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Lab 1 Software platform Description

This document provides an introduction for fresh users about how to install the Vivado® Design Suite on Windows or Linux OS(operating system).

1.1 Vivado® Design Suite

Introduction

Vivado® Design Suite is a software suite produced by [Xilinx](#) for synthesis and analysis of [HDL](#)(Hardware description language) designs, superseding [Xilinx ISE](#) with additional features for SoC([system on a chip](#)) development and HLS([high-level synthesis](#)).

It delivers a SoC-strength, IP-centric and system-centric, next generation development environment that has been built from the ground up to address the productivity bottlenecks in system-level integration and implementation. It comes in three editions:

- Vivado HL WebPack Edition
- Vivado HL Design Edition
- Vivado HL System Edition

Component

Vivado High-Level Synthesis compiler

The **Vivado High-Level Synthesis** compiler enables [C](#), [C++](#) and [SystemC](#) programs to be directly targeted into Xilinx devices without the need to manually create RTL. Vivado HLS is widely reviewed to increase developer productivity, and is confirmed to support C++ classes, templates, functions and operator overloading.

Vivado Simulator

The **Vivado Simulator** is a component of the Vivado Design Suite. It is a compiled-language simulator that supports mixed-language, [Tcl](#) scripts, encrypted IP and enhanced verification.

Vivado IP Integrator

The **Vivado IP Integrator** allows engineers to quickly integrate and configure IP from the large Xilinx IP library. The Integrator is also tuned for [MathWorks Simulink](#) designs built with Xilinx's System Generator and Vivado High-Level Synthesis.

Vivado Tcl Store

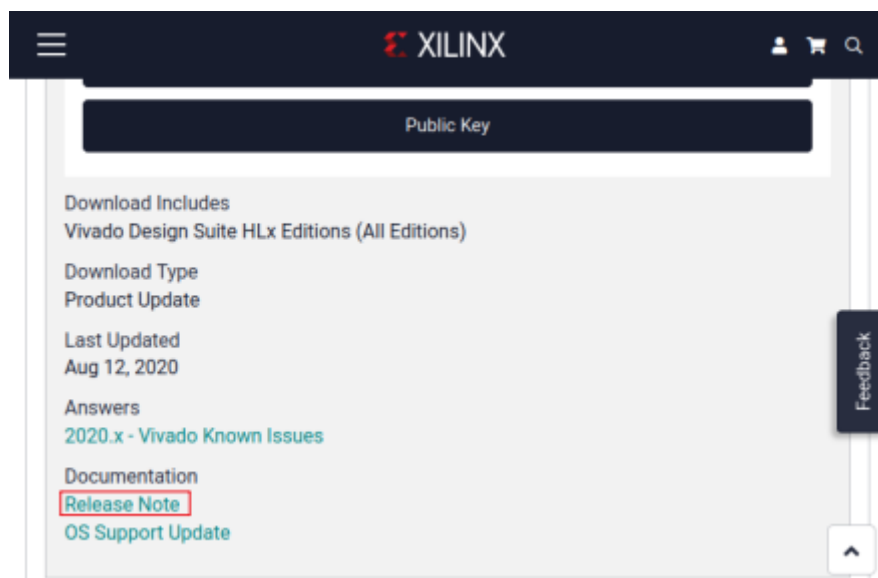
The **Vivado Tcl Store** is a scripting system for developing add-ons to Vivado, and can be used to add and modify Vivado's capabilities. Tcl is the scripting language on which Vivado itself is based. All of Vivado's underlying functions can be invoked and controlled via Tcl scripts.

1.2 Resource downloading

Please check the [link](#) to download the required version of Vivado® Design Suite.

Note:

1. Download from the official website may require you register for an Xilinx account.
2. Suggested version of Vivado® Design Suite is **2020.1**, which i used to design and verify the lab and code. It can not be guaranteed that the lab code can work on all the versions of suite.
3. Strongly suggest reading the **release note** file under the documentation catalog, it will save your time for the platform preparation including the downloading, installation and the later licensing.



1.3 Final installation and licensing

After successful downloading of Vivado® Design Suite installer, it can be ready for installation. Please check the **release note** again to make sure your OS version can support the downloaded Vivado® Design Suite installer.

Windows version

If you downloaded the lightweight installer, launch the downloaded file. You are prompted to log in and use your regular Xilinx login credentials to continue with the installation process.

Linux version

Find the mirror image in the [resource link](#): Ubuntu Linux's installation is not difficult. Two options are available:

1. Direct installation on your PC or Laptop, but it will erase all the files from your previous OS.
2. Virtual Machine(Oracle or VM workstation).

For option 1, please refer to this [guide](#) for USB booting or DVD formatting.

If you downloaded the lightweight installer, launch the downloaded file. You are prompted to log in and use your regular Xilinx login credentials to continue with the installation process.

Note: On Linux the file is a .bin file and can be launched by running `./bin` in the shell terminal, as can be seen in [Figure 1][Figure 1] .

Please ensure that you have changed the file permissions to execute.

