Physics 306L: LabView Assignment 6

This assignment demonstrates resource management in LabView. The goal is to: i) read a data file on the Internet, ii) convert the data file to a 1-D array of floating point numbers, iii) write this 1-D array to a file on the local disk, iv) open the file and use its data in a summing For Loop, and v) write the new data to disk. This is implemented in two independent VIs.

WARNING: Data Socket operations are known to sometimes cause problems when LabView is run on the OSX operating system. Apple users may have to test their VIs on a Windows PC.

The file of interest is located at this URL:

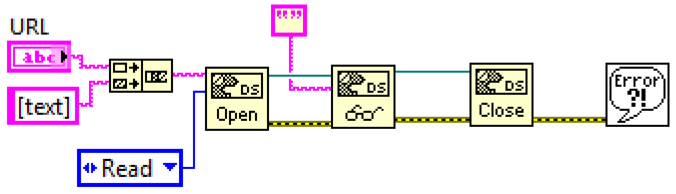
http://www.unm.edu/~mph/306/assignment6

The file can be accessed in LabView with a Data Socket, which should be open, read, and then closed.

Create a string control on the front panel and copy the entire URL above into it. The characters [text] must be appended to the URL string. This is performed with the Concatenate Strings function, which splices two strings together to make a single string of characters. The resulting string will be:

http://www.unm.edu/~mph/306/assignment6[text]

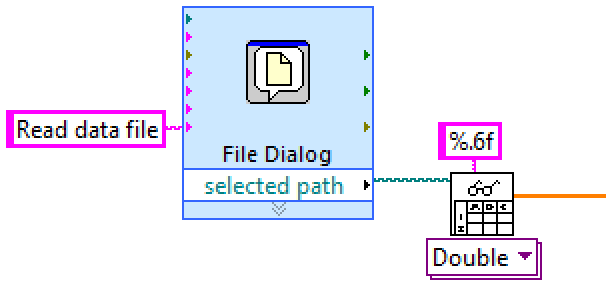
Wire this string to the **URL** input of Data Socket Open and configure the **mode** terminal for Read. Pass the **connection id** to Data Socket Read. This function must be instructed as to what type of data it is dealing with; wiring any string to the **type (Variant)** terminal defines the data type. In the diagram shown below, a blank string is used, but any string will work as the content is ignored. Close the resource when the read completes. With a working Internet connect, test the VI.



The data string is next converted to a 1-D array using the Spreadsheet String to Array function. In addition to the **spreadsheet string** from the Data Socket Read, this function needs formatting and configuration for a 1-D array (2-D is default). LabView has a powerful numeric formatting capabilities. Use the format syntax %.6f on the **format string** terminal. This specifies a floating point number with 6 digits of precision after the decimal point. Next, place an Array Constant on the Block Diagram. Create a DBL Numeric Constant and drop it into the Array Constant to define a 1-D array. Connect it to the **array type** terminal. This forces the function to produce a 1-D array of DBL floating point numbers.

A spreadsheet file can be created and written in a single, high-level operation using Write to Spreadsheet File.vi found on the File I/O palette. Wire the 1-D array data to the appropriate input and format as %.6f as before. When the VI is run, the user will be prompted to save a file to disk. Also save the working VI.

Open a blank VI and place Read from Spreadsheet File.vi on the Block Diagram. This high-level VI will be used to access the 1-D array file written above. It will deliver the data on the output terminal labeled **first row**. Set the format syntax to %.6f and wire the output into a For Loop. To setup a user prompt for opening the file, the Express VI File Dialog can be used:

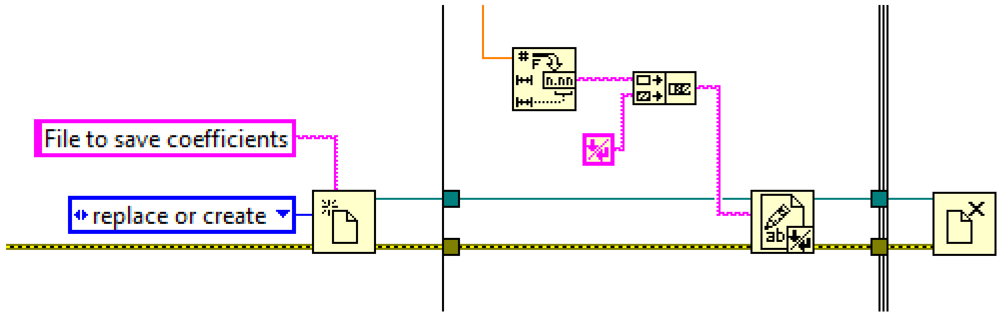


Following the procedure from Assignment 4, divide each term in the data file by i! where i is the iteration count of the For Loop. Sum the result of each iteration using a shift-register. Mathematically, the following finite series is being constructed:

$$\sum_{i=0} \frac{x_i}{i!}$$

If performed correctly, the series should sum to a value very close to 0.05.

Each term in the series should be written to a separate text file. This can be done when the For Loop exits, but it is often desirable to record data as it is being generated. From the File I/O palette, select the Open/Create/Replace File VI and place it outside the For Loop. Configure it to **replace or create** and add a custom user prompt. The **refnum** is wired to a Write to Text VI inside the For Loop. Each series term is a floating point number that must be converted to a text string using Number to Fractional String VI. The Concatenate Strings functions adds a Line Feed character to the end of each data point so the data is displayed in a single column; otherwise, a single continuous line of text would be written. When the For Loop exits, the file is closed as shown:



This VI is dealing with two files: one is being read and a second is written. To force the read operation followed by write, connect the **error out** cluster from the File Dialog Express VI to the **error in** terminal of the Open/Replace/Create File VI. Terminate the error cluster in both VIs with a Simple Error Handler.

Demonstrate and explain both VIs for the instructor.