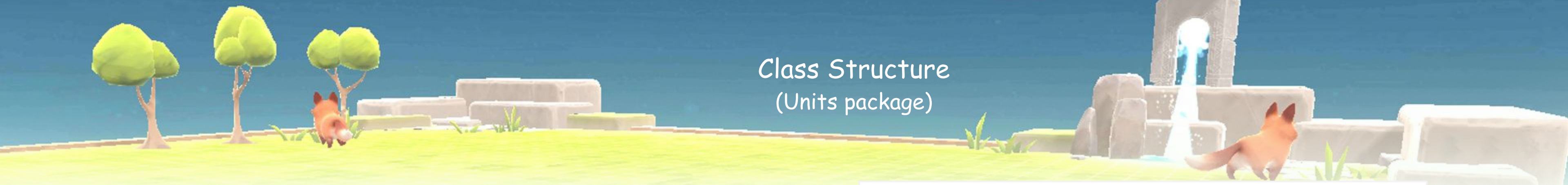
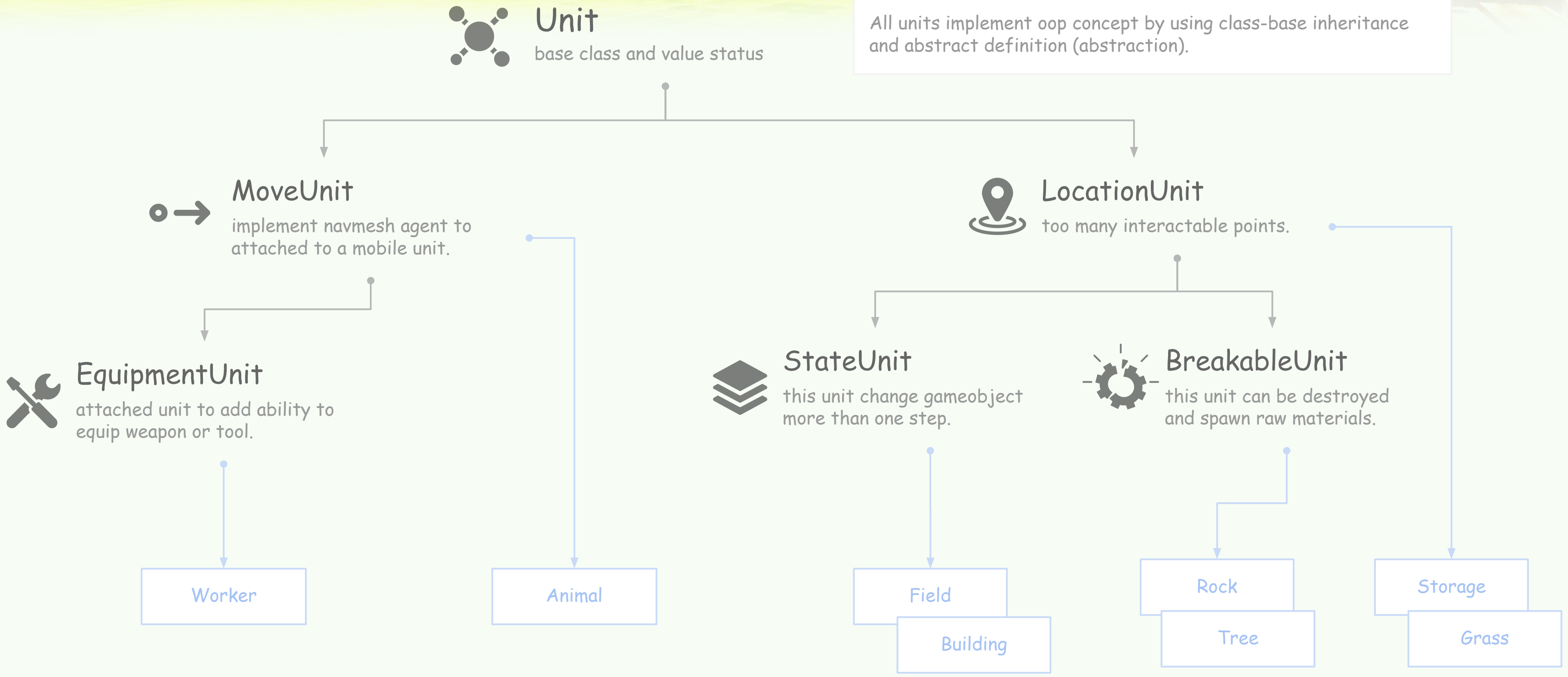


Class Structure
(Units package)

All units implement oop concept by using class-base inheritance and abstract definition (abstraction).



Unit
base class and value status

MoveUnit
implement navmesh agent to attached to a mobile unit.

LocationUnit
too many interactable points.

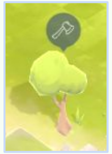
EquipmentUnit
attached unit to add ability to equip weapon or tool.

StateUnit
this unit change gameobject more than one step.

BreakableUnit
this unit can be destroyed and spawn raw materials.

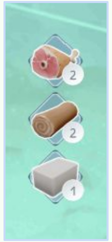
Manager classes

(include user interfaces)



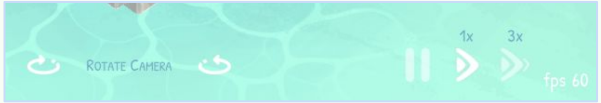
CommandManager

manage selection of units (trees, stones, animal) to order execute.



IconManager

display all raw materials that being kept in storage.

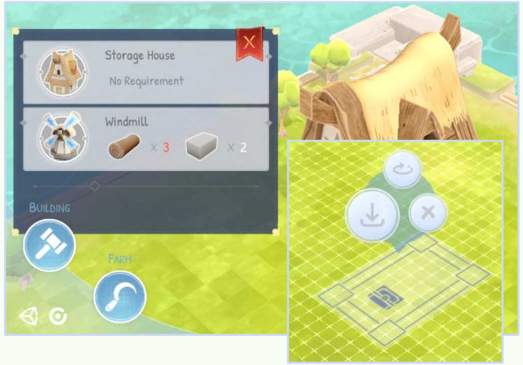


DisplayManager

rotate camera.