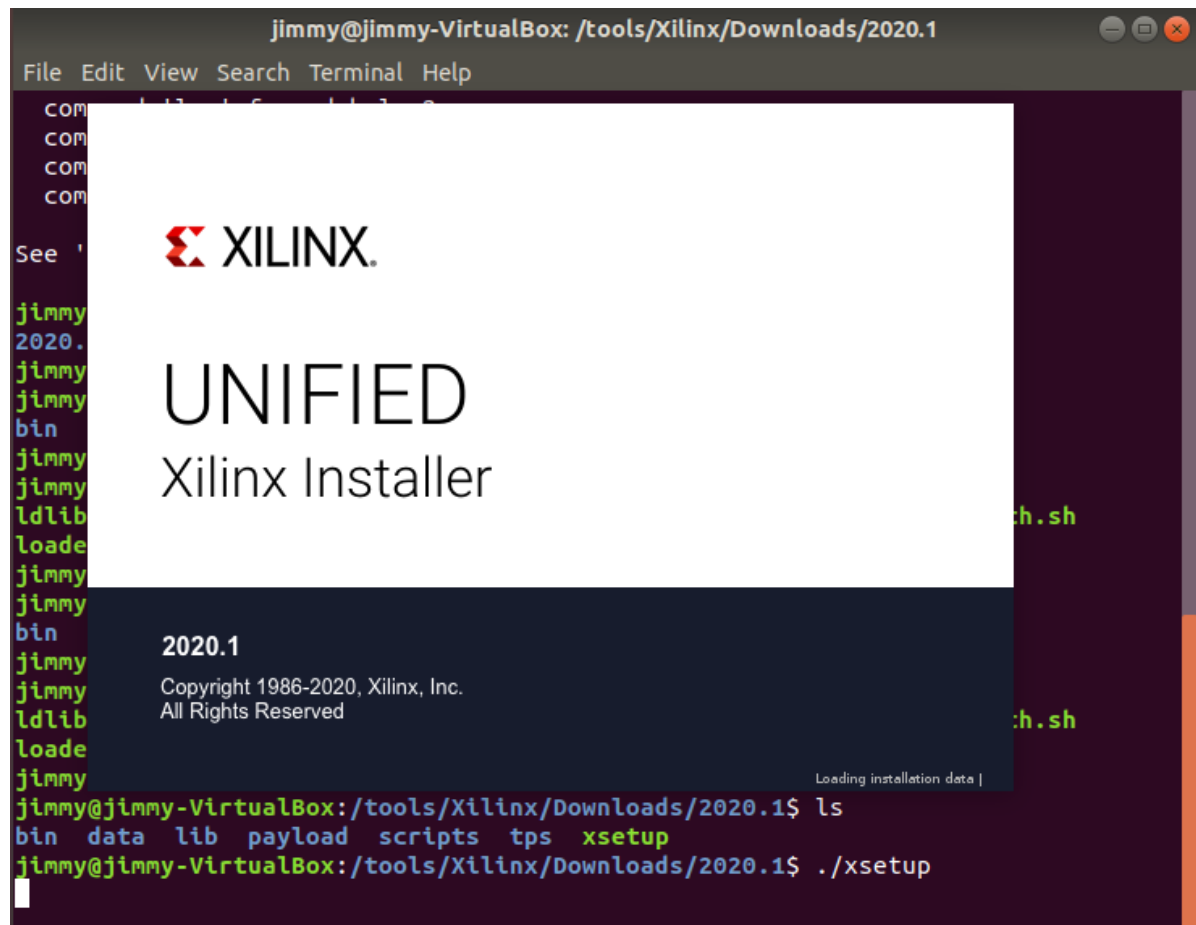


Figure 1

Following the initializing of the installer, a welcome window will appear with the necessary information about the supported operating systems, shown in [Figure 2][setup3].

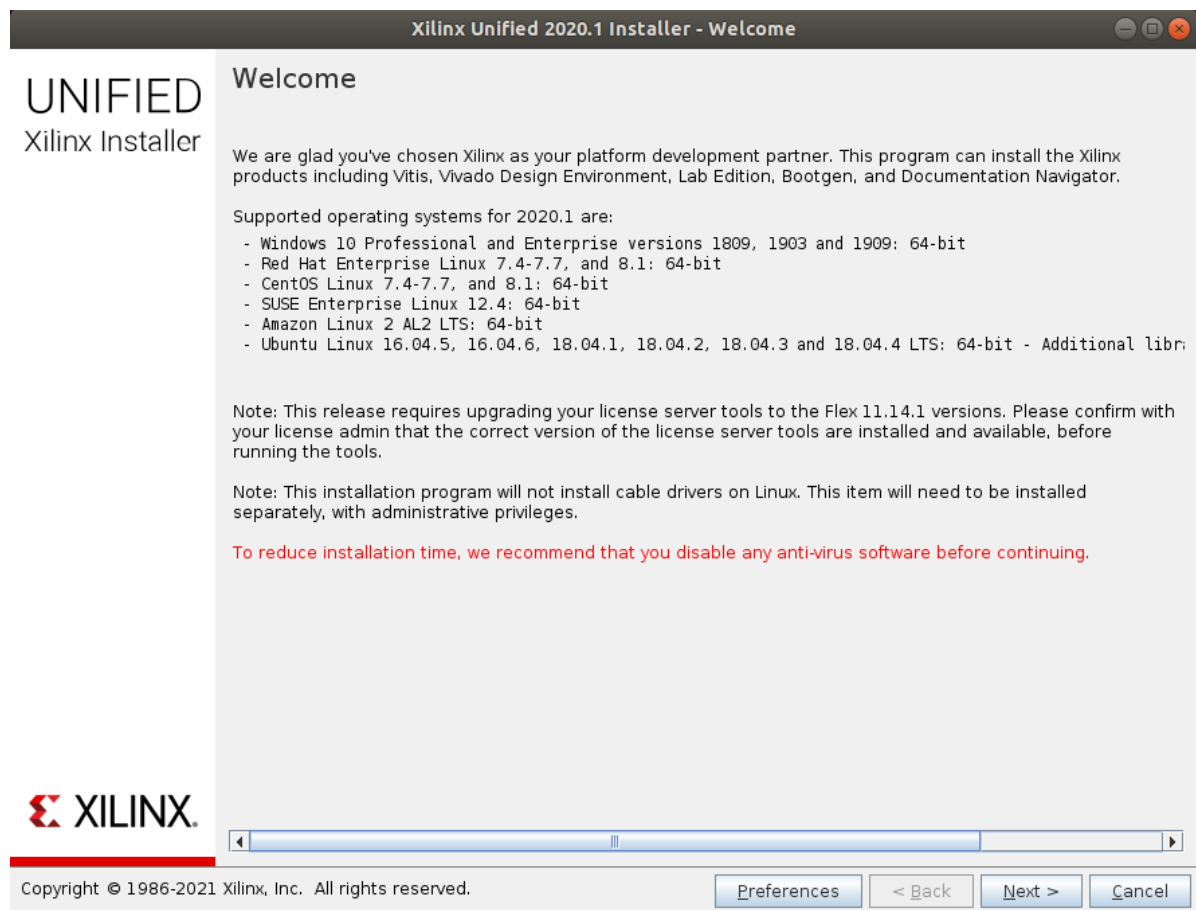
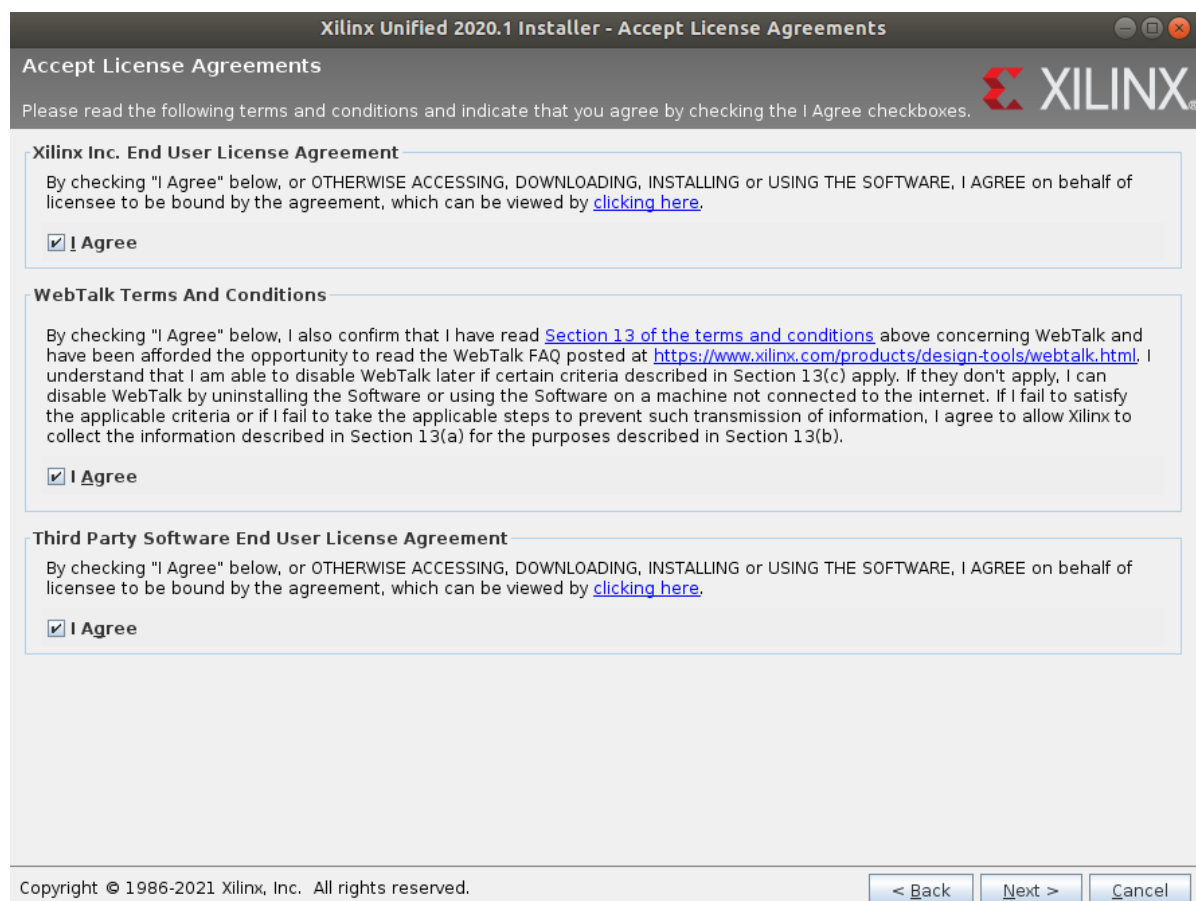


