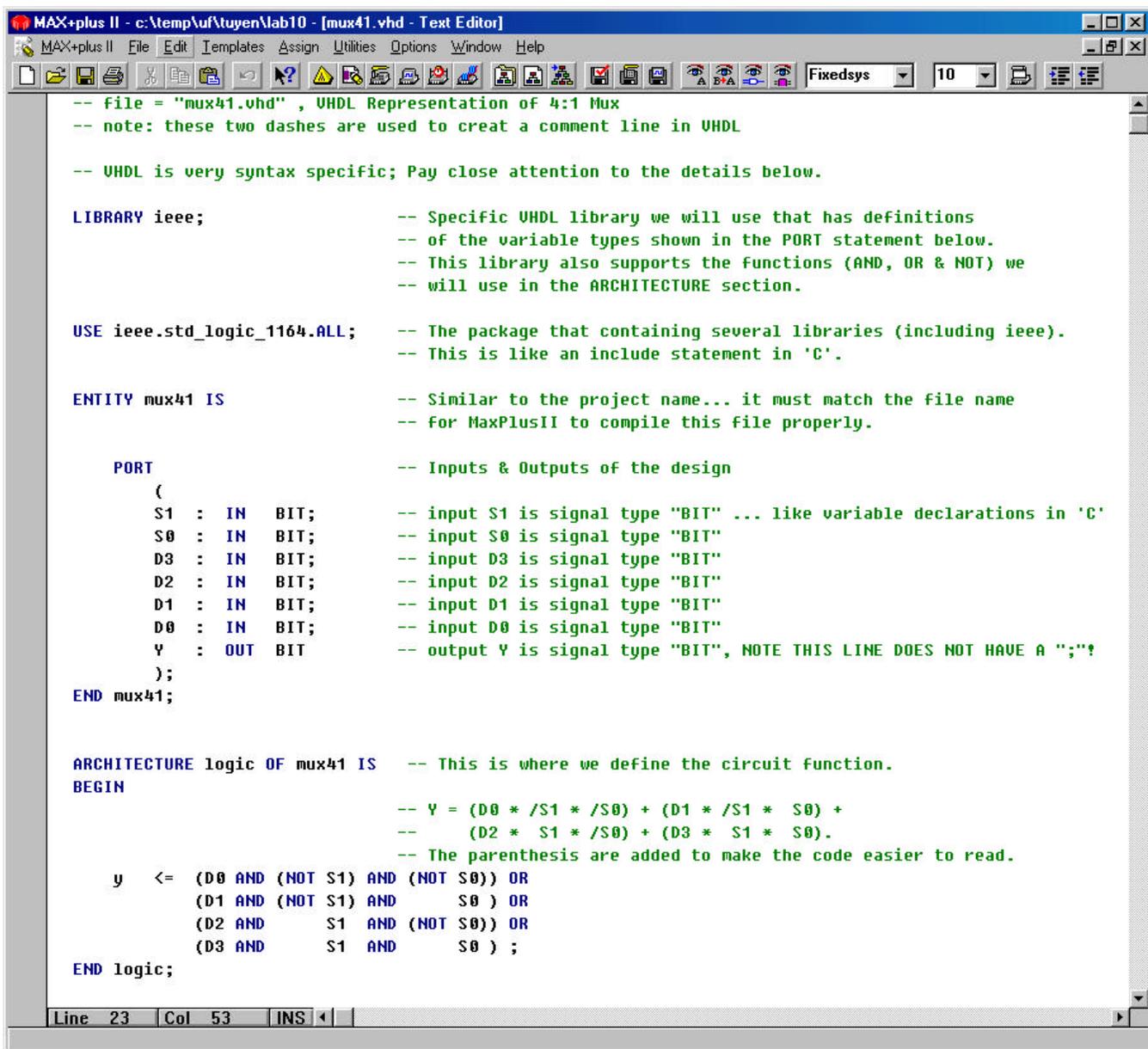


Title: Component Creation from VHDL Code MaxPlusII Tool Tip

Problem: You would like to create a component out of your VHDL code that will be placed onto your schematic or GDF file.