TimeManager

adjust time scale.

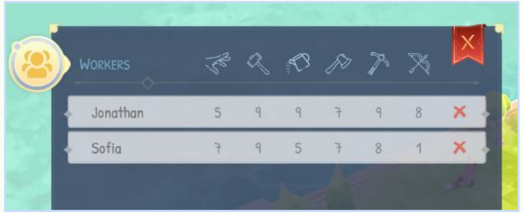


PanelManager

Display building templates and the amount of materials

BlueprintManager

manage building templates (rotate, move, setup).



Workers

Jonathan	5	9	9	7	9	8
Sofia	7	9	5	7	8	1

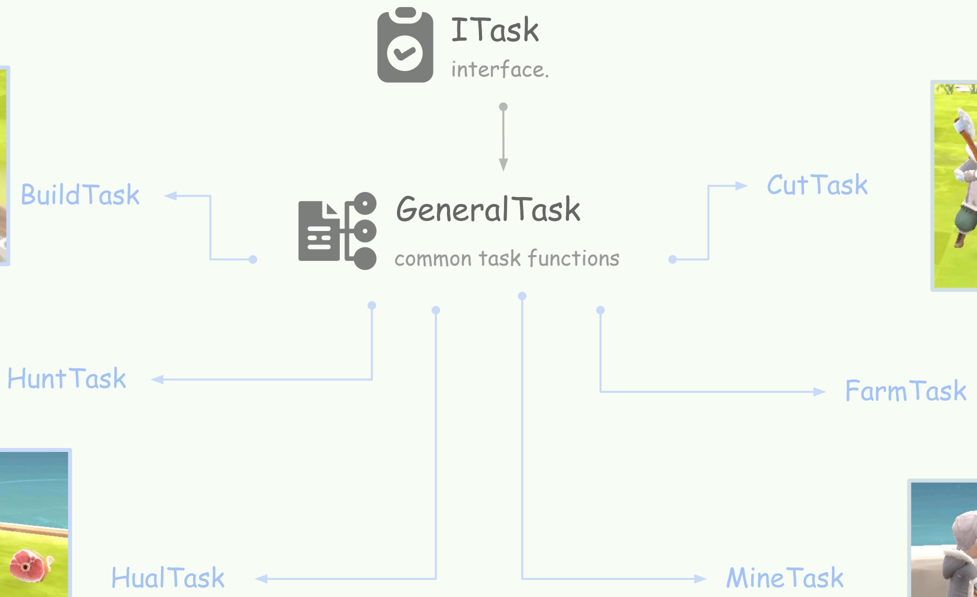
WorkerManager

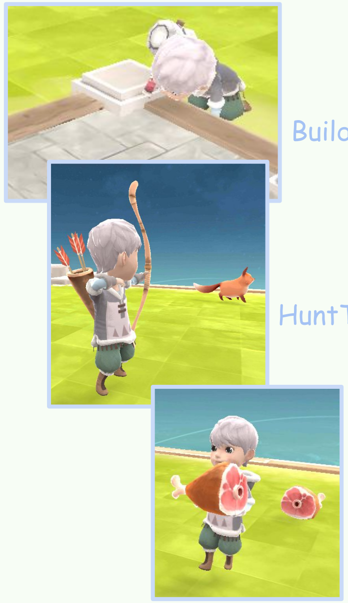
show all workers and manage worker's tasks priority.

Task System

(Movement.Tasks package)

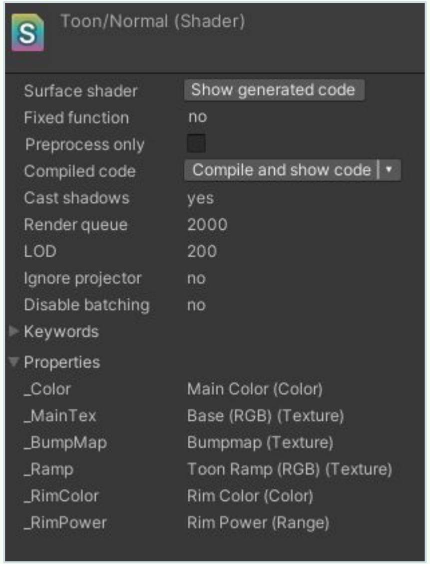
this component has been attached to worker character to control behavior movement and animations.





Toon Shader

(Graphics/Shaders)



Toon/Normal (Shader)

Surface shader	Show generated code
Fixed function	no
Preprocess only	
Compiled code	Compile and show code
Cast shadows	yes
Render queue	2000
LOD	200
Ignore projector	no
Disable batching	no
Keywords	
Properties	
_Color	Main Color (Color)
_MainTex	Base (RGB) (Texture)
_BumpMap	Bumpmap (Texture)
_Ramp	Toon Ramp (RGB) (Texture)
_RimColor	Rim Color (Color)
_RimPower	Rim Power (Range)

_Color

Add more additive color into main texture.

_MainTex

Albedo texture (RGB).

_BumpMap

Normal map texture.

_Ramp

Add toon Ramp texture to adjust toon light style.

