

Audience

- Android programmer? 🤖
- VR programmer? 🤖

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...



- 🔑: headless CMS: contentful.com
- 🐦: [@MarioBodemann](https://twitter.com/MarioBodemann)
- 📄: bit.ly/mbvrberlin
 - Please interrupt ⏹ ⏺ !

Agenda

The collage consists of nine white rectangular boxes arranged in a 3x3 grid, each containing text and small images related to VR technologies. The background is a grid of various colored pixels.

- 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?**
Prerequisites
 - clone Googles github for unity
<https://github.com/googlevr/gvr-unity-sdk> repository
 - install and open Unity
 - Mac: <https://store.unity.com/>
 - Windows: <http://forum.unity3d.com/threads/unity-on-linux-release-notes-and-known-issues.350256/>
- Daydream**
- Daydream SDK features**
 - Same as Cardboard SDK
 - Controlling the controller
 - orientation/acceleration
 - input (Clickpad: xy, clicked, App Button, Vol+/-)
 - spatial audio engine



Cardboard

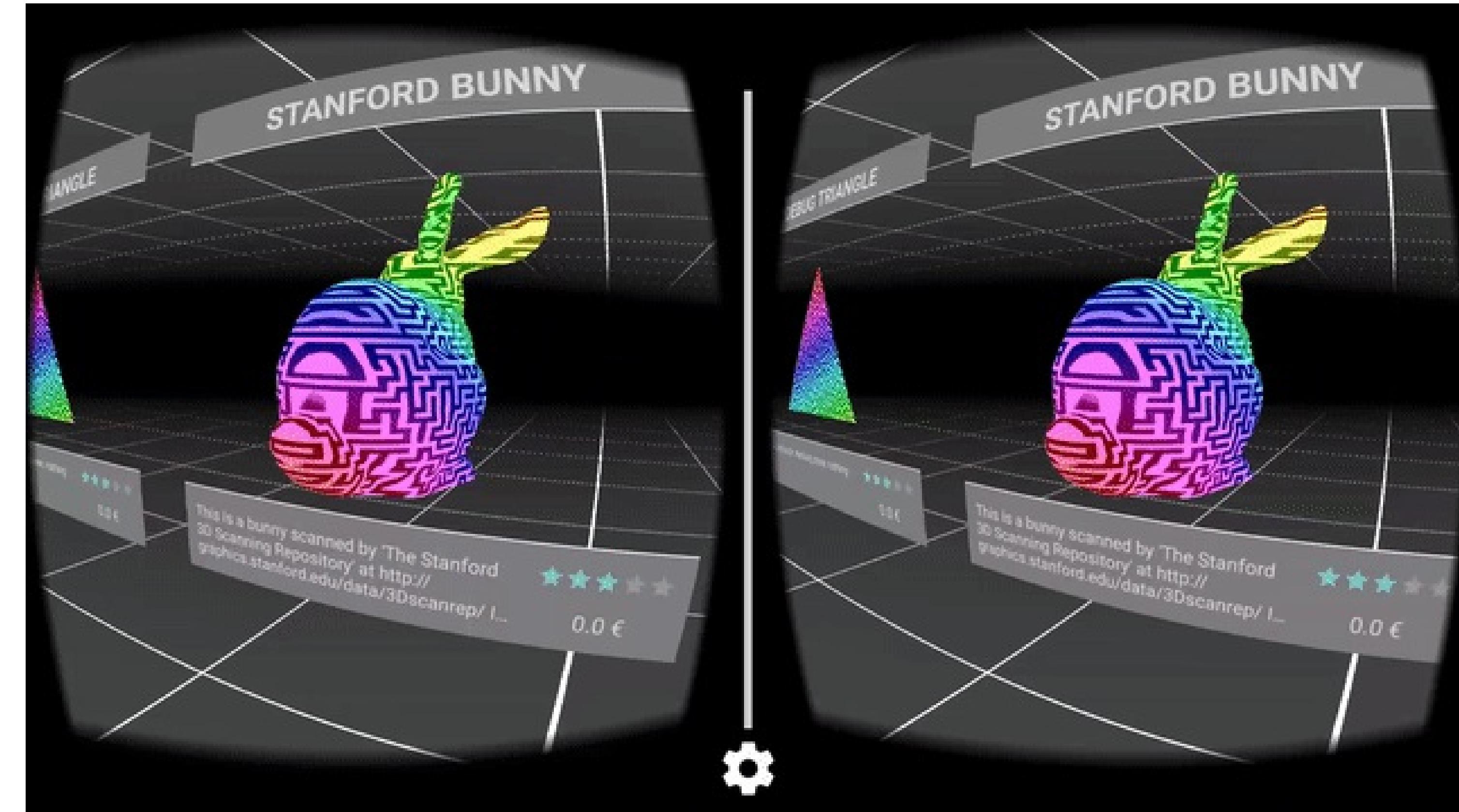
Google Cardboard

- easy to produce
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- in different styles/interactions
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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 you program for it?

Googles SDK are available for

- Android (OpenGL)
- IOS (Objective C)
- 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 developer.google.com/vr/android/

How do I write a Unity App?



Prerequisites

- clone Googles github for unity
<https://github.com/googlevr/gvr-unity-sdk> repsoitory
- install and open Unity
 -  / https://store.unity.com/
 - : <http://forum.unity3d.com/threads/unity-on-linux-release-notes-and-known-issues.350256/>

Create a new Project

Home

x

Projects

Getting started

NEW

OPEN

MY ACCOUNT

Create a project

New project

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](#)

File Edit Assets GameObject Component Help Window



Hierarchy

Create (Q+All)

Untitled

Main Camera
Directional Light

See it

Scene

Game

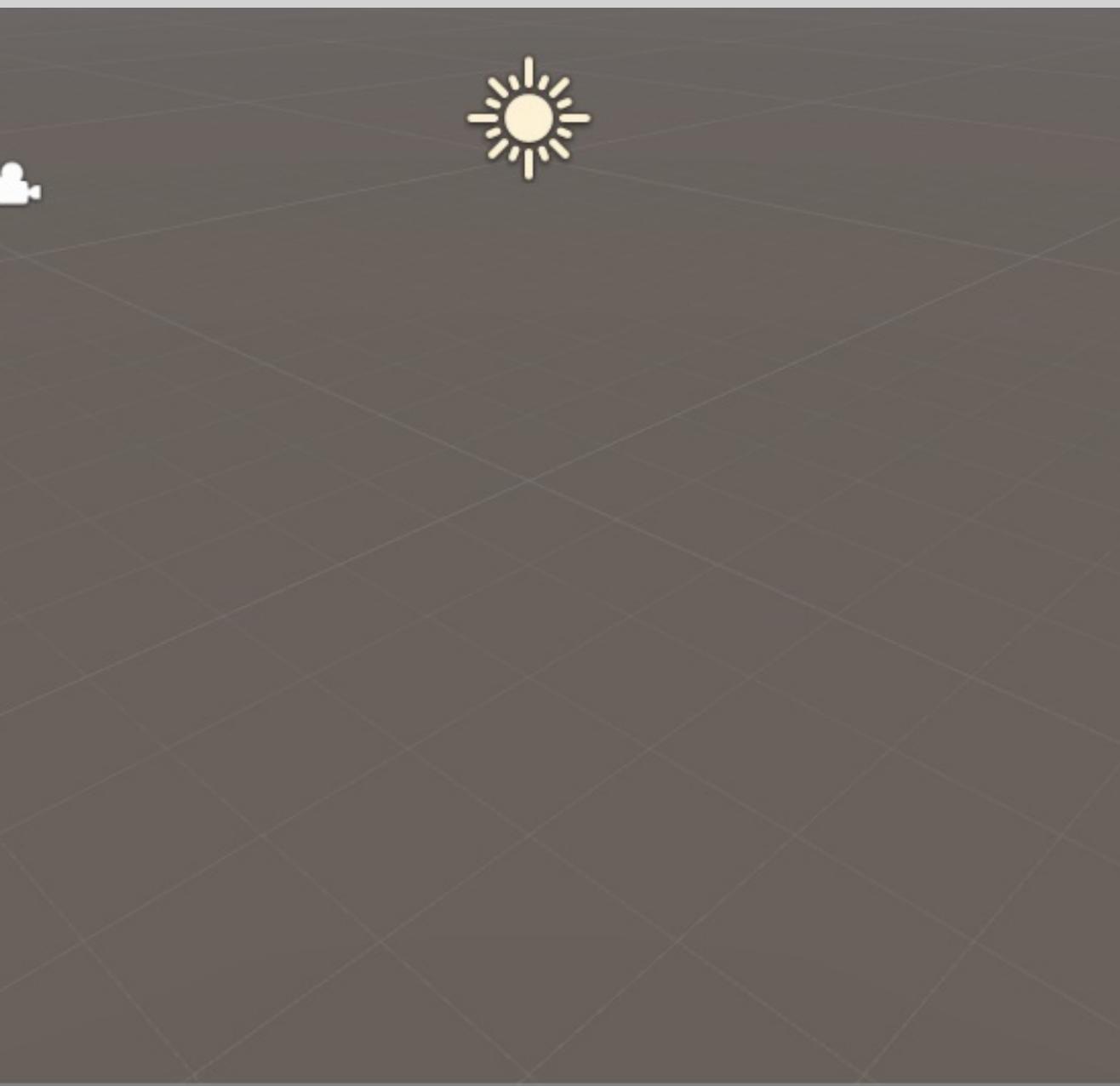
Asset Store



Cloud Account Layers Layout

Inspector Services

Go to Dashboard



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

Project Console

Create

Favorites

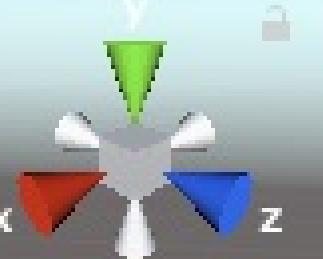
- All Materials
- All Models
- All Prefabs
- All Scripts

Assets

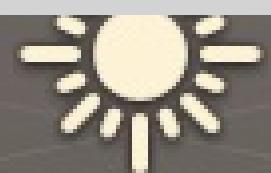
This folder is empty

Assets

Shaded | 2D | ☼ | ⌛ | 🔍 | Gizmos | ⚙ All



Main stage: see everything important happening here



Persp

Cardboa SERVICES

Unity provides you
increasing producti

SERVICES

Collaborate
Create together se

\$ In-App Pa
Simplify cross-plat

Ads
Monetize your game

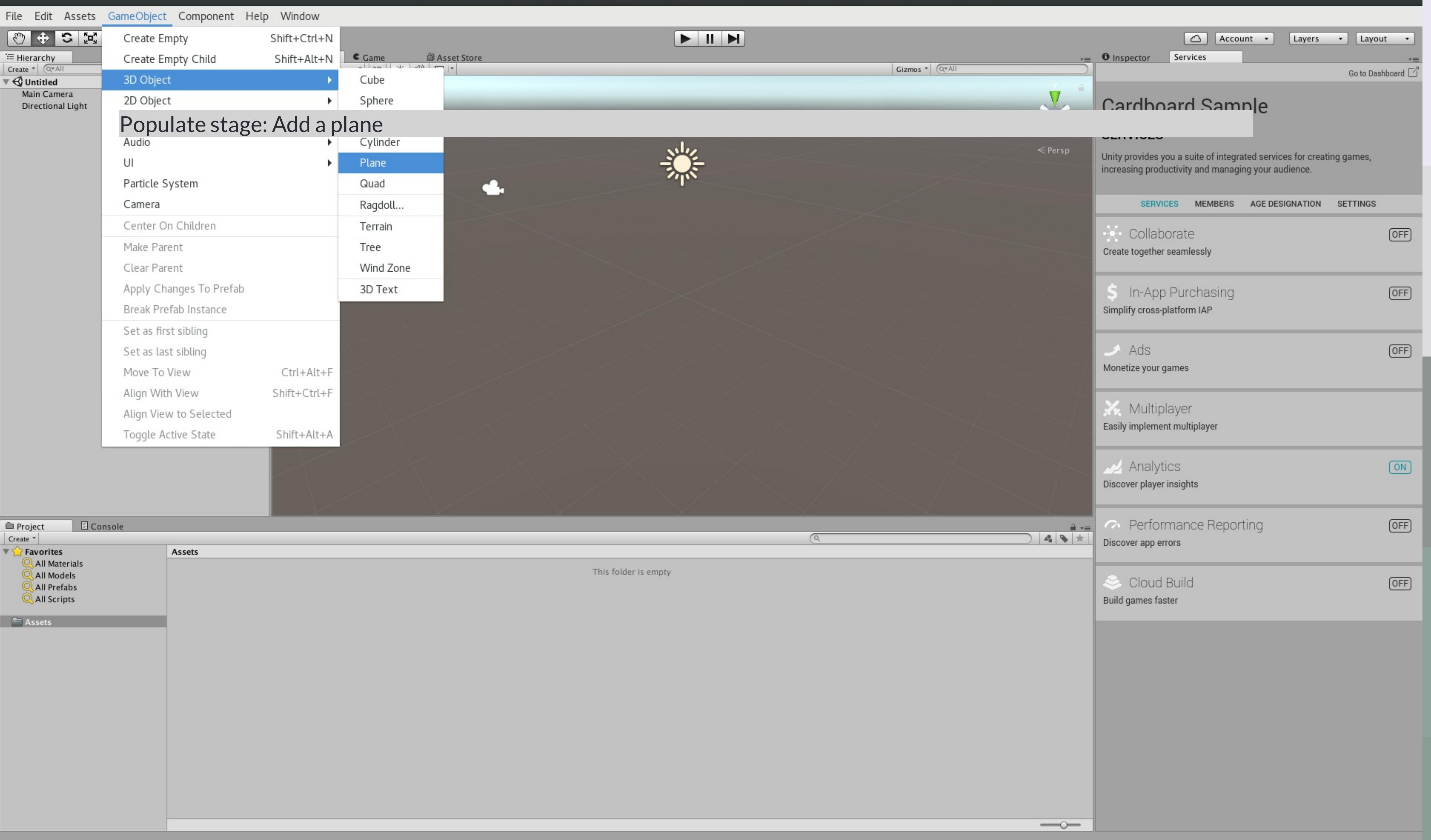
Multipla
Easily implement

Analytic
Discover player ins

Perform
Discover app error

Cloud Bu

This folder is empty





Menu > GameObject > 3D Object > Plane

Create Empty

Shift+Ctrl+N

Create Empty Child

Shift+Alt+N

3D Object

2D Object

Light

Audio

UI

Particle System

Camera

Center On Children

Make Parent

Clear Parent

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+A)
Untitled*
Main Camera
Directional Light
Plane

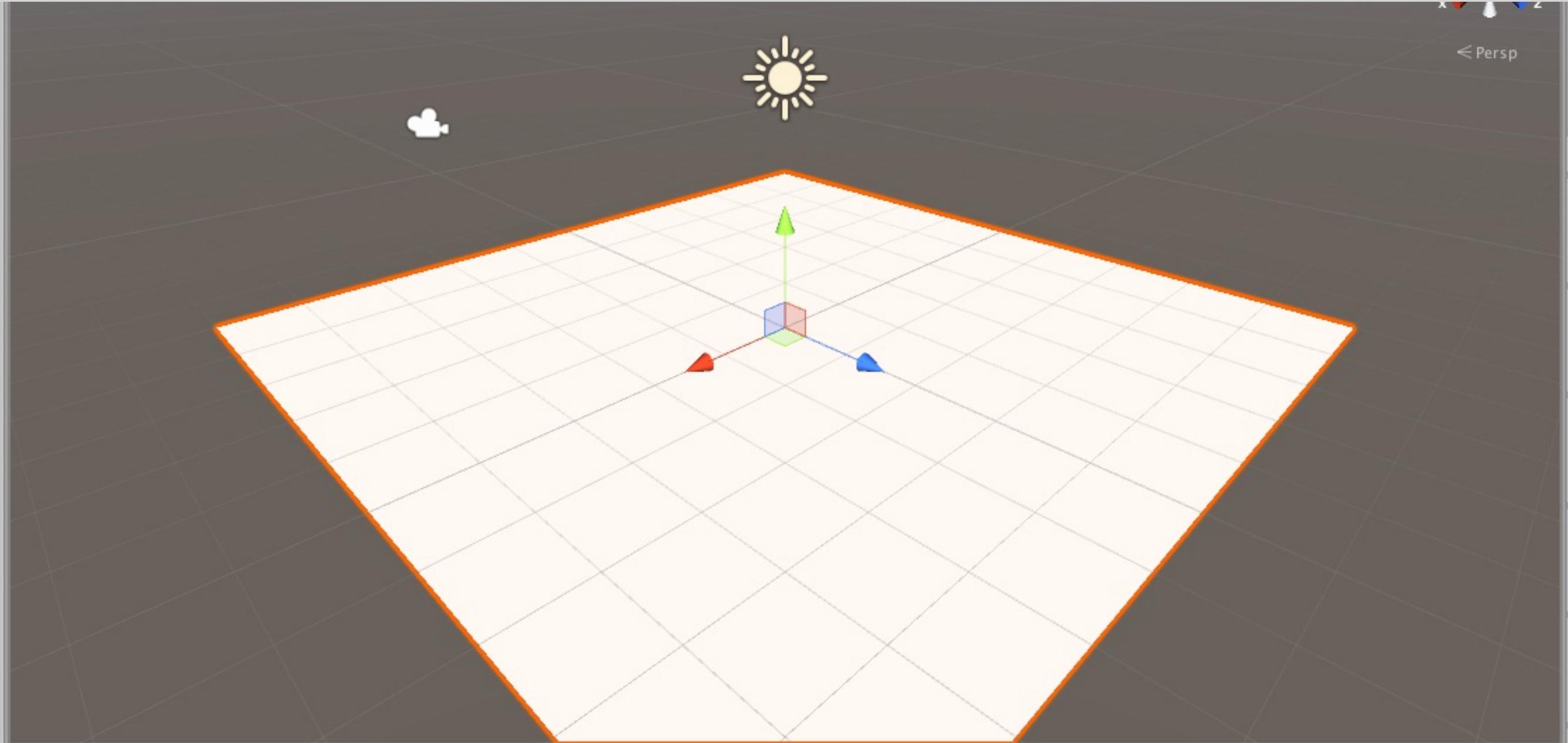
Scene Game Asset Store

Gizmos (Q+A)

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
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In-App Purchasing
Simplify cross-platform IAP

Ads
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Cloud Build
Build games faster

