Using Digilent Github Demo Projects

Overview

Digilent provides projects through Github that are designed to demonstrate different uses of our FPGA and Zynq boards. This guide will describe how to download and run these projects in Vivado 2016.

At the end of this tutorial you will have your demo project running on your board.

Prerequisites

Hardware

- **A Digilent 7-Series FPGA or Zynq Board with a Supported Project**
- **USB Cables**

Software

- **Xilinx Vivado 2016.X**
  - *Vivado 2016.4 is used in this tutorial*
- **Digilent Board Support Files**
  - *Follow the wiki guide (https://reference.digilentinc.com/vivado/boardfiles) on how to install Board Support Files for Vivado 2016.X*

Projects Supported by this Tutorial

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Arty	Pmod VGA Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-pmod-vga-demo/start)	Github Link (https://github.com/Digilent/Arty-Pmod-VGA)	ZIP Download (https://github.com/Digilent/Arty-Pmod-VGA/releases/download/v2016.4-2/Arty-Pmod-VGA-2016.4-2.zip)
Arty	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-general-io-demo/start)	Github Link (https://github.com/Digilent/Arty-GPIO)	ZIP Download (https://github.com/Digilent/Arty-GPIO/releases/download/v2016.4-1/Arty-GPIO-2016.4-1.zip)
Arty	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-xadc-demo/start)	Github Link (https://github.com/Digilent/Arty-XADC)	ZIP Download (https://github.com/Digilent/Arty-XADC/releases/download/v2016.4-3/Arty-XADC-2016.4-3.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Arty Z7-10	HDMI In Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-hdmi-in-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-10-hdmi-in)	ZIP Download (https://github.com/Digilent/Arty-Z7-10-hdmi-in/releases/download/v2016.4-2/Arty-Z7-10-hdmi-in-2016.4-2.zip)
Arty Z7-10	HDMI Out Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-hdmi-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-10-hdmi-out)	ZIP Download (https://github.com/Digilent/Arty-Z7-10-hdmi-out/releases/download/v2016.4-3/Arty-Z7-10-hdmi-out-2016.4-3.zip)
Arty Z7-10	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-xadc-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-10-xadc)	ZIP Download (https://github.com/Digilent/Arty-Z7-10-xadc/releases/download/v2016.4-2/Arty-Z7-10-xadc-2016.4-2.zip)
Arty Z7-20	HDMI In Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-hdmi-in-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-20-hdmi-in)	ZIP Download (https://github.com/Digilent/Arty-Z7-20-hdmi-in/releases/download/v2016.4-3/Arty-Z7-20-hdmi-in-2016.4-3.zip)
Arty Z7-20	HDMI Out Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-hdmi-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-20-hdmi-out)	ZIP Download (https://github.com/Digilent/Arty-Z7-20-hdmi-out/releases/download/v2016.4-4/Arty-Z7-20-hdmi-out-2016.4-4.zip)
Arty Z7-20	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/arty-z7-xadc-demo/start)	Github Link (https://github.com/Digilent/Arty-Z7-20-xadc)	ZIP Download (https://github.com/Digilent/Arty-Z7-20-hdmi-in/releases/download/v2016.4-4/Arty-Z7-20-hdmi-in-2016.4-4.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Basys 3	Abacus Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/basys-3-abacus/start)	Github Link (https://github.com/Digilent/Basys-3-Abacus)	ZIP Download (https://github.com/Digilent/Basys-3-Abacus/releases/download/v2016.4-1/Basys-3-Abacus-2016.4-1.zip)
Basys 3	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/basys-3-general-io/start)	Github Link (https://github.com/Digilent/Basys-3-GPIO)	ZIP Download (https://github.com/Digilent/Basys-3-GPIO/releases/download/V2016.4-1/Basys-3-GPIO-2016.4-1.zip)
Basys 3	Keyboard Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/basys-3-keyboard-demo/start)	Github Link (https://github.com/Digilent/Basys-3-Keyboard)	ZIP Download (https://github.com/Digilent/Basys-3-Keyboard/releases/download/v2016.4-1/Basys-3-Keyboard-2016.4-1.zip)
Basys 3	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/basys-3-xadc/start)	Github Link (https://github.com/Digilent/Basys-3-XADC)	ZIP Download (https://github.com/Digilent/Basys-3-XADC/releases/download/v2016.4-2/Basys-3-XADC-2016.4-2.zip)
Cmod A7 15T	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-gpio-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-15T-GPIO)	ZIP Download (https://github.com/Digilent/Cmod-A7-15T-GPIO/releases/download/v2016.4-1/Cmod-A7-15T-GPIO-2016.4-1.zip)
Cmod A7 15T	Out of Box Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-user-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-15T-OOB)	ZIP Download (https://github.com/Digilent/Cmod-A7-15T-OOB/releases/download/v2016.4-2/Cmod-A7-15T-OOB-2016.4-2.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Cmod A7 15T	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-xadc-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-15T-XADC)	ZIP Download (https://github.com/Digilent/Cmod-A7-15T-XADC/releases/download/v2016.4-1/Cmod-A7-15T-XADC-2016.4-1.zip)
Cmod A7 35T	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-gpio-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-35T-GPIO)	ZIP Download (https://github.com/Digilent/Cmod-A7-35T-GPIO/releases/download/v2016.4-1/Cmod-A7-35T-GPIO-2016.4-1.zip)
Cmod A7 35T	Out of Box Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-user-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-35T-OOB)	ZIP Download (https://github.com/Digilent/Cmod-A7-35T-OOB/releases/download/v2016.4-1/Cmod-A7-35T-OOB-2016.4-1.zip)
Cmod A7 35T	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/cmod-a7-xadc-demo/start)	Github Link (https://github.com/Digilent/Cmod-A7-35T-XADC)	ZIP Download (https://github.com/Digilent/Cmod-A7-35T-XADC/releases/download/v2016.4-1/Cmod-A7-35T-XADC-2016.4-1.zip)
Genesys 2	DMA Audio Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/genesys-2-dma-audio-demo/start)	Github Link (https://github.com/Digilent/Genesys-2-DMA)	ZIP Download (https://github.com/Digilent/Genesys-2-DMA/releases/download/v2016.4-3/Genesys-2-DMA-2016.4-3.zip)
Genesys 2	HDMI Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/genesys-2-hdmi-demo/start)	Github Link (https://github.com/Digilent/Genesys-2-HDMI)	ZIP Download (https://github.com/Digilent/Genesys-2-HDMI/releases/download/v2016.4-5/Genesys-2-HDMI-2016.4-5.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Genesys 2	Keyboard Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/genesys-2-keyboard-demo/start)	Github Link (https://github.com/Digilent/Genesys-2-Keyboard)	ZIP Download (https://github.com/Digilent/Genesys-2-Keyboard/releases/download/v2016.4-1/Genesys-2-Keyboard-2016.4-1.zip)
Genesys 2	OLED () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/genesys-2-oled-demo/start)	Github Link (https://github.com/Digilent/Genesys-2-OLED)	ZIP Download (https://github.com/Digilent/Genesys-2-OLED/releases/download/v2016.4-2/Genesys-2-OLED-2016.4-2.zip)
Nexys 4	Abacus Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-abacus-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-Abacus)	ZIP Download (https://github.com/Digilent/Nexys-4-Abacus/releases/download/v2016.4-1/Nexys-4-Abacus-2016.4-1.zip)
Nexys 4	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-basic-user-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-GPIO)	ZIP Download (https://github.com/Digilent/Nexys-4-GPIO/releases/download/v2016.4-1/Nexys-4-GPIO-2016.4-1.zip)
Nexys 4	OOB Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-user-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-OOB)	ZIP Download (https://github.com/Digilent/Nexys-4-OOB/releases/download/v2016.4-2/Nexys-4-OOB-2016.4-2.zip)
Nexys 4	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-xadc-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-XADC)	ZIP Download (https://github.com/Digilent/Nexys-4-XADC/releases/download/v2016.4-1/Nexys-4-XADC-2016.4-1.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Nexys 4 DDR	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-ddr-gpio-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-DDR-GPIO)	ZIP Download (https://github.com/Digilent/Nexys-4-DDR-GPIO/releases/download/v2016.4-1/Nexys-4-DDR-GPIO-2016.4-1.zip)
Nexys 4 DDR	Keyboard Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-ddr-keyboard-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-DDR-Keyboard)	ZIP Download (https://github.com/Digilent/Nexys-4-DDR-Keyboard/releases/download/v2016.4-1/Nexys-4-DDR-Keyboard-2016.4-1.zip)
Nexys 4 DDR	Music Looper Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-ddr-looper-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-DDR-Music-Looper)	ZIP Download (https://github.com/Digilent/Nexys-4-DDR-Music-Looper/releases/download/v2016.4-1/Nexys-4-DDR-Music-Looper-2016.4-1.zip)
Nexys 4 DDR	OOB Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-ddr-user-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-DDR-OOB)	ZIP Download (https://github.com/Digilent/Nexys-4-DDR-OOB/releases/download/v2016.4-2/Nexys-4-DDR-OOB-2016.4-2.zip)
Nexys 4 DDR	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-4-ddr-xadc-demo/start)	Github Link (https://github.com/Digilent/Nexys-4-DDR-XADC)	ZIP Download (https://github.com/Digilent/Nexys-4-DDR-XADC/releases/download/v2016.4-1/Nexys-4-DDR-XADC-2016.4-1.zip)
Nexys Video	DMA Audio Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-dma-audio-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-DMA)	ZIP Download (https://github.com/Digilent/Nexys-Video-DMA/releases/download/v2016.4-3/Nexys-Video-DMA-2016.4-3.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Nexys Video	GPIO () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-basic-user-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-GPIO)	ZIP Download (https://github.com/Digilent/Nexys-Video-GPIO/releases/download/v2016.4-1/Nexys-Video-GPIO-2016.4-1.zip)
Nexys Video	HDMI Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-hdmi-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-HDMI)	ZIP Download (https://github.com/Digilent/Nexys-Video-HDMI/releases/download/v2016.4-2/Nexys-Video-HDMI-2016.4-2.zip)
Nexys Video	Keyboard Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-keyboard-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-Keyboard)	ZIP Download (https://github.com/Digilent/Nexys-Video-Keyboard/releases/download/v2016.4-1/Nexys-Video-Keyboard-2016.4-1.zip)
Nexys Video	OLED () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-oled-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-OLED)	ZIP Download (https://github.com/Digilent/Nexys-Video-OLED/releases/download/v2016.4-2/Nexys-Video-OLED-2016.4-2.zip)
Nexys Video	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/nexys-video-xadc-demo/start)	Github Link (https://github.com/Digilent/Nexys-Video-XADC)	ZIP Download (https://github.com/Digilent/Nexys-Video-XADC/releases/download/v2016.4-1/Nexys-Video-XADC-2016.4-1.zip)
Sword	Basic I/O Demo	No	N/A	Github Link (https://github.com/Digilent/Sword-Basic-IO)	ZIP Download (https://github.com/Digilent/Sword-Basic-IO/releases/download/v2016.4-2/Sword-Basic-IO-2016.4-2.zip)

