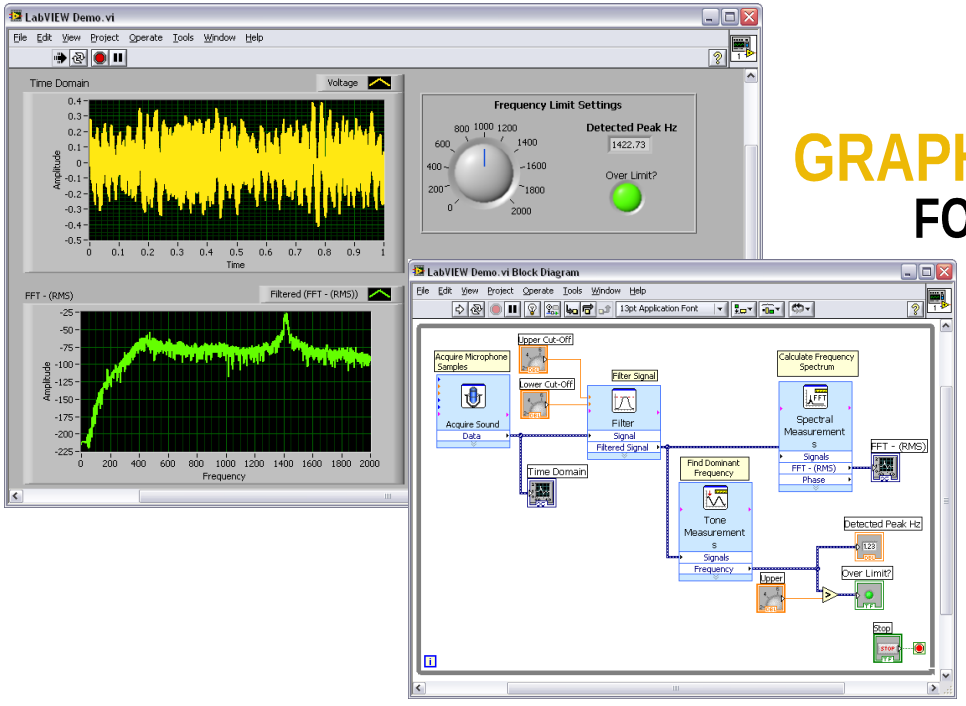
# WELCOME TO

PHYC 500: Introduction to **LabVIEW**

Regener 118 June 5—9, 2017  13:00—17:00

Instructor: Dr Michael Hasselbeck




GRAPHICAL PROGRAMMING
FOR ENGINEERS AND SCIENTISTS

LabVIEW™

# What is the purpose of this seminar?

Get familiar with the LabVIEW programming environment

Graphical/object-oriented – very different from text coding

Understand data flow

Learn how to interpret LabVIEW code

Elementary VI design (VI = Virtual Instrument)

Lots of hands-on work with the software
(and some hardware)


## PROS:

Data-flow programming: Parallel execution of code

Graphical: Easy to learn, even for non-programmers; Drag-and-drop icons

Vast library of example code available

Readily integrates with NI hardware and many other vendors

All popular data buses supported (GPIB, PCI, ethernet, USB, wireless...)

Executables can be generated: Use on computers without LabVIEW


## CONS:

Proprietary software from National Instruments

No independent standards

Licensing fees ($$$)