Project Console

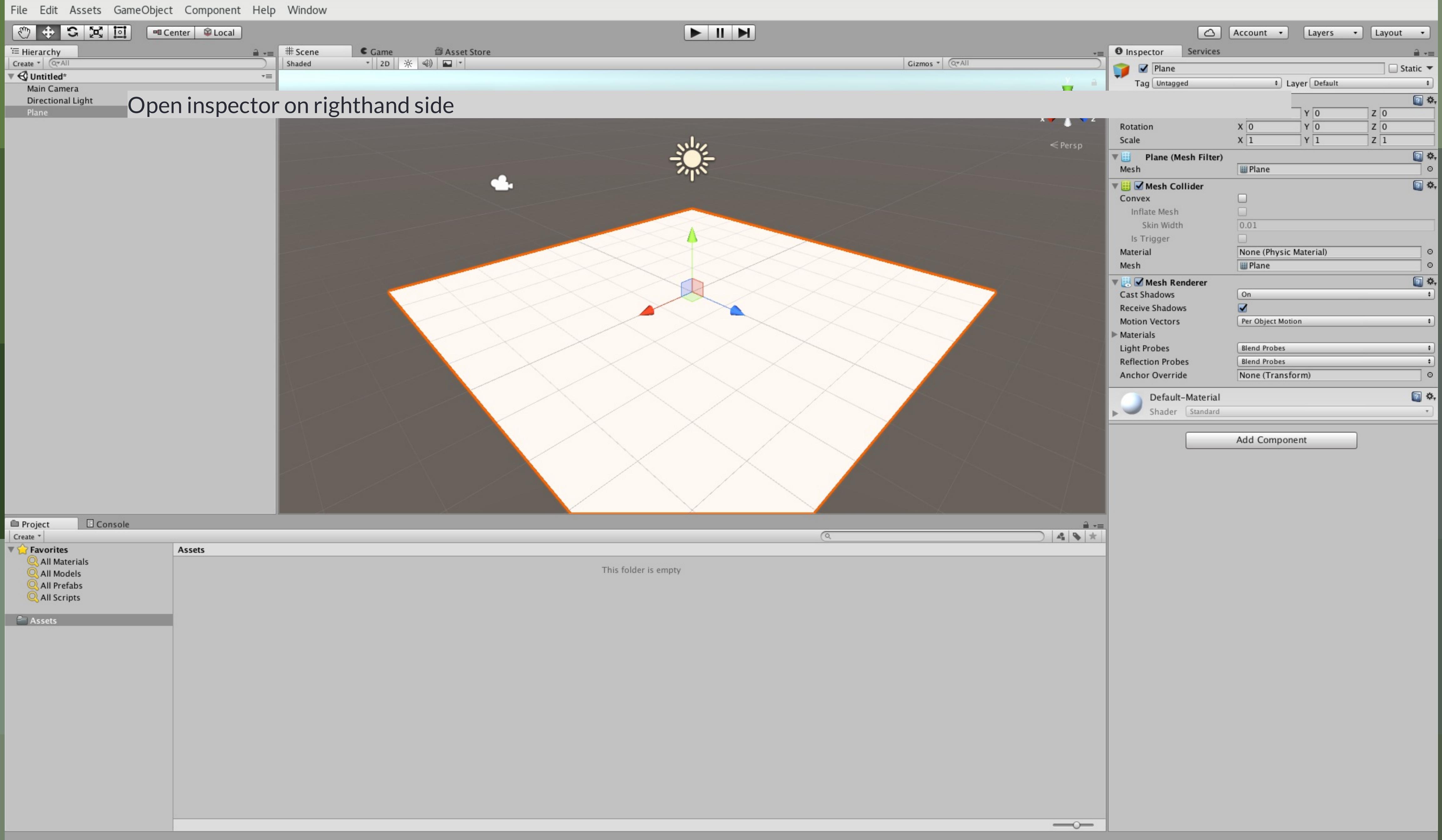
Create

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

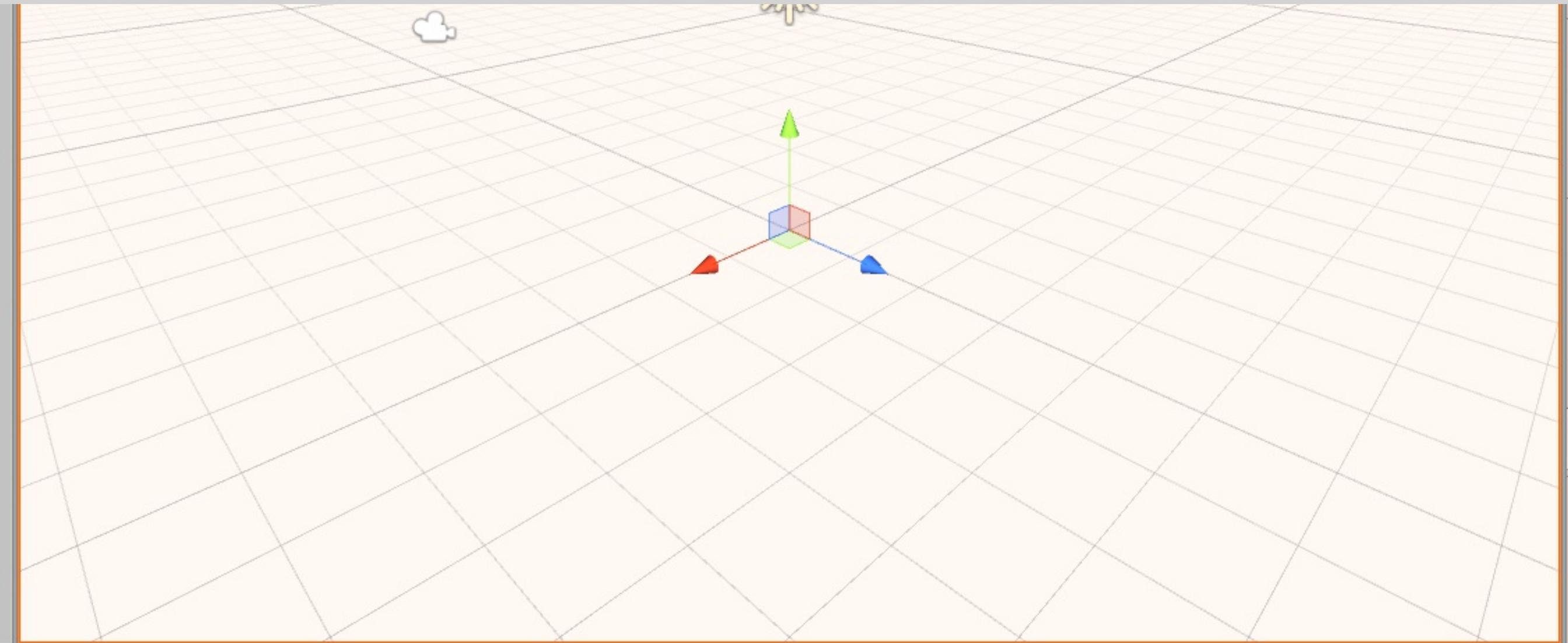
Search for Inspector > Transform > Scale

< Persp

File Edit Assets GameObject Component Help Window



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



Project Console

Create Favorites
All Materials
All Models
All Prefabs
All Scripts

Assets

This folder is empty



Filter



Account

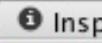
Layers

Layout



Services

Lock



Static



Layer

Default

Y 0 Z 0

Y 0 Z 0

Y 1 Z 10



Mesh Collider

Convex

Inflate Mesh

Skin Width

Is Trigger

Material

Mesh

Mesh Renderer

Cast Shadows

Receive Shadows

Motion Vectors

Materials

Light Probes

Reflection Probes

Anchor Override

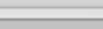
Default-Material

Shader

Standard

Add Component

Default



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
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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

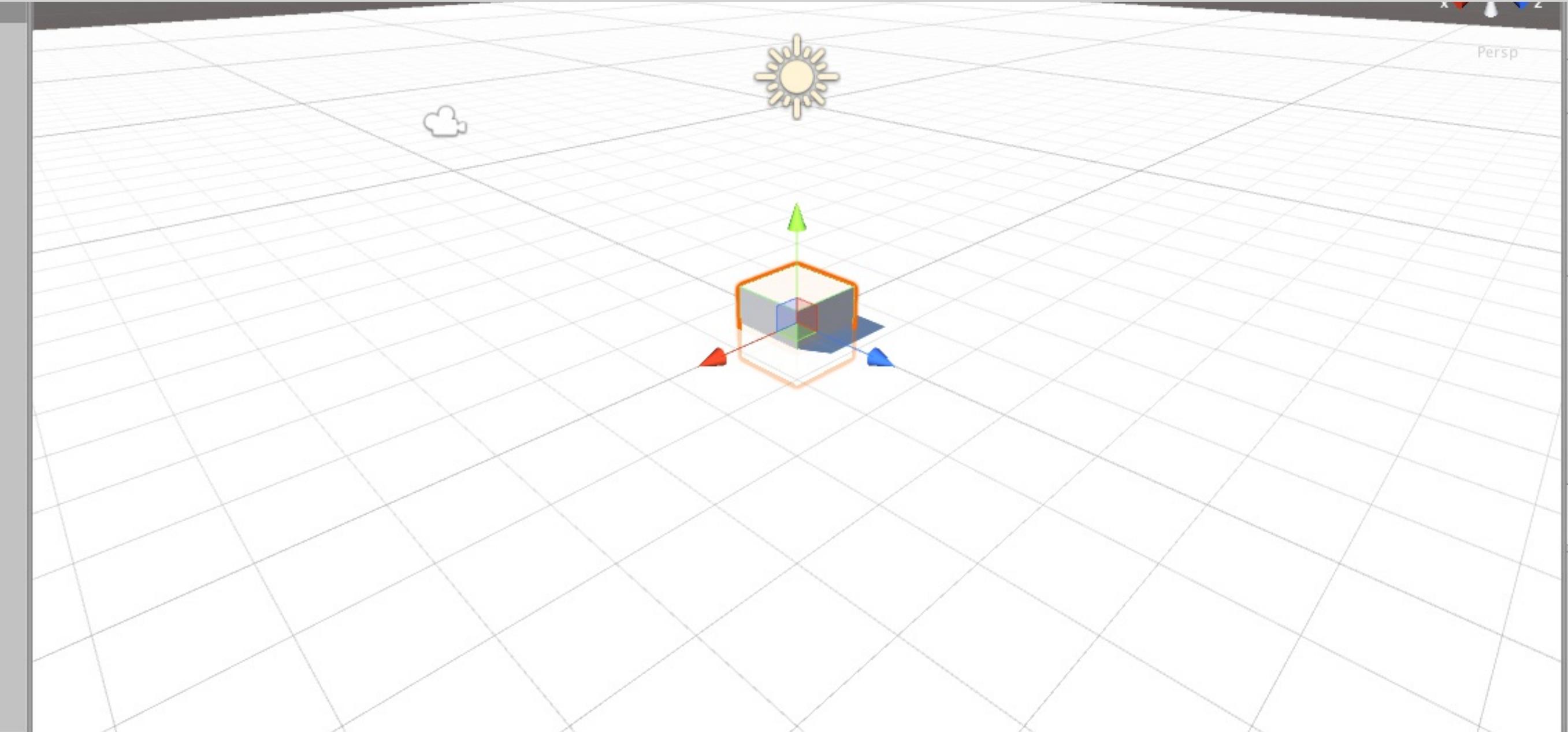
Favorites
All Materials
All Models
All Prefabs
All Scripts

Assets This folder is empty

File Edit Assets GameObject Component Help Window



A Cube appears

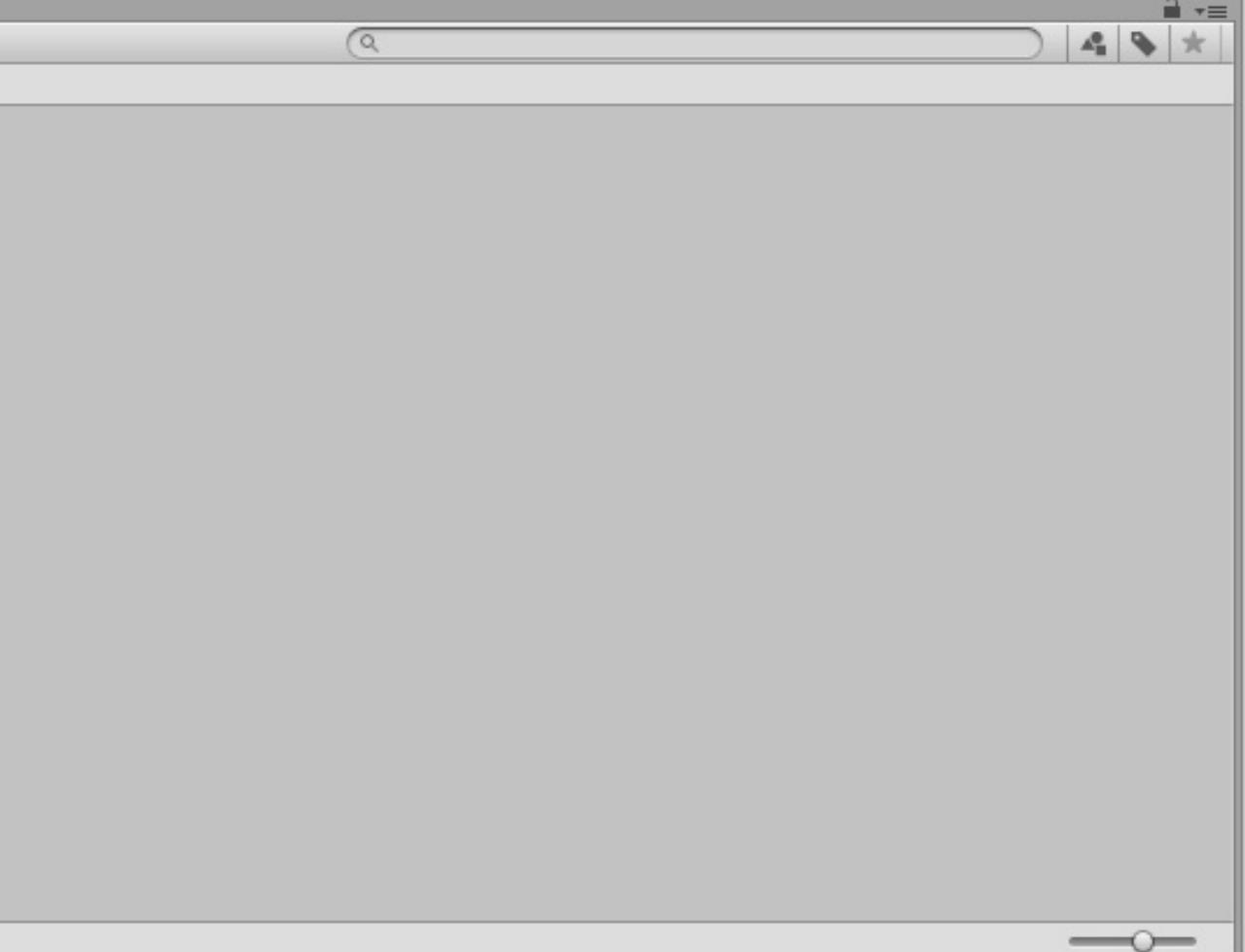


Project Console

Favorites
All Materials
All Models
All Prefabs
All Scripts

Assets

This folder is empty



Scene Game Asset Store

Gizmos All

Cloud Account Layers Layout

Inspector Services

Static

Cube

Untagged

Layer Default

Rotation

X 0 Y 0 Z 0

Scale

X 1 Y 1 Z 1

Cube (Mesh Filter)

Cube

Box Collider

Edit Collider

Is Trigger

None (Physic Material)

Material

X 0 Y 0 Z 0

Center

X 1 Y 1 Z 1

Size

Mesh Renderer

On

Cast Shadows

Receive Shadows

Motion Vectors

Per Object Motion

Materials

Blend Probes

Light Probes

Blend Probes

Reflection Probes

Anchor Override

None (Transform)

Default-Material

Shader Standard

Add Component

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

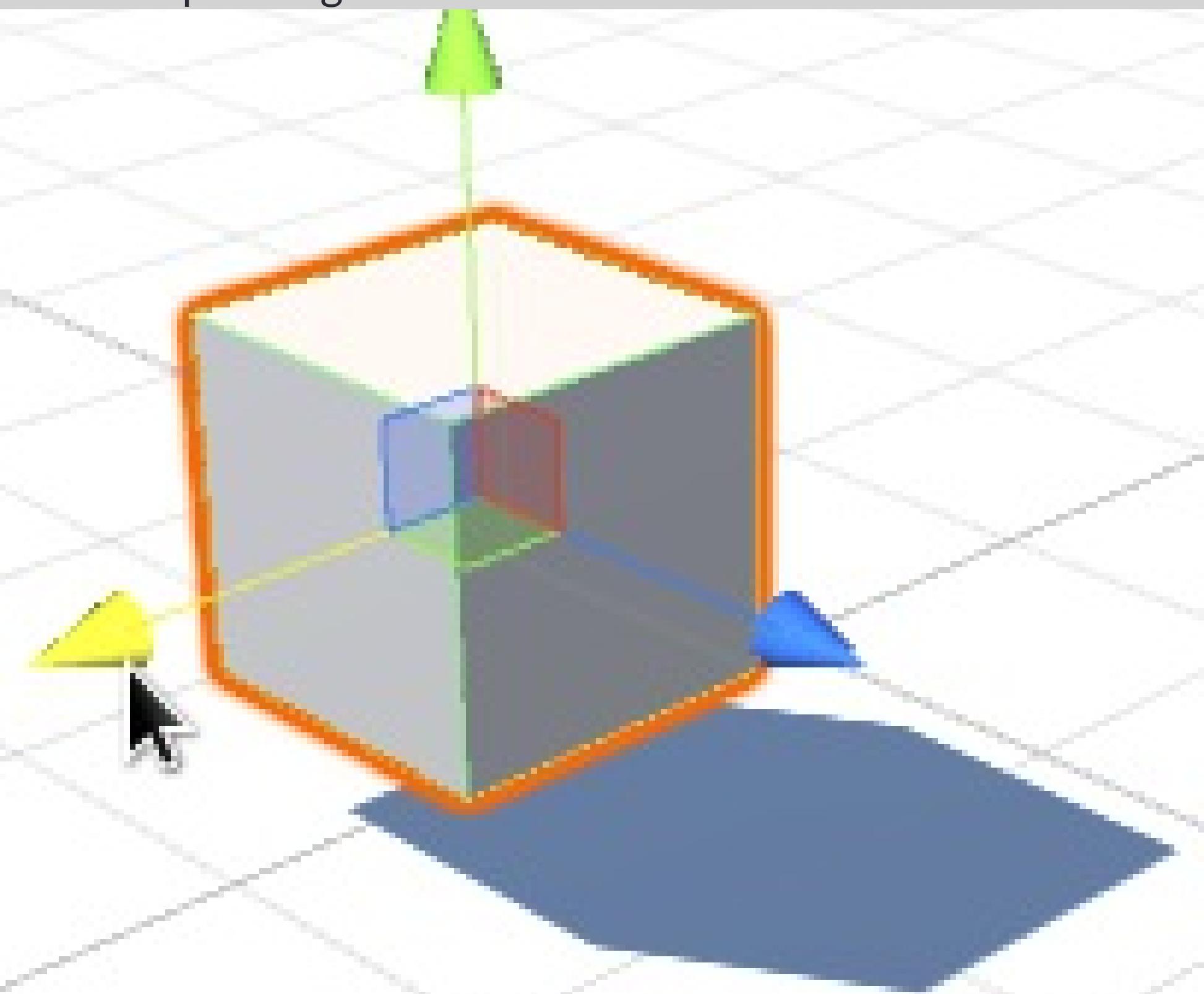
Shaded 2D 3D Gizmos Q All

Persp

Cloud Sun



Take a look where the mouse cursor is pointing at.



