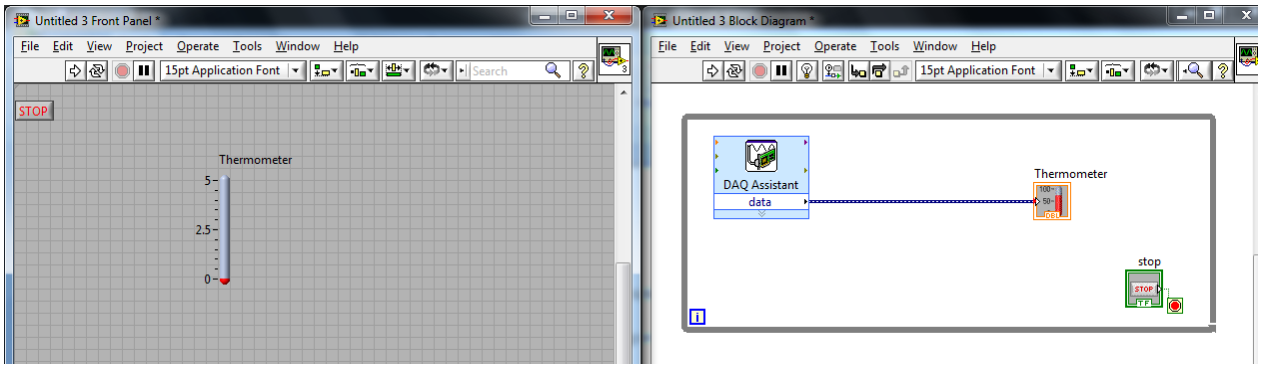
National Instruments LabVIEW 2010 software exercise #1

- Plug in USB-6008 DAQ unit into an available USB port on the PC
- Start LabVIEW 2010
- Double-check potentiometer and LED wiring on DAQ unit while LabVIEW starts up:
    - Pot wiper on AI0 terminal
    - One pot end on GND terminal (next to AI0)
    - Other pot end on terminal 31 (+5 volt DC supply)
    - Positive LED wire on terminal 17 (P0.0)
    - Negative LED wire on terminal 32 (GND)

- Intro: LabVIEW organizes all programming into two windows: the Block Diagram and Front Panel
    - Block Diagram – where all the "behind the scenes" function blocks are located to do the math and signal processing
    - Front Panel – where all the user controls and displays are located

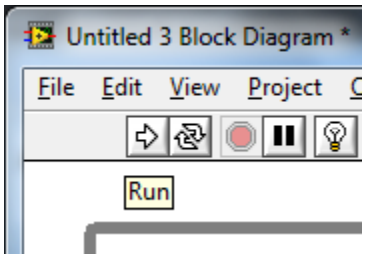


- Every Front Panel object will have at least one function block associated with it, which will appear in the Block Diagram window.
- Function blocks in the Block Diagram window are linked together with lines showing where signal values input (on the left-hand side of each block) and output (on the right-hand side of each block).
- The Block Diagram is where you do all the programming and math set-up to make a LabVIEW application ("virtual instrument" or .vi) do it's thing. The Front Panel is where the person using the application views and inputs data.

- After LabVIEW starts up, select “Blank VI” from splash screen window to begin
- “Tile” the Block Diagram and Front Panel windows so that they appear side-by-side (use the <Ctrl-T> hot-key combination to do this in Windows).
- Insert a “While Loop” in the Block Diagram window:
    - Right-click anywhere on white window space to pull up “Functions” menu
    - In Express, select “Exec Control”
    - Under Exec Control, select “While Loop”
    - Drag While loop to a larger size
    - *Every object we place inside the While loop will be repeatedly executed*
- Insert a “DAQ Assistant” function into the While loop:
    - Right-click to pull up Functions menu
    - In Express, select “Input”
    - Under Input, select “DAQ Assistant”
    - Place DAQ Assistant block inside the While loop
- Configure DAQ Assistant to pull data from the first analog input channel
    - In the “Create New Express Task” window, select “Acquire Signals”
    - Select “Analog Input”
    - Select “Voltage”
    - The window should now show all eight analog input channels on your USB-6008 DAQ device
    - Click on whichever channel you plan to use (e.g. *ai0*) and then click “Finish”
    - A new DAQ Assistant window will open, asking you to configure that channel:
        - Enter Signal Input Range of 0 to 5 volts DC
        - Select “RSE” Terminal Configuration (*Referenced Single-Ended*)
        - Select “1 Sample (On Demand)” for the Acquisition Mode. This tells the function to sample the input channel once for every execution.
        - Click “OK” button in the lower-right corner of the window to finish

- Place a Numerical Indicator on the Front Panel window:
    - Right-click anywhere on grey window space to pull up "Controls" menu
    - In Express, select "Numerical Indicators"
    - Choose an indicator style you personally like and place it into the Front Panel window
- Configure this numerical indicator for the proper signal range:
    - Right-click on the indicator graphic and select "Properties"
    - Under the "Appearance" tab, click the box for "Show Digital Display(s)"
    - Under the "Scale" tab, enter 0 and 5 as the min/max "Scale Range" parameters. This ensures the indicator graphic will be properly scaled to match the signal voltage acquired on the analog input channel.
- Connect the indicator function to the analog input function:
    - In the Block Diagram window, move the function for the numerical indicator to the right of the DAQ Assistant function. This numerical indicator block was placed into the Block Diagram automatically when you placed the indicator object in the Front Panel window.
    - Move the mouse pointer near the "data" output arrowhead on the DAQ Assistant block, and a "wire spool" will replace the regular mouse icon (arrowhead by default). Click the left mouse button and "draw" a connecting line to the data input arrowhead on the numerical indicator block.
    - The two blocks are now "connected" and ready to work!

- Run the LabVIEW application:
    - Click on the "Run" right-arrow icon button at the top of either the Block Diagram or the Front Panel window:



- Your "Virtual Instrument" application should now be running! Move the potentiometer and watch the numerical indicator show you the live voltage value in the Front Panel window!
- Click on the "Stop sign" icon button to halt the application
- *Troubleshooting???*