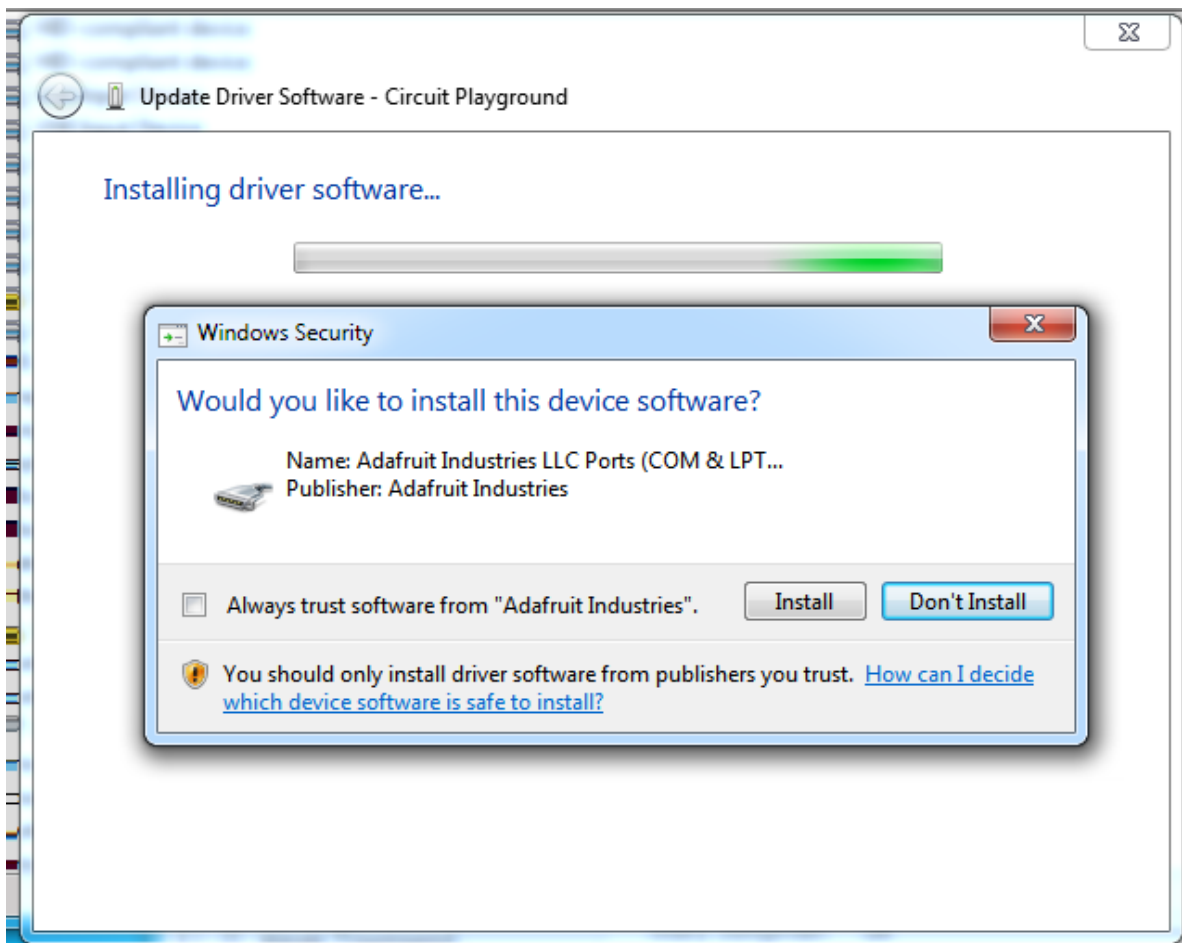




How to Sign Windows Drivers & Executables

Created by lady ada



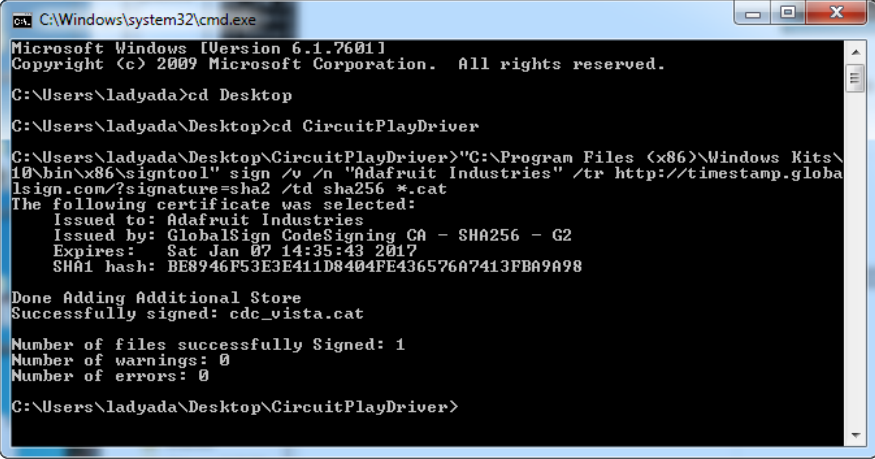
<https://learn.adafruit.com/how-to-sign-windows-drivers-installer>

Last updated on 2024-06-03 01:53:26 PM EDT

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Overview



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\ladyada>cd Desktop
C:\Users\ladyada\Desktop>cd CircuitPlayDriver
C:\Users\ladyada\Desktop\CircuitPlayDriver>"C:\Program Files (x86)\Windows Kits\
10\bin\x86\signtool" sign /a /n "Adafruit Industries" /tr http://timestamp.globa
ltime.com/?signature=sha2 /td sha256 *.cat
The following certificate was selected:
    Issued to: Adafruit Industries
    Issued by: GlobalSign CodeSigning CA - SHA256 - G2
    Expires:   Sat Jan 07 14:35:43 2017
    SHA1 hash: BE8946F53E3E411D8404FE436576A7413FBA9A98

