

Installing Vivado and Digilent Board Files

Introduction

This guide will show the process of installing and configuring the Vivado development environment, used for developing projects to run on Digilent FPGAs. In addition to the installation, Vivado will be pointed at Digilent's board support files, which are used to make the process of creating a new project significantly faster. In addition, the board files make it significantly easier to add a variety of peripherals (such as DDR memory) to a project.


Prerequisites

- 20+ ~~GB~~_{GB} of free hard-drive space.

Guide

1. Install Vivado

1.1

Open  Xilinx's Downloads page (https://www.xilinx.com/support/download.html?_ga=2.14456627.589334068.1557151868-1594675450.1553378737) in a new tab. Find the section of the page entitled “Vivado Design Suite - HLx Editions - 2018.2 Full Product Installation”. Select the “Self Extracting Web Installer” download for the appropriate operating system. Follow the prompts to sign in or create an account for Xilinx's website. Once signed in, the internet browser will download the selected installer.

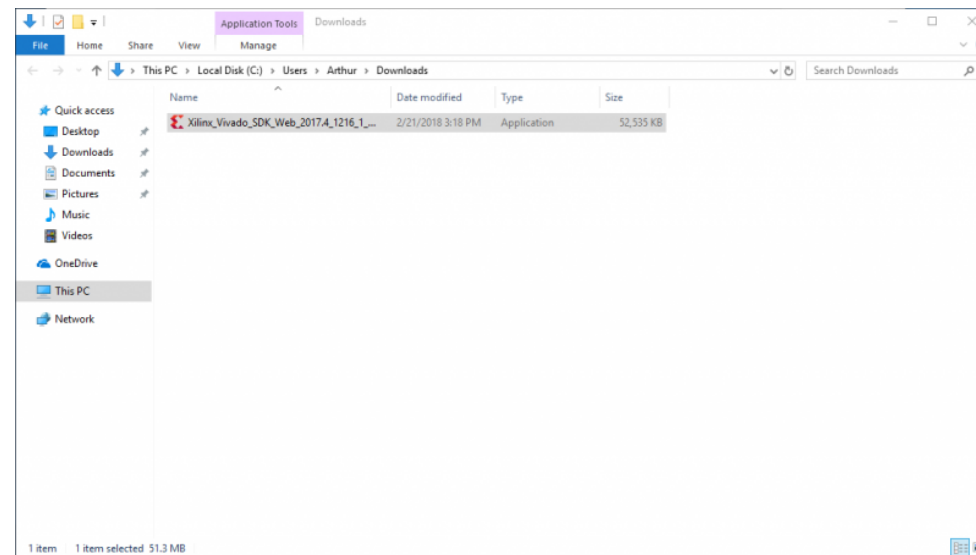
1.2

To launch the installer, choose the dropdown for the appropriate operating system, and follow the instructions:

Windows

Use Windows Explorer to find the installer executable in the Downloads directory.

Double click on the executable to run it.



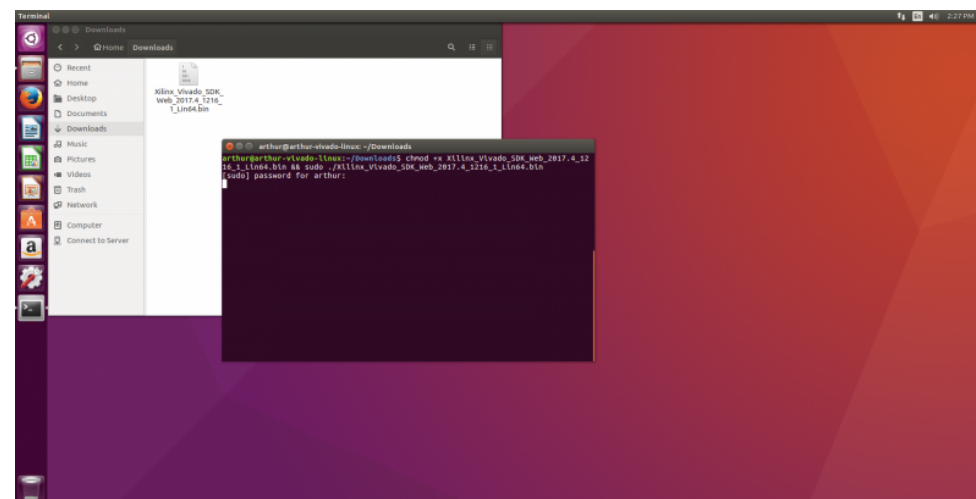
(<https://reference.digilentinc.com/detail/vivado/installing-vivado/windows-run.png?id=vivado%3Ainstalling-vivado%3Astart>)

Linux

Navigate to the directory that the installer binary was downloaded to in a terminal application, then enter the command below with the correct filename to execute it as a super-user:

```
chmod +x <installer>.bin && sudo ./<installer>.bin
```

NOTE: All use of Vivado in Linux should be done as a super-user.