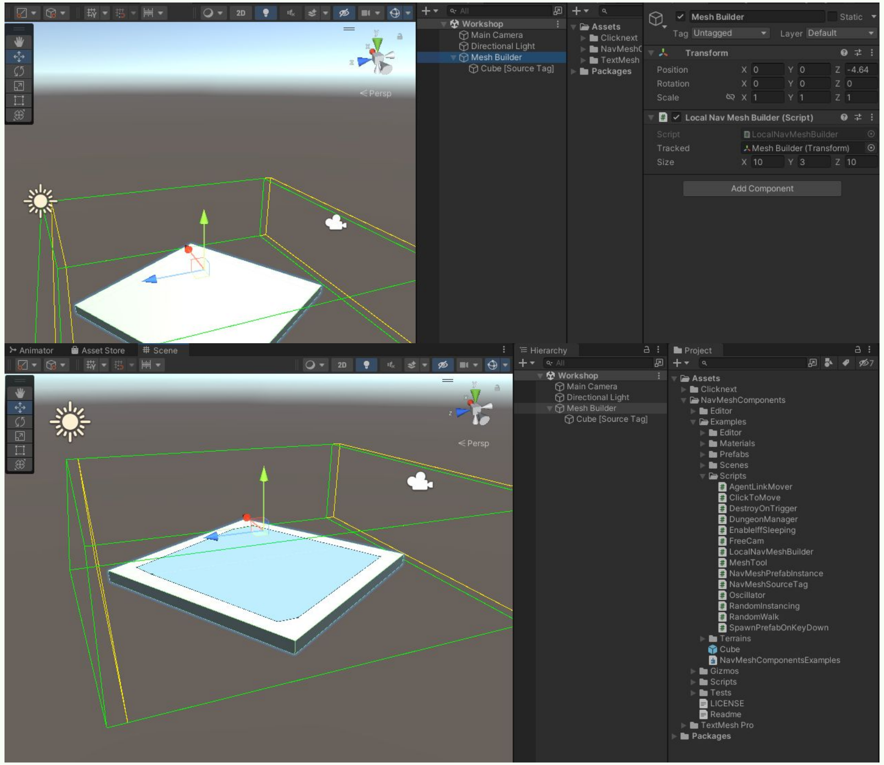
_RimColor and _RimPower

Custom rim light color and intensity.

Using Advanced NavMeshes

https://github.com/Unity-Technologies/NavMeshComponents

This tutorial project uses the high-level advanced NavMesh component to generate the NavMesh area at runtime. The LocalNavMeshBuilder and NavMeshSourceTag components (classes) can be found in the example folder. The NavMeshBuildSource and NavMeshData have been implemented and updated by the NavMeshBuilder class.

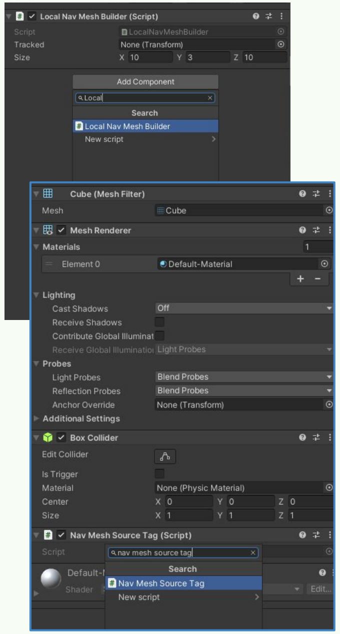


Mesh Builder — Static
Tag: Untagged — Layer: Default

Transform
Position X 0 Y 0 Z -4.64
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

Local Nav Mesh Builder (Script)
Script: LocalNavMeshBuilder
Tracked: Mesh Builder (Transform)
Size X 10 Y 3 Z 10

Add Component



Local Nav Mesh Builder (Script)
Script: LocalNavMeshBuilder
Tracked: None (Transform)
Size X 10 Y 3 Z 10

Add Component
Local
Search
Local Nav Mesh Builder
New script

Cube (Mesh Filter)
Mesh: Cube

Mesh Renderer
Materials: 1
Element 0: Default-Material
Lighting
Cast Shadows: Off
Receive Shadows
Contribute Global Illuminat
Receive Global Illuminatio: Light Probes
Probes
Light Probes: Blend Probes
Reflection Probes: Blend Probes
Anchor Override: None (Transform)
Additional Settings

Box Collider
Edit Collider
Is Trigger
Material: None (Physic Material)
Center X 0 Y 0 Z 0
Size X 1 Y 1 Z 1

Nav Mesh Source Tag (Script)
Script
nav mesh source tag
Search
Nav Mesh Source Tag
New script
Default-M
Shader
Edit...

1. Add local navmesh builder into hierarchy parent gameobject.

2. Create navmesh source tags under the local nave mesh builder.

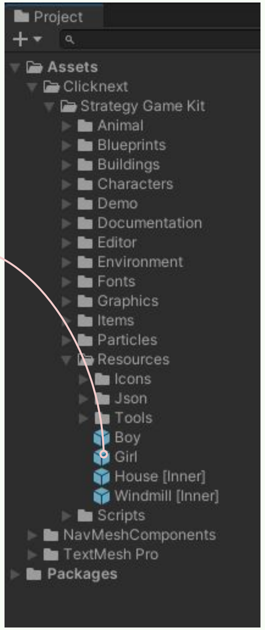
Nav Mesh
Show NavMesh
Show HeightMesh

* We use the runtime navmesh because player can build structure units at any time.

A - Create navmesh agent units

Worker characters

This tutorial project prepares character prefabs (found in Clicknext/Strategy Game Kit/Resources) that implement a NavMesh Agent to move and perform task actions. However, you can also create new ones using your imported character models and attach the worker component to them.

