

INSTRUMENTATIE VIRTUALA

CURS 7

Operatii cu fisiere

Variabile locale, globale, partajate

Objective

3

- Salvarea/citirea datelor in/din fisiere
- Transmiterea datelor intre fire de executie, aplicatii, aplicatii in retea

Operatii cu fisiere

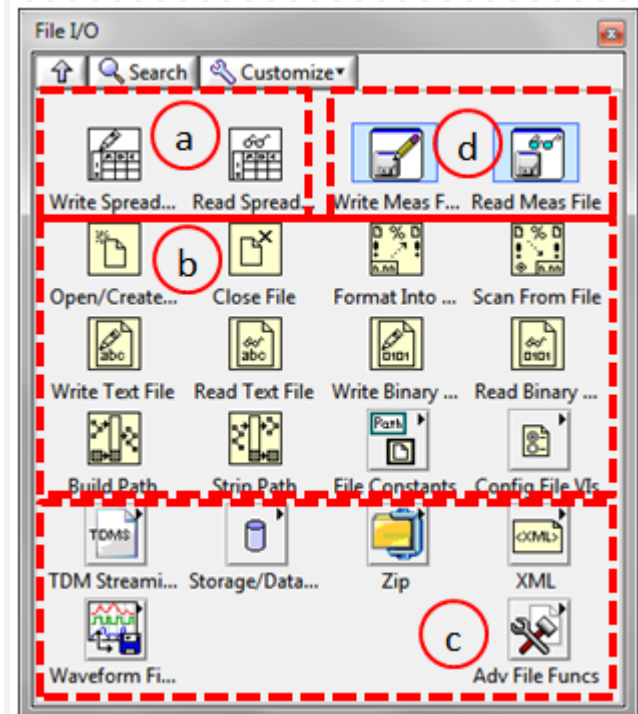
4

- Stocarea informatiilor presupune lucru cu fisiere:

- Scrierea
- Modificarea
- Citirea datelor în/din fișiere

- **Functions>>Programmig>>File I/O**

- a. functii de nivel inalt
- b. functii de nivel mediu
- c. functii avansate
- d. functii express



Operatii cu fisiere

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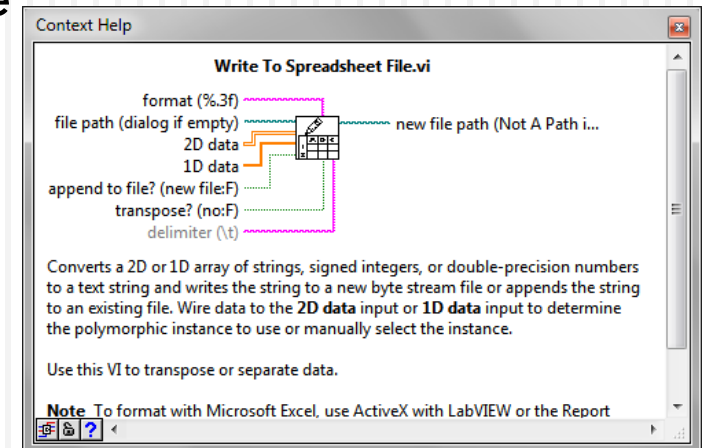
- In LabVIEW se pot utiliza urmatoarele formate pentru fisiere:
 - ▣ **Binary** – fisiere binare – trebuie cunoscuta structura
 - ▣ **ASCII** – fisiere de tip text – pot fi folosite cu alte aplicatii
 - ▣ **LVM** – LabVIEW measurement data file (.lvm) – este de tip text cu **tab** ca separator, pot fi deschise cu aplicatii tabelare sau cu editoare de text
 - ▣ **TDMS** – fisiere binare create cu structura proprietara NI dedicate fisierelor de date mari. Sunt formate din:
 - Un fisier binar
 - Un fisier de index binar

Funcțiile de nivel înalt

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- cer cunoștințe minime de lucru cu fișiere
- plasate în prima linie a paletei de funcții File I/O
- **Write To Spreadsheet File** - salvarea datelor în format tabelar
- Salvează datele conectate la intrările **2D data** (array-uri bidimensionale – matrici) sau **1D data** (array-uri unidimensionale) într-un fișier text
- Dacă nu se conectează nimic la intrarea **file path** atunci la executarea acestei funcții se va deschide fereastra de dialog

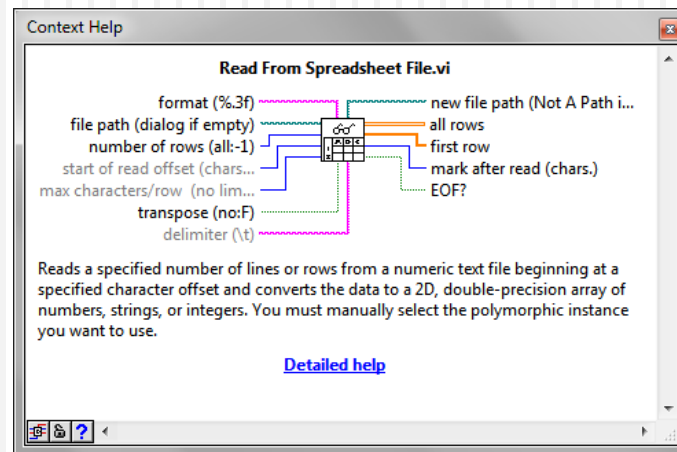
- Format
- Append to file?
- delimiter



Funcțiile de nivel înalt

7

- **Read From Spreadsheet File** - Citirea datelor din fișiere tabelate
- citește dintr-un fișier text numărul specificat de linii, începând cu caracterul dorit, convertește datele într-un format intern oferind la ieșire datele într-un tablou numeric în simpla/dubla precizie (normal sau în poziție transpusă)

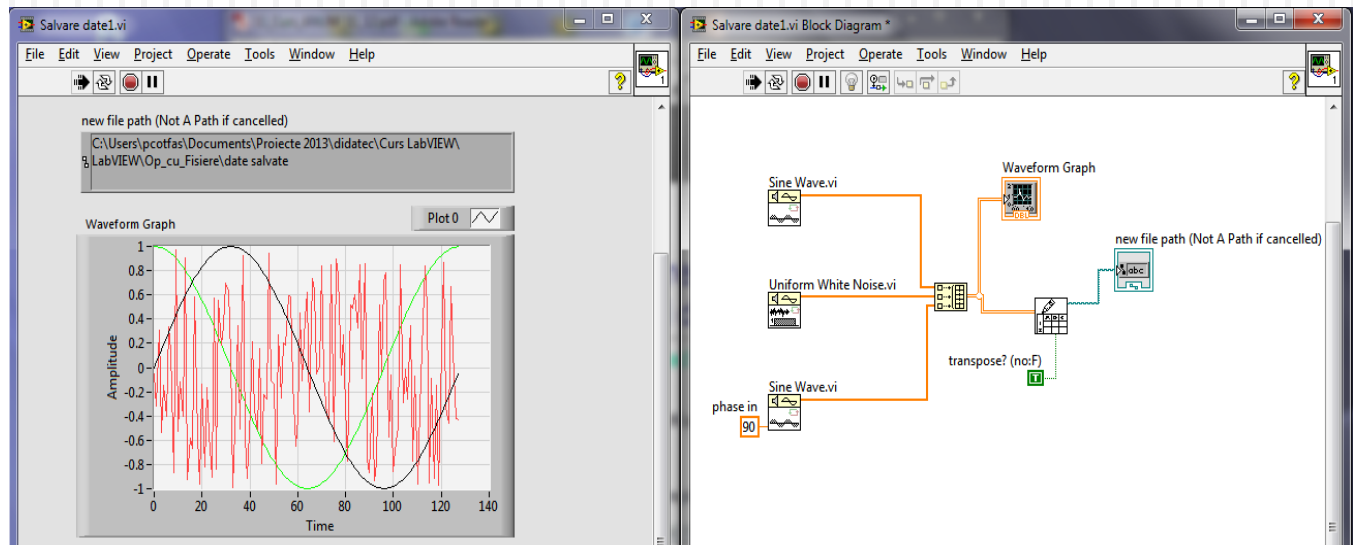


Salvare date

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□ Salvarea datelor în format tabelar

