HOW TO USE PLATFORM FLASH ROM ON DIGILENT BASYS BOARD

It is known that FPGA keeps its configuration as long as power is applied. If users want to save their configuration; they must use on-board Platform Flash ROM. It is user programmable like FPGA. The FPGA and Platform Flash ROM can be programmed from PC via using Xilinx's iMPACT software. In this part, how to upload a configuration file into Platform Flash ROM will be explained. Note that figures used in this document are taken from ISE Design Suite 9.2.

First of all, iMPACT file should be found and opened. Icon for iMPACT is given below: **Figure-1**.



Figure-1: iMPACT can be found under folder "ISE Design Tools".

Once it is opened **Figure-2** is opened and the following steps should be followed.

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Modes MPACT Processes ×		
Operations		http://www.xilinx.com
X Welcome to iMPACT		×

Figure-2: General view of the iMPACT

1. At first step; PROM type should be selected. Users can be learned PROM type from the datasheet of the Digilent Basys Board. To open PROM selection window; "**PROM File Formatter**" should be opened by double click; **Figure-3**.

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2. In this step, Prom File Format, its name and location is chosen, Figure-4.

😺 iMPACT - Prepare PROM Files	
I want to target a	
O Xilinx PROM	
🚫 Generic Parallel PROM	
3rd-Party SPI PROM	
O PROM Supporting Multiple Design Versions:	Spartan3E MultiBoot
MCS TEK UFP ('C'' format) EX0 BIN ISC HEX Swap Bits	
Checksum Fill Value (2 Hex Digits): FF PROM File Name: WRITE PROM FILE NAME HEI	RE
Location: C:\Documents and Settings\Admin\Dest	ktop\ Browse
	< Back Next > Cancel

Figure-4: Choose file format, name file and specify location of the file

File format should be chosen as ".mcs" and location of the file should be set an easy direction, because this file is going to be loaded to the PROM.

3. PROM type is selected at this window. When the datasheet is read, it can be seen that its name is xcf02s, **Figure-5**.

🐉 iMPACT - Specify Xilinx	PROM Device			
Auto Select PROM				
📃 Enable Revisioning				
	Number of Revis	ions: 🚺 🔽		
Enable Compression				
Select a PROM (bits): xcf	💌 xcf01s	[1048576]	✓	Add
	xcf01s	[1048576]		
	xcf02s	[2097152]		
	xcfU4s	[4194304]		
	xcru8p	[8388608]		
	xcf32p	[33554432]		
Add Data Files			Delete All)
		< <u>B</u> ack <u>N</u> e	ext >	Cancel

Figure-5: "xcf02s" is selected.

4. PROM is selected and it must be added to the design by using the button named "Add". **Figure-6** shows the view that after adding is completed.

😺 iMPACT - Specif	y Xilinx PROM	A Device		
Auto Select PROM	1			
Enable Revisioning]			
	Num	ber of Revisio	ons: 🚺 💌	
Enable Compression	on			
Select a PROM (bits):	xcf 💌	xcf02s	[2097152]	Add 🖌
		Position	Part Name	
		0	xcf02s	

Figure-6: PROM is selected and added to the design

5. Press Finish at the next window, Figure-7.

😻 iMPACT - File Generation Summary	
You have entered following information:	
PROM Type:	Serial
File Format	mcs
Fill Value	FF
PROM filename	WRITE PROM FILE NAME HERE
Number of PROMs	1
Position Part Name	
0 xcf02s	
Click "Finish" to start adding device files.	
	< <u>B</u> ack <u>F</u> inish Cancel

Figure-7: Press Finish

6. Press OK, in the following window, Figure-8.



Figure-8: Press "OK".

7. Figure-9 is for choosing source file which is generated on ISE Project navigator. Bit file can be found in the project folder with the extension ".bit" and its name is same s with your main VHDL file's name.

Add Device		? 🗙
Konum:	🔋 BASYS_SCANNING_DENEME_1 💽 🗢 🖻 📸 📰 -	
Masaüstü Masaüstü Bilgisayarım Ağ Bağlantılarım Belgelerim Belgelerim Resimlerim		
	Dosya adı: tarama_main.bit	Aç
	Dosya türü: FPGA Bit Files (".bit)	İptal

Figure-9: Choose ".bit" file in the corresponding project folder

8. Next window ask whether a new device is wanted to be added or not. Since we have need of use only one, click **No** at **Figure-10**.

🔯 Add Device		
?	Would you like to add another device file to	
4	Data Stream: 0	
	Yes <u>N</u> o	

Figure-10: Click No

9. In **Figure-11**, chosen PROM, left one, can be seen and its occupancy rate is also written with respect to loaded ".bit" file. For instance, ours is %27.72. Moreover, type of FPGA is also shown, right square, named as "xc3s100e" and under FPGA ".bit" file is seen.

