[SoC Design]
Term Project: Accelerator for CNN

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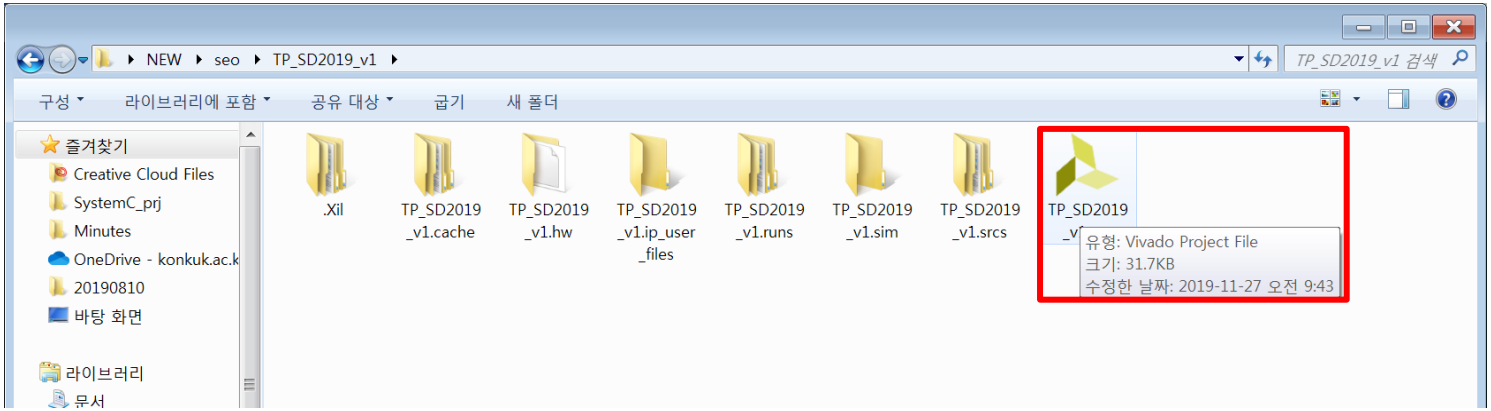
Outline

- Open Vivado projects
- Running C Applications

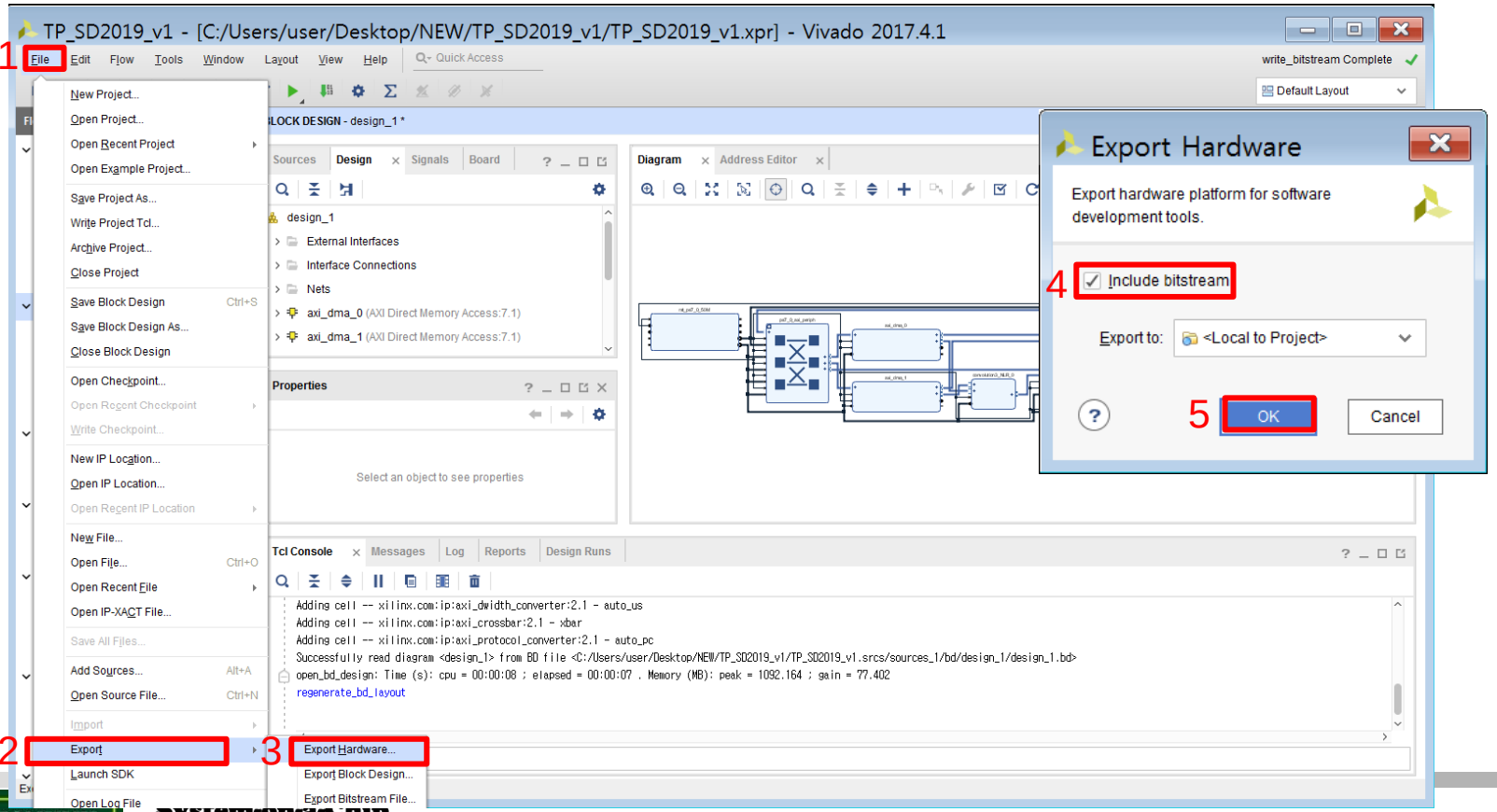
Open Vivado projects

- Open Vivado projects
  - Unzip and open '***TP_SD2019_v1***' folder and run file **'TP_SD2019_v1.xpr'**
    Download link:
    https://drive.google.com/open?id=1zwLSdnKHZNEAO4TTdc0Yk2tlPeKX14SV