File Edit Assets GameObject Component Help Window

Hierarchy Scene Game Asset Store

Main Camera

Directional Light
Plane
Cube
Sphere
Capsule
Cylinder

Untitled*

Adding one of each: Cube/Sphere/Cylinder/Capsule

3D Viewport (Persp)

Camera Preview

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

Camera Settings:

- Camera
- Clear Flags: Skybox (Everything)
- Background: Perspective (Field of View: 60)
- Projection: Clipping Planes (Near: 0.3, Far: 1000)
- Viewport Rect: X 0 Y 0 W 1 H 1
- Depth: -1 (Use Player Settings)
- Rendering Path: None (Render Texture)
- Occlusion Culling:
- HDR:
- Target Display: Display 1

GUI Layer, Flare Layer, Audio Listener

Add Component

Project Console

Favorites

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

Assets

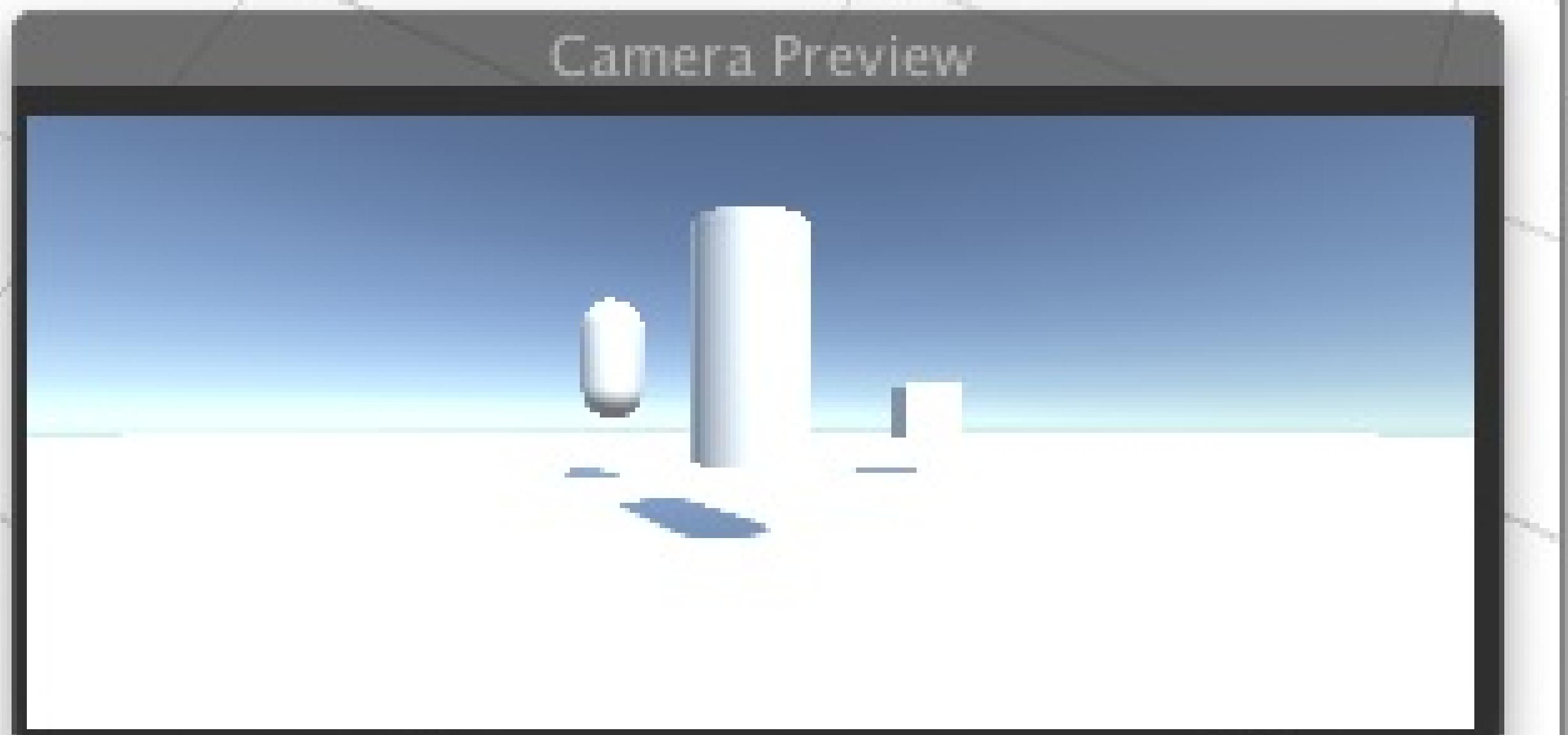
This folder is empty

Occlusion Culling

HDR

T----> Display

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

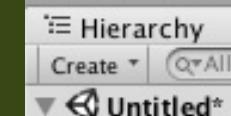


<input type="checkbox"/>	<input checked="" type="checkbox"/>	GUI Layer
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Flare Layer
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Audio Listener
		<input type="checkbox"/>

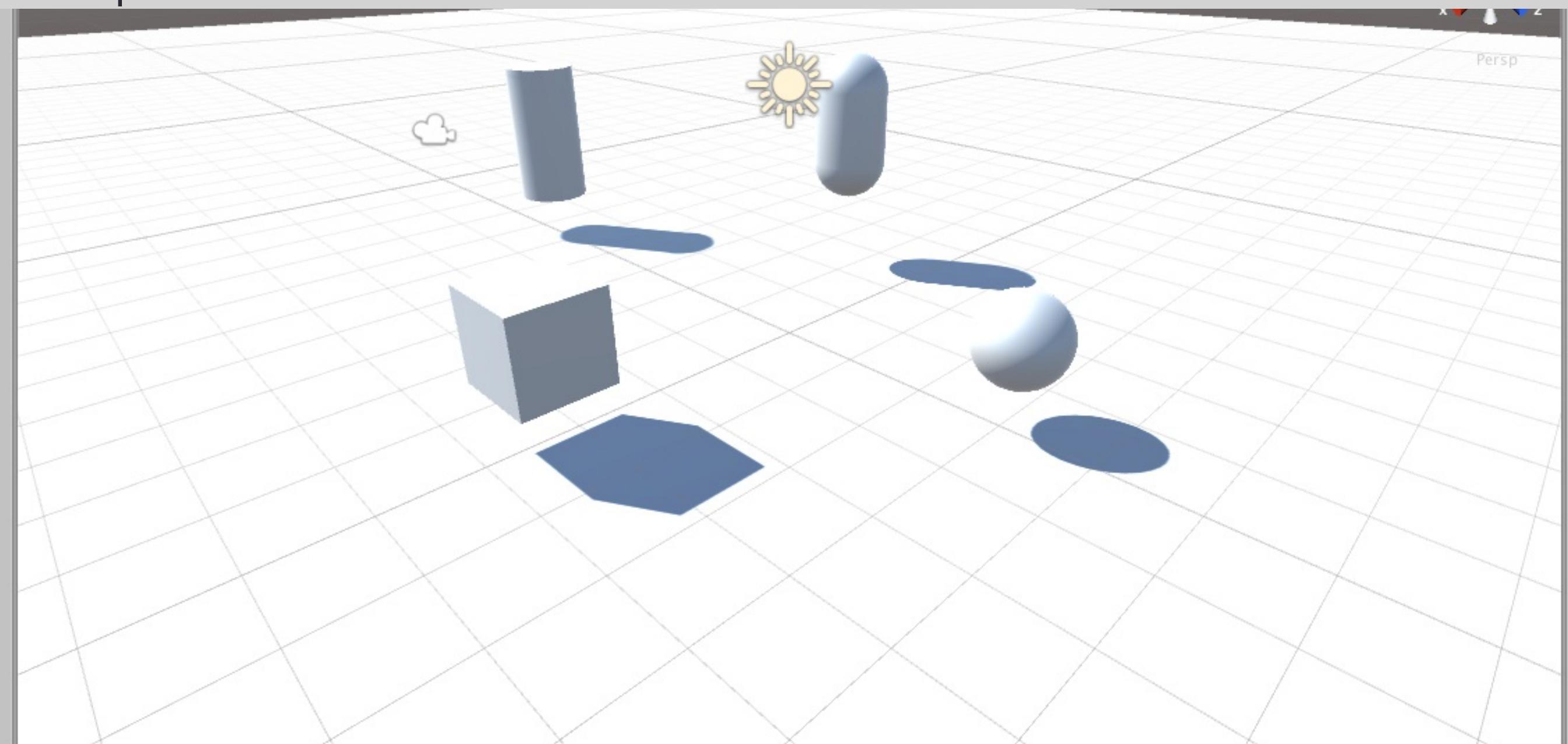
File Edit Assets GameObject Component Help Window



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+

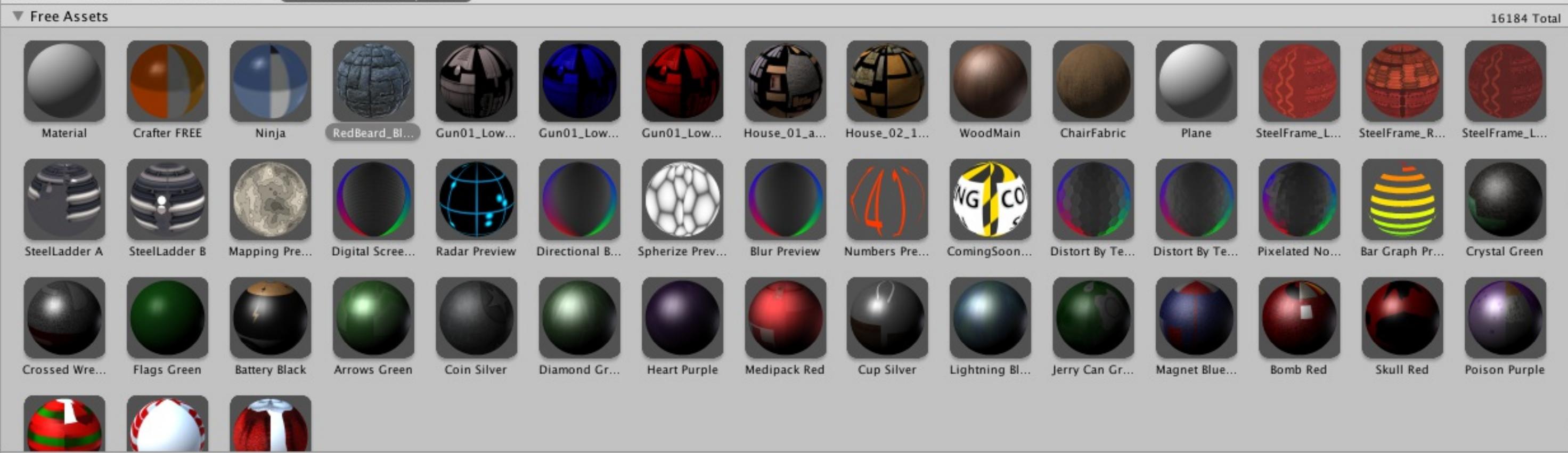


16184 Total

Favorites

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

Assets

**Procedural Properties**

Random Seed: Randomize 0
 Randomizer: 1
 Uniform / Random:

Generated Textures

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. On the far right, there is a preview window showing a dark sphere and a smaller preview below it.

Project

Console

Create

Favorites

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

Assets

Search

Free Assets

All Materials

All Models

All Prefabs

All Scripts

Material

Click on Asset Store

ected folder

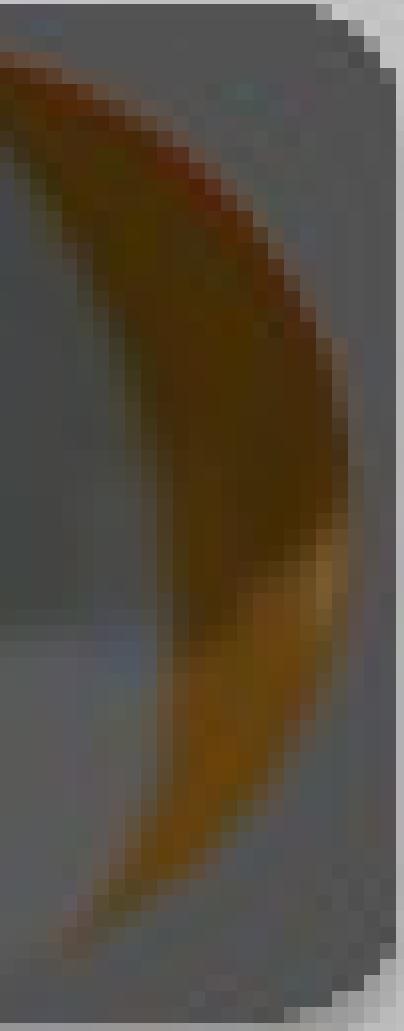
Asset Store: 999+ / 999+

FREE DOWNLOAD

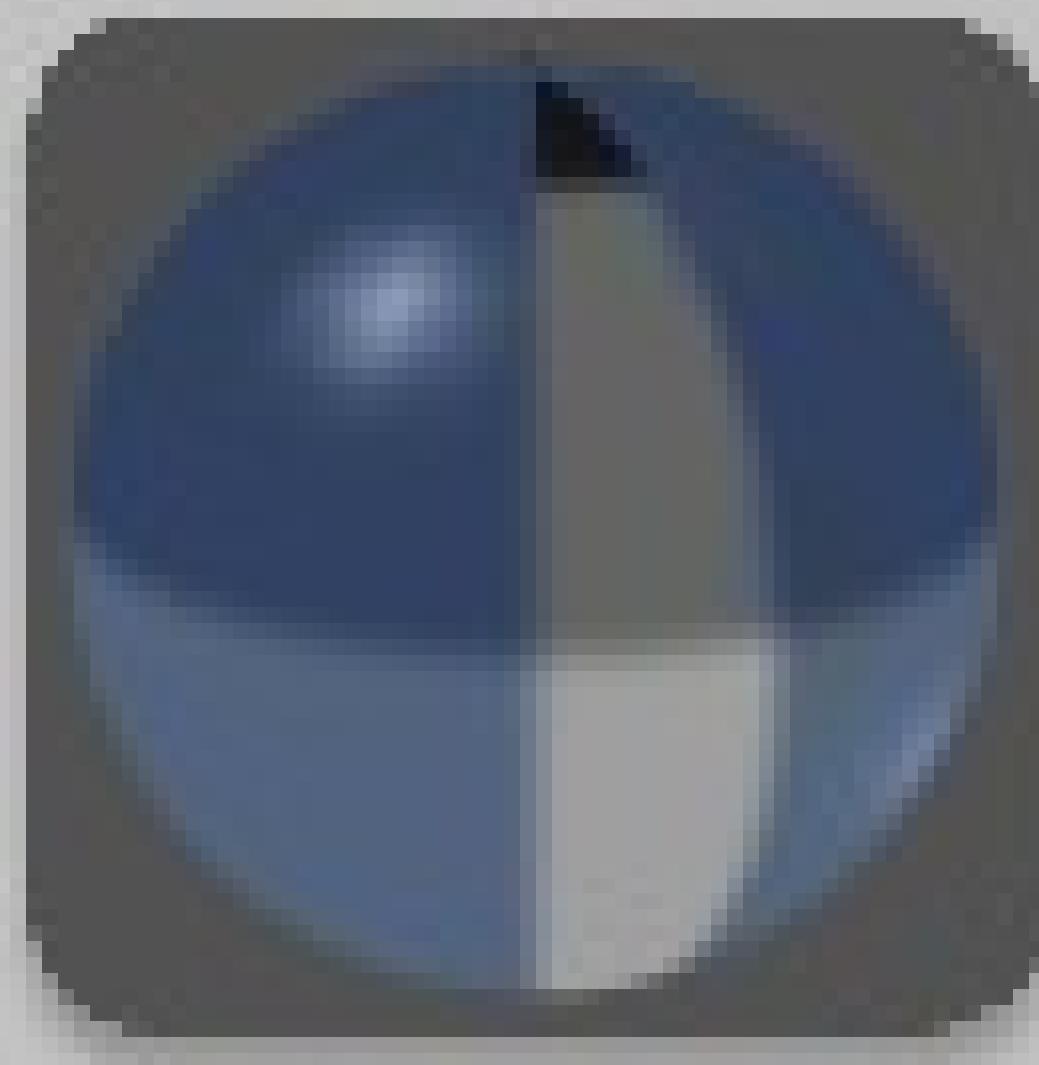
ASSET SOURCE: 3D3F

1

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



FREE



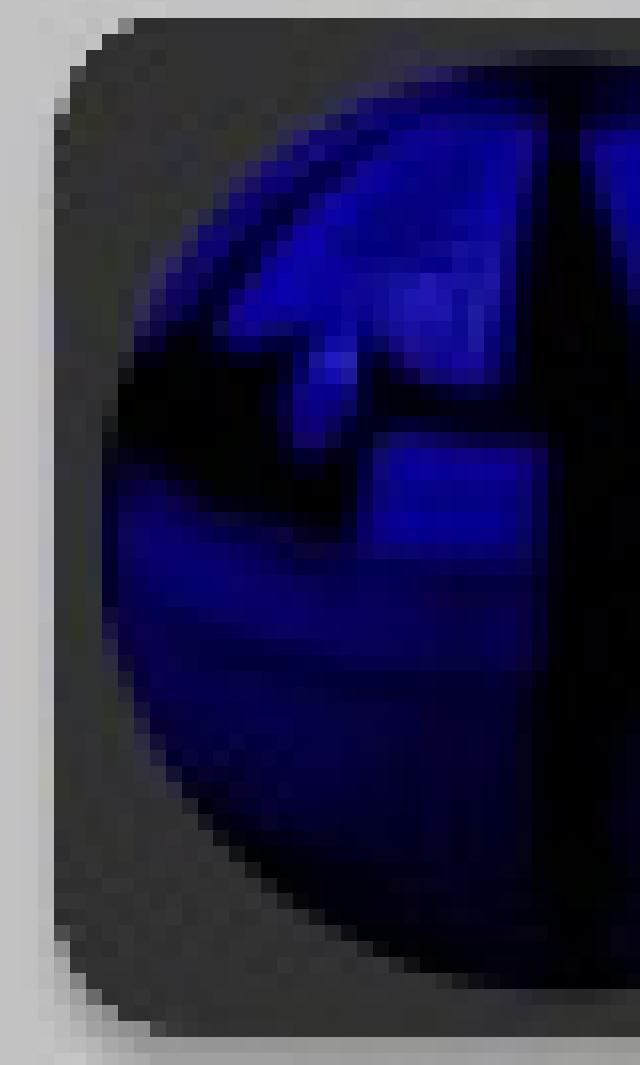
Ninja



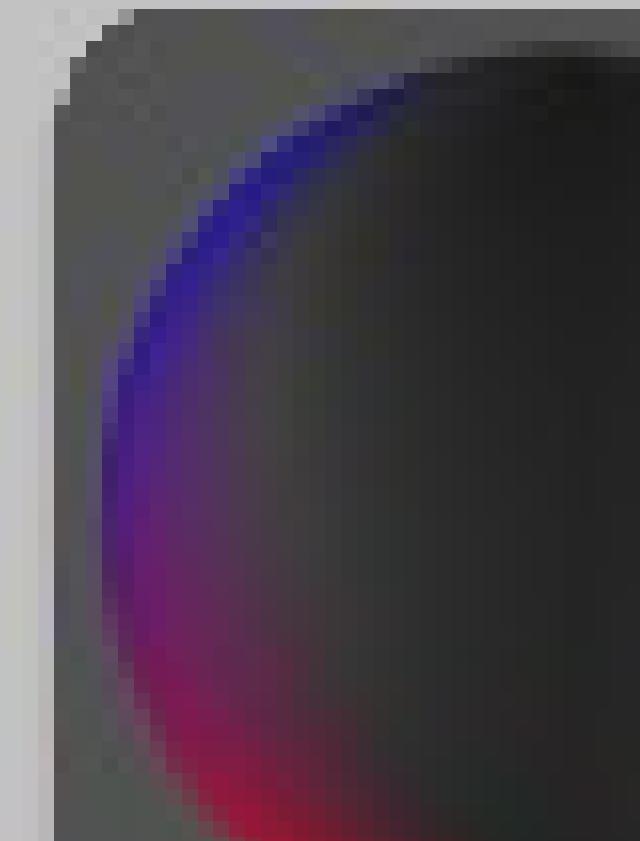
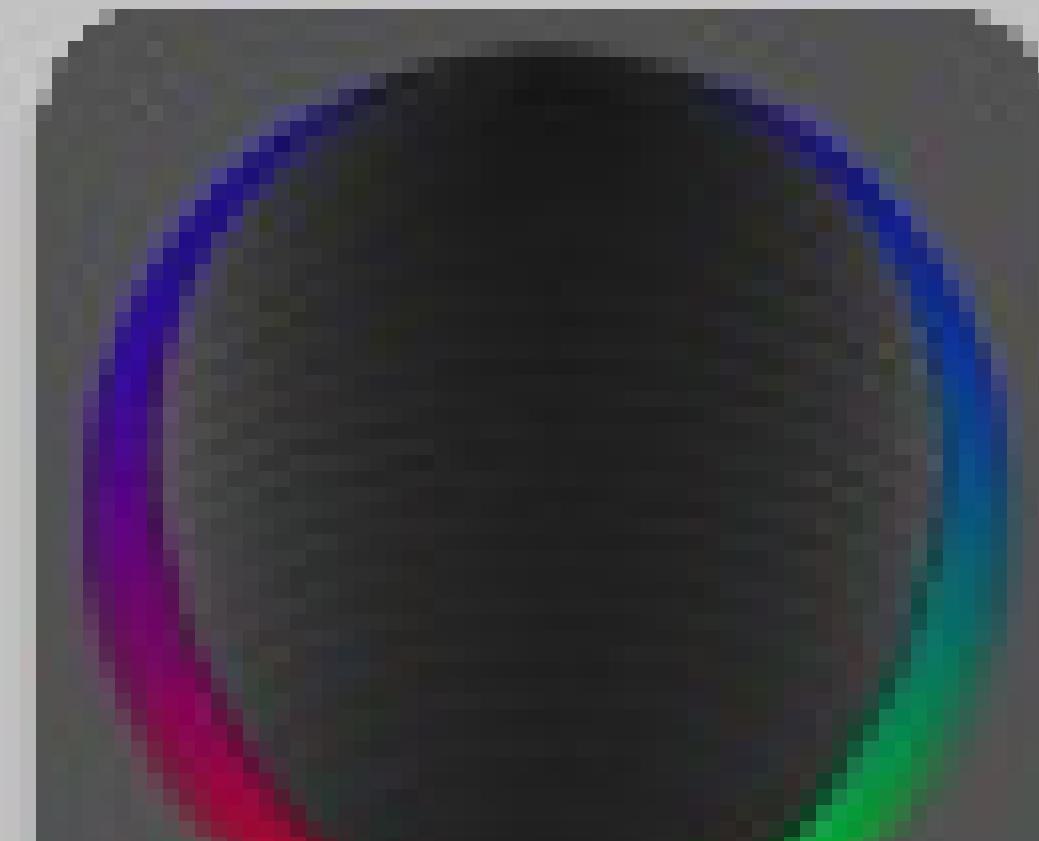
RedBeard_Blu...



