Xilinx VCU1525 (VU9P) FPGA

Crypto-Mining Installation & Operating Instructions

This user guide is SPECIFIC to Zetheron Technology Mining Software.

Other mining software may require significantly different instructions.

Required Hardware

1. One or more VCU1525 or BCU1525 FPGA cards
2. One 64-bit PC running Windows 7, 8, 10
3. Available USB ports
4. High power ATX power supply (allow 350W per FPGA card)
5. Ideally, one CPU core for each 2 FPGA cards (i.e. 8 cards should use a 4-core CPU)
6. Optional PCIe riser card
7. Internet connection (hardwired is better than wireless, but bandwidth requirement is low)
8. High ambient airflow (case fans mounted on an open aluminum frame are good)
9. Ambient air temperature of less than 32C, ideally

Step 1: Install the FTDI D2XX drivers

Download the Windows x64 SETUP EXECUTABLE from the FTDI website:

http://www.ftdichip.com/Drivers/D2XX.htm

Direct download link:

http://www.ftdichip.com/Drivers/CDM/CDM21228_Setup.zip

Unzip and run the installation utility.

Step 2: Install Microsoft Visual C++ 2013 Redistributable

Download and install the Visual C++ 2013 redistributable package:

https://www.microsoft.com/en-ca/download/details.aspx?id=40784

Step 3: Install Vivado Lab Edition

Download and install Vivado Lab Edition from the Xilinx website:

https://www.xilinx.com/support/download.html

Direct download link:

https://www.xilinx.com/member/forms/download/xef.html?filename=Xilinx_Vivado_Lab_Win_2018.2_0614_1954.tar.gz

Step 4: Download FPGA Bitstreams

Download your desired FPGA bitstream from the Zetheron Website:

http://zetheron.com/index.php/downloads/

You must download a bitstream that is compatible with your hardware. If you are using a stock VCU1525, you should download bitstreams designed for 'Stock-VCU1525.' If you have a device to under-volt your card, such as the ***Zetheron Dynavolt*** or the ***Linear DC1613A***, you should use a bitstream optimized for the low-voltage version 'VCU1525-Low Voltage'. Performance varies quite dramatically based on the FPGA operating voltage. For the 0xToken miner, you can get 11.55 GH/s on a stock VCU1525, and 15.09 GH/s on a card that has had its operating voltage decreased from 0.85V to 0.74V. That is an increase of more than 30% in hash rate. Other memory intensive algorithms can gain a similar 30% increase by *over-volting* the card to 0.95V. For maximum profit it is strongly recommend to acquire a device to adjust your card's voltage.

Step 5: Download Appropriate PC Mining Software

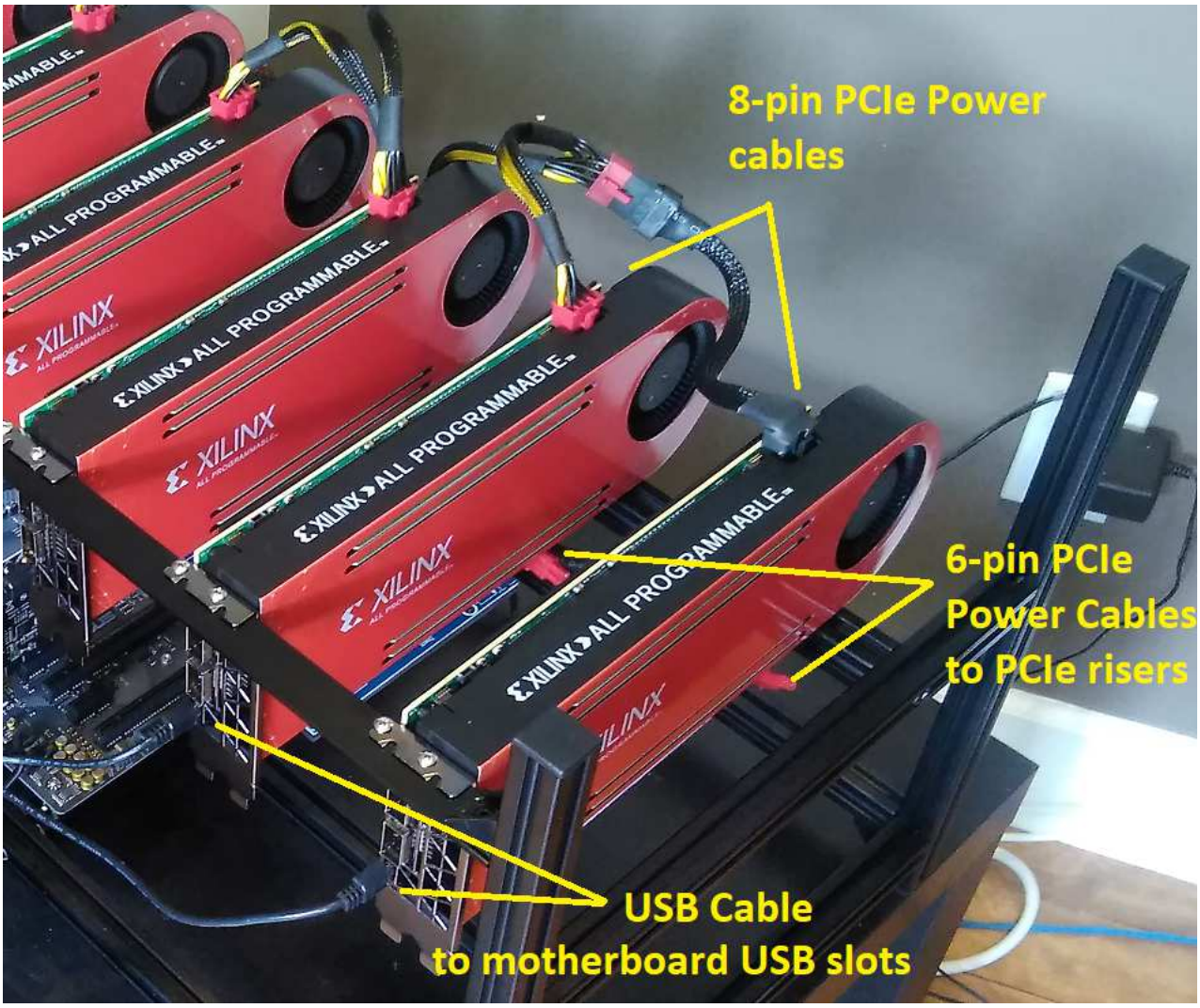
Download the appropriate version of FX-Miner for the algorithm you want to mine. Please realize you need a separate/independent build of FX-Miner for each algorithm, at least for now. As an example, for the 0xToken miner, you can download FX-Tokenminer here:

http://zetheron.com/index.php/downloads/

Unzip the mining software into a known directory on your computer.

