

Review for last Week (Jan 21)

Virtual instruments (VIs) have three main parts: the front panel, the block diagram, and the icon/connector

The front panel is the interface of a LabVIEW program and the block diagram is the executable code

Menu options allow you to access different features in LabVIEW

Floating Palettes

Tools Palette

Controls Palette (only when Panel Window is active)

Functions Palette (only when Diagram Window is active)

Right mouse click on Windows to get Controls and Functions

There are help utilities including the Context Help Window and Contents and Index...

Hands-on examples: 1. C to F conversion; 2. Creating a VI to generate, display and analyze a signal

Homework: F to C conversion VI

This Week (Jan 28)---Lesson 2 Sub VI, Reading and Saving a signal

You Will Learn:

- A. How to Create sub VIs
- B. How to save a signal
- C. How to read a file

We would emphasize what we learnt also last week:

An Express VI (only in LabVIEW Express 8.2) is a component of the block diagram that you can configure to perform common measurement tasks. It is first-level shortcut in Controls and Functions pallets with white&blue background

All LabVIEW objects have shortcut menus (Right mouse click)

You place controls (inputs) and indicators (outputs) in the panel window

Control terminals have thicker borders than indicator terminals

Wiring is the mechanism to control dataflow and produce LabVIEW programs

Broken Run arrow = nonexecutable VI

Various debugging tools and options available such as execution highlighting

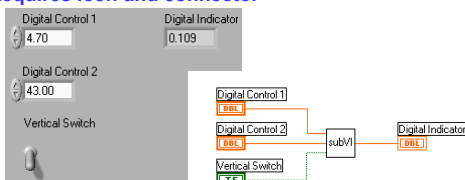
A. Creating a SubVI

You Will Learn:

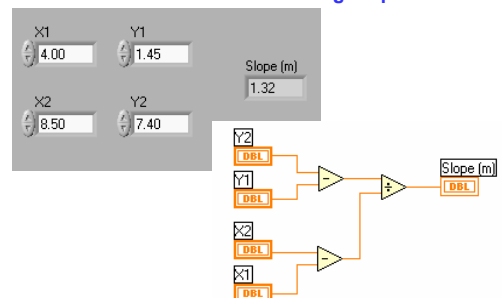
- A. What a SubVI is
- B. How to create the icon and connector
- C. How to use a VI as a subVI
- D. How to use the *Create SubVI* menu option

SubVIs

- A VI called from the block diagram of another VI is called a subVI. A subVI corresponds to a subroutine in text-based programming languages.
- Means of using a VI in the block diagram of a higher-level VI
- Requires icon and connector

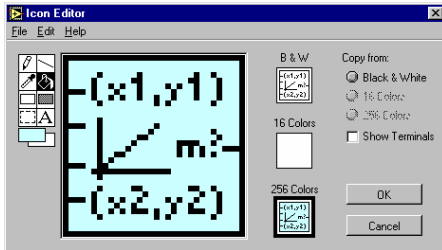


SubVI Example – Calculating Slope Let's create the following Slope.vi



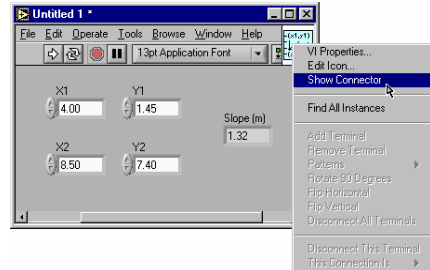
Creating the Icon

- Right-click in the icon pane (Panel or Diagram)
- Always create a black and white icon

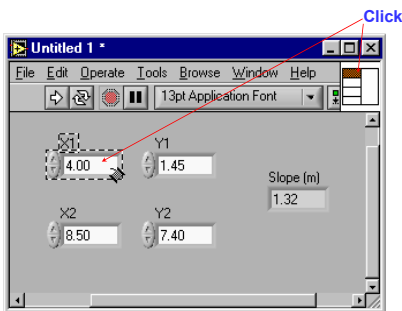


Creating the Connector

Right-click in the icon pane (Panel only)

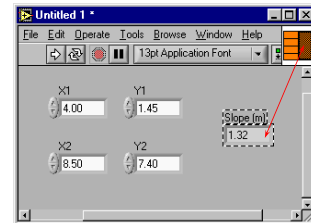


Creating the Connector - cont.



The Connector Pane

- The terminal colors match the data types to which they are connected
- Click on the terminal to see its associated front panel object



Using the VI as a SubVI

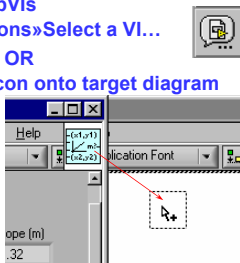
Changes made to subVI saved in memory until saved to disk

Calling subVIs

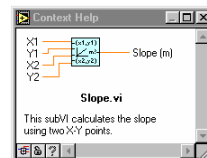
Functions » Select a VI...

OR

Drag icon onto target diagram

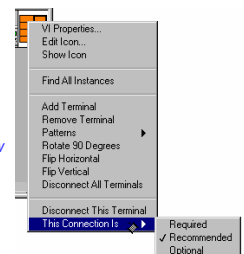


Help and Classifying Terminals



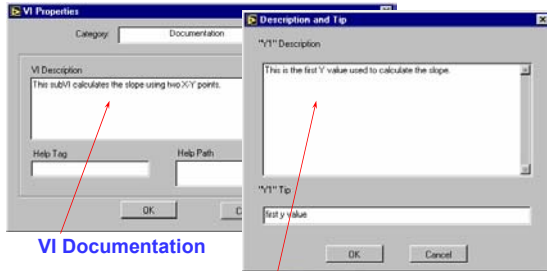
- Context Help for subVIs

- Classify inputs and outputs:
How displayed in Context Help Window
Required - Bold label
 Recommended - Normal text
 Optional - Visible or wire stubs shown

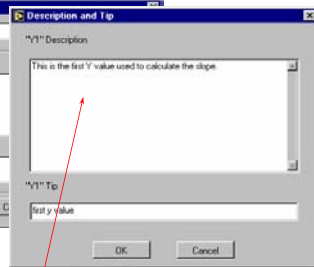


Documenting the VI

- Document VIs - VI Properties»Documentation
- Document objects - Description and Tip...