Gun01_Low...



Gun01_L...





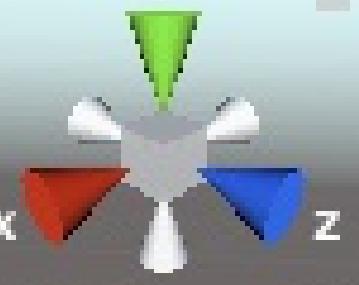
Account

Layers

Layout

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

Gizmos



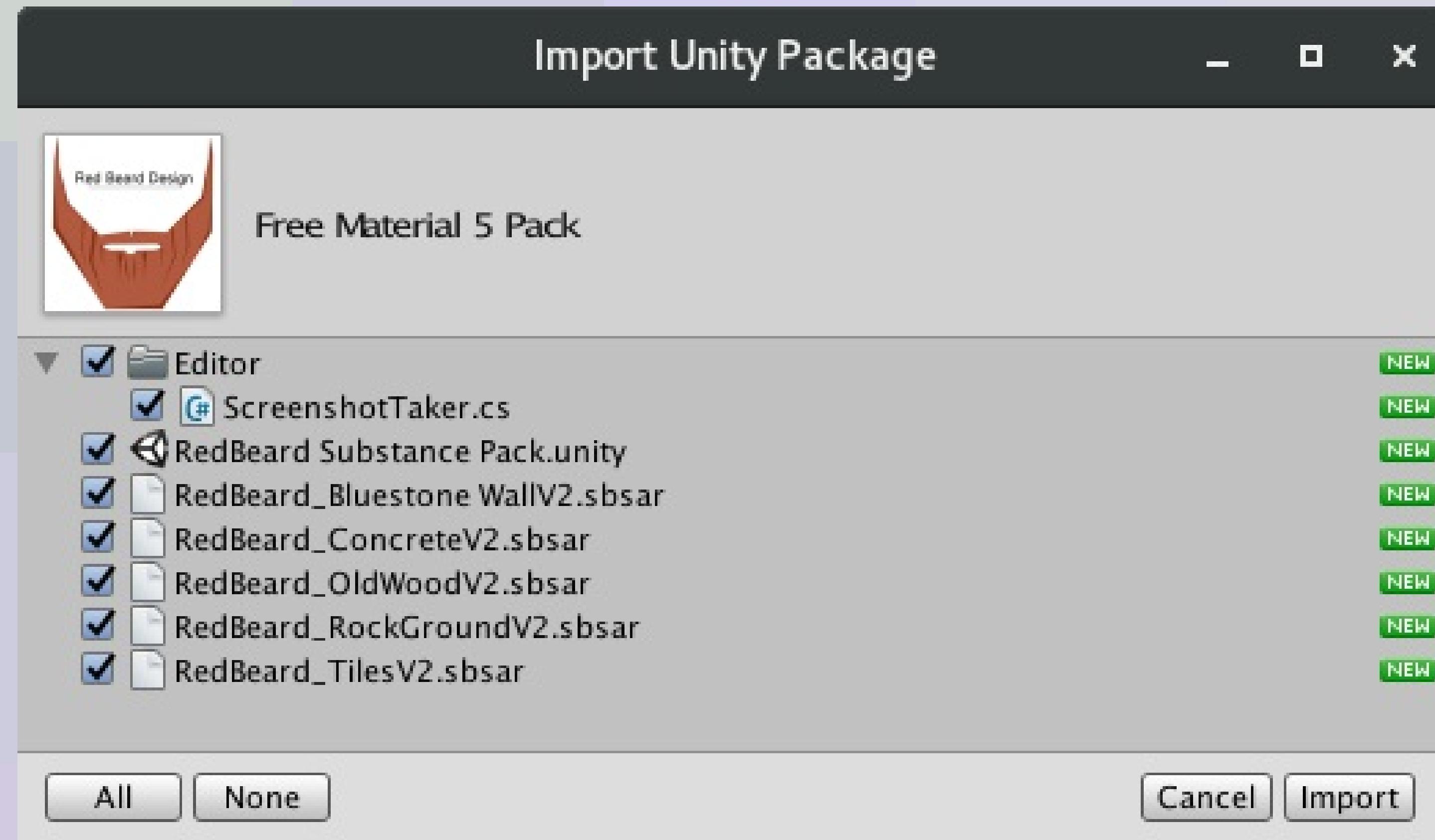
Persp

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)



File Edit Assets GameObject Component Help Tools Window



Center

Local



Cloud Account Layers Layout

Hierarchy

Create Untitled*

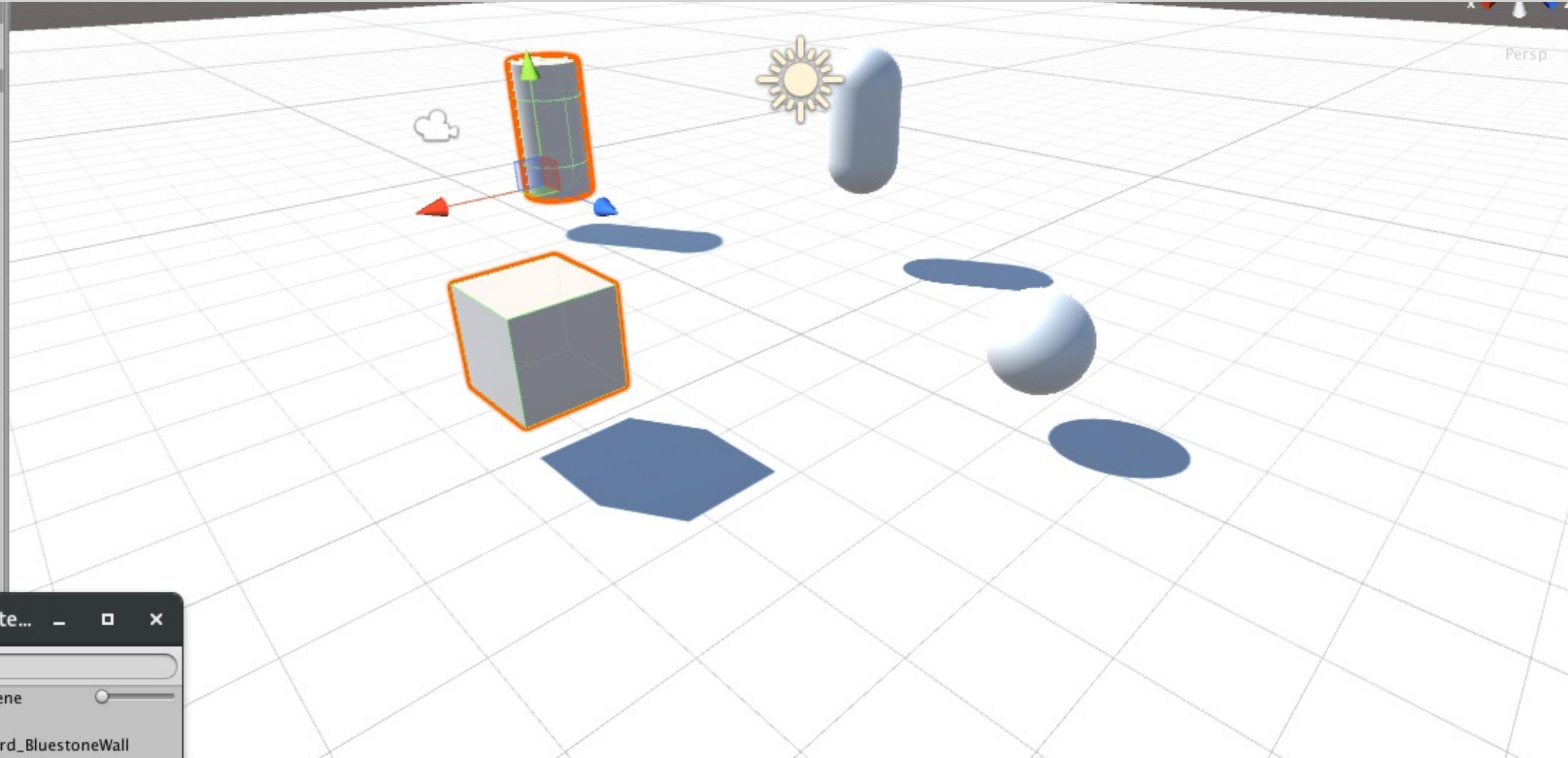
- Main Camera
- Directional Light
- Plane
- Cube
- Sphere
- Capsule
- Cylinder

Scene Game Asset Store

Gizmos

Q>All

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



Inspector Services

Tag Untagged Layer Default

Rotation

X 0 Y 0 Z 0

Scale

X 1 Y 1 Z 1

Cylinder (Mesh Filter)

Mesh

Mesh Renderer

Cast Shadows

Receive Shadows

Motion Vectors

Materials

Size

Element 0

Light Probes

Reflection Probes

Anchor Override

1 Default-Material

Blend Probes

Blend Probes

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



Project Console

Create

Assets

Editor

Assets

Editor

Favorites

All Materials

All Models

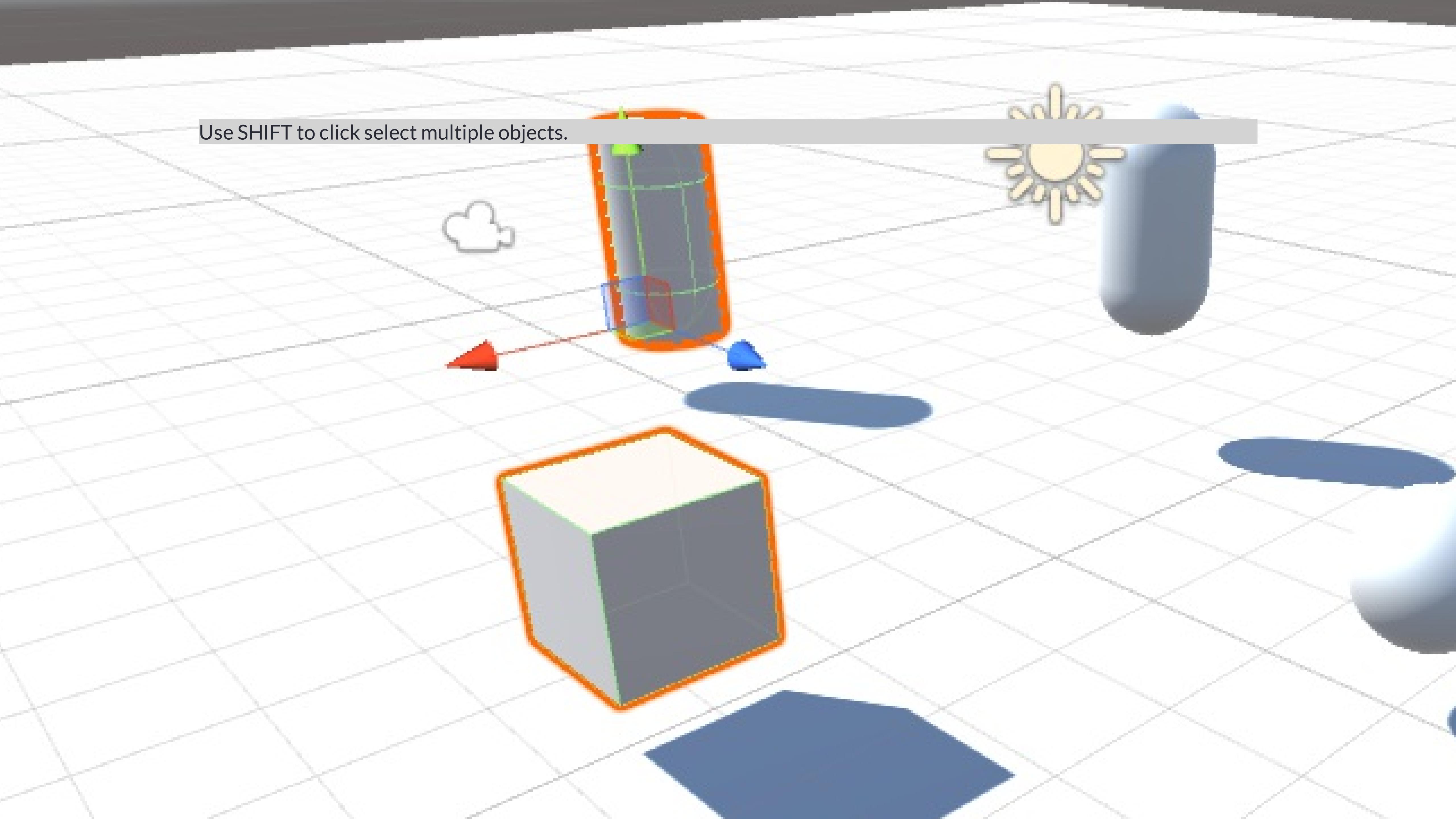
All Prefabs

All Scripts

Assets

Editor

Use SHIFT to click select multiple objects.



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.

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...

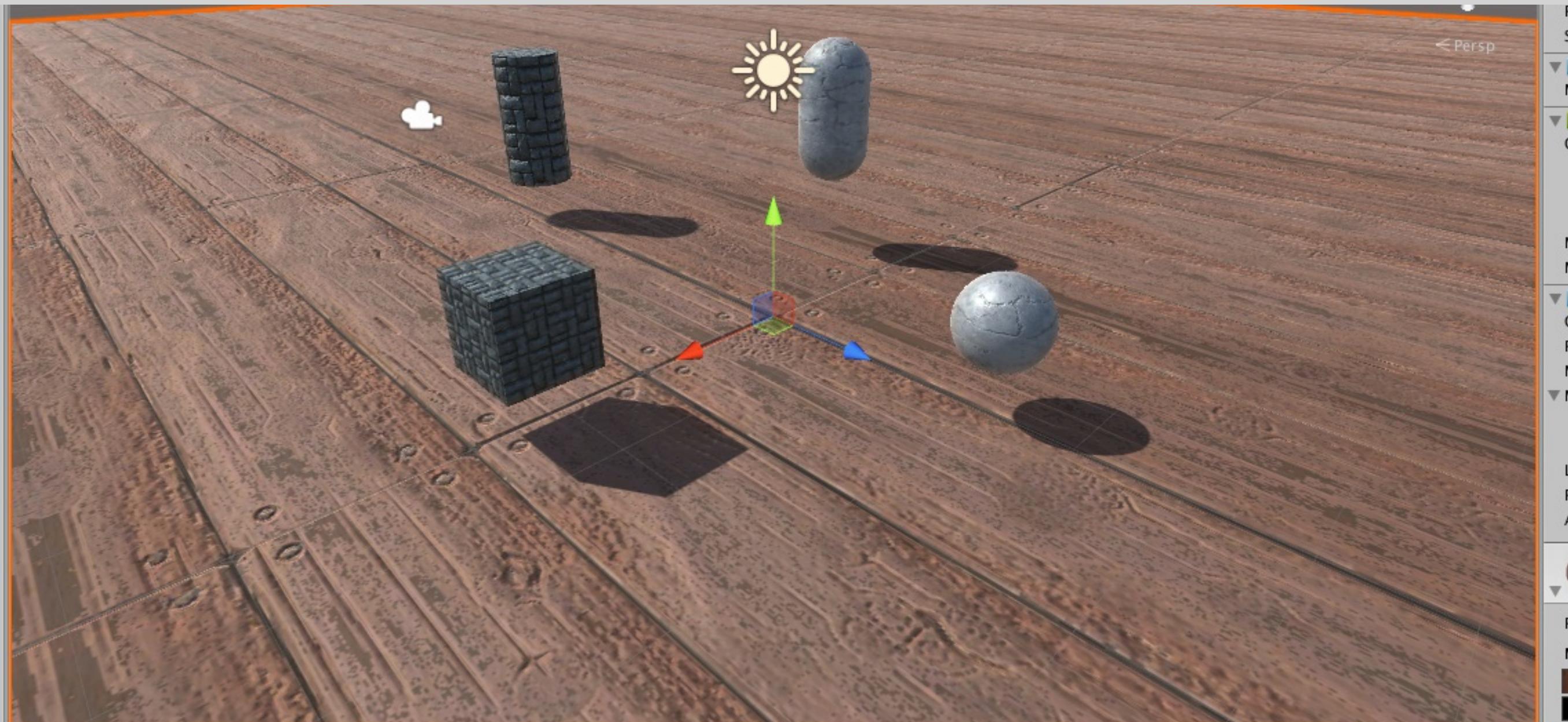
Re

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

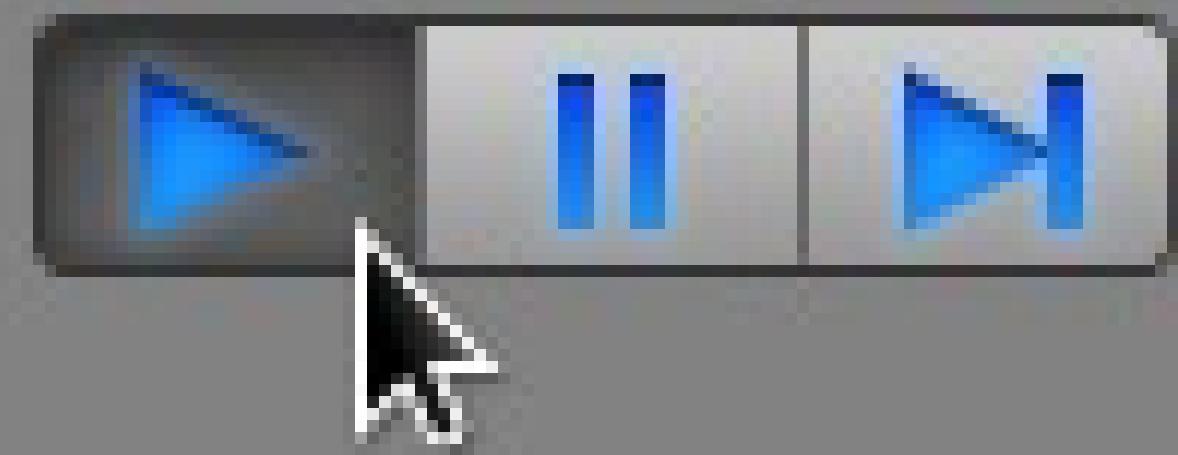


Cloud Account Layers Layout

Scene Game Asset Store

Shaded 2D | 3D | 4K | 8K | 16K | 32K | 64K | 128K | 256K | 512K | 1024K | 2048K | 4096K | 8192K | 16384K | 32768K | 65536K | 131072K | 262144K | 524288K | 1048576K | 2097152K | 4194304K | 8388608K | 16777216K | 33554432K | 67108864K | 134217728K | 268435456K | 536870912K | 1073741824K | 2147483648K | 4294967296K | 8589934592K | 17179869184K | 34359738368K | 68719476736K | 137438953472K | 274877906944K | 549755813888K | 1099511627776K | 2199023255552K | 4398046511104K | 8796093022208K | 17592186044416K | 35184372088832K | 70368744177664K | 140737488355328K | 281474976710656K | 562949953421312K | 112589990684264K | 225179981368528K | 450359962737056K | 900719925474112K | 1801439850948224K | 3602879701896448K | 7205759403792896K | 14411518807585792K | 28823037615171584K | 57646075230343168K | 115292150460686336K | 230584300921372672K | 461168601842745344K | 922337203685490688K | 1844674407370981376K | 3689348814741962752K | 7378697629483925504K | 14757395258967851008K | 29514790517935702016K | 59029581035871404032K | 118059162071742808064K | 236118324143485616128K | 472236648286971232256K | 944473296573942464512K | 1888946593147884929024K | 3777893186295769858048K | 7555786372591539716096K | 15111572745883079432192K | 30223145491766158864384K | 60446290983532317728768K | 120892581967064635457536K | 241785163934129270915072K | 483570327868258541830144K | 967140655736517083660288K | 1934281311473034167320576K | 3868562622946068334641152K | 7737125245892136669282304K | 1547425049178427333856464K | 3094850098356854667712928K | 6189700196713709335425856K | 12379400393427418670851712K | 24758800786854837341703424K | 49517601573709674683406848K | 99035203147419349366813696K | 198070406294838698733627392K | 396140812589677397467254784K | 792281625179354794934509568K | 1584563250358709589869091136K | 3169126500717419179738182272K | 6338253001434838359476364544K | 12676506002869676718952729088K | 25353012005739353437855458176K | 50706024011478706875710916352K | 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x Personal (64bit) - Untitled - Cardboard Sample - PC, Mac & Li



