

Appendix B – Tutorial

This tutorial shows a step-by-step instruction of entering exemplary function and obtaining structure realizing this function.

Goal:

Implement the function $F = (1, 2, 4, 12, 13, 14, 15, 18(6, 7))_{x_3 x_2 x_1 x_0}$ in a tree of multiplexers structure, where size of each multiplexer is 8 bits.

Executing the program causes the window (Fig. 1) to be displayed.

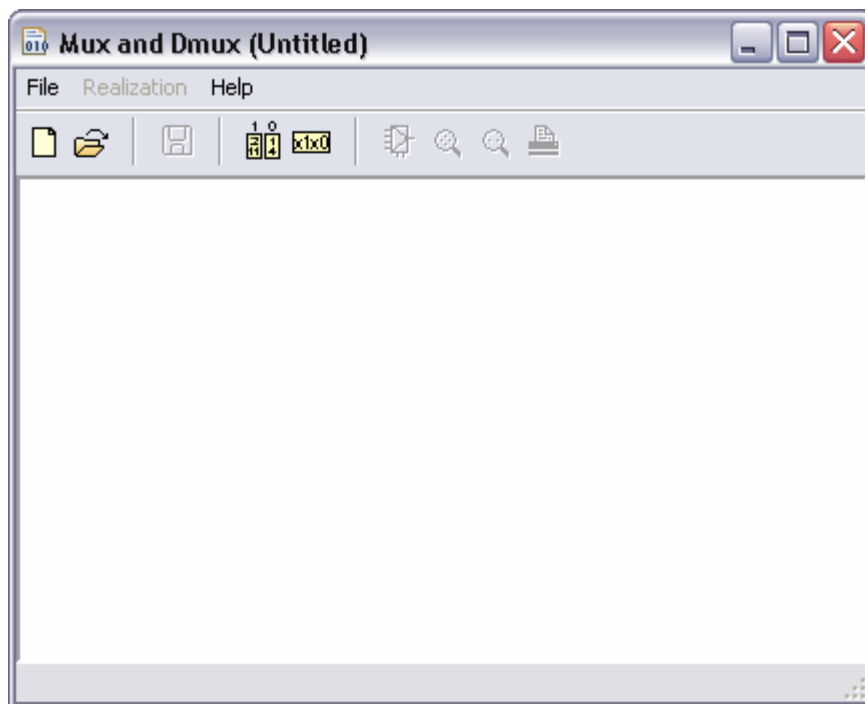

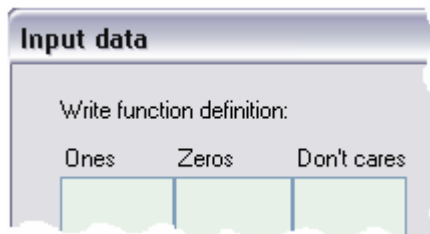


Fig. 1. Main program window (tutorial)

The function definition should be entered to the program in i.e. canonical numerical form, thus a user should click  button or select appropriate menu options – **File** \Rightarrow **New function** \Rightarrow **Canonical representation**. Window shows up, as in Fig. 2. The window consists of:

- Three lists of values: *Ones*, *Zeros*, *Don't cares*,



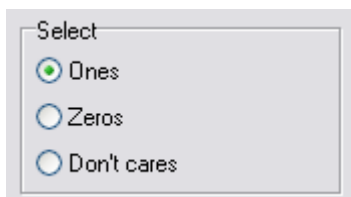
The image shows a window titled "Input data" with a section labeled "Write function definition:". Below this label are three columns labeled "Ones", "Zeros", and "Don't cares". Each column contains an empty green rectangular box for input.