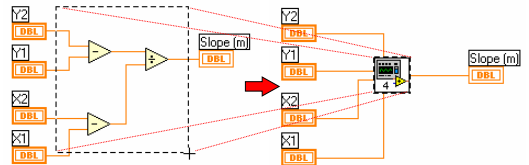
VI Documentation



Description and Tip

The Create SubVI Option

- Enclose area to be converted into a subVI
- Select Create SubVI from the Edit Menu



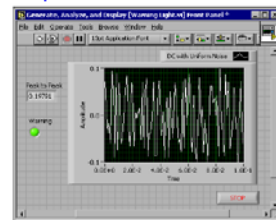
Summary for SubVI

- VIs can be used as subVIs after you make the icon and connector
- Icon created using Icon Editor
- Connector defined by choosing number of terminals
- Load subVIs using the Select a VI... option in the Functions palette or dragging the icon onto a new diagram
- Online help for subVIs using the Show Context Help option
- Descriptions document functionality
- Use Create SubVI feature to easily modularize the block diagram

B. Saving a signal

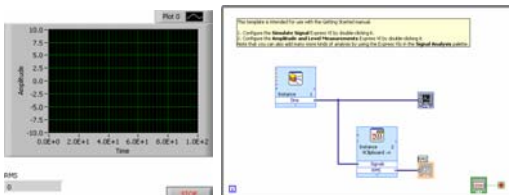
How to use LabVIEW to perform a basic analysis of a signal and how to save the analyzed data to a file.

In the following exercises, you will build a VI that generates a signal, extracts the DC value of the signal, indicates if the signal exceeds a certain limit, and records the data. When you complete the exercises, the front panel of the VI will look similar to the front panel



Creating the VI

1. In the LabVIEW dialog box, click the **New** button to display the **New** dialog box.
2. Select the **VI from Template»Tutorial (Getting Started)»Generate, Analyze, and Display** template in the **Create new** list.
3. Click the **OK** button to open the template. You also can double-click the name of the template VI in the **Create new** list to open the template.
4. Display the block diagram by pressing the <Ctrl-E> keys. And arrange the front panel and the block diagram in parallel.



Modifying the VI

1. Right-click the Simulate Signal Express VI and select **Properties** from the shortcut menu to display the **Configure Simulate Signal** dialog box.
2. Select **DC** from the **Signal type** pull-down menu.
3. Place a checkmark in the **Add noise** checkbox to add noise to the signal.
4. Type 0.3 in the **Noise amplitude** text box.
5. Click the **OK** button to save the current configuration and close.
6. Run the VI. The signal appears in the graph and the RMS in the indicator.
7. Click the **STOP** button.
8. Select **File»Save As** and save this VI as **Analysis.vi**.

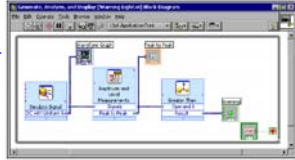


Adding a Warning Light and

Select **File»Save As** and save this VI as Warning Light.vi

Setting the Warning Level Limit --On the block diagram, select the Comparison Express VI on the **Arithmetic & Comparison»Express Comparison** palette and place it to the right of the Amplitude and Level Measurements Express VI.

- wiring it to the signal and RMS indicator
- In the **Configure Comparison** dialog box, select the **> Greater than** option from the **Compare Condition** section.
- In the **Comparison Inputs** section, select **Use constant value** and type 0.7 in the **Constant value** text box.
- Run
- to stop the VI.
- Select **File»Save** to save this VI.

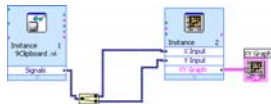
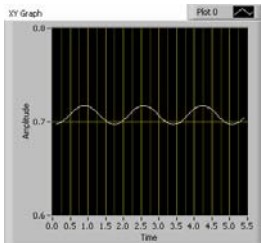


Save Data to a File - cont.

Configuring the VI to Save Data to a File

1. Select the Write LabVIEW Measurement File Express VI on the **Output** palette and place it on the block diagram below and to the right of the Amplitude and Level Measurements Express VI.
2. In the **Configure Write LabVIEW Measurement File** dialog box, select the **Append to file** option in the **If a file already exists** section. By selecting **Append to file**, LabVIEW writes all the data to the test.lvm file (get a path) without erasing the existing data in the file if a file by that name exists already. No headers.
3. Select the **One header only** option in the **Segment Headers** section.
4. Enter the following text in the **File Description** text box: Sample of peak to peak values.
5. Close the **Configure Write LabVIEW Measurement File** dialog box and return to the block diagram.
6. wiring
7. Run
8. open with Microsoft Excel

C. Reading a data file



Summary for Today

- Sub VIs
- VIs can be used as subVIs after you make the icon and connector
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- Descriptions document functionality
- Use Create SubVI feature to easily modularize the block diagram
- Saving signals to a file
- LabVIEW is able to save signals to a file
- Reading data files
- LabVIEW is able to read data files

Homework for Today
Make sub VIs for C to F and F to C