LabView Environment

MEMS 1049 Mechatronics

四川大学 匹兹堡学院

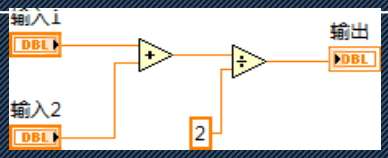
Outline

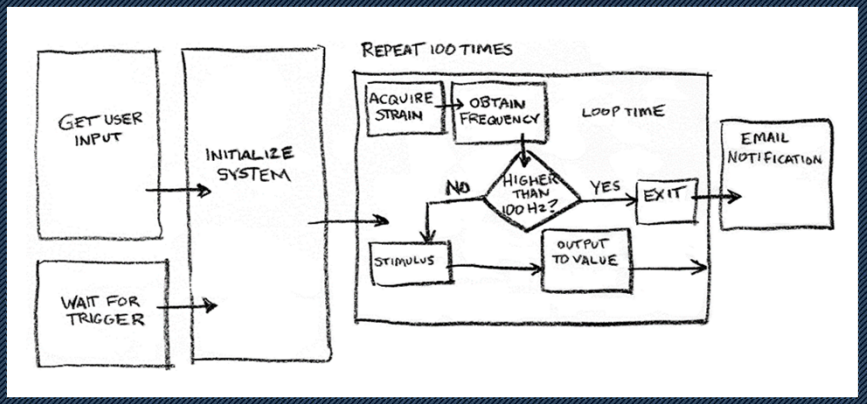
- What is LabVIEW?
- Project explorer
- VI
- Front Panel
- Block Diagram

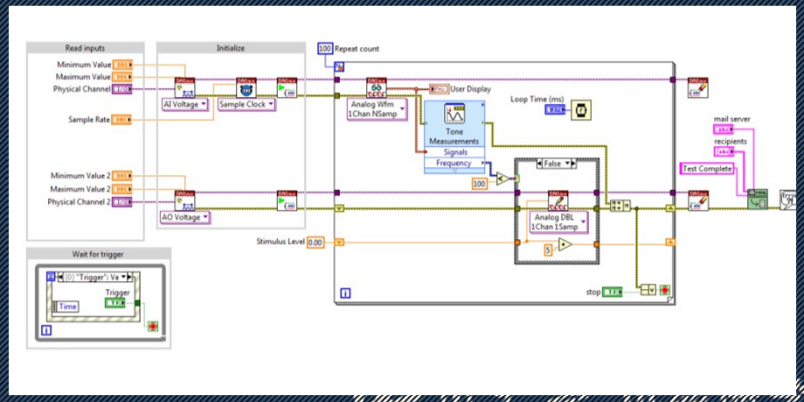
What is LabVIEW?

Laboratory Virtual Instrument Engineering Workbench

Graphic programming software

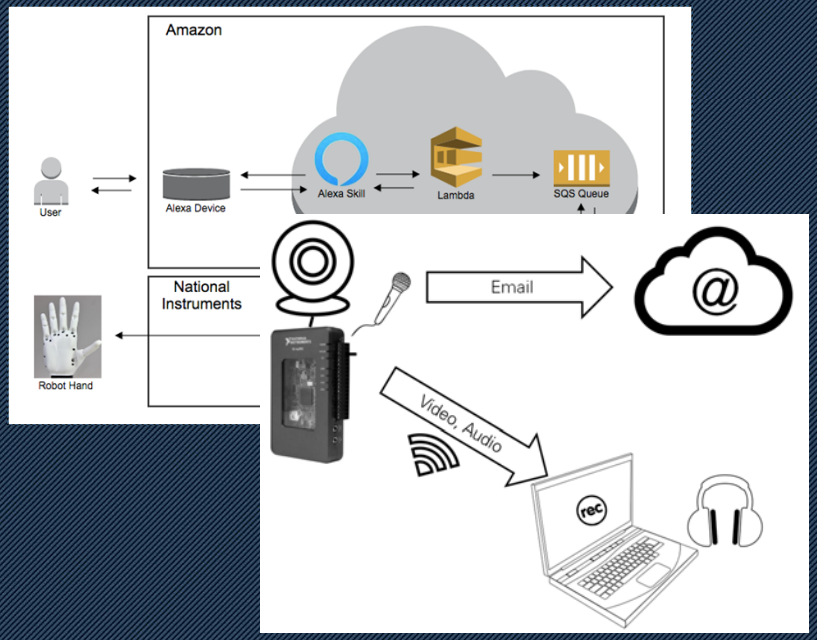
Code
function average (in1, in2, out) **{** **out = (in1 + in2)/2.0;** **}**
VI block diagram






What can be done with LabVIEW?

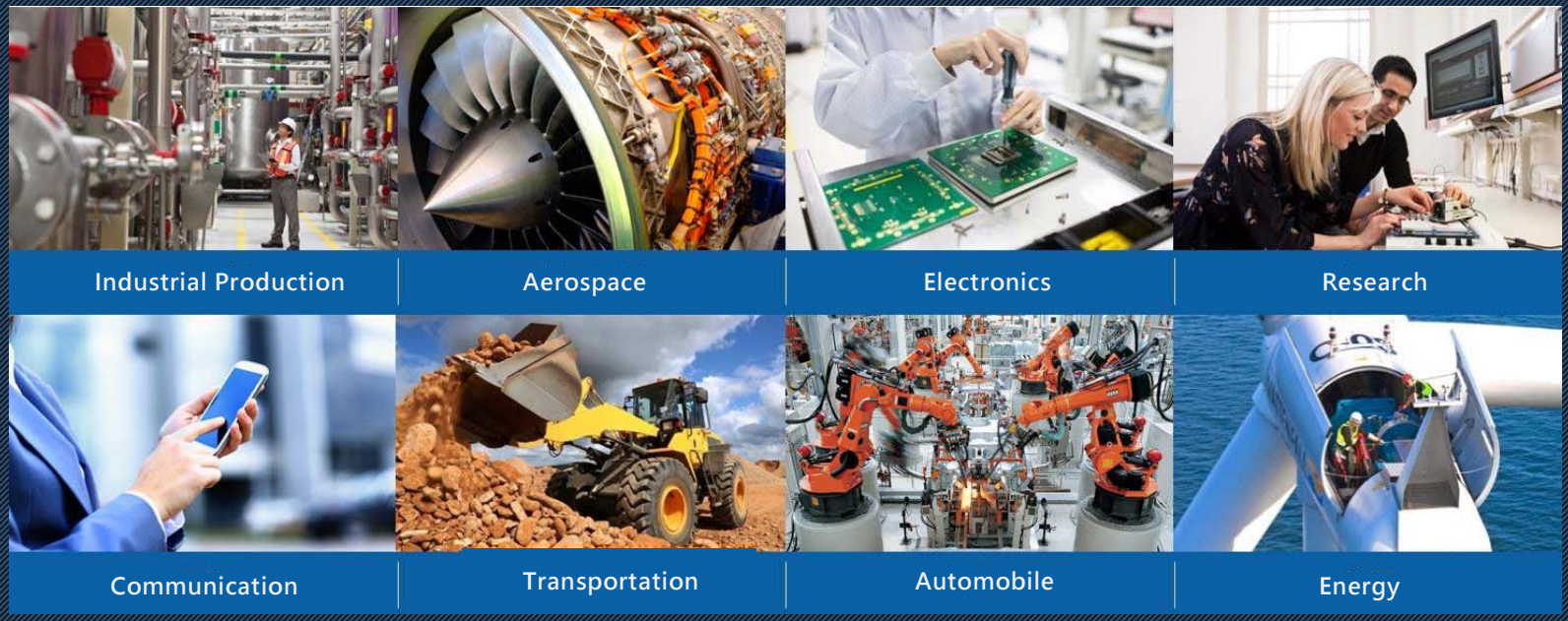
- Interdisciplinary solution



https://forums.ni.com/t5/myRIO-Student-Projects/tkb-p/3025?profile.language=zh-CN

