Create the First VI

MEMS 1049 Mechatronics

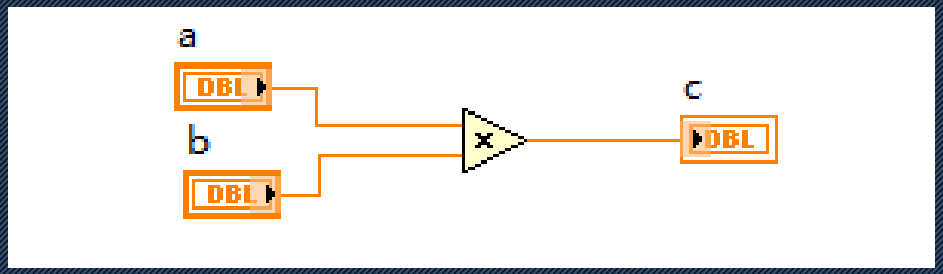
四川大学 匹兹堡学院

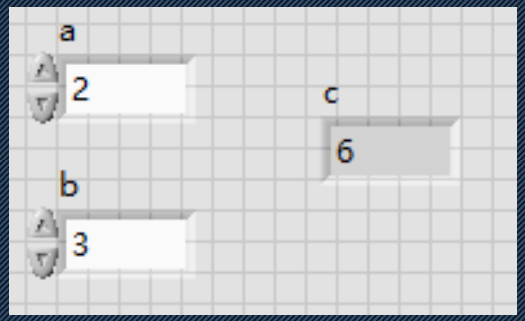
Outline

- Data Flow Programming
- Wiring
- LabVIEW Data Types
- Tools Palette
- Studio: Create simple VIs

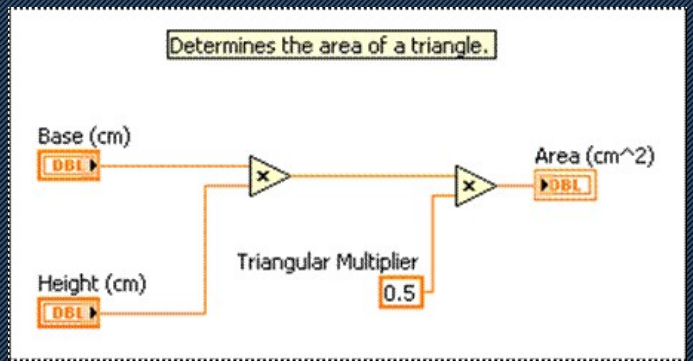
Task: Build a VI

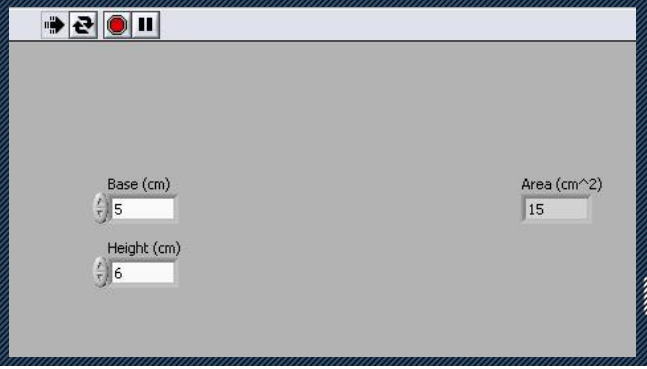
- Create a VI to calculate the product of two numbers.





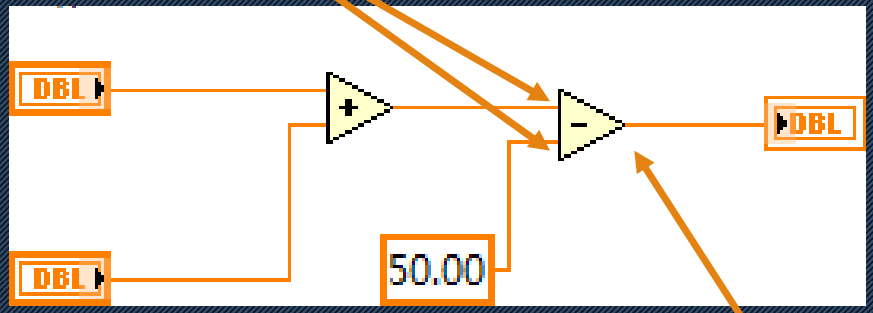
- Create a VI to calculate the area of a triangle





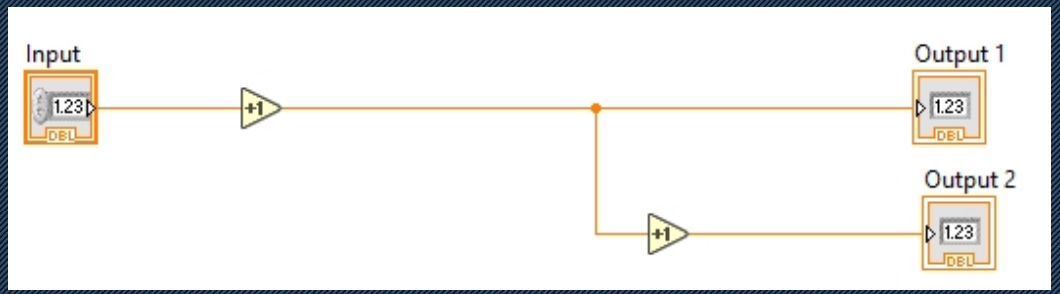
Data Flow Programming

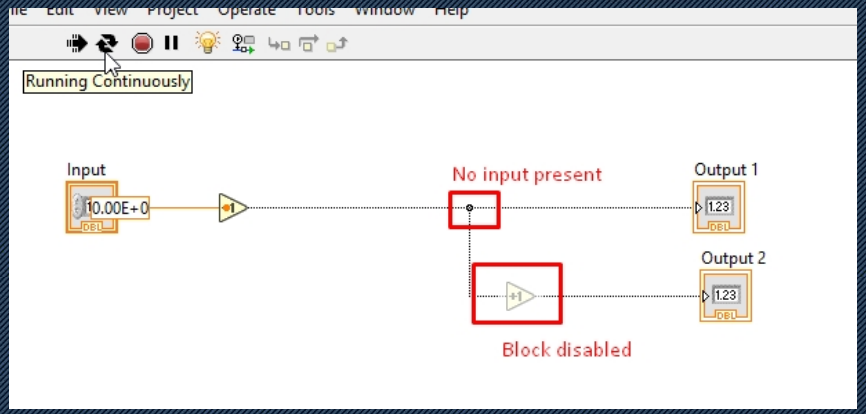
The node will not execute until it receives all the input data.