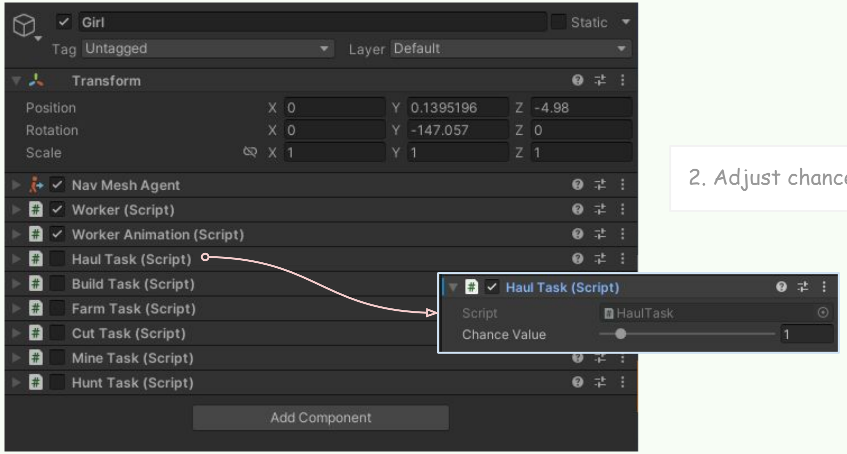


Project

- Assets
  - Clicknext
    - Strategy Game Kit
      - Animal
      - Blueprints
      - Buildings
      - Characters
      - Demo
      - Documentation
      - Editor
      - Environment
      - Fonts
      - Graphics
      - Items
      - Particles
      - Resources
        - Icons
        - Json
        - Tools
        - Boy
        - Girl
        - House [Inner]
        - Windmill [Inner]
      - Scripts
  - NavMeshComponents
  - TextMesh Pro
- Packages

1. Drag and drop character on the navmesh surface (Boy or Girl).

* The character's components must include at least one task and one worker animation component (optional).



Girl — Static

Tag Untagged — Layer Default

Transform

Position	X	0	Y	0.1395196	Z	-4.98
Rotation	X	0	Y	-147.057	Z	0
Scale	X	1	Y	1	Z	1

- ✓ Nav Mesh Agent
- ✓ Worker (Script)
- ✓ Worker Animation (Script)
- Haul Task (Script)
- Build Task (Script)
- Farm Task (Script)
- Cut Task (Script)
- Mine Task (Script)
- Hunt Task (Script)

Add Component

✓ Haul Task (Script)

Script: HaulTask

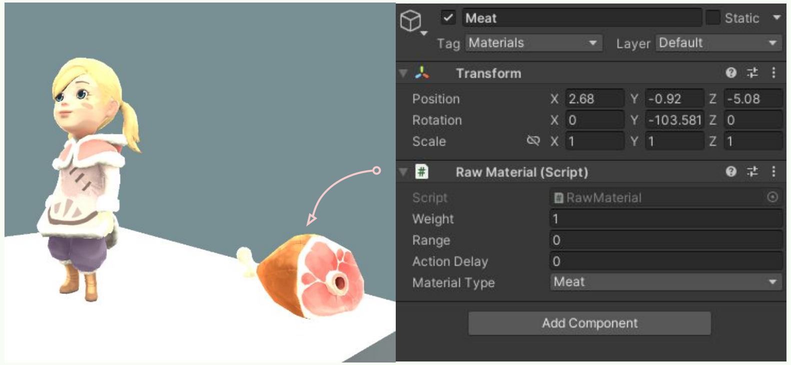
Chance Value: 1

2. Adjust chance value more than zero.

B - Create object units

Raw material and storage

Worker tasks need a few tag objects to take action; for example, haul tasks require two tag objects of raw material and storage to run the task process.



Meat — Static
Tag: Materials — Layer: Default

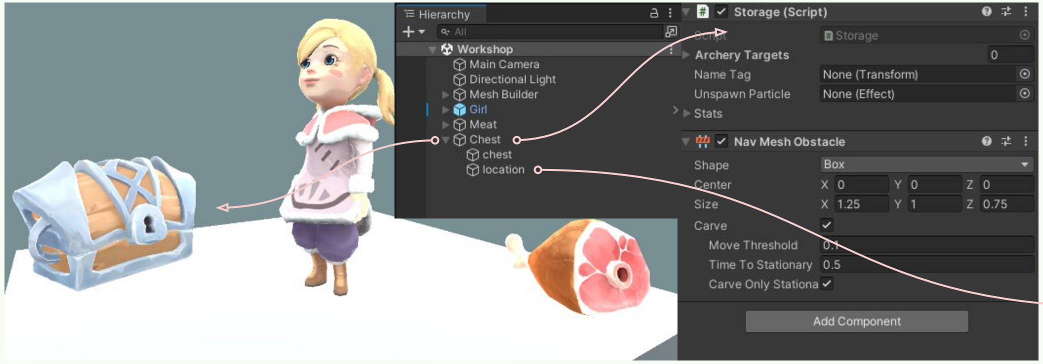
Transform

	X	Y	Z
Position	2.68	-0.92	-5.08
Rotation	0	-103.581	0
Scale	1	1	1

Raw Material (Script)

Script	RawMaterial
Weight	1
Range	0
Action Delay	0
Material Type	Meat

1. Create new gameobject and attach RawMaterial component. This component will set the tag to "Materials".



Hierarchy
- Workshop
  - Main Camera
  - Directional Light
  - Mesh Builder
  - Girl
  - Meat
  - Chest
    - chest
    - location

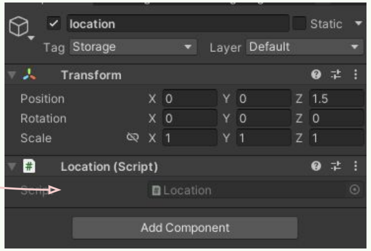
Storage (Script)

Script	Storage
Archery Targets	0
Name Tag	None (Transform)
Unspawn Particle	None (Effect)
Stats	

Nav Mesh Obstacle

Shape	Box
Center	X 0 Y 0 Z 0
Size	X 1.25 Y 1 Z 0.75
Carve	✓
Move Threshold	0.1
Time To Stationary	0.5
Carve Only Stationa	✓

2. To create a storage unit, add an additional NavMeshObstacle component and add a location child game object to it.



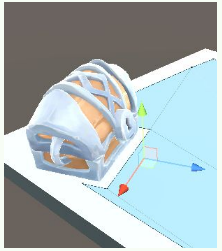
location — Static
Tag: Storage — Layer: Default

Transform

	X	Y	Z
Position	0	0	1.5
Rotation	0	0	0
Scale	1	1	1

Location (Script)

