

Réalité Virtuelle

Moteur 3D

Année 2019-2020

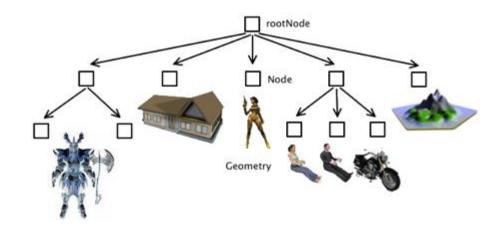
Arnaud MAS arnaud-a.mas@edf.fr

Moteur 3D

- Scène
 - Objets
 - Caméras
 - Lumières

• ...

Graphe de scène



Utilise une API 3D bas niveau









Composants d'un moteur 3D



Moteur de rendu



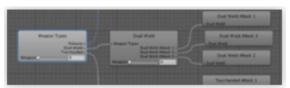
Moteur audio



Moteur de scripts



Moteur physique



Moteur d'animation



IA (navigation)



Couche réseau



Interfaces graphiques



Editeur



Moteur 3D

• Editeur / environnement de développement

```
Unity 5.5.6f1 Personal (64bit) - Image Tracking - Simple, unity - Wikitude Unity Example - Android (Personal) < OpenGL 4.1>
 (*) + S 또 iii
                             ■ Pivot 🕸 Local
                                                                                   ♥ Collab → 🔼 Account →
                         ≒ Hierarchy
                                                                                            6 Inspector
                                                 * 2D 🔅 ◄) 🔤 🔻 Gizmos * 🤕
                                Shaded
                                                                                                                                      ☐ Static ▼
                                                                                                 ✓ WikitudeCamera
▼  Image Tracking - Simple* =
                                                                                                 Tag MainCamera

    Layer Default

   Directional Light
                                                                                              Prefab
                                                                                                                       Revert
                                                                                                                                      Apply
  ▶ UI
                                                                                                                                           <u>□</u> $,
                                                                                                  Transform
  ▶ ImageTracker
                                                                                                                          Y 0.5
                                                                                                                                    Z 35
                                                                                              Position
    Controller
                                                                                             Rotation
                                                                                                                          Y 0
                                                                                                                                     Z 0
                                                                                                                          Y 1
                                                                                                                                     Z 1

▼ Wikitude Camera (Script)

                                                                                                                                           Wikitude License Key xmPeaqjkLHBj2U/kXirYdOxU6IE1pJkP
                                                                                             Enable Camera Render
                                                                                             Static Camera
                                                                                             Transform Override None (Transform Override)
                                                                                                                                             0
                                                                                             Camera Resolution Auto

    □ Console

                               € Game
                                                                                             Camera Framerate Auto
 Create *
                                Q t:Scene
                                                                             3 4 % *
                                                                                             Enable Camera2 API
▼ ★ Favorites
                                                     ▲ Search: Assets +
                                                                                              On SDK Initialized ()
                                                         Mage Tracking - Extended Trackir
                                                                                              List is Empty
      All Materials
                                                         MImage Tracking - Multiple Targets
      All Models

    ✓ Image Tracking – Multiple Trackers

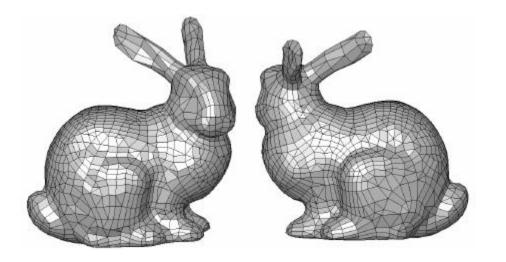
      All Prefabs
                                                          Mage Tracking - Runtime Tracker
      All Scripts
                                                          M Image Tracking - Simple
                                                                                              On Camera Error (Error)
                                                          Instant Tracking - Instant Tracking
                                                                                              List is Empty
 Assets
                                                          Instant Tracking - Load Instant Tai
  ▼ ■ Plugins
                                                          Instant Tracking - Save Instant Tar
      Android
                                                         Instant Tracking - Scene Picking
    ▶ ■ iOS
                                                         Main Menu
                                                                                             Enable Live Preview
    ▶ WSA
                                                         Object Tracking - Extended Tracki
                                                                                             Live Preview Mode Web Cam
  ▼ ■ StreamingAssets
                                                         Object Tracking - Object Tracking
                                                                                                WebCams
                                                                                                                 Default
      Wikitude
                                                         Plugins - Custom Camera
  ▼ Wikitude
                                                                                                                                           Plugins - QR & Barcode
                                                                                            ▼ 🖦 🗹 Camera
      Dependencies
                                                                                             Clear Flags
                                                                                                                Depth only
                                                         Plugins - Simple Input Plugin
    ▶ ■ Editor
                                                                                             Culling Mask
                                                                                                                Mixed ..
```

```
Debug - Any CPU - Attach to Unity - M _ In IT 3 % |
                                                       NewPlayModeTest
          using UnityEngine.TestTools;
          using NUnit.Framework;
          using System.Collections;
            ublic class NewPlayModeTest {
             public void NewPlayModeTestSimplePasses(
               // Use the Assert class to test conditions.
            // A UnityTest behaves like a coroutine in PlayMode
            // and allows you to yield null to skip a frame in EditMode
                     IEnumerator NewPlayModeTestWithEnumeratorPasses()
               // Use the Assert class to test conditions.
              // vield to skip a frame
Error List Task List Output Code Metrics Results Call Hierarchy Task Runner Explorer
HRESULT E FAIL has been retu Record a video about the Unity Test Runner
```



