc | |

Returns

| TYPE | DESCRIPTION |
|---|---|
| Vector3Int | |

### FromCubeCords(Vector3Int, Int32)

Declaration

```
public static Vector3Int FromCubeCords(Vector3Int cc, int y = 0)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| Vector3Int | cc | |
| Int32 | y | |

Returns

| TYPE | DESCRIPTION |
|---|---|
| Vector3Int | |

### FromSide(Int32)

Declaration

```
public static HexPrismFaceDir FromSide(int side)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | side | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexPrismFaceDir | |

### GetCellCenter(Vector3Int, Vector3, Vector3)

Declaration

```
public static Vector3 GetCellCenter(Vector3Int cell, Vector3 origin, Vector3 cellSize)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |
| Vector3 | origin | |
| Vector3 | cellSize | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### Rotate(HexRotation, Vector3Int)

Declaration

```
public static Vector3Int Rotate(HexRotation rotation, Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | rotation | |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### ToCubeCoords(Vector3Int)

Declaration

```
public static Vector3Int ToCubeCoords(Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

# Class HexPrismDirExtensions

**NOTE**

This class is available only in Tessera Pro

Inheritance

Object

HexPrismDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class HexPrismDirExtensions
```

## Methods

### Forward(SylvesHexPrismDir)

Declaration

```
public static Vector3 Forward(this SylvesHexPrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesHexPrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### GetSide(SylvesHexPrismDir)

Declaration

```
public static int GetSide(this SylvesHexPrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesHexPrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### IsUpDown(SylvesHexPrismDir)

Declaration

```
public static bool IsUpDown(this SylvesHexPrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesHexPrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Up(SylvesHexPrismDir)

Declaration

```
public static Vector3 Up(this SylvesHexPrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesHexPrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

# Enum HexPrismFaceDir

Enum of the 8 faces on a hex prism.

> **NOTE**
>
> This class is available only in Tessera Pro

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum HexPrismFaceDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| BackLeft | |
| BackRight | |
| Down | |
| ForwardLeft | |
| ForwardRight | |
| Left | |
| Right | |
| Up | |

# Class HexPrismFaceDirExtensions

**NOTE**

This class is available only in Tessera Pro

Inheritance

Object

HexPrismFaceDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class HexPrismFaceDirExtensions
```

## Methods

### Forward(HexPrismFaceDir)

Declaration

```
public static Vector3 Forward(this HexPrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexPrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### ForwardInt(HexPrismFaceDir)

Declaration

```
public static Vector3Int ForwardInt(this HexPrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexPrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### GetSide(HexPrismFaceDir)

Declaration

```
public static int GetSide(this HexPrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexPrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### IsUpDown(HexPrismFaceDir)

Declaration

```
public static bool IsUpDown(this HexPrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexPrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Up(HexPrismFaceDir)

Declaration

```
public static Vector3 Up(this HexPrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexPrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

# Struct HexRotation

Represents rotations / reflections of a hexagon

> **NOTE**
>
> This class is available only in Tessera Pro

Inherited Members

ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public struct HexRotation
```

## Properties

### All

Declaration

```
public static readonly HexRotation[] All { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation[] | |

### Identity

Declaration

```
public static readonly HexRotation Identity { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### IsReflection

Declaration

```
public readonly bool IsReflection { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### ReflectForwardLeft

Declaration

```
public static readonly HexRotation ReflectForwardLeft { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### ReflectForwardRight

Declaration

```
public static readonly HexRotation ReflectForwardRight { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### ReflectX

Declaration

```
public static readonly HexRotation ReflectX { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### ReflectZ

Declaration

```
public static readonly HexRotation ReflectZ { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### RotateCCW

Declaration

```
public static readonly HexRotation RotateCCW { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### Rotation

Declaration

```
public readonly int Rotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Methods

### Equals(Object)

Declaration

```
public override bool Equals(object obj)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Object | obj | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

Overrides

ValueType.Equals(Object)

### GetHashCode()

Declaration

```
public override int GetHashCode()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

Overrides

ValueType.GetHashCode()

### Invert()

Declaration

```
public HexRotation Invert()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### Rotate60(Int32)

Declaration

```
public static HexRotation Rotate60(int i)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | i | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

## Operators

### Equality(HexRotation, HexRotation)

Declaration

```
public static bool operator ==(HexRotation a, HexRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | a | |
| HexRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Implicit(CellRotation to HexRotation)

Declaration

```
public static implicit operator HexRotation(CellRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CellRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

### Implicit(HexRotation to CellRotation)

Declaration

```
public static implicit operator CellRotation(HexRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CellRotation | |

### Inequality(HexRotation, HexRotation)

Declaration

```
public static bool operator !=(HexRotation a, HexRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | a | |
| HexRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Multiply(HexRotation, Int32)

Declaration

```
public static int operator *(HexRotation a, int side)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | a | |
| Int32 | side | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Multiply(HexRotation, HexPrismFaceDir)

Declaration

```
public static HexPrismFaceDir operator *(HexRotation rotation, HexPrismFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | rotation | |
| HexPrismFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexPrismFaceDir | |

### Multiply(HexRotation, HexRotation)

Declaration

```
public static HexRotation operator *(HexRotation a, HexRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| HexRotation | a | |
| HexRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| HexRotation | |

# Interface IEngineInterface

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public interface IEngineInterface
```

## Methods

### Destroy(UnityEngine.Object)

Declaration

```
void Destroy(UnityEngine.Object o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | o | |

### Instantiate(GameObject, Vector3, Quaternion, Transform)

Declaration

```
GameObject Instantiate(GameObject gameObject, Vector3 position, Quaternion rotation, Transform parent)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| GameObject | gameObject | |
| Vector3 | position | |
| Quaternion | rotation | |
| Transform | parent | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

### RegisterCompleteObjectUndo(UnityEngine.Object)

Declaration

```
void RegisterCompleteObjectUndo(UnityEngine.Object objectToUndo)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | objectToUndo | |

### RegisterCreatedObjectUndo(UnityEngine.Object)

Declaration

```
void RegisterCreatedObjectUndo(UnityEngine.Object objectToUndo)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | objectToUndo | |

# Class InfiniteGenerator

Inheritance

Object

InfiniteGenerator

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class InfiniteGenerator : MonoBehaviour
```

## Fields

### chunkCleanupType

Determines what to do with unused chunks

Declaration

```
public ChunkCleanupType chunkCleanupType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| ChunkCleanupType | |

### chunkPersistTime

Time a chunk is kept around for even if not near a watched collider.

Declaration

```
public float chunkPersistTime
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### cleanupInterval

Time between cleanups that remove chunks that are no longer needed.

Declaration

```
public float cleanupInterval
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### generator

The generator that is used to fill the chunks. It also determines the size of each chunk.

Declaration

```
public TesseraGenerator generator
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraGenerator | |

### infiniteX

If true, chunks repeat infinitely on this axis. If false, you can specify the minXChunk/maxXChunk to give a limit to the amount of chunks generated.

Declaration

```
public bool infiniteX
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### infiniteY

If true, chunks repeat infinitely on this axis. If false, you can specify the minYChunk/maxYChunk to give a limit to the amount of chunks generated.

Declaration

```
public bool infiniteY
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### infiniteZ

If true, chunks repeat infinitely on this axis. If false, you can specify the minZChunk/maxZChunk to give a limit to the amount of chunks generated.

Declaration

```
public bool infiniteZ
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### maxCleanupPerUpdate

Maximum number of chunks to remove per update. Zero means unbounded.

Declaration

```
public int maxCleanupPerUpdate
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### maxInstantiatePerUpdate

Maximum number of tiles to create per-update. Negative means unbounded.

Declaration

```
public float maxInstantiatePerUpdate
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### maxXChunk

Declaration

```
public int maxXChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### maxYChunk

Declaration

```
public int maxYChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### maxZChunk

Declaration

```
public int maxZChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### minXChunk

Declaration

```
public int minXChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### minYChunk

Declaration

```
public int minYChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### minZChunk

Declaration

```
public int minZChunk
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### parallelism

The number of chunks that can be generated concurrently. Note that turning this up can cause slightly worse quality output.

Declaration

```
public int parallelism
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### scanInterval

Time between scans that detect if new chunks need creating

Declaration

```
public float scanInterval
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### seed

Fixes the seed for random number generator. If the value is zero, the seed is taken from Unity.Random. Note that generation is

still non-deterministic even with a fixed seed.

Declaration

```
public int seed
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### watchedColliders

Determines the volume in which chunks should be generated. You typically want to use a large trigger collider following the player or camera, to ensure that everything nearby is generated.

Declaration

```
public List<Collider> watchedColliders
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<Collider> | |

# Class InstantiateOutput

Inheritance

Object

InstantiateOutput

Implements

ITesseraTileOutput

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class InstantiateOutput : ITesseraTileOutput
```

## Constructors

### InstantiateOutput(Transform)

Declaration

```
public InstantiateOutput(Transform transform)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Transform | transform | |

## Properties

### IsEmpty

Declaration

```
public bool IsEmpty { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SupportsIncremental

Declaration

```
public bool SupportsIncremental { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### ClearTiles(IEngineInterface)

Declaration

```
public void ClearTiles(IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEngineInterface | engine | |

### UpdateTiles(TesseraCompletion, IEngineInterface)

Declaration

```
public void UpdateTiles(TesseraCompletion completion, IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraCompletion | completion | |
| IEngineInterface | engine | |

### Implements

ITesseraTileOutput

# Interface ITesseraInitialConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public interface ITesseraInitialConstraint
```

## Properties

### Name

Declaration

```
string Name { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

# Interface ITesseraTileOutput

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public interface ITesseraTileOutput
```

## Properties

### IsEmpty

Is the output currently empty.

Declaration

```
bool IsEmpty { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SupportsIncremental

Is this output safe to use with AnimatedGenerator

Declaration

```
bool SupportsIncremental { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### ClearTiles(IEngineInterface)

Clear the output

Declaration

```
void ClearTiles(IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEngineInterface | engine | |

