

JRA1 Telescope: NI Flex RIO DAQ

Labview Telescope DAQ demonstration software overview

G. Claus¹, Mathieu Goffe¹, Kimmo Jaaskelainen¹, Cayetano Santos¹, Matthieu Specht¹

January 17, 2011

Abstract

The EUDET JRA1 Pixel Telescope is using a custom-made data acquisition system since a couple of years. In preparation for AIDA, the group decided to investigate different off the shelf I/O systems. The advantage of such a system is the easier support and the availability over the next years. The IPHC group selected the NI Flex Rio system and prepared LabView sources, which can rather easy be connected to the existing DAQ. In this memo the Labview telescope DAQ demonstration software is documented.

¹ IPHC, Strasbourg, France

- 1 -

Inhaltsverzeichnis

NI Flex RIO DAQ	1
1 Introduction	2
Acknowledgement	96
References	Error! Bookmark not defined.

1 Introduction

The telescope DAQ software is a Labview application developed under Labview 2009. Labview is used for GUI and Flex RIO board driver and as a kind " top level software " responsible of the management of DAQ operation. The JTAG configuration, run configuration, data processing (to extract frames with trigger), saving data to disk, are written in C and C++ (eudet_frio library) and compiled in a dll named eudet_frio_dll.dll.

The interface between telescope DAQ software and EUDET DAQ software via Ethernet can be written in this DLL. Because it may be easier to write it in C rather than in Labview graphical language.

But, debugging this interface with the whole DAQ chain and moreover compiled in a DLL may be difficult, that's why a DAQ emulator has been developed. It has roughly the same functionalities as the DAQ. It's a C++ Builder application (no Labview code) which see the eudet_frio library as a part of it's source code (not as a DLL) therefore you can use Borland's debugger if needed. Of course you don't need the hardware to run this application.

- 2 -

2 How to compile the DLL

2.1 Introduction

The DLL source code is a part of the C source architecture installed on the host PC. Therefore the DLL will be compiled on this PC and the binary file (*.DLL) will be copied on the PXIe crate afterward.

If the source are not installed on the PC, please follow the procedure described in the document "2_c_source_arch.pdf".

If the source are installed, please don't forget to execute ch_prod.bat in order to create the virtual drives X:, Y: and L:

2.2 DLL project directory

The DLL project is in directory x:\dll\win\eudet_frio_dll



- 3 -

2.3 Compiling the DLL

Launch C++ Builder by a click on its desktop icon



Menu "File" - " Open project "



- 4 -

Open the directory x:\dll\win\eudet_frio_dll





Open the project file eudet_frio_dll.bpr



You will get this window

💏 C++Builder 6 - eudet_frio_dll		
Eichier Edition Chercher Yoir Projet Exécuter Composant Base of	le données <u>O</u> utils Fe <u>n</u> être <u>A</u> ide	(Ai
🗅 🖙 📲 🏉 🖆 🚅 🥔 Standard Supplément	Win32 Svstème AccèsBD ContrôleBD dbExoress BDE ADO InterBase Internet FastNet OReport Div	aloques Win 3.1 Exemples
🔞 🖉 🗆 🕨 🕨 🕨 🕨 👘	A 🔤 🖻 🗵 🖲 🗮 🗮 🚥 🗖 🖺 🔛 🎎	
Vue arborescente des objets 🗵		
🛍 🛍 🛉 🔸		
×	eudet_frio_dll.bpf	$\leftarrow \cdot \rightarrow \cdot$
H asses		~
Inspecteur d'objets		
Prontiétés Evénemente		
L Venerieriteriteriteriteriteriteriteriterite		
		>
	1: 1 Insertion Code/	1

- 7 -

This is the project files list : *.bpf and *.cpp which includes all source files.

🐉 C++Builder 6 - eudet_frio_dll
Echler Edition Chercher Yoir Brojet Exécuter Composant Base de données Quitis Fenêtre Aide
□ □ · · □ □ □ · · □ Standard
Yue arborescente des objets 🛛
time territe
eudet_frio_dll.ppf eudet_frio_dll.cpp
Inspecteur d'objets X Propriétés Evénements [in que l'mount que l'mount que l'mount que l'apprise de la bibliothèque d'exécution : /// /// ///
<pre>// structures/classes contenant des chaînes imbriquées) comme paramètre // ou résultat de fonction, vous devrez ajouter la bibliothèque MEMMGR.LIB // à la fois au projet DL et à tout projet qui utilise la DL. Vous devez aussi // utiliser MEMMGR.LIE si un projet qui utilise la DLL effectue des opérations // new ou delete sur n'importe quelle classe non dérivée de TObject qui est // exportée depuis la DLL. Ajouter MEMMGR.LIE à votre projet forcer la DLL et // ses EXE appelants à utiliser BORLNDMM.DLL comme gestionnaire de mémoire. // Dans ce cas, le fichier EORLNDMM.DLL devra être déployé avec votre DLL.</pre>
6: 23 Insertion \Code/

- 8 -



Open project options → Menu " Project " – " Options "

Panel compiler, disable warnings → sub panel "Warnings" – "None "





Compile DLL → Menu " Project " – " Build eudet_frio_dll "

You should get no errors as compilation result

le dat	e : 11/08/2010	
rsio		
c da s thor	ompration	
mail	Projet : X:\dll\win\eudet_frio_dll\eudet_frio_dll.bpr	
	Effectué : Construction complète	ŀ
cens	Ligne en cours : 0 Total lignes : 329137	ľ
	Conseils : 0 Avertissements : 0 Erreurs : 0	k
		t
abo	OK	ľ
****	<u> </u>	



Now execute mk_lib.bat which is located in x:\dll\win\eudet_frio_dll. It will create DLL interface files which may be needed in certain cases.

😂 eudet_frio_dll			
Fichier Edition Affichage Favoris Outil	s ?		
🔇 Précédente 🔹 🕥 - 🏂 🔎 Re	echercher 🔀 Dos	ossiers 🛄 🕶	
Dossiers		× Nom 🔺	
 Bureau Mes documents Poste de travail Disquette 3½ (A:) Disque local (C:) ABDO (E:) Lecteur DVD/CD-RW (F:) Couple local (L:) Letabo (X:) LABO (X:) ABDO (X:) Disque local (L:) Mes LABO (X:) Mes LA		Image: Construction of the second	bpf bpr cpp pr pp ss _new_dll.txt

A dos window shell will pop-up, close it when execution is finished

U	and eudet_frio.cpp	5 Ko C++
les documents	is eudet frio dll.∼bpf	1 Ko Fichie
C:\WINDOWS\system32\cmd.ex	e	- 🗆 X
PRO FOULT DE	016 - PPO FOutD6	
PPO FOut D7	P_{17} , P_{17} , P_{17} , P_{17}	
PPO SPIPol	P32 = PP0 SPIP01	
PPO SPIReset	034 : PPO SPIReset	
PPO SPITrigger	035 : PPO SPITnigger	
PPO TLIL FReadCot	P33 : PPO TLU FReadCot	
CPPdebugHook	P150 : CPPde bugHook	
orradiation	crob ;orrabidghoon	
X:\dll\win\eudet frin dll\d	ir x:\hin\eudet frin dll.*	
Le volume dans le lecteur	X s'annelle LABO	
Le numéro de série du volu	me est B467-1FCF	
Répertoire de x:\bin		
Répertoire de x:\bin		
Répertoire de x:\bin 14/11/2010 07:53	741 093 eudet_frio_dll.obj	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib	1
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:53 2	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:53 2 14/11/2010 07:53 5 fichier(s)	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds 3 458 467 octets	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:53 5 fichier(s) 0 Rép(s)	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 0016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds 3 458 467 octets 342 163 456 octets libres	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:53 2 5 fichier(s) 0 Rép(s)	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds 3 458 467 octets 342 163 456 octets libres	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:53 2 5 fichier(s) 0 Rép(s) X:\dll\win\eudet_frio_dll>p	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.dll 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds 3 458 467 octets 342 163 456 octets libres ause	
Repertoire de x:\bin 14/11/2010 07:53 14/11/2010 07:53 14/11/2010 07:54 14/11/2010 07:54 14/11/2010 07:54 2 5 fichier(s) 0 Rép(s) X:\dll\win\eudet_frio_dll>p, Appuyez sur une touche pour	741 093 eudet_frio_dll.obj 259 584 eudet_frio_dll.dll 22 016 eudet_frio_dll.lib 10 942 eudet_frio_dll.def 424 832 eudet_frio_dll.tds 3 458 467 octets 342 163 456 octets libres ause continuer	

- 11 -

The DLL files are created in directory x:\bin

🖣 bin			
Fichier Edition Affichage Favoris	s Outils ?		
	× Rechercher	Nom	••••
 Bureau Mes documents Poste de travail Disquette 3½ (A:) Disque local (C:) ABO (E:) LABO (E:) Lecteur DVD/CD-RW (F:) Disque local (L:) LABO (X:) Din portio dll Din 		eudet_frio_d eudet_frio_d eudet_frio_d eudet_frio_d eudet_frio_d eudet_frio_d eudet_frio_d eudet_frio_d forun_emul_fle allowio.exe portio	II.lib II.def II.dds II.dbj X_rio_daq.bat

3 DAQ sources (Labview) installation on PXIe carte

This document will not cover source files installation on PXIe crate, this section will be written later. This chapter will just list things in order to show you where they are installed.

Three directories are needed + the firmware installation directory

- C:\progs
- C:\ccmos_pxi_daq_crate_v2009
- C:\ccmos_pxi_daq_local_conf



- 13 -

First of all you must configure system, this is done by the batch file "load_labview_v2009.bat". You can start it by a click on its desktop icon.



This file is located in C:\progs\bat



You should not need to modify it, but in case you can edit it.



- 14 -

The following virtual drives will be created :

- Y: \rightarrow root of the whole source tree
- X: \rightarrow root of C, C++ source code tree
- L: → root of Labview source code tree



- 15 -

4 DLL copy from host PC to PXIe carte

We always compile the DLL on the host PC, not on the PXIe crate, because C++ Builder is installed on the PC not on the crate. Therefore we must copy DLL binary files from the directory x:\bin of the PC to the directory x:\bin of the crate. This is not a huge task as the crate can " mount " the PC disk, and it may be automated via a batch file.



There are three files to copy :

- eudet_frio_dll.def
- eudet_frio_dll.lib
- eudet_frio_dll.dll

I am not sure that all three are needed for Labview, but I didn't found the time to check, therefore please copy all of them to avoid problems and loose time.

- 16 -

5 DAQ demonstration

5.1 How to start Labview & load project

Execute " loc_labview_v2009.bat " if it's not already done. You need to do it only one time after logging on the carte.



Start Labview via the batch file " Labview.bat ", because it encapsulates the parallel port driver we need (this batch must be installed in Labview bin directory)



- 17 -

The Labview window shows up, select "Second_Project_PXIe_diff_ended.lvproj"

and the second s	
1 ab\/IE\Λ/ 200	IQ
	Licensed for Professional Versi
New	Latest from ni.com
💐 Blank VI	LabVIEW News (13)
🍓 Empty Project	LabVIEW in Action (15)
🝓 VI from Template	Example Programs (15)
🔁 More	Training Resources (11)
	Online Support
Open	Discussion Forums
Second Project PXIe diff ended.lvproj	Code Sharing
os/Second_Project_PXIe\diff_ended\Second_Project_PXIe_dif	f_ended.lvproj KnowledgeBase
	Request Support
🔜 💷 =	Help
🔜 lv_ex6_for_loop.vi	Getting Started with LabVIEW
🔜 lv_ex5_stacked_sequence.vi	LabVIEW Help
C Browse	List of All New Features
Targets	Examples
FPGA Project	

WARNING !

The project file path has changed, it's not the one displayed on the above screen shot, now it is

C:\flexrio_mi26_fw\14_december_2010\lv_2009\ project_pxie_diff_ended\flexrio_mi26_lv2009_pxie_diff_ended.lvproj

- 18 -

The "Project Explorer " window will appear, but you will not get access to GUI immediately, it will take some time ... please wait, that's the only thing you can do ...



Now, select the file "eudet_mi26_telescope_daq_demo_v1v0.vi ".

WARNING !

The application file name has changed, it's not the one displayed on the above screen shot, now it is :

eudet_mi26_telescope_daq_demo_v1_1.vi

- 19 -

The DAQ demo GUI windows should appear.

