Oslo - Stockholm - Utrecht - Brussels - Copenhagen - Helsinki

ni.com/nidays

NATIONAL INSTRUMENTS

TIPS AND TRICKS FOR DATA STORAGE AND RETRIEVAL WITH LABVIEW

Common Scenario

- Create LabVIEW application

write data to file ➔ 

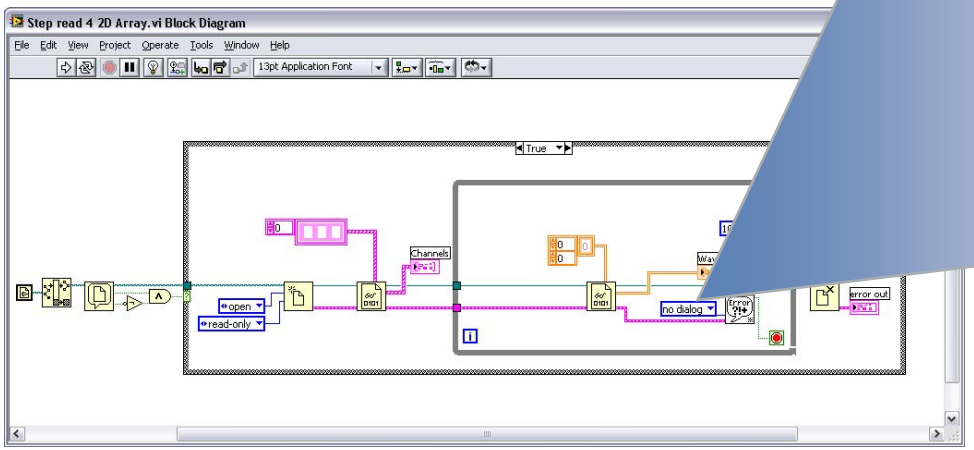
- Create another LabVIEW application

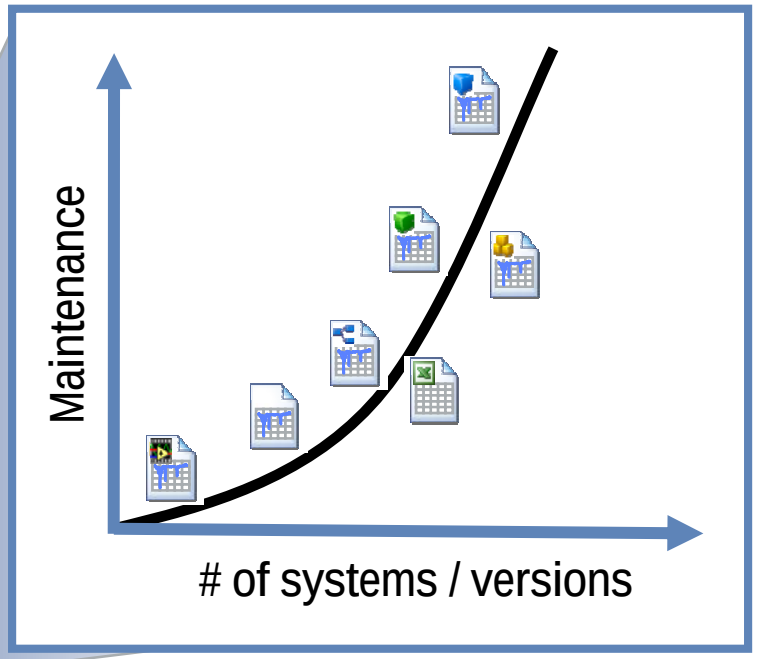
write data to file a little differently ➔ 

- Repeat over and over

Versioning Nightmare

Even minor variations can create long term maintenance headaches

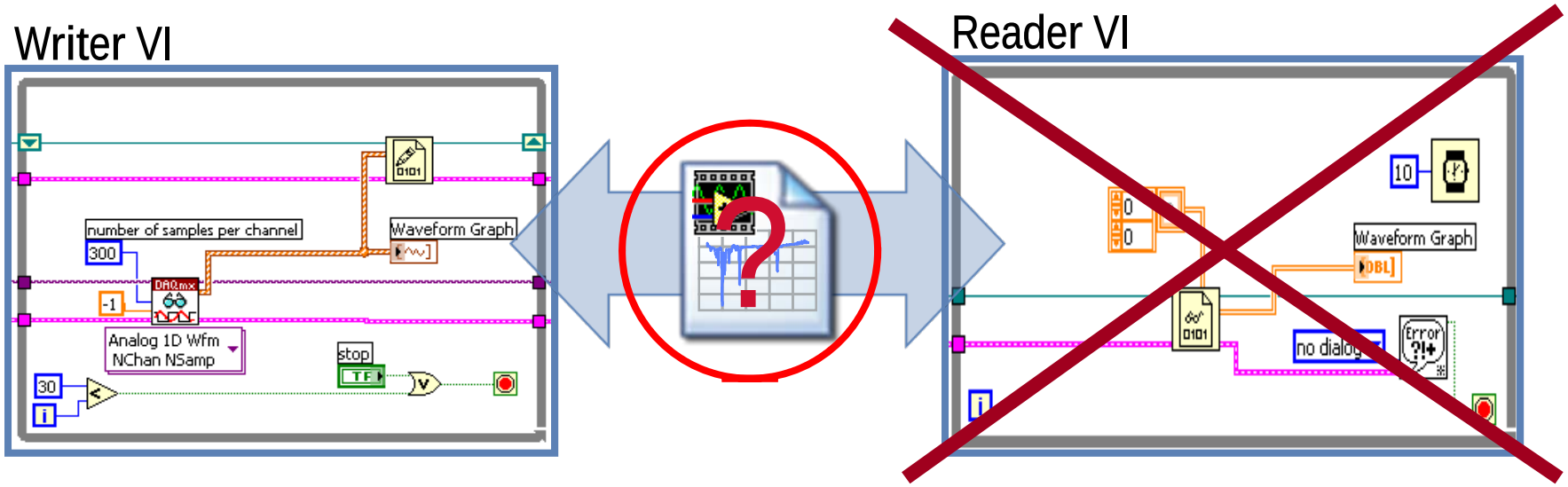




How do you handle variations?

- Case Statement?
- File Extensions?
- Version tag in cluster?
- Lots of different choices...