Moteur 3D

• Import de modèles 3D

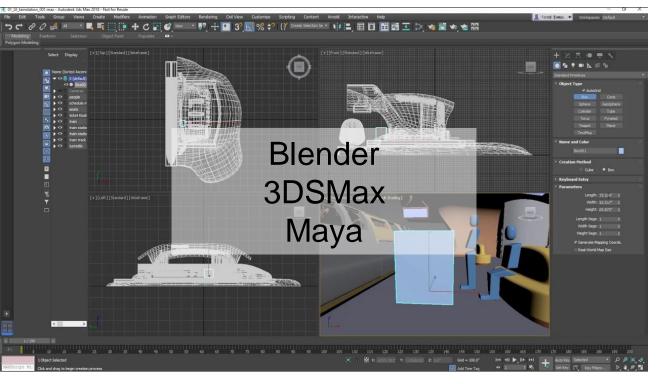


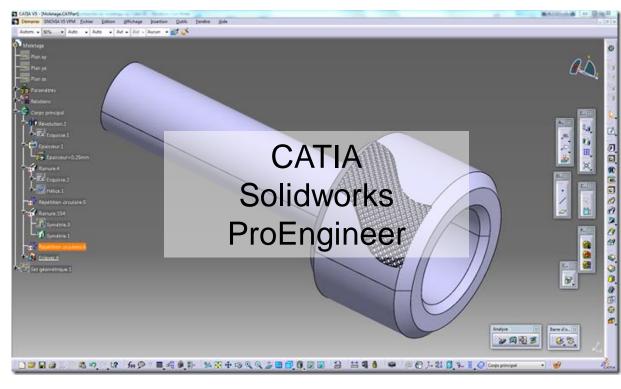


Modélisation 3D

Infographie 3D



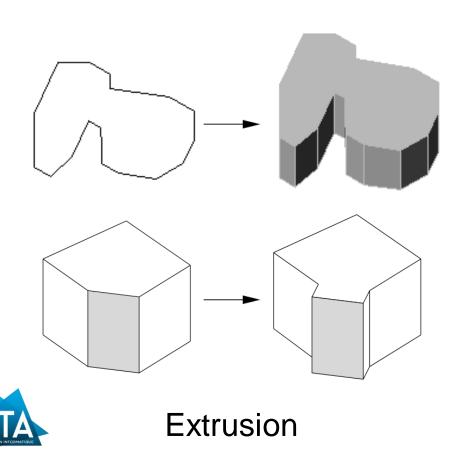


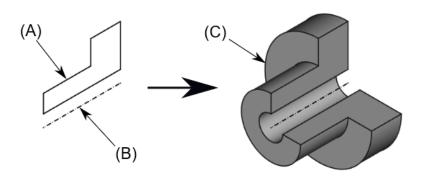




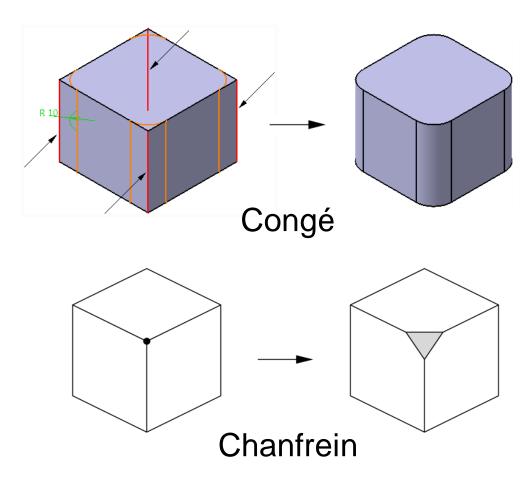
Modélisation CAO

Opérations paramétriques





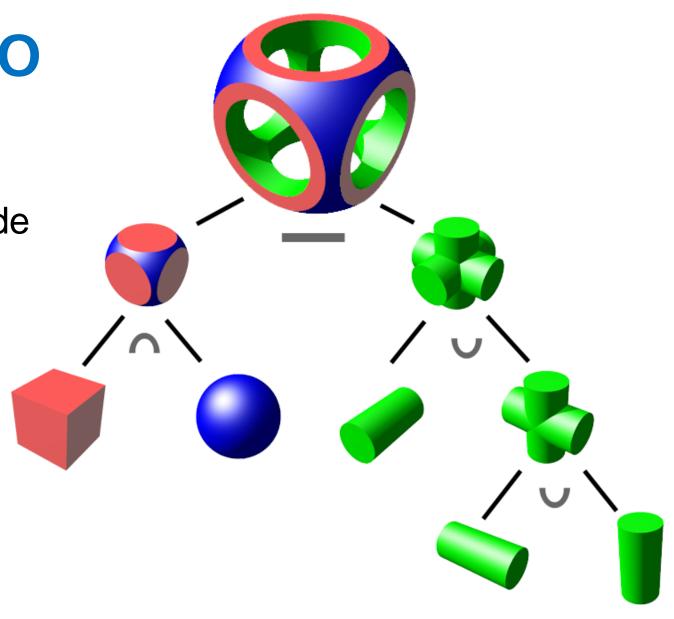
Révolution



Modélisation CAO

• Opérations booléennes :

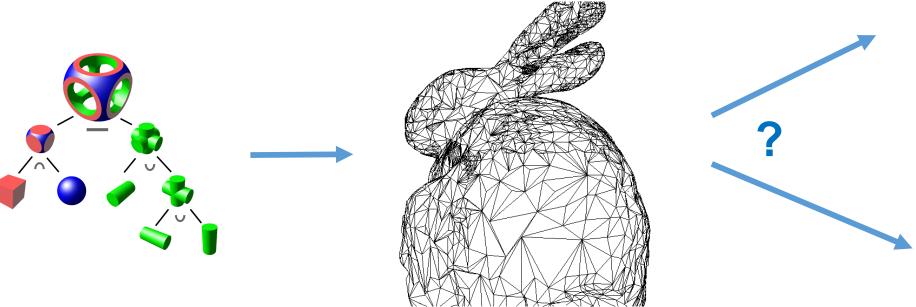
Géométrie de construction de solides (CSG)

