



## Hardware Processing Platform (HPP): Getting Started Guide

March, 2017

Neuralynx, Inc. 105 Commercial Drive Bozeman, MT 59715 406-585-4542

www.neuralynx.com support@neuralynx.com

Rev. 1.0 3/28/2017

Hardware Processing Platform (HPP) Getting Started Guide



### 1 Introduction

The Hardware Processing Platform (HPP) runs code developed on a PC and is downloaded through a USB connection. This "Getting Started Guide" walks you through the process of getting the HPP development environment installed and tested.

### 2 Installing Development Software

The development software used with the HPP is Vivado and SDK. The first step is to download this software. Use this link for the download web page:

https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/vivadodesign-tools/2014-1.html

The version to download is "Vivado Design Suite – 2014.1 Full Product Installation" For this Guide, we will download for Windows. <u>Vivado 2014.1 Full Image for Windows with SDK</u> (5.1GB) When the file is downloaded, unzip and untar the compressed file. If you don't have an application installed that can unzip and untar a file, you can download 7-zip at www.7-zip.org. Once the installation files are decompressed, run xsetup.exe



If the installation prompts to install the most recent version, decline and continue installing 2014.1. Once you've started the installation process, you will be prompted for the edition to install. You should select Vivado Design Edition.

# Neuralynx The Complete Solution for Electrophysiology Research

Vivado 2014.1 Installer - Select Edition to Install	+	—		×
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Select an edition to continue installation. You will be able to customize the content in the next page.				<b>X</b> 3le.
O Vivado WebPACK				
Vivado WebPACK is the no cost, device limited version of the Vivado Design Edition.				
Vivado Design Edition				
Vivado Design Edition includes Vivado Design Suite with complete device support, cable drivers and Documentation Na Software Development Kit to this installation.	vigator. Use	ers can option	ally add	
O Vivado System Edition				
Vivado System Edition is a superset of Vivado Design Edition with the addition of Vivado High-Level Synthesis and Syst optionally add Software Development Kit to this installation.	em Generat	tor for DSP. U	sers can	
○ Software Development Kit (Standalone)				
Software Development Kit (SDK) is an Eclipse-based package used to create and debug embedded software applicatio without Vivado Design Suite.	ns. This is a	a standalone i	nstallation	
O Hardware Server (Standalone)				
The hardware server enables Vivado Design tools to communicate with a remote target system. This standalone instal cable drivers but does not include Vivado Design Suite.	lation includ	les hw_serve	r and JTAG	
O Documentation Navigator (Standalone)				
Xilinx Documentation Navigator (DocNav) provides access to Xilinx technical documentation both on the Web and on t installation without Vivado Design Suite.	ne Desktop.	This is a star	Idalone	
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**Edition to Install** 



#### Install with the following options:



**Install Options** 

When the installation finishes, the Vivado License Manager will open:



🔤 Vivado License Manager	
File Help	
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Getting a License     Proxy Settings     Dotain License     Load License     Managing My Licenses     License Search Locations     View License Status     Return License to Xlinx     System Settings     System Information	Obtain License         Select one of the following options         Start Now! 30 Day Trial (No Bitstream)         @ Get Free Licenses - Vivado WebPACK, SDK, free IP and more         Start 30 Day Evaluation         @ Get My Purchased License(s)         Connect Now         Save Information         Description of the above selected option         Get a free Vivado/ISE WebPack license and start using your Xilinx software.         You will be taken to the Xilinx website where you can generate a license         for Vivado/ISE WebPack. For more information on Vivado/ISE WebPack,         including supported devices and applications, please visit www.xilinx.com.         Note: WebTalk is always enabled for WebPACK users. WebTalk ignores user and         install preference when a bitstream is generated using the WebPACK license.         If a design is using a device contained in WebPACK and a WebPACK license is         available, the WebPACK license will always be used. To change this, please         see Answer Record 34746.         After the license is generated and you have saved it to your machine, click on the Load License selection to either copy your .lic file to a default location, or to load your .xml response file into trusted storage.

Vivado License Manager

Click on "Obtain License" and select "Get Free Licenses - Vivado WebPack, SDK, free IP and more", then click "Connect Now."



You will need to sign up for a free Xilinx account using the "Create Account" link to get a license for the Xilinx software.

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**Create Account Link** 



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#### **Account information**



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**Activate Account** 

Click on the link in your email to activate your account. This will take you to the Xilinx login webpage. Sign in with your newly created account.

Enter the required profile information (indicated by \*) and click "Save Profile."

Return to the Vivado license manager. Click on "Obtain License" and select "Get Free Licenses – Vivado WebPack, SDK, free IP and more." Then click "Connect Now." This will take you back to the licensing web page.



