Quartus Tutorial on Instantiating VHDL specified UART 6402 file in logic block

Make sure to save previous work and exit Quartus to break linkages to previous contents in the “work” library. This resets all the internal states in the program to avoid linking to prior perhaps incorrect efforts.

Go to the course web site and download the UART VHDL file for the Berkeley 6402. Put the following link into your browser (FIREFOX, & EXPLORER works, but it looks like it does not work on Safari).

https://ecse.rpi.edu/courses/F16/ECSE-4770/LAB_5/HD-6402_Files.zip

You will download a .zip file and the third item broken out, “Original Code,” contains the file UART_6402.vhd. Just as a check, right click on that file, click “show properties,” and it should indicate that the file is a “Hard Disk Image File,” not a “text file.”

Place this file in a convenient file location that has a simple. Easy to remember path such as C:\Altera\CHD15

1) Open Quartus and create a new project. BUT MAKE THE PROJECT NAME the same UART_6402 (else the file evidently cannot be found)

Hit Next and the page for adding a file to this project will present itself. Unlike the earlier tutorials where we ignored this page use this one to locate and add your VHDL UART file by that easy to remember path C:\Altera\CHD15. You can find this easily by clicking on the triple dot button which will open this page:
Then select by highlighting the UART_6402 line hit the Add button and it will move the File name down into the summary area, where the Type is clearly shown as VHDL file as “Hard Disk Image File.” If you have done this incorrectly you may see file type “Text” instead. This happens if you do not properly put the “Hard Disk Copy” into the CHD13 folder. This is easy to happen if you are on a MAC with Fusion.

Now click the Next button which will ask you once again to select Cyclone II and the specific device which is EP2C35F672C6

Finally hit “Next” to toggle to the verification page and then “finish.”
3. Next hit the “Create New Design File (notice that there is a second path to add Files to the project under this command box, namely “Add/Remove Files in Project), but in this case we added the UART at the start. Select “Design Files” => “VHDL File.”
When you hit OK, the VHDL insertion editor opens up. In this case because we earlier added the UART VHDL there is a selection possible for UART_6402.vhd.

Click on that UART_6402 Selection and the VHDL for the UART will open, and the text for the imported VHDL will appear in that text editing window. You can ignore the small boxes and vertical lines.
Next select “Processing” => “Analyze Current File”
The analysis should be clean as shown here below:

Then select the Compilation tool. If your project name is UART_6402, matching the added hard disk image name, the compiler will be able to find the disk image file with that same name, and the compilation will be successful (otherwise not!).
You may have to exit the program and reenter to attain successful compilation too since earlier results/states may be still lingering in the system. Even without this it is possible to create the circuit schematic block entity so this code block can be used in a schematic.

To do this we do the usual “**New**” => “**Create/Update**” => “**Create Symbol Files For Current File**”

This should create the desired symbol.....which in this case is named Block1.bdf.
To use this symbol, create a new Design File and click on Block1.bdf. The symbol for the UART should appear in your new Design File area, and you should save it with a name such as “Lab5design.” You will notice that it has some bus fixtures, which were discussed in an earlier tutorial.
The Create Design selection also has a feature to add the VHDL file later if you have done other parts of the schematic first.

**REMEMBER** to save all your work before exiting the program using SAVE.
We can now begin to create a new block diagram schematic with this block AND say a memory block. To add the memory block we need to create it using the **MegaWizard**. Use the logic element selection tool to open the component list and scroll down to the “primitives” section. Select **Storage** and then the **MegaWizard Plug-In Manager**.
Select **Next** and then select **Memory Compiler**

Then click the **Next** button and under **Memory Compiler** select **RAM-1Port**.
Select the bit width of the memory (8b in this case) and the depth of the memory to be as small as possible (32 words in this case). Click Single Clock (default).

Then click Next, and unclick the “‘q’ output port” to drop output registering.
Click Next and Finish. The following page should open showing the new memory block, then click OK.
The memory block then appears in the UART_6402 window. Use the bus too to connect the 8bit RBR[7..0] UART output to the Data [7..0] port. Remember to use only two dots!

A bit more artwork ....