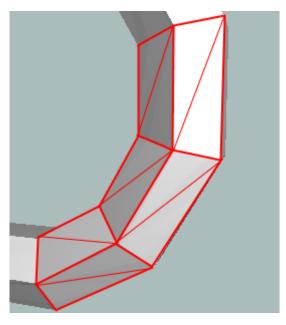


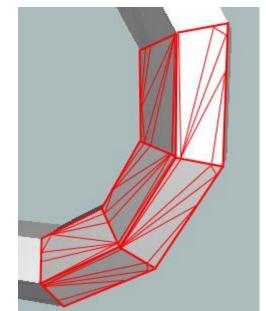


Tessellation

 Création d'un maillage : passage d'un modèle CAO à un modèle triangulé

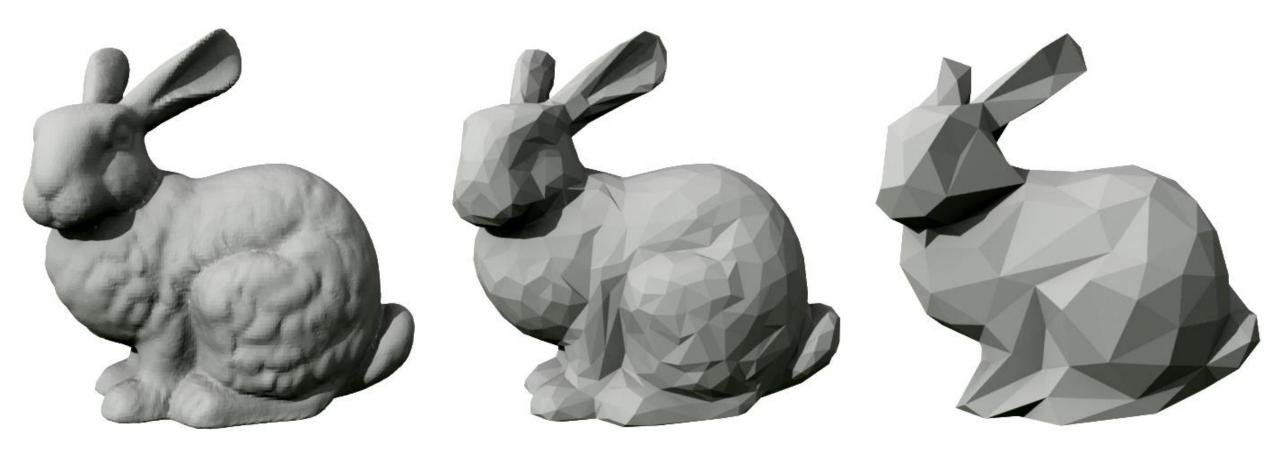








Tessellation





Import de modèles 3D

• Import de modèles tessellés

Pour Unity:

- Autodesk FBX (.fbx)
- Collada (.dae)
- Wavefront (.obj)
- Autodesk 3DS (.3ds)
- AutoCAD Drawig eXchange Format (.dxf)



