Unity & ARfoundation introduction

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akaSwap CTO

休士頓獨立製片與國際影片影展 互動類金獎

《聲．森不息 | 阿爆 A Bao演唱會》- 沈浸式體驗特效製作

故宮《四季百駿》 - VR 資深程式設計師

南科考古館 / 高雄科工館 / 苗栗客家文化館...等互動展覽 - AR 資深程式設計師

到底甚麼是 Unity 呢?

你所知道的遊戲引擎 ?
名稱? 數量? 差異? 分類?


UNREAL
ENGINE
5


unity

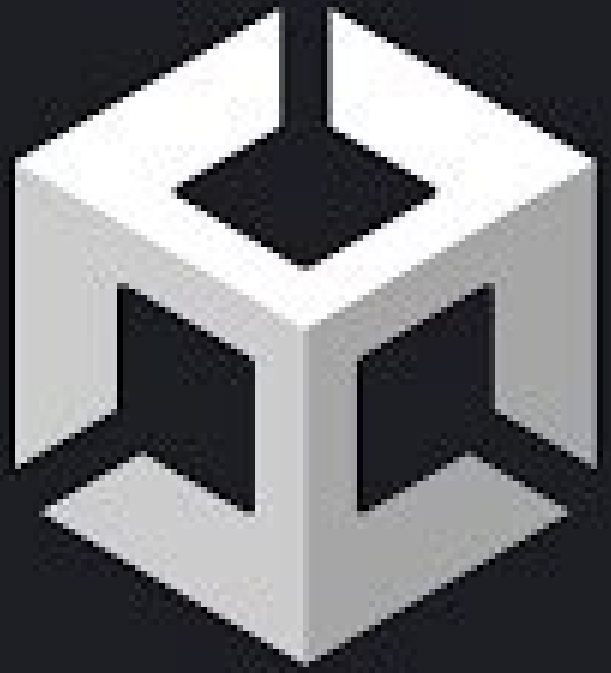

something
worth
waiting for.
GODOT
Game engine
3.0


CRYENGINE


lumberyard