Platform	Project Name	Uses SDK	Wiki Page	Github Repo	Github Release Archive
Sword	Microblaze GPIO () Demo	Yes	N/A	Github Link (https://github.com/Digilent/Sword-Microblaze-GPIO)	ZIP Download (https://github.com/Digilent/Sword-Microblaze-GPIO/releases/download/v2016.4-2/Sword-Microblaze-GPIO-2016.4-2.zip)
Zybo	DMA Audio Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zybo-dma-audio-demo/start)	Github Link (https://github.com/Digilent/Zybo-DMA)	ZIP Download (https://github.com/Digilent/Zybo-DMA/releases/download/v2016.4-3/Zybo-DMA-2016.4-3.zip)
Zybo	HDMI Input Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zybo-hdmi-input-demo/start)	Github Link (https://github.com/Digilent/Zybo-HDMI-In)	ZIP Download (https://github.com/Digilent/Zybo-HDMI-In/releases/download/v2016.4-3/Zybo-HDMI-In-2016.4-3.zip)
Zybo	HDMI Output Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zybo-hdmi-output-demo/start)	Github Link (https://github.com/Digilent/Zybo-HDMI-Out)	ZIP Download (https://github.com/Digilent/Zybo-HDMI-Out/releases/download/v2016.4-3/Zybo-HDMI-Out-2016.4-3.zip)
Zybo	XADC Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zybo-xadc-demo/start)	Github Link (https://github.com/Digilent/Zybo-XADC)	ZIP Download (https://github.com/Digilent/Zybo-XADC/releases/download/v2016.4-1/Zybo-XADC-2016.4-1.zip)
Zedboard	DMA Audio Demo	Yes	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zedboard-dma-audio-demo/start)	Github Link (https://github.com/Digilent/Zedboard-DMA)	ZIP Download (https://github.com/Digilent/Zedboard-DMA/releases/download/v2016.4-2/Zedboard-DMA-2016.4-2.zip)
Zedboard	OLED () Demo	No	Wiki Link (https://reference.digilentinc.com/learn/programmable-logic/tutorials/zedboard-oled-demo/start)	Github Link (https://github.com/Digilent/Zedboard-OLED)	ZIP Download (https://github.com/Digilent/Zedboard-OLED/releases/download/v2016.4-1/Zedboard-OLED-2016.4-1.zip)

Important

For further requirements, such as a serial terminal, external power supply, or other hardware, please review the project's wiki page.

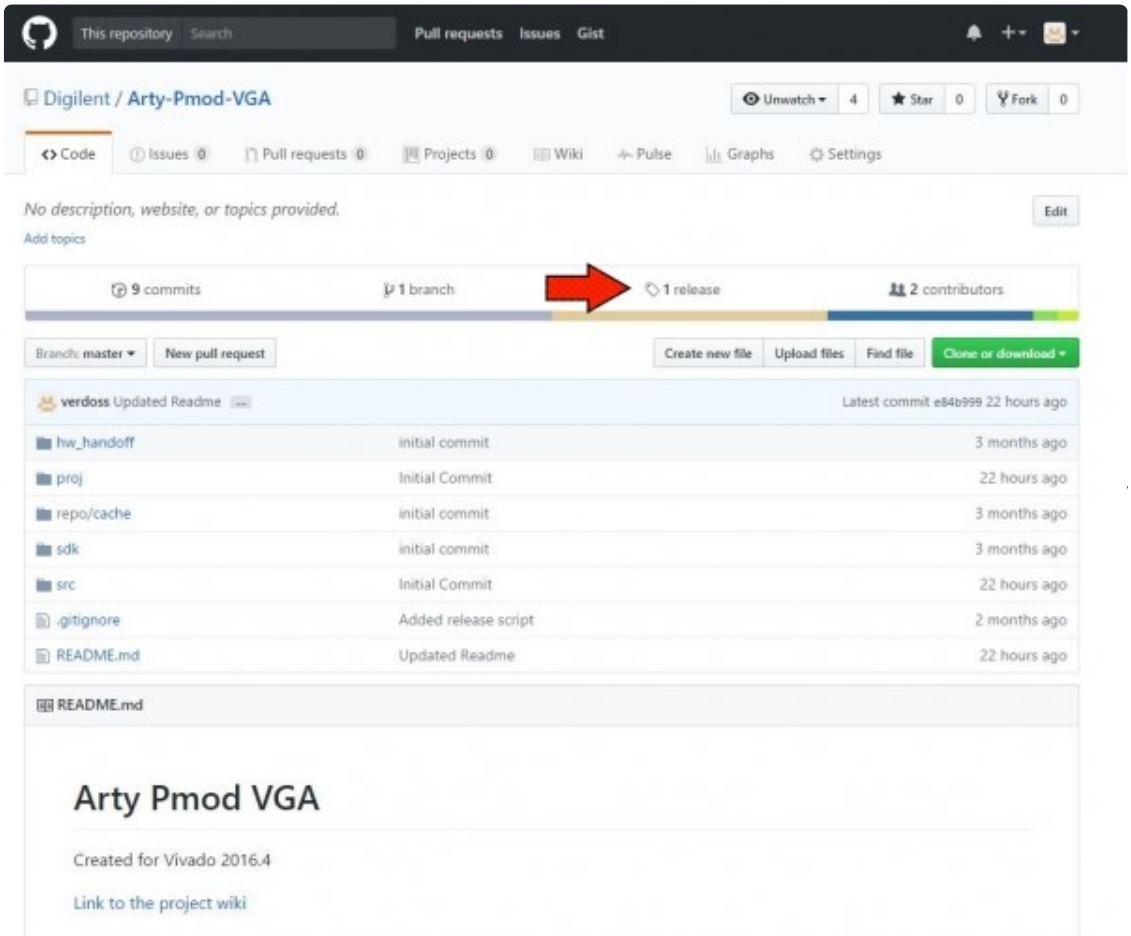
Tutorial

1. Download the Project ZIP from the Digilent Github

This step describes how to download a release from the Digilent Github, you can alternatively just download the project archive directly by clicking the link in the Projects Supported table above. The archive can be placed wherever you want, and will need to be extracted with **Right click → Extract All**.

Download from Github

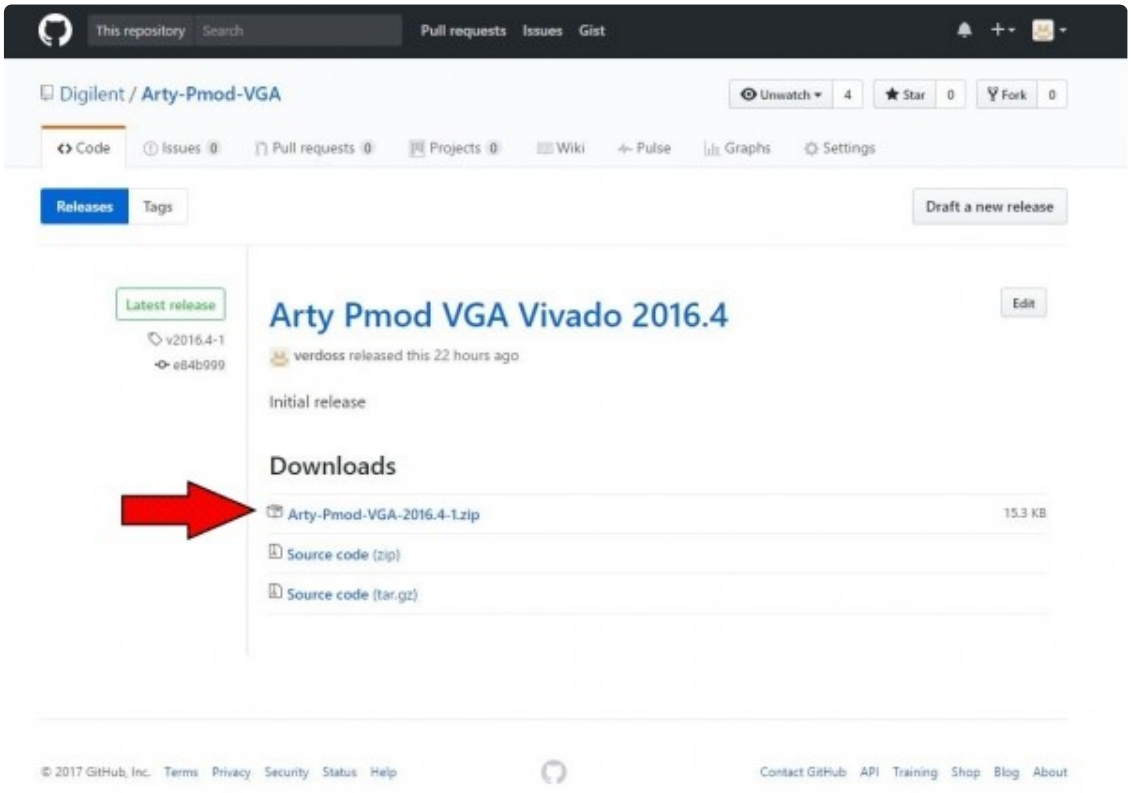
1.1) From the demo repository landing page, for which a link is provided in the Projects Supported table above, select the **release** link.



(https://reference.digilentinc.com/_detail/playground/clickrelease.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

1.2) If the repository has multiple releases, select **Latest Release**, then click on the **project ZIP file** included in the Downloads section of the release to download it.

> **Important**
>
> Make sure that you download the project-2016.4-x.zip, not the source code archive.



(https://reference.digilentinc.com/_detail/playground/downloadzip.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

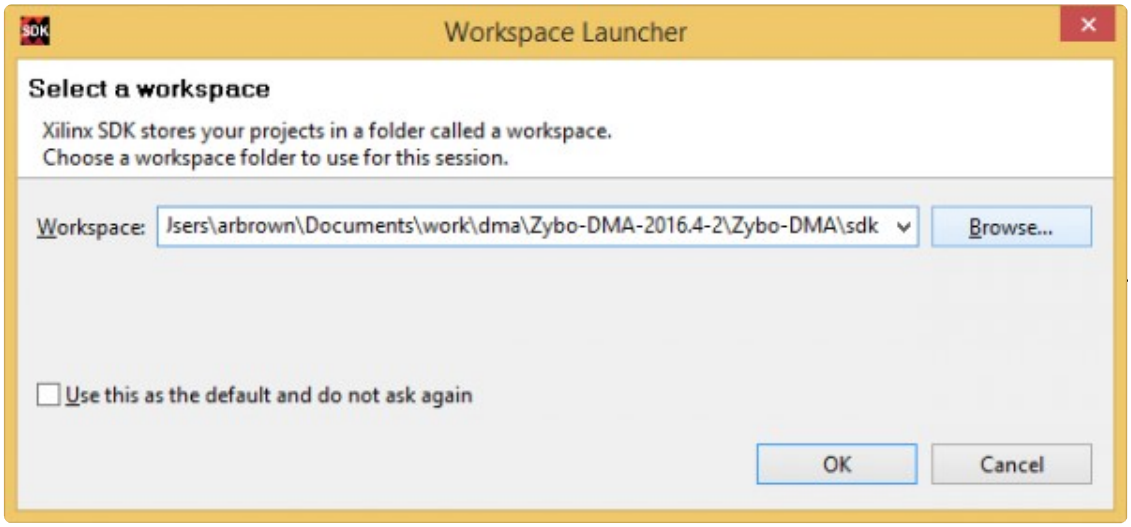
1.3) All of the necessary files are included within each project folder, with relative file paths established, so as long as the files aren't moved around within the folder, you can move and run the project from any location.

