

Daydreaming about Cardboards

Virtual Reality in Android

- Please follow the slides at the given address.
- Wait some seconds to see if someone is writing down the address...

Audience

- Android programmer? 🤖
- VR programmer? 🤖
 - 🔑: headless CMS: contentful.com
 - 🐦: [@MarioBodemann](https://twitter.com/MarioBodemann)
 - 📄: bit.ly/mbvrberlin
 - Please interrupt 🚫 🗑 !

Agenda

The slide features a central collage of nine white rectangular boxes, each containing a different VR-related topic or resource. The background is composed of a grid of colored pixels in shades of green, blue, and grey.

- Daydreaming about Cardboards**
Virtual Reality in Android
- contentful**
 - headless CMS: contentful.com
 - @[MarioBodemann](https://twitter.com/MarioBodemann)
 - bit.ly/mvrbberlin
 - Please interrupt 🙏!
- Google Cardboard**
 - easy to produce
 - available from different companies
 - in different styles/interactions
 - You just need a phone™
- How does Cardboard work?**
 - use 3D data and movement to draw two images
 - one for the left and right eye
 - contains Lenses to move things away
 - brain combines image to 3D scene
- How do I write a Unity App?**
Google Daydream Technical Preview
 - special preview build from unity
 - Out of the box, basic functionality

or Google VR Plugin
 - Installer for Unity on + (or)
 - Plugin gives full controller support and more
- Google Daydream Technical Preview**
 - special preview build from unity
 - Out of the box, basic functionality

or Google VR Plugin
 - Installer for Unity on + (or)
 - Plugin gives full controller support and more
- Daydream**
- Daydream SDK features**
 - Same as Cardboard SDK
 - Controlling the controller
 - orientation/acceleration
 - input (Clickpad: xy, clicked, App Button, Vol+/-)
 - spatial audio engine



Cardboard

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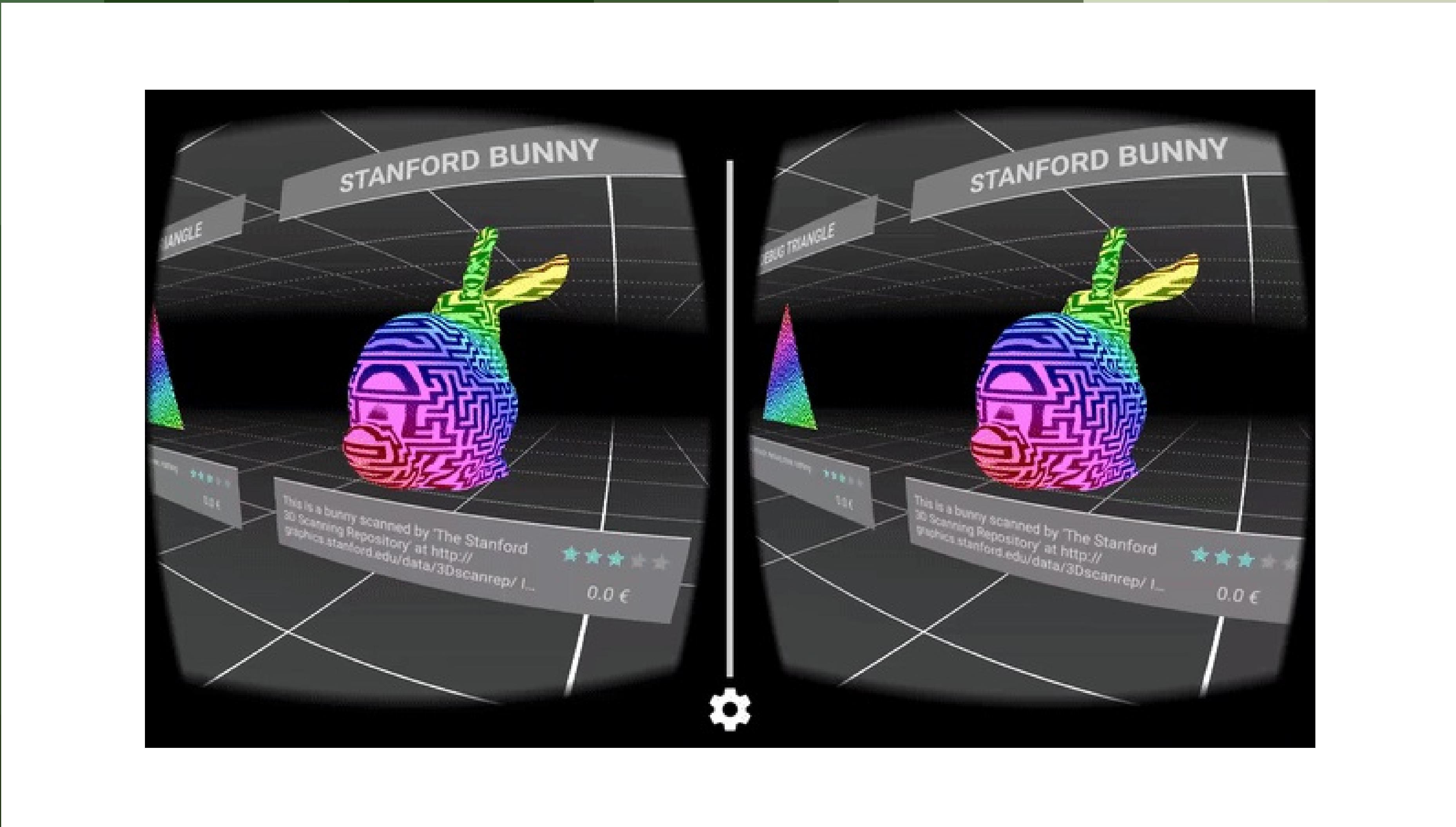
Google Cardboard

- easy to produce
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- in different styles/interactions
- You just need a phone™



How does Cardboard work?

- use 3D data and movement to draw two images
 - one for the left and right eye
- contains Lenses to move things away
- brain combines image to 3D scene



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How do you program for it?

Googles SDK are available for

- Android (OpenGL)
- iOS (Objective C)
- Unreal Engine (NEW)
- Unity Engine (C# /JS) x ( , G,  , )

What do those SDKs provide?

- lens distortion correction
- spatial audio
- head tracking
- 3D calibration
- side-by-side rendering

What else do they provide?

- stereo geometry configuration
- user input event handling
- see <https://vr.google.com/developers/>

How do I write a Unity App?

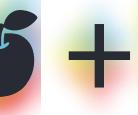


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Google Daydream Technical Preview

- special preview build from unity
- Out of the box, basic functionality

or Google VR Plugin

- Installer for Unity on  +  (or 

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Create a new Project

The screenshot shows a user interface for creating a new project. At the top, there is a navigation bar with the title "Home" and a close button "x". Below the navigation bar, there are two tabs: "Projects" (which is underlined) and "Getting started". On the right side of the header, there are three icons: a plus sign labeled "NEW", an upward arrow labeled "OPEN", and a user profile icon labeled "MY ACCOUNT". The main content area features a large, centered text "Create a project" above a blue button labeled "New project".

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Name it

Home

Projects Getting started

[+ NEW](#) [OPEN](#) [MY ACCOUNT](#)

Project name*
Cardboard Sample

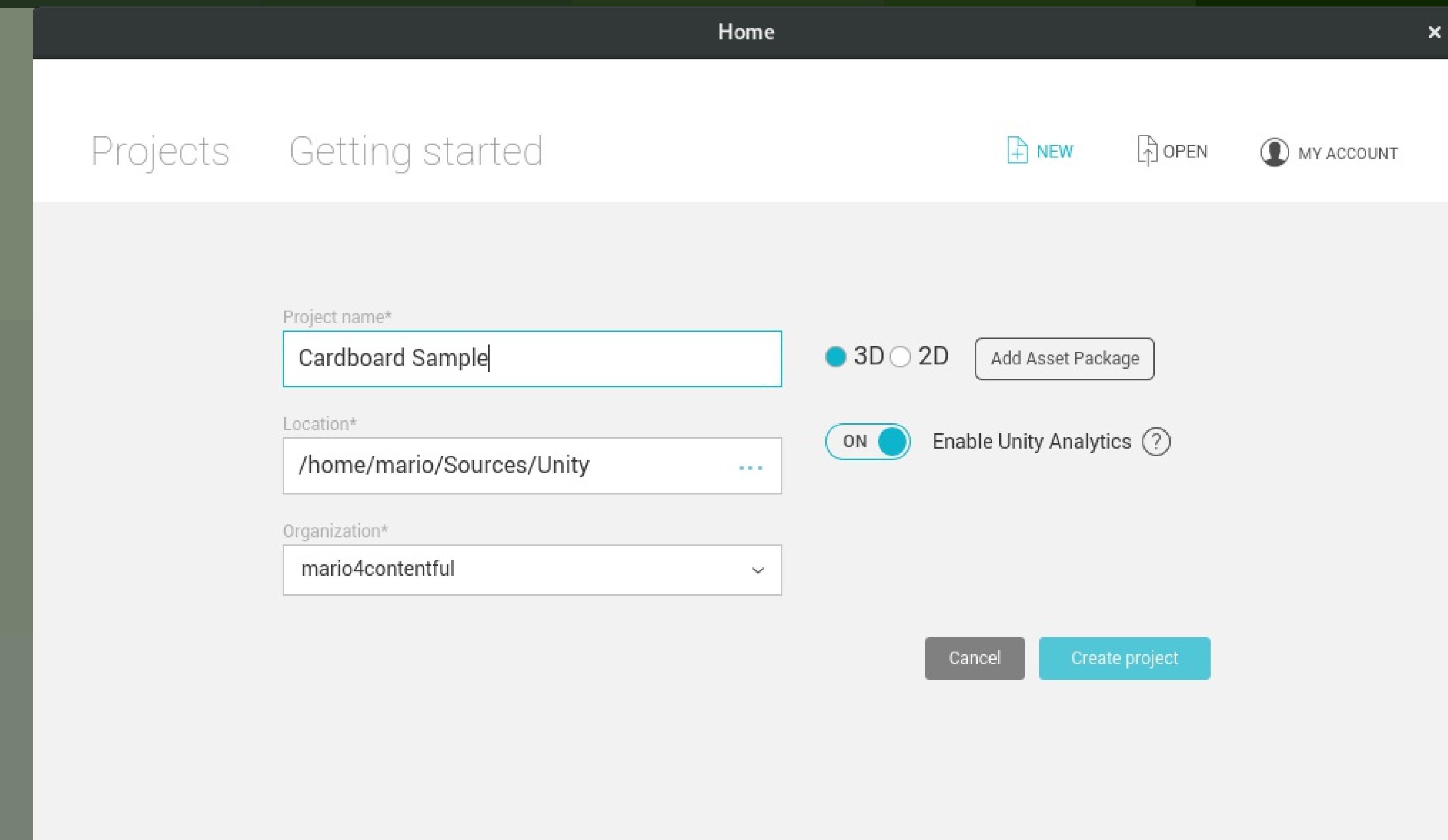
3D 2D [Add Asset Package](#)

Location*
/home/mario/Sources/Unity

[ON](#) [Enable Unity Analytics](#)

Organization*
mario4contentful

[Cancel](#) [Create project](#)



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File Edit Assets GameObject Component Help Window



Cloud Account Layers Layout

Hierarchy

Create (Q) All

Untitled

Main Camera
Directional Light

See it



Project

Create (Q)

Console

Favorites

- All Materials
- All Models
- All Prefabs
- All Scripts

Assets

This folder is empty

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SERVICES

Unity provides you a suite of integrated services for creating games, increasing productivity and managing your audience.

SERVICES MEMBERS AGE DESIGNATION SETTINGS

Collaborate

Create together seamlessly

OFF

In-App Purchasing

Simplify cross-platform IAP

OFF

Ads

Monetize your games

OFF

Multiplayer

Easily implement multiplayer

ON

Analytics

Discover player insights

ON

Performance Reporting

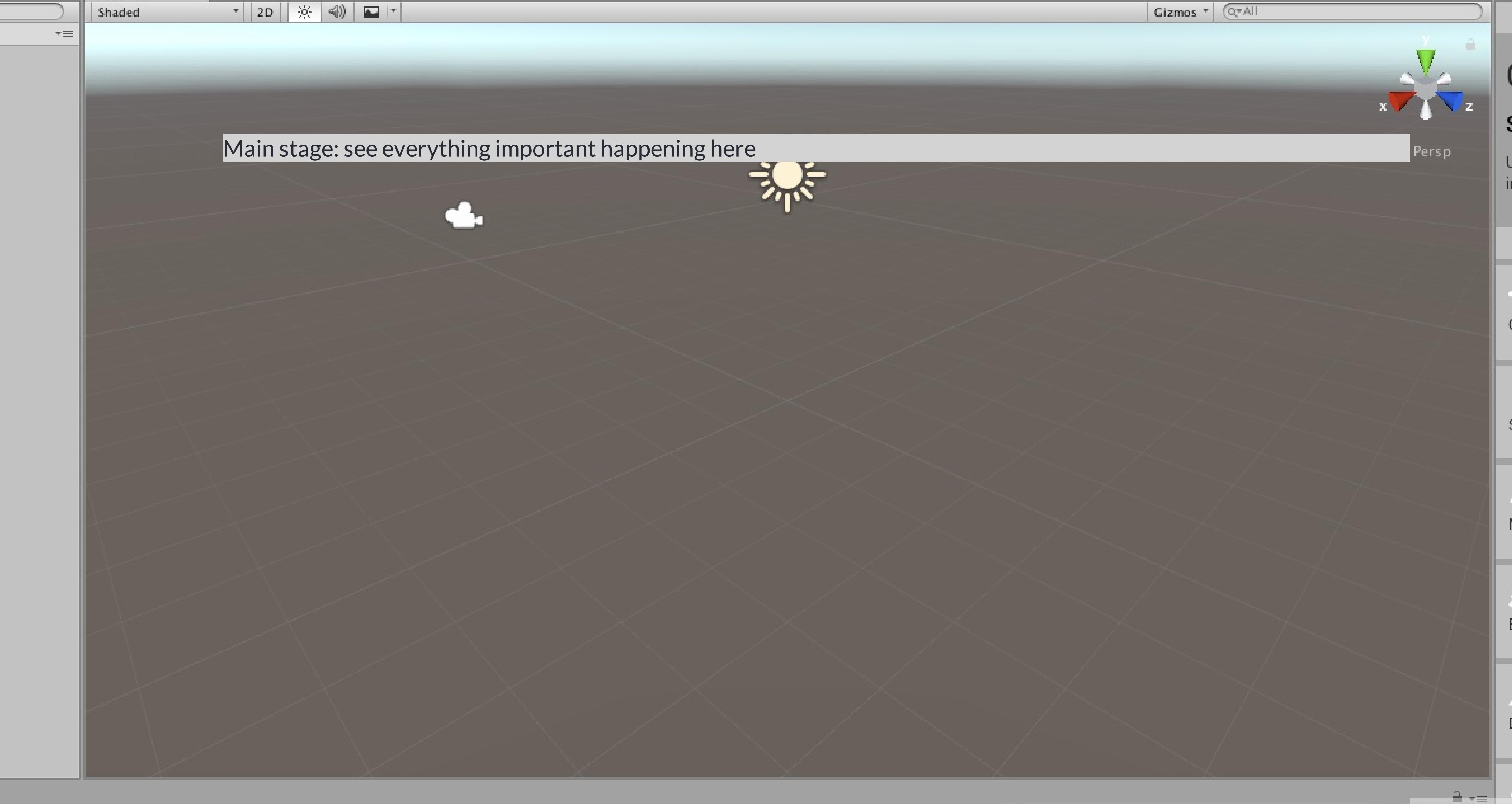
Discover app errors

OFF

Cloud Build

Build games faster

OFF



Cardboa

SERVICES

Unity provides you
increasing productivit

SERVICES

 Collaboration
Create together se

 In-App Purchases
Simplify cross-plat

 Ads
Monetize your game

 Multiplayer
Easily implement m

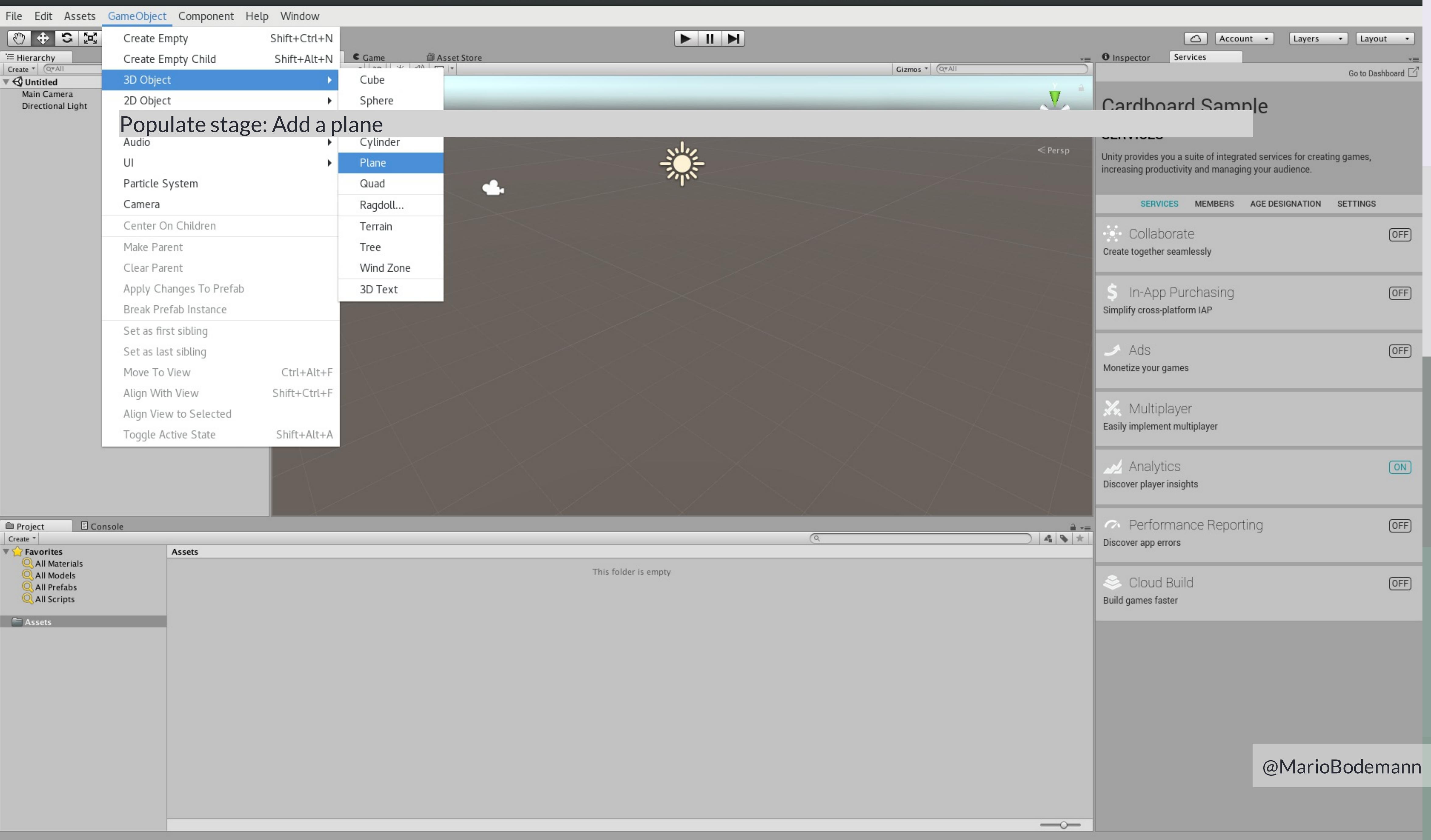
 Analytics
Discover player ins

 Performance

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This folder is empty

 Cloud Bu





Create Empty

Shift+Ctrl+N

Menu > GameObject > 3D Object > Plane

Create Empty Child

Shift+Alt+N

3D Object

2D Object

Light

Audio

UI

Particle System

Camera

Center On Children

Make Parent

Clear Parent

Game

Asset Store

Cube

Sphere

Capsule

Cylinder

Plane

Quad

Ragdoll...

Terrain

Tree

Wind Zone



File Edit Assets GameObject Component Help Window



Center Local



Cloud Account Layers Layout

Hierarchy
Create (Q>All)
Untitled*
Main Camera
Directional Light
Plane

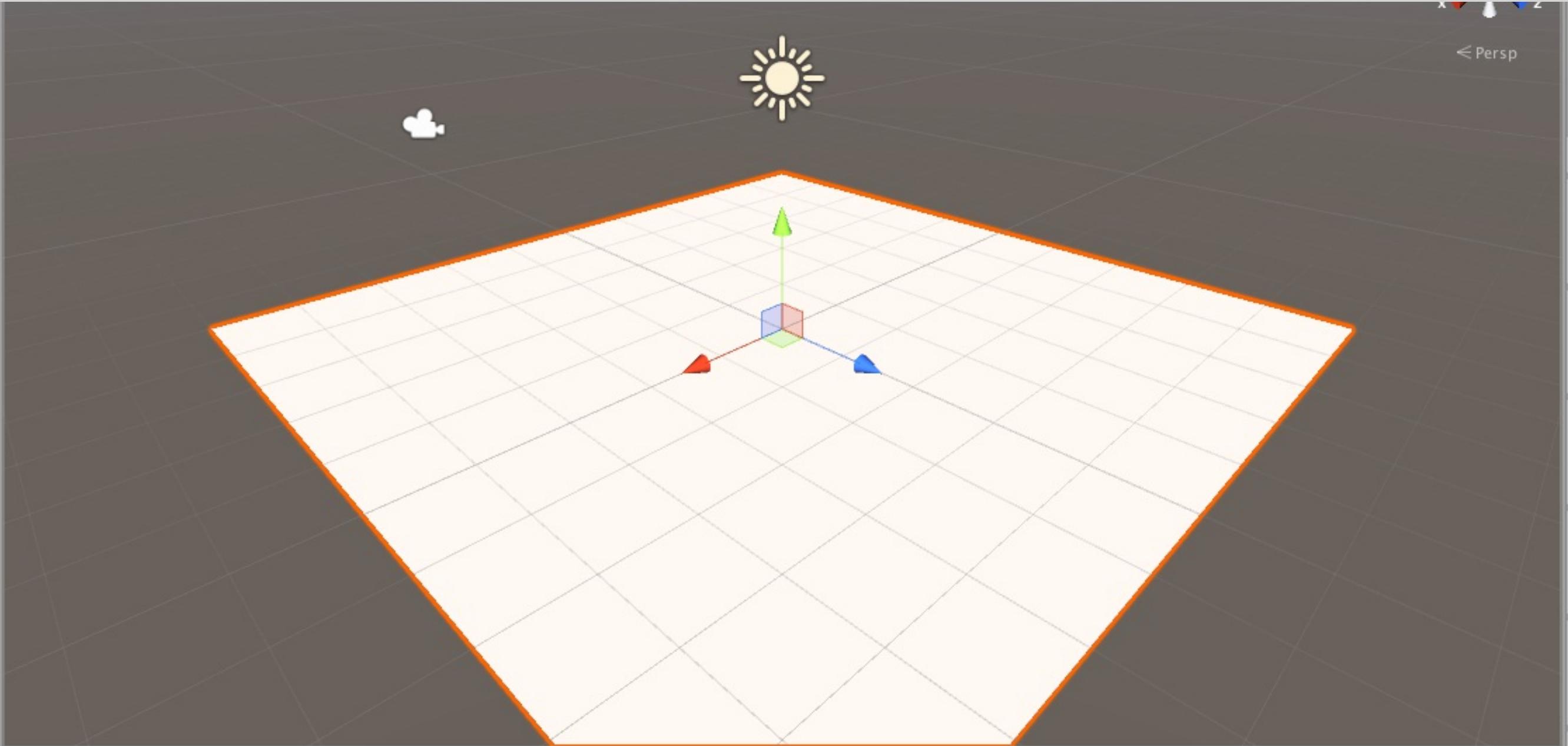
Scene Game Asset Store

Gizmos (Q>All)

Inspector Services

Go to Dashboard

Show GameObject Plane



SERVICES

Unity provides you a suite of integrated services for creating games, increasing productivity and managing your audience.