Done Adding Additional Store
Successfully signed: cdc_vista.cat

Number of files successfully Signed: 1
Number of warnings: 0
Number of errors: 0

C:\Users\ladyada\Desktop\CircuitPlayDriver>
```

You've got a hot new product, ready to sell - You're a pro now! But part of that professionalism is making sure you have signed versions of all your drivers. If you're using a FTDI or Cypress or SiLabs chip to do USB, you might already have a signed driver that comes with it.

If not, it's an extra step and expense that will make your life (and your customer's lives!) much easier. These are my notes as I signed a Circuit Playground CDC driver file, made an installer, then signed that installer

More details!

Big ups to Pololu-pal David Grayson's intensely detailed tutorial which taught me everything I know! :)

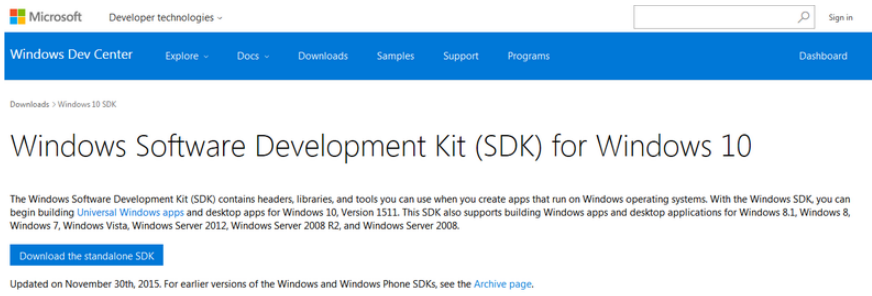
<http://www.davidegrayson.com/signing/#howto> (<https://adafru.it/BYv>)

Really, read the above if you need more than these steps, or read both tutorials at once for stereo-vision learning

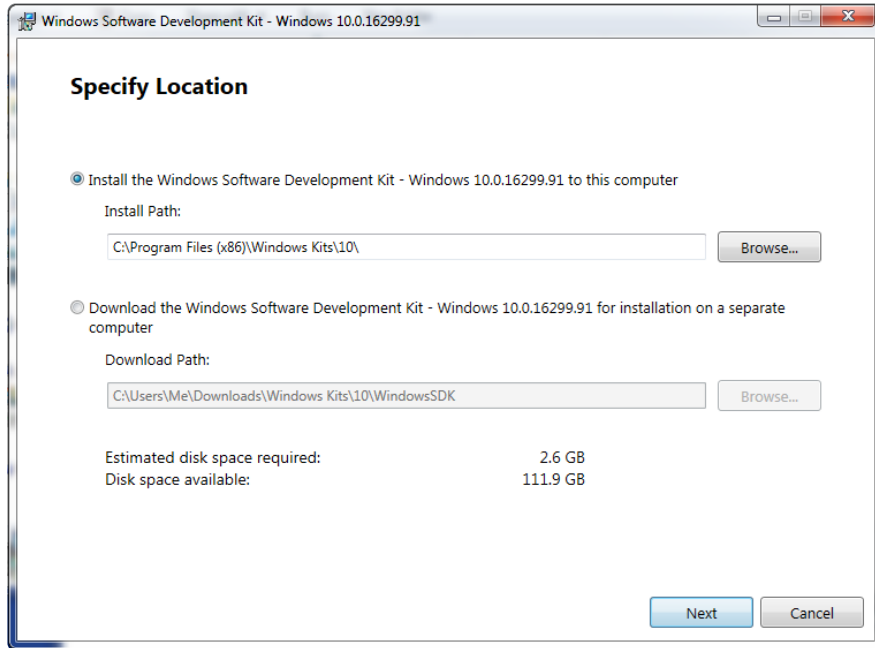
Installing Windows SDK

Visit Microsoft's SDK download page to grab the latest standalone SDK. Even though this is the Windows 10 SDK, you can install it on Windows 7 if you need to.

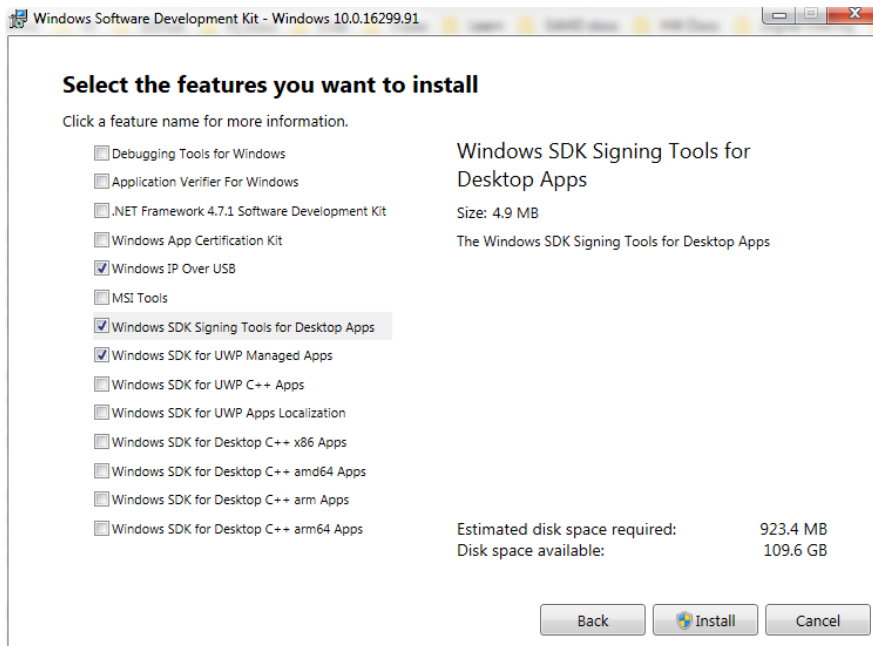
<https://dev.windows.com/en-us/downloads/windows-10-sdk> (<https://adafru.it/ma8>)



Its ok to install in **C:\Program Files(x86)\Windows Kits\10**



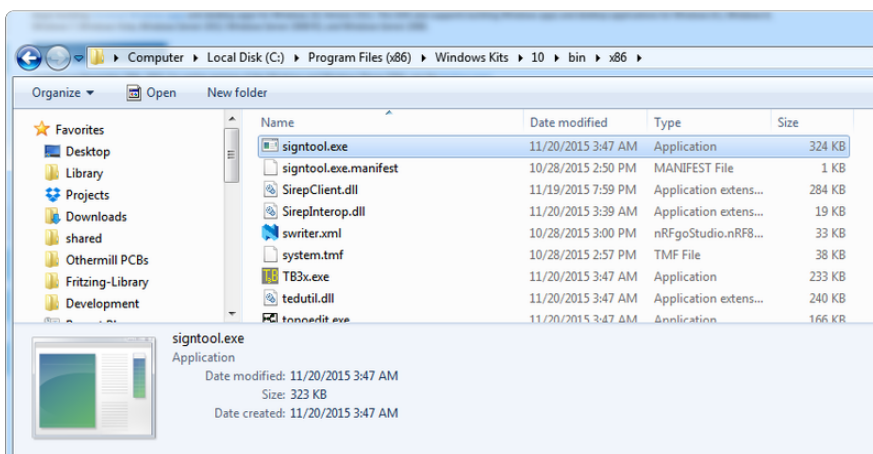
The screenshot below shows the minimal set of features you need to install to do signing: **Windows IP over USB** (required by SDK for UWP), **Windows SDK Signing Tools for Desktop Apps** (installs `signtool.exe`), and **Windows SDK for UWP Managed Apps** (installs `certmgr.exe`). You can install more if you're doing Windows development.



Done!



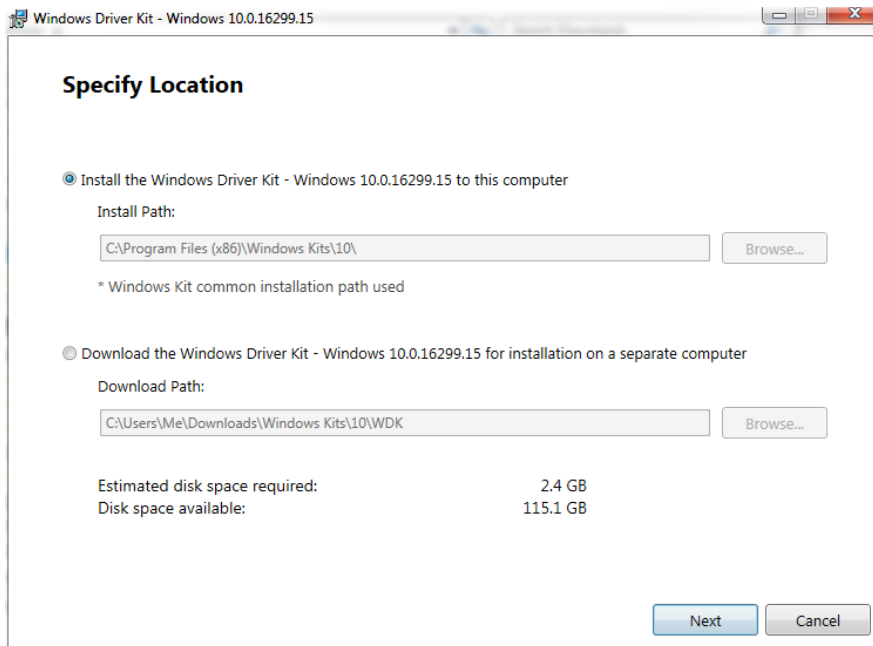
You can now find `signtool.exe` and `certmgr.exe` in `C:\Program Files (x86)\Windows Kits\10\bin\10.0.16299.0\x64` (or a newer version, if one has been released). Previous SDK installations did not include a version number in the path.



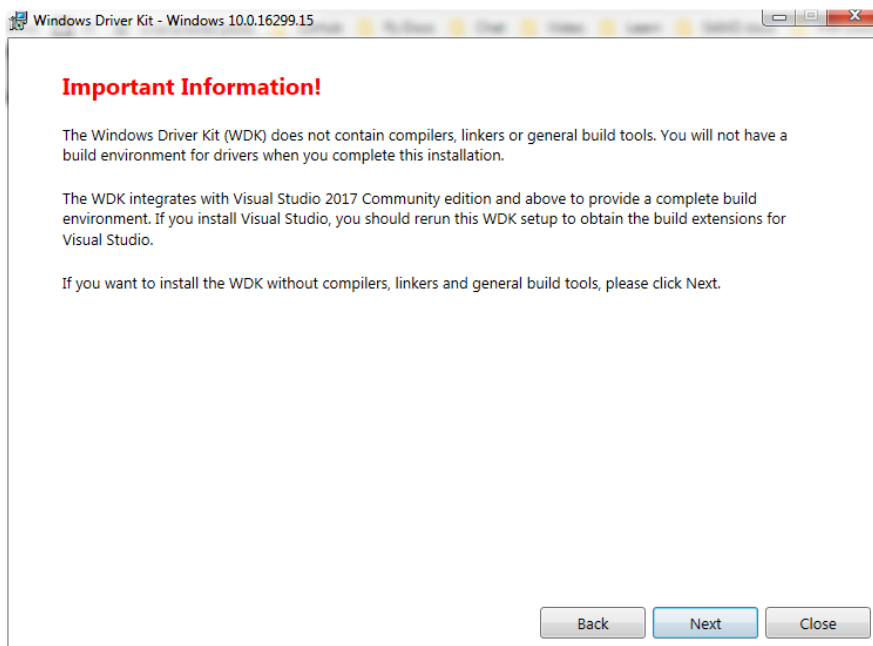
Download Windows WDK (Windows Driver Kit)

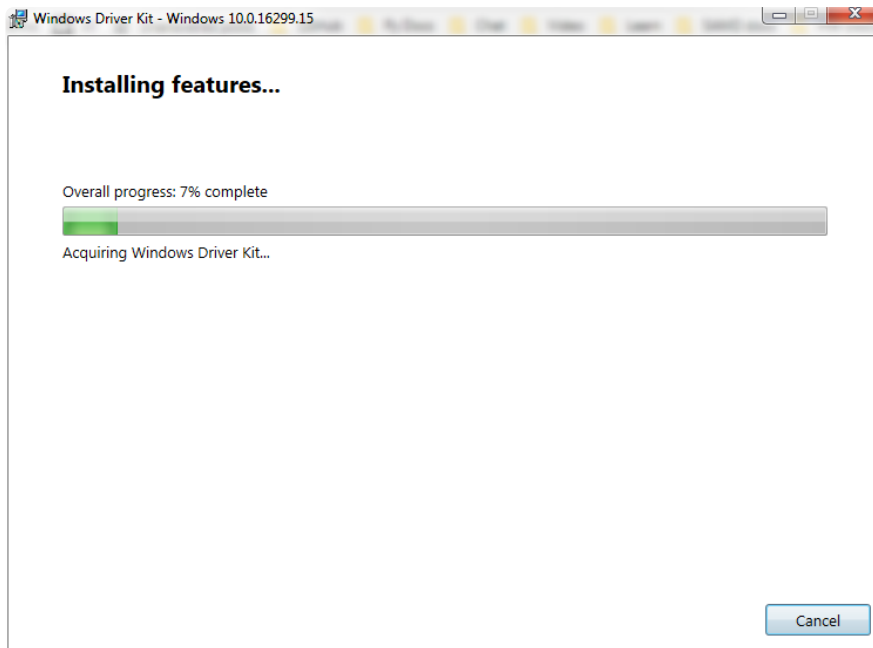
Go to <https://docs.microsoft.com/en-us/windows-hardware/drivers/download-the-wdk> (<https://adafru.it/BYw>) and download the latest WDK (not ADK, scroll down!). You

don't need to install Visual Studio first even though it looks like a prerequisite. Install into the same location:

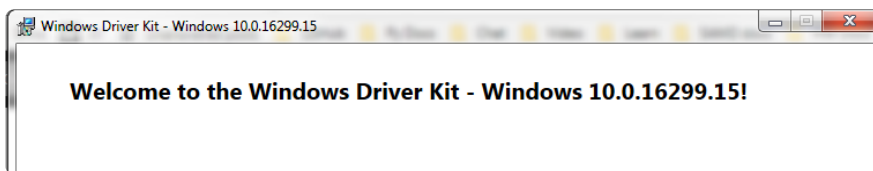


This warning is OK.

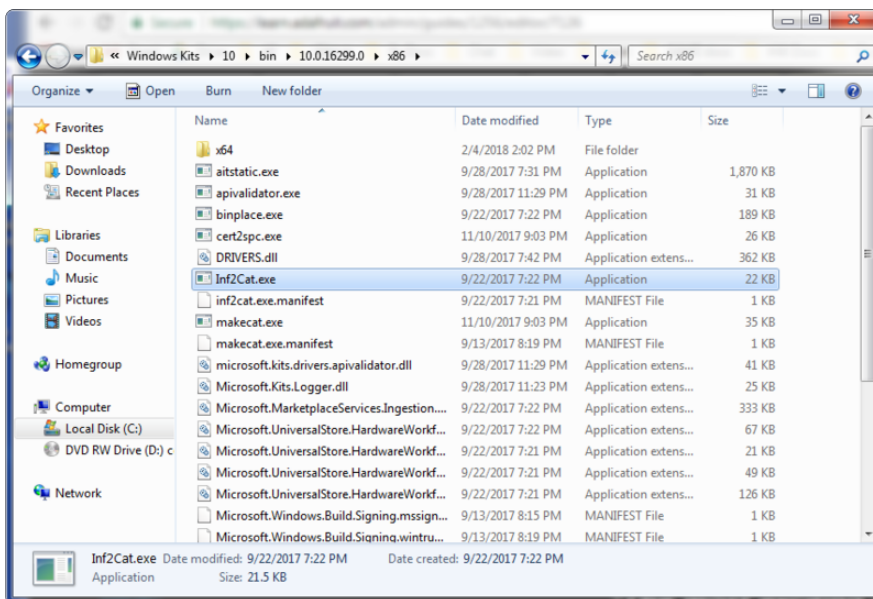




Half an hour later...WDK is installed!



Now you can check `C:\Program Files (x86)\Windows Kits\10\bin\10.0.16299.0\x86` (or whatever version you installed) to see that you have a new tool called `inf2cat.exe`.



Buy & Download Certificate

In order to sign a driver you need a **Code Signing Certificate** - once purchased you can use it for a period of time to sign as much code/drivers as you like. For example, a 3 year certificate can be used for 3 years to sign drivers as needed. After 3 years, all your signed drivers still work great but you will have to buy a new cert if you have code you would like to sign a-new

Buy Code Signing Certificate

We bought our cert from **GlobalSign**



Make an account, it will have a strange usrename that starts with PAR

Ordering Certificates from GlobalSign is Quick & Easy

User Name :	<input type="text" value="PAR[redacted]_adafruit"/>
	<small>* English one byte characters e.g) PAR*****admin</small>
Password :	<input type="password" value="••••••"/>
	<small>* English one byte characters</small>

 **Login**

[Forgot your Password? Click here](#)

You can click on **Order Certificates** - we already did so we have a certificate we paid for a few years ago, certificates cost ~\$500

ACCOUNT & FINANCE | SSL CERTIFICATES | MANAGED SSL | DOCUMENT, CODE & EMAIL SIGNING | ENTERPRISE PKI

Client Certificates Home

Search Order History

MY CERTIFICATES

- Order Certificates
- Pending Approvals

FIND CERTIFICATES

- Search Order History

TOOLS

- CSR Checker
- Search Email History

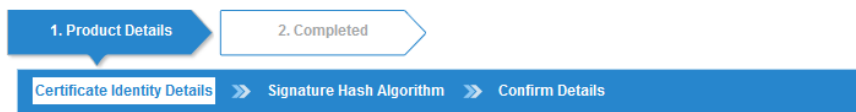
e.g. PC201207029070 OR John Smith Show Advanced Search

Display Number 1 - 1/1

< 1 >

Edit	Update	Order ID	Period	Organization Name	Common Name	Product	Email Address	Corporate ID/Contractor
<input type="button" value="Edit"/>		OS201401061043	3 year	Adafruit Industries	Adafruit Industries	Code Signing	support@adafruit.com	PAR █████_adafruit