Solution:

We would like to create a graphical component out of the Mux41 VHDL code that was used in an earlier lab (i.e. mux41.vhd) and use it graphically in another design. This code is shown below:



```
MAX+plus II - c:\temp\uf\uyen\lab10 - [mux41.vhd - Text Editor]
MAX+plus II File Edit Templates Assign Utilities Options Window Help
Fixedsys 10

-- file = "mux41.vhd" , VHDL Representation of 4:1 Mux
-- note: these two dashes are used to create a comment line in VHDL

-- VHDL is very syntax specific; Pay close attention to the details below.

LIBRARY ieee;           -- Specific VHDL library we will use that has definitions
                        -- of the variable types shown in the PORT statement below.
                        -- This library also supports the functions (AND, OR & NOT) we
                        -- will use in the ARCHITECTURE section.

USE ieee.std_logic_1164.ALL;  -- The package that containing several libraries (including ieee).
                              -- This is like an include statement in 'C'.

ENTITY mux41 IS           -- Similar to the project name... it must match the file name
                          -- for MaxPlusII to compile this file properly.

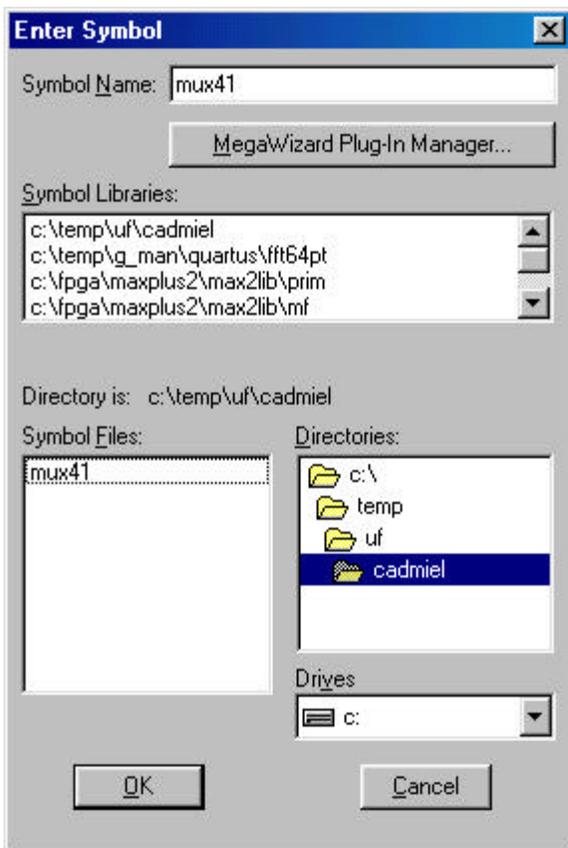
    PORT                  -- Inputs & Outputs of the design
    (
        S1 : IN  BIT;     -- input S1 is signal type "BIT" ... like variable declarations in 'C'
        S0 : IN  BIT;     -- input S0 is signal type "BIT"
        D3 : IN  BIT;     -- input D3 is signal type "BIT"
        D2 : IN  BIT;     -- input D2 is signal type "BIT"
        D1 : IN  BIT;     -- input D1 is signal type "BIT"
        D0 : IN  BIT;     -- input D0 is signal type "BIT"
        Y  : OUT BIT      -- output Y is signal type "BIT", NOTE THIS LINE DOES NOT HAVE A ";"!
    );
END mux41;

ARCHITECTURE logic OF mux41 IS -- This is where we define the circuit function.
BEGIN
    -- Y = (D0 * /S1 * /S0) + (D1 * /S1 * S0) +
    --      (D2 * S1 * /S0) + (D3 * S1 * S0).
    -- The parenthesis are added to make the code easier to read.