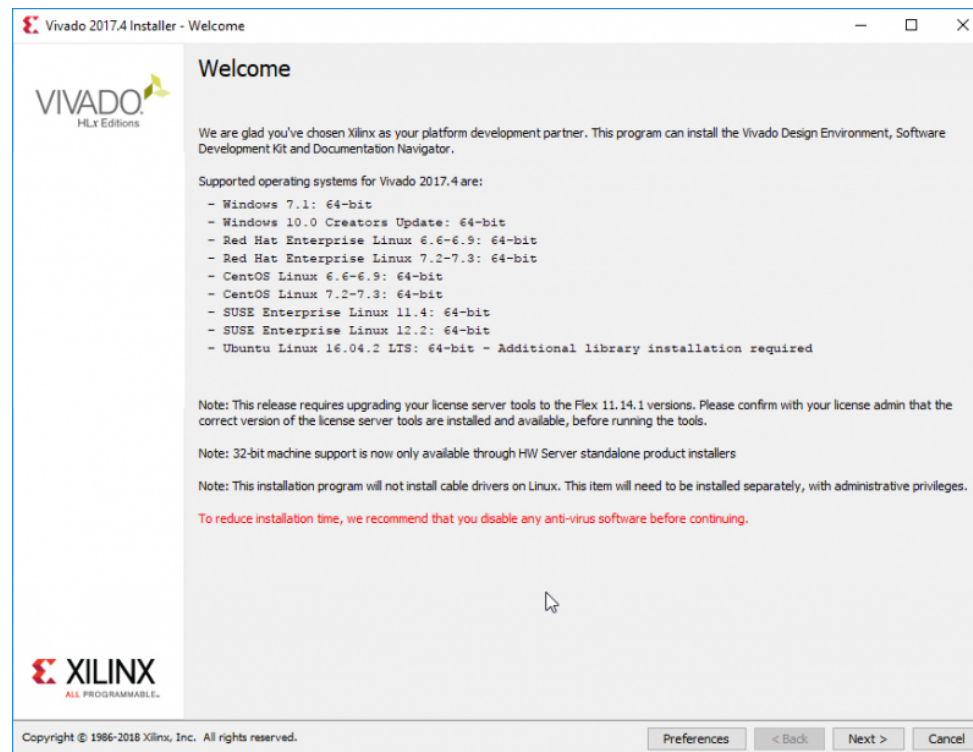


(<https://reference.digilentinc.com/detail/vivado/installing-vivado/linux-run.png?id=vivado%3Ainstalling-vivado%3Astart>)

The rest of the steps in Section 1 are the same for both Windows and Linux.

1.3

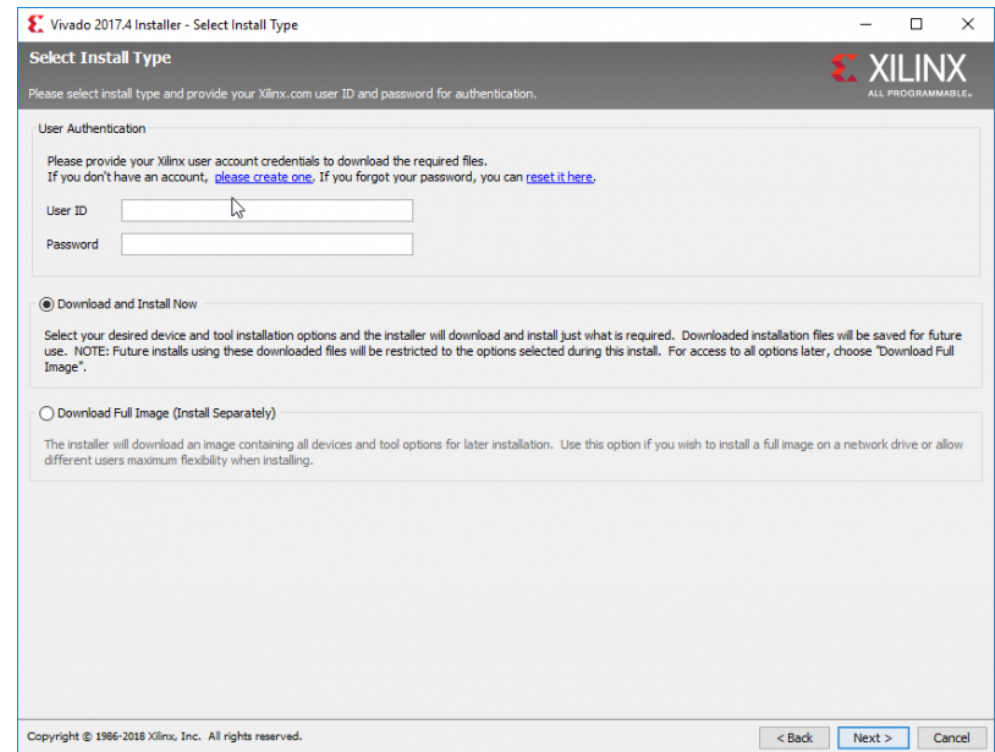
At the Welcome screen, make sure that the operating system of the computer being used is listed in the compatibility list, then click **Next**.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/welcome.png?id=vivado%3Ainstalling-vivado%3Astart>)

1.4

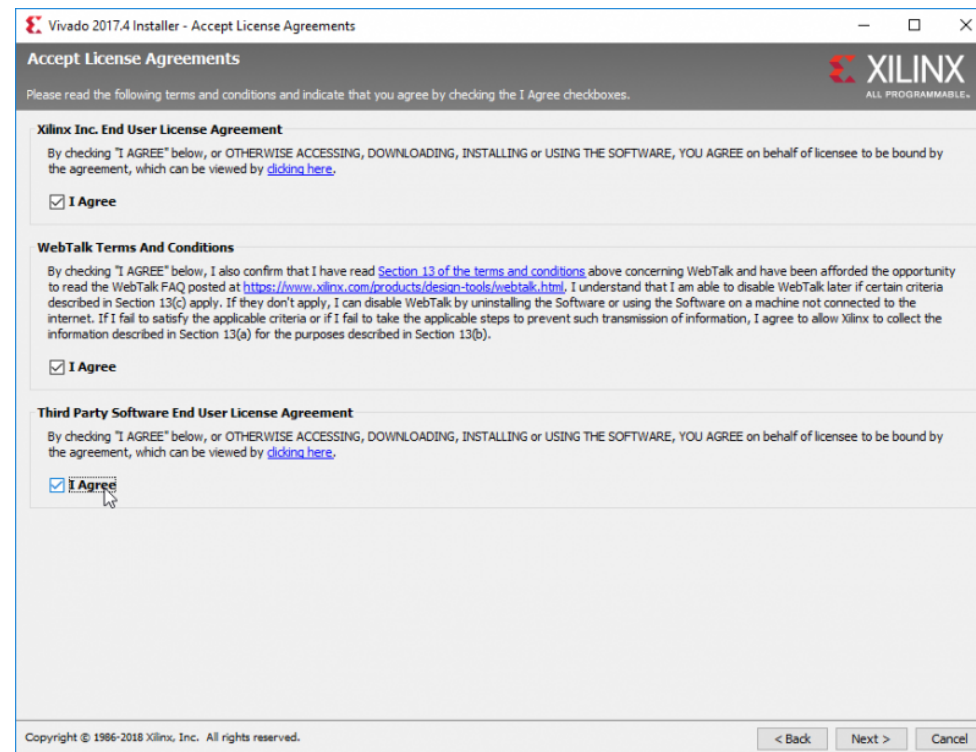
Use the same credentials as on the Xilinx website for user authentication. Select the **Download and Install Now** option and click **Next**.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/authenticate.png?id=vivado%3Ainstalling-vivado%3Astart>)