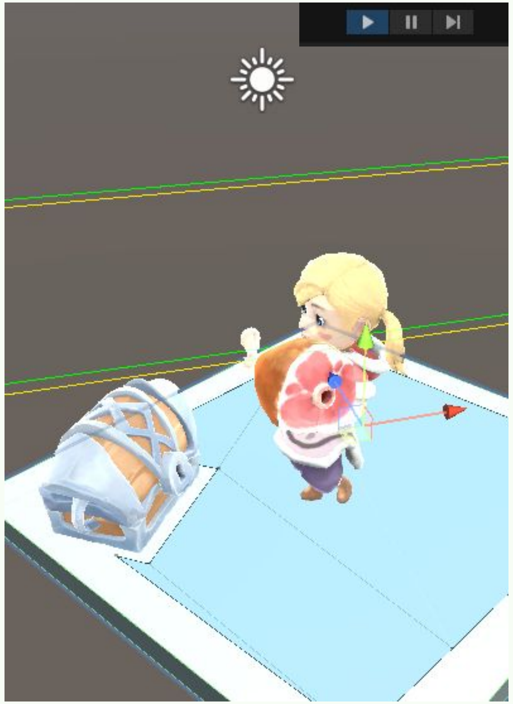
Script: Location



B - Create object units

Run the task process

Make sure all of the raw materials are placed within the NavMesh area and that our character is also standing on the NavMesh area.



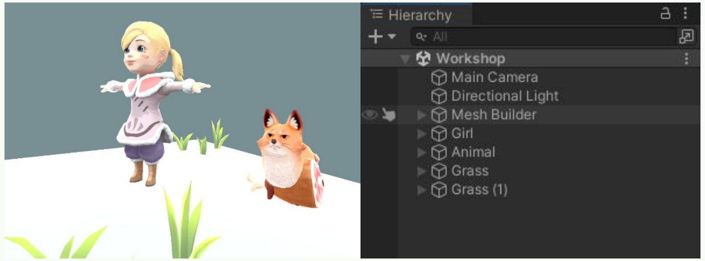
3. Press the play button in Unity Editor, here we go!

* If there are no raw materials, the worker will idle after hauling the last of them.

C - Two relational agents

Hunting animal task

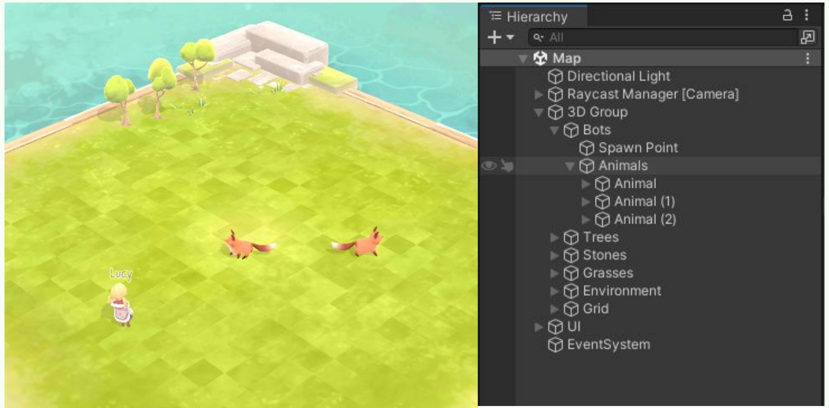
This example requires at least two agents and the "hunt" task must be enabled. The animal script will set the red fox to idle if there are no grasses available.



Hierarchy

- Workshop
  - Main Camera
  - Directional Light
  - Mesh Builder
  - Girl
  - Animal
  - Grass
  - Grass (1)

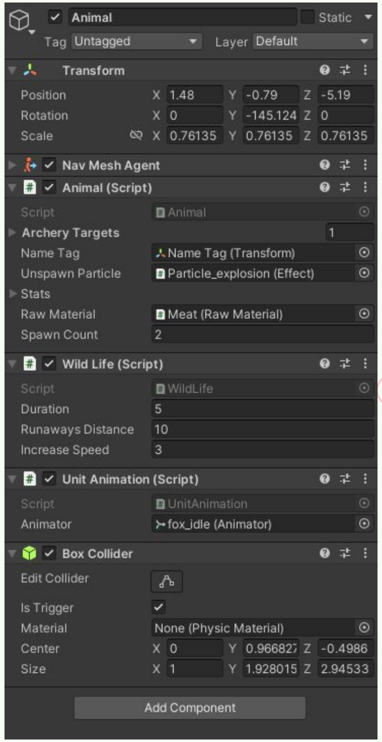
1. Add animal (red fox), a worker and grasses into scene.



Hierarchy

- Map
  - Directional Light
  - Raycast Manager [Camera]
  - 3D Group
    - Bots
      - Spawn Point
      - Animals
        - Animal
        - Animal (1)
        - Animal (2)
    - Trees
    - Stones
    - Grasses
    - Environment
    - Grid
  - UI
  - EventSystem

* You can copy the animal in the Map scene (Demo) and paste it in your scene or set up the animal character on your own.



Animal — Static
Tag Untagged — Layer Default

Transform

Position	X	1.48	Y	-0.79	Z	-5.19
Rotation	X	0	Y	-145.124	Z	0
Scale	X	0.76135	Y	0.76135	Z	0.76135

Nav Mesh Agent

Animal (Script)

Script	Animal
Archery Targets	1
Name Tag	Name Tag (Transform)
Unspawn Particle	Particle_explosion (Effect)
Stats	
Raw Material	Meat (Raw Material)
Spawn Count	2

Wild Life (Script)

Script	WildLife
Duration	5
Runaways Distance	10
Increase Speed	3

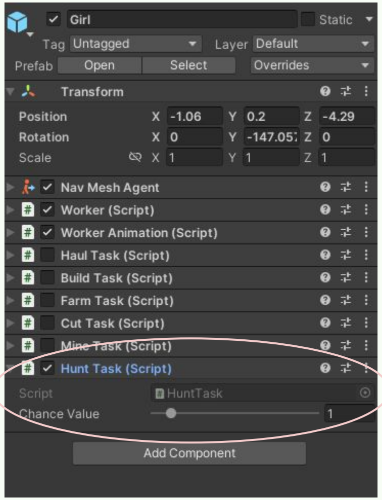
Unit Animation (Script)

