Three Levels of Data-Logging Software from National Instruments

One of the most common data acquisition applications is simply logging acquired data to disk or a database for future analysis. Most National Instruments data acquisition (DAQ) devices are shipped with FREE data-logging software. Depending on your data-logging application requirements, you may need additional functionality. This article introduces the three levels of data-logging software for use with National Instruments DAQ devices – NI LabVIEW SignalExpress, NI LabVIEW SignalExpress LE and NI LabVIEW.

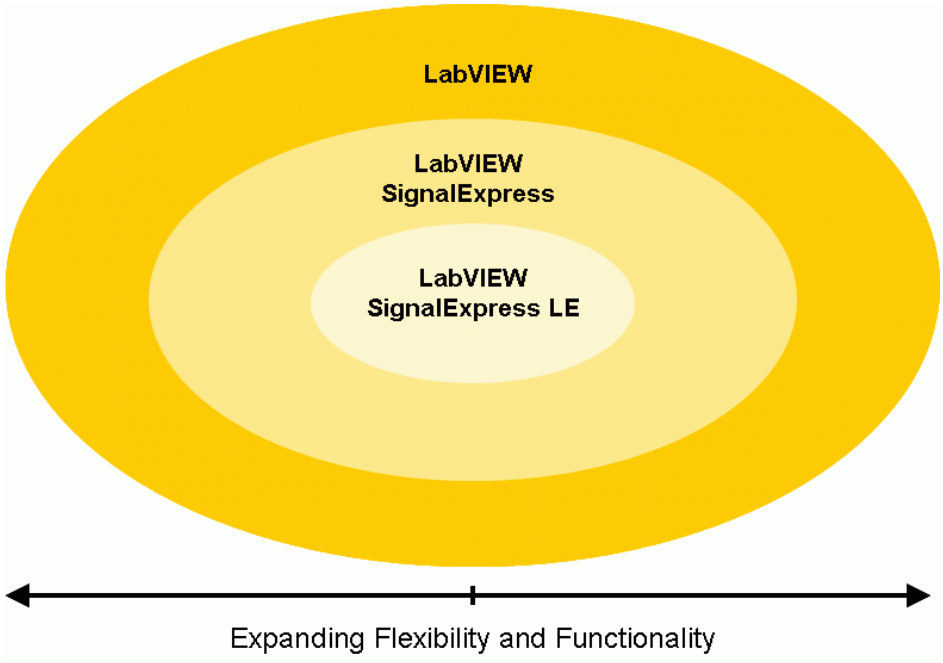

Figure 1. Choose from three levels of data-logging software.

NI LabVIEW SignalExpress

With LabVIEW SignalExpress you can quickly configure data-logging applications interactively. Built with data logging in mind, LabVIEW SignalExpress provides a broad set of features for completing common data-logging tasks, including basic data analysis, alarming, customizable graphs and displays to present your data.

Automatic Device Detection

NI LabVIEW SignalExpress automatically detects National Instruments USB DAQ devices and immediately launches a data-logging application based on the measurements being made. By combining NI DAQ devices with LabVIEW Signal Express you can make your measurements in a couple of mouse clicks.

Channel View

For quick setup and configuration, LabVIEW SignalExpress has a Channel View you can use to simultaneously configure multiple channels for logging. The Channel View allows you to configure a multi-channel data logger making various types of measurements all with a few clicks of the mouse.

Data View

The Data View of LabVIEW SignalExpress is the main window for presenting the acquired data and analysis. You have the option of customizing the Data View by adding graphs, charts, thermometers, meters, gauges, and LEDs. You can create your display in the Data View while the application is running by dragging the data from the applicable step into the Data View.