Figure 2

Accept all the license agreement, otherwise the installation will not proceed, displayed in Figure 3.



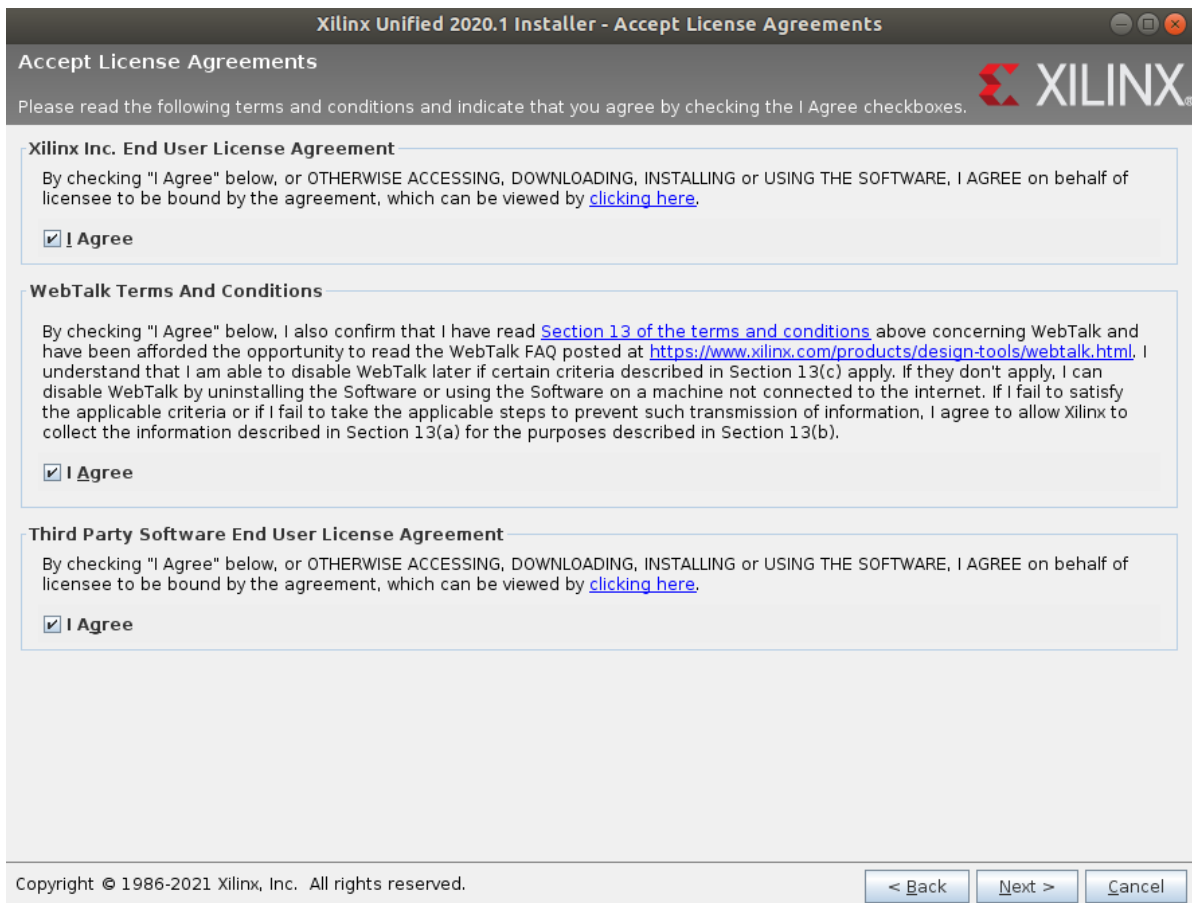


Figure 3

Shown in Figure 4, take the Vivado product, including all the required toolkits and library. To experience the Machine learning and AIoT function, you can take the Vitis option, which also includes the Vivado Design Suite.

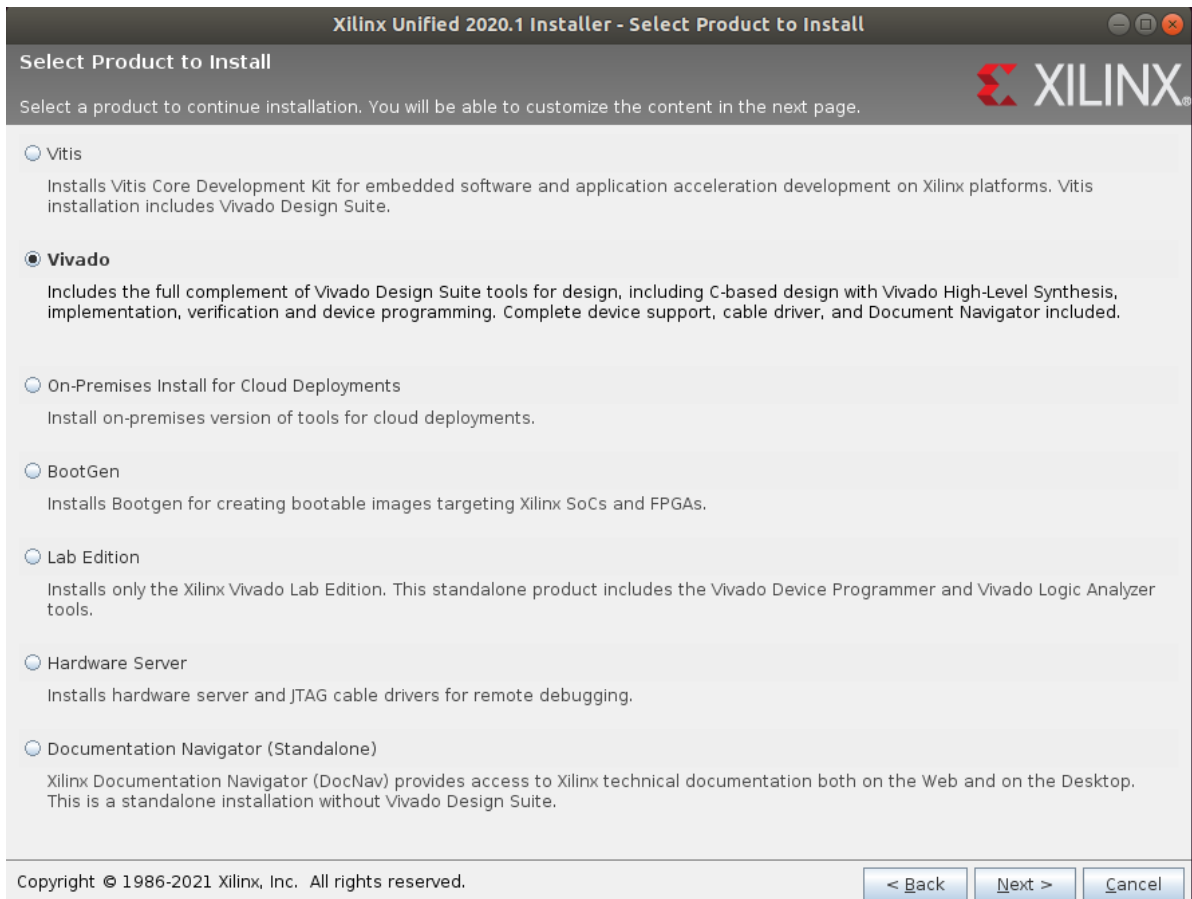


Figure 4

Choose the Vivado HL System Edition.

