Exercise 10-1: Using High-Level I/O VIs/Functions

Goal

- Use high-level file I/O VIs and functions to write an array of acquisition data to a file.

Hardware Setup

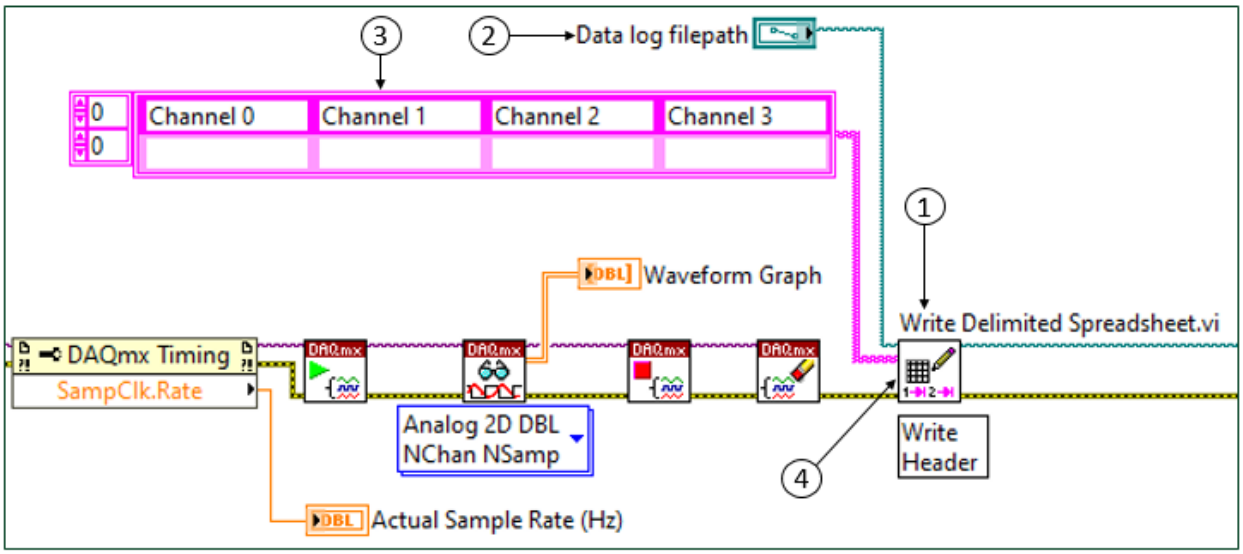
- BNC-2120—Set up the Temperature Reference, Thermocouple, and Sine Wave Function & TTL Square Wave Function inputs (ai0:3).
- Simulated—Set up ai0:3 of an analog input module.

Instructions

Finite Acquisition of *N*-Channels and *N*-Samples

1. Open the following project: `C:\Exercises\LabVIEW Core 1\ High-Level Write to File\High-Level Write to Text File.lvproj`.
2. From the **Project Explorer** window, open the High-Level Write to Text File – *N*-Channel VI.
3. Examine the VI.
   - Notice that the DAQmx Read VI is configured to read multiple samples from multiple channels as a 2D DBL array.
   - Notice that the DAQmx Timing VI configures this VI to perform a finite acquisition of *N*-samples per channel (**Number of Samples** control) at a defined sample rate (**Sample Rate** control).

