SOC Design Lab10

BNN accelerator

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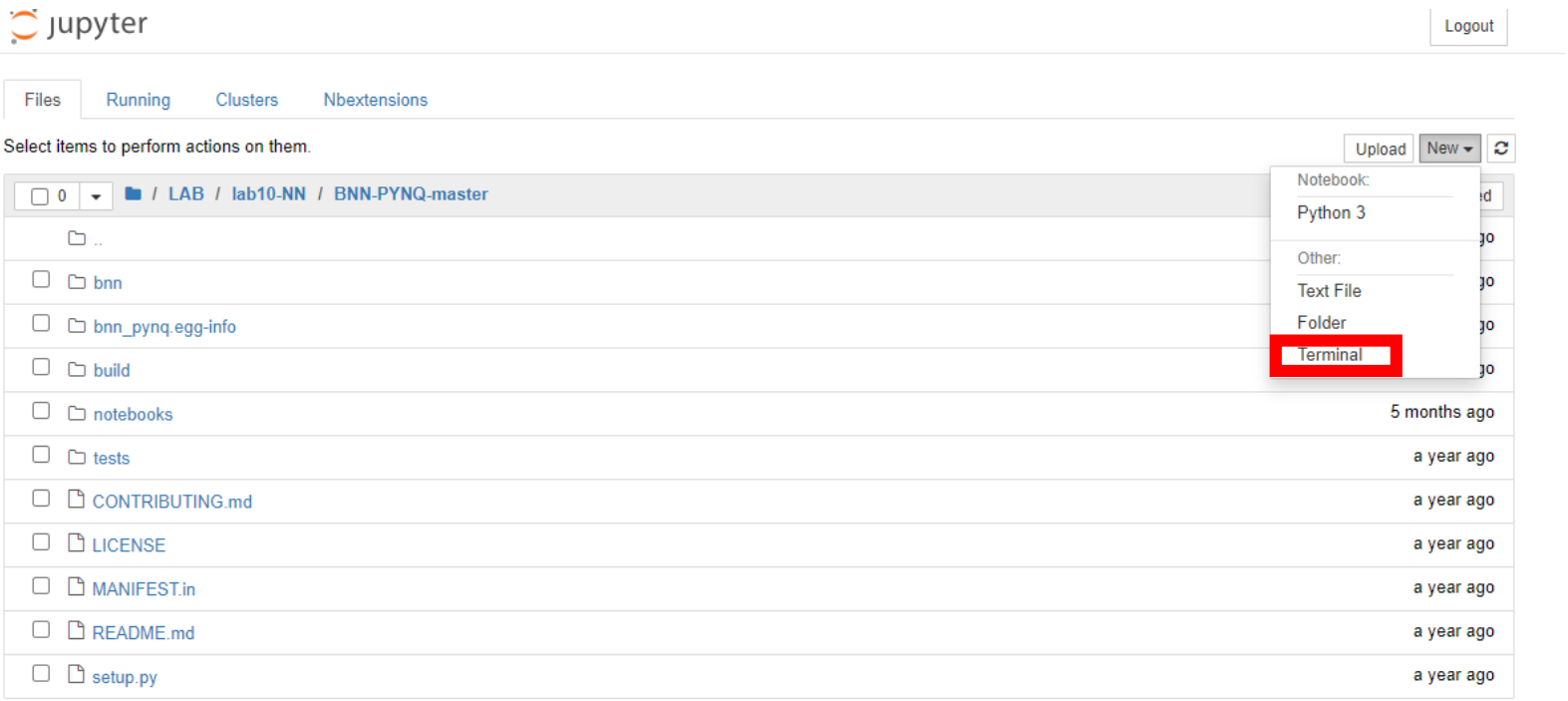