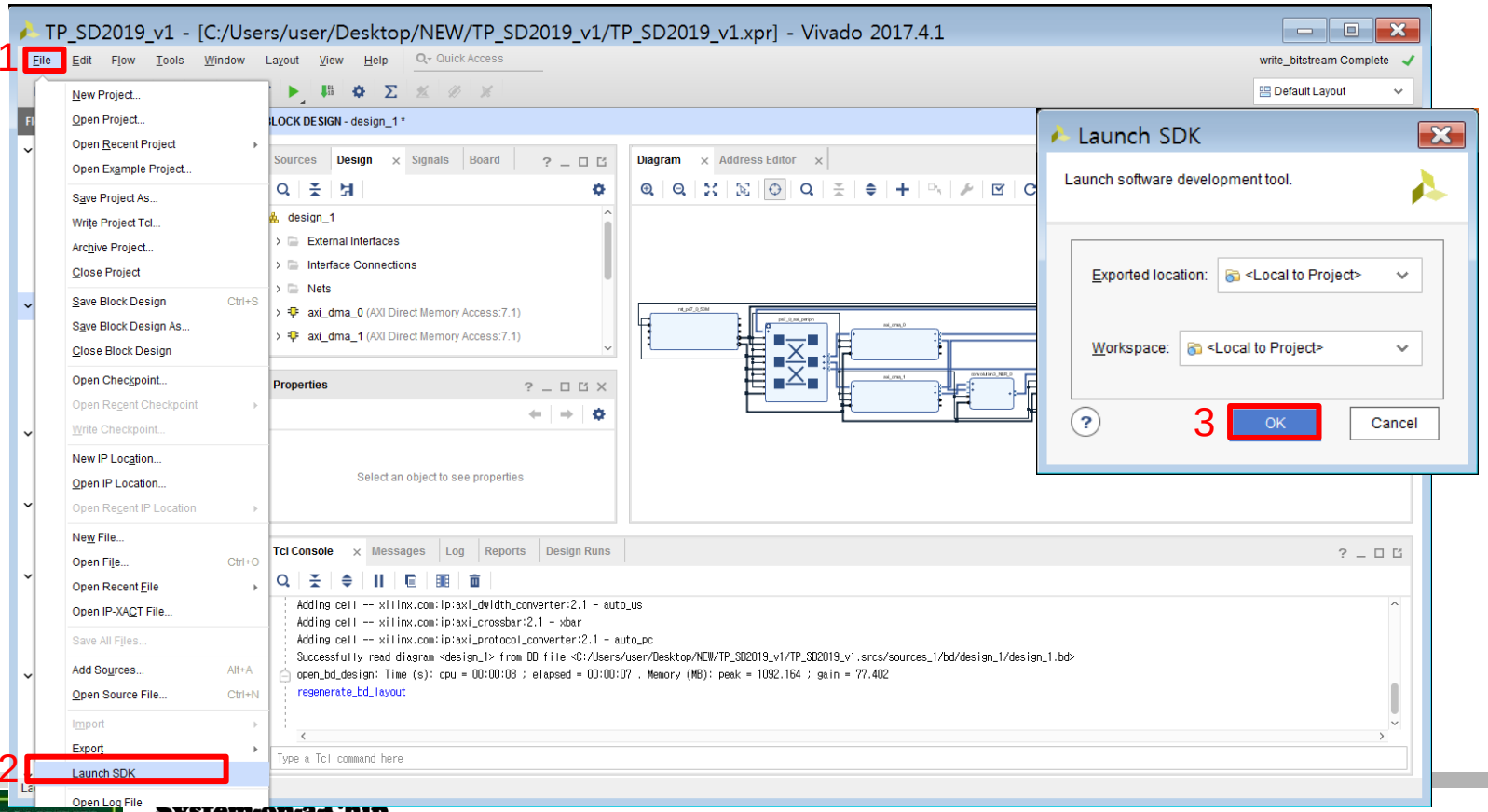
Open Vivado projects

- Export Hardware
  - Click ***'Export > Export Hardware'*** in ***'File'*** menu
  - Check ***'Include Bitstream'*** and then click ***'OK'***



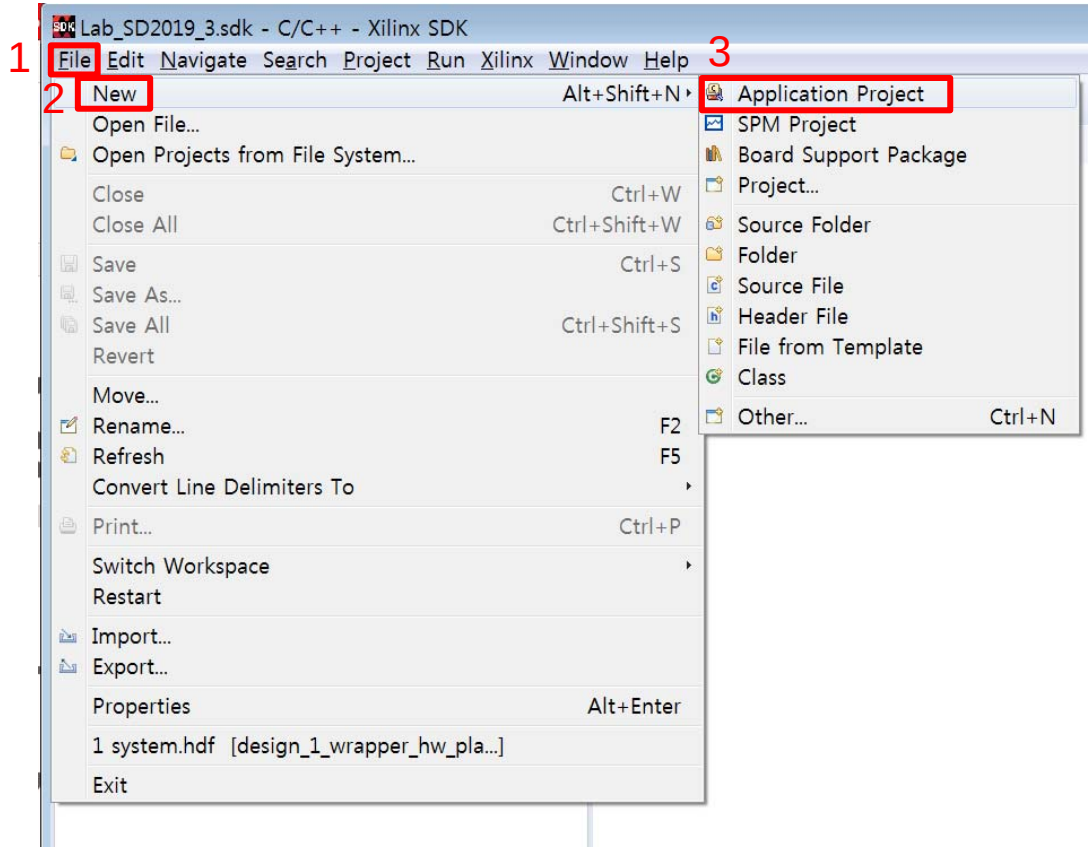
Open Vivado projects

- Launch SDK
  - Click ***'Launch SDK'*** in ***'File'*** menu
  - Click ***'OK'***