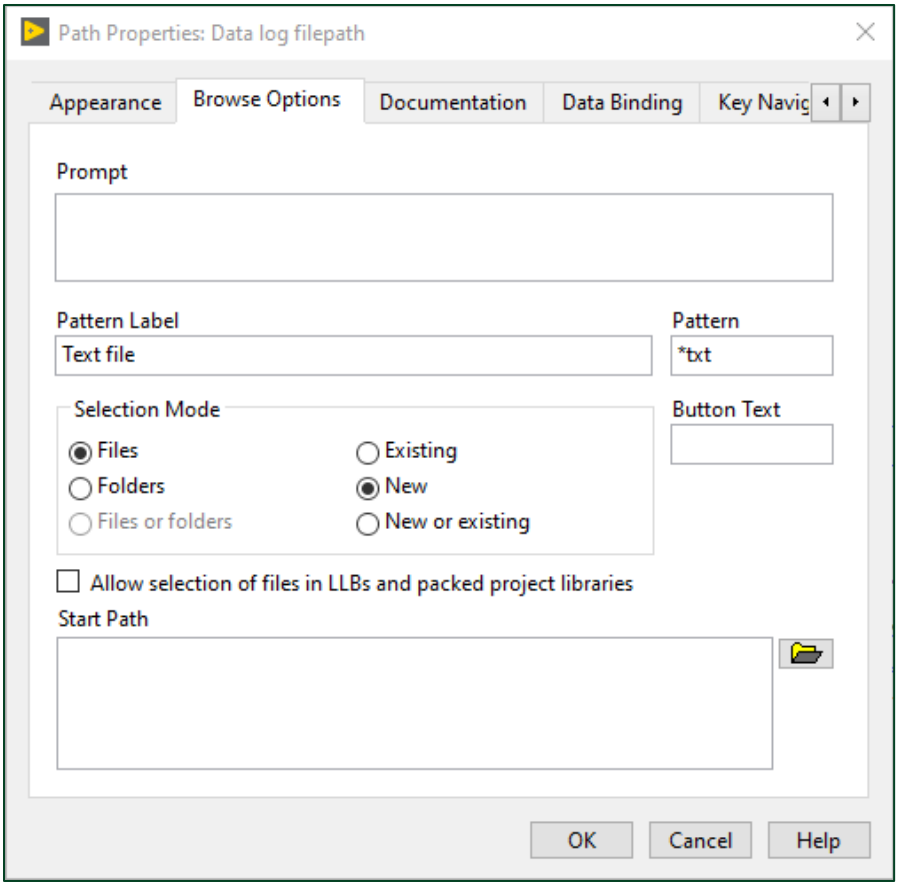
4. Modify the block diagram, as shown in the following figures, to write the acquisition data to a file.



---

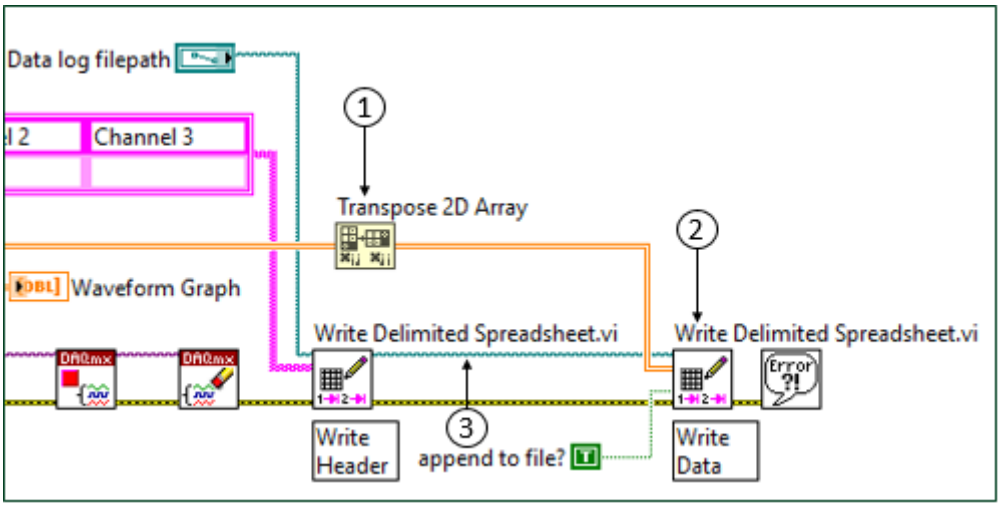
1. **Write Delimited Spreadsheet VI** – Use the first Write Delimited Spreadsheet VI to write the header to the file. Place the VI on the block diagram.
2. Right-click the **file path** input and select **Create Control**. Rename the control `Data log filepath`.
3. **String Array Constant** – Place an Array Constant on the block diagram. Create a String Constant and drag it into the Array Constant, which changes the Array Constant to a string array constant. Right-click the **array index**, select **Properties»Size**, and set **Dimensions** to 2. Resize the constant and set the values in the first row, as shown. Wire the constant to the **2D data** input of the Write Delimited Spreadsheet VI, which will adapt to the 2D string array data type.
4. Notice that the **append to file** input is unwired, so it will default to False. This means that if a text file already exists at the data log file path, this VI will overwrite any data in that file.