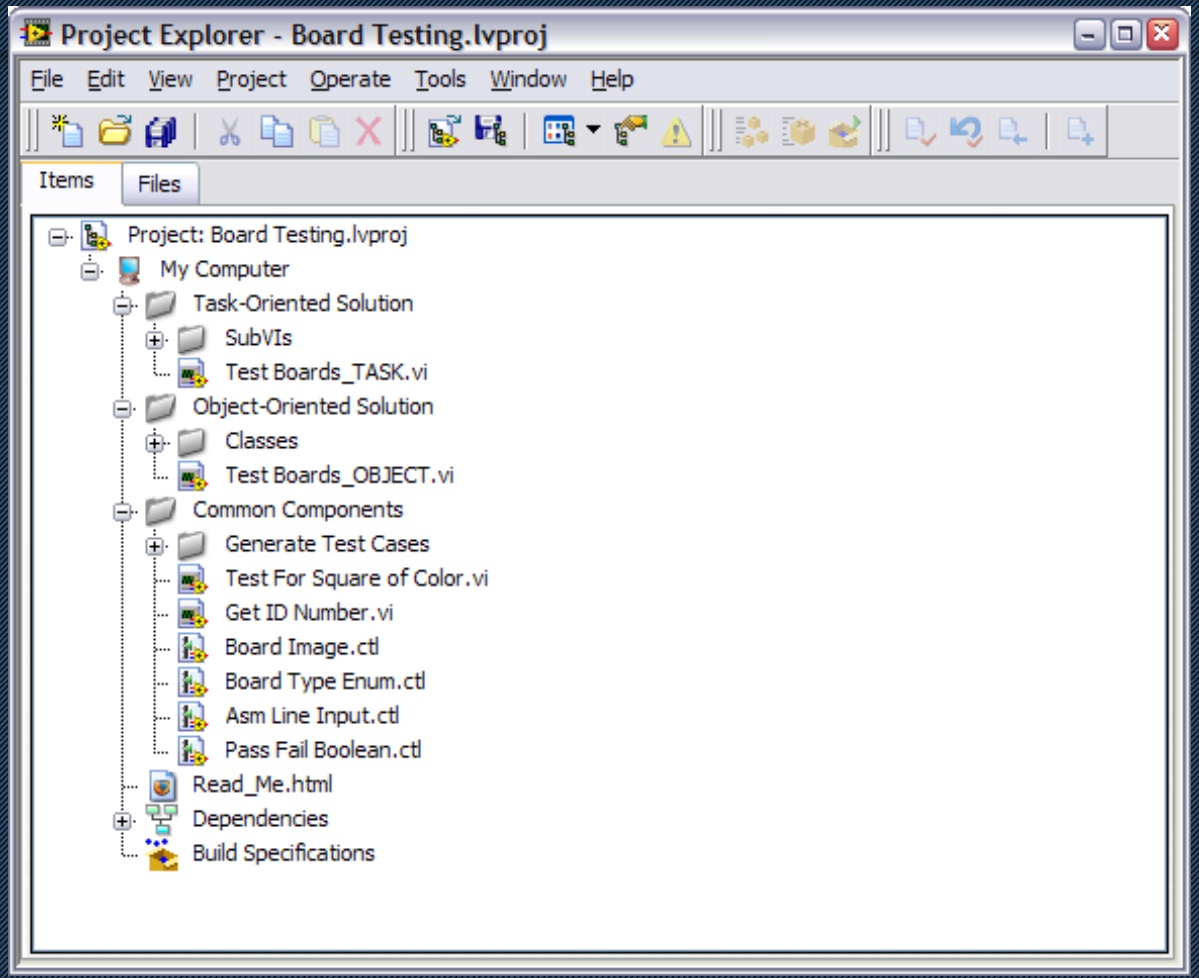
Industrial Applications

- Graphic programming software
- Interdisciplinary solutions on a unified platform



LabVIEW Files & Project Explorer

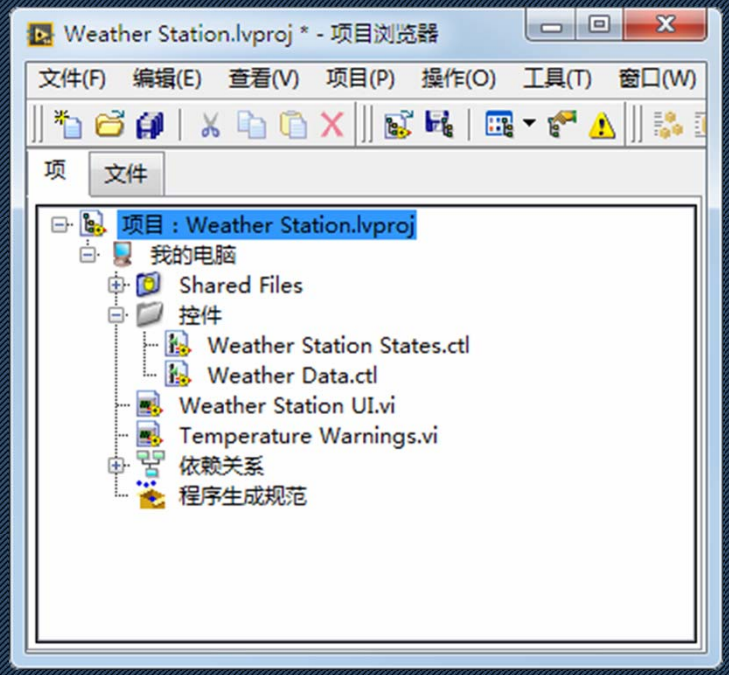
- LabVIEW Project：.lvproj
- Virtual Instrument (VI)：.vi
- LabVIEW controls：.ctl



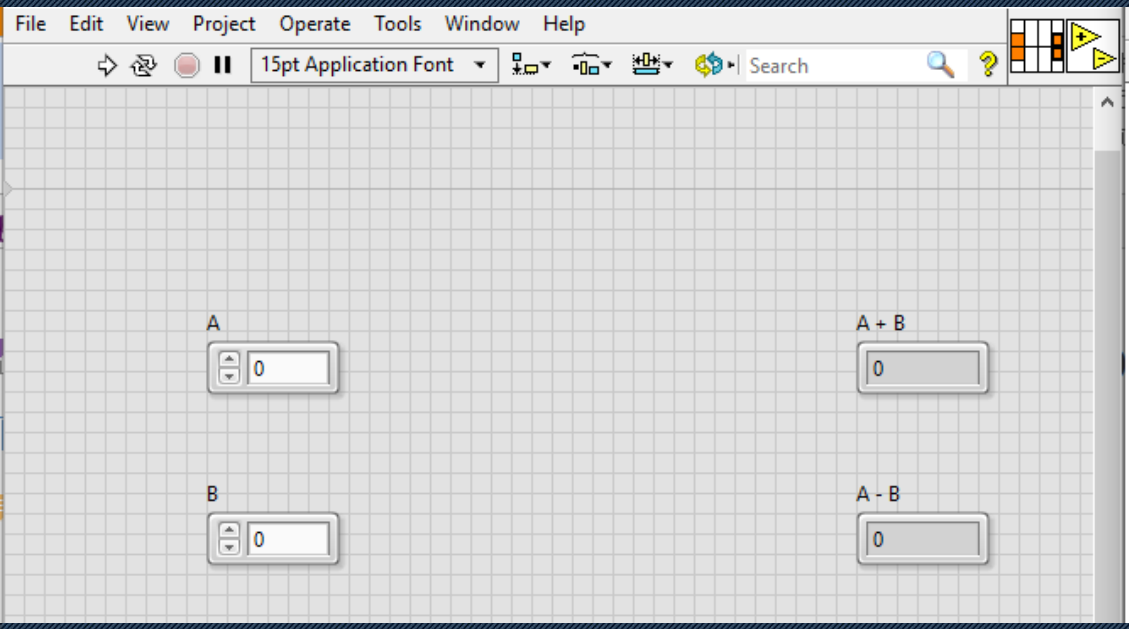
Adding Folders to Project

Virtual Folder

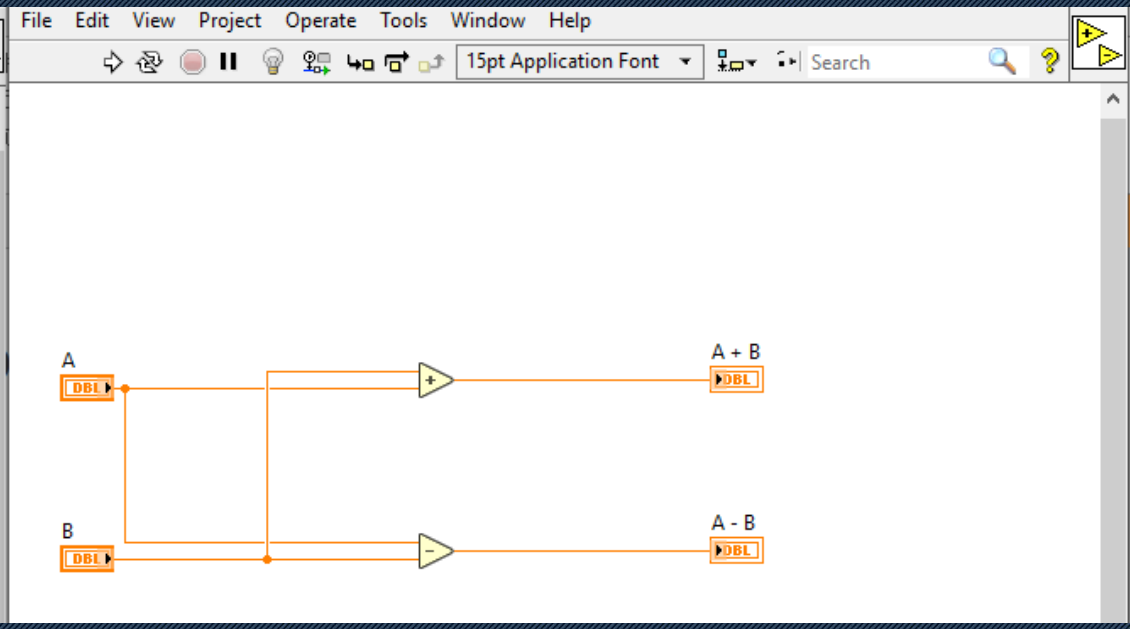
Auto Populating Folder



VI Components



Front Panel

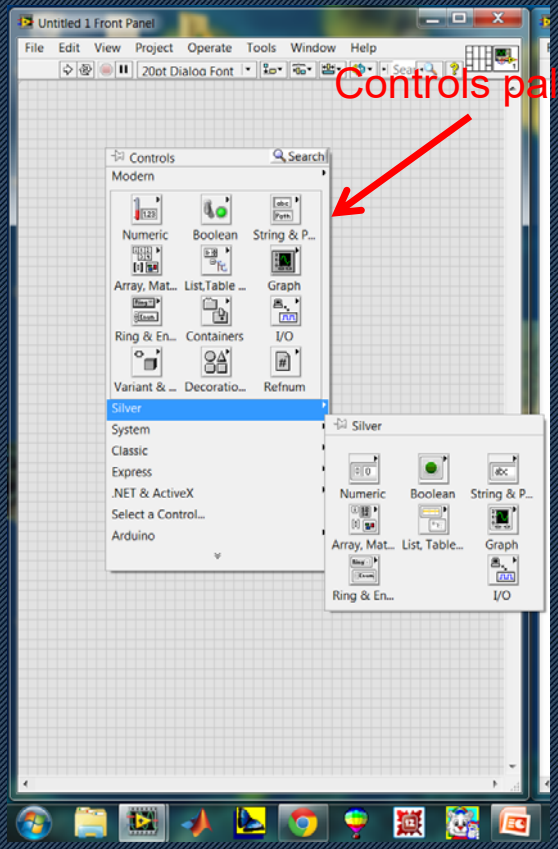


Block Diagram

VI Components

- The block diagram window is used to write the program while the front panel window is used to place inputs and outputs. The inputs are called controls and outputs are called indicators.
- Indicators or controls placed on the front panel also appear on the block diagram.
- If you right click on the *block diagram* window, you will get the *functions pallet*.
- If you right click on the *front panel* window, you will get the *controls pallet*.