Works best on Windows.  Less capable on Mac-OSX and Linux

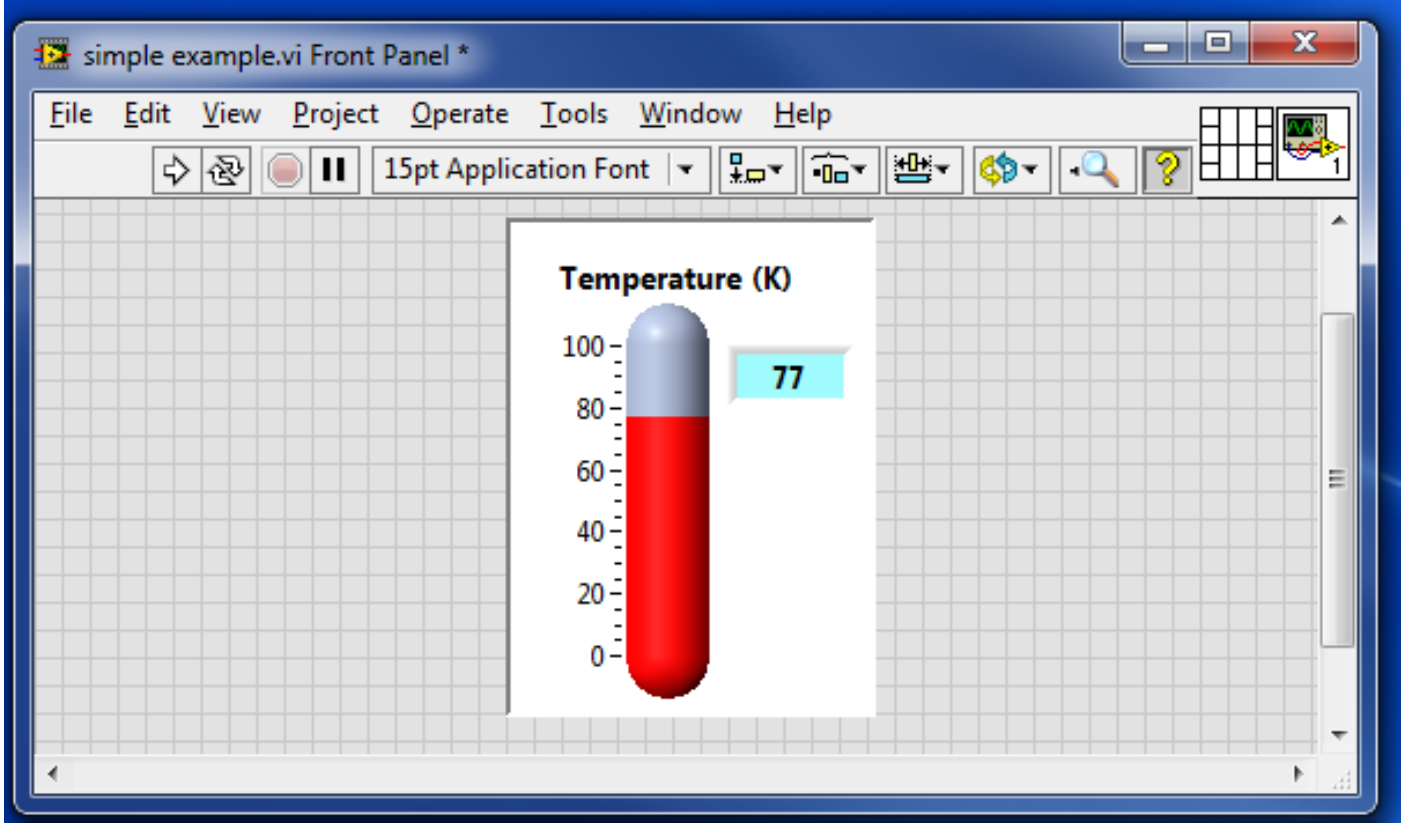
Large applications require high expertise; resource management