To **re-download** your certificate you'll have to click **EDIT** to the left of the Order ID. Which is so counter-intuitive but basically you are re-issuing the cert.



Certificate Identity Details

Please specify the information you would like to appear in this certificate. Some of this information may have been autofilled using the pre-vetted profile you chose earlier.

It is important that this information is correct, as any inaccuracy will lead to delays in the vetting process.

Common Name <small>Required</small>	Adafruit Industries This will be shown to relying parties highlighting the authenticity of the software. Enter your legal name in full including Inc, Ltd, NV, Plc
Organizational Unit <small>Optional</small>	Department - e.g. Marketing
Locality <small>Optional</small>	New York Specify the City or Town in which the Organization is Registered
State or Province <small>Optional</small>	NY Specify State or Province in which the Organization is Registered. For US applications you must specify the State in full
Country <small>Required</small>	United States - US Specify Country in which the Organization is Registered
Email Address <small>Optional for Organization use only</small>	support@adafruit.com IMPORTANT: This email address will be publicly visible in your code signing certificate. It is often used to include a general contact address e.g. support@yoursite.com. If you do NOT wish to include an email address in your publicly visible certificate, leave this field blank. Email address not applicable for Individual applicants.

Continue through and pick a secure Pickup Password, this password is only used to download the certificate, it isnt the password for the cert itself!

Create Temporary Pickup Password

Please create a temporary pickup password. You will only need this during the installation process. This is not the same as your account password.

If you forget this password you will need to resubmit your order. Please copy it somewhere safe.

Pickup Password <small>Required</small>	●●●●●● Password must be a minimum of 8 characters. Alpha-numeric values only (A-Z, 0-9)
Pickup Password (re-enter) <small>Required</small>	●●●●●●

Required I have copied this password to a safe location

Pick a hash algorithm. For backwards compatibility with XP SP2 you can request SHA-1 but these days you should probably just go with SHA-256 since it is more secure

1. Product Details 2. Completed

Certificate Identity Details >> Signature Hash Algorithm >> Confirm Details

Signature Hash Algorithm

Hash Algorithm:	<input checked="" type="radio"/> SHA-256 (Recommended) <small>SHA-256 is strongly recommended, since vulnerability has been found in SHA-1, which has been the standard until now. This product may not be available for use with some environments such as Windows XP SP2 or earlier versions but transition to SHA-1 is available by reissuing the certificate.</small>
	<input type="radio"/> SHA-1

Back Next

Click **Next**...this will have the pickup email sent to the email address associated with the account.

Certificate Application

1. Product Details 2. Completed

Application Completed

Almost there!
 Before we can process your order, you must respond to the confirmation email we sent to the address you specified earlier.

Check your email, you'll have the pickup link in there. Click it!

Thank you for your order. Your Code Signing Certificate is now ready for collection.

You must complete this process on the machine from which you intend to use the certificate.

Click on the link below to initiate the certificate generation and installation process. Please make sure the link is unbroken and complete. Copy and paste the entire link into your browser if necessary.

<https://system.globalsign.com/pc/public/certificate/install.do?p=...>

For assistance on how to install and use your Code Signing Certificate, please visit GlobalSign Support:
<https://www.globalsign.com/support/codesign.php>

Thank you for choosing GlobalSign, if you have any questions or issues please do not hesitate to contact us.

You'll be asked for that password from before. If by chance you forgot it in the last 5 minutes, you'll need to start over.

Install Certificate

Before you start:
 Make sure this is the computer you want to install your certificate on.

Next, enter the temporary password you created at registration

.....

Forgotten the Pickup Password? [Click Here](#) for instructions.

Next

You'll now be asked to be a private key for the certificate. You'll need this to install the certificate. Keep this secret from getting out or someone could be able to sign malware with your name, no good eh?!

