For Loops versus While Loops

Goal

Identify when to use a While Loop and when to use a For Loop. Then, build an example using both.

Description

For the following scenarios, decide whether to use a While Loop or a For Loop.

Scenario 1

Acquire data in a loop that executes once per second for one minute.

1. If you use a While Loop, what is the condition that you need to stop the loop?

2. If you use a For Loop, how many iterations does the loop need to run?

3. Is it easier to implement a For Loop or a While Loop?

Scenario 2

Acquire pressure data until the pressure is greater than or equal to 1400 psi.

1. If you use a While Loop, what is the condition that you need to stop the loop?

2. If you use a For Loop, how many iterations does the loop need to run?

3. Is it easier to implement a For Loop or a While Loop?

Scenario 3

Perform a repeated calculation for a number of iterations defined by a front panel control.

1. If you use a While Loop, what is the condition that you need to stop the loop?

2. If you use a For Loop, how many iterations does the loop need to run?

3. Is it easier to implement a For Loop or a While Loop?

Scenario

Build a VI to enact Scenario 1 described above. Create a loop which will simulate acquiring data once per second for one minute using both a While Loop and a For Loop.
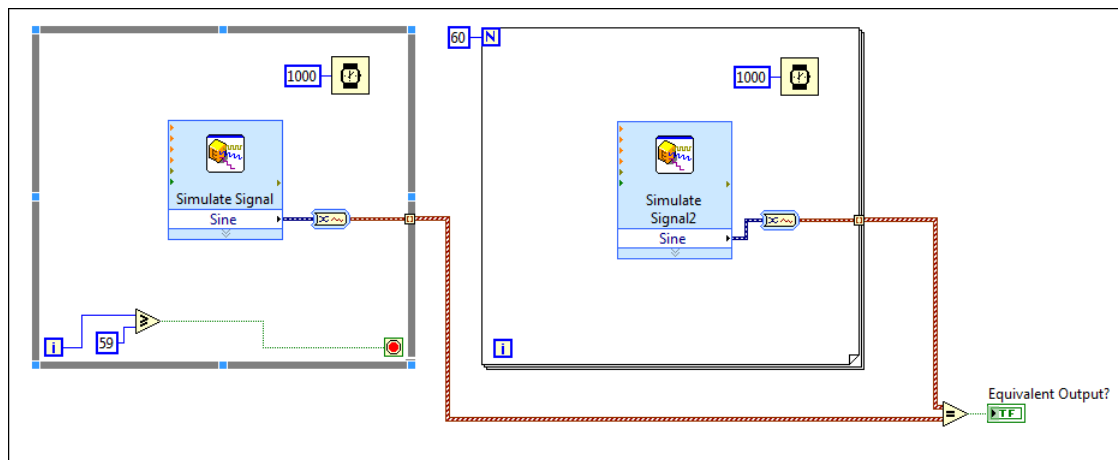
Design

The finished VI is shown in Figure 1.

Figure 1. Simulate Data VI Block Diagram

Implementation

The files that you need to complete this exercise are here:
`<NI eLearning>\LV Core 1\For Loops\Exercise`.

1. Open a blank VI.

2. Save the VI as `Simulate Data.vi` in the `<Exercise>` directory.

3. Place a While Loop.

    ❑ Add a **While Loop** to the block diagram.

4. Define the period for each iteration of the loop.

    ❑ Add a **Wait (ms)** function to the block diagram inside the loop.

    ❑ Right-click the milliseconds to wait input and select **Create» Constant**.

    ❑ Enter the value `1000`.

5. Define the condition to end the loop.

❑ Add a **Greater Or Equal?** function to the block diagram inside the loop.

❑ Wire the iteration terminal to the **x** input of the Greater Or Equal? function.

❑ Right-click the **y** input and select **Create»Constant**.

❑ Enter the value 59.

❑ Wire the output of the Greater Or Equal? function into the conditional terminal.

6. Define the action for the loop to perform.

❑ Add a **Simulate Signal Express VI** to the block diagram inside the loop.

❑ When the dialog window appears, leave all values default.

❑ Click **OK**.

❑ Add a **Convert from Dynamic Data Express VI** to the block diagram inside the loop.

❑ When the dialog window appears, select **Single waveform** from the Resulting data type list.

❑ Click **OK**.

❑ Wire the output of the Simulate Signal Express VI into the Convert from Dynamic Data Express VI.

❑ Wire the output of the Convert from Dynamic Data Express VI to the edge of the While Loop.

❑ Right-click the tunnel which appears and select **Enable Indexing**.

7. Make a copy of the While Loop.

❑ Select the While Loop, hold <Ctrl>, and drag the selected code to the right.

8. Change the new loop to a For Loop.

   ❑ Right-click the new loop and select **Replace With For Loop**.

   ❑ Move the numeric constant which is connected to the Greater Or Equal? function outside of the For Loop.

   ❑ Wire the constant into the count terminal of the For Loop.

   ❑ Change the value of the constant to 60.

   ❑ Delete the Greater Or Equal? function from the For Loop and delete the broken wires.

9. Compare the results of the two loops.

   ❑ Add an **Equal?** function to the block diagram.

   ❑ Wire the output of the For Loop to the x input of the Equal? function.

   ❑ Wire the output of the While Loop to the y input of the Equal? function.

   ❑ Right-click the Equal? function and select **Comparison Mode» Compare Aggregates**.

   ❑ Right-click the output of the Equal? function and select **Create» Indicator**.

   ❑ Rename the indicator Equivalent Output?.

Test

1. Run the VI.

2. The VI will run for 60 seconds.

3. When the VI is finished, check the indicator on the front panel to determine whether the two loops generate equivalent data.

4. Save the VI and close it when you are finished

Answers

Scenario 1

Acquire data every second for one minute.

1. While Loop: Time = 1 minute

2. For Loop: 60 iterations

3. Both are possible.

Scenario 2

Acquire pressure data until the pressure is 1400 psi.

1. While Loop: Pressure = 1400 psi

2. For Loop: unknown

3. A While Loop. Although you can add a conditional terminal to a For Loop, you still need to wire a value to the count terminal. Without more information, you do not know the appropriate value to wire to the count terminal.

Scenario 3

Perform a repeated calculation for a number of iterations defined by a front panel control.

1. While Loop: Iterations = value of the control

2. For Loop: Defined by the front panel control

3. Both are possible.

End of Exercise

Notes