SERVICES MEMBERS AGE DESIGNATION SETTINGS

Collaborate Create together seamlessly

In-App Purchasing Simplify cross-platform IAP

Ads Monetize your games

Multiplayer Easily implement multiplayer

Analytics Discover player insights

Performance Reporting Discover app errors

Cloud Build Build games faster

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Project Console

Create

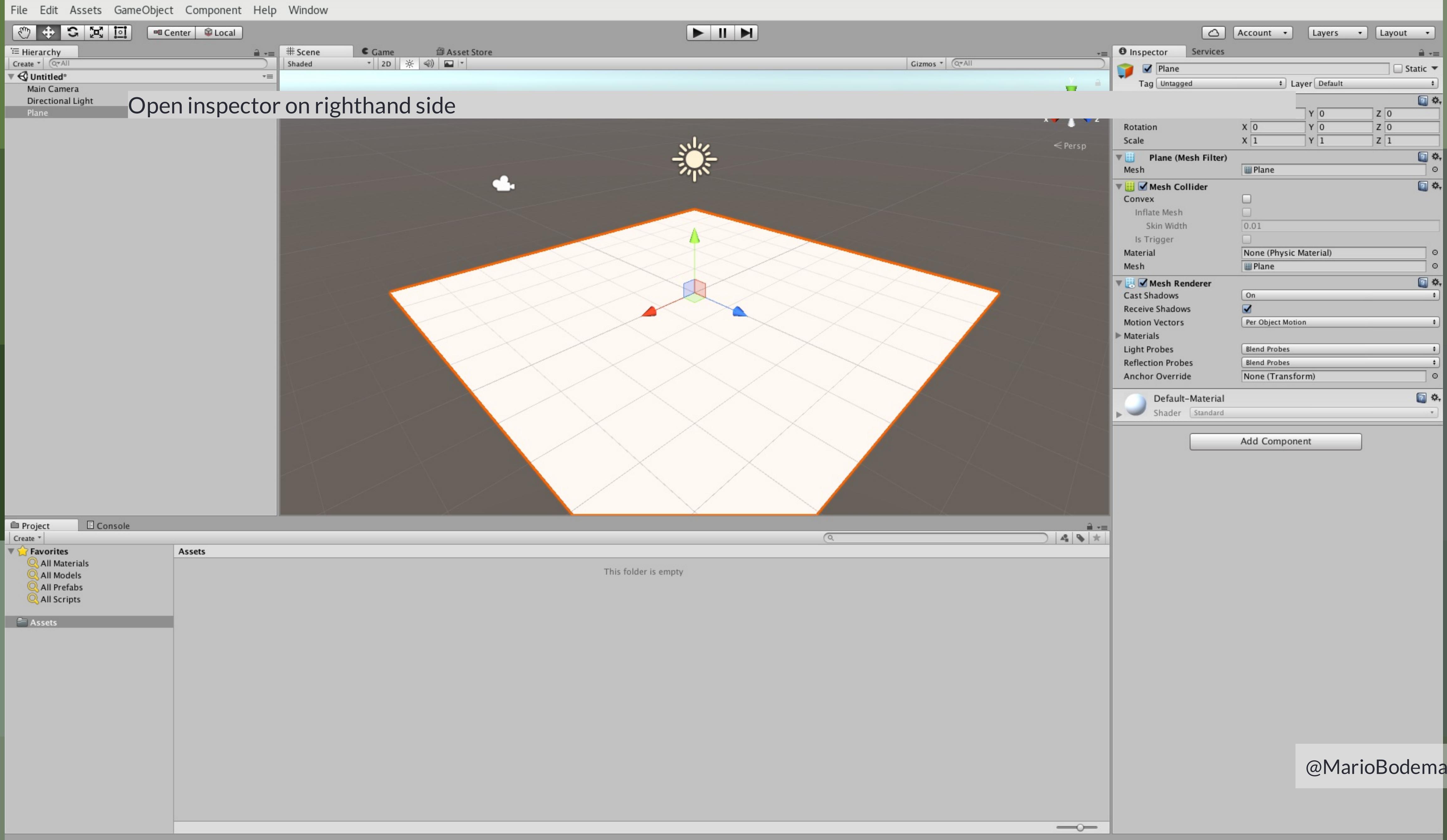
Favorites

- All Materials
- All Models
- All Prefabs
- All Scripts

Assets

This folder is empty

Assets



Plane

Static

Tag Untagged Layer Default

Transform

Position X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

Plane (Mesh Filter)

Mesh Plane

Mesh Collider

Convex

Inflate Mesh

Skin Width 0.01

Is Trigger

Material None (Physic Material)

Mesh Plane

Mesh Renderer

Cast Shadows On

Receive Shadows

Motion Vectors Per Object Motion

Materials

Light Probes Blend Probes

Reflection Probes Blend Probes

Anchor Override None (Transform)

Default-Material

Shader Standard

Search for Inspector > Transform > Scale

< Persp

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File Edit Assets GameObject Component Help Window



Center Local



Cloud Account Layers Layout

Hierarchy

Create Q All

Untitled*

Main Camera

Directional Light

Plane

- See size changed to be screen filling.
- Let's make it more exciting > more objects!

Scene Game Asset Store

Shaded 2D



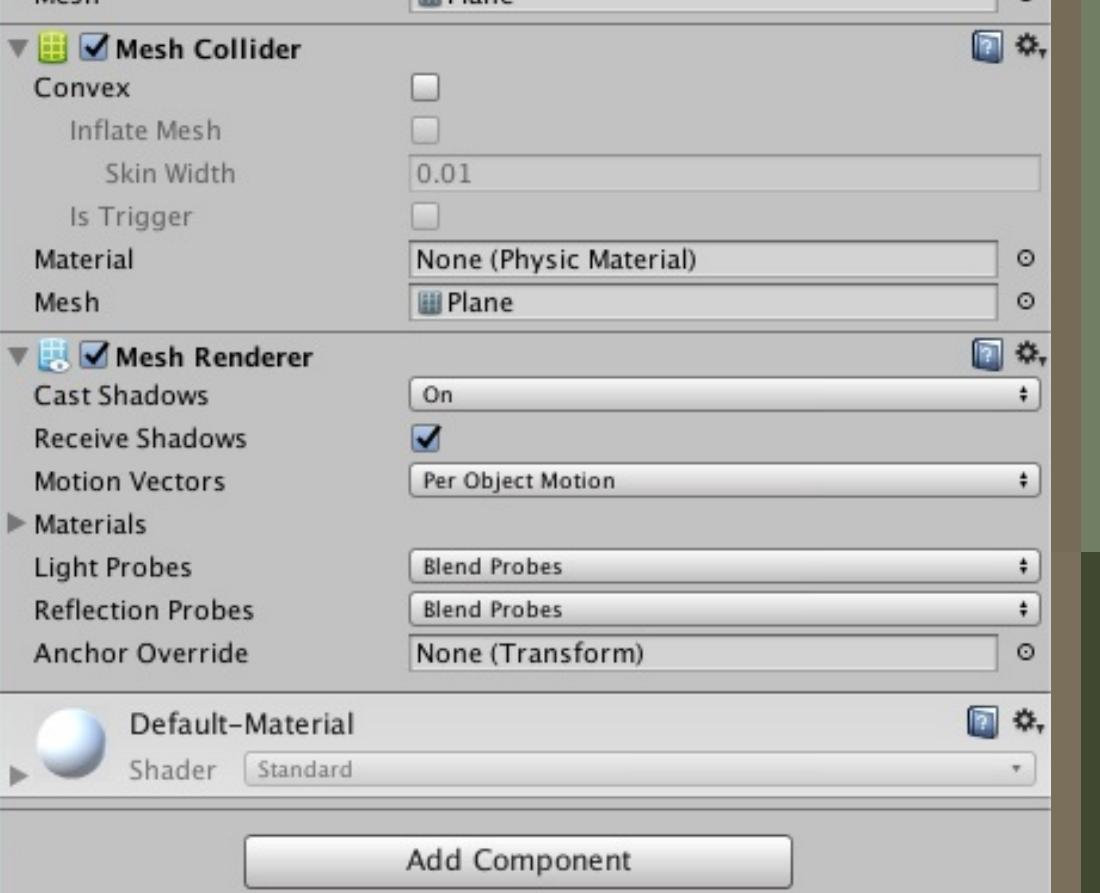
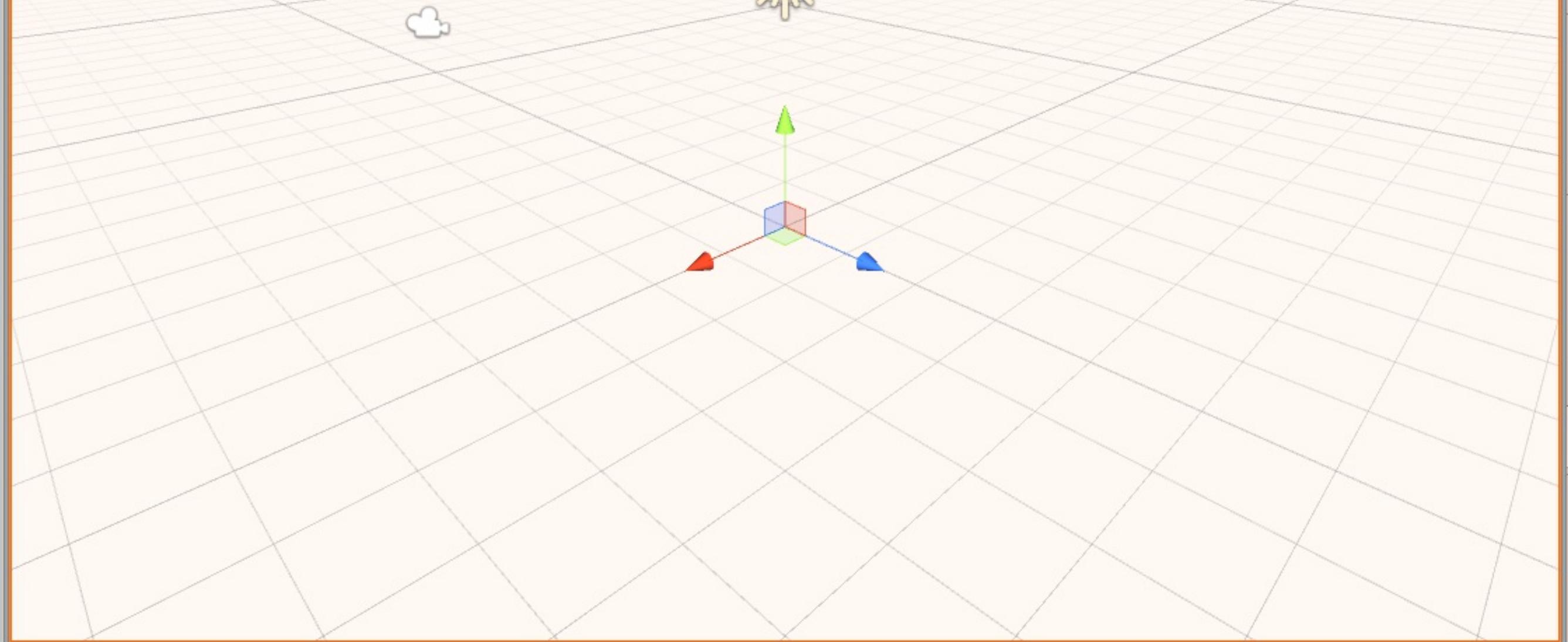
Inspector Services

Plane

Tag Untagged

Layer Default

Y	0	Z	0
Y	0	Z	0
Y	1	Z	10



Project Console

Create

Favorites

All Materials

All Models

All Prefabs

All Scripts

Assets

This folder is empty

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File Edit Assets **GameObject** Component Help Window

Create Empty Shift+Ctrl+N
Create Empty Child Shift+Alt+N
3D Object Cube

Let's add more objects

Capsule
Cylinder
Plane
Quad
Ragdoll...
Terrain
Tree
Wind Zone
3D Text

Light
Audio
UI
Particle System
Camera
Center On Children
Make Parent
Clear Parent
Apply Changes To Prefab
Break Prefab Instance
Set as first sibling
Set as last sibling
Move To View Ctrl+Alt+F
Align With View Shift+Ctrl+F
Align View to Selected
Toggle Active State Shift+Alt+A

Rotation X 0 Y 0 Z 0
Scale X 10 Y 1 Z 10

Plane (Mesh Filter)
Mesh Plane

Mesh Collider
Convex
Inflate Mesh
Skin Width 0.01
Is Trigger
Material None (Physic Material)
Mesh Plane

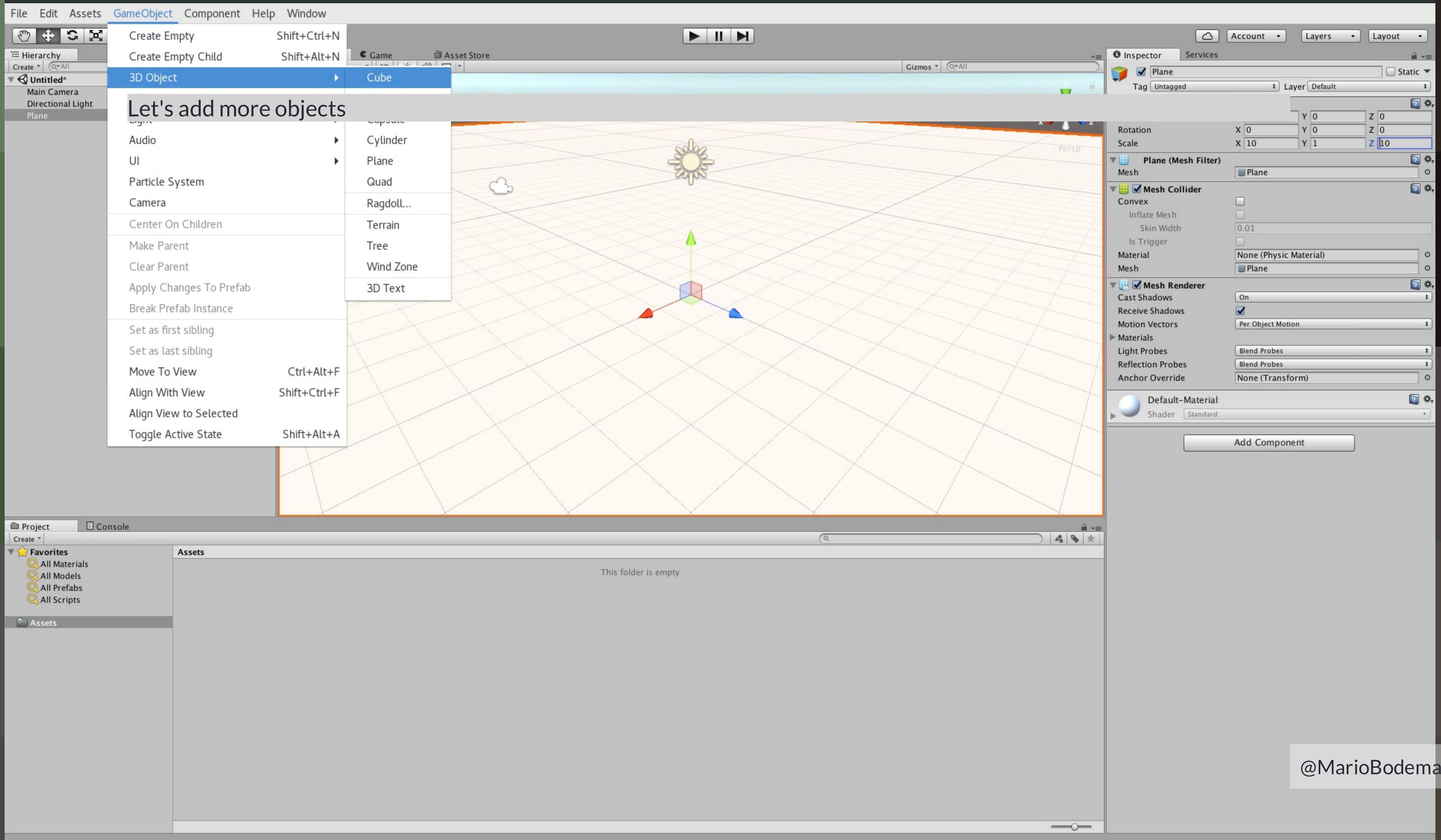
Mesh Renderer
Cast Shadows On
Receive Shadows
Motion Vectors Per Object Motion
Materials
Light Probes Blend Probes
Reflection Probes Blend Probes
Anchor Override None (Transform)
Default-Material
Shader Standard

Add Component

Project Console

Favorites
All Materials
All Models
All Prefabs
All Scripts

Assets This folder is empty



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File Edit Assets GameObject Component Help Window



A Cube appears



Cloud Account Layers Layout

Hierarchy

Create Untitled*
Main Camera
Directional Light
Plane
Cube

Scene Game Asset Store

Shaded 2D 3D Gizmos

Gizmos

All

Persp

Edit

Game

Asset Store

File Edit Assets GameObject Component Help Window



Center Local



Cloud Account Layers Layout

Hierarchy

Create Q All

Untitled*

Main Camera

Directional Light

Plane

Cube

Move that cube.

Scene Game Asset Store

Shaded 2D 3D

Gizmos

Q All

Gizmos Q All

Inspector Services

Cube

Tag Untagged

Layer Default

Y 0.88 Z 0.11
X 0 Y 0 Z 0
X 1 Y 1 Z 1

Cube (Mesh Filter)

Mesh

Cube

Box Collider

Edit Collider

Is Trigger

Material

None (Physic Material)

Center X 0 Y 0 Z 0

Size X 1 Y 1 Z 1

Mesh Renderer

Cast Shadows

Receive Shadows

Motion Vectors

Materials

Light Probes

Reflection Probes

Anchor Override

Default-Material

Shader Standard

Add Component

Project Console

Create

Favorites

All Materials

All Models

All Prefabs

All Scripts

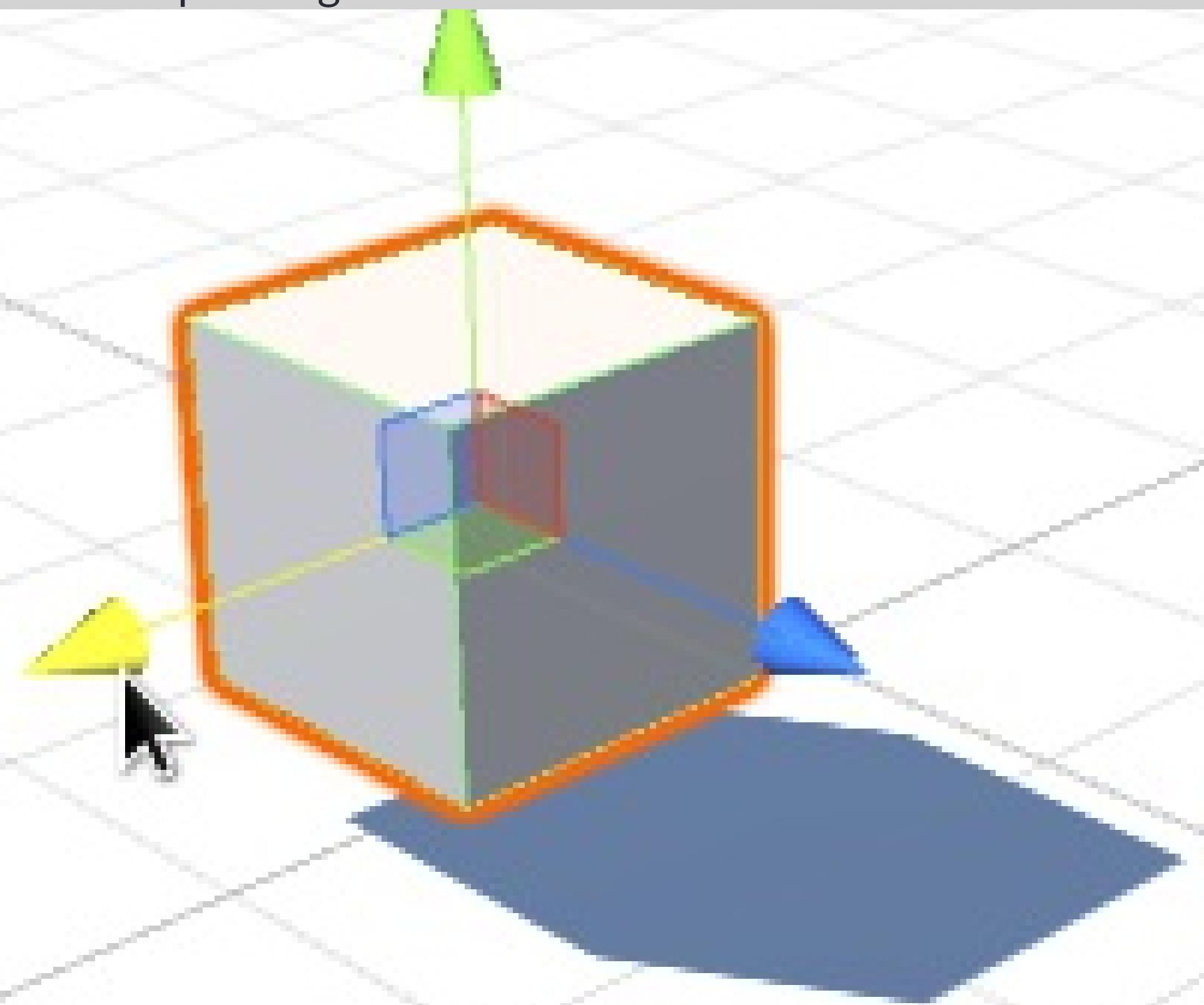
Assets

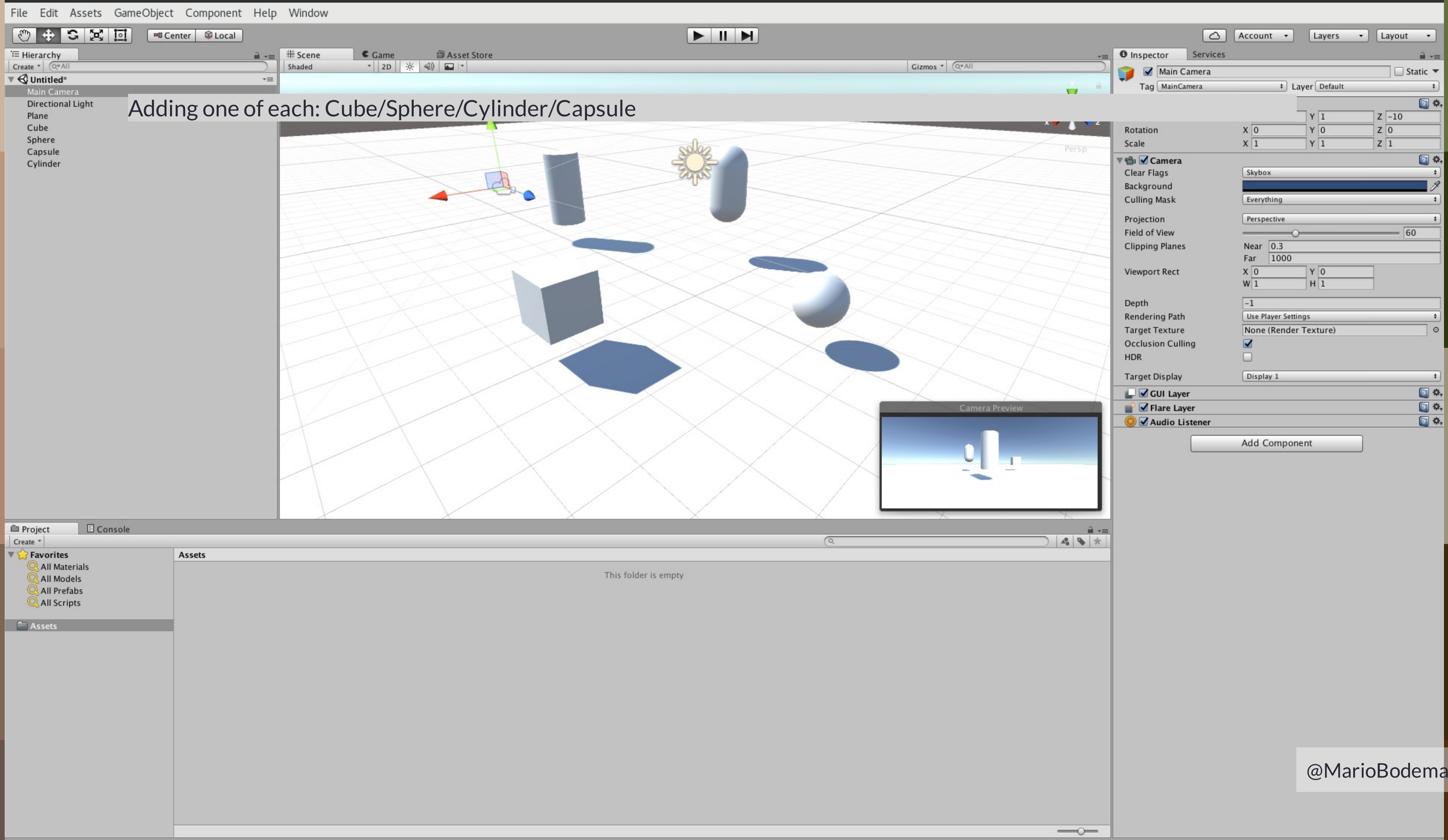
This folder is empty

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Take a look where the mouse cursor is pointing at.