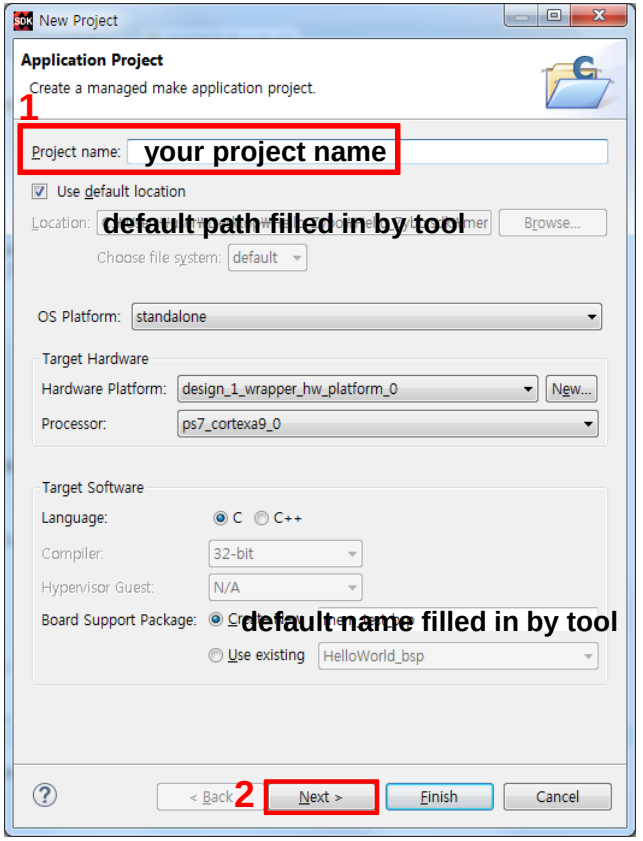
Running C Applications

- Create a C application project
  - Click ***'File' > 'New' > 'Application Project'***



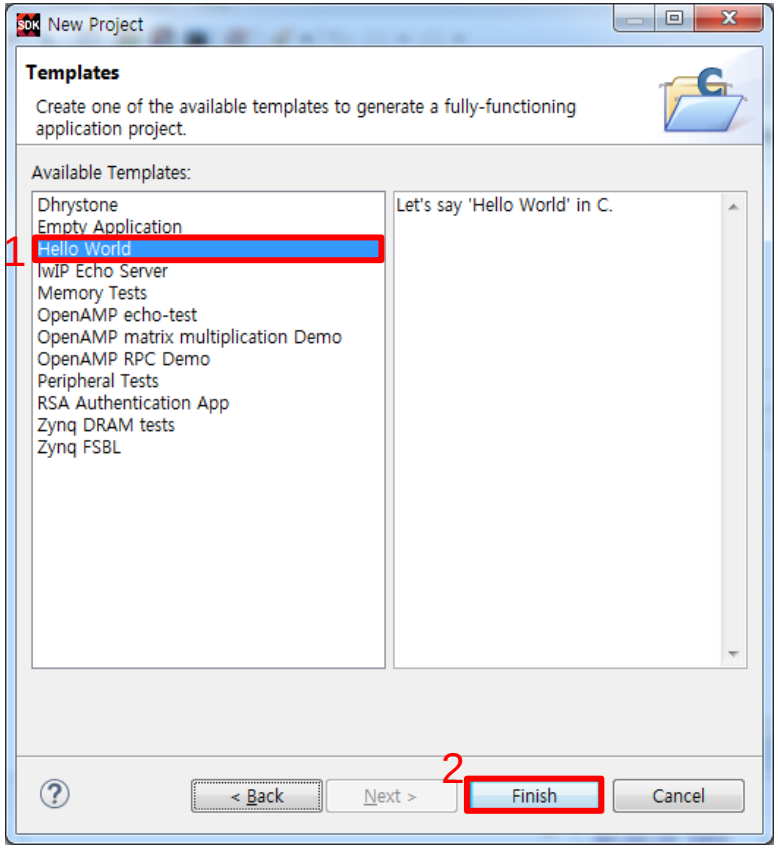
Running C Applications

- Create a C application project (cont'd)
  - Type the project name
  - Click ***'Next'***



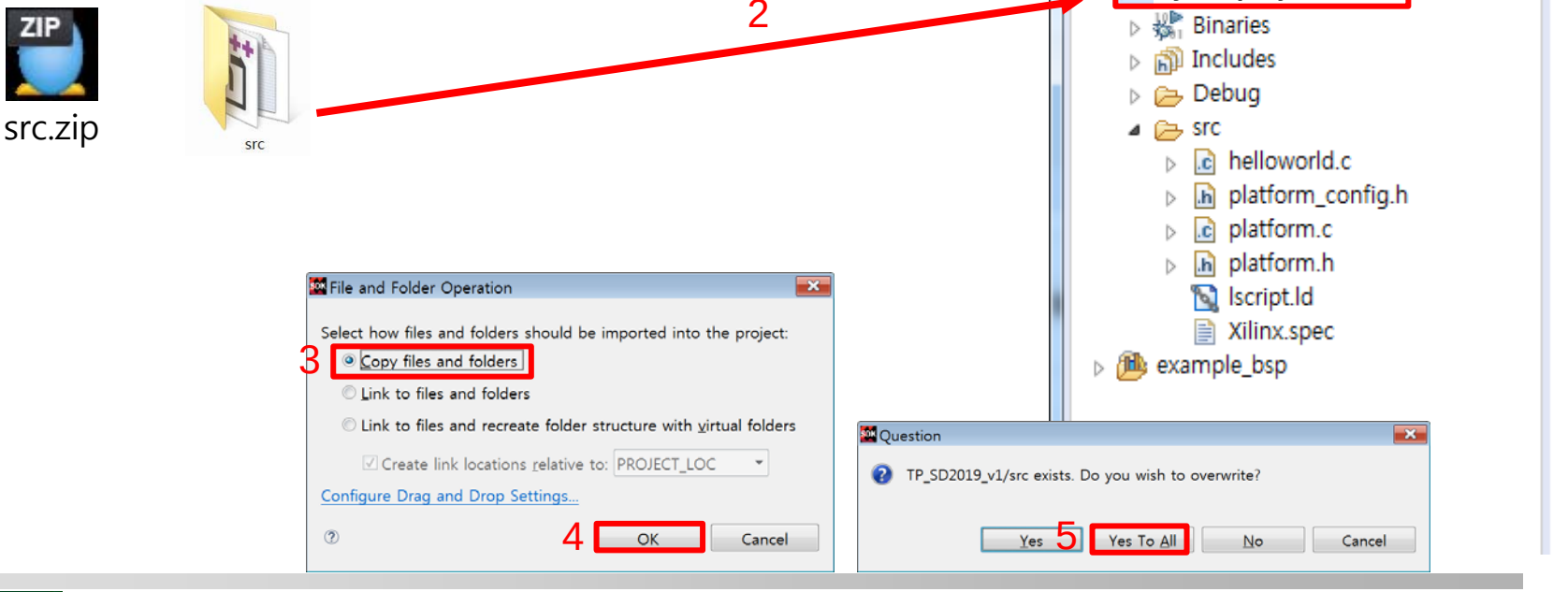
Running C Applications

- Create a C application project (cont'd)
  - Choose ***'Hello World'*** and then click ***'Finish'***