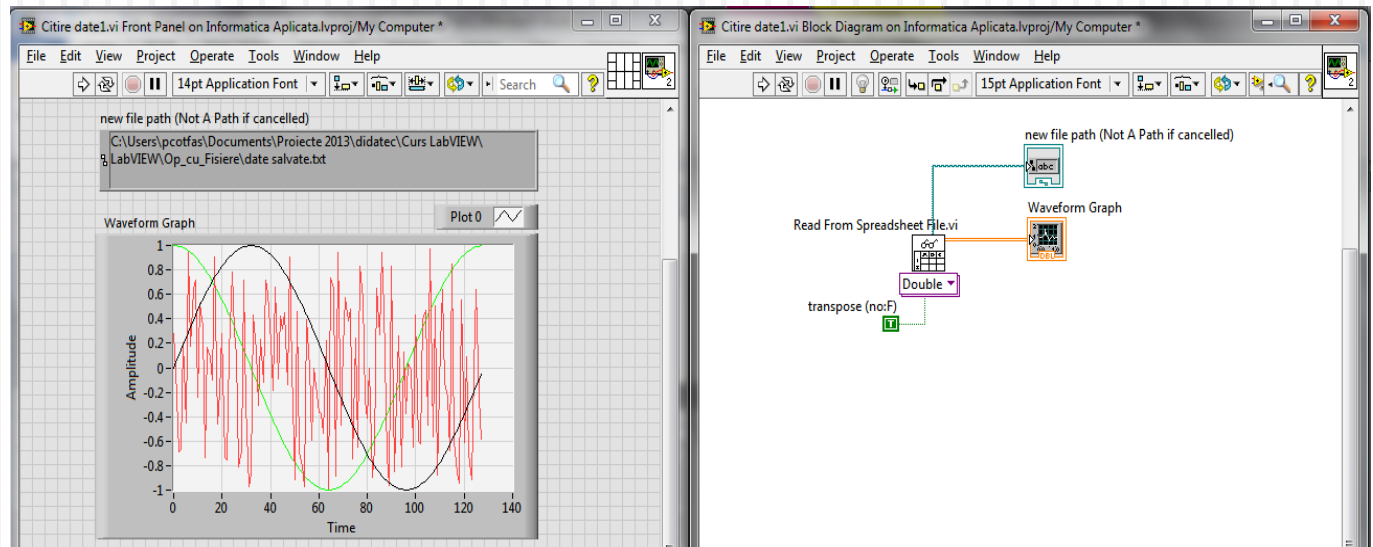


Citirea datelor

9



□ Citirea datelor din fisiere tabelate



Operatii cu fisiere – functii de nivel mediu

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Open/
Create/
Replace File

Read
and/or
Write to File

Close
File

Check for
Errors

Open/Create/Replace File



Read from Text File



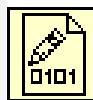
Read from Binary File



Write to Text File



Write to Binary File



Close File

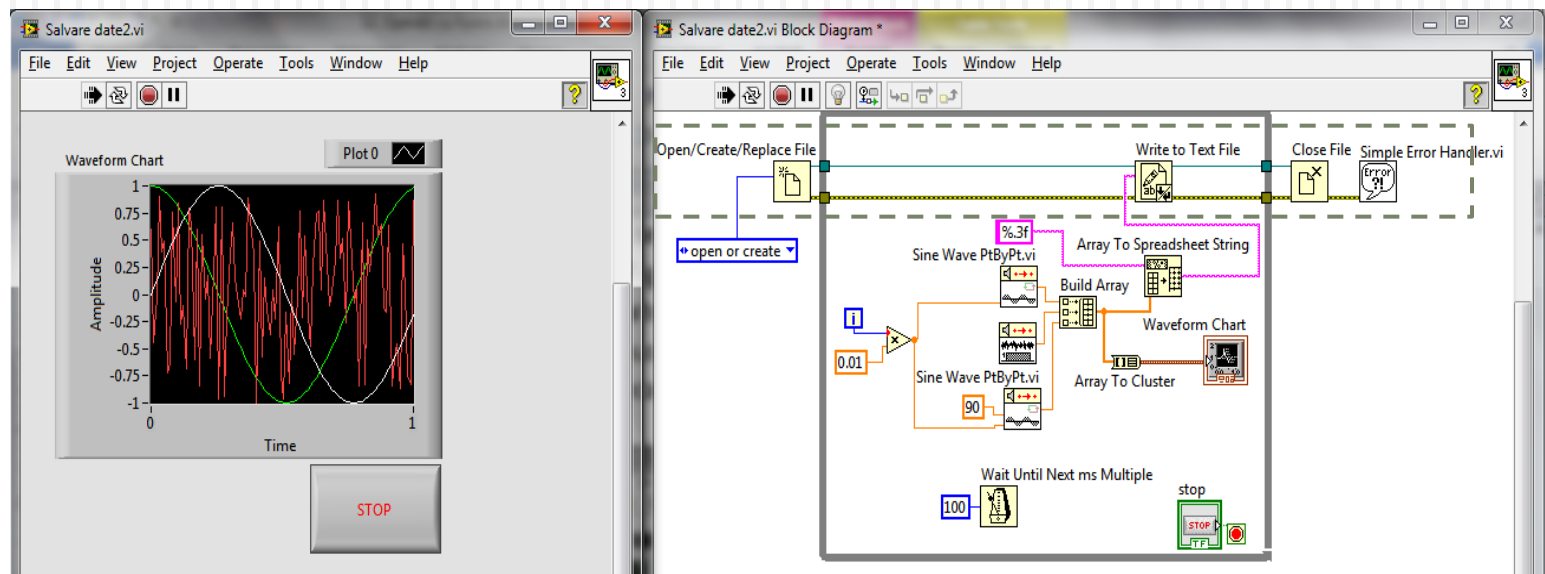


Simple Error
Handler.vi



Operatii cu fisiere – functii de nivel mediu

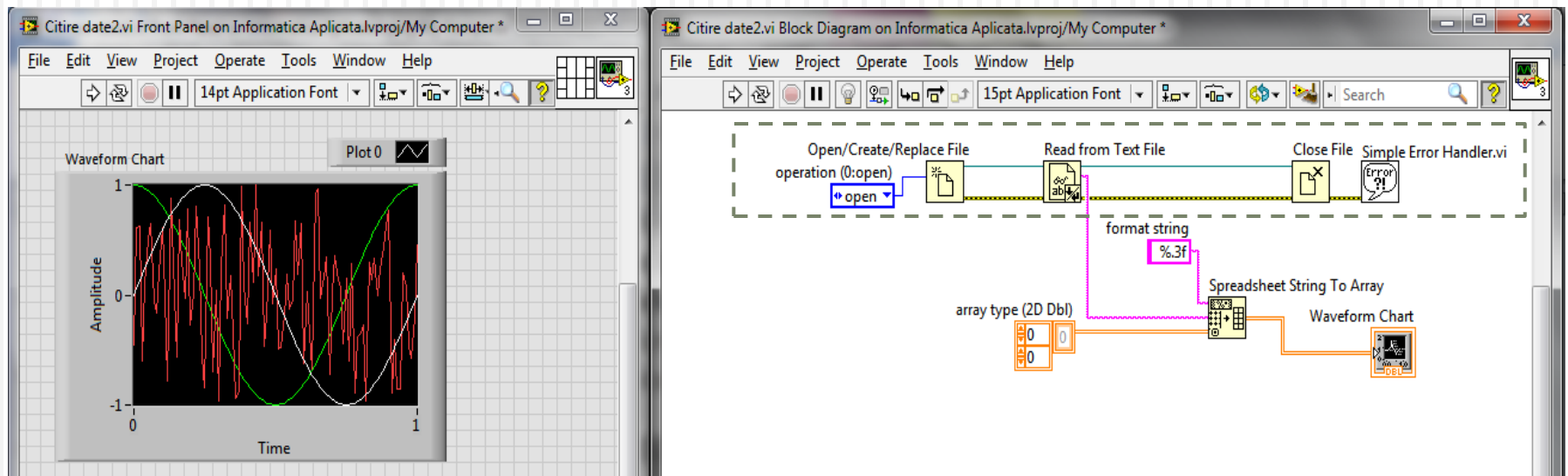
- ❑ **Open/Create/Replace** – deschide un fisier existent si genereaza refnum si error cluster
- ❑ **Write to Text File** – scrie datele in fisierul existent
- ❑ **Close File** – inchide fisierul
- ❑ **Simple Error Handler** – verifica daca in cadrul acestor trei operatii au aparut erori



Citirea datelor dintr-un fisier

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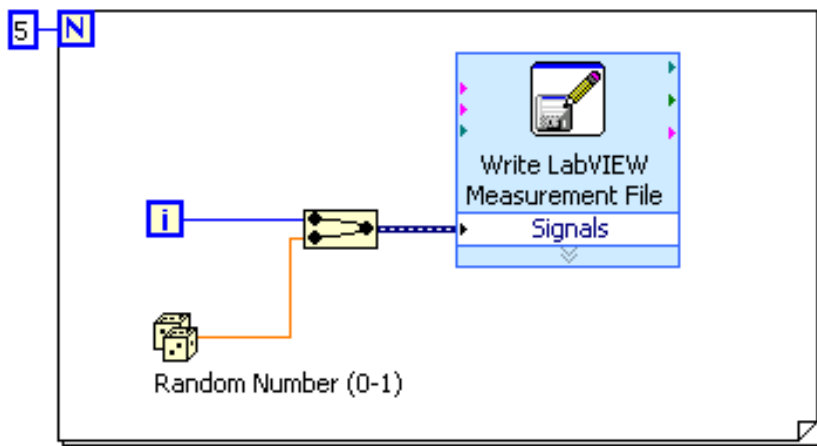
- **Open/Create/Replace** – deschide un fisier
- **Read From Text File** - citeste un numar specificat de bytes dintr-un fisier
- **Close File** – inchide fisierul
- **Simple Error Handler** – verifica erorile



Scrierea unui fisier de date Masurate in LabVIEW

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- Acest icon Express include functiile: **open**, **write**, **close** si **error**
- Poate formata stringul cu separator: **tab** sau **comma**
- Functia **Merge Signals** este folosita pentru a combina datele si a forma date dinamice.