Exemples de moteurs 3D









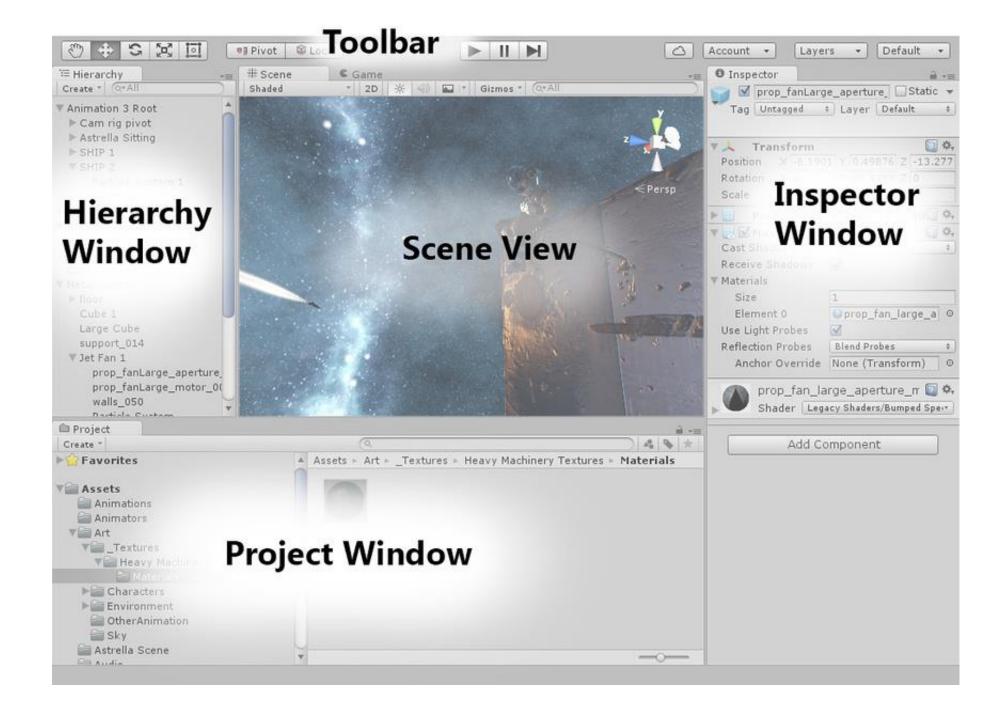








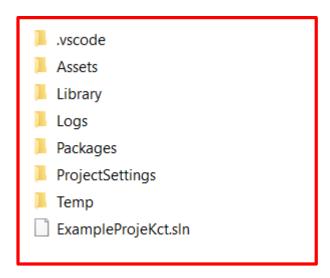
Unity

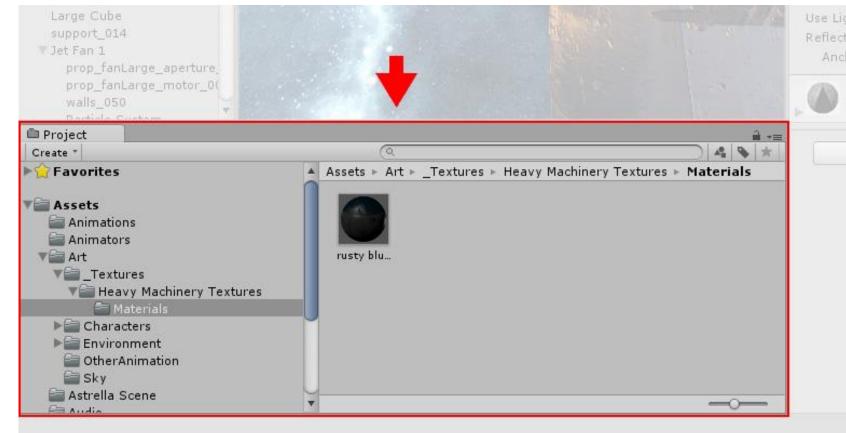




Unity: Projet

- Assets
- ProjectSettings

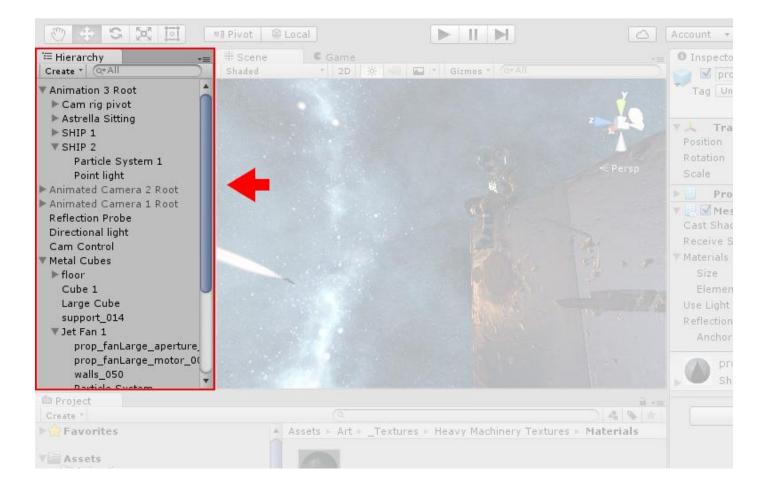






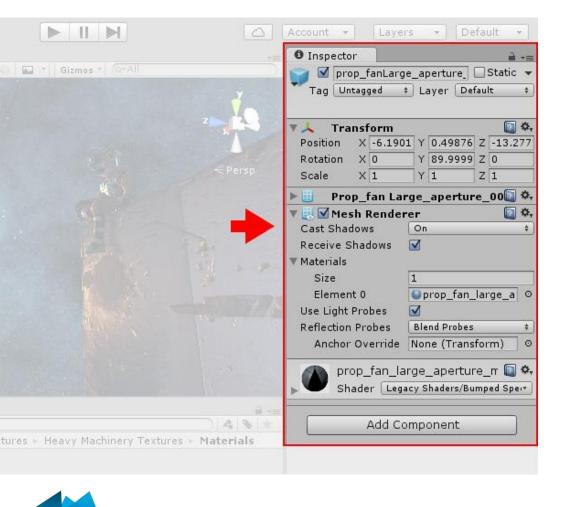
Unity: Hierarchy

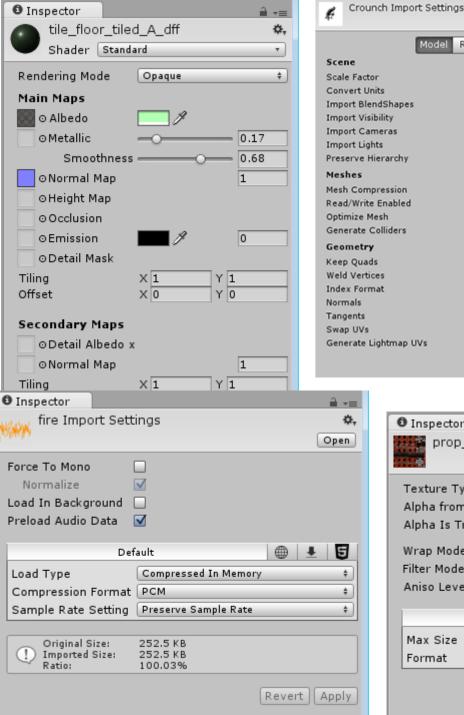
Gestion du graphe de scène

