How to Use the Signal Operation Y[i] = X[n-i] PtByPt Tutorial

Functions -> Signal Processing -> Signal Operation  -> Y[i] = X[n-i] PtByPt 

Start by opening up the Functions palette and selecting the Signal Processing sub-palette. Then open up the Signal Operation  sub-palette where you will find the Y[i] = X[n-i] PtByPt function  . Note that this is very similar to the Y[i] = X[i-n] PtByPt function so be careful not to mix them up.

The Y[i] = X[n-i] PtByPt function shifts the values supplied to its input terminal by a specified number of shift counts. The number of shift counts is determined by the input to the second terminal as is an I32 value. The input terminals to the function are shown in Figure 1.

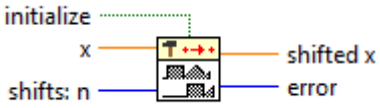

Figure 1

The output of the Signal operation PtByPt function is the values that enter the x input terminal shifted over by a nonnegative number n samples. In essence, the function simply outputs a delayed sequence of values defined by the input values.

You will notice that, because the function is a PtByPt operation, the value of the x input is a single numeric double type. This means that in order to use this function effectively, we will have to use this function in conjunction with a loop structure and with Auto Indexing.

For example, consider the following example in Figure 2 where we shift the input signal of a sine wave by 50 samples. In order to generate the sine wave, we first take 100 samples of the sine function with an offset of 0.01 represented by the first For Loop.

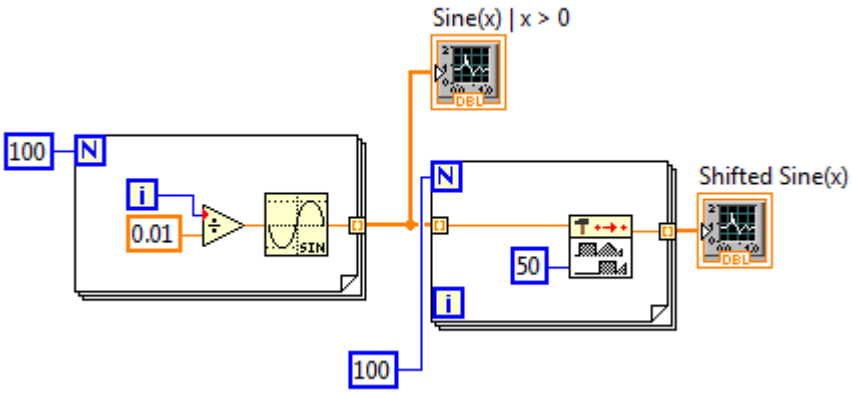

Figure 1

Remember that the Auto Indexing produces an array which becomes our waveform. In the next For Loop, we apply the Y = X[n-i] PtByPt function. Notice we also use Auto Indexing here to process each value individually. Since we want to shift the sine wave 50 samples, we connect 50 to the n input terminal in Figure 1. The result of this shift operation is shown in Figure 3.

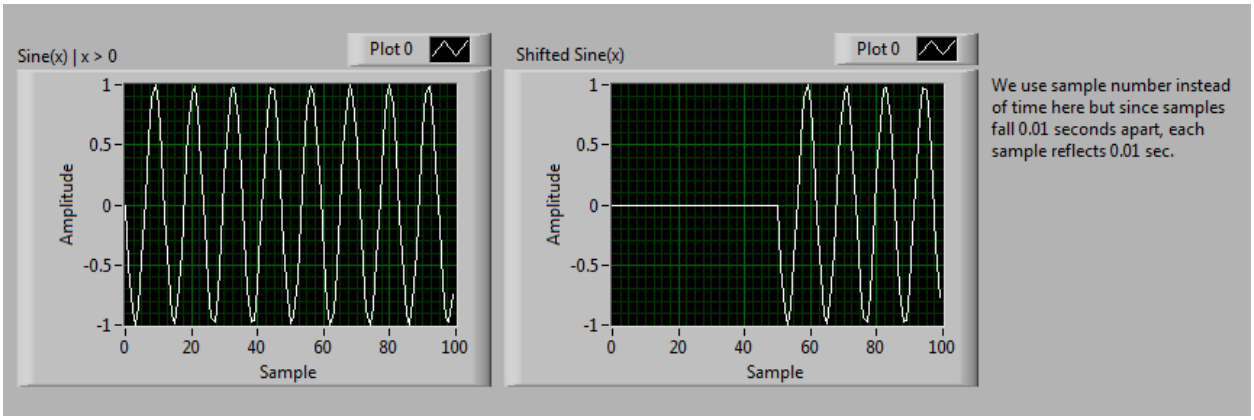

Figure 3

Notice how the initial 50 samples of the shifted output sine signal are zero.

