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In [1]: from __future__ import print_function
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```
import sys
import numpy as np
from time import time
import matplotlib.pyplot as plt
```

```
sys.path.append('/home/xilinx')
from pynq import Overlay
from pynq import allocate
```

```
ROM_SIZE = 0x2000 #8K
```

```
In [2]: ol = Overlay("/home/xilinx/jupyter_notebooks/ipy_fpga/caravel_fpga.bit")
#ol.ip_dict
```

```
In [3]: ipOUTPIN = ol.output_pin_0
ipPS = ol.caravel_ps_0
ipReadROMCODE = ol.read_romcode_0
```

```
In [4]: # Create np with 8K/4 (4 bytes per index) size and be initiled to 0
rom_size_final = 0

# Allocate dram buffer will assign physical address to ip ipReadROMCODE
npROM = allocate(shape=(ROM_SIZE >> 2,), dtype=np.uint32)

# Initial it by 0
for index in range (ROM_SIZE >> 2):
    npROM[index] = 0

npROM_index = 0
npROM_offset = 0
fiROM = open("counter_wb.hex", "r+")
#fiROM = open("counter_la.hex", "r+")
#fiROM = open("gcd_la.hex", "r+")

for line in fiROM:
    # offset header
    if line.startswith('@'):
        # Ignore first char @
        npROM_offset = int(line[1:].strip(b'\x00'.decode()), base = 16)
        npROM_offset = npROM_offset >> 2 # 4byte per offset
        #print (npROM_offset)
        npROM_index = 0
        continue
    #print (line)

    # We suppose the data must be 32bit alignment
    buffer = 0
    bytecount = 0
    for line_byte in line.strip(b'\x00'.decode()).split():
        buffer += int(line_byte, base = 16) << (8 * bytecount)
        bytecount += 1
        # Collect 4 bytes, write to npROM
        if(bytecount == 4):
            npROM[npROM_offset + npROM_index] = buffer
            # Clear buffer and bytecount
            buffer = 0
            bytecount = 0
            npROM_index += 1
            #print (npROM_index)
```

```

        continue
    # Fill rest data if not alignment 4 bytes
    if (bytecount != 0):
        npROM[npROM_offset + npROM_index] = buffer
        npROM_index += 1

fiROM.close()

rom_size_final = npROM_offset + npROM_index
#print (rom_size_final)

#for data in npROM:
#    print (hex(data))

```

In [5]:

```

# 0x00 : Control signals
#     bit 0 - ap_start (Read/Write/COH)
#     bit 1 - ap_done (Read/COR)
#     bit 2 - ap_idle (Read)
#     bit 3 - ap_ready (Read)
#     bit 7 - auto_restart (Read/Write)
#     others - reserved
# 0x10 : Data signal of romcode
#     bit 31~0 - romcode[31:0] (Read/Write)
# 0x14 : Data signal of romcode
#     bit 31~0 - romcode[63:32] (Read/Write)
# 0x1c : Data signal of length_r
#     bit 31~0 - length_r[31:0] (Read/Write)

# Program physical address for the romcode base address
ipReadROMCODE.write(0x10, npROM.device_address)
ipReadROMCODE.write(0x14, 0)
# Program length of moving data
ipReadROMCODE.write(0x1c, rom_size_final)

# ipReadROMCODE start to move the data from rom_buffer to bram
ipReadROMCODE.write(0x00, 1) # IP Start
while (ipReadROMCODE.read(0x00) & 0x04) == 0x00: # wait for done
    continue

print("Write to bram done")

```

Write to bram done

In [6]:

```

# Check MPRJ_IO input/out/en
# 0x10 : Data signal of ps_mprj_in
#     bit 31~0 - ps_mprj_in[31:0] (Read/Write)
# 0x14 : Data signal of ps_mprj_in
#     bit 5~0 - ps_mprj_in[37:32] (Read/Write)
#     others - reserved
# 0x1c : Data signal of ps_mprj_out
#     bit 31~0 - ps_mprj_out[31:0] (Read)
# 0x20 : Data signal of ps_mprj_out
#     bit 5~0 - ps_mprj_out[37:32] (Read)
#     others - reserved
# 0x34 : Data signal of ps_mprj_en
#     bit 31~0 - ps_mprj_en[31:0] (Read)
# 0x38 : Data signal of ps_mprj_en
#     bit 5~0 - ps_mprj_en[37:32] (Read)
#     others - reserved

print ("0x10 = ", hex(ipPS.read(0x10)))
print ("0x14 = ", hex(ipPS.read(0x14)))
print ("0x1c = ", hex(ipPS.read(0x1c)))
print ("0x20 = ", hex(ipPS.read(0x20)))
print ("0x34 = ", hex(ipPS.read(0x34)))
print ("0x38 = ", hex(ipPS.read(0x38)))

```

```
0x10 = 0x0
0x14 = 0x0
0x1c = 0x8
0x20 = 0x0
0x34 = 0xffffffff7
0x38 = 0x3f
```

```
In [7]: # Release Caravel reset
# 0x10 : Data signal of outpin_ctrl
#       bit 0 - outpin_ctrl[0] (Read/Write)
#       others - reserved
print (ipOUTPIN.read(0x10))
ipOUTPIN.write(0x10, 1)
print (ipOUTPIN.read(0x10))
```

```
0
1
```

```
In [8]: # Check MPRJ_IO input/out/en
# 0x10 : Data signal of ps_mprj_in
#       bit 31~0 - ps_mprj_in[31:0] (Read/Write)
# 0x14 : Data signal of ps_mprj_in
#       bit 5~0 - ps_mprj_in[37:32] (Read/Write)
#       others - reserved
# 0x1c : Data signal of ps_mprj_out
#       bit 31~0 - ps_mprj_out[31:0] (Read)
# 0x20 : Data signal of ps_mprj_out
#       bit 5~0 - ps_mprj_out[37:32] (Read)
#       others - reserved
# 0x34 : Data signal of ps_mprj_en
#       bit 31~0 - ps_mprj_en[31:0] (Read)
# 0x38 : Data signal of ps_mprj_en
#       bit 5~0 - ps_mprj_en[37:32] (Read)
#       others - reserved

print ("0x10 = ", hex(ipPS.read(0x10)))
print ("0x14 = ", hex(ipPS.read(0x14)))
print ("0x1c = ", hex(ipPS.read(0x1c)))
print ("0x20 = ", hex(ipPS.read(0x20)))
print ("0x34 = ", hex(ipPS.read(0x34)))
print ("0x38 = ", hex(ipPS.read(0x38)))
```

```
0x10 = 0x0
0x14 = 0x0
0x1c = 0xab610008
0x20 = 0x2
0x34 = 0xfff7
0x38 = 0x37
```

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In [ ]:
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In [ ]:
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