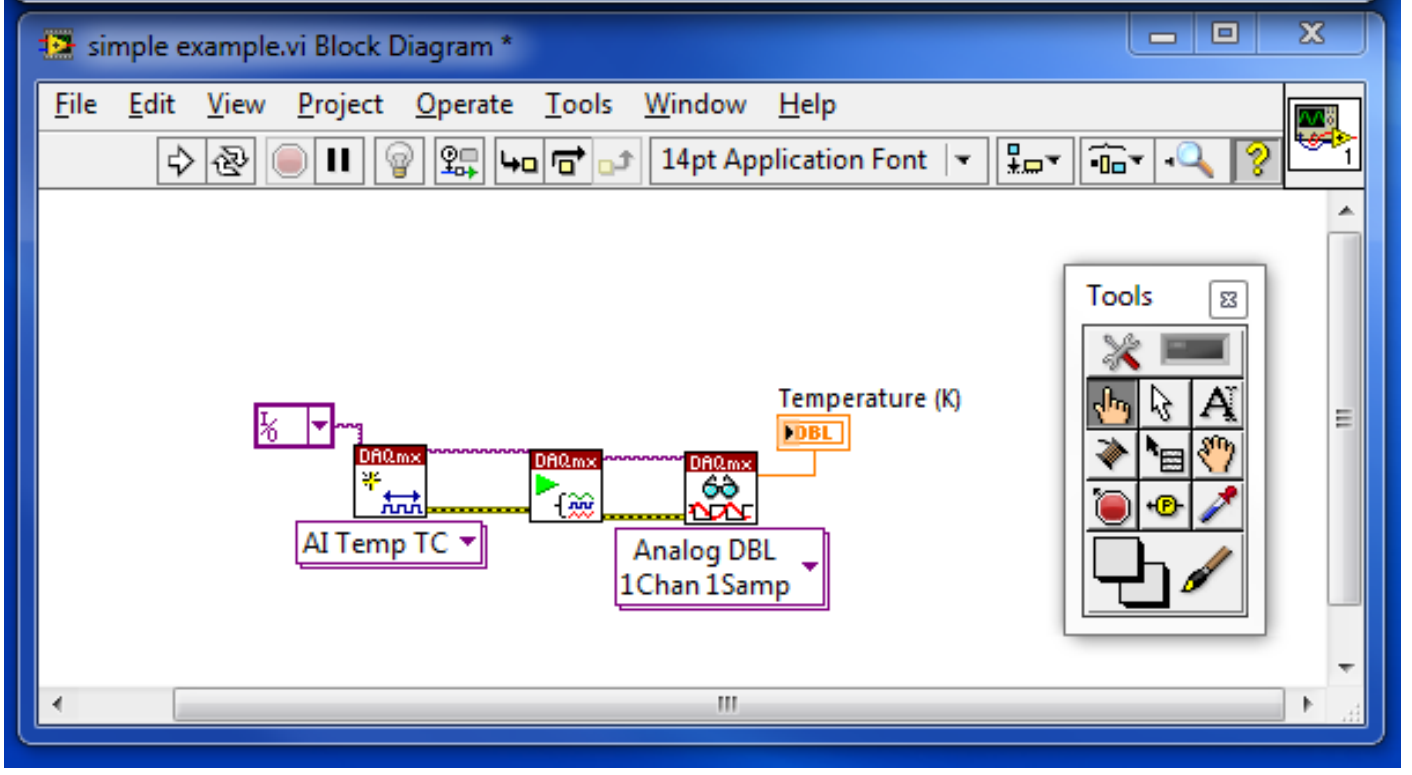
Generally slower than text-based code

Building stand-alone executables requires
Professional Development System (more $$$)