    y <= (D0 AND (NOT S1) AND (NOT S0)) OR
         (D1 AND (NOT S1) AND S0 ) OR
         (D2 AND S1 AND (NOT S0)) OR
         (D3 AND S1 AND S0 ) ;
END logic;

Line 23 Col 53 INS
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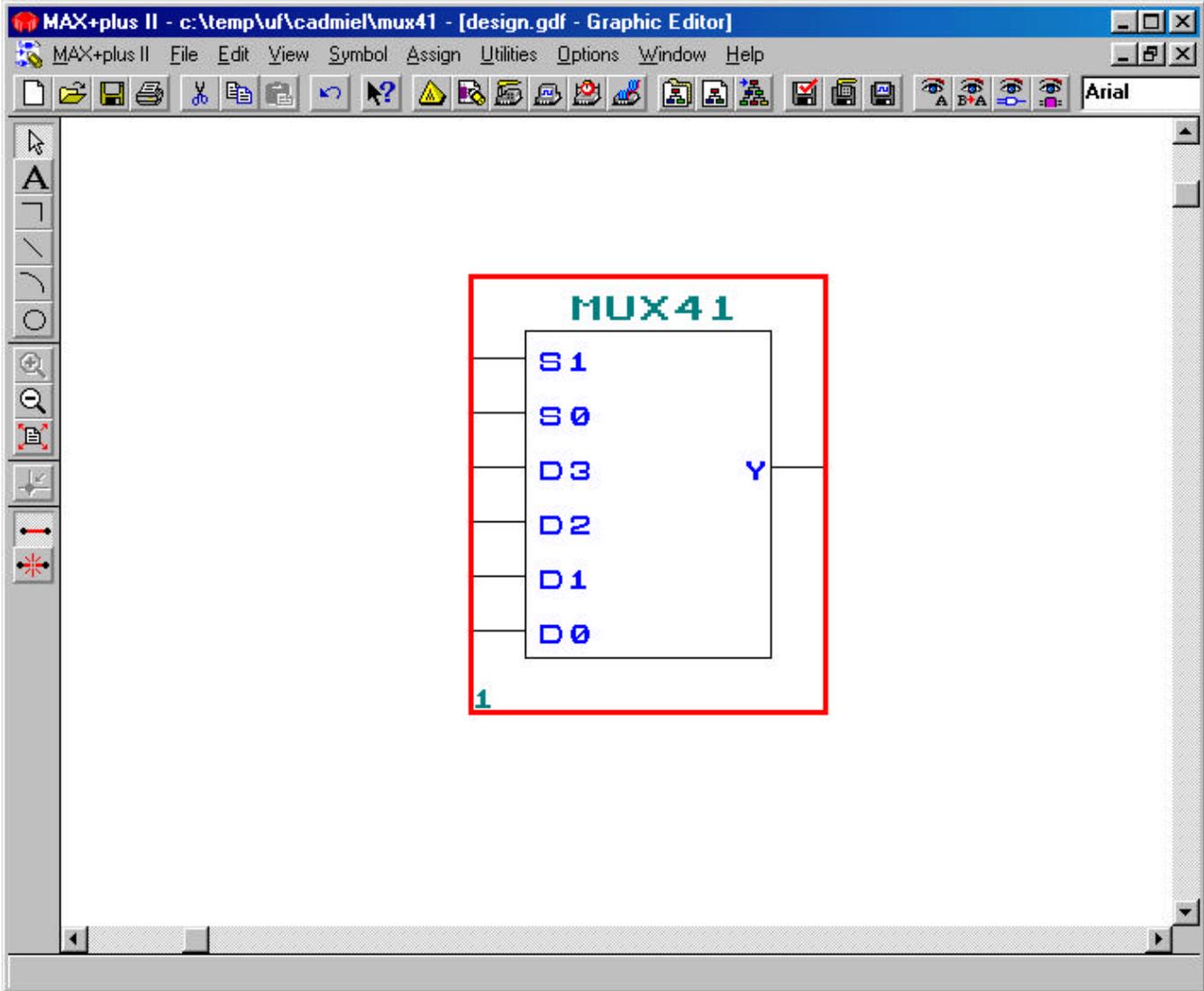
The steps to create a graphical component for this code are:

1. Assume that two files, Labx.gdf and mux41.vhd, are in the same directory. In MaxPlus2, open mux41.vhd, set your project to this file, and compile it.
2. After compilation, a symbol file, mux41.sym, has been created in that same directory.
3. Open your schematic (Labx.gdf) in the same directory as the symbol file and set your project to this file. This is the file in which you want to place your newly created VHDL component symbol. Now right click the mouse to enter a symbol and select your symbol you just created from the VHDL code.