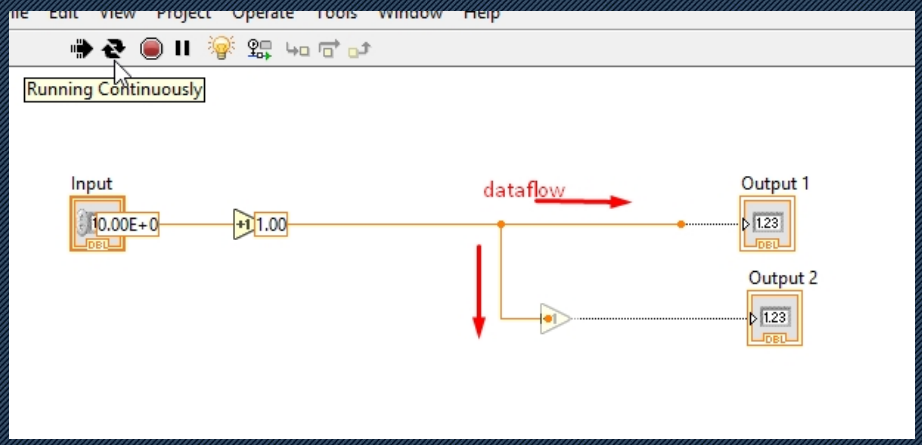


Data is not provided to the output until the node is executed.