### UpdateTiles(TesseraCompletion, IEngineInterface)

Update a chunk of tiles. If inremental updates are supported, then:

- Tiles can replace other tiles, as indicated by the Cells field.
- A tile of null indicates that the tile should be erased

Declaration

```
void UpdateTiles(TesseraCompletion completion, IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraCompletion | completion | |
| IEngineInterface | engine | |

# Class MeshUtils

Utility for working with meshes.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

MeshUtils

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class MeshUtils
```

## Methods

### TransformRecursively(GameObject, Sylves.Deformation)

Applies Transform gameObject and its children. Components affected:

- MeshFilter
- MeshColldier
- BoxCollider

Declaration

```
public static void TransformRecursively(GameObject gameObject, Sylves.Deformation meshDeformation)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| GameObject | gameObject | |
| Sylves.Deformation | meshDeformation | |

# Class MirrorConstraint

Ensures that the generation is symmetric when x-axis mirrored. If there are any tile constraints, they will not be mirrored.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TesseraConstraint

MirrorConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class MirrorConstraint : TesseraConstraint
```

## Fields

### axis

Declaration

```
public MirrorConstraint.Axis axis
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| MirrorConstraint.Axis | |

# Enum MirrorConstraint.Axis

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum Axis
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| W | |
| X | |
| Y | |
| Z | |

# Struct ModelTile

Actual tiles used internally. There's a many-to-one relationship between ModelTile and TesseraTile due to rotations and "big" tile support.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public struct ModelTile
```

## Constructors

### ModelTile(TesseraTileBase, Sylves.CellRotation, Vector3Int)

Declaration

```
public ModelTile(TesseraTileBase tile, Sylves.CellRotation rotation, Vector3Int offset)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraTileBase | tile | |
| Sylves.CellRotation | rotation | |
| Vector3Int | offset | |

## Properties

### Offset

Declaration

```
public Vector3Int Offset { readonly get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### Rotation

Declaration

```
public Sylves.CellRotation Rotation { readonly get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellRotation | |

### Tile

Declaration

```
public TesseraTileBase Tile { readonly get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

## Methods

### Equals(Object)

Declaration

```
public override bool Equals(object obj)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Object | obj | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

Overrides

ValueType.Equals(Object)

### Equals(ModelTile)

Declaration

```
public bool Equals(ModelTile other)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| ModelTile | other | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### GetHashCode()

Declaration

```
public override int GetHashCode()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

Overrides

ValueType.GetHashCode()

## ToString()

Declaration

```
public override string ToString()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

Overrides

ValueType.ToString()

# Enum ModelType

Different models Tessera supports. The model dictates how nearby tiles relate to each other.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum ModelType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Adjacent | See overlapping. |
| AdjacentPaint | The default model using the painting system to determine tile adjacencies. |
| Overlapping | See overlapping. |

# Struct OrientedFace

Legacy class used when serializing. You should use SylvesOrientedFace instead. Records the painted colors and location of single face of one cube in a TesseraTile

Inherited Members

ValueType.Equals(Object)
ValueType.GetHashCode()
ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public struct OrientedFace
```

## Constructors

### OrientedFace(Vector3Int, CellFaceDir, FaceDetails)

Declaration

```
public OrientedFace(Vector3Int offset, CellFaceDir faceDir, FaceDetails faceDetails)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| Vector3Int | offset | |
| CellFaceDir | faceDir | |
| FaceDetails | faceDetails | |

## Fields

### faceDetails

Declaration

```
public FaceDetails faceDetails
```

Field Value

| TYPE | DESCRIPTION |
|---|---|
| FaceDetails | |

### faceDir

Declaration

```
public CellFaceDir faceDir
```

Field Value

| TYPE | DESCRIPTION |
|---|---|
| CellFaceDir | |

### offset

Declaration

```
public Vector3Int offset
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

## Methods

### Deconstruct(out Vector3Int, out CellFaceDir, out FaceDetails)

Declaration

```
public void Deconstruct(out Vector3Int offset, out CellFaceDir faceDir, out FaceDetails faceDetails)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| CellFaceDir | faceDir | |
| FaceDetails | faceDetails | |

# Class PaletteEntry

Inheritance

Object

PaletteEntry

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class PaletteEntry
```

## Fields

### color

Declaration

```
public Color color
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Color | |

### name

Declaration

```
public string name
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

# Class PathConstraint

Forces a network of tiles to connect with each other, so there is always a complete path between them. Two tiles connect along the path if:

- Both tiles are in pathTiles (if hasPathTiles set); and
- The central color of the sides of the tiles leading to each other are in pathColors (if pathColors set)

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object
TesseraConstraint
PathConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class PathConstraint : TesseraConstraint
```

## Fields

### acyclic

If set, bans all cycles, forcing a tree or forest.

Declaration

```
public bool acyclic
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### connected

If Set, then the constraint forces that all path tiles must have a contiguous path between them.

Declaration

```
public bool connected
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### hasPathColors

If set, pathColors is used to determine path tiles and sides.

Declaration

```
public bool hasPathColors
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### hasPathTiles

If set, pathTiles is used to determine path tiles.

Declaration

```
public bool hasPathTiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### loops

If set, forces there to be at least two non-overlapping valid paths between any two connected path tiles.

Declaration

```
public bool loops
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### parity

Enable this if your path tileset includes no forks or junctions, it can improve the search quality.

Declaration

```
public bool parity
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### pathColors

If hasPathColors, this set filters tiles that the path can connect through. Only the central square on each face is inspected.

Declaration

```
public List<int> pathColors
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<Int32> | |

### pathTiles

If hasPathTiles, this set filters tiles that the path can connect through.

Declaration

```
public List<TesseraTileBase> pathTiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TesseraTileBase> | |

### prioritize

If set, the the generator will prefer generating tiles near the path.

Declaration

```
public bool prioritize
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

# Enum PinType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum PinType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| FacesAndInterior | The faces of the pinned tile are used to constrain the cells adjacent to the location of the pinned tile and the cells covered by the pin tile are masked out so no tiles will be generated in that location. |
| FacesOnly | The faces of the pinned tile are used to constrain the cells adjacent to the location of the pinned tile. |
| Pin | Forces generation the pinned tile at the location of the pin. |

# Class PrefixLookup<T>

Stores key-value pairs, with efficient searching for the longest key that is a prefix of a given string.

Inheritance

Object

PrefixLookup<T>

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class PrefixLookup<T>
```

Type Parameters

| NAME | DESCRIPTION |
| --- | --- |
| T | |

## Constructors

### PrefixLookup()

Declaration

```
public PrefixLookup()
```

## Methods

### Add(String, Object)

Declaration

```
public void Add(string name, object value)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| String | name | |
| Object | value | |

### TryFindLongestPrefix(String, out T)

Declaration

```
public bool TryFindLongestPrefix(string name, out T value)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| String | name | |
| T | value | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

# Enum RotationGroupType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum RotationGroupType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| All | |
| None | |
| XY | |
| XZ | |
| YZ | |

# Class SeparationConstraint

Inheritance

Object

TesseraConstraint

SeparationConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class SeparationConstraint : TesseraConstraint
```

## Fields

### minDistance

The count to be compared against.

Declaration

```
public int minDistance
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### tiles

The set of tiles to count

Declaration

```
public List<TesseraTileBase> tiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TesseraTileBase> | |

# Enum SquareFaceDir

Enum of the 4 sides of a square.

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum SquareFaceDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Down | |
| Left | |
| Right | |
| Up | |

# Class SquareFaceDirExtensions

Inheritance

Object

SquareFaceDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class SquareFaceDirExtensions
```

## Methods

### Forward(SquareFaceDir)

Declaration

```
public static Vector3Int Forward(this SquareFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | The normal vector for a given face. |

### GetSide(SquareFaceDir)

Declaration

```
public static int GetSide(this SquareFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Inverted(SquareFaceDir)

Declaration

```
public static SquareFaceDir Inverted(this SquareFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareFaceDir | Returns the face dir with the opposite normal vector. |

# Class SquareFaceExtensions

Inheritance

Object

SquareFaceExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class SquareFaceExtensions
```

## Methods

### Forward(Sylves.SquareDir)

Declaration

```
public static Vector3Int Forward(this Sylves.SquareDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.SquareDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | The normal vector for a given face. |

### GetSide(Sylves.SquareDir)

Declaration

```
public static int GetSide(this Sylves.SquareDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.SquareDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Inverted(Sylves.SquareDir)

Declaration

```
public static Sylves.SquareDir Inverted(this Sylves.SquareDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.SquareDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.SquareDir | Returns the face dir with the opposite normal vector. |

# Struct SquareRotation

Represents rotations / reflections of a square

Inherited Members

ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public struct SquareRotation
```

## Properties

### All

Declaration

```
public static readonly SquareRotation[] All { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation[] | |

### Identity

Declaration

```
public static readonly SquareRotation Identity { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### IsReflection

Declaration

```
public readonly bool IsReflection { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### ReflectX

Declaration

```
public static readonly SquareRotation ReflectX { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### ReflectY

Declaration

```
public static readonly SquareRotation ReflectY { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### RotateCCW

Declaration

```
public static readonly SquareRotation RotateCCW { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### Rotation

Declaration

```
public readonly int Rotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Methods

### Equals(Object)

Declaration

```
public override bool Equals(object obj)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Object | obj | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

Overrides

ValueType.Equals(Object)

### GetHashCode()

Declaration

```
public override int GetHashCode()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

Overrides

ValueType.GetHashCode()

### Invert()

Declaration

```
public SquareRotation Invert()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### Rotate90(Int32)

Declaration

```
public static SquareRotation Rotate90(int i)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | i | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

## Operators

### Equality(SquareRotation, SquareRotation)

Declaration

```
public static bool operator ==(SquareRotation a, SquareRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | a | |

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Implicit(CellRotation to SquareRotation)

Declaration

```
public static implicit operator SquareRotation(CellRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CellRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### Implicit(SquareRotation to CellRotation)

Declaration