→ 1x

File Edit Assets GameObject Component Help Tools Window



Center

Local



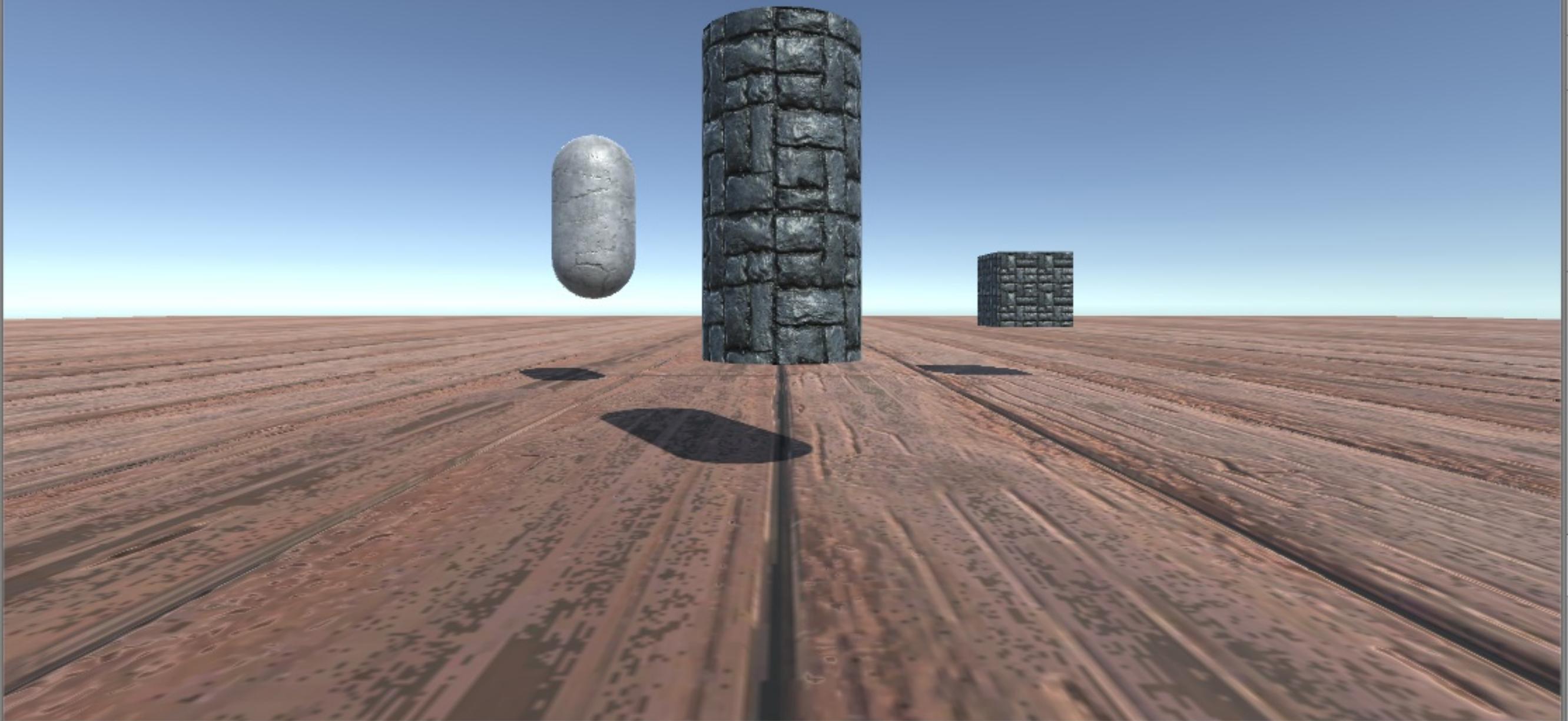
Cloud Account Layers Layout

Hierarchy

Create Untitled*

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

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

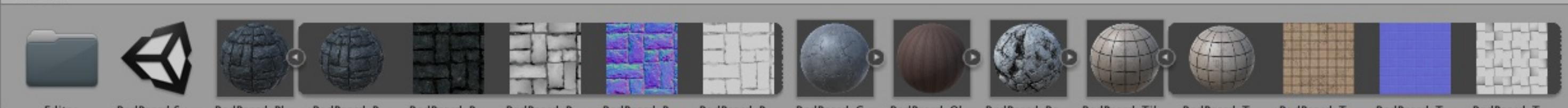


Project Console

Create Favorites

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

Assets



Assets

Editor

Scene

Game

Asset Store

Display 1 Free Aspect Scale 1x

Maximize On Play Mute Audio Stats

Gizmos

Inspector Services

Cloud Account Layers Layout

Plane

Tag Untagged

Layer Default

Y 0 Z 0 X 0 Y 0 Z 0

Rotation

X 0 Y 0 Z 0

Scale

X 10 Y 1 Z 10

Plane (Mesh Filter)

Plane

Mesh Collider

Convex

Inflate Mesh

Skin Width

0.01

Is Trigger

Material

None (Physic Material)

Mesh

Plane

Mesh Renderer

Cast Shadows

Receive Shadows

Motion Vectors

Per Object Motion

Materials

Size

1

Element 0

RedBeard_WoodWall

Light Probes

Blend Probes

Reflection Probes

Blend Probes

Anchor Override

None (Transform)

RedBeard_WoodWall

Shader

Standard

Rendering Mode

Opaque

Main Maps

Albedo

Metallic

Smoothness

Source

Metallic Alpha

Normal Map

1

Height Map

0.0476

Occlusion

Emission

0

Global Illumination

Realtime

Detail Mask

Tiling

X 10

Offset

X 0

UV Set

Y 10

Secondary Maps

Detail Albedo x2

Normal Map

Tiling

X 1

Offset

Y 1

UV Set

UV0

Forward Rendering Options

Specular Highlights

Reflections

Procedural Properties

Generate all outputs

Overview of adding a gravity animation

The Unity Editor interface showing the process of adding a gravity animation 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.

Scene View: The central view showing a 3D environment on a wooden floor. Several objects are present: a cylinder, a cube, a sphere, and a small blue cube. A green gizmo indicates the center of gravity for one of the objects.

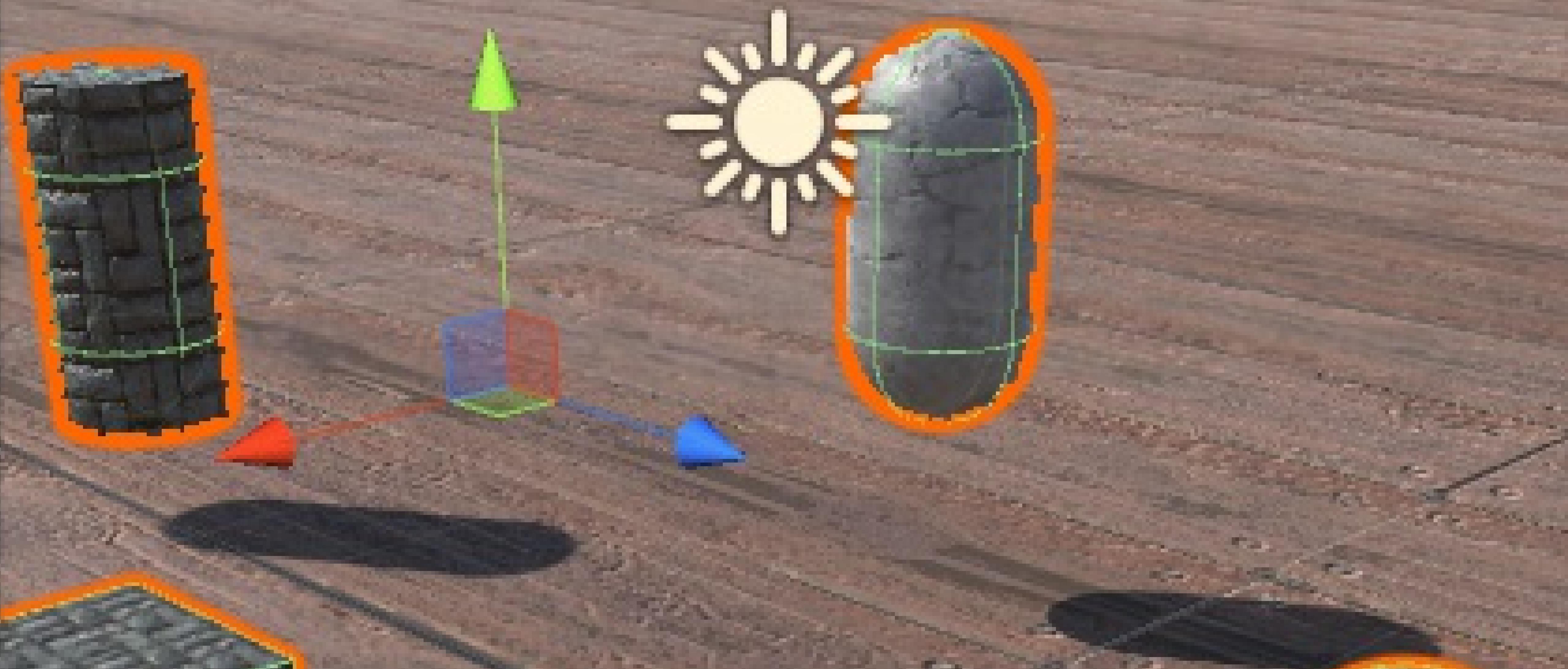
Inspector View: The right-hand panel displays the properties of the selected object, which is a cylinder. The Inspector shows the following settings:

- Rotation:** X: 0, Y: 0, Z: 0
- Scale:** X: 1, Y: 1, Z: 1
- Cylinder (Mesh Filter):** Mesh is set to "None".
- Mesh Renderer:** Cast Shadows: On, Receive Shadows: checked, Motion Vectors: Per Object Motion.
- Materials:** Size: 1, Element 0: Blend Probes, Light Probes: Blend Probes, Reflection Probes: Blend Probes, Anchor Override: None (Transform).

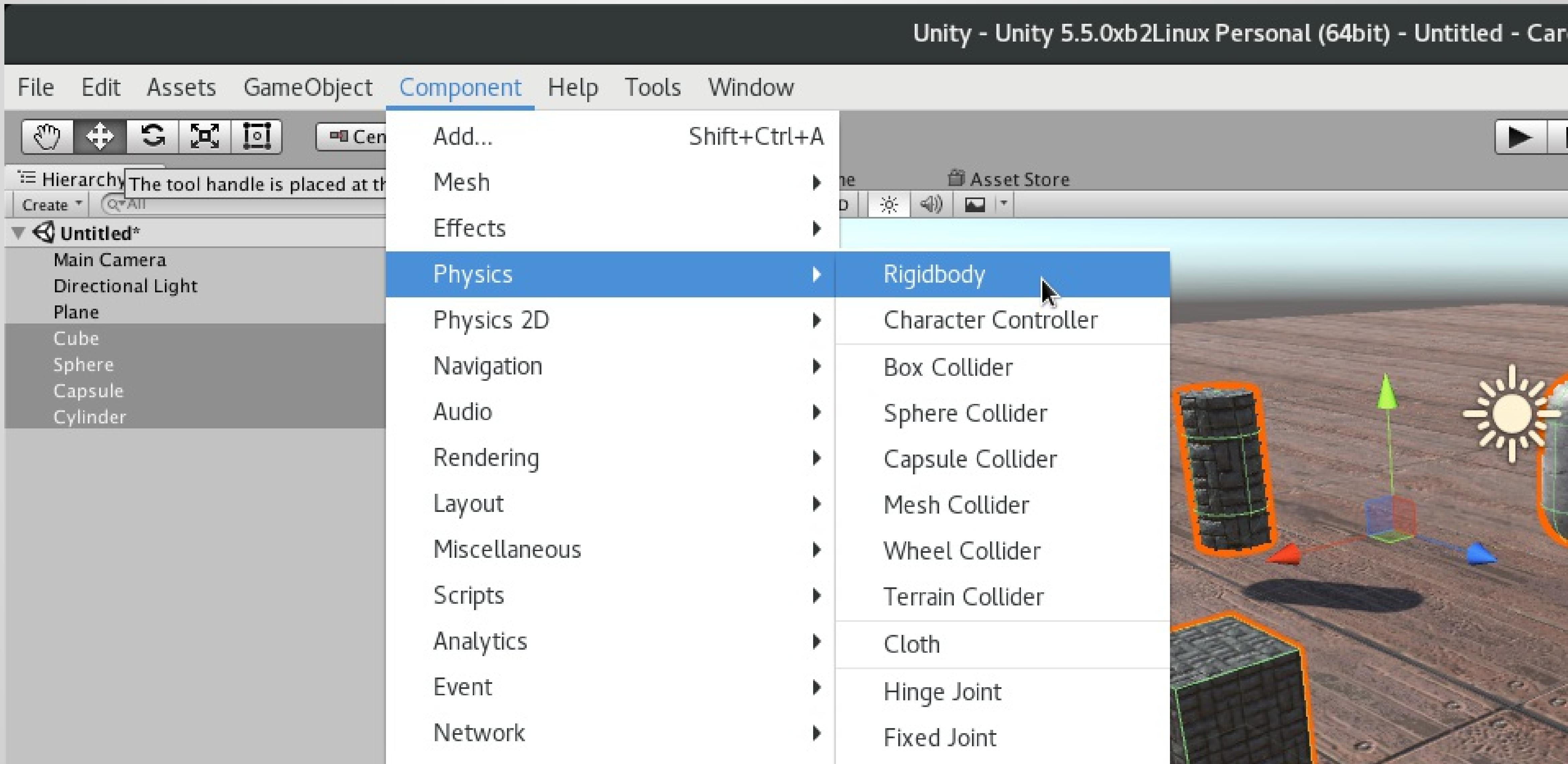
Add Component: A button at the bottom right of the Inspector panel.

Project View: The bottom-left panel showing the project structure. It includes sections for Favorites (All Materials, All Models, All Prefabs, All Scripts) and Assets (Assets, Editor). The Assets section lists various materials and models, including RedBeard_Su..., RedBeard_Bl..., and several RedBeard_B... variants.

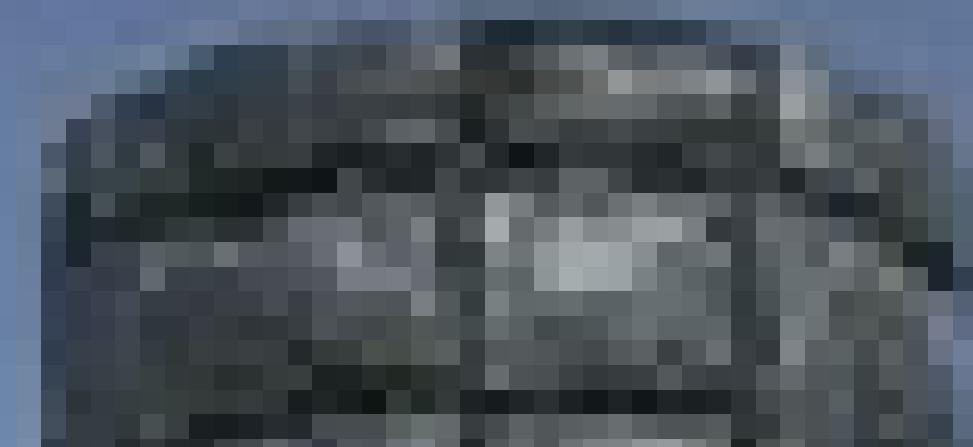
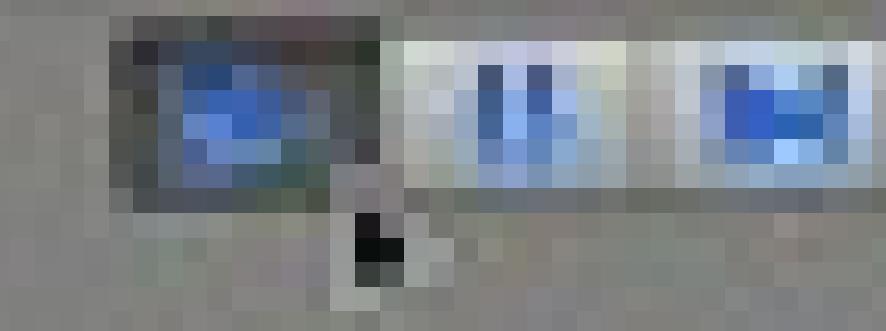
- Select all gravityable objects using SHIFT and left mouse click.
- Do not add the plane, since the other objects need something to land on.

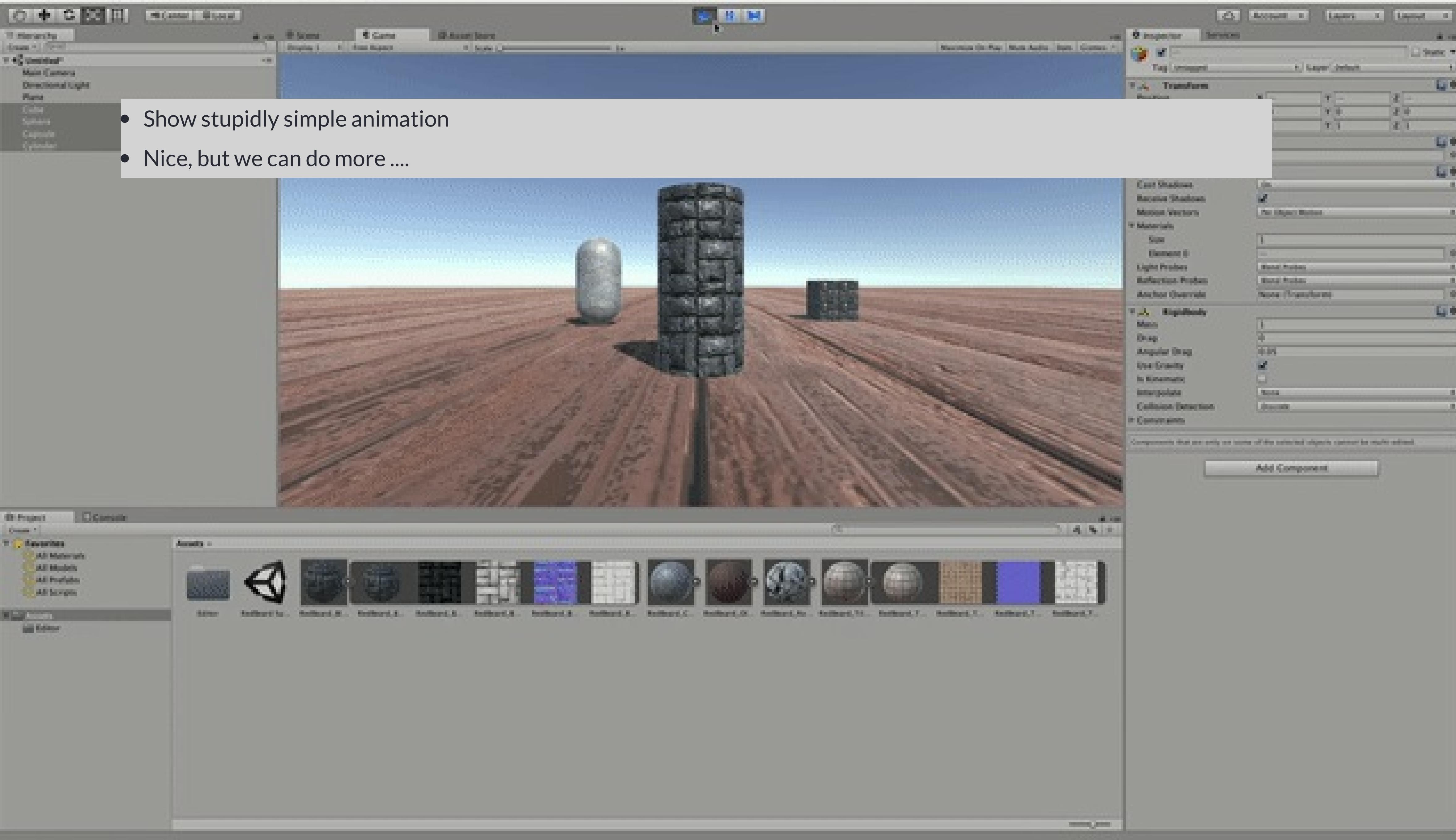


Add gravity to all selected objects by hitting menu option Component > Physics > Rigidbody.



Hit play.