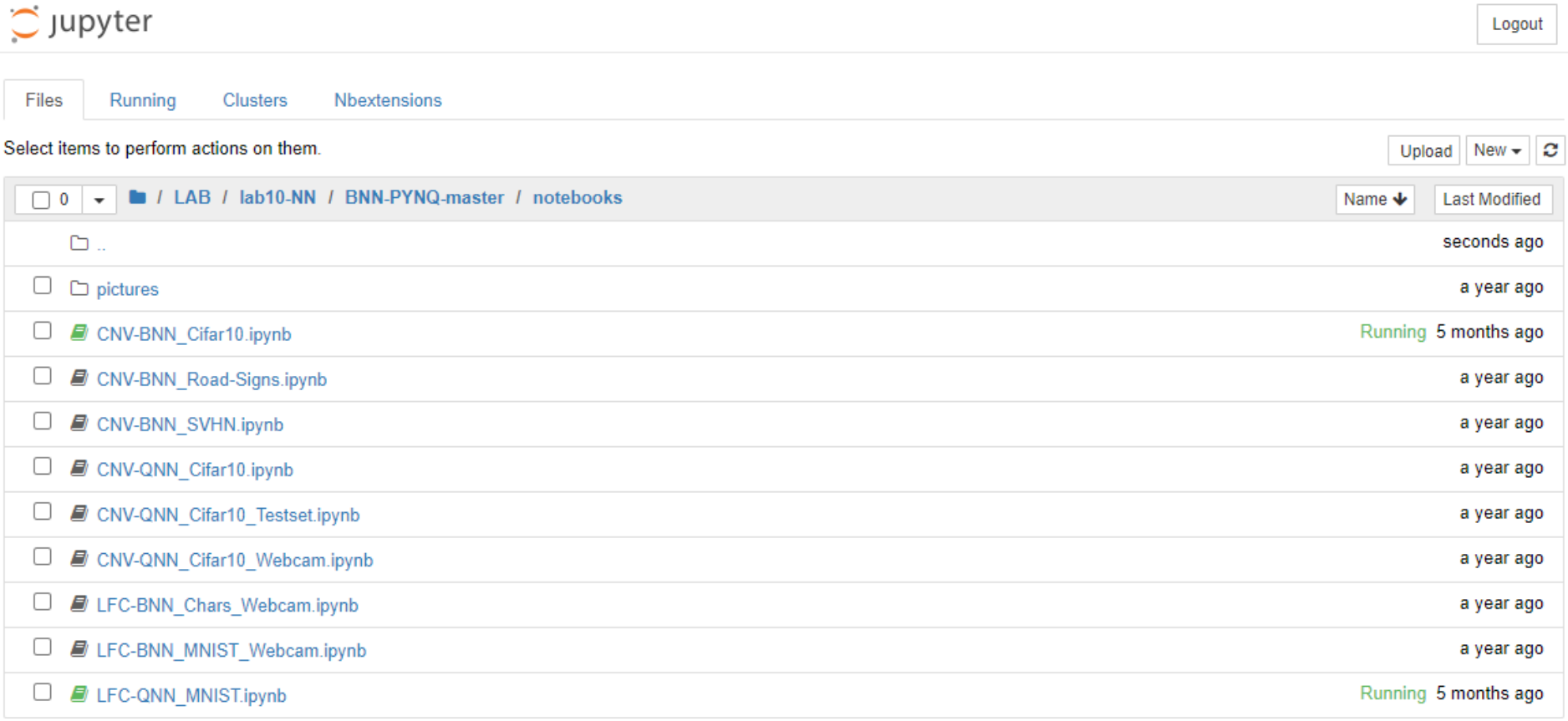
Ref: FINN: A Framework for Fast, Scalable Binarized Neural Network Inference

