



How to Use a Feedback Node Tutorial

Functions -> Programming -> Structures  -> Feedback Node 

The Feedback Node structure behaves similarly to a Shift Register. However, the Feedback Node is used explicitly to take a value from the output of a function and use it to modify the input to the function on the next iteration.

To create a Feedback Node, start by opening the Functions palette and selecting the Programming


sub-palette. Select the Structures  palette where you will find the Feedback Node structure



Figure 1

You will notice that when initialized the Feedback Node structure composes of the input terminal on the right side and the output terminal on the left side. This is because a value that was computed $x(n)$ is being used to compute the next value $x(n+1)$ so the computed value $x(n)$ needs to enter the flow of data at an earlier time in the pipeline.

Note that the Feedback Node is only useful when placed in a loop structure because it saves values across iterations.

You will also notice there is an input on the bottom of the Feedback Node structure which is labeled Initializer Terminal. This is the input terminal for the first value that the Feedback Node supplies. The position of this terminal can be moved to the edge of the loop structure by right clicking the Initializer Terminal portion of the Feedback Node and selecting "Move Initializer One Loop Out" as shown in Figure 2. This will allow you to use an input external to the loop as an initial value.

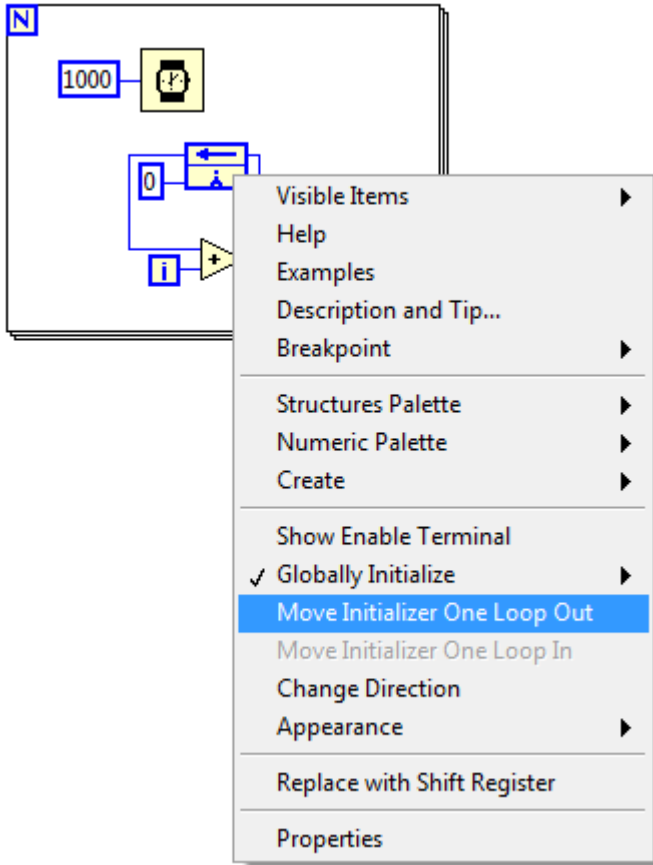


Figure 2

Now consider the following example that computes the value of $x(n)$ which is defined by the recursive sequence $x(n) = x(n-1) + n$ with $x(0) = 0$. We will notice that the Feedback Node saves the sum and feeds it back to the adder function for the next iteration, and that the Feedback Node is initialized to zero because $x(0) = 0$.

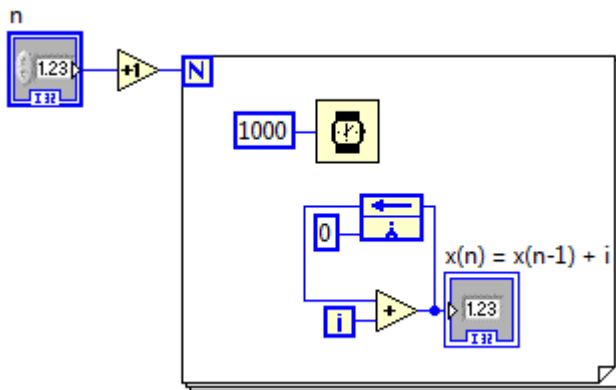


Figure 3

If we trace the output of this example, we will recognize that the Feedback Node behaves the same as a Shift Register. Furthermore it is possible to directly replace the Feedback Node and Shift

Registers by right-clicking on the Feedback Node and selecting “Replace with Shift Register” or right-click on the Shift Register and selecting “Replace with Feedback Node” as shown in Figures 4 and 5.