```
public static implicit operator CellRotation(SquareRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CellRotation | |

### Inequality(SquareRotation, SquareRotation)

Declaration

```
public static bool operator !=(SquareRotation a, SquareRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | a | |
| SquareRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Multiply(SquareRotation, BoundsInt)

Declaration

```
public static BoundsInt operator *(SquareRotation r, BoundsInt bounds)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | r | |
| BoundsInt | bounds | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

### Multiply(SquareRotation, Int32)

Declaration

```
public static int operator *(SquareRotation a, int side)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | a | |
| Int32 | side | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Multiply(SquareRotation, SquareFaceDir)

Declaration

```
public static SquareFaceDir operator *(SquareRotation rotation, SquareFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | rotation | |
| SquareFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareFaceDir | |

### Multiply(SquareRotation, SquareRotation)

Declaration

```
public static SquareRotation operator *(SquareRotation a, SquareRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | a | |
| SquareRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SquareRotation | |

### Multiply(SquareRotation, Vector3Int)

Declaration

```
public static Vector3Int operator *(SquareRotation r, Vector3Int v)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SquareRotation | r | |
| Vector3Int | v | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

# Class SylvesConversions

Utilities for converting legacy Tessera enumerations to Sylves equivalents

Inheritance

Object

SylvesConversions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class SylvesConversions
```

## Methods

### CubeOffset(Vector3Int)

Declaration

```
public static Vector3Int CubeOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### CubeOrientedFace(OrientedFace)

Declaration

```
public static SylvesOrientedFace CubeOrientedFace(OrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| OrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SylvesOrientedFace | |

### HexOffset(Vector3Int)

Declaration

```
public static Vector3Int HexOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### HexOrientedFace(OrientedFace)

Declaration

```
public static SylvesOrientedFace HexOrientedFace(OrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| OrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SylvesOrientedFace | |

### SquareOffset(Vector3Int)

Declaration

```
public static Vector3Int SquareOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### SquareOrientedFace(OrientedFace)

Declaration

```
public static SylvesOrientedFace SquareOrientedFace(OrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| OrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SylvesOrientedFace | |

### TriangleOffset(Vector3Int)

Declaration

```
public static Vector3Int TriangleOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### TrianglePrismOrientedFace(OrientedFace)

Declaration

```
public static SylvesOrientedFace TrianglePrismOrientedFace(OrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| OrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| SylvesOrientedFace | |

### UndoCubeOffset(Vector3Int)

Declaration

```
public static Vector3Int UndoCubeOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### UndoCubeOrientedFace(SylvesOrientedFace)

Declaration

```
public static OrientedFace UndoCubeOrientedFace(SylvesOrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesOrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| OrientedFace | |

### UndoHexOffset(Vector3Int)

Declaration

```
public static Vector3Int UndoHexOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### UndoHexOrientedFace(SylvesOrientedFace)

Declaration

```
public static OrientedFace UndoHexOrientedFace(SylvesOrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesOrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| OrientedFace | |

### UndoSquareOffset(Vector3Int)

Declaration

```
public static Vector3Int UndoSquareOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### UndoSquareOrientedFace(SylvesOrientedFace)

Declaration

```
public static OrientedFace UndoSquareOrientedFace(SylvesOrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesOrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| OrientedFace | |

### UndoTriangleOffset(Vector3Int)

Declaration

```
public static Vector3Int UndoTriangleOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### UndoTrianglePrismOrientedFace(SylvesOrientedFace)

Declaration

```
public static OrientedFace UndoTrianglePrismOrientedFace(SylvesOrientedFace x)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesOrientedFace | x | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| OrientedFace | |

# Class SylvesExtensions

Inheritance

Object

SylvesExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class SylvesExtensions
```

## Fields

### CubeCellType

Declaration

```
public static readonly Sylves.ICellType CubeCellType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

### CubeGridInstance

Declaration

```
public static readonly Sylves.IGrid CubeGridInstance
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### HexPrismCellType

Declaration

```
public static readonly Sylves.ICellType HexPrismCellType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

### HexPrismGridInstance

Declaration

```
public static readonly Sylves.IGrid HexPrismGridInstance
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### SquareCellType

Declaration

```
public static readonly Sylves.ICellType SquareCellType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

### SquareGridInstance

Declaration

```
public static readonly Sylves.IGrid SquareGridInstance
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### TrianglePrismCellType

Declaration

```
public static readonly Sylves.ICellType TrianglePrismCellType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

## Properties

### TrianglePrismGridInstance

Declaration

```
public static Sylves.IGrid TrianglePrismGridInstance { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

## Methods

### FindCell(Sylves.IGrid, Vector3, Matrix4x4, out Sylves.Cell, out Sylves.CellRotation)

Declaration

```
public static bool FindCell(this Sylves.IGrid grid, Vector3 tileCenter, Matrix4x4 tileLocalToGridMatrix, out
Sylves.Cell cell, out Sylves.CellRotation rotation)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | grid | |
| Vector3 | tileCenter | |
| Matrix4x4 | tileLocalToGridMatrix | |
| Sylves.Cell | cell | |
| Sylves.CellRotation | rotation | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### GetCellCenter(Sylves.IGrid, Vector3Int, Vector3, Vector3)

Declaration

```
public static Vector3 GetCellCenter(this Sylves.IGrid sylvesCellGrid, Vector3Int offset, Vector3 center,
Vector3 cellSize)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | sylvesCellGrid | |
| Vector3Int | offset | |
| Vector3 | center | |
| Vector3 | cellSize | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### GetCellSizeTransform(Sylves.IGrid, Vector3, Vector3)

Returns a transform from the canonical cell (of unit size) to a specific cell size and center.

Declaration

```
public static Matrix4x4 GetCellSizeTransform(this Sylves.IGrid sylvesCellGrid, Vector3 center, Vector3
cellSize)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | sylvesCellGrid | |

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3 | center | |
| Vector3 | cellSize | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Matrix4x4 | |

### GetCellType(Sylves.IGrid)

Declaration

```
public static Sylves.ICellType GetCellType(this Sylves.IGrid grid)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | grid | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

### GetDirPairs(Sylves.ICellType)

Declaration

```
public static IEnumerable<(Sylves.CellDir, Sylves.CellDir)> GetDirPairs(this Sylves.ICellType cellType)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.ICellType | cellType | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IEnumerable<(T1, T2)<Sylves.CellDir, Sylves.CellDir>> | |

### GetDisplayName(Sylves.ICellType, Sylves.CellDir)

Declaration

```
public static string GetDisplayName(this Sylves.ICellType cellType, Sylves.CellDir cellDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.ICellType | cellType | |

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.CellDir | cellDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

### GetReflectX(Sylves.ICellType)

Declaration

```
public static Sylves.CellRotation GetReflectX(this Sylves.ICellType cellType)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.ICellType | cellType | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellRotation | |

### GetRotations(Sylves.ICellType, Boolean, Boolean, RotationGroupType)

Declaration

```
public static IList<Sylves.CellRotation> GetRotations(this Sylves.ICellType cellType, bool rotatable = true,
bool reflectable = true, RotationGroupType rotationGroupType = RotationGroupType.All)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.ICellType | cellType | |
| Boolean | rotatable | |
| Boolean | reflectable | |
| RotationGroupType | rotationGroupType | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IList<Sylves.CellRotation> | |

### RotateBy(Sylves.ICellType, Sylves.CellDir, FaceDetails, Sylves.CellRotation)

Declaration

```
public static (Sylves.CellDir, FaceDetails) RotateBy(this Sylves.ICellType cellType, Sylves.CellDir dir,
FaceDetails faceDetails, Sylves.CellRotation rot)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.ICellType | cellType | |
| Sylves.CellDir | dir | |
| FaceDetails | faceDetails | |
| Sylves.CellRotation | rot | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| (T1, T2)<Sylves.CellDir, FaceDetails> | |

# Enum SylvesHexPrismDir

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum SylvesHexPrismDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| BackLeft | |
| BackRight | |
| Down | |
| ForwardLeft | |
| ForwardRight | |
| Left | |
| Right | |
| Up | |

# Struct SylvesOrientedFace

Records the painted colors and location of single face of one cube in a TesseraTile

Inherited Members

ValueType.Equals(Object)
ValueType.GetHashCode()
ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public struct SylvesOrientedFace
```

## Constructors

### SylvesOrientedFace(Vector3Int, Sylves.CellDir, FaceDetails)

Declaration

```
public SylvesOrientedFace(Vector3Int offset, Sylves.CellDir dir, FaceDetails faceDetails)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| Sylves.CellDir | dir | |
| FaceDetails | faceDetails | |

## Fields

### dir

Declaration

```
public Sylves.CellDir dir
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellDir | |

### faceDetails

Declaration

```
public FaceDetails faceDetails
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| FaceDetails | |

### offset

Declaration

```
public Vector3Int offset
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

## Methods

### Deconstruct(out Vector3Int, out Sylves.CellDir, out FaceDetails)

Declaration

```
public void Deconstruct(out Vector3Int offset, out Sylves.CellDir dir, out FaceDetails faceDetails)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| Sylves.CellDir | dir | |
| FaceDetails | faceDetails | |

# Enum SylvesTrianglePrismDir

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum SylvesTrianglePrismDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Back | |
| BackLeft | |
| BackRight | |
| Down | |
| Forward | |
| ForwardLeft | |
| ForwardRight | |
| Up | |

# Class TesseraCompletion

Returned by TesseraGenerator after generation finishes

Inheritance

Object

TesseraCompletion

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraCompletion
```

## Properties

### backtrackCount

The number of times the generation process backtracked.

Declaration

```
public int backtrackCount { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### contradictionLocation

If success is false, indicates where the generation failed.

Declaration

```
public Vector3Int? contradictionLocation { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Nullable<Vector3Int> | |

### grid

Describes the geometry and layout of the cells. See separate Sylves documentations for more details.
https://www.boristhebrave.com/docs/sylves/1

Declaration

```
public Sylves.IGrid grid { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### gridTransform

The position of the grid in world space. (Sylves grids always operate in local space).

Declaration

```
public TRS gridTransform { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TRS | |

### isIncremental

Indicates these instances should be added to the previous set of instances.