BY amazon


GameMaker
Studio 2

100 SECONDS OF



製作一個虛擬內容，需要甚麼呢？

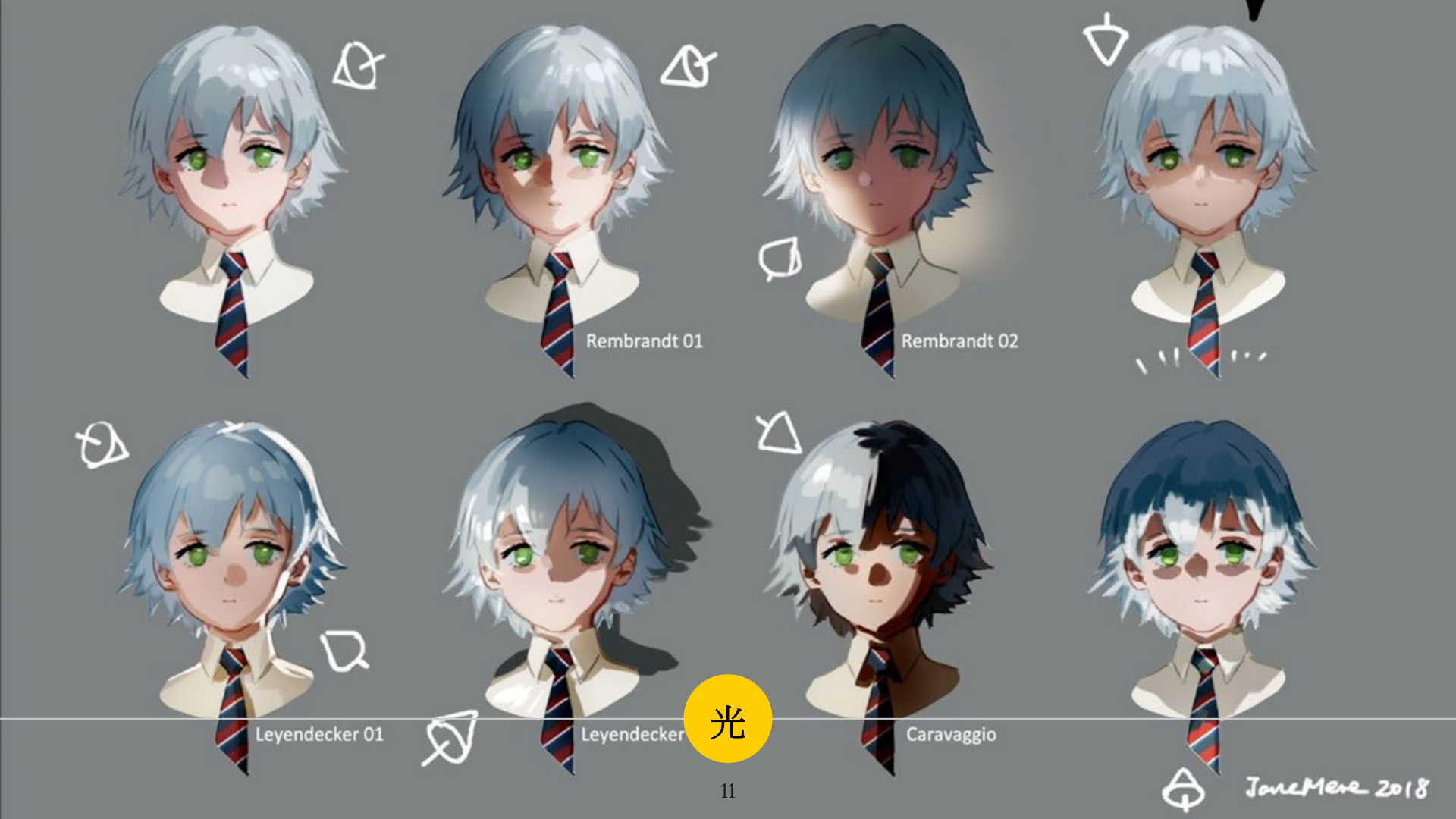
組成遊戲的元素？電影的橋段？

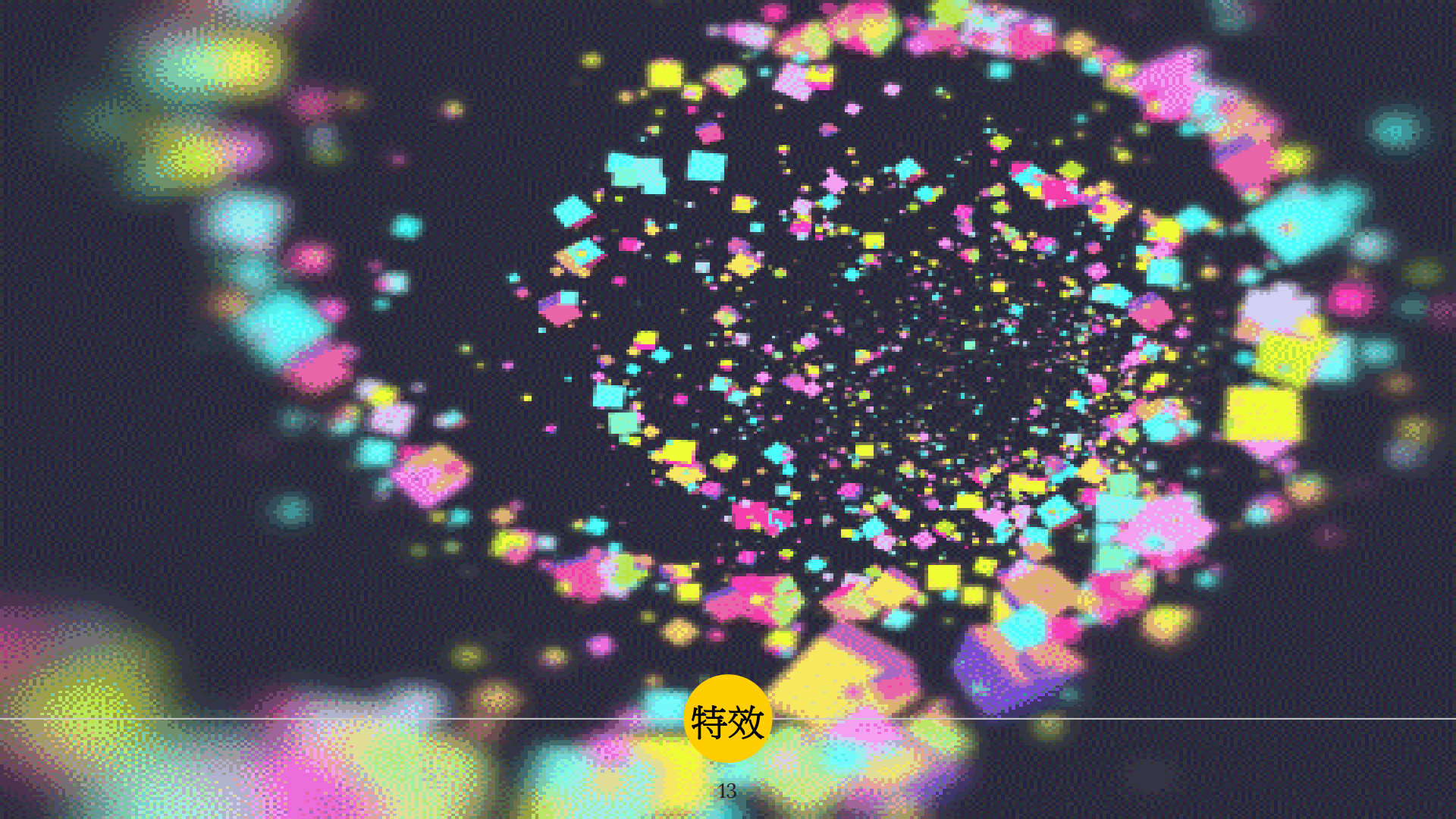

物件

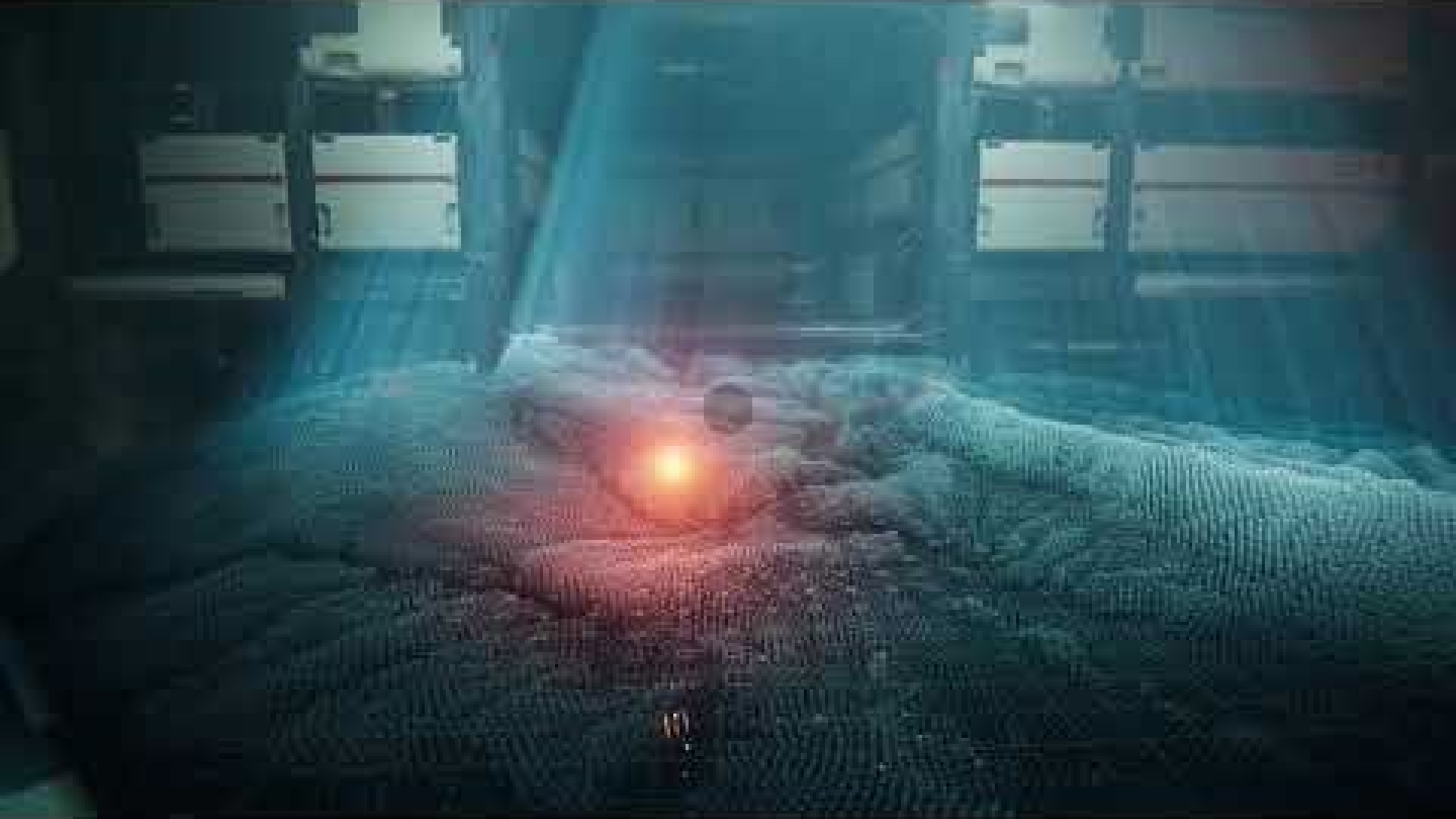

場景


角色

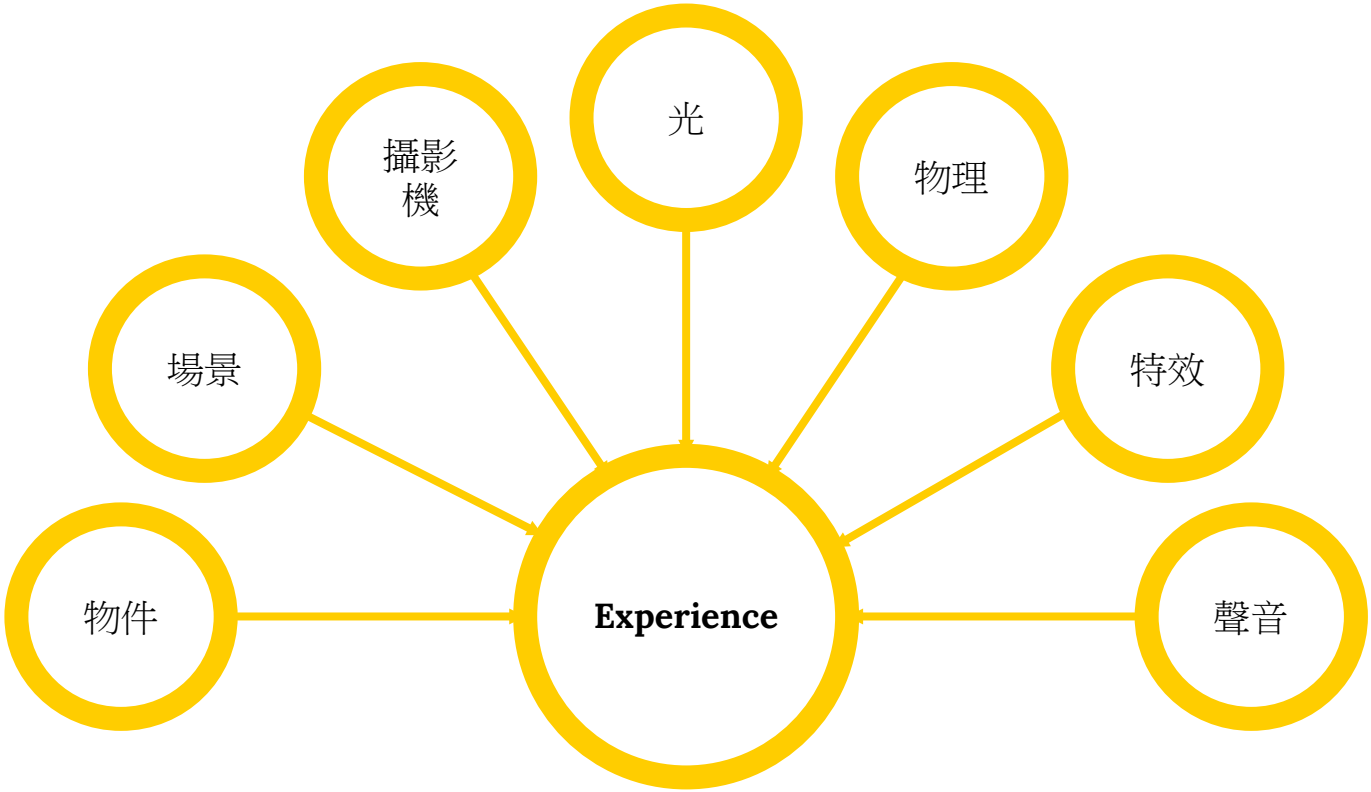
攝影機


Rembrandt 01
Rembrandt 02
Leyendecker 01
Leyendecker
光
Caravaggio
JaneMere 2018


特效



聲音


攝影機
光
物理
場景
特效
物件
Experience
聲音

Why unity ?