	😰 Project Explorer - Second_Project_PXIe_diff_ended.lv 💶 🗙								
My D	Elle Edit View Project Operate Tools Window Help	😫 eudet_mi26_tele	escope_daq_den	no_v1_0.vi Front I	Panel on Second	_Project_PXIe_di	ff_ended.lvproj/M	y Computer	
	<u> *1 🗃 🖬 🕼 X 🗅 (1 X 🍤 (2 1 🖬 ₹ 🚰 </u>	Eile Edit View Pro	ject Operate I	ools <u>Window</u> Help	p				
	Items Files	수 윤 🤍	13pt Appli	ation Font	1.pr •6.r 👑				<u> </u>
My C	Project: Second_Project_PXIe_diff_ended.lvproj			Initialization			DAQ errors		
						TableTashian			
	ter jo fiex_rio	Error level	Err	orLogFile	بال الم	Initialization	E load fw	E Unload fw Co	nferror?
My	🗄 💋 eudet	grenors	3 X.	hodifeut_enner_iun-	unca	-	0	0 0	
ę	- R get frame fields header font di trailer.vi	EnableMsgLog	Ms	gLogF/e	di s. a	Load Fw	E Stop board	E Start board	
	尾 get_frame_fields_mi26_trig.vi		X:	yogynsg_edder_mo	_dil.ext		0	0	
Red	- struct.vi		F	tun configuration			E Start saving	E Save Acq E St	op saving
1000	- k_w_st_init_optim	RunNo	FrameNbPerAc	q DestDir			0	0	
	- 🙀 Iv_ex3_case.vi	666	1800	d:\data			JTAG configura	tion JTAG Er	or 🕥
	- R Iv_ex4_inac_sequence.vi	TotEvNb	DataTransferM	ode FileNamePrel	fix		JTAG config file		
FARE	- 🛋 lv_ex6_for_loop.vi	10000	- 3	run_			8		
	- s, lv_ex7_while_loop_wait_user_action.vi	EvNbPerFile	Mi26Nb	Trigger mo	de Save to disk	Run conf	JTAG Reset	JTAG Load JTA	iG Start
1	- 📕 lv_ex9_meas_ram_cpy_time.vi	1000	6	÷)0	- ENO				
	Stath U22 dff anded (Hech) u	SendOnEth	SendOnEthPCe	nt Emule 6 Mi	i26 on board				
	- Eight_U32_4dma_diff_ended (Host).vi	÷)0	0						
	🔜 Test_DRAM_diff_ended (Host).vi			Monitoring	Enable			Debug t	ools
dh_0	FPGA Target (RIO0, PXIe-7962R) Foga reference.ctl	Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board status	// Port D4
14	B P Dependencies	10008001	80008002	180008003	180008004	80008005	180008006		
4	- 👻 Build Specifications	Data length [0]	Data length [1]	Data length [2]	Data length [3]	Data length [4]	Data length [5]	Print board conf	// Port D5
daq_		64	120	152	1256	320	1304		
		Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]		110-107
		10					10	Principalities	Il Port Di
N		Trailer [0] (H) AAAA00001	Trailer [1] (H) AAAA0002	Trailer [2] (H) AAAA0003	Trailer [3] (H) AAAA0004	Trailer [4] (H) AAAA0005	Trailer [5] (H) AAAA0006	-	9
		Trig nb	TLU trig [0]	TLU trig [1]	TLU tric	р[2] ТL	U trig [Last]	Exec ont	
ė		1	F0000 - T0040	F2047 - T65	5535 F2047	- T65535	0000 - 10040	8	
First		Frame Id	Display frame off	line (incomplete)					
		0							
				ptart acquisit	2001				
First		EmuleMode	WaitMsAtEnd	TriggerHandlingM	ode Acq Error co	Acq counte	r Data rate (MB 20.403	/sj	
		91	Timon + [m-1	Start run	0.0	105	100,000		
ļ		IngStatus	() 10000		RetLostFran	Acq size [B	ytesj		
Lab		90		-		1113000			
		Last error message					Close fw		
,									
licen		Second_Project_PXIe_	diff_ended.lvproj/f	ty Computer					

- 20 -

5.2 GUI overview

-151.0	udet mi26 t	alescope dag den	vo v1 0 vi					
File	Edit View	oject Operate Ti	ools Window Help)				
								2
~	\bigcirc		Initialization			DAQ errors		Lucia
	Error level	Erri	prLogFile		Initialization	E load fw	E Unload fw C	onf error ?
	Errors	3 x:	log\err_eudet_frio_	dll.t×t		0	0	D
	EnableMsgLo	Msq x:	JLogFile (log\msg eudet frio	dll.txt	Load Fw	E Stop board	E Start board	
					9	E Start saving	E Save Acg E S	itop saving
		E	un configuration			0	0 0	
	RunNo 666	FrameNbPerAc	d:\data			JTAG configura	tion JTAG E	rror 🕥
	TotEvNb	DataTransferM	ode FileNamePref	ix		JTAG config file		
	() 10000	()]3	run_			⊪C:\ccmos_sc	trl\MIMOSA26_JTAG	
	EvNbPerFile	Mi26Nb	Trigger mo	de Save to disk	Run conf	JTAG Reset	JTAG Load JT	AG Start
	1000	÷)6		J No	\bigcirc			
	SendOnEth	SendOnEthPCe	nt Emule 6 Mil	26 on board				
	JI0	J.	Monitoring	Enable			Debug	tools
	Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board statu	s // Port D4
	80018009	80018009	80018009	80018009	80018009	80018009		
	Data length [0] 2280	Data length [1] 2280	Data length [2] 2280	Data length [3] 2280	Data length [4] 2280	Data length [5] 2280	Print board conf	// Port D5
	Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]		
	6551432	6551432	6551432	6551432	6551432	6551432	Print run conf	// Port D7
	Trailer [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		
	Tuin al	Till brie [0]	TUIN- [1]	TUTE	[0] TI	Jooonoov	E	
	1	F0000 - T0000	F2047 - T65	535 F2047	- T65535 F	0 trig [Last] 0000 - T0000	9	
	Frame Id	Display frame off	line (incomplete)					
	÷)0		-					
			Start acquisit	ion				
	EmuleMode	WaitMsAtEnd	TriggerHandlingM	ode Acq Error co	de Acq counte 205	r Data rate [MB, 115,062	(s]	
	TrioStatus	Timeout [ms]	Start run	RetLostFram	eNb Aca size (By	/tes]		
		() 10000	\bigcirc	0	24890400			
	Last error mess	age				Close fw		
	J							

Click on the " black arrow " to start the software.

- 21 -



- 22 -

Load the firmware by a click on the "Loa	ad Fw " but	ton, if the operation
failed an error code (value < 0) will be display	yed in indic	ator " E load fw "

🔝 eude	t_mi26_te	lescope_daq_de	mo_v1_0.vi					
	lit Yiew P	roject Operate	Lools Window Help)		<u> </u>		
88	1 C				↓	<u> </u>		8
			Initialization			DAQ errors		
Er	ror level	Er	rorLogFile	dll For	Initialization	E load fw	E Unload fw C	onferror?
50-		13 17	liogten_eddet_ino_	unitet	9		J0 J0	
	nablei¤isgLog .27	i Mi	sgLogFile ::\log\msg_eudet_frio	_dll.txt	Load Fw	0	E Start board	
					9	E Start saving	E Save Aco E S	itop saving
			Run configuration			0	0 0	
R	unNo	FrameNbPerA	cq DestDir d:)data			-		
310	000	A1000	Janage			JTAG configura	tion JIAG E	ror 😈
	otevNb 0000	DataTransfer	Mode FileNamePref	ix		3 C:\ccmos. sc	HIMIMOSA26 ITAG	
20-		J.S.	Triagor mo	do come se altab	Run conf	JTAG Reset	JTAG Load JT	AG Start
() (2) (1)	/NbPerFile	1/126ND	<pre>(inggerind</pre>					
Se	endOnEth	SendOnEthPO	ent Emule 6 Mi	26 on board	-			
÷)	0	\bigcirc					
			Monitoring	Enable 📃			Debug	tools
Hear	der [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board statu	s // Port D4
1800	118009	80018009	J80018009	80018009	80018009	80018009		
Data 228	a length [0]	Data length [1] 2280	Data length [2] 2280	Data length [3]	Data length [4] 2280	Data length [5] 2280	Print board conf	// Port D5
Eron	oo cet [0]	Frame cot [1]	Frame opt [2]	Frame opt [3]	Frame cot [4]	Frame cot [5]		
655	51432	6551432	6551432	6551432	6551432	6551432	Print run conf	// Port D7
Trail	er [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		
AA	AAAAAB	АААААААВ	АААААААВ	АААААААВ	AAAAAAAB	AAAAAAB		
Trig	nb	TLU trig [0]	TLU trig [1]	TLU trig	[2] TL	U trig [Last]	Exec cnt	
1		F0000 - T0000	F2047 - T65	535 F2047	- T65535	0000 - T0000	9	
Fr	ame Id	Display frame of	f-line (incomplete)					
90)		Start acquisit					
E	muleMode	WaitMcAtEnd	TriggerHandlingM	ode Aca Error co	de Acalcounte	 Data rate [MB] 	(<]	
(†) ()		÷) 0		205	115,062		
Т	rigStatus	Timeout [ms]	Start run	RetLostFram	eNb Aca size [B	/tes]		
9		() 10000	\bigcirc	0	24890400			
l rak		20				Close fw		
Last	error messa	iye						
P						-		

- 23 -

Select JTAC	i file, configure Mimosa 26 by a click on "JTAG load", the	
"JTAG error " led	will become red in case of configuration error.	1
		- I

19H e	udet_mi26_tele	scope_daq_	demo, v1	_0.vi							
Eile	Edit <u>V</u> iew Pro	oject <u>O</u> perate	Tools	Vindow <u>H</u> elp							
-	، کې چې										8
2	. Income terminant termina	and, around									Lances
			Initia	alization				DAQ errors			
	Error level		ErrorLogFi	ile	\mathbf{X}	Initiali	ization	E load fw	E Unload fw	Cont error	?
	Errors	3	x:\log\er	r_eudet_frio_c	III.t×t	\sim		0	0	0	
	EnableMsgLog		MsgLogFile	e		Load	Fw	E Stop board	E Start board		
	127		x:\log\ms	sg_eudet_frio_	dll.t×t			0	0		
			-	<u> </u>				E Start saving	E Save Acq	E Stop saving	g
			Run con	higuration				0	q	0	
	RunNo	FrameNbPe	rAcq	d:\data		_	\sim	1		C Error	
	J1000	J 1000		1-1-1-1-1				JTAG configur	ation]		
	TotEVNb	DataTransf	erMode	FileNamePrefi	×		_	STAG conrig n	ctrliMIMOSA26_1	TAG)	
	910000	9 3		Trieser and	la en en en	Run	conf	JTAG Reset	JTAG Load	JTAG Start	
	EVNbPerFile	1 6		4) 0		$\neg c$					
	SandOnEth	SendOnEth	PCont	Emule 6 Mi2	6 on board	-	_		-	-	
	4) 0		rconc	\bigcirc							
	<i>SP</i>	9		Monitoring	Enable				De	bug tools	
	Header [0] (H)	Header [1] (H) Hea	der [2] (H)	Header [3] (H)	Header	[4] (H)	Header [5] (H)	Print board s	tatus // Po	rt D4
	80018009	80018009	800	018009	80018009	800180)09	80018009		\subset	
	Data length [0]	Data length [:	l] Data	a length [2]	Data length [3]	Data len	igth [4]	Data length [5]	Duint based a		
	2280	2280	228	30	2280	2280		2280	Princ board t		In DS
	Frame cnt [0]	Frame cnt [1]	Fran	ne cnt [2]	Frame cnt [3]	Frame c	nt [4]	Frame cnt [5]	9	5	2
	6551432	6551432	655	51432	6551432	655143	32	6551432	Print run con	if // Po	ort D7
	Trailer [0] (H)	Trailer [1] (H)	Trail	er [2] (H)	Trailer [3] (H)	Trailer [4	4] (H)	Trailer [5] (H)		\subset	
	AAAAAAB	AAAAAAAB	AA	AAAAAB	AAAAAAB	AAAAA	AAB	AAAAAAAB			
	Trig nb	TLU trig [0]		TLU trig [1]	TLU trig	[2]	TLU	trig [Last]	Exec cnt		
	1	F0000 - T000	00	F2047 - T65	535 F2047	- T65535	FO	000 - T0000	9		
	Frame Id	Display frame	off-line (in	icomplete)							
	90			Start acquicitie	20						
	EmuleMode	WaitMcAtEn	d Tria	aerHendlingMo	de Aca Error co	م ما	a souther	Data rate [M	B/c]		
		() O	4) o	gennandiingino		ле AL	:05	115,062	0191		
	TrioStatus	Timeout [ms] Start	t run	RetLostFram	eNb or	o cizo [But	ocl			
	() 1	() 10000	C		0	2	4890400	1			
								Class for			
	Last error message	e					_	Close rw			
								9			

The default JTAG file to load to test DAQ is : daq_test_2x80MHz_6_chip.mcf.