Declaration

```
public bool isIncremental { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### retries

The number of times the generation process was restarted.

Declaration

```
public int retries { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### success

True if all tiles were successfully found.

Declaration

```
public bool success { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### tileData

The raw tile data, describing which tile is located in each cell.

Declaration

```
public IDictionary<Vector3Int, ModelTile> tileData { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| IDictionary<Vector3Int, ModelTile> | |

### tileInstances

The list of tiles to create. Big tiles will be listed a single time, and each TesseraTileInstance has the world position set.

Declaration

```
public IList<TesseraTileInstance> tileInstances { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| IList<TesseraTileInstance> | |

## Methods

### LogErrror()

Writes error information to Unity's log.

Declaration

```
public void LogErrror()
```

# Class TesseraConstraint

Abstract class for all generator constraint components.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object
TesseraConstraint
BorderConstraint
CountConstraint
MirrorConstraint
PathConstraint
SeparationConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public abstract class TesseraConstraint : MonoBehaviour
```

# Class TesseraGenerateOptions

Additional settings to customize the generation at runtime.

Inheritance

Object

TesseraGenerateOptions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraGenerateOptions
```

## Fields

### cancellationToken

Allows interuption of the calculations

Declaration

```
public CancellationToken cancellationToken
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| CancellationToken | |

### initialConstraints

If set, overrides TesseraGenerator.initialConstraints and TesseraGenerator.searchInitialConstraints.

Declaration

```
public List<ITesseraInitialConstraint> initialConstraints
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<ITesseraInitialConstraint> | |

### multithreaded

If set, then generation is offloaded to another thread stopping Unity from freezing. Requires you to use StartGenerate in a coroutine. Multithreaded is ignored in the WebGL player, as it doesn't support threads.

Declaration

```
public bool multithreaded
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### onComplete

Called when the generation is complete. By default, checks for success then invokes onCreate on each instance.

Declaration

```
public Action<TesseraCompletion> onComplete
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Action<TesseraCompletion> | |

### onCreate

Called for each newly generated tile. By default, Instantiate(TesseraTileInstance, Transform, IEngineInterface) is used.

Declaration

```
public Action<TesseraTileInstance> onCreate
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Action<TesseraTileInstance> | |

### progress

Called with a string describing the current phase of the calculations, and the progress from 0 to 1. Progress can move backwards for retries or backtracing. Note progress can be called from threads other than the main thread.

Declaration

```
public Action<string, float> progress
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Action<String, Single> | |

### seed

Fixes the seed for random number generator. By defult, random numbers from from Unity.Random.

Declaration

```
public int? seed
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Nullable<Int32> | |

# Class TesseraGenerator

GameObjects with this behaviour contain utilities to generate tile based levels using Wave Function Collapse (WFC). Call Generate(TesseraGenerateOptions) or StartGenerate(TesseraGenerateOptions) to run. The generation takes the following steps:

- Inspect the tiles in tiles and work out how they rotate and connect to each other.
- Setup any initial constraints that fix parts of the generation (initialConstraints).
- Fix the boundary of the generation if skyBox is set.
- Generate a set of tile instances that fits the above tiles and constraints.
- Optionally retries or backtrack.
- Instantiates the tile instances.

Inheritance

Object

TesseraGenerator

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraGenerator : MonoBehaviour
```

## Fields

### algorithm

Controls the algorithm used internally for Wave Function Collapse.

Declaration

```
public TesseraWfcAlgorithm algorithm
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraWfcAlgorithm | |

### backtrack

If set, backtracking will be used during generation. Backtracking can find solutions that would otherwise be failures, but can take a long time.

Declaration

```
public bool backtrack
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### contradictionTile

Game object to show in cells that cannot be solved.

Declaration

```
public GameObject contradictionTile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

### failureMode

Controls what is output when the generation fails.

Declaration

```
public FailureMode failureMode
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| FailureMode | |

### filterSurfaceSubmeshTiles

If true, and a surfaceMesh is set with multiple submeshes (materials), then use surfaceSubmeshTiles.

Declaration

```
public bool filterSurfaceSubmeshTiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### modelType

Sets which sort of model the generator uses. The model dictates how nearby tiles relate to each other.

Declaration

```
public ModelType modelType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| ModelType | |

### overlapSize

The size of the overlap parameter for the overlapping model. Overlapping

Declaration

```
public Vector3Int overlapSize
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### recordUndo

Records undo/redo when run by pressing the Generate button in the Inspector.

Declaration

```
public bool recordUndo
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### retries

If backtracking is off, how many times to retry generation if a solution cannot be found.

Declaration

```
public int retries
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### samples

For overlapping models, a list of objects to use as input samples. Each one will have its children inspected and read out.
Overlapping

Declaration

```
public List<GameObject> samples
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<GameObject> | |

### scaleUncertainyTile

If true, the uncertainty tiles shrink as the solver gets more certain.

Declaration

```
public bool scaleUncertainyTile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### searchInitialConstraints

If true, then active tiles in the scene will be taken as initial constraints. If false, then no initial constraints are used. Using initialConstraints overrides either outcome.

Declaration

```
public bool searchInitialConstraints
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### seed

Fixes the seed for random number generator. If the value is zero, the seed is taken from Unity.Random

Declaration

```
public int seed
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### skyBox

If set, this tile is used to define extra initial constraints for the boundary.

Declaration

```
public TesseraTileBase skyBox
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

### stepLimit

How many steps to take before retrying from the start.

Declaration

```
public int stepLimit
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### surfaceMesh

If set, then tiles are generated on the surface of this mesh instead of a regular grid.

Declaration

```
public Mesh surfaceMesh
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Mesh | |

### surfaceOffset

Height above the surface mesh that the bottom layer of tiles is generated at.

Declaration

```
public float surfaceOffset
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

### surfaceSmoothNormals

Controls how normals are treated for meshes deformed to fit the surfaceMesh.

Declaration

```
public bool surfaceSmoothNormals
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### surfaceSubmeshTiles

A list of tiles to filter each submesh of surfaceMesh to. Ignored unless filterSurfaceSubmeshTiles is true.

Declaration

```
public List<TileList> surfaceSubmeshTiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TileList> | |

### tiles

The list of tiles eligible for generation.

Declaration

```
public List<TileEntry> tiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TileEntry> | |

### uncertaintyTile

Game object to show in cells that have yet to be fully solved.

Declaration

```
public GameObject uncertaintyTile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

## Properties

### bounds

The area of generation. Setting this will cause the size to be rounded to a multiple of cellSize

Declaration

```
public Bounds bounds { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Bounds | |

### CellGrid

Indicates the cell type of the tiles set up.

Declaration

```
public Sylves.IGrid CellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### cellSize

The stride between each cell in the generation. "big" tiles may occupy a multiple of this cell size.

Declaration

```
public Vector3 cellSize { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### CellType

Indicates the cell type of the tiles set up.

Declaration

```
public Sylves.ICellType CellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

### center

The local position of the center of the area to generate.

Declaration

```
public Vector3 center { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### origin

Declaration

```
public Vector3 origin { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### palette

Inherited from the first tile in tiles.

Declaration

```
public TesseraPalette palette { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraPalette | |

### size

The size of the generator area, counting in cells each of size cellSize.

Declaration

```
public Vector3Int size { get; set; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

## Methods

### Clear()

Clears previously generated content.

Declaration

```
public void Clear()
```

### CloneSample(Int32, IEngineInterface)

Dumps out the internal view of the sample. Can be used for diagnosing issues with reading samples.

Declaration

```
public void CloneSample(int index = 0, IEngineInterface engineInterface = null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | index | |
| IEngineInterface | engineInterface | |

### Generate(TesseraGenerateOptions)

Synchronously runs the generation process described in the class docs.

Declaration

```
public TesseraCompletion Generate(TesseraGenerateOptions options = null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraGenerateOptions | options | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraCompletion | |

### GetCellTypes()

For validation purposes

Declaration

```
public IList<Sylves.ICellType> GetCellTypes()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IList<Sylves.ICellType> | |

### GetGrid()

Describes the geometry and layout of the cells. See separate Sylves documentations for more details. https://www.boristhebrave.com/docs/sylves/1 Note: If you are using a Mesh Surface based grid, then GetGrid() can be quite slow, and you are recommended to cache the result of it.

Declaration

```
public Sylves.IGrid GetGrid()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### GetInitialConstraintBuilder()

Declaration

```
public TesseraInitialConstraintBuilder GetInitialConstraintBuilder()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraInitialConstraintBuilder | |

### GetTileOutput(Boolean)

Declaration

```
public ITesseraTileOutput GetTileOutput(bool forceIncremental = false)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Boolean | forceIncremental | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| ITesseraTileOutput | |

### Instantiate(TesseraTileInstance, Transform, GameObject, Boolean, IEngineInterface)

Utility function that instantiates a tile instance in the scene. This is the default function used when you do not pass `onCreate` to the Generate method. It is essentially the same as Unity's normal Instantiate method with extra features:

- respects instantiateChildrenOnly
- applies mesh transformations (Pro only)

Declaration

```
public static GameObject[] Instantiate(TesseraTileInstance instance, Transform parent, GameObject gameObject,
bool instantiateChildrenOnly, IEngineInterface engine = null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| TesseraTileInstance | instance | The instance being created. |
| Transform | parent | The game object to parent the new game object to. This does not affect the world position of the instance |
| GameObject | gameObject | The game object to actually instantiate. Usually this is instance.Tile.gameObject |
| Boolean | instantiateChildrenOnly | Should gameObject be created, or just it's children. |
| IEngineInterface | engine | |

Returns

| TYPE | DESCRIPTION |
|---|---|
| GameObject[] | The game objects created. |

### Instantiate(TesseraTileInstance, Transform, IEngineInterface)

Utility function that instantiates a tile instance in the scene. This is the default function used when you do not pass `onCreate` to the Generate method. It is essentially the same as Unity's normal Instantiate method with extra features:

- respects instantiateChildrenOnly
- applies mesh transformations (Pro only)

Declaration

```
public static GameObject[] Instantiate(TesseraTileInstance instance, Transform parent, IEngineInterface engine
= null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| TesseraTileInstance | instance | The instance being created. |
| Transform | parent | The game object to parent the new game object to. This does not affect the world position of the instance |
| IEngineInterface | engine | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject[] | The game objects created. |

### Regenerate(TesseraGenerateOptions)

Runs Clear, then Generate

Declaration

```
public TesseraCompletion Regenerate(TesseraGenerateOptions options = null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraGenerateOptions | options | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraCompletion | |

### StartGenerate(TesseraGenerateOptions)

Asynchronously runs the generation process described in the class docs, for use with StartCoroutine.

Declaration

```
public EnumeratorWithResult<TesseraCompletion> StartGenerate(TesseraGenerateOptions options = null)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraGenerateOptions | options | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| EnumeratorWithResult<TesseraCompletion> | |

Remarks

The default instantiation is still synchronous, so this can still cause frame glitches unless you override onCreate.

