INSTRUMENTATIE VIRTUALA

CURS 7

Operatii cu fisiere

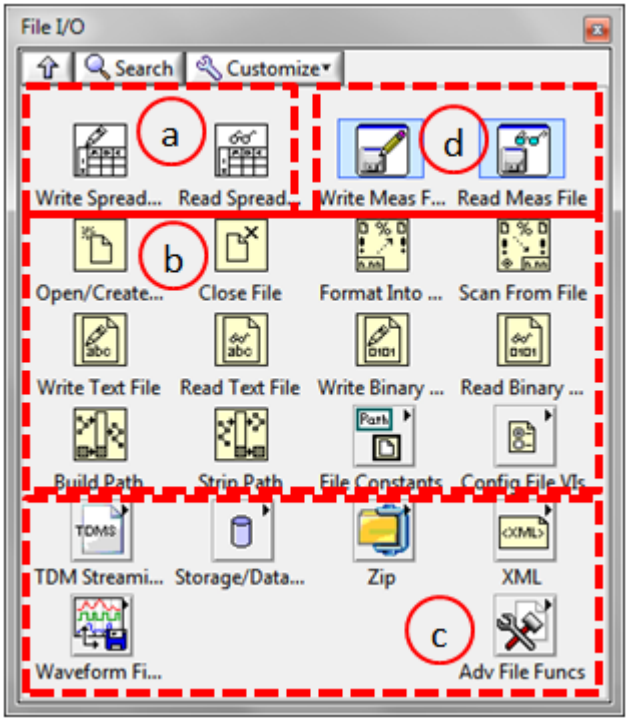
Variabile locale, globale, partajate

Obiective

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

Operatii cu fisiere

- 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

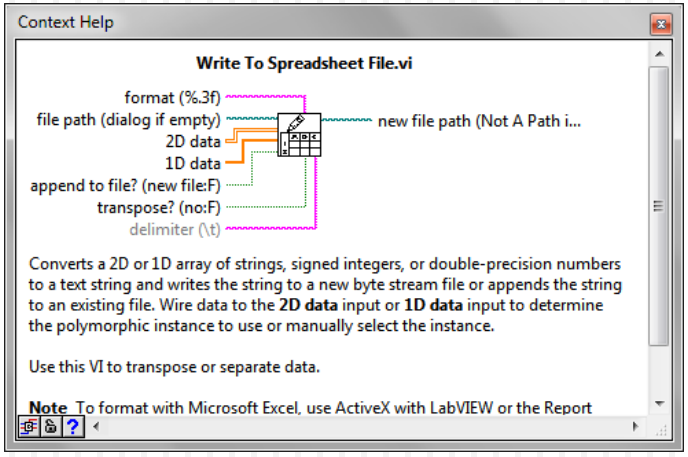
- In LabVIEW se pot utiliza urmatoarele formate pentru fisiere:
  - **Binary** – fisiere binare – trebuie cunoscuta structura
  - **ASCII** – fisiere de tip text – pot fi folosite cu alte aplicatii
  - **LVM** – LabVIEW measurement data file (.lvm) – este de tip text cu **tab** ca separator, pot fi deschise 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

Functiile de nivel inalt

- cer cunostinte minime de lucru cu fisiere
- plasate in prima linie a paletei de funcții File I/O

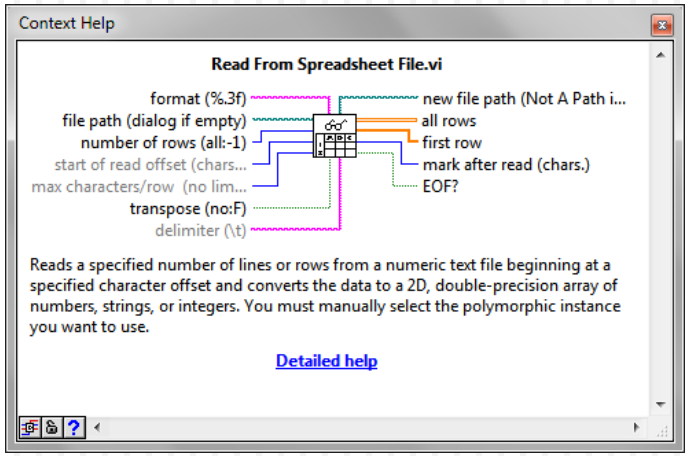
- **Write To Spreadsheet File** - salvarea datelor in format tabelar
- Salveaza datele conectate la intrarile **2D data** (array-uri bidimensionale – matrici) sau **1D data** (array-uri unudimensional) intr-un fisier text
- Daca nu se conectează nimic la intrarea **file path** atunci la executarea acestei functii se va deschide fereastra de dialog

  - Format
  - Append to file?
  - delimiter



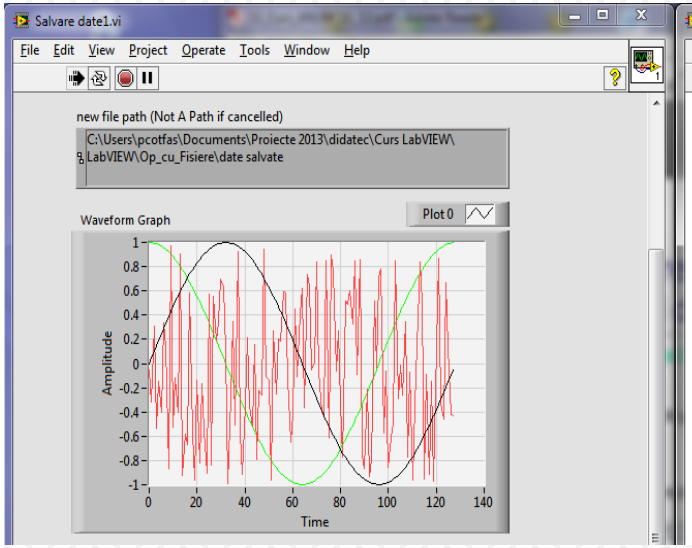
Functiile de nivel inalt

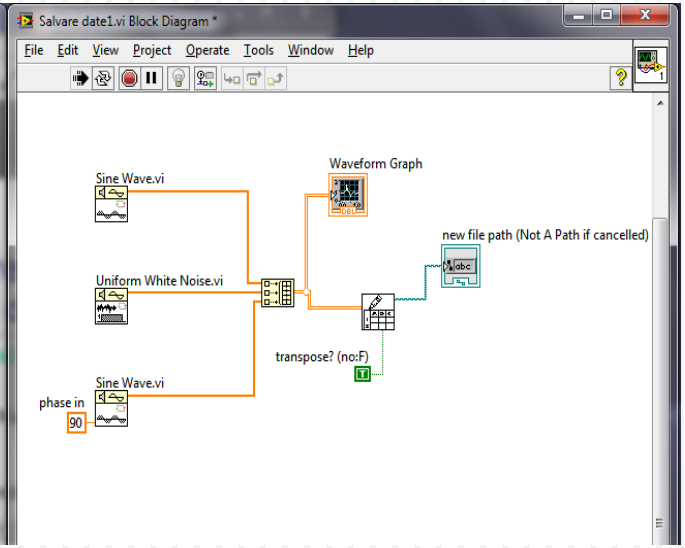
- **Read From Spresheet File** - Citirea datelor din fisiere tabelate
- citeste dintr-un fisier text numarul specificat de linii, incepand cu caracterul dorit, converteste datele intr-un format intern oferind la iesire datele intr-un tablou numeric în simpla/dubla precizie (normal sau în pozitie transpusa)