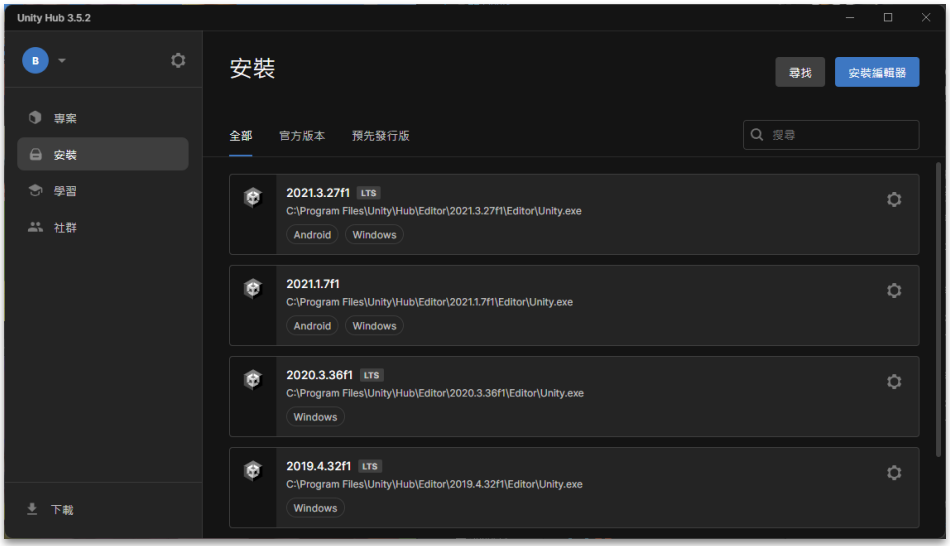
- 跨平台支援度高（**PC, Mac, VR, iOS, Android, Web...**）
- 相對易上手，資源、插件豐富
- 靈活度高（使用 **C# script** ）

先從安裝開始吧！

記得要註冊帳號~

Unity 2023.2.0b

使用 unity hub 安裝 https://unity.com/download

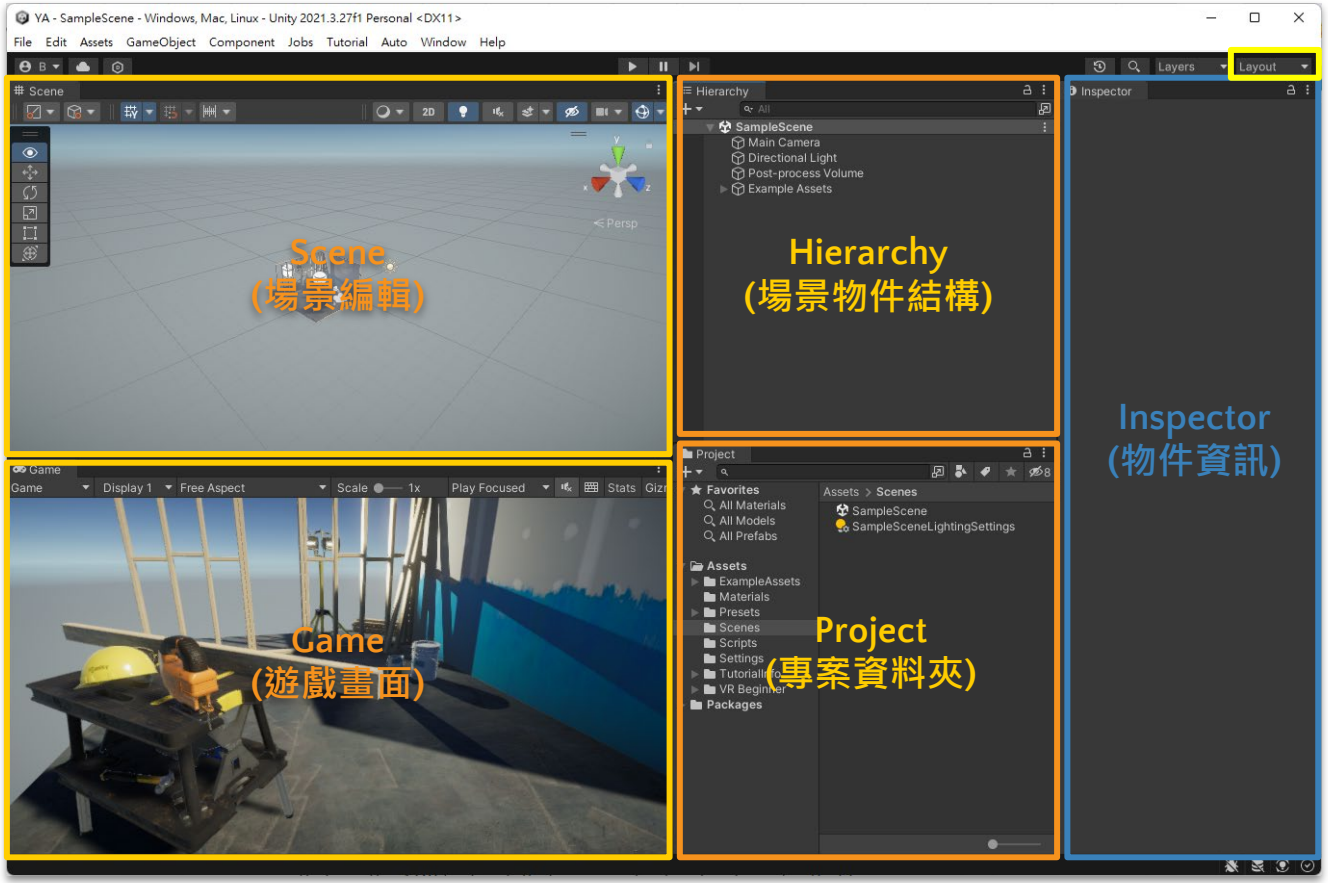


Create a Project

× 來試試看 3D 場景的範本吧！

如果遇到授權問題

如果使用 Unity Hub 新增專案，他會要求授權，
因此需要自己更新授權


YA - SampleScene - Windows, Mac, Linux - Unity 2021.3.27f1 Personal <DX11>
File Edit Assets GameObject Component Jobs Tutorial Auto Window Help
Layers
Layout
Scene
Persp
Scene
(場景編輯)
Hierarchy
SampleScene
Main Camera
Directional Light
Post-process Volume
Example Assets
Hierarchy
(場景物件結構)
Inspector
Inspector
(物件資訊)
Game
Game
Display 1
Free Aspect
Scale 1x
Play Focused
Stats
Game
(遊戲畫面)
Project
Favorites
All Materials
All Models
All Prefabs
Assets
ExampleAssets
Materials
Presets
Scenes
Scripts
Settings
Packages
Assets > Scenes
SampleScene
SampleSceneLightingSettings
Project
(專案資料夾)
2 by 3
4 Split
Default
Tall
Wide
Save Layout...
Delete Layout...
Revert Factory Settings...
可以編輯
介面配置

介面

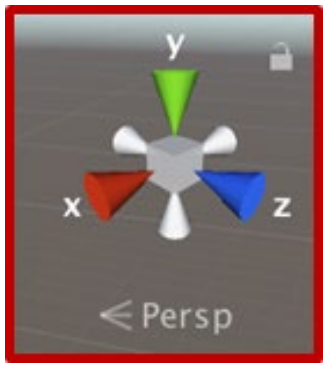
基礎操作 (手動)