File Edit Assets GameObject Component Help Tools Window



Center Local



Cloud Account Layers Layout

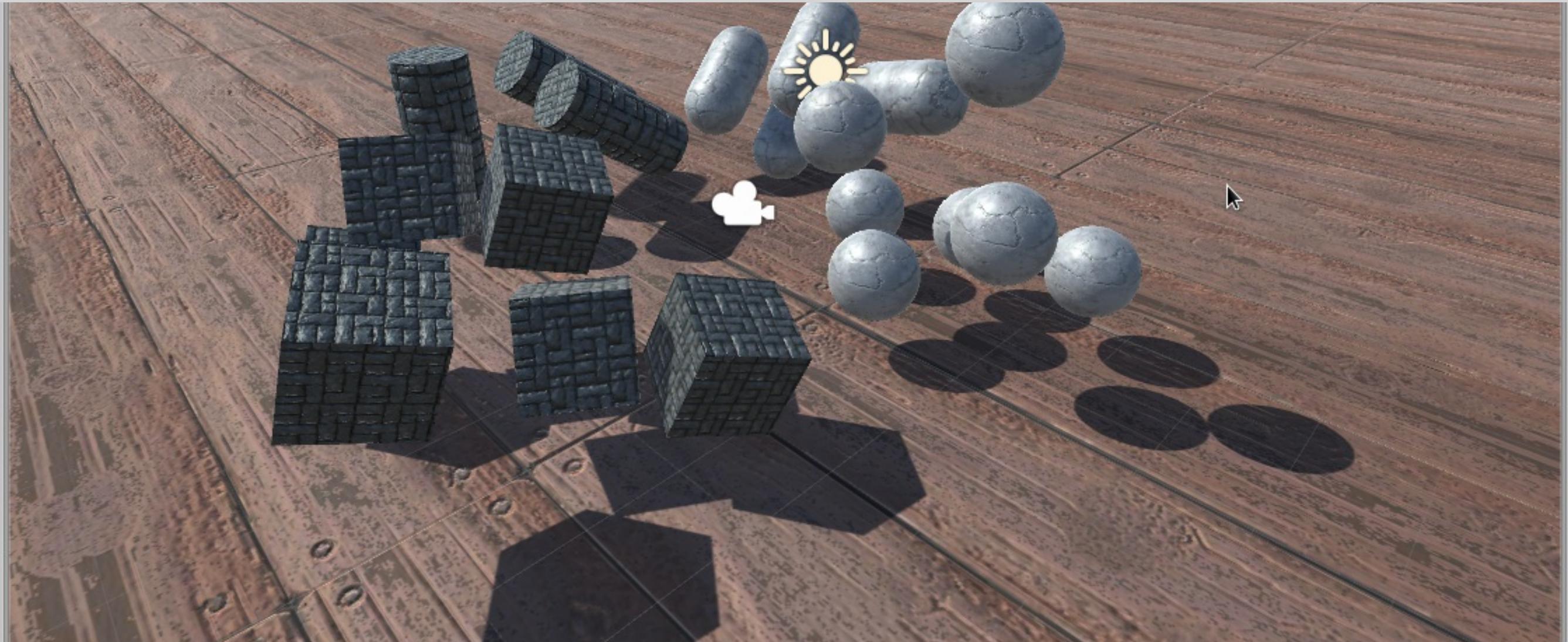
Hierarchy

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



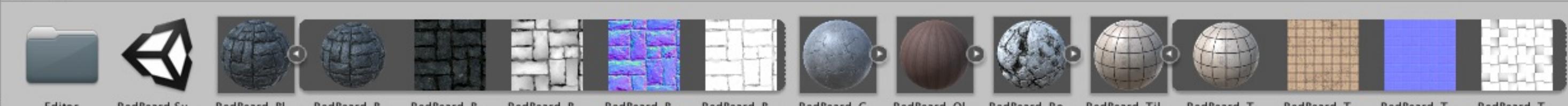
Project Console

Create

Favorites

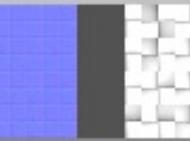
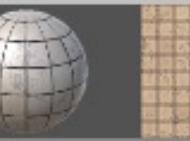
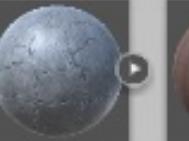
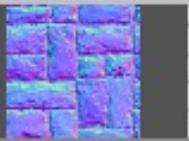
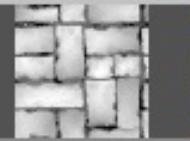
All Materials
All Models
All Prefabs
All Scripts

Assets



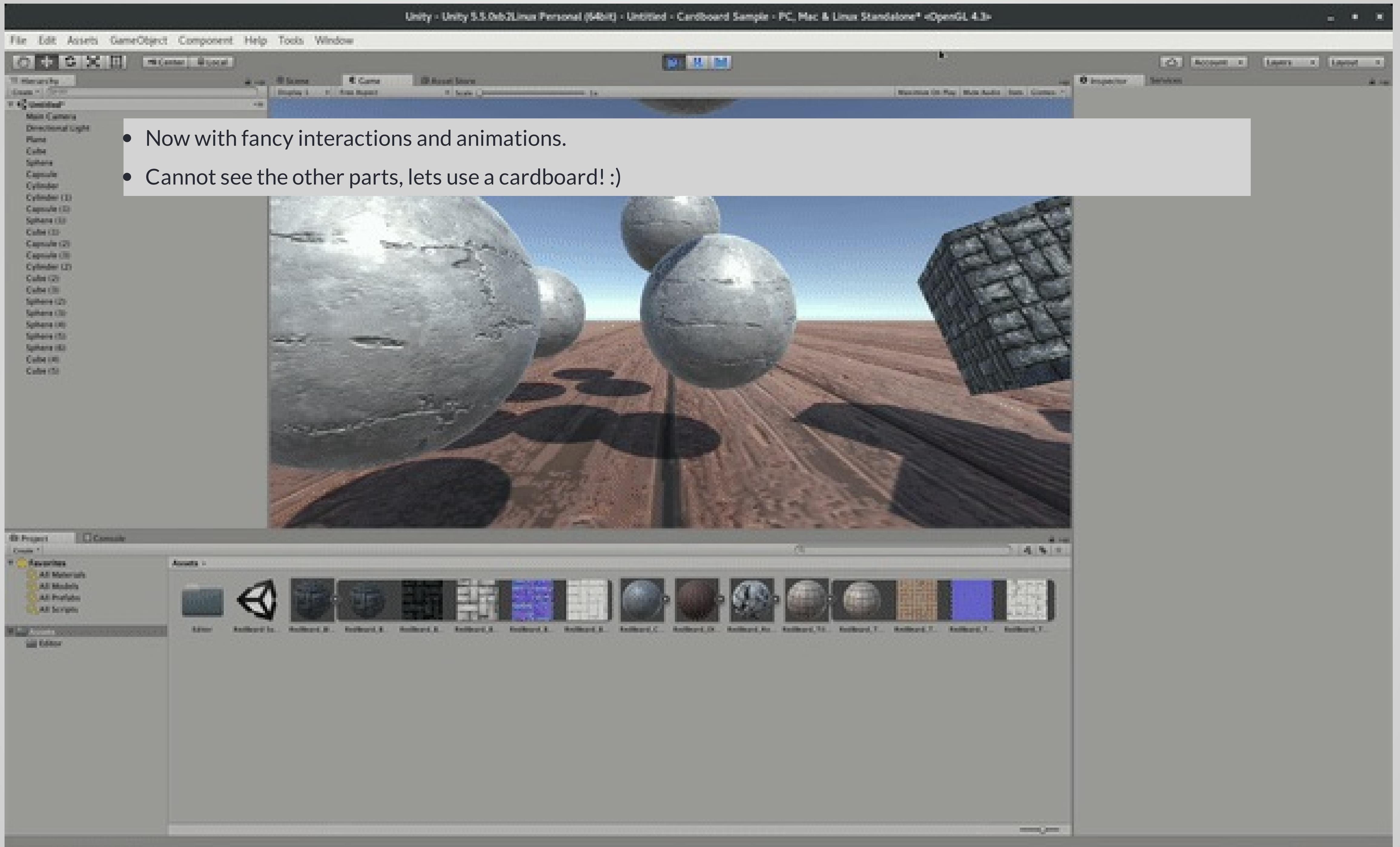
Editor

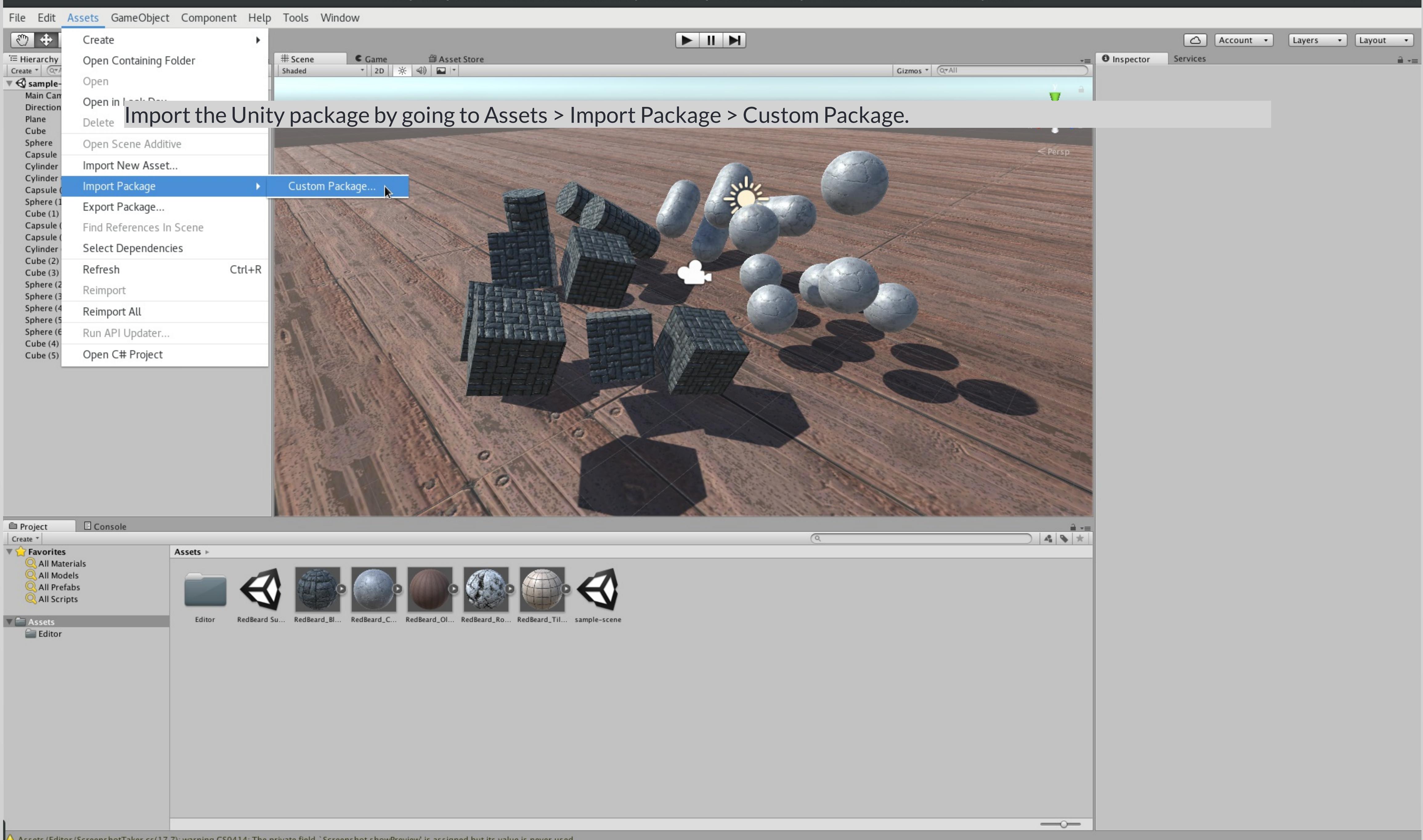
RedBeard_S...



Assets

Editor





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

2D

3D

Lighting

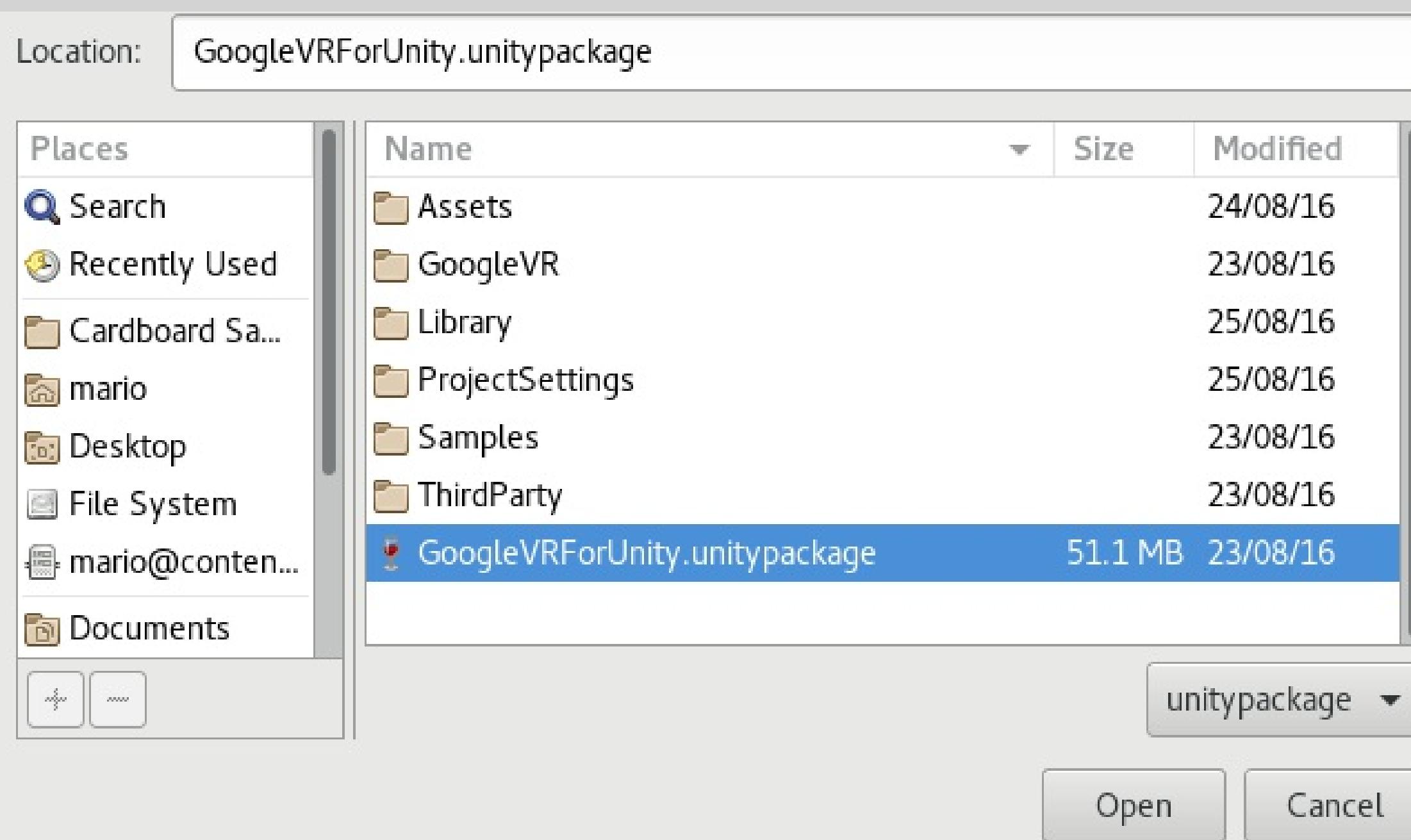
Audio

Image

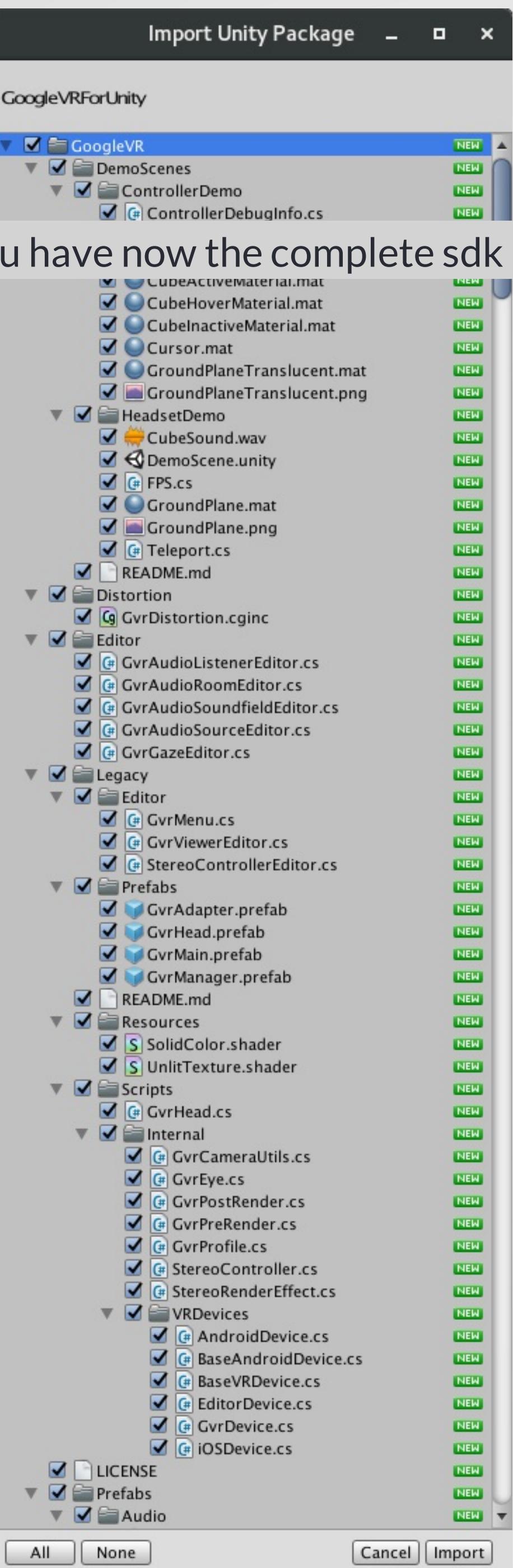
Shaded

2D

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



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



Please wait ... ;)



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

API Update Required



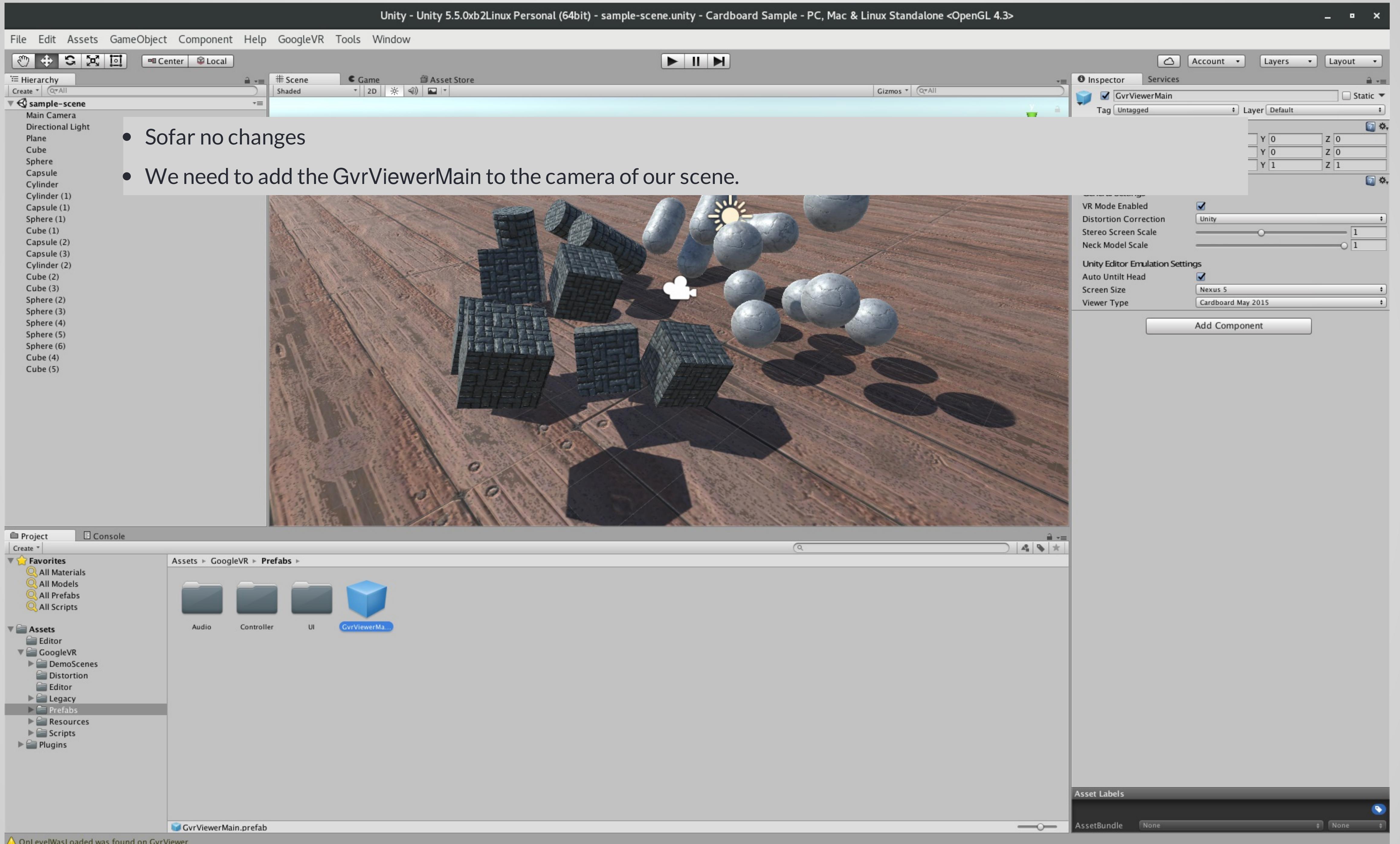
This project contains scripts and/or assemblies that use obsolete APIs.