Salvare date

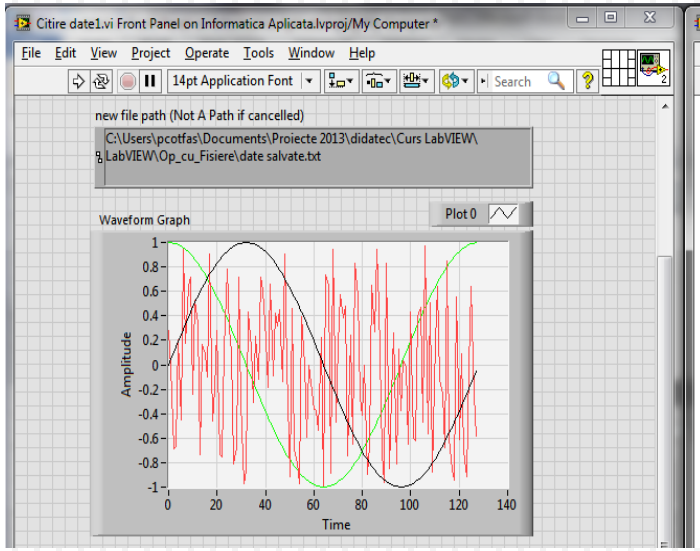
- Salvarea datelor în format tabelar

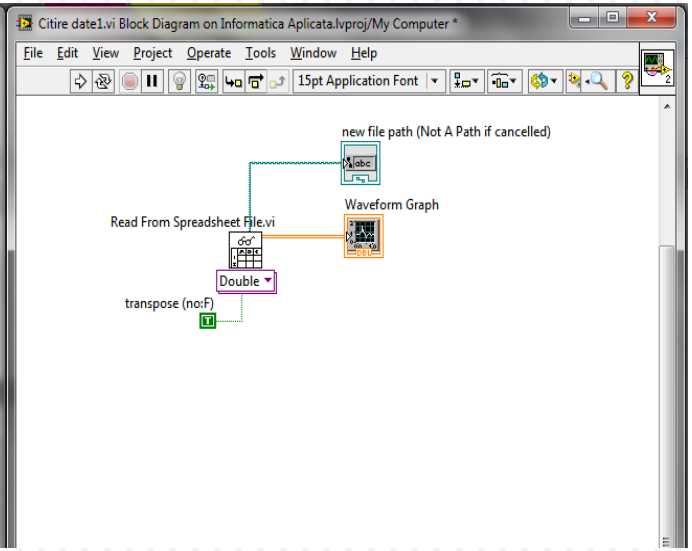




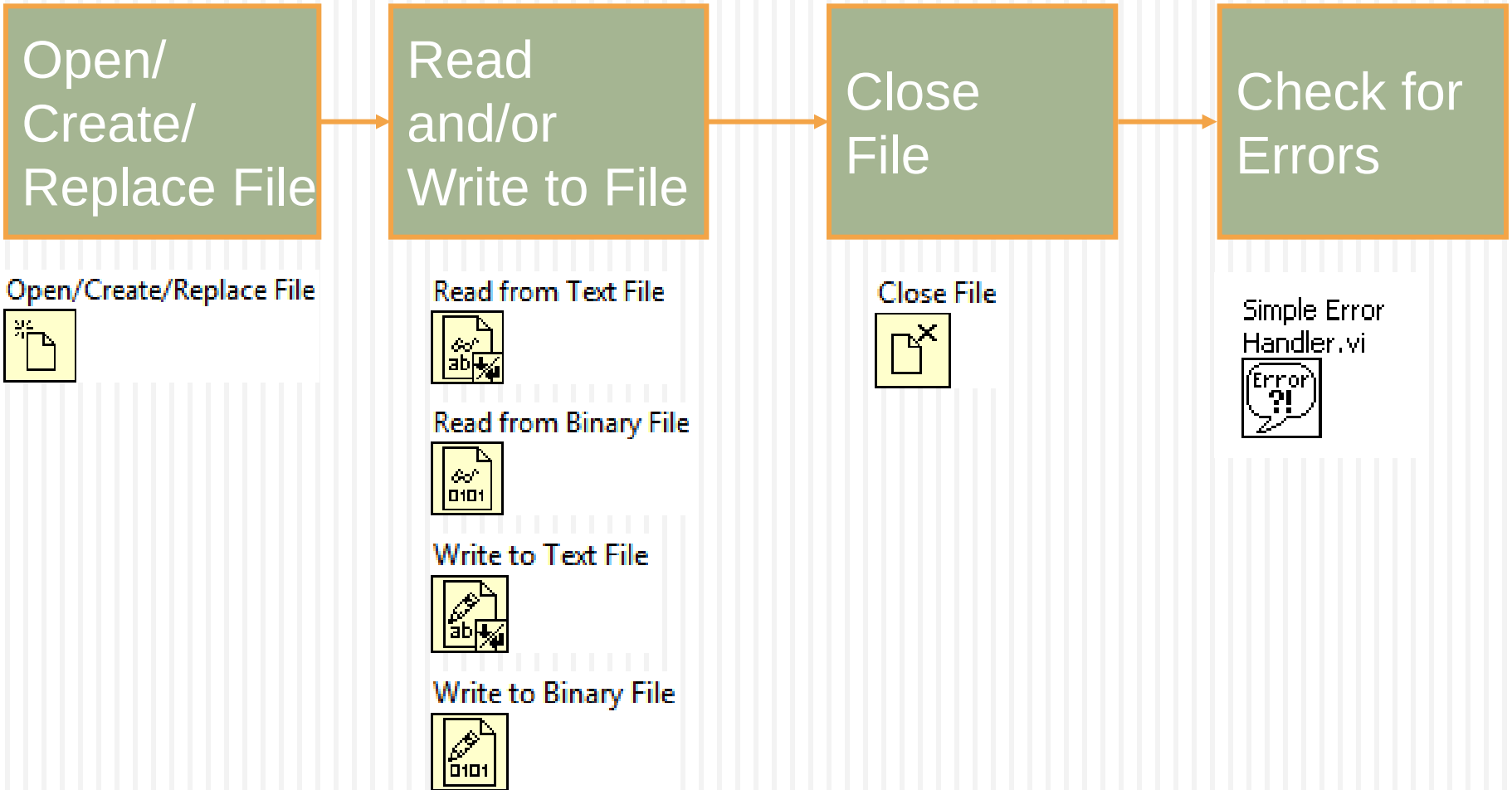
Citirea datelor

- Citirea datelor din fisiere tabelate



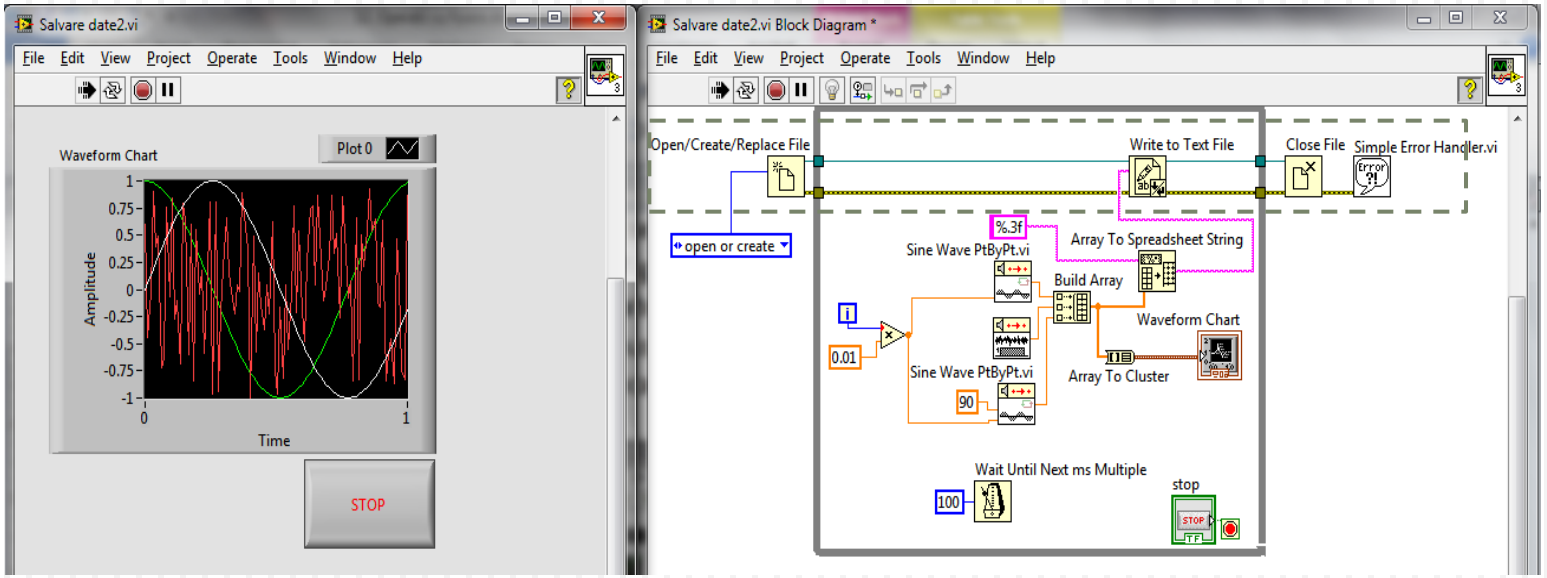


Operatii cu fisiere – functii de nivel mediu



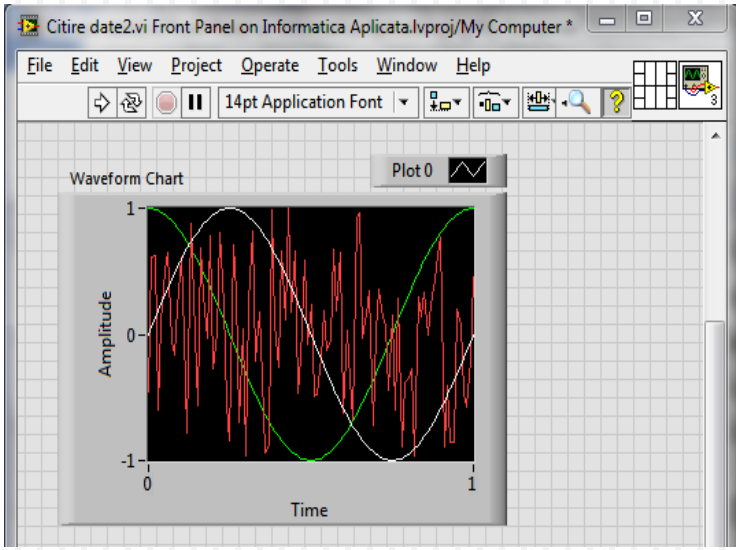
Operatii cu fisiere – functii de nivel mediu