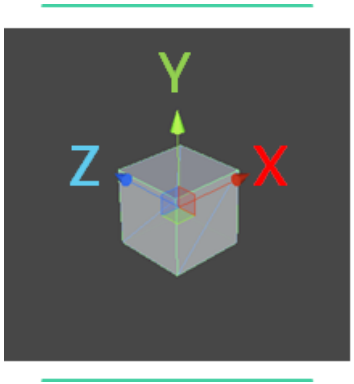
快捷鍵 Q W E R

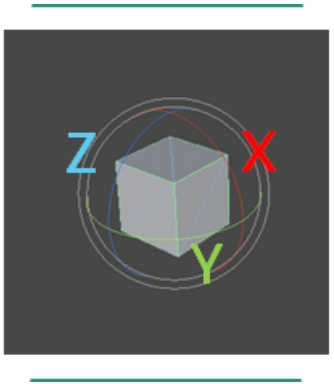
移動場景\移動物件\旋轉物件\縮放物件

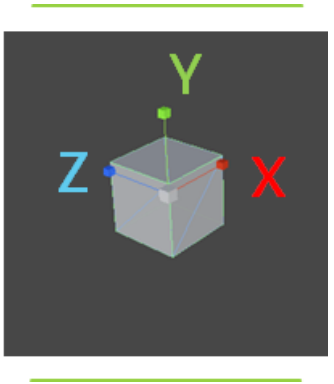
點選物件後可以看到三個顏色的軸向，分別對應 XYZ 軸。

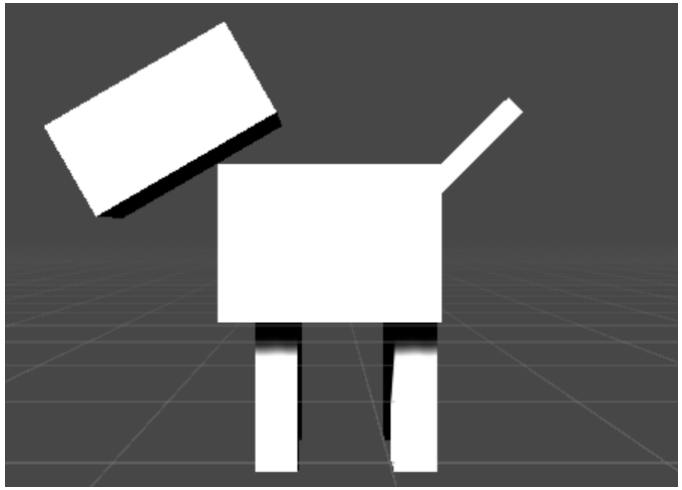
Scene 右上角也可以看到

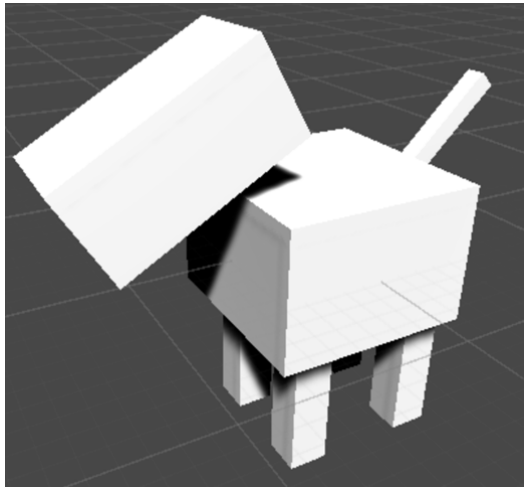












Tips:

- Ctrl + C = 複製
- Ctrl + D = 也是複製
- Ctrl + V = 貼上

- [滑鼠] 中鍵 = 平移視角 = Q
- [滑鼠] 右鍵 = 旋轉視角

練習時間

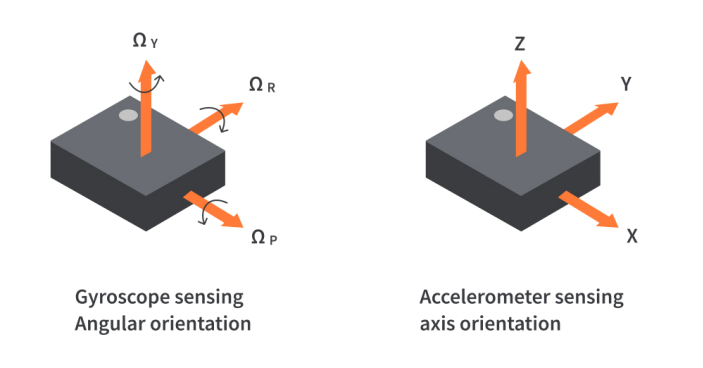
ARfoundation

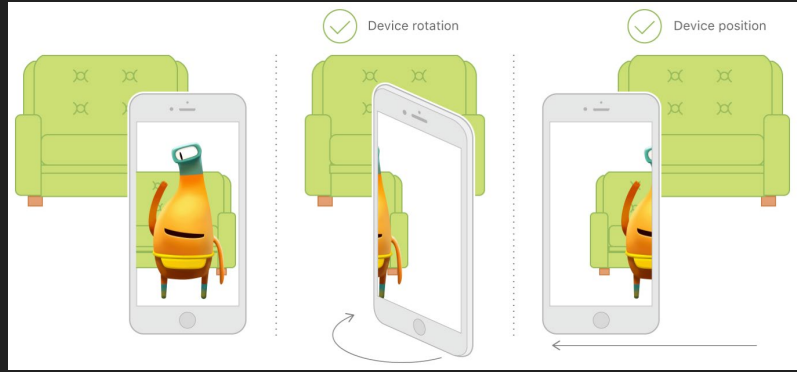
What’s AR?

1. **知道自己手機的位置（定位）**

   localization - 使用者經自身與辨識物(anchor)的相對位置，透過演算法分析並推導真實世界的空間座標(三角測量法、RGBD相機、lidar sensor)

   tracking - 動態的追蹤使用者座標上的位移，配合數秒前的資訊估算使用者位移
   慣性測量方式: 陀螺儀和加速度計(6DoF) 或 電腦視覺方式



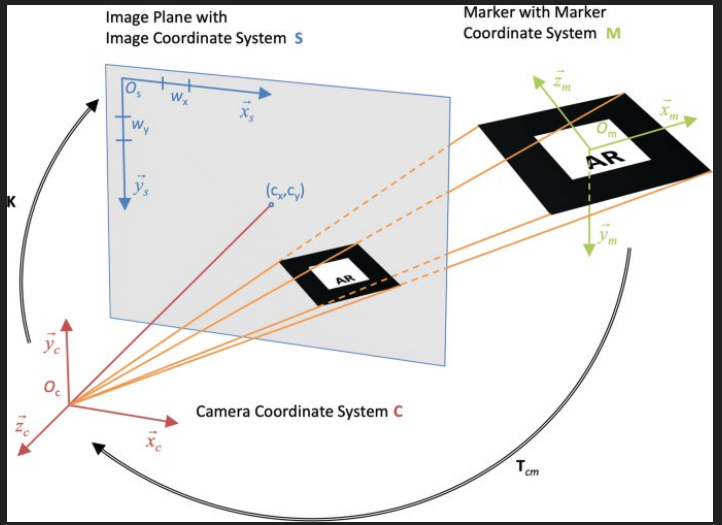


What’s AR?

2. 畫上虛擬的物件（渲染）

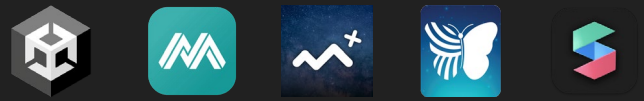
- 包括繪製模型的外型、材質，將 3D 世界座標映射至 2D 座標（螢幕）

- 其他還有像是遮擋 (occlusion)等問題，基於影像辨識或是深度資料以正確畫出虛擬物件。



Platform

- Laptop or Digital signage
- Mobile



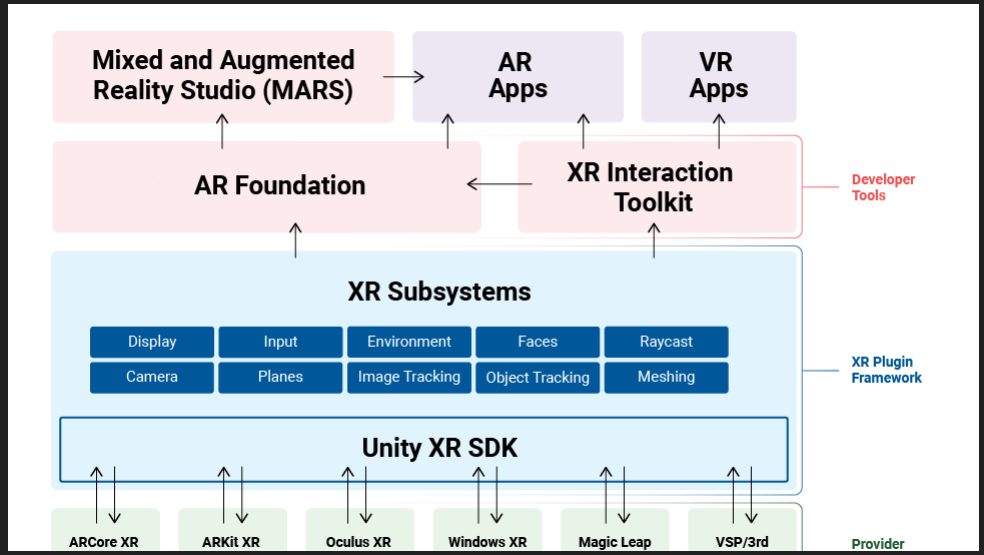
  - Native app: Unity, MAKAR, Marq+, Quiver, Spark AR
  - Web browser: 8th Wall, AR.js

- Head-mounted Display(HMD):
  HoloLens and others

AR frameworks

ARKit	ARcore	Vuforia
		
iOS	iOS/Android	iOS/Android
Free	Free	Premium Plan / Basic Plan (with watermark)

What’s ARfoundation?



- Unity package
- 各平台 native AR SDK 整合器
- 其架構大致分為3層：

  最上層 - AR Foundation 本身的 API 與 C# 接口，供開發者使用

  中間層 - 將取自底層的 SDK 依據功能重新封裝成獨立的Subsystem，統一其數據結構同時避免不同功能(subsystem)間互相干擾

  最下層 - 來自不同平台的 AR SDK（如 ARKit, ARCore…）

Platform support

AR Foundation provider plug-ins rely on platform implementations of AR features, such as Google's ARCore on Android and Apple's ARKit on iOS. Not all features are available on all platforms.