Script	UnitAnimation
Animator	fox_idle (Animator)

Box Collider

Edit Collider						
Is Trigger	✓					
Material	None (Physic Material)					
Center	X	0	Y	0.966827	Z	-0.4986
Size	X	1	Y	1.928015	Z	2.94533

Add Component



Girl — Static
Tag Untagged — Layer Default
Prefab Open Select Overrides

Transform

Position	X	-1.06	Y	0.2	Z	-4.29
Rotation	X	0	Y	-147.05	Z	0
Scale	X	1	Y	1	Z	1

- ✓ Nav Mesh Agent
- ✓ Worker (Script)
- ✓ Worker Animation (Script)
- Haul Task (Script)
- Build Task (Script)
- Farm Task (Script)
- Cut Task (Script)
- Mine Task (Script)
- ✓ Hunt Task (Script)

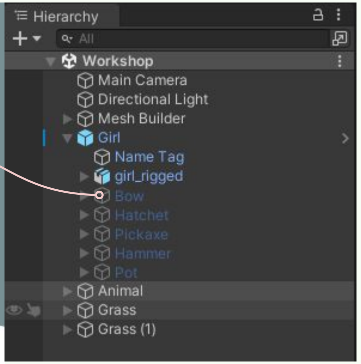
Script	HuntTask
Chance Value	1

Add Component

C - Two relational agents

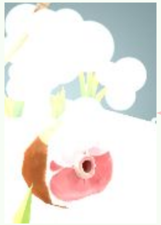
Animal's tag

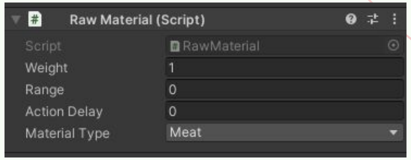
It is important to note that the hunting task requires that the animal's script is set up correctly, and that there is at least one animal present in the scene for the task to be performed. Additionally, it is important that the agent that is assigned to perform the hunting task is set up with the correct animations and equipment for hunting.



```
Hierarchy
+ ▾  All
▾ Workshop
    Main Camera
    Directional Light
  ▸ Mesh Builder
  ▾ Girl
      Name Tag
    ▸ girl_rigged
    ▸ Bow
    ▸ Hatchet
    ▸ Pickaxe
    ▸ Hammer
    ▸ Pot
  ▸ Animal
  ▸ Grass
  ▸ Grass (1)
```

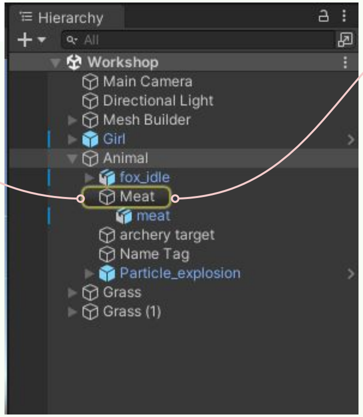
2. Set the equipment for hunting.



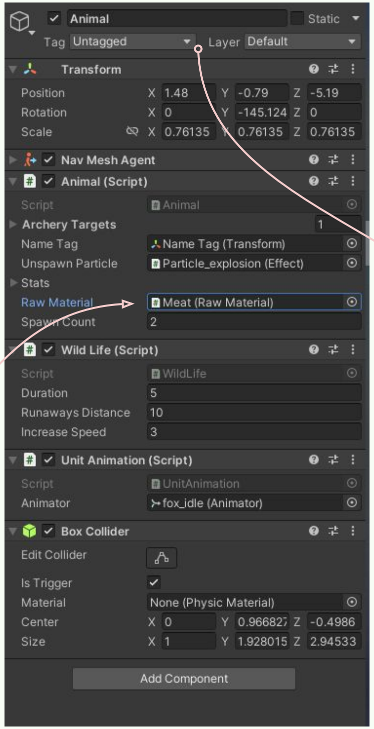


Raw Material (Script)

Script	RawMaterial
Weight	1
Range	0
Action Delay	0
Material Type	Meat



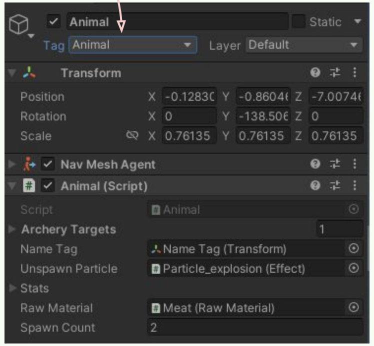
```
Hierarchy
+ ▾  All
▾ Workshop
    Main Camera
    Directional Light
  ▸ Mesh Builder
  ▸ Girl
  ▾ Animal
    ▸ fox_idle
    ▾ Meat
        meat
      archery target
      Name Tag
    ▸ Particle_explosion
  ▸ Grass
  ▸ Grass (1)
```



```
✓ Animal                                   Static ▾
  Tag Untagged ▾          Layer Default ▾
▾ Transform
  Position     X 1.48      Y -0.79      Z -5.19
  Rotation     X 0         Y -145.124   Z 0
  Scale        X 0.76135   Y 0.76135    Z 0.76135
▸ ✓ Nav Mesh Agent
▾ ✓ Animal (Script)
  Script               Animal
▸ Archery Targets      1
  Name Tag             Name Tag (Transform)
  Unspawn Particle     Particle_explosion (Effect)
▸ Stats
  Raw Material         Meat (Raw Material)
  Spawn Count          2
▾ ✓ Wild Life (Script)
  Script               WildLife
  Duration             5
  Runaways Distance    10
  Increase Speed       3
▾ ✓ Unit Animation (Script)
  Script               UnitAnimation
  Animator             fox_idle (Animator)
▾ ✓ Box Collider
  Edit Collider
  Is Trigger           ✓
  Material             None (Physic Material)
  Center       X 0         Y 0.966827   Z -0.4986
  Size         X 1         Y 1.928015   Z 2.94533
              Add Component
```

3. Add the raw material (Meat) to animal's serialized field. If it dies, it will spawn this raw material.

4. Worker has not been hunt until animal's tag is set to 'Animal'. Change tag to 'Animal' manually or using the manager script.