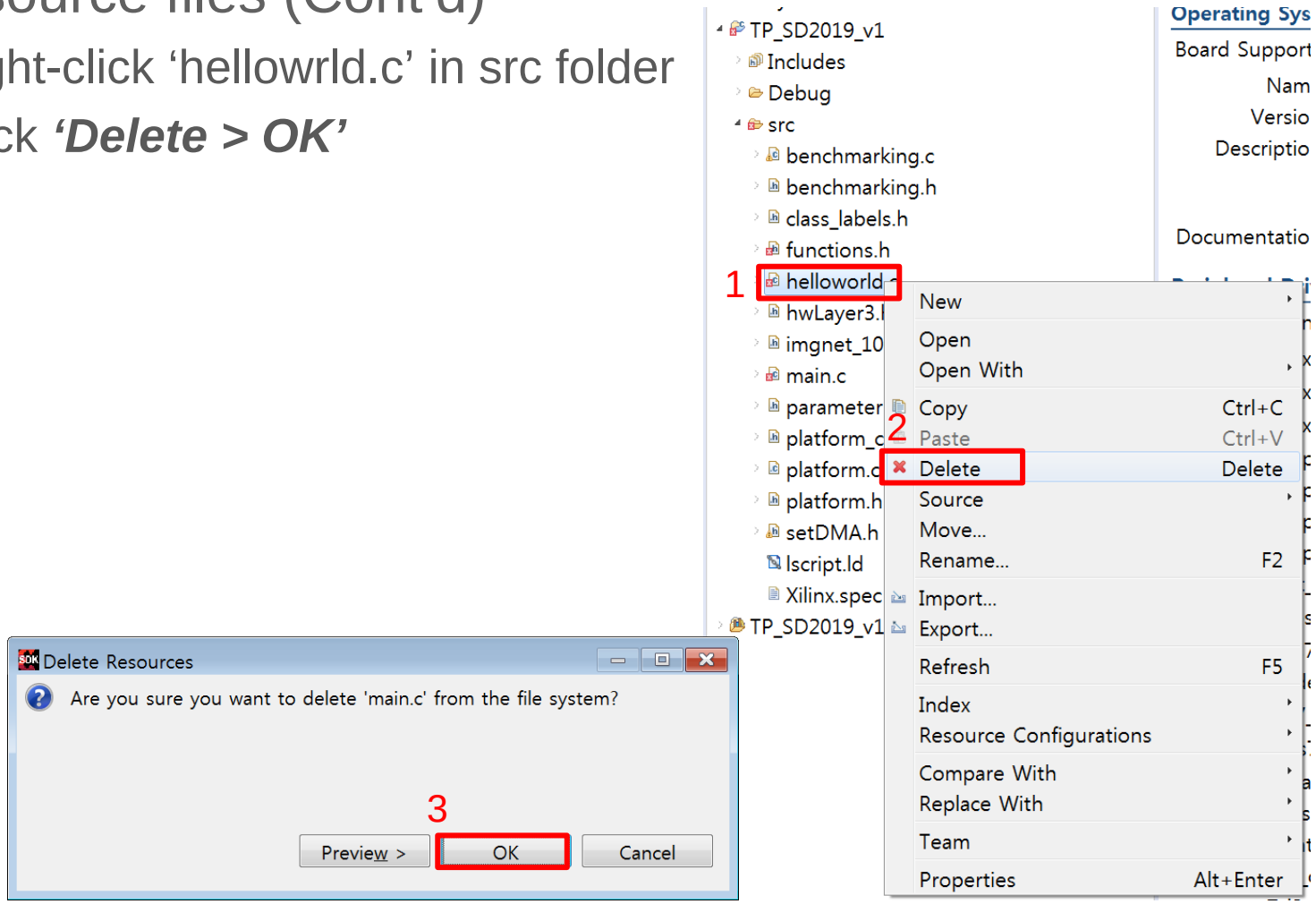
Running C Applications

- Add source files
  - Choose ‘your project name’
  - Unzip and copy src folder and paste into the ‘your project name’ folder
  - Click ***‘OK > Yes To All’***



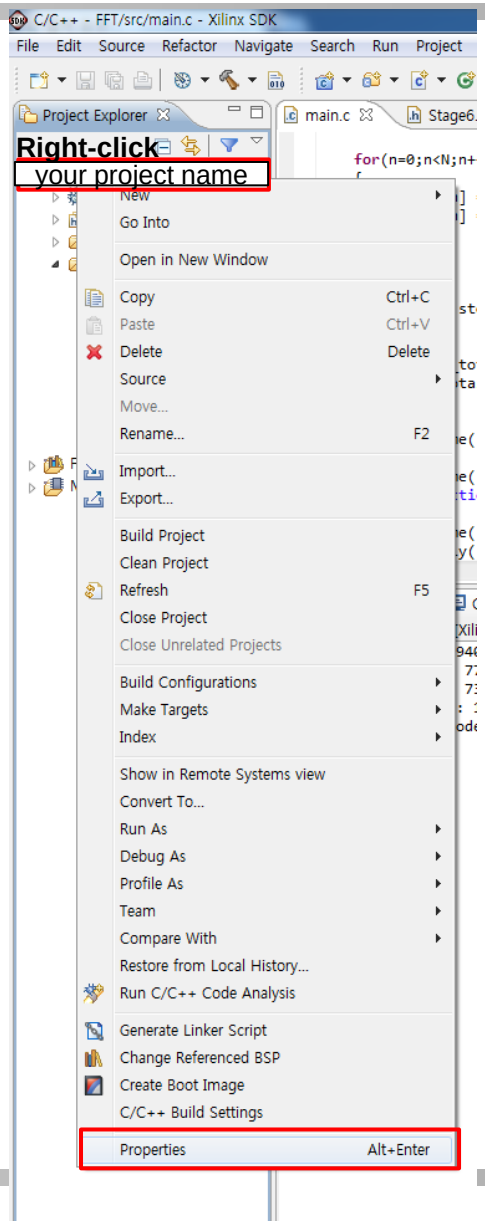
Running C Applications

- Add source files (Cont'd)
  - Right-click 'hellowrld.c' in src folder
  - Click ***'Delete > OK'***



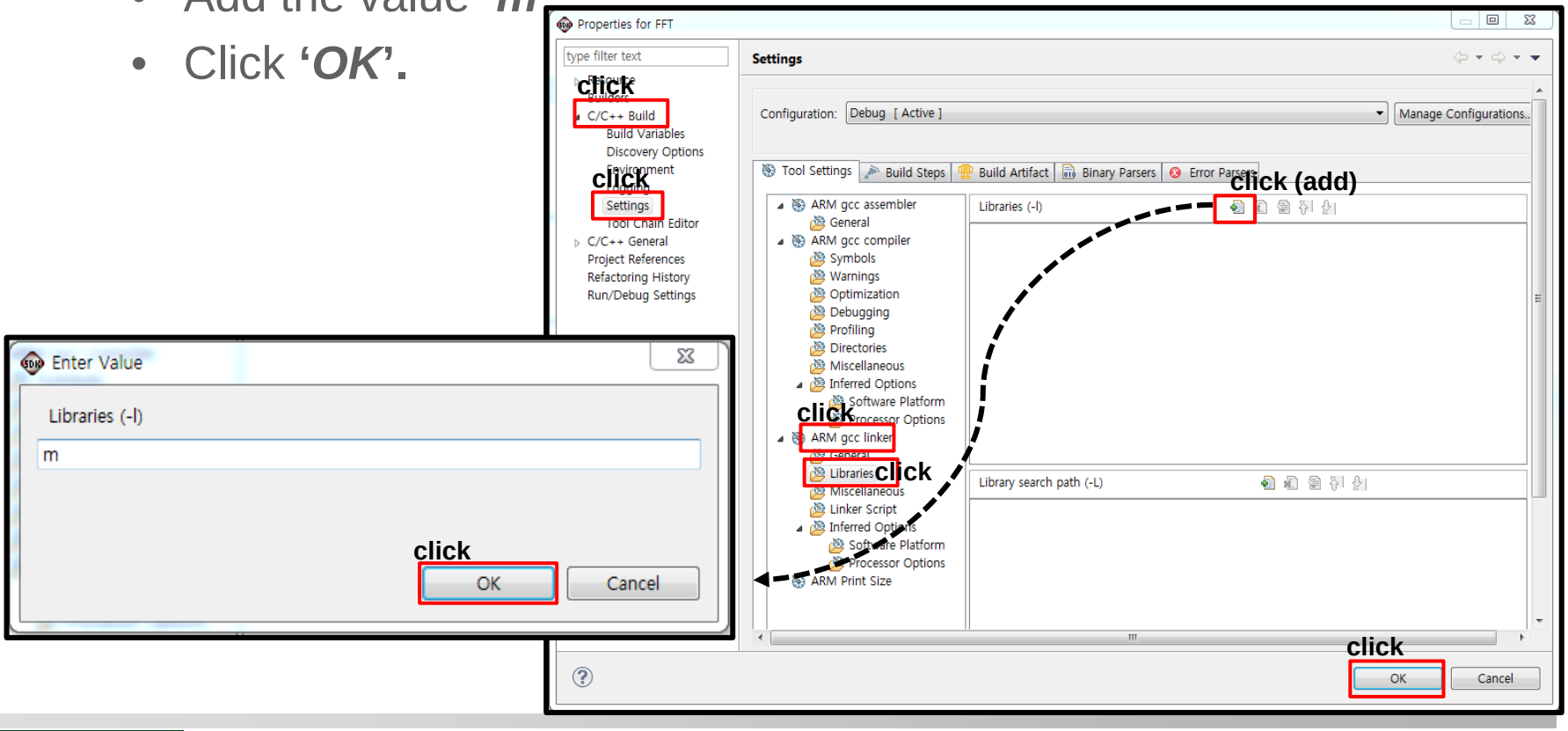
Running C Applications

- Adding Math Library
  - Project must have ***'–lm library'*** to use ***'math.h'*** header file.
  - Right-click ***'your project name'*** and then click ***'Properties'***



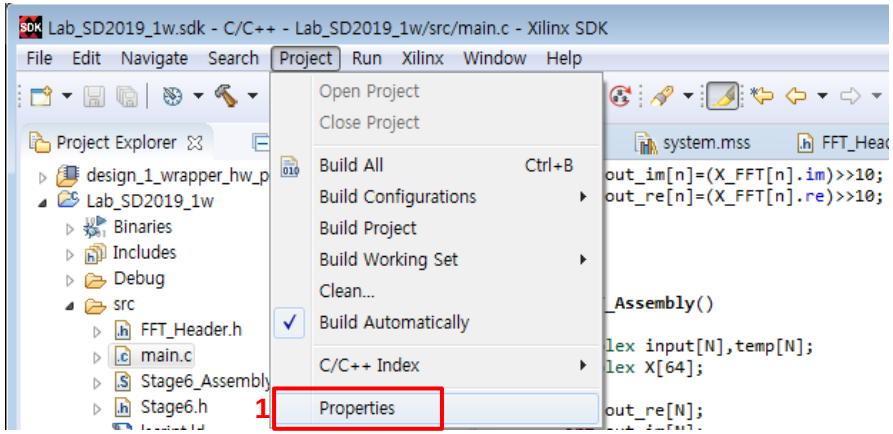
Running C Applications

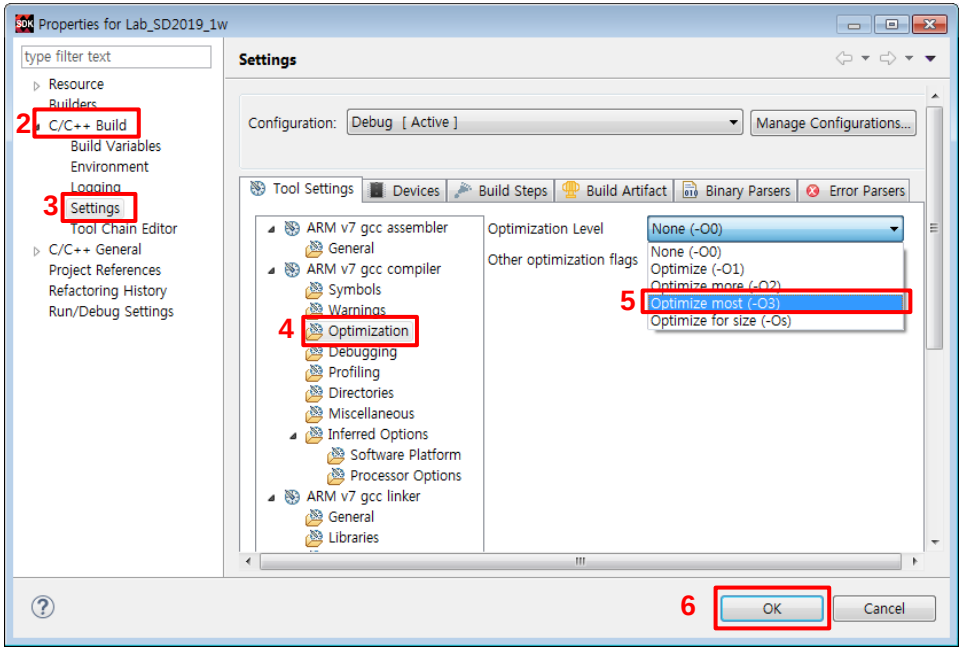
- Adding Math Library (Cont'd)
  - Click ***'C/C++ Build*** > ***Settings*** > ***ARM gcc linker*** > ***libraries*** > ***add'***
  - Add the value ***'m'***
  - Click '***OK***'.



Running C Applications

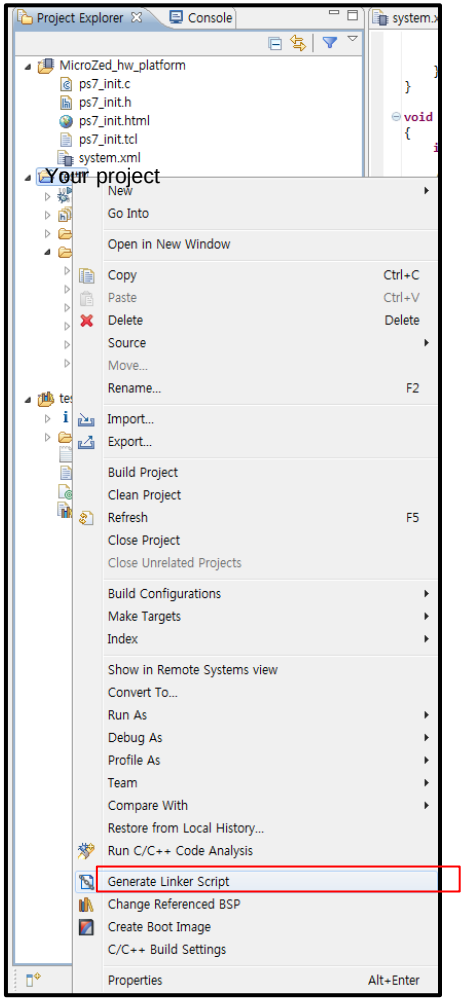
- Set the compiler optimization level
  - Select ***'Project'*** menu and click ***'Properties'***
  - Select ***'Settings'*** tap and click ***'ARM v7 gcc compilier > Optimization'***
  - Select ***'Optimization most (-O3)'*** in the dropdown menu of ***'Optimization Level'***
  - Click ***'OK'***





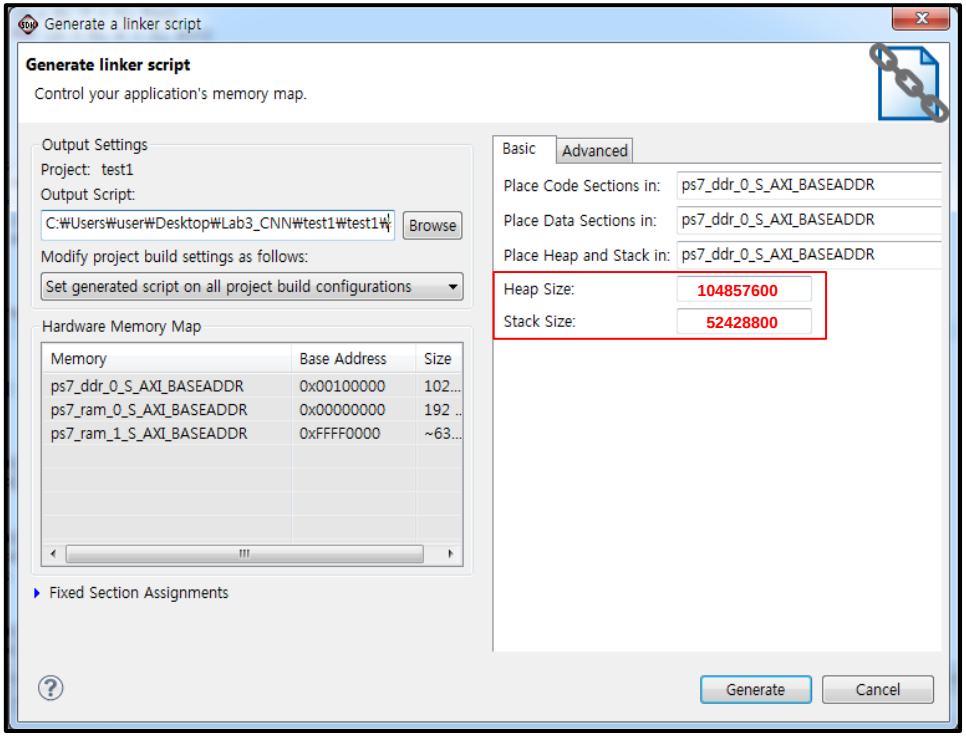
Running C Applications

- Setting Stack & Heap Size
  - Select the application project in the ***Project Explorer*** or ***C/C++ Projects*** view
  - Right-click ***'your project name'*** and then click '***Generate Linker Script'*** or click '**Xilinx Tools > Generate Linker script'**



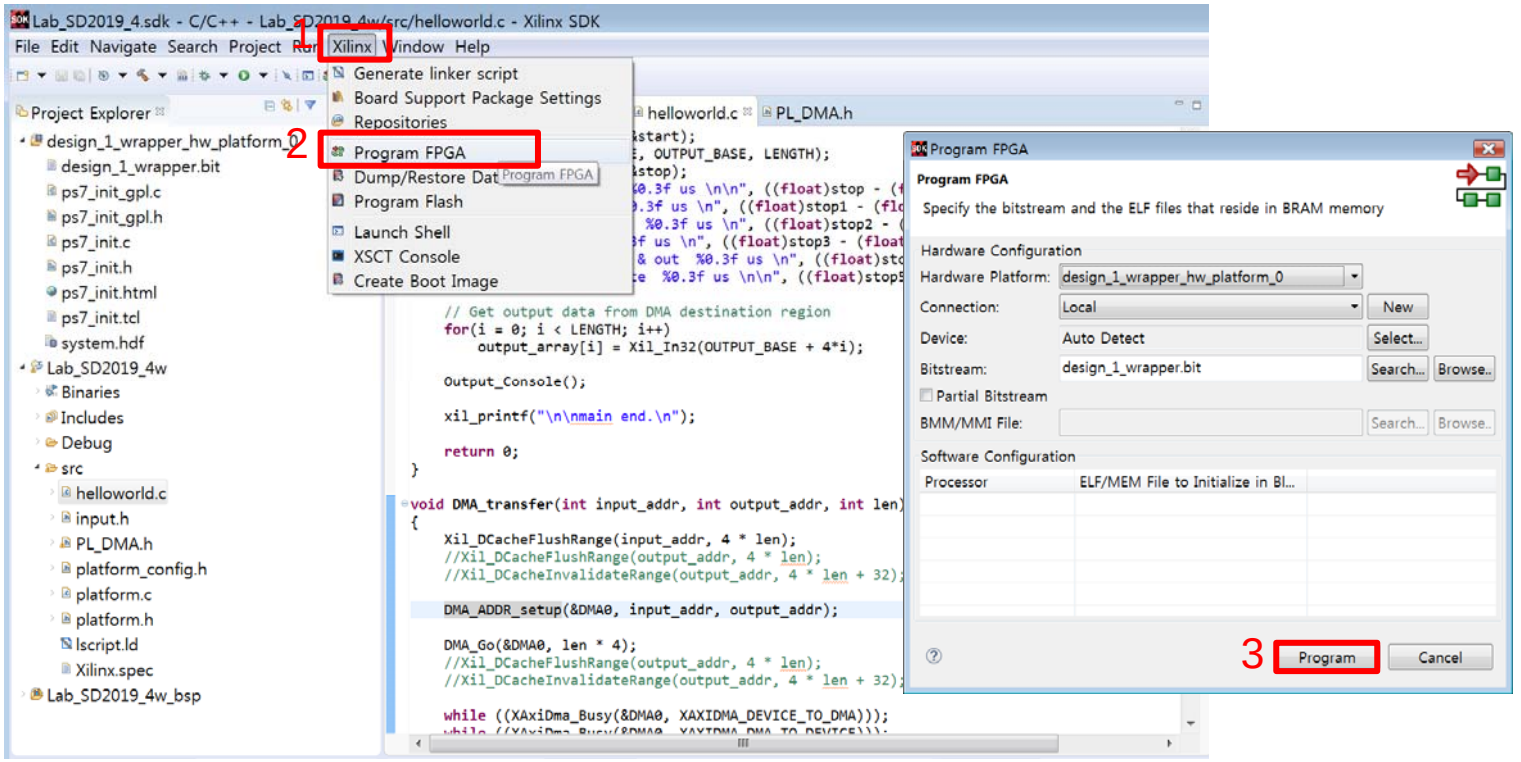
Running C Applications

- Setting Stack & Heap Size (Cont'd)
  - Set both the heap and stack sizes in the ***Basic*** tab to ***104857600*** (100 MB) and ***52428800*** (50 MB) respectively, as shown below



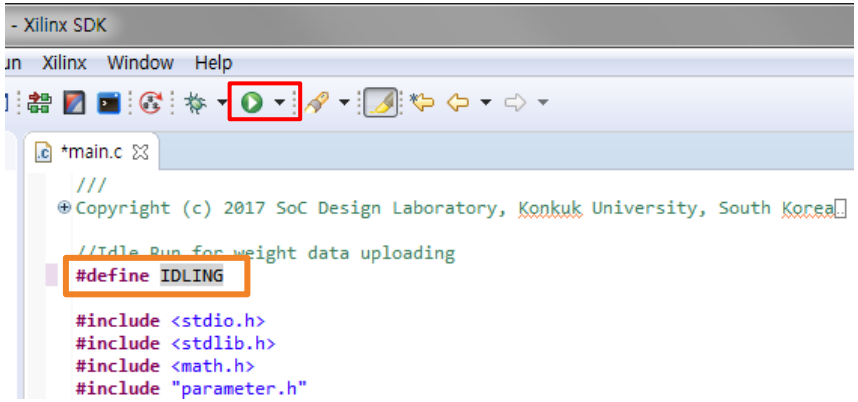
Running C Applications

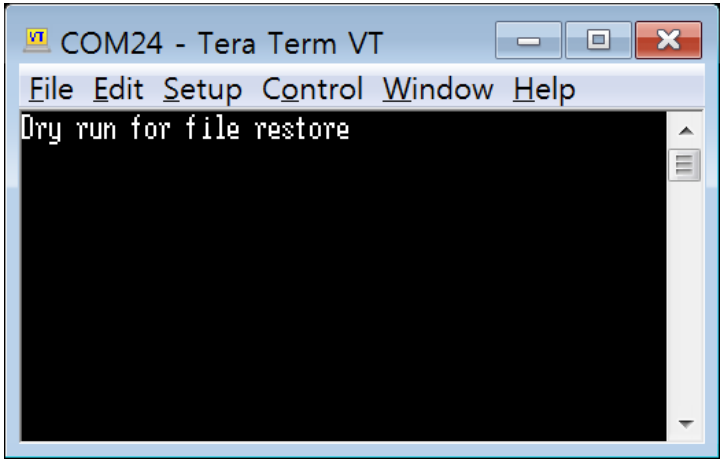
- Program FPGA
  - Choose the ***'Xilinx'*** menu and then click ***'Program FPGA'***
  - Click ***'Program'***



Running C Applications

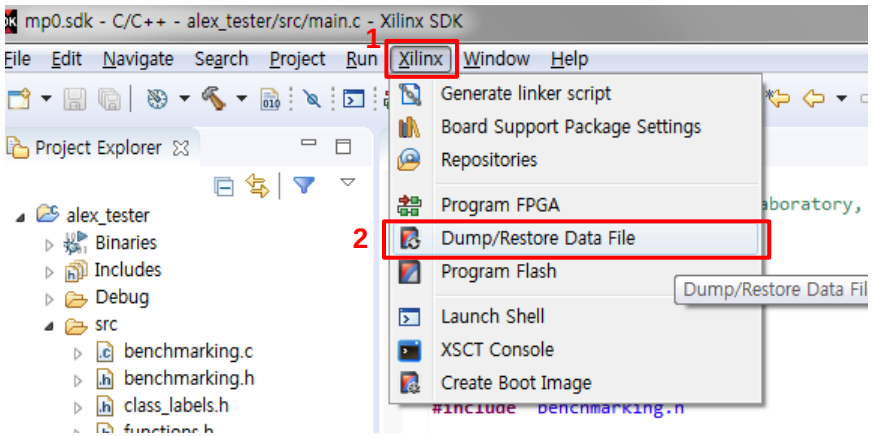
- Check the source code: **main.c**
  - Make sure that **'#define IDLING'** is written at the top of the source code
- Run the application
  - This application is simply for uploading the convolution weights into the DDR





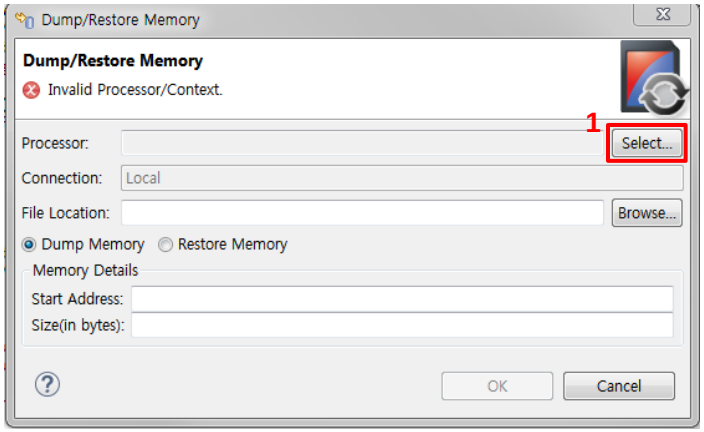
Running C Applications

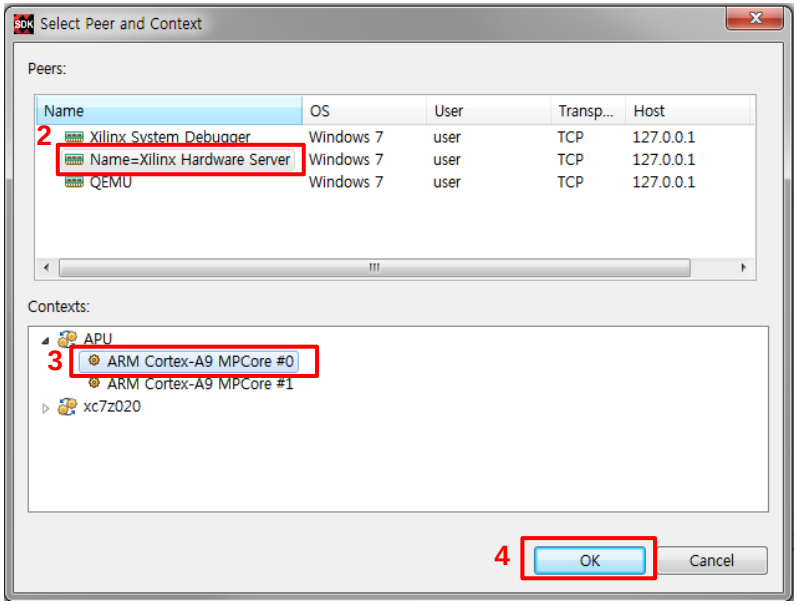
- Restore Memory
  - Click '***Xilinx > Dump/Restore Data File***'



Running C Applications

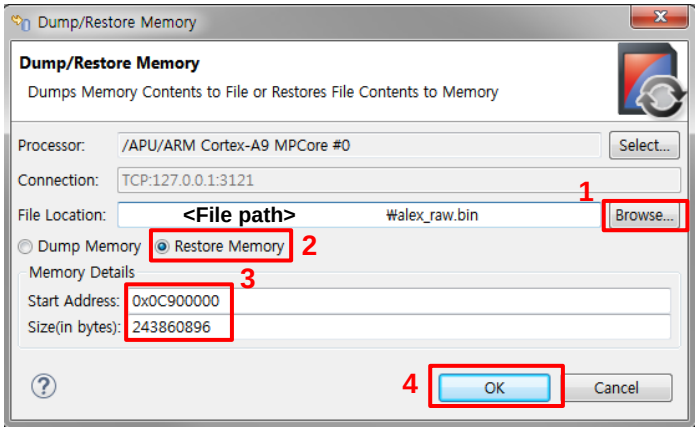
- Restore Memory (Cont'd)
  - Click '***Select***'
  - Select '***Name=Xilinx Hardware Server***'
  - Select '***ARM Cortex-A9 MPCore #0***'
  - Click '***OK***'





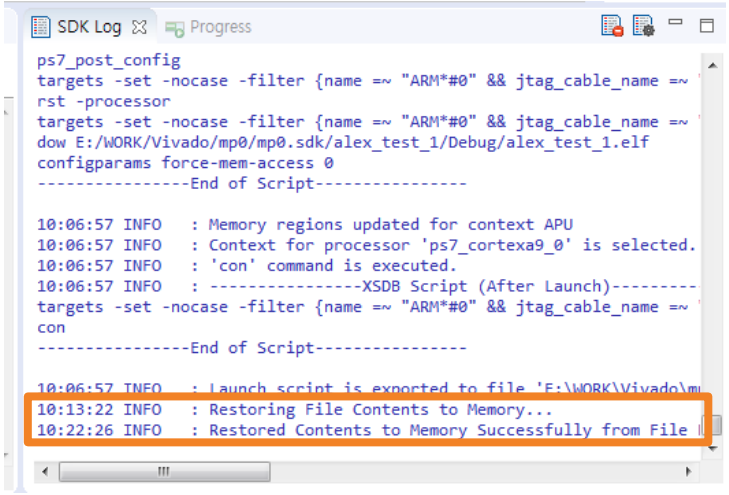
Running C Applications

- Restore Memory (Cont'd)
  - Click '***Browse***' and select file **alex_raw.bin**
    Download link:
    https://drive.google.com/open?id=122wv9t3FVrXlQYgc9bk7eK_L5-Q8ansA
  - Select '***Restore Memory***'
  - Type **0x0C900000** on '**Start Address**' and **243860896** on '**Size(in bytes)**'



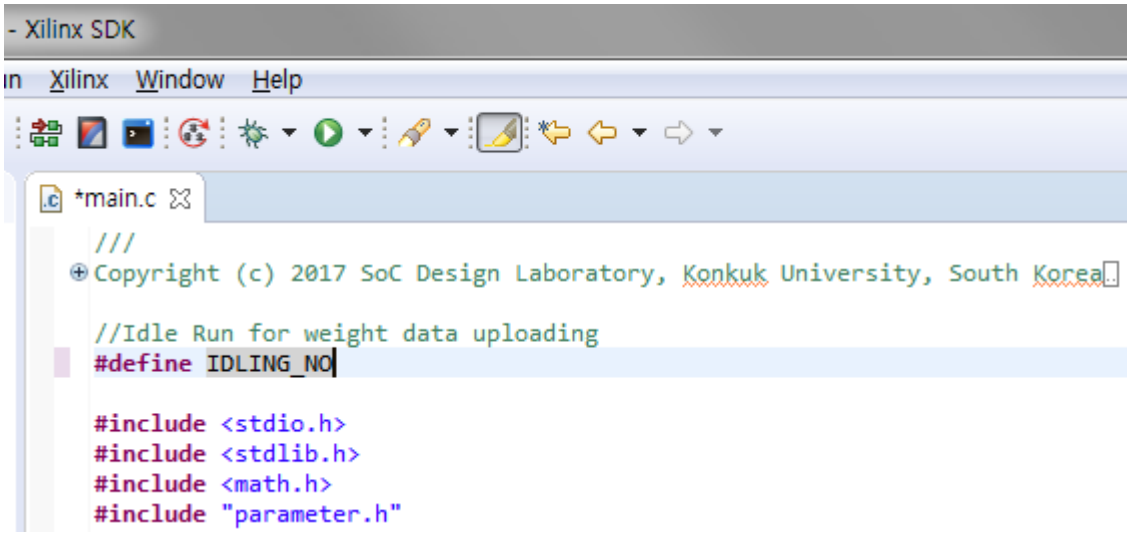
Running C Applications

- Restore Memory (Cont'd)
  - Check the SDK log window (which may take about 9 minutes) to see the message '***Restored Contents to Memory Successfully from File ~***'



Running C Applications

- Modify the source code: ***main.c***
  - Change **'#define IDLING'** to **'#define IDLING_NO'** (or anything different from **'IDLING'**)
- Run the application again
  - This application is for actually running the CNN algorithm



Running C Applications

- Run the application again (Cont'd)
  - Check the output of the application on ***'Tera Term'***