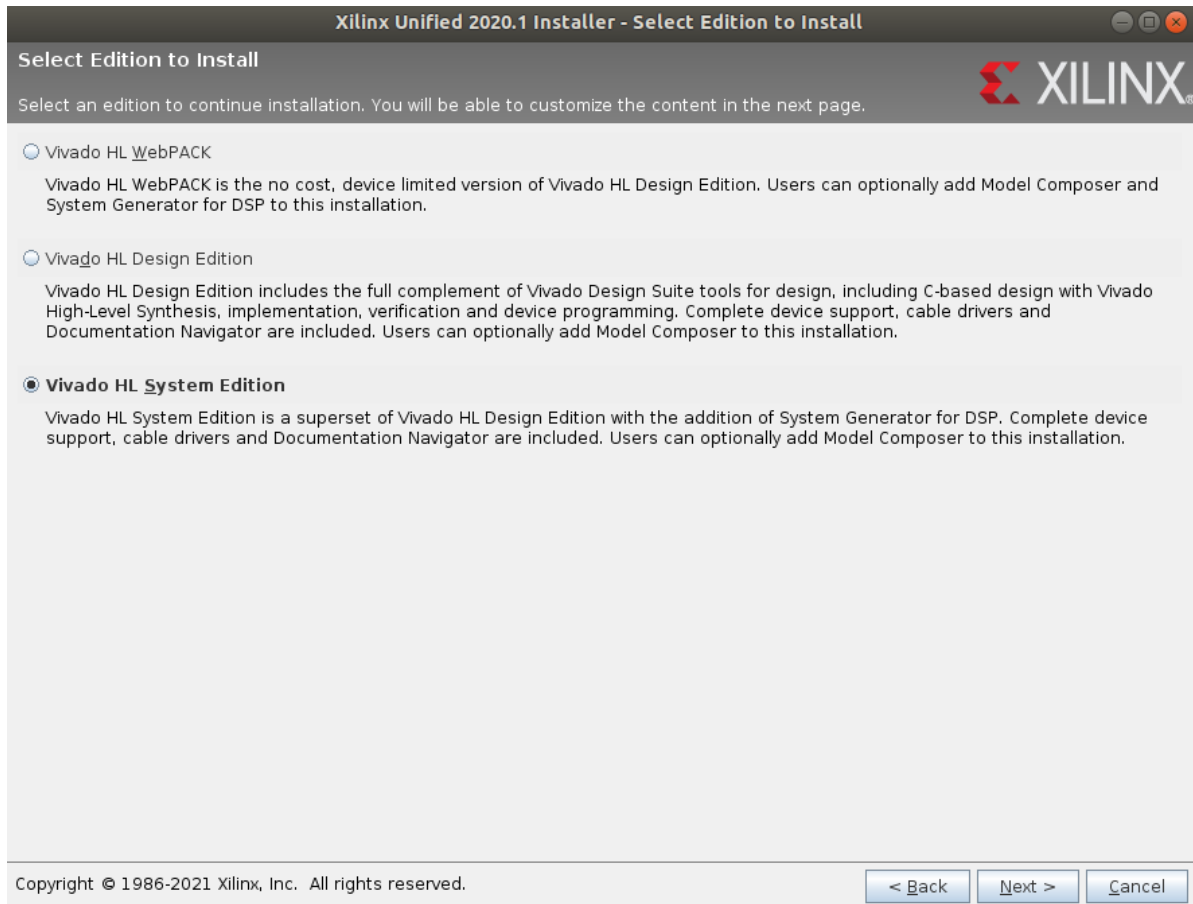


Figure 5

After the Edition version is set, the installer will display the available design tools for your reference. Here i suggest selecting all the tools and devices, shown in Figure 6.

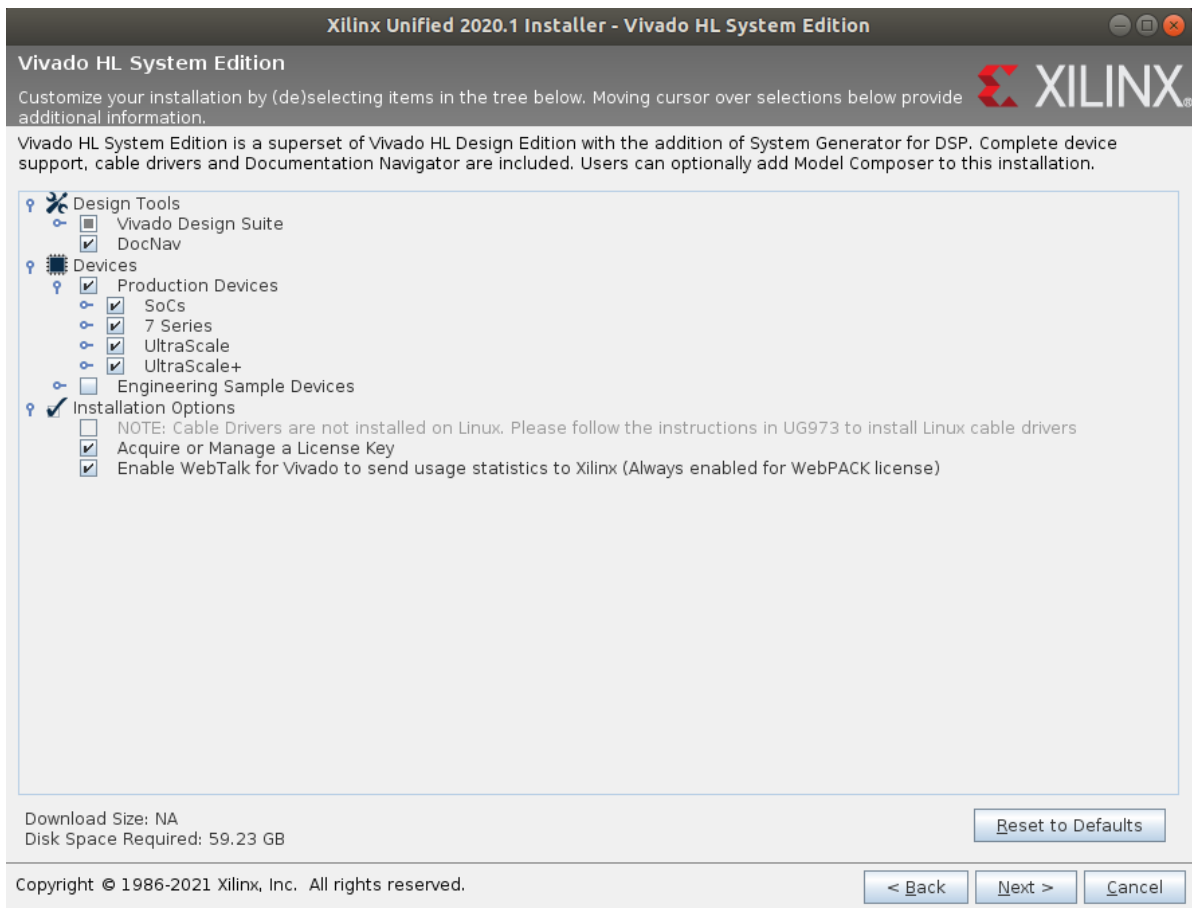


Figure 6

Choose the installation location.