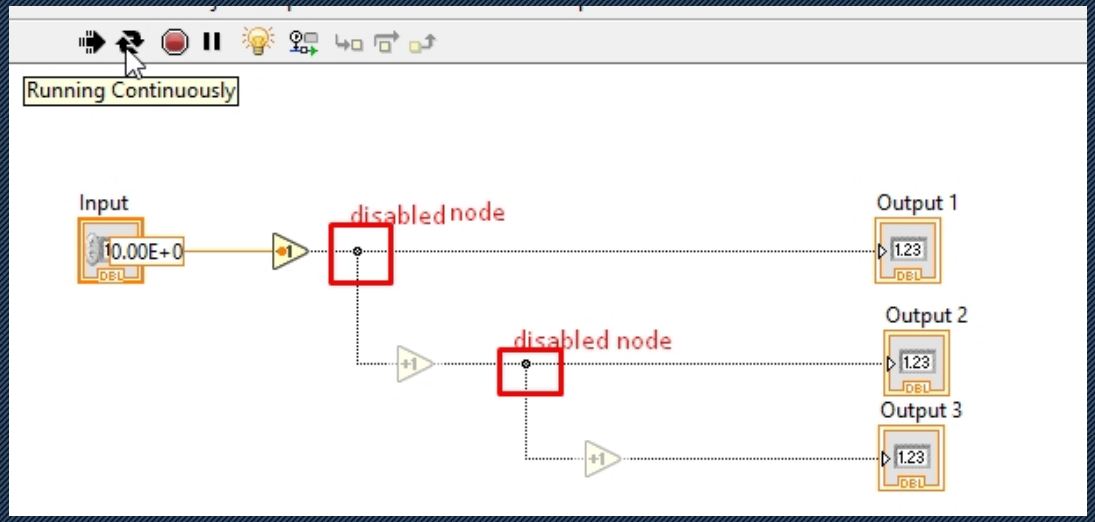
Data Flow Programming

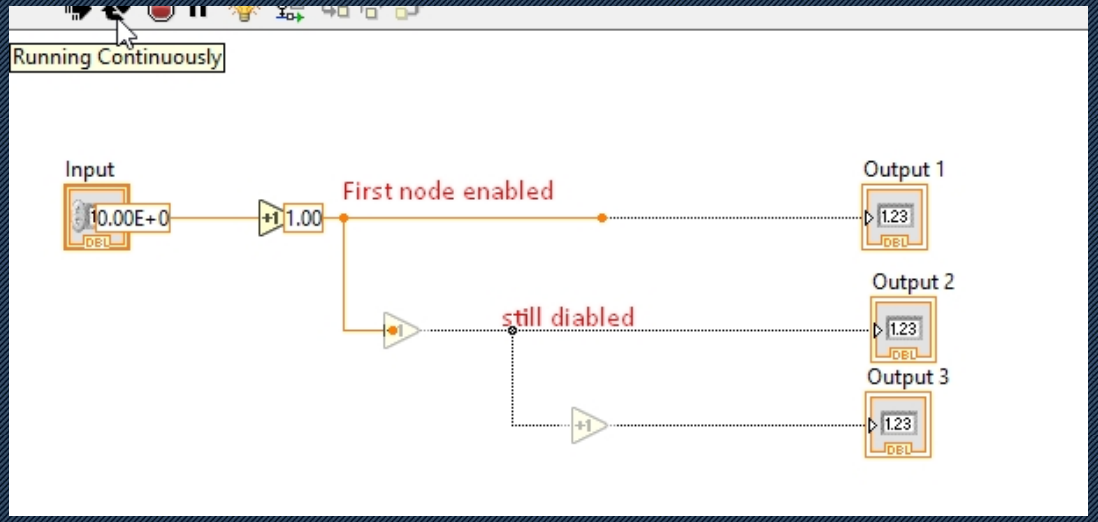






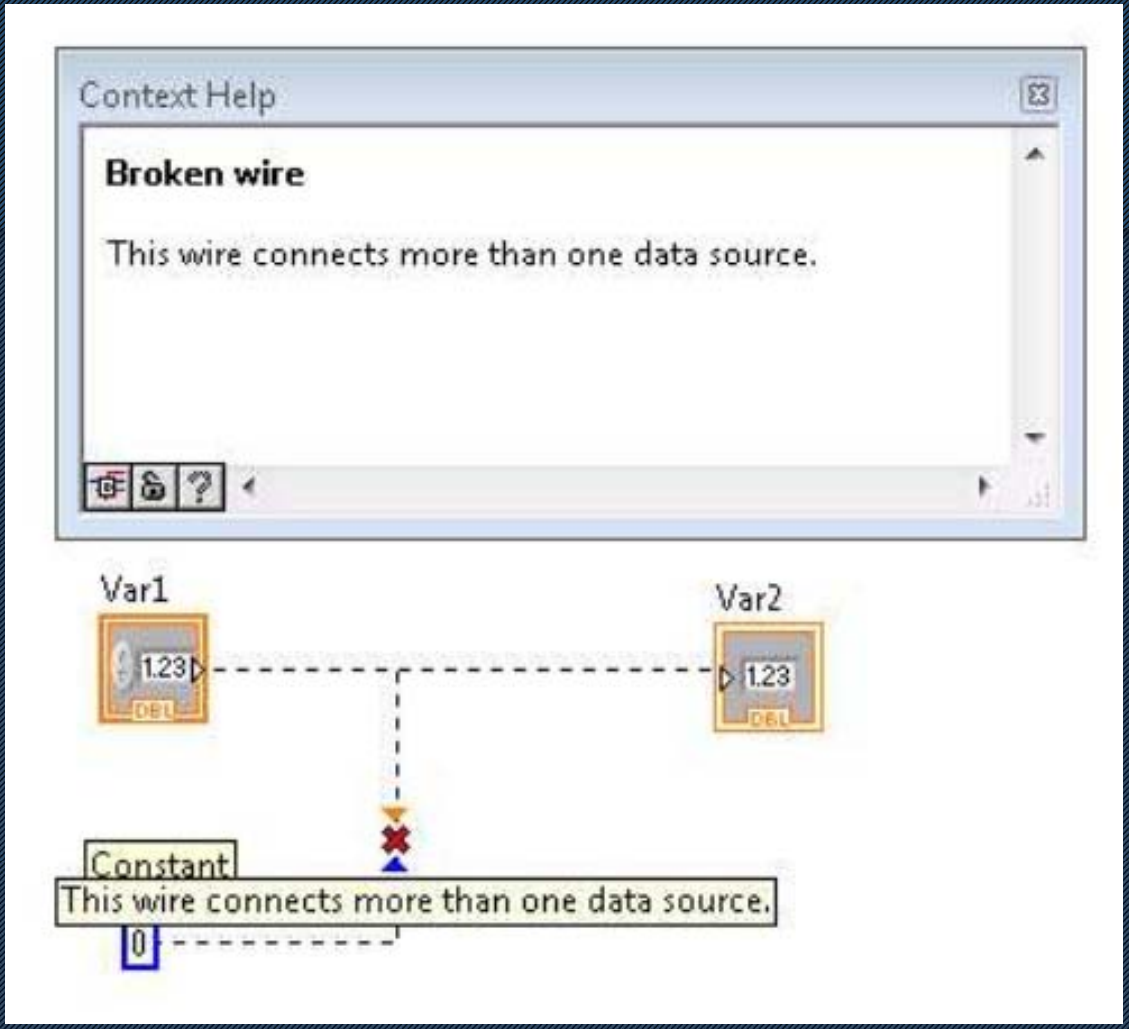
Data Flow Programming





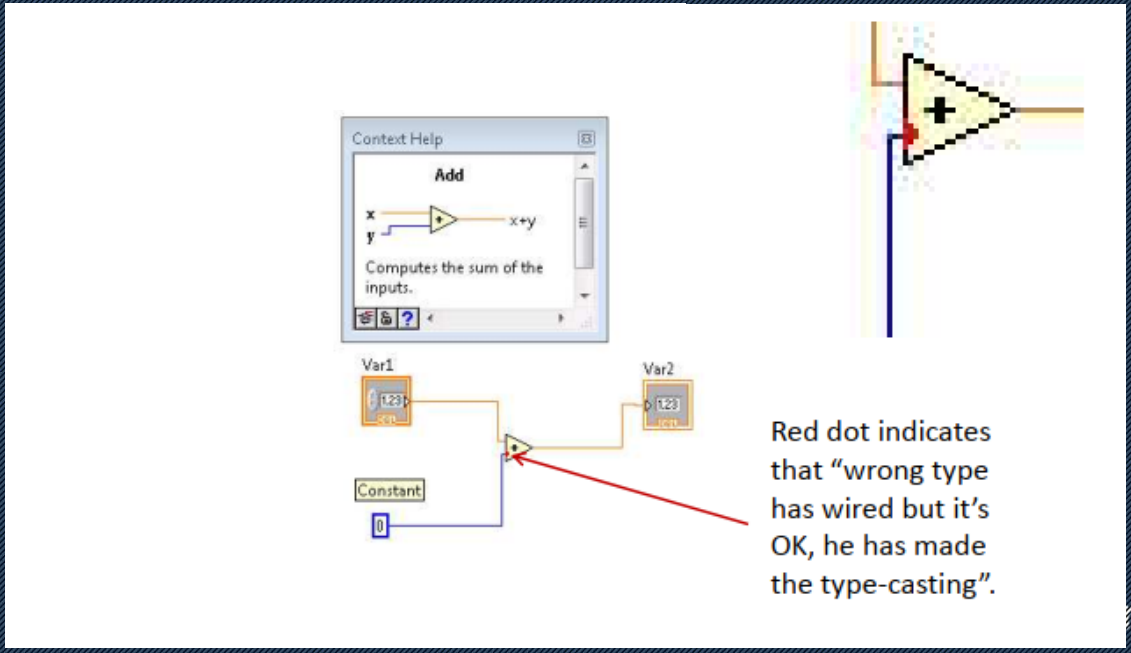
Wiring

- Defines the direction of flow
- One to many connection is acceptable
- Many to one connection is illegal