The table below lists the available features in each Unity-supported provider plug-in:

Feature	ARCore	ARKit	HoloLens (OpenXR)	Meta Quest (OpenXR)
Session	Yes	Yes	Yes	Yes
Device tracking	Yes	Yes	Yes	Yes
Camera	Yes	Yes		Yes
Plane detection	Yes	Yes	Yes	Yes
Image tracking	Yes	Yes		
Object tracking		Yes		
Face tracking	Yes	Yes		
Body tracking		Yes		
Point clouds	Yes	Yes		
Raycasts	Yes	Yes	Yes	Yes
Anchors	Yes	Yes	Yes	Yes
Meshing		Yes	Yes	
Environment probes	Yes	Yes		
Occlusion	Yes	Yes		
Participants		Yes		

https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@6.0/manual/index.html

AR foundation setup

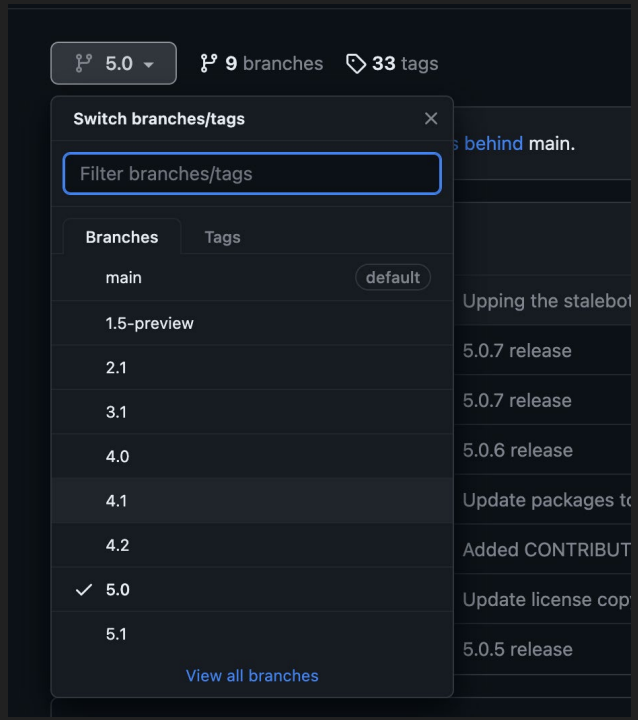
https://github.com/Unity-Technologies/arfoundation-samples

1. Download the sample project from the github and unzip it.

This sample project depends on four Unity packages:

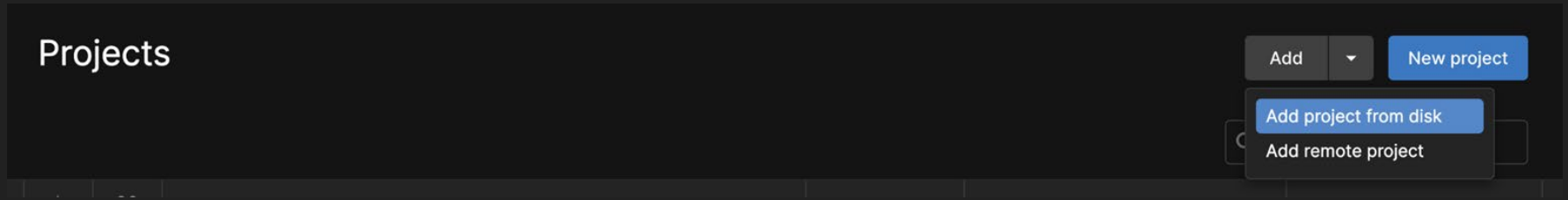
- AR Foundation
- Google ARCore XR Plug-in on Android
- Apple ARKit XR Plug-in on iOS
- OpenXR Plug-in on HoloLens 2

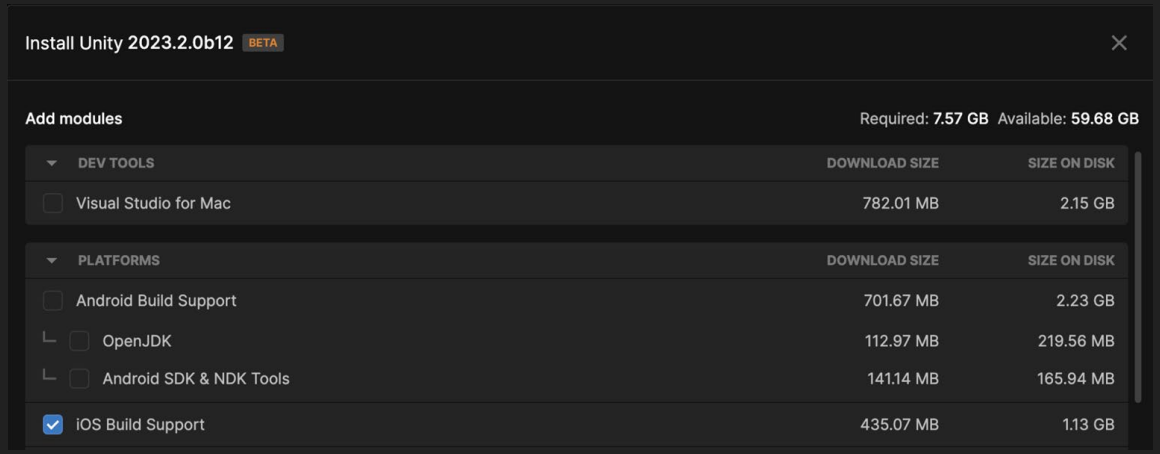
Unity Version	AR Foundation Version
2023.3 (alpha)	6.0
2023.2 (beta)	5.1
2023.1	5.1
2022.3	5.0
2021.3	4.2
2020.3	4.1



AR foundation setup https://github.com/Unity-Technologies/arfoundation-samples

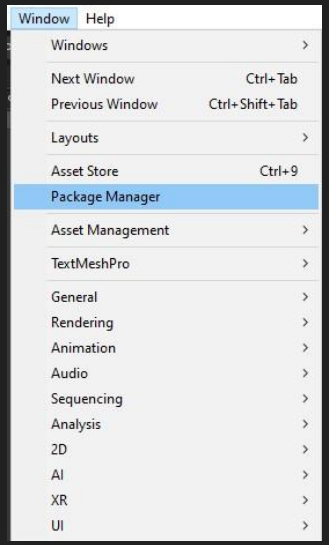
2. Open the project in unity hub

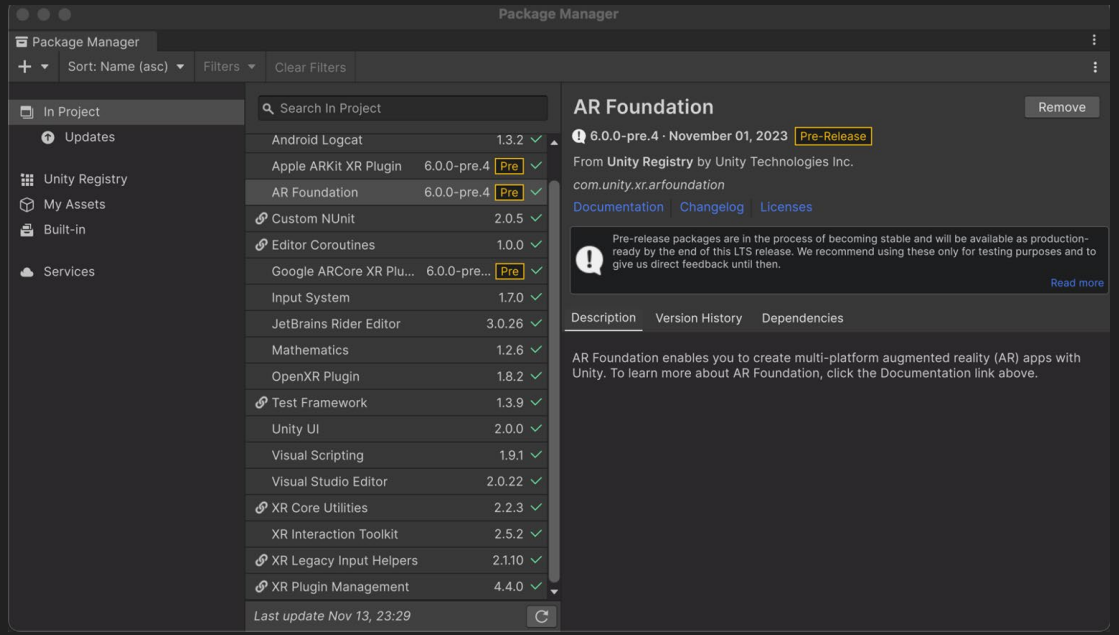




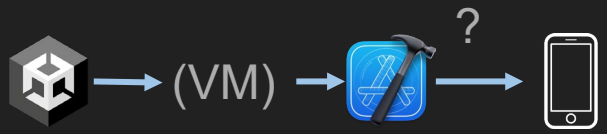
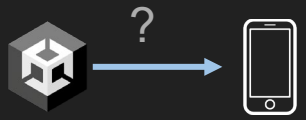
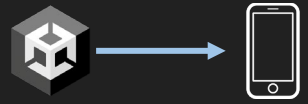
AR foundation setup

