

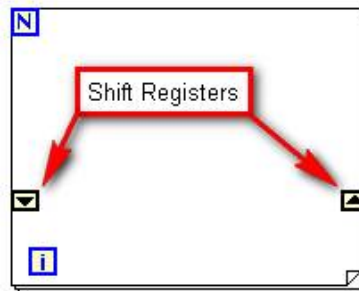
Basic LabVIEW

Tutorial: 1 2 3 4 5 6 7 8 9 10 11

Shift Registers

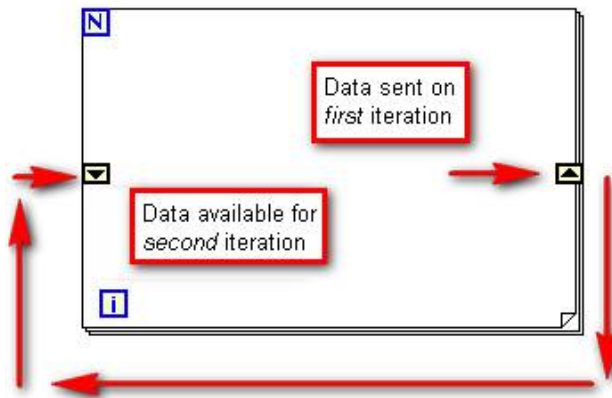
Many times you will be creating a program with loops and you need to use data from the previous iteration. As an example, say you are writing a program that will move the NXT robot counting the number of times a particular object is found on the ground as you move around the four corners of the room. A for loop going from 0 to 3 works for the 4 corners but you need to retain the counter as the object is found.

In LabVIEW, you can use shift registers, which allows you to pass a value from one to the next iteration. If you know programming languages such as C++ or JAVA you may be familiar with static variables which are used to pass values from one loop iteration to the next.




Above is a block diagram showing what you are going to create in LabVIEW.

Data comes into the loop by way of the shift register on the left side of the for loop and is passed to the next iteration of the loop through the shift register on the right side of the for loop. Below is another diagram that shows more detail about the passing of data in the shift register.



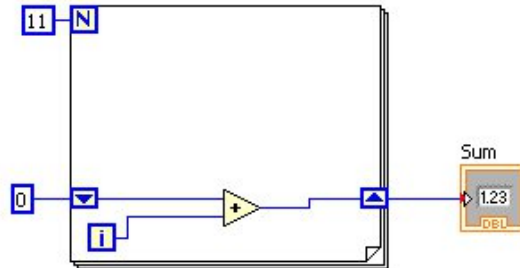
Now we are going to write a LabVIEW program that will calculate the sum of the numbers from 1 to 10 using a shift register in a for loop. If you know C++ or JAVA here is the same program in C++.

```
int i, n, sum;
n=11;
sum=0;
for (i=0; i<n; i++)
{
    sum = sum + i;
}
cout << sum << endl;
```

1. Start with a blank VI and add a for loop over in the block diagram.
2. Now we are going to add the shift register to the for loop. Move the cursor to the left border of the for loop. If you are slow enough when you are moving the cursor the words "for loop" will come up. Right click as soon as you are on the border. You will know that you are in the right location because a set of operations for the for loop will be there instead of the function palette. Select "Add Shift Register"
3. The sum must start off at zero and then add 1, then add 2, and so on until we reach 10. To initialize the shift register you right click on the left shift register and create a constant with zero in it. To do that right click in the block diagram and select Express --> Arithmetic and Comparison --> Express Numeric and drag the "Num Constant" icon to the left of the shift register. Wire the constant into the shift register.
4. Remember that for loops in LabVIEW go from 0 to N-1 where N is the value in the count terminal which looks like this: . Now you want to set the count terminal to 11 because you want the numbers from 0 to 10. Move the cursor up next to the count terminal, right click and select "create constant". Set the constant to 11.



5. The iteration terminal of the for loop, which looks like the icon above, provides the current loop count going from 0 to 10 and will change every time through the loop. We want the value from the shift register, which will have the previous sum of numbers added to the count terminal giving us the current sum. As an example, say we have been through the loop 4 times and it has summed $0+1+2+3$ which is 6. We are going to add together the 6 plus the current count terminal, which will have the value of 5 in it, giving 11. To do this add an "addition" function to the block diagram, wire the shift register on the left side of the for loop to one input and the count terminal to the other input. Wire the output to the shift register on the right side of the for loop.
6. Now we have the for loop calculating the sum of 0..10 but we need to print that sum after the loop has finished. To do that we add an indicator outside of the for loop to the right of it and wire the shift register on the right side of the for loop to this indicator.
7. You have a very basic loop with a shift register and you want to make sure that when it is run it produces the output of 55 since the sum of the numbers from 0..10 is 55. If you want to see what your program should look like, below is a version of the program. Yours may be different with wired and nodes in different locations.



In one of the exercises in this tutorial there is a program to compute the square root of a number and that will use a shift register in a while loop. The while loop is used for this problem because we will compute a new estimate of the square root from the value computed in the previous iteration and pass the new value in the shift register.

◀ Previous Next ▶

© 2011 National Instruments. All rights reserved. Return to LabVIEW Training on ni.com/stem-education.