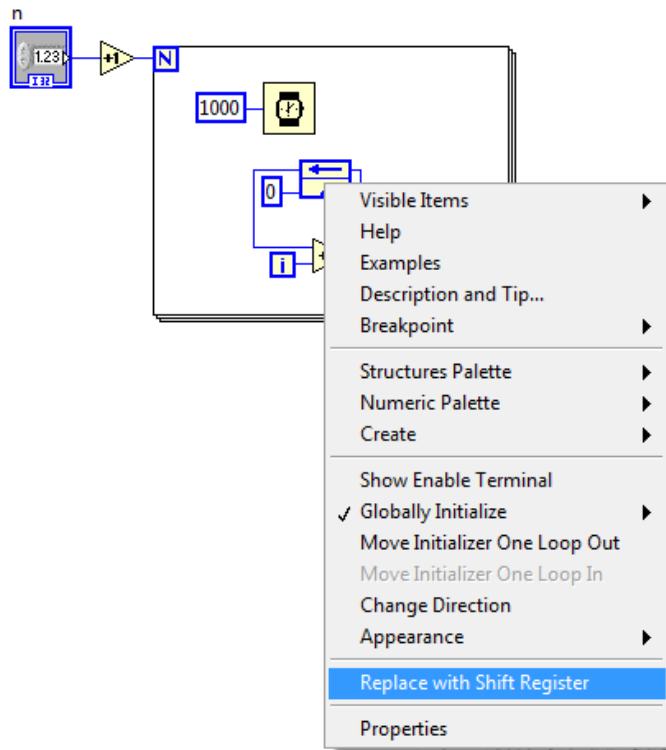


Figure 4

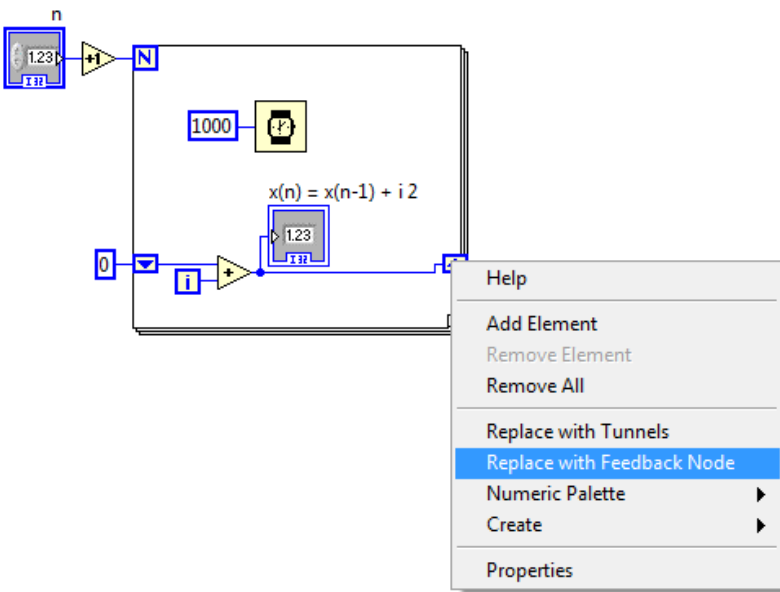


Figure 5

We will notice that once rewired, the Feedback Node driven loop and the Shift Register Driven loop perform the same operation. The two loops are shown in Figure 6.

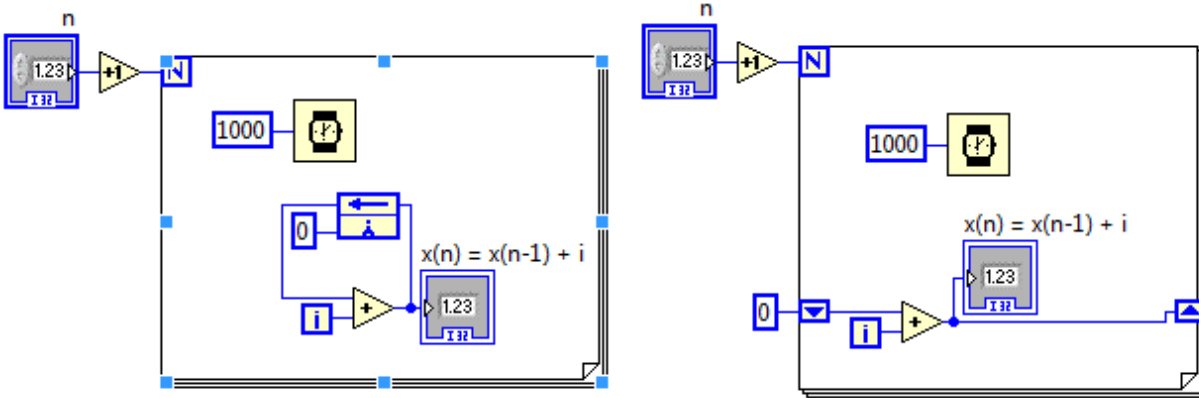


Figure 6

Notice that the equivalent to initializing the Feedback Node to zero is initializing the Shift Register to zero and that the only other difference is the wiring to the adder terminals.