3. Check the Package Manager



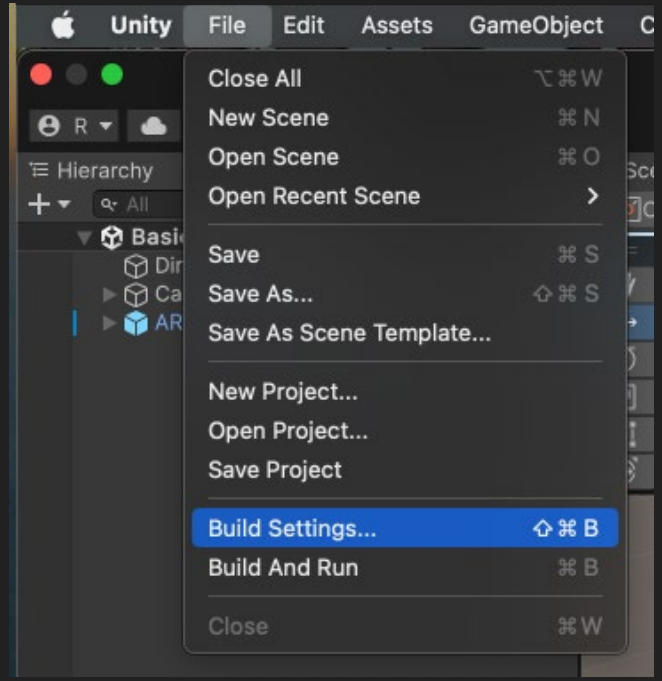


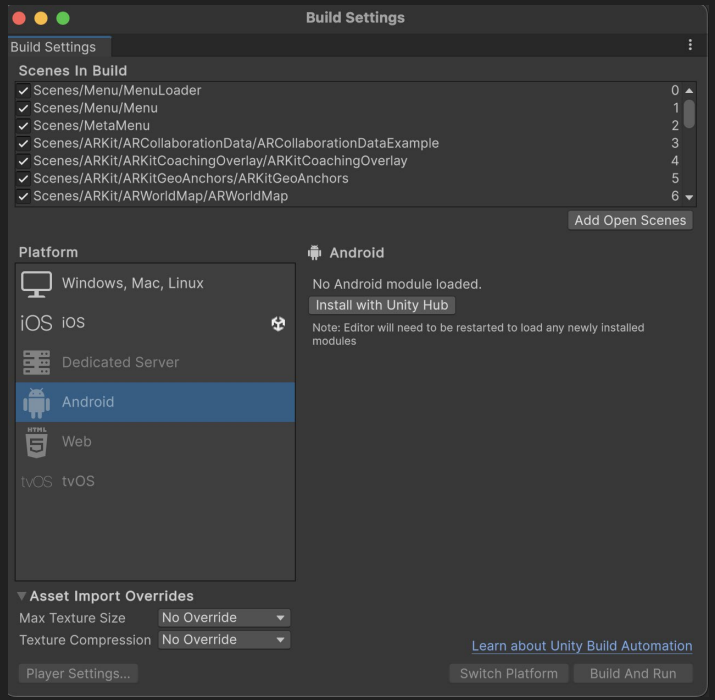
AR foundation build to mobile

	MacOS	Windows
iOS		
Android		

AR foundation build (Android)

4. Build to Device (https://www.youtube.com/watch?v=r3JXOoPTUHw)





AR foundation build (iOS)

MacOS: 14.1.1

iOS: 17.1.1

Xcode: 15.0.1

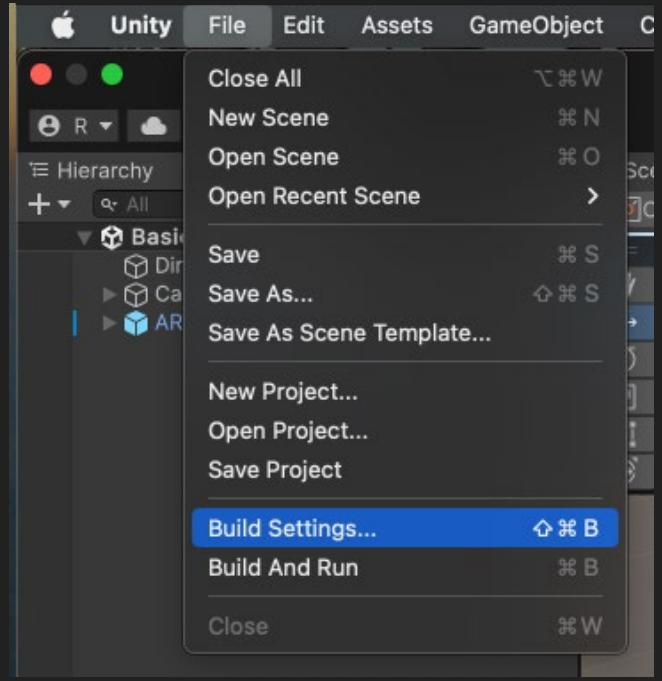
Unity: 2023.2.0b

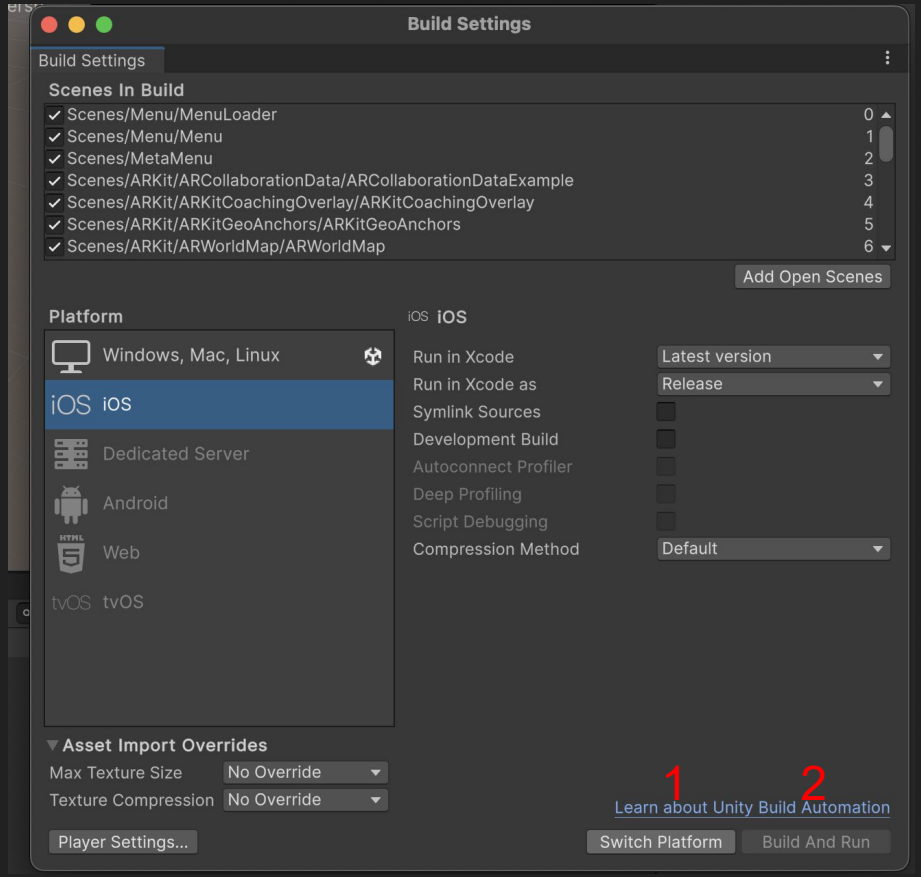
ARfoundation: 6.0.0-pre

(Strongly recommended)

AR foundation build (iOS)