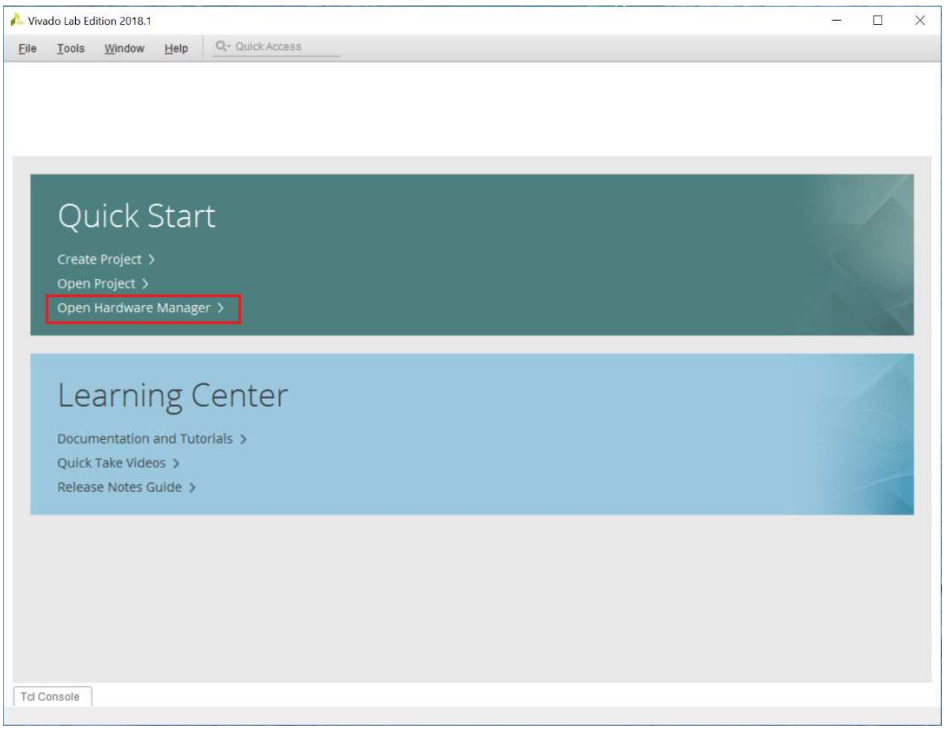
Step 6: Install & Connect FPGA Hardware

Make sure your FPGA card has power to its PCIe riser (or is plugged into the motherboard), and connect an additional 8-pin PCIe power connector to the upper back of the card. Connect a USB cable from the front of the card to your PC's USB port.

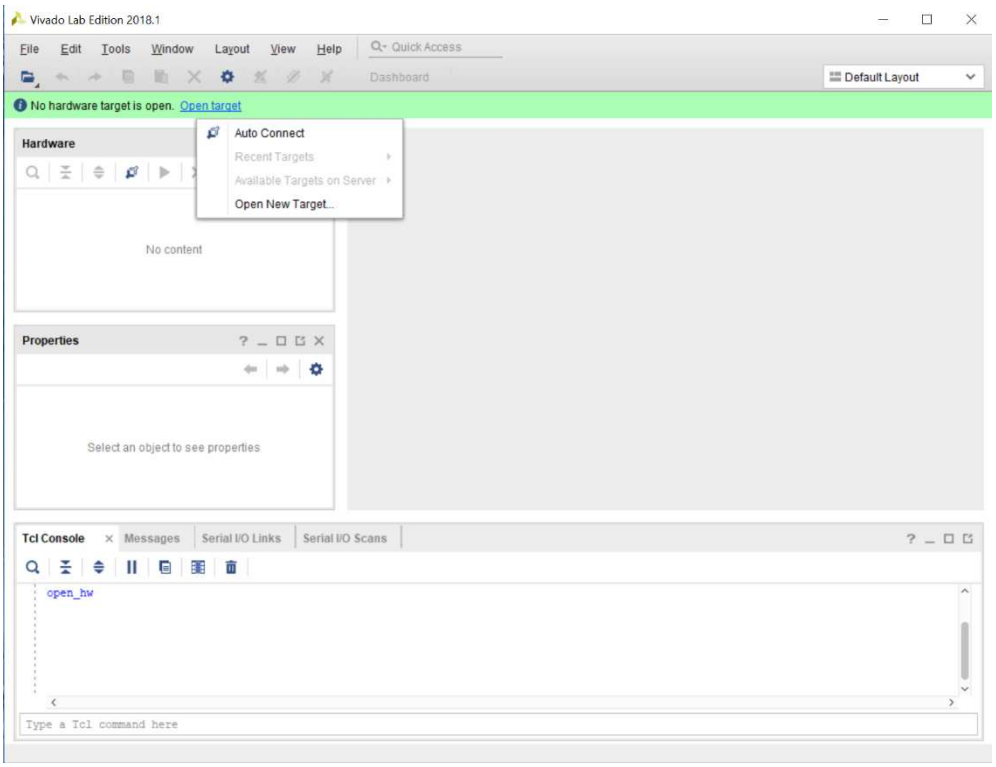


Step 7: Program the FPGA with the Bitstream

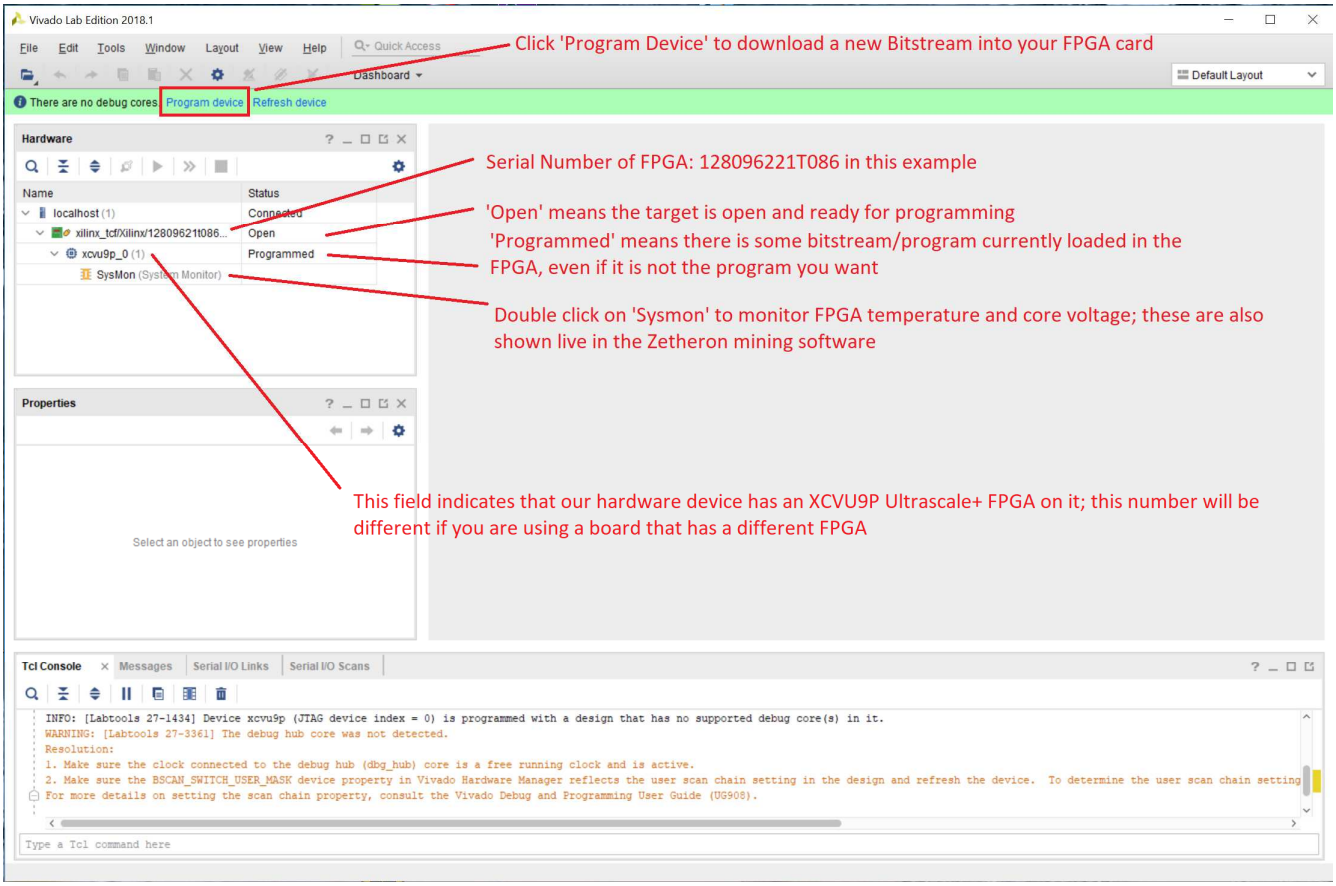
Launch Vivado Lab Edition and select ***Open Hardware Manager***:



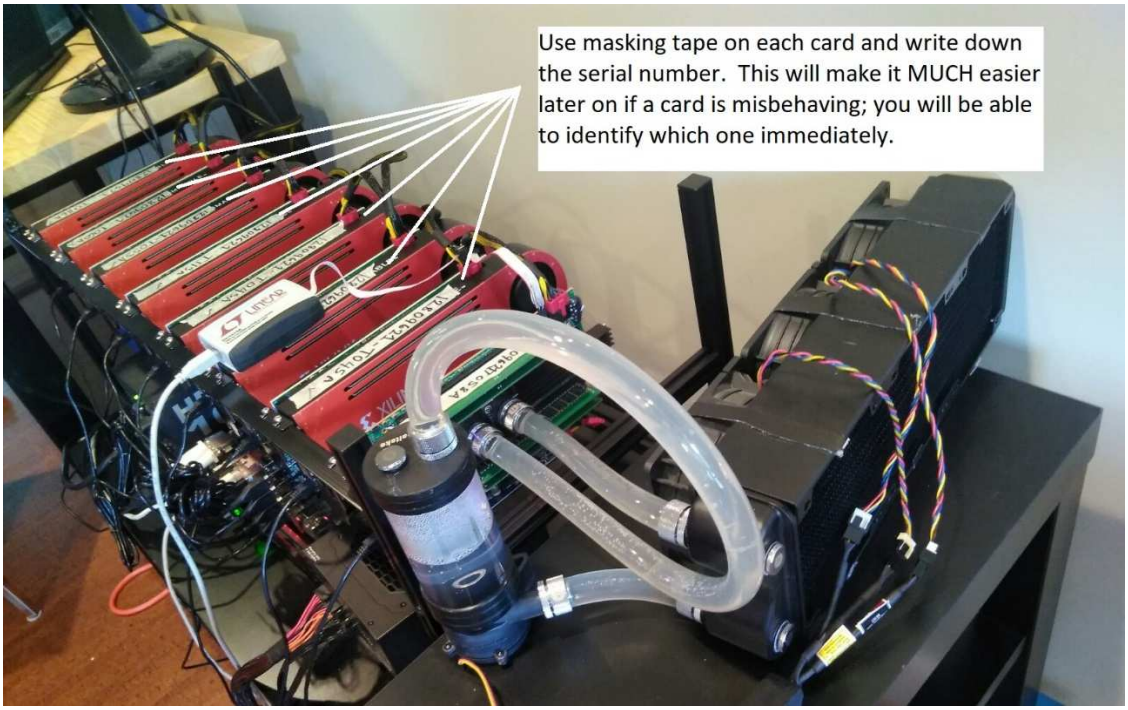
Right click on 'Open target' and select 'Auto Connect':



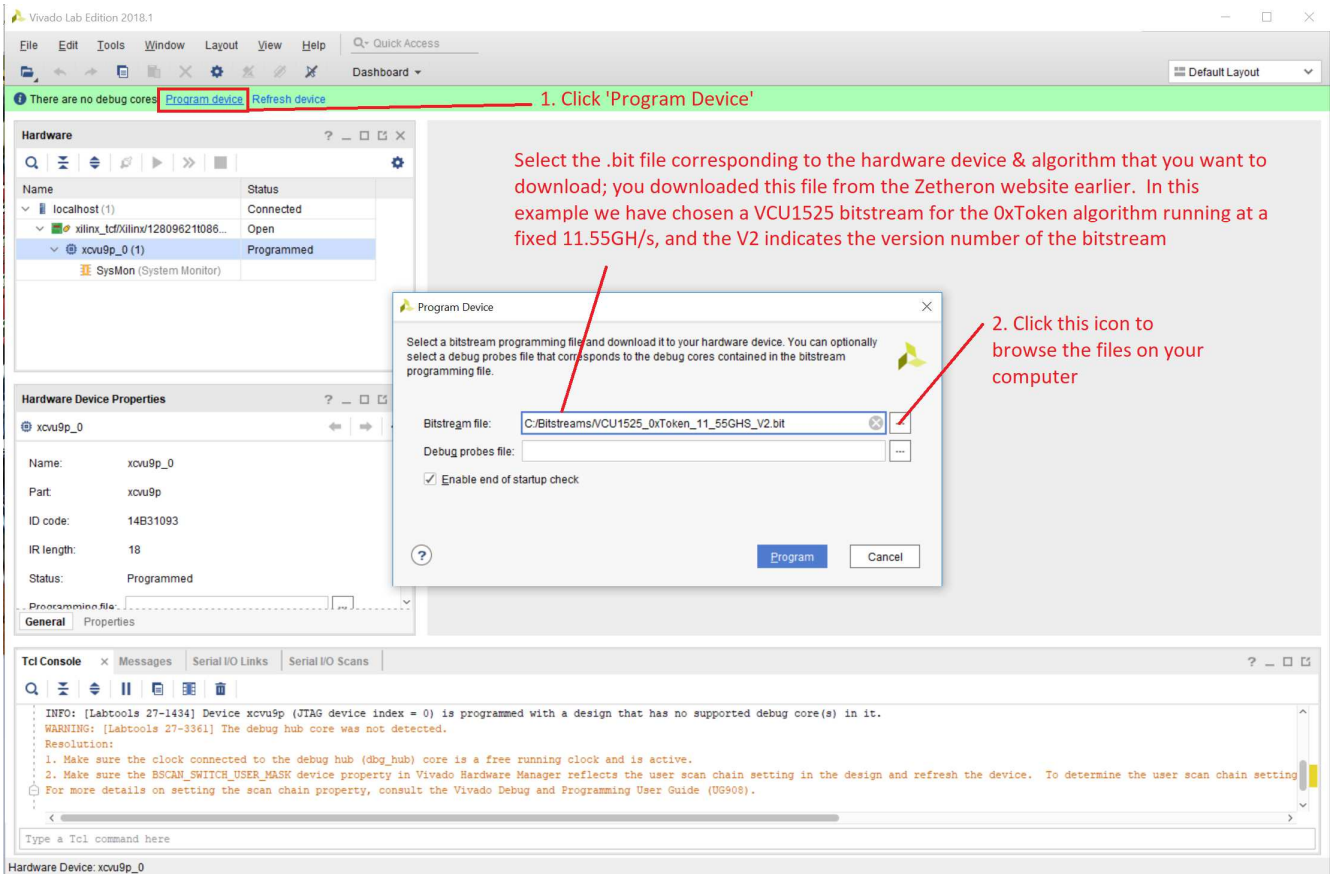
Assuming your card was powered up, and plugged into a good USB port, Vivado will connect to the board and you will see the following:



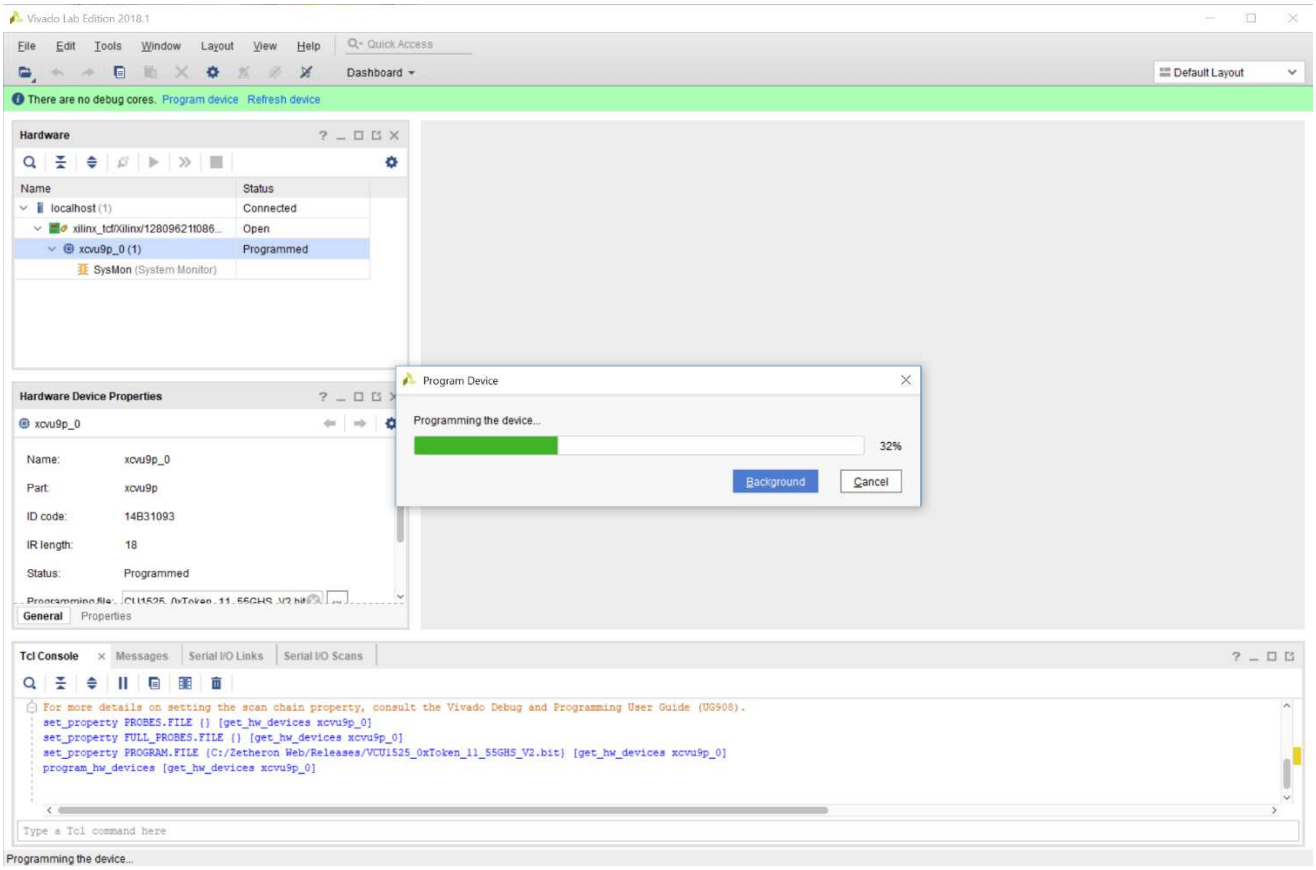
At this point it is a very good idea to take a piece of masking tape, stick it onto the FPGA card and write down the serial number on the masking tape. Make sure only one FPGA card USB cable is plugged into your computer, so that you know that the serial number being displayed is the one corresponding to the single card plugged into your computer. You can plug one card into your computer at a time, and you will see the serial number in Vivado Lab Edition, so you can enumerate all your cards:



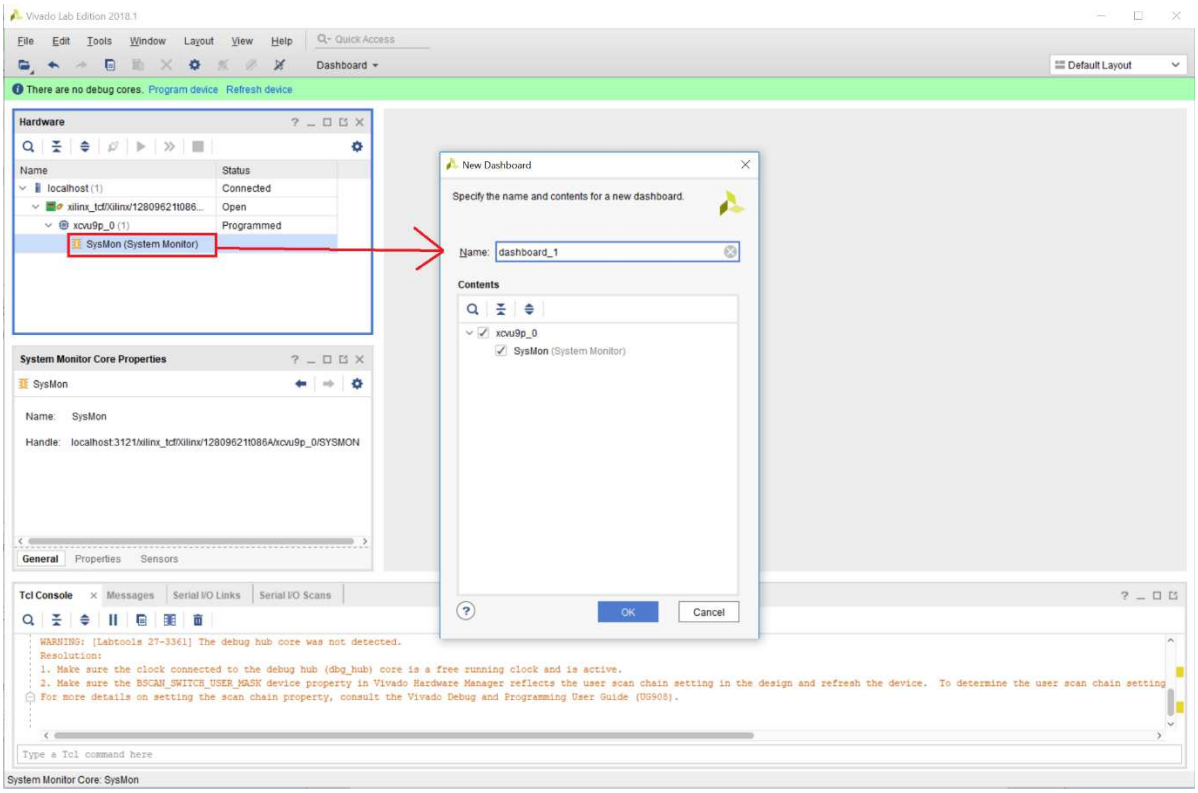
When you are ready, click ‘Program Device’, select the file, and then click the blue ‘Program’ button:



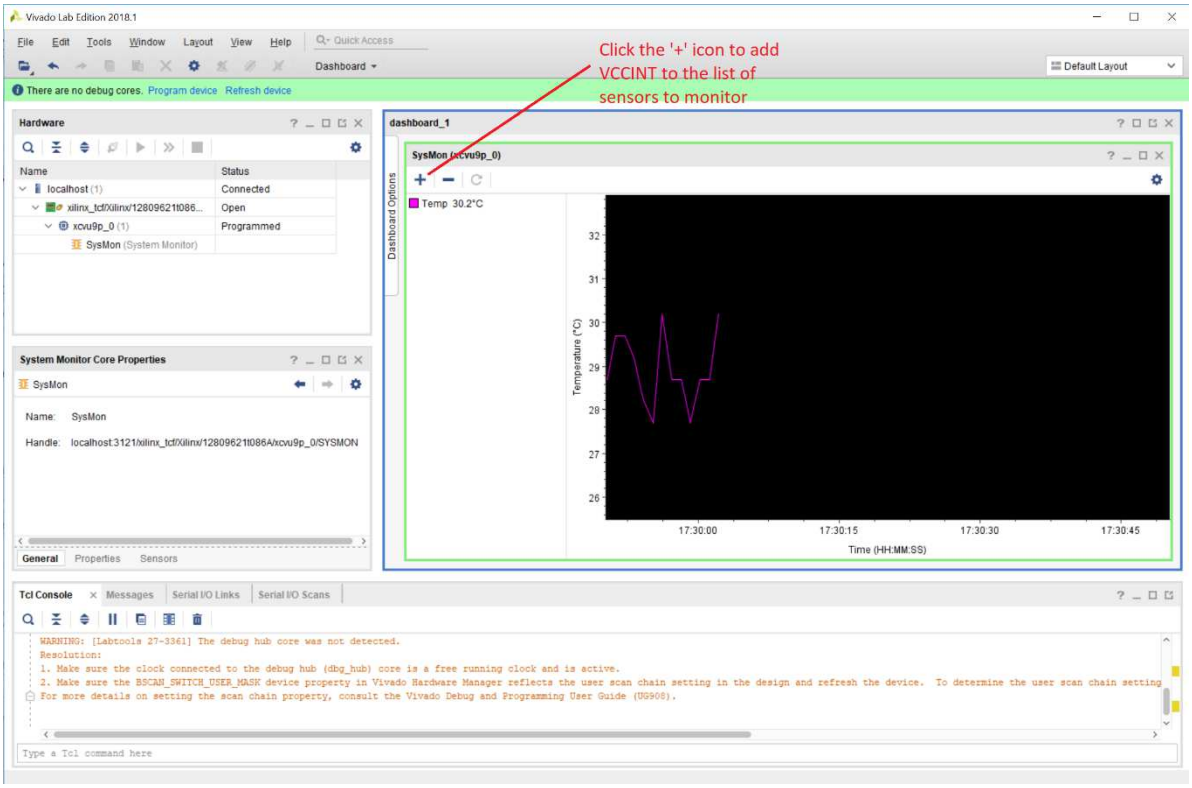
Once you click the blue ‘Program’ button, Vivado will start programming the FPGA with the bitstream:



Once the programming completes, double click on the Sysmon icon:

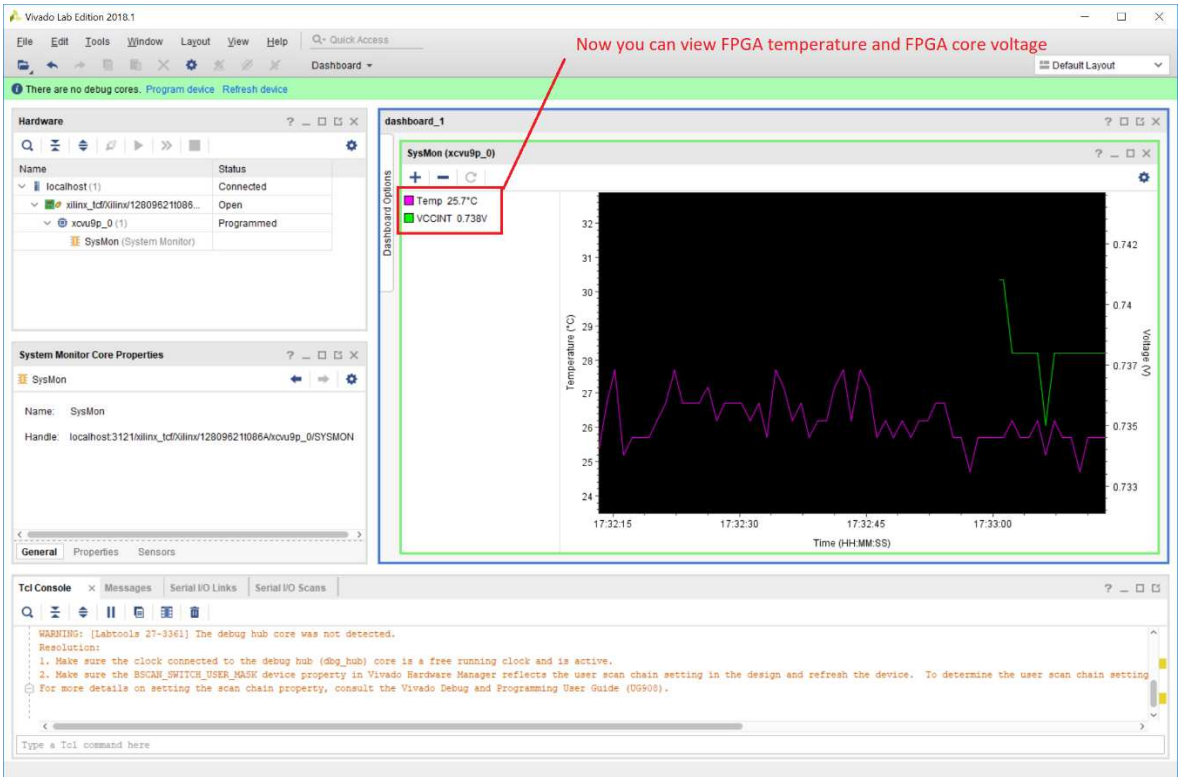


Select any name for the dashboard, then click the blue OK button:

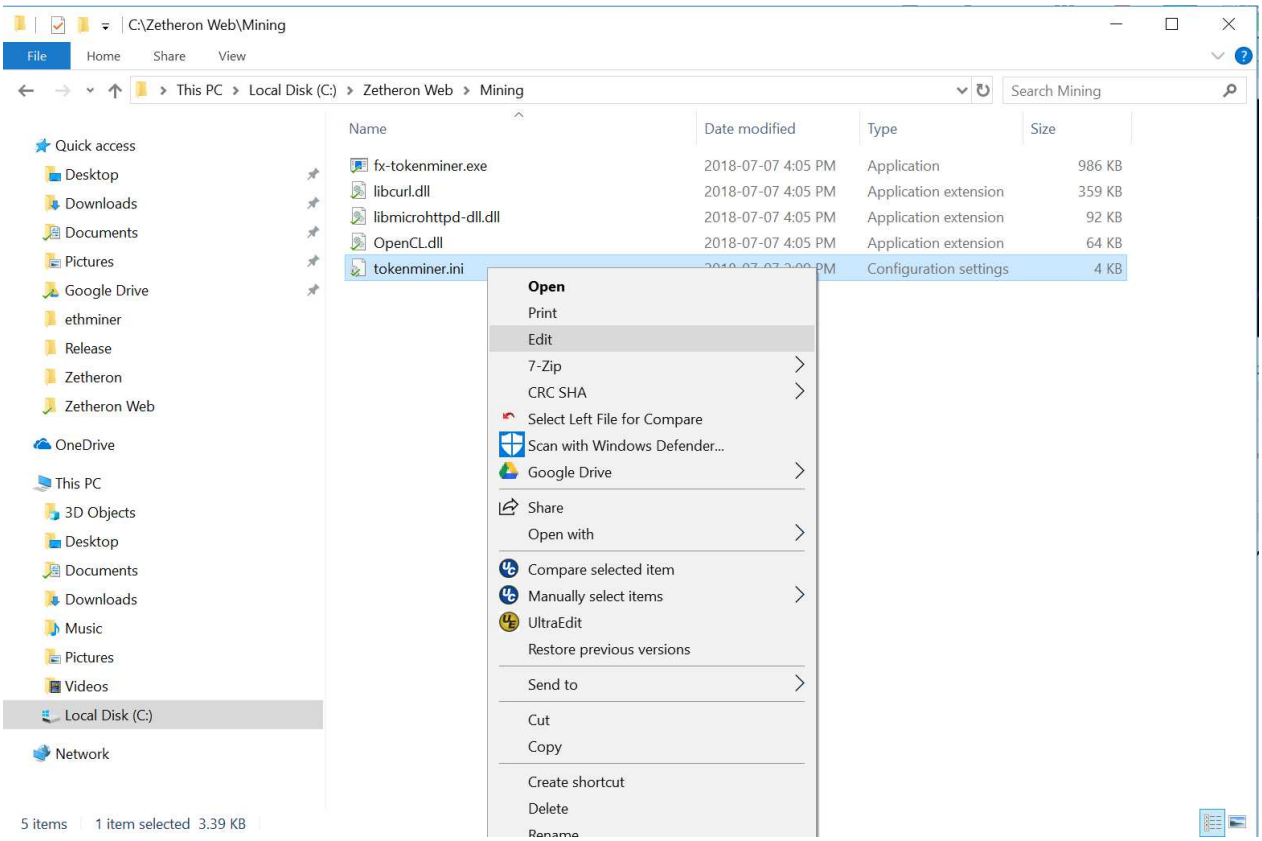


Now click the '+' icon to add VCCINT as an additional sensor to monitor.