From the Product Licensing web page that opens, verify user information and click "Next."

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**Product Licensing Information** 



Check the box in "Certificate Based Licenses" for "Vivado Design Suite: HL WebPACK ..." and click "Generate Node-Locked License."

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ISE WebPACK License		Certificate - No Charge	Node 1/1	Current	None	
PetaLinux Tools License		Certificate - Evaluation	Node 1/1	Current	365 days	
Vivado HLS Evaluation License		Certificate - Evaluation	Node 1/1	Current	30 days	$\sim$

**Generate License** 



This page will use a host ID from the current PC to license the development software.



**Obtain Host ID** 



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<ul> <li>System Settings</li> <li>System Information</li> </ul>	Activation Based Licenses Click the 'Activate License' button to load a response XML file into VLM to activate your machine for Xilinx tools and IP. Activate License

#### Load License

Locate the downloaded license (Xilinx.lic) and select "Open." Close the Vivado License Manager and finish the Vivado installation.



Download the base example project for the HPP from: <u>https://www.dropbox.com/s/hs3dxnlwoltjoo7/HPP\_SfN.zip?dl=0</u> Unzip the project to a development folder on your development PC. Open Vivado 2014.1 and load the unzipped project file "HPP\_SfN.xpr." Generate the bitstream by clicking on "Generate Bitstream" on the left side of the interface.

- Program and Debug
  - 🏀 Bitstream Settings
  - 🔚 Generate Bitstream
  - Open Hardware Manager

Bitstream generation option

#### Open Xilinx SDK 2014.1.

Select the workspace of the recently extracted project. This should be located at [Base project folder] \HPP\_SfN\FreeRTOS\Workspace.

Right-click on "RTOSDemo" in the Project Explorer and select "delete." Confirm the deletion. Right-click on "RTOSDemo\_BSP" in the Project Explorer and select "delete." Confirm the deletion.



Select menu option "File->Import." Choose "Existing Projects into Workspace." Select root directory [Base project folder]\HPP SfN\FreeRTOS\FreeRTOS\Demo\CORTEX A9 Zyng ZC702

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**Import Projects** 

Click "finish" to Import the files from their new location. Right-click on RTOSDemo and select "Clean Project."

Rev. 1.0 3/28/2017



## 3 Running an Application

The HPP uses a serial command line interface to interact with the operating system. To connect the PC for terminal access, you must have required drivers for the PC.

Download and install VCP driver (CP210x VCP driver) from:

https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx If you haven't already done so,

- Attach a USB cable from development PC to Digital Lynx SX port "HPP Terminal"
- Attach a USB cable from development PC to Digital Lynx SX port "HPP JTAG"

If you don't already have a terminal application, you can download Teraterm (<u>https://ttssh2.osdn.jp/index.html.en</u>)



Open TeraTerm, Select "Setup->Serial Port" and select the COM Port of your HPP connection. This is listed in the Windows Device Manager as "Silicon Labs CP210x USB to UART Bridge." You will also need to change the baud rate to 115200.



Windows device manager view of COM ports



	113200							
Data:	8 bit	~	Cancel					
Parity:	none	~						
Stop:	1 bit	~	Help					
Flow control:	none	$\sim$						
Transmit delay O msec/char O msec/line								

Serial port setup - Use your COM port

In the SDK, right-click on RTOSDemo and select Run As-> "1 Launch on Hardware (GDB)." This will create a default run configuration for this application.

In the SDK interface, Select Run->Run configuration. In the Target Setup tab, select "Reset Entire System" for the reset option drop down box. In the Bitstream file box, click Search and choose hpp\_top.bit. Click apply and then Run.

Run Configurations				83
Create, manage, and run configurations				
Image: an other comparations       Image: an other comparation       Image	Name: RTOSDemo.elf Target Setup 7 Debug Type: Standalon Connection: Local Device: Auto Dete Hardware platform: Processor: Bitstream file: Initialization file: Reset Entire System Program FPGA Program FPGA Run ps7_init Run ps7_init Run ps7_init	pplication % STDIO Connection & Profile Options Common  Application Debug  Application Debug  Application Debug  New  ct Select  Select  Select  New  ct Select  Select Select  Select  Select Select  Select Select  Select Select Select  Select Sel	Search Search	Browsen
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Run Configuration

Rev. 1.0 3/28/2017

Hardware Processing Platform (HPP) Getting Started Guide



This will begin a download process visible in the lower right progress bar. This process usually takes about 15 seconds as it configures the FPGA, then it will download the application.



View teraterm terminal and verify that the following output is received:



Type "help" and Enter, this will output a default menu.

#### For more information or questions, please contact:

HPP\_Support@neuralynx.com / 406-585-4542

Rev. 1.0 3/28/2017

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