1.5

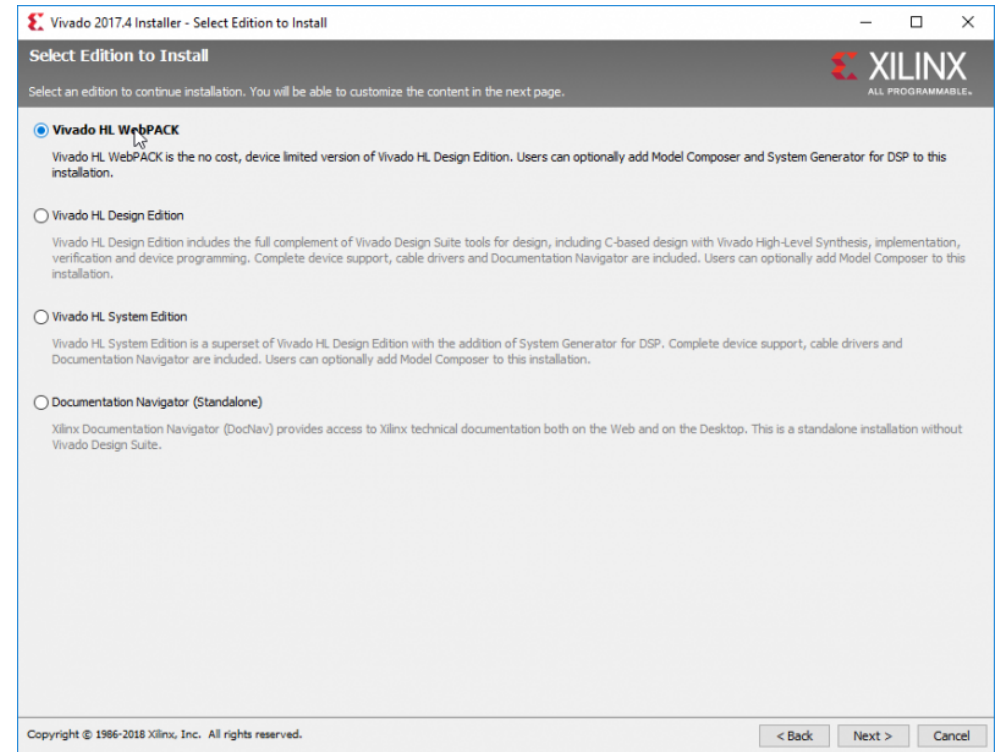
Read and **accept** all three license agreements, then click **Next**.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/eulas.png?id=vivado%3Ainstalling-vivado%3Astart>)

1.6

On the “Select Edition to Install” screen, several options are presented. Vivado WebPACK Edition is fully free, but will not work when developing for Digilent FPGAs that use a Kintex-7 or Virtex-7 part. Vivado Design Edition can be used without a license, and is the edition recommended by Digilent. A license is required to use Vivado System Edition. This guide does not cover the acquisition and management of licenses. Select the most appropriate edition for the situation, then click **Next**.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/select-editions.png?id=vivado%3Ainstalling-vivado%3Astart>)