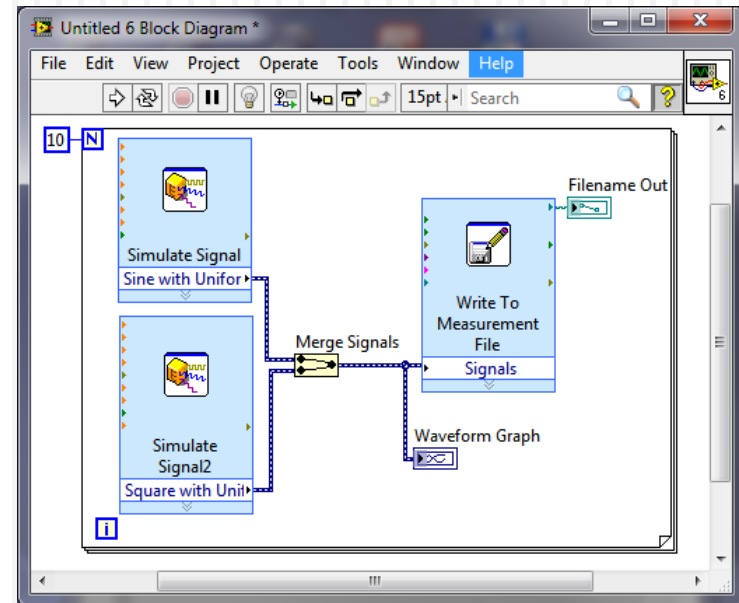
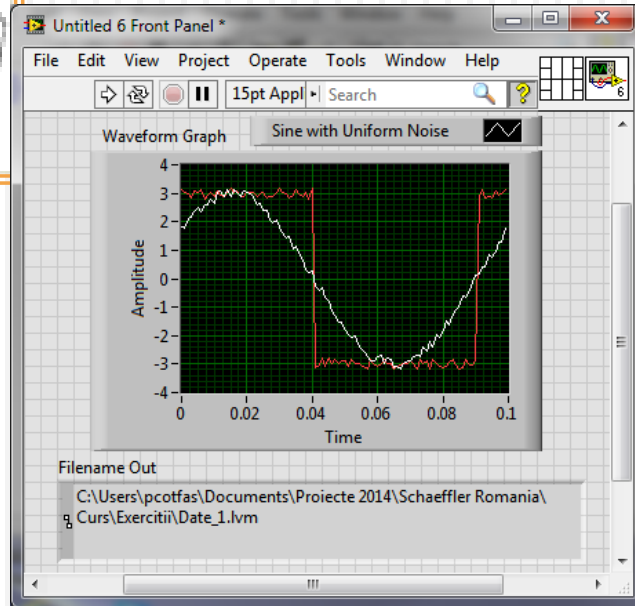
	A	B	C	D
1			0 0.385055	
2			1 0.23516	
3			2 0.985184	
4			3 0.177893	
5			4 0.935915	
6				
7				

Salvare date

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Utilizare Express VI – Write to Measurement File



Salvare date

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Utilizare Express VI

Configure Write To Measurement File [Write To Measurement File]

Filename
C:\Users\pcof\Documents\LabVIEW Data\test.lvm

Action
☒ Save to one file
☒ Ask user to choose file
☐ Ask only once
☐ Ask each iteration

If a file already exists
☐ Rename existing file
☒ Use next available filename
☐ Append to file
☐ Overwrite file

☐ Save to series of files (multiple files)

File Format
☒ Text (LVM)
☐ Binary (TDMS)
☐ Binary with XML Header (TDM)
☐ Microsoft Excel (.xlsx)
☒ Lock file for faster access

Segment Headers
☐ One header per segment
☒ One header only
☐ No headers

X Value (Time) Columns
☐ One column per channel
☒ One column only
☐ Empty time column

Delimiter
☒ Tabulator
☐ Comma

File Description

OK Cancel Help

Configure Simulate Signal [Simulate Signal]

Signal
Signal type: Sine
Frequency (Hz): 10.1
Amplitude: 3
Phase (deg): 0
Offset: 0
Duty cycle (%): 50
☒ Add noise
Noise type: Uniform White Noise
Noise amplitude: 0.2
Seed number: -1
Trials: 1

Timing
Samples per second (Hz): 1000
Number of samples: 100
☐ Simulate acquisition timing
☒ Run as fast as possible
☐ Integer number of cycles
Actual number of samples: 100
Actual frequency: 10.1

Result Preview
Amplitude vs Time graph showing a sine wave.