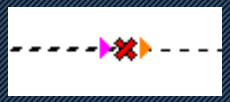


Wiring

- Application of algorithm is done by wiring
- Color of the wire indicates type

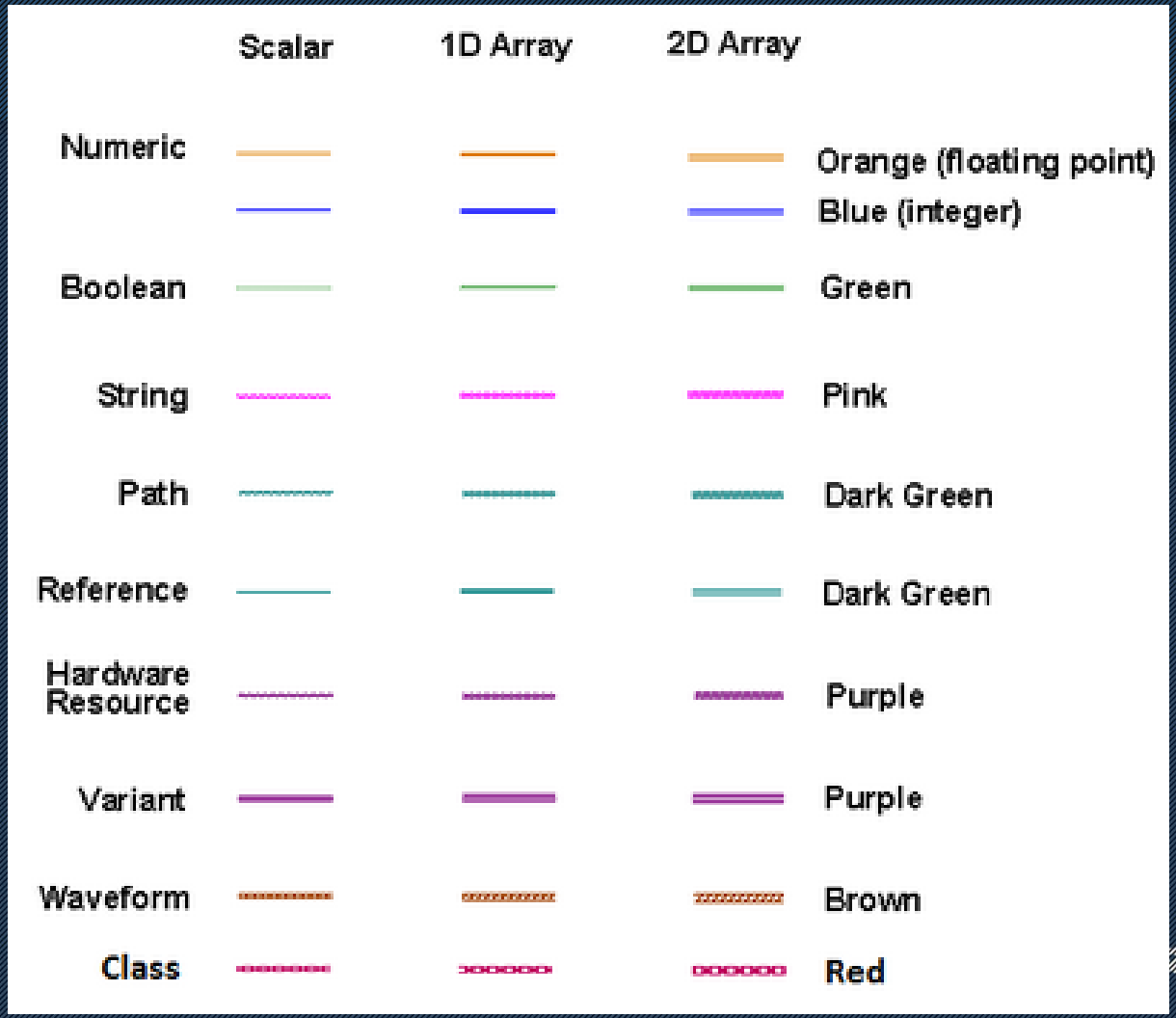


Wires are Used to Pass Data

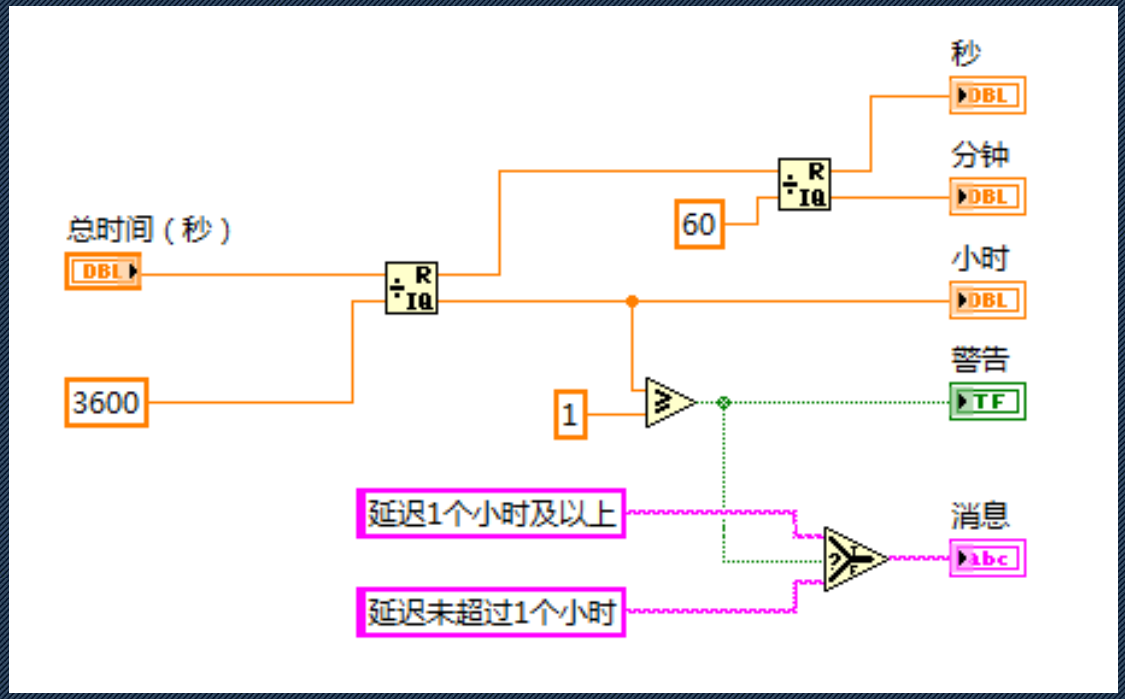
Broken wire： 

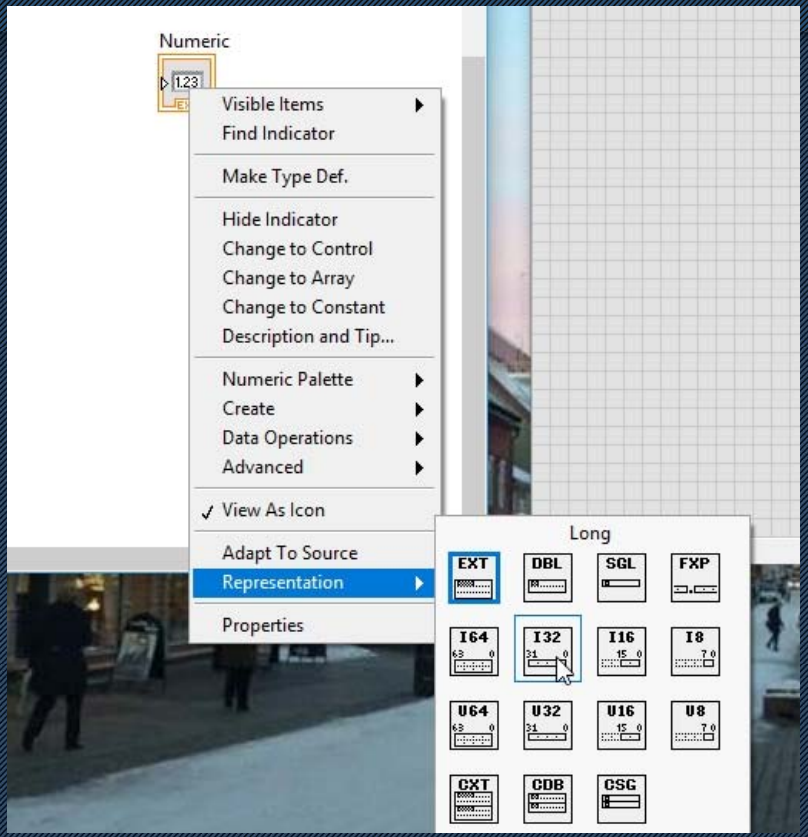
	Floating Point	Integer	String	Boolean
Scalar				
One-dimensional array				
Two-dimensional array				

Note: The wires and numeric boxes are color coded. The color orange is used for a double precision number.