- 24 -

158	eudet_mi26_tel	escope_daq_den	10_v1_0.vi					Ī
Ei	le <u>E</u> dit <u>V</u> iew Pr	oject Operate <u>T</u> o	oo <mark>ls Window H</mark> el	p				
	۲							3
			Inicialization			DAQ errors		ł
	Error level	Erro	orLogFile		Initialization	E load fw	E Unload fw 🛛 🔾	Confierror ?
	Errors	3 ×:	log\err_eudet_frio	_dll.t×t		0	J0 J	0
	EnableMsgLog	Msg	LogFile		Lc <mark>ad F</mark> w	E Stop board	E Start board	
	5/12/		log\msg_eudet_frid	o_dll.txt		Ju	10	
		R	un configuration			E Start saving	E Save Acq E:	Stop saving
	RunNo	FrameNbPerAc	g DestDir			10	10 10	
	666	() 1800	d:\data			JTAG configura	tion JTAG E	Error 🔘
1	TotEvNb	DataTransferM	ode FileNamePre	fix		JTAG config file		
	10000	()3	run_			ፄ ⊂:\ccmos_sc	trl\MIMOSA26_JTAG	
	EvNbPerFile	Mi26Nb	Trigger m	ode Save to disk	Run conf	JTAG Reset	JTAG Load J	TAG Start
	1000	÷)6	J0 Fauda 6 M	No	\bigcirc			-
	SendOnEth	SendOnEthPCe		126 on board				
	30	5/10	Monitoring	Enable -			Debuc	tools
	Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board statu	us // Port D4
	80018009	80018009	80018009	80018009	80018009	80018009		
	Data length [0]	Data length [1]	Data length [2]	Data length [3]	Data length [4]	Data length [5]		
	2280	2280	2280	2280	2280	2280	Princ board conr	II Port DS
	Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]	9	9
	6551432	6551432	6551432	6551432	6551432	6551432	Print run conf	// Port D7
	Trailer [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		9
	AAAAAAAB	АААААААВ	AAAAAAAB	ААААААА	JAAAAAAAB	AAAAAAAB		
	Trig nb	TLU trig [0]	TLU trig [1]	TLU trig	[2] TI	LU trig [Last]	Exec ont	
	1	Dicplay frame off.	line (incomplete)	5555 12047	- 105555 ji	-0000 - 10000	19	
	Frame Id		and (incompletey					
		9	Start acquisi	tion				
	EmuleMode	WaitMsAtEnd	TriggerHandlingM	lode Acq Error co	de Acq counte	er Data rate [MB	ls]	
		90	Jo .	0	205	115,062		
	TrigStatus	Timeout [ms]	Scart run	RetLostFram	ieNb Acq size [B	lytes]		
	J1	J 10000		10	24890400	0		
	Last error messag	je				Close fw		
	1				f			

Configure run parameters, click on "Run conf", error displayed in "Conf error ?".

- 25 -



Click on the "Start run" to start the acquisition, "Acq counter" should increase and the values of header, data length, ... trailer will be displayed here.

- 26 -

Triggers number and trigger values are displayed here, an evaluation of the data stream rate in MB/s is also calculated on-line by averaging of the last 10 acquisitions.

🔛 eudet_mi26_tel	escope_daq_den	10_v1_0.vi					
Eile Edit View Pr	oject <u>O</u> perate <u>T</u> i	ools <u>W</u> indow <u>H</u> elp)				
🐡 🕸 🌘							1
							
		[Initialization]			DAQ errors		
Error level	Ei <mark>n</mark>	prLogFile		Initialization	E load fw	E Unload fw	Conf error ?
Errors	3 3	log\err_eudet_frio_	dll.t×t		0	0	0
EnableMsgLog	Mag	JLogFile		Load Fw	E Stop board	E Start board	
127	.	log\msg_eudet_frio	_dll.t×t		0	0	
				-	E Start saving	E Save Acg	E Stop saving
	E	un configuration			0	0	0
RunNo	FrameNbPerA	q DestDir					
666	1800	d:(data			JTAG configural	tion JTA	G Error 🔘
TotEvNb	DataTransfer	ode FileNamePrel	ix		JTAG config file		
10000	.]]3	run_			ង C:\ccmos_scl	trl\MIMOSA26_J1	'AG\
EvNbPerFile	Mi26Nb	Trigger mo	de Save to disk	Run conf	JTAG Reset	JTAG Load	JTAG Start
1000) 6	<u> </u>	JNo			0	9
SendOnEth	SendOnEthPC	nt Emule 6 Mi	26 on board				
910	Jo						
		[Monitoring]	Enable			De	bug tools
Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board s	tatus // Port D4
100010009	190019009	190019009	00019009	00010009	00010009	9	
Data length [0]	Data length [1]	Data length [2]	Data length [3]	Data length [4]	Data length [5]	Print board c	onf // Port D5
2280	J2280	J2280	J2280	J2280	12280		
Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]	-	9
6551432	6551432	6551432	6551432	6551432	6551432	Print run con	// Port D7
Trailer [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		
AAAAAAAB	ААААААВ	AAAAAAB	AAAAAAB	AAAAAAB	АААААААВ		
Tria nh	TLU ong [U]	TLU trig [1]	TLU trig	[2] <u>T</u>	Utrig [Last]	Exec cnt	
1	F0000 - T0000	F2047 - T65	535 F2047	- T65535	0000 - T0000	9	
Frame Id	Display frame off	line (incomplete)					
() O		[
		Start acquisit	ion		×		
EmuleMode	WaitMsAtEnd	TriggerHandlingM	ode Acq Error co	de Acq counte	r Data rate [MB)	sj	
30	30	Start run	10	1205	115,002		
TrigStatus	Timeout [ms]		RetLostFram	eNb Acq size [B	/tes]		
J 1	5 10000	0	10	24890400			
Last error messao	je				Close fw		

- 27 -

The frame displayed on-line is the one selected by "Frame Id". This online monitoring can be disabled by a click on "Enable " control.

🔛 eudet_mi26_tel	escope_daq_de	mo_v1_0.vi					
Eile Edit View Pro	oject <u>O</u> perate	<u>T</u> ools <u>W</u> indow <u>H</u> elp					
٠ کو							3
		Initialization			DAQ errors		
Error level	E	rrorLogFile		Initialization	E load fw	E Unload fw Co	nf error ?
Errors	3	x:\log\err_eudet_frio_d	l.txt		0	0 0	
EnableMsgLog	M	IsgLogFile		Load Fw	E Stop board	E Start board	
5/12/		x:\log\msg_eudet_frio_	dll.txt		Ju	10	
		Run configuration			E Start saving	E Save Acq E St	op saving
RunNo	FrameNbPer	Acq DestDir			10	10	
() 666	÷) 1900	d:\data			JTAG configural	tion JTAG Err	or 🔘
TotEvNb	DataTransfer	rMode FileNamePrefix	¢		JTAG config file		
10000	() <mark>3</mark>	run_			B C:\ccmos_scl	trl\MIMOSA26_JTAG\	
EvNbPerFile	Mi26Nb	Trigger moo	le Save to di <mark>s</mark>	k Run conf	JTAG Reset	JTAG Load JTA	iG Start
3 1000	6	JO Faula CMD	J No	\bigcirc			2
SendOnEth	SendOnEthP	Cent Endele 6 Mizi	o un buaru				
5/0	310	Monitoring	Enable	-		Debug t	ools
Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board status	// Port D4
80018009	80018009	80018009	80018009	80018009	80018009		
Data length [0]	Data length [1]	Data length [2]	Data length [3]	Data length [4]	Data length [5]	~	
2280	2280	2280	2280	2280	2280	Print board conf	// Port D5
Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]	9	9
6551432	6551432	6551432	6551432	6551432	6551432	Print run conf	// Port D7
Trailer [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		9
JAAAAAAA	АААААААВ	AAAAAAAB	АААААААВ	JAAAAAAAB	AAAAAAAB		
Trig nb	TLU trig [0] F0000 - T0000	TLU trig [1]	7LU tr 35 F204	ig [2] 7 - T65535	TLU trig [Last] F0000 - T0000	Exec cnt	
Eramo Id	Display frame o	ff-line (incomplete)					
() 0							
		Start acquisitio	n				
EmuleMode	WaitMsAtEnd	TriggerHandlingMo	de Acq Error o	ode Acq coun	ter Data rate [MB)	's]	
30	- Ju	Start run	JU	J205	115,062		
TrigStatus	Timeout [ms]		RetLostFra	meNb Acq size	[Bytes]		
31	J 10000		10	2489040			
Last error messag	e				Close fw		

- 28 -

🔀 eudet_mi26_te	lescope_daq_den	10_v1_0.vi					
Eile Edit View Pr	oject <u>O</u> perate <u>T</u>	ools <u>W</u> indow <u>H</u> elp					
· · · · · · · · · · · · · · · · · · ·							8
		Initialization			DAQ errors		Laistee
Error level	Err 3 X:	orLogFile \log\err_eudet_frio_(ill.t×t	Initialization	E load fw 0	E Unload fw C	onf error ?
EnableMsgLog	Mse	gLogFile	dli tvet	Load Fw	E Stop board	E Start board	
y 127	jx.	up configuration	untet		E Start saving	E Save Acq E S	itop saving
RunNo	FrameNbPerAc	q DestDir d:\data					rror O
5/000	g/1000				JTAG configural	tion] Jing L	
TotEvNb	DataTransferM	ode FileNamePref	x	/	JTAG conrig rile	WIMINOSA26 ITAC	
J10000	J13	Jun_	2	Dun conf	TAG Reset	TAGLoad II	AG Start
EvNbPerFile	Mi26Nb	Trigger mo	de Save to disk	Kurtoni	Sindheset		
J1000	J/0	Eroule 6 Mi2	5 op board	9	9	9	2
SendOnEth	SendOnEthPCe	int Cindle of Ma	o on board				
310	210	Monitoring	Enable			Debug	tools
Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board statu	 s // Port D4
80018009	80018009	80018009	80018009	80018009	80018009		
Data length [0] 2280	Data length [1] 2280	Data length [2] 2280	Data length [3]	Data length [4] 2280	Data length [5] 2280	Print board conf	// Port D5
Examp ant [0]	Erame cot [1]	Erame ont [2]	Exame cot [3]	Exame opt [4]	Frame opt [5]		
6551432	6551432	6551432	6551432	6551432	6551432	Print run conf	// Port D7
Trailer [0] (H) AAAAAAAB	Trailer [1] (H)	Trailer [2] (H) AAAAAAAB	Trailer [3] (H) AAAAAAAB	Trailer [4] (H) AAAAAAAB	Trailer [5] (H)	9	9
Trig nb	TLU trig [0] F0000 - T0000	TLU trig [1]	TLU trig 535 F2047 -	[2] TLI • T65535 FI	J trig [Last] 2000 - T0000	Exec cnt	
Frame Id	Display frame off	line (incomplete)	/				
() 0		Start acquisiti	on.				
EmuleMode	WaitMsAtEnd	TriggerHandlingMo	de Acq Error cod	le Acq counter 205	Data rate [MB)	's]	
TrigStatus	Timeout [ms]	Start run	RetLostFrame	eNb Acq size [By 24890400	rtes]		
Last error messa	10				Close fw		
Last en or messai	10						

While acquisition is running the "Start run ".button is green, click again on it in order to stop the acquisition.

- 29 -

The frames can also been displayed off-line (DAQ stopped), select the "Frame Id".and click on " Display frame ...". WARNING : Only the frame counter will be displayed, because this code is not finished \rightarrow the user can do it as an exercise ;-).