# Class TesseraHexTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

Inheritance

Object
TesseraTileBase
TesseraHexTile

Implements

ISerializationCallbackReceiver

Inherited Members

TesseraTileBase.palette
TesseraTileBase.sylvesFaceDetails
TesseraTileBase.sylvesOffsets
TesseraTileBase.center
TesseraTileBase.cellSize
TesseraTileBase.rotatable
TesseraTileBase.reflectable
TesseraTileBase.rotationGroupType
TesseraTileBase.symmetric
TesseraTileBase.instantiateChildrenOnly
TesseraTileBase.Get(Vector3Int, CellFaceDir)
TesseraTileBase.Get(Vector3Int, Sylves.CellDir)
TesseraTileBase.TryGet(Vector3Int, CellFaceDir, FaceDetails)
TesseraTileBase.TryGet(Vector3Int, Sylves.CellDir, FaceDetails)
TesseraTileBase.AddOffset(Vector3Int)
TesseraTileBase.RemoveOffset(Vector3Int)
TesseraTileBase.OnBeforeSerialize()
TesseraTileBase.OnAfterDeserialize()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraHexTile : TesseraTileBase
```

## Constructors

### TesseraHexTile()

Declaration

```
public TesseraHexTile()
```

## Properties

### SylvesCellGrid

Declaration

```
public override Sylves.IGrid SylvesCellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

Overrides

TesseraTileBase.SylvesCellGrid

### SylvesCellType

Declaration

```
public override Sylves.ICellType SylvesCellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

Overrides

TesseraTileBase.SylvesCellType

## Methods

### GetBounds()

Declaration

```
public BoundsInt GetBounds()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

## Implements

ISerializationCallbackReceiver

# Class TesseraInitialConstraint

Initial constraint objects fix parts of the generation process in places. Use the utility methods on TesseraGenerator to create these objects.

Inheritance

Object

TesseraInitialConstraint

Implements

ITesseraInitialConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class TesseraInitialConstraint : ITesseraInitialConstraint
```

## Properties

### Name

Declaration

```
public string Name { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

## Implements

ITesseraInitialConstraint

# Class TesseraInitialConstraintBuilder

Utility for creating ITesseraInitialConstraint objects, which describe a variety of different constraints.

Inheritance

Object

TesseraInitialConstraintBuilder

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraInitialConstraintBuilder
```

## Constructors

### TesseraInitialConstraintBuilder(Transform, Sylves.IGrid)

Declaration

```
public TesseraInitialConstraintBuilder(Transform transform, Sylves.IGrid grid)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Transform | transform | |
| Sylves.IGrid | grid | |

## Properties

### Grid

Declaration

```
public Sylves.IGrid Grid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

## Methods

### GetInitialConstraint(GameObject)

Gets the initial constraint for a given game object. It checks for a TesseraPinned, TesseraTile or TesseraVolume component.

Declaration

```
public ITesseraInitialConstraint GetInitialConstraint(GameObject gameObject)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| GameObject | gameObject | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| ITesseraInitialConstraint | |

### GetInitialConstraint(TesseraPinned)

Gets the initial constraint from a given pin at a given position. It should be aligned with the grid defined by this generator.

Declaration

```
public ITesseraInitialConstraint GetInitialConstraint(TesseraPinned pin)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraPinned | pin | The pin to inspect |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| ITesseraInitialConstraint | |

### GetInitialConstraint(TesseraPinned, Matrix4x4)

Gets the initial constraint from a given pin at a given position. It should be aligned with the grid defined by this generator.

Declaration

```
public ITesseraInitialConstraint GetInitialConstraint(TesseraPinned pin, Matrix4x4 localToWorldMatrix)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraPinned | pin | The pin to inspect |
| Matrix4x4 | localToWorldMatrix | The matrix indicating the position and rotation of the tile |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| ITesseraInitialConstraint | |

### GetInitialConstraint(TesseraTileBase)

Gets the initial constraint from a given tile. The tile should be aligned with the grid defined by this generator.

Declaration

```
public TesseraInitialConstraint GetInitialConstraint(TesseraTileBase tile)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraTileBase | tile | The tile to inspect |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraInitialConstraint | |

### GetInitialConstraint(TesseraTileBase, Matrix4x4)

Gets the initial constraint from a given tile at a given position. The tile should be aligned with the grid defined by this generator.

Declaration

```
public TesseraInitialConstraint GetInitialConstraint(TesseraTileBase tile, Matrix4x4 localToWorldMatrix)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraTileBase | tile | The tile to inspect |
| Matrix4x4 | localToWorldMatrix | The matrix indicating the position and rotation of the tile |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraInitialConstraint | |

### GetInitialConstraint(TesseraTileInstance, PinType)

Converts a TesseraTileInstance to a ITesseraInitialConstraint. This allows you to easily use the output of one generation for later generations

Declaration

```
public ITesseraInitialConstraint GetInitialConstraint(TesseraTileInstance tileInstance, PinType pinType =
PinType.Pin)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraTileInstance | tileInstance | |
| PinType | pinType | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| ITesseraInitialConstraint | |

### GetInitialConstraint(TesseraVolume)

Gets the initial constraint from a given tile. The tile should be aligned with the grid defined by this generator.

Declaration

```
public TesseraVolumeFilter GetInitialConstraint(TesseraVolume volume)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraVolume | volume | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraVolumeFilter | |

### SearchInitialConstraints()

Searches the scene for all applicable game objects and converts them to ITesseraInitialConstraint

Declaration

```
public List<ITesseraInitialConstraint> SearchInitialConstraints()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| List<ITesseraInitialConstraint> | |

# Class TesseraInstantiateOutput

Attach this to a TesseraGenerator to control how tiles are instantiated.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TesseraInstantiateOutput

Implements

ITesseraTileOutput

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraInstantiateOutput : MonoBehaviour, ITesseraTileOutput
```

## Constructors

### TesseraInstantiateOutput()

Declaration

```
public TesseraInstantiateOutput()
```

## Fields

### parent

Declaration

```
public Transform parent
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Transform | |

### tileMappings

Declaration

```
public TileMapping[] tileMappings
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TileMapping[] | |

## Properties

### IsEmpty

Declaration

```
public bool IsEmpty { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SupportsIncremental

Declaration

```
public bool SupportsIncremental { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### ClearTiles(IEngineInterface)

Declaration

```
public void ClearTiles(IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEngineInterface | engine | |

### UpdateTiles(TesseraCompletion, IEngineInterface)

Declaration

```
public void UpdateTiles(TesseraCompletion completion, IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraCompletion | completion | |
| IEngineInterface | engine | |

## Implements

ITesseraTileOutput

# Class TesseraMeshOutput

Attach this to a TesseraGenerator to output the tiles to a single mesh instead of instantiating them.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TesseraMeshOutput

Implements

ITesseraTileOutput

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraMeshOutput : MonoBehaviour, ITesseraTileOutput
```

## Fields

### chunkSize

Declaration

```
public Vector3 chunkSize
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### colliders

Declaration

```
public TesseraMeshOutputCollider colliders
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraMeshOutputCollider | |

### materialGrouping

Declaration

```
public TesseraMeshOutputMaterialGrouping materialGrouping
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraMeshOutputMaterialGrouping | |

### singleMaterial

Declaration

```
public Material singleMaterial
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Material | |

### useChunks

Declaration

```
public bool useChunks
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Properties

### ChunkGrid

Declaration

```
public Sylves.CubeGrid ChunkGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CubeGrid | |

### IsEmpty

Declaration

```
public bool IsEmpty { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SupportsIncremental

Declaration

```
public bool SupportsIncremental { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### ClearTiles(IEngineInterface)

Declaration

```
public void ClearTiles(IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEngineInterface | engine | |

### GetCellsInChunk(Sylves.IGrid, Sylves.Cell)

Declaration

```
public IEnumerable<Sylves.Cell> GetCellsInChunk(Sylves.IGrid grid, Sylves.Cell chunk)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | grid | |
| Sylves.Cell | chunk | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| IEnumerable<Sylves.Cell> | |

### GetChunk(Sylves.IGrid, Sylves.Cell)

Declaration

```
public Sylves.Cell GetChunk(Sylves.IGrid grid, Sylves.Cell cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Sylves.IGrid | grid | |
| Sylves.Cell | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.Cell | |

### UpdateTiles(TesseraCompletion, IEngineInterface)

Declaration

```
public void UpdateTiles(TesseraCompletion completion, IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraCompletion | completion | |
| IEngineInterface | engine | |

Implements

ITesseraTileOutput

# Enum TesseraMeshOutputCollider

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum TesseraMeshOutputCollider
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Merge | Merge all MeshColliders, other colliders ignored. |
| None | Don't do anything. |
| ReuseRenderMesh | Use the same mesh as MeshFilter, in a MeshCollider |

# Enum TesseraMeshOutputMaterialGrouping

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum TesseraMeshOutputMaterialGrouping
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Single | Merge everything to a single material |
| Unique | Every material in the input becomes a material in the output |
| UniqueByName | Every name of material in the input becomes a material in the output. (useful when you have duplicate materials of the same name) |

# Class TesseraMultipassGenerator

Inheritance

Object

TesseraMultipassGenerator

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraMultipassGenerator : MonoBehaviour
```