Front Panel


Untitled 1 Front Panel
File Edit View Project Operate Tools Window Help
Controls pallet
Controls
Search
Modern
Numeric
Boolean
String & P...
Array, Mat...
List,Table ...
Graph
Ring & En...
Containers
I/O
Variant & ...
Decoratio...
Refnum
Silver
System
Classic
Express
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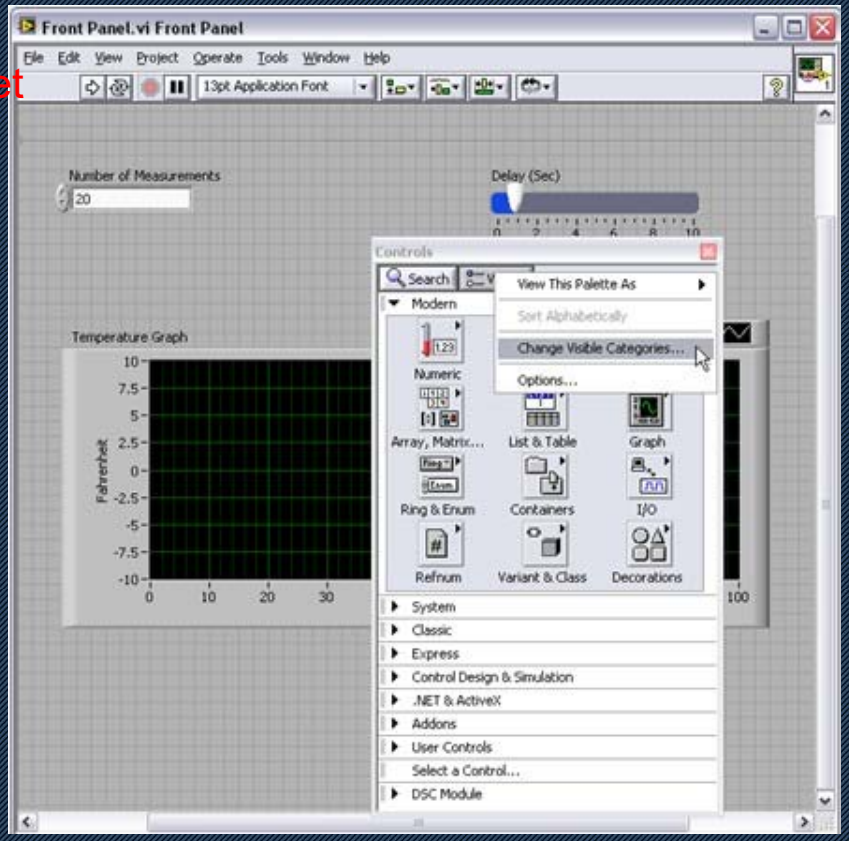
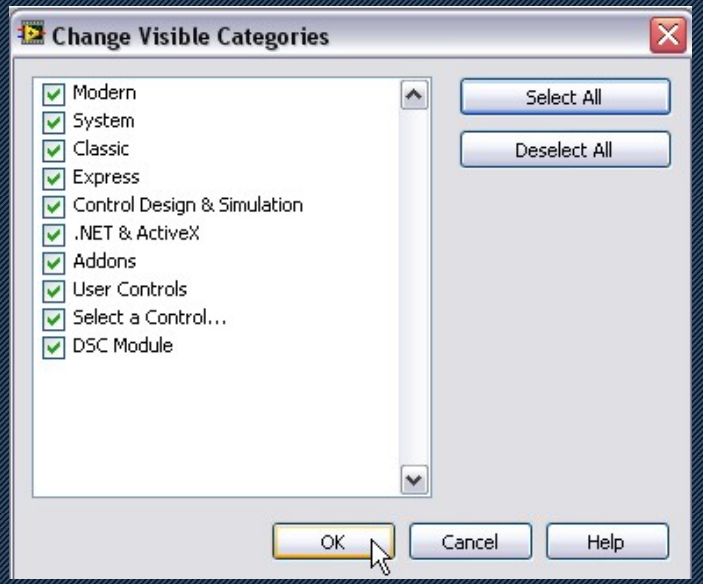
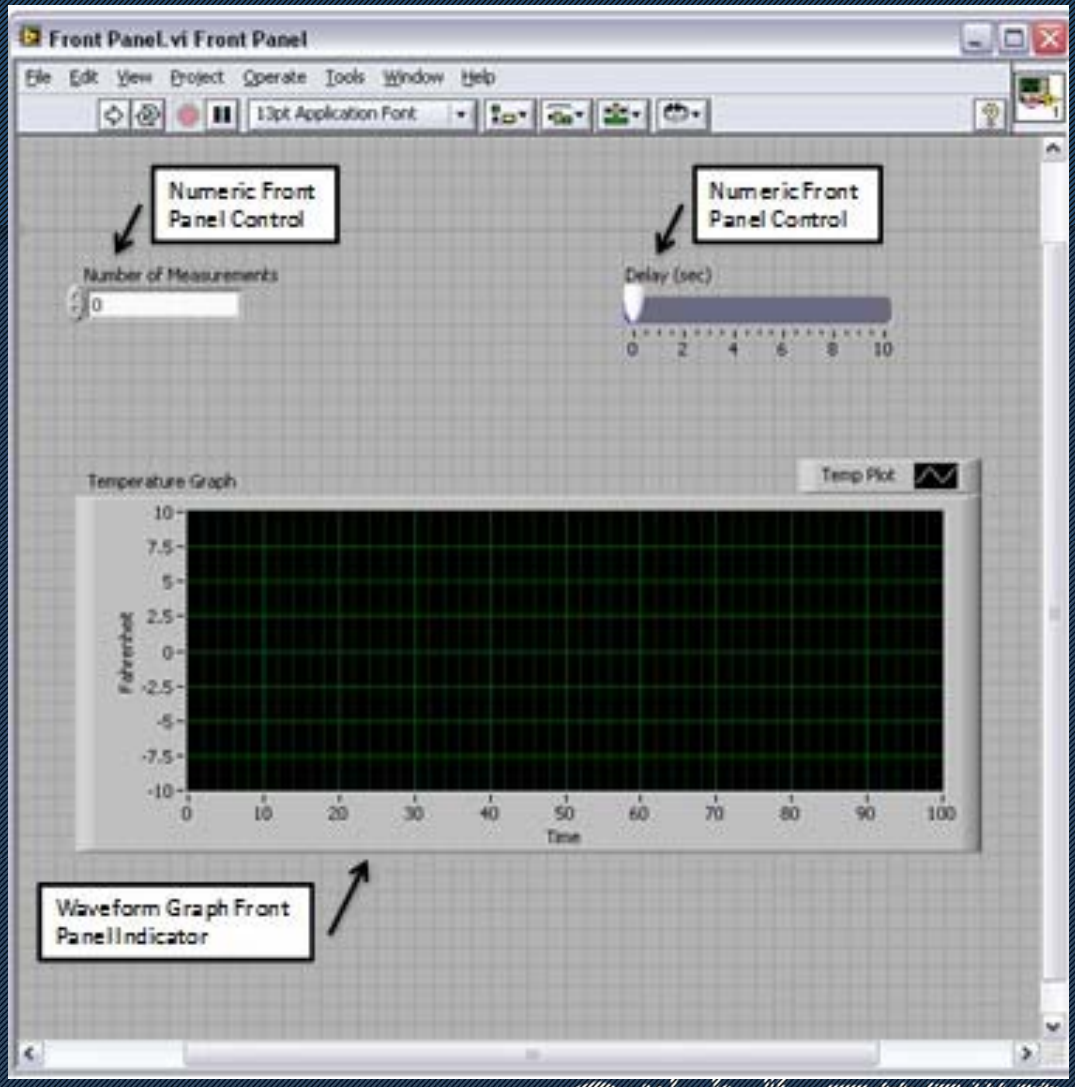
Select a Control...
Arduino
Silver
Numeric
Boolean
String & P...
Array, Mat...
List, Table...
Graph
Ring & En...
I/O