Time Stamps
☒ Relative to start of measurement
☐ Absolute (date and time)

Reset Signal
☐ Reset phase, seed, and time stamps
☒ Use continuous generation

Signal Name
☒ Use signal type name
Signal name: Sine with Uniform Noise

OK Cancel Help

Configure Simulate Signal [Simulate Signal2]

Signal
Signal type: Square
Frequency (Hz): 10.1
Amplitude: 3
Phase (deg): 0
Offset: 0
Duty cycle (%): 50
☒ Add noise
Noise type: Uniform White Noise
Noise amplitude: 0.2
Seed number: -1
Trials: 1

Timing
Samples per second (Hz): 1000
Number of samples: 100
☐ Simulate acquisition timing
☒ Run as fast as possible
☐ Integer number of cycles
Actual number of samples: 100
Actual frequency: 10.1

Result Preview
Amplitude vs Time graph showing a square wave.

Time Stamps
☒ Relative to start of measurement
☐ Absolute (date and time)

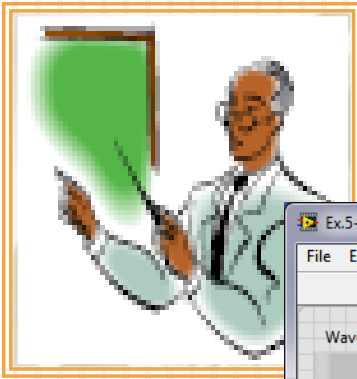
Reset Signal
☐ Reset phase, seed, and time stamps
☒ Use continuous generation

Signal Name
☒ Use signal type name
Signal name: Square with Uniform Noise

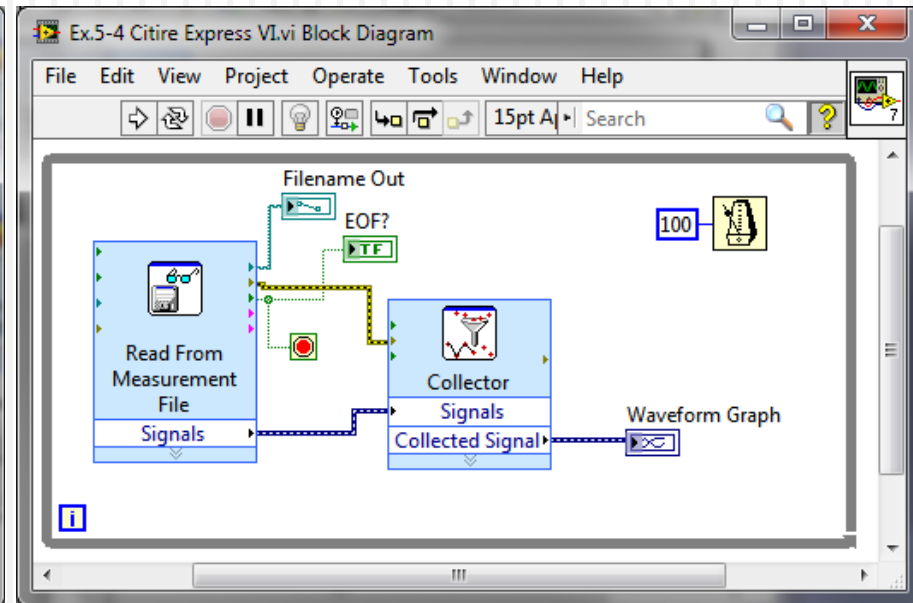
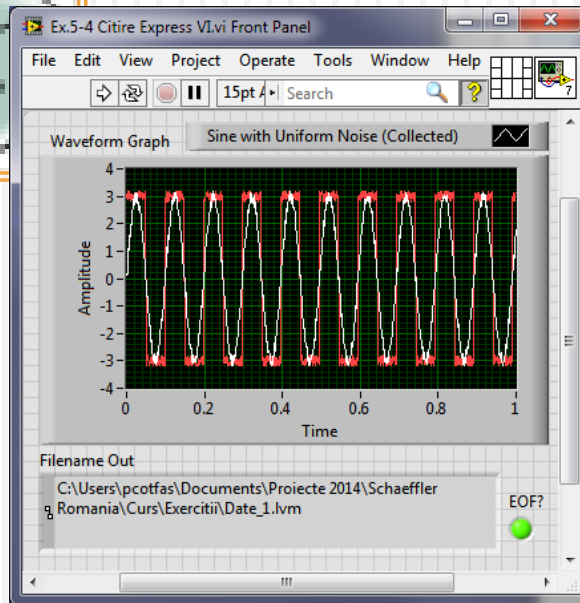
OK Cancel Help

Citirea datelor

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Utilizare Express VI – Read from Measurement File



Citirea datelor

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□ Utilizare Express VI

Configure Read From Measurement File [Read From Measurement File]

Filename
C:\Users\pcotfas\Documents\Proiecte 2014\Schaeffler Romania\Curs\Exercitii\data1.lvm

File Format
☒ Text (LVM)
☐ Read generic text files
☐ Binary (TDMS)
☐ Binary with XML Header (TDM)
☒ Lock file for faster access

Time Stamps
☒ Relative to start of measurement
☐ Absolute (date and time)

Segment Size
☒ Retrieve segments of original size
☐ Retrieve segments of specified size
Samples: 100

Action
☒ Ask user to choose file

Generic Text File
Delimiter
☒ Tabulator
☐ Comma
Start row of numeric data: 1
☐ First row is channel names
☐ First column is time channel
Decimal Point
☒ . (dot)
☐ , (comma)

Sample data

Read File Now

OK Cancel Help

Configure Collector [Collector]

This Express VI collects input signals and returns the most recent samples collected, up to the number of samples configured below.

Maximum number of samples
10000

OK Cancel Help



Lucru cu fisiere avansate

Ce tip de fisiere ar trebui folosite?

- Un subiect complex
 - ▣ LabVIEW poate citi/scrie in multe tipuri de fisere
- Acestea pot fi grupate in doua mari categorii:
 - ▣ Fisiere text – sunt formatate ASCII. Au portabilitate mare
 - ▣ Fisiere binare – portabilitate mai mica dar au dimensiuni mai reduse, sunt procesate mai rapid (accesibilitatea datelor mai rapida mai ales in cazul fisierelor mari)

Tipuri de fisiere text

- Fisiere text generice, pot contine orice tip de text
- Fisiere tabelare (Spreadsheet files), structurate pe linii si coloane
- LabVIEW Measurement (.lvm) files
- Fisiere de configurare (.ini)
- Fisiere XML



Read Text File



Read Spread...