Maintaining File Reader VIs Doubles Your Work



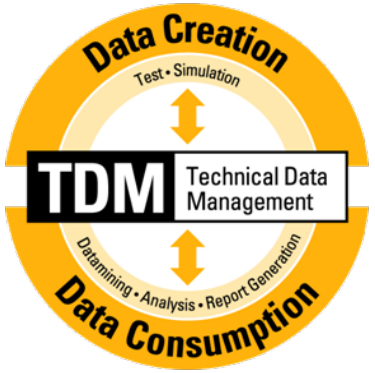
- Update the File Writer VI → Have to distribute a new File Reader VI
- Your File Reader VI has to figure out what file version it's reading
- The old file versions don't go away so your File Reader complexity grows
- Problem: Your File Reader VI doesn't ship with LabVIEW

Agenda

- LabVIEW File I/O Challenges
- NI Technical Data Management (TDM)
- TDM File I/O in LabVIEW
- TDM Offline Analysis

NI Technical Data Management (TDM) Vision

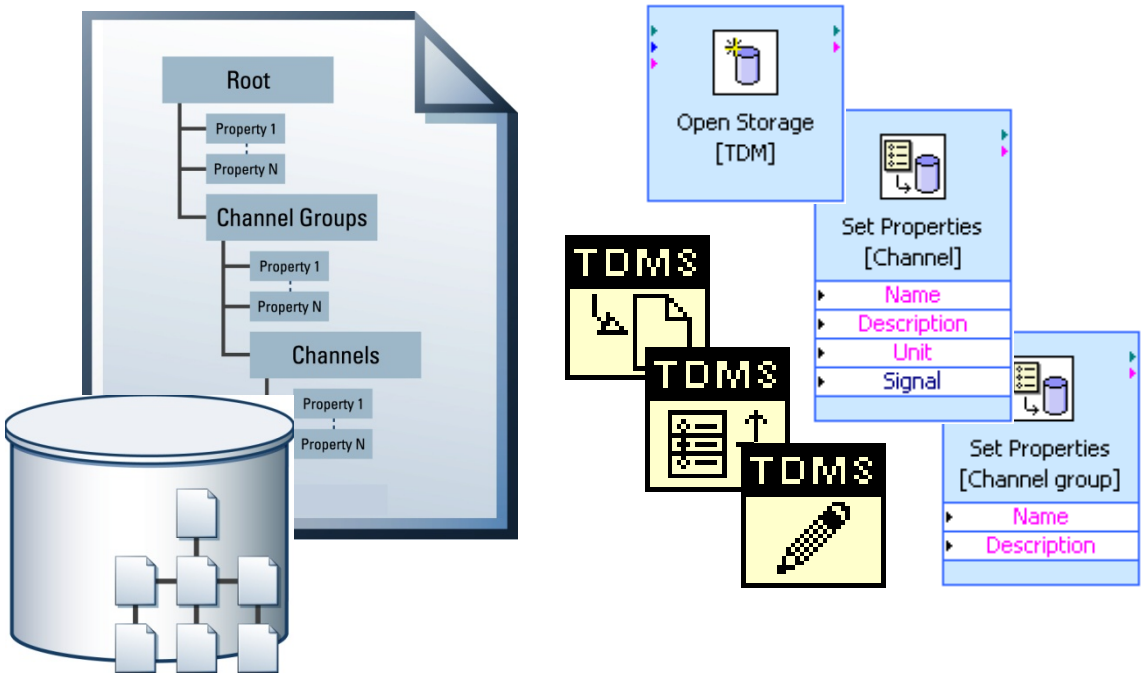
- Reduce time LabVIEW programmers spend on file I/O while increasing the value the stored data brings to their organizations.



How? By providing

- Flexible data model for storing technical data
- Robust APIs for reading and writing data
- Self-configuring data management tools to aid in accessing data

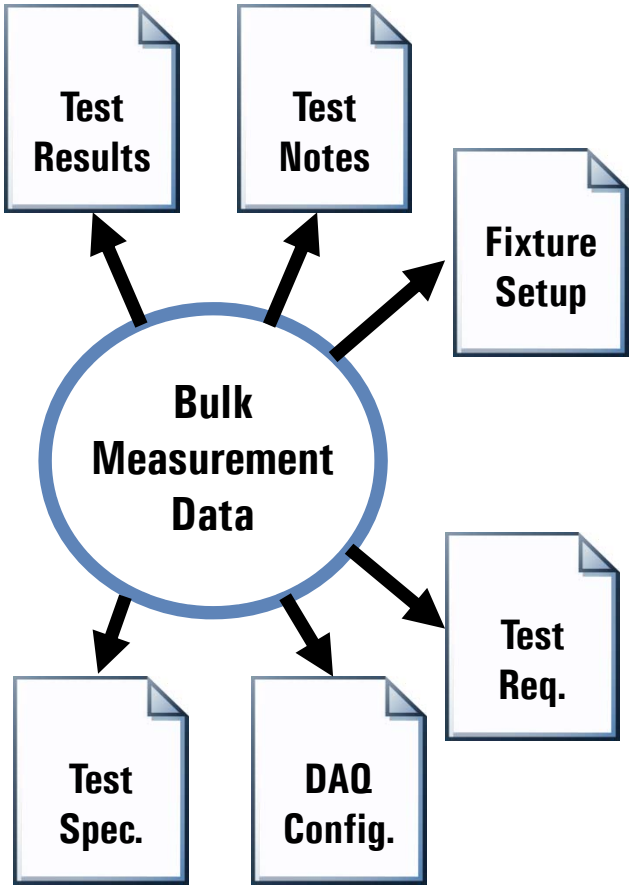
NI Core TDM Components



- TDM Data Model & File
- TDM Streaming VIs
- Data Storage VIs
- DataPlugins
- DIAdem DataFinder

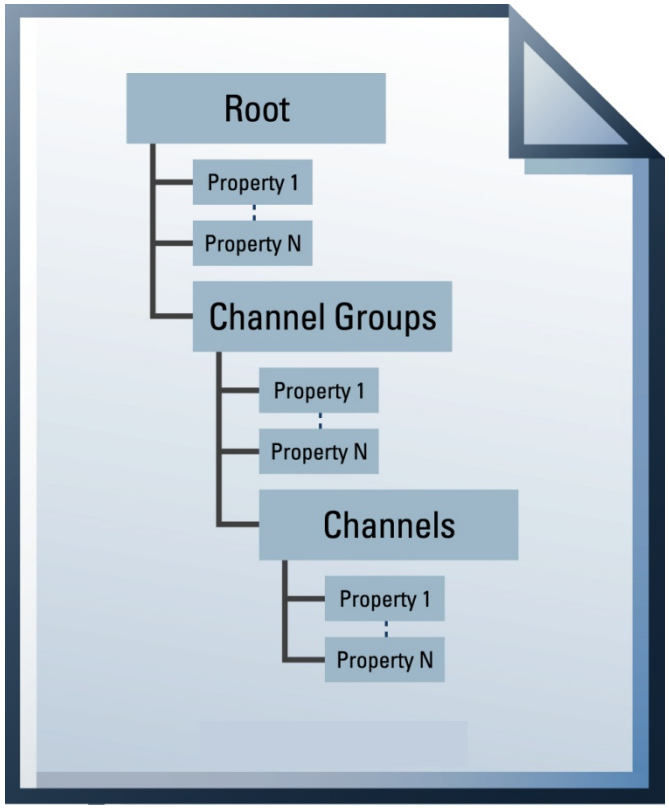
In this second half of the presentation we'll investigate how you use TDM to address your data management challenges