In addition, we will notice that the behavior of the Y[i] = X[n-i] PtByPt function is analogous to using a shift register bank of 50 outputs and wiring the 50th register element as the output. Figure 4 demonstrates this analogous behavior with a sample delay of 10 samples.

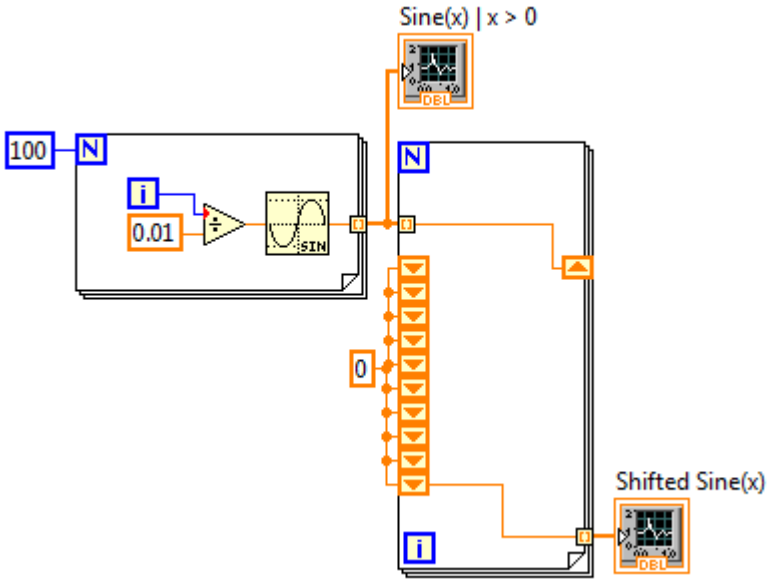

Figure 4

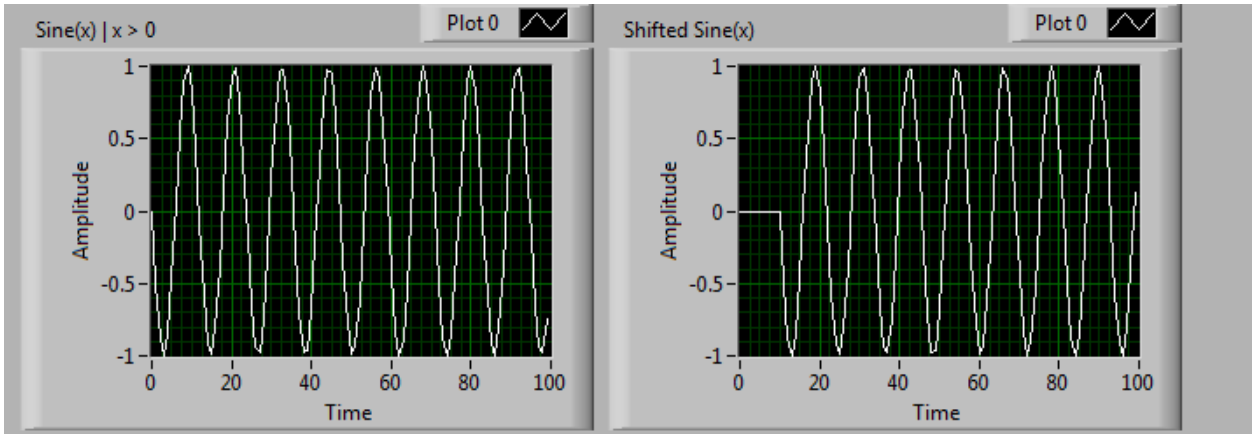

Figure 5

We will notice that the behavior is identical in Figure 5 except for the shift value.