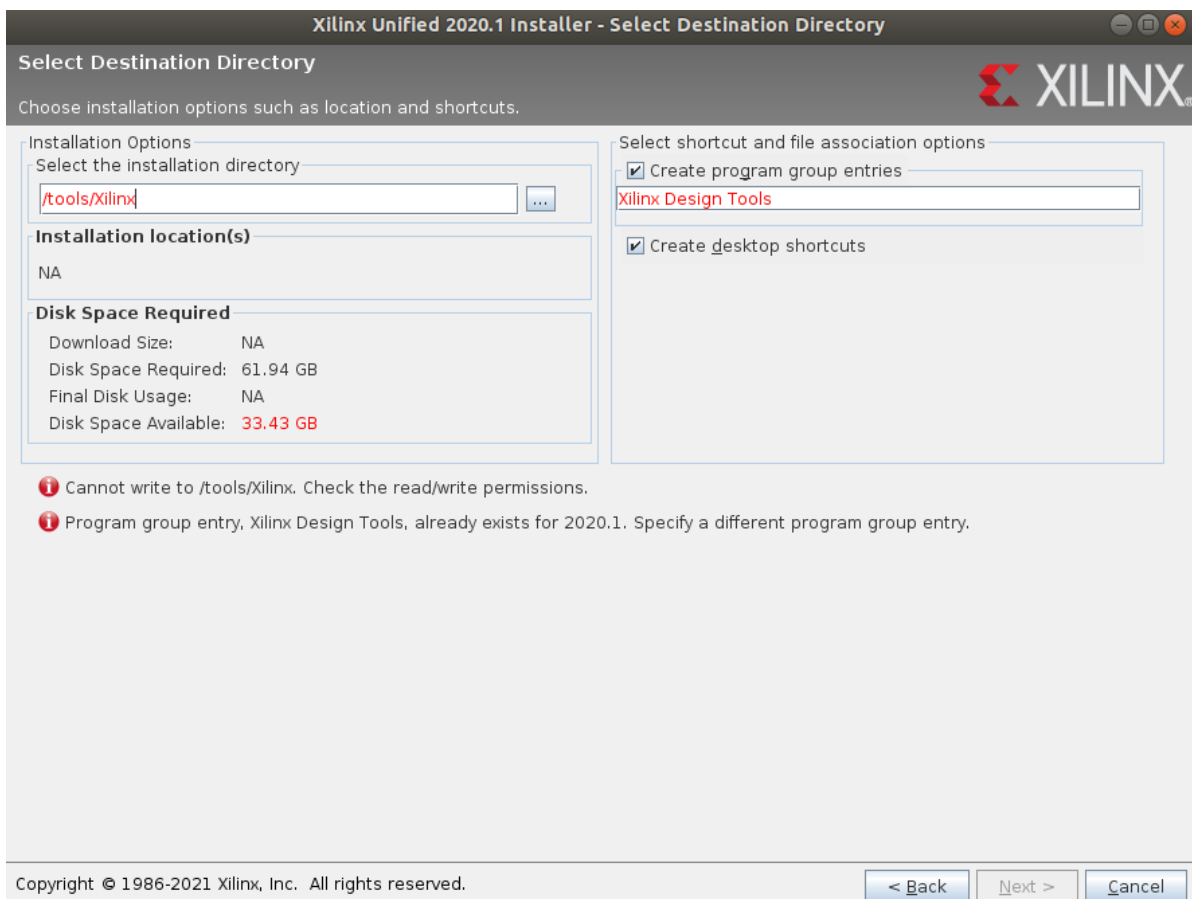


Figure 7

Finally the installation will automatically progress and logically it will succeed. If not, the problem might link to the disk room for storage and processing or the system's compatibility.

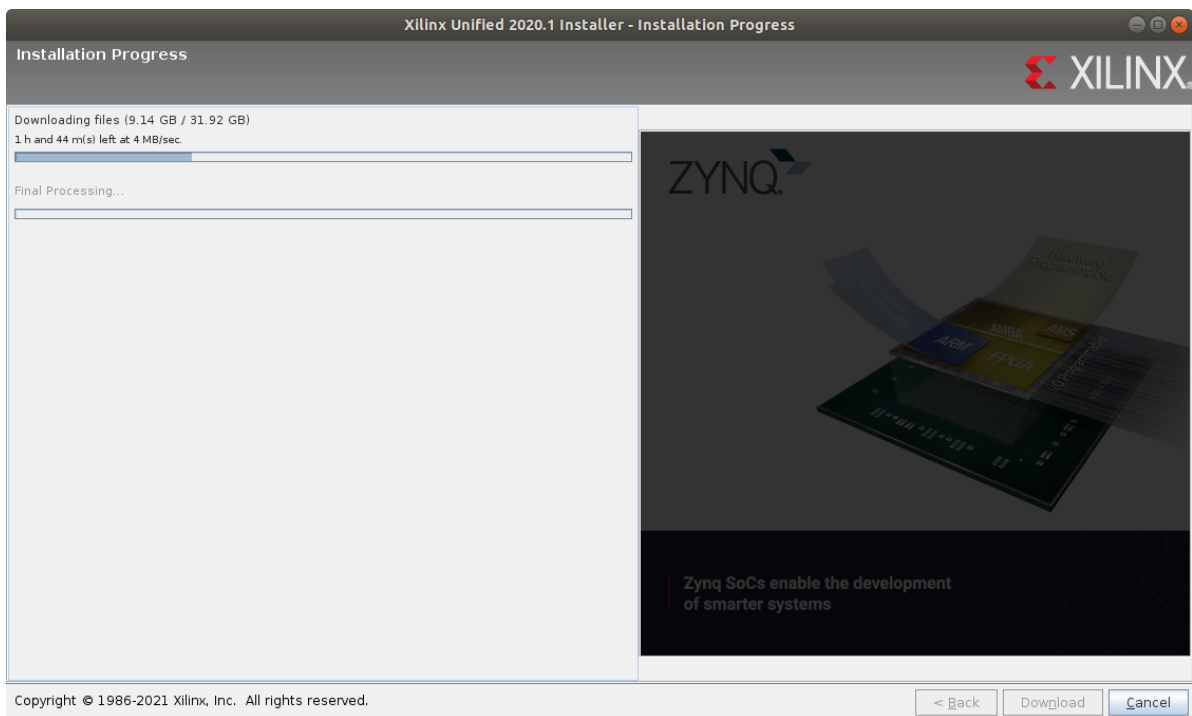
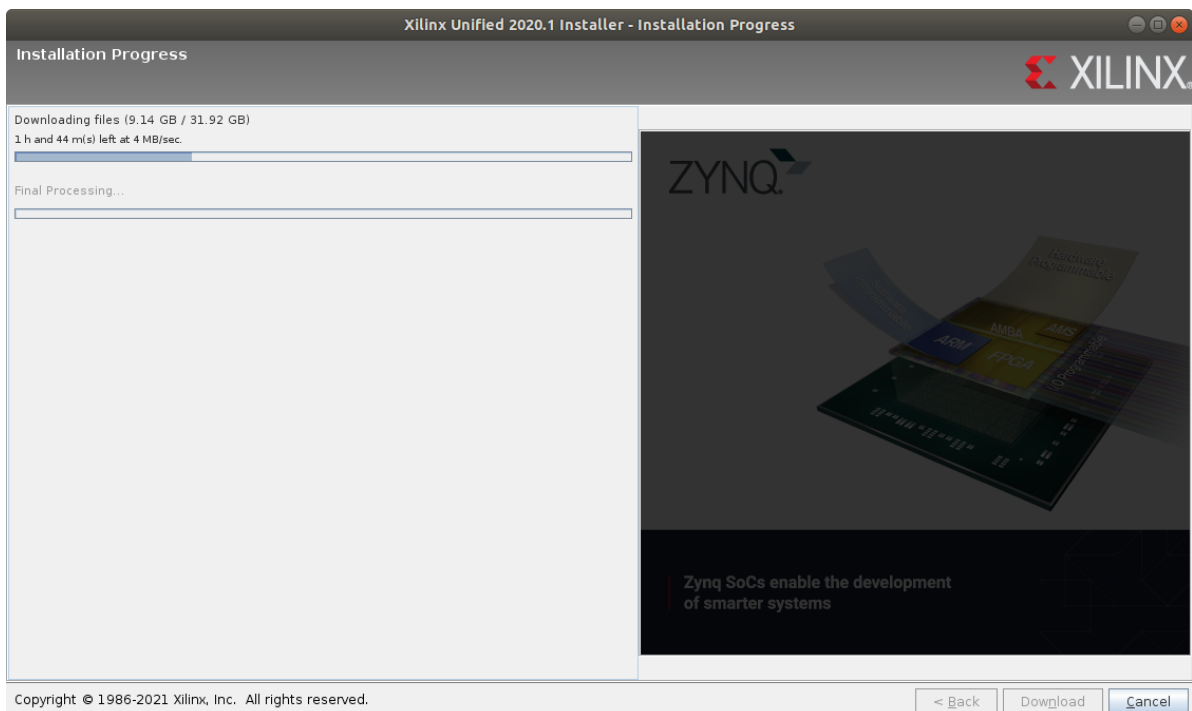