2. Open the Project

Select the "SDK Hardware Handoff" option if your project supports Vivado SDK and you want to jump directly in, otherwise select the "Vivado" option. Review the Supported Projects table above to determine if the project is an SDK project.

SDK Hardware Handoff

2.1) Find and Launch Xilinx SDK. This will open a "Select Workspace" dialog. Click **Browse**, then find and select the "sdk" directory of your project.

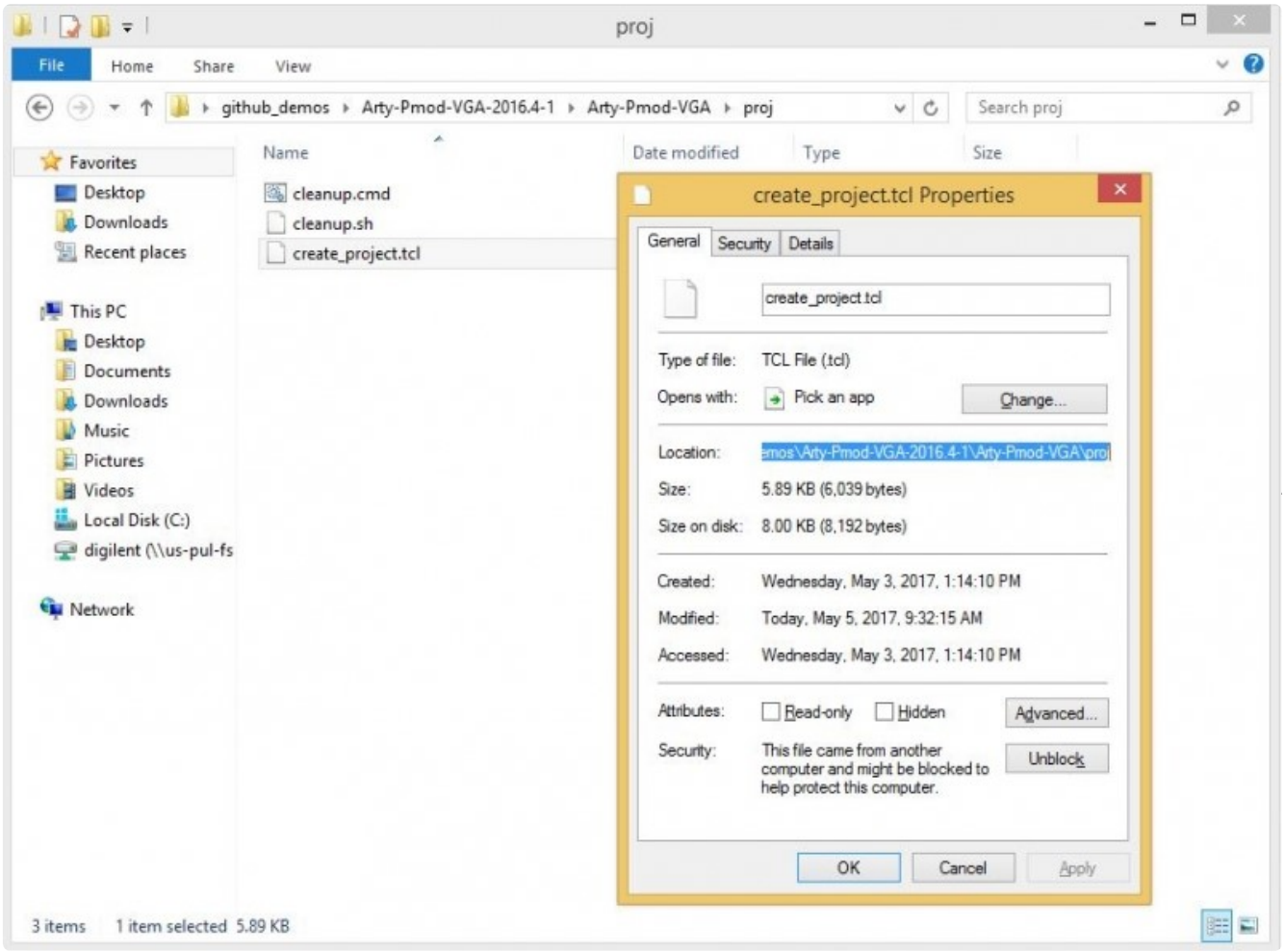


(https://reference.digilentinc.com/_detail/playground/hw-wkspace.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

2.2) Click **Ok** to finish launching SDK.

Vivado

2.1) Within the project folder there will be several subfolders named “hw_handoff”, “proj”, “src”, “repo”, and “sdk”. Go into the “proj” folder, right click the “create_project” file and select **Properties**. Highlight and copy the file's location.

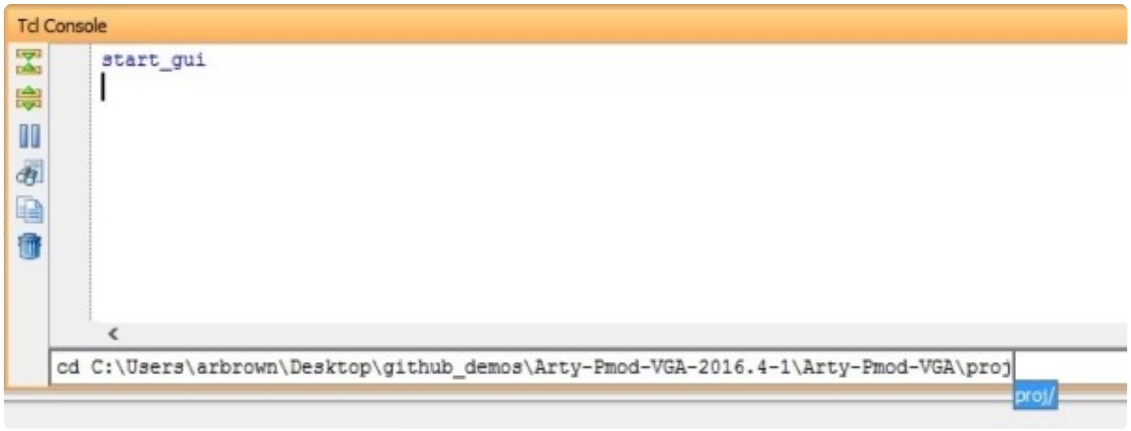


(https://reference.digilentinc.com/_detail/playground/tcl_address.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

2.2) Open Vivado and find the Tcl Console on the bottom of the window. Enter the letters 'cd' (change directory) and paste the file path you copied earlier. Select the “proj” folder from the drop down menu to make sure that Vivado converts the path's back slashes ' \ ' to forward slashes ' / '.

Important

Vivado will not recognize paths that include back slashes, be very careful to make sure that it is properly converted.



(https://reference.digilentinc.com/_detail/playground/cd.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

2.3) Enter the command “source ./create_project.tcl”, this will set up the project for you within the proj directory you previously cd'd into.

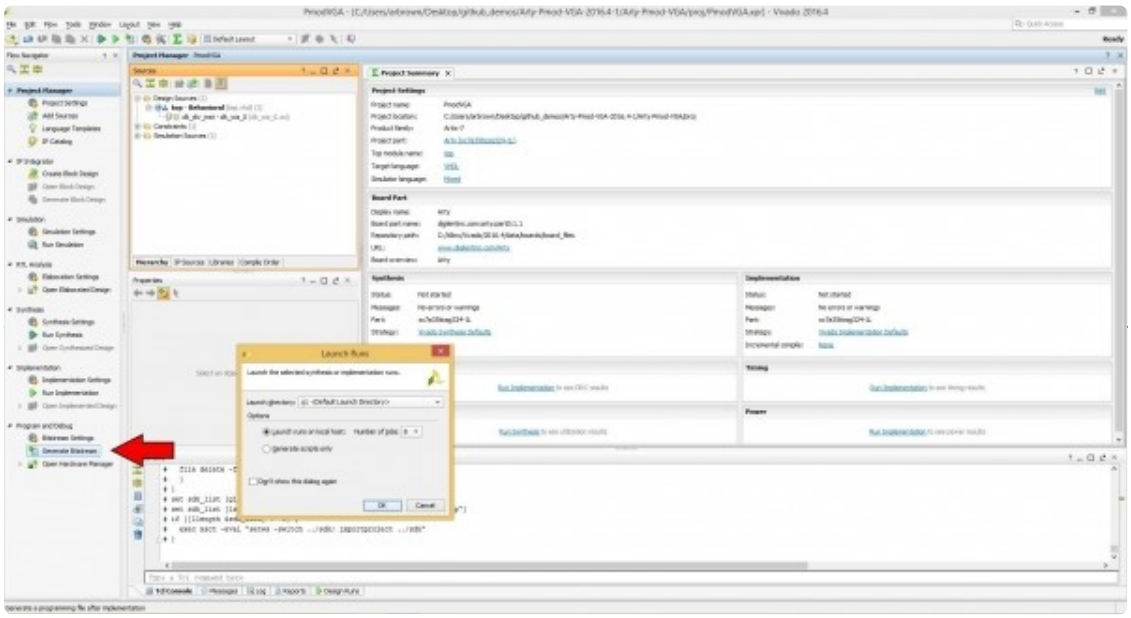
3. Generate Bitstream

Skip this step if you previously selected the “SDK Hardware Handoff” option.