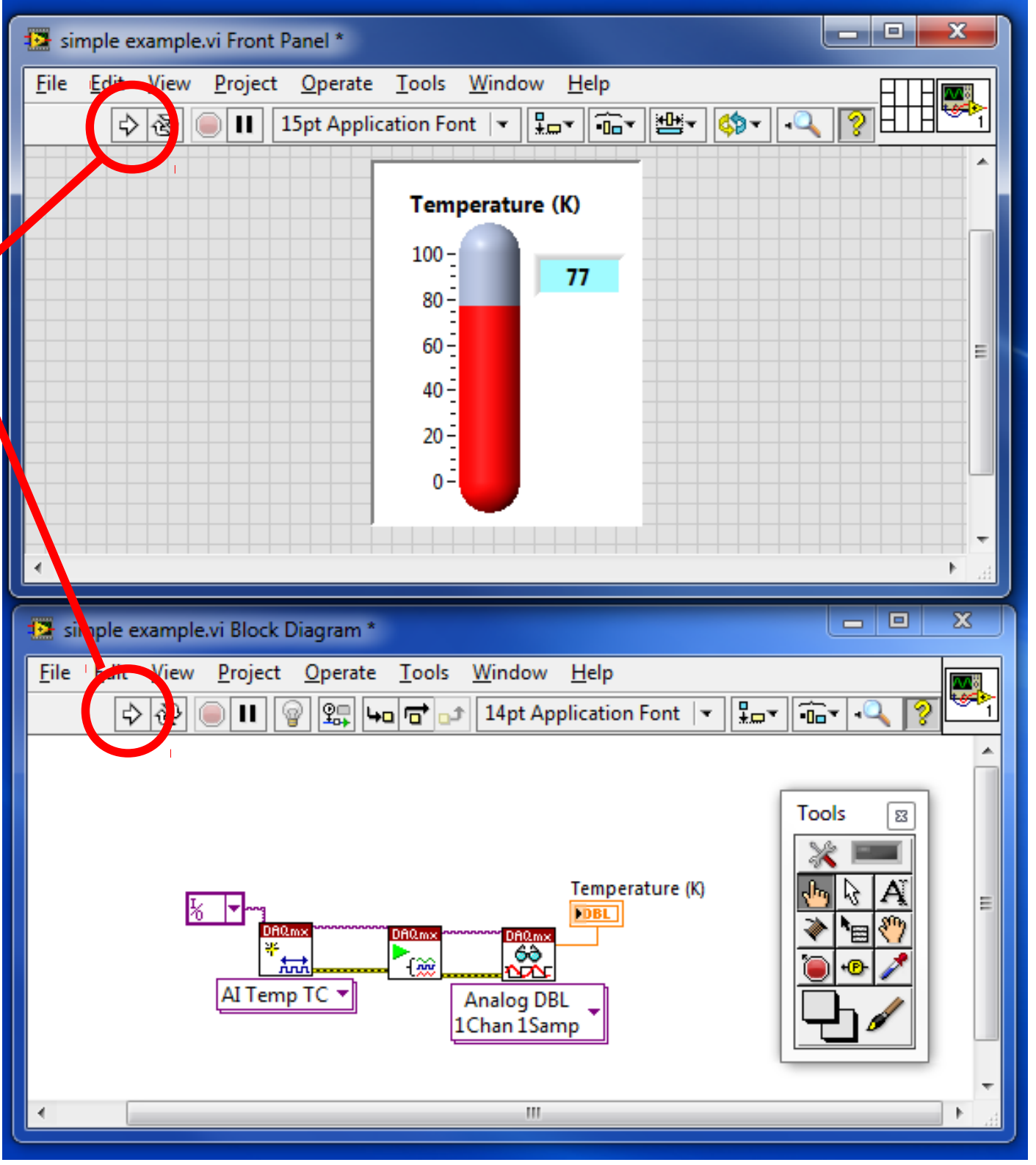
# FRONT PANEL

# BLOCK DIAGRAM



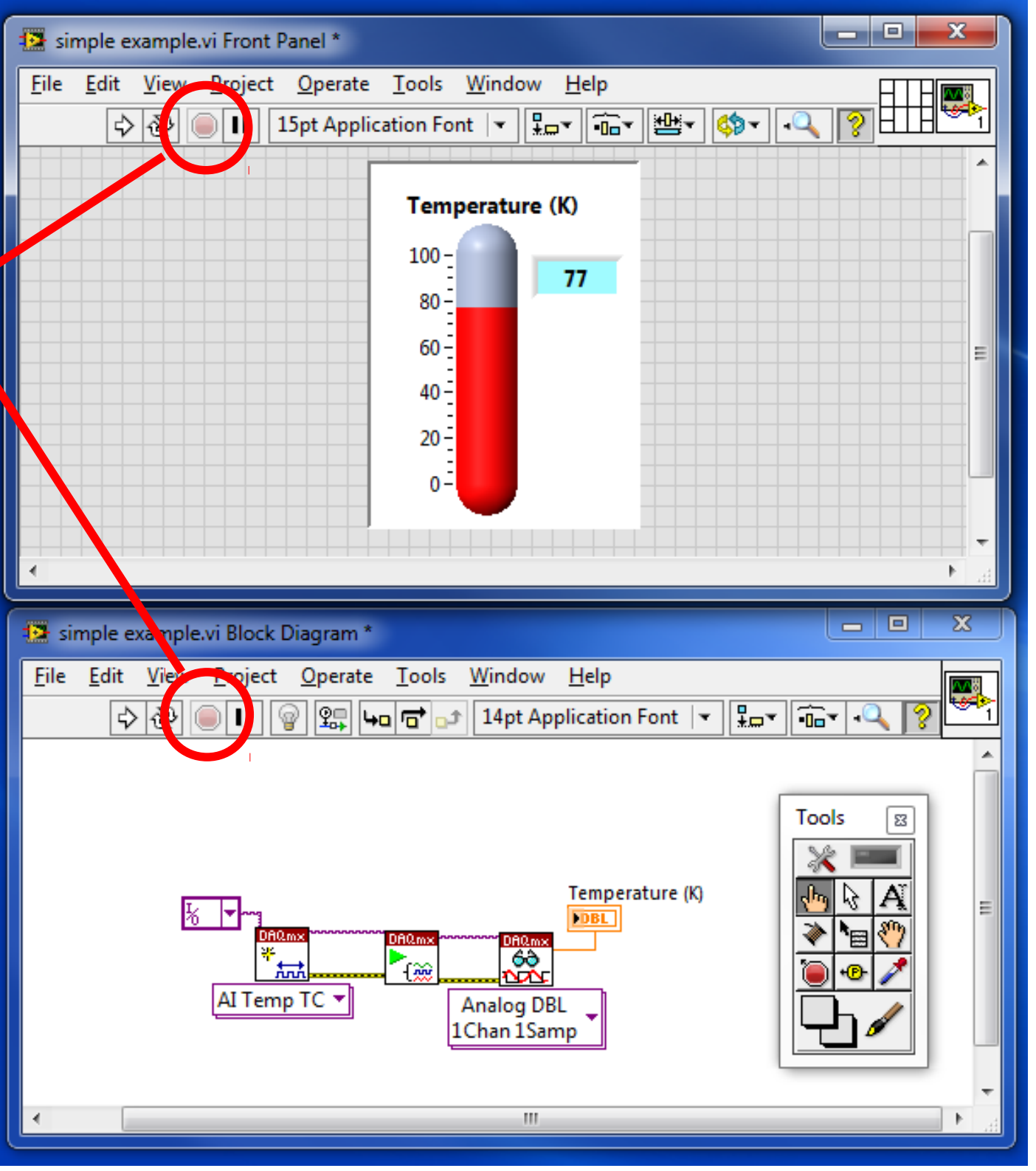



# Run the VI

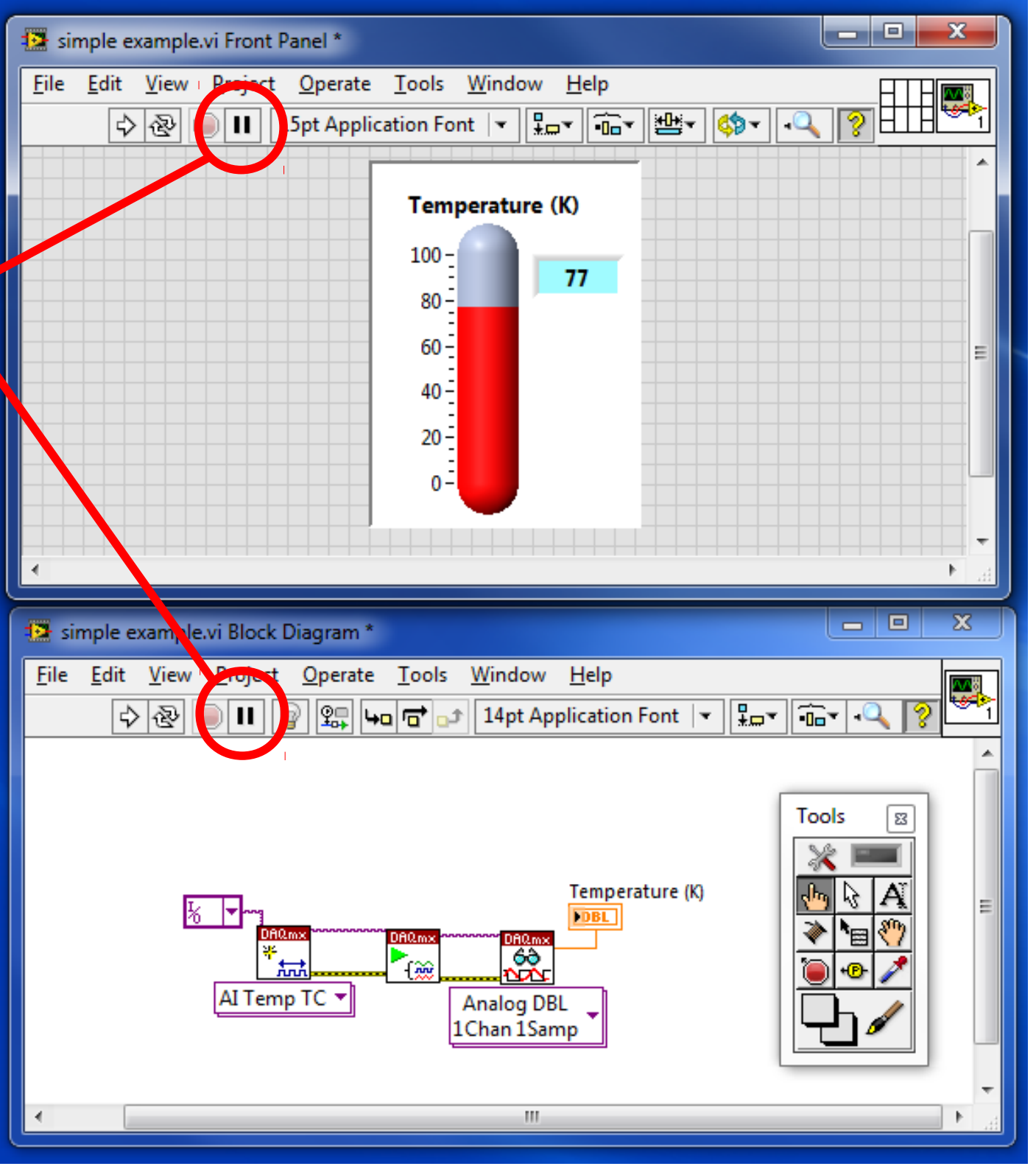

simple example.vi Front Panel *
File Edit View Project Operate Tools Window Help
15pt Application Font
Temperature (K)
100
80
60
40
20
0
77
simple example.vi Block Diagram *
File Edit View Project Operate Tools Window Help
14pt Application Font
Temperature (K)