Well Documented Data



- Very similar benefits to well documented LabVIEW code
- The more test related information you store in the file the less likely the end user will come back to you with questions
- **However**, using traditional LabVIEW file I/O this is a lot of work to program and maintain

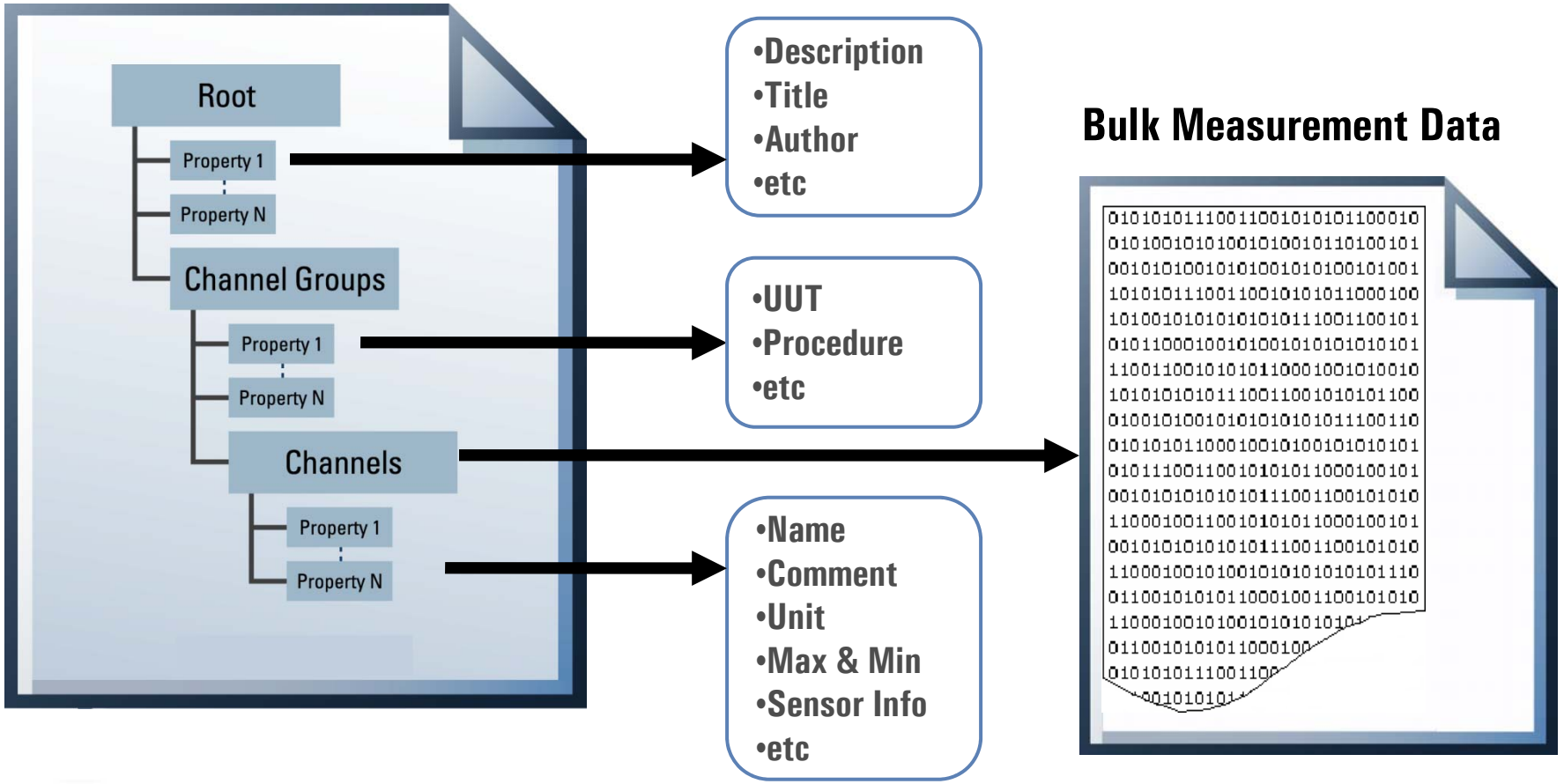
TDM Data Model



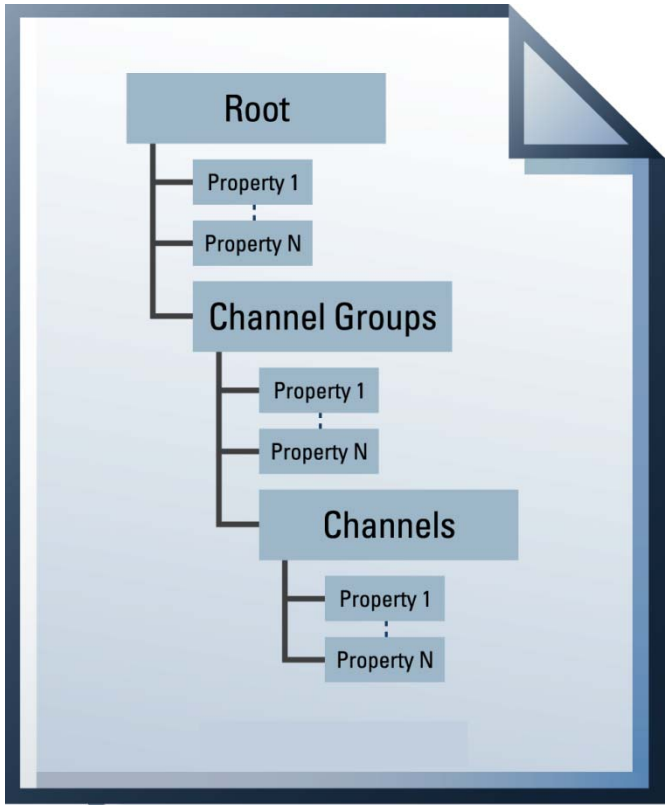
- 3 Levels of Hierarchy
  - File, Groups and Channels
- Each level has associated properties which you can customize
- The TDM data model is saved with each data file, it's self-describing

File = Root, terms are interchangeable

TDM Files are Self Describing



The LabVIEW TDM Files and Interfaces



.TDMS

- Covers widest range of use cases
- Optimized for high-speed streaming
- Binary based header
- Supported on LabVIEW RT

.TDM

- XML based header
- Storage VIs offers additional functionality for reading non-TDM files

