Quartus Safe Project Installation

(Last verified for Quartus Prime Lite Edition 25.1 and ModelSim 19.1)

Preface

Until the following *pof* file is programmed and confirmed to be functioning, do **NOT** program your DE10-Lite while the board is connected to anything (other than power and ground) on your breadboard. Doing so risks **PERMANENTLY** damaging any attached components **AND** the DE-10!

- By default, Quartus programs unused pins as outputs.
- An output pin can be destroyed if a contending signal is inputted into it (you will learn more about this later in the course)!
- In **ALL** future projects, ensure that you set unused pins as tri-stated via the following steps:
    i. In the *Assignments* menu, select *Device*
    ii. Select *Device and Pin Options…*
    iii. Select the *Unused pins* tab and then select "*As input tri-stated*." Press *O*K in both windows.
    iv. Recompile the design before programming.

The following instructions walk through the installation of the **ONLY** *pof* (Programmer Object File) programmed to the DE-10, to ensure a consistent and safe startup state. All other coursework will be programmed as a *sof* (SRAM Object File) to *volatile* memory, which is erased when power is disconnected.

(Last verified for Quartus Prime Lite Edition 25.1 and ModelSim 19.1)

Programming your DE-10-Lite for a SAFE STARTUP STATE

A. Unarchiving the Files

1. Download the provided POF file.

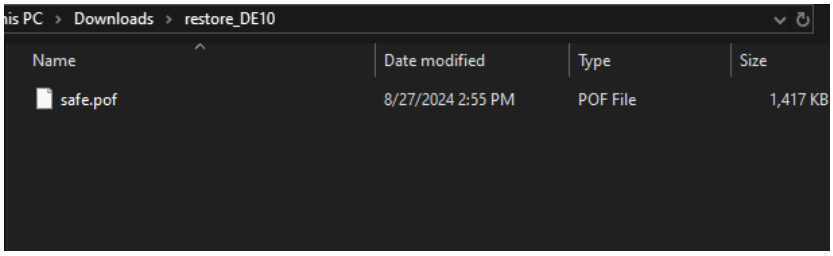

Figure 1: Extracting the Safe Programmer File.

2. Launch *Quartus Prime.* A project is NOT necessary for this process.
3. Press the *Tools* menu, then *Programmer* to open the *Device Programmer*.

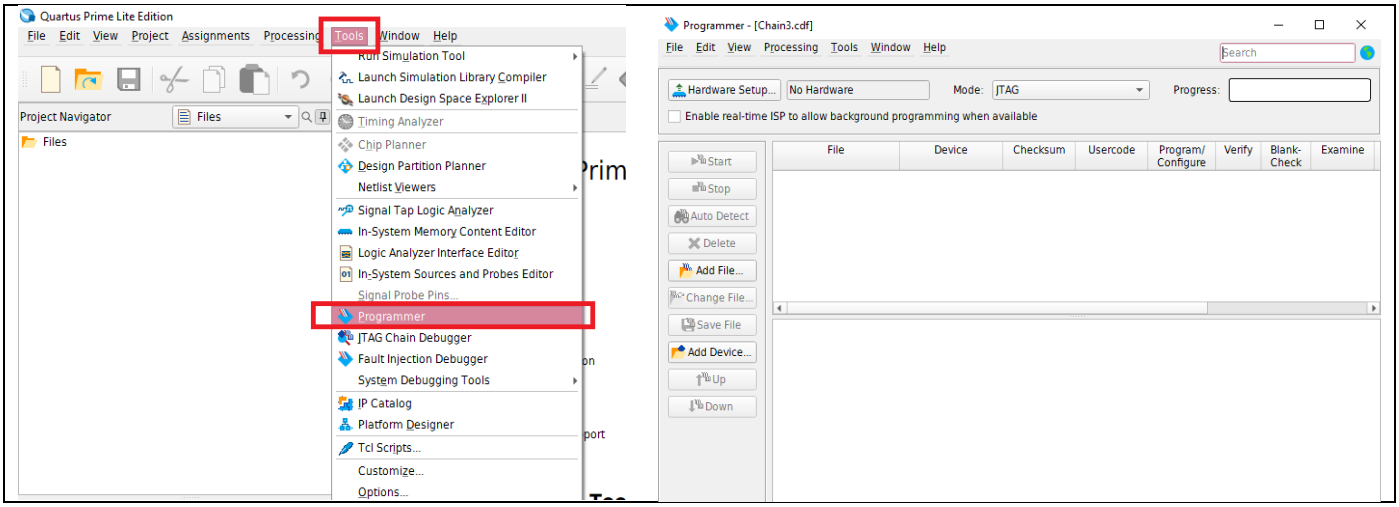

Figure 2: Launching the Programmer.

B. Driver Installation

If you have not yet installed the driver necessary to program your DE10-Lite, attach the DE10-Lite to your computer and complete the driver installation as specified below.