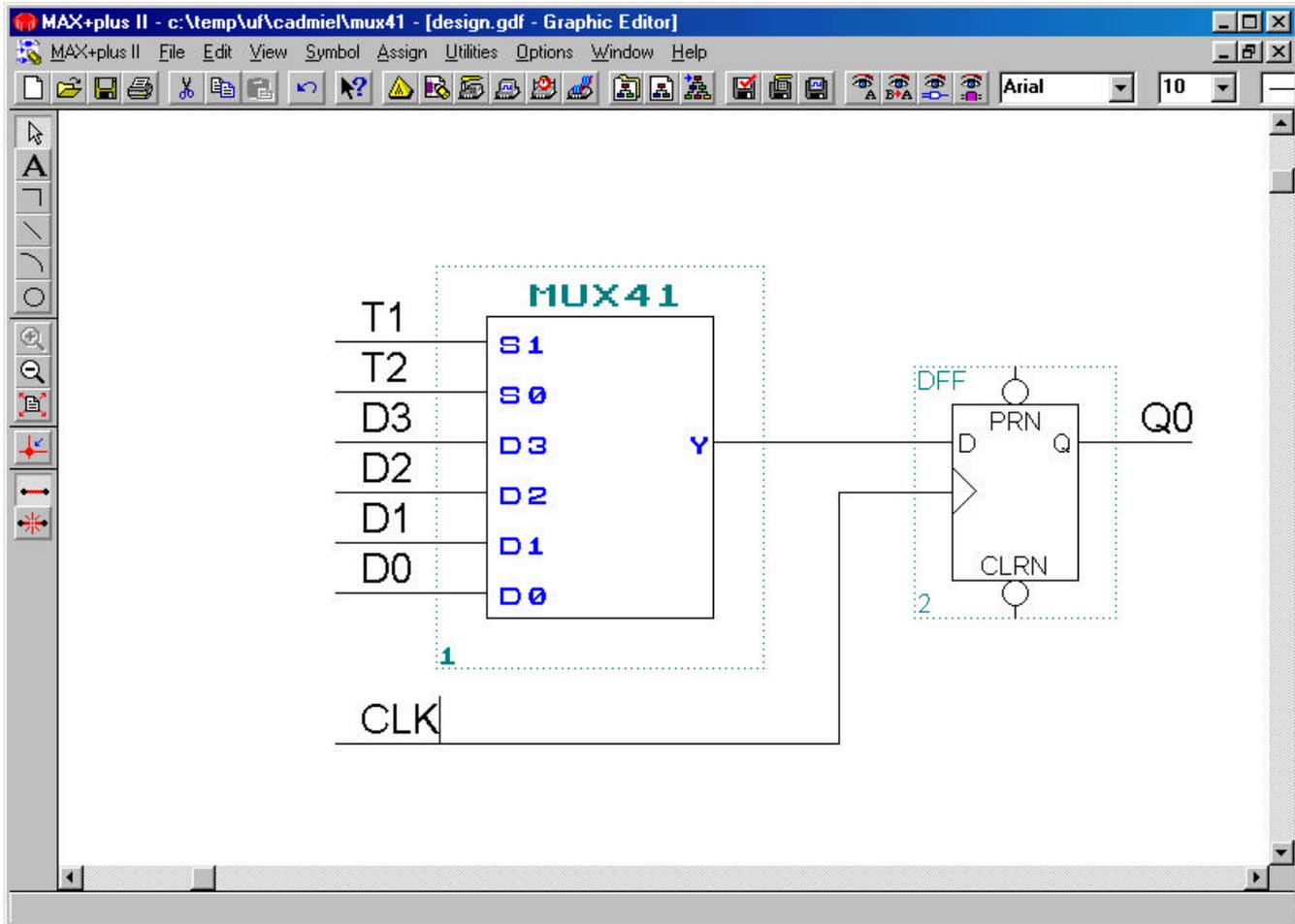


4. You should see the symbol that you have created from your VHDL file now on your schematic. It is illustrated on the next page.

Special Note: It is best not to name the VHDL component and GDF file the same name... use different names for each.



5. You can now add wires & I/O to the input and output ports of the component as you would any other component grabbed out of Altera's libraries.



Example application:

The logic equations of the controller of an ASM can be easily specified using VHDL (much easier than graphically entering the gates). More importantly, they can be easily changed during the debugging phase without having to redraw and connect the gates every time. Using the graphical symbol, the equations can then be integrated with the rest of the ASM.