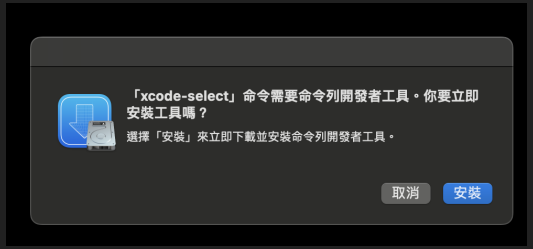
4. Build to Xcode project

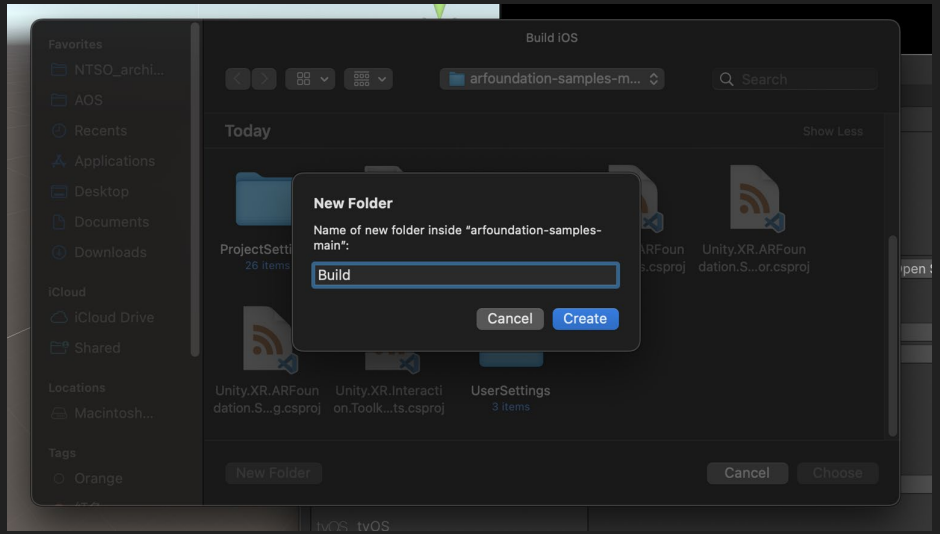


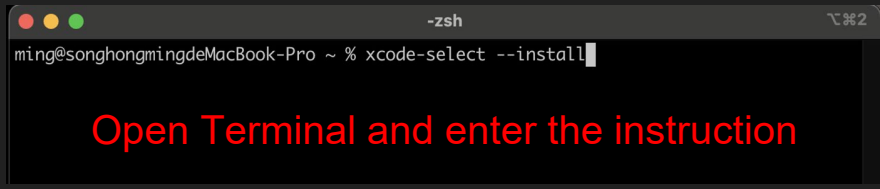


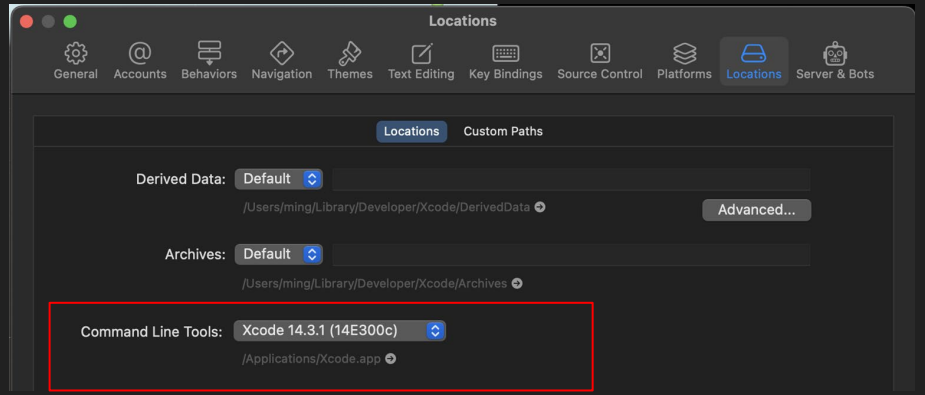
AR foundation build (iOS)

4. Build to Xcode project (install xcrun if you don't have it)





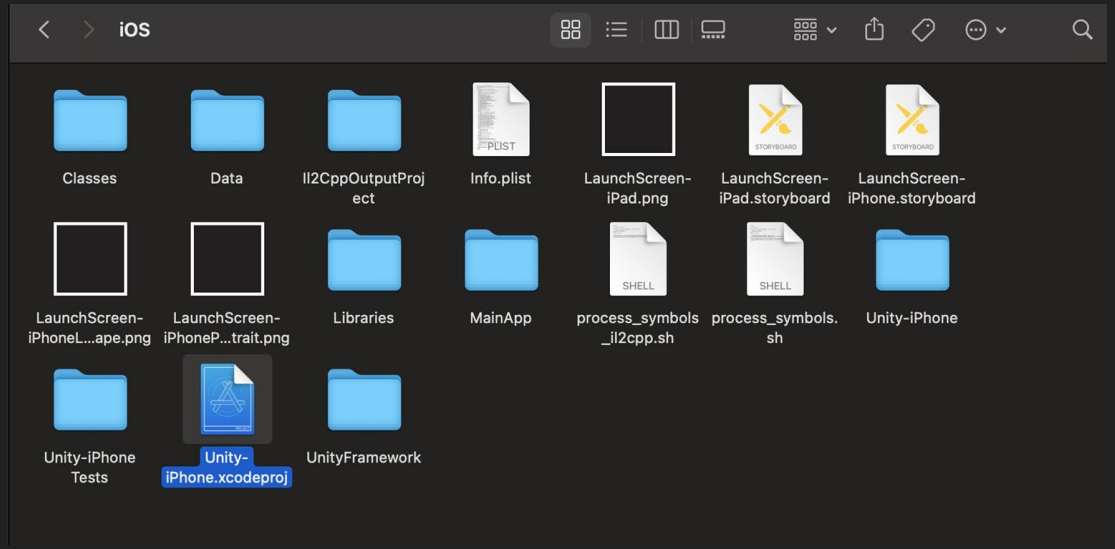




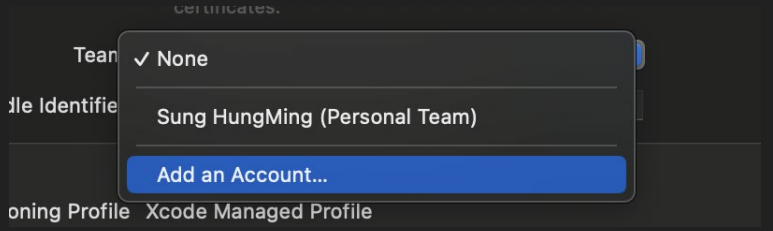
Xcode -> Settings -> Locations
Check here

AR foundation build (iOS)

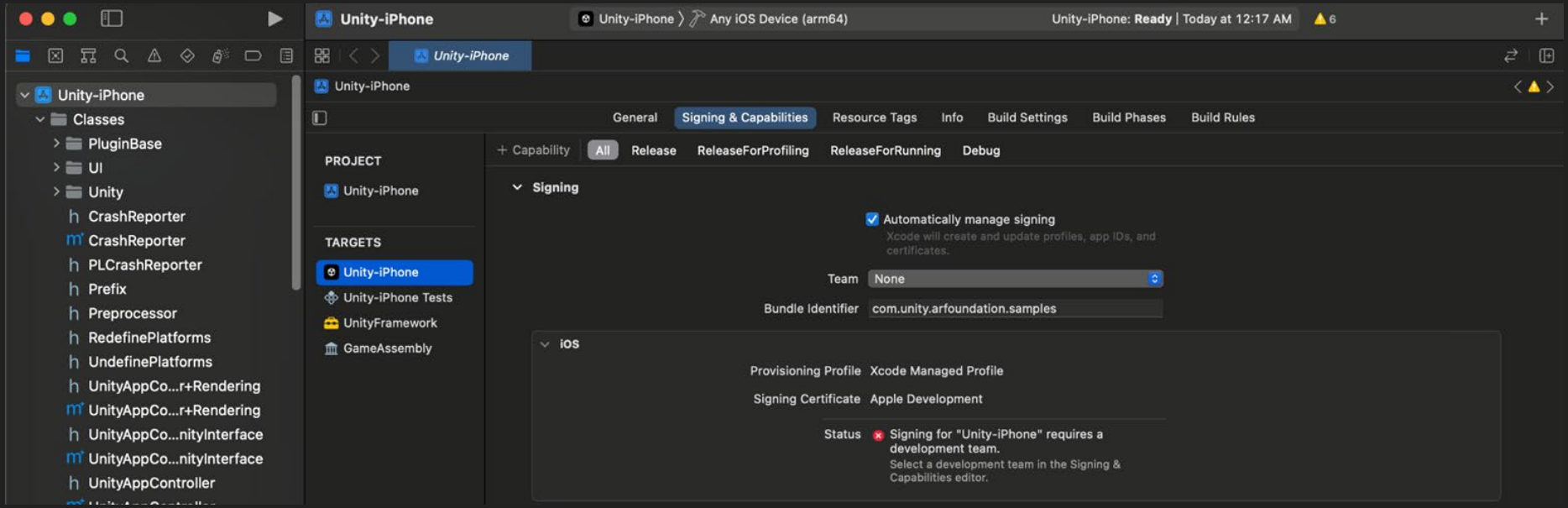
5. Open Xcode project & register an [apple developer account]