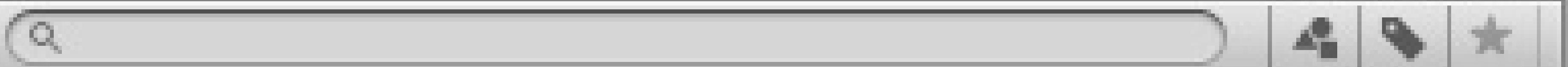
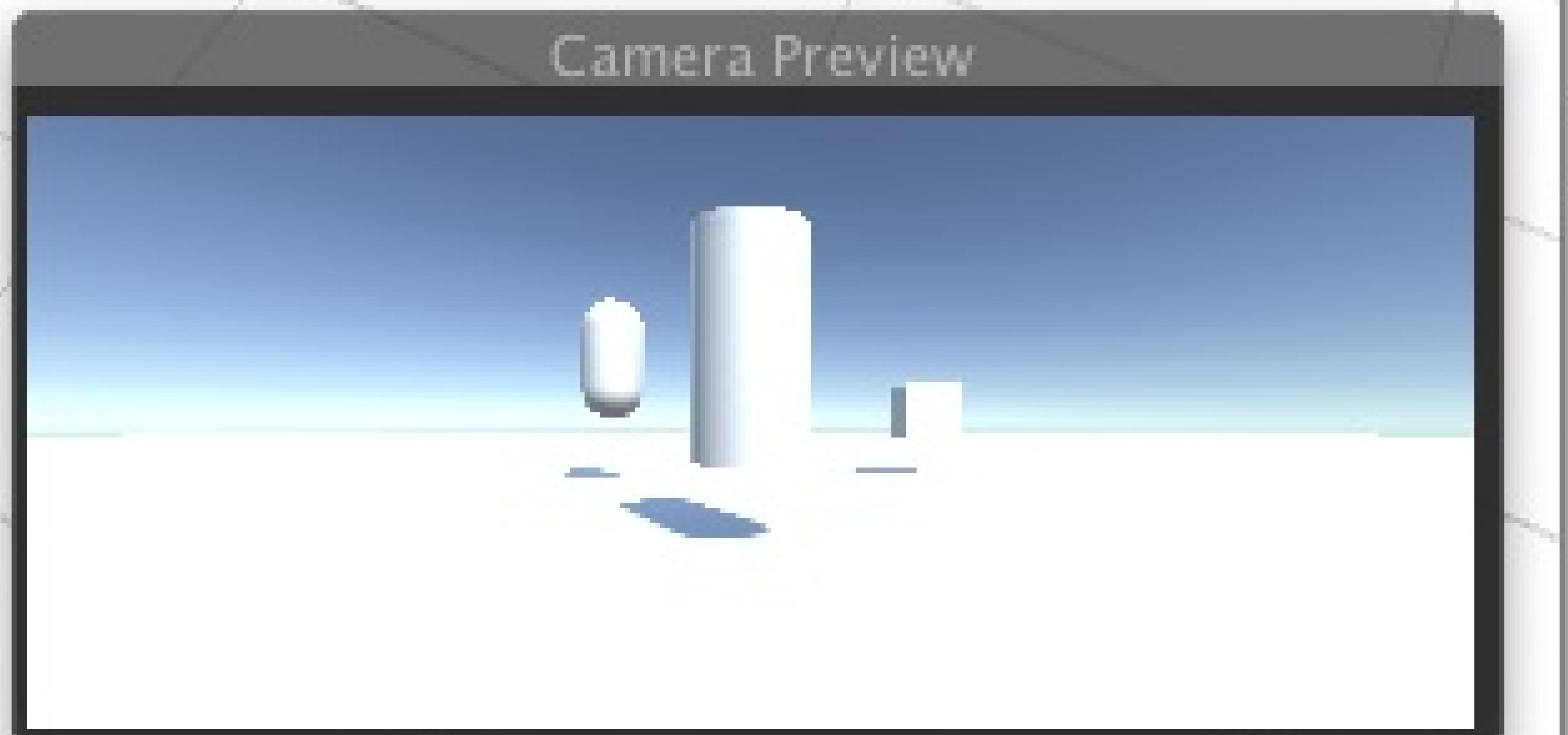


Occclusion Culling

HDR

Display

Take a look at the camera preview: It does not look too colourfull. Let's change that.

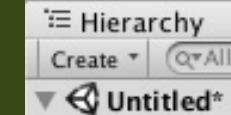


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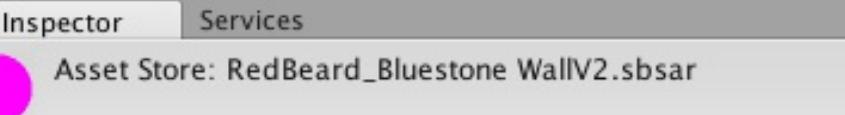
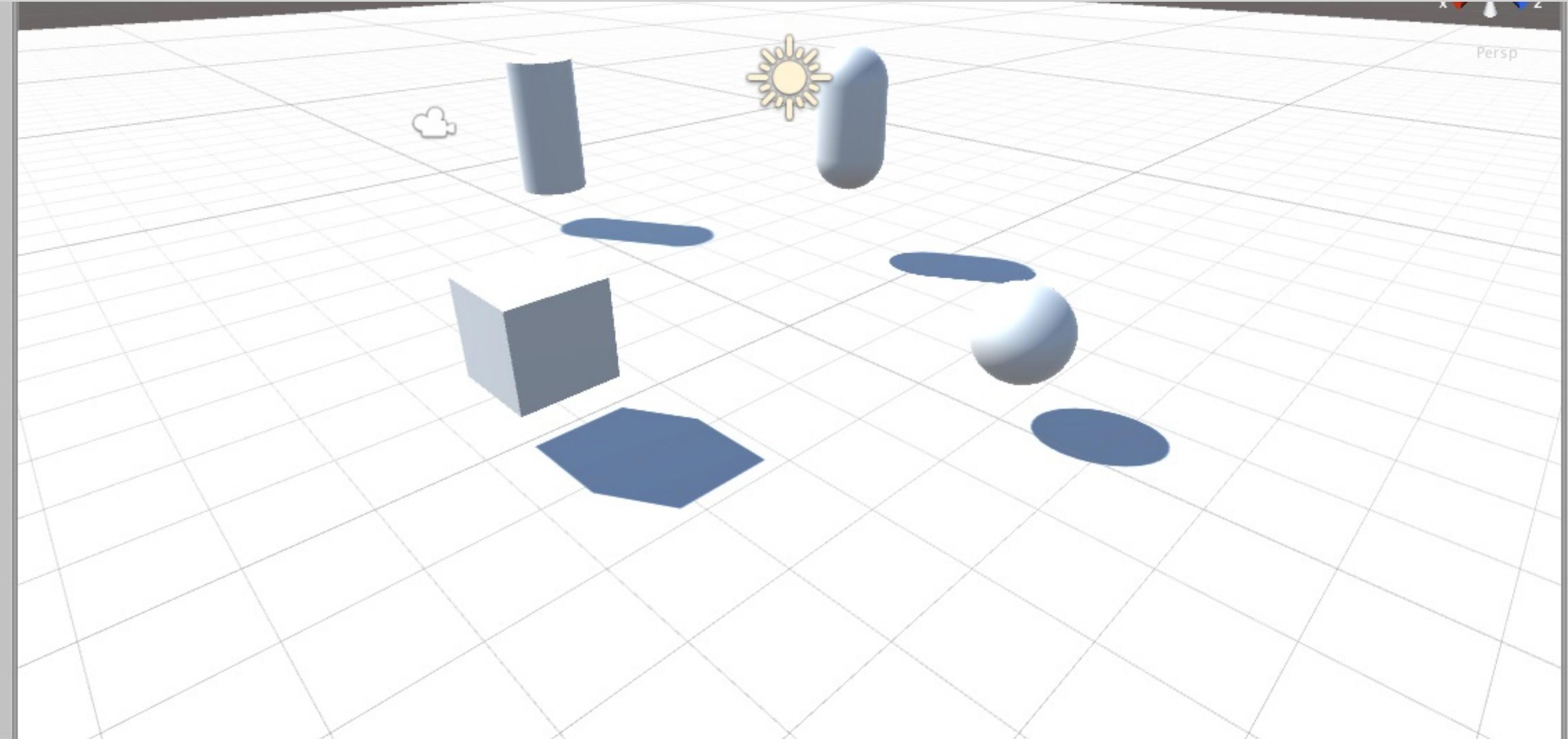
File Edit Assets GameObject Component Help Window



Cloud Account Layers Layout



Overview of next steps: Let's add materials.



Part of package	
Name	Free Material 5 Pack
Version	1.0
Price	free
Rating	5 of 5
Size	559.74 KB
Asset count	8
Web page	http://u3d.as/r9x
Publisher	Russ Denny

Import package Open Asset Store

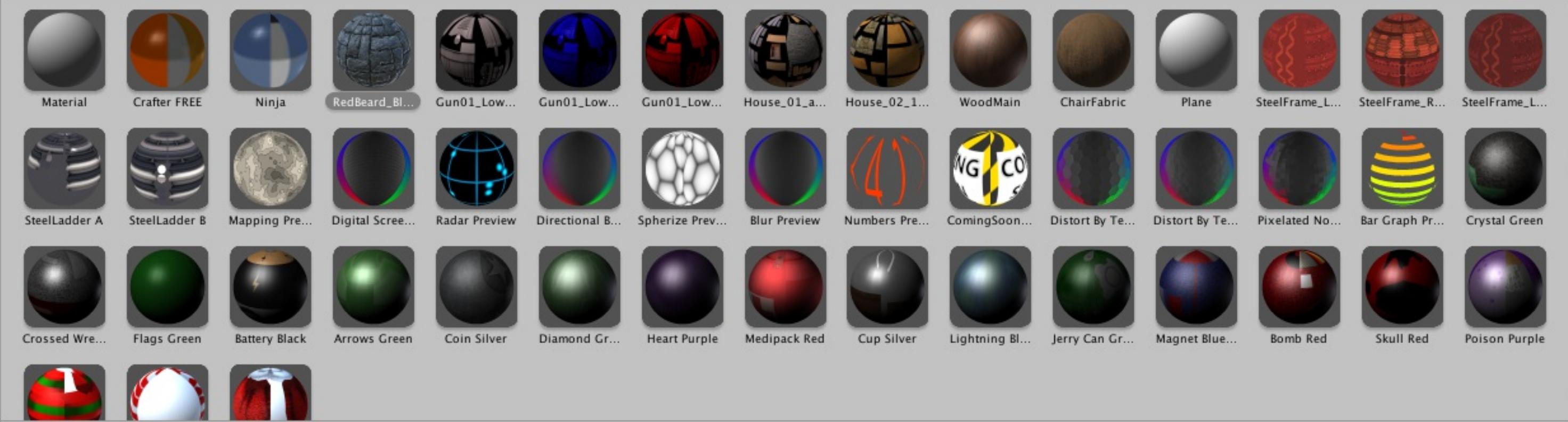
Project Console



Search: Assets Selected folder Asset Store: 999+ / 999+

t:Material

16184 Total



Click on Favorites\All Material

The screenshot shows the Unity Editor's Project Manager. At the top, there are tabs for "Project" and "Console". Below the tabs, a "Create" dropdown menu is visible. The main area is titled "Favorites" and contains four items: "All Materials", "All Models", "All Prefabs", and "All Scripts", each preceded by a magnifying glass icon. To the right of the favorites section, there is a search bar labeled "Search" and a partially visible "Free Assets" section. A large, semi-transparent watermark of a Mario head is overlaid on the bottom right. In the bottom right corner, there is a small white box containing the text "@MarioBodemann".

Project

Console

Create

Favorites

- All Materials
- All Models
- All Prefabs
- All Scripts

Assets

Search

Free Assets

Mario

@MarioBodemann

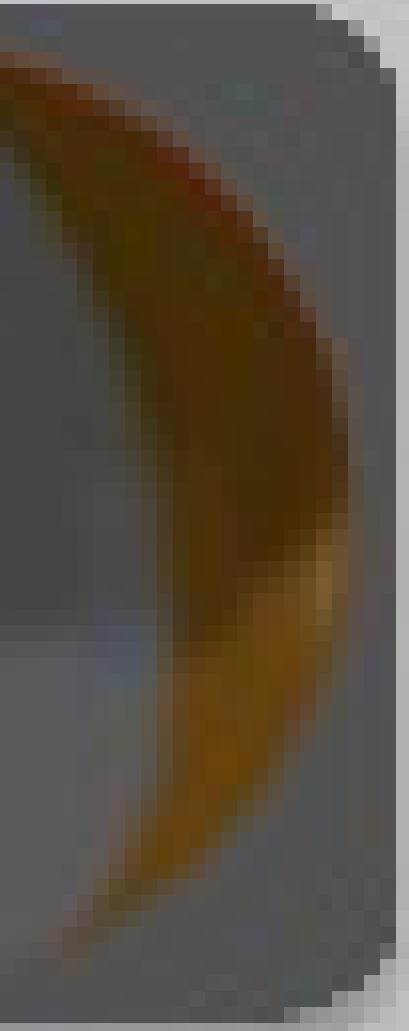
Click on Asset Store

ected folder

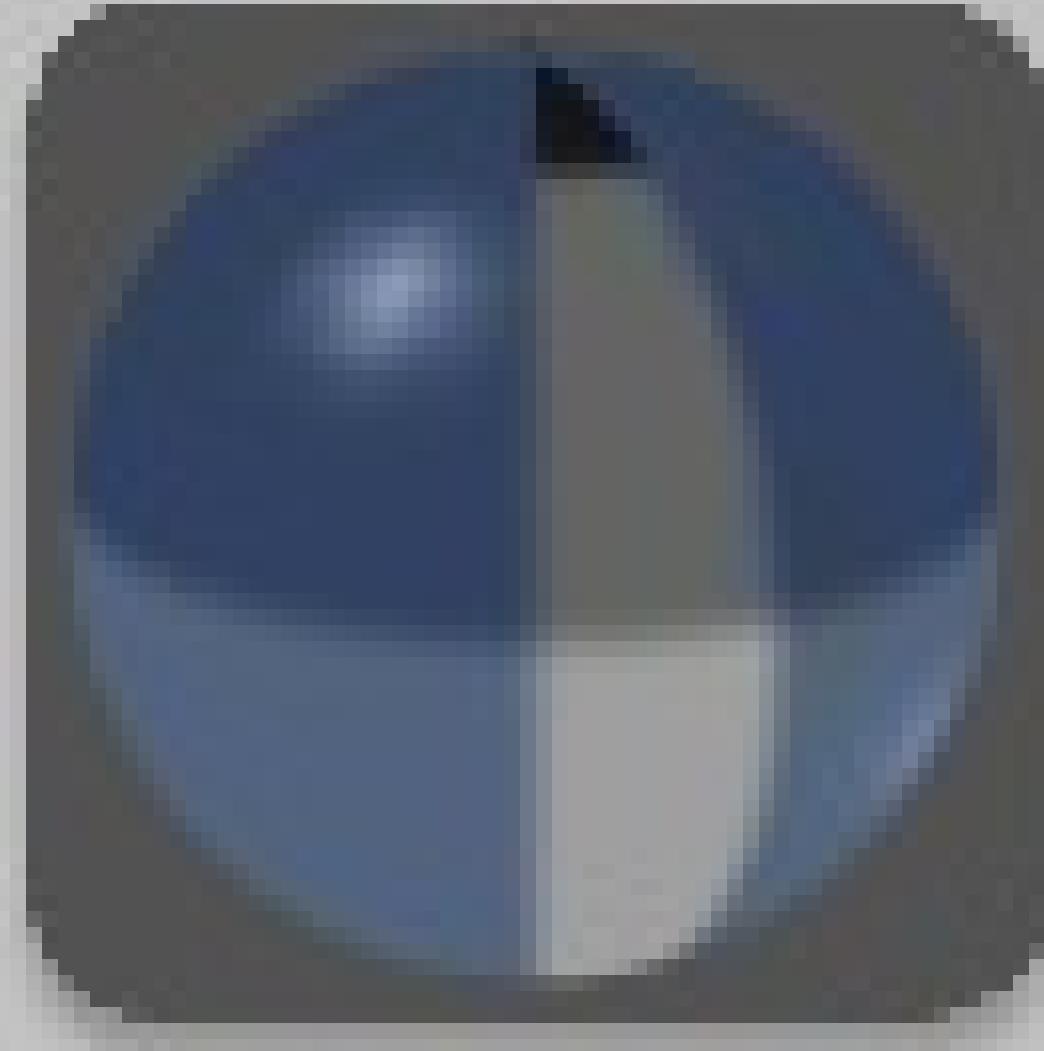
Asset Store: 999+ / 999+

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Click on an asset which is interesting/looks nice (RedBeard_Bluestone WallV2)



FREE



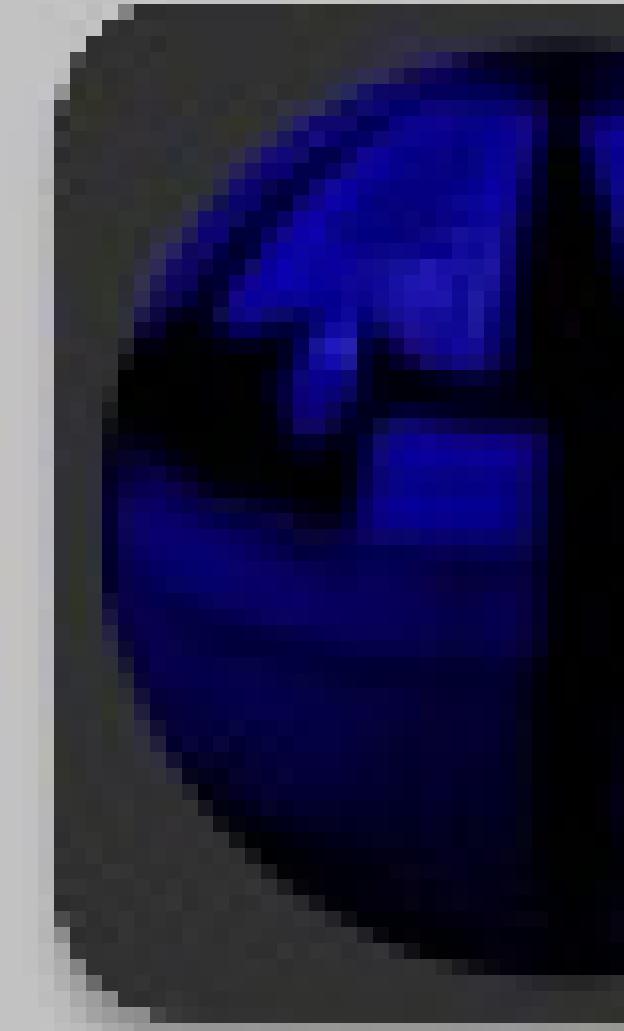
Ninja



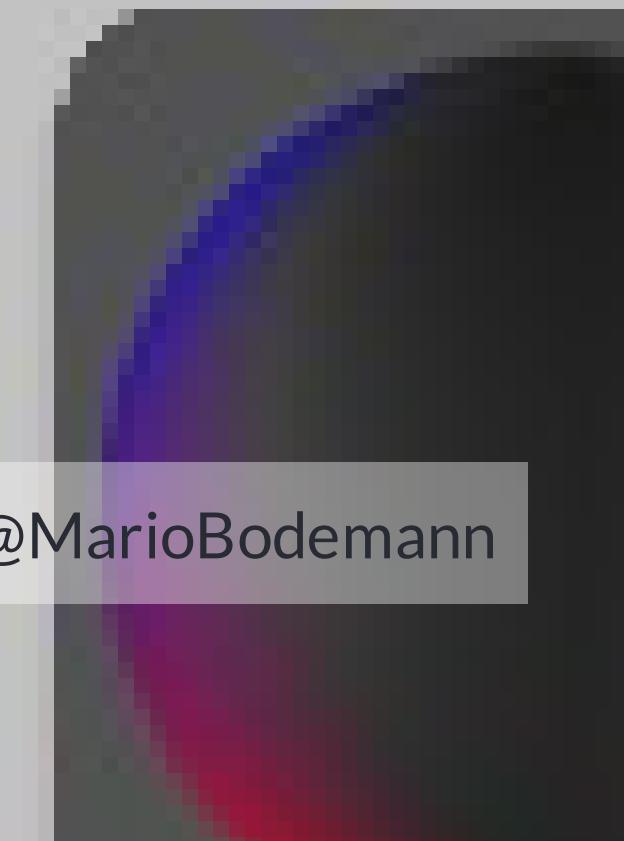
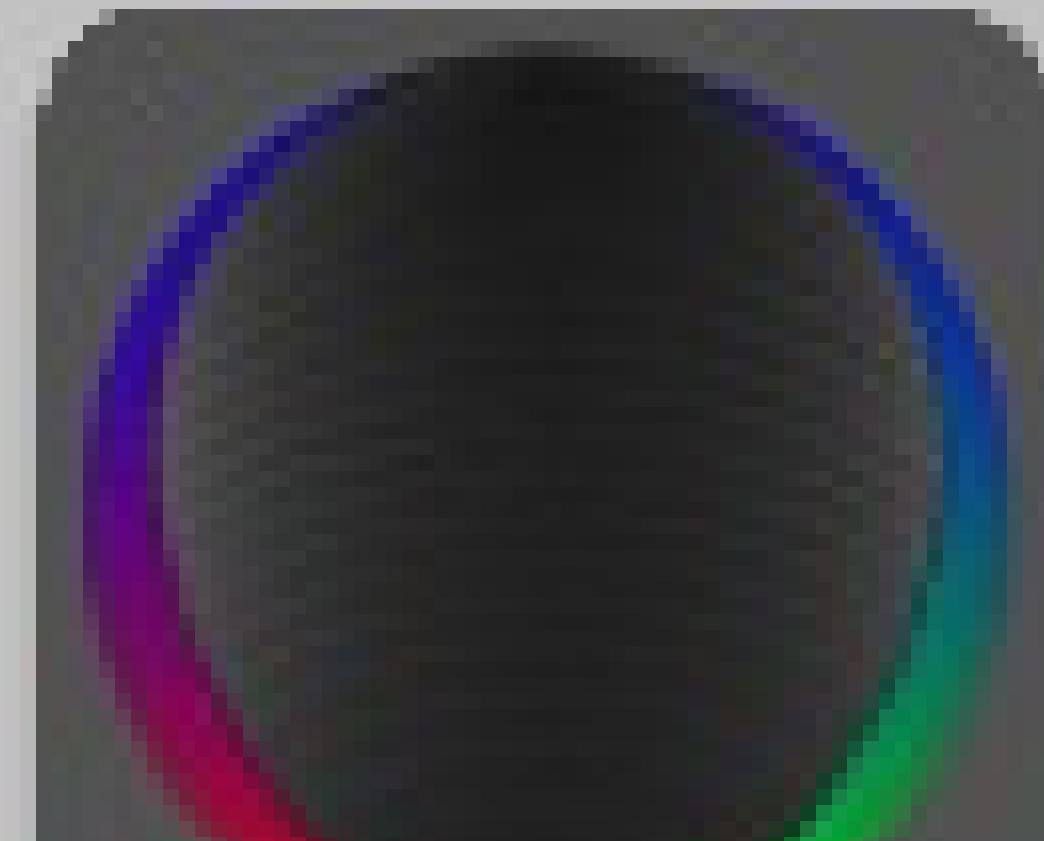
RedBeard_Bl...