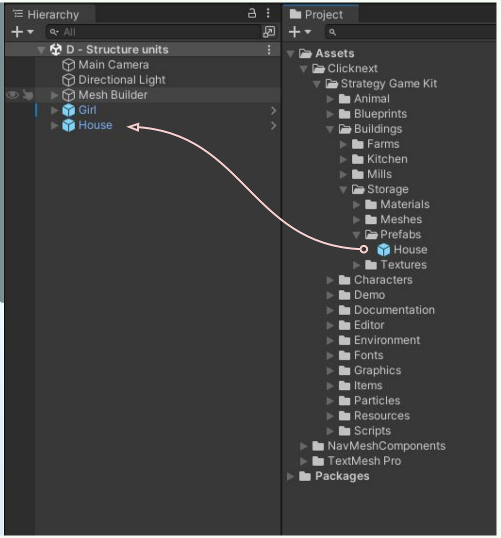


```
✓ Animal                                   Static ▾
  Tag Animal ▾            Layer Default ▾
▾ Transform
  Position     X -0.1283C  Y -0.8604E   Z -7.0074E
  Rotation     X 0         Y -138.50E   Z 0
  Scale        X 0.76135   Y 0.76135    Z 0.76135
▸ ✓ Nav Mesh Agent
▾ ✓ Animal (Script)
  Script               Animal
▸ Archery Targets      1
  Name Tag             Name Tag (Transform)
  Unspawn Particle     Particle_explosion (Effect)
▸ Stats
  Raw Material         Meat (Raw Material)
  Spawn Count          2
```

D - Structure units

Build a storage

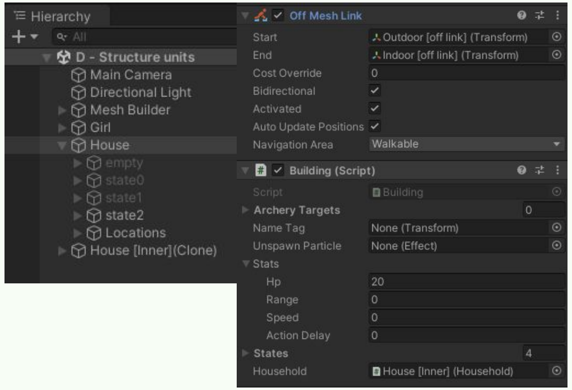
This section, explain about how to build the state unit (building component). Some building units included an interior structure (room) where worker can enter to perform tasks. These rooms have a OffMesh Link implemented to allow the worker character to navigate and enter the interior.



```
Hierarchy
▼ D - Structure units
    Main Camera
    Directional Light
  ▶ Mesh Builder
  ▶ Girl
  ▶ House
```

```
Project
▼ Assets
  ▼ Clicknext
    ▼ Strategy Game Kit
      ▶ Animal
      ▶ Blueprints
      ▼ Buildings
        ▶ Farms
        ▶ Kitchen
        ▶ Mills
        ▼ Storage
          ▶ Materials
          ▶ Meshes
          ▼ Prefabs
              House
          ▶ Textures
      ▶ Characters
      ▶ Demo
      ▶ Documentation
      ▶ Editor
      ▶ Environment
      ▶ Fonts
      ▶ Graphics
      ▶ Items
      ▶ Particles
      ▶ Resources
      ▶ Scripts
  ▶ NavMeshComponents
  ▶ TextMesh Pro
▶ Packages
```

1. Drag and drop worker character and House to the scene.



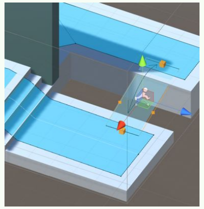
```
Hierarchy
▼ D - Structure units
    Main Camera
    Directional Light
  ▶ Mesh Builder
  ▶ Girl
  ▼ House
    ▶ empty
    ▶ state0
    ▶ state1
    ▶ state2
    ▶ Locations
  ▶ House [Inner](Clone)
```

Off Mesh Link

Start	Outdoor [off link] (Transform)
End	Indoor [off link] (Transform)
Cost Override	0
Bidirectional	✓
Activated	✓
Auto Update Positions	✓
Navigation Area	Walkable

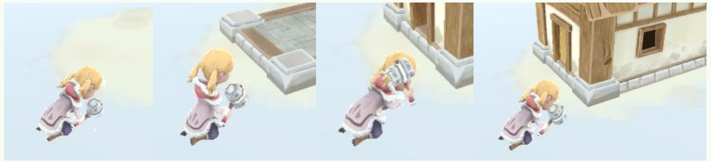
Building (Script)

Script	Building
Archery Targets	0
Name Tag	None (Transform)
Unspawn Particle	None (Effect)
Stats	
Hp	20
Range	0
Speed	0
Action Delay	0
States	4
Household	House [Inner] (Household)



* more explanation about OffMesh Link:
https://docs.unity3d.com/Manual/class-OffMeshLink.html

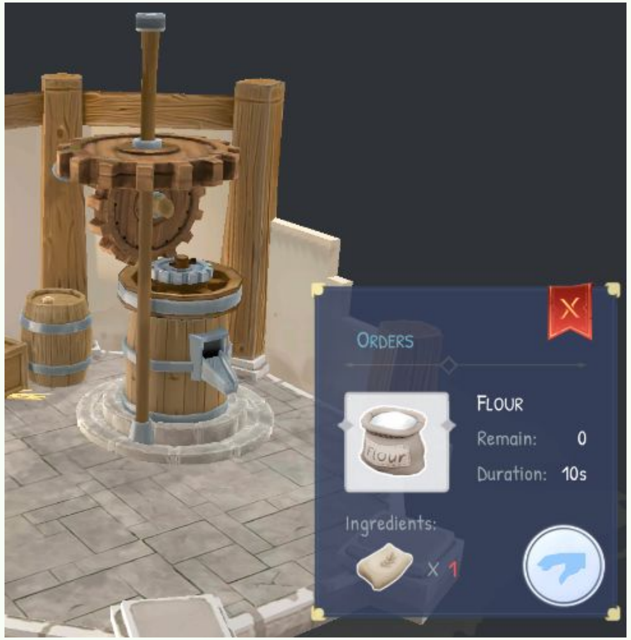
2. Each buildings can include multiple state, and the interior will spawn after final state of building is completed.