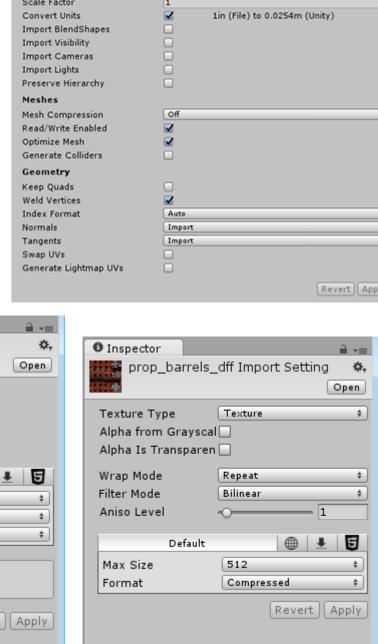




Unity: Inspecteur







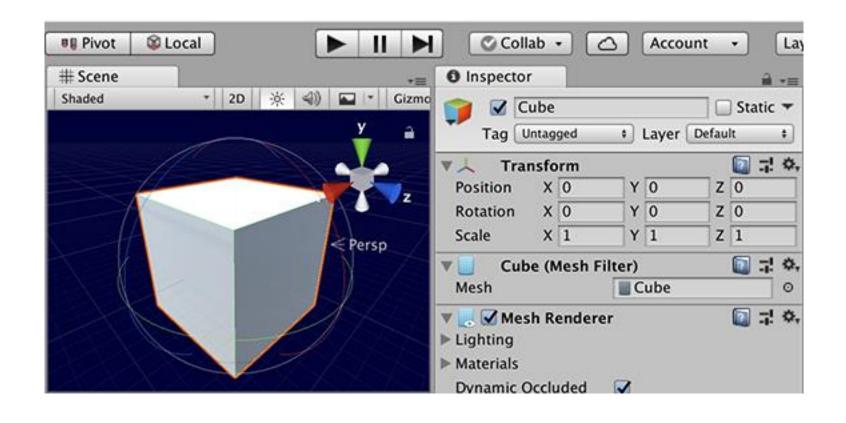
Rig Animation Materials

Opi

Unity: GameObject

Transform

Ensemble de composants





Unity: Composant

ExampleComponent.cs X

 Dérive de la classe MonoBehaviour

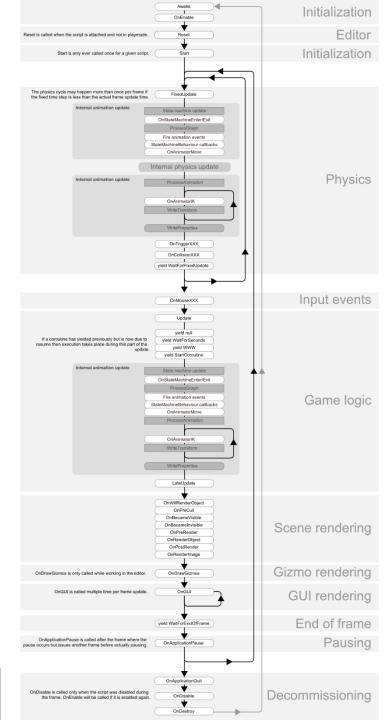


```
using System.Collections;
     using System.Collections.Generic;
     using UnityEngine;
     public class ExampleComponent : MonoBehaviour
         // Start is called before the first frame update
         void Start()
 11
 12
         // Update is called once per frame
 13
         void Update()
 14
 15
 17
 18
 19
```



Unity: MonoBehaviour

- Fonctions callback
 - Start()
 - Update()
 - FixedUpdate()
 - LateUpdate()
 - OnGUI()







Unity Asset Store

https://assetstore.unity.com/

Platforms