## Fields

### passes

Declaration

```
public TesseraMultipassPass[] passes
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraMultipassPass[] | |

## Methods

### Clear()

Declaration

```
public void Clear()
```

### Generate()

Declaration

```
public void Generate()
```

# Class TesseraMultipassPass

Inheritance

Object

TesseraMultipassPass

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class TesseraMultipassPass
```

## Fields

### clearEvent

Declaration

```
public UnityEvent clearEvent
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| UnityEvent | |

### generateEvent

Declaration

```
public UnityEvent generateEvent
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| UnityEvent | |

### generator

Declaration

```
public TesseraGenerator generator
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraGenerator | |

### passType

Declaration

```
public TesseraMultipassPassType passType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraMultipassPassType | |

# Enum TesseraMultipassPassType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum TesseraMultipassPassType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Event | |
| Generator | |

# Class TesseraPalette

Inheritance

Object

TesseraPalette

Implements

ISerializationCallbackReceiver

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraPalette : ScriptableObject
```

## Constructors

### TesseraPalette()

Declaration

```
public TesseraPalette()
```

## Fields

### entries

Declaration

```
public List<PaletteEntry> entries
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<PaletteEntry> | |

### matchOverrides

Declaration

```
public Dictionary<(int, int), bool> matchOverrides
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Dictionary<(T1, T2)<Int32, Int32>, Boolean> | |

## Properties

### defaultPalette

Declaration

```
public static TesseraPalette defaultPalette { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraPalette | |

### entryCount

Declaration

```
public int entryCount { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Methods

### GetColor(Int32)

Declaration

```
public Color GetColor(int i)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | i | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Color | |

### GetEntry(Int32)

Declaration

```
public PaletteEntry GetEntry(int i)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | i | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| PaletteEntry | |

### Match(Int32, Int32)

Declaration

```
public bool Match(int a, int b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | a | |

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Match(FaceDetails, FaceDetails)

Declaration

```
public bool Match(FaceDetails a, FaceDetails b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| FaceDetails | a | |
| FaceDetails | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### OnAfterDeserialize()

Declaration

```
public void OnAfterDeserialize()
```

### OnBeforeSerialize()

Declaration

```
public void OnBeforeSerialize()
```

### Implements

ISerializationCallbackReceiver

# Class TesseraPinConstraint

Inheritance

Object

TesseraPinConstraint

Implements

ITesseraInitialConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraPinConstraint : ITesseraInitialConstraint
```

## Properties

### Name

Declaration

```
public string Name { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

## Implements

ITesseraInitialConstraint

# Class TesseraPinned

Inheritance

Object

TesseraPinned

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraPinned : MonoBehaviour
```

## Fields

### pinType

Sets the type of pin to apply.

Declaration

```
public PinType pinType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| PinType | |

### tile

The tile to pin. Defaults to a tile component found on the same GameObject

Declaration

```
public TesseraTile tile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTile | |

# Class TesseraSquareTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

Inheritance

Object
TesseraTileBase
TesseraSquareTile

Implements

ISerializationCallbackReceiver

Inherited Members

TesseraTileBase.palette
TesseraTileBase.sylvesFaceDetails
TesseraTileBase.sylvesOffsets
TesseraTileBase.center
TesseraTileBase.cellSize
TesseraTileBase.rotatable
TesseraTileBase.reflectable
TesseraTileBase.rotationGroupType
TesseraTileBase.symmetric
TesseraTileBase.instantiateChildrenOnly
TesseraTileBase.Get(Vector3Int, CellFaceDir)
TesseraTileBase.Get(Vector3Int, Sylves.CellDir)
TesseraTileBase.TryGet(Vector3Int, CellFaceDir, FaceDetails)
TesseraTileBase.TryGet(Vector3Int, Sylves.CellDir, FaceDetails)
TesseraTileBase.AddOffset(Vector3Int)
TesseraTileBase.RemoveOffset(Vector3Int)
TesseraTileBase.OnBeforeSerialize()
TesseraTileBase.OnAfterDeserialize()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraSquareTile : TesseraTileBase
```

## Constructors

### TesseraSquareTile()

Declaration

```
public TesseraSquareTile()
```

## Properties

### SylvesCellGrid

Declaration

```
public override Sylves.IGrid SylvesCellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

Overrides

TesseraTileBase.SylvesCellGrid

### SylvesCellType

Declaration

```
public override Sylves.ICellType SylvesCellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

Overrides

TesseraTileBase.SylvesCellType

## Methods

### GetBounds()

Declaration

```
public BoundsInt GetBounds()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

## Implements

ISerializationCallbackReceiver

# Class TesseraTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

Inheritance

Object
TesseraTileBase
TesseraTile

Implements

ISerializationCallbackReceiver

Inherited Members

TesseraTileBase.palette
TesseraTileBase.sylvesFaceDetails
TesseraTileBase.sylvesOffsets
TesseraTileBase.center
TesseraTileBase.cellSize
TesseraTileBase.rotatable
TesseraTileBase.reflectable
TesseraTileBase.rotationGroupType
TesseraTileBase.symmetric
TesseraTileBase.instantiateChildrenOnly
TesseraTileBase.Get(Vector3Int, CellFaceDir)
TesseraTileBase.Get(Vector3Int, Sylves.CellDir)
TesseraTileBase.TryGet(Vector3Int, CellFaceDir, FaceDetails)
TesseraTileBase.TryGet(Vector3Int, Sylves.CellDir, FaceDetails)
TesseraTileBase.AddOffset(Vector3Int)
TesseraTileBase.RemoveOffset(Vector3Int)
TesseraTileBase.OnBeforeSerialize()
TesseraTileBase.OnAfterDeserialize()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraTile : TesseraTileBase
```

## Constructors

### TesseraTile()

Declaration

```
public TesseraTile()
```

## Properties

### SylvesCellGrid

Declaration

```
public override Sylves.IGrid SylvesCellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

Overrides

TesseraTileBase.SylvesCellGrid

### SylvesCellType

Declaration

```
public override Sylves.ICellType SylvesCellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

Overrides

TesseraTileBase.SylvesCellType

## Methods

### GetBounds()

Declaration

```
public BoundsInt GetBounds()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

## Implements

ISerializationCallbackReceiver

# Class TesseraTileBase

Inheritance

Object

TesseraTileBase

TesseraHexTile

TesseraSquareTile

TesseraTile

TesseraTrianglePrismTile

Implements

ISerializationCallbackReceiver

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public abstract class TesseraTileBase : MonoBehaviour
```

## Fields

### cellSize

The size of one cell in the tile. NB: This field is only used in the Editor - you must set cellSize to match.

Declaration

```
public Vector3 cellSize
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### center

Where the center of tile is. For big tiles that occupy more than one cell, it's the center of the cell with offset (0, 0, 0). Thie tile may not actually occupy that cell!

Declaration

```
public Vector3 center
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### instantiateChildrenOnly

If set, when being instantiated by a Generator, only children will get constructed. If there are no children, then this effectively disables the tile from instantiation.

Declaration

```
public bool instantiateChildrenOnly
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### palette

Set this to control the colors and names used for painting on the tile. Defaults to defaultPalette.

Declaration

```
public TesseraPalette palette
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraPalette | |

### reflectable

If true, when generating, reflections in the x-axis will be used.

Declaration

```
public bool reflectable
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### rotatable

If true, when generating, rotations of the tile will be used.

Declaration

```
public bool rotatable
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### rotationGroupType

If rotatable is on, specifies what sorts of rotations are used.

Declaration

```
public RotationGroupType rotationGroupType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| RotationGroupType | |

### sylvesFaceDetails

A list of outward facing faces. For a normal cube tile, there are 6 faces. Each face contains adjacency information that indicates what other tiles can connect to it. It is recommended you only edit this via the Unity Editor, or Get(Vector3Int, CellFaceDir) and AddOffset(Vector3Int)

Declaration

```
[NonSerialized]
public List<SylvesOrientedFace> sylvesFaceDetails
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<SylvesOrientedFace> | |

### sylvesOffsets

A list of cells that this tile occupies. For a normal cube tile, this just contains Vector3Int.zero, but it will be more for "big" tiles. It is recommended you only edit this via the Unity Editor, or AddOffset(Vector3Int) and RemoveOffset(Vector3Int)

Declaration

```
[NonSerialized]
public List<Vector3Int> sylvesOffsets
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<Vector3Int> | |

### symmetric

If true, Tessera assumes that the tile paint matches the the symmetry of the tile. Disable this if there are important details of your tile that the paint doesn't show. Turning symmetric on can have some performance benefits, and affects the behaviour of the mirror constraint.

Declaration

```
public bool symmetric
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Properties

### SylvesCellGrid

Declaration

```
public abstract Sylves.IGrid SylvesCellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

### SylvesCellType

Declaration

```
public abstract Sylves.ICellType SylvesCellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

## Methods

### AddOffset(Vector3Int)

Configures the tile as a "big" tile that occupies several cells. Keeps sylvesOffsets and sylvesFaceDetails in sync.

Declaration

```
public void AddOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

### Get(Vector3Int, Sylves.CellDir)

Finds the face details for a cell with a given offeset.

Declaration

```
public FaceDetails Get(Vector3Int offset, Sylves.CellDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| Sylves.CellDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| FaceDetails | |

### Get(Vector3Int, CellFaceDir)

Finds the face details for a cell with a given offeset.

Declaration

```
public FaceDetails Get(Vector3Int offset, CellFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| CellFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| FaceDetails | |

### OnAfterDeserialize()

Declaration

```
public void OnAfterDeserialize()
```

### OnBeforeSerialize()

Declaration

```
public void OnBeforeSerialize()
```

### RemoveOffset(Vector3Int)

Configures the tile as a "big" tile that occupies several cells. Keeps sylvesOffsets and sylvesFaceDetails in sync.