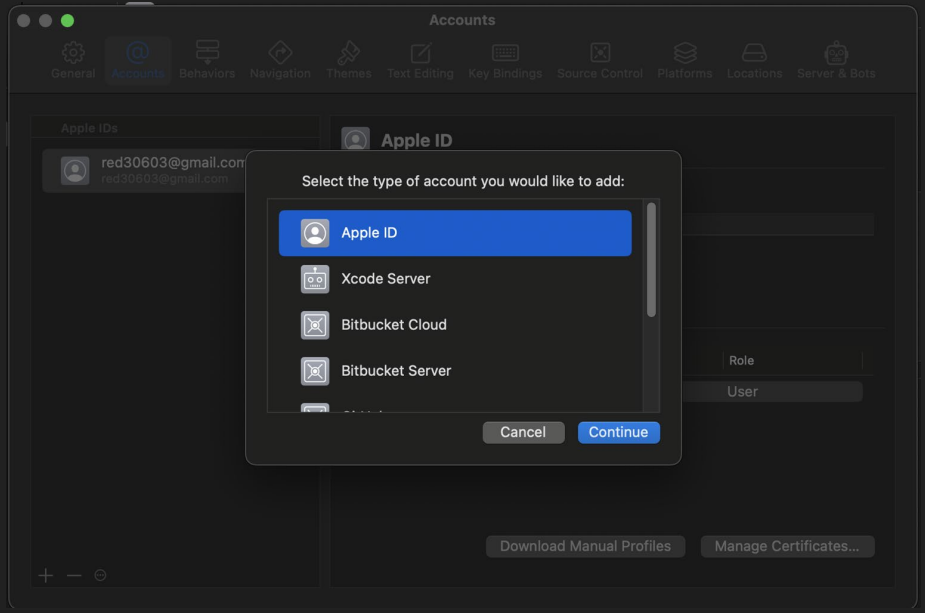
AR foundation build (iOS)

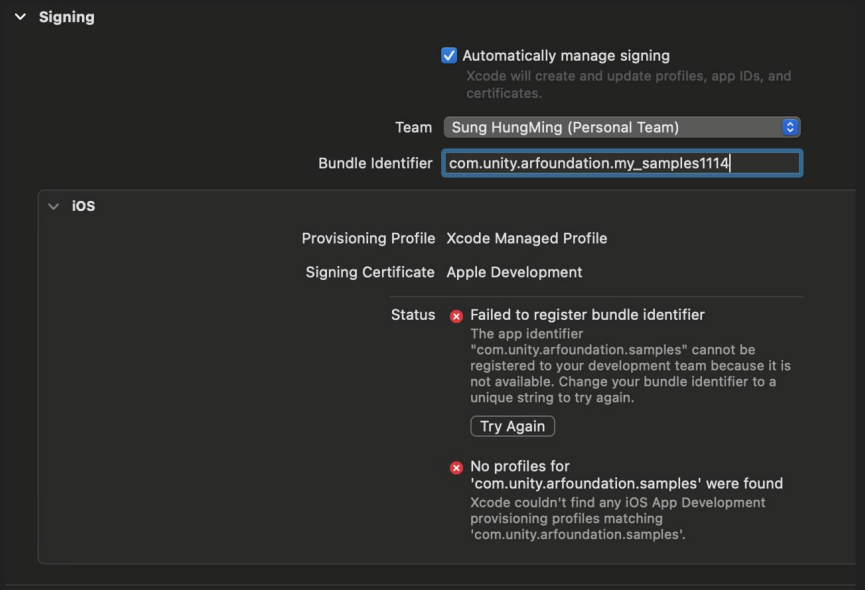


6. Set the project with user information

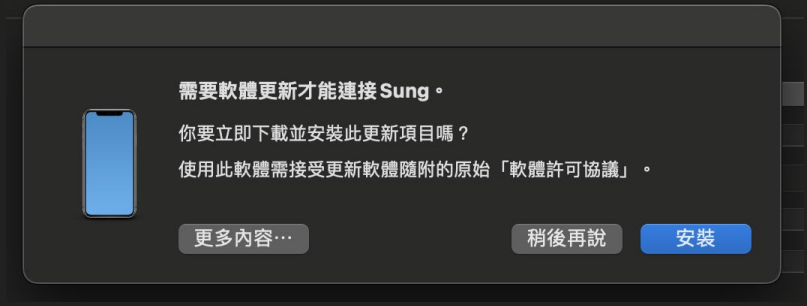


AR foundation build (iOS)





AR foundation build (iOS)



7. Run on a iOS device

7-1 Connect the iPhone (Click “Trust this device”)

7-2 Open the developer mode

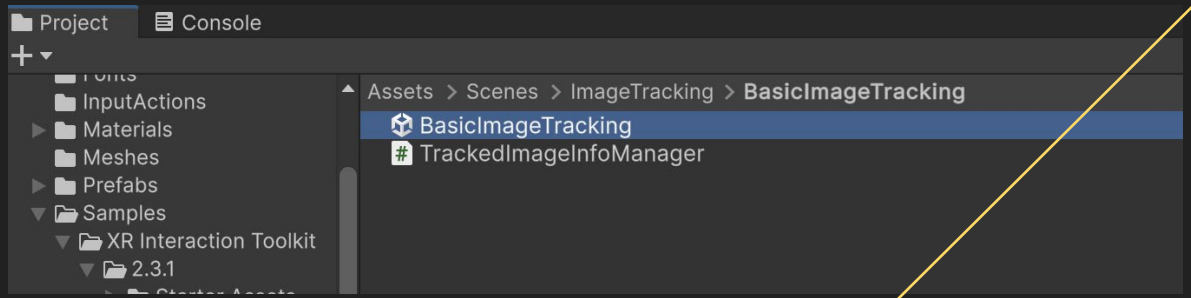
Sample scenes

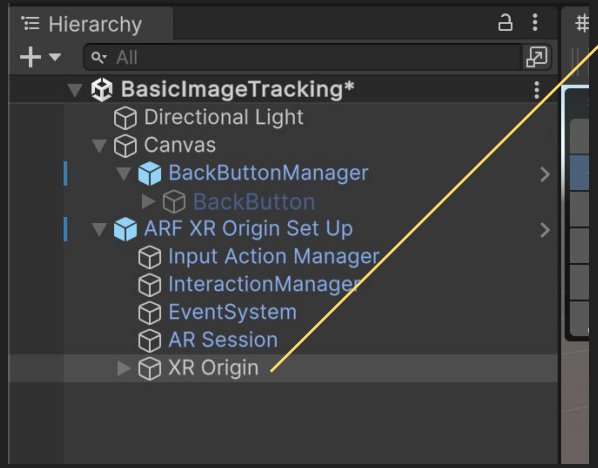
- Simple AR
- image-tracking
- object-tracking
- face-tracking
- body-tracking
- point-clouds
- ar-worldmap

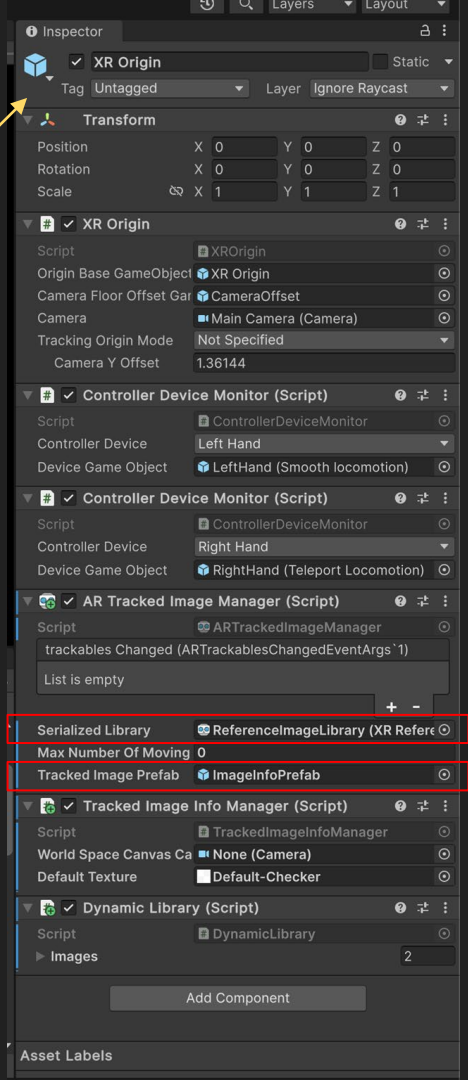
Table of Contents

Sample scene(s)	Description
Simple AR	Demonstrates basic Plane detection and Raycasting
Camera	Scenes that demonstrate Camera features
Plane detection	Scenes that demonstrate Plane detection
Image tracking	Scenes that demonstrate Image tracking
Object tracking	Demonstrates Object tracking
Face tracking	Scenes that demonstrate Face tracking
Body tracking	Scenes that demonstrate Body tracking
Point clouds	Demonstrates Point clouds
Anchors	Demonstrates Anchors
Meshing	Scenes that demonstrate Meshing
Environment Probes	Demonstrates Environment Probes
Occlusion	Scenes that demonstrate Occlusion
Check support	Demonstrates checking for AR support on device
Configuration Chooser	Demonstrates AR Foundation's Configuration Chooser
Debug Menu	Visualize trackables and configurations on device
ARKit	ARKit-specific sample scenes
ARCore session recording	Demonstrates the session recording and playback functionality available in ARCore

AR foundation image-tracking example







Thanks for listening