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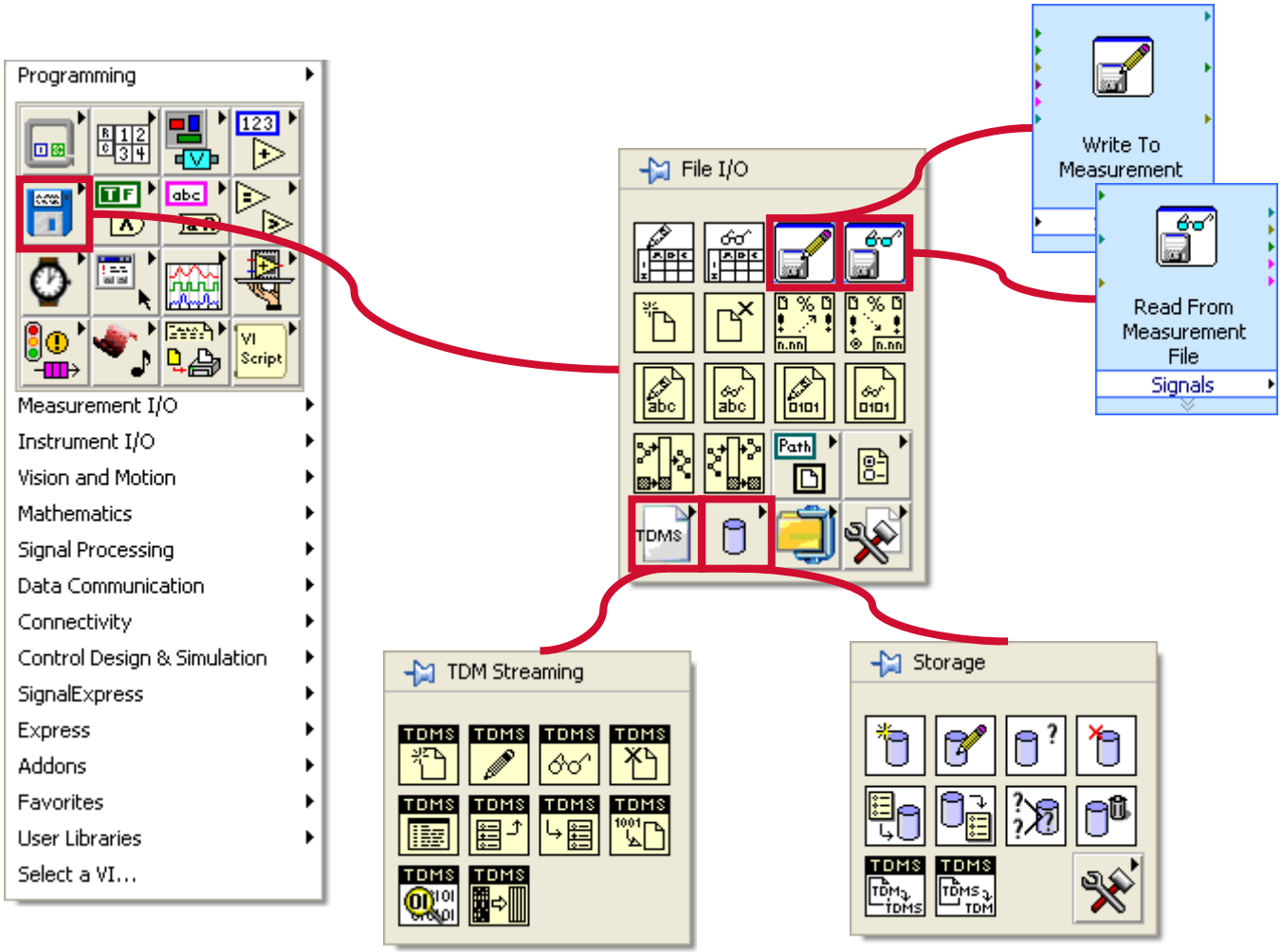
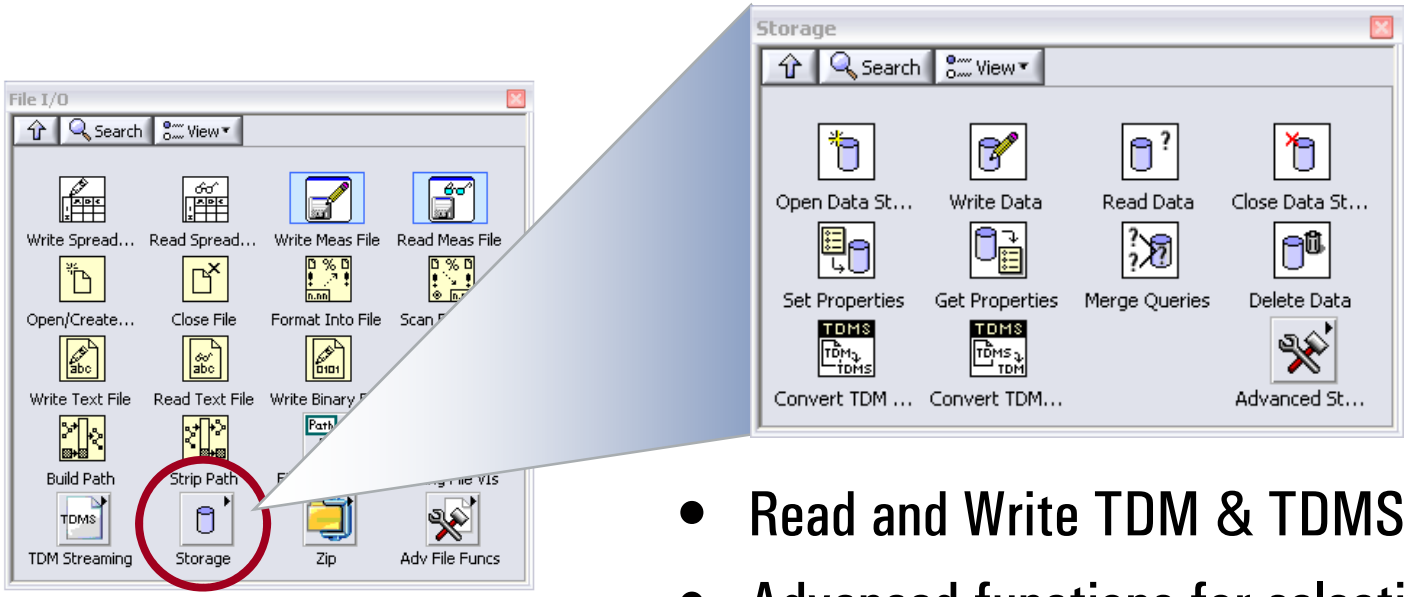
TDM File I/O in LabVIEW