Install Certificate

Certificate Password <small>Required</small>	●●●●●●●● <small>Password must be a minimum of 12 characters. Alpha-numeric values only (A-Z, 0-9)</small>
Certificate Password (re-enter) <small>Required</small>	●●●●●●●●

GlobalSign Subscriber Agreement - Version 3.3

PLEASE READ THIS AGREEMENT CAREFULLY BEFORE USING THE CERTIFICATE ISSUED TO YOU OR YOUR ORGANIZATION. BY APPLYING FOR A CERTIFICATE, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PROMPTLY CANCEL THE ORDER WITHIN SEVEN (7) DAYS OF THE AVAILABILITY OF THE CERTIFICATE FOR A FULL REFUND. IF YOU HAVE PROBLEMS UNDERSTANDING THIS AGREEMENT, E-MAIL US AT legal@globalsign.com

This GlobalSign Subscriber Agreement (the "Agreement") between GlobalSign and the Applicant or Subscriber is effective as of the date of the application for the Certificate (the "Effective Date").

I AGREE TO THE SUBSCRIBER AGREEMENT

Please click Next and wait. Do not click Next again and do not close the browser, the process may take a few seconds.

[Next](#)

OK finally - download the certificate file!

Install Certificate

Success! Your certificate has been generated

[Download My Certificate](#)

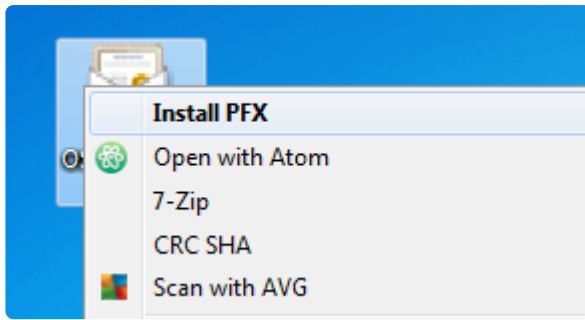
What next?

For help with the installation process please refer our Code Sign support pages at:

<https://www.globalsign.com/support/codesign.php>

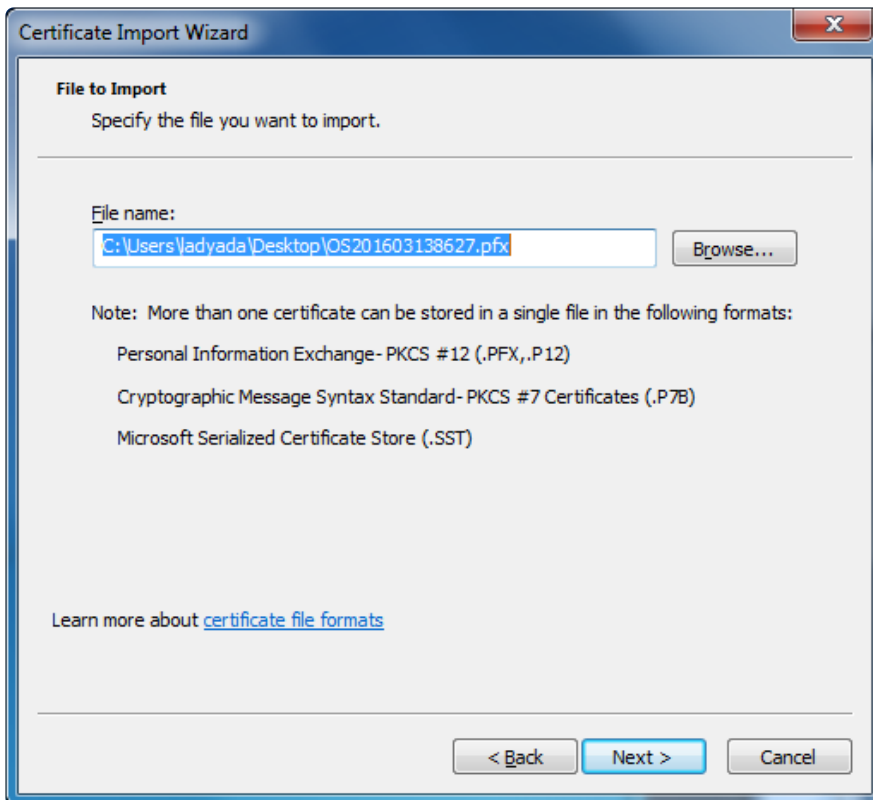
Install Certificate

OK how that you have the **pxf** file, right click on it and **Install** it!

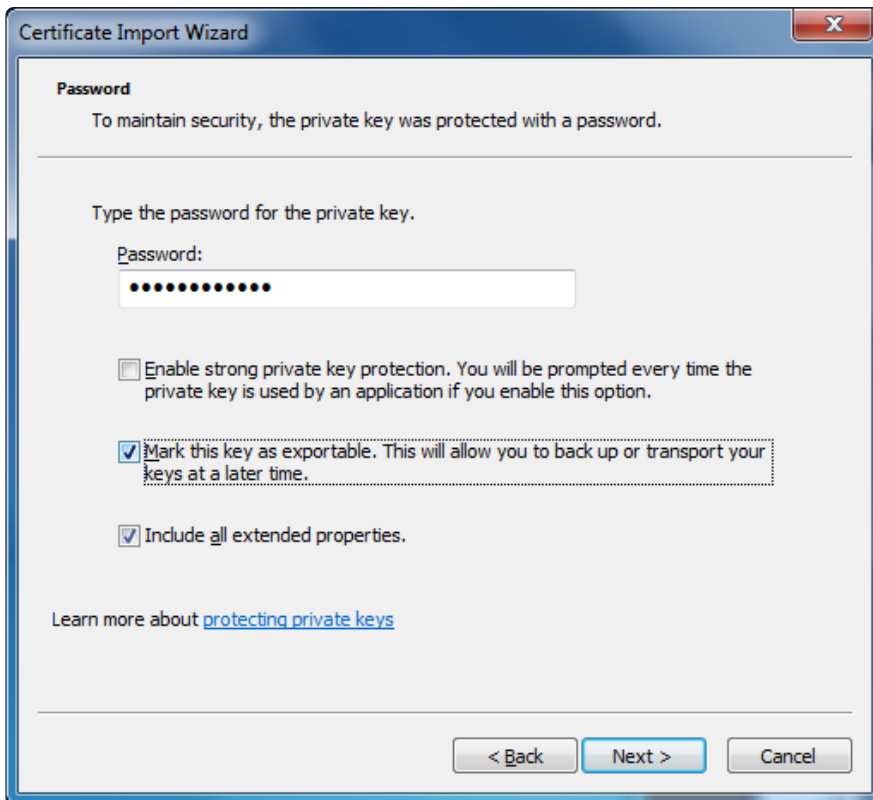


Go through the wizard to install the cert...

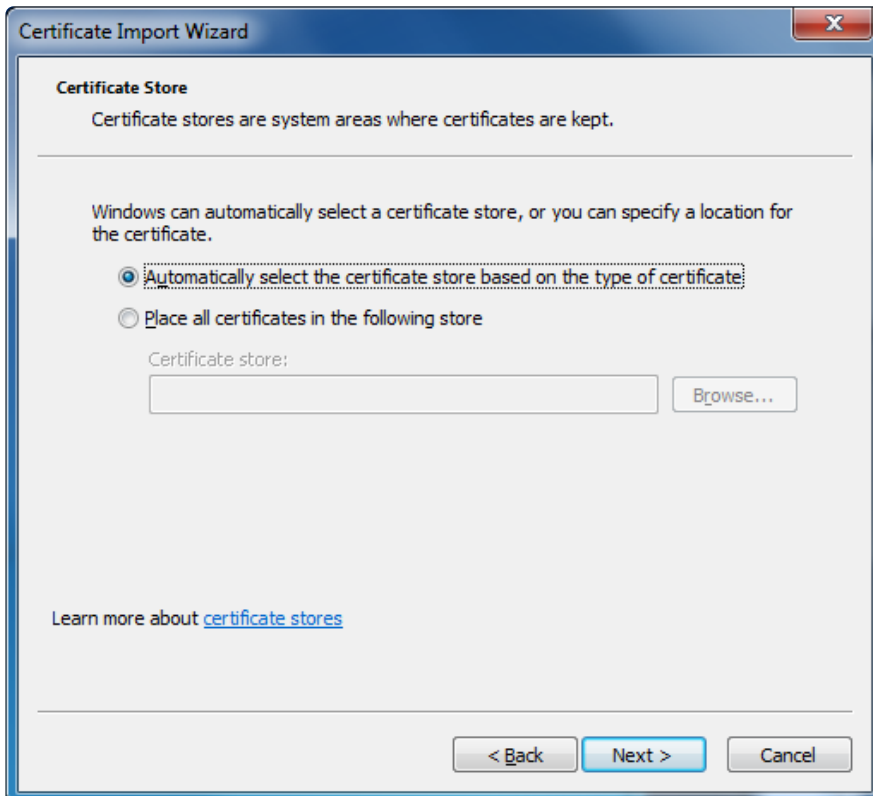
Make sure the right file is selected:



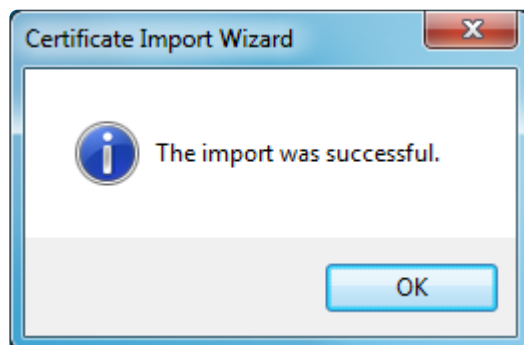
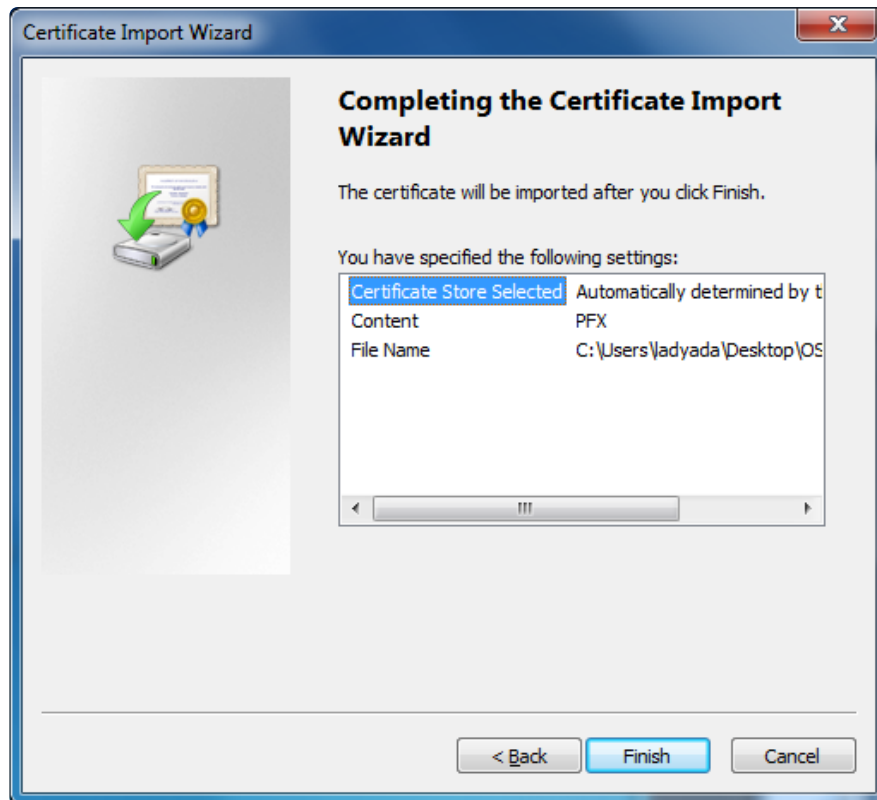
To install, you'll need to enter in that long private key you put in doing the pickup process. I recommend marking the key as exportable, so you don't have to go thru the pickup process if another person needs to install it and you lost the certificate file.



You can use the Automatic Store to put it in your cert manager

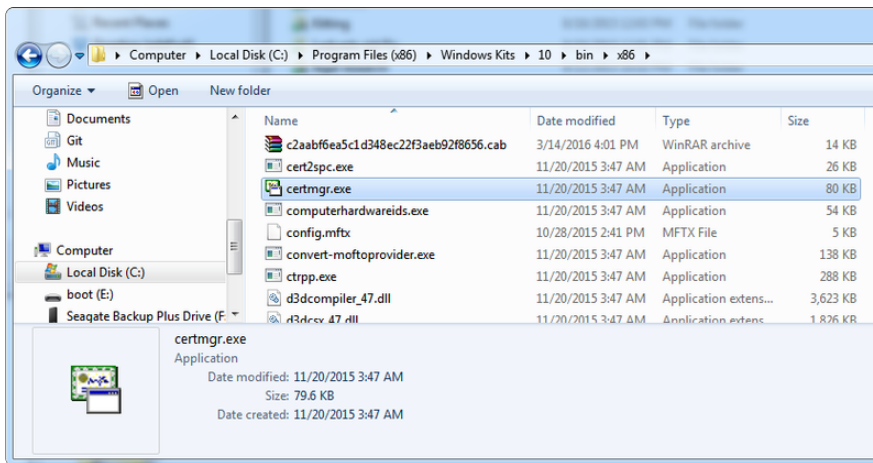


And, Finish!

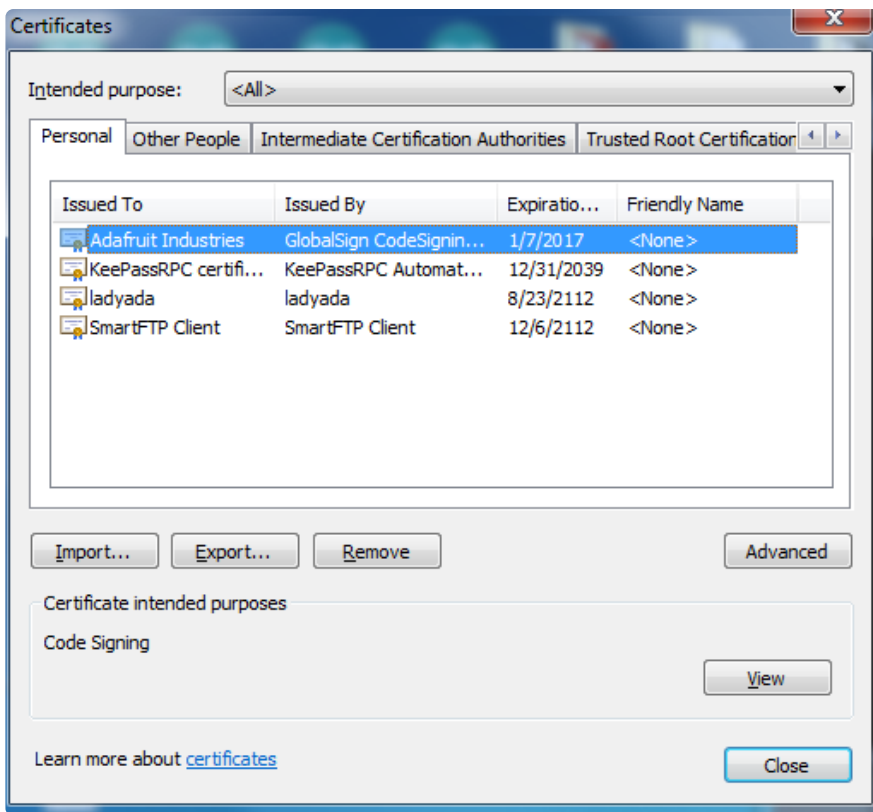


Checking Installed Cert

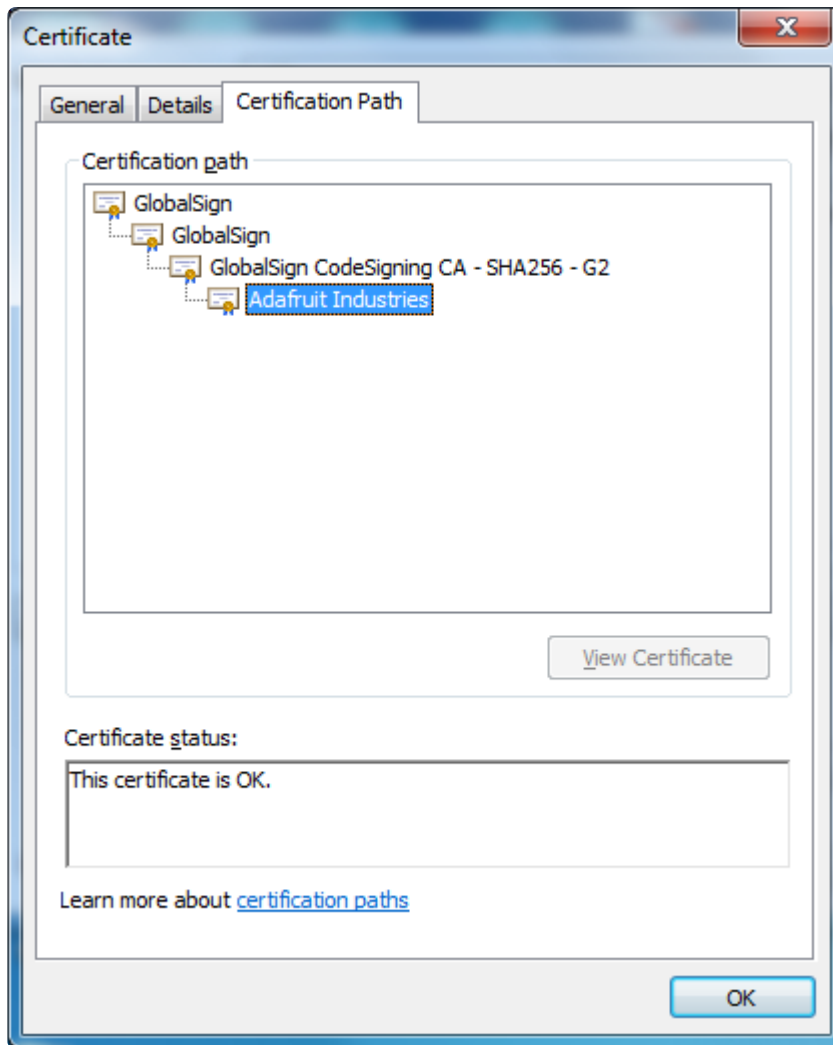
Now that you have the certificate, its easy to check it out in your Cert Manager. Visit [C:\Program Files \(x86\)\Windows Kits\10\bin\10.0.16299.0\x86](C:\Program Files (x86)\Windows Kits\10\bin\10.0.16299.0\x86) and run `certmgr.exe`

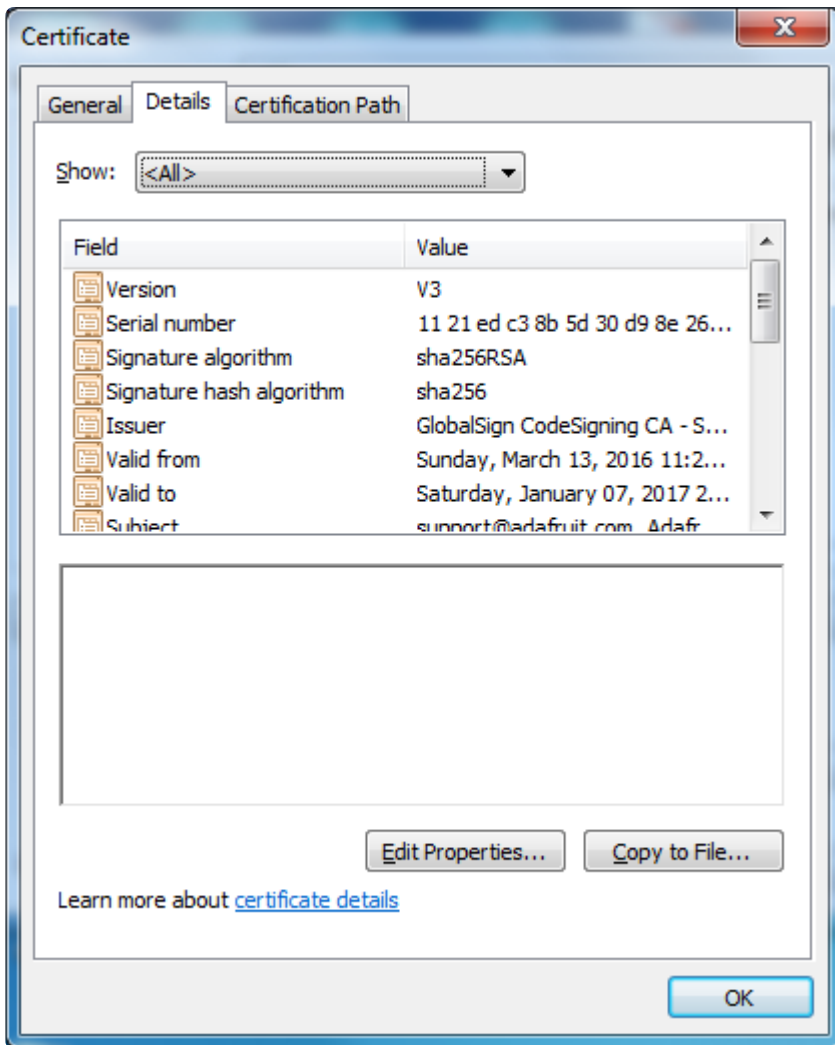


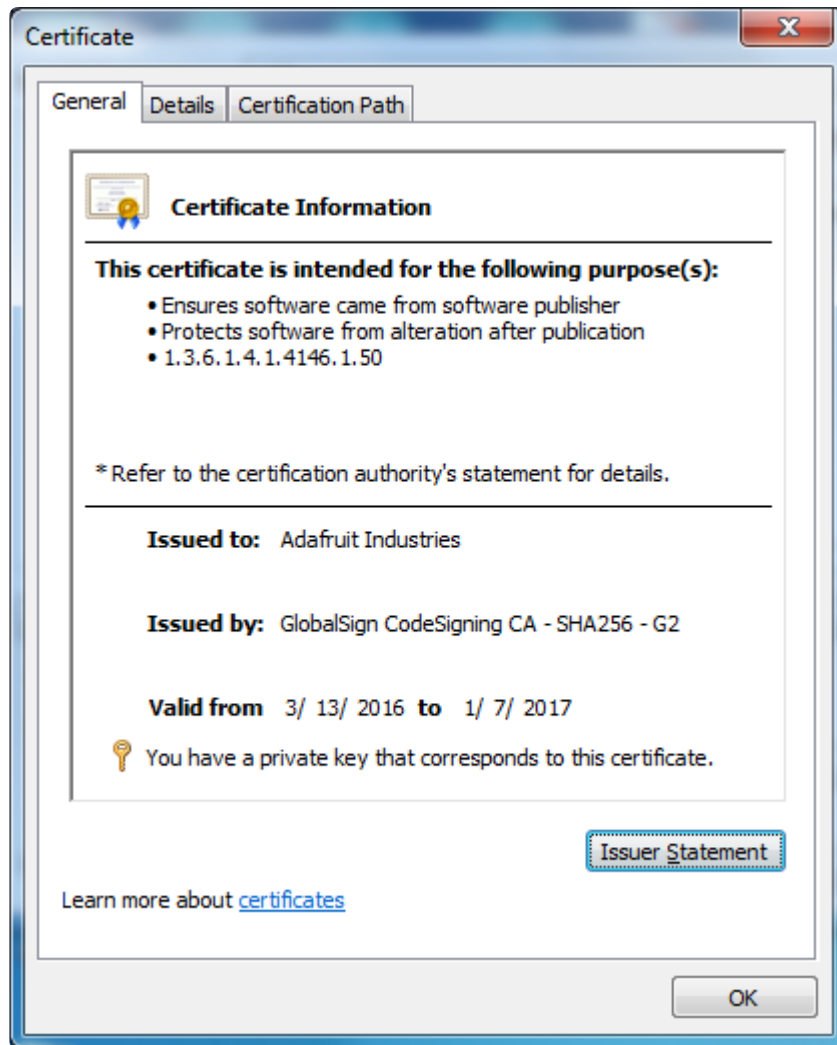
In **Personal**, you'll be able to see your signing cert!



You can click on **Advanced** to get more details about the cert:







Download Intermediate Certificate

Finally, you need the matching root certificate file from GlobalSign. [Go here to download it, you'll need to cross-lookup the right cert \(https://adafru.it/max\)](https://adafru.it/max), for SHA-256 its Root-R3.crt

GlobalSign Root Certificates

Last Updated: Aug 07, 2015 12:49PM EDT

 Tweet

 18

 Like

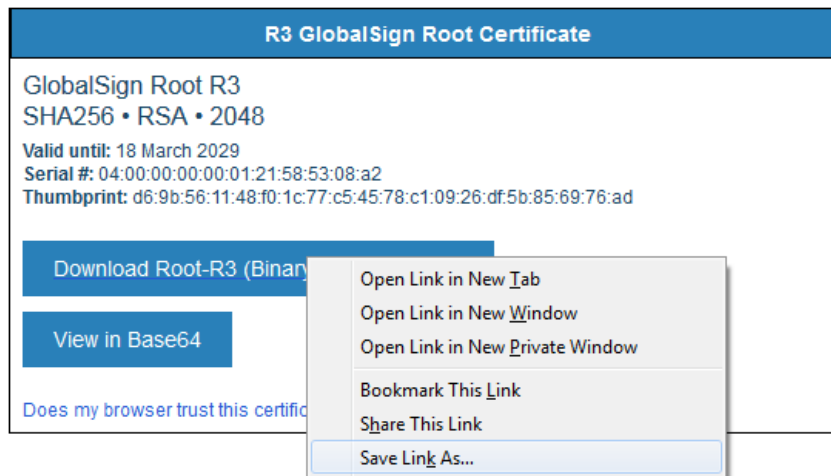
 4

 G+1

Root Certificates by Product Type

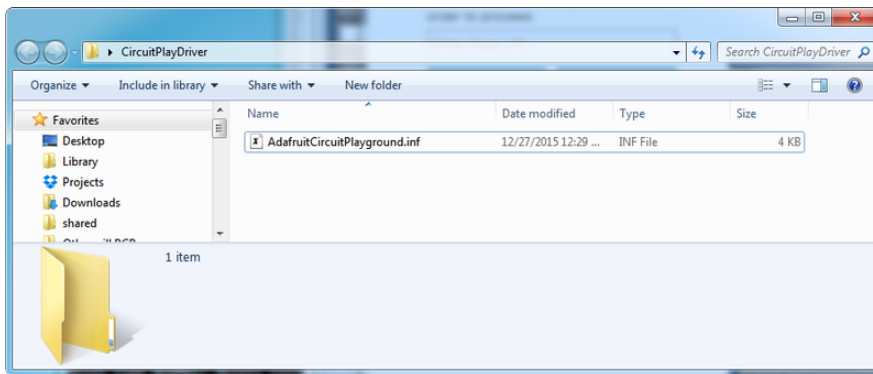
	SHA-256 RSA (Default)	SHA-1 RSA (Legacy)	ECC (Custom)
AlphaSSL	R1	R1	R1
DomainSSL	R1	R1	R1
OrganizationSSL	R1	R1	R1
ExtendedSSL	R2	R2	R2
CloudSSL	R1	R1	R1
AATL	R3	N/A	N/A
CodeSign	R3	R1	N/A
EV CodeSign	R3	N/A	N/A

Save the root certificate to your Desktop, you'll need it in the next step



Signing Driver

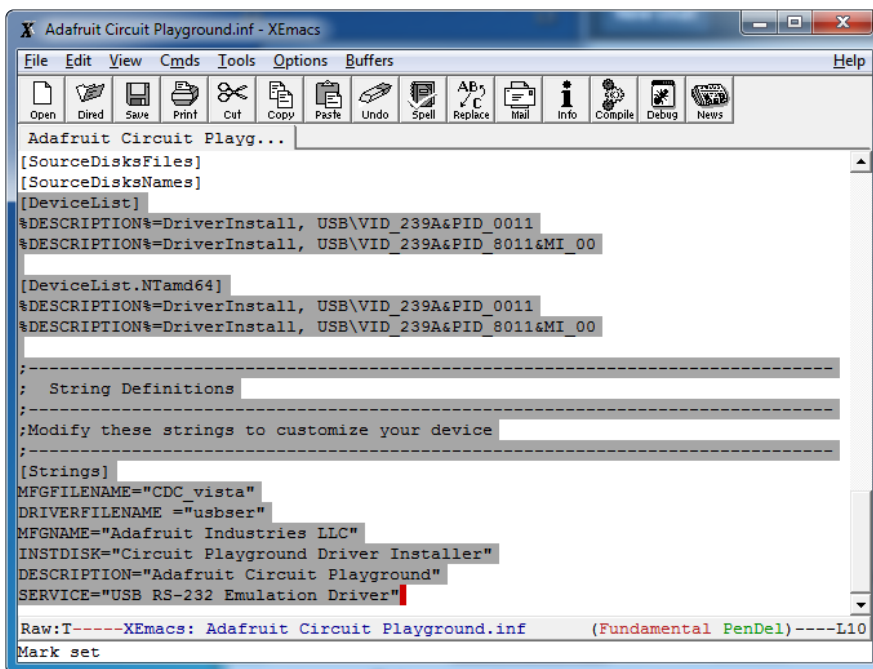
We'll be signing a serial port inf driver file. Basically this just tells Windows "Hey use the CDC Serial driver you have already" but lets it know the name, VID and PID for the device.



You can use our generic INF file, just be sure to edit it to change the VID/PID and identifier strings!

Adafruit_Circuit_Playground.inf

<https://adafru.it/maa>



I recommend having the name of the inf not have space in it, just during the signing process

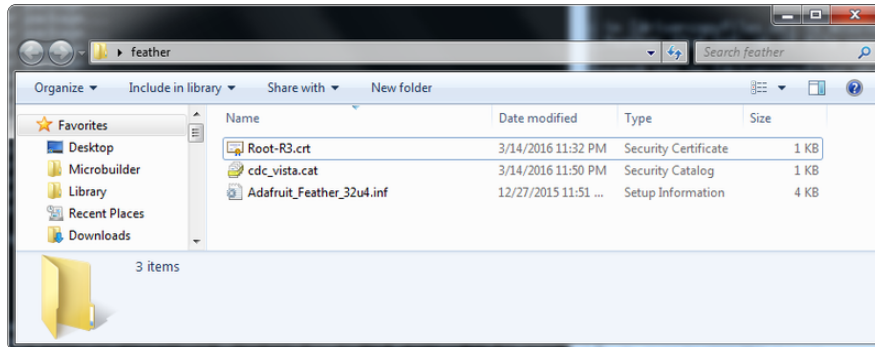
Also, put the inf into a folder on your desktop, also without spaces in it.

Only perform these steps on one inf at a time, in a single folder. srsly.

For example, I put AdafruitCircuitPlayground.inf into C:
 \User\ladyada\Desktop\CircuitPlayDriver

Add the Root Certificate

Copy that root certificate you downloaded at the end of the last step into the same directory



Signing!

OMG are you ready??? It's finally time to sign the driver!

Open up a new command line and go to the directory **with the inf & cat in it**

