# Lab 5: Vuforia + Unity

CS410/510: Virtual Reality
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# Review from last week

- Vuforia: What/why
- Go to https://developer.vuforia.com/
- Sign up for an account
- Upload an image under “target manager”
- When choosing an image, select for:
  - Strong lines
  - Good lighting
  - <2Mb size

# Review from last week

- Marker-based vs markerless AR applications
  - Marker-based AR: Use image or pattern to orient scene
  - Markerless AR: Map environment to orient scene
- Choosing marker-based vs markerless AR determines many things about your app

# Addendum to last week

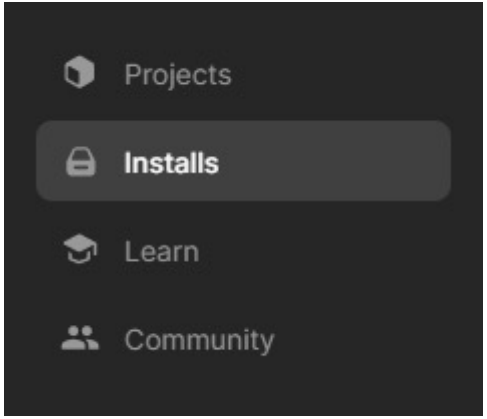
- Limits to environmental understanding are largely performance-based
  - Object recognition/SLAM are hard
  - Phones have limited hardware and poor thermals
  - Poor performance = low framerate = poor user experience

# Unity

- Open Unityhub
- We’ll set up a very basic marker-based AR app during class
- This is the homework

# Editor settings

- If you plan to deploy this to a mobile phone, make sure your platform's build support is checked in the editor you installed.
- To check, go to Installs in the UnityHub.
  - Check for Android or iOS as necessary

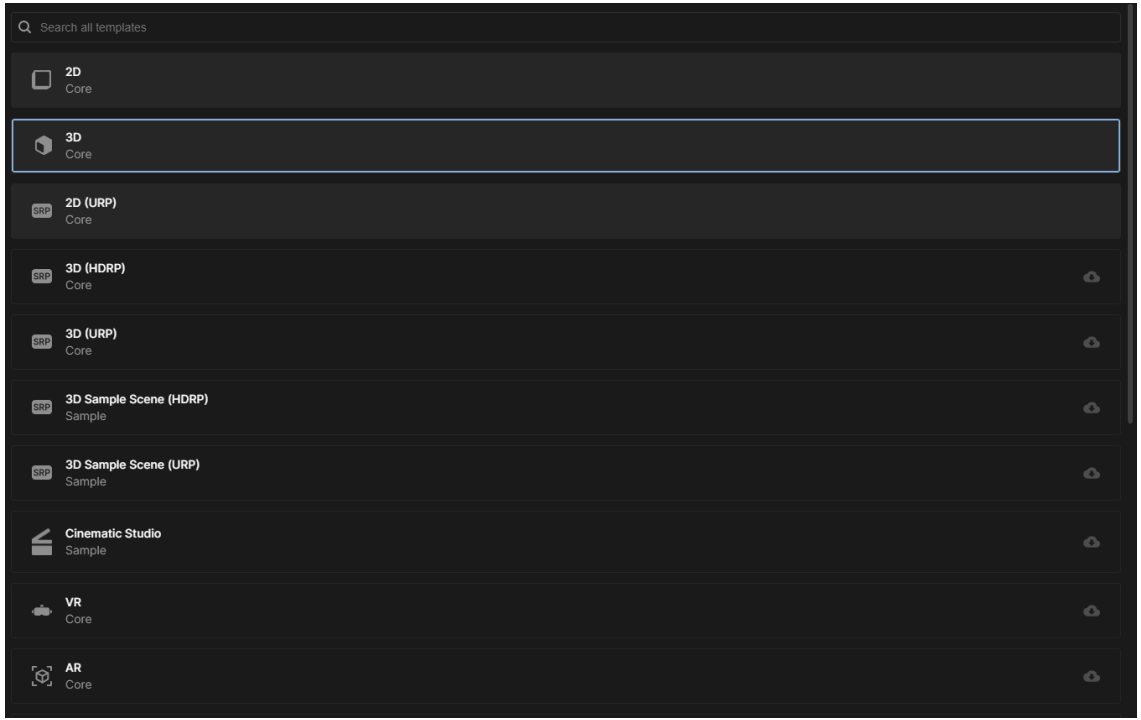


# Deployment and testing

- Desktop: Unity play mode will work fine
- Android: Building for Android has worked fine for most people
- iOS: You may experience difficulties building for iPhones without a mac and xcode correctly configured.