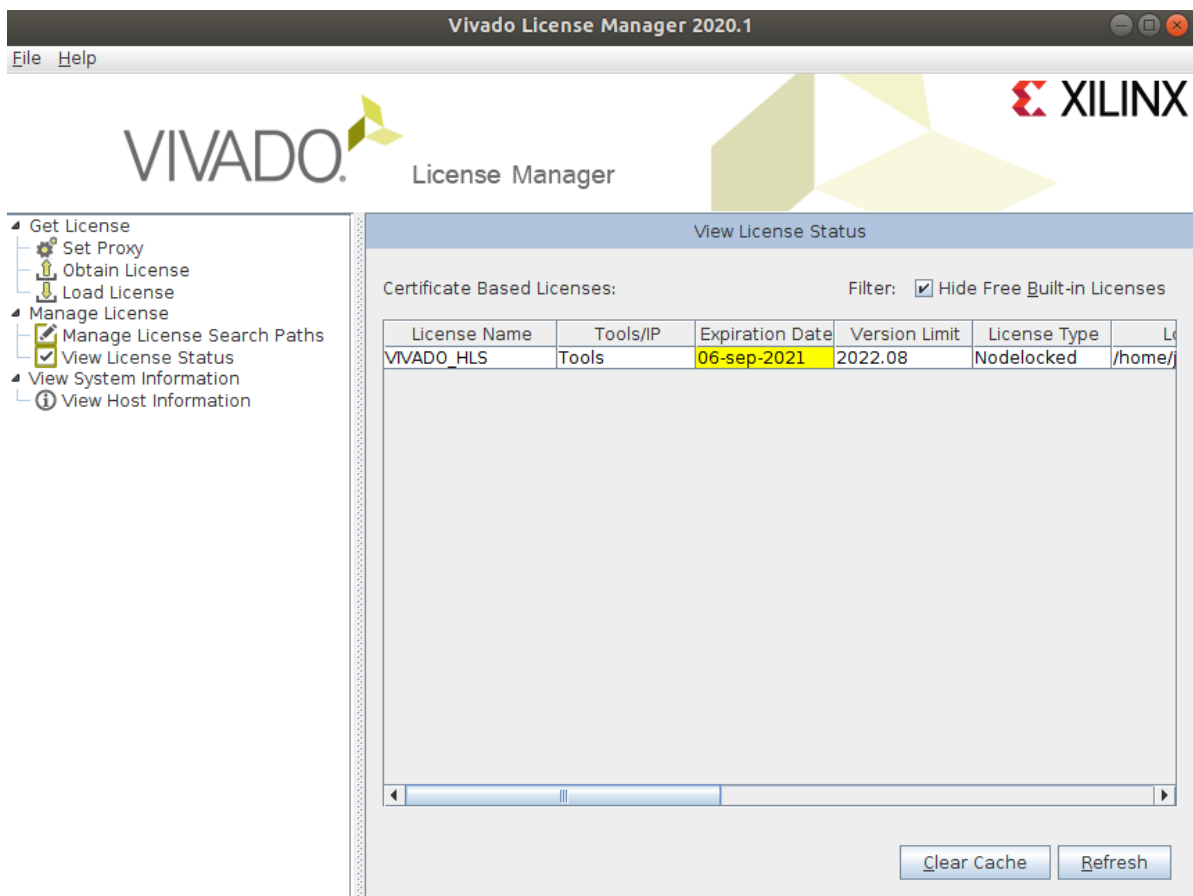
Figure 8



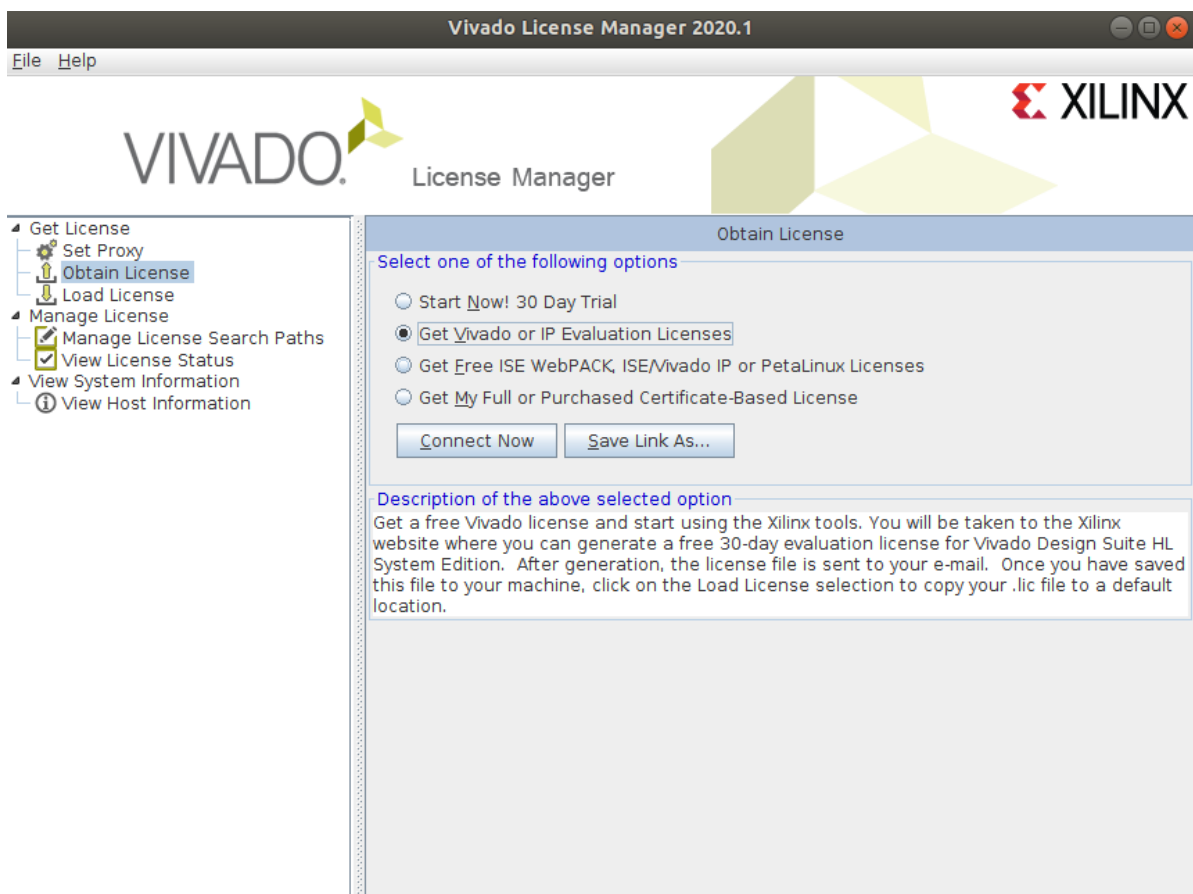
Licensing

Xilinx charges for IP design and software and profits from the business. Currently, you can have one month's trial free of charge with your registered information.

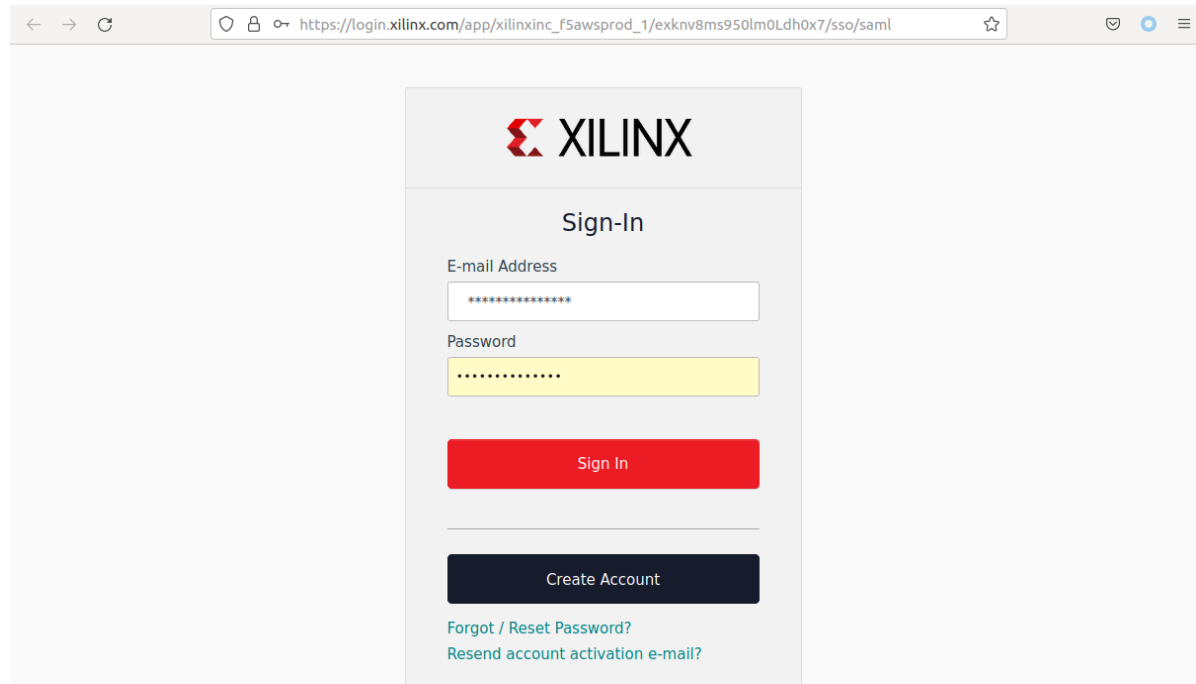
After your first time successful installation, the Vivado license manager will appear, displayed in Figure 9. It shows the information about the license getting and the current license status.



Click the **obtain license** part on the left side, choose the second option **Get Vivado or IP Evaluation Licenses**, you will have 30 days' free use of Vivado Design Suite. And confirm with clicking the **Connect Now**.

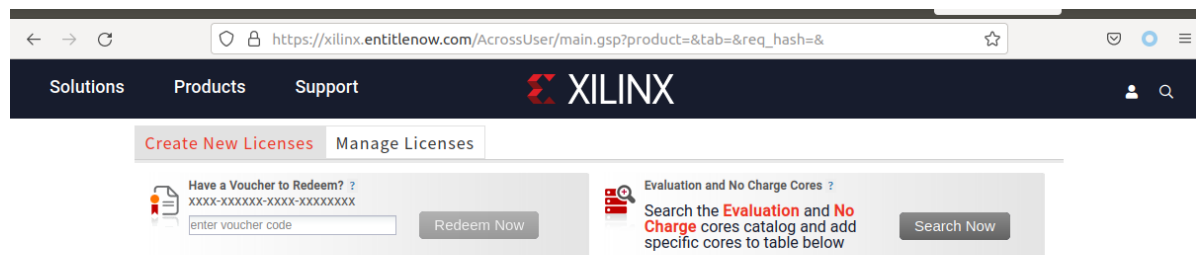


The program will ask you to sign in with your pre-registered user information, including e-mail address and password.



The image shows a web browser window displaying the Xilinx Sign-In page. The URL in the address bar is https://login.xilinx.com/app/xilinxinc_f5awsprod_1/exknv8ms950lm0Ldh0x7/sso/saml. The page features the Xilinx logo at the top, followed by the heading "Sign-In". Below this, there are two input fields: "E-mail Address" and "Password", both containing masked text (asterisks). A red "Sign In" button is positioned below the password field. At the bottom of the form, there is a dark blue "Create Account" button. Below the buttons, there are two links: "Forgot / Reset Password?" and "Resend account activation e-mail?".

After successful login or signup, you will see a list of certificate based licenses, shown in Figure . Find the Vivado HLS Evaluation Evaluation, select it and confirm the generation. The license with file name **Xilinx.lic** will be downloaded to you local computer.