1. Connect the USB-Blaster (DE10-Lite) to your PC.
2. Open Device Manager.
3. Locate *USB-Blaster* under *Other devices*.
4. Right-click on *USB-Blaster* and select *Update Driver*.
5. Choose *Browse my computer for drivers*.
6. Select the *Browse...* button in the new window.
7. Navigate to your Quartus installation directory:
   - This is typically found at: `C:\altera_lite\25.1std\quartus\drivers`
   - Adjust the path according to your specific Quartus version (e.g., it may not be 25.1std for you).
   - Note: Stop at the `drivers` folder, i.e., do not go deeper by opening a folder within the `drivers` folder.
8. Confirm the file path and click *Next*.
9. If prompted by Windows Security:
   - Check the box for *Always trust software from "Altera Corporation"*.
   - Click *Install*.

C. Configuring the Programmer

1. Within the Programmer, select *Hardware Setup…*

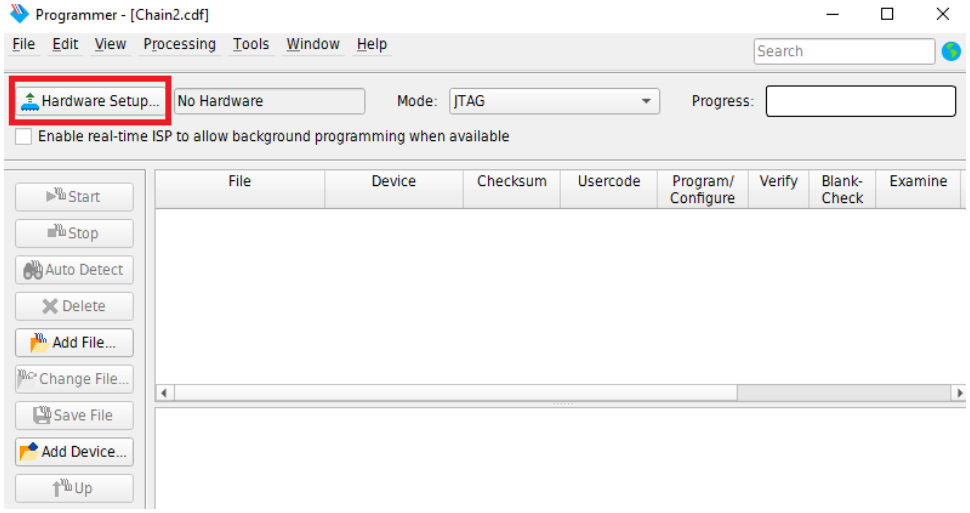

Figure 3: Opening Hardware Setup.

2. If you have properly installed the drivers as instructed above, you should see a device labeled *USB-BLASTER*. If not, repeat Part B. **NOTE**: Ensure that other programs utilizing USB, such as Waveforms (for your DAD 3), are closed, as this can contend with the DE10-Lite.

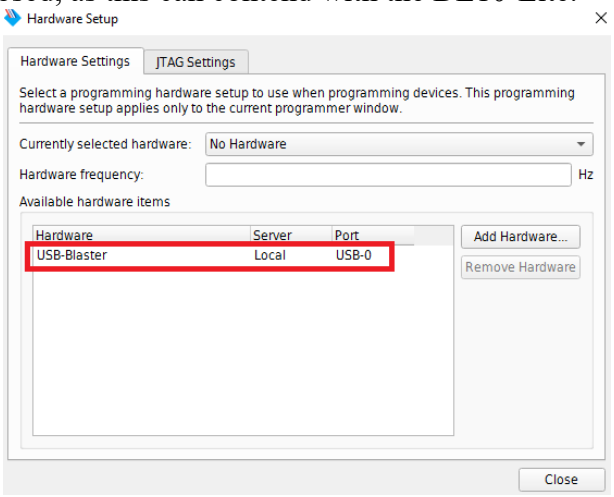

Figure 4: Identifying the Connected Device.

3. Select the Drop down for *Currently selected hardware:* and select the *USB-Blaster*.

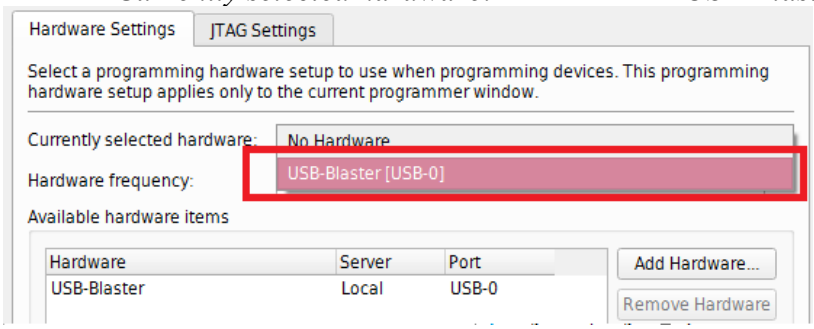

Figure 5: Selecting the Device in the Programmer.