# Getting started

- Create project

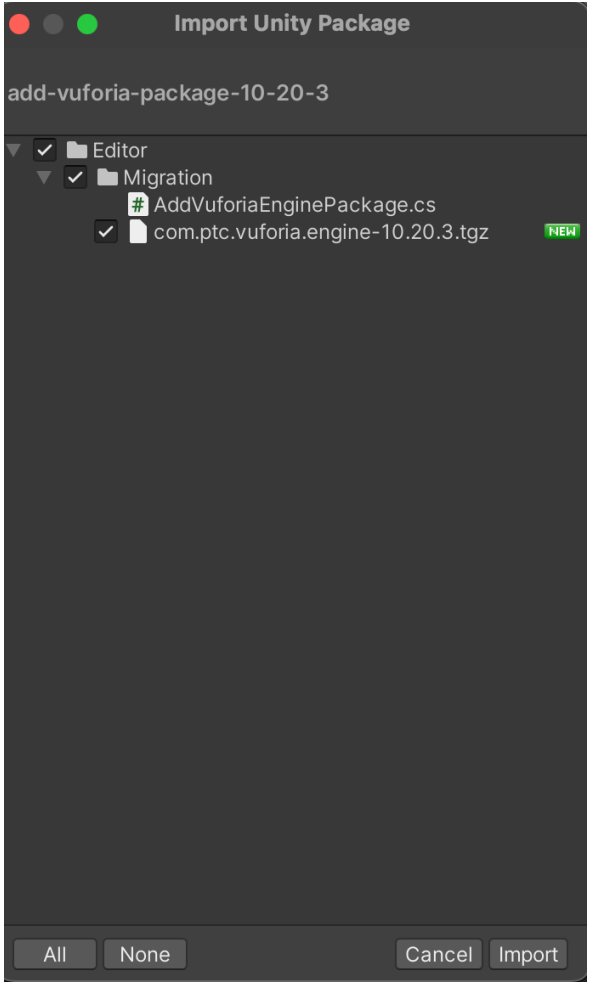


# Adding Vuforia support

- Unity packages are distributed as .unitypackage files, usually from developer's websites
- https://developer.vuforia.com/downloads/sdk
- Download the .unitypackage file

# Adding Vuforia support

- Assets
  - Import package -> custom package
- Find wherever you put the Vuforia package
- Import
- Confirm

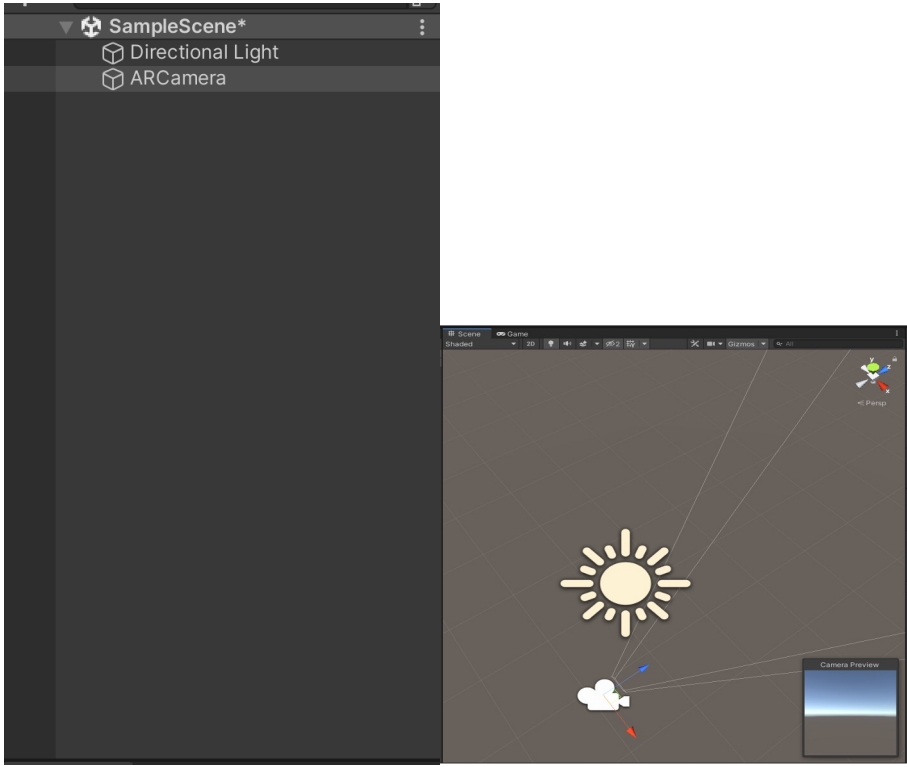


# Vuforia Camera

- AR Cameras
  - Vuforia implements its own camera which you have to add in lieu of the normal Unity camera
  - Think of this as a wrapper around a normal camera that:
    - Performs marker recognition
    - Moves the camera to the correct position relative to the marker
- It doesn’t matter where you put this
  - All transforms are computed relative to the marker now