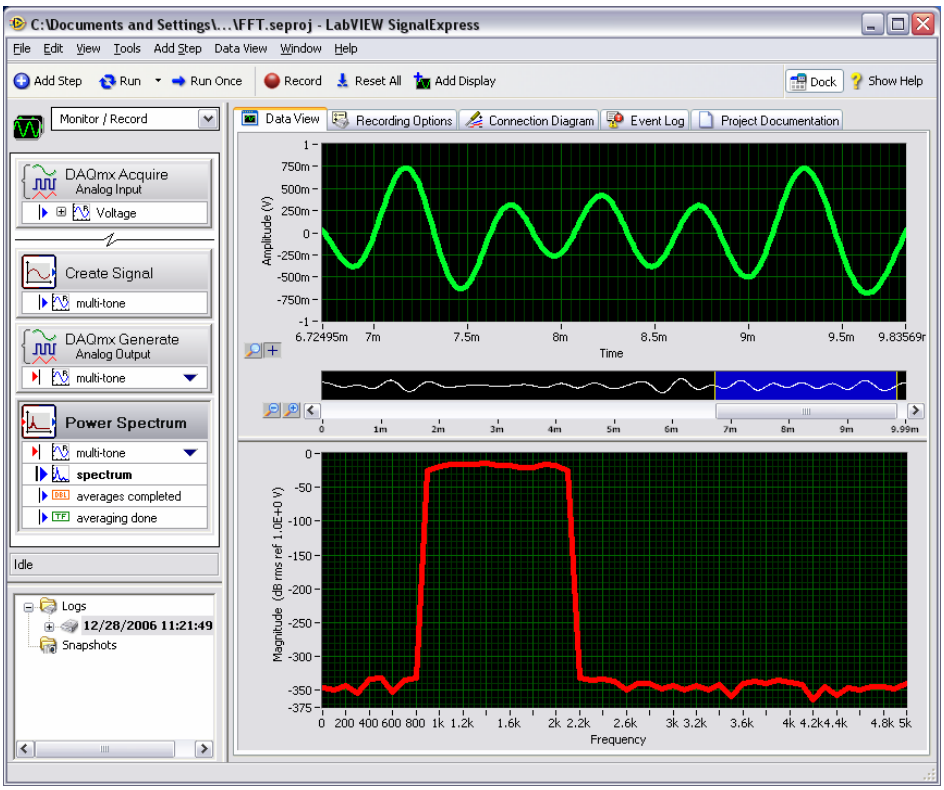

Figure 2. Quickly configure data-logging applications using LabVIEW SignalExpress.

Recording Options, Alarms and Events

You can log data to disk by clicking the record button in LabVIEW SignalExpress. By storing multiple logs you can load data later to perform off-line analysis. In addition, with the Recording Options tab you can specify alarms and dynamic events. By setting alarm conditions in your LabVIEW SignalExpress project you can be notified when thresholds have been passed, tests have been failed, or other specific events have occurred during acquisition runs. In addition, you can react to specific events by setting digital lines and analog levels. You can quickly scan through data logs using the historical data viewer to locate signals and alarms that may have occurred during the acquisition.

Signal Processing and Data Analysis

Many simple data loggers can do nothing more than acquire a basic signal. With LabVIEW SignalExpress you can perform basic data analysis to determine max, min, averages, and means; run and set masks and limits to dictate thresholds within your acquired data; apply lowpass, highpass, and other filtering techniques to your signals to get rid of unwanted aliasing and noise. You can perform analysis on your data as it is being acquired or analyze data previously logged to disk.