If you choose 'Go Ahead', Unity will automatically upgrade any scripts/assemblies in the Assets folder found using the old APIs. You should make a backup before proceeding.

(You can always run the API Updater manually via the 'Assets/Run API Updater' menu command.)

I Made a Backup. Go Ahead!

No Thanks



Select Project > Assets > GoogleVR > Prefabs

Assets > GoogleVR > Prefabs

▼ ★ Favorites
Q All Materials

- Q All Materials
Q All Prefabs
Q All Scripts

▼ Assets
Editor
GoogleVR
DemoScenes
Distortion
Editor
Legacy
Prefabs
Resources
Scripts
Plugins



Audio

Controller

Start drag and drop the prefab.

Assets ▶ GoogleVR ▶ Prefabs ▶



Audio



Controller

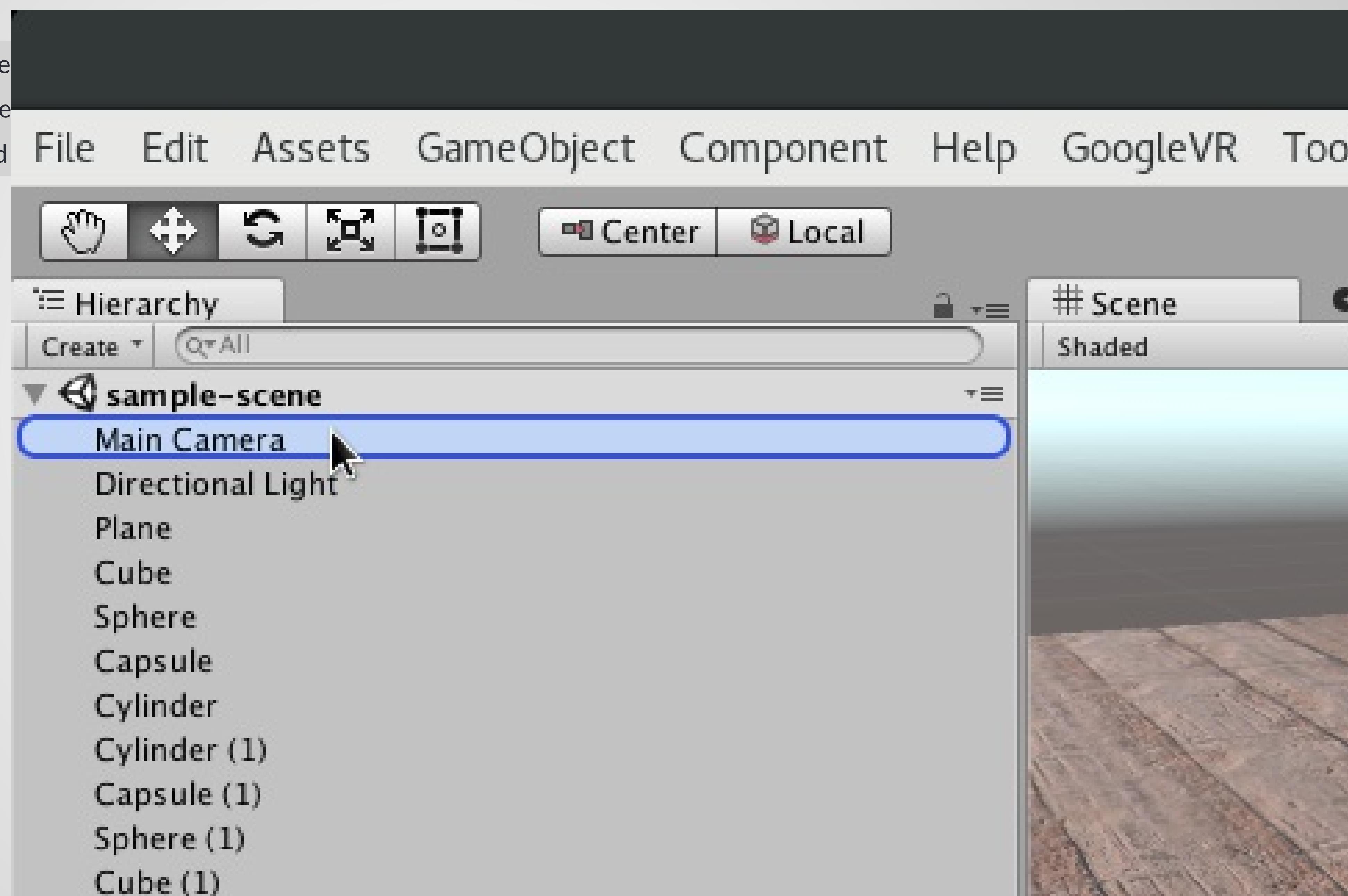


UI



GvrViewerMa...

- 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

Gizmos

Q All

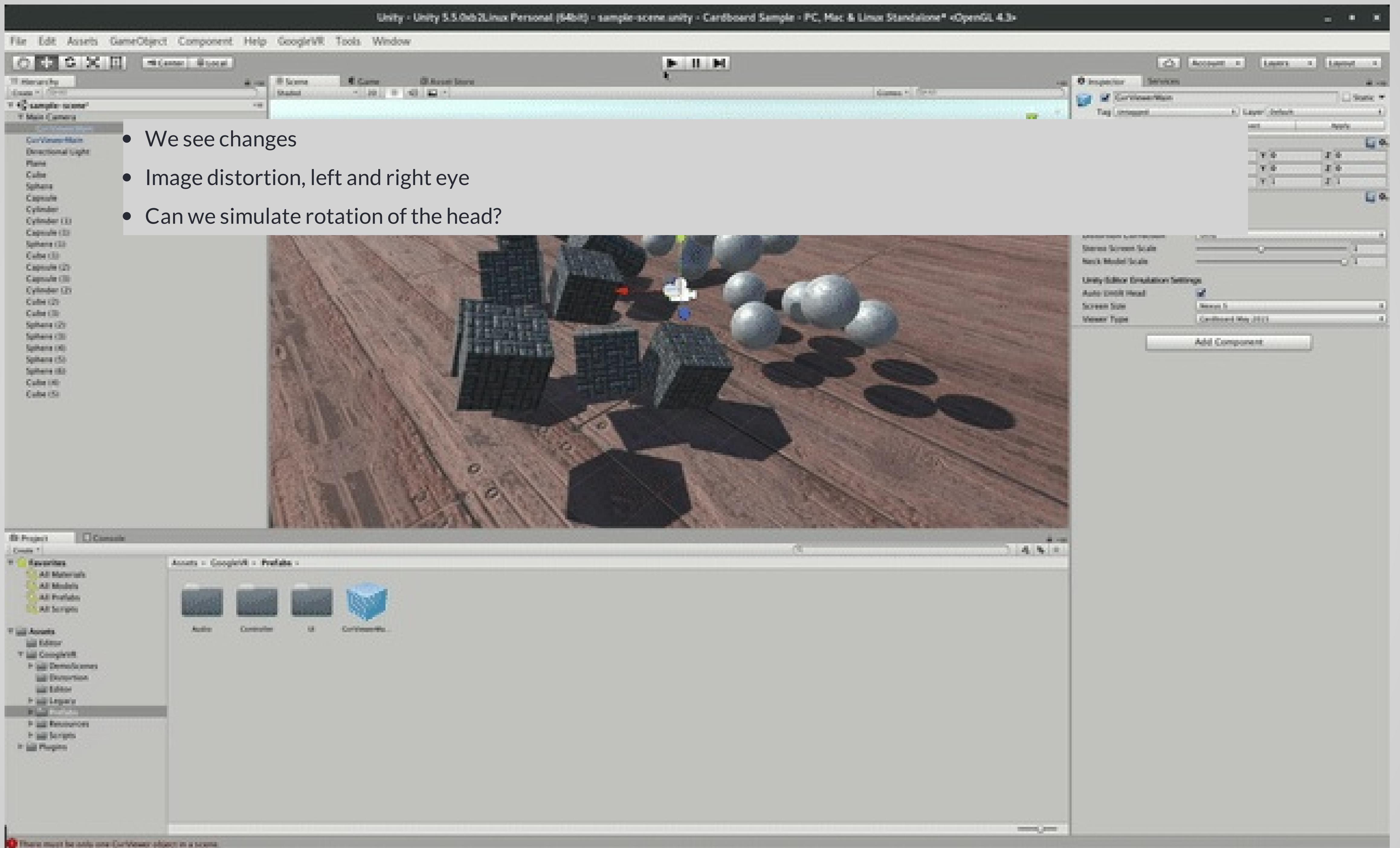
Shaded

2D

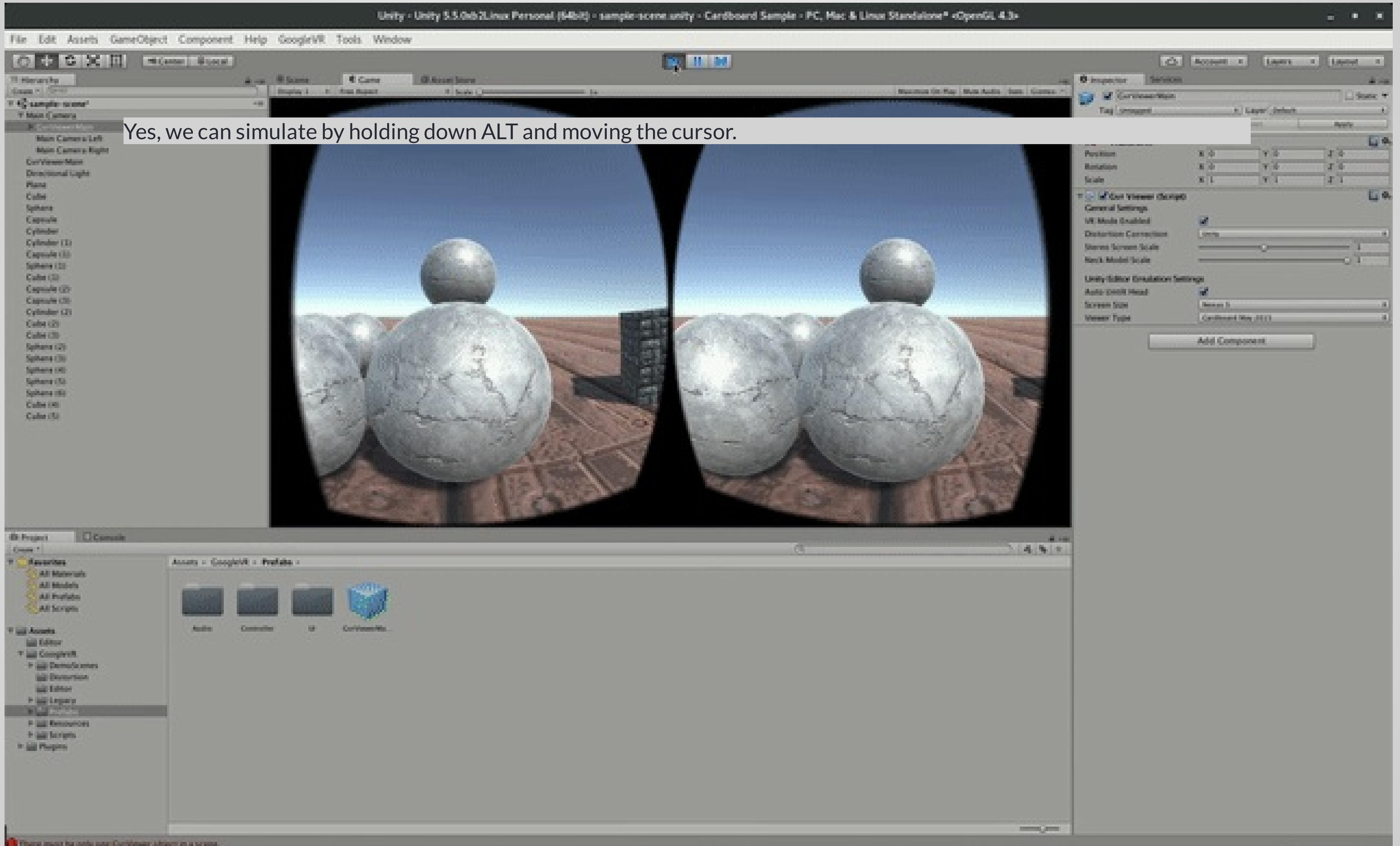
Light

2D

3D



- We see changes
 - Image distortion, left and right eye
 - Can we simulate rotation of the head?



Summary of Unity Demo

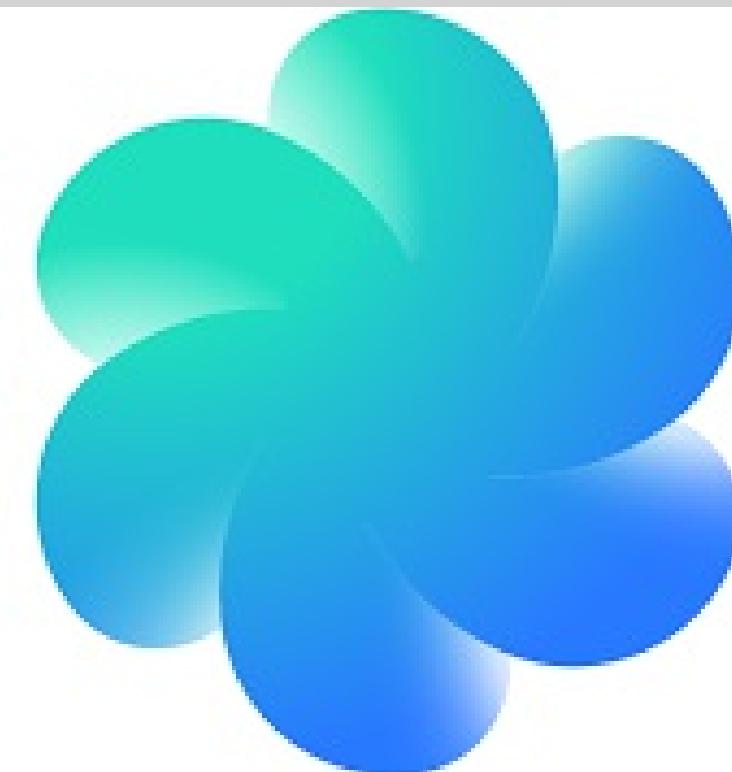
- Using Unity is fast
- Using Cardboard SDK is easy
- Using internal renderer for simulating



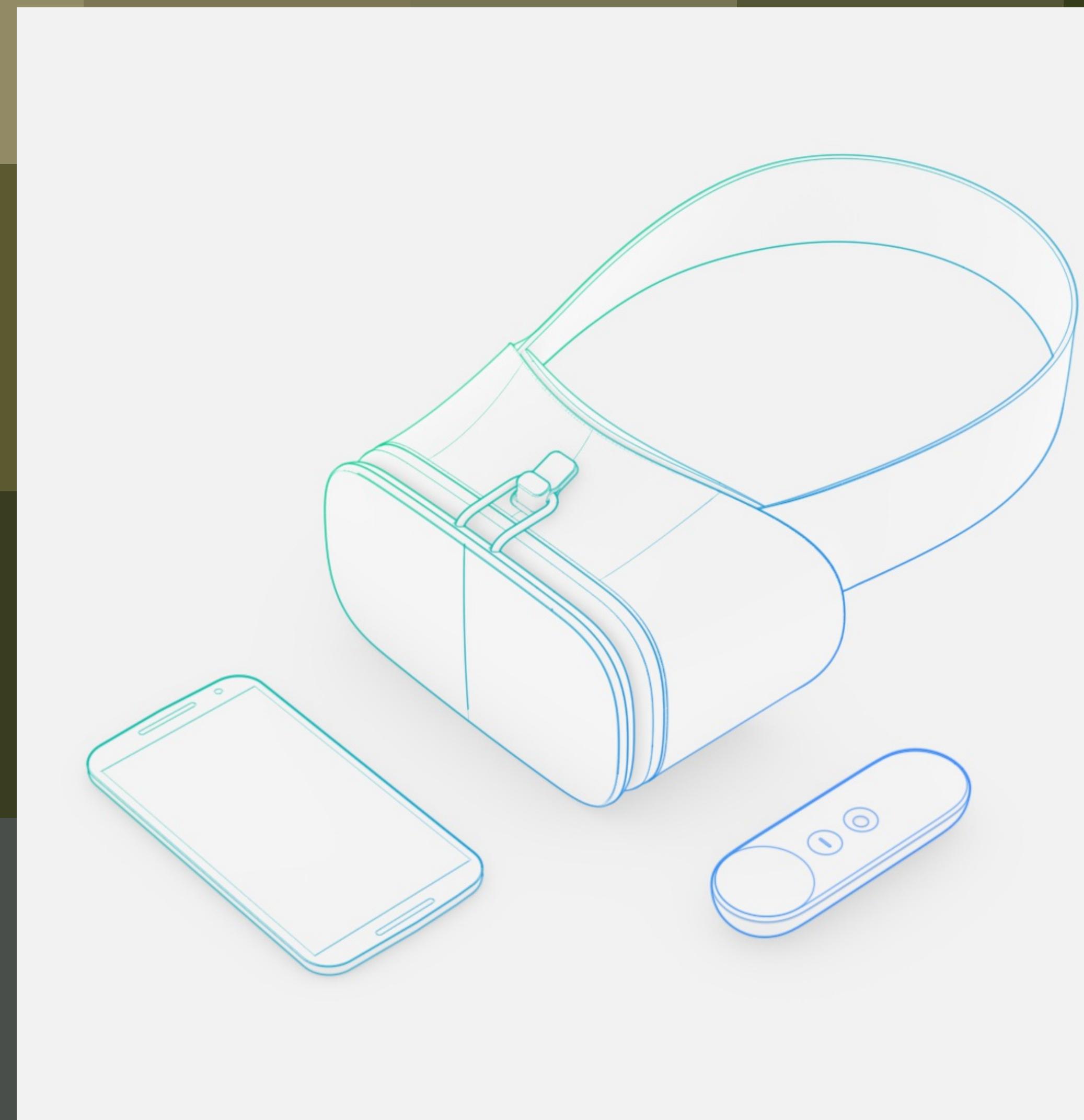
Difficulties in using Unity

- Cost for non free version exists.
- Integration with other (Java) libraries difficult at best.
- Sending of Intents (aka interacting with Android OS / apps) is rather hard.