D. Flashing the DE10-Lite

With the above steps completed, you are almost done! We must select the correct file to flash, and program the DE10-Lite.

1. Select *Add File…*, navigate to the directory you downloaded the pof to and select *safe.pof*.

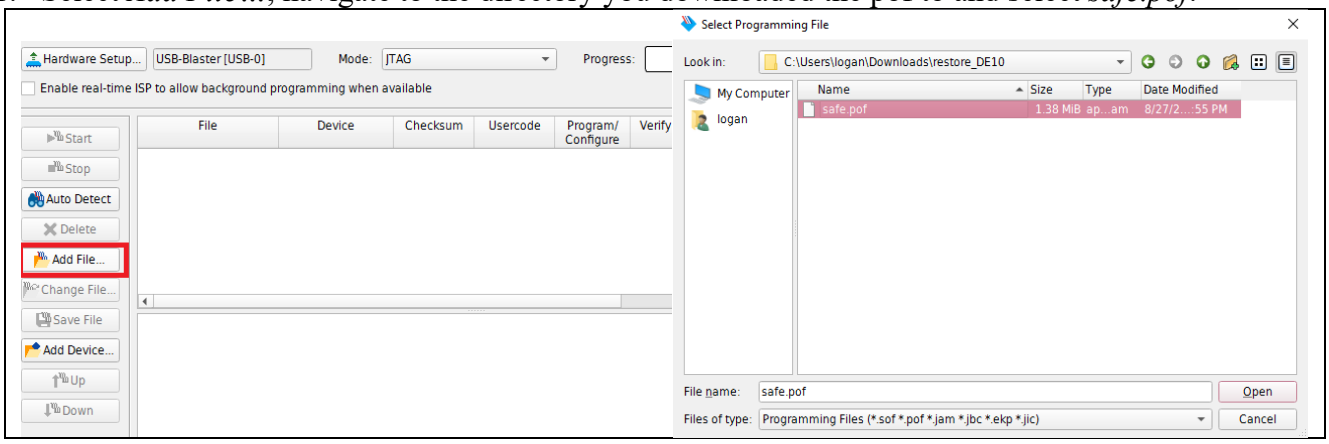

Figure 6: Adding the pof file.

2. Back in the Programmer window, enable the checkbox for *Program/Configure*. Then click Start. This will flash the safe program into your DE10-Lite's *non-volatile* flash memory, making it the default program on power-on.

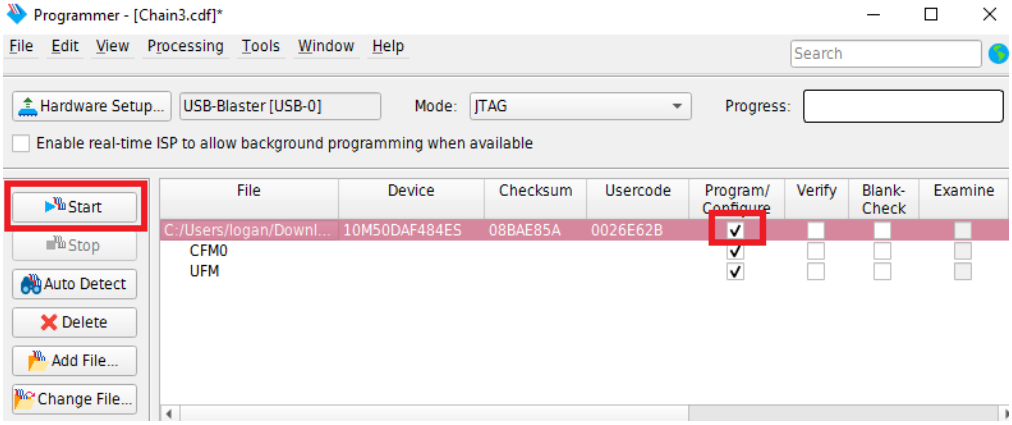

Figure 7: Flashing the DE10-Lite.

E. Ensuring Proper Functionality

To ensure that your DE10-Lite is functioning properly, you must check a few things:

1. Look at the 7-segment displays as the provided "EEL3701" text scrolls. Ensure that none of the segments are failing to illuminate. If they are, let your PI know.
2. To the right of the 7-segment displays, look at the 10 LEDs above the set of switches. To ensure that the *accelerometer* functions, tilt your DE10-Lite and ensure that the illuminated LEDs track its orientation.
3. Lastly, hold down *KEY0* (the depressible button closest to the VGA header). This will illuminate ALL onboard LEDS simultaneously. Check for any LEDs failing to illuminate. If there are any, let your PI know.

A video of the results of "safe" programming is available here.