Front Panel.vi Front Panel
File Edit View Project Operate Tools Window Help
13pt Application Font
Number of Measurements
20
Delay (Sec)
Temperature Graph
Fahrenheit
Controls
Search
Modern
View This Palette As
Sort Alphabetically
Change Visible Categories...
Options...
Numeric
Array, Matrix...
List & Table
Graph
Ring & Enum
Containers
I/O
Refnum
Variant & Class
Decorations
System
Classic
Express
Control Design & Simulation
.NET & ActiveX
Addons
User Controls
Select a Control...
DSC Module

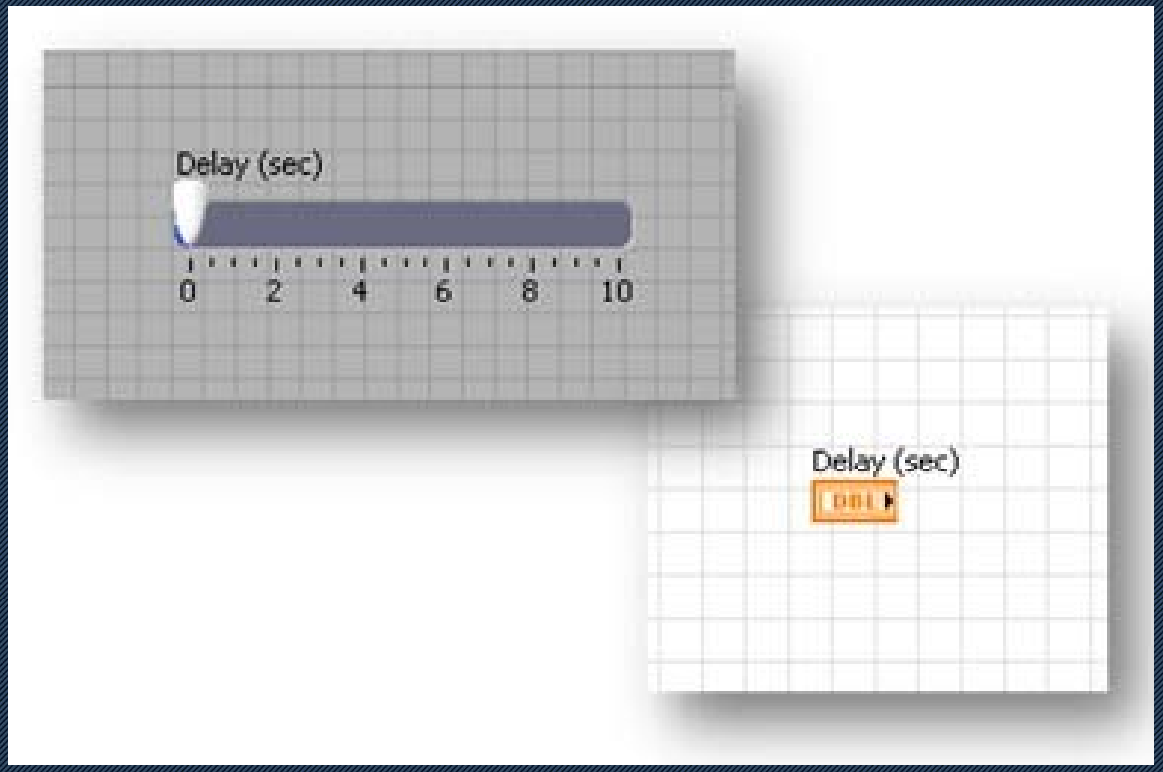

Change Visible Categories
Modern
System
Classic
Express
Control Design & Simulation
.NET & ActiveX
Addons
User Controls
Select a Control...
DSC Module
Select All
Deselect All
OK
Cancel
Help