Gun01_Low...



Gun01_Hi...



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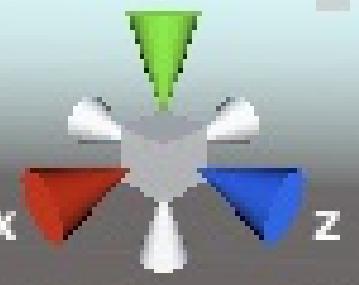
Account

Layers

Layout

- Check Asset count: Defines how many different materials are included. the more the nicer looking.
- Hit Import package.

Gizmos



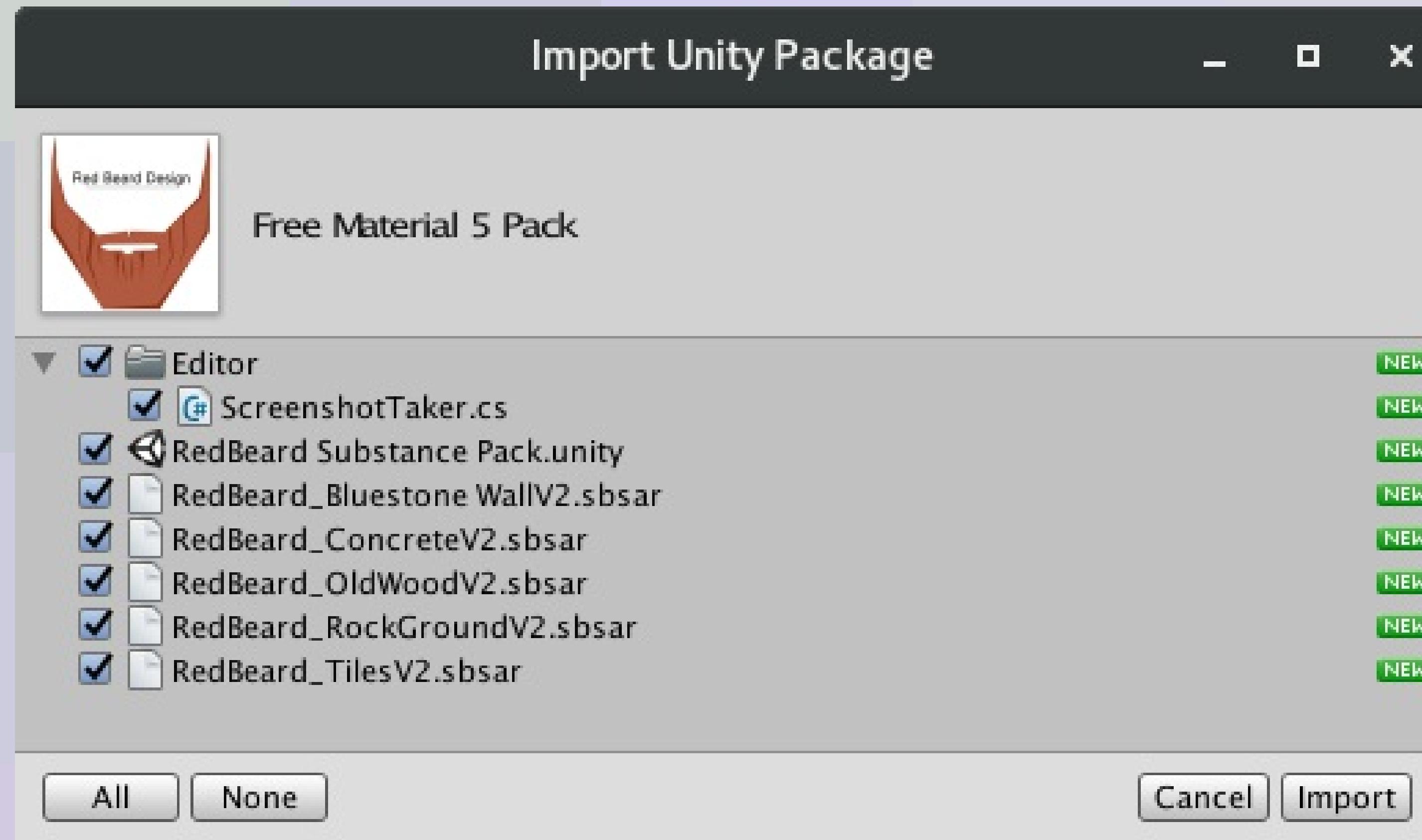
Persp

Type	ProceduralMaterial
▼ Part of package	
Name	Free Material 5 Pack
Version	1.0
Price	free
Rating	5 of 5
Size	559.74 KB
Asset count	8
Web page	http://u3d.as/r9x
Publisher	Russ Denny

Import package

Open Asset Store

Hit import after checking all checkmarks (should already be the case)



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File Edit Assets GameObject Component Help Tools Window



Scene Game Asset Store



Cloud Account Layers Layout

Hierarchy

Create Untitled*

Main Camera

Directional Light

Plane

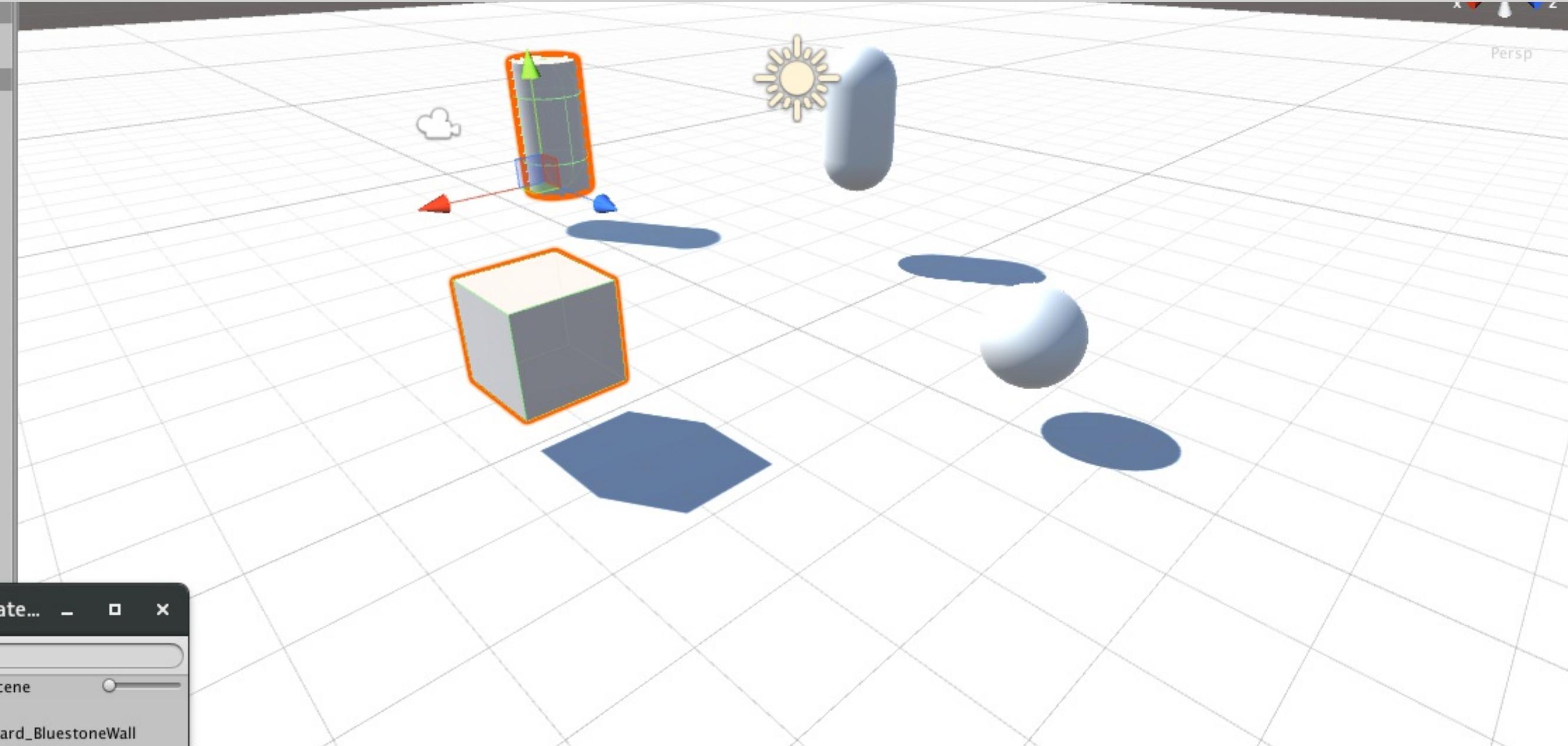
Cube

Sphere

Capsule

Cylinder

No change, we have to assign the material to different objects.



Inspector Services

Tag Untagged Layer Default

Rotation

Y

0

X

1

Z

0

Scale

X

1

Y

1

Z

1

Cylinder (Mesh Filter)

Mesh

Mesh Renderer

Cast Shadows

Receive Shadows

Motion Vectors

Materials

Size

1

Element 0

Default-Material

Light Probes

Blend Probes

Reflection Probes

Blend Probes

Anchor Override

None (Transform)

Default-Material

Shader Standard

Components that are only on some of the selected objects cannot be multi-edited.

Add Component

Select Mate...

Assets Scene

None

- RedBeard_BluestoneWall
- Redbeard_Concrete
- RedBeard_RockGround
- RedBeard_Tiles
- RedBeard_WoodWall

FrameDebuggerRenderTargetD

Default-Diffuse

Default-Material

Default-Particle

Default-Skybox

Sprites-Default

SpatialMappingOcclusion

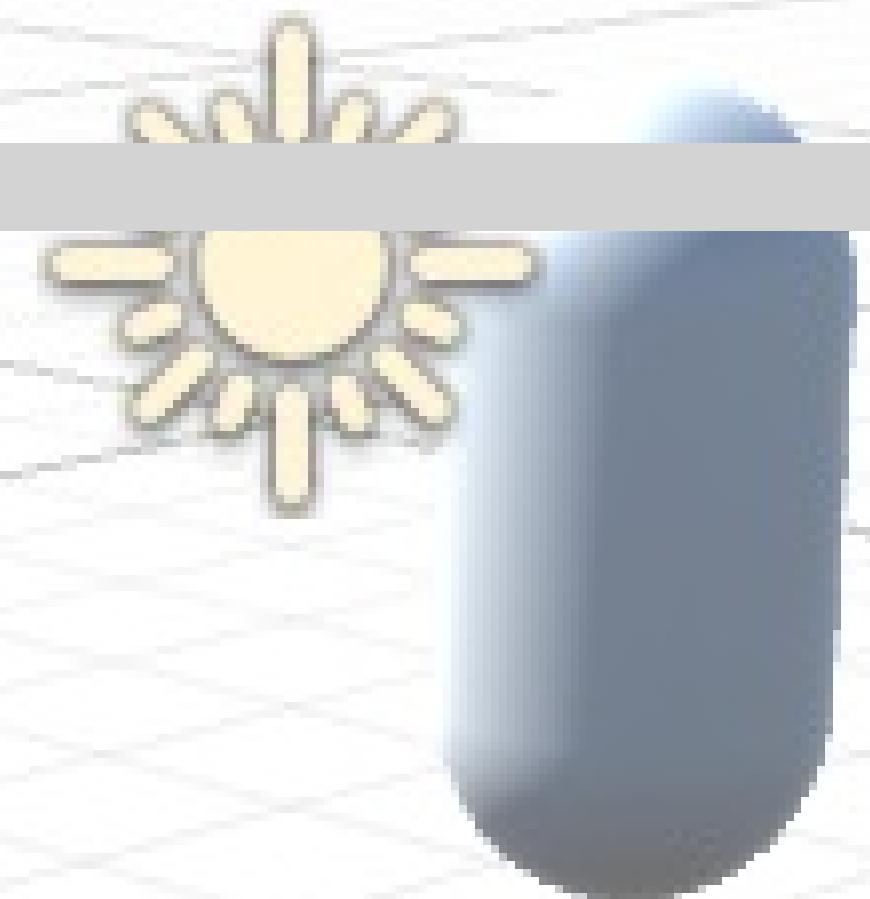
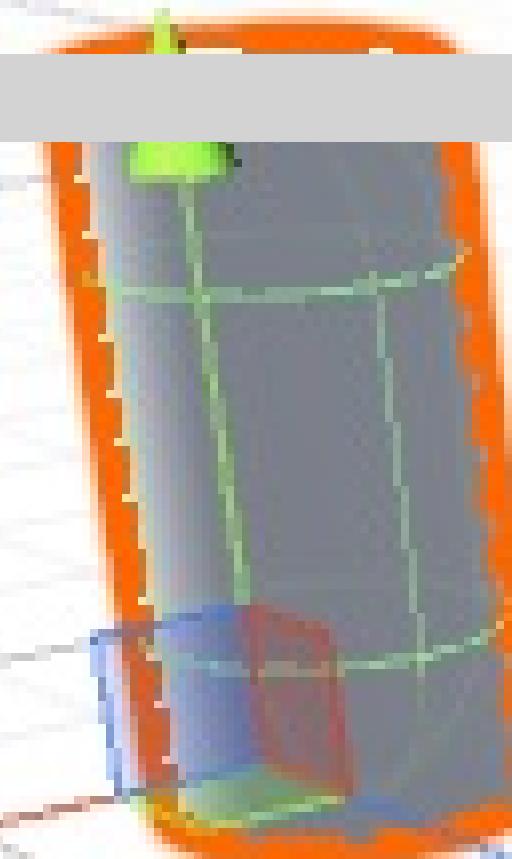
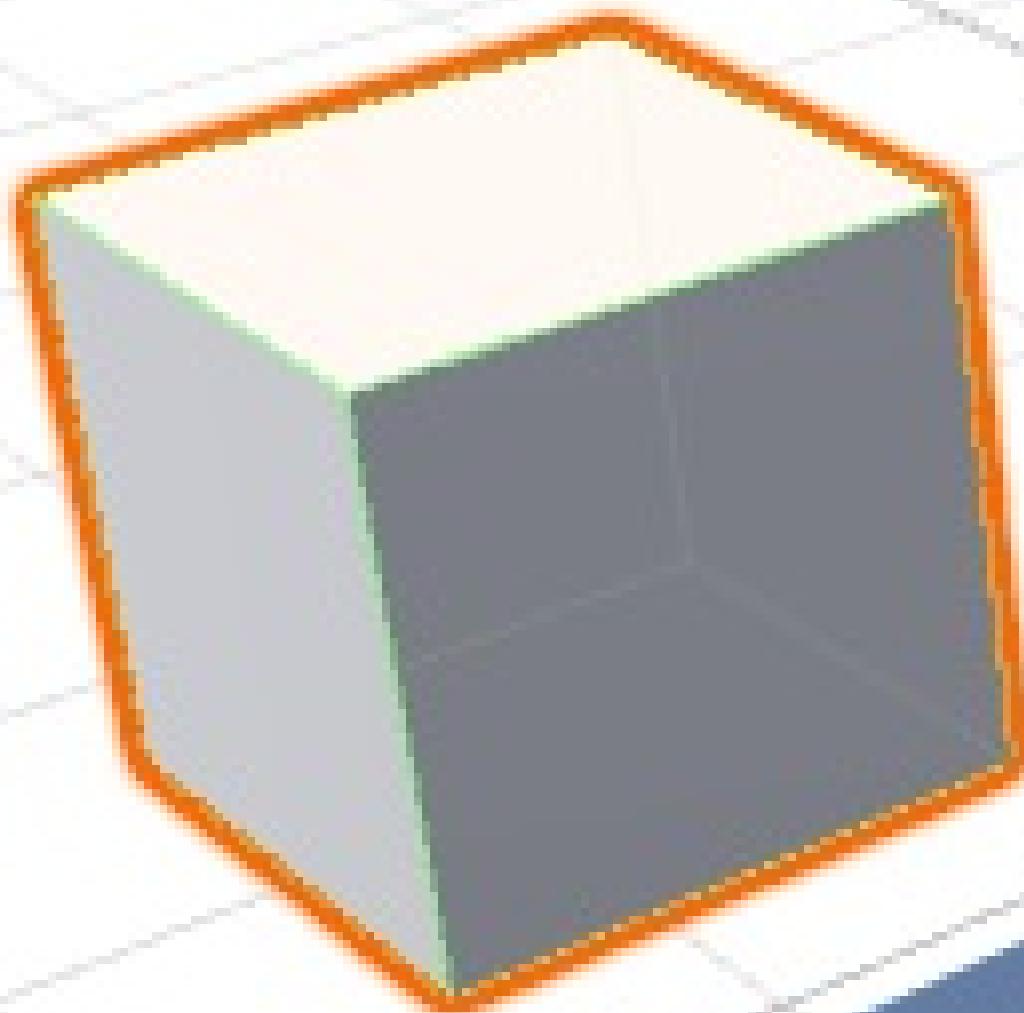
SpatialMappingWireframe

Default-Material (Material) Res



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Use SHIFT to click select multiple objects.



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Position

X —

Y —

Z —

Rotation

X 0

Y 0

Z 0

Scale

X 1

Y 1

Z 1

Hit the little hidden button next to Inspector > ✓ Mesh Renderer > Materials > Element 0 > Default Material ... ○

Cylinder (mesh filter)

Mesh

Mesh Renderer

Cast Shadows

On

Receive Shadows

✓

Motion Vectors

Per Object Motion

Materials

Size

1

Element 0

Default-Material

Light Probes

Blend Probes

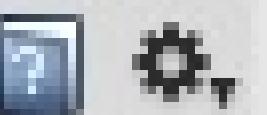
Reflection Probes

Blend Probes

Anchor Override

None (Transform)

Default-Material



Shader Standard

Components that are only on some of the selected objects cannot be multi-edited.

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Select Mate...

- Select a material to be used.
- Repeat for all objects.

None
RedBeard_BluestoneWall
Redbeard_Concrete
RedBeard_RockGround
RedBeard_Tiles
RedBeard_WoodWall
FrameDebuggerRenderTargetD
Default-Diffuse
Default-Material
Default-Particle
Default-Skybox
Sprites-Default
SpatialMappingOcclusion
SpatialMappingWireframe



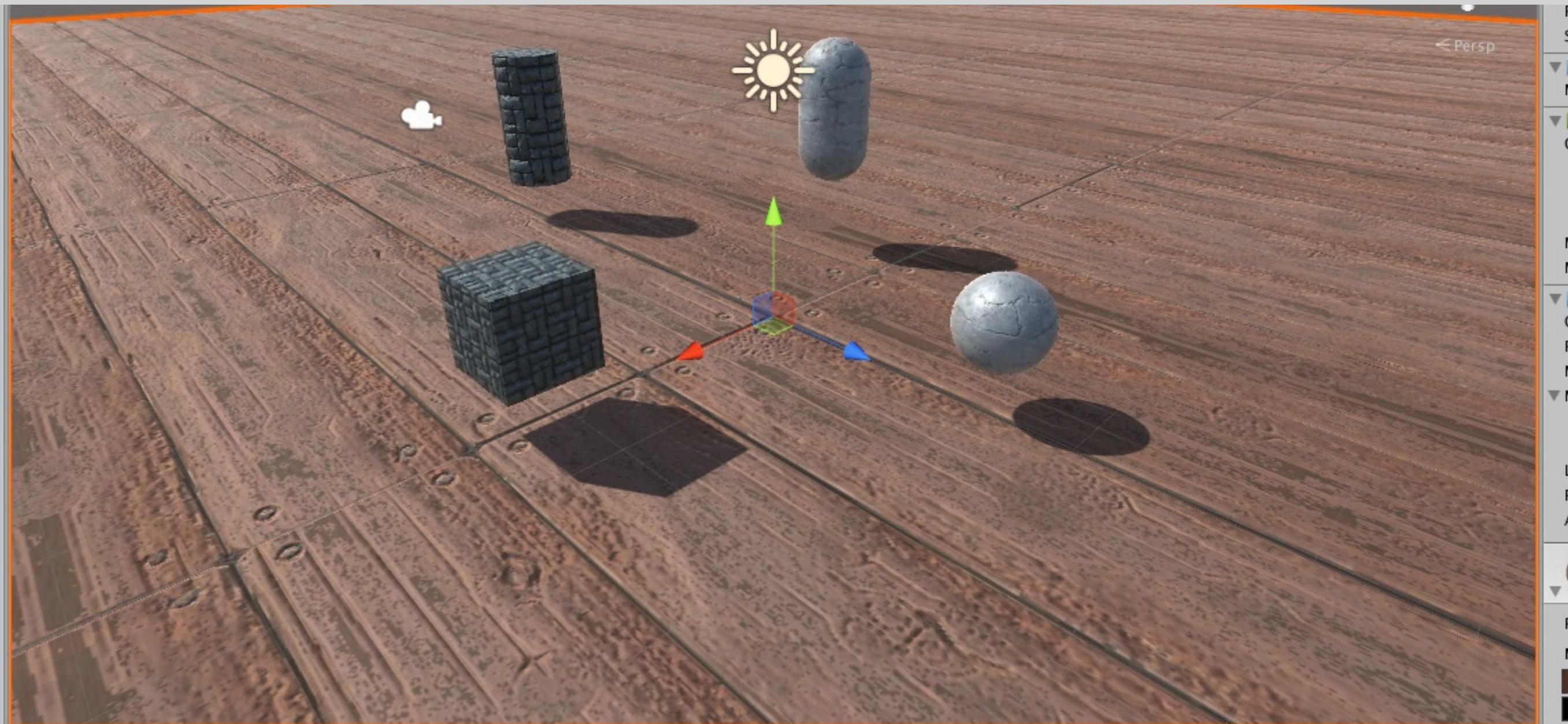
Beard_B... RedBeard_B... RedBeard_B... Re

File Edit Assets GameObject Component Help Tools Window



Hierarchy
Create (Q+A)
Untitled*
Main Camera
Directional Light
Plane
Cube
Sphere
Capsule
Cylinder

Looks nice, let's run it.