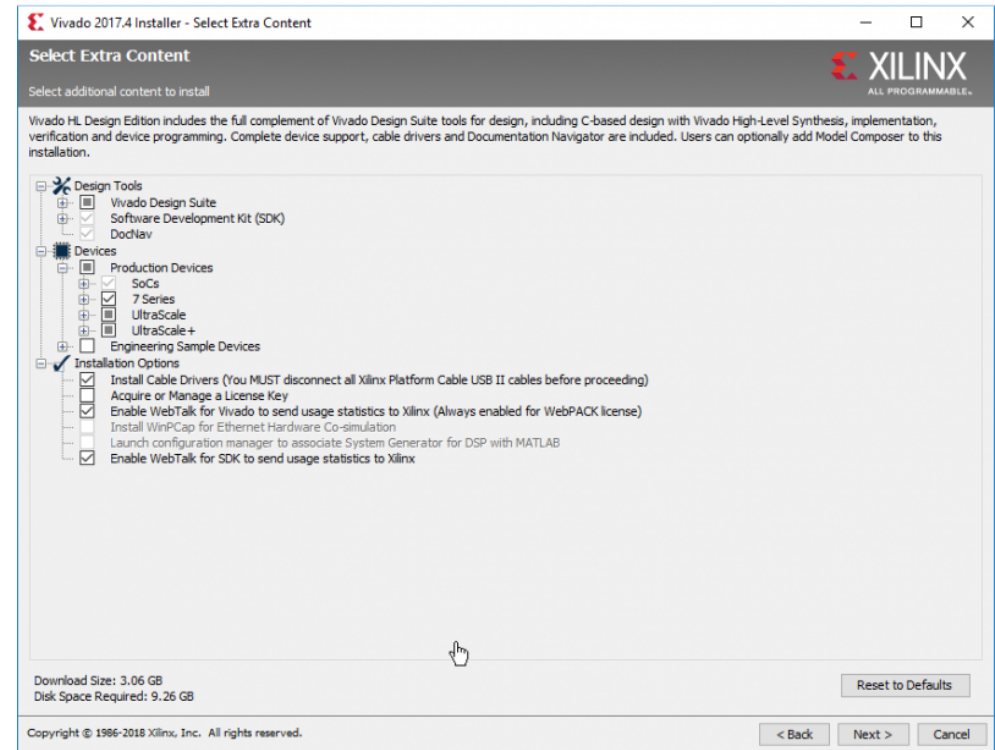
1.7

This screen provides more detailed options for the customization of the installation. The majority of these options do not need to be changed for a basic installation, but unnecessary features can be removed to reduce the installation's footprint on the file-system - for example, most users will not need their Vivado installation to support Ultrascale, Kintex, or Virtex devices. The important options for a beginner to note here are described in the list below. Review the selections, then click **Next**.

- *Design Tools:*
 - *Vivado Design Suite:*
 - Installs the main Vivado development environment.
 - *Software Development Kit:*
 - Installs an Eclipse-based development environment for Microblaze and Zynq designs.
 - *DocNav:*

- Installs a navigation tool to quickly find appropriate Xilinx documentation of IP and examples.
- *Devices:*
 - Allows customization of the set of Xilinx FPGA parts that can be designed for after installation.
- *Installation Options:*
 - *Install Cable Drivers:*
 - Installs the appropriate drivers so that a connected FPGA can be programmed. **If Vivado has not been installed before, make sure to check this!**
 - *Acquire or Manage a License Key:*
 - Launches the Xilinx License manager after installation is complete. **Most users do not need to manage licenses.**

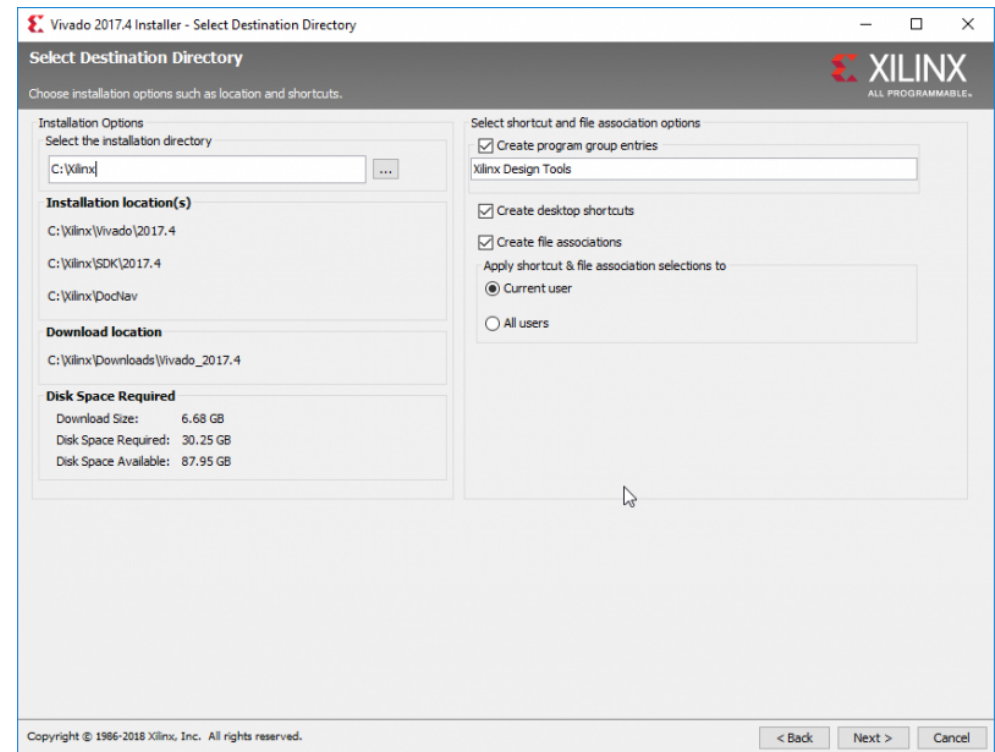
NOTE: Changes can be made to the installation after it is complete by going to **Help** → **Add Design Tools or Devices** in the Vivado toolbar.



<https://reference.digilentinc.com/detail/vivado/installing-vivado/customize-install.png?id=vivado%3Ainstalling-vivado%3Astart>