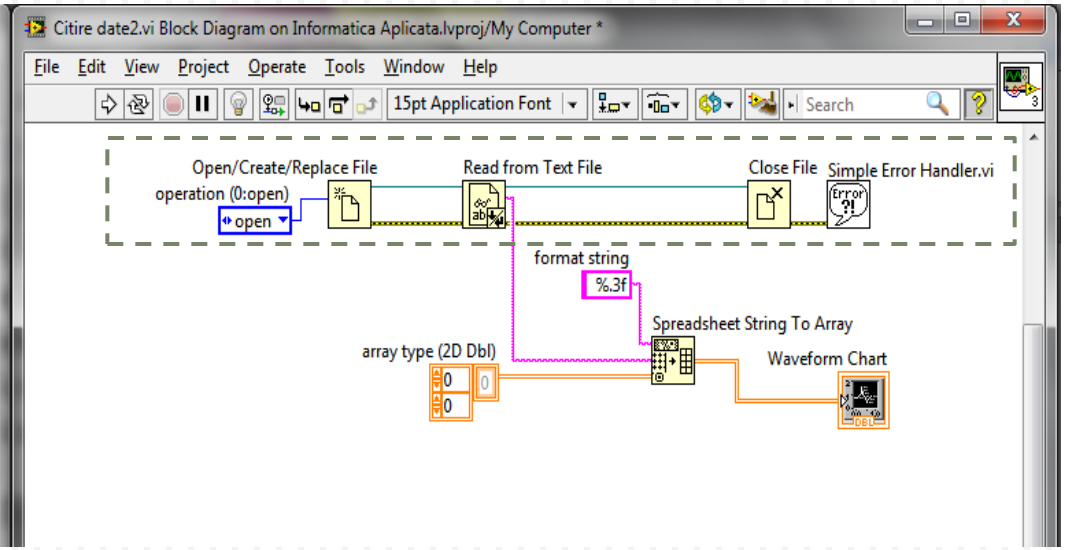
- **Open/Create/Replace** – deschide un fisier existent si genereaza refnum si error cluster
- **Write to Text File** – scrie datele in fisierul existent
- **Close File** – inchide fisierul
- **Simple Error Handler** – verifica daca in cadrul acestor trei operatii au aparut erori



Citirea datelor dintr-un fisier

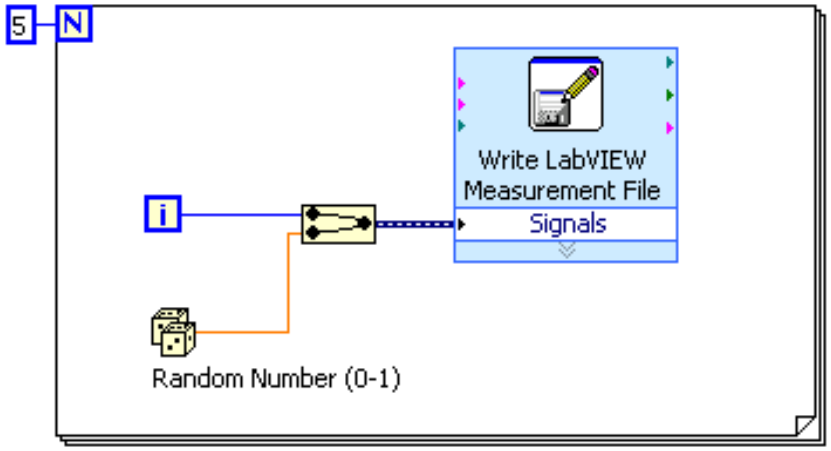
- **Open/Create/Replace –** deschide un fisier
- **Read From Text File** - citeste un numar specificat de bytes dintr-un fisier
- **Close File –** inchide fisierul
- **Simple Error Handler –** verifica erorile





Scrierea unui fisier de date Masurate in LabVIEW

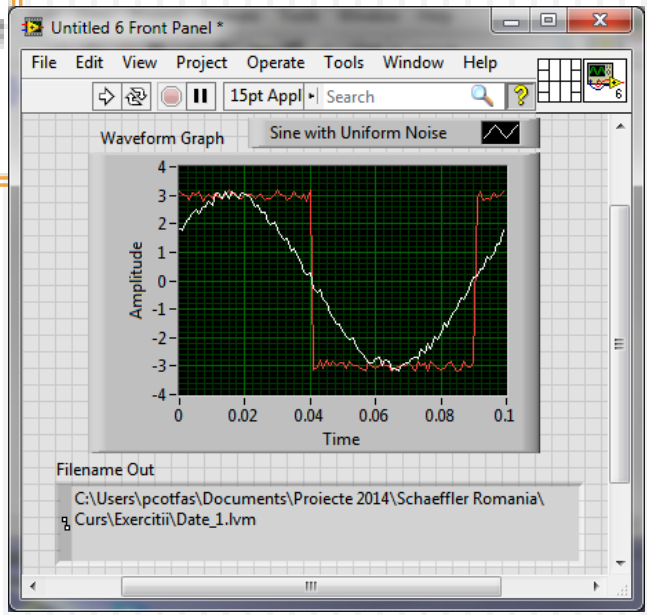
- Acest icon Express include functiile: **open, write, close** si **error**
- Poate formata stringul cu separator: **tab** sau **comma**
- Functia **Merge Signals** este folosita pentru a combina datele si a forma date dinamice.