- 30 -

Some debug tools are also provided : print the context record in log file and parallel port lines control.

eudet mi26 telescope	dag demo v1 0.vi					
File Edit View Project Op	erate <u>T</u> ools <u>W</u> indow <u>H</u>	jelp				
🔹 🕑 💷						2
	Initialization			DAQ errors		
Error level	ErrorLogFile 3 x:\log\err_eudet_fri	o_dll.txt	Initialization	E load fw 0	E Unload fw	Conf error ?
EnableMsgLog	MsqLogFile		Load Fw	E Stop board	E Start board	
(-) 127	x:\log\msg_eudet_f	rio_dll.txt		0	0	
	Run configuration		-	E Start saving	E Save Acq	E Stop saving
RunNo Fram	eNbPerAcq DestDir					
÷) 666 ÷) 180) d:\data			JTAG configurat	tion JTAG	Error 🔘
TotEvNb Data	TransferMode FileNameP	refix		JTAG config file		
(j) 10000 (j) 3	run_			名 C:\ccmos_sct	rl\MIMOSA26_JTA	iGl 🗖
EvNbPerFile Mi26 () 1000 () 6	Vb Trigger	mode Save to disk	Run conf	JTAG Reset	JTAG Load	JTAG Start
SendOnEth Send	OnEthPCent Emule 6	Mi26 on board				
glo glo	Monitorin	9 Enable 💳			Deb	ug tools
Header [0] (H) Header 80018009 80018	[1] (H) Header [2] (H) 009 80018009	Header [3] (H) 80018009	Header [4] (H) 80018009	Header [5] (H) 80018009	Print board sta	itus // Port D4
Data length [0] Data ler 2280 2280	ngth [1] Data length [2]	Data length [3] 2280	Data length [4]	Data length [5] 2280	Print board cor	nf // Port D5
Frame cnt [0] Frame c 6551432 655143	rnt [1] Frame cnt [2] 32 6551432	Frame cnt [3] 6551432	Frame cnt [4] 6551432	Frame cnt [5] 6551432	Print run conf	// Port D7
Trailer [0] (H) Trailer [AAAAAAAB AAAAA	1] (H) Trailer [2] (H) AAAB AAAAAAAB	Trailer [3] (H) AAAAAAAB	Trailer [4] (H)	Trailer [5] (H) AAAAAAAB		
Trig nb TLU trig	[0] TLU trig [1 - T0000 F2047 - 1] TLU trig	[2] TL - T65535 F	U trig [Last]	Exec cnt	
Erame to Display	frame off-line (incomplete)	,	,			
	Start acqu	isition				
EmuleMode WaitM	sAtEnd TriggerHandling	gMode Acq Error coo	de Acq counte 205	r Data rate [MB/ 115,062	's]	
TrigStatus Timeo	ut [ms] Start run	RetLostFram	eNb Acq size [B 24890400	ytes]		
Last error message				Close fw		

- 31 -

5.3 How to configure JTAG

First of all, launch the JTAG software. The DAQ application can do it automatically, but not for all versions of JTAG, therefore please do it manually.

Click on the desktop " Mimosa 26 JTAG " icon.



The following windows will appear, you don't need to load any file, just start the software, that's all.

		ITAG Configurati	ion V1 5		
	General D	iscriminators Line	Patterns Suze 88	/10B Debug	
Minicola.26:3774.C Master Configuration File Maine Configuration Configuration File: Open: Save Device: Open: Open: Save Device: Open: Open: Save Configuration File: Coconse. petholikol SAS, JTAQUeoring Jier Mar, Jean, Jobb Har, John John Configuration File: Coconse. petholikol SAS, JTAQUeoring Jier Mar, Jean, Jobb Har, John JY, Ti Contract, petholikol SAS, JTAQUeoring Jier Mar, Jean, Jobb Har, John JY, Ti Relead Device: Device: Remove Context Pre Incluit Address: Reset Reset Device: Device: Reset Device: Device: Reset Device: Device: Reset Device: Device: Device:	General D Bias Regis ICLPOICS INTERNATIONI INTERNATION INTERNATION INTERNATION INTERNATION INTERNATION INTERNATIONI INTERN	Incommation Line Here: Here: Ars 10 10 10 10	Paterni Suze 88 Paterni Suze 88 Paterni Suze Paterni Suze Paterni Suze Cosabe Co	AIGB Datage District Meds " '' Issimal " Test " Power Miss Ander " '' Estable " '' Crassis " <th>Control Rev Make A P P Hate New Nam (77) 775 775 Hate Naw Nam (77) 775 775 Hate Naw Nam (77) 775 775 Dealwood) 7777 7777 Dealwood) 7777 7777 Dealwood) 7777 7777 Dealwood Nam (7777 7777 7777 Tabel AAAA AAAA Dealwood AAAAA AAAA Dealwood AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA</th>	Control Rev Make A P P Hate New Nam (77) 775 775 Hate Naw Nam (77) 775 775 Hate Naw Nam (77) 775 775 Dealwood) 7777 7777 Dealwood) 7777 7777 Dealwood) 7777 7777 Dealwood Nam (7777 7777 7777 Tabel AAAA AAAA Dealwood AAAAA AAAA Dealwood AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

- 32 -

Select JTAC	i file, configure Mimosa 26 by a click on "JTAG lo	oad", the	
"JTAG error " led	will become red in case of configuration error.	1	

🕅 eudet mi26 tel	escope dag d	lemo, v1 0.vi					
<u>File E</u> dit <u>V</u> iew Pro	oject Operate	Tools Window Help)				
							2
		Initialization			DAQ errors		
Error level		Errori ogEile	\mathbf{i}	Initialization	E load fw	E Unload fw	opt error ?
() Errors	3	x:\log\err_eudet_frio_	dll.txt		0	0	
EpableMcal.og		Maal aa Eila		Land Em	E Stop board	E Start board	
127		villaaimsa eudet fria	dil tyt	Load FW		E Start Doard	
- Su		Txt flog filling_coddoc_fillo	direct		<u>).</u>		
		Run configuration			E Start saving	E Save Acq E S	top saving
RunNo	FrameNbPer	Acq DestDir			10	10 10	
() 666	() 1800	d:\data			JTAG configura	tion JTAG E	ror 🙆
TotEvNb	DataTransfe	arModa EilaNamaDraf	io		JTAG config file		~
() 10000		run	IX		LC:\ccmos_sc	trl\MIMOSA26_JTAG\	D
<i>y</i>	MOCHE	Trigger po	ida Saucita dick	Run conf	JTAG Reset	JTAGLoad JT	AG Start
LUNDPerFile	11/120ND	() o	A No				
91000	Candoo Film	Emule 6 Mi	26 on board	-	-		2
SendUnEth	4 n						
Suc.	30-	Monitoring	Enable			Debug	tools
Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board statu	; // Port D4
80018009	80018009	80018009	80018009	80018009	80018009		
Data leasth [0]	Data length [1	1 Data length [2]	Data length [2]	Data length [4]	Data length [5]	9	9
2280	2280	2280	2280	2280	2280	Print board conf	// Port D5
			From and [2]	France and [4]	France and [5]		
Frame cnt [U]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	6551432	6551432	Print run conf	// Port D7
0001102	10001102	10001102	10001102	10001102	10001102	mineraricon	Troicor
Trailer [0] (H)	Trailer [1] (H)	Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)	9	9
AAAAAAB	Ланананар	AAAAAAAA	AAAAAAAA	ААААААА	Анананар		
Trig nb	TLU trig [0]	TLU trig [1]	TLU trig	[2] TL	U trig [Last]	Exec ont	
1	F0000 - T000	0 F2047 - T65	535 F2047	- T65535	0000 - T0000	9	
Frame Id	Display frame	off-line (incomplete)					
) O			-				
		<u>(Start acquisit</u>	<u>ion</u>				
EmuleMode	WaitMsAtEnc	I TriggerHandlingM	ode Acq Error coo	de Acq counter	r Data rate [MB,	(s]	
3 0	210	Start rup	10	1205	115,002		
TrigStatus	Timeout [ms]		RetLostFram	eNb Acq size [By	/tes]		
J 1	J 10000		10	24890400			
Last error messag	e				Close fw		
,					-		

- 33 -

5.4 How to configure emulation modes

The data emulation is controlled by the fields " EmuleMod ", "TrigStatus" and "Emule 6 Mi26 on board".

The "EmuleMode" control :

- = 0 → No data emulation → DAQ provides Telescope data
- = 1 → Telescope data overwritten by emulated data No trigger
- < 0 → Telescope data overwritten by emulated data + Trigger(s) Generate | EmuleMode | triggers, eg : -1 → 1 trigger / frame

📓 eudet_mi26_tel	escope_daq_den	no_v1_0.vi			/		le l
Eile Edit View Pro	oject <u>O</u> perate <u>T</u> e	ools <u>W</u> indow <u>H</u> el	p				
🔹 🕑							
		Initialization			DAQ errors		
Error level	Erro 3 X:	orLogFile \log\err eudet frio	dll.txt	Initialization	E load fw	E Unload fw	Conferror ?
EnableMcal.og	Mer	al oa Filo		Lood Eur	E Stop board	E Start board	
127	×	\log\msg_eudet_fric	_dll.txt				
	E	tun configuration			E Start saving	E Save Acq E	Stop saving)
RunNo	FrameNbPerAc	q DestDir					
5 666	J 1800	Ju. Juaca			JTAG configural	ion JIAG I	Error
TotEvNb	DataTransferM	ode FileNamePre	fix	<u> </u>	JTAG config file	Internet of arts	
10000	3	run_			The C:\comos_sci	rt(MIMOSA26_JTAG	
EvNbPerFile	Mi26Nb	Trigger m	ode Save to disk	Run cont	JTAG Reset	JIAG LOAD J	ITAG Start
1000	5)6	5∬U Faula ≤ M	5 NO	9	9	9	9
SendOnEth	SendOnEthPCe		26 on board				
		Monitoring	Enable 🗔			Debug	g tools
Header [0] (H) 80008001	Header [1] (H) 80008002	Header [2] (H) 80008003	Header [3] (H) 80008004	Header [4] (H) 80008005	Header [5] (H) 80008006	Print board state	us // Port D4
Data length [0] 2280	Data length [1]	Data length [2] 192	Data length [3] 256	Data length [4] 320	Data length [5] 384	Print board conf	// Port D5
Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]	Print run conf	// Port D7
Trailer [0] (H) AAAA0001	Trailer [1] (H) AAAA0002	Trailer [2] (H) AAAA0003	Trailer [3] (H) AAAA0004	Trailer [4] (H) AAAA0005	Trailer [5] (H) AAAA0006		
Trig nb	TLU trig [0] F0000 - T0040	TLU trig [1] F2047 - T6	TLU trig	[2] TLI - T65535 FI	J trig [Last] 2000 - T0040	Exec cnt	
Frame Id	Display frame off	-line (incomplete)					
3/0	P	Start acquisi	ion				
EmuleMode	WaitMsAtEnd	TriggerHandlingM	ode Acq Error coo	de Acq counter 234	Data rate [MB)	5]	
TrigStatus	Timeout [ms]	Start run	RetLostFram	eNb Acq size [By	/tes]		
Ju 🕨	J 10000		Ju	24890400			
Last error messag	e				Close fw		
J							

- 34 -

The "TrigStatus" control :

- = 0 → DAQ provides Telescope data No trigger
- > 0 → Overwrite the trigger info from Flex RIO but NOT the data Generate " TrigStatus " triggers per frame It's a way to force trigger number given by board

The control "TrigStatus" has priority on "EmuleMode", because it's the last one processed by software. For example, if "TrigStatus" = 3 and "EmuleMode" = -1, telescope data will overwritten by emulated data (rs will be emulated not 1.EmuleMode <> 0) BUT 3

- 35 -

trigge							
🔁 eudet_n	ni26_telescope_daq_	_demo_v1_0.vi	-				
Eile Edit 1	View Project Operate	e <u>T</u> ools <u>W</u> indow <u>H</u> e	lp				
	· ❷ ● □						8
		Initialization			DAQ errors		
Error	evel	ErrorLogFile		Initialization	E load fw	E Unload fw	Conf error ?
S Error	\$ 3	x: (log(err_eudet_rrio	_all.txt	9	Ju	10	10
Enable (-) 127	:MsgLog	MsgLogFile x:\log\msg_eudet_fri	o_dll.txt	Load Fw	E Stop board	E Start board	
		Run configuration		-	E Start saving	E Save Acq	Stop saving
RunNo	FrameNbP	erAcq DestDir			10	10	
() 666	() 1800	d:\data			JTAG configura	tion JTAG	Error 🔘
TotEvi	Nb DataTrans	ferMode FileNamePro	əfix		JTAG config file		
() 1000	0 43	run_			ষ C:\ccmos_sc	trl\MIMOSA26_JTA	G\ 🖻
EVNbP	erFile Mi26Nb	Trigger m	odeSave to disk	Run conf	JTAG Reset	JTAG Load	JTAG Start
() 1000	()6	() () ()	No				
SendC	nEth SendOnEt	hPCent Emule 6 N	1i26 on board				
÷) o	÷) 0		2				
		Monitoring	Enable 🔤			Debu	ug tools
Header [0] (H) Header [1] (I	H) Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board sta	tus // Port D4
800080	01 80008002	80008003	80008004	80008005	80008006		
Data len 2280	gth [0] Data length	[1] Data length [2] 192	Data length [3] 256	Data length [4] 320	Data length [5] 384	Print board cor	If // Port D5
Frame cr	t [0] Frame cnt [1] Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]		
0	0	0	0	0	0	Print run conf	// Port D7
Trailer [0] (H) Trailer [1] (H) Trailer [2] (H)	Trailer [3] (H)	Trailer [4] (H)	Trailer [5] (H)		
	7010 7000	,			,	_	
Trig nb	F0000 - T00	040 F2047 - T6	5535 F2047	- T65535 F	0 trig [Last] 0000 - T0040	9	
Frame	Id Display fram	e off-line (incomplete)					
÷) o		Start acquis	ition				
Emulei	Mode WaitMsAtE	nd TriggerHandling	Node Acq Error co	de Acq counte	r Data rate [MB,	/s]	
()-1	90	(j) o	0	234	115,062		
TrigSt	atus Timeout (m	is] Start run	RetLostFram	eNb Acq size [By	/tes]		
() o	() 10000	\bigcirc	0	24890400			
Lash					Close fw		
Last erro	r message						
1					9		

Control "Emule 6 Mi26 on board" \rightarrow see 5.5.1 Introduction.