1.8

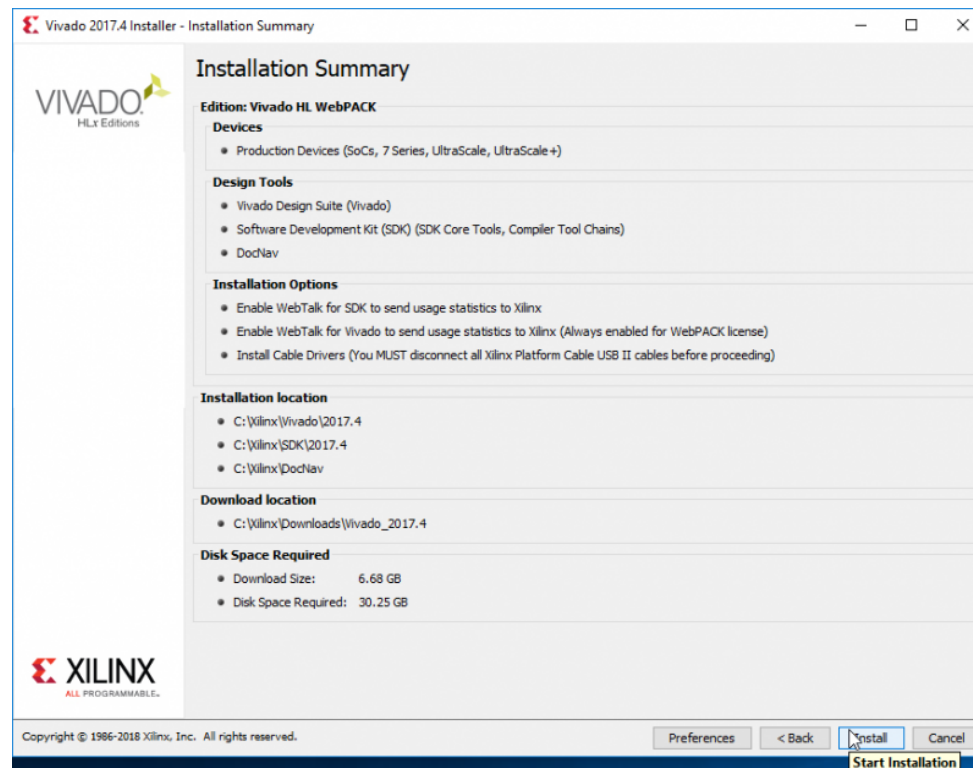
The “Select Destination Directory” screen shows how and where the installation will be placed in the computer's file system. Leaving all of these settings as default is typically fine. Click **Next** and then **Yes** if prompted to confirm that the installer will be creating a new directory.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/select-install-directory.png?id=vivado%3Ainstalling-vivado%3Astart>)

1.9

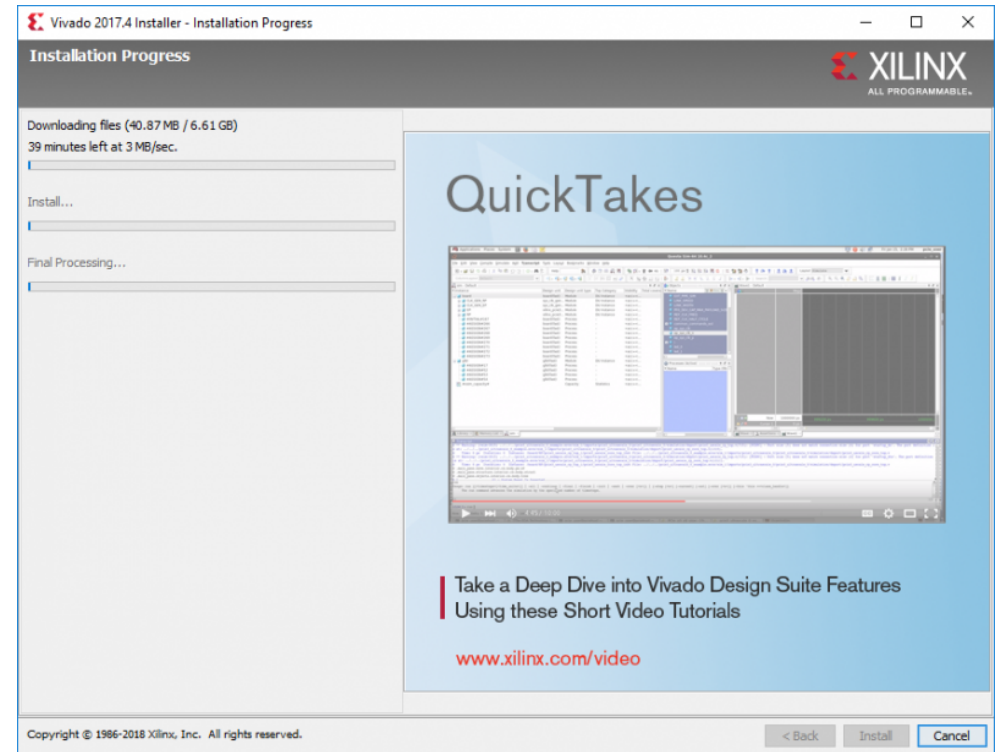
Review the “Installation Summary”, then click **Install**.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/summary.png?id=vivado%3Ainstalling-vivado%3Astart>)

1.10

The installation process will take quite a while, as seen in the screenshot to the right. Find something else to work on until it completes.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/install-progress.png?id=vivado%3Ainstalling-vivado%3Astart>)

2. Installing Cable Drivers on Linux

Windows users may skip this section and continue on to [Step 3](#).

2.1

The Vivado installer does not install the USB drivers required to recognize an FPGA on a Linux system, regardless of whether the option was checked or not. In order to install these drivers, navigate to the “<Vivado Install>/data/xicom/cable_drivers/lin64/install_script/install_drivers/” directory in a console window. The “<Vivado Install>” directory is typically the “/opt/Xilinx/Vivado/*/” directory - the “*” representing the Vivado version number (2018.2). From within this directory, run the “./install_drivers” command as a super-user. Once this command completes successfully, the required drivers will be installed.