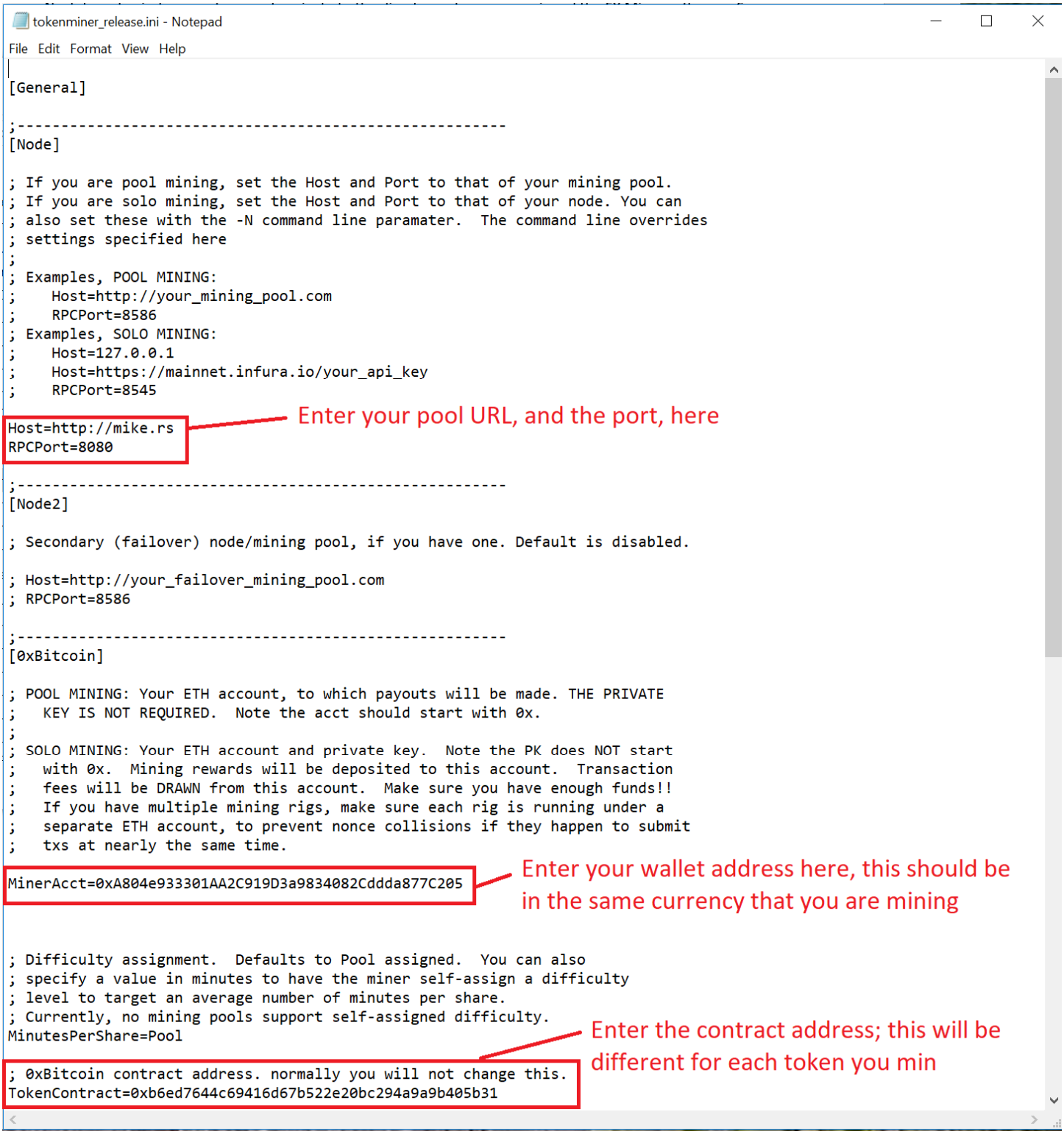
Now you can view and monitor the FPGA temperature and core voltage:



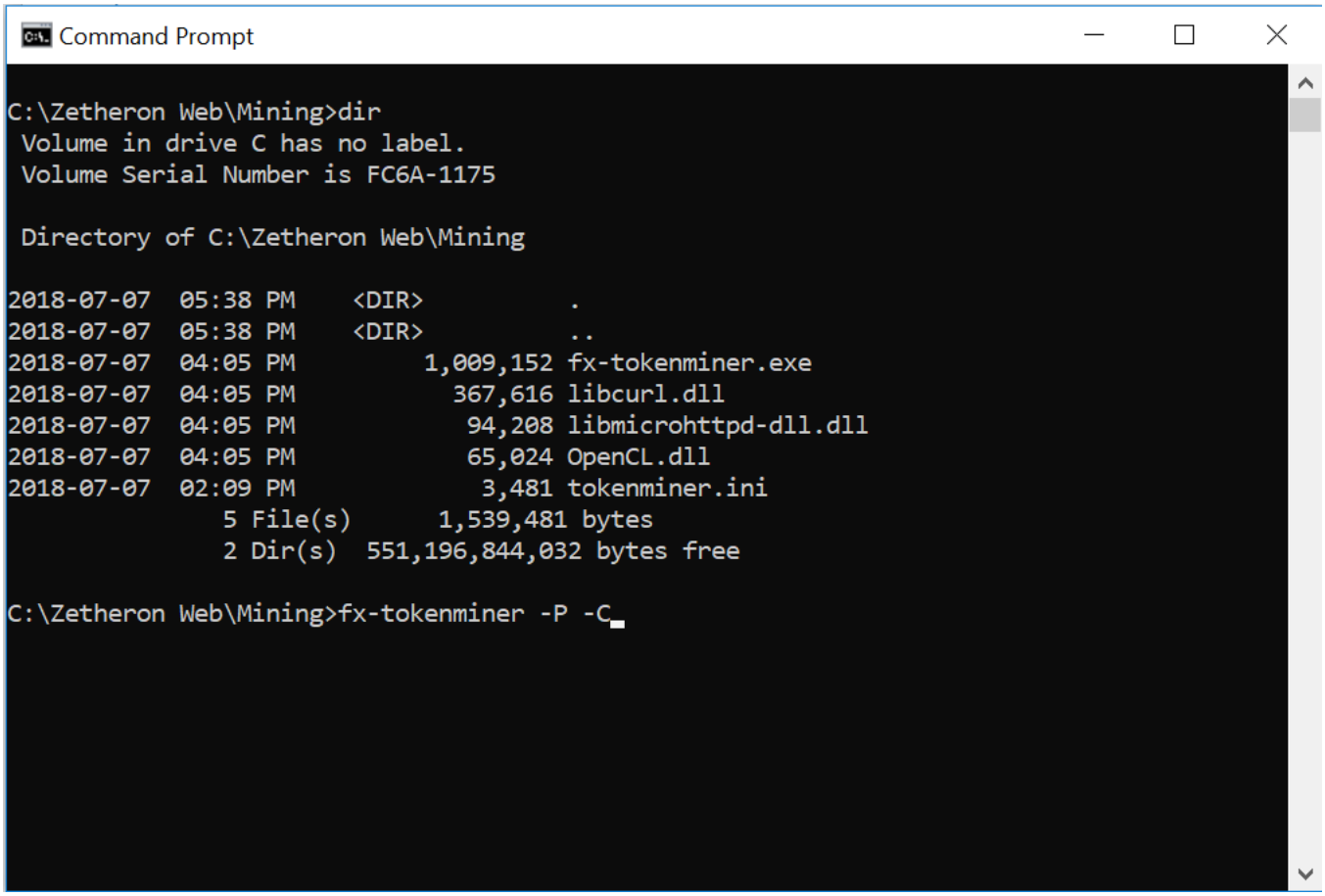
Next, launch windows explorer and navigate to the directory where you unzipped the FX Miner software. Some algorithms require you to edit a config file to set up your wallet address, and pool URL; you can usually supply these on the command line as well. In this example for the 0xToken miner, we would right click on tokenminer.ini, and click 'edit' to set up our wallet & pool address:



Next, customize the file as shown below, then click File->Save.