- 36 -
5.5 Running the DAQ software

5.5.1 Introduction

The DAQ software has, like the emulator, four modes to read data, selection is done via the control "DataTransferMode":

- 0 → IPHC
- 1 → EUDET 1
- 2 → EUDET 2
- $3 \rightarrow \text{EUDET } 3$

Please read the DAQ emulator documentation to learn more about theses modes.

The DAQ software can also emulate data but its functionalities are limited compared to the DAQ emulator. The header, trailer, trigger values are hard coded in emulation functions, they are not configurable from GUI. Nevertheless it can emulate Mimosa 26 data and especially triggers, their number can be configured from GUI.

The DAQ also have an option to duplicate Mimosa 26 data, because sometimes it difficult to keep a system for week with 6 Mimosa 26 installed on it ... This option is enabled by the control " Emule 6 Mi26 on board", in this case only one Mimosa 26 is needed, connected to the first pair of links (D00, D01), a copy of his data stream will be done in memory part reserved for the next five Mimosa 26.

😰 eudet mi26 telescope dag demo v1 0.vi	
File Edit View Project Operate Tools Window Help	
	2
Initialization DAQ errors	Linion
Error level ErrorLogFile Initialization E load fw E Ur	Inload fw Conferror ?
Errors 3 x:\log\err_eudet_frio_dll.t 0 0	0
EnableMsgLog MsgLogFile Load Fw E Stop board E St	itart board
127 x:\log\msg_eudet_frio_dll. xt 0 0	
E Start saving E S. Run configuration 0 0 0	ave Acq E Stop saving
RunNo FrameNbPerAcq DestDir	
€) 666 €) 1800 d:\data JTAG configuration	JTAG Error 🔘
TotEvNb DataTransferMode FileNamePrefix JTAG config file	
() 10000 () 3 run_ % C:\ccmos_sctrl\MI	IMOSA26_JTAG\
EvNbPerFile Mi26Nb Trigger mode Save to disk Run conf JTAG Reset JTA	AG Load JTAG Start
4) 1000 4) 6 20 20 ANO OD C	
SendOnEth SendOnEthPCent Emule 6 Mi26 ph board	

- 37 -

EUDET-Memo-2010-28

- 38 -

5.6 Mode EUDET 1 – 1 Mi26 x 6 – full frame length....

Mode EUDET 1 selected, one Mi 26 connected, 6 Mi 26 emulated on board, full frame length by setting Mi26 in pattern mode via JTAG. We see that frame size is the maximum and data rate close to 6 x 20 MB/s = 120 MB/s. 🔀 eudet_mi26_telescope_daq_demo_v1_0.vi _ 0 File Edit View Project Operate Tools Window Help 🐡 🕹 🔍 💷 2 Initialization DAQ errors Initialization Error level ErrorLogFile E load fw E Unload fw Conf error ? () Errors 3 x:\log\err_eudet_frio_dll.txt 0 0 0 E Stop board E Start board EnableMsgLpg MsgLogFile Load Fw () 127 0 x:\log\msg eudet frio dll.txt 0 E Start saving E Save Acq E Stop saving Run configuration 0 0 0 DestDir FrameNbPerAcq RunNo () 666 () 1800 d:\data JTAG Error JTAG configuration JTAG config file TotEvNb DataTransferMode FileNamePrefix () 10000 41 & C:\ccmos_sctrl\MIMOSA26_JTAG\ run_ Save to disk JTAG Load Run conf JTAG Reset JTAG Start MIZONE Trigger mode EvNbPerF () 1000 - 6 () 0 C C Emule 6 Mi26 on board SendOnethPCent SendOnE C ÷) 0 () 0 Monitoring Debug tools Enable Header [1] (H) Header [3] (H) Header [4] (H) Header [5] (H) Print board status // Port D4 Header [0] (H) Header [2] (H) 80018009 80018009 80018009 80018009 80018009 80018009 Data length [1] Data length [2] Data length [4] Data length [0] Data length [3] Data length [5] Print board conf // Port D5 2280 2280 2280 2280 2280 2280 🔶 Frame cnt [1] Frame cnt [2] Frame cnt [3] Frame cnt [4] Frame cnt [5] Frame cnt [0] 408960 408960 408960 408960 408960 408960 Print run conf // Port D7 Trailer [1] (H) Trailer [2] (H) Trailer [3] (H) Trailer [5] (H) Trailer [0] (H) Trailer [4] (H) ААААААА АААААААВ AAAAAAAB AAAAAAAB AAAAAAAB AAAAAAAB TLU trig [0] TLU trig [1] TLU trig [Last] TLU trig [2] Trig nb Exec ont F2047 - T65535 F2047 - T65535 F2047 - T65535 F2047 - T65535 9 0 Display frame off-line (incomplete) Frame Id (;) O Start acquisition Data rate [MB/s] EmuleMode WaitMsAtEnd TriggerHandlingMode Acq Error code Acq counter ÷) 0 ()÷) o 0 114,166 158 Start run Timeout [ms] RetLostFrameNb TrigStatus Acq size [Bytes] () 0 () 10000 C 0 24876000 Close fw Last error message

- 39 -

5.6.1 Mode EUDET 2 – 1 Mi26 x 6 – full frame length....

Mode EUDET 2 selected, one Mi 26 connected, 6 Mi 26 emulated on board, full frame length by setting Mi26 in pattern mode via JTAG. We see that frame size is the maximum and data rate close to 6 x 20 MB/s = 120 MB/s.



- 40 -

Mode EUDET 3 – 1 Mi26 x 6 – full frame length – No trigger....

Mode EUDET 3 selected, one Mi 26 connected, 6 Mi 26 emulated on board, full frame length by setting Mi26 in pattern mode via JTAG, but no trigger. We see that data are default values (\$FFFFFFFF) and data rate = 0 ! It's normal because in mode EUDET 3 only frames with trigger are acquired and there is no trigger.

eudet mi26 telescope dag de	emo v1 Avi				
File Edit View Project Operate	Tools Window Help				
					8
	Initialization		DAQ errors		
Error level E	rrorLogFile	Initialization	E load fw E	Unload fw Conf	error ?
gitterors [3]	x:(log(err_eudet_rrio_dil.txt	9	10 10	u ju	
EnableMsgLoc M	lsgLogFile x:\log\msg_eudet_frio_dll.txt	Load Fw	E Stop board E	itart board	
	Run configuration		E Start saving E	Save Acq E Stop	saving
RunNo FrameNbPer/	Acq DestDir				
666 1800	d:\data		JTAG configuration	JTAG Error	۲
TotEvNb DataTransfe	rMode FileNamePrefix		JTAG config file		
÷ 10000 ÷ 3	run_		R C:\ccmos_sctrl\№	MOSA26_JTAG	
EvNbPerFile Mi26Nb	Trigger mode S.	ave to disk Run conf	JTAG Reset J	1AG Load JTAG	Start
	e e e	No			
SendOnEth SendOnEthP	Cent Emule 6 Mi26 on bo	bard			
	<u>[monitoring]</u> Er	nable 🗖			<u> </u>
Header [0] (H) Header [1] (H)	Header [2] (H) Heade	er [3] (H) Header [4] (H) FFFF FFFFFFF	FFFFFFF	Print board status	II Port D4
Data length 0] Data length [1] 4294967295 4294967295	Data length [2] Data le 4294967295 4294	ength [3] Data length [4 967295 4294967295] Data length [5] 4294967295	Print board conf	// Port D5
Frame cnt [0] Frame cnt [1]	Frame cnt [2] Frame	e cnt [3] Frame cnt [4]	Frame cnt [5]		
4294967295 4294967295	4294967295 4294	967295 4294967295	4294967295	Print run conf	If Port D7
Trailer [0] (H) Trailer [1] (H)	Trailer [2] (H) Trailer	[3] (H) Trailer [4] (H) FFFF FFFFFFFF	Trailer [5] (H)	-	9
Trig nb TLU trig [0]	TLU trig [1]	TLU trig [2]	TLU trig [Last]	Exec ont	
Display frame o	ff-line (incomplete)	112011 100000	112011 100000		
	Start acquisition				
EmuleMode WaitMsAtEnd	TriggerHandlingMode A	Acq Error code Acq cour	nter Data rate [MB/s]		
Trischehen Timeout [me]	Start run)oti octEromolik	[D]]		
		0 0	[Bytes]	Ļ	
Last error message			Close fw		

- 41 -

5.6.2 Mode EUDET 3 – 1 Mi26 x 6 – full frame length – 1 trigger / frame....

Mode EUDET 3 selected, one Mi 26 connected, 6 Mi 26 emulated on board, full frame length, one trigger per frame. The triggers are emulated via the parameter " Emule mode " set to -1, trigger number = abs (Emule mode). Now we get data, frame size is the maximum and data rate close to 6 x 20 MB/s = 120 MB/s.



- 42 -

5.6.3 Mode EUDET 3 – 1 Mi26 x 6 – full frame length – 4 triggers / frame....

Mode EUDET 3 selected, one Mi 26 connected, 6 Mi 26 emulated on board, full frame size, 4 triggers / frame. The triggers are emulated via the parameter

" Emule mode " set to -1, trigger number = abs (Emule mode). We see that frame size is the maximum and data rate close to 6 x 20 MB/s = 120 MB/s.

eudet_mi26_tel	escope_daq_demo	v1_0.vi		1			
<u>File E</u> dit ⊻iew Pr	oject <u>O</u> perate <u>T</u> oc	ls <u>M</u> indow <u>H</u> elp					
· 🔿 🐨							3
		lritialization			DAQ errors		
Error level	Error 3 × de	logFile g\err_eudet_frio_d	ll.txt	Initialization	E load fw	E Unload fw C	onferror?
EnableMsgLog	MsgL	ogFile		Load Fw	E Stop board	E Start board	
127	×: (la	og\msg_eudet_frio_(dll.txt		0	0	
	Ru	n configuration			E Start saving	E Save Acq E S	top saving
RunNo	FrameNbPerAcq	DestDir					_
5/666	J 1800	ju: (uaca			JTAG configurat	ion JTAG E	ror 🔘
TotEvNb	DataTransferMo	de FileNamePrefix	<		JTAG config file	JMMOGAOC ITAC	
5/10000	U 3	Jun_		Rup copf	ITAG Reset	ITAG Load IT	AG Start
EvNbPerFile	Mi26Nb (-) 6	() () ()	No				
SendOnEth	SendOnEthPCeni	Emule 6 Mi2	6 on board				
e) o	()) b 👘	\bigcirc					
		Monitoring	Enable 📃			Debug	tools
Header [0] (H) 80008001	Header [1] (H) 80008002	Header [2] (H) 80008003	Header [3] (H) 80008004	Header [4] (H) 80008005	Header [5] (H) 80008006	Print board statu	; // Port D4
Data length [0]	Data length [1]	Data length [2]	Data length [3]	Data length [4]] Data length [5]	Print board conf	// Port D5
12200	5 150	F 152	5 1 [0]	520	504		
Frame cnt [0]	Frame ont [1]	Prame cnt [2]	Prame cnt [3]	Frame cnt [4]	Frame ont [5]	Print run conf	// Port D7
Trailer [0] (H) AAAA0001	railer [1] (H) AAAA0002	Trailer [2] (H) AAAA0003	Trailer [3] (H) AAAA00004	Trailer [4] (H) AAAA0005	Trailer [5] (H) AAAA0006		
Trig nb	TLU trig [0] F0000 - T0010	TLU trig [1] F0000 - T003	TLU trig	[2] • T0030	TLU trig [Last] F0000 - T0040	Exec ont	
Frame	Display frame off-li	ne (incomplete)					
0		Start acquisitio	n				
EmuleMode	WaitMsAtEnd	TriggerHandlingMo	de Acq Error coc	le Acq cour 29	nter Data rate [MB/ 115,318	5]	
TrigStatu	Timeout [ms]	Start run	RetLostFrame	Nb Acq size	[Bytes]		
÷) 0	3 10000	\bigcirc	0	249336	00 🔶		
Last error messag	e				Close fw		
J							

- 43 -

5.6.4 Mode EUDET 3 – 6 Mi26 x 6 – full frame length – 1 trigger / frame....

Mode EUDET 3 selected, six Mi 26 connected, full frame length by setting Mi26 in pattern mode via JTAG, one trigger emulated. We see that frame size is the maximum and data rate close to 6 x 20 MB/s = 120 MB/s.