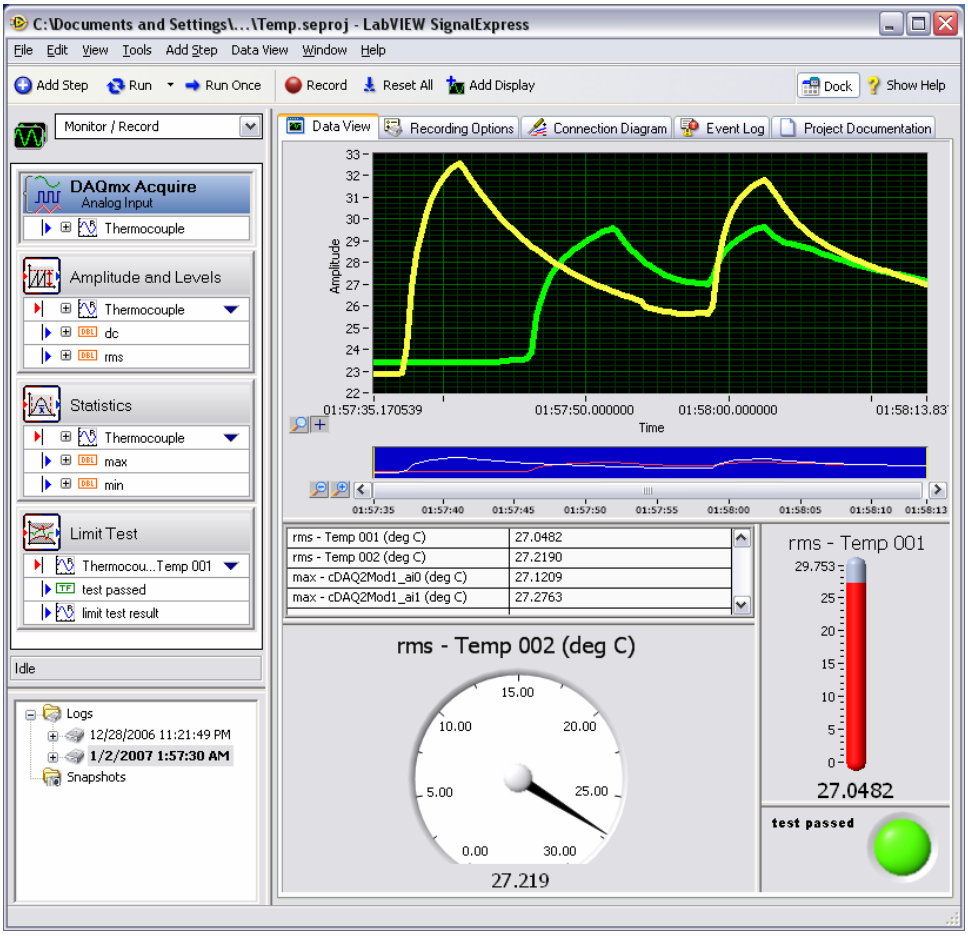

Figure 3. With LabVIEW SignalExpress, you can customize your user interface with 8 different indicators.

Data Import, Export, and Streaming

LabVIEW SignalExpress simplifies many common data logging tasks, including exporting your data. You can export to common Windows applications such as Microsoft Excel by right-clicking on your data, or dragging and dropping your data from LabVIEW SignalExpress into Excel. LabVIEW SignalExpress automatically formats the data and applies column headers and supports streaming of your acquired data in the TDMS (Technical Data Management Streaming) format. The TDMS format adds descriptive information to your bulk data to allow for complete documentation of your saved data such as operator name, data and time, and various other test parameters. TDMS files are also

optimized for data mining to help you quickly search, find, analyze, and present your test data in an off-line data mining tool such as NI DIAdem.

Project Documentation
You can create custom reports within the Project Documentation tab, similar to what you can create in a basic word processing application. By adding documentation within the LabVIEW SignalExpress environment, you automatically receive several benefits including easy maintenance as your documentation stays with your engineering data, instant updates to your reports each time a new set of data is recorded, and live updating and viewing of data from within the Project Documentation tab. The graphs and indicators placed within your documentation update live while your project is logging or replaying data in playback mode.

NI LabVIEW SignalExpress LE

LabVIEW SignalExpress LE provides a subset of functionality offered within the LabVIEW SignalExpress interactive measurement environment for FREE and is included with NI data acquisition devices that are compatible with the NI-DAQmx driver and measurement services software. Customers who already own a device compatible with NI-DAQmx can download LabVIEW SignalExpress LE for FREE.

Using LabVIEW SignalExpress LE with NI-DAQmx driver software, you can acquire, log, export, and view historical data. However, it does not provide the analysis functions, alarming, or events that may be required in your data-logging applications. Upgrading to LabVIEW SignalExpress gives you the full functionality provided in the interactive data-logging software. Table 1 shows a complete comparison between LabVIEW SignalExpress LE and LabVIEW SignalExpress.