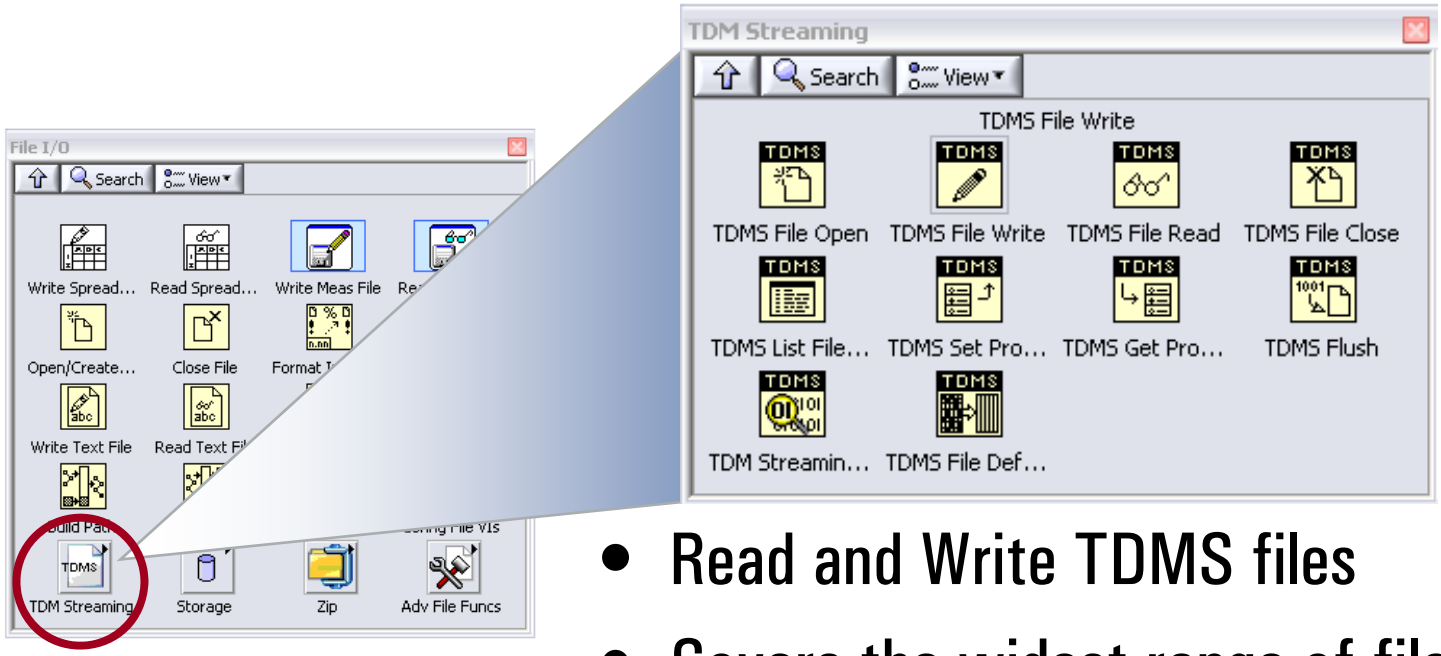
The LabVIEW Data Storage API *(existing)*



Flexible

- Read and Write TDM & TDMS files
- Advanced functions for selective data loading
- Supports reading data using DataPlugins
- Convert TDM to TDMS files and vice versa

The LabVIEW TDM Streaming API *(new)*



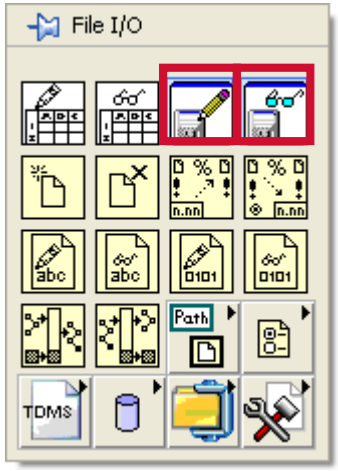
Fast

- Read and Write TDMS files
- Covers the widest range of file i/o use cases
- VIs for capturing descriptive meta data
- Optimized for High Speed Streaming

TDMS – New File Format in LabVIEW 8.2

Benchmark	LabVIEW 8.0		LabVIEW 8.2	
	Fastest	Runner-Up	Fastest	Runner-Up
Mainstream DAQ	Bytestream	Datalog	TDMS	Bytestream
Scope	NI-HWS	Bytestream	NI-HWS	TDMS
Industrial Automation	Bytestream	Datalog	Bytestream	TDMS
Triggered Measurements	Bytestream	Datalog	TDMS	Bytestream
Indexing	NI-HWS	TDM	TDMS	NI-HWS
Random Access (Channel)	TDM	NI-HWS	TDMS	TDM
Random Access (Scan)	Datalog	TDM	TDMS	Datalog
Replay	Bytestream	Datalog	TDMS	Bytestream

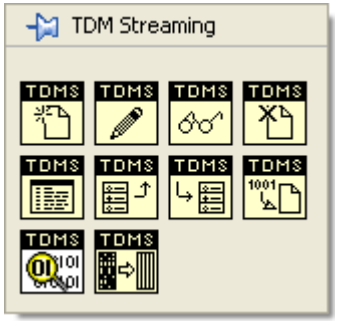
Demo
TDMS in LabVIEW Express



What you will see

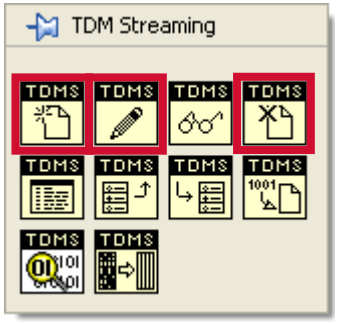
- Write Data to TDMS Files
- Include Descriptive Information
- Include DAQmx Configuration
- Use LabVIEW TDMS File Viewer