Generate Bitstream

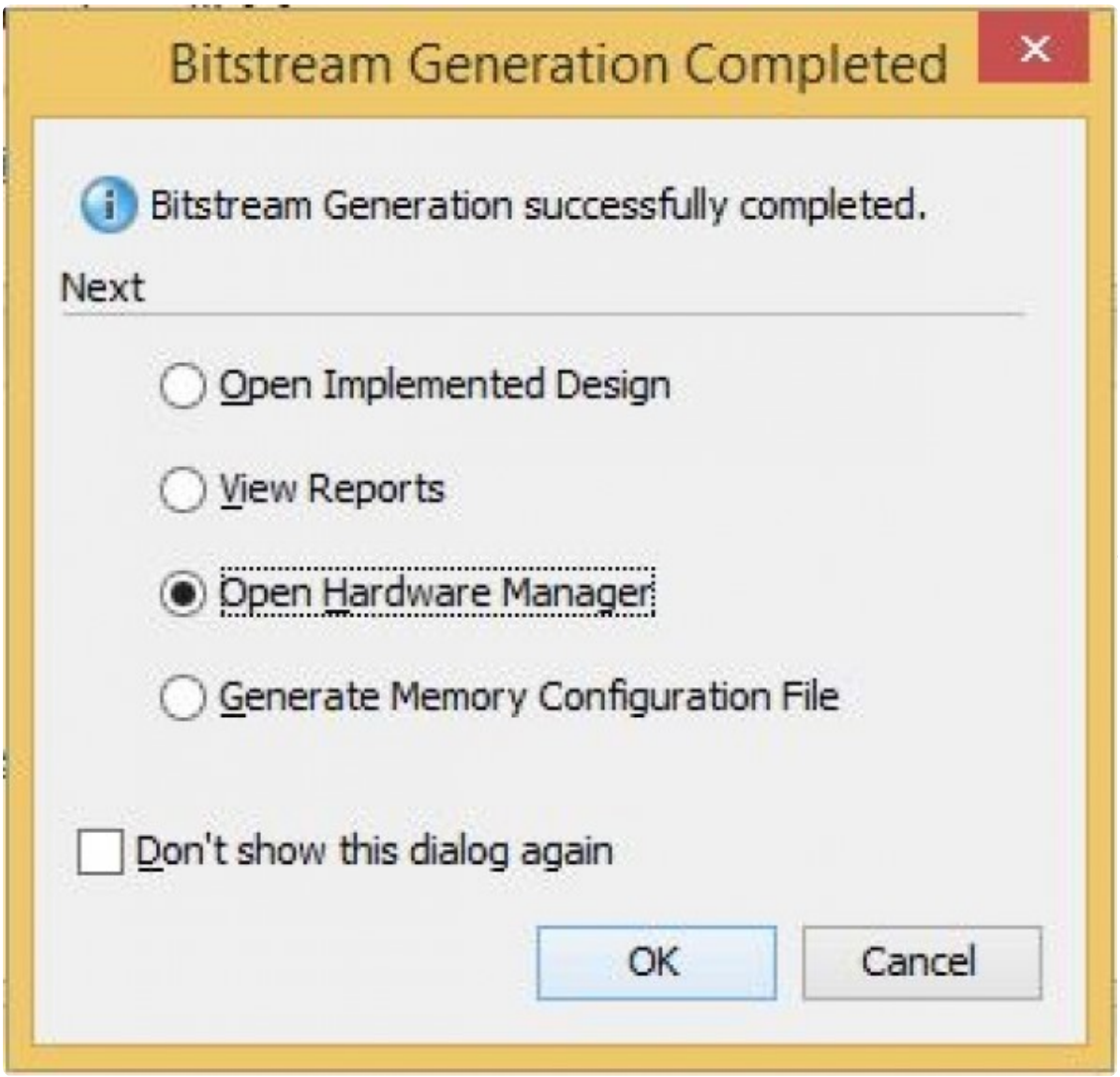
3.1) Click **Generate Bitstream** on the left hand menu towards the bottom. In the "Launch Runs" dialog, make sure **Launch runs on local host** is selected and click **OK**. In the "No Implementation Results Available" dialog, click **Yes** to run synthesis and implementation.

> **Tip**
>
> If your computer has multiple CPU cores, you can increase the number of jobs to make this process faster.



(https://reference.digilentinc.com/_detail/playground/generatebitstream.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

3.2) When this process has finished, which may take a while, in the "Bitstream Generation Completed" dialog you will be presented with several options. You can **Open Implemented Design** to view how your design will be placed onto the FPGA. **View Reports** will show you a number of different diagnostics on your project, including how the resources of your board will be used. **Open Hardware Manager** is used to program the bitstream onto the board (this will not be used for the SDK flow). **Generate Memory Configuration File** creates a file that can be used to program the bitstream from local memory on your device.



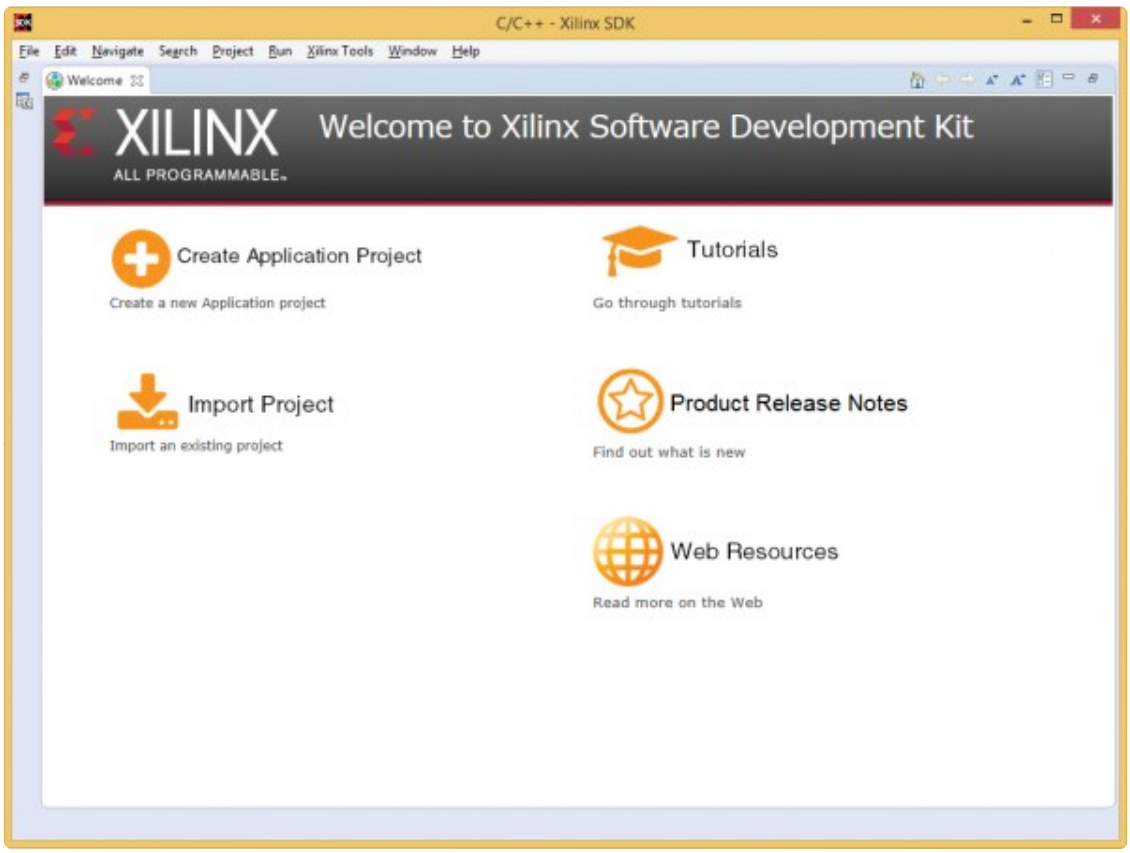
(https://reference.digilentinc.com/_detail/playground/openhwmanager.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4. Import SDK Projects

Skip this step if your project doesn't support SDK.

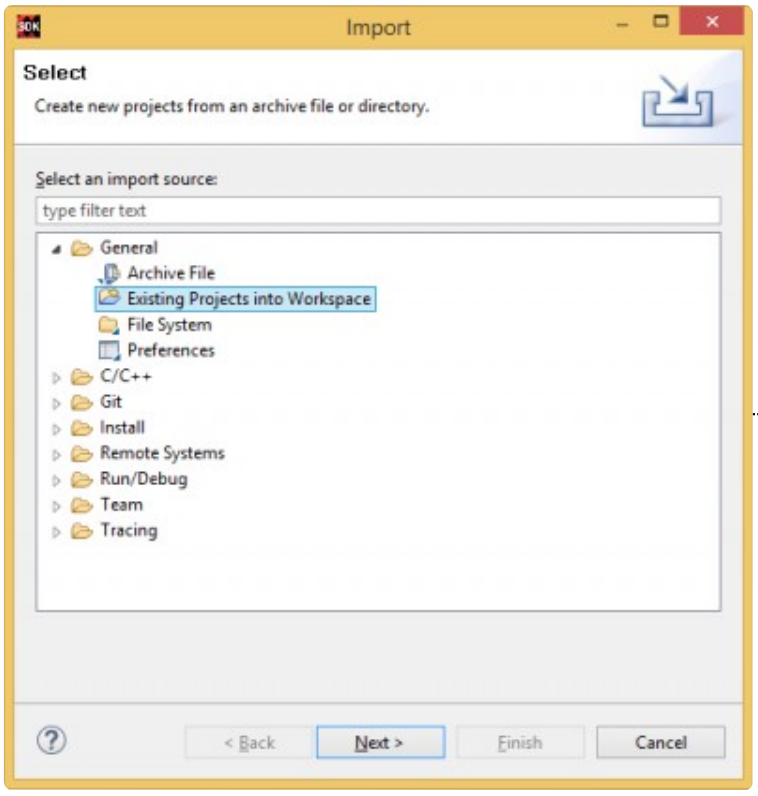
SDK Hardware Handoff

4.1) In SDK's main page, click the **Import Projects** button.



(https://reference.digilentinc.com/_detail/playground/hw-sdk-splash.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.2) In the "Import" dialog, under the "General" dropdown, select "Existing projects into workspace". Then click **Next**.

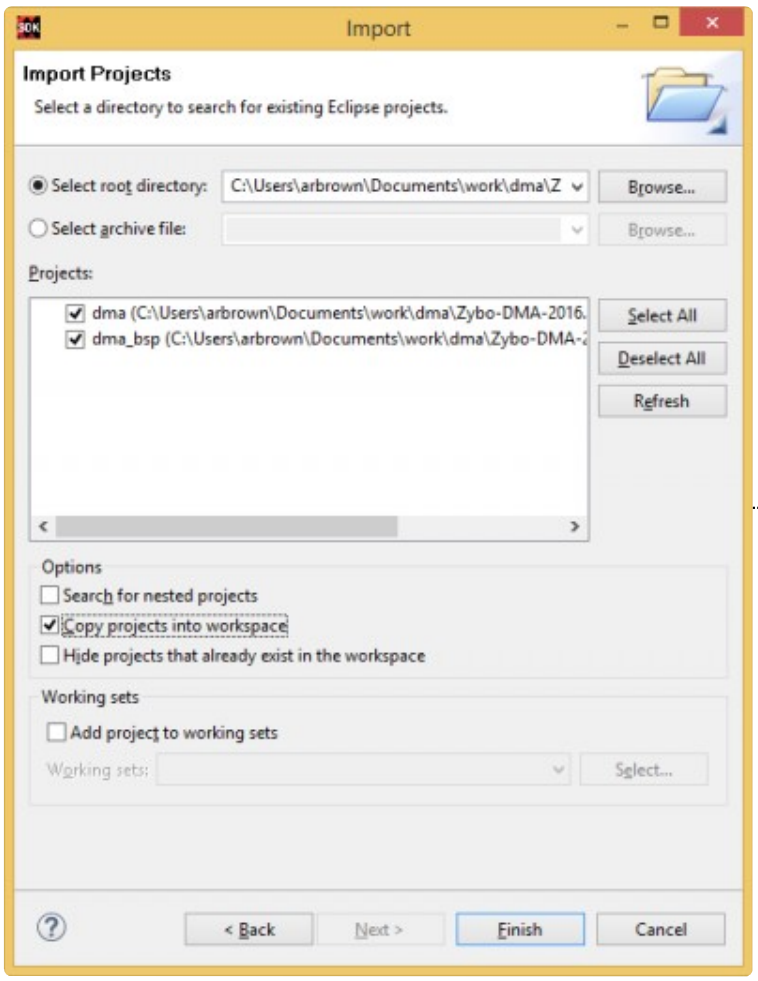


(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-1.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.3) In the "Import Projects" dialog, make sure that the **Select root directory** option is checked. Then click **Browse**.