Read Meas File



Read Key.vi



Load

Tipuri de fisiere binare

- Fisiere binare generice
- Fisiere LabVIEW TDMS (Technical Data Management Streaming)
- Fisiere LabVIEW Datalog
- Fisiere de tip ZIP



Read Binary File



TDMS Read



Read Datalog



Add File to Zip

Comparare intre formatele des utilizate

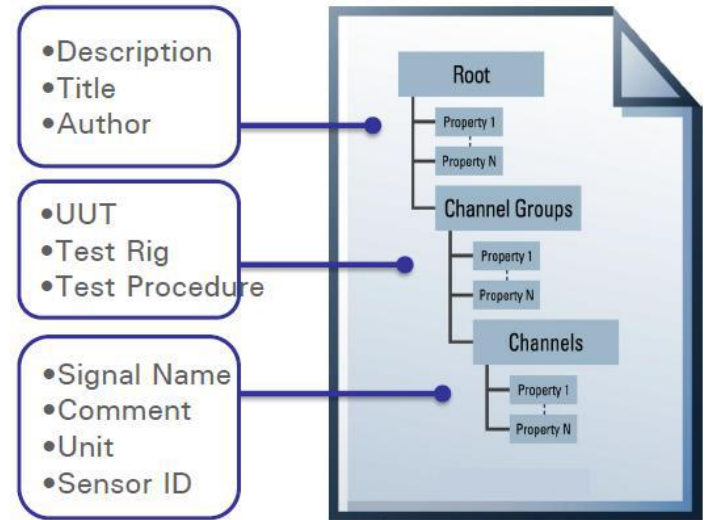
	ASCII	TDMS	Direct Binary
Numeric Precision	Good	Best	Best
Share Data	Best (Any program easily)	Better (NI programs easily; Excel)	Good (only with detailed format information)
Efficiency	Good	Best	Best
Ideal Use	Share data with other programs when file space and numeric precision are not important.	Store measurement data and related meta data. High-speed streaming without loss of precision.	Store numeric data compactly with ability to access randomly.

Fisiere de tip TDMS

- Sunt fișiere dedicate salvării datelor pe HDD de dimensiuni mari și cu metainformații
- Permite organizarea fișierelor în canale și grupuri de canale
 - ▣ Un canal permite stocarea semnalelor măsurate (vectori de date) în fișier
 - Fiecare canal poate avea proprietăți ce descriu datele
 - Datele sunt stocate binar
 - ▣ Grupul de canale reprezintă un segment al unui fișier TDMS ce conține
 - Proprietăți asupra stocării informației
 - Cel puțin un canal
 - Permite gruparea canalelor pe diferite criterii
 - ▣ Poate conține oricâte grupuri de canale sau canale

Fisiere de tip TDMS

- Contine un fisier binar *nume fisier.tdms* si *nume fisier.tdms index*
- Are o structura pe trei nivele de proprietati ce pot si salvate
 - Pentru intreg fisierul
 - Pentru grupurile de canale
 - Pentru fiecare canal in parte
- Ex.:
 - Fisier: Data/Ora realizarii fisierului, inregistrarea utilizatorului si incepera inregistrarii
 - Grupurile de canale: localizarea grupurilor de senzori, tipurile de senzori
 - Canal: ID-ul senzorului, maximul/minimul citit



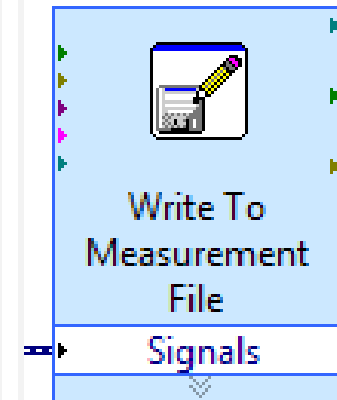
Funcțiile TDMS

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□ Utilizand Express VIs :

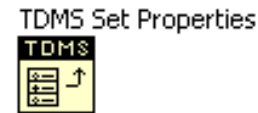
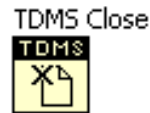
■ Rapid, dar control in organizare scazut

- Write to Measurement File
- Read from Measurement File



□ Utilizand API-ul TDM Streaming

■ Control total asupra organizarii, dar mai complexa utilizarea

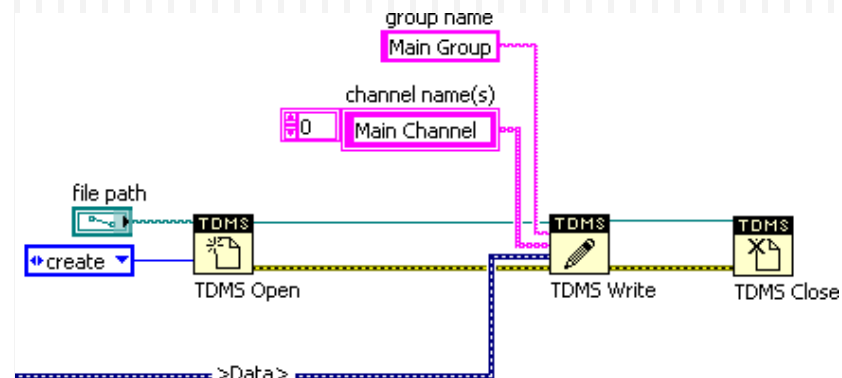


□ Fisiererele TDMS pot fi deschise si utilizate in Microsoft Excel

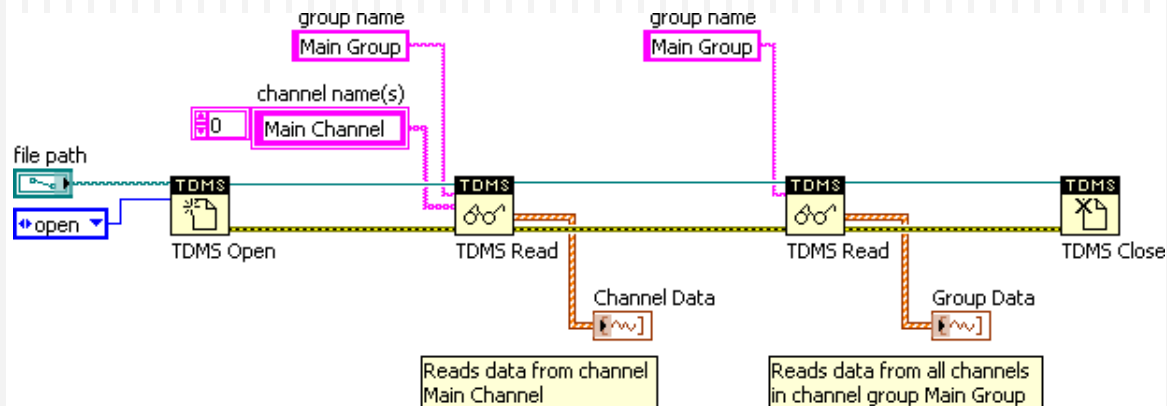
Lucru cu fisiere TDMS

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- Varianta simpla
 - ▣ Scrierea datelor in fisiere TDMS