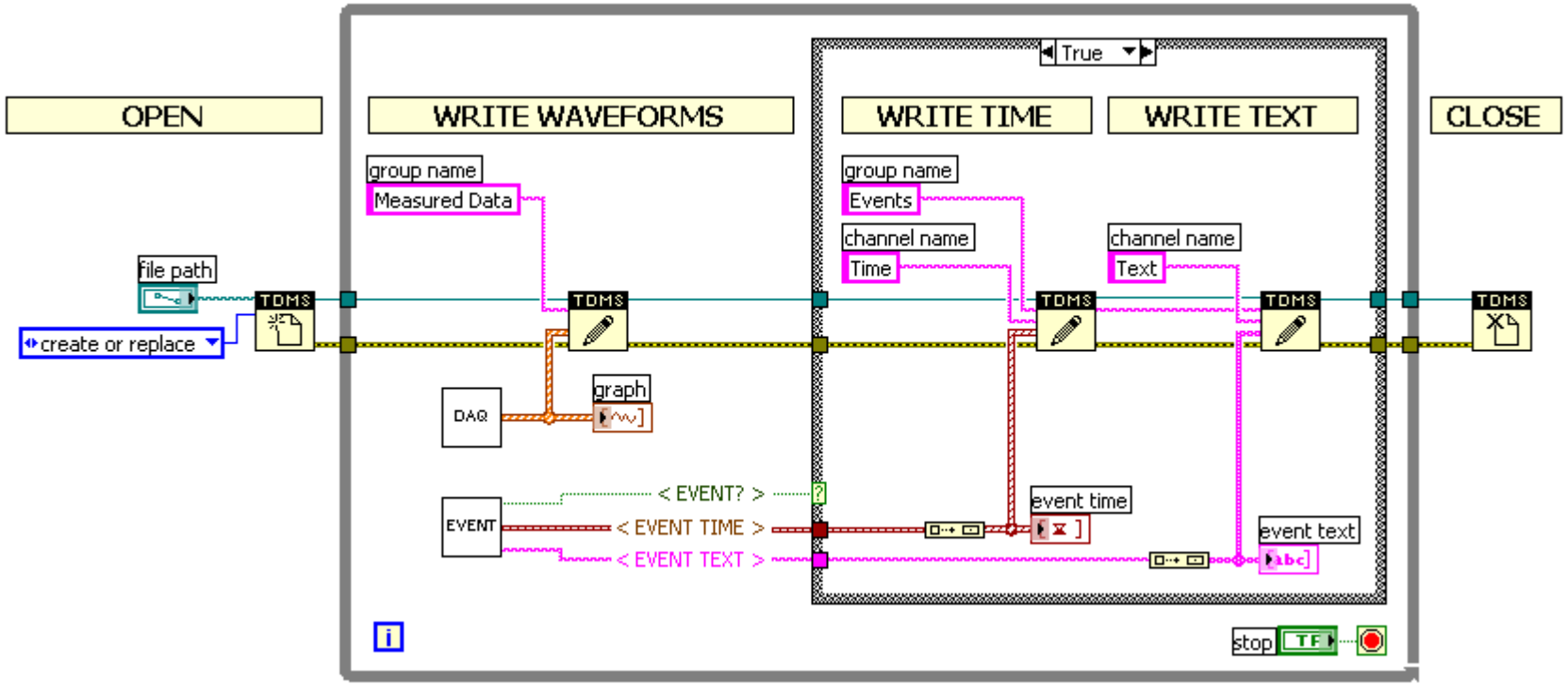
TDM Streaming API



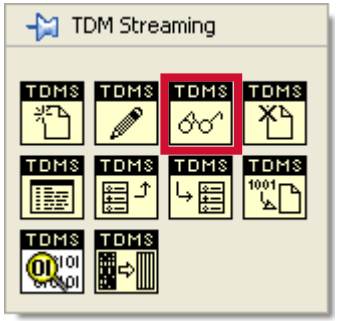
- Write Data to TDMS Files
- Customize TDMS Group Structure
- Read Data from TDMS files
- Use Descriptive Properties