- Text edit field,



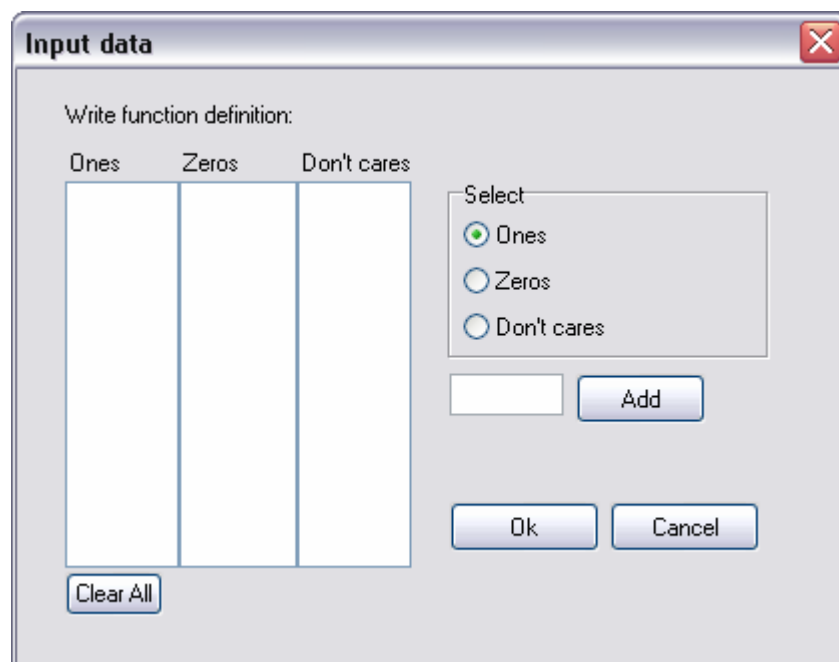
The image shows a text input field with a cursor inside, followed by a button labeled "Add".

- Radio group options selecting to which list the value entered in the text field should be put,



The image shows a "Select" group box containing three radio buttons labeled "Ones", "Zeros", and "Don't cares". The "Ones" radio button is selected.

- Buttons: "**Add**", "**Clear All**", "**OK**", "**Cancel**".



The image shows the complete "Input data" window. It has a title bar with a close button. Inside, there's a "Write function definition:" section with three columns: "Ones", "Zeros", and "Don't cares", each with a large empty box. To the right of these columns is a "Select" group box with three radio buttons: "Ones" (selected), "Zeros", and "Don't cares". Below the "Select" group is a small text input field and an "Add" button. At the bottom left is a "Clear All" button, and at the bottom right are "Ok" and "Cancel" buttons.

Fig. 2. Window that enables entering function definition in canonical form (tutorial)

To enter function ones components user is required to do:

1. Select to which list the value should be added, by clicking on one of the radio buttons, thus click "*Ones*",
2. In text field individual one component should be entered,
3. Button "**Add**" should be clicked.

Steps 2 and 3 should be repeated until all ones components are entered. In case of mistake (i.e. misspelling, wrong list selection) user can delete the value entered by selecting this value and clicking right mouse button, and choosing "**Delete**" from popup menu, as shown in Fig. 3.