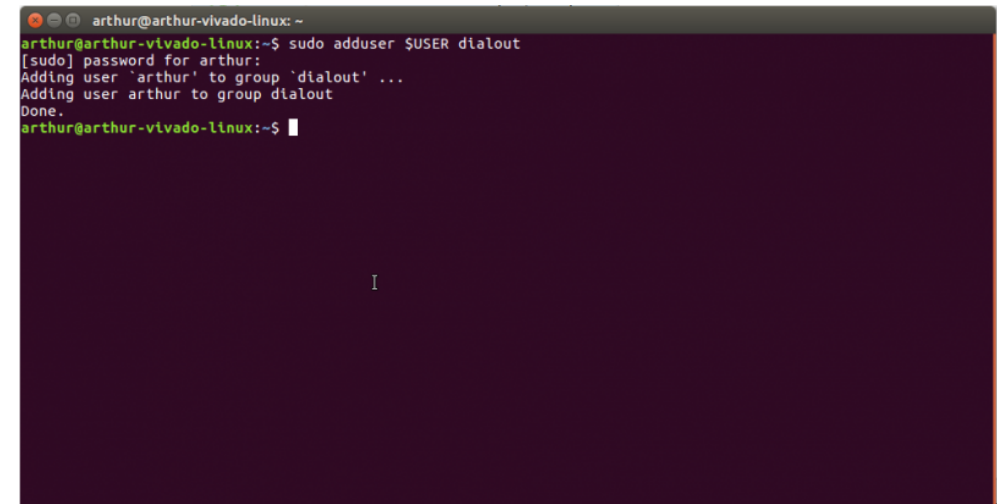
```
root@arthur-vivado-linux: /opt/Xilinx/Vivado/2017.4/data/xicom/cable_drivers/lin64/install_script/install_drivers
root@arthur-vivado-linux: /opt/Xilinx/Vivado/2017.4/data/xicom/cable_drivers/lin64/install_script/install_drivers# ./install_drivers
INFO: Installing cable drivers.
INFO: Script name = ./install_drivers
INFO: HostName = arthur-vivado-linux
INFO: Current working dir = /opt/Xilinx/Vivado/2017.4/data/xicom/cable_drivers/lin64/install_script/install_drivers
INFO: Kernel version = 4.10.0-28-generic.
INFO: Arch = x86_64.
Successfully installed Digilent Cable Drivers
--File /etc/udev/rules.d/52-xilinx-ftdi-usb.rules does not exist.
--File version of /etc/udev/rules.d/52-xilinx-ftdi-usb.rules = 0000.
--Updating rules file.
--File /etc/udev/rules.d/52-xilinx-pcusb.rules does not exist.
--File version of /etc/udev/rules.d/52-xilinx-pcusb.rules = 0000.
--Updating rules file.
INFO: Digilent Return code = 0
INFO: Xilinx Return code = 0
INFO: Xilinx FTDI Return code = 0
INFO: Return code = 0
INFO: Driver installation successful.
CRITICAL WARNING: Cable(s) on the system must be unplugged then plugged back in order for the driver scripts to update the cables.
root@arthur-vivado-linux: /opt/Xilinx/Vivado/2017.4/data/xicom/cable_drivers/lin64/install_script/install_drivers#
```

NOTE: Some older versions of Vivado may require that the `install_drivers` command be extracted from a TAR file before use.

2.2

In order to use the USB drivers with a serial terminal, each user that will be using serial terminals must be added to the dialout group. Serial terminals can be very useful for debugging FPGA designs that implement a USB-UART controller. A user can be added to the dialout group with the “**sudo adduser \$USER dialout**” command. Note that this only adds the user that is currently active. In order to add a non-super-user while authenticated as root, use the command “**adduser <username> dialout**” instead, with “<username>” replaced with the name of the user to be added.


(<https://reference.digilentinc.com/detail/vivado/installing-vivado/linux-drivers.png?id=vivado%3Ainstalling-vivado%3Astart>)

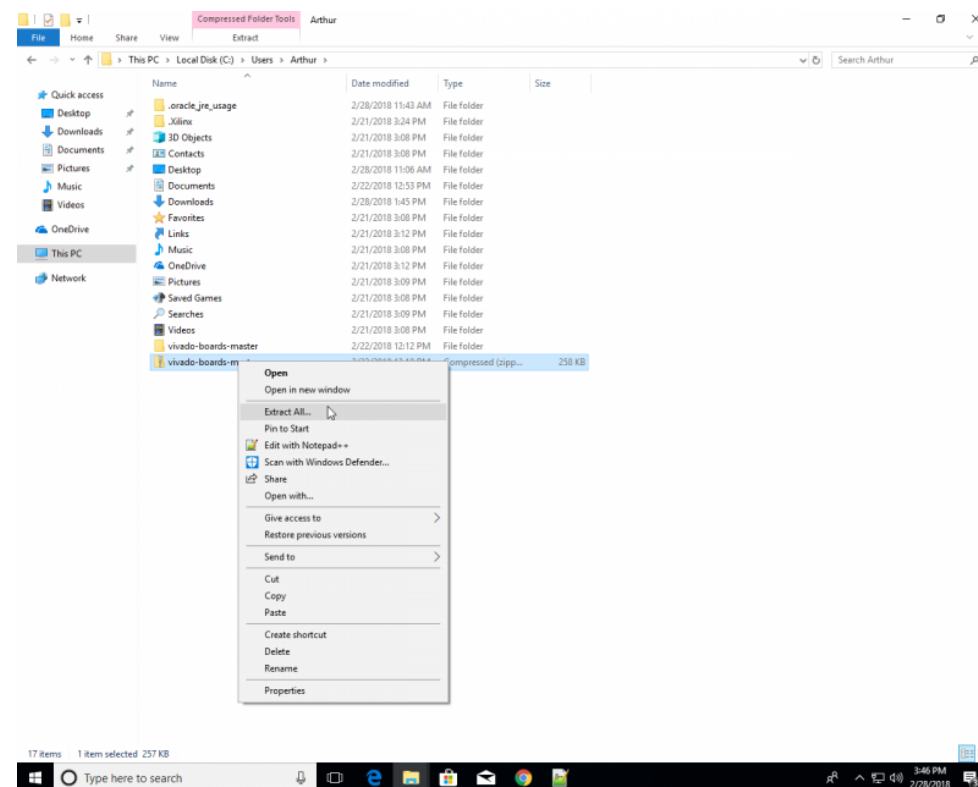
A terminal window with a dark purple background. The prompt is 'arthur@arthur-vivado-linux: ~'. The command 'sudo adduser \$USER dialout' is entered. The output shows the password prompt, confirmation to add user 'arthur' to group 'dialout', and the command completion. The prompt returns to 'arthur@arthur-vivado-linux: ~\$'.