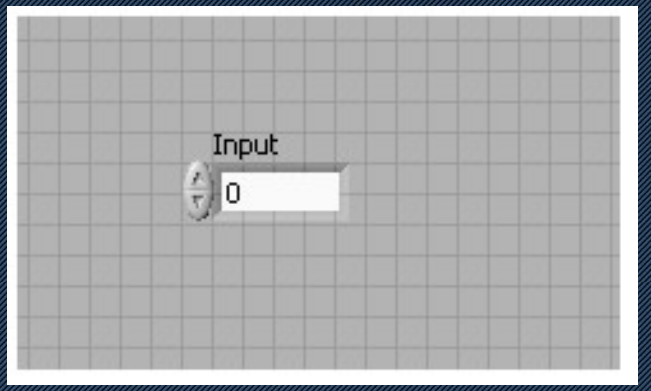
Controls and Indicator

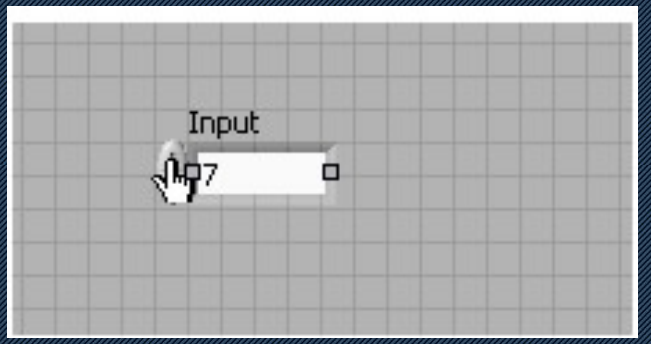
- Controls: Input
- Indicator: Output



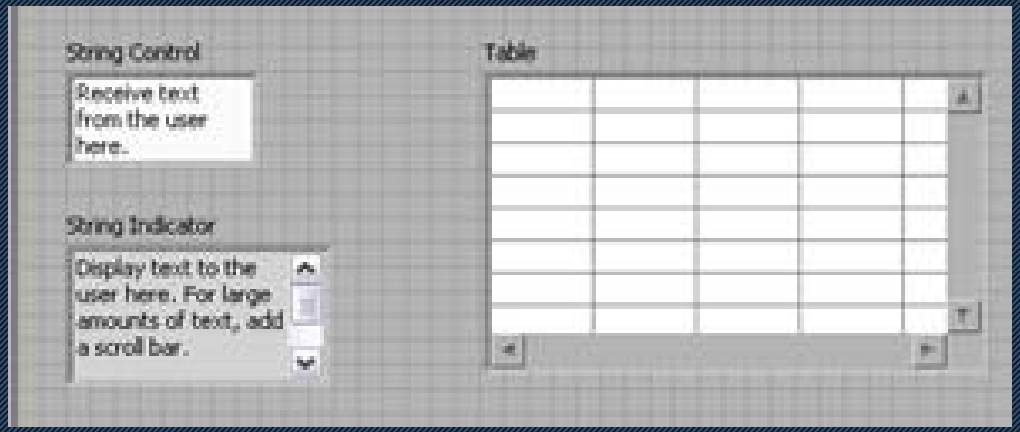
Controls and Indicator



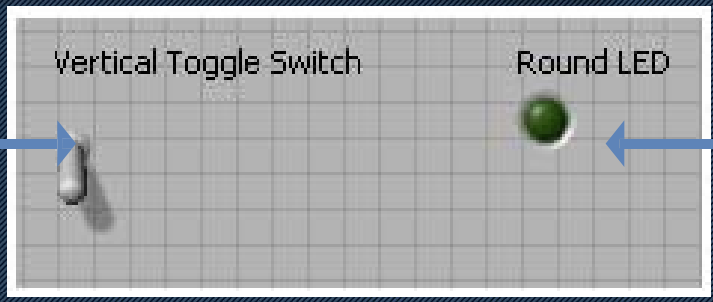




String, Boolean, and Numeric



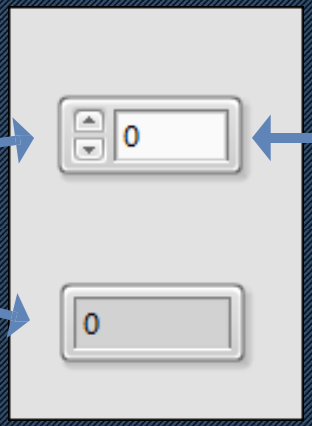
Boolean Control



Boolean Indicator

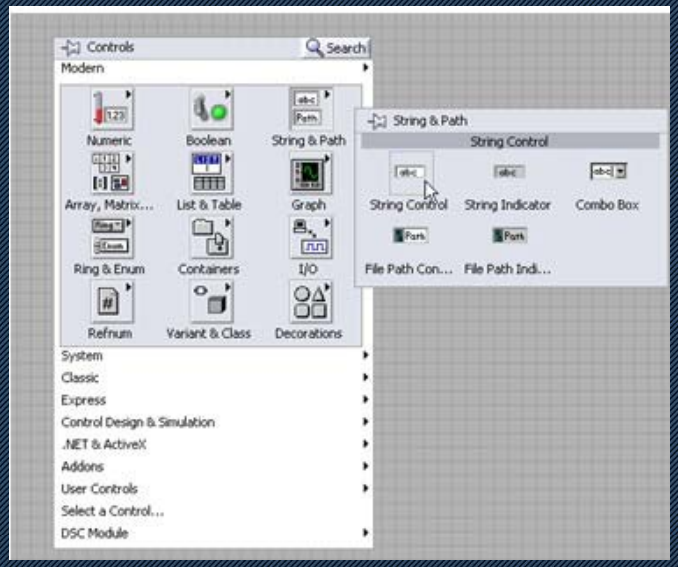
Increment/decrement buttons

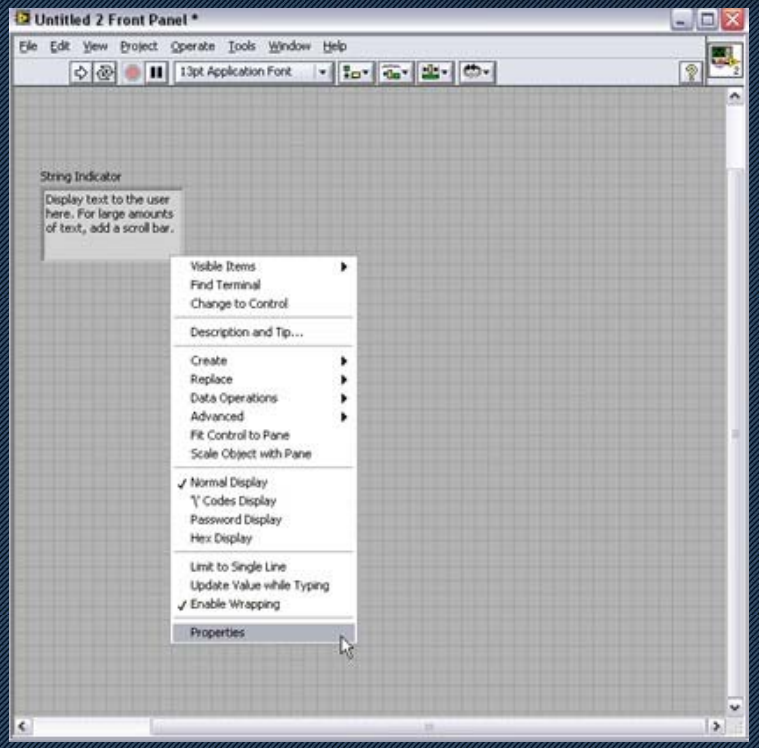
Numeric Indicator

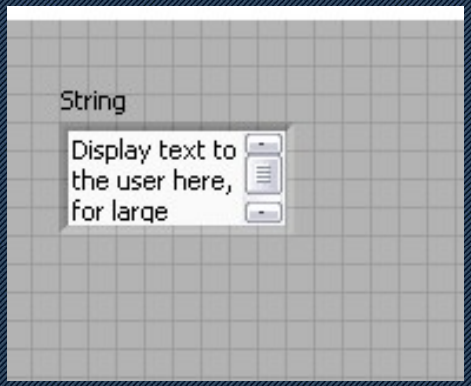


Numeric Control

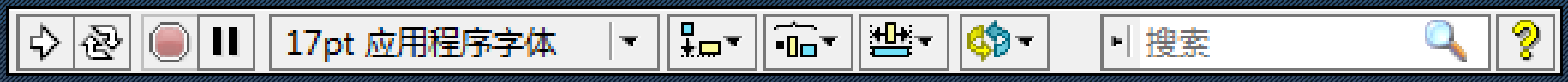
String Control

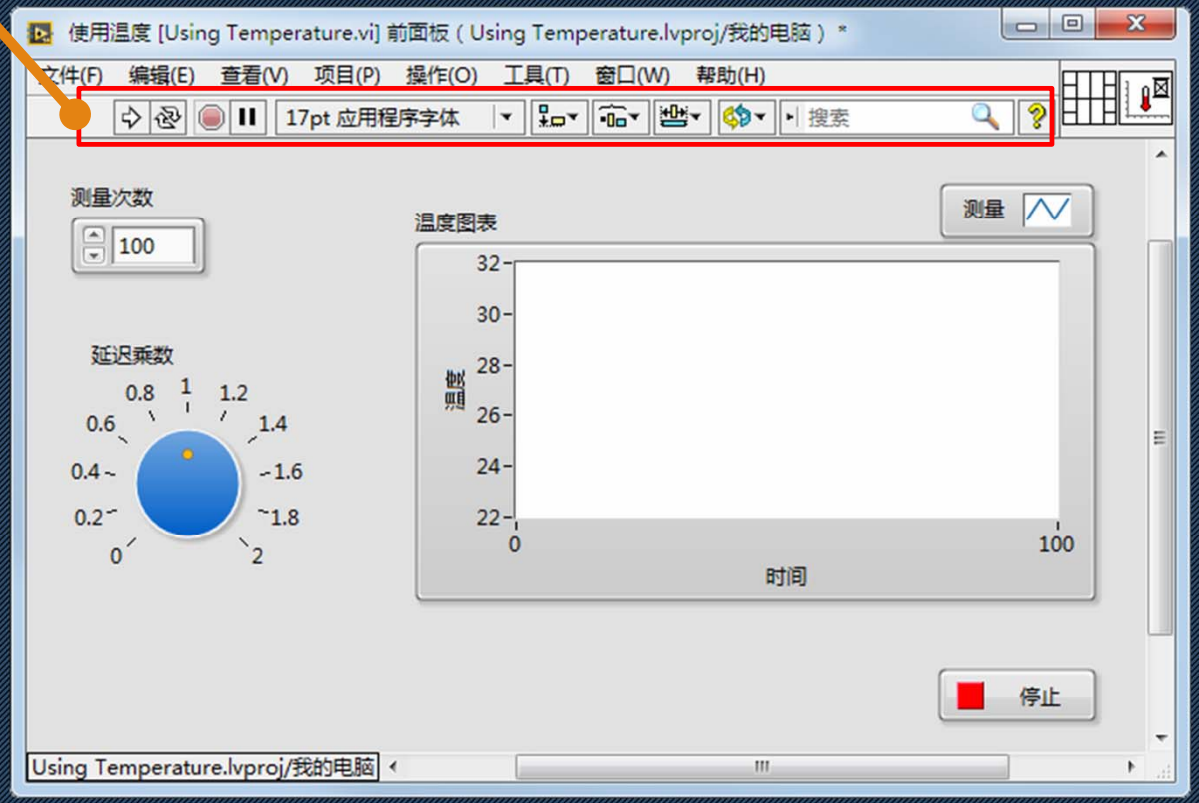






Front Panel Tool Bar





Front Panel Window Toolbar

Click the Run button to run your VI. You do not need to compile your code; LabVIEW compiles it automatically. You can run a VI if the Run button appears as a solid white arrow, shown at left.

The Run button appears broken when the VI you are creating or editing contains errors. If the Run button still appears broken after you finish wiring the block diagram, the VI is broken and cannot run. Click this button to display the Error List window, which lists all errors and warnings.

Click Run Continuously to run the VI until you abort or pause execution. You also can click the button again to disable continuous running.

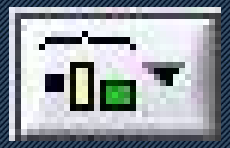
While the VI runs, the Abort Execution button appears. Click this button to stop the VI immediately if there is no other way to stop the VI. If more than one running top-level VI uses the VI, the button is dimmed.

Front Panel Window Toolbar

Click Pause to pause a running VI. When you click the Pause button, LabVIEW highlights on the block diagram the location where you paused execution, and the Pause button appears red. Click the Pause button again to continue running the VI.

Select the Text Settings pull-down menu to change the font settings for the selected portions of your VI, including size, style, and color.

Click the Align Objects pull-down menu to align objects along axes, including vertical, edge, and left.



Click the Distribute Objects pull-down menu to resize multiple front panel objects to the same size.

Front Panel Window Toolbar

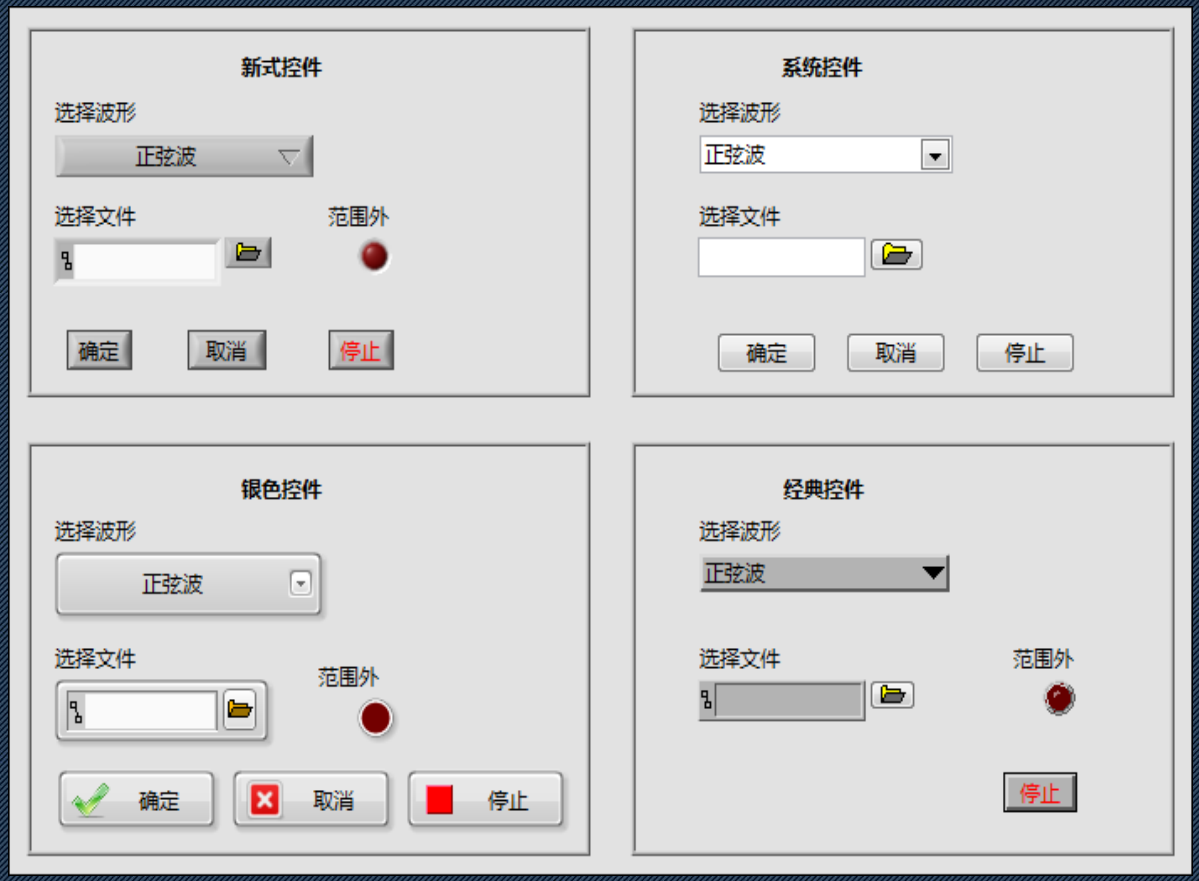
Click the Resize Objects pull-down menu to resize multiple front panel objects to the same size.