# Vuforia Camera

- Add the Vuforia camera
- GameObjects
  - Vuforia Engine
  - AR Camera
- **Delete the main camera**
  - **The scene won't work if you leave it there**
- Should look basically the same as the default scene

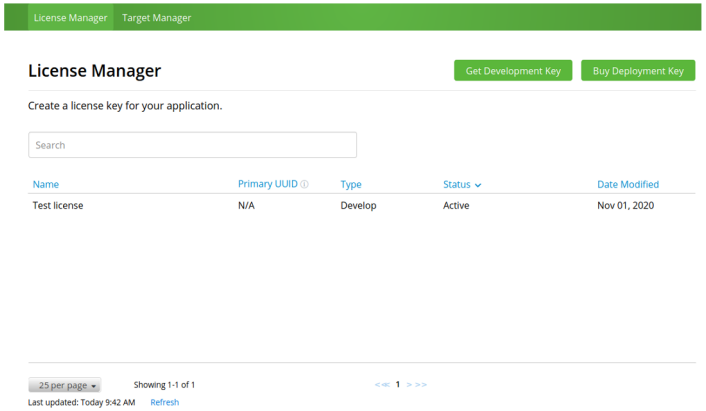


# Adding the Vuforia marker

- Time to add the markers we made last week through Vuforia's developer portal.

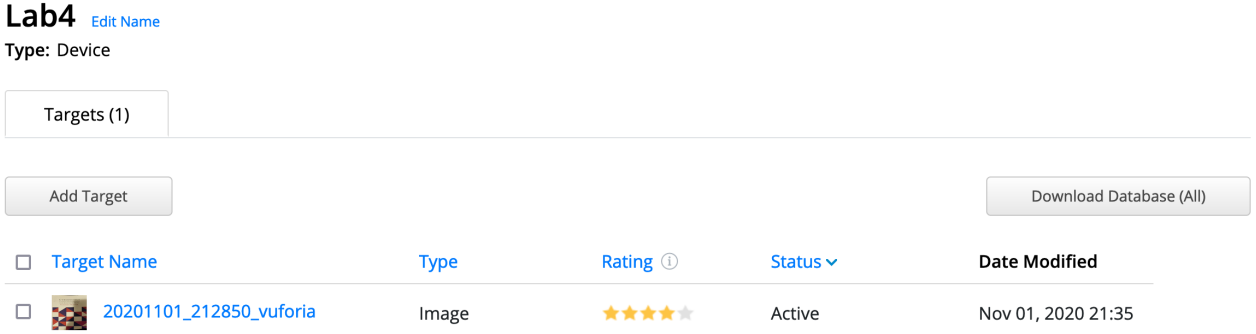
# Adding the Vuforia marker

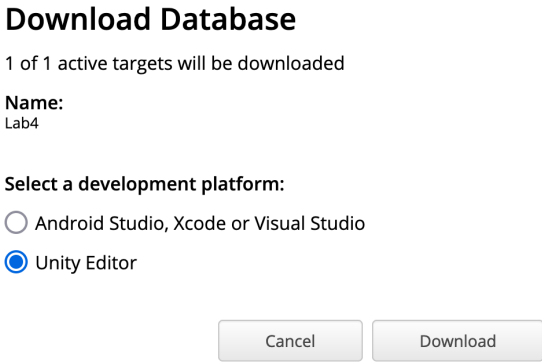
- Time to add the markers we made last week through Vuforia's developer portal.
- Go to the Vuforia developer portal
- Make sure your license is still good