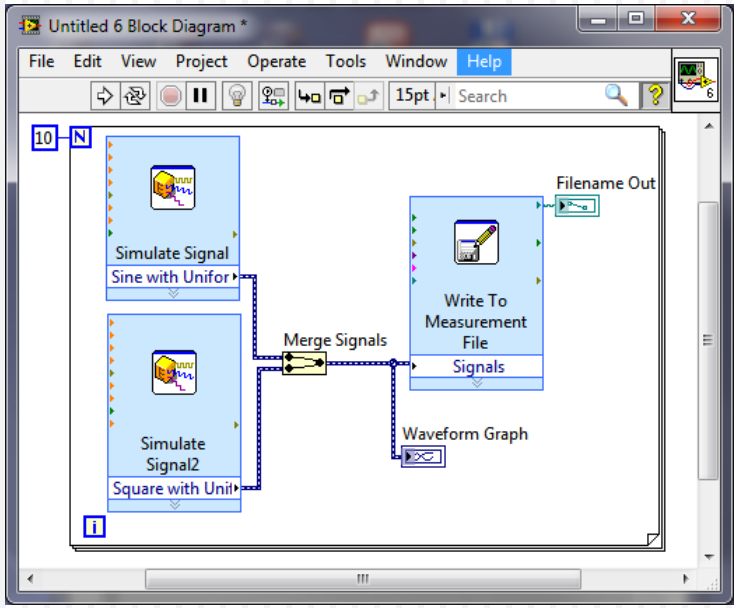


	A	B	C	D
1		0	0.385055	
2		1	0.23516	
3		2	0.985184	
4		3	0.177893	
5		4	0.935915	
6				
7				

Salvare date

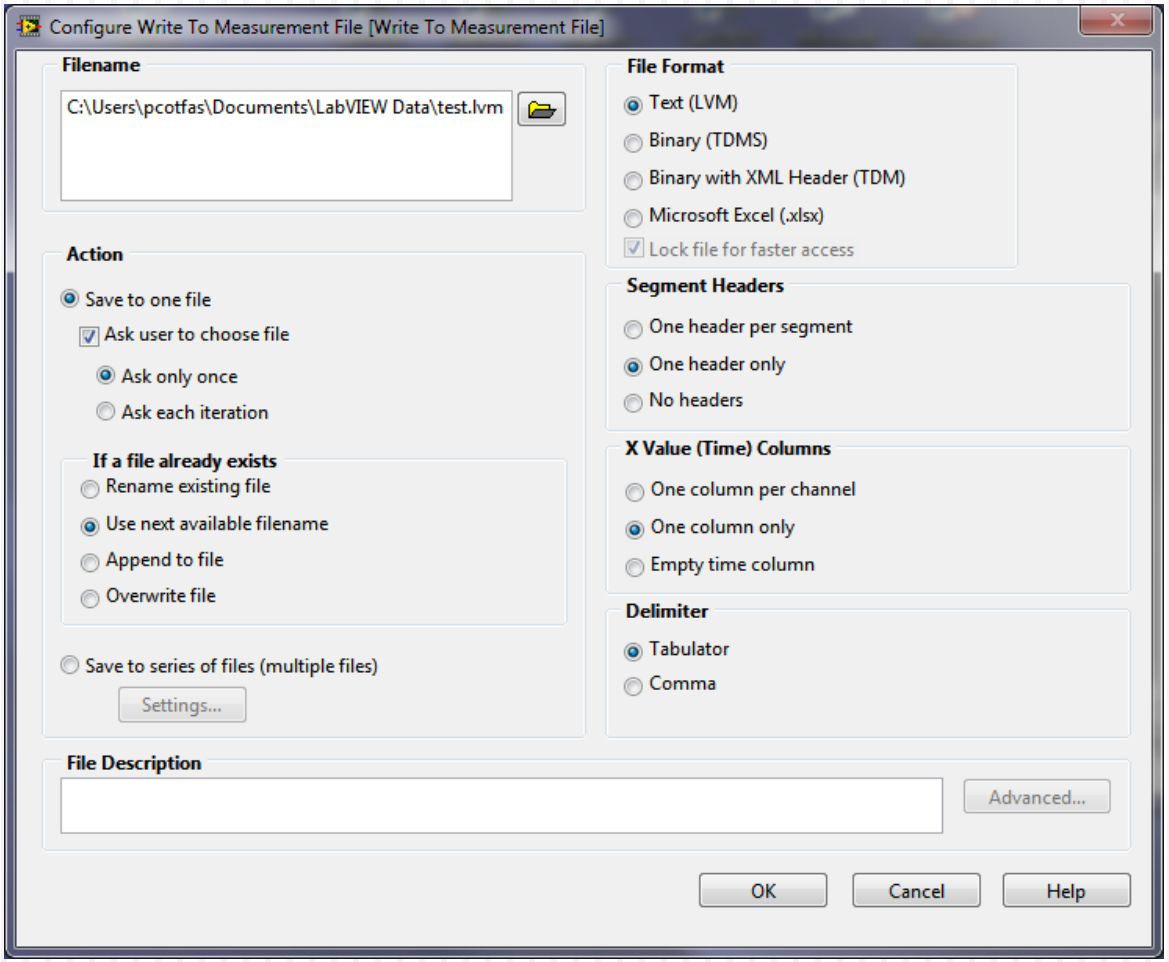
- Utilizare Express VI – **Write to Measurement File**