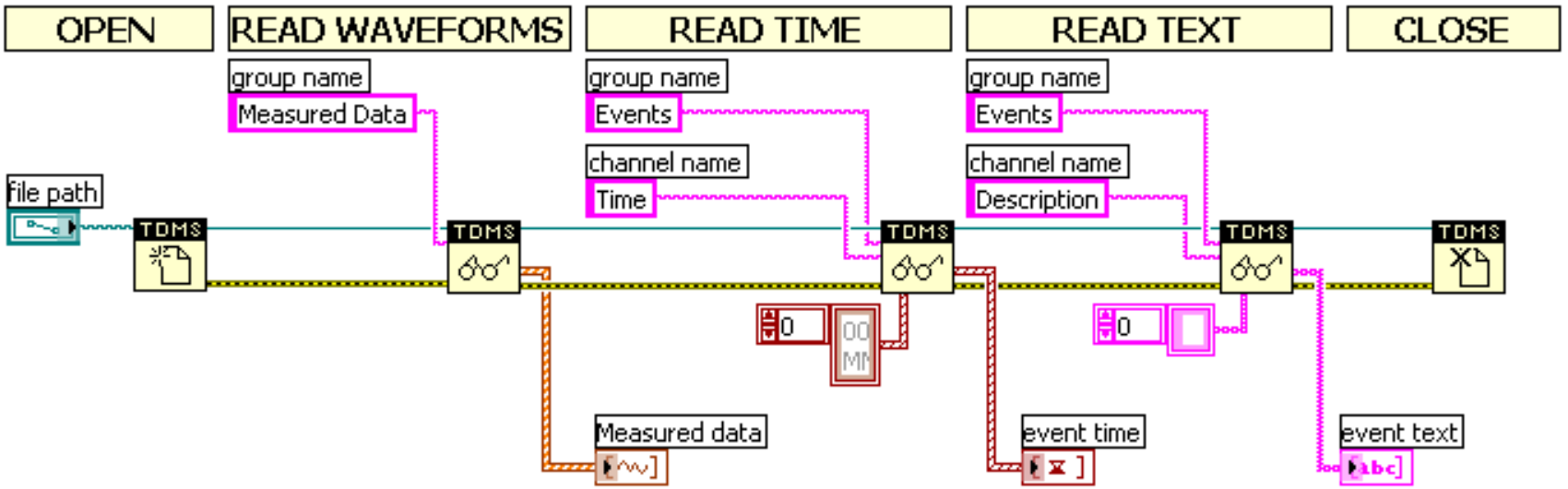
TDMS – Write Data



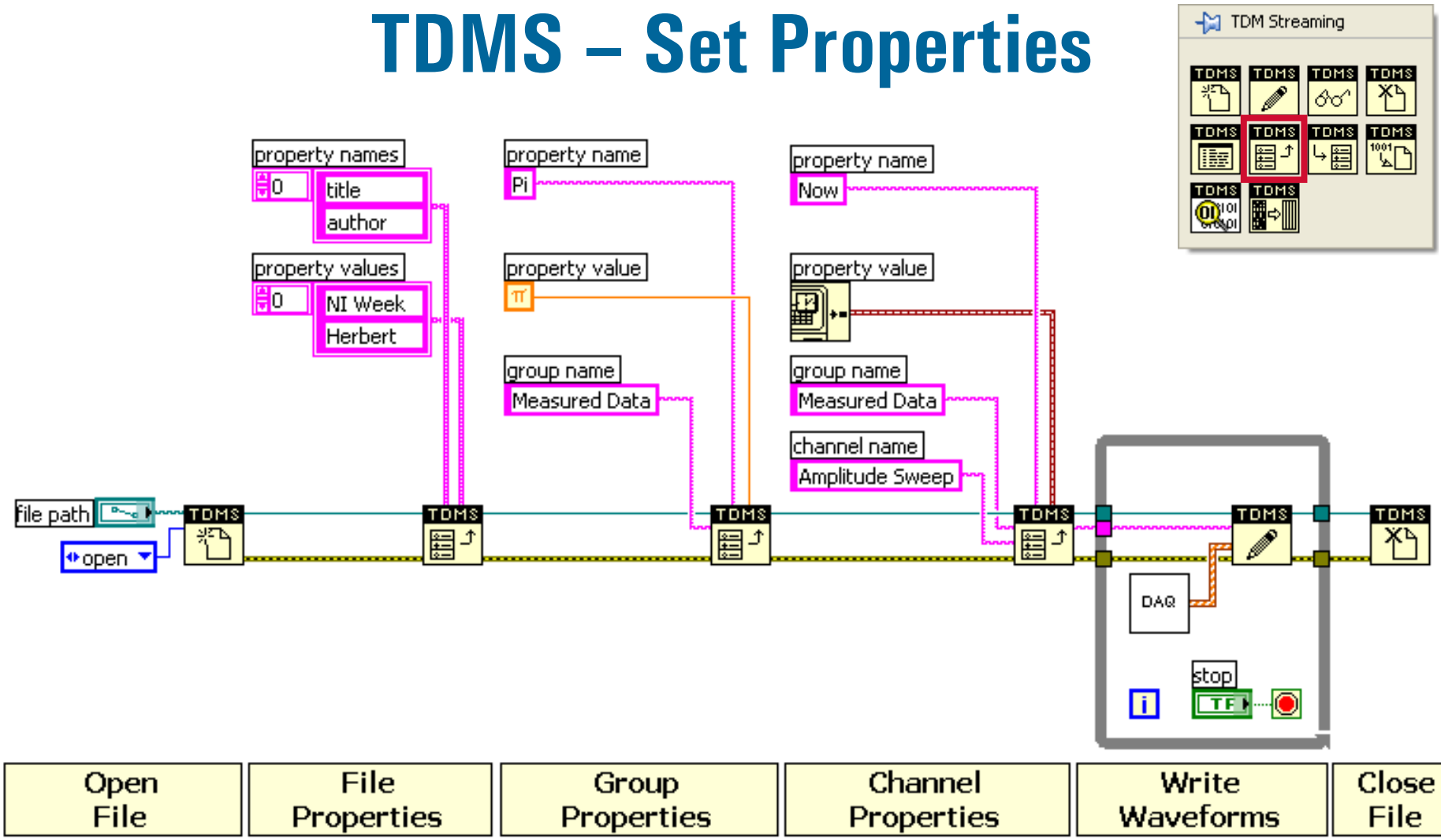


TDMS – Read Data





TDMS – Set Properties



TDMS – Recent Improvements

- Built-in buffering
  - Set NI_MinimumBufferSize for each channel
  - Good ballpark numbers: 1000, 10000
  - Speed up writing/reading single-point data
  - Reduce disc footprint
- Rename groups and channels
  - NI_UpdateGroupName / NI_UpdateChannelName
  - Move channels between groups

TDMS – Summary

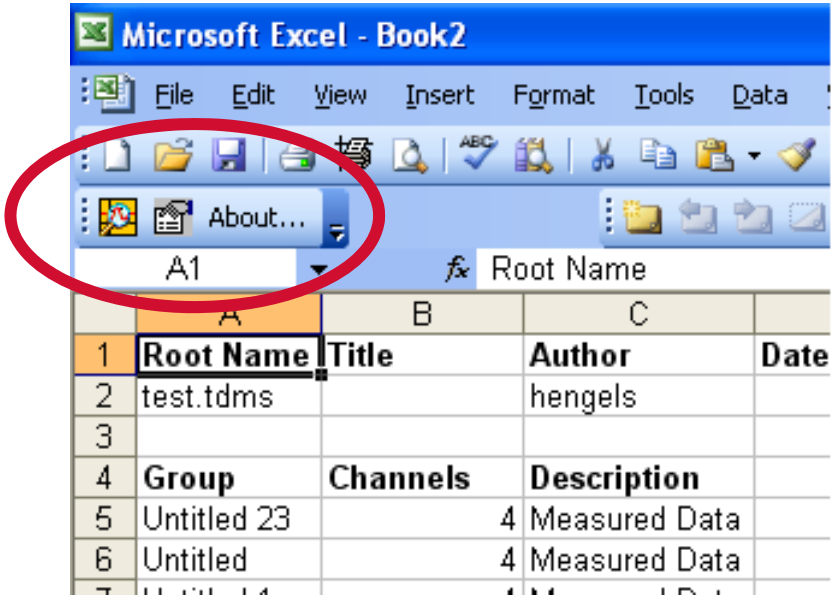
- Fastest file format in LabVIEW
- Covers widest range of use cases
- Stores test information along with test data
- Works with LabVIEW, LabVIEW RT, CVI, CVI RT, LabVIEW SignalExpress, DIAdem
- No need to document the format
- No need to create a Reader VI
- Versioning is no longer an issue

Agenda

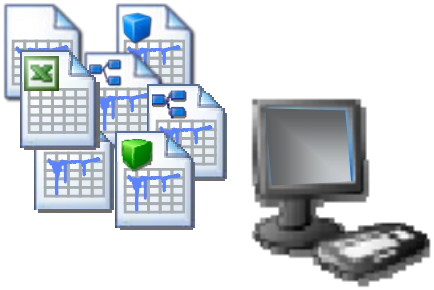
- LabVIEW File I/O Challenges
- NI Technical Data Management (TDM)
- TDM File I/O in LabVIEW
- TDM Offline Analysis

Read TDMS Files in MS Excel

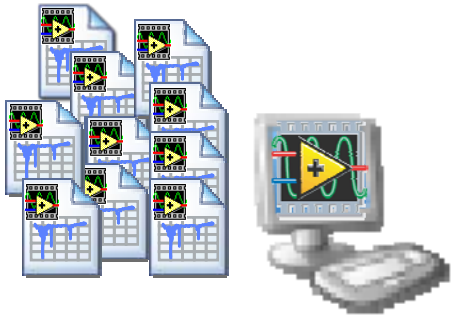
- You can import TDMS files into Excel
- Download the Excel TDMS Add-in from www.ni.com/tdm



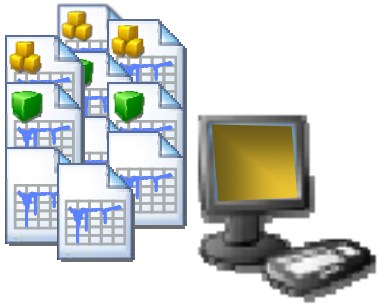
How Do End Users Find The Data?