Next, launch a command prompt and go to the directory where you unzipped the FX Miner software. Type ‘dir’ to make sure the files are all there. Launch the FX Miner software from the command line. The exact name of the FX Miner executable file varies depending on the algorithm. For this example, we will launch fx-tokenminer with command line arguments -P (pool mining), and -C (CPU mining; accelerated by FPGA):



The software will read our tokenminer.ini file (which must be in the same directory), and it will use the pool URL and wallet address from that file. The software will first search for FPGA’s that use FTDI interface chips; if it does not find any, it will search COM ports for FPGA’s that are connected by virtual COM ports. The software will ‘lock on’ to the first available FPGA and start mining immediately. If all goes well you will see text as shown in the following command prompt image:

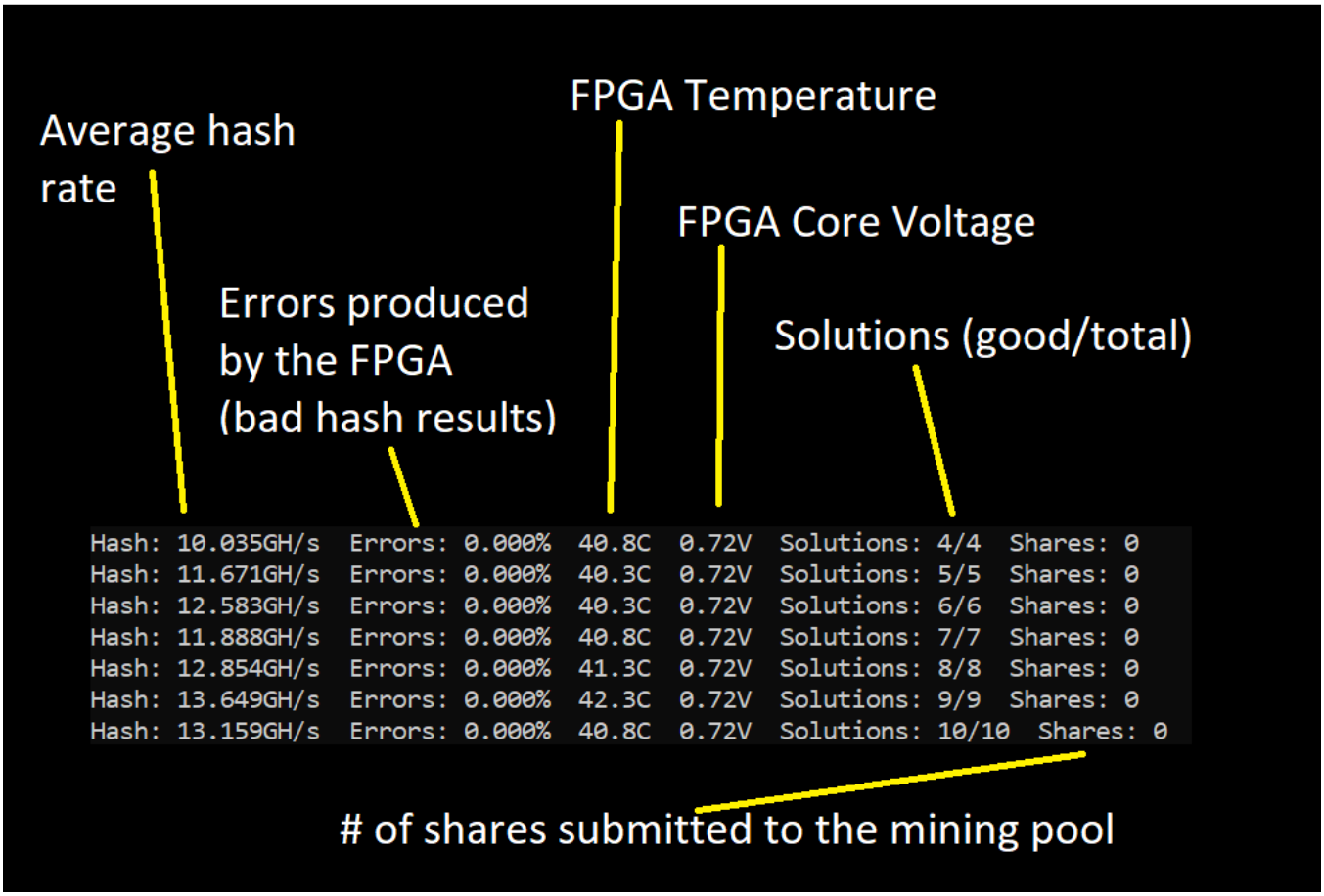
Command Prompt

```
C:\Zetheron Web\Mining>fx-tokenminer -P -C

MVis-tokenminer, modified by Zetheron Technology for FPGA acceleration
Zetheron modification version 1.10 (July 6, 2018)
     Usage:    fx-tokenminer -P -C
     Set your wallet address & coin contract in tokenminer.ini file.
     LAUNCH A SEPARATE INSTANCE OF THIS PROGRAM FOR EACH FPGA DEVICE.
     THIS PROGRAM WILL START MINING ON THE FIRST COMPATIBLE FPGA DEVICE.
     Make sure you have an SHA-3 bitstream loaded into your FPGA prior
     to launching this program!

Supported FPGA hardware:
Xilinx: VCU1525, BCU1525
Avnet:  AES-KU040
Bittware: XUPVVP-VU9, XUPVVP-VU13, XUPP3R, XUPVV4

Please refer to www.zetheron.com for user guides and operating instructions.
For donations to Zetheron:
LTC: LY1RkQA5JFfN7UWGsGLhNq3VHYuj6gbeLW
BTC: 1AEE1rHhEYzjg5QDCudt1c3VLmcdideCYz
ETH: 0x1E43256557A8762a9B160F5be67d38645A050182
For donations to the original creator of MVis Tokenminer: mining-visualizer.eth  (0xA804e933301AA2C919D3a9834082Cddda877C205
)


Waiting 2 seconds for driver handles...
FT4232H 12809621t086C Xilinx VCU1525 Dev Kit C: Configured successfully.

Detected 5 Logical FTDI channels:
Channel 0: FT4232H Xilinx VCU1525 Dev Kit C 12809621t086C [VALID data] [Bytes Received: 41]
Channel 1: Unknown or Occupied Device   [Bytes Received: 0]
Channel 2: FT4232H Xilinx VCU1525 Dev Kit D 12809621t086D [Bytes Received: 0]
Channel 3: Unknown or Occupied Device   [Bytes Received: 0]
Channel 4: FT4232H Xilinx VCU1525 Dev Kit B 12809621t086B [Bytes Received: 0]

Searching for COM port FPGA's...
Opening port: COM1 SUCCESS
Opening port: COM2 SUCCESS
Opening port: COM4 SUCCESS
Opening port: COM6 SUCCESS
Opening port: COM8 SUCCESS
Detected 5 available COM ports
COM1 [NO data]
COM2 [NO data]
COM4 [NO data]
COM6 [NO data]
COM8 [NO data]
FPGA 0 has Algorithm ID: SHA3, Bitstream version: 2
Found 1 valid FPGA's.

Mining on user account for 1 minute...
d7 18:02:39.509> Connecting to http://mike.rs:8080 ...
d7 18:02:40.282> Connection established.
d7 18:02:40.286> New challenge : 42e4a44a

New Job or Extranonce.
Wrote new vector to FPGA.
FPGA acknowledged receipt of new job.  Mining on new job...
Hash: 0.000GH/s  Errors: 0.000%  35.8C  0.72V  Solutions: 1/1  Shares: 0
Hash: 0.000GH/s  Errors: 0.000%  35.3C  0.72V  Solutions: 2/2  Shares: 0
Hash: 0.000GH/s  Errors: 0.000%  35.3C  0.72V  Solutions: 3/3  Shares: 0
Hash: 10.035GH/s  Errors: 0.000%  40.8C  0.72V  Solutions: 4/4  Shares: 0
Hash: 11.671GH/s  Errors: 0.000%  40.3C  0.72V  Solutions: 5/5  Shares: 0
Hash: 12.583GH/s  Errors: 0.000%  40.3C  0.72V  Solutions: 6/6  Shares: 0
Hash: 11.888GH/s  Errors: 0.000%  40.8C  0.72V  Solutions: 7/7  Shares: 0
Hash: 12.854GH/s  Errors: 0.000%  41.3C  0.72V  Solutions: 8/8  Shares: 0
Hash: 13.649GH/s  Errors: 0.000%  42.3C  0.72V  Solutions: 9/9  Shares: 0
Hash: 13.159GH/s  Errors: 0.000%  40.8C  0.72V  Solutions: 10/10  Shares: 0
```