Project Console

Favorites
All Materials
All Models
All Prefabs
All Scripts

Assets



Assets
Editor



Cloud Account Layers Layout

Scene Game Asset Store

Shaded 2D 3D Gizmos

Gizmos

Q+A

All

Untagged

Layer Default

Static

None

Persp

Ortho

Front

Back

Left

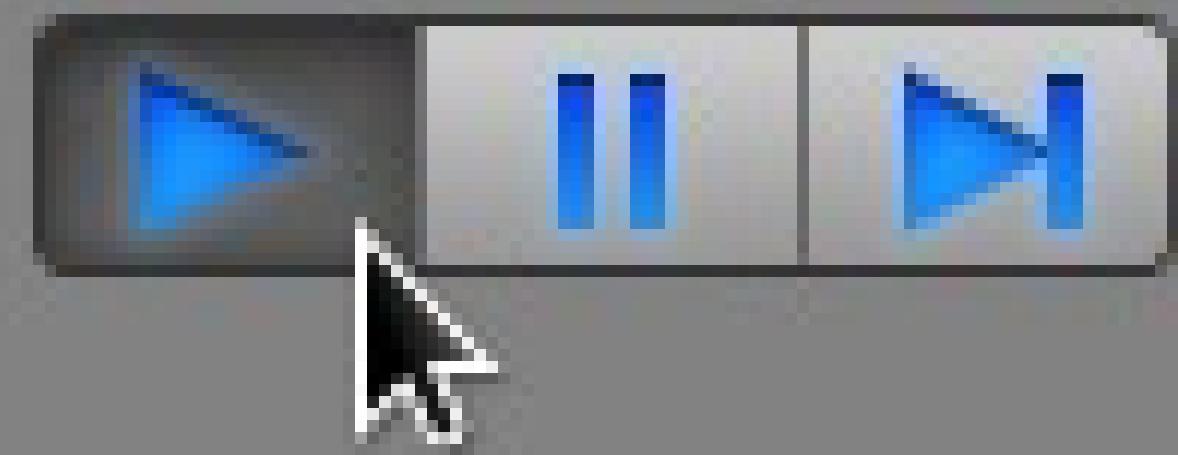
Right

Up

Down

Front

x Personal (64bit) - Untitled - Cardboard Sample - PC, Mac & Li



→ 1x

File Edit Assets GameObject Component Help Tools Window



Center

Local



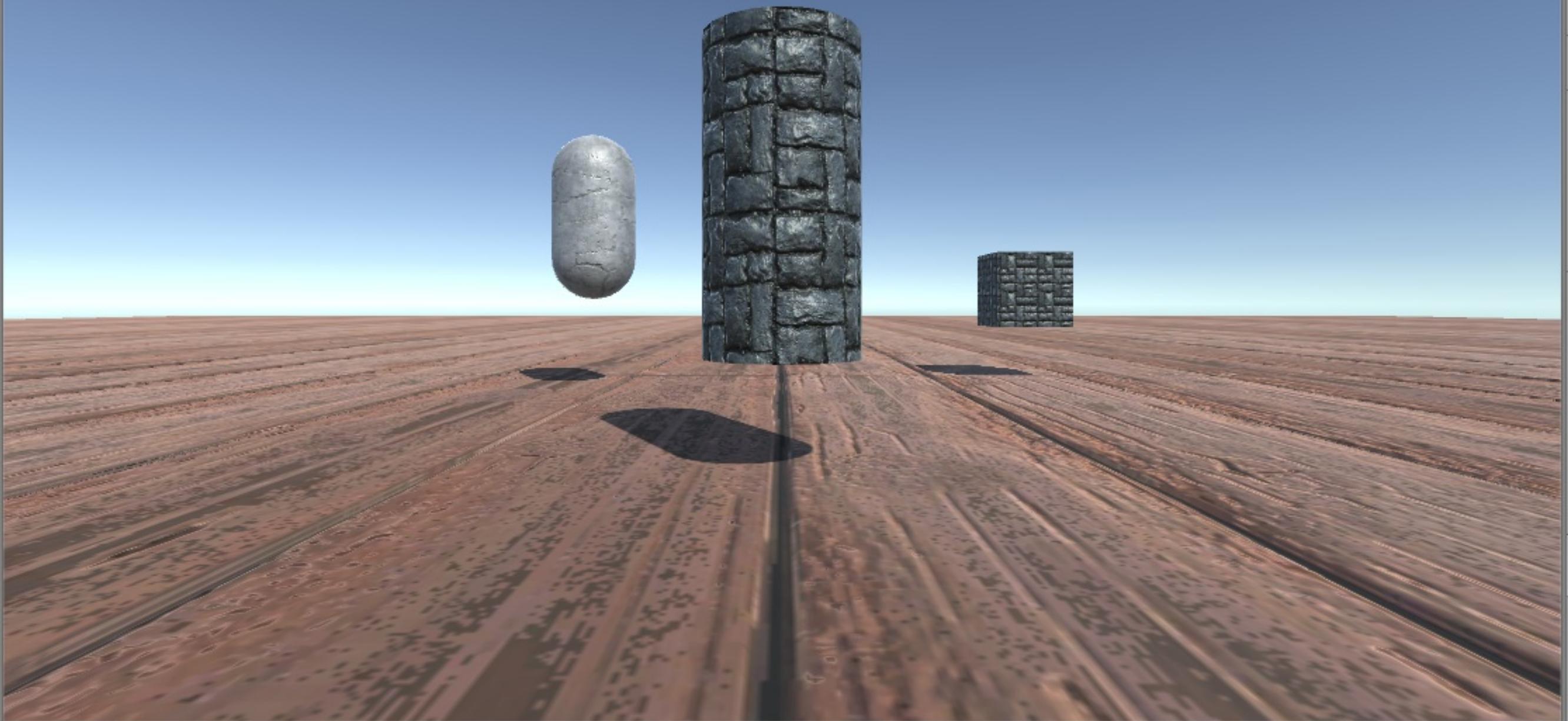
Cloud Account Layers Layout

Hierarchy

Create Untitled*

- Main Camera
- Directional Light
- Plane
- Cube
- Sphere
- Capsule
- Cylinder

Looks nice, but there is nothing happening, let's change that!



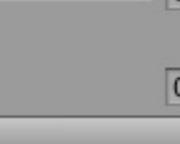
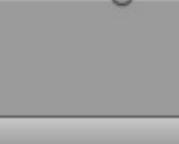
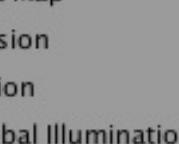
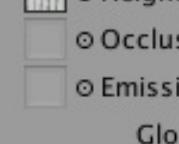
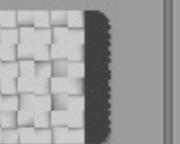
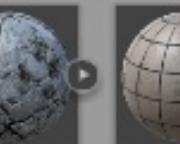
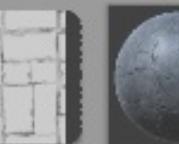
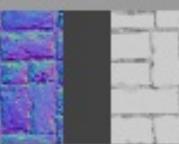
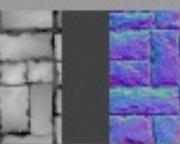
Project Console

Create Favorites

- All Materials
- All Models
- All Prefabs
- All Scripts

Assets

RedBeard Su...



Assets

Editor

RedBeard_Su...

RedBeard_B...

RedBeard_B...

RedBeard_B...

RedBeard_B...

RedBeard_B...

RedBeard_C...

RedBeard_Ol...

RedBeard_Ro...

RedBeard_Til...

RedBeard_T...

RedBeard_T...

RedBeard_T...

RedBeard_T...

RedBeard_T...

Scene View Controls: Display 1, Free Aspect, Scale 1x, Maximize On Play, Mute Audio, Stats, Gizmos.

Inspector Panel (Plane Object Selected):

- Tag: Untagged
- Layer: Default
- Rotation: X 0, Y 0, Z 0
- Scale: X 10, Y 1, Z 10
- Plane (Mesh Filter): Mesh: Plane
- Mesh Collider: Convex, Inflate Mesh, Skin Width: 0.01, Is Trigger: unchecked, Material: None (Physic Material), Mesh: Plane
- Mesh Renderer: Cast Shadows: On, Receive Shadows: checked, Motion Vectors: Per Object Motion
- Materials: Size: 1, Element 0: RedBeard_WoodWall, Light Probes: Blend Probes, Reflection Probes: Blend Probes, Anchor Override: None (Transform)
- Material Inspector (RedBeard_WoodWall): Shader: Standard, Rendering Mode: Opaque, Main Maps: Albedo (white), Metallic (black), Smoothness: 1, Metallic Alpha: 1, Normal Map: (blue), Height Map: (green), Occlusion: (grey), Emission: (black), Global Illumination: Realtime, Detail Mask: (white), Tiling: X 10, Y 10, Offset: X 0, Y 0, Secondary Maps: Detail Albedo x2, Normal Map, Tiling: X 1, Y 1, Offset: X 0, Y 0, UV Set: UV0, Forward Rendering Options: Specular Highlights: checked, Reflections: checked, Procedural Properties: Generate all outputs: unchecked, Generate Min Maps: unchecked.

Bottom Right: @MarioBodemann

Overview of adding a gravity animation

The Unity Editor interface showing the process of adding a gravity effect to a scene.

Component Menu: A dropdown menu under the **Component** tab in the top navigation bar. It lists various physics components such as Box Collider, Sphere Collider, Capsule Collider, Mesh Collider, Wheel Collider, Terrain Collider, Cloth, Hinge Joint, Fixed Joint, Spring Joint, Character Joint, Configurable Joint, and Constant Force. The **Constant Force** option is currently selected.

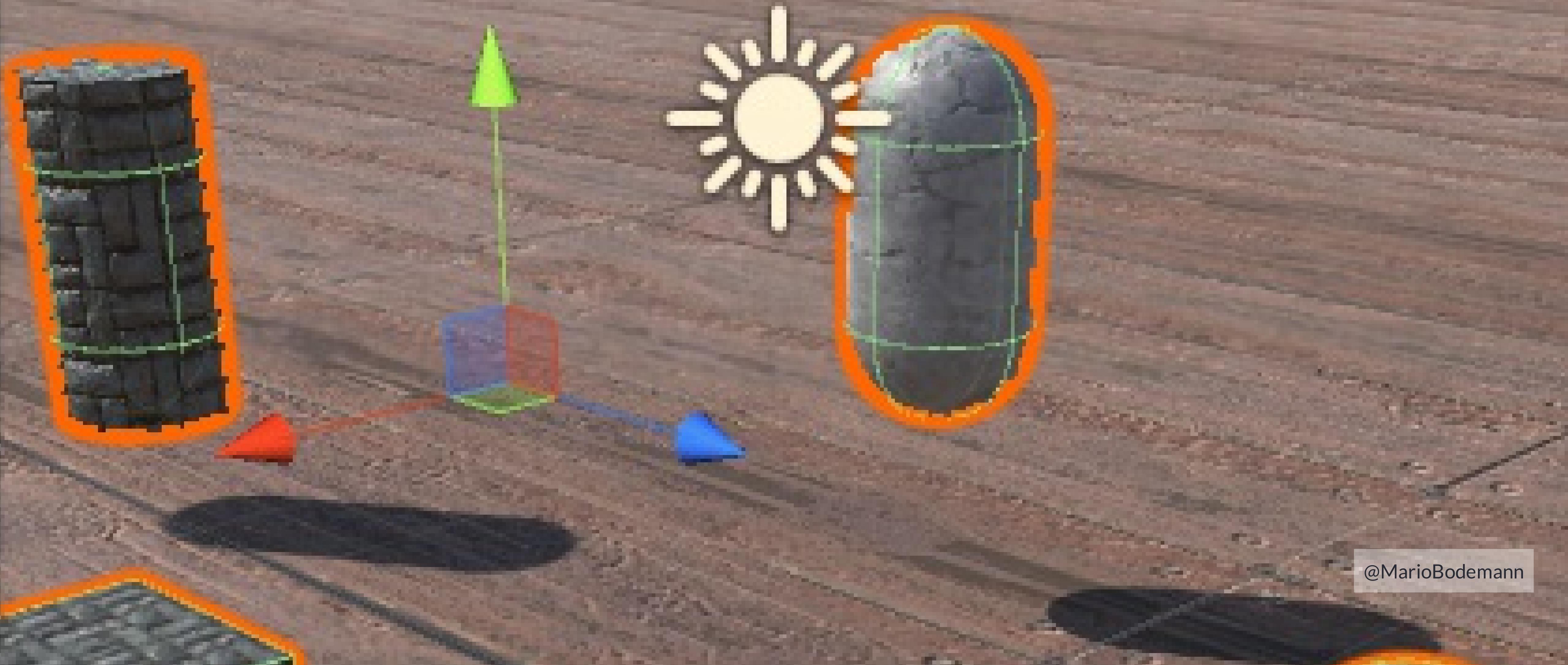
Scene View: The central view showing a 3D environment on a wooden floor. Several objects are present: a tall black cylinder, a smaller black cube, a blue cube, a yellow sun-like sphere, and a dark sphere. The objects have orange outlines, indicating they are selected.

Inspector View: The right-hand panel displays the properties of the selected objects. For the selected cylinder, the **Mesh Renderer** component is active, with options like **Cast Shadows** (On), **Receive Shadows** (checked), and **Motion Vectors** (Per Object Motion). The **Materials** section shows a single material assigned with a size of 1.

Project View: The bottom-left panel shows the project structure. Under **Favorites**, there are links to All Materials, All Models, All Prefabs, and All Scripts. The **Assets** folder contains several materials named RedBeard_Su..., RedBeard_Bl..., RedBeard_B..., RedBeard_B..., RedBeard_B..., RedBeard_B..., RedBeard_C..., RedBeard_Ol..., RedBeard_Ro..., RedBeard_Til..., RedBeard_T..., RedBeard_T..., and RedBeard_T... .

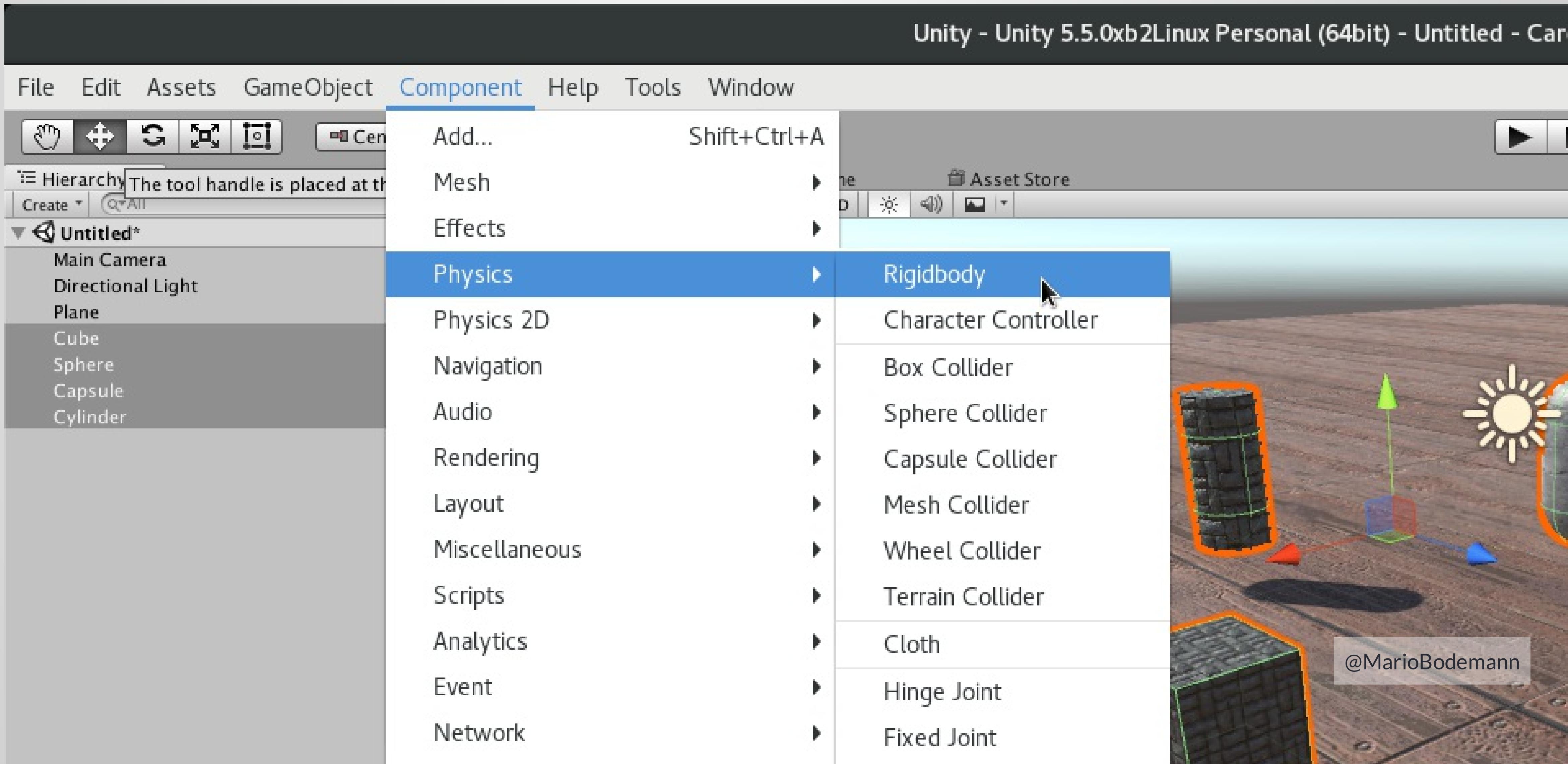
Bottom Right: A watermark or signature that reads **@MarioBodemann**.

- Select all gravityable objects using SHIFT and left mouse click.
- Do not add the plane, since the other objects need something to land on.

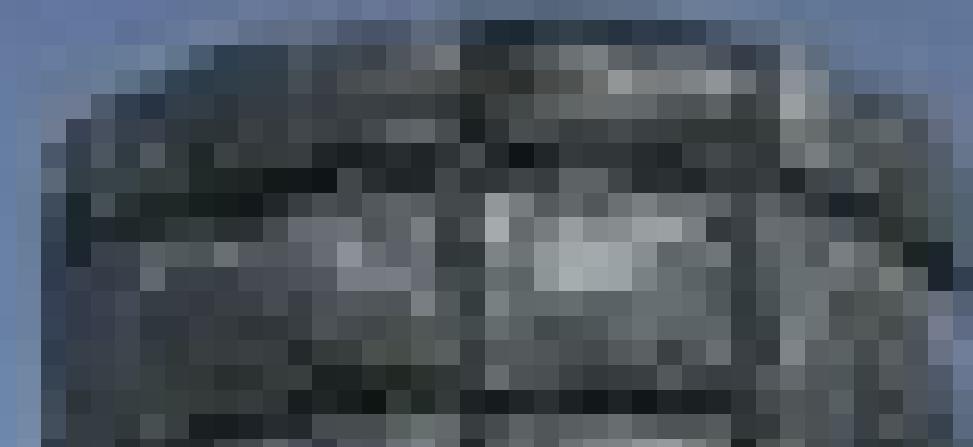
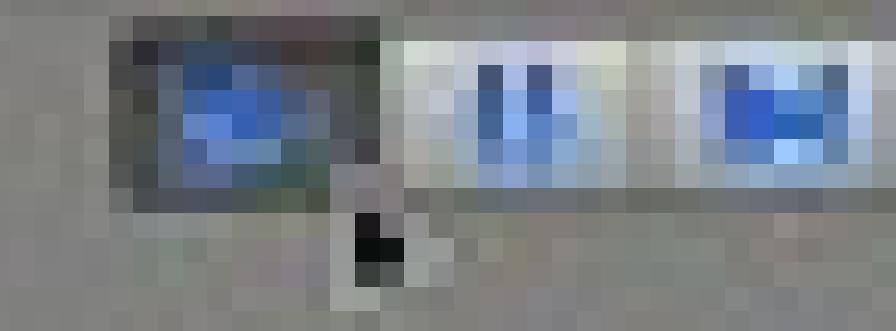


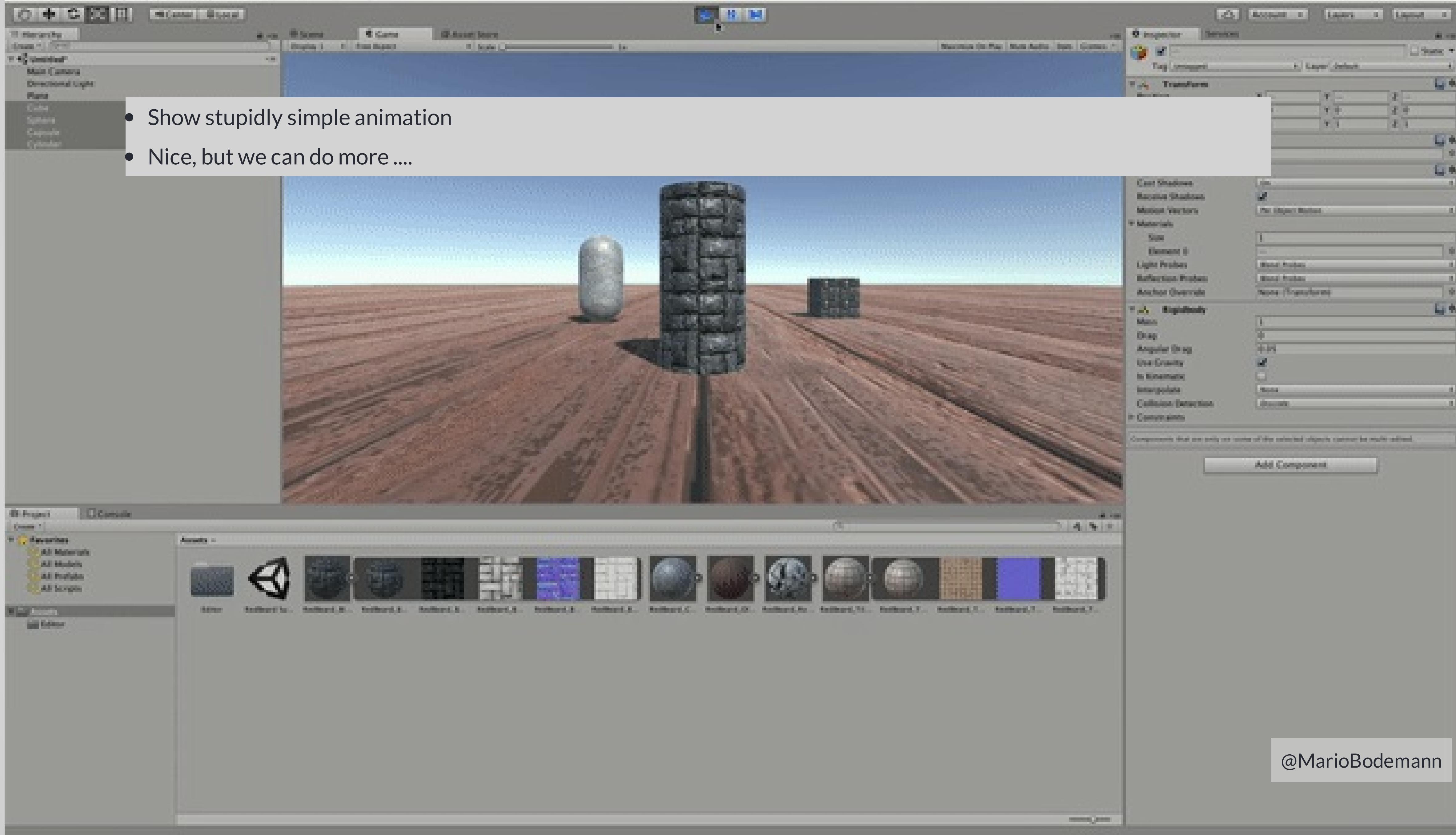
@MarioBodemann

Add gravity to all selected objects by hitting menu option Component > Physics > Rigidbody.



Hit play.