- Configure the **Data log filepath** control.
  - Switch to the front panel.
  - Right-click the **Data log filepath** control and select **Properties**.
  - In the **Browse Options** tab set the **Selection Mode** as shown in the figure below. This allows the user to browse to a new or existing file path where the user wants to save the log file.



  - Set **Pattern Label** to Text file.
  - Set **Pattern** to *txt.

- Refer to the following figure to transpose the 2D array to represent data by column instead of row and write numeric data to the file.

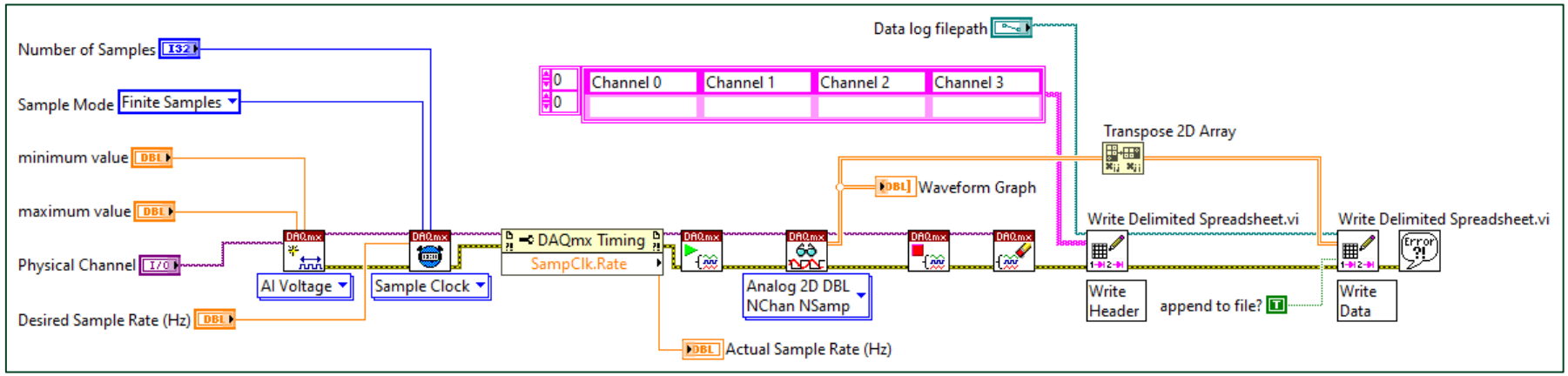


---

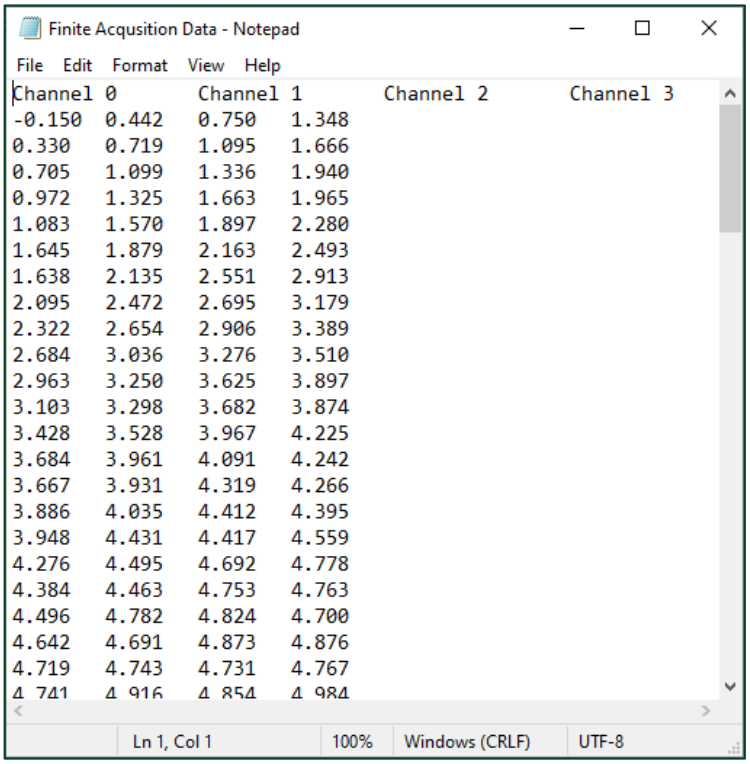
1. **Transpose 2D Array function** – Use this function to transpose the 2D array so that each channel's data is represented by a column instead of a row. In this exercise, this is how we want the spreadsheet file to show the data.
2. **Write Delimited Spreadsheet VI** – Use the second Write Delimited Spreadsheet VI to write the numeric data to the file. The previous Write Delimited Spreadsheet VI adds headers to the text file, and this Write Delimited Spreadsheet VI appends data to the file after the headers.
3. Wire the file path terminals between the two Write Delimited Spreadsheet VIs, as shown in the figure. This tells the second VI to write to the same file as the first VI.

---

5. Complete the wiring as shown in the following figure.



6. Create the text file.
   - On the front panel, set the **Physical Channel** control to the following values:
   - (**BNC-2120/Simulated Hardware**) PCI-6221/ai0:3
   - On the front panel, click the **…** button of the **Data log filepath** control. In the **Save As** dialog box, set the file path to `C:\Exercises\LabVIEW Core 1\High-Level Write to File\Finite Acquisition Data.txt`.