(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-2.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.4) Find and select the "sdk" subdirectory of your project and click **Ok**.



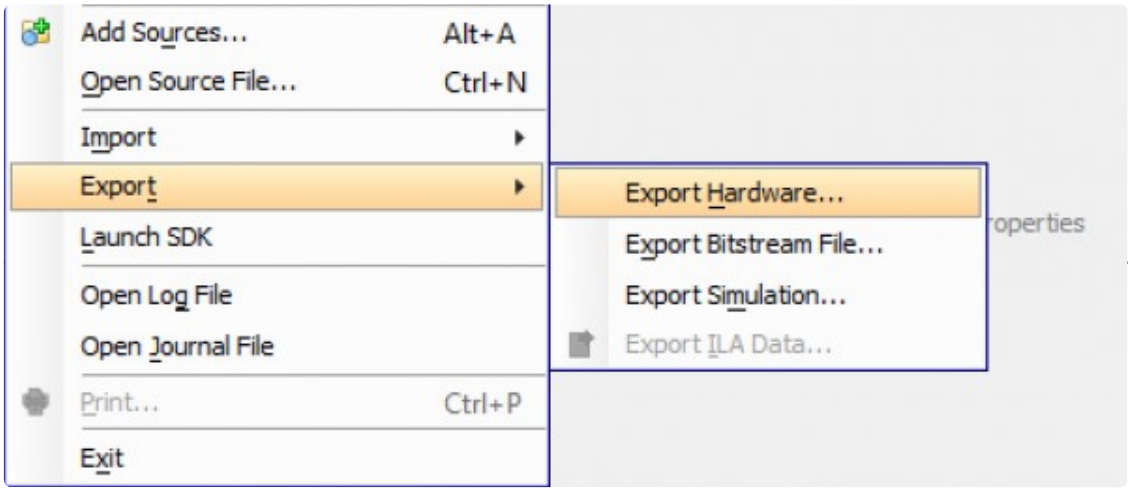
(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-3.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.5) Back in "Import Projects", make sure that the hw_handoff, application, and application board support package (BSP) projects are all checked, then click **Finish** to open the projects in SDK.

Launch from Vivado

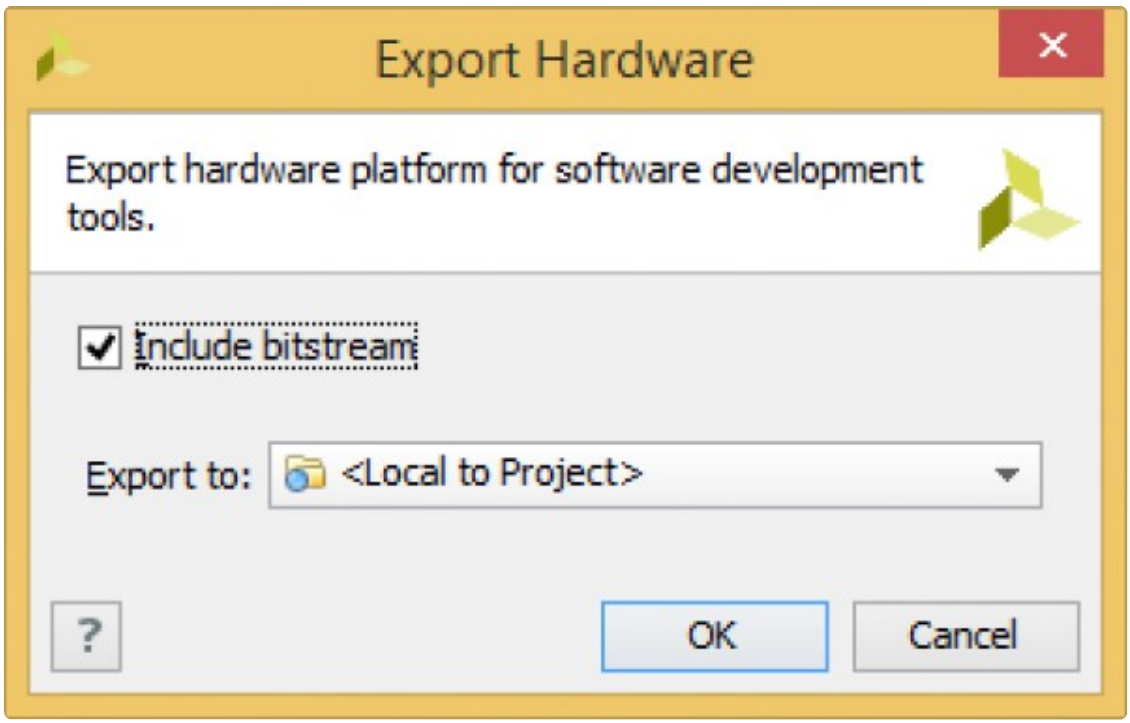
4.1) If the "Generate Bitstream Complete" dialog is still open, click **Cancel**.

4.2) In the top toolbar, select **File → Export → Export Hardware**.



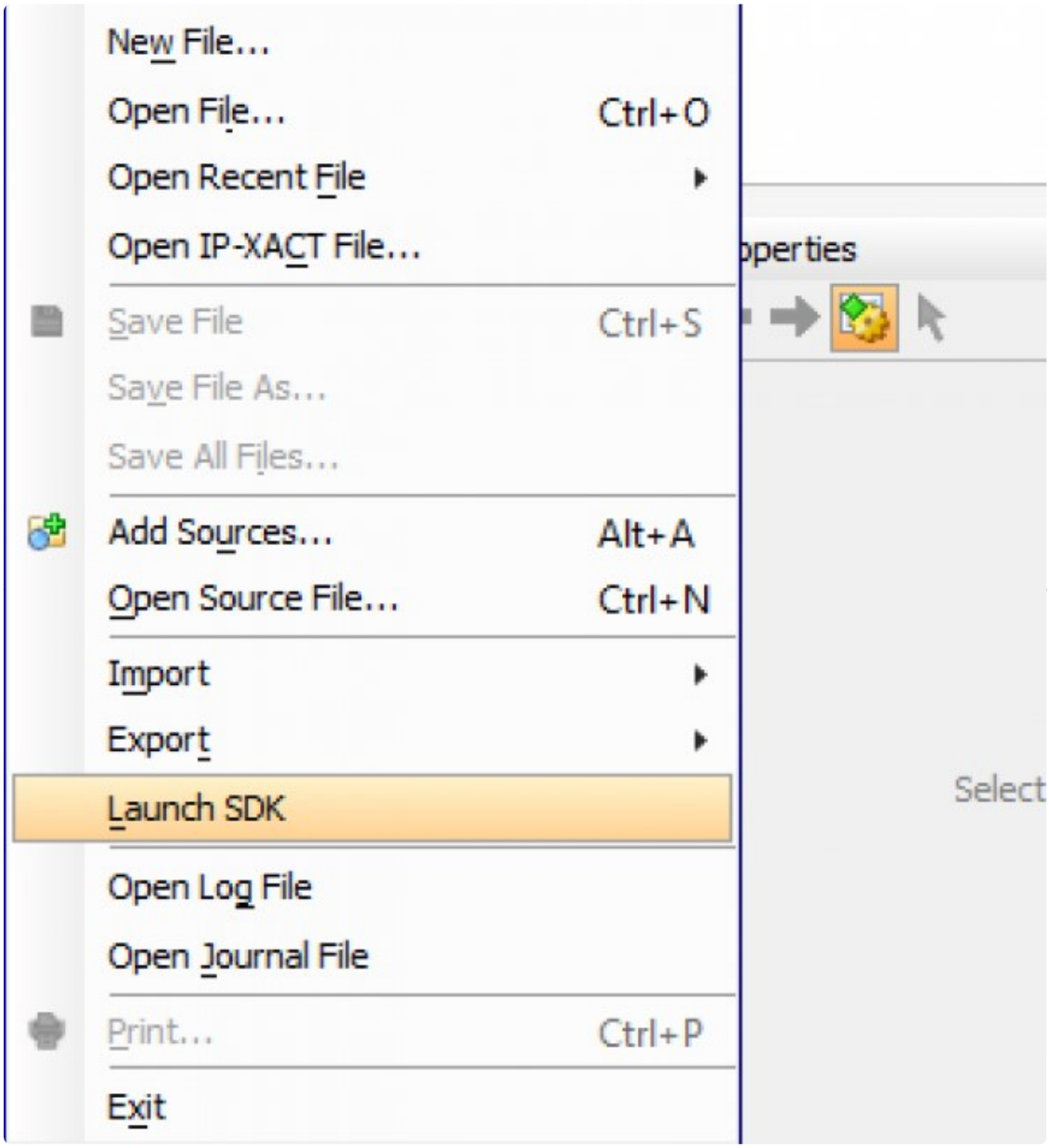
(https://reference.digilentinc.com/_detail/playground/bd-export.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.3) Make sure that the "Include bitstream" checkbox is checked and that the hardware platform will be exported to **<Local to Project>**. Click **Ok**.