Declaration

```
public void RemoveOffset(Vector3Int o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | o | |

### TryGet(Vector3Int, Sylves.CellDir, out FaceDetails)

Finds the face details for a cell with a given offeset.

Declaration

```
public bool TryGet(Vector3Int offset, Sylves.CellDir faceDir, out FaceDetails details)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| Sylves.CellDir | faceDir | |
| FaceDetails | details | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### TryGet(Vector3Int, CellFaceDir, out FaceDetails)

Finds the face details for a cell with a given offeset.

Declaration

```
public bool TryGet(Vector3Int offset, CellFaceDir faceDir, out FaceDetails details)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | offset | |
| CellFaceDir | faceDir | |
| FaceDetails | details | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Implements

ISerializationCallbackReceiver

# Class TesseraTileInstance

Represents a request to instantiate a TesseraTile, post generation.

Inheritance

Object

TesseraTileInstance

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraTileInstance
```

## Properties

### Cell

The grid cell this instance fills. (for big tiles, this is the cell of the first offset)

Declaration

```
public Vector3Int Cell { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### CellRotation

The rotation this instance is placed at (for big tiles, this is the cell of the first offset)

Declaration

```
public Sylves.CellRotation CellRotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellRotation | |

### CellRotations

The rotations this instance instance, in the same order as the tile offsets. Most grids will have same rotation for all offsets.

Declaration

```
public Sylves.CellRotation[] CellRotations { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.CellRotation[] | |

### Cells

The cells this instance fills, in the same order as the tile offsets.

Declaration

```
public Vector3Int[] Cells { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int[] | |

### LocalPosition

Declaration

```
public Vector3 LocalPosition { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### LocalRotation

Declaration

```
public Quaternion LocalRotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Quaternion | |

### LocalScale

Declaration

```
public Vector3 LocalScale { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### LossyScale

Declaration

```
public Vector3 LossyScale { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### MeshDeformation

Gives a mesh deformation from tile space to generator space. Null for grids that do not have deformed tiles.

Declaration

```
public Sylves.Deformation MeshDeformation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.Deformation | |

### Position

Declaration

```
public Vector3 Position { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### Rotation

Declaration

```
public Quaternion Rotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Quaternion | |

### Tile

Declaration

```
public TesseraTileBase Tile { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

## Methods

### Align(TRS)

Sets Position/Rotation/Scale from the local versions and a given transform

Declaration

```
public void Align(TRS transform)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TRS | transform | |

## Clone()

Declaration

```
public TesseraTileInstance Clone()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileInstance | |

# Class TesseraTilemapOutput

Attach this to a TesseraGenerator to output the tiles to a Unity Tilemap component instead of directly instantiating them.

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TesseraTilemapOutput

Implements

ITesseraTileOutput

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraTilemapOutput : MonoBehaviour, ITesseraTileOutput
```

## Fields

### tilemap

The tilemap to write results to.

Declaration

```
public Tilemap tilemap
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Tilemap | |

### useSprites

If true, TesseraTiles that have a SpriteRenderer will be recorded to the Tilemap as that sprite. This is more efficient, but you will lose any other components on the object.

Declaration

```
public bool useSprites
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### useWorld

If true, tiles will be transformed to align with the world space position of the generator.

Declaration

```
public bool useWorld
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Properties

### IsEmpty

Declaration

```
public bool IsEmpty { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SupportsIncremental

Declaration

```
public bool SupportsIncremental { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### ClearTiles(IEngineInterface)

Declaration

```
public void ClearTiles(IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| IEngineInterface | engine | |

### UpdateTiles(TesseraCompletion, IEngineInterface)

Declaration

```
public void UpdateTiles(TesseraCompletion completion, IEngineInterface engine)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TesseraCompletion | completion | |
| IEngineInterface | engine | |

## Implements

ITesseraTileOutput

# Class TesseraTransformedTile

Definesa Unity tile that has a specific transform applied to it. Used by TesseraTilemapOutput

Inheritance

Object

TesseraTransformedTile

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraTransformedTile : Tile
```

## Fields

### localScale

Declaration

```
public Vector3 localScale
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### position

Declaration

```
public Vector3 position
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### rotation

Declaration

```
public Quaternion rotation
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Quaternion | |

### useWorld

Declaration

```
public bool useWorld
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

## Methods

### StartUp(Vector3Int, ITilemap, GameObject)

Declaration

```
public override bool StartUp(Vector3Int position, ITilemap tilemap, GameObject go)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | position | |
| ITilemap | tilemap | |
| GameObject | go | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

# Class TesseraTrianglePrismTile

GameObjects with this behaviour record adjacency information for use with a TesseraGenerator.

Inheritance

Object
TesseraTileBase
TesseraTrianglePrismTile

Implements

ISerializationCallbackReceiver

Inherited Members

TesseraTileBase.palette
TesseraTileBase.sylvesFaceDetails
TesseraTileBase.sylvesOffsets
TesseraTileBase.center
TesseraTileBase.cellSize
TesseraTileBase.rotatable
TesseraTileBase.reflectable
TesseraTileBase.rotationGroupType
TesseraTileBase.symmetric
TesseraTileBase.instantiateChildrenOnly
TesseraTileBase.Get(Vector3Int, CellFaceDir)
TesseraTileBase.Get(Vector3Int, Sylves.CellDir)
TesseraTileBase.TryGet(Vector3Int, CellFaceDir, FaceDetails)
TesseraTileBase.TryGet(Vector3Int, Sylves.CellDir, FaceDetails)
TesseraTileBase.AddOffset(Vector3Int)
TesseraTileBase.RemoveOffset(Vector3Int)
TesseraTileBase.OnBeforeSerialize()
TesseraTileBase.OnAfterDeserialize()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraTrianglePrismTile : TesseraTileBase
```

## Constructors

### TesseraTrianglePrismTile()

Declaration

```
public TesseraTrianglePrismTile()
```

## Properties

### SylvesCellGrid

Declaration

```
public override Sylves.IGrid SylvesCellGrid { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.IGrid | |

Overrides

TesseraTileBase.SylvesCellGrid

### SylvesCellType

Declaration

```
public override Sylves.ICellType SylvesCellType { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Sylves.ICellType | |

Overrides

TesseraTileBase.SylvesCellType

## Methods

### GetBounds()

Declaration

```
public BoundsInt GetBounds()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| BoundsInt | |

## Implements

ISerializationCallbackReceiver

# Class TesseraUncertainty

If this is set on the "uncertainty tile" used by TesseraGenerator/AnimatedGenerator, it will be populated with data about which tiles are actually possible.

Inheritance

Object

TesseraUncertainty

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraUncertainty : MonoBehaviour
```

## Properties

### modelTiles

Declaration

```
public ISet<ModelTile> modelTiles { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| ISet<ModelTile> | |

# Class TesseraVolume

Inheritance

Object

TesseraVolume

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraVolume : MonoBehaviour
```

## Fields

### generator

No effect on behaviour, setting this improves the UI in the Unity inspector.

Declaration

```
public TesseraGenerator generator
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraGenerator | |

### invertArea

If false, affect all cells inside the volume's colliders. If true, affect all cells outside.

Declaration

```
public bool invertArea
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### tiles

The list of tiles to filter on.

Declaration

```
public List<TesseraTileBase> tiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TesseraTileBase> | |

### volumeType

Controls the behaviour of this volume

Declaration

```
public VolumeType volumeType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| VolumeType | |

# Class TesseraVolumeFilter

Inheritance

Object

TesseraVolumeFilter

Implements

ITesseraInitialConstraint

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TesseraVolumeFilter : ITesseraInitialConstraint
```

## Fields

### volumeType

Declaration

```
public VolumeType volumeType
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| VolumeType | |

## Properties

### Name

Declaration

```
public string Name { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| String | |

## Implements

ITesseraInitialConstraint

# Enum TesseraWfcAlgorithm

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum TesseraWfcAlgorithm
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Ac3 | |
| Ac4 | |
| Default | |
| OneStep | |

# Class TileEntry

Specifies a tile to be used by TesseraGenerator

Inheritance

Object

TileEntry

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class TileEntry
```

## Fields

### tile

The tile to use

Declaration

```
public TesseraTileBase tile
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

### weight

The weight controls the relative probability of this tile being selected. I.e. tile wiht weight of 2.0 is twice common in the generation than a tile with weight 1.0.

Declaration

```
public float weight
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Single | |

# Class TileList

Inheritance

Object

TileList

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class TileList
```

## Fields

### tiles

Declaration

```
public List<TesseraTileBase> tiles
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| List<TesseraTileBase> | |

# Class TileMapping

Inheritance

Object

TileMapping

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
[Serializable]
public class TileMapping
```

## Fields

### from

Declaration

```
public TesseraTileBase from
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| TesseraTileBase | |

### instantiateChildrenOnly

Declaration

```
public bool instantiateChildrenOnly
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### to

Declaration

```
public GameObject to
```

Field Value

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

# Class TrianglePrismDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TrianglePrismDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class TrianglePrismDirExtensions
```

## Methods

### Forward(SylvesTrianglePrismDir)

Declaration

```
public static Vector3 Forward(this SylvesTrianglePrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### GetSide(SylvesTrianglePrismDir)

Declaration

```
public static int GetSide(this SylvesTrianglePrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### IsUpDown(SylvesTrianglePrismDir)

Declaration

```
public static bool IsUpDown(this SylvesTrianglePrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### IsValid(SylvesTrianglePrismDir, Boolean)

Declaration

```
public static bool IsValid(this SylvesTrianglePrismDir dir, bool pointsUp)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |
| Boolean | pointsUp | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### IsValid(SylvesTrianglePrismDir, Vector3Int)

Declaration

```
public static bool IsValid(this SylvesTrianglePrismDir dir, Vector3Int offset)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |
| Vector3Int | offset | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### SylvesOffsetDelta(SylvesTrianglePrismDir)