Terminal and Datatype

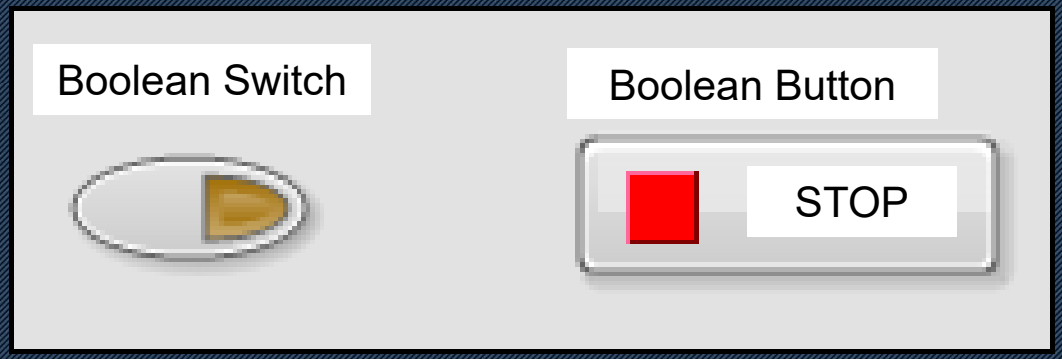


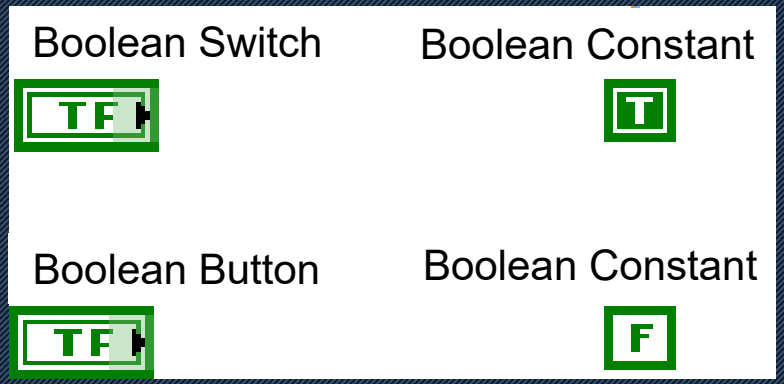


Numeric Datatype Table

Terminal	Numeric Data Type	Bits of Storage on Disk	Approximate Number of Decimal Digits	Approximate Range
SGL	Single-precision, floating-point	32	6	Minimum positive number: 1.40e–45 Maximum positive number: 3.40e+38 Minimum negative number: –1.40e–45 Maximum negative number: –3.40e+38
DBL	Double-precision, floating-point	64	15	Minimum positive number: 4.94e–324 Maximum positive number: 1.79e+308 Minimum negative number: –4.94e–324 Maximum negative number: –1.79e+308
EXT	Extended-precision, floating-point	128	varies from 15 to 20 by platform	Minimum positive number: 6.48e–4966 Maximum positive number: 1.19e+4932 Minimum negative number: –6.48e–4966 Maximum negative number: –1.19e+4932
CSG	Complex single-precision, floating-point	64	6	Same as single-precision, floating-point for each (real and imaginary) part
CDB	Complex double-precision, floating-point	128	15	Same as double-precision, floating-point for each (real and imaginary) part
CXT	Complex extended-precision, floating-point	256	varies from 15 to 20 by platform	Same as extended-precision, floating-point for each (real and imaginary) part
FXP	Fixed-point	64, or 72 if you include an overflow status	varies by user configuration	varies by user configuration
I8	Byte signed integer	8	2	–128 to 127
I16	Word signed integer	16	4	–32,768 to 32,767
I32	Long signed integer	32	9	–2,147,483,648 to 2,147,483,647
I64	Quad signed integer	64	18	–1e19 to 1e19
U8	Byte unsigned integer	8	2	0 to 255
U16	Word unsigned integer	16	4	0 to 65,535
U32	Long unsigned integer	32	9	0 to 4,294,967,295
U64	Quad unsigned integer	64	19	0 to 2e19
TS	128-bit time stamp	128	19	Minimum time: 01/01/1600 00:00:00 UTC maximum time: 01/01/3001 00:00:00 UTC