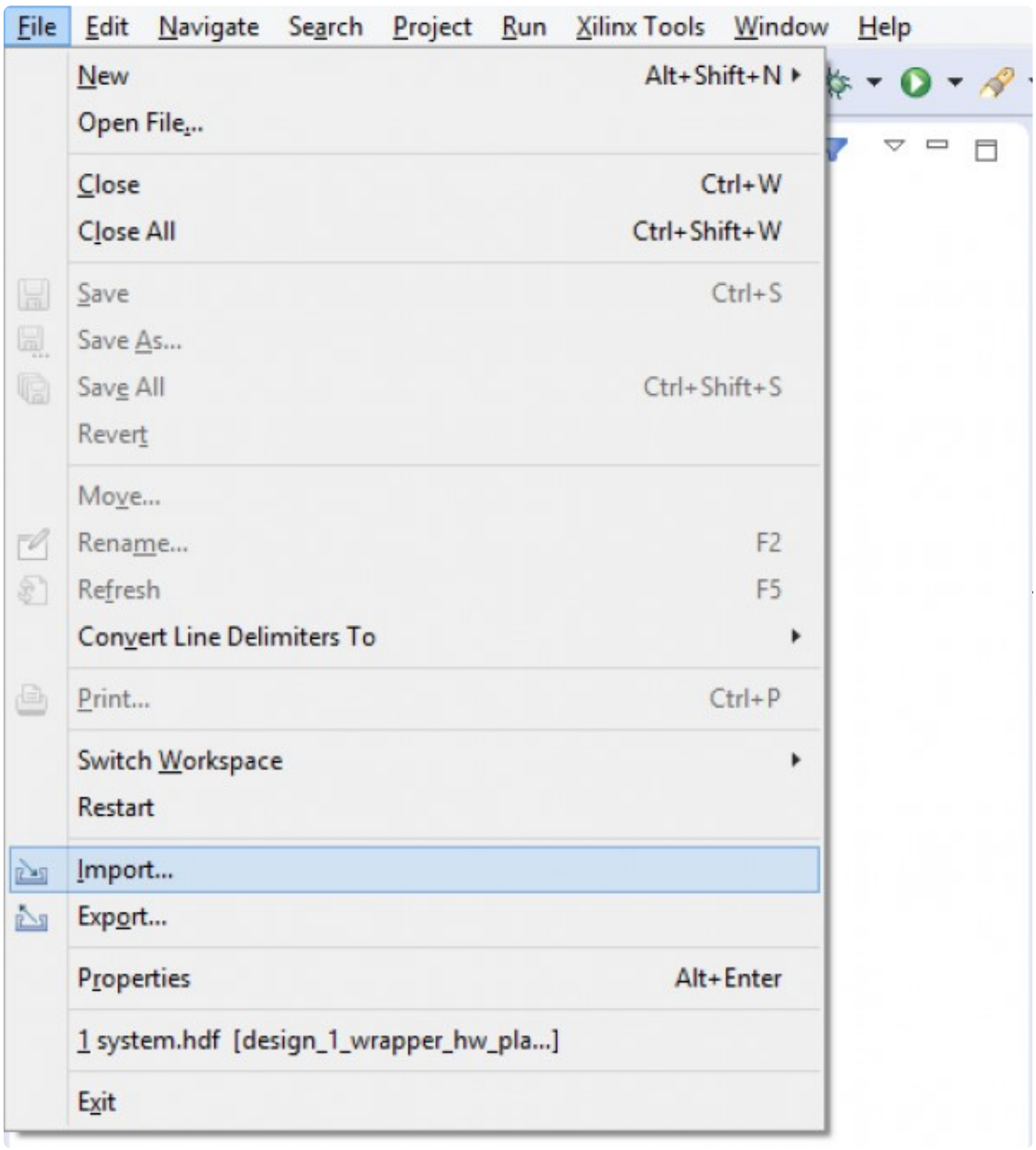
(https://reference.digilentinc.com/_detail/playground/bd-export-dialog.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.4) In the top toolbar, select File → Launch SDK, make sure that "Exported location" and "Workspace" are set to **<Local to Project**>. Click **Ok**.



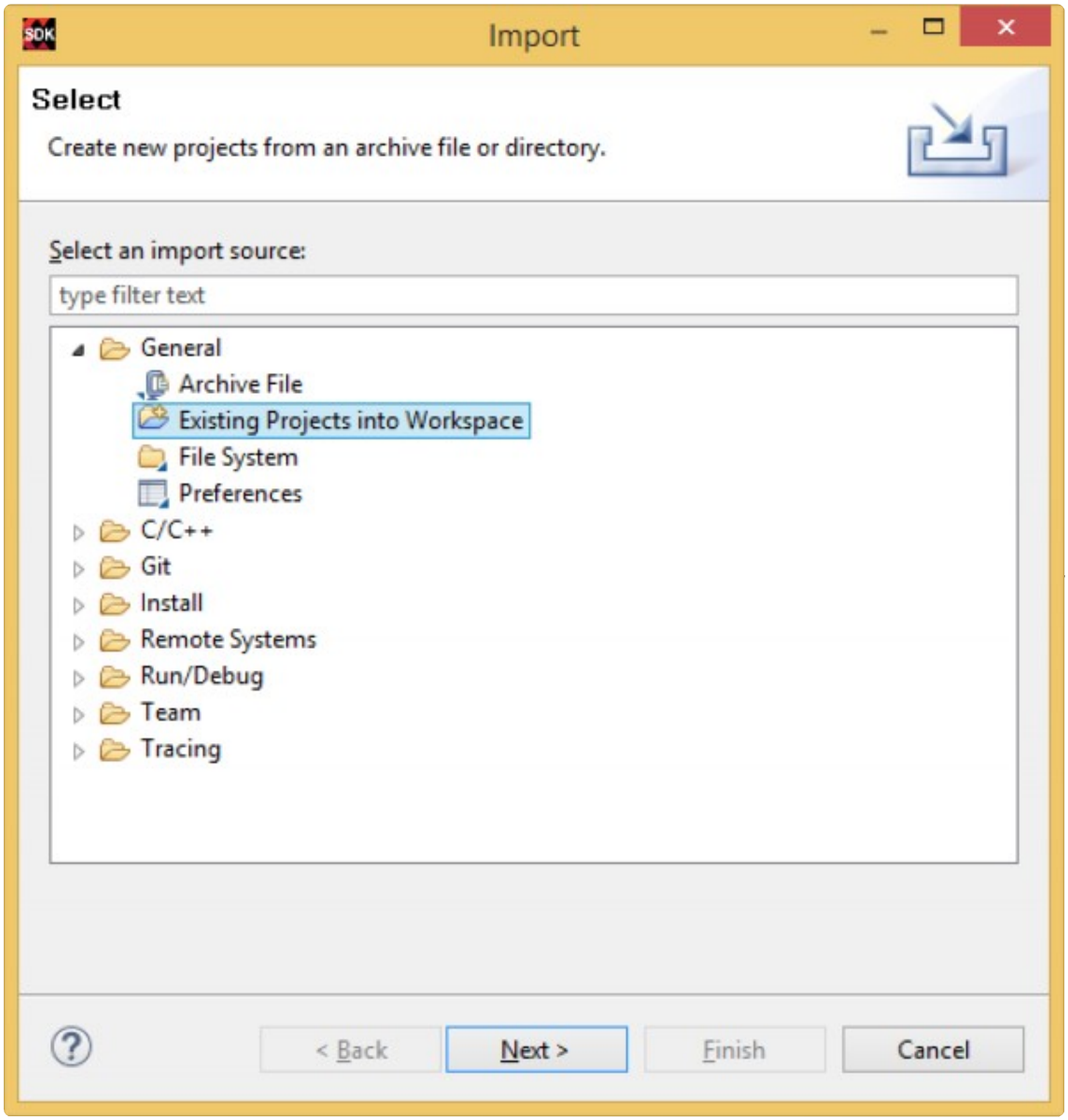
(https://reference.digilentinc.com/_detail/playground/bd-launch.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.5) In SDK, from the top toolbar, select **File → Import**.



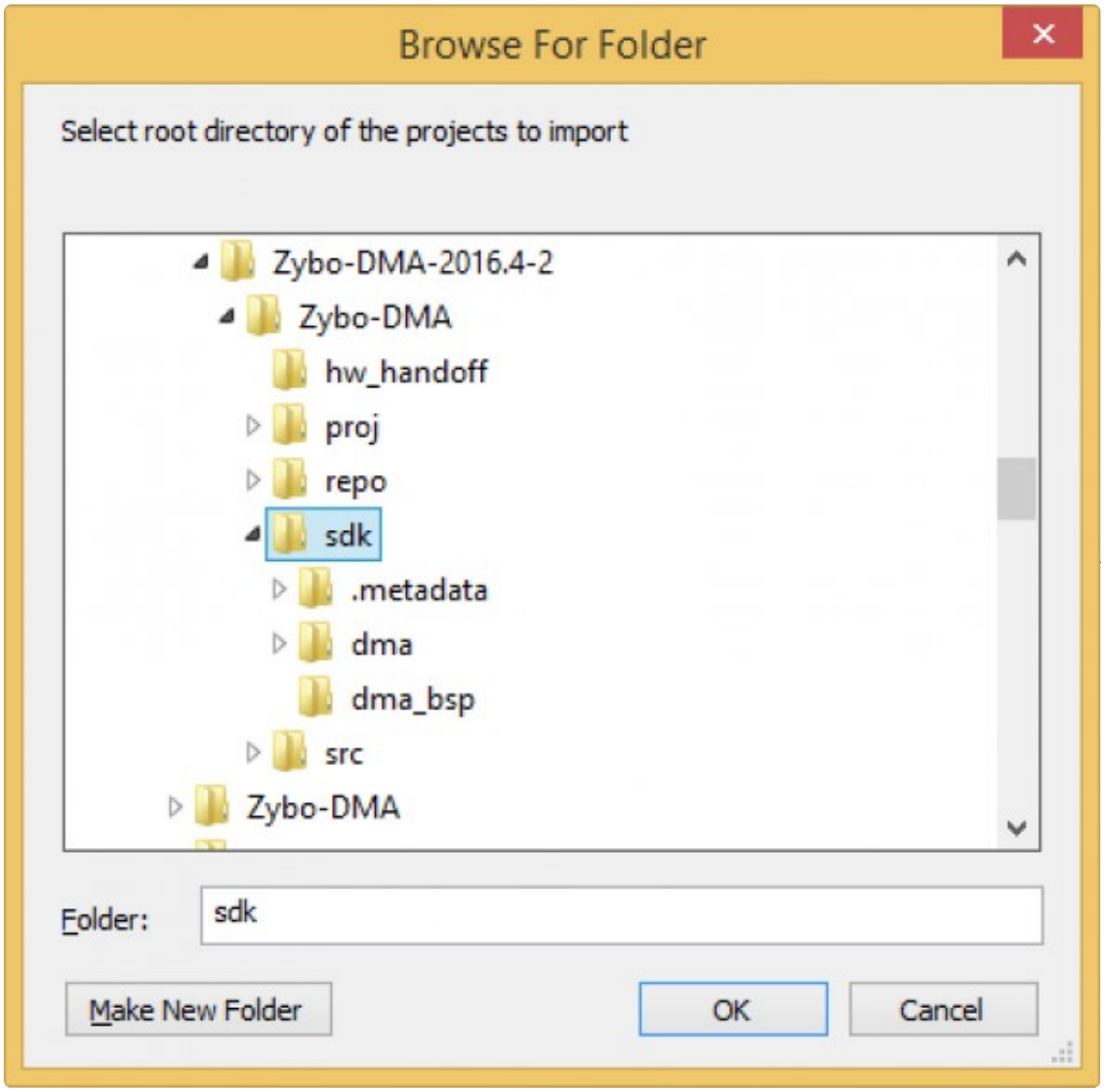
(https://reference.digilentinc.com/_detail/playground/bd-import.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.6) In the "Select an import source" dialog dropdowns, select **General → Existing Projects into Workspace**, then click **Next**.