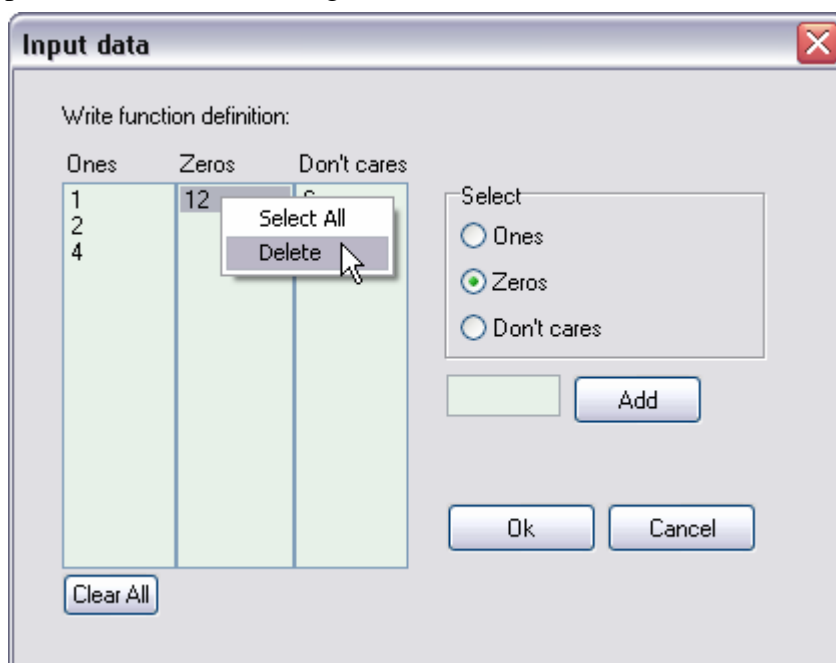

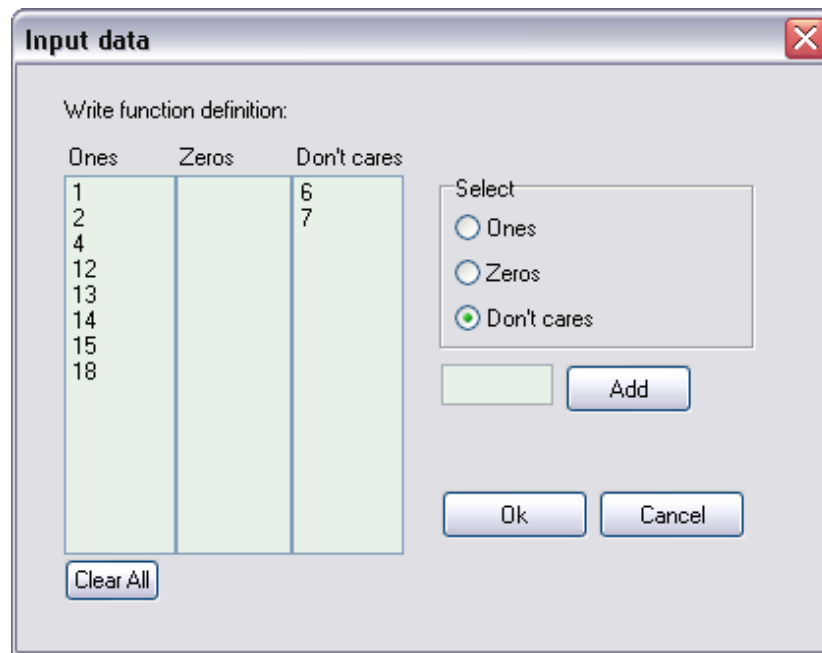


Fig. 3. Deleting term from the list (tutorial)

In order to enter don't care states the same algorithm is used apart from the first step. Here, user should select other radio group button by clicking "*Don't cares*" button. When all function components are entered the window should look similar to this shown in Fig. 4.

To apply the changes user is required to click "**OK**" button.