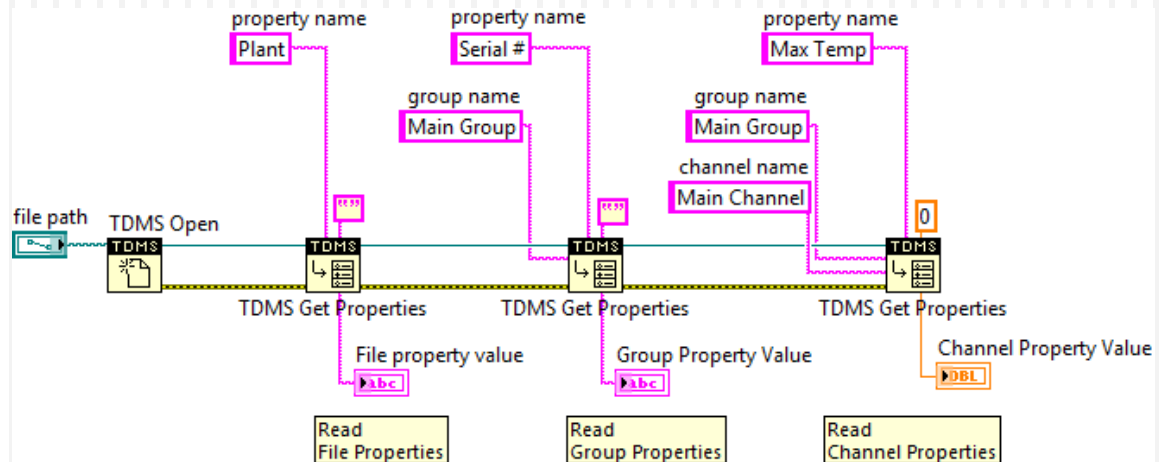
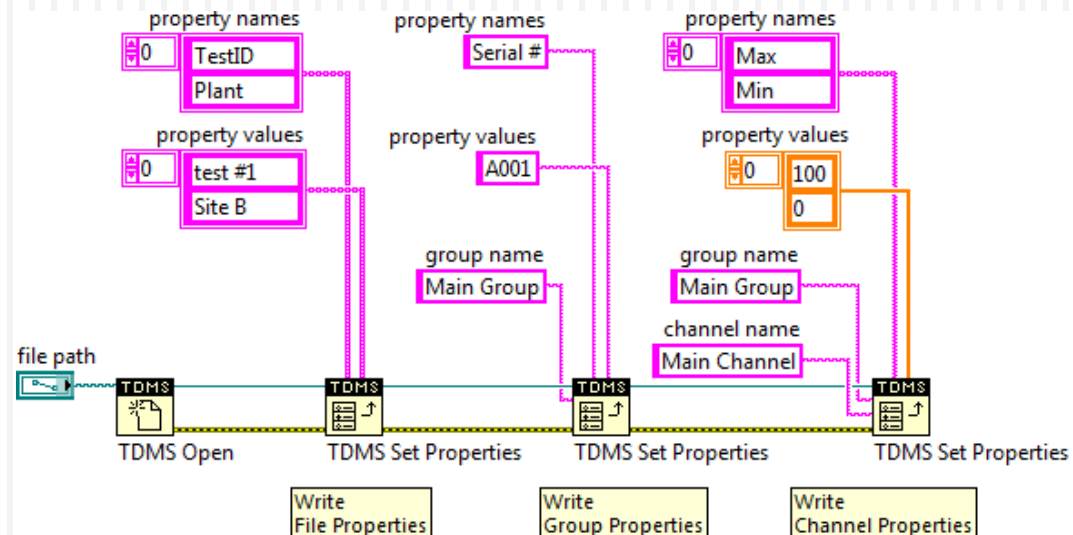
- ▣ Citirea datelor din fisierele TDMS



Lucru cu fisiere TDMS

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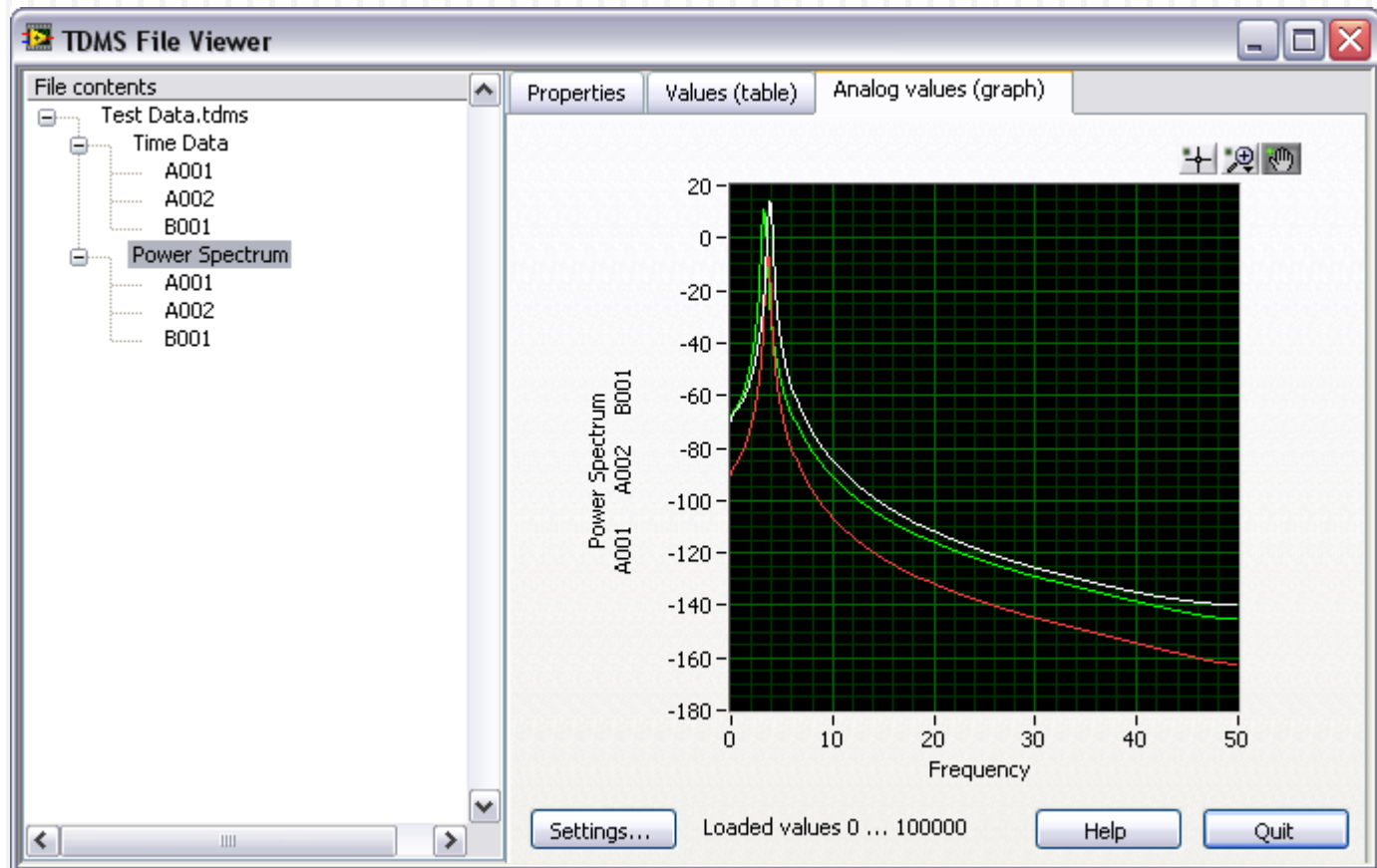
- Scrierea proprietatilor in fisiere TDMS
- Citirea proprietatilor din fisiere TDMS



Previzualizarea datelor

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- Utilizand TDMS File Viewer VI din API-ul TDMS