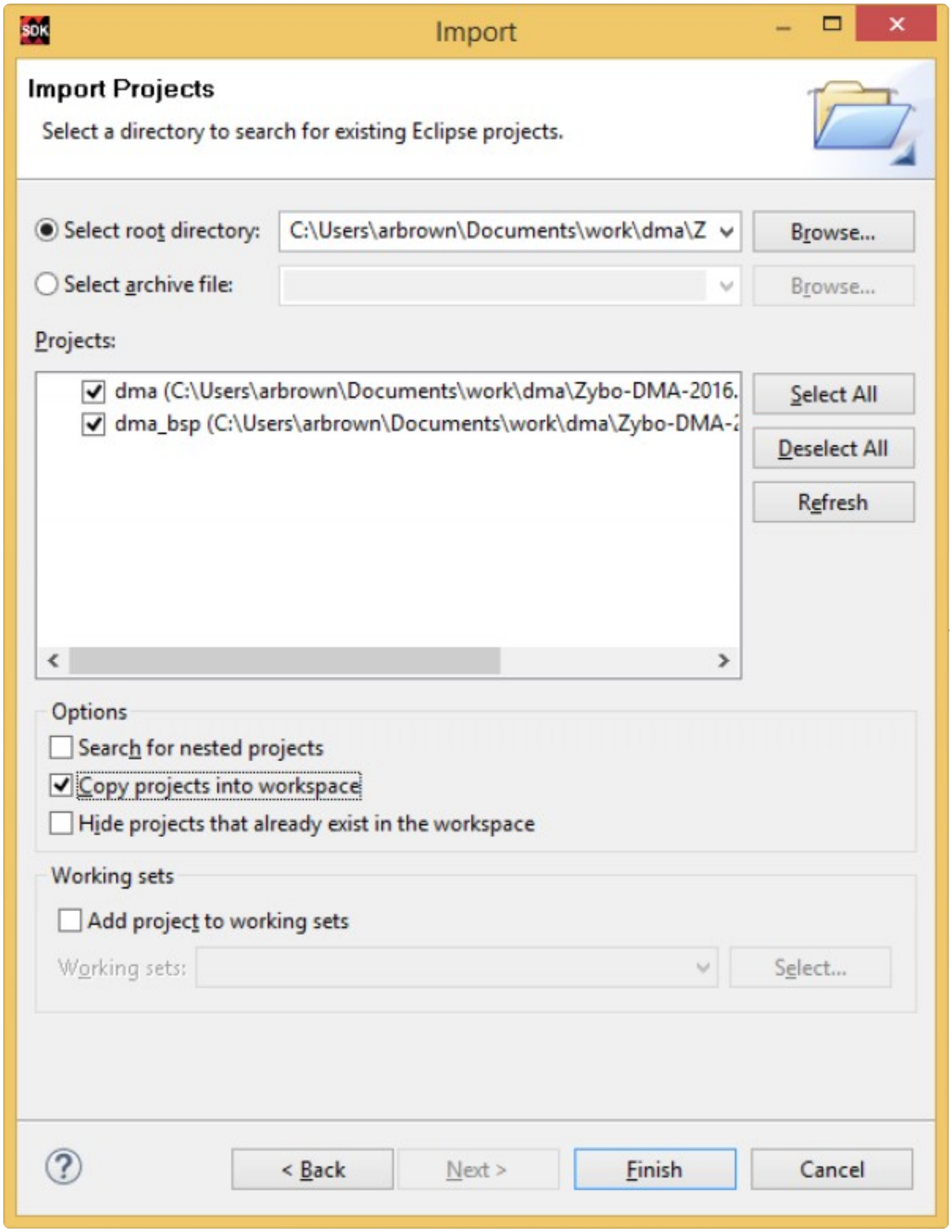
(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-1.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.7) In the "Import Projects" dialog, click **Browse** next to "select root directory", then find and select the "sdk" subdirectory of your project. Click **Ok**.



(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-2.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

4.8) Make sure that the application and application board support package (BSP) projects are checked, then click **Finish**.



(https://reference.digilentinc.com/_detail/playground/bd-import-dialog-3.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

Tip

Many apparent errors at this stage can be solved by right-clicking the bsp project and selecting Re-generate BSP Sources.

5. Run the Project

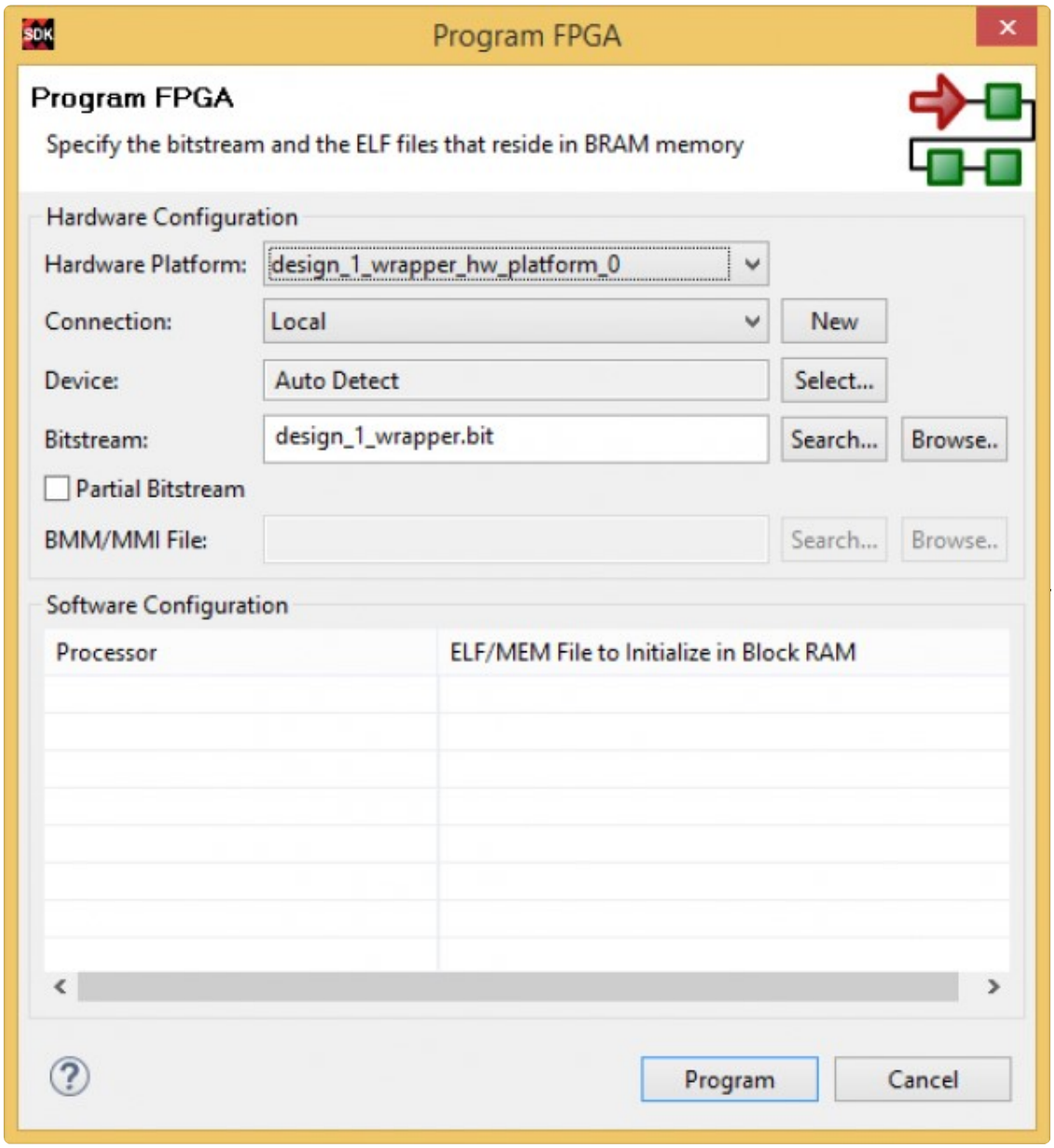
If you have opened your project in SDK in previous steps, select the “SDK” option, otherwise, select “Vivado”.

SDK

5.1) Ensure your board is turned on and connected to your computer with a USB cable.

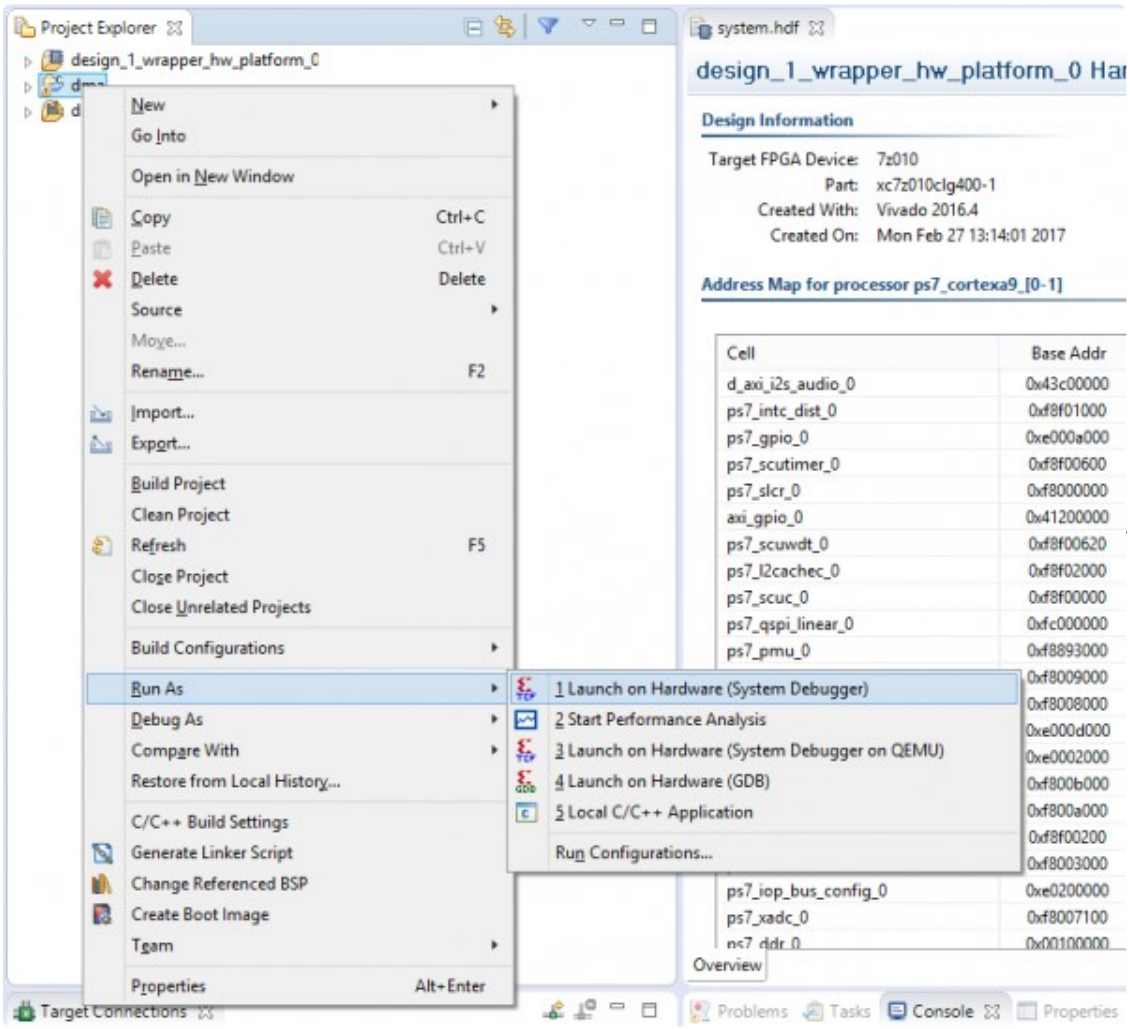
5.2) Revisit the project's wiki page to check for extra requirements, such as setting up a serial terminal, or connecting additional cables.