DBL
DAQmx
DAQmx
DAQmx
AI Temp TC
Analog DBL
1Chan 1Samp
Tools

**Abort the VI***

* Use this only when all else fails



**Pause the VI**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DAQmx
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1Chan 1Samp
Tools

# Description of Tools Palette

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**Operate Value**

Interact with working VI primarily from Front Panel

# Description of Tools Palette


**Position/Size/Select**

Used on both Front Panel and Block Diagram

Opens pop-up menus with right-click

# Description of Tools Palette


**Edit Text**

Works like a word-processor cursor

# Description of Tools Palette


**Connect Wire**

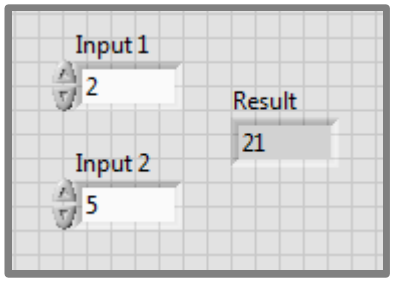
Connects icons and objects on the Block Diagram

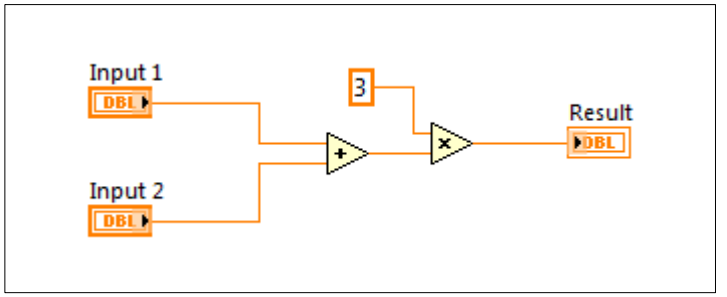
# Data-flow programming on the Block Diagram