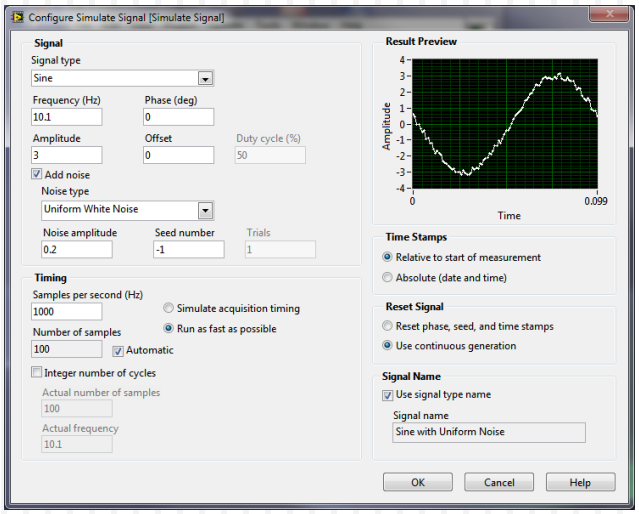


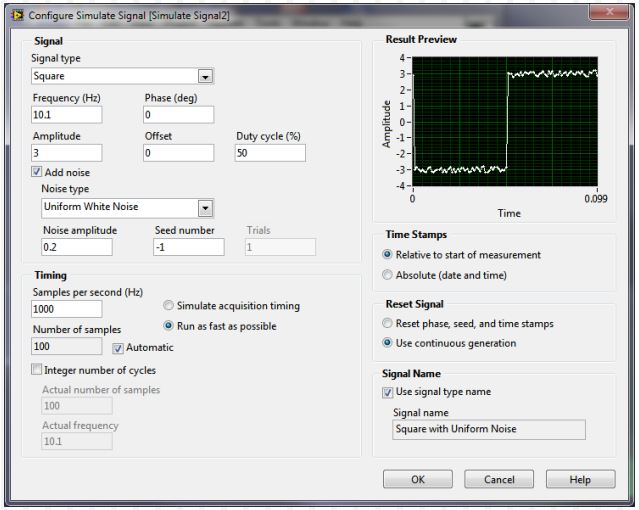


Salvare date

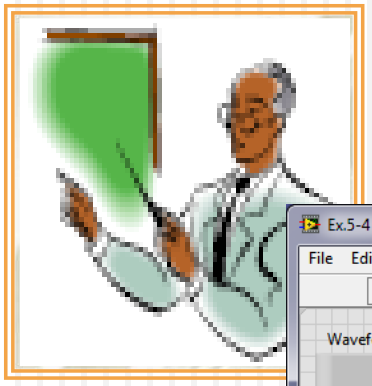
- Utilizare Express VI



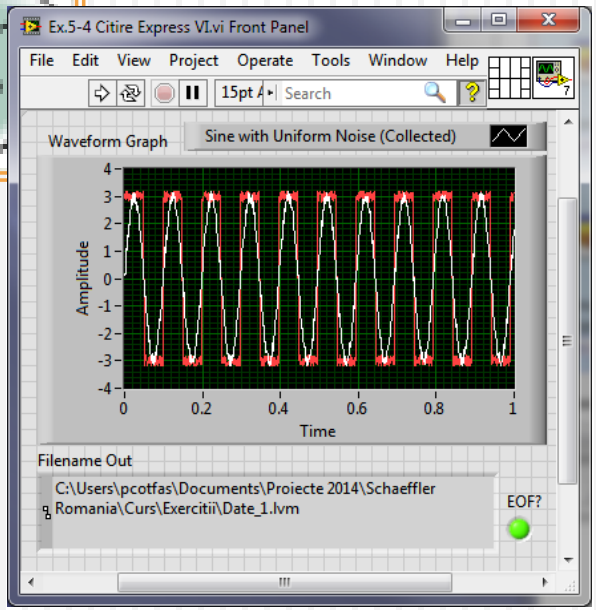


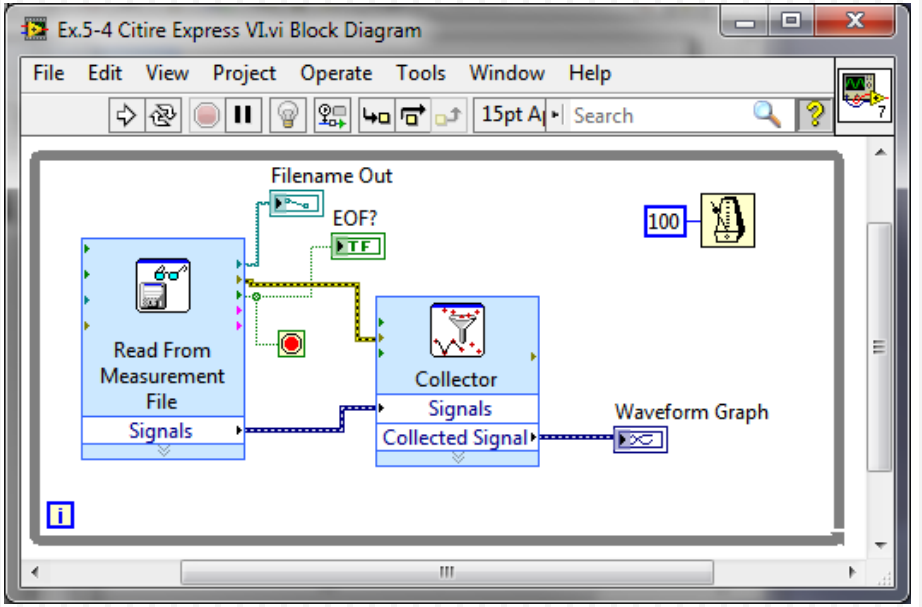


Citirea datelor



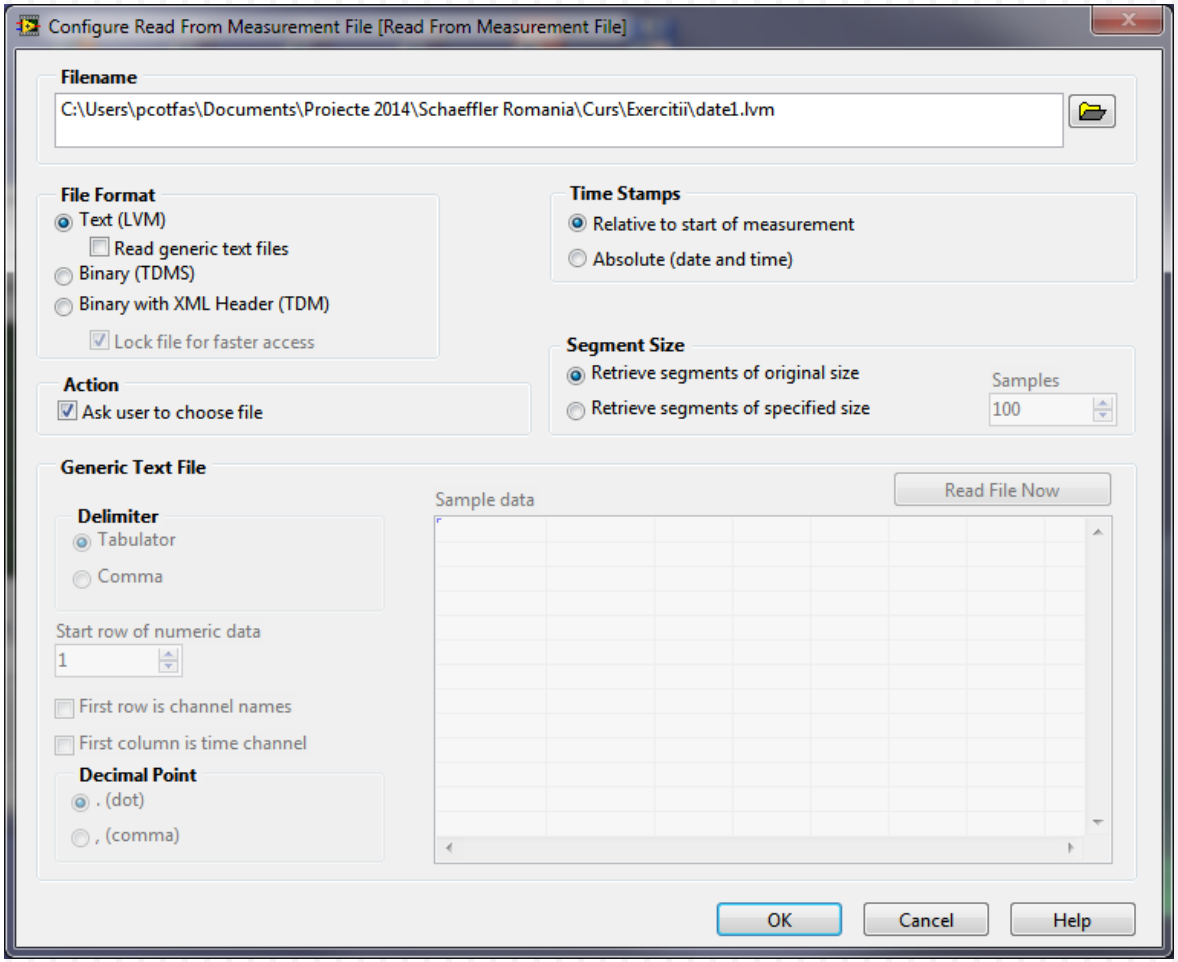
- Utilizare Express VI – **Read from Measurement File**

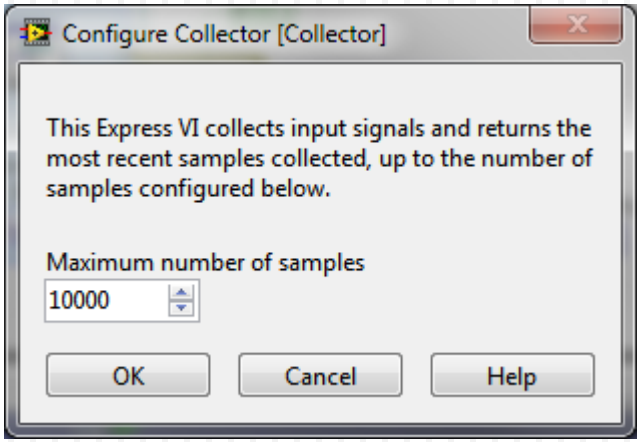




Citirea datelor

- Utilizare Express VI





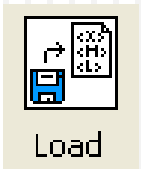
Lucru cu fisiere avansate

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 categori:
  - Fisiere text – sunt formatate ASCII. Au portabilitate mare
  - Fisiere binare – portanbilitate mai mica dar au dimensiuni mai reduse, sunt procesate mai rapid (accesibilitatea datelor mai rapida mai ales in cazul fisierelor mari)

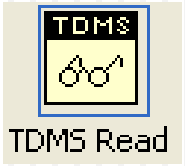
Tipuri de fisiere text

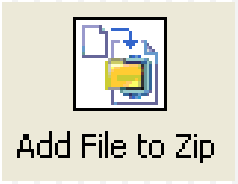
- Fisiere text generice, pot contine orice tip de text
- Fisiere tabelare (Spreadsheet files), structurate pe linii si coloane
- LabVIEW Measurement (.lvm) files
- Fisiere de configurare (.ini)
- Fisiere XML



Tipuri de fisiere binare

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





Comparare intre formatele des utilizate

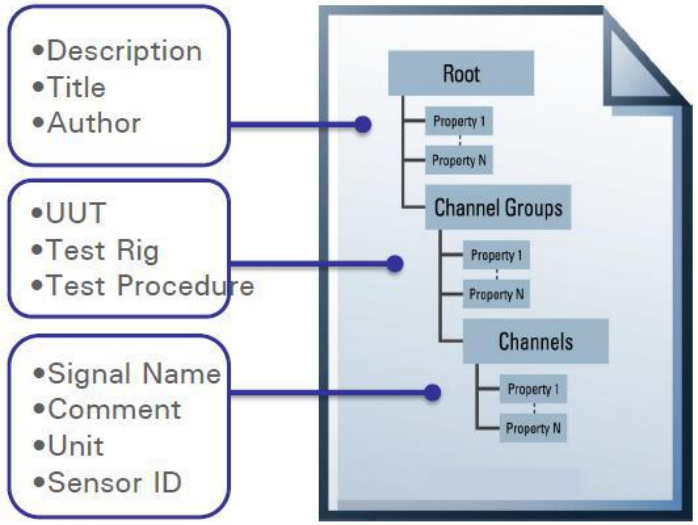
	ASCII	TDMS	Direct Binary
Numeric Precision	Good	Best	Best
Share Data	Best (Any program easily)	Better (NI programs easily; Excel)	Good (only with detailed format information)
Efficiency	Good	Best	Best
Ideal Use	Share data with other programs when file space and numeric precision are not important.	Store 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 fisiere dedicate salvarii datelor pe HDD de dimensiuni mari si cu metainformatii
- Permite organizarea fisierelor in canale si grupuri de canale
  - Un canal permite stocarea semnalelor masurate (vectori de date) in fisier
    - Fiecare canal poate avea proprietati ce descriu datele
    - Datele sunt stocate binar
  - Grupul de canale reprezinta un segment a unui fisier TDMS ce contine
    - Proprietati asupra stocarii informatiei
    - Cel putin un canal
    - Permite gruparea canalelor pe diferite criterii
  - Poate contine oricate grupuri de canale sau canale

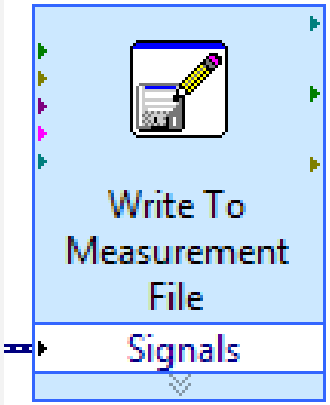
Fisiere de tip TDMS

- 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



Functiile TDMS

- Utilizand Express VIs :
  - Rapid, dar control in organizare scazut
    - Write to Measurement File
    - Read from Measurement File