- Download BNN-PYNQ master from
  https://github.com/Xilinx/BNN-PYNQ
- Clone the folder to the PYNQ
- Open the terminal



- cd <your own clone path>
- python3 setup.py install

- For inference，there are some examples provided from FINN paper (https://arxiv.org/abs/1612.07119)



For hardware design rebuilt

- You must follow the steps on LINUX operating system
- You must install Vivado 2018.2 on Linux

Hardware design rebuilt

- 設置臨時的環境變量
- PATH=$PATH:/opt/Xilinx/Vivado/2018.2/bin
  XILINX_BNN_ROOT=$XILINX_BNN_ROOT:/home/yourname/bnn/BNN-PYNQ-master/bnn/src/

Launch the shell script make-hw.sh with passing parameters for target network, target platform and mode, with the command

./make-hw.sh {network} {platform} {mode}

where:

- **network** can be cnvW1A1, cnvW1A2, cnvW2A2 or lfcW1A1, lfcW1A2;
- **platform** can be pynqZ1-Z2 or ultra96;
- **mode** can be `h` to launch Vivado HLS synthesis, `b` to launch the Vivado project (needs HLS synthesis results), `a` to launch both;

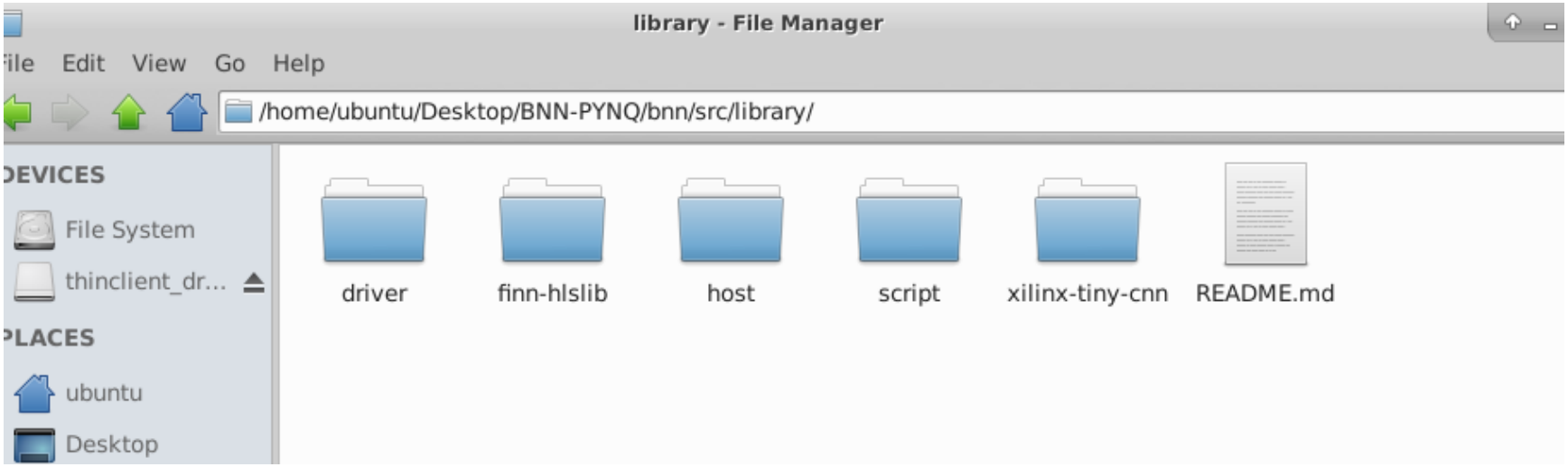
生成HLS IP

```
./make-hw.sh cnvW1A1 pynqZ1-Z2 h
```

生成vivado專案

```
./make-hw.sh cnvW1A1 pynqZ1-Z2 b
```

- make-hw.sh script中仍缺失了兩個檔案，ubuntu下git也很容易失敗，建議在windows上下載好兩個檔案放在指定路徑即可。將xilinx-tiny-cnn放在BNN-PYNQ-master/bnn/src文件夾下，將finn-hlslib放在BNN-PYNQ-master/bnn/src/library文件夾下。