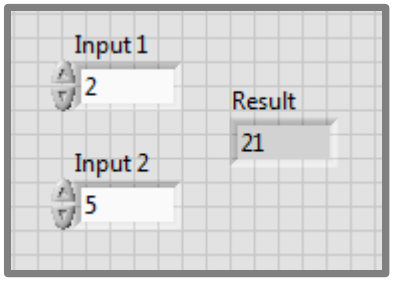
Code does not execute left-to-right

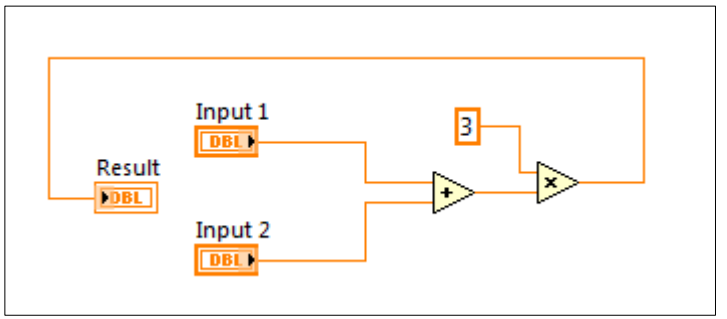
Nodes execute depending on availability of data at input terminals

These two VIs are operationally identical:




Setting up Block Diagram to flow left-to-right can help visualize logical flow

# Different data types: Block Diagram View


Alpha-numeric characters

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Alpha-numeric characters


Logical TRUE-FALSE (Binary 0-1)

# Different data types: Block Diagram View

## Numeric Floating Point


Single precision; 32 bit (sign, exponent, fraction)


Double precision; 64 bit (sign, exponent, fraction)


Extended precision; 128 bit (sign, exponent, fraction)


Complex double precision; 128 bit (64 bits for Re & Im)

# Different data types: Block Diagram View

## Numeric Integer


Signed 8-bit integer (-128  to 127)

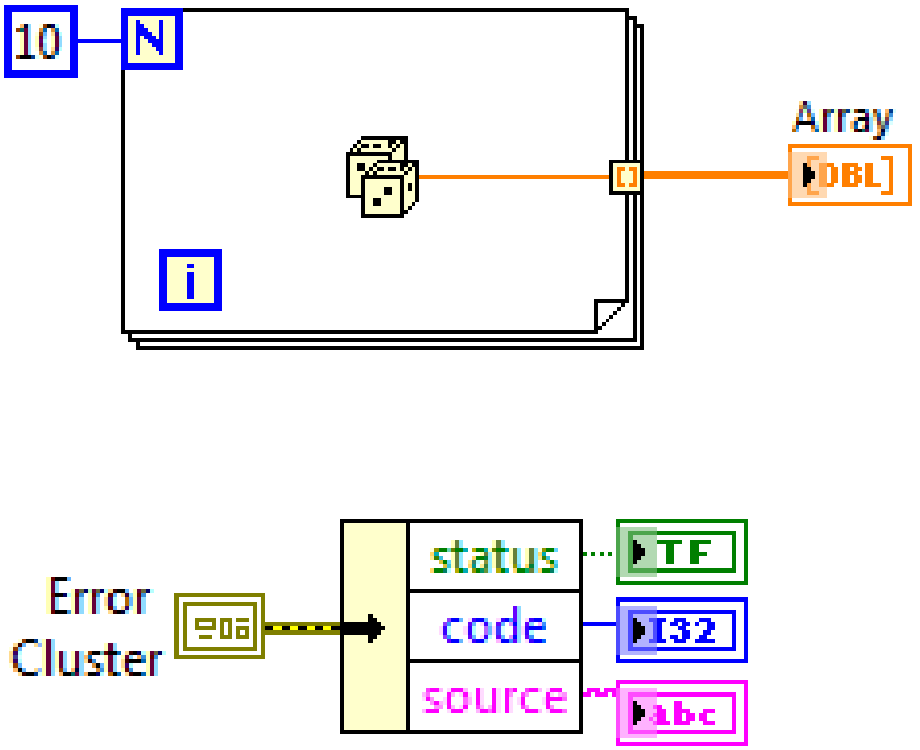

Unsigned 8-bit integer (0 to 255)


Signed 16-bit integer (-32768  to 32767)


Signed 32-bit integer (−2,147,483,648 to 2,147,483,647)