Declaration

```
public static Vector3Int SylvesOffsetDelta(this SylvesTrianglePrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### Up(SylvesTrianglePrismDir)

Declaration

```
public static Vector3 Up(this SylvesTrianglePrismDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| SylvesTrianglePrismDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

# Enum TrianglePrismFaceDir

> **NOTE**
>
> This class is available only in Tessera Pro

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum TrianglePrismFaceDir
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| Back | |
| BackLeft | |
| BackRight | |
| Down | |
| Forward | |
| ForwardLeft | |
| ForwardRight | |
| Up | |

# Class TrianglePrismFaceDirExtensions

> **NOTE**
>
> This class is available only in Tessera Pro

Inheritance

Object

TrianglePrismFaceDirExtensions

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class TrianglePrismFaceDirExtensions
```

## Methods

### Forward(TrianglePrismFaceDir)

Declaration

```
public static Vector3 Forward(this TrianglePrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### GetSide(TrianglePrismFaceDir)

Declaration

```
public static int GetSide(this TrianglePrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### IsUpDown(TrianglePrismFaceDir)

Declaration

```
public static bool IsUpDown(this TrianglePrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### IsValid(TrianglePrismFaceDir, Boolean)

Declaration

```
public static bool IsValid(this TrianglePrismFaceDir dir, bool pointsUp)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |
| Boolean | pointsUp | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### IsValid(TrianglePrismFaceDir, Vector3Int)

Declaration

```
public static bool IsValid(this TrianglePrismFaceDir dir, Vector3Int offset)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |
| Vector3Int | offset | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### OffsetDelta(TrianglePrismFaceDir)

Declaration

```
public static Vector3Int OffsetDelta(this TrianglePrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### Up(TrianglePrismFaceDir)

Declaration

```
public static Vector3 Up(this TrianglePrismFaceDir dir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TrianglePrismFaceDir | dir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

# Class TrianglePrismGeometryUtils

**NOTE**

This class is available only in Tessera Pro

Inheritance

Object

TrianglePrismGeometryUtils

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public static class TrianglePrismGeometryUtils
```

## Methods

### CoordRotate(TriangleRotation, Vector3Int)

Declaration

```
public static Vector3Int CoordRotate(TriangleRotation rotation, Vector3Int coords)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| TriangleRotation | rotation | |
| Vector3Int | coords | |

Returns

| TYPE | DESCRIPTION |
|---|---|
| Vector3Int | |

### FindCell(Vector3, Vector3, Vector3, out Vector3Int)

Declaration

```
public static bool FindCell(Vector3 origin, Vector3 cellSize, Vector3 position, out Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
|---|---|---|
| Vector3 | origin | |
| Vector3 | cellSize | |
| Vector3 | position | |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### FromSide(Int32)

Declaration

```
public static TrianglePrismFaceDir FromSide(int side)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | side | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TrianglePrismFaceDir | |

### FromTriCoords(Vector3Int, Int32)

Declaration

```
public static Vector3Int? FromTriCoords(Vector3Int coords, int y = 0)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | coords | |
| Int32 | y | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Nullable<Vector3Int> | |

### GetCellCenter(Vector3Int, Vector3, Vector3)

Declaration

```
public static Vector3 GetCellCenter(Vector3Int cell, Vector3 origin, Vector3 cellSize)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |
| Vector3 | origin | |
| Vector3 | cellSize | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### Pack(Vector2Int, Boolean, Int32)

Declaration

```
public static Vector3Int Pack(Vector2Int tri, bool pointsUp, int y)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector2Int | tri | |
| Boolean | pointsUp | |
| Int32 | y | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### PointsUp(Vector3Int)

Declaration

```
public static bool PointsUp(Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Standardize(Vector2)

Declaration

```
public static Vector2 Standardize(Vector2 p)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector2 | p | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector2 | |

### ToTriCoords(Vector3Int)

Declaration

```
public static Vector3Int ToTriCoords(Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3Int | |

### Unpack(Vector3Int)

Declaration

```
public static (Vector2Int, bool, int) Unpack(Vector3Int cell)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3Int | cell | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| (T1, T2, T3)<Vector2Int, Boolean, Int32> | |

### Unstandardize(Vector2)

Declaration

```
public static Vector2 Unstandardize(Vector2 p)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector2 | p | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Vector2 | |

# Struct TriangleRotation

Represents rotations / reflections of a hexagon

> **NOTE**
>
> This class is available only in Tessera Pro

Inherited Members

ValueType.ToString()

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public struct TriangleRotation
```

## Properties

### All

Declaration

```
public static readonly TriangleRotation[] All { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation[] | |

### Identity

Declaration

```
public static readonly TriangleRotation Identity { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### IsReflection

Declaration

```
public readonly bool IsReflection { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### ReflectX

Declaration

```
public static readonly TriangleRotation ReflectX { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### ReflectY

Declaration

```
public static readonly TriangleRotation ReflectY { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### RotateCCW

Declaration

```
public static readonly TriangleRotation RotateCCW { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### RotateCW

Declaration

```
public static readonly TriangleRotation RotateCW { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### Rotation

Declaration

```
public readonly int Rotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

## Methods

### Equals(Object)

Declaration

```
public override bool Equals(object obj)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Object | obj | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

Overrides

ValueType.Equals(Object)

### GetHashCode()

Declaration

```
public override int GetHashCode()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

Overrides

ValueType.GetHashCode()

### Invert()

Declaration

```
public TriangleRotation Invert()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### RotateCCW60(Int32)

Declaration

```
public static TriangleRotation RotateCCW60(int i)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Int32 | i | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

## Operators

### Equality(TriangleRotation, TriangleRotation)

Declaration

```
public static bool operator ==(TriangleRotation a, TriangleRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | a | |
| TriangleRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Implicit(CellRotation to TriangleRotation)

Declaration

```
public static implicit operator TriangleRotation(CellRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| CellRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

### Implicit(TriangleRotation to CellRotation)

Declaration

```
public static implicit operator CellRotation(TriangleRotation r)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | r | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| CellRotation | |

### Inequality(TriangleRotation, TriangleRotation)

Declaration

```
public static bool operator !=(TriangleRotation a, TriangleRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | a | |
| TriangleRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Boolean | |

### Multiply(TriangleRotation, Int32)

Declaration

```
public static int operator *(TriangleRotation a, int side)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | a | |
| Int32 | side | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Int32 | |

### Multiply(TriangleRotation, TrianglePrismFaceDir)

Declaration

```
public static TrianglePrismFaceDir operator *(TriangleRotation rotation, TrianglePrismFaceDir faceDir)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | rotation | |
| TrianglePrismFaceDir | faceDir | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TrianglePrismFaceDir | |

### Multiply(TriangleRotation, TriangleRotation)

Declaration

```
public static TriangleRotation operator *(TriangleRotation a, TriangleRotation b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TriangleRotation | a | |
| TriangleRotation | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TriangleRotation | |

# Class TRS

Rerpresents a position / rotation and scale. Much like a Transform, but without the association with a unity object.

Inheritance

Object

TRS

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class TRS
```

## Constructors

### TRS(Matrix4x4)

Declaration

```
public TRS(Matrix4x4 m)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Matrix4x4 | m | |

### TRS(Vector3)

Declaration

```
public TRS(Vector3 position)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3 | position | |

### TRS(Vector3, Quaternion, Vector3)

Declaration

```
public TRS(Vector3 position, Quaternion rotation, Vector3 scale)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Vector3 | position | |
| Quaternion | rotation | |
| Vector3 | scale | |

## Properties

### Position

Declaration

```
public Vector3 Position { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

### Rotation

Declaration

```
public Quaternion Rotation { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Quaternion | |

### Scale

Declaration

```
public Vector3 Scale { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| Vector3 | |

## Methods

### Local(Transform)

Declaration

```
public static TRS Local(Transform t)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Transform | t | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TRS | |

### ToMatrix()

Declaration

```
public Matrix4x4 ToMatrix()
```

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| Matrix4x4 | |

### World(Transform)

Declaration

```
public static TRS World(Transform t)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| Transform | t | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TRS | |

## Operators

### Multiply(TRS, TRS)

Declaration

```
public static TRS operator *(TRS a, TRS b)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| TRS | a | |
| TRS | b | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| TRS | |

# Class UnityEngineInterface

Inheritance

Object

UnityEngineInterface

Implements

IEngineInterface

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public class UnityEngineInterface : IEngineInterface
```

## Properties

### Instance

Declaration

```
public static UnityEngineInterface Instance { get; }
```

Property Value

| TYPE | DESCRIPTION |
| --- | --- |
| UnityEngineInterface | |

## Methods

### Destroy(UnityEngine.Object)

Declaration

```
public void Destroy(UnityEngine.Object o)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | o | |

### Instantiate(GameObject, Vector3, Quaternion, Transform)

Declaration

```
public GameObject Instantiate(GameObject gameObject, Vector3 position, Quaternion rotation, Transform parent)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| GameObject | gameObject | |
| Vector3 | position | |
| Quaternion | rotation | |
| Transform | parent | |

Returns

| TYPE | DESCRIPTION |
| --- | --- |
| GameObject | |

### RegisterCompleteObjectUndo(UnityEngine.Object)

Declaration

```
public void RegisterCompleteObjectUndo(UnityEngine.Object objectToUndo)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | objectToUndo | |

### RegisterCreatedObjectUndo(UnityEngine.Object)

Declaration

```
public void RegisterCreatedObjectUndo(UnityEngine.Object objectToUndo)
```

Parameters

| TYPE | NAME | DESCRIPTION |
| --- | --- | --- |
| UnityEngine.Object | objectToUndo | |

## Implements

IEngineInterface

# Enum VolumeType

Namespace: Tessera

Assembly: cs.temp.dll.dll

Syntax

```
public enum VolumeType
```

## Fields

| NAME | DESCRIPTION |
| --- | --- |
| MaskOut | Removes the cells inside the volume from generation |
| TilesetFilter | Restricts the set of tiles inside the volume |