Variabile

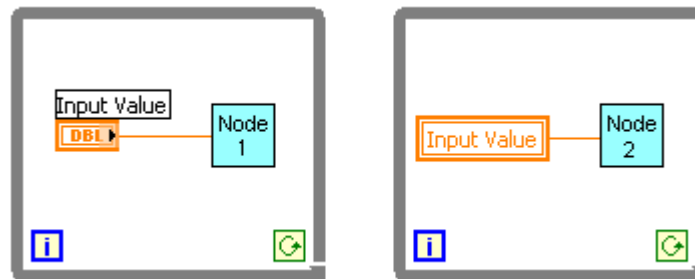
29

- Variabile locale
- Variabile globale
- Variabile partajate

Variabile locale

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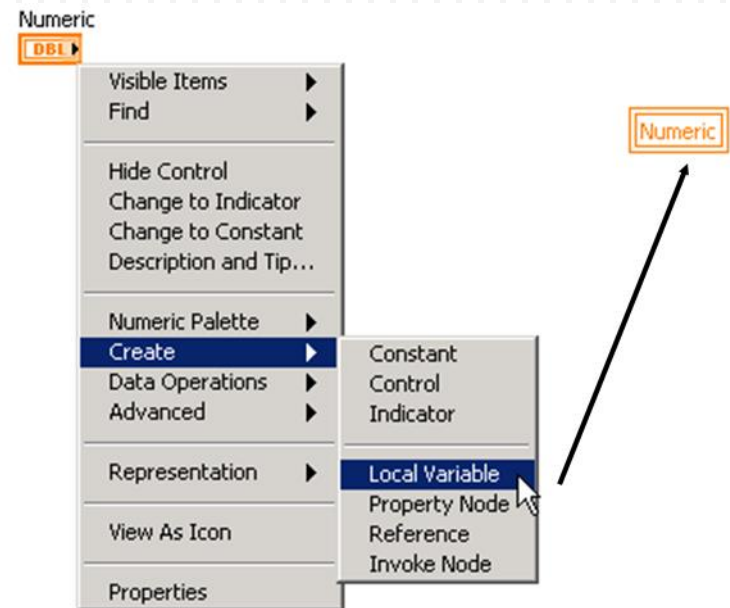
- Variabilele locale ne permit transferul datelor intre bucle care se ruleaza in paralel
- Acestea intrerup “dataflow programming paradigm”!



Realizarea Variabilelor Locale

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- Accesam obiectele din Panou din mai multe locuri din Diagrama
- Avem doua posibilitati sa realizam Varibile Locale:
 - Right-click pe terminalul obiectului si selectam Create»Local Variable
 - Selectam o Variabila Locala din paleta de Structuri

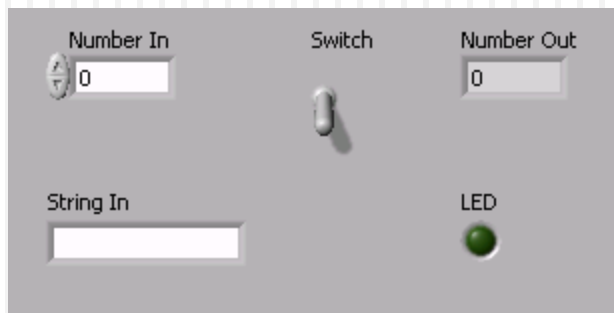


Realizarea Variabilelor Locale

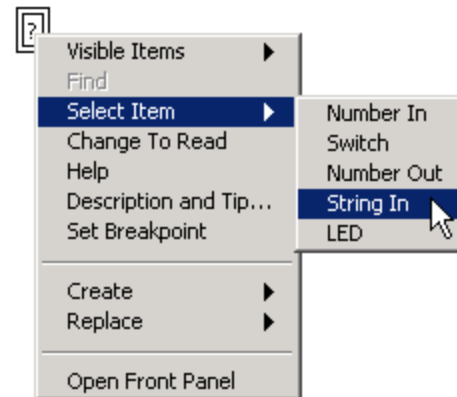
32

- Right-click pe nodul de Variabila Locala si se alege Select Items pentru a selecta obiectul dorit
- Eticheta selectata devine Numele Variabilei

Front Panel



Block Diagram

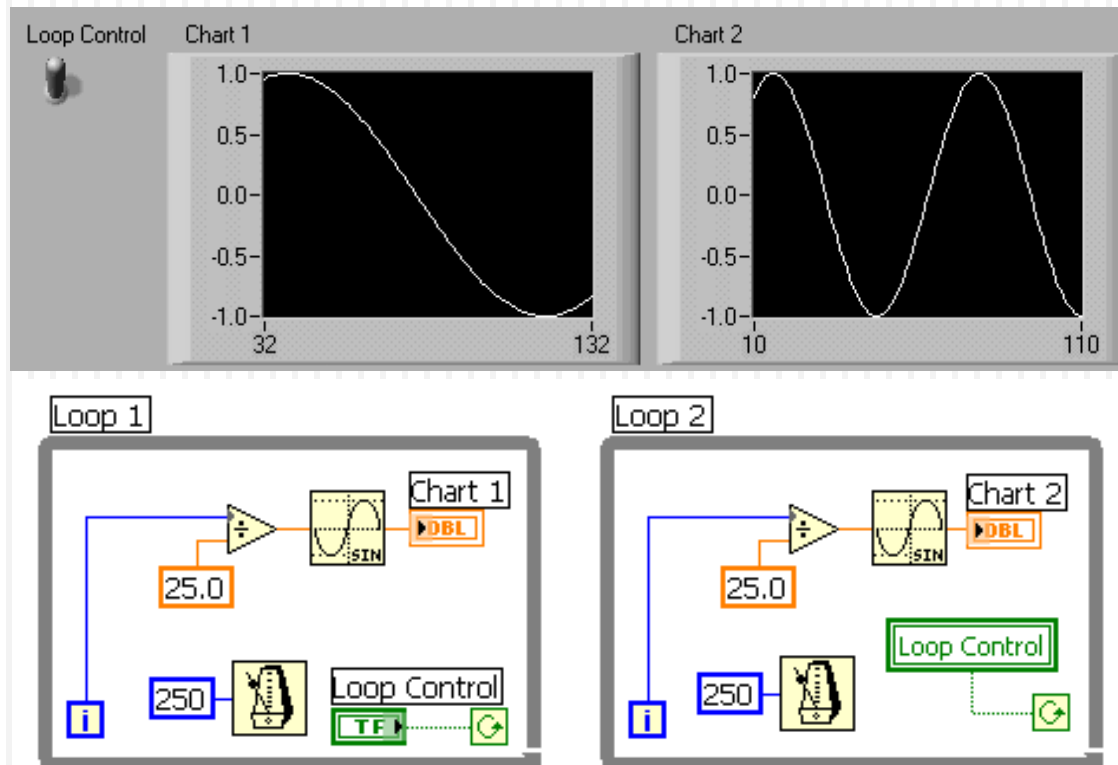


String In

Exemple cu Variabile Locale

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- Consideram o aplicatie care sa permita oprirea a doua bucle de date independente While Loops, care ruleaza in paralel.
- Fiecare bucla While reprezinta grafic o functie sinus pe un indicator grafic de tip Chart plots



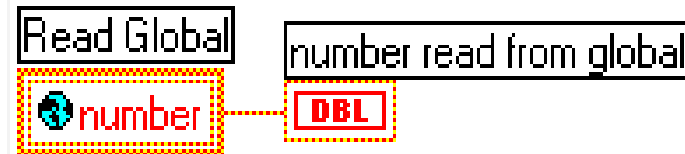
Variabile Globale

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- Un tip special de VI
 - Avem Panou si obiecte de panou
 - Nu avem Diagrama
- Obiectele din panou sunt obiecte de stocare – se scriu si se citesc date
- Se folosesc pentru a trece datele intre VI-uri care se executa in paralel sau intre VI-uri care nu pot fi direct legate prin fire
- Scrierea si citirea Variabilelor Globale
 - Write global (se scrie o Variabila Globala)
 - Read global (se citeste o Variabila Globala)
 - Right-click pe nod se poate schimba intre read si write