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



Daydream



Controller

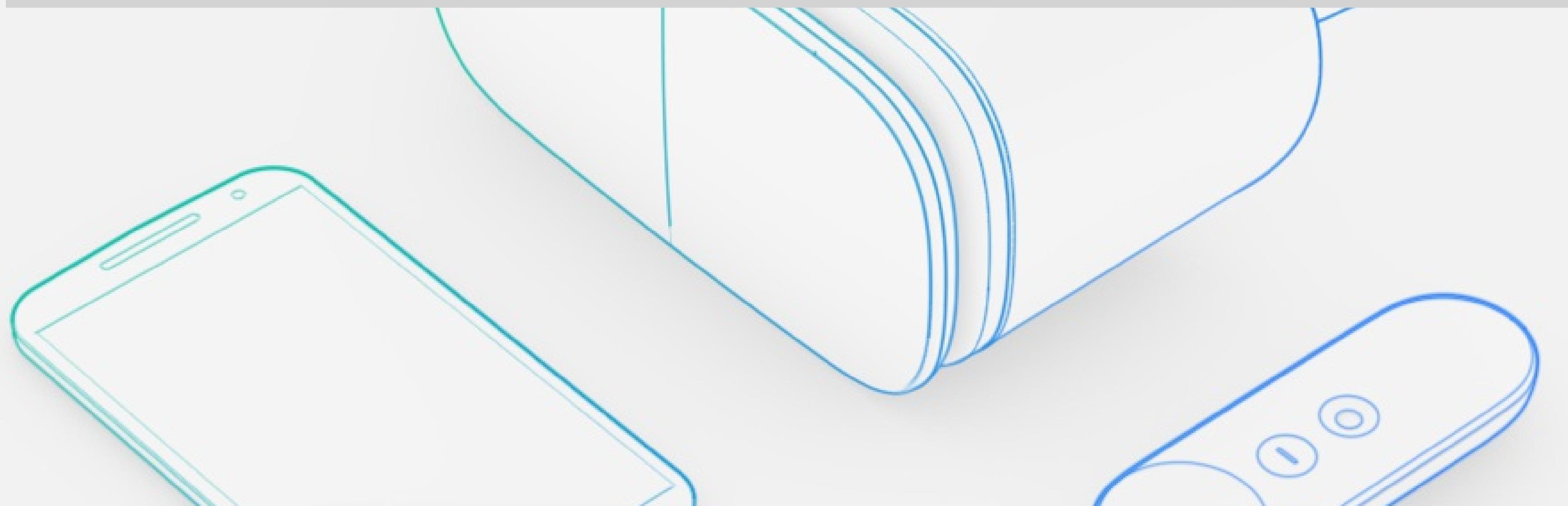
- uses special hardware as controller
 - can get emulated by any Android phone (>= 4.4)
 - has four Buttons: Volume +/-, App(Programmable), Home
 - clickable Touchpad. (x/y position, clicked state)(emulated by two touches)
- Print out sheet to not get to distracted by Phone
- Connects via bluetooth to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



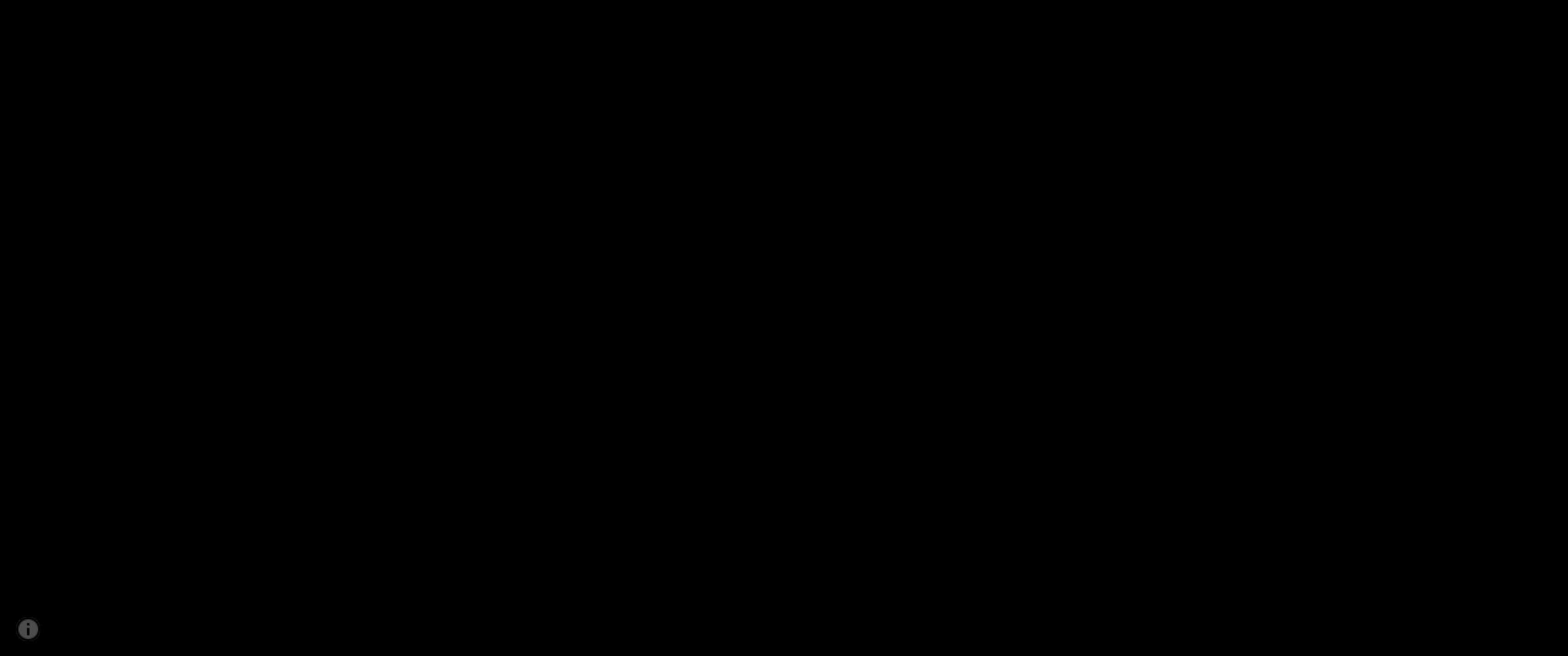
Daydream SDK features

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

VRView, available for

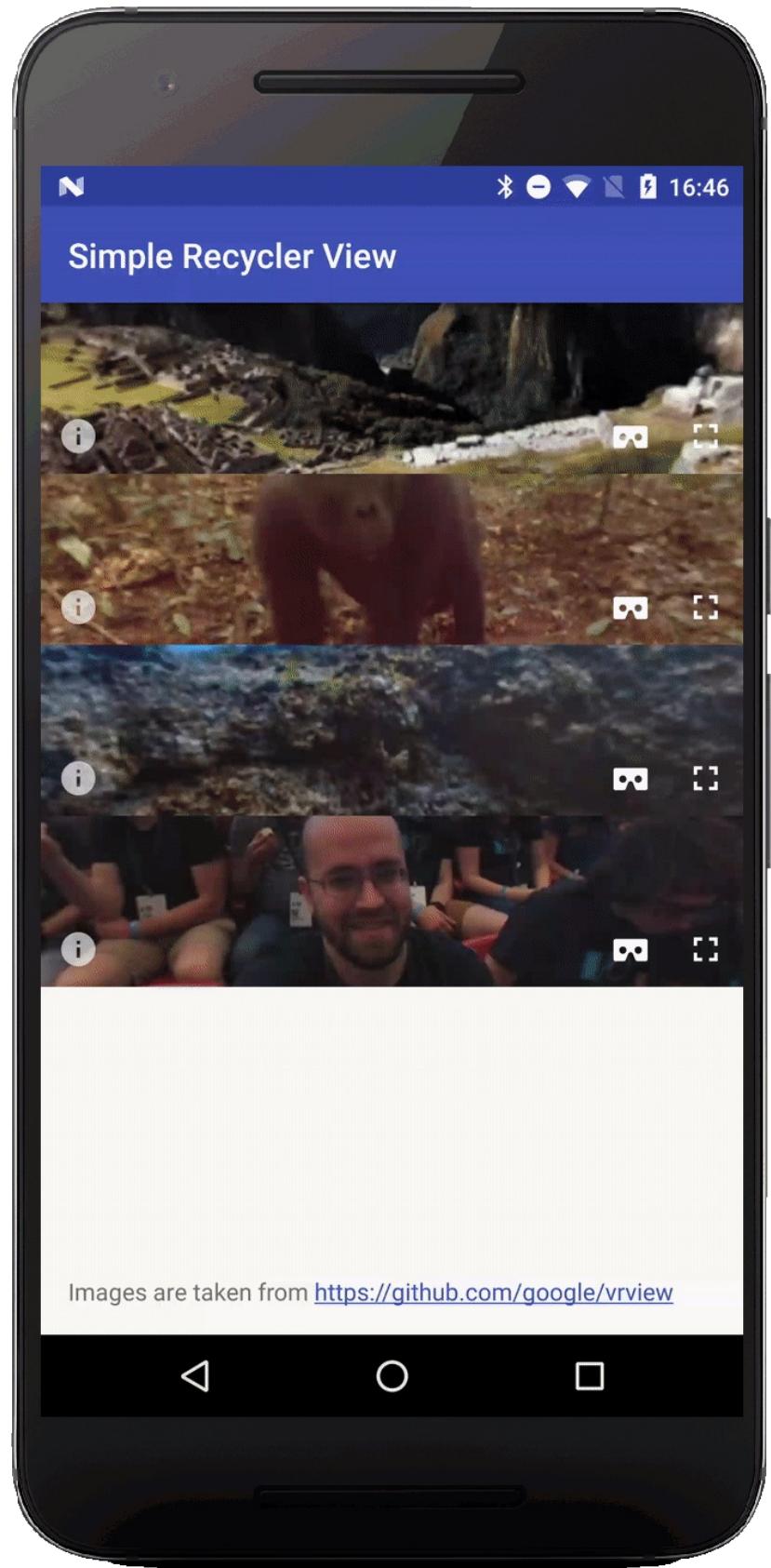
- Android
- IOS
- Web

Not for Unity!

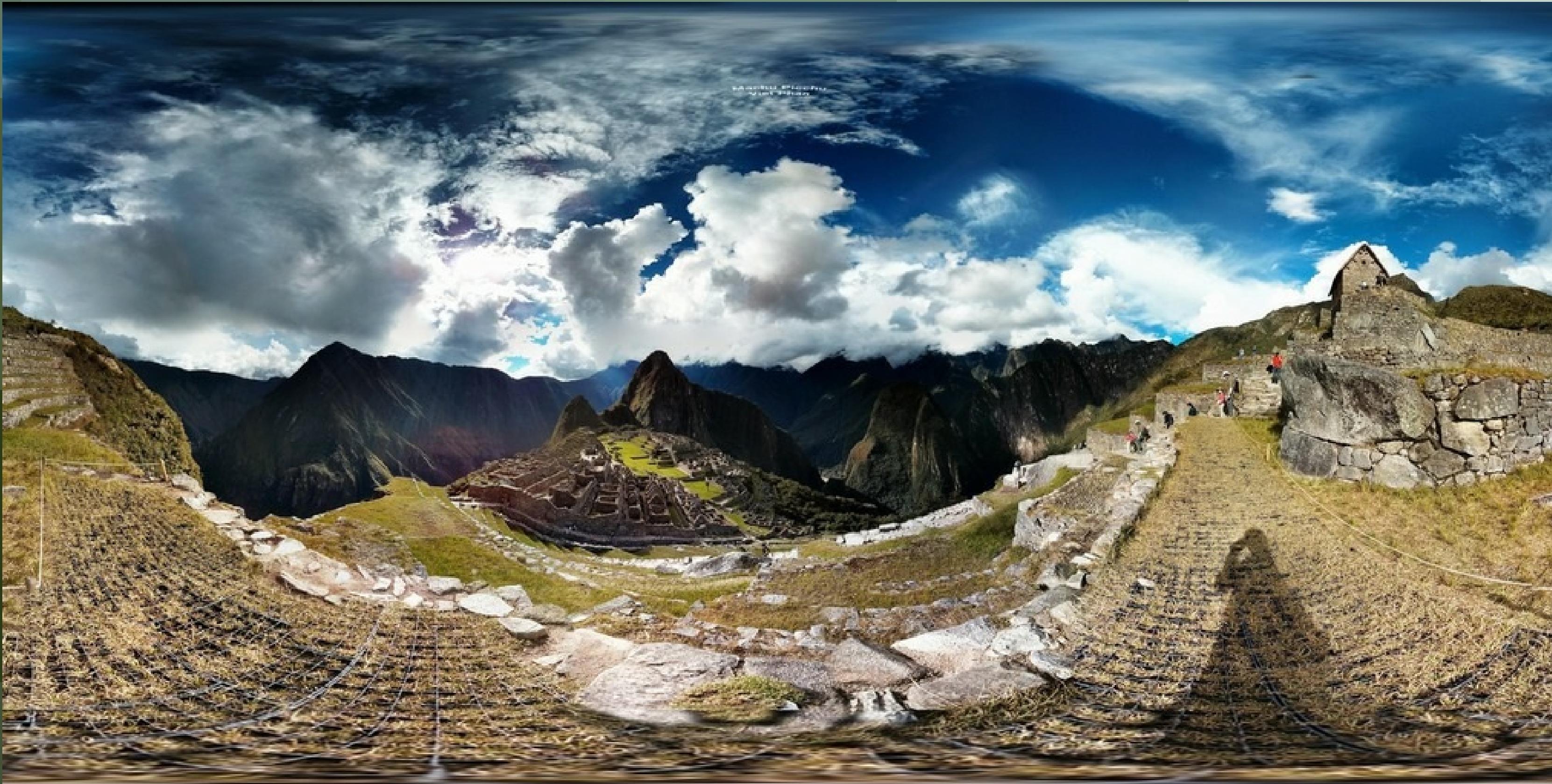


Final result of our current demo

Simple RecyclerView with 4 VrViews 🎥 Images from Google



Those images are represented by the ids seen earlier



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

Sample Recycler View Project

Source Code



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);

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RecyclerView.Adapter adapter =
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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());  
  
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    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();
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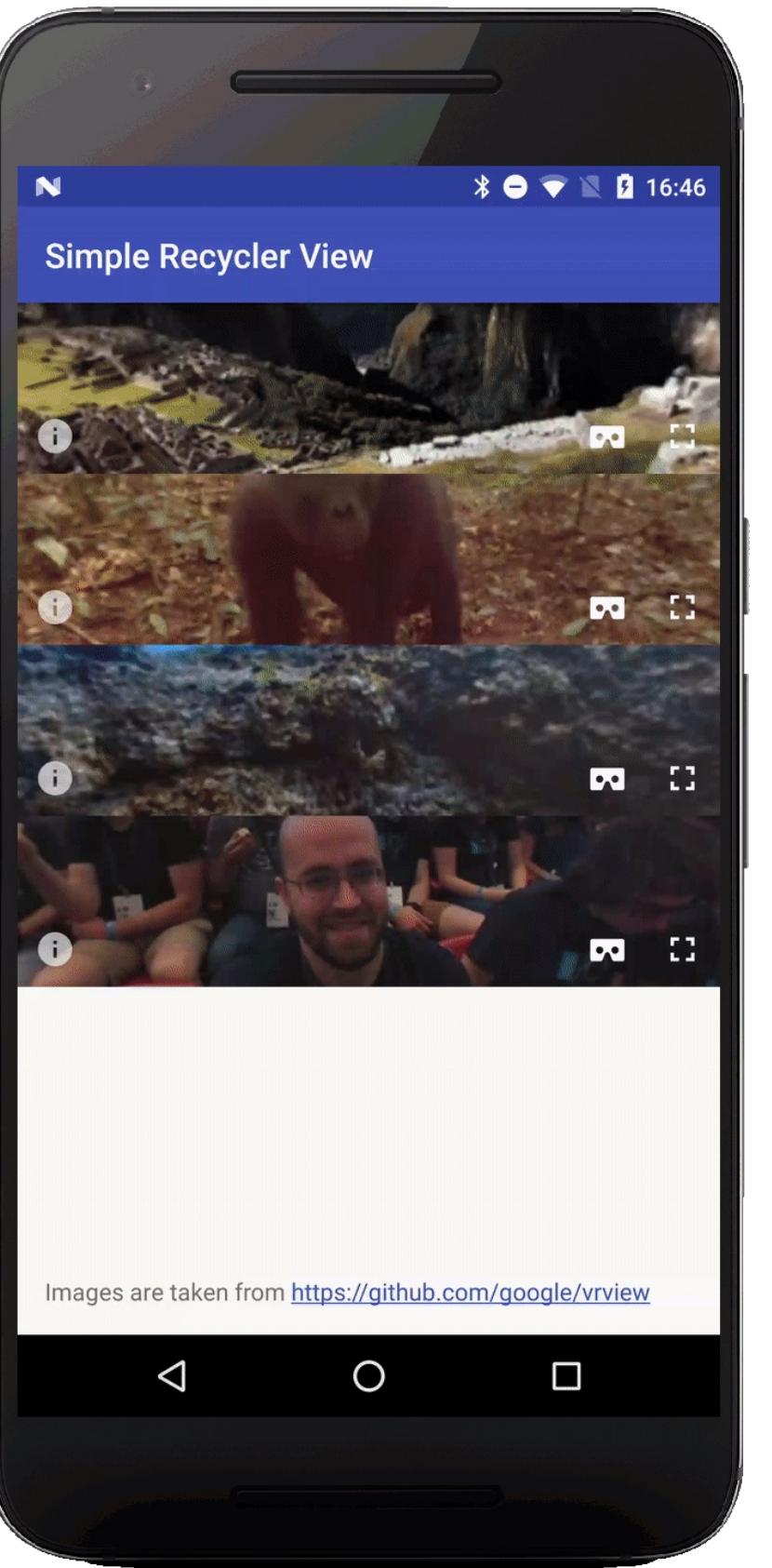
}
```

```
@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



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

Google Cardboard

- easy to produce
- available from different companies
- 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 you program for it?

- Google's SDKs are available for
- Android (OpenGL)
- iOS (Objective C)
- Unity Engine (C# / JS) x (e.G. GL, 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 developer.google.com/vr/android/



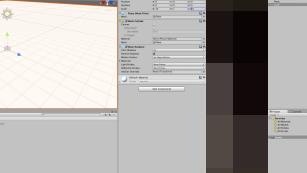
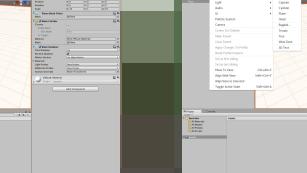
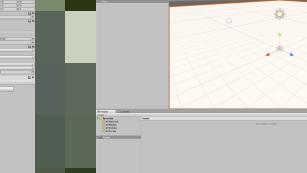
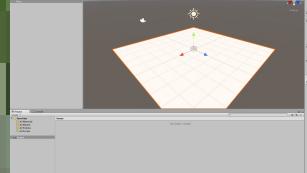
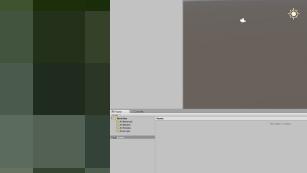
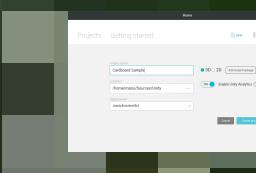
How do I write a Unity App?



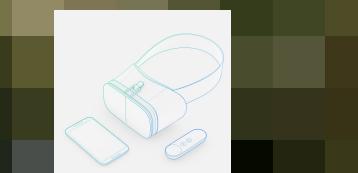
Prerequisites

- clone Google's GitHub for Unity <https://github.com/googlevr/unity-sdk-repository>
- install and open Unity
 - <https://store.unity.com/>
 - <http://forum.unity3d.com/threads/unity-on-linux-release-notes-and-known-issues.350256/>

Unity Editor screenshots

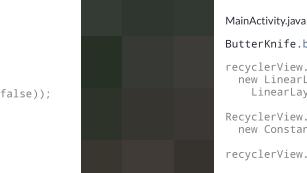
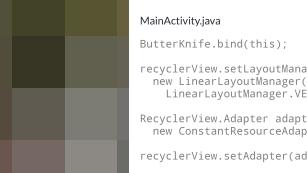
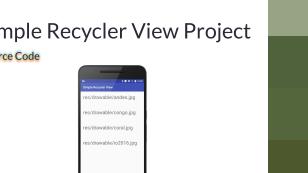
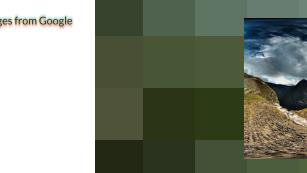


Daydream



Daydream SDK features

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



What will you build?

🎥 General 🎥 Controller 🎥 Designing

📄 Google VR Github

🐦 @MarioBodemann