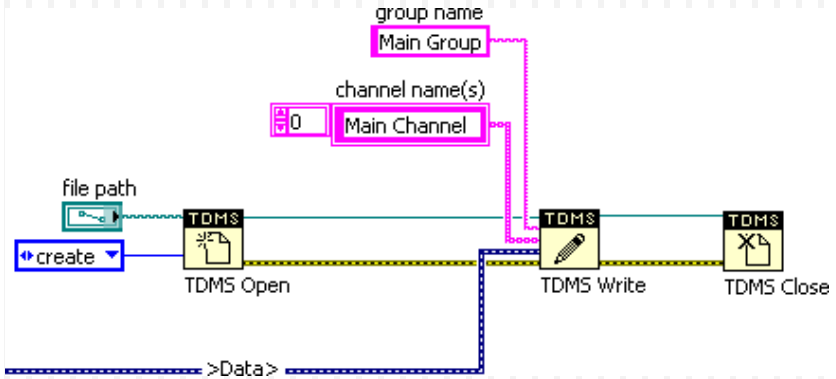


- Utilizand API-ul TDM Streaming
  - Control total asupra organizarii, dar mai complexa utilizarea

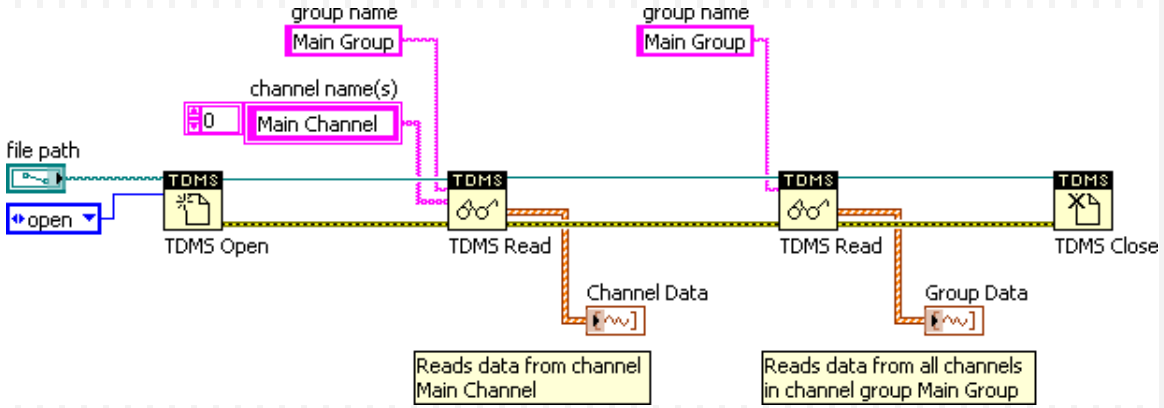
- Fisierele TDMS pot fi deschise si utilizate in Microsoft Excel