😫 eudet_mi26_tel	escope_daq_der	no_v1_1.vi						
Eile Edit View Pr	oject <u>O</u> perate <u>1</u>	ools <u>W</u> indow <u>H</u> elp	,					
							2	2
		Initialization			DAQ errors			
Error level	En 3 ×	orLogFile \log\err_eudet_frio_	dll.txt	Initialization	E load fw	E Unload fw	Conf error ?	
EnableMsgLog	Ms ×	gLogFile \log\msg_eudet_frio	_dll.txt	Load Fw	E Stop board	E Start board		
RunNo	[FrameNbPerAd	Run configuration			E Start saving	E Save Acq	E Stop saving 0	
666	1800	d:\data			JTAG configurat	ion JTAG	5 Error 🔘	
TotEvNb	DataTransferM	1ode FileNamePref	ix		JTAG config file			
() 10000	3	run_			ፄ C:\ccmos_sct	rl\MIMOSA26_JT	AG\ 🗁	
EvNbPerFile	Mi26Nb	Trigger mo	de Save to disk	Run conf	JTAG Reset	JTAG Load	JTAG Start	
1000	96	JO Emula 6 Mi	JNo 26 op board		9			
SendOnEth		Ant Elificite o Mile Monitoring	Enable			Deb	oug tools	
Header [0] (H)	Header [1] (H)	Header [2] (H)	Header [3] (H)	Header [4] (H)	Header [5] (H)	Print board st	atus // Port D4	
80018001	80018002	80018003	80018004	80018005	80018006			
Data length [0] 2280	Data length [1] 2280	Data length [2] 2280	Data length [3] 2280	Data length [4] 2280	Data length [5] 2280	Print board co	onf // Port D5	
Frame cnt [0] 83323	Frame cnt [1] 83323	Frame cnt [2] 83323	Frame cnt [3] 83323	Frame cnt [4] 83323	Frame cnt [5] 83323	Print run conf	// Port D7	
Trailer [0] (H)	Trailer [1] (H) AAAAAAAB	Trailer [2] (H)	Trailer [3] (H) AAAAAAAD	Trailer [4] (H) AAAAAAAE	Trailer [5] (H) AAAAAAAF			
Trig nb	TLU trig [0] F0000 - T0000	TLU trig [1]	TLU trig 535 F2047 ·	[2] TLL • T65535 FC	J trig [Last] 1000 - T0000	Exec cnt		
Frame Id	Display frame off	-line (incomplete)						
÷)lo		Start acquisit	on					
EmuleMode	WaitMsAtEnd	TriggerHandlingMe	ode Acq Error cod	e Acq counter	Data rate [MB/ 114,232	s]		
TrigStatus	Timeout [ms]	Start run	RetLostFrame	eNb Acq size [By 24890400	tes]			
Last error messag	e				Close fw			
								-
flexrio_mi26_lv2009_p	xie_diff_ended.lvp	roj/My Computer 🖣						• //

- 44 -

6 Labview tutorial

6.1 Introduction

The goal is to make a short tutorial about Labview graphical programming. I will present you the main Labview language structures and show you how to use them via simple programs examples.

6.2 List of examples / exercises

This is the list of examples.

1 A A	
	🔛 Project Explorer - Second_Project_PXIe_diff_ended.lv 💶 🔁
4y D	<u>File Edit View Project Operate Tools Window H</u> elp
	🏝 🗃 🖬 🕼 🗴 🛍 🗓 🗙 🍤 🝽 🕵 🖬 🖼 🕈 😭
	Items Files
My C	🕞 📴 Project: Second_Project_PXIe_diff_ended.lvproj
	📄 📩 🕎 My Computer
	🛉 🛱 mi26
	🖕 🌐 💋 flex_rio
Mo	🖕 🛱 eudet
F	🚽 🔤 eudet_mi26_telescope_daq_demo_v1_0.vi
	🚽 🔤 get_frame_fieldsheader_fcnt_dl_trailer.vi
	🚽 🛶 📷 get_frame_fieldsmi26_trig.vi
	- 🔜 lv_ex0_ctrl_indic_struct.vi
Rec	🔜 Iv_ex1_while_loop.vi
	- 🔜 Iv_ex2_if.vi
	- www.www.www.www.www.www.www.www.www.ww
	- 🛃 lv_ex4_flat_sequence.vi
AMS	🛃 lv_ex5_stacked_sequence.vi
	- 📑 Iv_ex6_for_loop.vi
	📑 Iv_ex7_while_loop_wait_user_action.vi
1	V Ivex8_user_event_wait_user_action.vi



6.3 Controls, indicators & structures

The Labview GUI is called "Panel " and the source code " Diagram ". On the above diagram you can see the main Labview " components " : controls, indicators, and program control structures.



- 1. "Numeric control" is an input field in which user set values
- 2. "Numeric indicator " is an output field which displays results
- 3. Local variable is a way to create a variable associate to a control or an indicator, eg : "Numeric control ", "Numeric indicator ". The default way to interconnect " things " in Labview is wires ... but it get quickly messy ... local variables can help you to make the source code more readable.
- 4. "While loop" is the equivalent of the C while (..) loop. The code inserted in the box is executed until a condition tells to stop.
- 5. The "For loop " is the equivalent of C for (;;) loop, it executes the code in the box N times, i is the loop index.

- 46 -



- 6. The "case structure" with only two cases (True / False) is the equivalent of C If / else test. The box has two sides, one executed if input Boolean "?" is true, the other if it's false.
- 7. The " case structure" with more than two cases (input = integer) is the equivalent of the C switch case instruction. The box has one side per case value, the case corresponding to the input "?" is executed.
- 8. The "flat sequence" is the equivalent of sequential C code = simple code written on consecutive lines without any branch instruction. The sequence has frames from left to write. Their content is executed one after the other from left to right. This structure seems strange and useless, but in fact it is useful because Labview programming is " data driven " not executed sequentially
- 9. The "staked sequence" is the same structure as "flat sequence" but it's displayed in a compact way : staked, that's all.
- 10. The "Event " structure is an event handler which links code execution to GUI events or user events. It's an equivalent of a " call back function " in an IDE like C++ Builder.
- 11. The " call DLL function " is a way to call a function from a DLL. In fact it encapsulates the function in a Labview Vi.

- 47 -

6.4 While loop

Run the program by a click on black arrow, the loop counter will increment, until you click on the "Stop loop " button. Notice the local variable used for loop counter.

1	A Project Explorer - Second Project PXIe diff ended.lv	1	
My D	Eile Edit View Project Operate Iools Window Help		
	∬ 🏠 🗃 H (J) X 🗅 🕦 X 🤌 🖓 📓 🖬 - 🐔		
	Items Files		
My	🖃 🗟 Project: Second_Project_PXIe_diff_ended.lvproj	In the second se	
	👜 🕎 My Computer		
1	E 0 mi26		
	E M eudet		
My	- R eudet_mi26_telescope_daq_demo_v1_0.vi	Stop loop Loop cnt	
	🔜 get_frame_fieldsheader_fcnt_dl_trailer.vi	151253121	
	get_frame_fieldsmi26_trig.vi		
Bar	w sv lite loop.vi	While loop demo	
	v ex3 case.vi		
		Second_Project_PXIe_diff_ended.lvproj/My Computer	
	- 🔂 lv_ex6_for_loop.vi		
FAME	Iv_ex/_while_loop_wait_user_action.vi		
		😫 lv_ex1_while_loop.vi Block Diagram *	
	🔜 lv_ex9_meas_ram_cpy_time.vi	Eile Edit View Project Operate Tools Window Help	
	🖶 💋 eudet_frio	· · · · · · · · · · · · · · · · · · ·	3 🗂
	Eigth_U32_diff_ended (Host).vi		1
	Test_DRAM_diff_ended (Host).vi	(While loop demo)	
	FPGA Target (RIO0, PXIe-7962R)		
ch_c	- k fpga_reference.ctl	Loop cnt	
	Provide Specifications	N 122	
į			
daq_			
		Loop cnt	
E N			
Instr			
1		Stop loop	Toth Issue & Total
First			
Einelt			
TUPSU			
			1
Lab		Second_Project_PXIe_diff_ended.lvproj/My Computer	<u> </u>

- 48 -

6.5 If

Run the program by a click permanent execution button. Click on the "Increment " button, the loop counter will increment while button is on (green) and stop when it gets off.



6.6 Flat sequence

Run the program by a click permanent execution button. The sequence will execute step by step from left to right, the light will switch on one after the other, with a delay of 1000 ms.



- 50 -

6.7 Staked sequence

Run the program by a click permanent execution button. The sequence will executes step by step from left to right, the light will switch on one after the other, with a delay of 1000 ms. The result is the same as with the "flat sequence " (6.6) the only difference is the way the structure is displayed in diagram.





6.8 For loop

Run the program by a click permanent execution button. The loop will execute " Loop nb to run " times, you can check it via " Loop index " indicator, but as permanent execution is enabled, the loop will restart automatically. Therefore the " Loop cnt " indicator will indicates a number higher than " Index" because it counts since beginning of program execution.



- 52 -

6.9 While loop wait user action

Run the program by a click on black arrow. The loop runs and the "Exec cnt " indicator increments while the "Exec " switch is on (green).

The windows tasks manager show that Laview uses 50 % of the CPU to perform this task ... it's because it's a polling of the "Exec " switch state ! it's not event driven ...



- 53 -

Please notice the switch property "mechanical action" set to "Switch when pressed " \rightarrow this is a simple ON / OFF switch like the one used to control the light of this room.



- 54 -

6.10 Event wait user action

Run the program by a click on black arrow. The loop runs and the "Exec cnt " indicator increments while the "Exec " switch is on (green).

The windows tasks manager show that Laview uses 0 % of the CPU to perform this task ... it's because now it's event driven ... compare to result of (6.9) !!!



- 55 -

Please notice the switch property "mechanical action " set to "Switch until released " \rightarrow this is " push button " like the one we use for a ring.



- 56 -

6.11 DLL function call

It will be explained in next version of documentation.

- 57 -

6.12 RAM copy execution time measurement

This program uses most of the control structures shown in the examples. It also uses the "Event" structure in a different way than in the examples, by using the "time out" event. It's a way to make a polling but to free CPU between two pool cycles. The execution time is not displayed in GUI, it must be measured with an oscilloscope on parallel port line D6 (or D7 ?).

	an Yolume (11-)	1		
Ele	📴 Project Explorer - Second_Project_PXIe_diff_ended.lv 💶 🗖 🔀			
	Eile Edit View Project Operate Iools Window Help			
G	Ĩ [™] 및 번 번 1 × ₩ 및 × № Ø × № Ø 22 H [®] = 4.		🔛 lv_ex9_meas_ram_cpy_time.vi	
Addi	Items Silve		Eile Edit Yiew Broject Operate Iools Window Help	
Cala		l r		2
POIL	🕞 🙀 Project: Second_Project_PXIe_dlff_ended.lvproj			
100	🖻 😡 My Computer		Initialization	
	🕀 🔯 mi26			
	🕀 💆 flex_rio	hformation	Error level ErrorLogFile	
	E 🔯 eudet		Errors + Warnings 2 x:\log\err_meas_ram_cpy_time.txt	
	eudet_mi26_telescope_daq_demo_v1_0.vi		EnableMotion ModioaElla	Initialization
	- st frame_fields_fields_fields_it/alier.vi		A Log	
	k ext while loop vi		J 127 JX:(bg(iisg_iieas_raii_cpy_diie.cxc	9
	h ex2 if vi		Alles men	~
	- R ly ex3 case, vi		S2MB	00
	- R Iv ex4 flat sequence.vi		25	
	- R Iv_ex5_stacked_sequence.vi			D7
•	V_ex6_for_loop.vi		Free mean	
1	- 🙀 lv_ex7_while_loop_wait_user_action.vi			9
	- 🔜 lv_ex8_user_event_wait_user_action.vi		Meas mem crivitime	
	- 🔜 Iv_ex9_meas_ram_cpy_time.vi		Mem cpy mode Mem cpy loop cnt	
1	🔁 💆 eudet_frio		7/3 978	
	- Eigth_U32_dirr_ended (Host).vi		Second Project PYTe diff ended knowi/My Computer	
	Eigth_U32_4dma_diff_ended (Host).vi		Decense indeced and an analysis of the computer 14	
	Tesc_DRAM_dill_ended (Host).VI			

- 58 -

Ele Edit View Project Operate Tools Window Help	📴 lv_ex9_meas_ram_cpy_time.vi Bl	lock Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer
Image:	Eile Edit View Project Operate To	ols Window Help
Alloc mem Free mem Meas mem cpy time Mem cpy mode Mem cpy loop cnt S2MB 20 B Trans 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		a 📅 🔐 13pt Application Font 🖃 🚛 🖬 🐨 🦗
20 2 Timeout 20 ms	Alloc mem Free mem Meas mer	m cpy time Mem cpy loop cnt SzMB
Tree Z0 ms Type Time EFRIO_FDbgMeasRamCpyTime.vi		
Type Time Mem cpy mode EFRIO_FDbgMeasRamCpyTime.vi ScMB	Timeout 20 ms	a True ▼►
A THE MEAST THE THE PART OF TH	Time Time	EFRIO_FDbgMeasRamCpyTime.vi
Mem cpy loop cnt		Mem cpy loop cnt

- 59 -

7 DAQ source code

7.1 Introduction

The goal of this chapter is to give you an overview of DAQ Labview source code. We can't go into details, but we can explain the job of each part and how it runs.