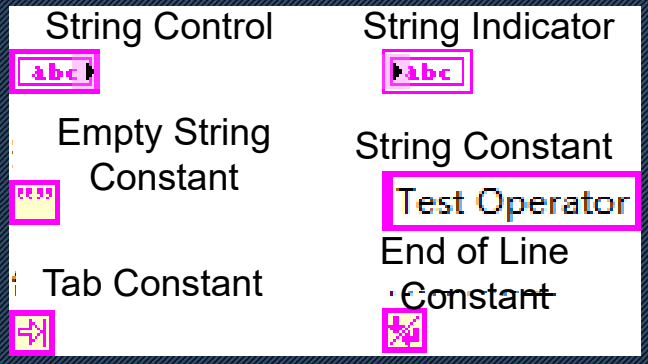
Boolean Data

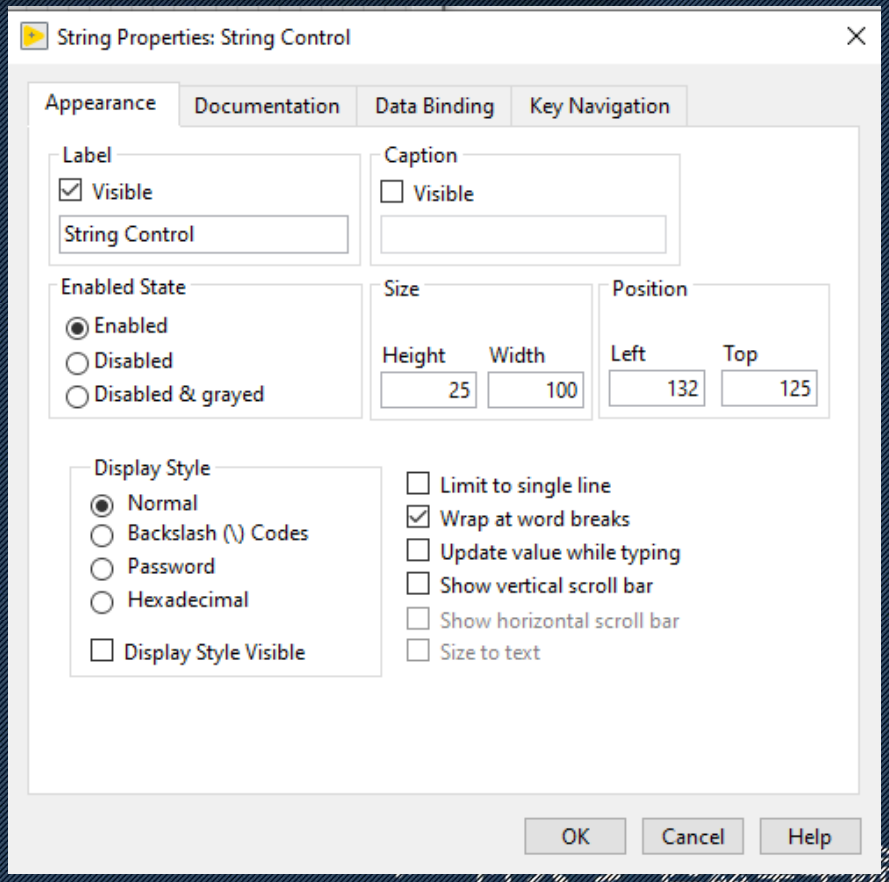




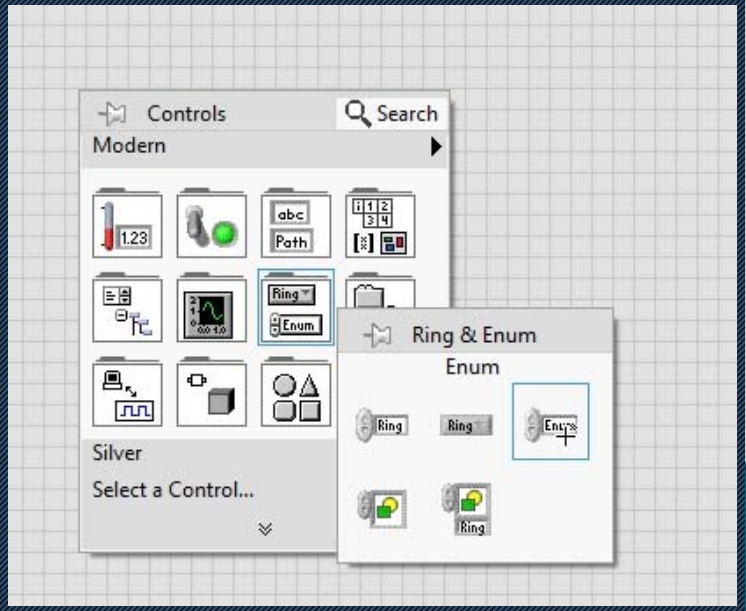
String

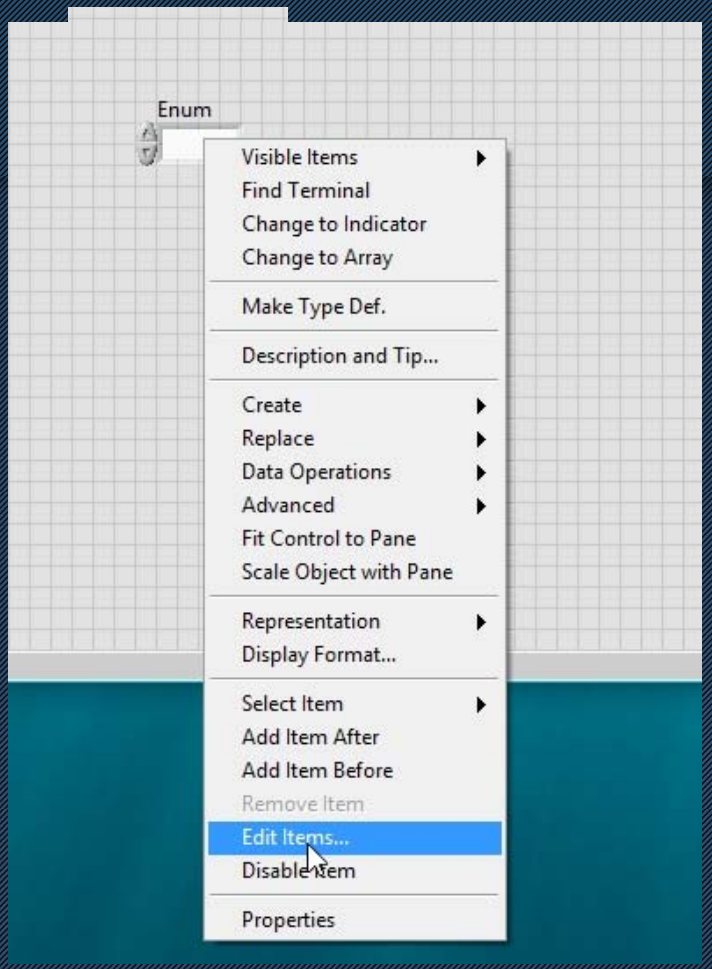

String Control
String Indicator

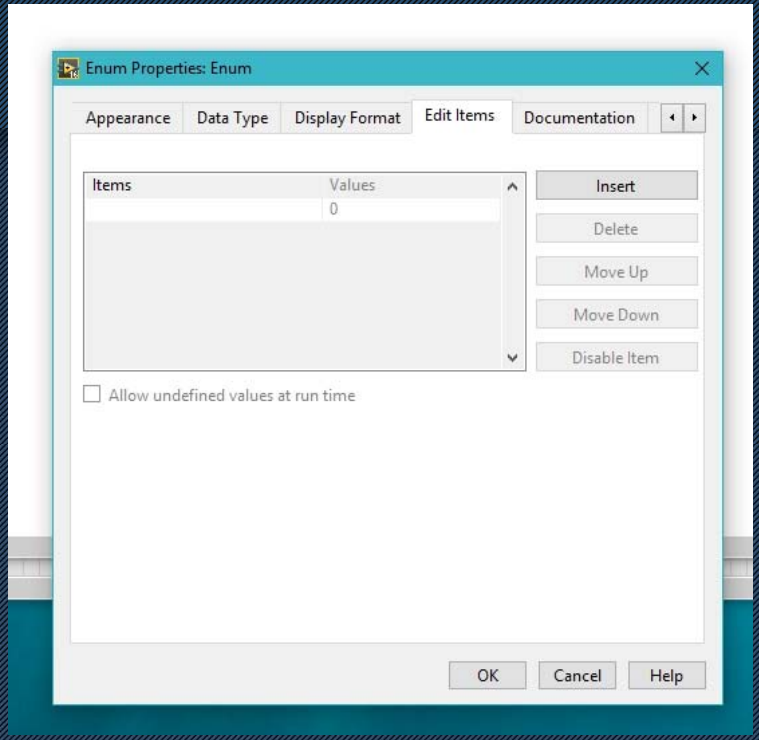

String Control
String Indicator
Empty String Constant
String Constant
Test Operator
Tab Constant
End of Line Constant


String Properties: String Control
Appearance
Documentation
Data Binding
Key Navigation
Label
Visible
String Control
Caption
Visible
Enabled State
Enabled
Disabled
Disabled & grayed
Size
Height
Width
25
100
Position
Left
Top
132
125
Display Style
Normal
Backslash (\) Codes
Password
Hexadecimal
Display Style Visible
Limit to single line
Wrap at word breaks
Update value while typing
Show vertical scroll bar
Show horizontal scroll bar
Size to text
OK
Cancel
Help