Lucru cu fisiere TDMS

- Varianta simpla
  - Scrierea datelor in fisiere TDMS

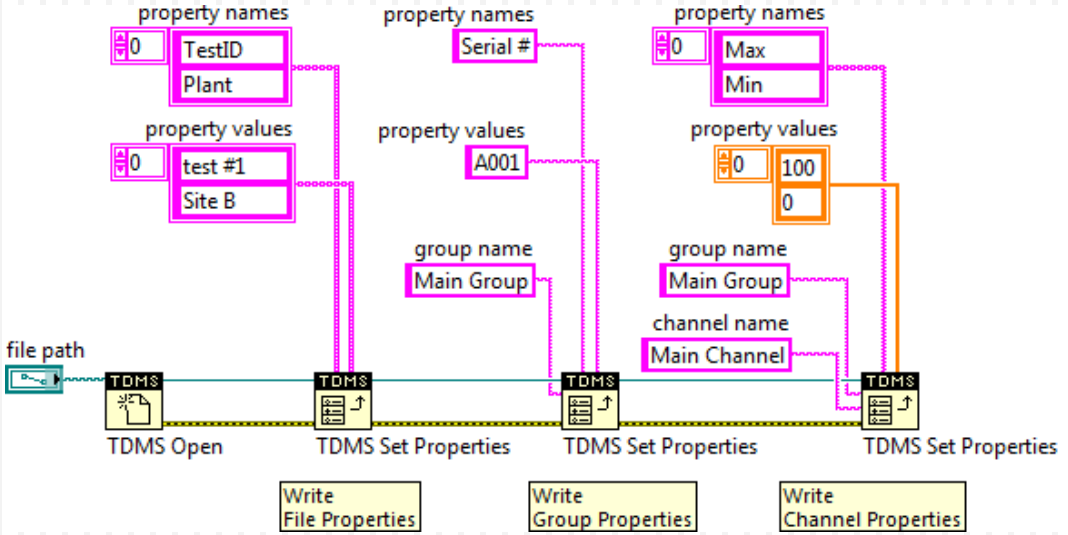


  - Citirea datelor din fisierele TDMS

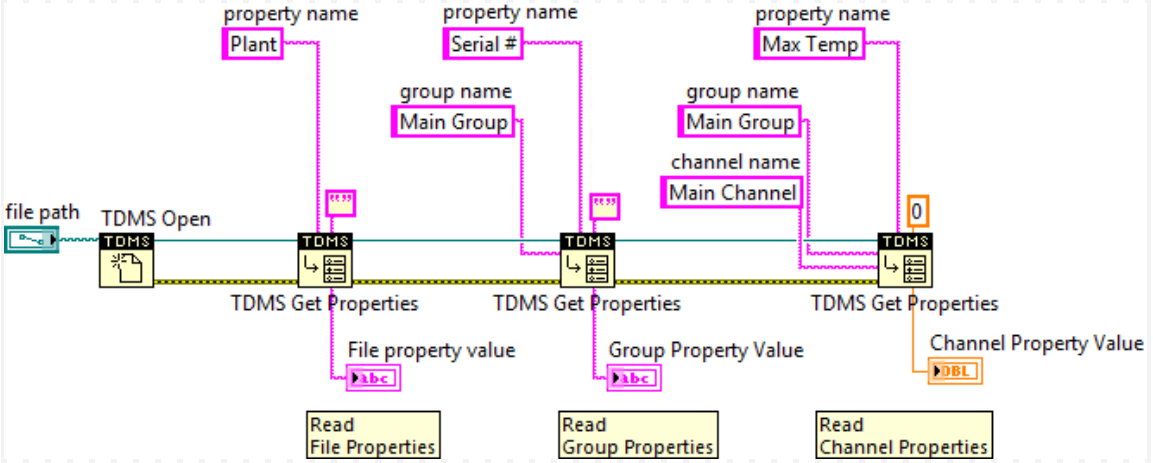


Lucru cu fisiere TDMS

- Scrierea proprietatilor in fisiere TDMS

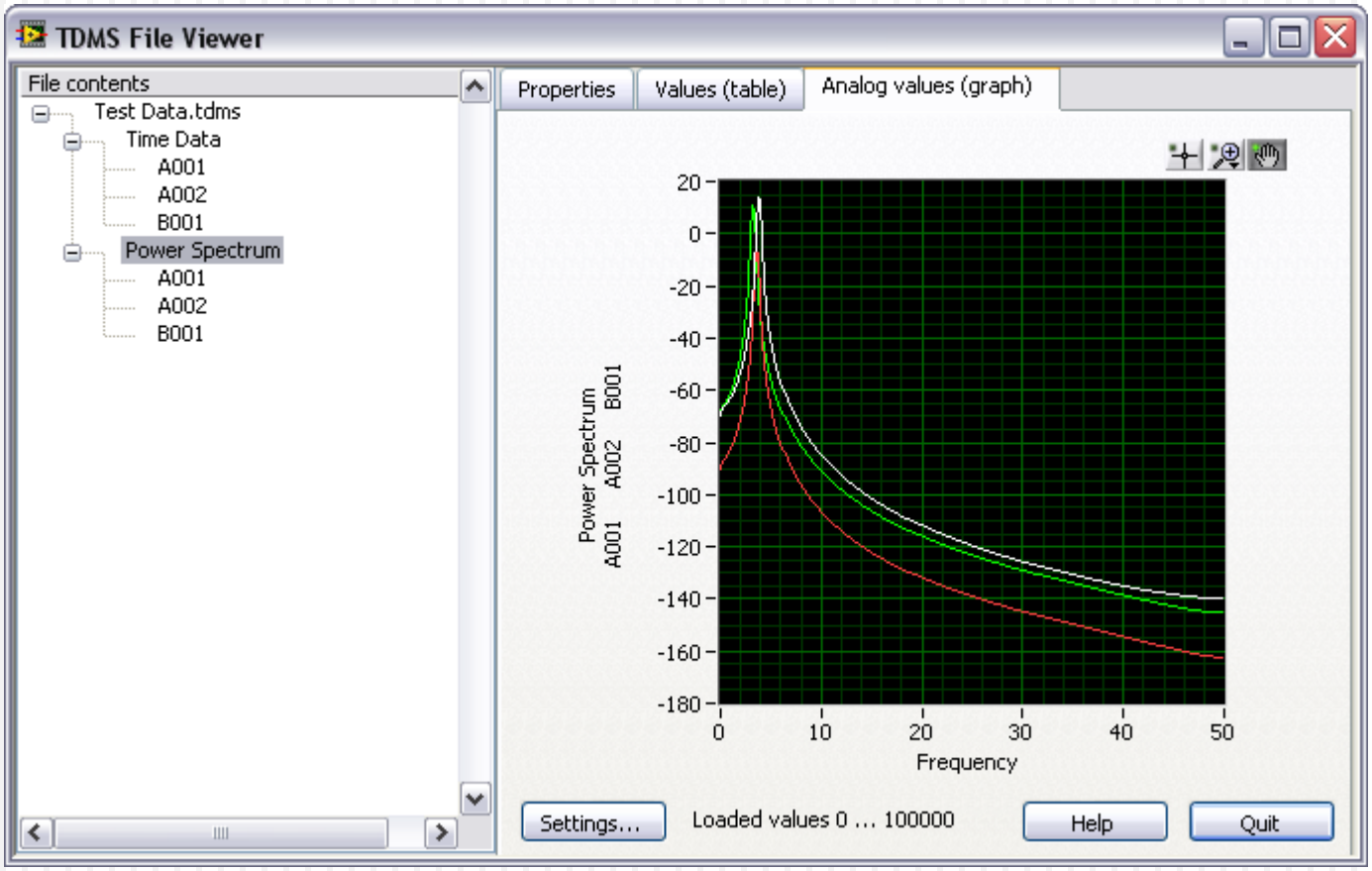


- Citirea proprietatilor din fisiere TDMS



Previzualizarea datelor

- Utilizand TDMS File Viewer VI din API-ul TDMS

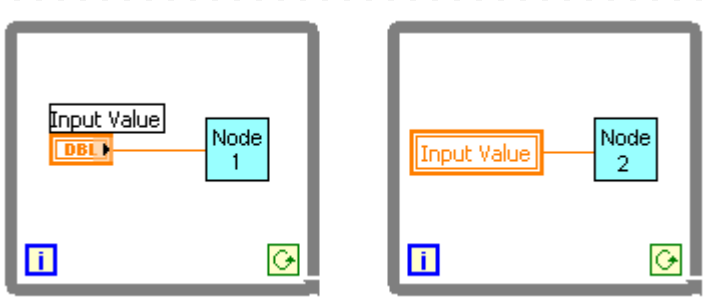


Variabile

- Variabile locale
- Variabile globale
- Variabile partajate

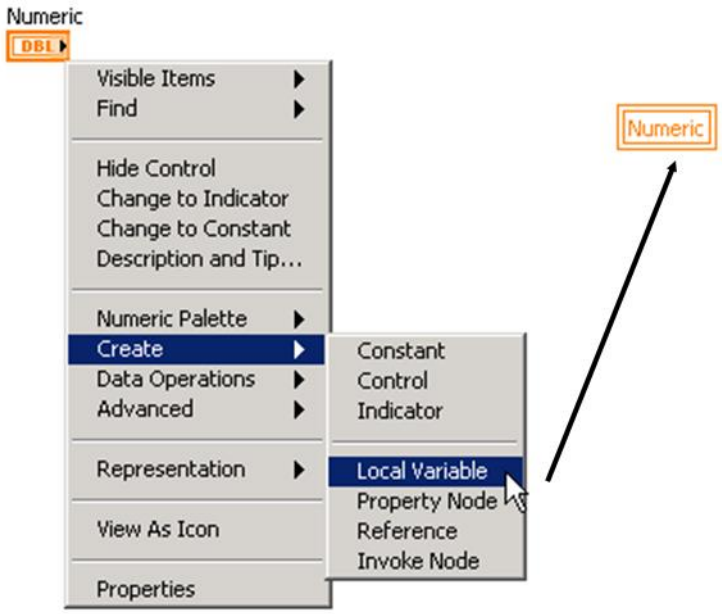
Variabile locale

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



Realizarea Variabilelor Locale

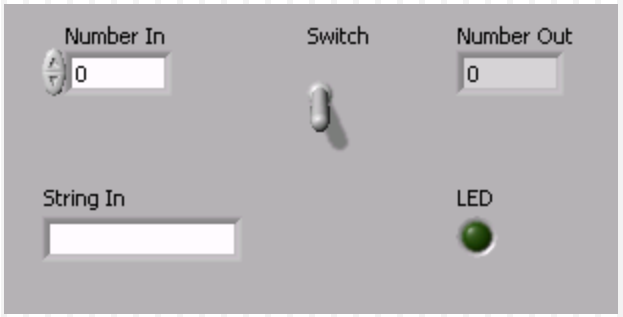
- Accesam obiectele din Panou din mai multe locuri din Diagrama
- Avem doua posibilitati sa realizam Varibile Locale:
  - Right-click pe terminalul obiectului si selectam Create»Local Variable
  - Selectam o Variabila Locala din paleta de Structuri