5.3) Select **Program FPGA** from the Xilinx Tools dropdown in the toolbar. Then click **Program**.



(https://reference.digilentinc.com/_detail/playground/bd-program-dialog.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.4) Right click on the application project - the one that doesn't end with "_hw_platform" or "_bsp" - and under "Run As", select **Launch on Hardware (System Debugger)**.



(https://reference.digilentinc.com/_detail/playground/bd-runas.png?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.5) The project will now be programmed and running on your board and you can return to the project's wiki page to verify functionality.

Vivado

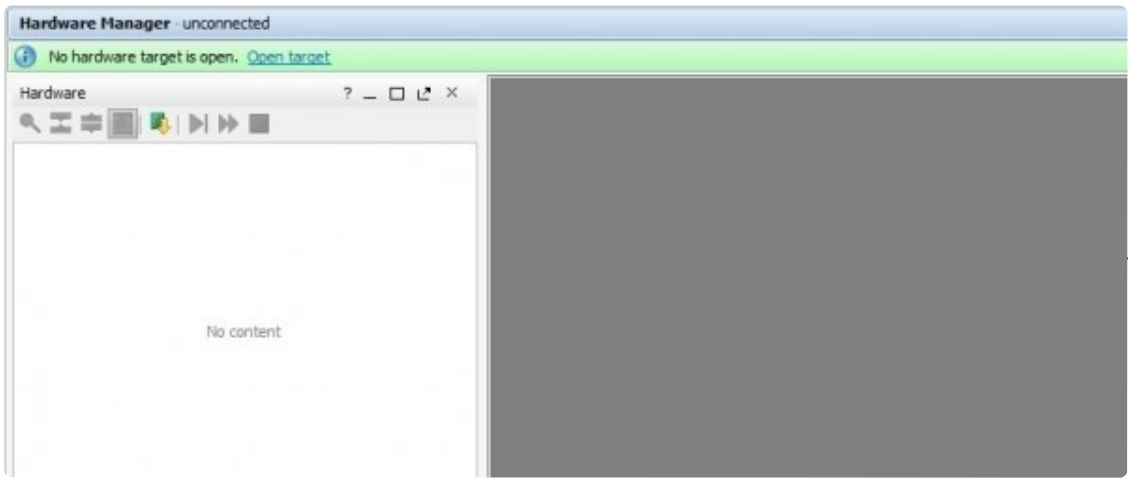
5.1) Ensure your board is turned on and connected to your computer with a USB cable.

5.2) Revisit the project's wiki page to check for extra requirements, such as setting up a serial terminal, or connecting additional cables.

5.3) In the Generate Bitstream Complete dialog, select "Open Hardware Manager", then click **Ok**. If the dialog is no longer open, select **Hardware Manager** from the Program and Debug section of the Flow Navigator to the left, just underneath **Generate Bitstream**.

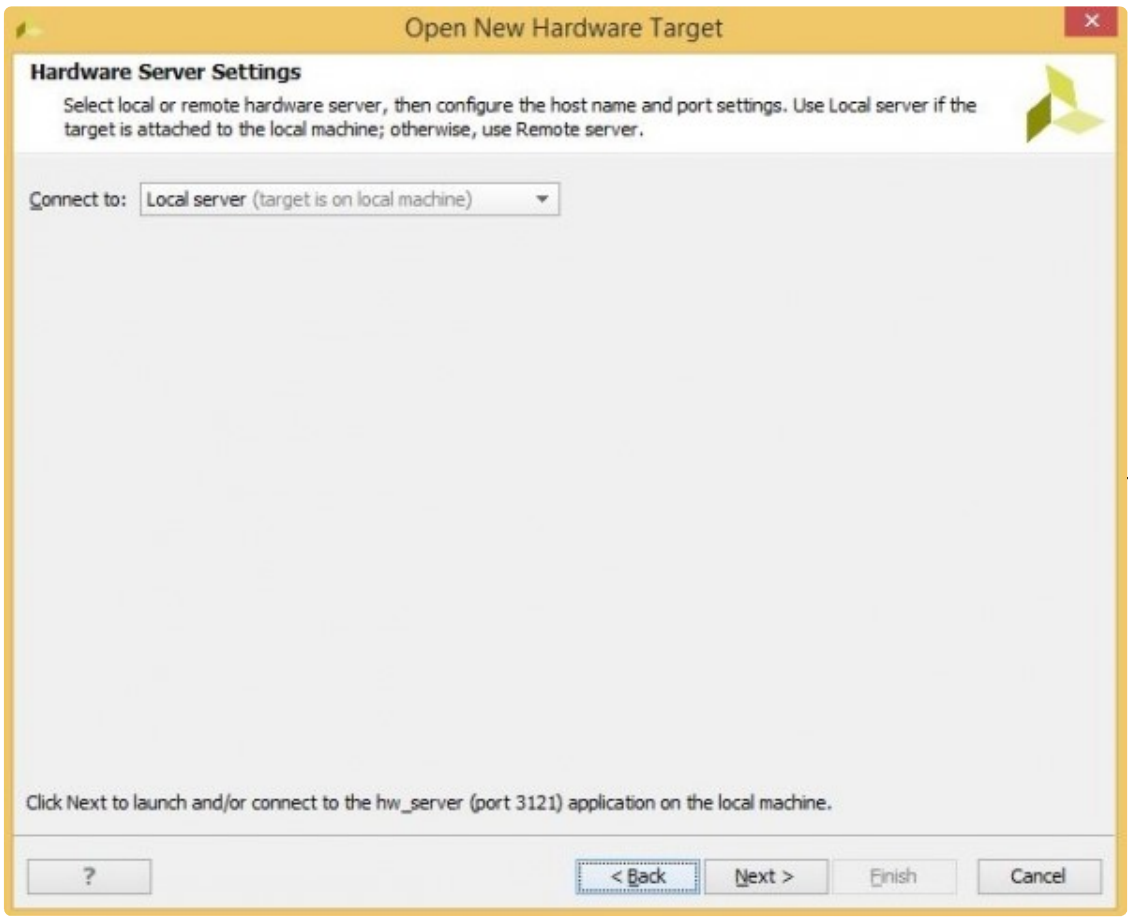
(https://reference.digilentinc.com/_detail/playground/openhwmanager.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.4) Select **Open Target** from the green bar at the top. In the drop down menu that this creates, select **Open New Target**.



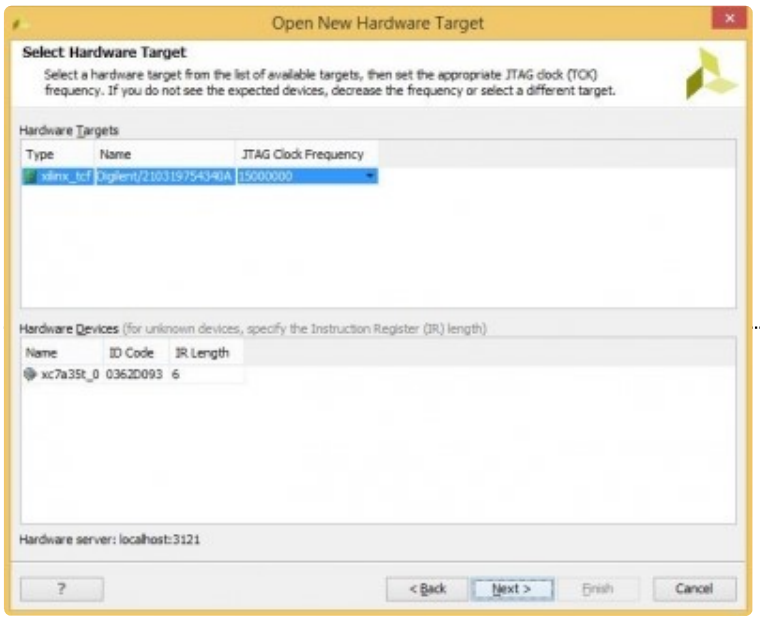
(https://reference.digilentinc.com/_detail/playground/hdl-opentarget.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.5) Make sure that **Local server** is selected in the "Connect to" drop down, then click **Next**.



(https://reference.digilentinc.com/_detail/playground/hardwareserversettings.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.6) Make sure that your board shows up in the "Hardware Targets" list, then click **Next** and **Finish**.



(https://reference.digilentinc.com/_detail/playground/connect.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.7) Select **Program Device** from the green bar, then select your device from the dropdown list (there will usually only be one device listed). Then click **Program**.

Important

If nothing shows up in the "Bitstream file" text box, click the **…** button to the right, navigate to "proj/*.runs /impl_1" subdirectory of your project and select the "*.bit" file.

(https://reference.digilentinc.com/_detail/playground/program.jpg?id=learn%3Aprogrammable-logic%3Atutorials%3Agithub-demos%3Astart)

5.8) The project will now be programmed and running on your board and you can return to the project's wiki page to verify functionality.

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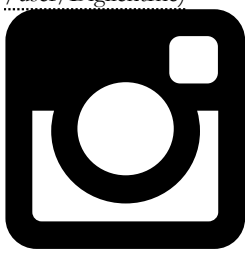
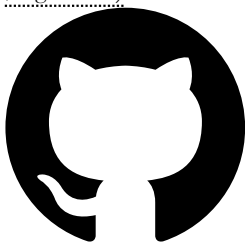
(https://store.digilentinc.com/internships/)

- (https://www.youtube.com/user/DigilentInc)



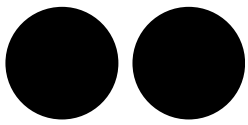
- (https://instagram.com/digilentinc)



- (https://github.com/digilent)

- (https://www.reddit.com/r/digilent)

- (https://www.linkedin.com/company/1454013)



- (https://www.flickr.com/photos/127815101@N07)