😵 IMPACT - [PROM File Formatter]	
😵 Elle Edit View Operations Window Help	
Bows Image: Construction of the second sec	
MPACT Processes X Available Operations are: Image: Constant of the second seco	
Uperations 🛞 PRDM File Formatter	
Add one device.Revision 0, Design 0 Device #0 is Selected.	>
PROM File Generation Target Xilinx PROM 581,344 Bits used File: Untitled in Location: C:\Documents and Settings\Admin\Des	

Figure-11: Demonstration of the PROM device and its occupancy rate with respect to our ".bit" file

10. Now it is time to generate PROM File with extension ".mcs". When you double click "Generate File" tab, Figure-12 appears.

2 IMPACT - [PRUM FIle Formatter]	
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Flows X StaveSerial StaveSerial SelectMAP EXUNX Direct SPI Configuration EXUNX SystemACE 27.72 % Full Xcf02s Xc3s100e tarama_main.bit	
Modes MPACT Processes Available Operations are: Generate File	
PROM File Generation Succeeded	
Uperations 🛞 PROM File Formatter	
V Uriting file "C:\Documents and Settings\Admin\Desktop\//Untitled.mcs". Writing file "C:\Documents and Settings\Admin\Desktop\//Untitled.prm". Writing file "C:\Documents and Settings\Admin\Desktop\//Untitled.sig".	~
Dutput Error Warning Display help for clicked on buttor PROM File Generation Target Xilinx PROM 581.344 Bits used File: Untitled in Location: CliDonuments and Settions/Admini	DesktopV

Figure-12: PROM File is generated

11. PROM File is generated. It is time to load this file to the Platform Flash ROM. Firstly, plug in your Digilent Basys Board and connect it to your PC via JTAG. To see your Basys board at iMPACT software, firstly double click "Boundary Scan". Then right click to initialize JTAG chains when the mouse is on the biggest sub-window.



Figure-13: Double Click on Boundary Scan then initialize chain

12. Chain is initialized, FPGA and PROM are seen in the software window. First one is the FPGA and the second one is the PROM. There are two choices; you can configure FPGA from PC and configuration will be kept until power is off . When FPGA figure is right clicked and "Assign New Configuration File" tab is chosen **Figure-14** is opened and users must choose a file with extension ".bit".

😺 iMPACT - [Boundary Scan]	X
😵 File Edit View Operations Output Debug Window Help	
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- Bassan and a series and a ser	
TDI TRANSFORME	
BDesktop Configuration	
PROM File Formatter file ? file ?	
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Seassien New Configuration File	
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Modes tarama_main.bit	
MPACT Processesngo	
Available Operations are:Xmsgs	
iscore di	
xinx_euto_0_xdb	
st .	
File name:	
The barry Ald Device The (Hold Add Add Device To Add Add	
rile gype: All Design Files (Loir Link Files Cloba)	
Cancel All Bypass	
None	
Operations O Enable Programming of SPI Flash Device Attached to this FPGA	
Enable Programming of BPI Flash Device Attached to this FPGA	
× PROGRESS END	<u>^</u>
// *** BATCH CMD : identifyMPM	
	~
- Cuput Enor Warning	

Figure-14: Assigning Configuration File to the FPGA

When you choose bit file and open it, you should again right click on the FPGA and click **"Program".** During this operation Mode Select Jumper should be on JTAG side. **Figure-15** shows JTAG connector's headers and Mode Select Jumper choices.



Figure-15: Relation between JTAG cable, FPGA, PROM and Mode Select Jumper

13. Step 12 is about how to program FPGA by JTAG via PC, now it is time to program PROM, to assign configuration file with extension of ".mcs"; right click to the PROM on software and the click "Assign New Configuration File" tab and choose your configuration, **Figure-16**. You can find it from the location that you have specified before in **Figure-4**.

😵 Assign New Configuration File 🛛 🕐 🔀
Look jn: 🔄 C:/Documents and Settings/Admin/Desktop/ 💽 🗢 🗈 🟥 🎬
Image_DISPLAY ARAÇLAR STM_TARAMA BASYS_SCANNING_DENEME_1 top_oyunu_butonlu çok hoş microblaze tutorials VHDL DF Untitled.mcs EDK GENÇLER DOSYLAR
File name: Untitled.mcs
File type: All Design Files (*.mcs *.exo *.isc *.bsd) Cancel
Cancel <u>A</u> ll <u>Bypass</u>
 None
Enable Programming of SPI Flash Device Attached to this FPGA
Enable Programming of BPI Flash Device Attached to this FPGA

Figure-16: Select ".mcs" file for your PROM

14. After configuration file for PROM is chosen, it can be programmed like in Figure-17. After you see indication of successful operation, you can change Mode Select Jumper to ROM. At this point even if you turn off the power and then on if the jumper is at ROM, Figure-15. When you press reset button, you can see that your program is running.



Figure-17: Finally Program your ROM