```
"C:\Program Files (x86)\Windows  
Kits\10\bin\10.0.16299.0\x86\signtool" sign /v /n "Your company name"  
/ac "Root-R3.crt" /tr http://timestamp.globalsign.com/?signature=sha2  
/td sha256 *.cat
```

Of course, change Your Company Name to the certificate name's owner, and the intermediate certificate name if necessary.

(The screenshot below is slightly obsolete.)

```

C:\Windows\system32\cmd.exe
C:\Users\ladyada\Desktop\feather>"C:\Program Files (x86)\Windows Kits\10\bin\x86
\signtool" sign /v /n "Adafruit Industries" /ac "Root-R3.crt" /tr http://timesta
mp.globalsign.com/?signature=sha2 /td sha256 *.cat
The following certificate was selected:
  Issued to: Adafruit Industries
  Issued by: GlobalSign CodeSigning CA - SHA256 - G2
  Expires:   Sat Jan 07 14:35:43 2017
  SHA1 hash: BE8946F53E3E411D8404FE436576A7413FBA9A98

Cross certificate chain (using machine store):
  Issued to: GlobalSign
  Issued by: GlobalSign
  Expires:   Sun Mar 18 06:00:00 2029
  SHA1 hash: D69B561148F01C77C54578C10926DF5B856976AD

  Issued to: GlobalSign CodeSigning CA - SHA256 - G2
  Issued by: GlobalSign
  Expires:   Fri Aug 02 06:00:00 2019
  SHA1 hash: 905F596AAE7714155643606EAA5C83080B1B439A