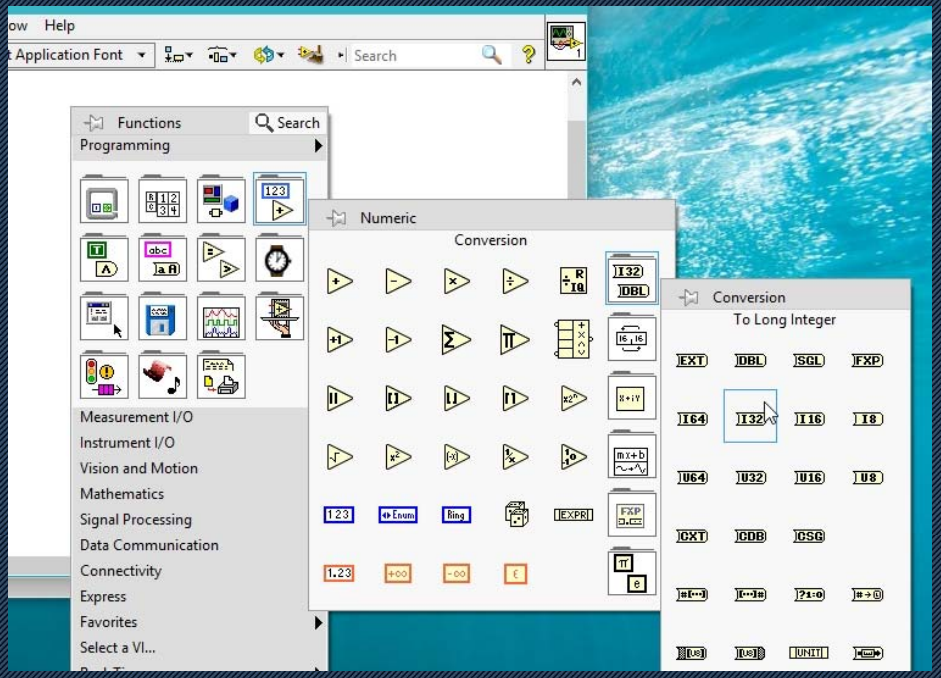
Enum

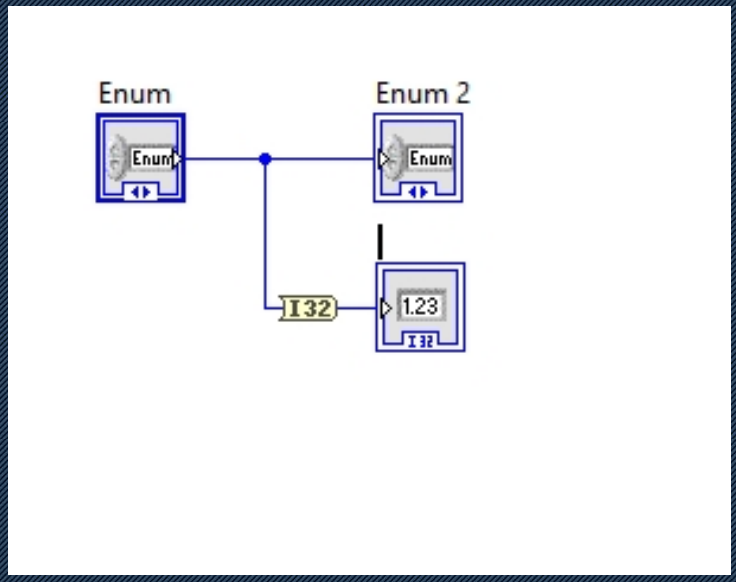

Controls
Search
Modern
Ring & Enum
Enum
Silver
Select a Control...


Enum
Visible Items
Find Terminal
Change to Indicator
Change to Array
Make Type Def.
Description and Tip...
Create
Replace
Data Operations
Advanced
Fit Control to Pane
Scale Object with Pane
Representation
Display Format...
Select Item
Add Item After
Add Item Before
Remove Item
Edit Items...
Disable Item
Properties

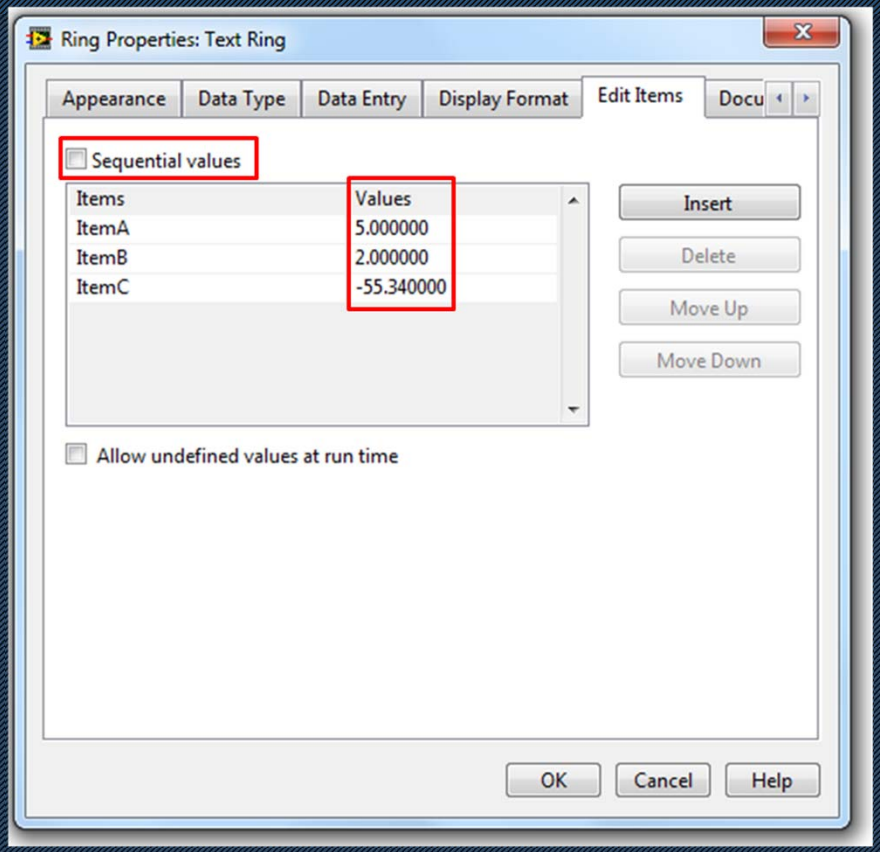

Enum Properties: Enum
Appearance
Data Type
Display Format
Edit Items
Documentation
Items
Values
0
Insert
Delete
Move Up
Move Down
Disable Item
Allow undefined values at run time
OK
Cancel
Help

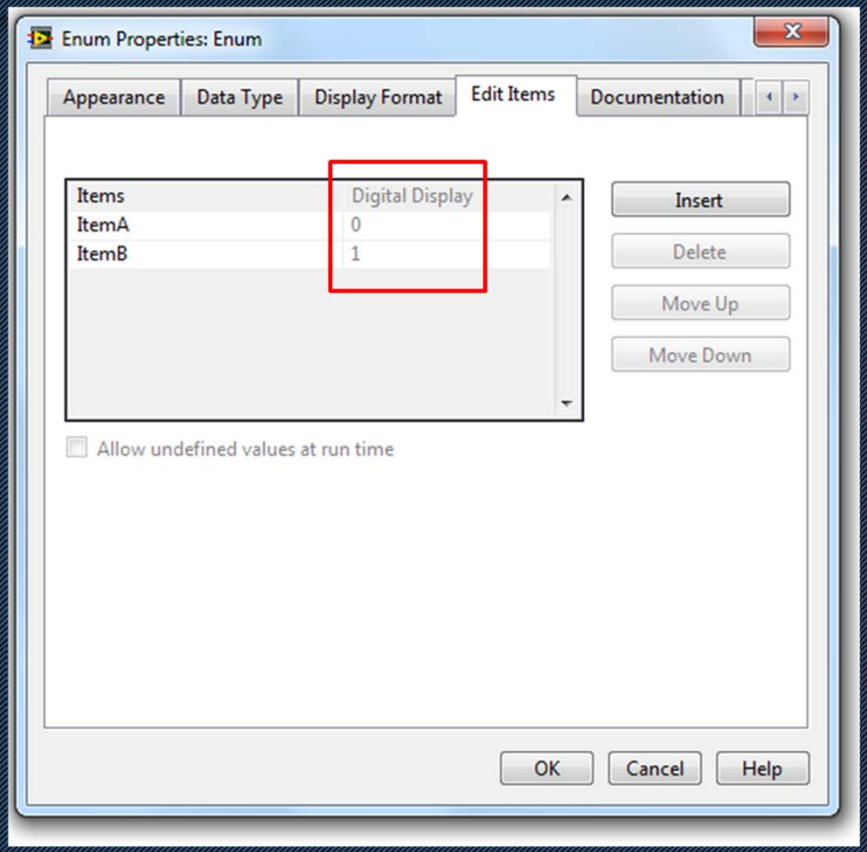
Enum


Help
Application Font
Search
Functions
Search
Programming
Measurement I/O
Instrument I/O
Vision and Motion
Mathematics
Signal Processing
Data Communication
Connectivity
Express
Favorites
Select a VI...
Numeric
Conversion
Conversion
To Long Integer