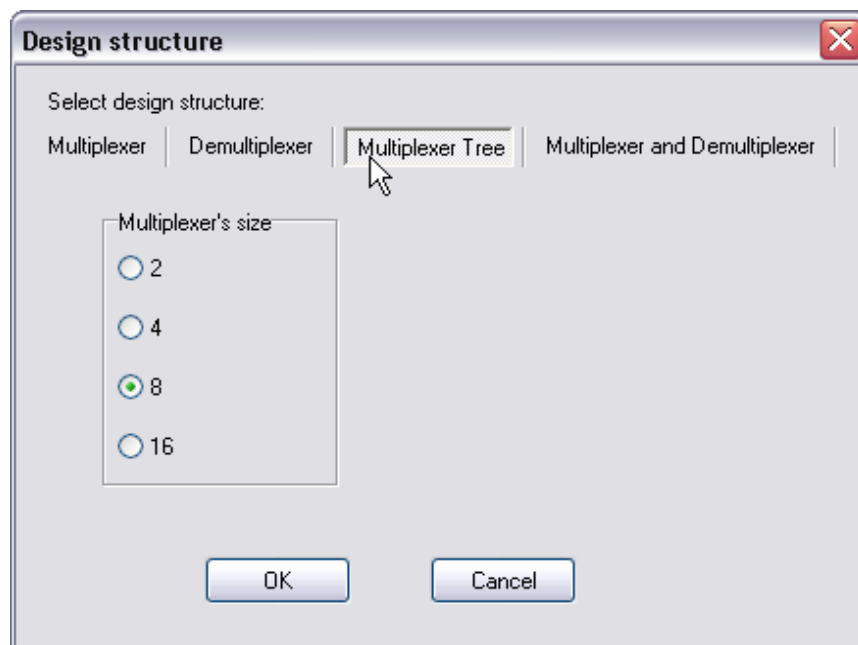
Beginning of function implementation process is achieved by clicking **Realization** from the program menu or *realization* icon  from the toolbar. The window shows up, where user should select required structure (Fig. 5).



The 'Input data' dialog box contains a section titled 'Write function definition:'. It features three vertical columns labeled 'Ones', 'Zeros', and 'Don't cares'. The 'Ones' column contains the values 1, 2, 4, 12, 13, 14, 15, and 18. The 'Zeros' column is empty. The 'Don't cares' column contains the values 6 and 7. To the right of these columns is a 'Select' group box with three radio buttons: 'Ones', 'Zeros', and 'Don't cares'. The 'Don't cares' radio button is selected. Below the radio buttons is a small green rectangular box and an 'Add' button. At the bottom of the dialog are 'Ok' and 'Cancel' buttons, and a 'Clear All' button is located at the bottom left.

Ones	Zeros	Don't cares
1		6
2		7
4		
12		
13		
14		
15		
18		

Fig. 4. Window showing all values properly entered (tutorial)



The 'Design structure' dialog box has a section titled 'Select design structure:'. It contains four tabs: 'Multiplexer', 'Demultiplexer', 'Multiplexer Tree', and 'Multiplexer and Demultiplexer'. The 'Multiplexer Tree' tab is selected, and a mouse cursor is pointing at it. Below the tabs is a group box labeled 'Multiplexer's size' containing four radio buttons: '2', '4', '8', and '16'. The '8' radio button is selected. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Fig. 5. Structure selection window (tutorial)

As it is shown the only one parameter to set, in order to generate multiplexer tree structure, is the size of a multiplexer. Therefore user should click **8**, as it is stated in the goal of this example. Then "**OK**" button should be clicked to generate the required structure. The window shows up (Fig. 6).

