NATIONAL INSTRUMENTS

Exercise: Arrays, Clusters, and Text-Based Nodes

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Overview

This exercise will walk you through creating arrays and clusters. You will then be able to see how to use arrays and clusters with Formula Nodes and MathScript nodes.

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Goal

Understand the basic behavior of MathScript and Formula Nodes, as well as clusters and arrays.

Description

This exercise consists of a series of tasks in which will walk you through how clusters and arrays can be manipulated and controlled. MathScript and Formula Nodes will also be used to perform mathematical operations.

Arrays, Clusters, and Text Based Nodes
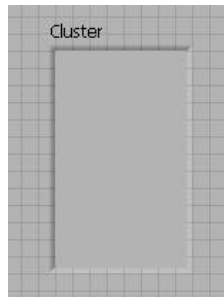
1. Launch LabVIEW and open a blank VI.

   Select **File»New VI**.
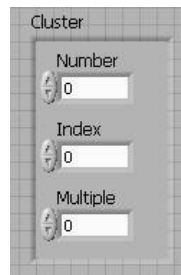
2. Open the front panel.

3. Place a cluster control on the front panel.

   Select **Modern»Array, Matrix & Cluster»Cluster** from the **Controls** palette.
   Place the cluster on the front panel by clicking and holding the cluster on the front panel and then creating a box shape with the mouse.

4. Place three numeric controls in the cluster and label the controls Number, Index, and Multiple, respectively, as shown in the following front panel.

5. Place two array controls on the front panel and label them Original Array and New Array, as shown in the following front panel.
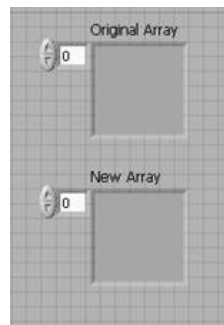
6. Place a numeric control in **Original Array**.

   Select **Modern»Numeric»Numeric Control** from the controls palette and place it within the **Original Array** structure.
   Resize the array to seven elements by hovering the mouse on the right side of the array until the double arrows appear, and then clicking and dragging the array out to seven elements, as shown in the following front panel.


   Initialize the array by double clicking the last element, entering a value of 0 and pressing the <Enter> key.

7. Place a numeric indicator in **New Array**.

Select **Modern»Numeric»Numeric Indicator** from the controls palette and place it within the New Array structure.

Resize the array to seven elements by hovering the mouse on the right side of the array until the double arrows appear, and then clicking and dragging the array out to seven elements.

8. Place a numeric indicator on the front panel and label it 5th Element, as shown in the following front panel.
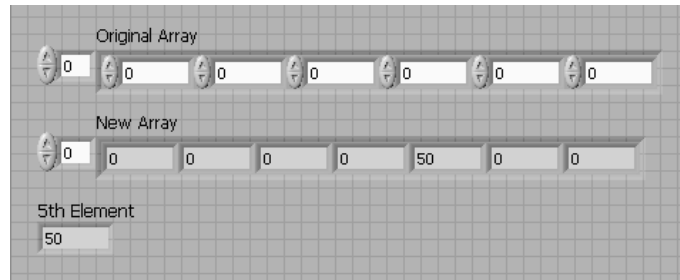

9. Select **Window»Show Block Diagram** to switch to the block diagram.

10. Place a While Loop structure on the block diagram.

11. Drag all of the elements currently outside the while loop to inside the While Loop.

12. Right-click the conditional terminal of the While Loop and select **Create»Control** from the shortcut menu.

13. Place an Unbundle by Name function inside the While Loop.

14. Place a Replace Array Subset function inside the While Loop.

15. Wire the output of **Cluster** to the input of the Unbundle by Name function.

Resize the Unbundle by Name function so that there are three elements.
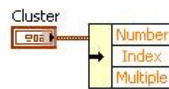
16. Place a MathScript Node on the block diagram inside the While Loop.
Inside the MathScript Node, enter z = x*y;.

17. Create inputs and output for the MathScript Node, as shown in the following block diagram.

Right-click the left side of the structure and select **Add Input** from the shortcut menu.
Label this input x.
Right-click the left side of the structure and select **Add Input** from the shortcut menu.
Label this input y.
Right-click the right side of the structure and select **Add Output** from the shortcut menu.
Label this input z.
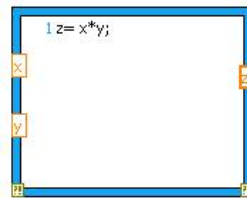
18. Place a Formula Node on the block diagram inside the While Loop to the right of the MathScript Node.

Inside the Formula Node, enter s = t[4];.

19. Create input and output for the Formula Node.

Right-click the left side of the structure and select **Add Input** from the shortcut menu.
Label this input t.
Right-click the right side of the structure and select **Add Output** from the shortcut menu.
Label this input s.
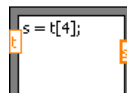
20. Wire the block diagram as shown in the following screenshot.

Wire the **Number** output of the Unbundle by Name function to the **x** input of the MathScript Node.
Wire the **Multiple** output of the Unbundle by Name function to the **y** input of the MathScript Node.
Wire the output of the Original Array control to the **array** input of the Replace Array Subset function.
Wire the **Index** output of the Unbundle by Name function to the **index** input of the Replace Array Subset function.
Wire the **new array** output of the Replace Array Subset function to the input of the **New Array** indicator.
Wire the **z** output of the MathScript Node to the **new element** input of the Replace Array Subset function.
Wire the **new array** output of the Replace Array Subset function in to the **t** input of the Formula Node.
Wire the **s** output of the Formula Node to the input of the **5th Element** indicator.
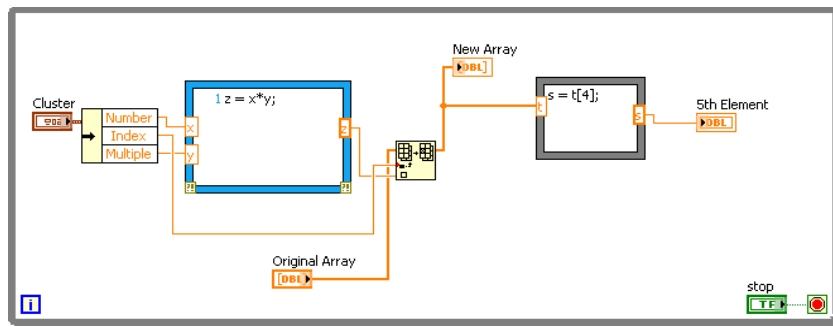
21. Select **Window»Show Front Panel** to switch to the Front Panel.

22. Enter the value 5 into the **Number** input, 3 into the **Index** input, and 20 into the **Multiple** input.

23. Run the VI. Note how the value in the specified index is changed to the value outputted by the MathScript Node. Also note how the Formula Node returns the fifth element of the array.

24. Press the **STOP** button.

25. Close the VI.

END OF EXERCISE

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