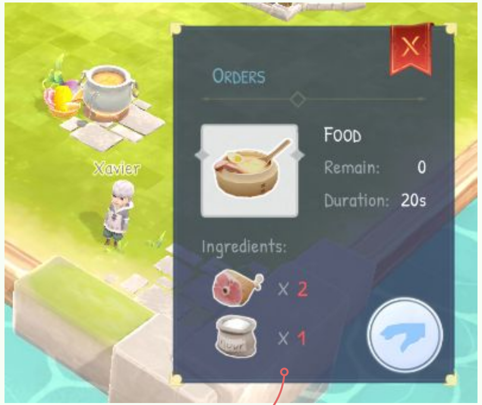
Producible units

Can raw materials be used for something?

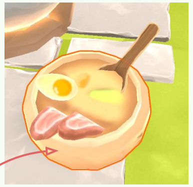
Yes, in the Map scene (demo) with producible units, players can use raw materials to produce new goods. This is a common feature in many games and simulations, where players can gather resources and use them to create new items or upgrade existing ones.

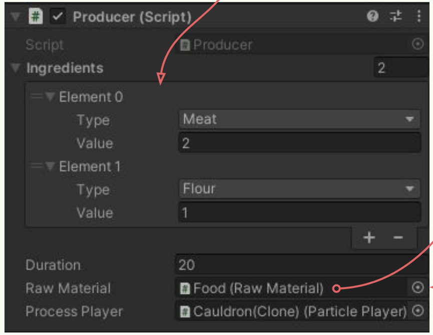


FLOUR
Remain: 0
Duration: 10s
Ingredients:
X 1



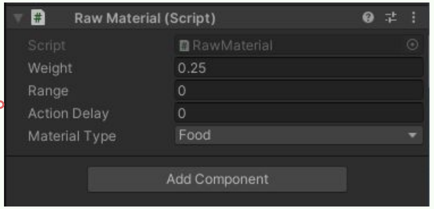
FOOD
Remain: 0
Duration: 20s
Ingredients:
X 2
X 1





Producer (Script)

Script	Producer
Ingredients	2
Element 0	
Type	Meat
Value	2
Element 1	
Type	Flour
Value	1
Duration	20
Raw Material	Food (Raw Material)
Process Player	Cauldron(Clone) (Particle Player)



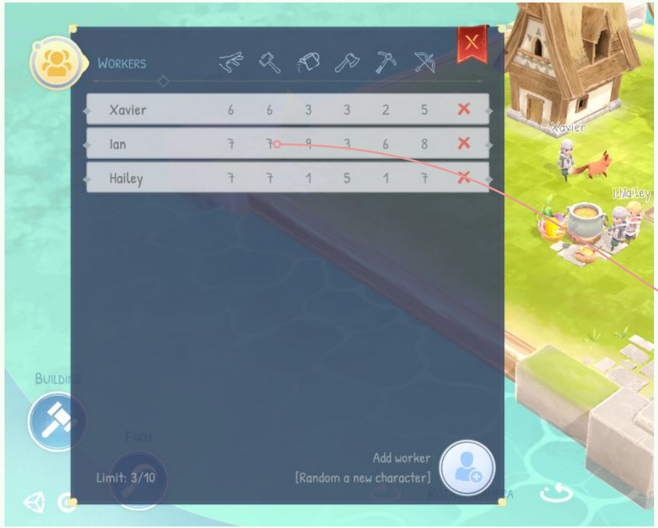
Raw Material (Script)

Script	RawMaterial
Weight	0.25
Range	0
Action Delay	0
Material Type	Food

Unit's commands

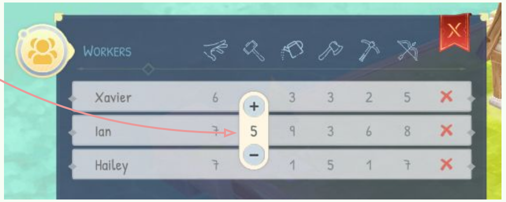
Worker manager

We can assign worker task by setting task priorities and selecting resource objects to toggle action command. In the Map scene (demo), there is a command function that allow workers to move and perform tasks with probabilities of those tasks.

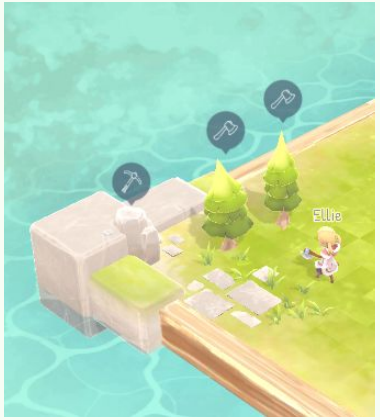


Xavier	6	6	3	3	2	5	✕
Ian	7	7	9	3	6	8	✕
Hailey	7	7	1	5	1	7	✕

* The worker manager can set task priorities and add new workers to the scene.



Xavier	6		3	3	2	5	✕
Ian	7	5	9	3	6	8	✕
Hailey	7		1	5	1	7	✕



* The command manager assigns available tasks for workers by toggling task symbols.