File Edit Assets GameObject Component Help Tools Window



Center Local



Cloud Account Layers Layout

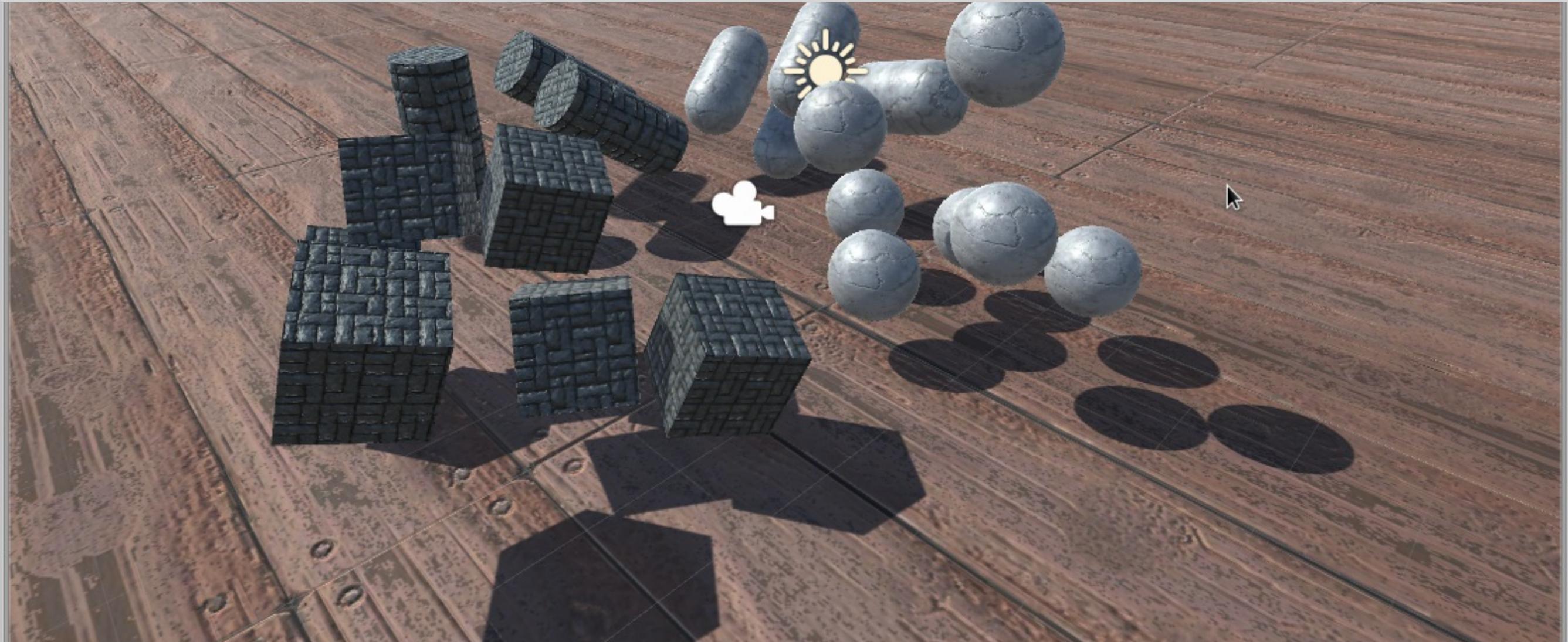
Hierarchy

Create (Q) All

Untitled*

Main Camera
Directional Light
Plane
Cube
Sphere
Capsule
Cylinder
Cylinder (1)
Capsule (1)
Sphere (1)
Cube (1)
Capsule (2)
Capsule (3)
Cylinder (2)
Cube (2)
Cube (3)
Sphere (2)
Sphere (3)
Sphere (4)
Sphere (5)
Sphere (6)
Cube (4)
Cube (5)

- Copying objects by using Copy and Paste
- Also: I moved the camera inside of the action



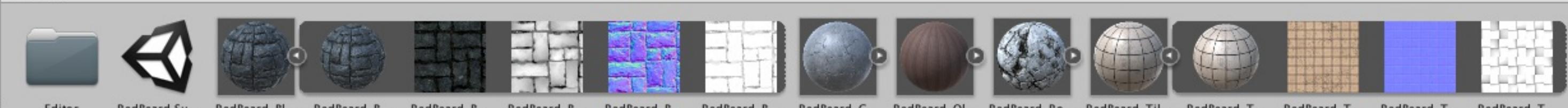
Project Console

Create

Favorites

All Materials
All Models
All Prefabs
All Scripts

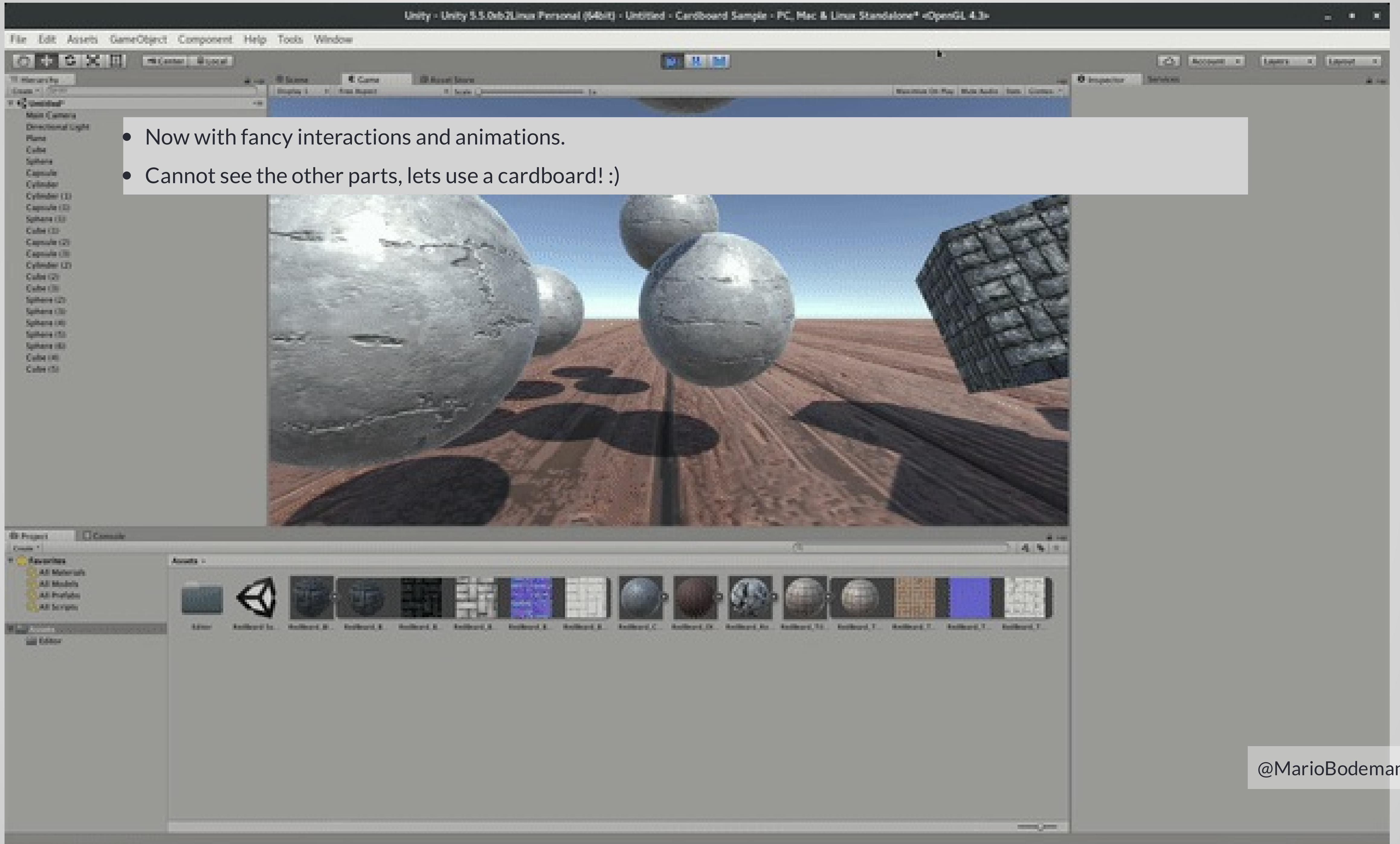
Assets



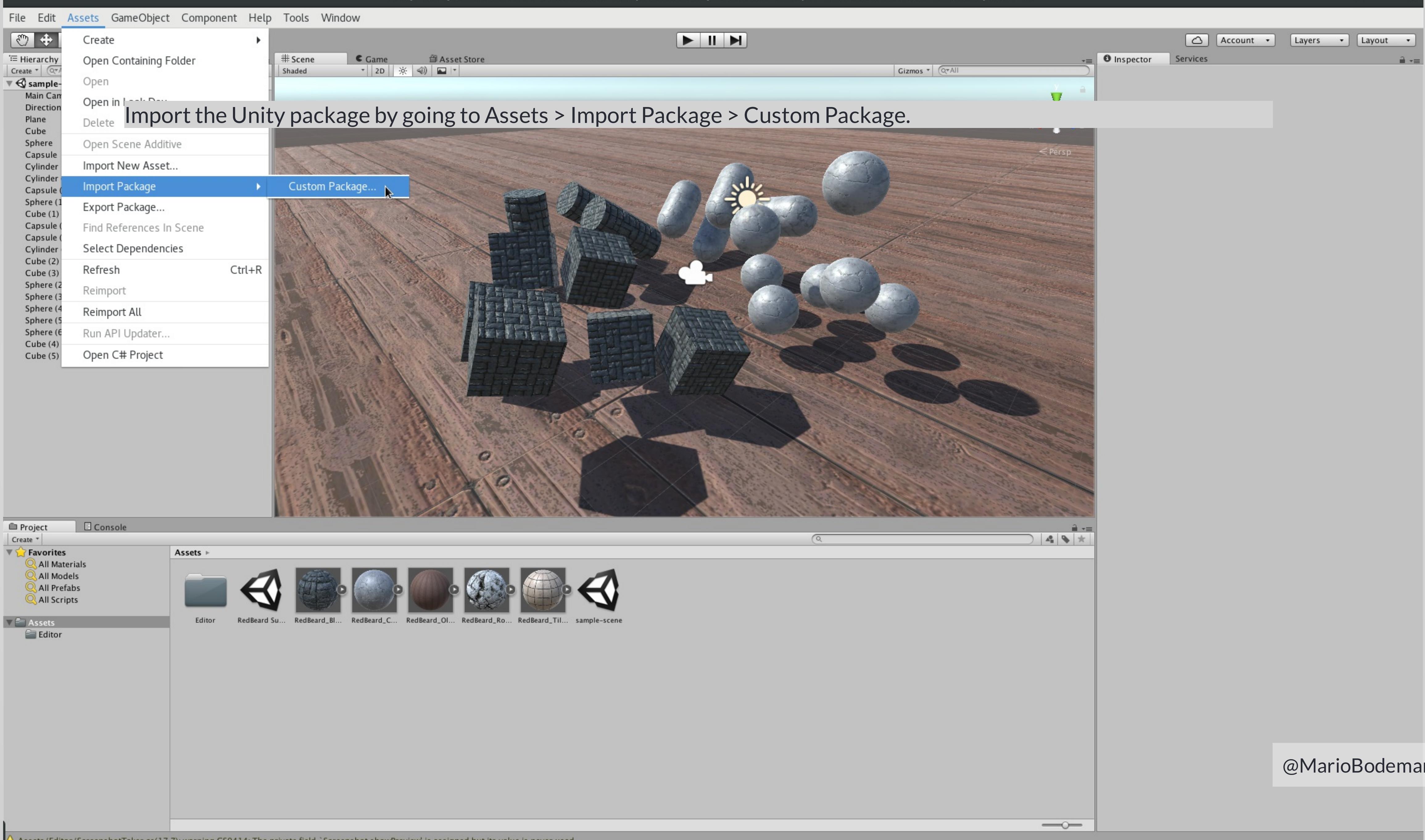
Assets

Editor

@MarioBodemann



@MarioBodemann



File Edit **Assets** GameObject Component Help Tools Window

zoomed in view

Hierarchy

Create

sample-

Main Cam

Direction

Plane

Cube

Sphere

Capsule

Cylinder

Cylinder

Capsule

Sphere (1)

Cube (1)

Capsule (1)

Capsule (1)

Cylinder (1)

Cube (2)

Cube (3)

Sphere (2)

Sphere (3)

Sphere (4)

Sphere (5)

Sphere (6)

Cube (4)

Create

Open Containing Folder

Open

Open in Look Dev

Delete

Open Scene Additive

Import New Asset...

Import Package

Export Package...

Find References In Scene

Select Dependencies

Refresh

Ctrl+R

Reimport

Reimport All

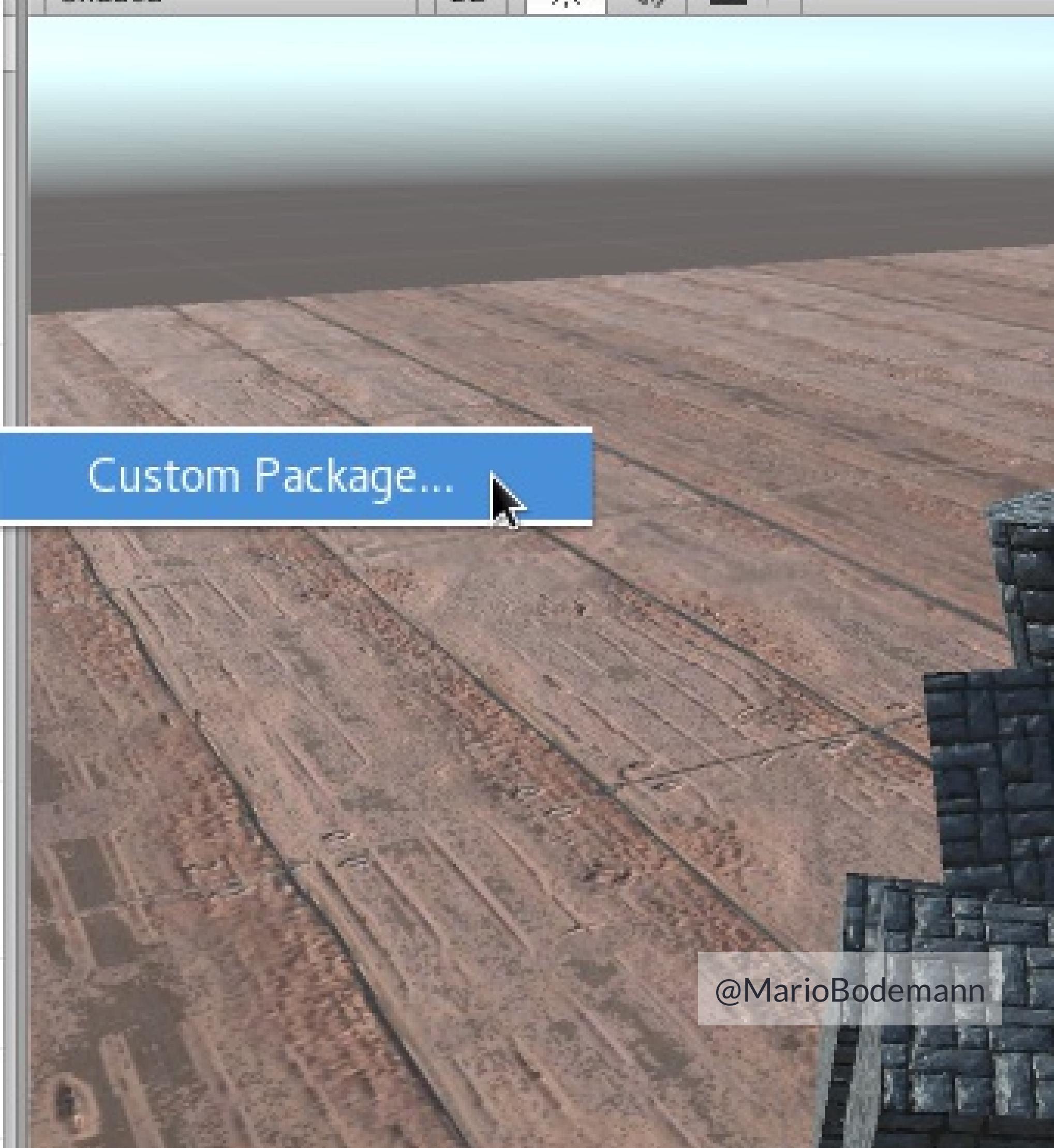
Run API Updater...

Scene

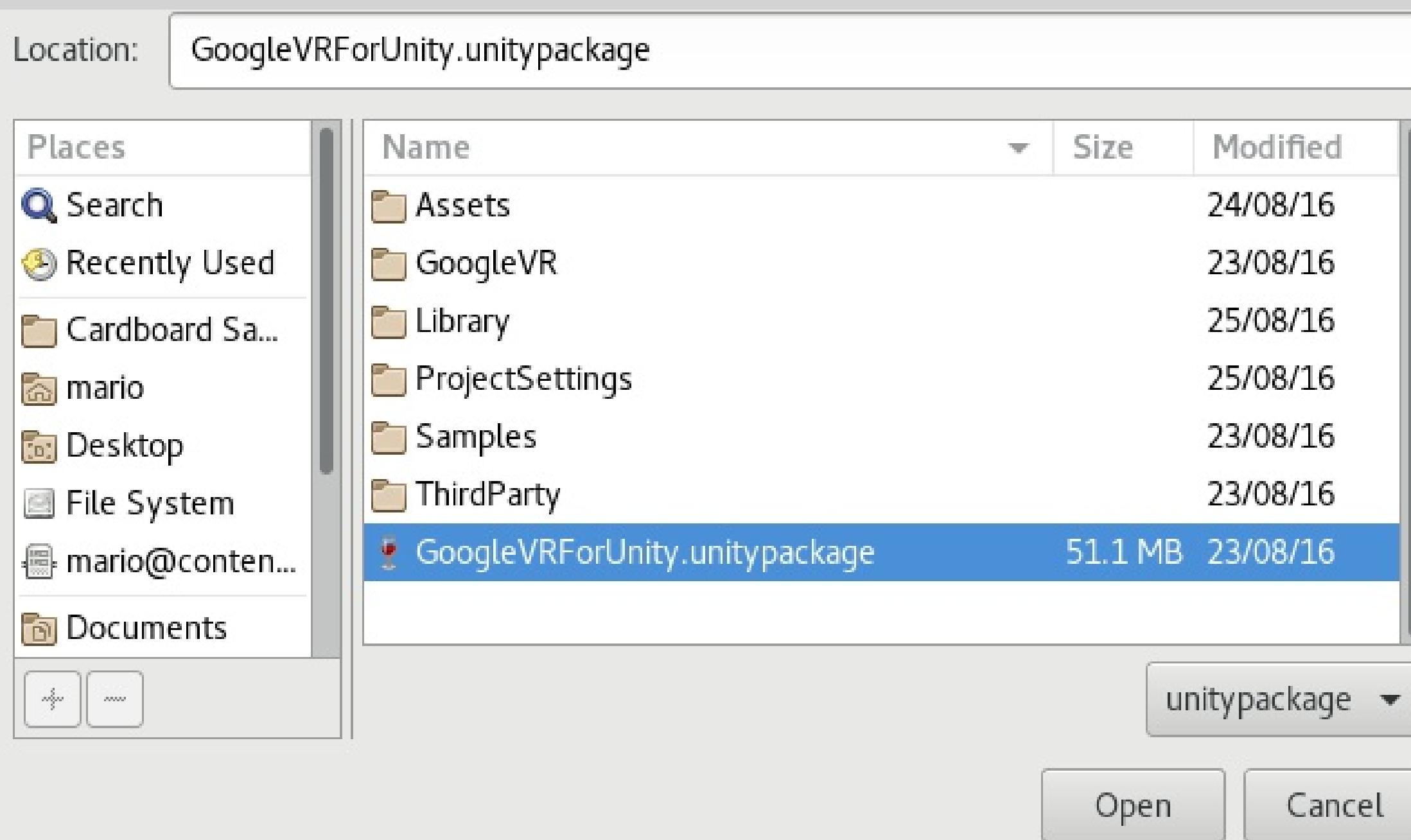
Shaded

Game

Asset Store

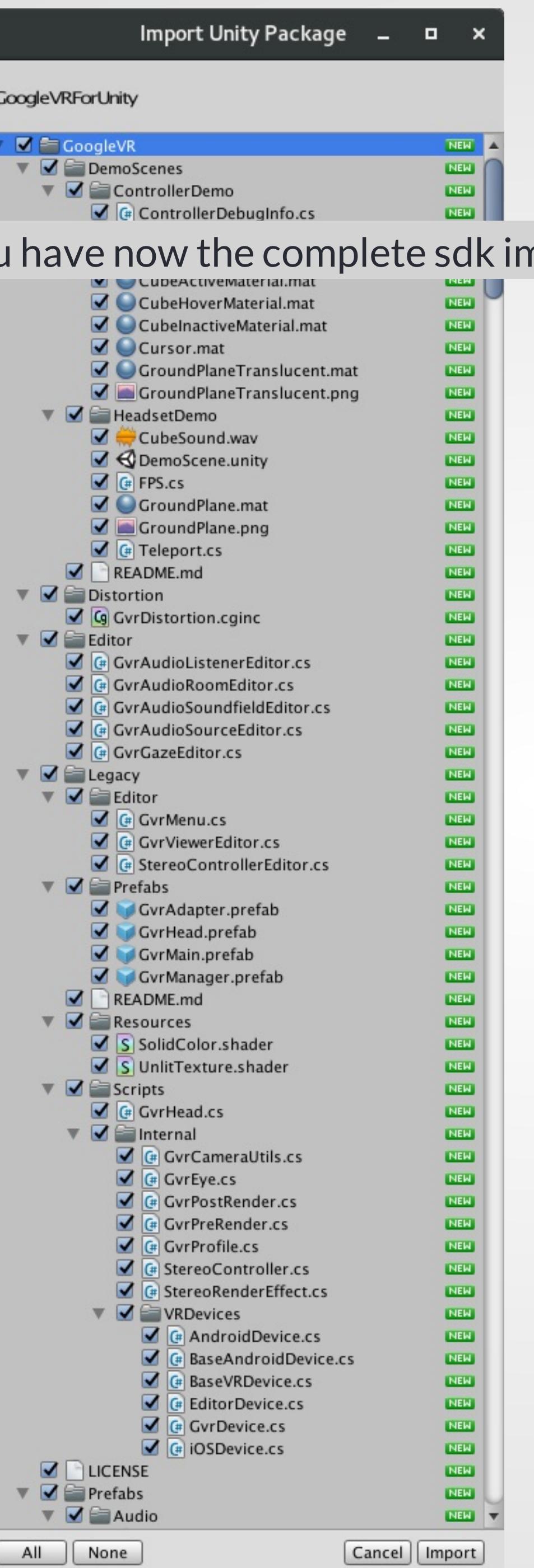


- Find the checked out folder from step 1
- Select the GoogleVRForUnity.unitypackage
- Hit Open.
- Wait



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Select all and hit ok again. You have now the complete sdk imported.