The image shows the Xilinx Entitlement Management page. The URL in the address bar is https://xilinx.entitlenow.com/AcrossUser/main.gsp?product=&tab=&req_hash=&. The page has a dark blue header with the Xilinx logo and navigation links for "Solutions", "Products", and "Support". Below the header, there are two tabs: "Create New Licenses" (active) and "Manage Licenses". The main content area is divided into two sections. The left section is titled "Have a Voucher to Redeem?" and contains a text input field for "enter voucher code" and a "Redeem Now" button. The right section is titled "Evaluation and No Charge Cores" and contains a "Search the Evaluation and No Charge cores catalog and add specific cores to table below" button.

Create a New License File

Create a new license file by making your product selections from the table below. ?

Certificate Based Licenses

Product	Type	License	Available Seats	Status	Subscription End Date
<input type="checkbox"/> Vivado ML Enterprise Edition, 30-Day Evaluation License	Certificate - Evaluation	Node	1/1	Current	30 days
<input type="checkbox"/> 2021 AI Engine Tools License	Certificate - No Charge	Node	1/1	Current	None
<input type="checkbox"/> Vitis Model Composer (Xilinx toolbox for MATLAB and Simulink), 90 Day Evaluation	Certificate - Evaluation	Node	1/1	Current	90 days
<input type="checkbox"/> ISE Embedded Edition License	Certificate - No Charge	Node	1/1	Current	None
<input type="checkbox"/> SDSoC Environment, 60 Day Evaluation License	Certificate - Evaluation	Node	1/1	Current	60 days
<input type="checkbox"/> SDAccel OpenCL Development Environment: 30 Day Node Locked Evaluation Lice...	Certificate - Evaluation	Node	1/1	Current	30 days
<input type="checkbox"/> Vivado Design Suite: HL WebPACK 2015 and Earlier License	Certificate - No Charge	Node	1/1	Current	None
<input type="checkbox"/> ISE WebPACK License	Certificate - No Charge	Node	1/1	Current	None
<input type="checkbox"/> Xilinx MicroBlaze/All Programmable SoC Software Development Kit – Standalone	Certificate - No Charge	Node	1/1	Current	None
<input type="checkbox"/> PetaLinux Tools License	Certificate - Evaluation	Node	1/1	Current	365 days

← → ↻ https://xilinx.entitlenow.com/AcrossUser/main.gsp?product=&tab=&req_hash=& ☆

Solutions Products Support **XILINX** 👤 🔍

Create New Licenses **Manage Licenses**

Host Name	Host Type	Host ID	License Type	OS	Created By	Created Date
jimmy	Ethernet MAC	08002773284C	Node	Linux 64-bit	Ji HUIDONG	07 AUG 2021

Page 1 of 1 | Displaying 1 - 1 of 1

Product	Type	Status	Subscription End Date	Activated Seats
Vivado HLS Evaluation License	Certificate - Evaluation	Current		1

Comments

Shown in Figure , **Load license** with the selected license file in your local machine. The License manager will verify the file to check the credential. If the verification passed, the license status window will show the license's detail.

Vivado License Manager 2020.1

File Help

VIVADO License Manager XILINX

- Get License
 - Set Proxy
 - Obtain License
 - Load License**
- Manage License
 - Manage License Search Paths
 - View License Status
- View System Information
 - View Host Information

Load License

Select License File

Look In: Downloads

Xilinx.lic

File Name:

Files of Type: License files (*.lic)

Open Cancel

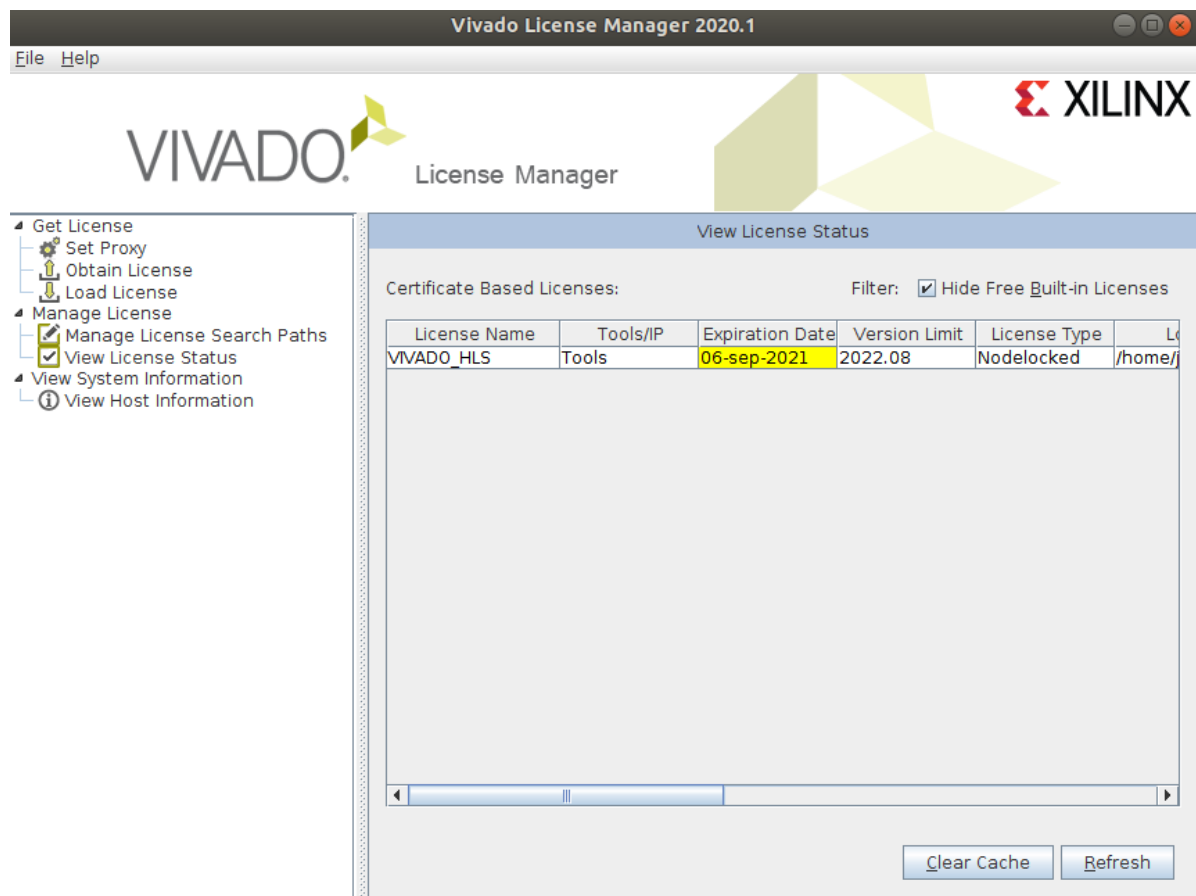


Figure 9

Any problems concerning the installation, please feel free to contact me.

In the next lab session, we will write the first project on Vivado Design Suite, therefore, before the start of the lab, please learn yourself the basics of VHDL and Verilog.

Maybe there are students who are not familiar with Verilog and VHDL, two popular hardware description languages. Don't worry, Here are some websites helping you get start with these.

Lab 2 Verilog & VHDL:

The first verilog sample code with comment is listed below:

```
module
```

To validate the performance of the module, a testbench script file is needed.

Testbench

Vivado can display the waveform with the set clock and time frequency.

You can check yourself whether the result is the same.

Lab 3 MAC