(<https://reference.digilentinc.com/detail/vivado/installing-vivado/linux-dialout.png?id=vivado%3Ainstalling-vivado%3Astart>)

3. Installing Digilent Board Files

3.1

Download the  archive (<https://github.com/Digilent/vivado-boards/archive/master.zip>) of the vivado-boards Github repository and extract it wherever desired.

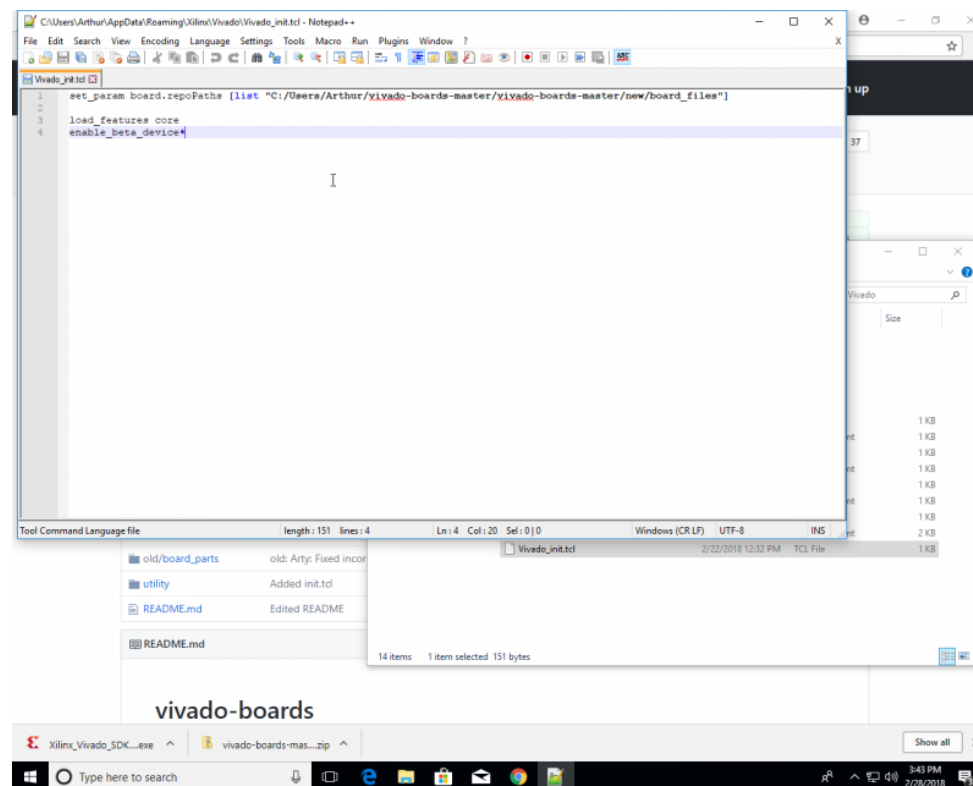


(<https://reference.digilentinc.com/detail/vivado/installing-vivado/download-boards.png?id=vivado%3Ainstalling-vivado%3Astart>)

3.2

Open the file “Vivado_init.tcl” in the “utility” subdirectory of the vivado-boards repo. This file is a script that will be run whenever Vivado is launched. It will load Digilent's board files for use in Vivado from the directory they were extracted into. Change the text “<extracted path>” in the script to the extracted location of vivado-boards. **Save** and **close** the file.

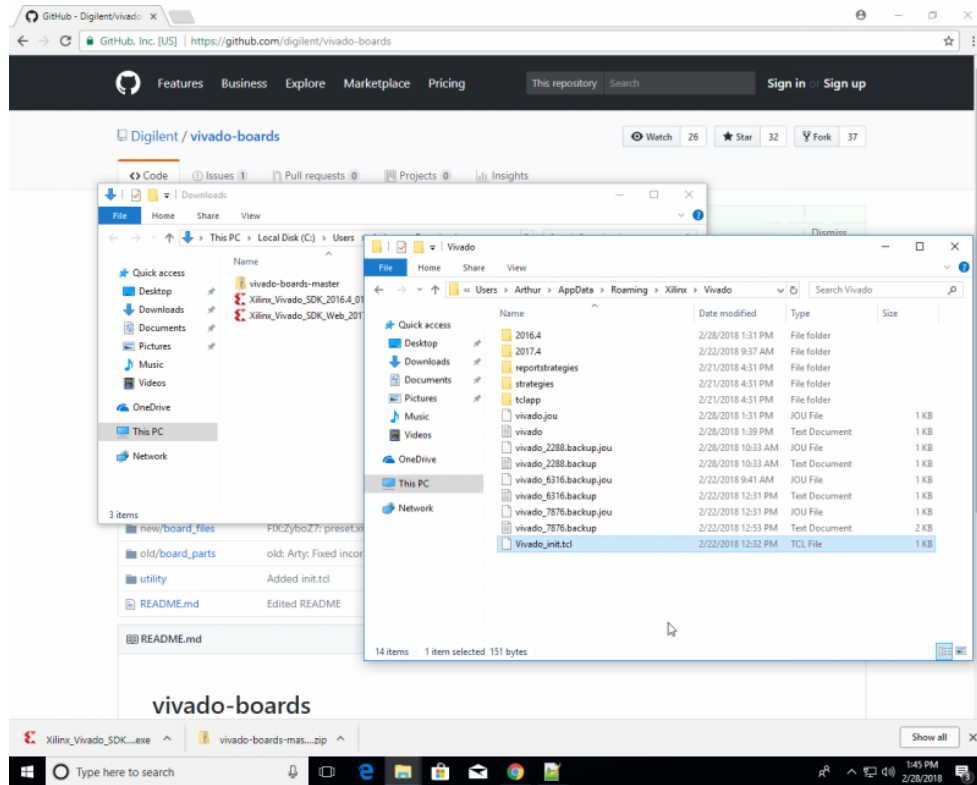
NOTE: The file init.tcl should be used instead of Vivado_init.tcl when installing Vivado versions 2016.4 and older.