7.2 DAQ source tree

Two directories contain the DAQ Labview source code :

- ccmos_pxi_daq_local_conf → configuration files for old PXI DAQ (not for EUDET)
- ccmos_pxi_daq_crate_V2009 → source files



The batch "loc_labview_v2009.bat" creates three virtual drives \rightarrow Y:, X:,



L:



The batch "loc_labview_v2009.bat" creates three virtual drives \rightarrow Y:, X:,

L:

- Y → Points to ccmos_pxi_daq_crate_V2009
- X → Points to ccmos_pxi_daq_crate_V2009\X It contains the binary part of the C tree architecture → DLL
- L → Points to ccmos_pxi_daq_crate_V2009\L It contains the Labview source files for EUDET Telescope DAQ

The X: virtual drive contains the eudet_frio_dll.dll and the log files directory.





The L: virtual drive contains the eudet_frio_dll.dll interface to Labview.

It means one Vi (Virtual Instrument ⇔ function in C code) which " encapsulates " each function of the DLL. Each Vi has the same name as the DLL function, example : EFRIO__MI26_FJtagStartChip.vi encapsulates the DLL function EFRIO__MI26_FJtagStartChip (...).

These Vi are installed in directory L:\dll\win\eudet_frio

🔄 eudet_frio	
File Edit View Favorites Tools Help	
🚱 Back 🔹 🕥 👻 🏂 🔎 Search 👘 Folders	7 -
Address 🛅 L:\dll\win\eudet_frio	
Folders	Name
Desktop My Computer My Computer My Computer New Volume (D:) WINDOWS (C:) Mundows	 temp.vi EFRIO_MI26_FJtagStartChip.vi EFRIO_MI26_FJtagReset.vi EFRIO_MI26_FJtagLoadFile.vi EFRIO_MI26_FJtagLoadFile.vi EFRIO_MI26_FJtagLoadChip.vi EFRIO_MI26_FFRioAcqDeserDataMi26.vi EFRIO_FTrfData.vi EFRIO_FTluTrigger2Str.vi EFRIO_FTimeStamp2Str.vi EFRIO_FStorpSavingOnFile.vi EFRIO_FStetBoardConf.vi EFRIO_FPrintRunCont.vi EFRIO_FPrintBoardStatus.vi EFRIO_FPrintBoardConf.vi EFRIO_FPPOutD7.vi EFRIO_FPPOutD6.vi EFRIO_FPPOutD6.vi EFRIO_FPPOutD4.vi



The L: virtual drive contains EUDET Telescope DAQ project.

The DAQ source file eudet_mi26_telescope_daq_demo_v1_0.vi is installed in the directory L:\prj\win\daq_pxi\eudet.



- 63 -

The L: virtual drive contains Flex RIO board control Vi. This is an API written in Labview to configure the Flex RIO board.

We can't explain each Vi during this training, we will see the most useful when we will look into in the DAQ application source code.

Theses files are located in directory L:\prj\win\daq_pxi\flex_rio.



7.3 DAQ software GUI

🔝 eudet_mi26_te	lescope_daq_dem	io_v1_0.vi	What it io	oks like.			
Eile Edit ⊻iew P	roject <u>O</u> perate <u>T</u> o	iols <u>W</u> indow <u>H</u> elj	D				
							3
		Initialization			DAQ errors		
Error level	Erro 3 x:1	rLogFile log\err_eudet_frio_	dll.txt	Initialization	E load fw	E Unload fw Co	onferror?
EnableMsgLog	Msg x:1	LogFile log\msg_eudet_frio	_dll.txt	Load Fw	E Stop board	E Start board	
	R	un configuration		9	E Start saving	E Save Acq E S	op saving
RunNo	FrameNbPerAcc	g DestDir d:\data			JTAG configura	ition JTAG Er	ror 🔘
TotEvNb	DataTransferM	ode FileNamePrei	fix		JTAG config file	•	
10000	3	run_	ow.		B C:\ccmos_so	trl\MIMOSA26_JTAG	
EvNbPerFile	Mi26Nb	Trigger mo (-) 0	de Save to disk	Run conf	JTAG Reset	JTAG Load JT.	AG Start
SendOnEth	SendOnEthPCe	nt Emule 6 Mi	26 on board				-
		Monitoring	Enable			Debug	ools
Header [0] (H) 80008001	Header [1] (H) 80008002	Header [2] (H) 80008003	Header [3] (H) 80008004	Header [4] (H) 80008005	Header [5] (H) 80008006	Print board status	// Port D4
Data length [0] 2280	Data length [1] 128	Data length [2]	Data length [3] 256	Data length [4] 320	Data length [5] 384	Print board conf	// Port D5
Frame cnt [0]	Frame cnt [1]	Frame cnt [2]	Frame cnt [3]	Frame cnt [4]	Frame cnt [5]	Print run conf	// Port D7
Trailer [0] (H) AAAA0001	Trailer [1] (H) AAAA0002	Trailer [2] (H) AAAA0003	Trailer [3] (H) AAAA0004	Trailer [4] (H) AAAA0005	Trailer [5] (H) AAAA0006		
Trig nb	TLU trig [0] F0000 - T0040	TLU trig [1]	TLU triç 5535 F2047) [2] TL - T65535 F	U trig [Last] 0000 - T0040	Exec ont	
Frame Id	Display frame off-	line (incomplete)					
<i>(</i>) 0		Start acquisit	ion				
EmuleMode	WaitMsAtEnd	TriggerHandlingM	ode Acq Error co	de Acq counte	r Data rate [MB	/s]	
TrigStatus	Timeout [ms]	Start run	RetLostFram	neNb Acq size [B	ytes]		
Last error messa	ge				Close fw		
	-						

The Just to remind you what it looks like.

- 65 -

7.4 Controls of the DAQ software

It's the controls used on DAQ software GUI. As you can see they are on the left, out of any control structure (loop and so on), it's because I prefer to use local variables to access them rather than having a lot of wires which cover the diagram ...



- 66 -

7.5 Indicators of the DAQ software

It's the indicators (or most of them) used on DAQ software GUI. As you can see they are on the top, out of any control structure (loop and so on), it's because I prefer to use local variables to access them rather than having a lot of wires which cover the diagram ...

🔛 ei	udet_	_mi26_	telesco	be_daq_d	emo_v1_0.vi	Block Diagrai	n on Seco	ond_Project_P	(Ie_diff_ended.lvpr	oj/ľ
<u>F</u> ile	Edit	⊻iew	Project	<u>O</u> perate	<u>T</u> ools <u>W</u> indov	∧ <u>H</u> elp				
		¢ @		8 🖫	╘┙┏┓┑	13pt Applicatio	n Font		- 💁 😼	
		D	isplays fo	r frames mo	nitoring -> Hea	der, Frame cnt	Trailer	+ TLU Triggers		
	Head	er [0] (H]	H) He	ader [1] (H 132	I) Header [132]	2] (H) Heade	er [3] (H)]	Header [4] (H)	Header [5] (H)	
	Data	length]	[0] Da	ata length []32]	1] Data leng 132	jth [2] Data •032	length [3]]	Data length [4]	Data length [5]	
	Fram	ie cnt (C)] Fr	ame cnt [1] 132	Frame cnt	[2] Fram	ie cnt [3]	Frame cnt [4]	Frame cnt [5]	
	Traile	r [0] (H]) Tra D	ailer [1] (H) 32	Trailer [2]	(H) Traile	r [3] (H)]	Trailer [4] (H)	Trailer [5] (H)	
	Trig n	њ]	TLI	J trig [0] bc	TLU trig [1]	TLU tr	ig [2]	TLU trig [Last]		
C										
	20 🗵			~					[1] "Initialization": N	1ous
L		Exe	c cnt	+1	Exec cr	it			F	Initia
L	Ī	Type Time							Ŀ	THER

- 67 -

7.6 The main " endless "loop ...

The whole DAQ software is in an "endless " while loop (exit condition set to false by a constant) because the "event " structure has some limitations. Therefore the only way I found is to encapsulate the "event " structure in a "while (1) loop".

structure in a " while (1) loop". It will not waste CPU time because of the " event " structure " time out " event which will release CPD each 20 ms. It's a way to have both : polling and event driven code in the same application.

🖻 eudet_mi26_telescope_daq_demo_yt_0.vi Block Diagram on Second_Project_P%te_diff_ended.lvproj/My Computer	
File Edit View Broject Operate Tools Window Help	
	2
Timeout 20 ms Start run Last error message Hande "Run request "	
Reset acquisitions counter	
Acq counter	
n- nra	
Start saving on Sie (f enabled in up narameters)	
EPRIO_FStartSavingOnFile.vi E Start saving	
22	
1 II 11 LE 11 B	8 11
	+

- 68 -

7.7 The initialization code \rightarrow " Initialization " button

This code initialize the library, it's called by a click on "Initialization" button via the "event" structure on mouse down event.

Step 0

It calls the eudet_frio DLL initialization function \rightarrow EFRIO_FBegin (...).



- 69 -

7.8 Step 1

It forces the board state to be present and prints a log message.

😥 eudet_mi26_telescope_daq_demo_v1_0.vi Block Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer		
Elle Edit View Project Operate Tools Window Help		
🔷 🕘 🔲 😰 🕼 🖕 🛱 🔐 13pt Application Font 🔤 😨 🐨 🐨		
20 🖾 🚽 🚽 🚽 🖌 🚽		
Initialize DLL		
Type		
Button		
Plathas		
Porce Doard to be present.		
I + BoardPresent		
Init end step 1		

- 70 -

7.9 The firmware loading code \rightarrow " Load Fw " button

This code loads the firmware in Flex RIO board, it's called by a click on "Load Fw" button via the "event" structure on mouse down event.

7.9.1 Step 0

It calls the fw loading Vi → FlexRio_LoadFw.vi



- 71 -

7.9.2 Step 1

It prints a log message.

🔀 eudet_mi26_telescope_daq_demo_v1_	0.vi Block Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer	
Elle Edit View Project Operate Iools Window Help		
수 관 🕘 🗉 😵 🕵 🖬 🗗	🗊 13pt Application Font 🔍 🚛 🐻 V	
20 2	4[2] "Load Fw": Mouse Down	
	Load Firmura	
Tuno -	Load minimare,	
Time	₹ 1 [01] ▼▶	
CtlRef		
Button		
Mods		
PlatMods		
	Print debug messages	
	EFRIO_FPrintMsg.vi	
	Load fw step 1 - end of init sequence - do nothing	
	· · · · · · · · · · · · · · · · · · ·	

- 72 -
7.10 The JTAG code → " Initialization " button

7.10.1 JTAG configuration file loading \rightarrow " On file selection "

This code tells the JTAG application to load a JTAG configuration file via COM interface. It's called on file name change. It calls the eudet_frio DLL JTAG loading file function \rightarrow EFRIO_MI26_FJtagLoadFile (...)



- 73 -

7.10.2 JTAG Reset chip → " JTAG Reset " button

This code tells the JTAG application to reset all the Mimosa 26 via COM interface. It's called by a click on "JTAG Reset ".button. It calls the eudet_frio DLL JTAG reset function \rightarrow EFRIO_MI26_FJtagReset (...).



- 74 -

JTAG Load chip \rightarrow " JTAG Load " button

This code tells the JTAG application to load all the Mimosa 26 via COM interface. It's called by a click on "JTAG Load ".button. It calls the eudet_frio DLL JTAG load chip function \rightarrow EFRIO_MI26_FJtagLoadChip (...).