Click the Reorder pull-down menu when your objects overlap each other and you want to define which one is in front or back of another. Select one of the objects with the Positioning tool and then select from Move Forward, Move Backward, Move To Front, and Move To Back.

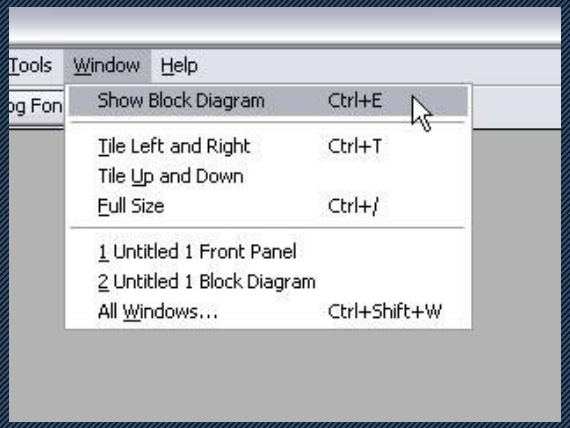
Click the Show Context Help Window button to toggle the display of the context help window.

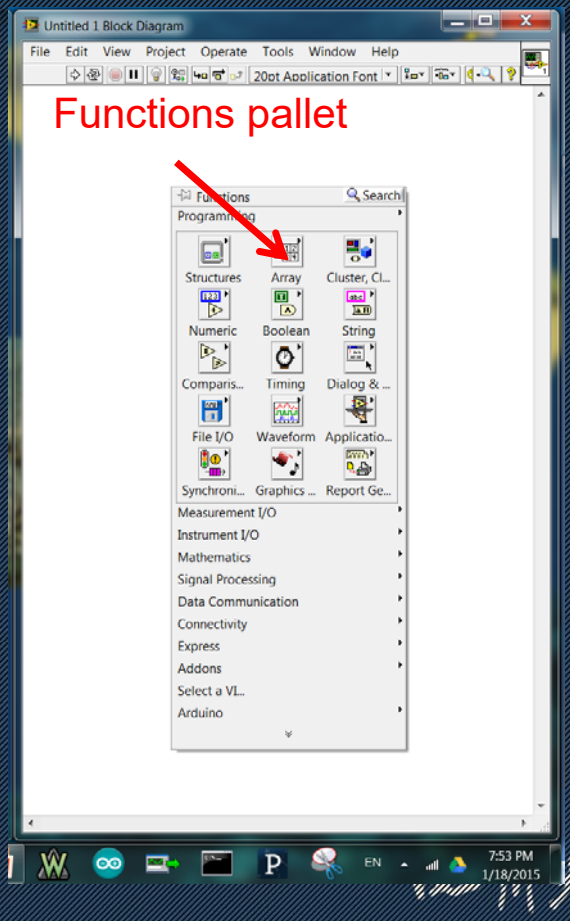
Enter Text appears to remind you that a new value is available to replace an old value. The Enter Text button disappears when you click it, press the <Enter> key, or click the front panel or block diagram workspace.