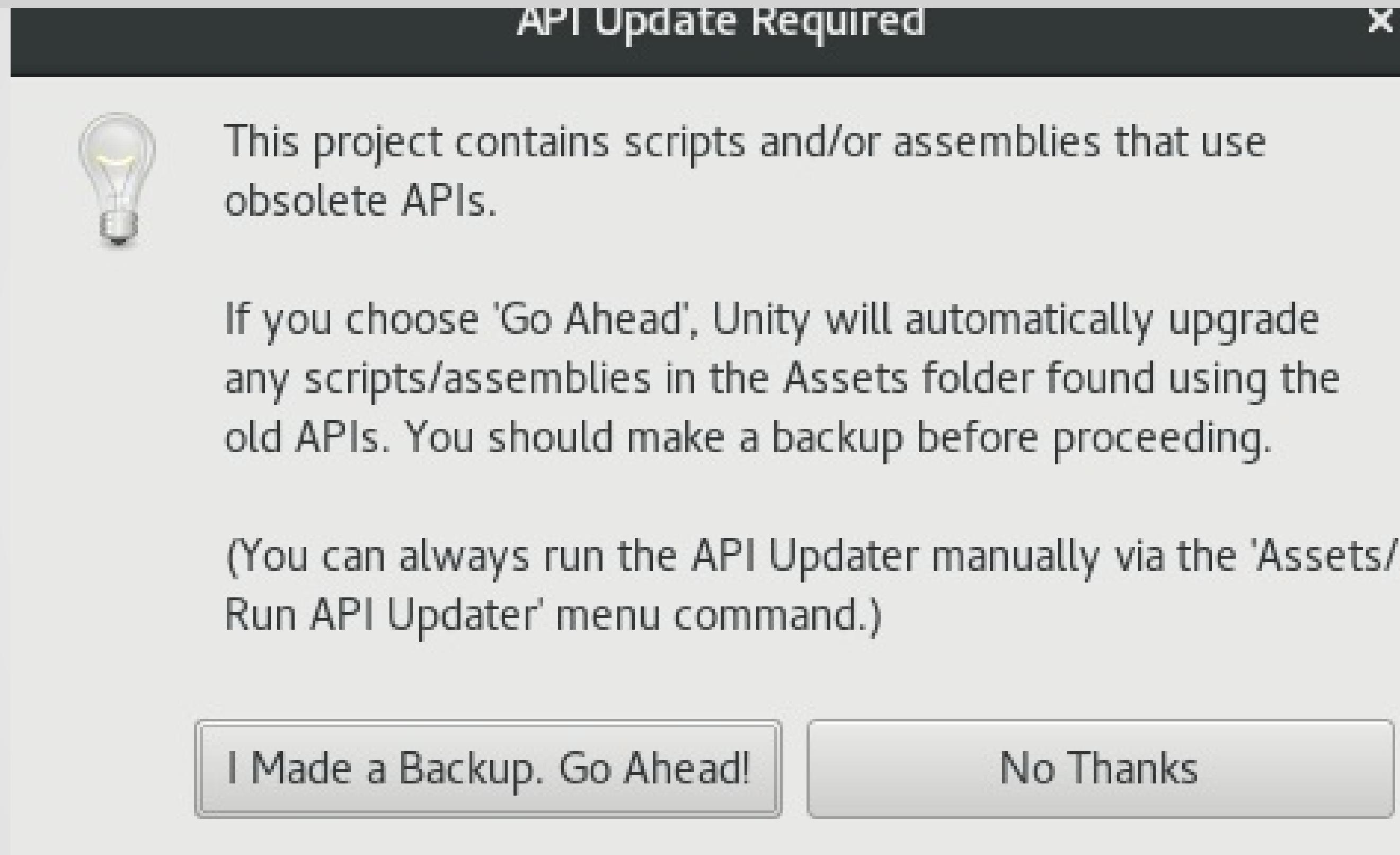
@MarioBodemann

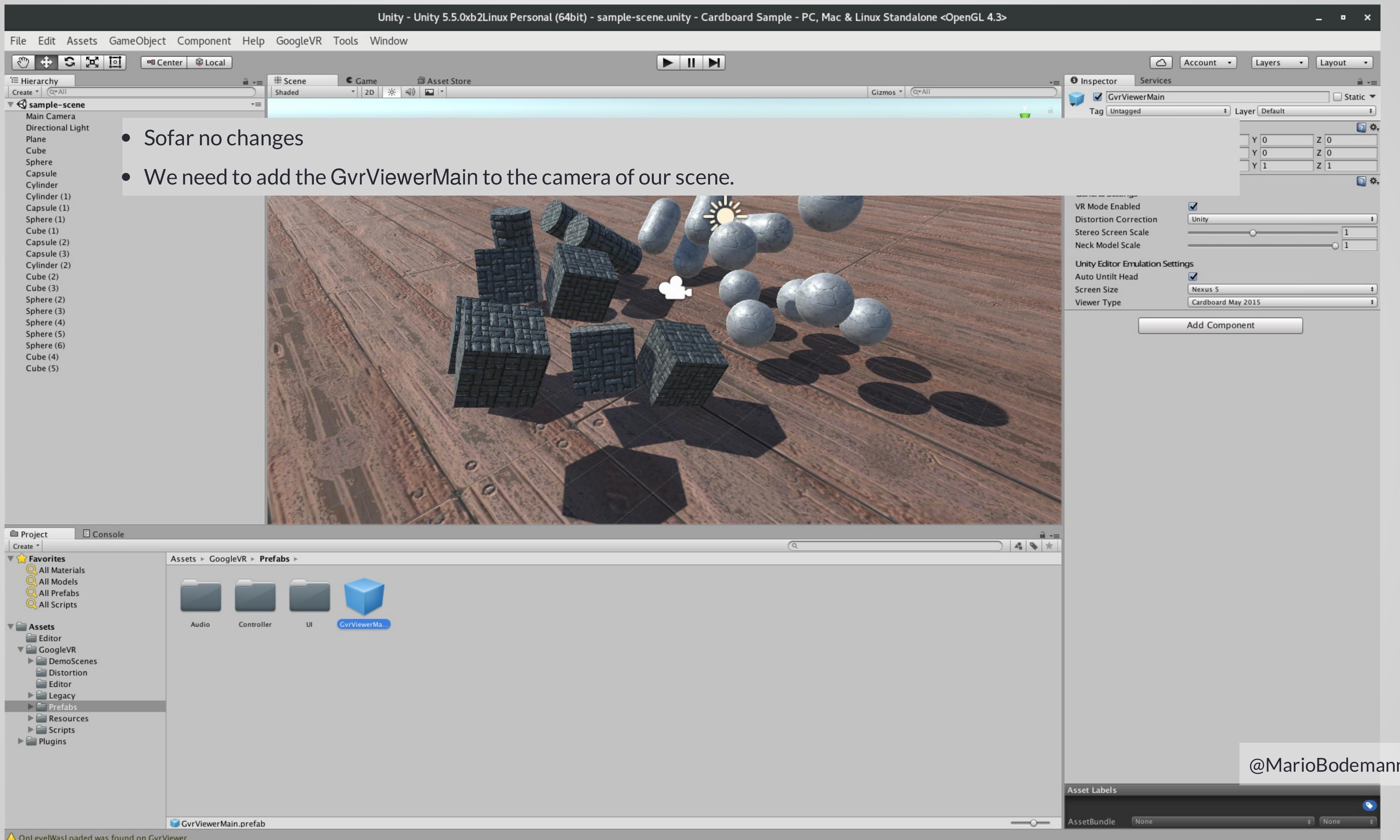
Please wait ... ;)



@MarioBodemann

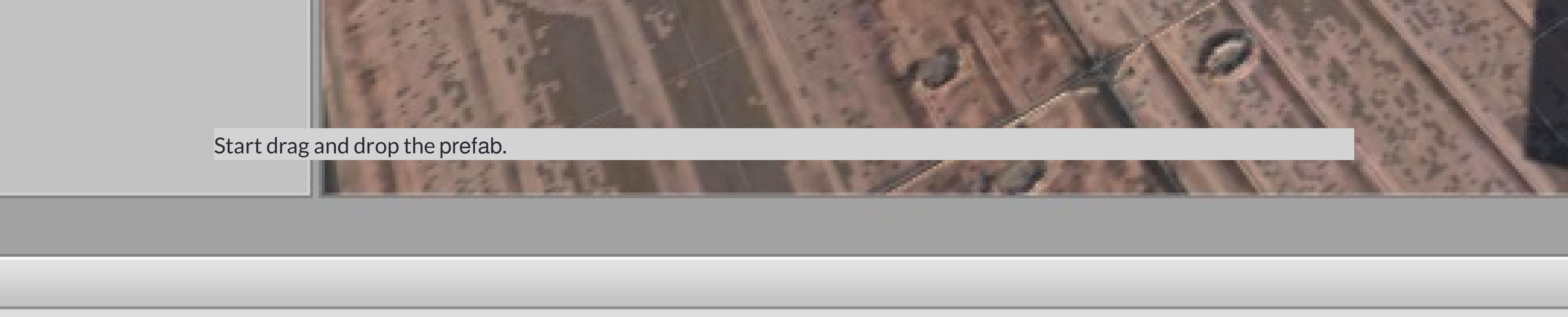
- Updating is fine for simple projects, more complex might be an issue.
- I Made a Backup. Go Ahead!





Select Project > Assets > GoogleVR > Prefabs





Start drag and drop the prefab.

Assets ▶ GoogleVR ▶ Prefabs ▶



Audio

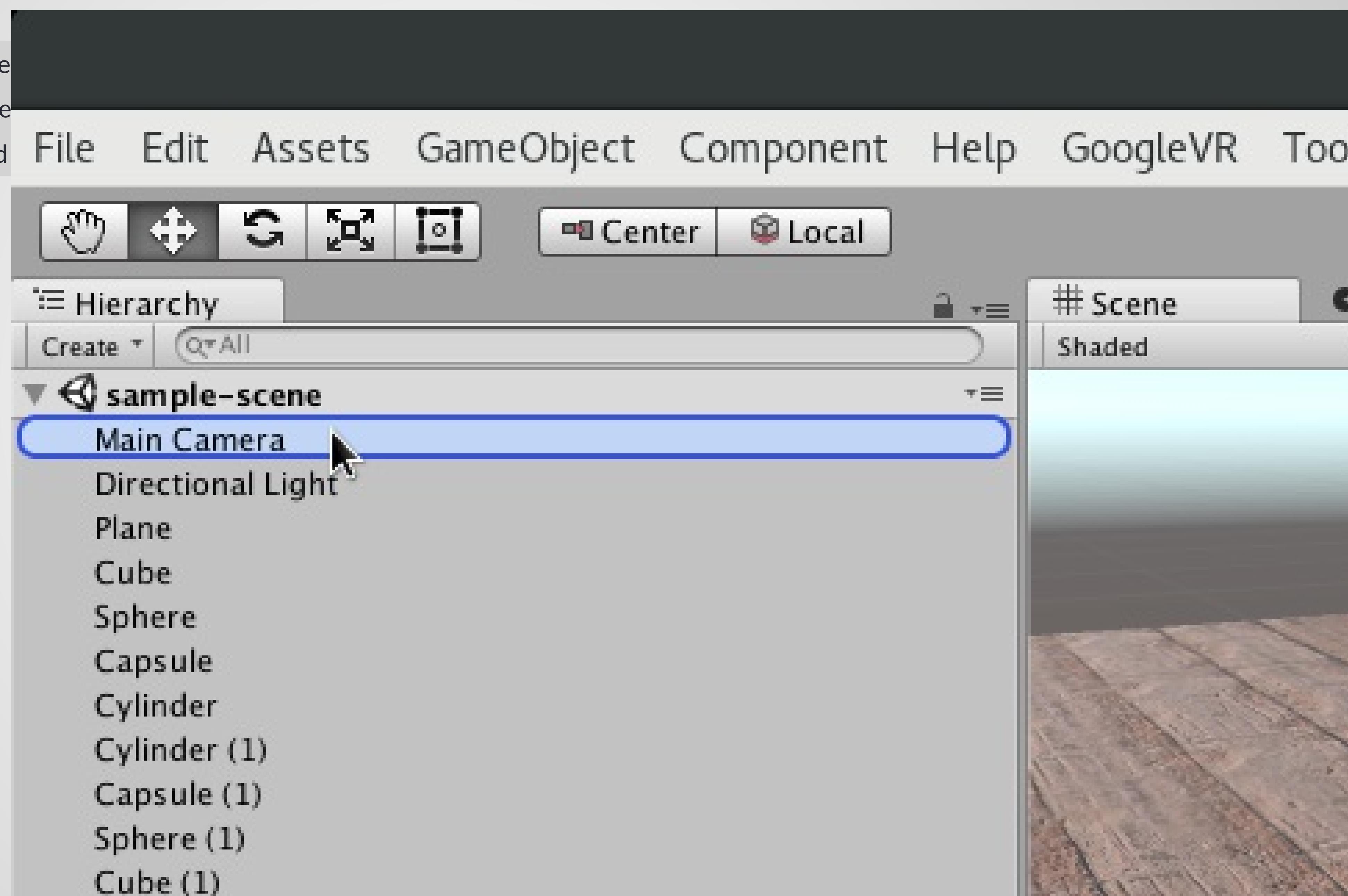
Controller

UI

GvrViewerMa...

@MarioBodemann

- Drop it onto the
- So far no change
- We need to add



File Edit Assets GameObject Help GoogleVR Tools Window



Center Local



Cloud Account Layers Layout

Hierarchy

Create Q All

sample-scene

Main Camera

Directional Light

Plane

Cube

Sphere

Capsule

Cylinder

Cylinder (1)

Capsule (1)

Sphere (1)

Cube (1)

Capsule (2)

Capsule (3)

Cylinder (2)

Cube (2)

Cube (3)

Sphere (2)

Sphere (3)

Sphere (4)

Sphere (5)

Sphere (6)

Cube (4)

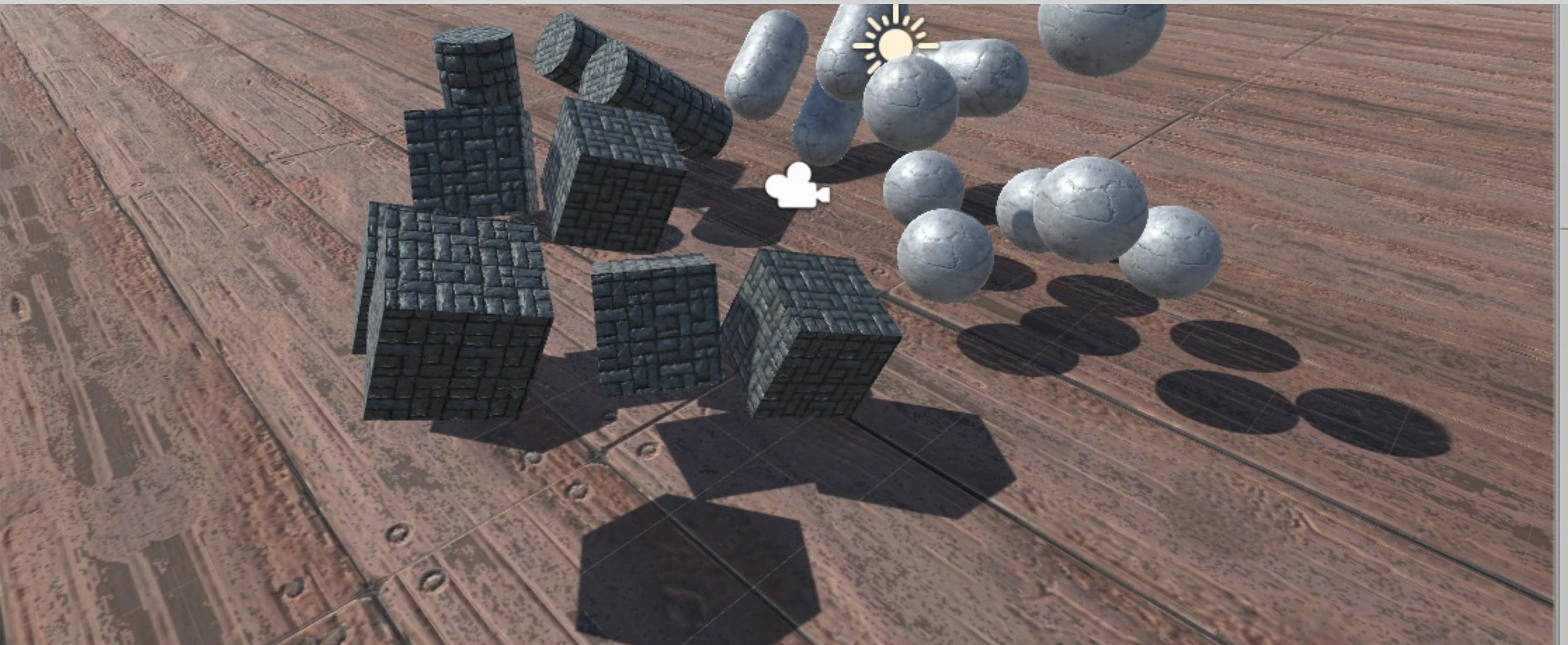
Cube (5)

Scene Game Asset Store

Shaded 2D

Gizmos Q All

- Again no change :(
- Let's run it.



Inspector Services

GvrViewerMain

Tag Untagged

Layer Default

<input type="checkbox"/> Y 0	<input type="checkbox"/> Z 0
<input type="checkbox"/> Y 0	<input type="checkbox"/> Z 0
<input type="checkbox"/> Y 1	<input type="checkbox"/> Z 1

Y 0 Z 0

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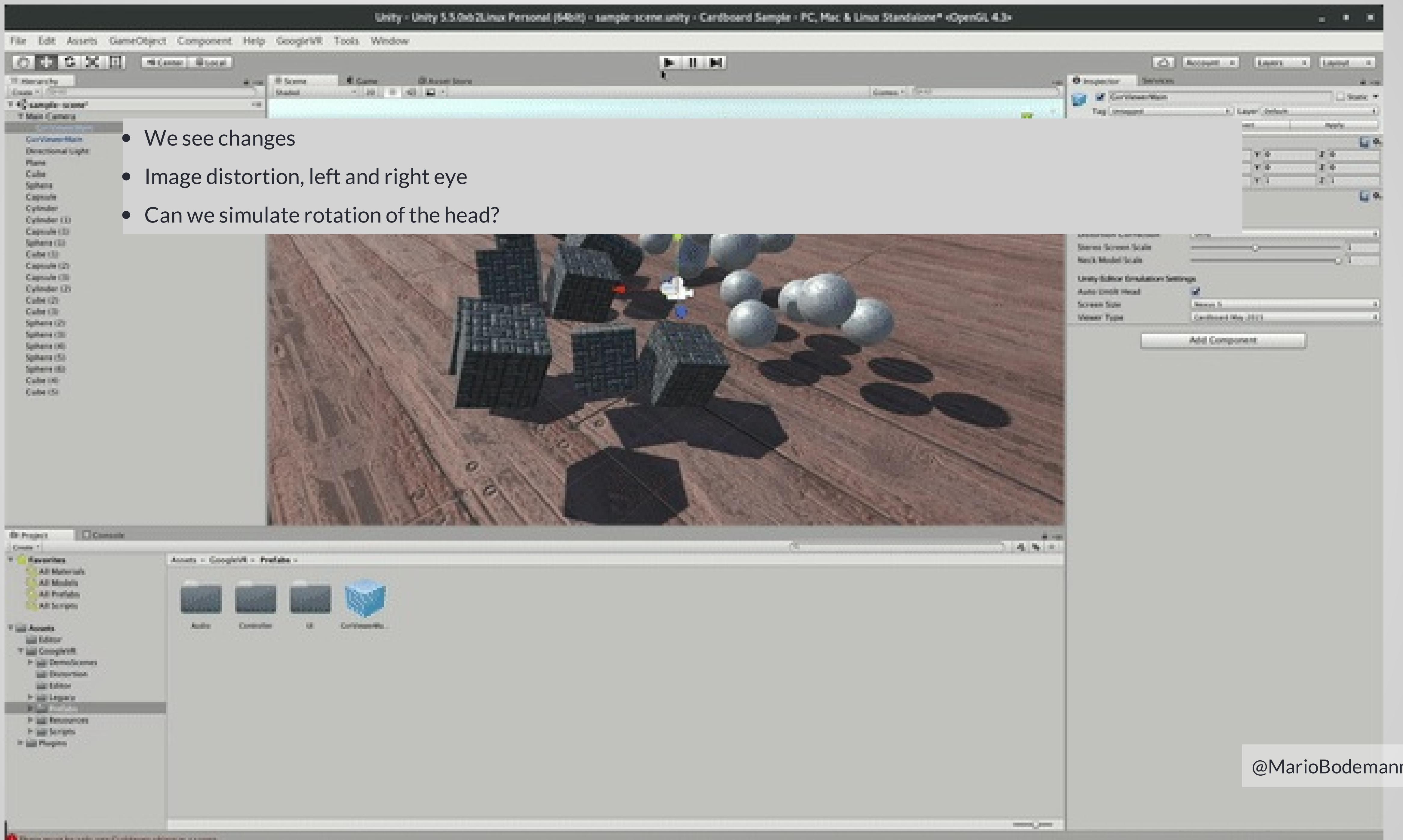
Y 1 Z 1

Y 1 Z 1

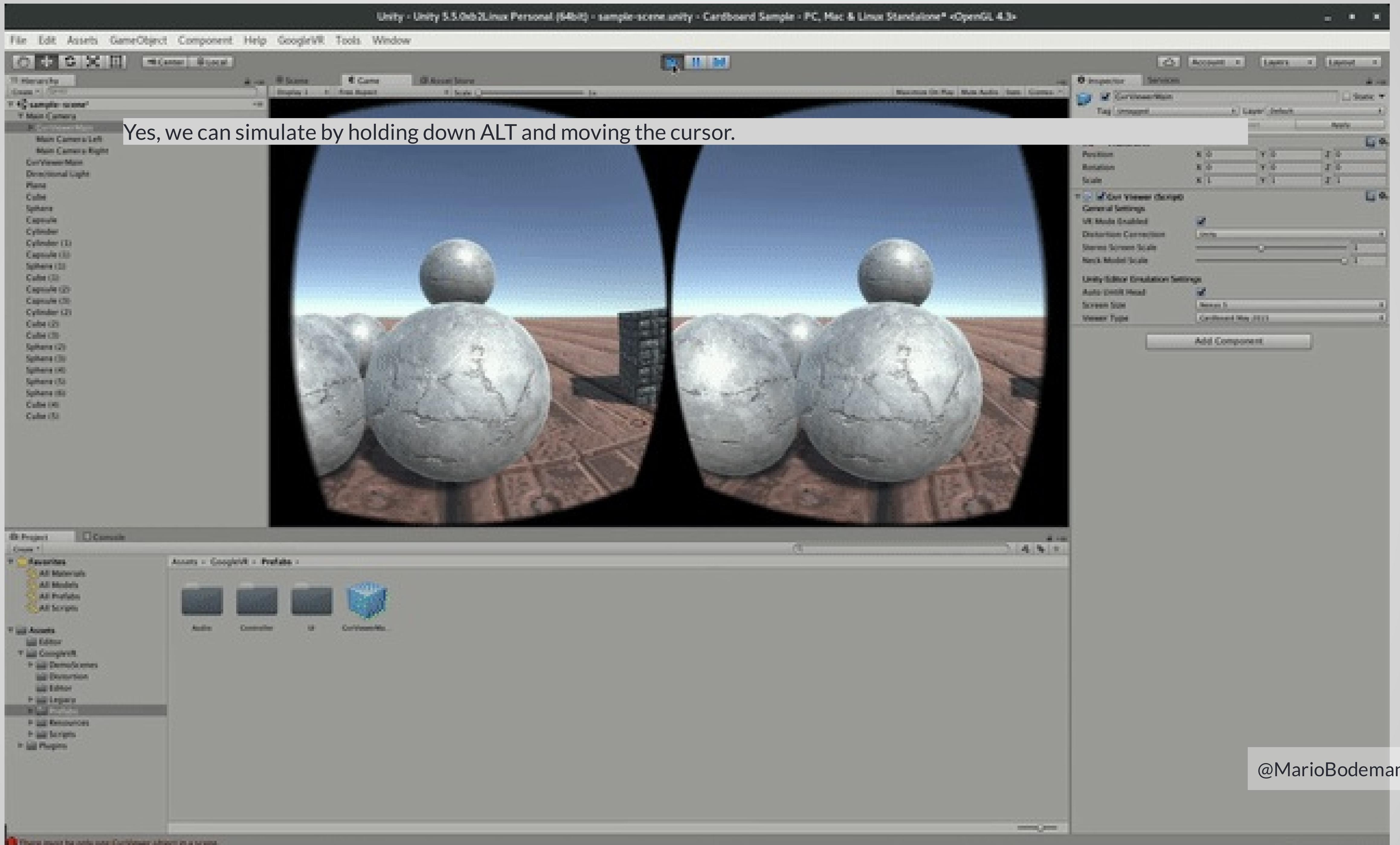
Y 1 Z 1

Y 1 Z 1

Y 1 Z 1



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Summary of Unity Demo

- Using Unity is fast
- Using Cardboard SDK is easy
- Using internal renderer for simulating
- GvrIntent start of interoperation Android - Unity



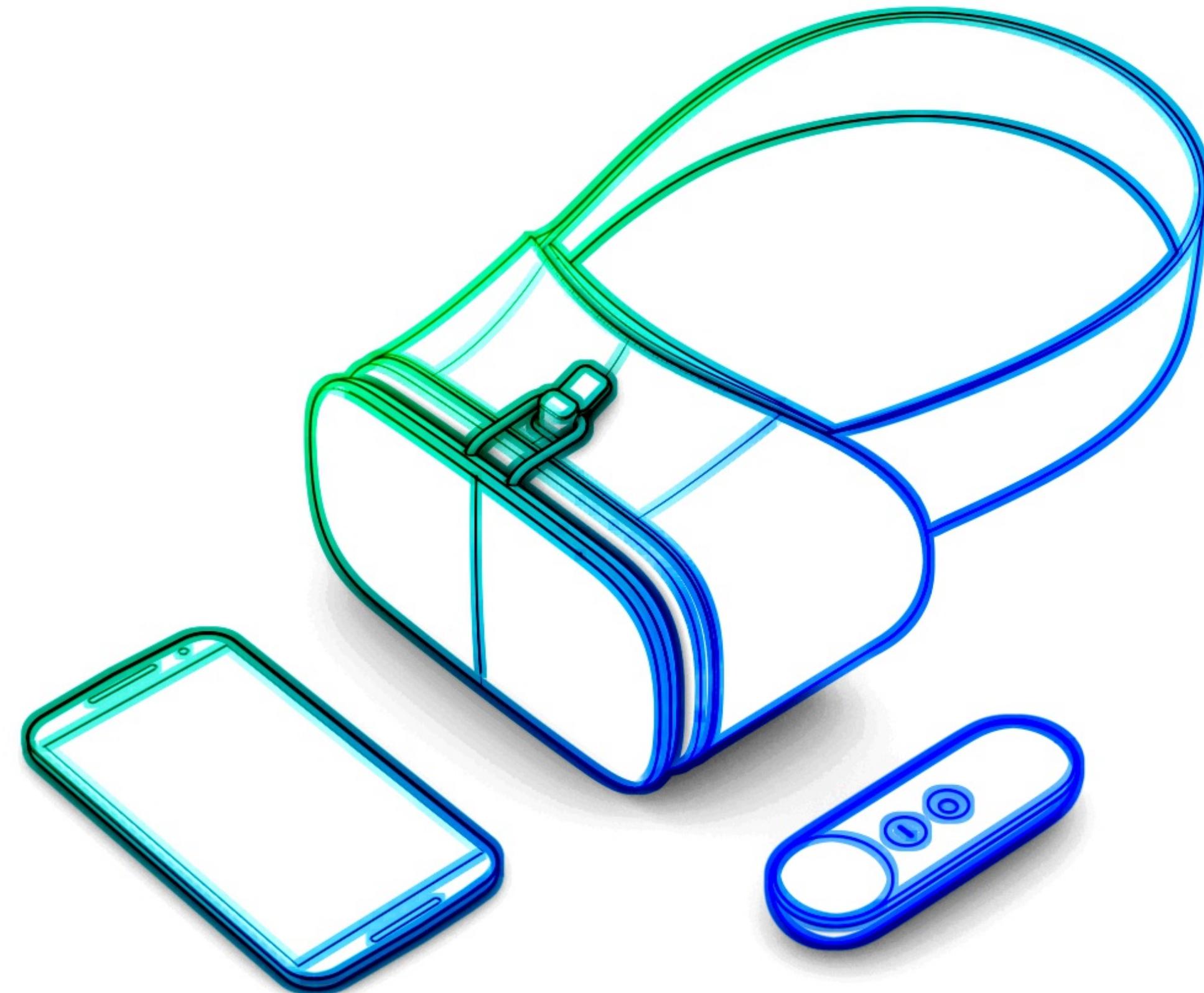
Difficulties in using Unity

- Cost for non free version exists.
- Integration with other (Java) libraries difficult at best.