# Adding the Vuforia marker

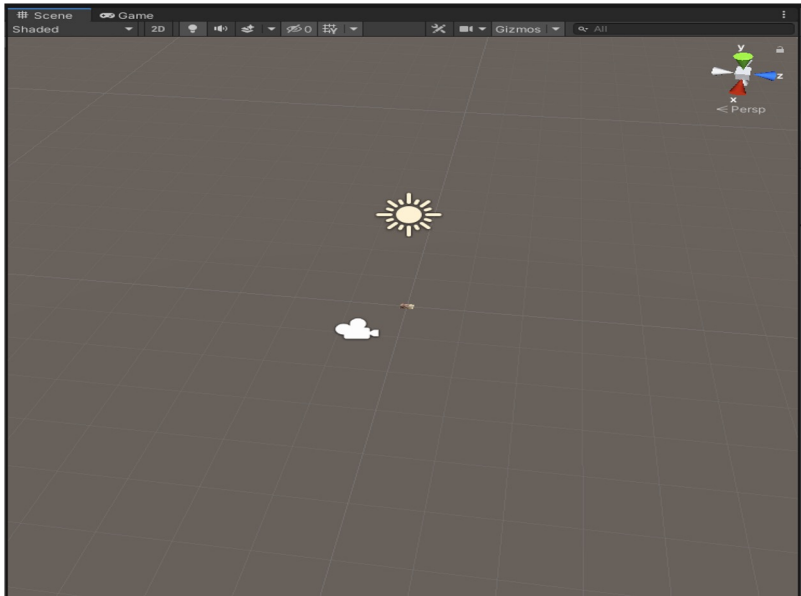
- Go to the target manager after that
- Select Download Database (All)
- Then make sure to select Unity Editor



# Adding the Vuforia Marker

- Back in the Unity editor, go to
- GameObject
  - Vuforia Engine
  - Image target
- Should be really really small by default

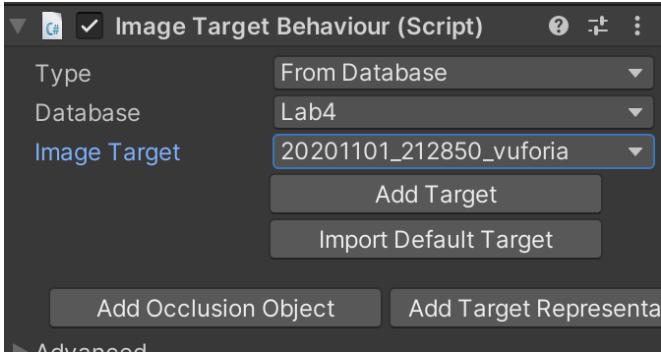


# Adding the Vuforia Marker

- Change to our database
- Assets
  - Import package
  - Custom package
  - Find the .unitypackage (the database) you just downloaded

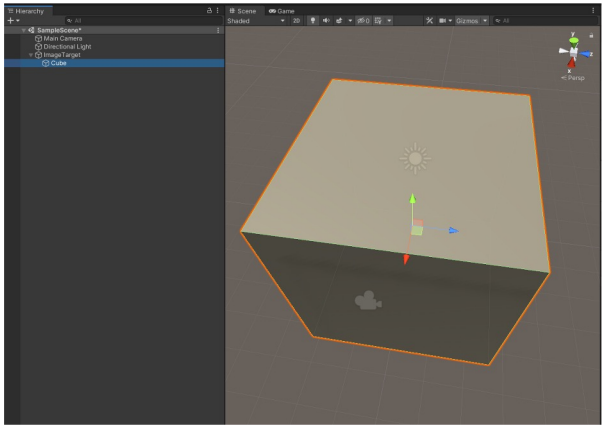
# Adding the Vuforia Marker

- Configure the image target
- Select the image target in the hierarchy
- Look at the inspector, find Image Target Behaviour
- Change the “database” and “image target” attributes to point to what you want them to.



# The actual app part

- You now have a kind of working app!
- Add some assets, as children of the image target.
- I'm uncreative, so I've put a cube here.
- You can hit the play button to test it



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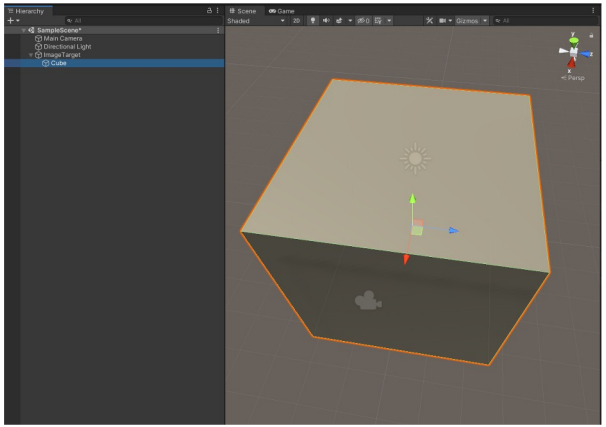

# Further reading

- Vuforia is easy to use, but certainly not the only AR platform!
- If you'd like to experiment more with Marker based AR, consider using Three.JS + AR.JS, A-Frame, AWS Sumerian, or any one of around a dozen constantly shifting proprietary solutions.
- If you'd like to experiment with markerless AR, try the same set of things, plus Unity's AR Foundation.