Test Station 1



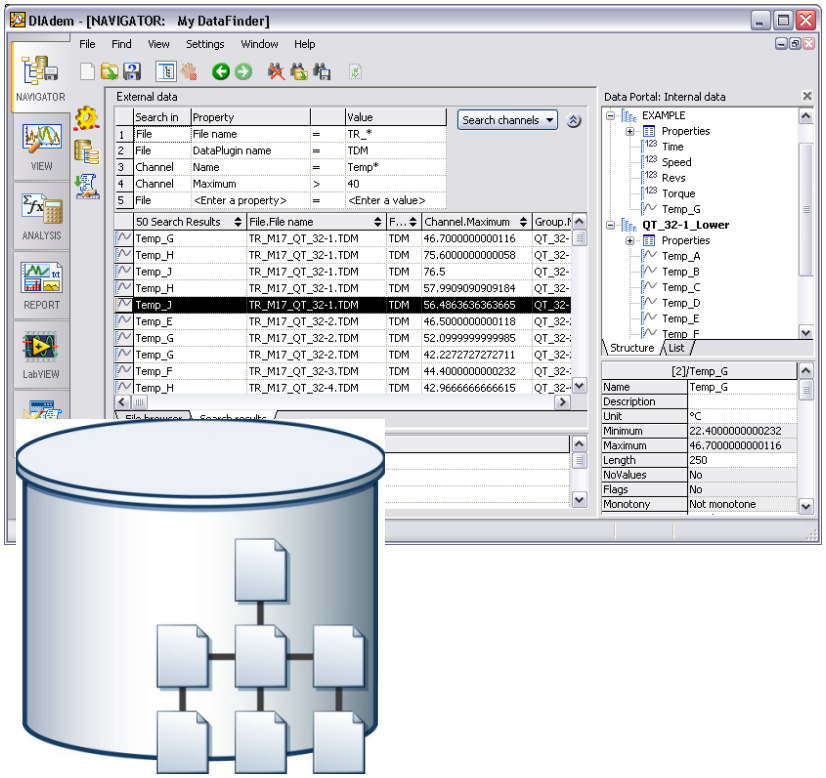
Test Station 2



Computer 1...N

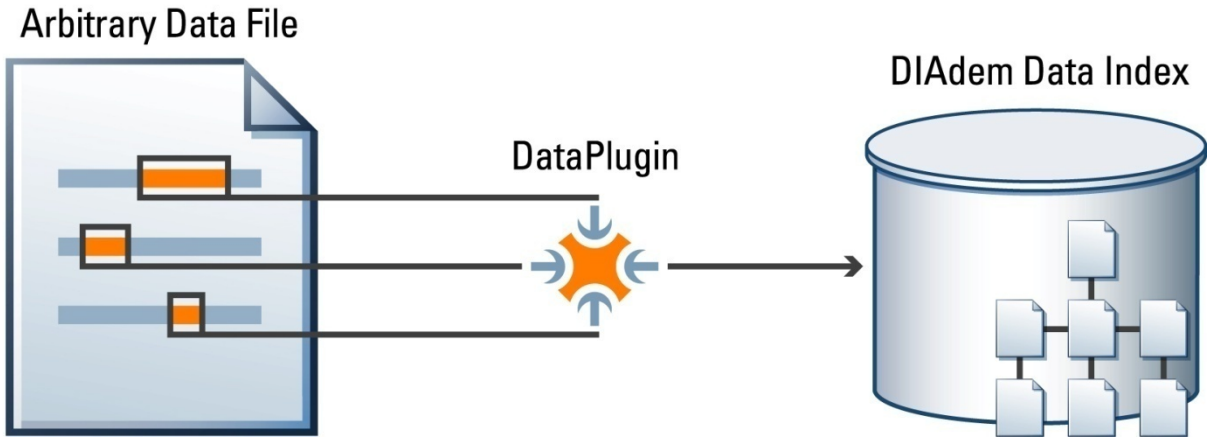
- Your data is well documented now.
- Your data is stored on multiple machines.
- How can you find what you are looking for?

Manage and Mine Your Test Data



- **DIAdem** is NI's application for off-line analysis and reporting
- **DIAdem DataFinder** indexes properties from each data file
- DataFinder **locates data based on properties** at the file, group and channel levels

DIAdem DataFinder



- Stores descriptive information from data files
- Works with **TDMS and many more file formats**
- Builds and updates automatically
- **Requires no IT support** to install, configure or maintain

AMO_SDF_V3
ADAMS
ADCAnalyzer
ADO
AMO_SDF_V3
ASCII
Astro-Med
ATF
AVL_IFILE
Berkely SPICE
Bosch_MDF
Caesar_MDF
CODAS
COMTRADE
Cosmos Strong Motion
CSMIP Strong Motion
CSV
DASYlab
Dbase
DIF
DT_DCF
EasySPC
EDAS_Win
EGV
EMGWorks
ETAS® INCA® MDF
EuropeanDataFormat
Excel
Famos
FCS_3
FITS
FSI_X1_ASCII
GRAMS SPC
GraphTec
HBM Catman
HBM Catman online
HBM MGCPlus
HIOKI_HiCORDER
HP SDF
ISESD Strong Motion
JCamp-DX
KiK_Net Strong Motion
Kyowa ASCII
Kyowa_KS
Kyowa_KU
LMS-TDF
LOTUS(wk)
Lotus123
LVM
MATLAB
Minitab_MTP
Minitab® Worksheet
MME import
MS_XMLDataPlugin
MTS RPC III
Multisim
NCODE
Nicolet® NRF
Nicolet® TEAM®
Nicolet® WFT
NMEA®
ODBC
Origin_ASCII
Origin_OPJ
OROS_AE2
Perkin Elmer LS50B
PSpice
Racelogic_VBOX
SBench5
SMC Strong Motion
Sony Mk2, Mk3
SYSTAT_TableCurve2D
SYSTAT®
TEAC TAFFmat
TEAC_DaDisp
Tektronix_AWG2000
Tektronix_ISF
Tektronix_TDS5000
Turbolab_DAFF
UFF58
Vector CANape MDF
WAV
Win600
Wintax2
XML
Yokogawa®_DAT
Yokogawa®_DEV
Yokogawa®_RTM
Yokogawa®_WVF

Demo – DIAdem DataFinder

What you will see

- Use Simple Keyword Search
- Use Advanced Search
- Create a Report

Presentation Summary

- Custom file formats in LabVIEW
  - Sometimes necessary
  - Long-term maintenance and versioning difficulties
- NI Technical Data Management (TDM)
  - Simplifies storing and retrieving data
  - Eliminates versioning hassles
  - Ensures data is well documented
  - Comes with out-of-the box data management system (DIAdem)

Where to Find additional Information

- www.ni.com/tdm
- www.ni.com/dataplugins
- www.ni.com/diadem