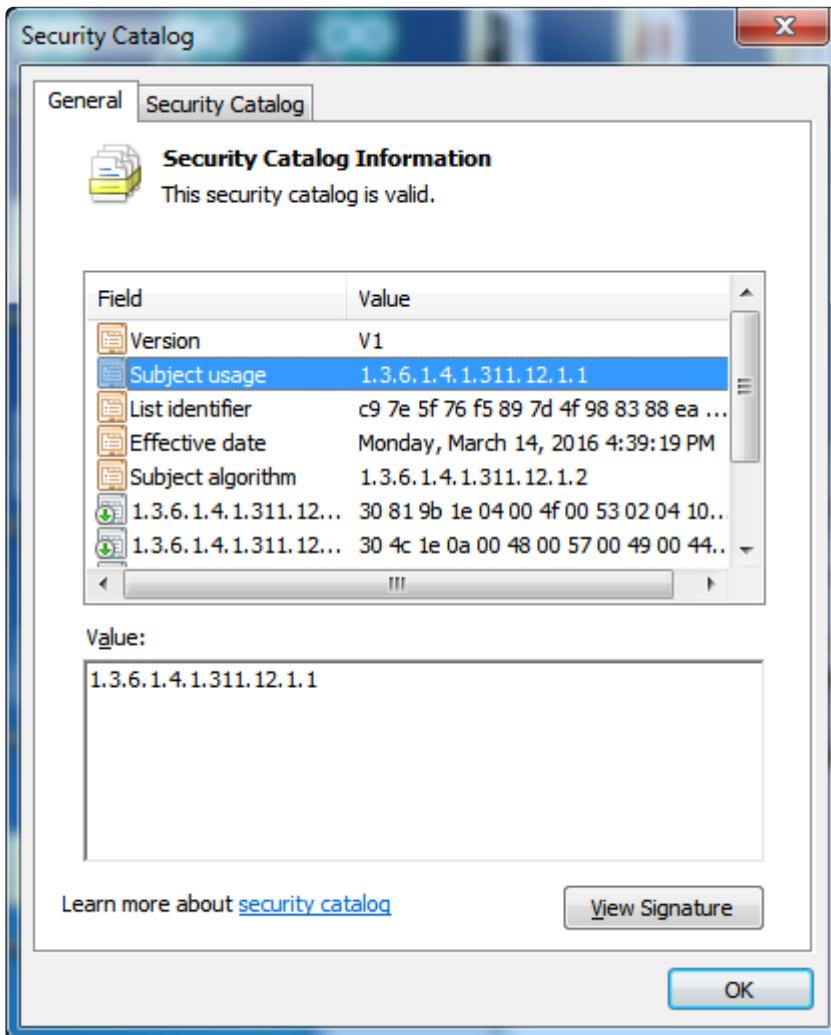
  Issued to: Adafruit Industries
  Issued by: GlobalSign CodeSigning CA - SHA256 - G2
  Expires:   Sat Jan 07 14:35:43 2017
  SHA1 hash: BE8946F53E3E411D8404FE436576A7413FBA9A98

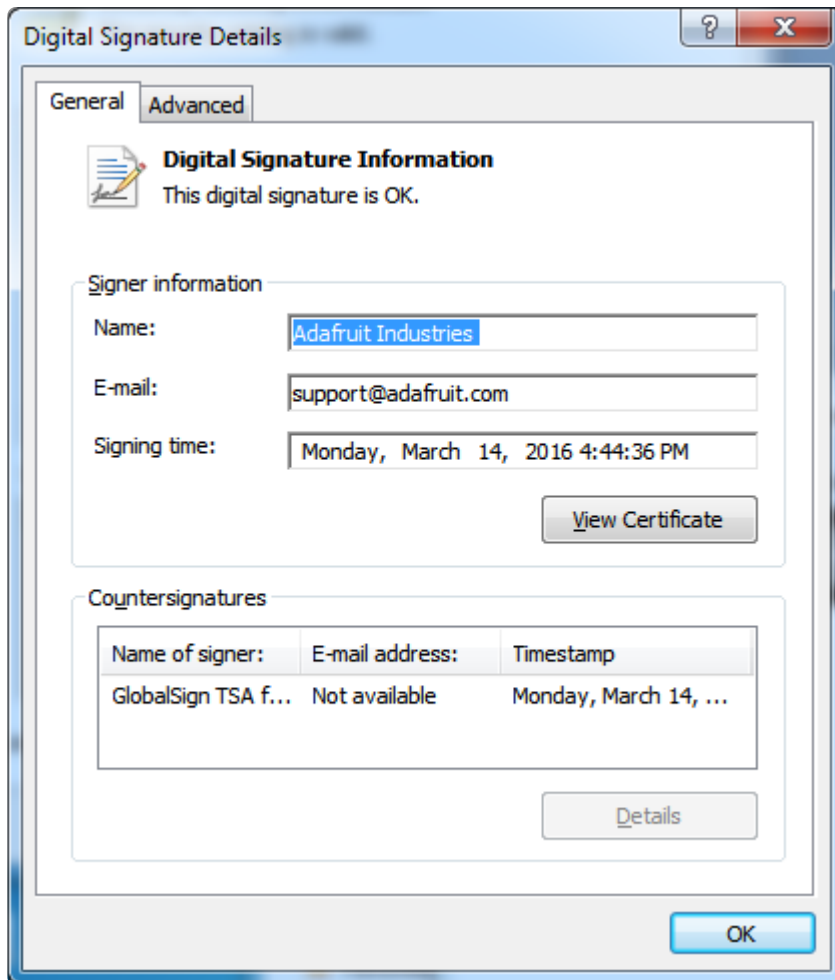
Done Adding Additional Store
Successfully signed: cdc_vista.cat

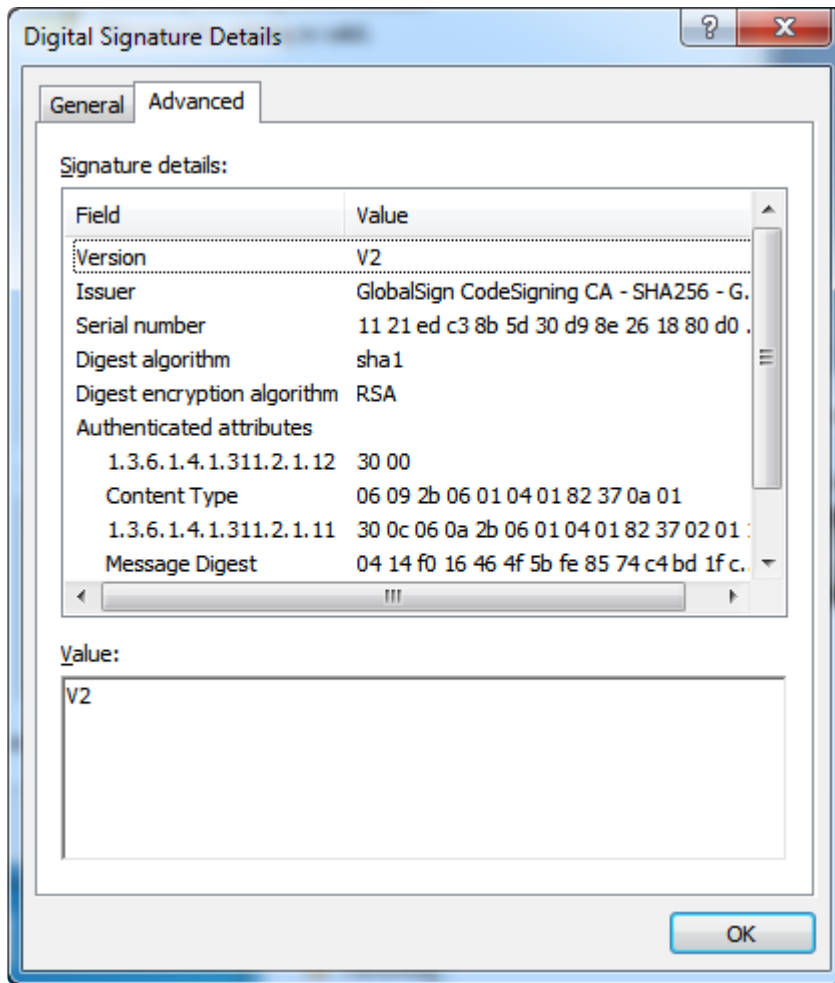
Number of files successfully Signed: 1
Number of warnings: 0
Number of errors: 0

C:\Users\ladyada\Desktop\feather>

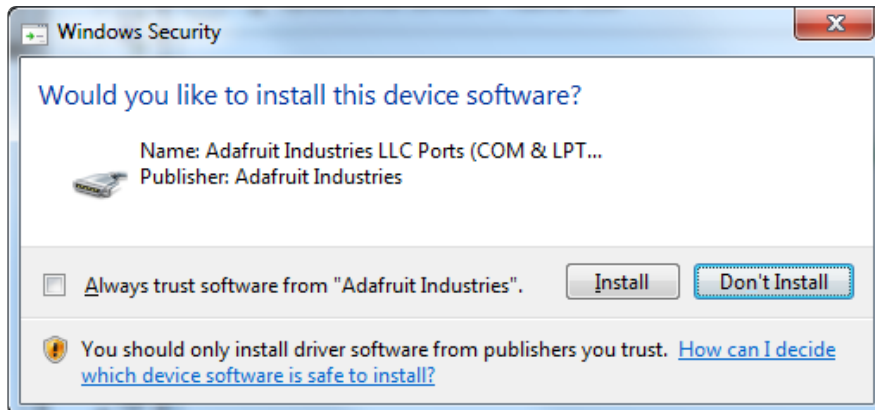
```







Now if the driver gets installed, the user will see the following, a happy installer!



Making an Installer

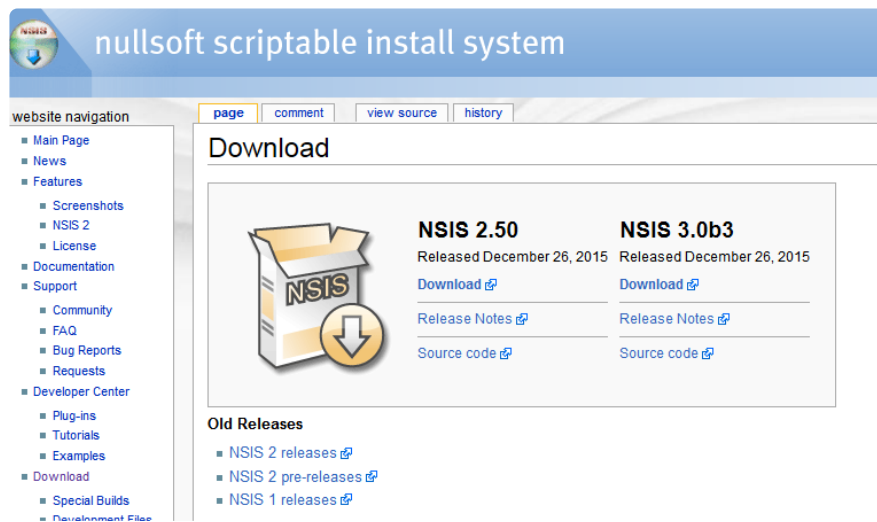
OK now you have a nice signed driver, so lets make a fancy installer so people can just double-click to install

These instructions are pretty much the same as the great tutorial at:

blog.codebender.cc/2016/01/04/create-a-simple-windows-driver-installer-using-nsis/ (<https://adafru.it/mae>)

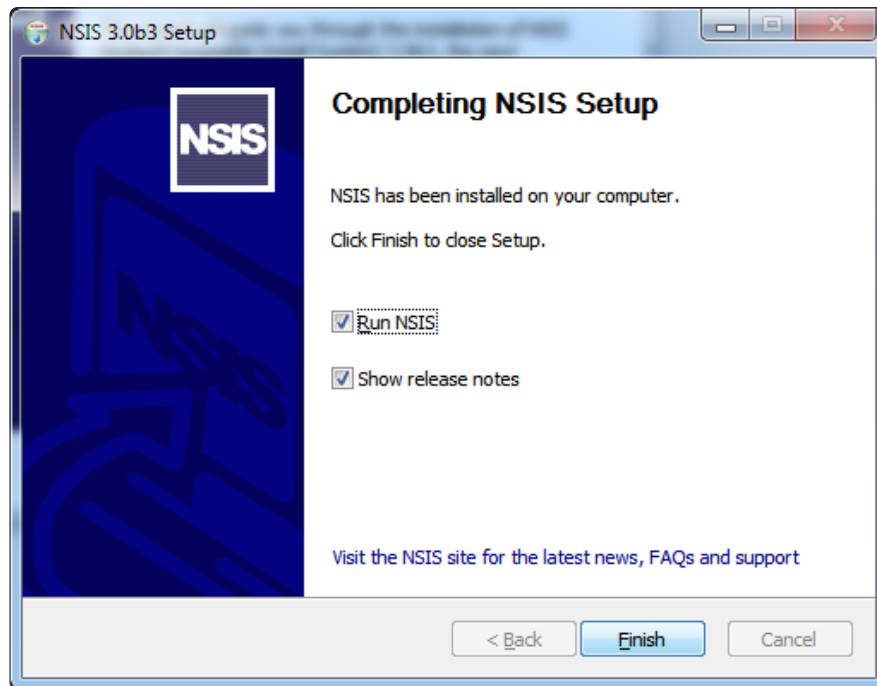
Install NSIS

Start off by installing [NSIS](https://adafru.it/mat) (<https://adafru.it/mat>) - written by [Nullsoft](https://adafru.it/maf), the creators of [WinAmp](https://adafru.it/maf) (which really whip's the llama's ass) (<https://adafru.it/maf>)



I installed 3.0b3, the latest version as of this tutorial's writing





Find DPinst

This is the Microsoft driver installation software which came with the WDK you installed earlier.

Go to `C:\Program Files (x86)\Windows Kits\10\Redist\DIFx` and you can find many versions.

I recommend grabbing

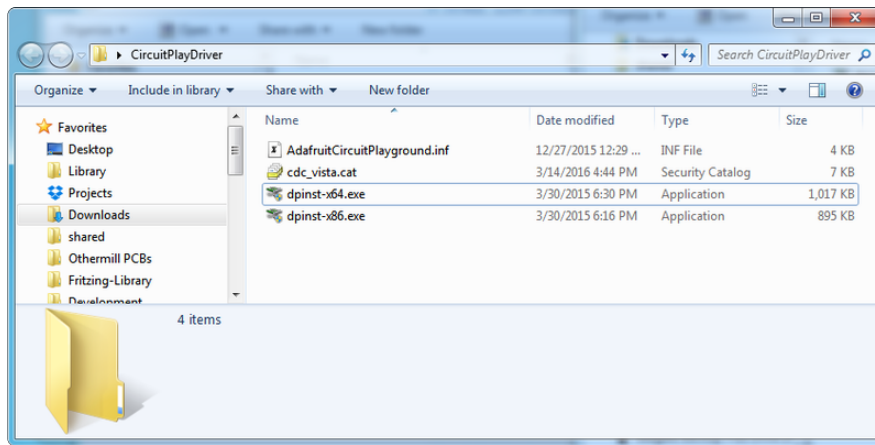
```
C:\Program Files (x86)\Windows  
Kits\10\Redist\DIFx\dpinst\MultiLin\x64\dpinst.exe
```

and putting it in your driver folder, called **dpinst-x64.exe**

Also grab