Enum
Enum 2
Enum
Enum
I32
1.23

Text Ring & Enum





Tools Palette

Automatic Selection Tool

Operating Tool

Positioning/Resizing Tool

Labeling Tool

Wiring Tool

Shortcut Menu Tool

Scrolling Tool

Breakpoint Tool

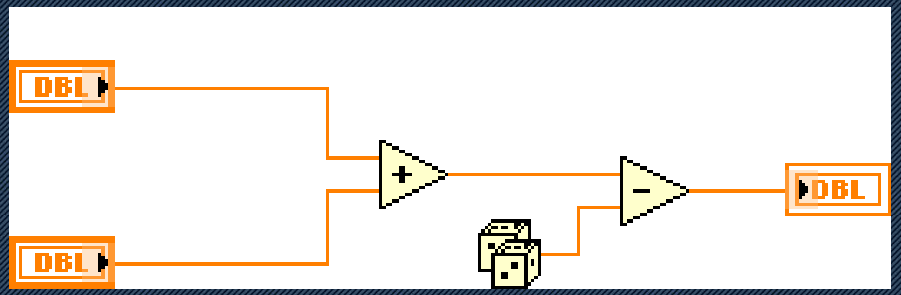
Probe Tool

Color Copy Tool

Coloring Tool

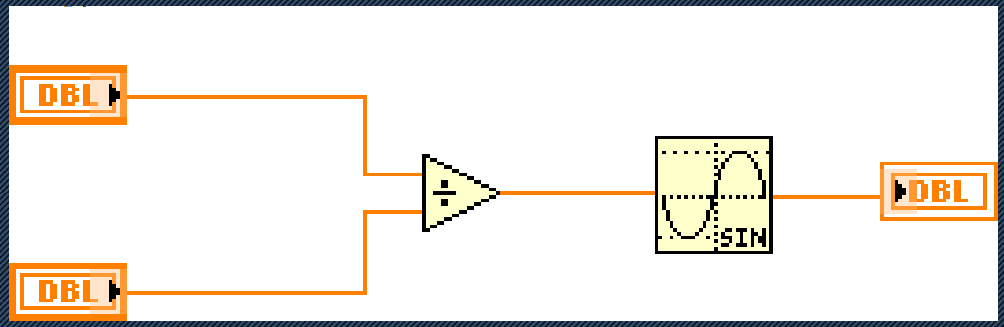
Which Function Executes First?

a. add
b. subtract
c. unknown



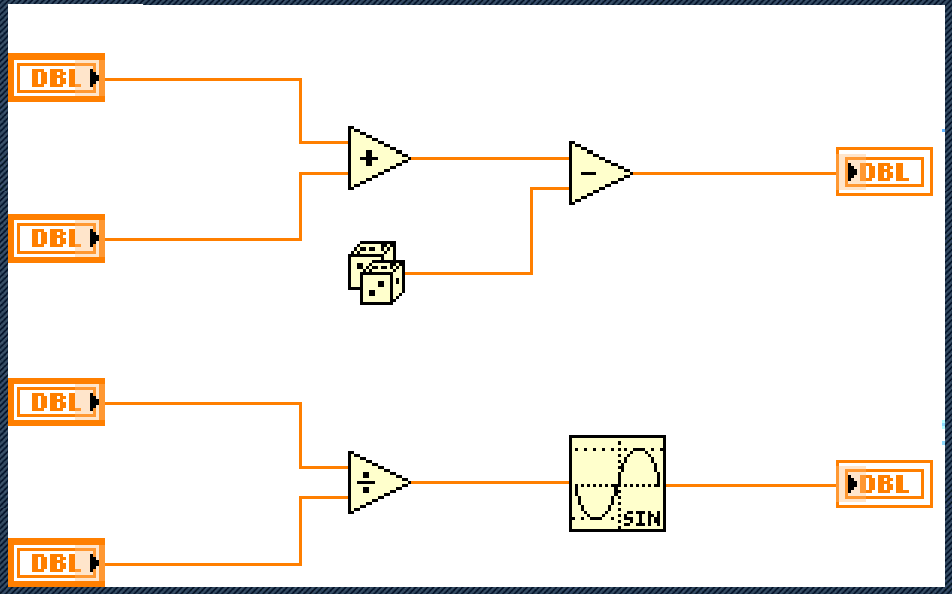
Which Function Executes First?

a. sine
b. divide
c. unknown



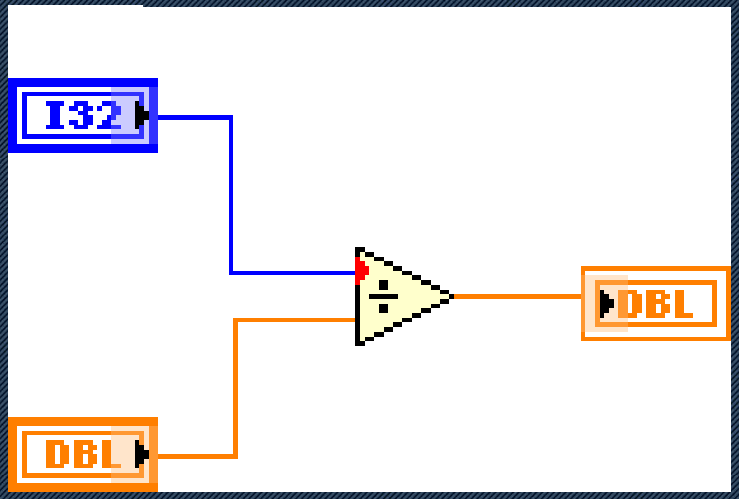
Which Function Executes First?

a. random number
b. divide
c. plus
d. minus
e. sine
f. unknown



If the input of a function is marked with a red dot (cast point), this point indicates which of the following information?

a. The data is transferred to the structures
b. The input is not connected
c. The connection is disconnected
d. The value transferred to the node is converted to a different type



Studio: create a LabVIEW project with the following three VIs

- P1: Create a VI to calculate the product of two numbers
- P2: Create a VI to calculate the area of a triangle using the length of the base and height

$$A = \frac{1}{2} b * h$$

- P3: Use Heron's Formula to calculate the area of a triangle using the length of 3 sides

$$s = \frac{1}{2}(a + b + c)$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$