Write Global

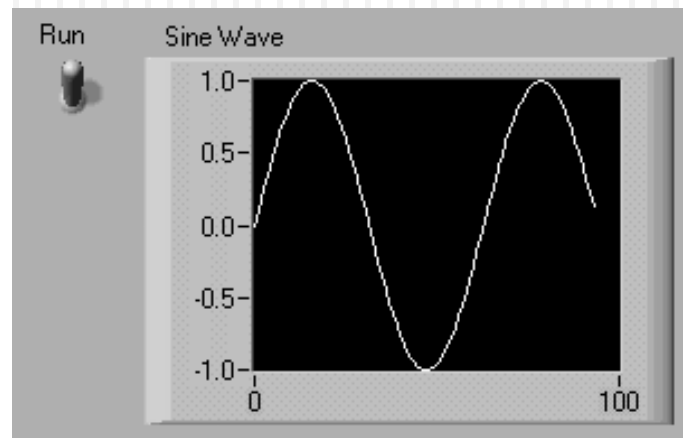


Read Global

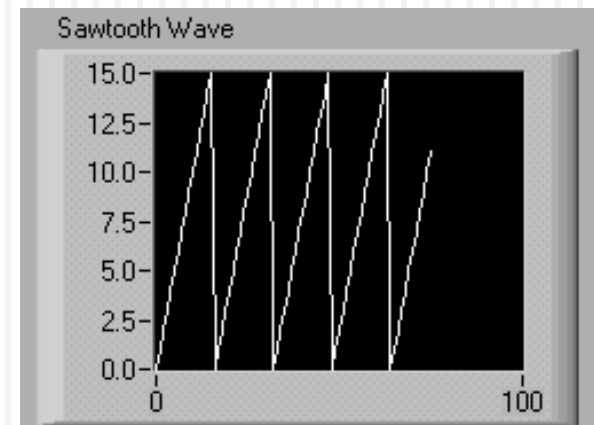
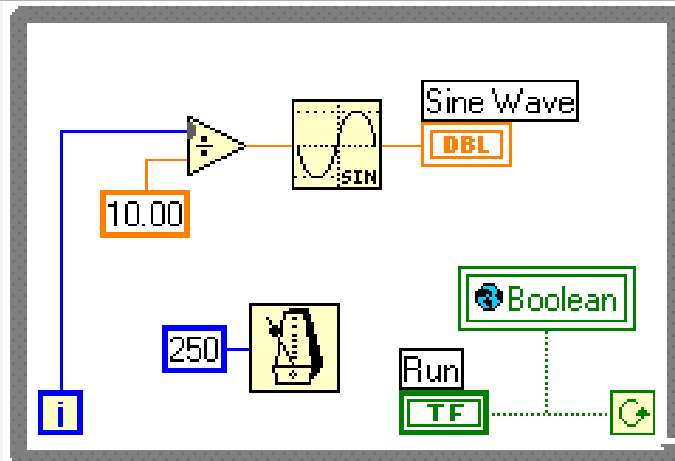
Exemple

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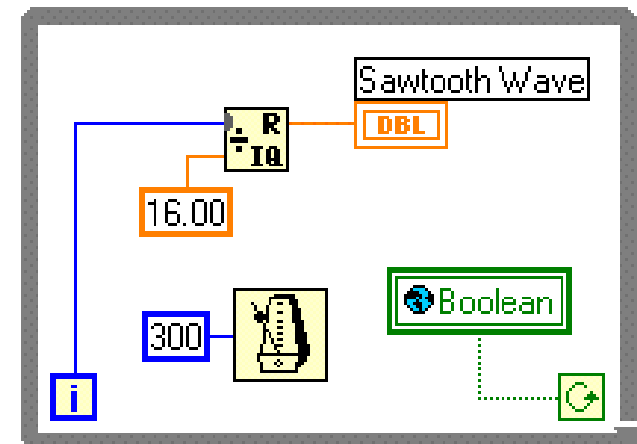
- Schimbare Datelor intre VI-uri (atentie sunt doua VI-uri separate; nu bucle separate)



VI Number 1

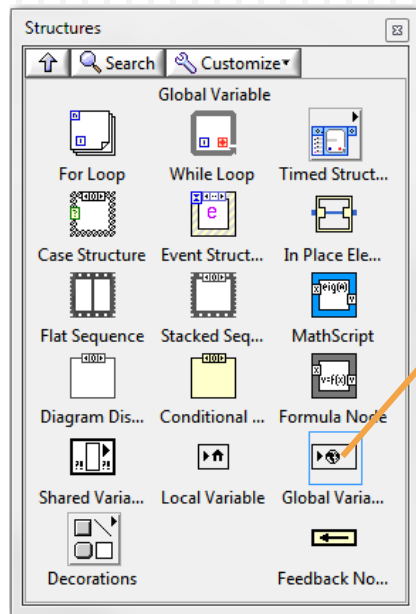


VI Number 2

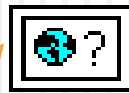


Crearea unor Variabile Globale

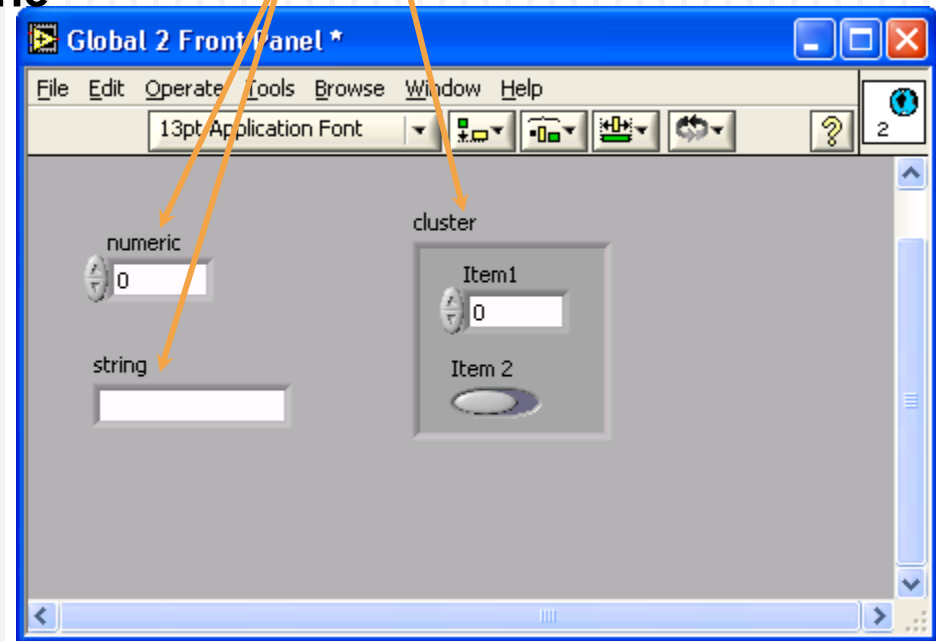
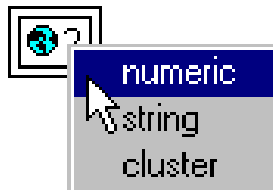
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Fiecare control trebuie sa aiba o Eticheta proprie



Right-click



**Realizarea Controalelor
necesare ca Variabile Globale**