(<https://reference.digilentinc.com/detail/vivado/installing-vivado/edit-init-tcl.png?id=vivado%3Ainstalling-vivado%3Astart>)

3.3

Copy `Vivado_init.tcl` and paste it into the `"%APPDATA%\Xilinx\Vivado/"` directory for Windows or `"$HOME/.Xilinx/Vivado/"` (after authenticating as superuser) in Linux.



In Conclusion

Vivado has now been installed and it has access to Digilent's board files! To begin using Vivado to develop a project, check out one of the tutorials below:

- [Getting Started with Vivado \(https://reference.digilentinc.com/vivado/getting_started/start\)](https://reference.digilentinc.com/vivado/getting_started/start)
- [Getting Started With Vivado IP Integrator \(https://reference.digilentinc.com/vivado/getting-started-with-ipi/start\)](https://reference.digilentinc.com/vivado/getting-started-with-ipi/start)

[learn \(https://reference.digilentinc.com/tag/learn?do=showtag&tag=learn\)](https://reference.digilentinc.com/tag/learn?do=showtag&tag=learn), [programmable-logic \(https://reference.digilentinc.com/tag/programmable-logic?do=showtag&tag=programmable-logic\)](https://reference.digilentinc.com/tag/programmable-logic?do=showtag&tag=programmable-logic), [software \(https://reference.digilentinc.com/tag/software?do=showtag&tag=software\)](https://reference.digilentinc.com/tag/software?do=showtag&tag=software), [tutorial \(https://reference.digilentinc.com/tag/tutorial?do=showtag&tag=tutorial\)](https://reference.digilentinc.com/tag/tutorial?do=showtag&tag=tutorial), [vivado \(https://reference.digilentinc.com/tag/vivado?do=showtag&tag=vivado\)](https://reference.digilentinc.com/tag/vivado?do=showtag&tag=vivado), [arty \(https://reference.digilentinc.com/tag/art?do=showtag&tag=arty\)](https://reference.digilentinc.com/tag/art?do=showtag&tag=arty), [arty-a7 \(https://reference.digilentinc.com/tag/art-a7?do=showtag&tag=arty-a7\)](https://reference.digilentinc.com/tag/art-a7?do=showtag&tag=arty-a7), [arty-s7 \(https://reference.digilentinc.com/tag/art-s7?do=showtag&tag=arty-s7\)](https://reference.digilentinc.com/tag/art-s7?do=showtag&tag=arty-s7), [arty-z7 \(https://reference.digilentinc.com/tag/art-z7?do=showtag&tag=arty-z7\)](https://reference.digilentinc.com/tag/art-z7?do=showtag&tag=arty-z7), [basys-3 \(https://reference.digilentinc.com/tag/basys-3?do=showtag&tag=basys-3\)](https://reference.digilentinc.com/tag/basys-3?do=showtag&tag=basys-3), [cmod-a7 \(https://reference.digilentinc.com/tag/cmod-a7?do=showtag&tag=cmod-a7\)](https://reference.digilentinc.com/tag/cmod-a7?do=showtag&tag=cmod-a7), [cmod-s7 \(https://reference.digilentinc.com/tag/cmod-s7?do=showtag&tag=cmod-s7\)](https://reference.digilentinc.com/tag/cmod-s7?do=showtag&tag=cmod-s7), [cora-z7 \(https://reference.digilentinc.com/tag/cora-z7?do=showtag&tag=cora-z7\)](https://reference.digilentinc.com/tag/cora-z7?do=showtag&tag=cora-z7), [genesys-2 \(https://reference.digilentinc.com/tag/genesys-2?do=showtag&tag=genesys-2\)](https://reference.digilentinc.com/tag/genesys-2?do=showtag&tag=genesys-2), [nexys-4 \(https://reference.digilentinc.com/tag/nexys-4?do=showtag&tag=nexys-4\)](https://reference.digilentinc.com/tag/nexys-4?do=showtag&tag=nexys-4), [nexys-4-ddr \(https://reference.digilentinc.com/tag/nexys-4-ddr?do=showtag&tag=nexys-4-ddr\)](https://reference.digilentinc.com/tag/nexys-4-ddr?do=showtag&tag=nexys-4-ddr), [nexys-a7 \(https://reference.digilentinc.com/tag/nexys-a7?do=showtag&tag=nexys-a7\)](https://reference.digilentinc.com/tag/nexys-a7?do=showtag&tag=nexys-a7), [nexys-video \(https://reference.digilentinc.com/tag/nexys-video?do=showtag&tag=nexys-video\)](https://reference.digilentinc.com/tag/nexys-video?do=showtag&tag=nexys-video), [zedboard](https://reference.digilentinc.com/tag/zedboard)