```
C:\Program Files (x86)\Windows  
Kits\10\Redist\DIFx\dpinst\MultiLin\x86\dpinst.exe
```

and put that also in your driver folder, called **dpinst-x86.exe**



Create a configuration file!

You can spend a ton of time making super customized installation programs - ours originally was for installing a wide range of drivers, here's the core of it

```
# Adafruit Board Driver NSIS Install Script
# Author: Tony DiCola

# Import some useful functions.
!include WinVer.nsh # Windows version detection.
!include x64.nsh    # X86/X64 version detection.

# Set attributes that describe the installer.
Icon "Assets\adafruit.ico"
Caption "Adafruit Board Drivers"
Name "Adafruit board drivers"
Outfile "adafruit_cplay.exe"
ManifestSupportedOS "all"
SpaceTexts "none"

# Install driver files to a temporary location (then dpinst will handle the real
install).
InstallDir "$TEMP\adafruit_cplay"

# Set properties on the installer exe that will be generated.
VIAddVersionKey /LANG=1033 "ProductName" "Adafruit Circuit Playground Driver"
VIAddVersionKey /LANG=1033 "CompanyName" "Adafruit Industries"
VIAddVersionKey /LANG=1033 "LegalCopyright" "Adafruit Industries"
VIAddVersionKey /LANG=1033 "FileDescription" "Installer for Adafruit Circuit
Playground board driver."
VIAddVersionKey /LANG=1033 "FileVersion" "1.0.0"
VIProductVersion "1.0.0.0"
VIFileVersion "1.0.0.0"

# Define variables used in sections.
Var dpinst # Will hold the path and name of dpinst being used (x86 or x64).

# Components page allows user to pick the drivers to install.
PageEx components
    ComponentText "Check the board drivers below that you would like to install.
Click install to start the installation." \
    "" "Select board drivers to install:"
PageExEnd

# Instfiles page does the actual installation.
Page instfiles
```

```

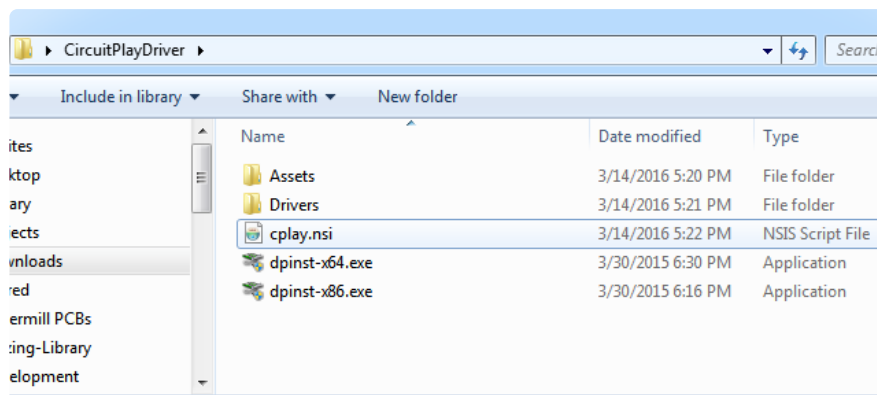
# Sections define the components (drivers) that can be installed.
# The section name is displayed in the component select screen and if selected
# the code in the section will be executed during the install.
# Note that /o before the name makes the section optional and not selected by
# default.

# This first section is hidden and always selected so it runs first and bootstraps
# the install by copying all the files and dpinst to the temp folder location.
Section
  # Copy all the drivers and dpinst exes to the temp location.
  SetOutPath $INSTDIR
  File /r "Drivers"
  File "dpinst-x64.exe"
  File "dpinst-x86.exe"
  # Set dpinst variable based on the current OS type (x86/x64).
  ${If} ${RunningX64}
    StrCpy $dpinst "$INSTDIR\dpinst-x64.exe"
  ${Else}
    StrCpy $dpinst "$INSTDIR\dpinst-x86.exe"
  ${EndIf}
SectionEnd