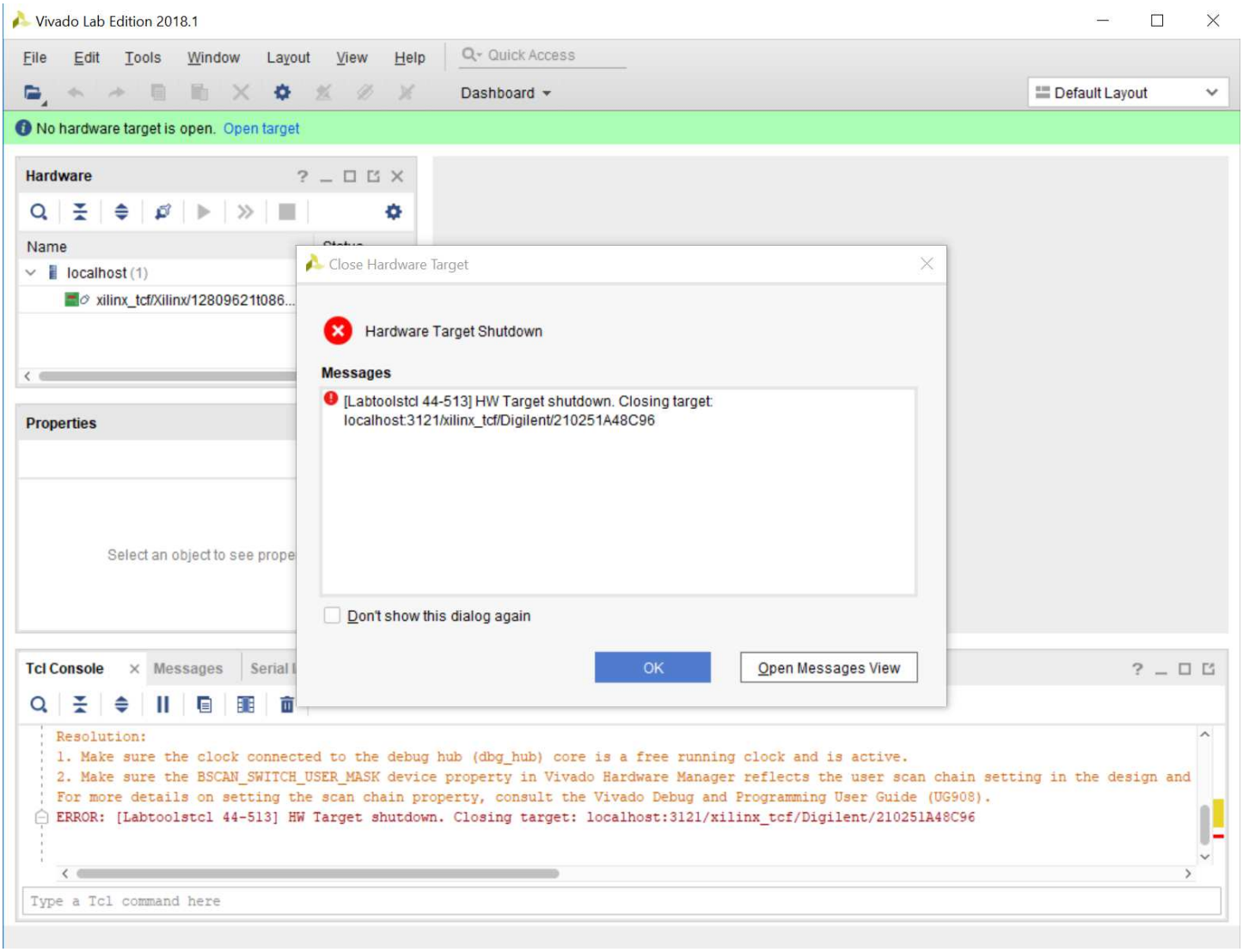
The mining software incorporates a 4% embedded development fee to help support the creation of new software for new algorithms and coins. The fee schedule is:

60 seconds on the user account
30 seconds on the dev account
96 minutes on the user account
4 minutes on the dev account
96 minutes on the user account
4 minutes on the dev account

The image below explains in more detail what you see while mining:



The average hash rate is the rate of 'valid' hashes, after errors have been subtracted. The FPGA temperature is important; if the temperature goes over 92C, there is a risk of the card shutting down. If the VCU1525 overheats, the mining software will no longer produce any solutions, and if you have a Vivado Lab Edition window open, you might see the following image:



If the FPGA overheats and shuts down, you will need to re-program it with Vivado Lab edition then re-launch the software. Loading ordinary bitstreams (.BIT) files into the FPGA is a volatile (RAM) based programming, so you also lose the programming if you power off the computer. This can be avoided by using a memory configuration (.CFG) file, which is programmed into a flash memory on the FPGA board. Once you program the non-volatile memory, it is much easier to recover from power outages or overheating events. Programming the non-volatile memory is explained in a different document—see the Zetheron website for downloads or the Zetheron YouTube channel for How-To videos.

USING MULTIPLE FPGA's

If you want to mine with 2 or more FPGA's at the same time, you must launch a separate instance of the FX Miner software for each FPGA. If you create a different directory for each FPGA, you can use a different configuration file for each FPGA, and therefore mine different coins and different pools with each FPGA.

SOLO MINING

Some of the FX Miner software packages support solo mining. Read up on the original software documentation for details.

APPENDIX

A partial list of 0xTokens

0xBITCOIN
Home Page: https://0xbitcoin.org/
Web Wallet: http://0xbitcoin.org/wallet/
Stats: https://0x1d00ffff.github.io/0xBTC-Stats/?page=stats&
Mining Calculator: https://0x1d00ffff.github.io/0xBTC-Stats/?page=miningcalculator&#
Pools: https://0x1d00ffff.github.io/0xBTC-Stats/?page=stats&#miners

ATLANTIS token
Home Page: http://atlantistoken.org/
Pool: http://ata.wolfpool.io/ (port 8080)
https://bitcointalk.org/index.php?topic=4496240.0
CONTRACT: 0xd72f60b2e7649bbc5835d25e30ef917f04d9131c

0xDIARY
https://0xhorcrux.github.io/0xDiary-Stats/?page=stats&#
https://0xhorcrux.github.io/0xdiary/
CONTRACT: 0x6056247d57fbf1e7d2ca01b9b2ac03a12061221b

0xSKORCH
https://skorch.io/stats/?page=stats&
https://skorch.io/
CONTRACT: 0xd83caA129d9D7080A15d26499733f783eb14e667

0xLTC
CONTRACT: 0x012fd5049a203df08c02fb2e0ed15ceed10d9ed4

KIWI
http://thekiwi.info/?page=stats&
CONTRACT: 0x2BF91c18Cd4AE9C2f2858ef9FE518180F7B5096D

0xZIBI
https://0xzibittoken.github.io/0xZibit-Stats/?page=stats&#
CONTRACT: 0x7fB550255d0daf6dE4d9B8D5275d2Dc28619B78D
INFO WEBSITE: https://0xzibit.wordpress.com/

0xDOGECOIN
http://0xdogecoin.com/stats/?page=stats&
CONTRACT: 0x97A89a0286a673ac8CDABBc42e5B2AaAE74B09e5

0xRAMEN
https://ramencoin.me/
https://ramencoin.me/stats/?page=stats&
CONTRACT: 0xee8965ca57f9d252a8d5da1faa5f7d85ad78a24f

0xBITCOINCASH
https://0xbitcoincash.io/
https://0xbitcoincash.io/stats/?page=stats&
CONTRACT: 0xe5b9746dfCC2eF1054D47A451A77bb5f390c468d
https://www.enclaves.io/trade/0xBCH