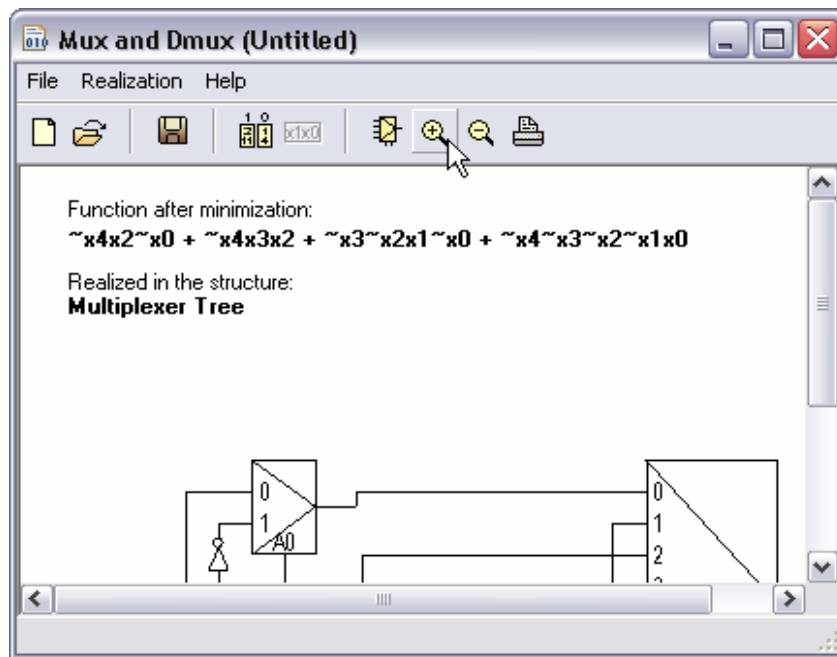




Fig. 6. Window showing the structure generated (tutorial)

Since not full structure is visible in the window it is necessary to either change size of this window or zoom in  or zoom out . Fully visible structure is presented in Fig. 7. As it can be seen only one 8-bit multiplexer is needed, remaining multiplexers are 2-bit.

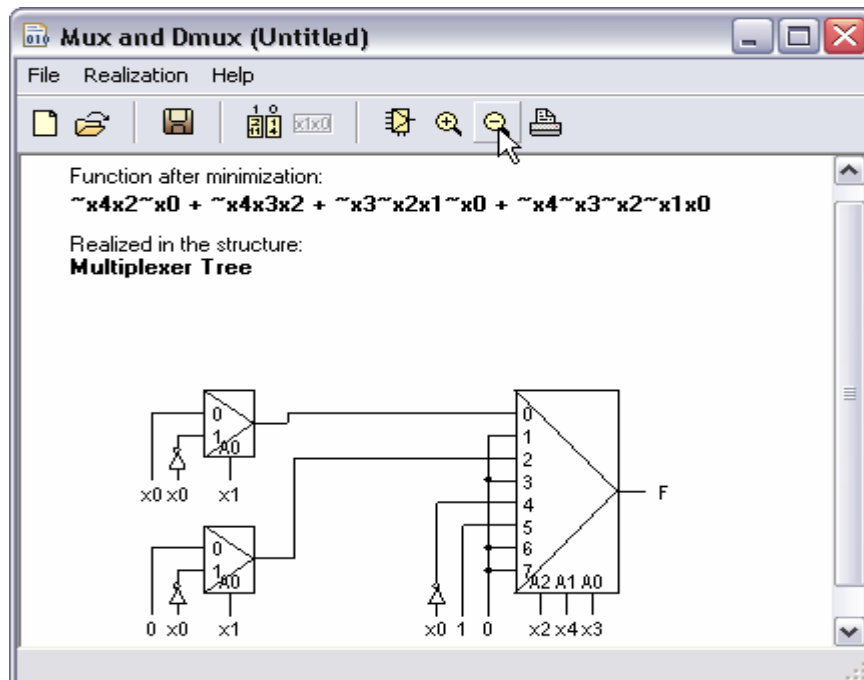




Fig. 7. Window presenting fully visible structure (tutorial)

The goal of the tutorial is completed so it is advised to save the project for later use, print it or export it to graphical format. Saving may be performed in two

ways, as a project or as a function. When user needs to save the function definition only, he discards the diagram generated. In the case when the structure is obtained, a better solution is to save data in project definition file, by selecting **File ⇒ Save project as...** or toolbar icon . In the dialog box appeared the user needs to supply the file name.

The project can also be printed or a printer can be set up in **File ⇒ Print setup**. In order to print a project user should select from program menu **File ⇒ Print project** or click toolbar icon . It is also useful to export the generated structure and use it in any graphical program or word processor. The structure may be saved in a graphical format (WMF, BMP, JPEG) as a diagram file (only structure) or as a project file (structure and function definition). To export the generated structure user should select from program menu **File ⇒ Export diagram** or **File ⇒ Export project**.