   - Run the VI.
7. Explore the text file created by this VI.
   - In the **Windows Explorer**, navigate to the data log file and double-click it to view the **contents**.
   - Notice the file includes a header describing each channel.
   - Verify that the log file looks similar to the following figure.



- Try opening the text file using Microsoft Excel. Verify that the log file looks similar to the following figure.

	A	B	C	D
1	Channel 0	Channel 1	Channel 2	Channel 3
2	-0.15	0.442	0.75	1.348
3	0.33	0.719	1.095	1.666
4	0.705	1.099	1.336	1.94
5	0.972	1.325	1.663	1.965
6	1.083	1.57	1.897	2.28
7	1.645	1.879	2.163	2.493
8	1.638	2.135	2.551	2.913
9	2.095	2.472	2.695	3.179
10	2.322	2.654	2.906	3.389
11	2.684	3.036	3.276	3.51
12	2.963	3.25	3.625	3.897
13	3.103	3.298	3.682	3.874
14	3.428	3.528	3.967	4.225

Your Turn

1. Use the LabVIEW Help to learn more about each node.
2. Experiment with the VI to better understand its functionality. For examples:
   - What is the effect on the log file if you modify the values in the 2D string array for the header text?

     _____
     _____
     _____
     _____

   - What is the effect on the VI if you remove the filepath input of the first Write Delimited Spreadsheet VI?

     _____
     _____
     _____
     _____

   - What is the effect on the VI if you remove the filepath input of the first Write Delimited Spreadsheet VI?

     _____
     _____
     _____

On the Job

1. Do any of your applications require logging data from an *N*-channel *N*-sample finite acquisition?

   _____

2. If so, how many channels? _____
   How many samples per channel? _____
   List the column header names below.

   _____
   _____
   _____
   _____
   _____
   _____
   _____

End of Exercise 10-1