Front Panel Controls Style

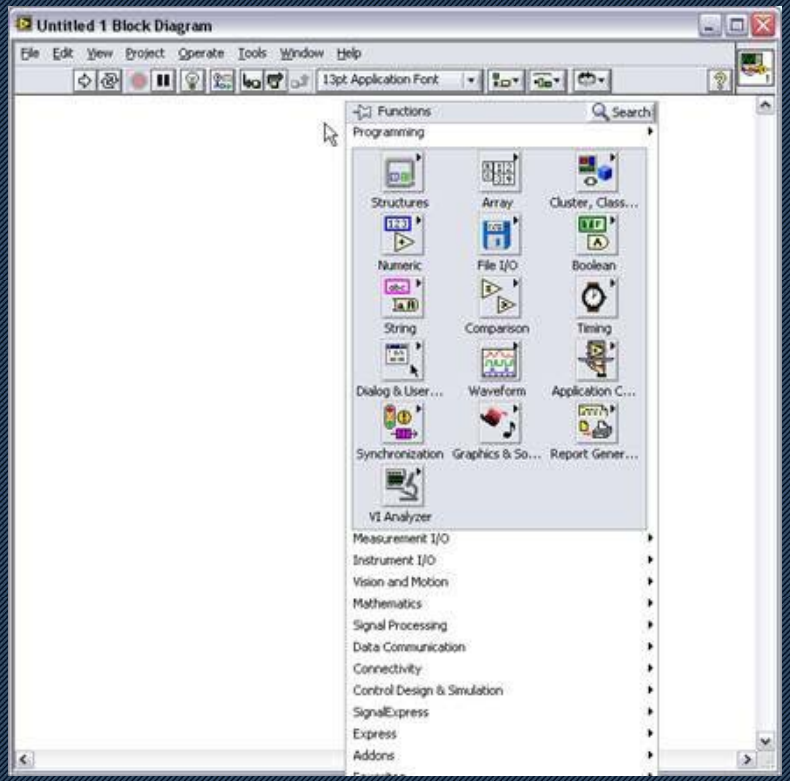


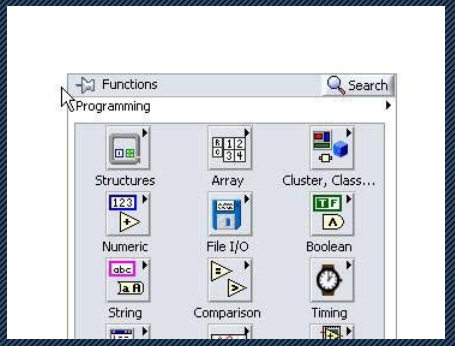
Block Diagram

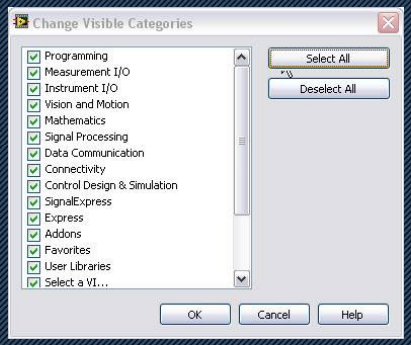




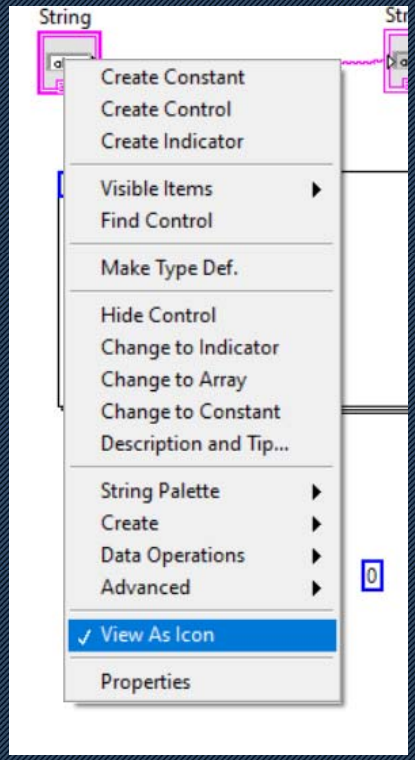
Block Diagram

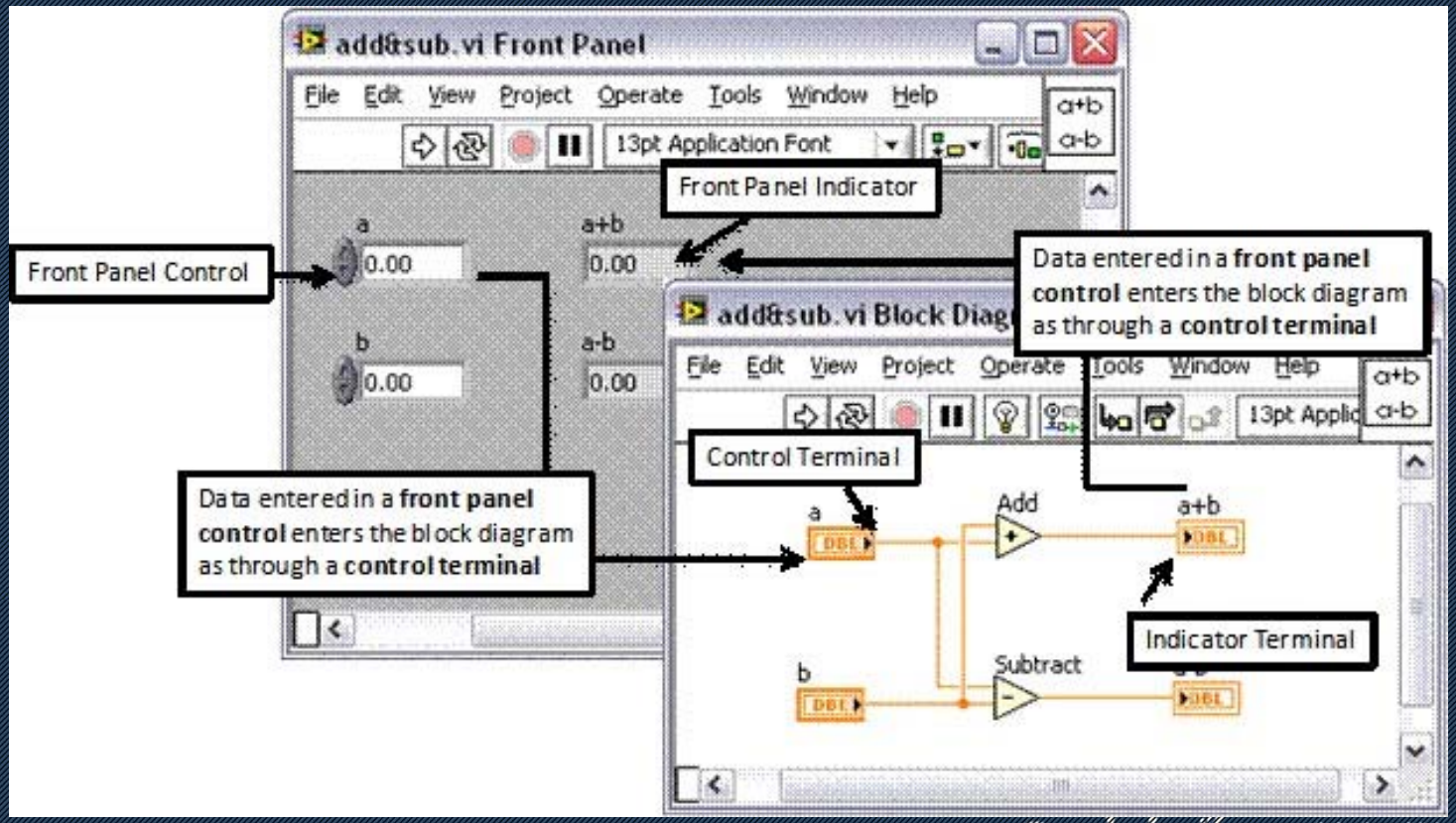






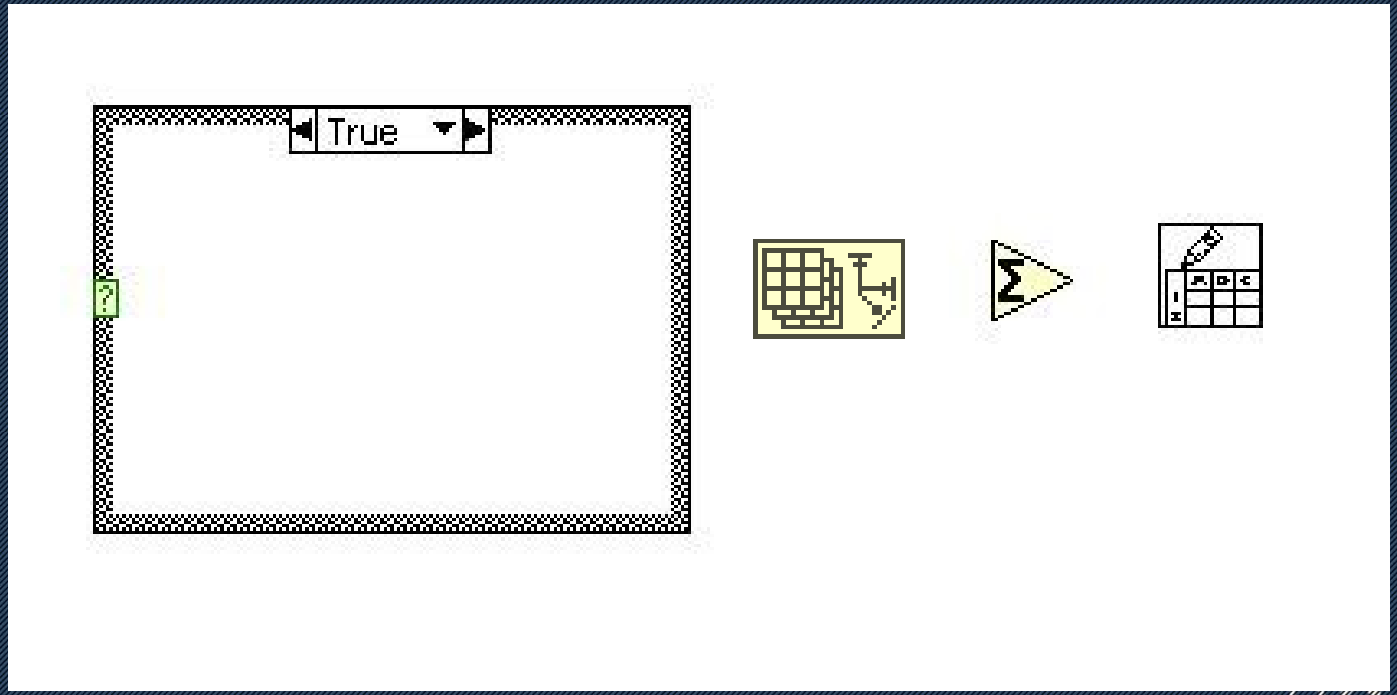
Block Diagram Terminal





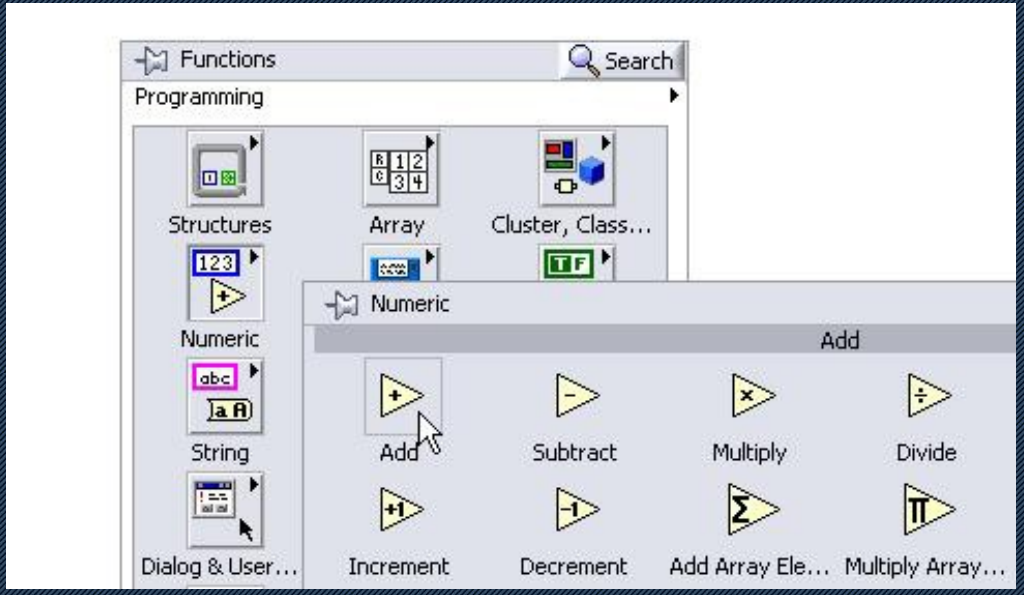
Block Diagram Nodes

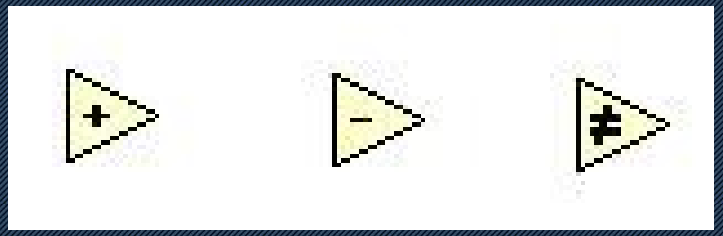
Nodes are objects on the block diagram that have inputs and/or outputs and perform operations when a VI runs. They are analogous to statements, operators, functions, and subroutines in text-based programming languages. Nodes can be functions, subVIs, or structures.



Block Diagram Nodes

Functions are the fundamental operating elements of LabVIEW. Functions do not have front panel windows or block diagram windows, but they do have input and output terminals for passing data in and out similarly to controls and indicators.