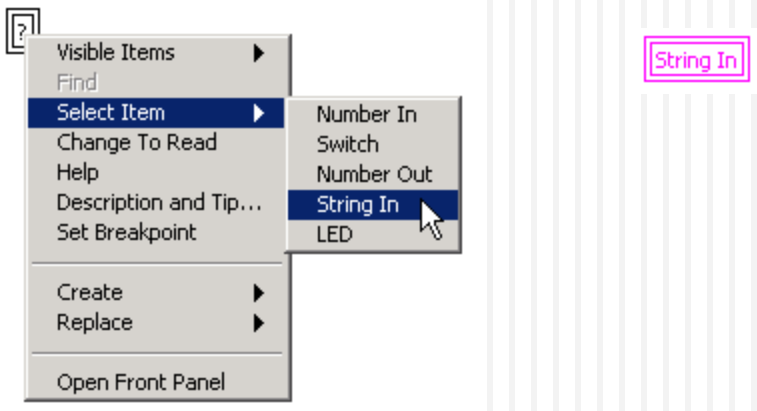
Realizarea Variabilelor Locale

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

Front Panel

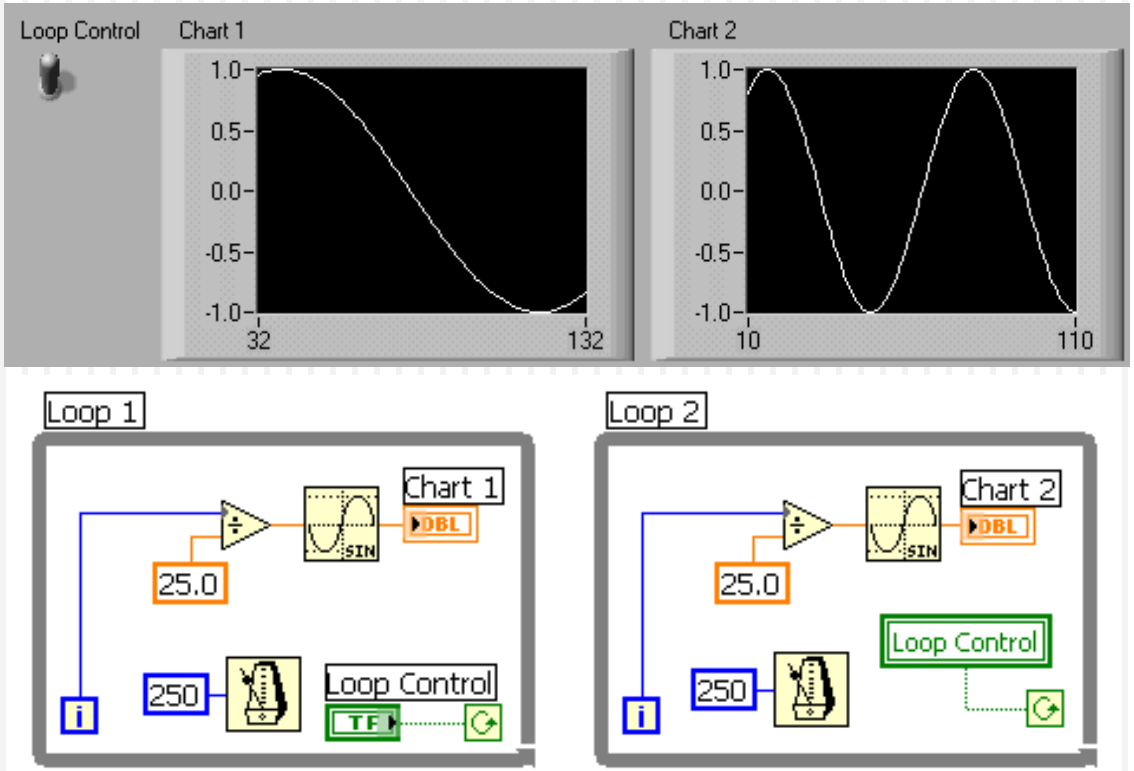


Block Diagram



Exemple cu Variabile Locale

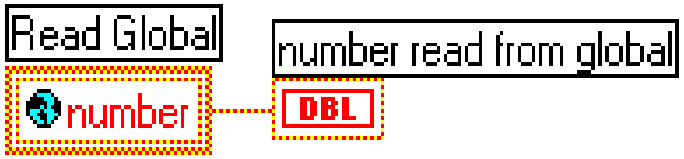
- Consideram o aplicatie care sa permita oprirea a doua bucle de date independente While Loops, care ruleaza in paralel.
- Fiecare bucla While reprezinta grafic o functie sinus pe un indicator grafic de tip Chart plots



Variabile Globale

- 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

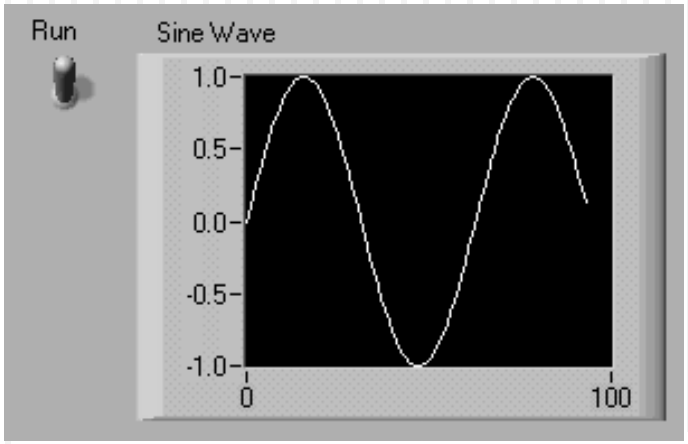
Write Global

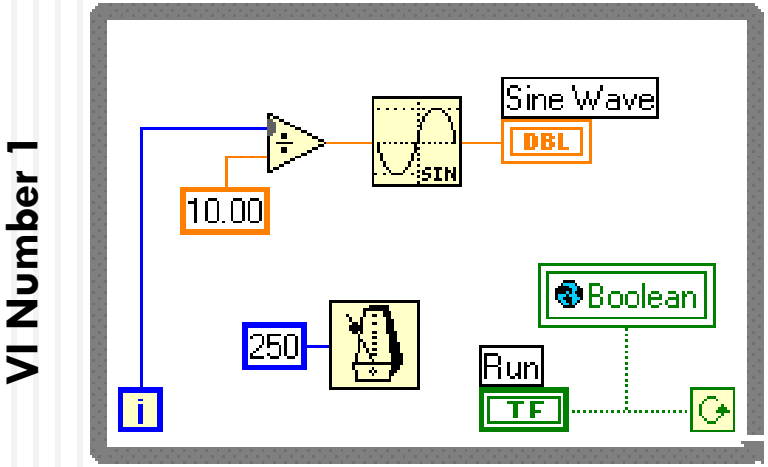


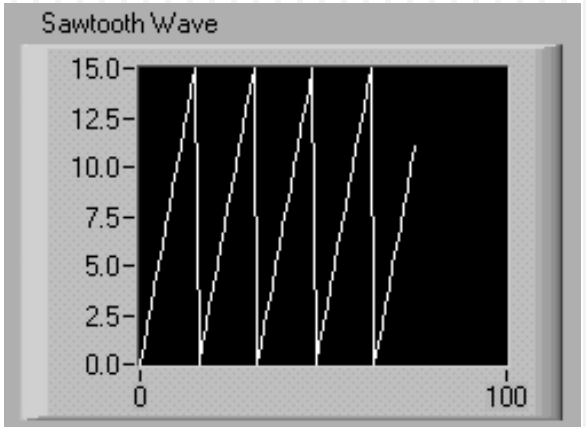
Read Global

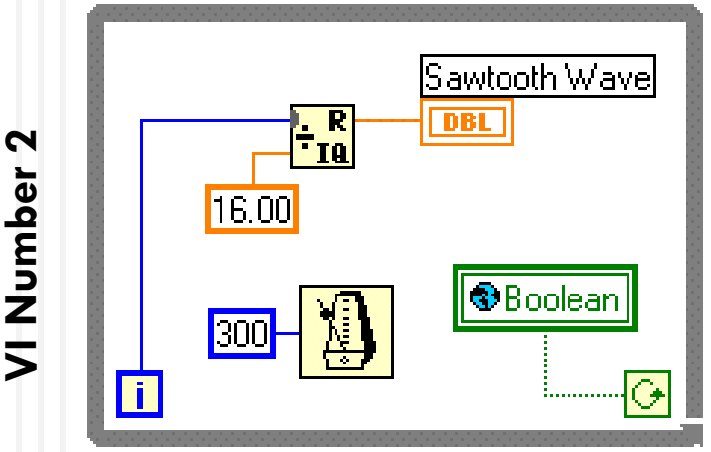
Exemple

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

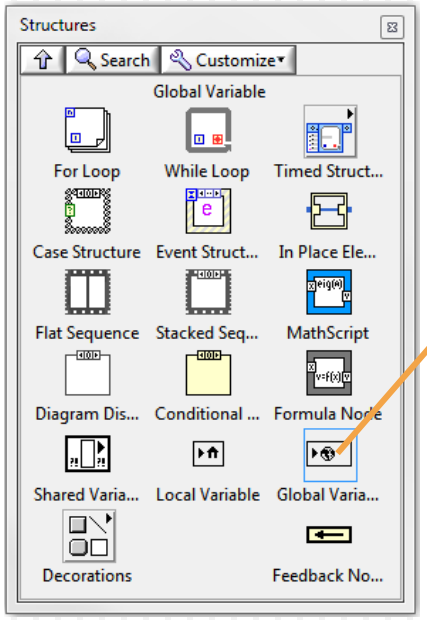




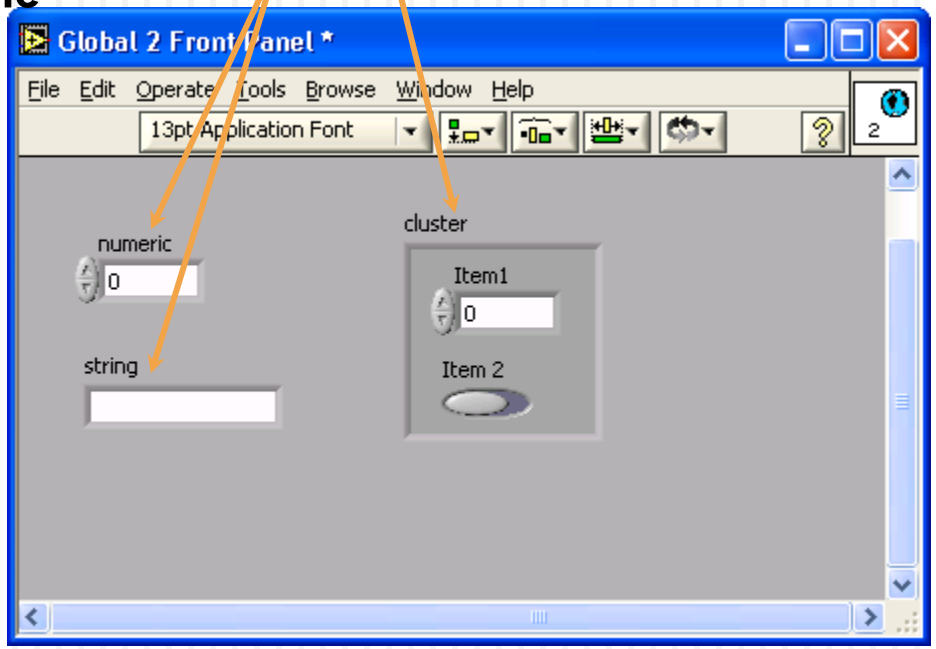




Crearea unor Variabile Globale



Fiecare control trebuie sa aiba o Eticheta proprie



Realizarea Controalelor necesare ca Variabile Globale

Right-click