# Different data types: Block Diagram View

Arrays and Clusters



# Handy keyboard shortcuts

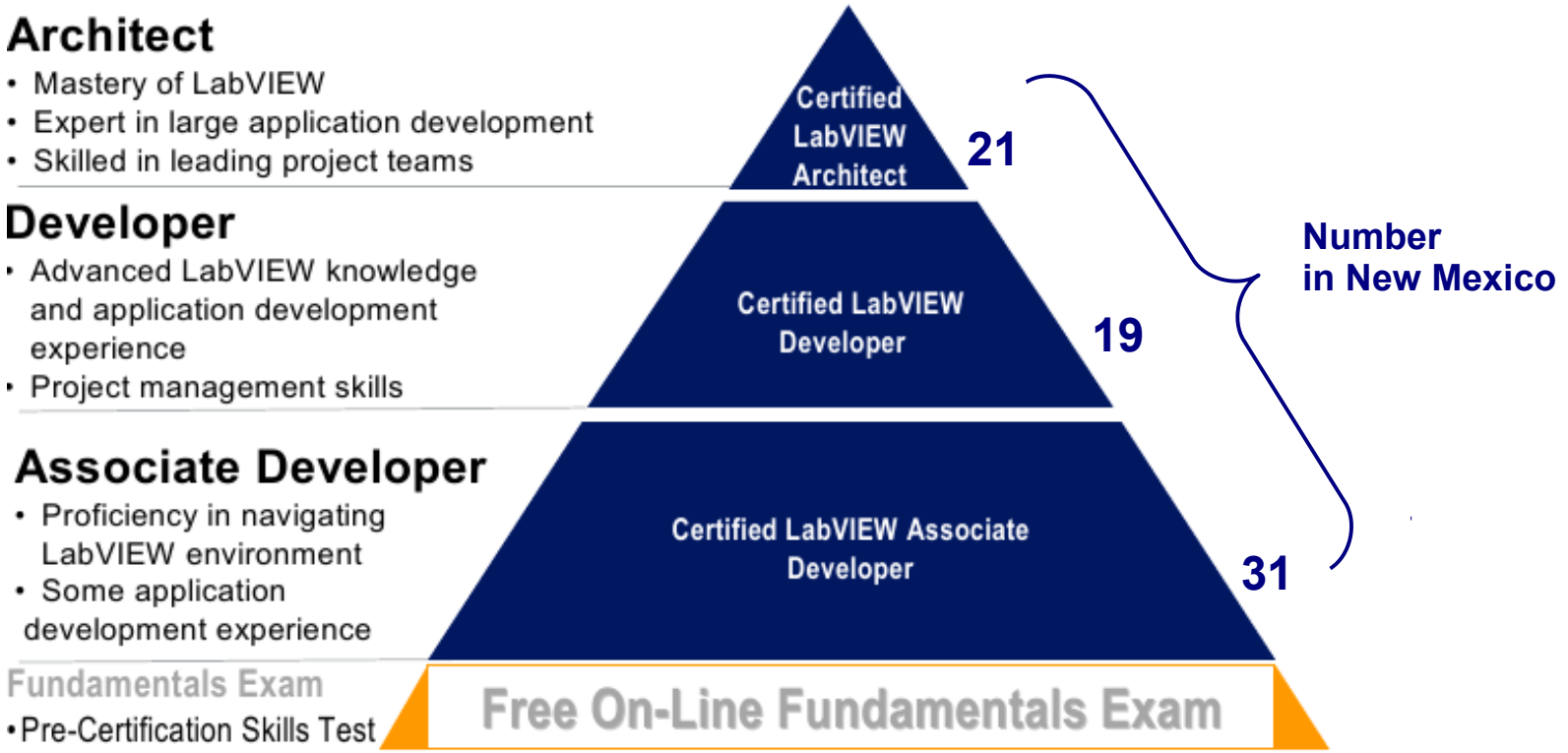
**CTRL-Z:** Undo the last operation (has extended memory)

**CTRL-E:** Toggle between Front Panel and Block Diagram

**CTRL-B:** Remove broken wires

**CTRL-H:** Enable context help (hover over components to get specific help)

# NI LabVIEW Certification Program: A Resume Enhancer?




Exams cost $$$; student discounts available
Certification must be renewed every 2 years
Test site here in Albuquerque
Need many months of LabVIEW experience before attempting CLAD

# About this seminar

Introduces many key subjects but material has been left out!

Sequence of exercises found on class website (panda.unm.edu)

Content developed with LabVIEW 2011 and 2012

Students work individually, but collaboration is OK.

Ask for help...any and all questions are allowed!

We will try to work through exercises together