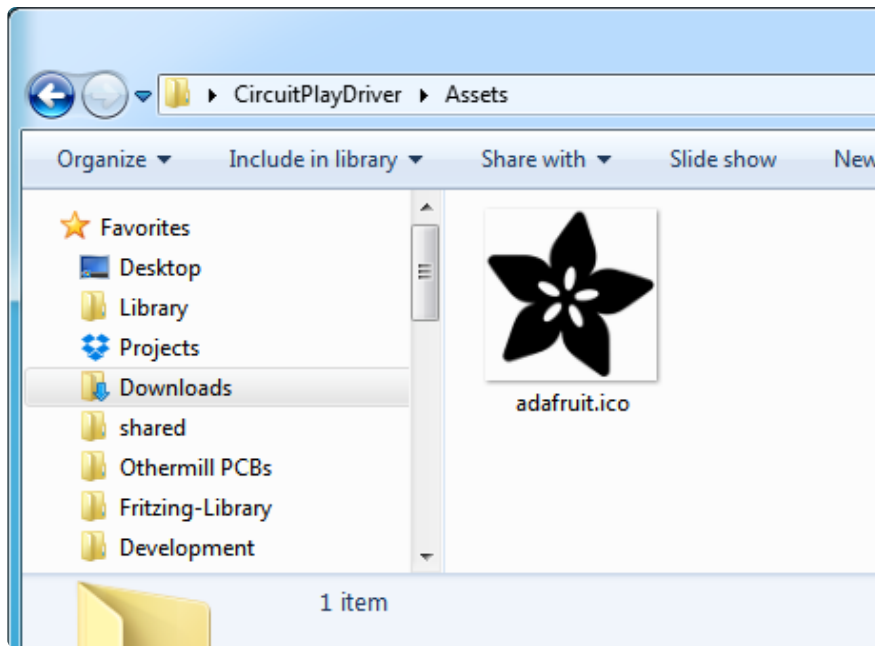
Section "Circuit Playground"
  # Use dpinst to install the driver.
  # Note the following options are specified:
  # /sw = silent mode, hide the installer but not OS prompts (critical!)
  # /path = path to directory with driver data
  ExecWait "$dpinst" /sw /path "$INSTDIR\Drivers\Adafruit_CircuitPlayground"
SectionEnd

```

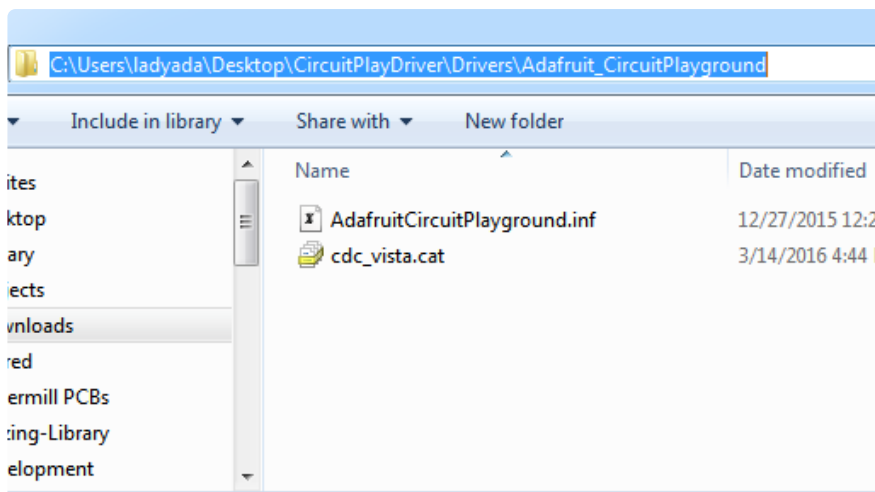
Place this file in the directory with **dpinst-x86** and **dpinst-x64**



In Assets, put an ico file with your logo



Inside **Drivers** put another folder that contains the actual driver files. E.g. **Drivers/CircuitPlayground/circuitplay.inf** this way you can expand the installer to install more software & drivers easily

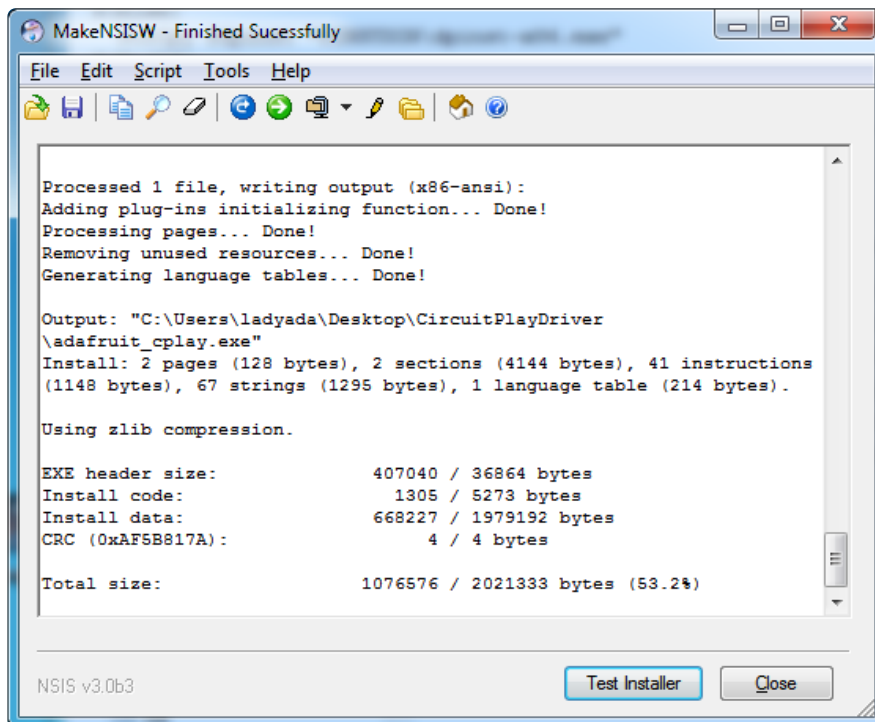
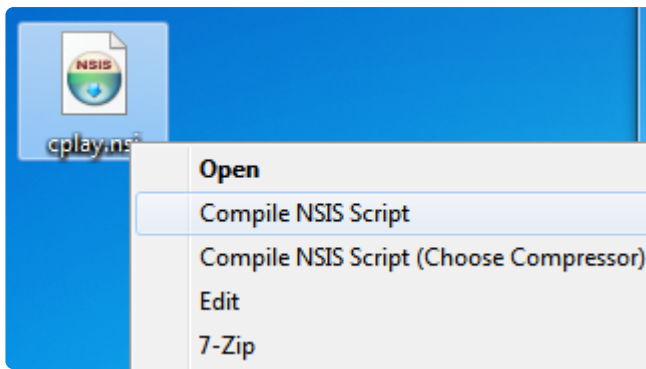


If you'd like you can check out our package for the structure:

CircuitPlayDriver.zip

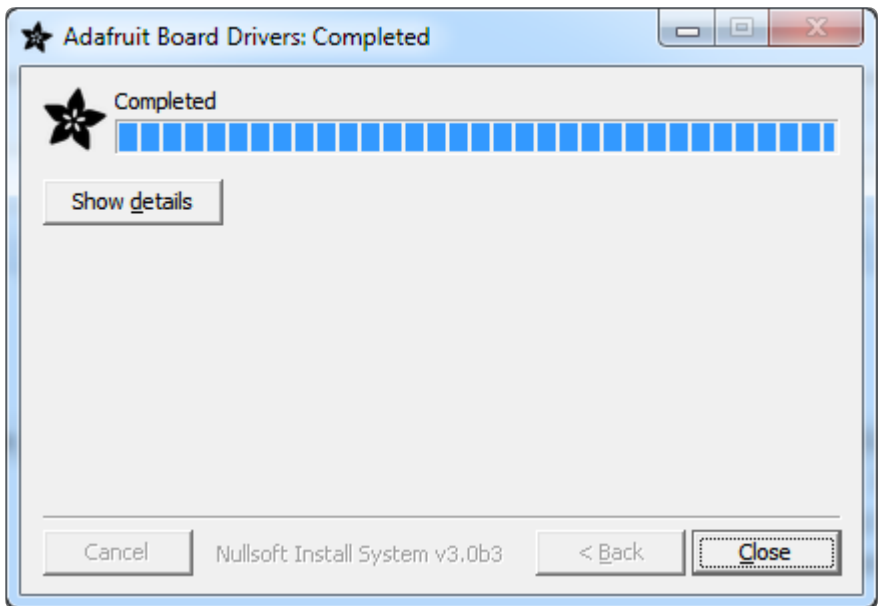
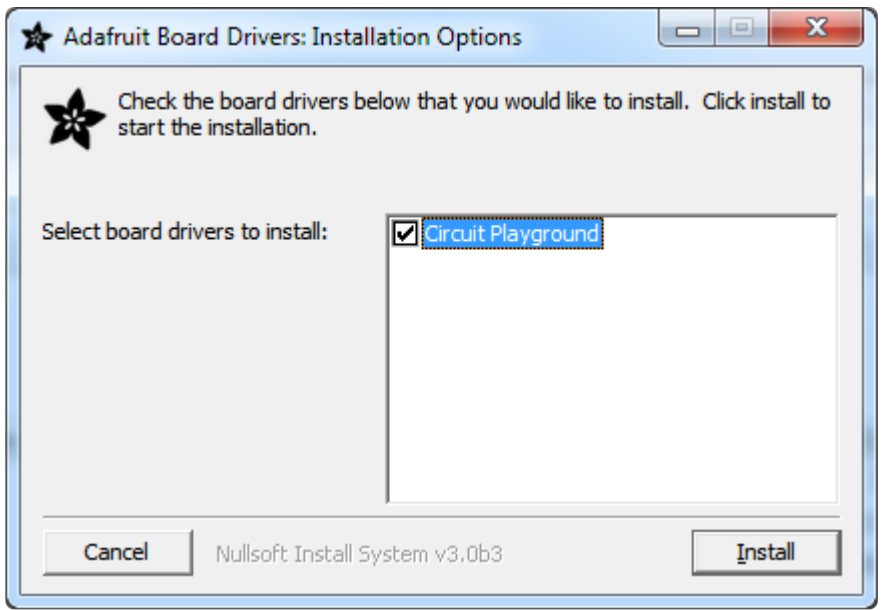
<https://adafru.it/mag>

Go back to the **NSI** file, right click and **Compile** it

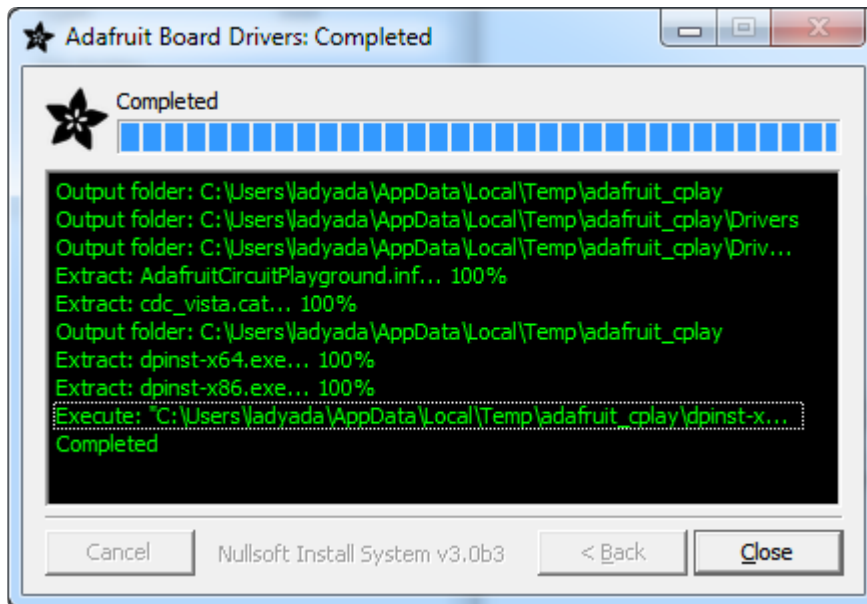


Read thru the text to make sure everything was found properly!

You can now test it out - double click to run the installer



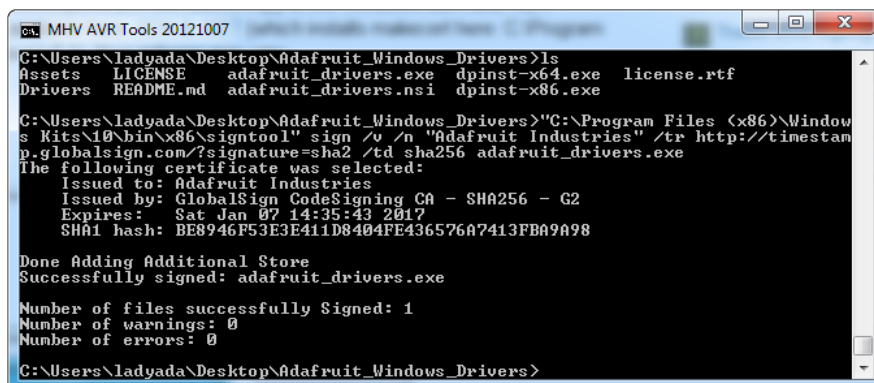
Check the **Details** again, to verify the installer did what its supposed to do



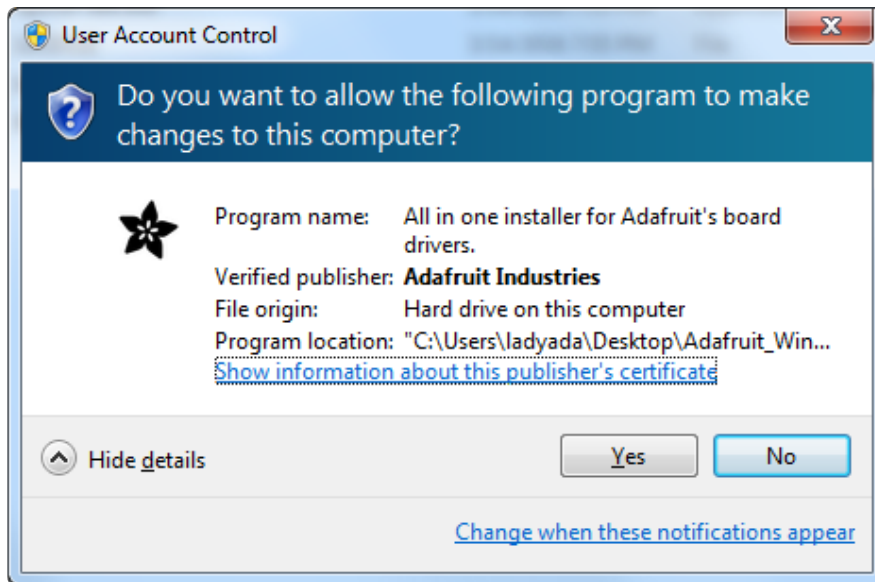
Sign the Installer

OK since you have everything set up its easy to also sign the installer! Go into the directory where you have the generated exe and run

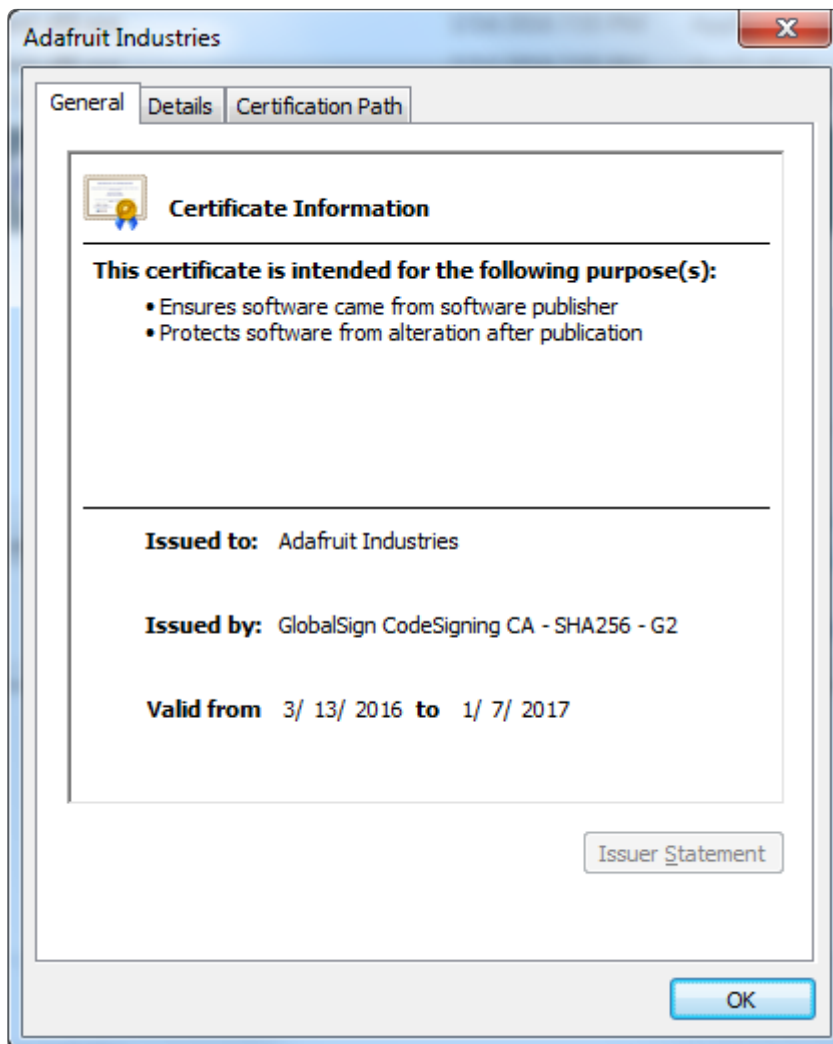
```
"C:\Program Files (x86)\Windows Kits\10\bin\x86\signtool" sign /v /n
"Company Name" /tr http://timestamp.globalsign.com/?signature=sha2 /
td sha256 driverinstaller.exe
```



When the customer double clicks, it will let them know that this is Verified to be from Adafruit Industries!



You can see information about the certificate if you Show Details:



You can also check the exe properties:

