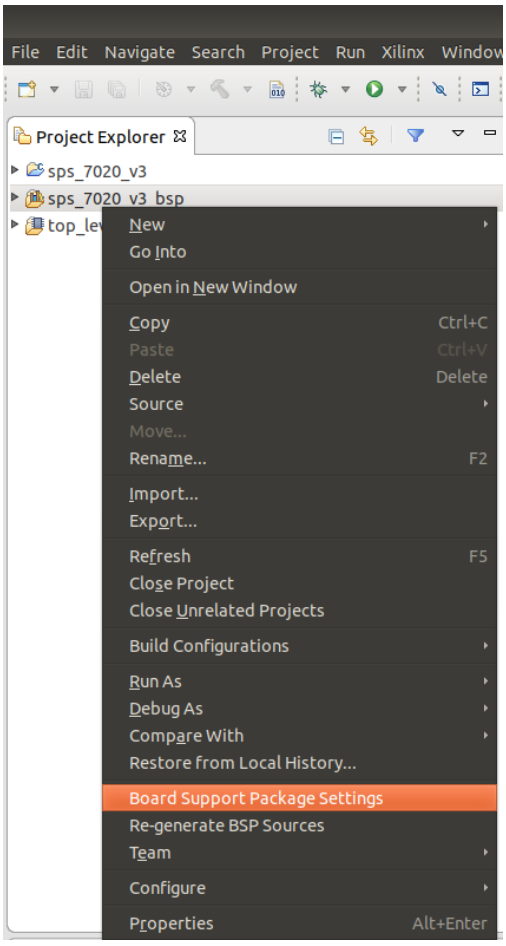
Booting Zynq-7000 from a SD Card

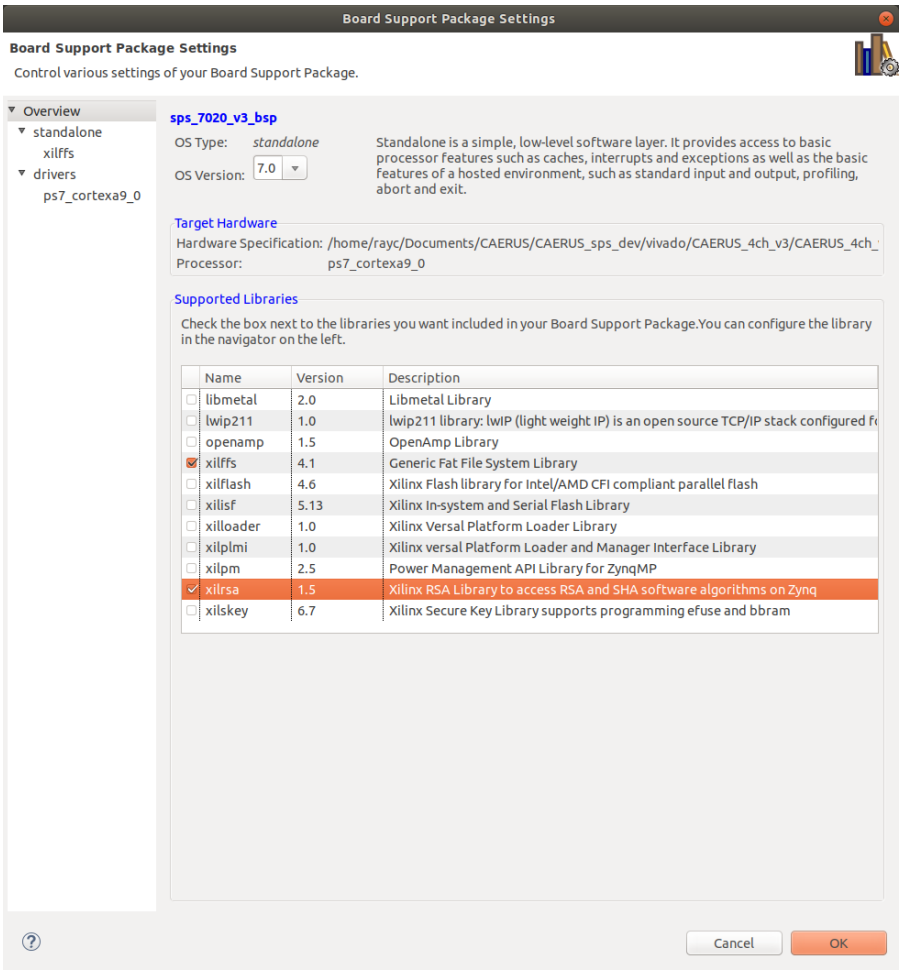
This guide will walk you through the process of creating the projects and files necessary for booting a Xilinx Vivado project from an SD card on a Zynq-7000 series FPGA.

Creating a First Stage Boot Loader and Boot Image

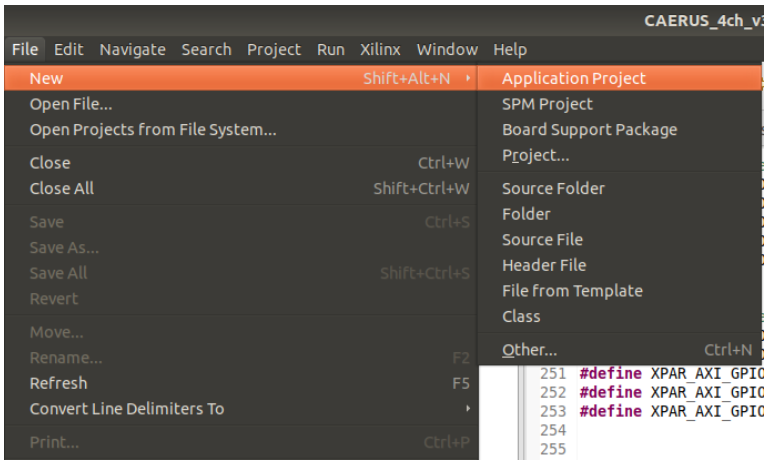
1. Open the Vivado project that you want to load onto an SD card, and open SDK from the project. It is assumed that at this point, the main C project, board support package project, and hardware platform project all work.
2. If xilrsa and xilffs are not enabled on the board support package settings, right click the bsp project and select "*Board Support Package Settings*". If they are enabled, skip to step 4.



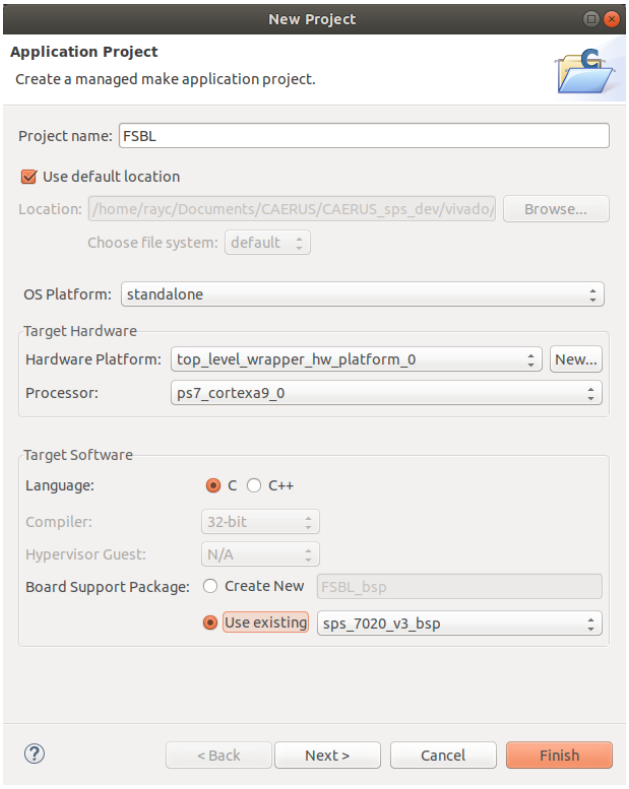
3. In the popup, check the boxes for xilrsa and xilffs then hit okay.



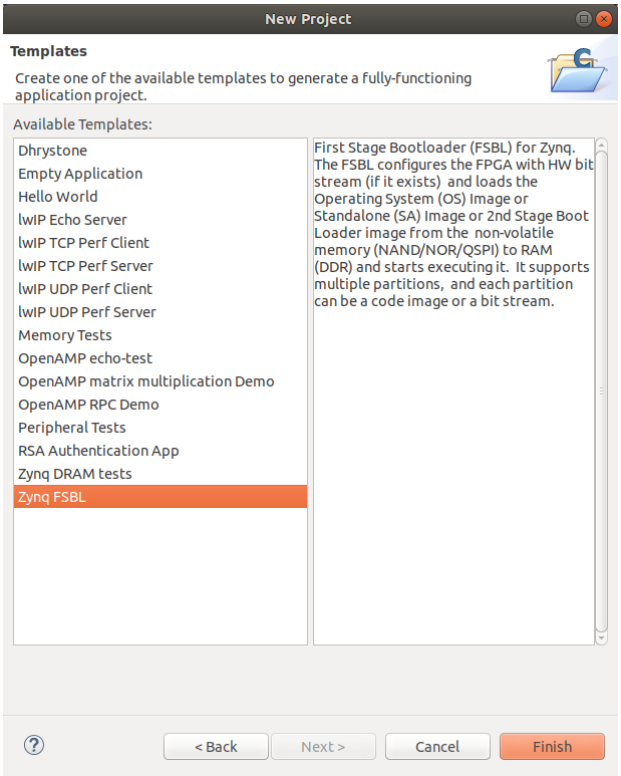
4. Create a new application project by clicking "*File*"→"*New*"→"*Application Project*"



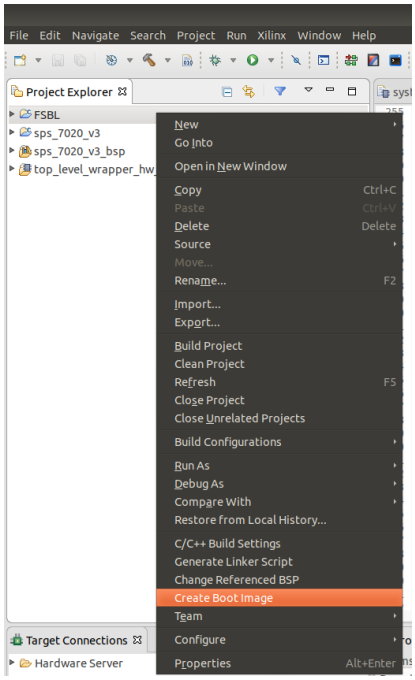
5. Name the project "*FSBL*" for first stage boot loader and change the "*Board Support Package*" to the bsp that you already have created.



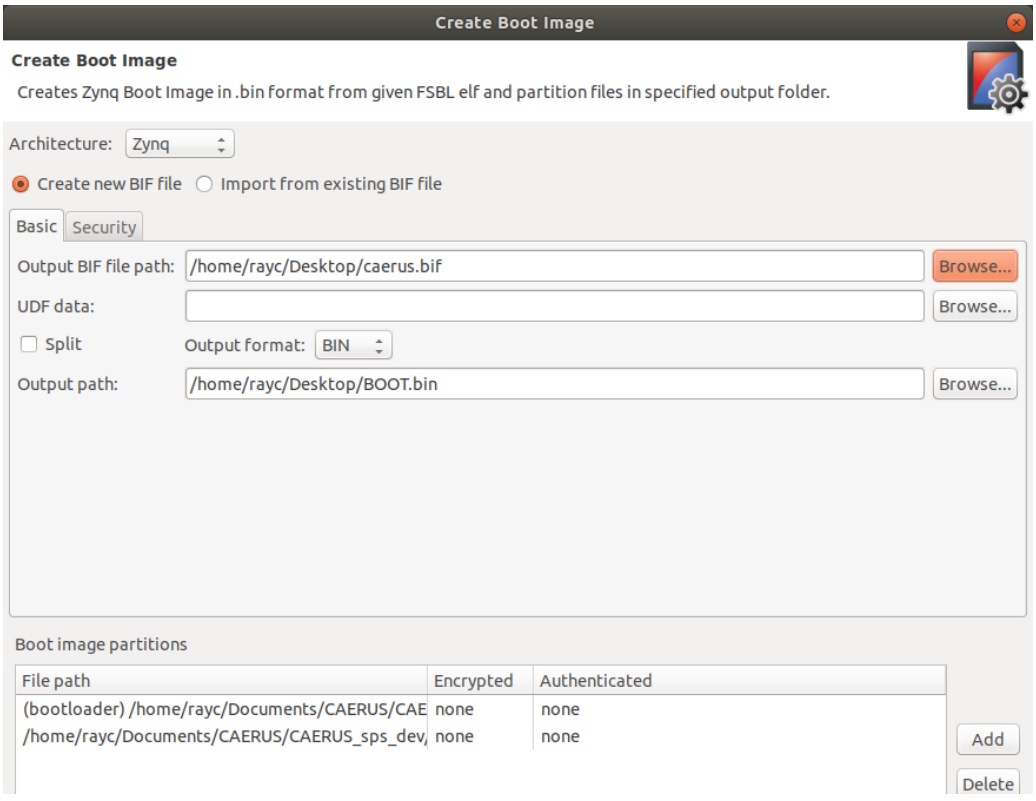
6. Hit "*Next >*" then choose the "*Zynq FSBL*" project template.



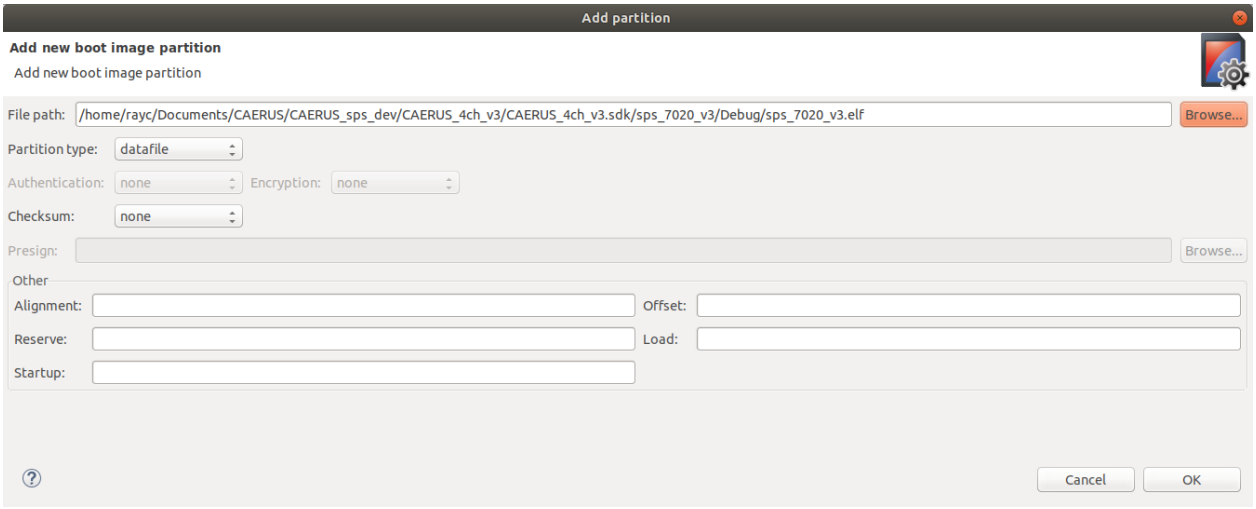
7. Click the “*Finish*” button.
8. Highlight the “*FSBL*” project, right click, and choose “*Create Boot Image*”



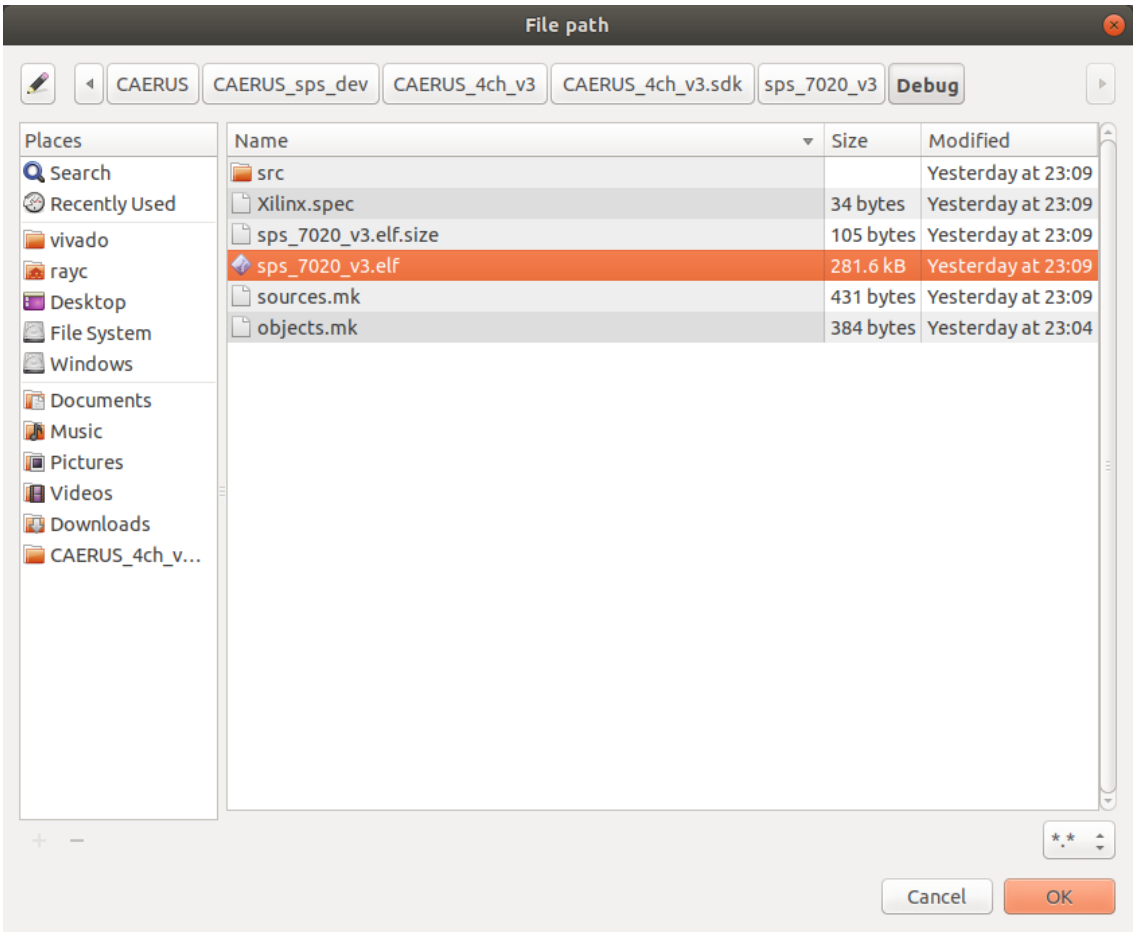
9. In the popup, choose a location for the output BIF file so you can easily find it. This example will place it on the desktop. The BOOT.bin file path will be automatically generated from the BIF file path.



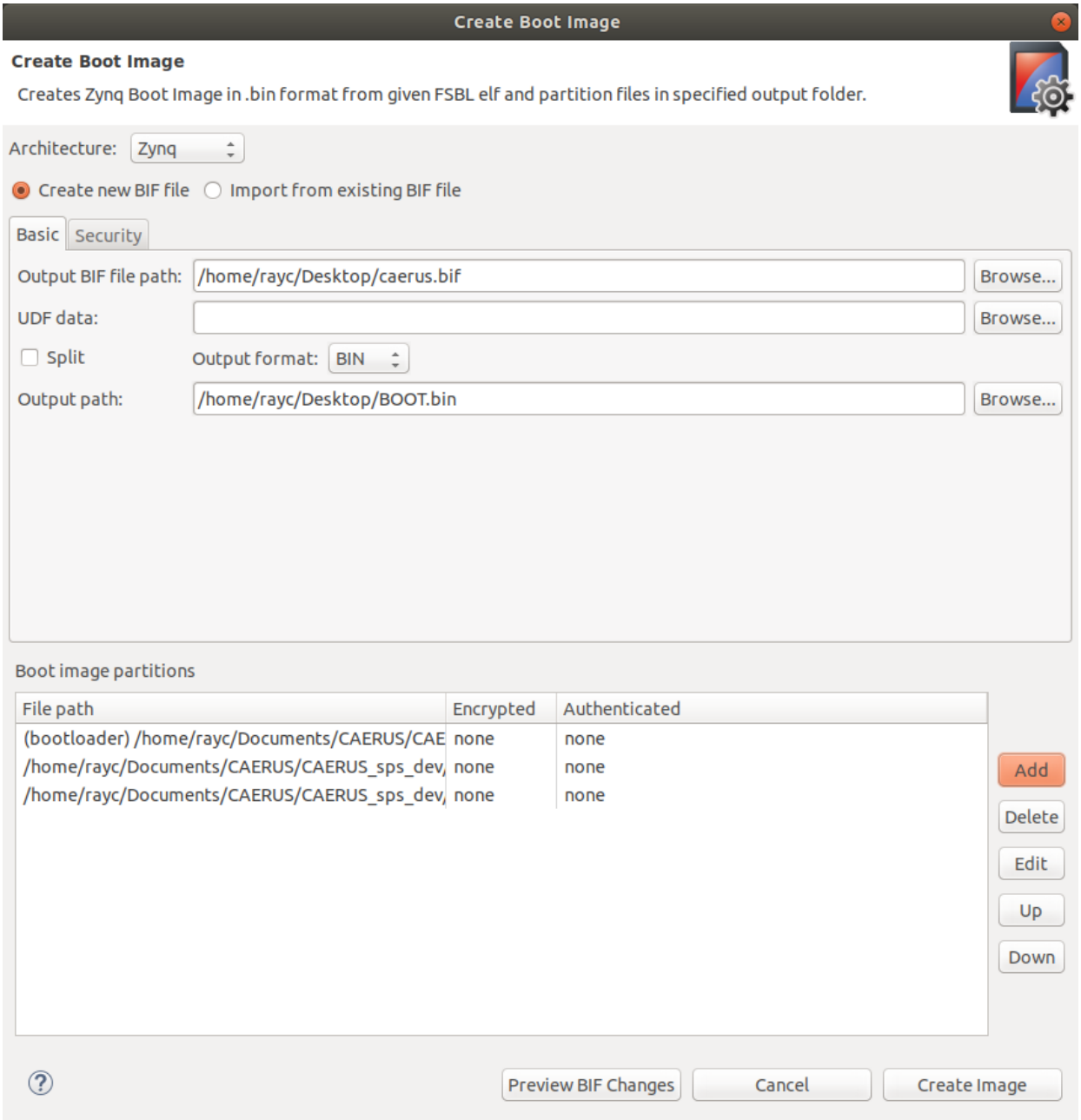
10. By creating the boot image from the FSBL, the bootloader .elf file and the bitstream .bit file from the hardware platform will automatically be populated in the "*Boot image partitions*" section. If you do not create the boot image from the FSBL, you will have to manually populate these in the proper order. Hit the "*Add*" button to add another partition.



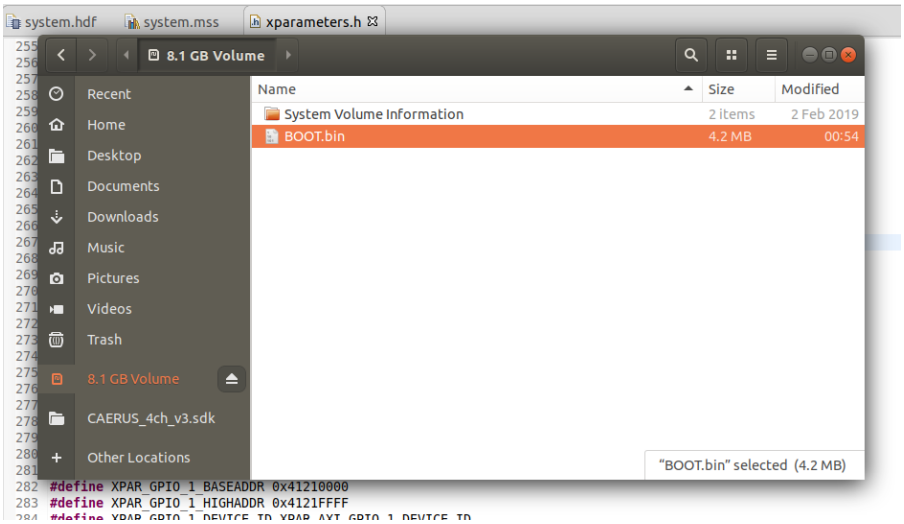
11. Browse to the .elf file for the main C project and hit "*OK*".



12. Make sure the .elf file is labeled as a datafile. Only the FSBL.elf file should be a bootloader. The bitstream should always come in between the two .elf files.



13. On your desktop, there should be two new files. Only the BOOT.bin file is needed. Copy it onto a microSD card with FAT formatting (if the card came from the ECE parts room with the board, then it is likely already programmed correctly).



14. Put the SD card in the FPGA. Ensure the jumper on the board is on SD and then power the board. If all goes well, the red LED should immediately power on, and after a few seconds, the green "*Done*" LED should activate.

Useful Links for SD Card Booting and Debugging

Zynq-7000 SoC: SD Programming/Booting Checklist
https://www.xilinx.com/support/answers/59476.html

SDK - How to debug FSBL code
https://www.xilinx.com/support/answers/71671.html

Files Necessary for Zynq Booting from SD Card
https://forums.xilinx.com/t5/ACAP-and-SoC-Boot-and/Zynq-booting-from-SD-Card/td-p/470062

Creating a Boot Image
https://www.xilinx.com/html_docs/xilinx2018_2/SDK_Doc/SDK_tasks/task_creatingabootimage.html

Creating a FSBL Project
https://www.xilinx.com/html_docs/xilinx2018_1/SDK_Doc/SDK_tasks/task_creatinganewzynqfsblapplicationproject.html