🔛 ei	udet _.	_mi26_	telescop	e_daq_de	:mo_v1	_0.vi	Block Diag	ram on Se	cond_Pro	ject_PXI	e_diff_ende	d.lvproj/l	My Comp	uter		
File	<u>E</u> dit	⊻iew	Project	<u>O</u> perate	Tools	<u>W</u> indov	v <u>H</u> elp									
		\$ ₽		8	6	t.	13pt Applic	ation Font		•	Ø- 😼					
	_															
	20	<u>x</u>									◀[5]"JTAG	Load": Mou	se Down			*
		II Tur	10						Send cor	nmand to .	JTAG applicati	on -> Load	all Mimosa	26 with JTA	G config file	parameters
		Tim	18													
		Ctlk Coo	tef rds									EFRIO_	_MI26_FJt	agLoadChip.	Vİ	
		Butt	ion											*0		rror
		PlatM	as Iods									<u> </u>		12		

- 75 -

JTAG Start chip \rightarrow " JTAG Start " button

This code tells the JTAG application to start all the Mimosa 26 via COM interface. It's called by a click on "JTAG Start ".button. It calls the eudet_frio DLL JTAG start chip function \rightarrow EFRIO_MI26_FJtagStartChip (...).

🔁 eud	et_mi2	i_telescop	oe_daq_d	emo_v	1_0.vi Block Diag	ram on Sec	ond_Proje	ct_PXIe_di	f_ended.l	vproj/My	Computer		
<u>File</u>	idit <u>V</u> iev	v <u>P</u> roject	<u>O</u> perate	Tools	<u>W</u> indow <u>H</u> elp								
	\$	₽ 	8	40 6	13pt Applic	ation Font	 1	<u>-</u>	- 😼				
r.													
2	20 🛛							•[6] "JTAG Sta	rt": Mouse ()own		•
		rype						Send co	mmand to 1	TAG applica	tion -> Star	rt all Mimosa 2	<u>'6</u>
	F	Time tIRef											-
		oords							E	FRIO_MI2	26_FJtagSta	artChip.vi	
		uccon Aods								2	-	JTAG	Error
	Pla	itMods									L.		
1													

- 76 -

Run configuration \rightarrow " Run Conf " button

This code sets run configuration.

Step 0

It makes a copy of Labview global variables to DLL, because it's the easiest way to get current state of board configuration and status Vi in the DLL.

🔛 e	udet_mi	26_telesco	pe_daq_de	mo_v1_0.vi Block Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer
File	<u>E</u> dit <u>V</u> ie	w <u>P</u> roject	<u>O</u> perate	[ools <u>W</u> indow <u>H</u> elp
	€	<u>ଛ</u> 🔵 🛙	I 💡 🕵	👆 📅 🔐 13pt Application Font 🖌 🚛 🖬 🖓 🦚
				Get run parameters from GUI and call EFRIO_FConfRun with them to s
		Туре		
	I IF	Time		
		Coords		
		Button		Copy variables from LV to DLL
	F	latMods		
				EFRIO_CpyBoardConfLvToDII.vi
				2
				EFRIO CovBoardStatusLyToDII.
				2

- 77 -

It gets run parameters from GUI and call the eudet_frio DLL run configuration function \rightarrow EFRIO_FConfRun (...).



- 78 -

It makes a copy of the DLL board configuration and status variables to the Labview global, because it's the easiest way to get current state of board configuration and status from the DLL to Labview. It's the complementary operation of the one done in Step 0.

🚺 eudet_mi26	_telescope_daq_d	:mo_v1_0.vi B	ock Diagram on Sec	ond_Project_P>	<pre>{Ie_diff_ended.</pre>	lvproj/My Computer	
<u>File E</u> dit <u>V</u> iew	Project Operate	<u>T</u> ools <u>W</u> indow	Help				
4 图) 🕘 🔳 😰 🔛		3pt Application Font		- 🗠 😼		
					I [7] "Dup copf	²¹ Mourse Down	- L
20 4						: Mouse Down	
				Get ru	un parameters fron	m GUI and call EFRIO_FCon	fRun with them to setup (
Ту	'pe	1000000					
Ti	me Ref	1				22222 222	
Co	ords						
But	ton nds						
Plat	Mods					Copy variables from DLL	to LV
						EFRIOCpy	yBoardConfDllToLv.vi
						2 1	
						EFRIOCp	yBoardStatusDIIToLv.vi
						2	

- 79 -

It enables or not the emulation of 6 Mimosa 26 on board. It is done by setting the state of the global variable " Emule channels" in function of the switch " Emule 6 Mi26 on board " state.

- 80 -

Print run configuration record in log file \rightarrow "Print run conf" button

This code prints the run configuration record in log file. It calls the eudet_frio library function EFRIO_FPrintRunCont (...) on a click on button " Print run conf ".

🔛 eud	let_n	ni26_telesco	pe_daq_d	emo_v	L_O.vi Block	(Diagram	on Secon	d_Project	_PXI	(e_diff_en	ded.lvpr	oj/My Co	mputer
<u>F</u> ile <u>E</u>	dit	<u>View</u> Project	<u>O</u> perate	<u>T</u> ools	<u>W</u> indow <u>H</u> e	elp							
	€	≥ & ● I	I 💡 🕵	6	13pt	Application	Font		• 0 •	\$			
ſ,													
	20 🛛									-4 [8]"Prir	nt run conf	r": Mouse D)own
	ī	Type								P <mark>rint run co</mark>	onfiguratio	n record in	<mark>log file -> for debuggi</mark> i
		Time											
		CtlRef										EFRIO_	_FPrintRunCont.vi
		Button										2	
		Mods PlatMods											
	ľ	Fiduhous											



Print board configuration record in log file \rightarrow "Print board conf" button

This code prints the board configuration record in log file.

Step 0

Copy Labview global variables to DLL context records.



- 82 -

It calls the eudet_frio library function EFRIO_FPrintBoardConf (...) .

- 83 -

Print board status record in log file \rightarrow "Print board statusf" button

This code prints the board status record in log file.

Step 0

Copy Labview global variables to DLL context records.



- 84 -

It calls the eudet_frio library function EFRIO_FPrintBoardStatus (...).



- 85 -

The acquisition code \rightarrow " Time out " of " Event " structure

This code detects the Start and Stop run commands, controls the Flex RIO board and the on-line monitoring indicators of GUI.

It is " written " in the time out event and not on an event connected to the button

" Start run "	' because i	t contains f	the acquisition	loop which	would lock the	
event struct	ure.					

The " If Start run"

We enter in the following sequence (steps 0..3) only if the switch " Start run" is on.

Вe	udet	_mi26_tele	scope_daq_demo_v1_0.vi Block	Diagram on Second_Project_	PXIe_diff_ended.lypa	oj/My Computer	
File	Edit	: View Pro	iect Operate Tools Window He	lo			
	-			Application Fact I III			
		5 6 .			◢ थ्य 🎽		
1							
	20	<u>x</u>			[0] Timeout		▼▶
	-	Timeout	20 ms Start rup		Last orrer message		
					Last en or message	Handle Run request "	
				LastErrorMsg) abc	-> Test switch by polling each 20	ums D
		Time			abc		
		Time				4	
						Irue ▼▶	
				Reset acquisitions counter			
				Acq counter			
				A 122			
				Start caving on file (if enable	d in run parameters)		
				prare saving on the (IF chaple	ann an parameters /		
				EFRIOFStartSavingOnFile.	vi E Start saving		
				2 🌮	1.23		
		· · · · · · · · · · · · · · · · · · ·					

- 86 -

Step 0 → Init

It resets the acquisition counter and call the eudet_frio data saving
function (it's behaviour is under run control parameters) ->
EFRIOFStartSavingOnFile.

🔛 eu	ıdet_	_mi26_	telescop	e_daq_d	emo_v	1_0.vi Bl	ock Diagr	am on Secon	d_Project_	_PXIe_diff_e	nded.lvpr	oj/My Computer
Eile	<u>E</u> dit	<u>V</u> iew	Project	Operate	<u>T</u> ools	<u>W</u> indow	Help					
	[0		9 🕵	40 F	1 🖞 🖞	3pt Applical	tion Font 🛛 🖣		<u>- 0-</u>	2	
- 1		7									noout	- L
	20	Tim	eout 20 m	.c.	Charle Pro	_					neout	
- 1			6000 20 M	15	Start ru	11				Last error	r message	Handle " Run request "
- 1		Туре					Q L	.astErrorMsg		abc		-> Stays in a loop until end of run
- 1		Time								[]		
- 1												True 🔸
- 1												
- 1												□ Ϥ ◀ 0 [03] ▼▶ <mark>□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ </mark>
- 1												
- 1							Re	eset acquisition	s counter			
- 1							Ac	q counter				
- 1								1.23				
- 1								DBL				
- 1												
- 1							S	tart saving on l	file (if enable	ed in run para	meters)	
- 1							_					
- 1							E	FRIO_FStarts	SavingOnFile	.VI ES	tart saving	
							E	2			23	
											[]] [
		?										

- 87 -

Step 1 → Start FlexRio and Mimosa 26

It starts FlexRio board by a call to Vi "FlexRio_Start", then it starts Mimosa 26 by a call to the eudet_frio DLL function EFRIO__Ml26_FHwStartChip (). This function generates a pulse on parallel port pin D6 which is connected to Mimosa 26 Start input.

- 88 -

Step 2 → Acquisition loop

This step contains the acquisition loop which will run until " Start run " button become false.



- 89 -

Step 2 (Acquisition loop) – Step 0

This code calls the Vi to read the FlexRio board " FlexRio_ReadRamAsW32_opt.vi " and " pass data " to the eudet_frio DLL data processing function EFRIO_MI26_FFRioAcqDeserDataMi26.

Acquisition loop - until switch "Start Run" is set to false



- 90 -

Step 2 (Acquisition loop) – Step 1

If the on-line monitoring is enabled, this codes displays the "relevant "fields (header ... trailer) of the Mimosa 26 frame selected. It calls eudet_frio DLL function to get fields values.



- 91 -

Step 2 (Acquisition loop) – Step 2

This code calls the eudet_frio DLL data saving function, EFRIO__FSaceAcqOnFile, and it can contain the code to send data on Ethernet to EUDET DAQ.

lescope_daq_demo_v1_0.vi Block Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer								
roject Operate Iools Window Help								
D. 💵 😨 窓。 🏎 🚰 🔐 13pt Application Font 🔍 💼 🗸 🚳 🖌 🚧								

****** True 🔹

Approxisition loop working they be proved by the set of the follow	
Acquisition dop - unui switch plant kun is set to raise	

<u> </u>	
Save data on file (if enabled in run conf)	
EFPLO_FSaveAcqOnFile.vi E Save Acq	
This frame or a following frame can call Ethernet handling function	



This code stops the acquisition, calls the FlexRio board stop Vi (FlexRio_Stop) and the eudet_frio DLL data saving stop function \rightarrow EFRIO_FStopSavingOnFile (...).

The good question is "how do we go there?" as there is no test on " Start run" button ... We should not forget that in previous step (No 2) we were in a loop and the exit condition was "Start run" = FALSE.

🔀 eudet_mi26_telescope_daq_demo_v1_0.vi Block Diagram on Second_Project_PXIe_diff_ended.lvproj/My Computer												
Eile	Ele Edit Yiew Project Operate Loois Window Help											
	🗘 🕸 🖲 🖩 😵 🎭 📅 🕼 13pt Application Font 🔤 🗫 🛣 😴											
11												
	20 🗵				[0] Timeout							
		Timeou	t 20 ms Start run		Last error message	Handle " Run request "						
		<u> </u>		LastErrorMsg	Diabe	-> Test switch by polling each 20 ms -> Stays in a loop until end of run						
		Time										
		Beasers										
			}			3[03] ▼▶						
				BoardId —	FlexRio_Stop.vi	(trror)						
						22						
					. [E Charles and						
				Return from Vi when stop done	P							
						D 123						
					EFRIOFStop	SavingOnFile.vi E Stop saving						
						5 123						
		Ì										
	- E	ÐÇ	-									

- 93 -

Display frames off-line → "Display frame off-line ..." button

This code displays the frame selected by "Frame Id " when user clicks on the button " Display frame off-line ... ". But he code is incomplete, only frame counter is displayed, the user can write the missing code as an exercise.



- 94 -

Close firmware → "Close fw" button

This code closes the firmware, it calls the Vi FlexRio_UnloadFw.



- 95 -

Control parallel port pin D4 \rightarrow "// Port D4" button

This code controls the state of the pin D4 of parallel port. It call the eudet_frio DLL function EFRIO__FPPOutD4. The same code exists for D5 and D6.



Acknowledgement

This work is supported by the Commission of the European Communities under the 6th Framework Programme "Structuring the European Research Area", contract number RII3-026126.

- 96 -