- Introduced at Google I/O this year.
- Soon™ first hardware available.



Daydream



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Controller

- uses special hardware as controller
 - can get emulated by any Android phone (>= 4.4)
 - has four Buttons: Volume +/-, App(Programmable), Home
 - clickable Touchpad. (x/y position, clicked state)(emulated by two touches)
- Print out sheet to not get to distracted by Phone
- Connects via bluetooth to Headset Phone



Headset Phone

- has to be a Nexus 6P running Android Nougat
- start a Daydream app once, set it up by clicking on the Gear, enabling all VR settings
- Reboot phone ... ;).
- Bluetooth to connect to controller.



Complete Package

- Daydream Ready
 - high performance sensors for high accuracy head tracking
 - displays with fast response time to minimize blur
 - powerfull mobile processor
 - VR System notifications
- will be available in fall
- will be created by hardware partners
- certified by Google
- Google Play for VR and Daydream Home

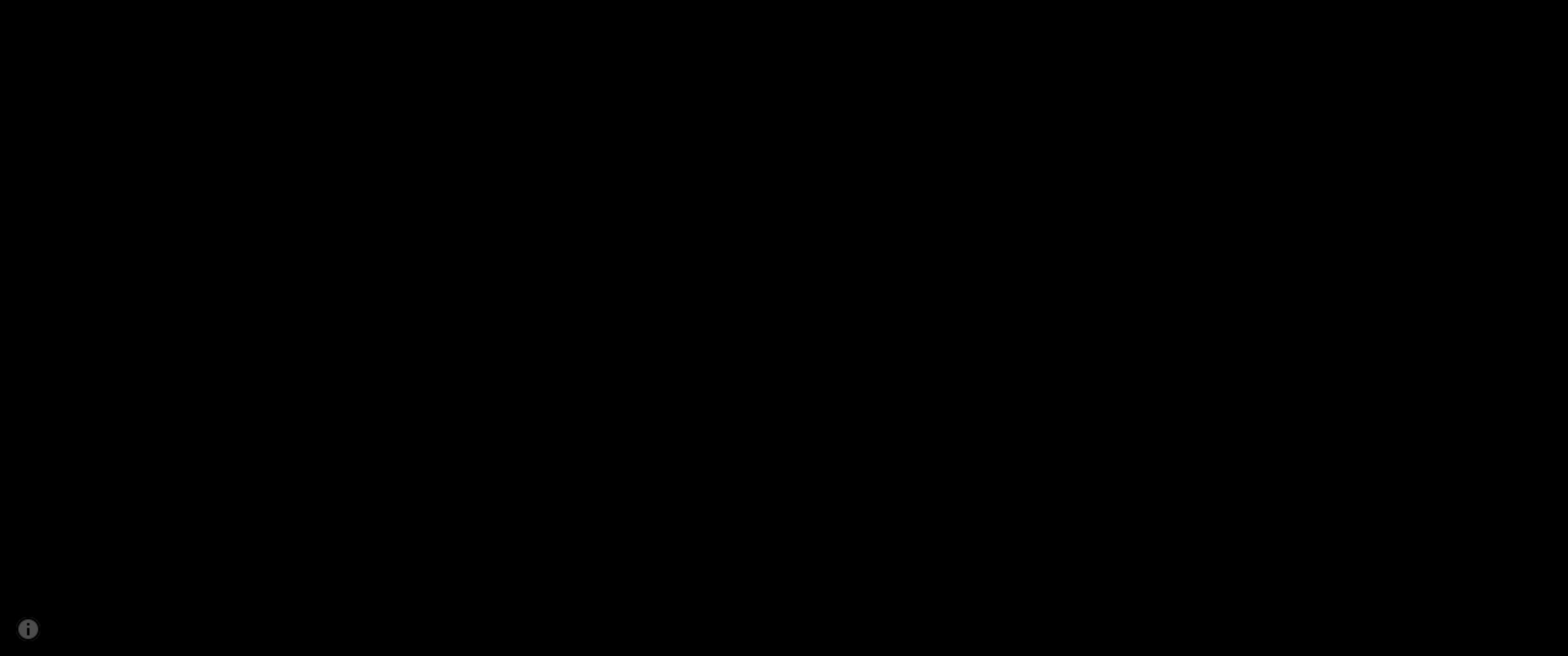
Daydream SDK features

- Same as Cardboard SDK
- Controlling the controller
 - orientation/acceleration
 - input (Clickpad: x,y, clicked, App Button, Vol+/-)
- spatial audio engine

VRView, available for

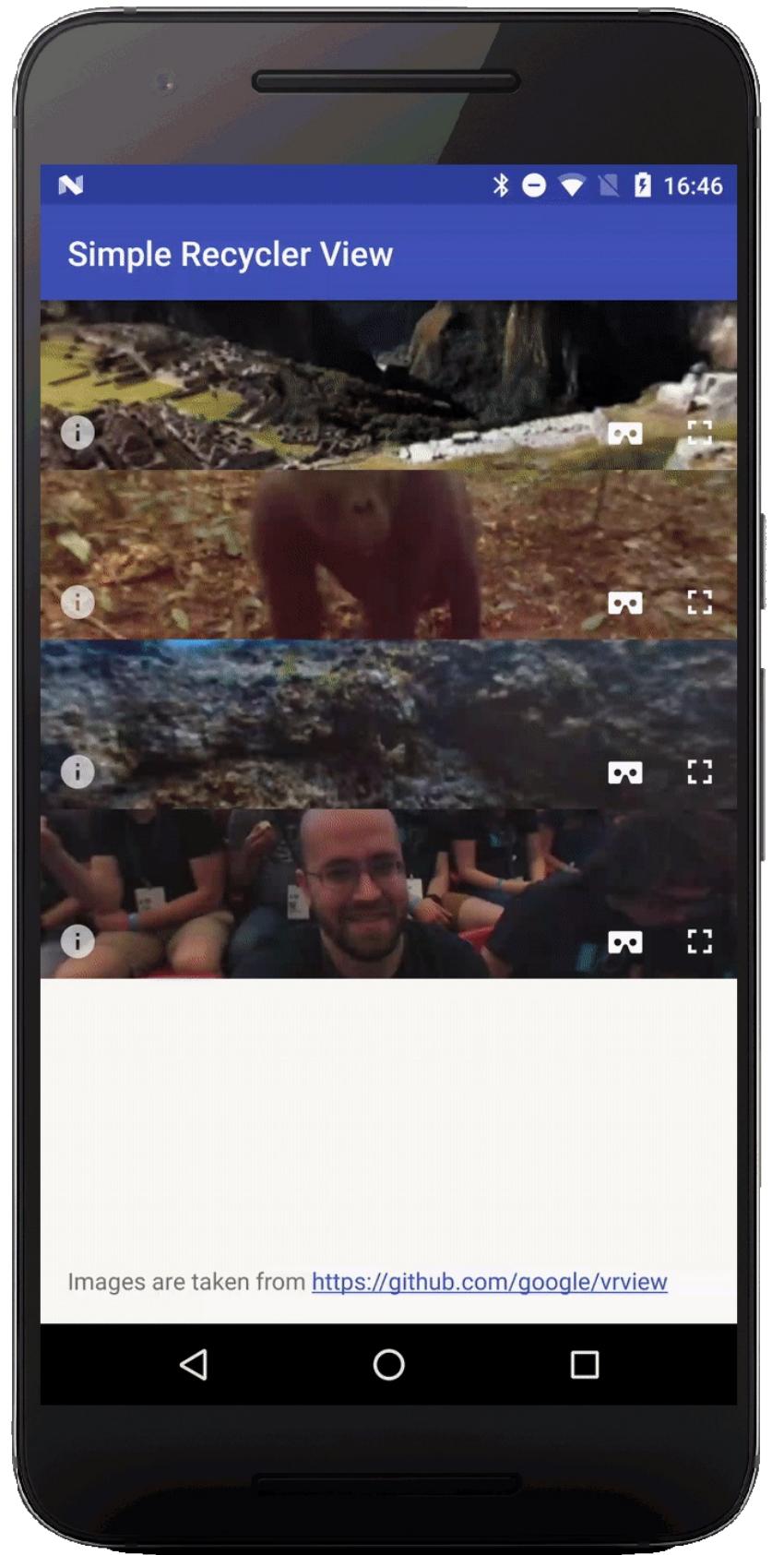
- Android
- IOS
- Web

Not for Unity!



Final result of our current demo

Simple RecyclerView with 4 VrViews 🎥 Images from Google



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Those images are represented by the ids seen earlier



@MarioBodemann

Using VrPanoramaView we'll be able to generate those interactions.

Sample Recycler View Project

Source Code



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Project Layout

MainActivity.java
ConstantResourceAdapter.java

activity_main.xml
resource_layout.xml

Uses ButterKnife to bind activity_main.xml's RecyclerView, creates the ConstantResourceAdapter.

MainActivity.java

```
ButterKnife.bind(this);
```

```
recyclerView.setLayoutManager(  
    new LinearLayoutManager(this,  
        LinearLayoutManager.VERTICAL, false));
```

```
RecyclerView.Adapter adapter =  
    new ConstantResourceAdapter();
```

```
recyclerView.setAdapter(adapter);
```

MainActivity.java

```
ButterKnife.bind(this);

recyclerView.setLayoutManager(
    new LinearLayoutManager(this,
        LinearLayoutManager.VERTICAL, false));

RecyclerView.Adapter adapter =
    new ConstantResourceAdapter();

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MainActivity.java

```
ButterKnife.bind(this);

recyclerView.setLayoutManager(
    new LinearLayoutManager(this,
        LinearLayoutManager.VERTICAL, false));

RecyclerView.Adapter adapter =
    new ConstantResourceAdapter();

recyclerView.setAdapter(adapter);
```

ConstantResourceAdapter.java

```
private static final List<Integer> elements =  
    new ArrayList<>();  
  
static {  
    elements.add(R.drawable.andes);  
    elements.add(R.drawable.congo);  
    elements.add(R.drawable.coral);  
    elements.add(R.drawable.io2016);  
}
```

ConstantResourceAdapter.java

```
static class ResourceItemViewHolder  
    extends RecyclerView.ViewHolder {  
    private final TextView textView;  
  
    public ResourceItemViewHolder(View itemView)  
        super(itemView);  
    textView = (TextView) itemView;  
}  
}
```

ConstantResourceAdapter.java

```
public  
RecyclerView.ViewHolder onCreateViewHolder(...){  
  
    final LayoutInflater layoutInflater =  
        LayoutInflater.from(parent.getContext());  
  
    final View inflate =  
        layoutInflater.inflate(R.layout.resource_layout,...  
  
    return new ResourceItemViewHolder(inflate);  
}
```

ConstantResourceAdapter.java

```
public  
RecyclerView.ViewHolder onCreateViewHolder(...) // {  
  
    final LayoutInflater layoutInflater =  
        LayoutInflater.from(parent.getContext());  
  
    final View inflate =  
        layoutInflater.inflate(R.layout.resource_layout,...  
  
    return new ResourceItemViewHolder(inflate);  
}
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    return new ResourceItemViewHolder(inflate);  
}
```

ConstantResourceAdapter.java

```
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    final LayoutInflater layoutInflater =  
        LayoutInflater.from(parent.getContext());  
  
    final View inflate =  
        layoutInflater.inflate(R.layout.resource_layout,...)  
  
    return new ResourceItemViewHolder(inflate);  
}
```

ConstantResourceAdapter.java

```
public void onBindViewHolder(
    RecyclerView.ViewHolder baseHolder,
    int position) {

    final ResourceItemViewHolder viewHolder =
        (ResourceItemViewHolder) baseHolder;

    viewHolder.textView.setText(
        elements.get(position));
}
```

resource_layout.xml

```
<TextView  
    [...]  
    android:layout_height="100dp"  
    android:textSize="32sp"  
/>
```

Result



Making the change

Add *.aar dependencies to app

- common.aar
- commonwidget.aar and
- panowidget.aar

from Google VR Android Github

Change in resource_layout.xml

<TextView

[...]

to

<com.google.vr.sdk.widgets.pano.VrPanoramaView

[...]

Replacing TextView with VrPanoramaView

Change in ConstantResourceAdapter.java

```
class ResourceItemViewHolder  
    extends RecyclerView.ViewHolder {  
  
    private final VrPanoramaView vrPanoramaView;  
  
    public ResourceItemViewHolder(View itemView) {  
        super(itemView);  
        vrPanoramaView = (VrPanoramaView) itemView;  
    }  
}
```

```
@Override public void onBindViewHolder(...) //{

    final ResourceItemViewHolder viewHolder =
        (ResourceItemViewHolder) baseHolder;
    final Resources resources =
        viewHolder.vrPanoramaView.getResources();
    final Bitmap bitmap =
        BitmapFactory.decodeResource(resources,
            elements.get(position));
    viewHolder.vrPanoramaView
        .loadImageFromBitmap(bitmap, null);

}
```

```
@Override public void onBindViewHolder(...) //{

    final ResourceItemViewHolder viewHolder =
        (ResourceItemViewHolder) baseHolder;

    final Resources resources =
        viewHolder.vrPanoramaView.getResources();
    final Bitmap bitmap =
        BitmapFactory.decodeResource(resources,
            elements.get(position));
    viewHolder.vrPanoramaView
        .loadImageFromBitmap(bitmap, null);

}
```

```
@Override public void onBindViewHolder(...) //{

    final ResourceItemViewHolder viewHolder =
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        viewHolder.vrPanoramaView.getResources();

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    final Bitmap bitmap =
        BitmapFactory.decodeResource(resources,
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    viewHolder.vrPanoramaView
        .loadImageFromBitmap(bitmap, null);

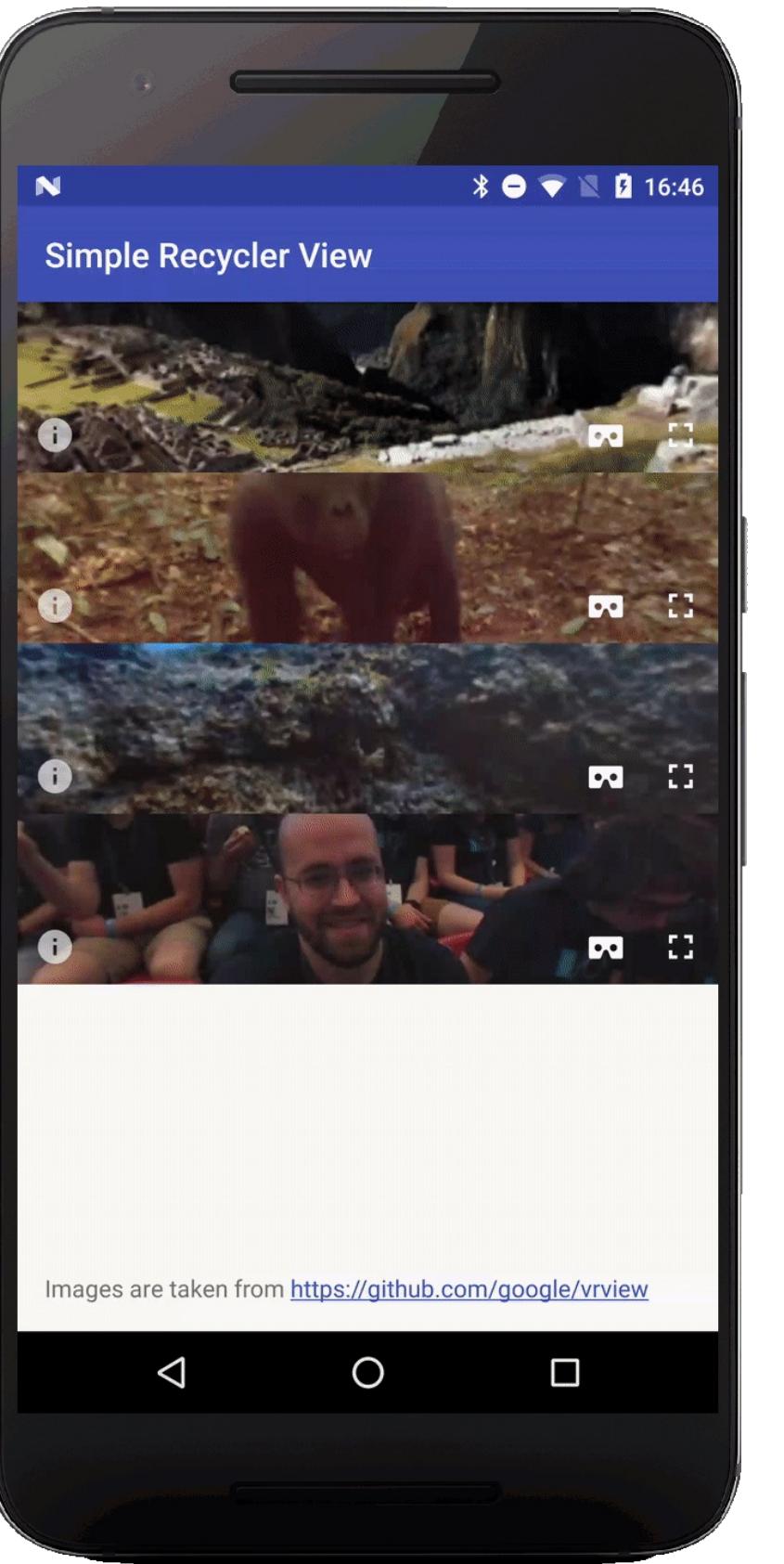
}
```

```
@Override public void onBindViewHolder(...) //{

    final ResourceItemViewHolder viewHolder =
        (ResourceItemViewHolder) baseHolder;
    final Resources resources =
        viewHolder.vrPanoramaView.getResources();
    final Bitmap bitmap =
        BitmapFactory.decodeResource(resources,
            elements.get(position));
    viewHolder.vrPanoramaView
        .loadImageFromBitmap(bitmap, null);
}
```

Final result of our current demo

Result



Images are taken from <https://github.com/google/vrview>

@MarioBodemann

What did we do?

- Loaded a equirectangular image into a bitmap
- Let it be displayed by a VrPanoramaView
- Use Daydream SDK to display it

Limitations of Daydream for Android SDK

- using 3D models has to be done by
 - either low level OpenGL or
 - 3rd party 3d engine



Cardboard



How does Cardboard work?

- easy to produce
- available from different companies
- in different styles/interactions
- You just need a phone™



How do you program for it?

Googles SDKs are available for:

- Android (OpenGL)
- iOS (Objective C)
- Unreal Engine (NEW)
- Unity Engine (C# / JS) x (U.G., A)

What do those SDKs provide?

- lens distortion correction
- spatial audio
- head tracking
- 3D calibration
- side-by-side rendering

What else do they provide?

- stereo geometry configuration
- user input event handling
- see <https://vr.google.com/developers/>

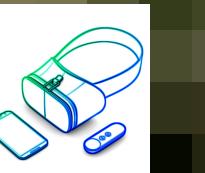
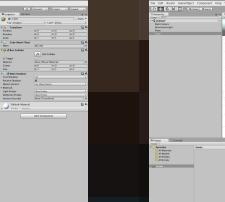
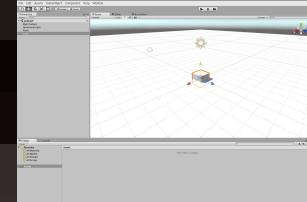
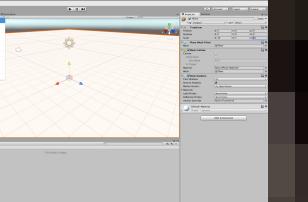
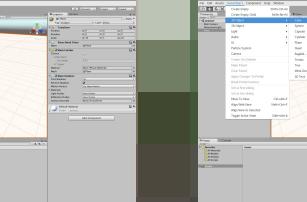
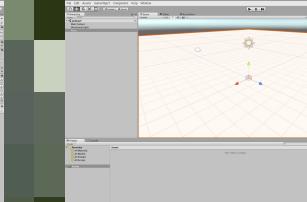
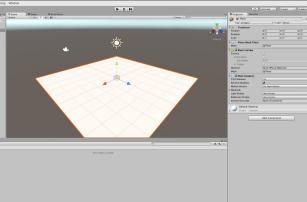
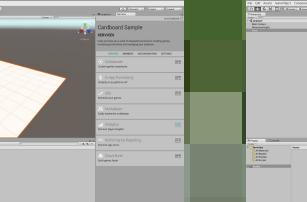
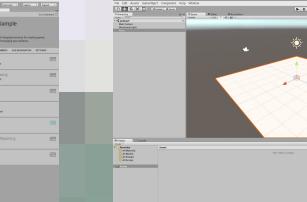
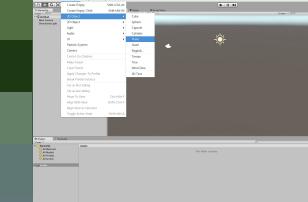
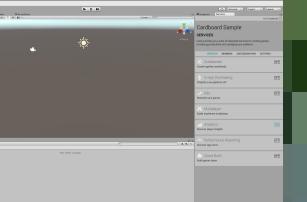
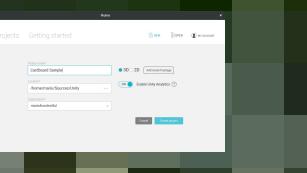
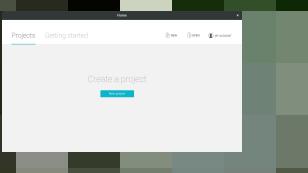


How do I write a Unity App?



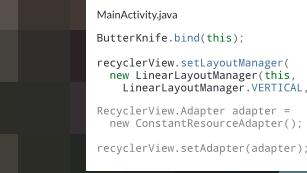
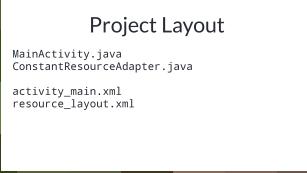
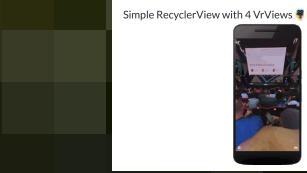
Google Daydream Technical Preview

- special preview build from unity
- Out of the box, basic functionality
- or Google VR Plugin
- Installer for Unity on [Windows](#) (or [macOS](#))
- Plugin gives full controller support and more



Daydream SDK features

- Same as Cardboard SDK
- Controlling the controller
- orientation/acceleration
- Input (Clickpad, xy, clicked, App Button, Vol+/-)
- spatial audio engine



What will you build?



General



Controller



Designing



Google VR Github



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