NI LabVIEW

For creating a user-defined data-logging application, there is no better tool than LabVIEW. With LabVIEW graphical programming you can take advantage of LabVIEW SignalExpress and extend your data logging application by:

- Creating custom user interfaces
- Handling if-else and what if scenarios
- Defining custom timing, triggering, event and alarm conditions
- Applying over 600 math, signal processing and analysis functions
- Saving your data to custom file formats and databases
- Sharing your results over the web
- Distributing your applications as executables

Inherently, tools that do not require programming are limited in their functionality. By combining LabVIEW SignalExpress and LabVIEW, you have limitless options for your data-logging application. To help you transition from

LabVIEW SignalExpress to LabVIEW, you can automatically generate LabVIEW code from your existing LabVIEW SignalExpress projects. This means you can start your data-logging applications using LabVIEW SignalExpress and port your projects to LabVIEW for complete customization, flexibility, and functionality.

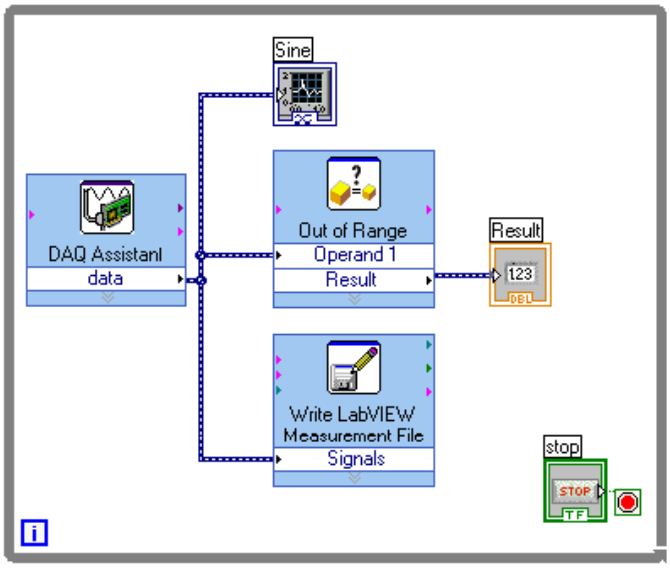

Figure 4. LabVIEW Express VIs help you easily build a customizable data-logging application and take advantage of advanced analysis and functionality.

National Instruments also provides the LabVIEW Datalogging and Supervisory Control (DSC) Module to help you interactively develop your data-logging applications for thousand channels. With the LabVIEW DSC Module, you can extend your LabVIEW application to log data to a networked historical database, track real-time and historical data trends, configure alarms and events, set up security on your applications, and easily network OPC devices and LabVIEW Real-Time targets together into one complete system.

Comparison Table

National Instruments provides three levels of data-logging software, each customized to meet your specific application needs. With easy configuration and customizable data presentation, LabVIEW SignalExpress is a premier choice for interactive data logging. For basic data acquisition and presentation, LabVIEW SignalExpress LE provides a free option. To expand upon the options provided in the non-programming environment which LabVIEW SignalExpress provides, you can continue to the LabVIEW graphical development environment to obtain complete control over functionality and customization of all aspects of your application.

For additional information on any of the three levels of National Instruments data-logging software, contact an NI technical representative. You can also try all three levels of data-logging software online for FREE.

Feature	LabVIEW SignaExpress LE	LabVIEW SignalExpress	LabVIEW
Configuration based data logging	■	■	■
Ready-to-use example projects	■	■	■
Display of signals and data	■	■	■
Basic logging of one data set	■	■	■
Ability to export/save acquired data	■	■	■
Logging of multiple data sets		■	■
Basic signal processing		■	■
Basic Time and frequency domain analysis		■	■
Alarming and events		■	■
Report generation		■	■
Graphical programming			■
Custom user interface development			■
Support for if-else and what-if scenarios			■
Data acquisition functions and API			■
Control more than 5,000 instruments			■
External code (DLL) integration			■
Digital signal logging			■
Modular code development			■
Network communication			■
Analysis & signal processing API with over 600 functions			■
Event driven programming			■
Application distribution to EXEs and DLLs			■
Software engineering tools			■

Table 1. Compare the three levels of NI data-logging software.