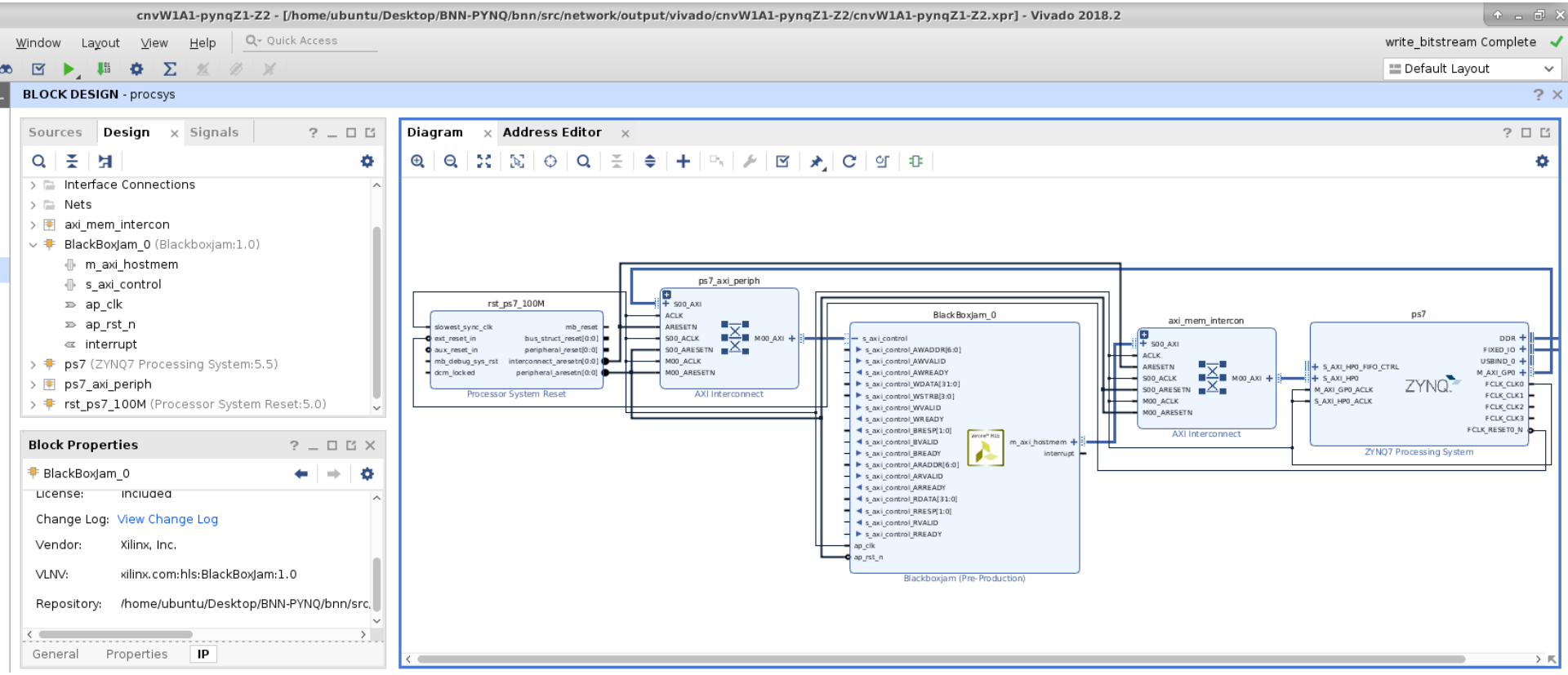
xilinx-tiny-cnn

https://github.com/Xilinx/xilinx-tiny-cnn

finn-hlslib

https://github.com/Xilinx/finn-hlslib/tree/8b7f5f5dcd4e3dd17eddc41253040931af28179a

生成專案


cnvW1A1-pynqZ1-Z2 - [/home/ubuntu/Desktop/BNN-PYNQ/bnn/src/network/output/vivado/cnvW1A1-pynqZ1-Z2/cnvW1A1-pynqZ1-Z2.xpr] - Vivado 2018.2
Window
Layout
View
Help
Quick Access
write_bitstream Complete
Default Layout
BLOCK DESIGN - procsys
Sources
Design
Signals
Interface Connections
Nets
axi_mem_intercon
BlackBoxJam_0 (Blackboxjam:1.0)
m_axi_hostmem
s_axi_control
ap_clk
ap_rst_n
interrupt
ps7 (ZYNQ7 Processing System:5.5)
ps7_axi_periph
rst_ps7_100M (Processor System Reset:5.0)
Block Properties
BlackBoxJam_0
License:
Included
Change Log:
View Change Log
Vendor:
Xilinx, Inc.
VLNV:
xilinx.com:hls:BlackBoxJam:1.0
Repository:
/home/ubuntu/Desktop/BNN-PYNQ/bnn/src
General
Properties
IP
Diagram
Address Editor
ps7_axi_periph
rst_ps7_100M
BlackBoxJam_0
axi_mem_intercon
ps7
Processor System Reset
AXI Interconnect
Blackboxjam (Pre-Production)
AXI Interconnect
ZYNQ7 Processing System