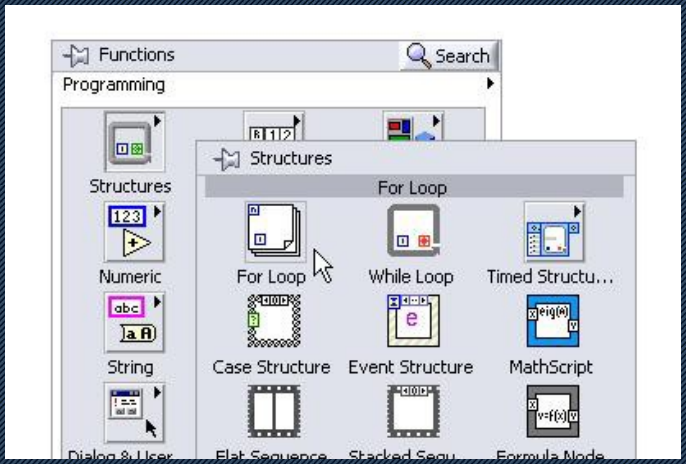


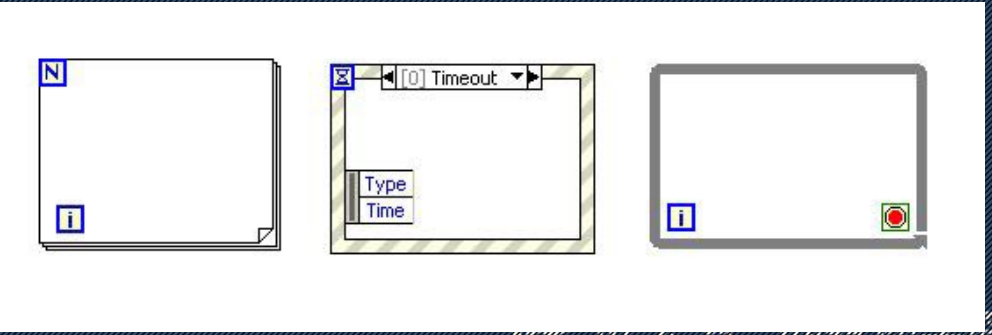


Block Diagram Nodes

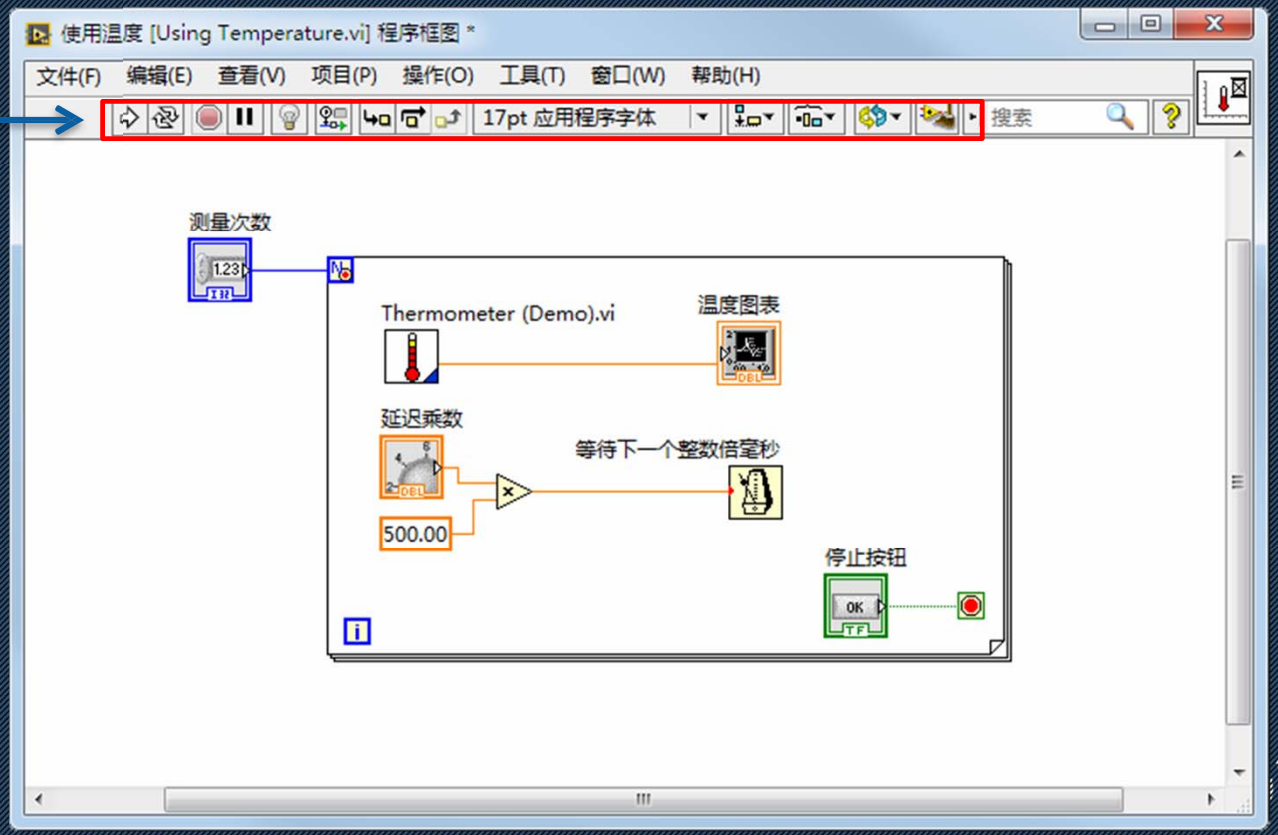
SubVIs are VIs that you create to use inside another VI or that you access on the Functions palette.

Structures, which include for loops, case structures, and while loops, are used for process control

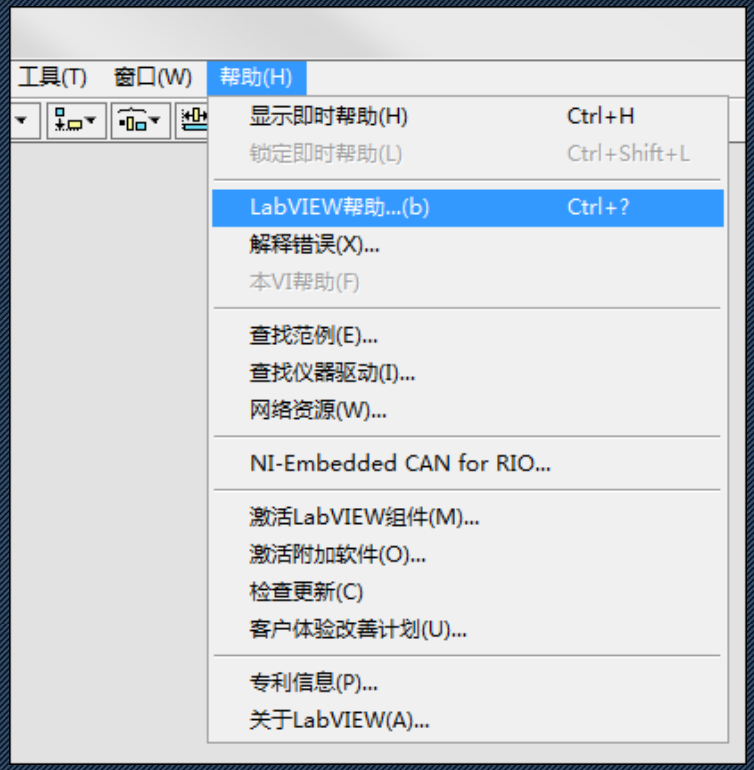


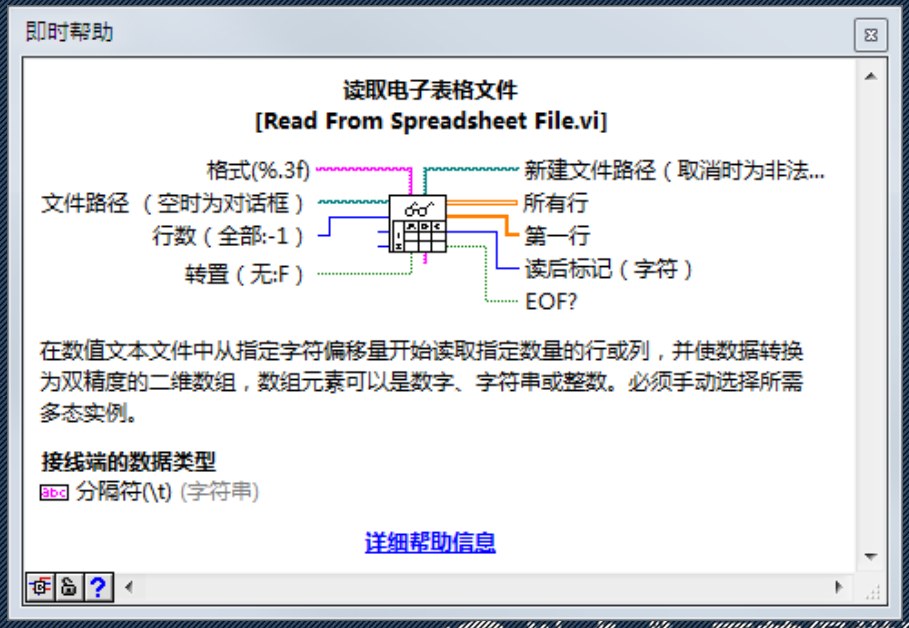


Block Diagram Toolbar



Help Document





LabVIEW Shortcuts

- CTRL-T will arrange the two panels vertically to fill the entire screen.
- CTRL-B cleans up loose wires.
- CTRL click and drag to copy.
- CTRL-A selects all.
- CTRL-E switches from block diagram and front panel.
- CTRL-H for help.
- More shortcut keys are available
  http://www.ni.com/pdf/manuals/373353c.pdf

- CTRL-C, CTRL-V, CTRL-X all works
- CTRL-O,N,S to open, create a new and save files.
- CTRL-Z undo