Lab #8 LabView Structures

Introduction:
LabView program contains a lot of structures; between all of them we are interested in three only which are "For loop structure, While loop structure and Case structure". The following paragraph will give a simple illustration about these structures.

For Loop
Executes its subdiagram N times, where N is the value wired to the count (N) terminal. The iteration (i) terminal provides the current loop iteration count, which ranges from 0 to N-1. The count starts at zero.

Example

This loop will execute five times. The terminal i starts at zero and will increment at each iteration of the loop till it reaches 4 and then stop.

While Loop
The While loop is a conditionally executing loop. It will continue to execute until told to stop or will stop unless told to continue running. A Boolean condition needs to be wired to the stop (run) terminal.

Example

Both loops will execute six times. In the first loop the iteration terminal is compared to five and when the two are equal the loop will finish. The second loop will continue running until the iteration terminal equals five.
Case Structure
The Case structure will run a particular dependent upon the input to the Case Selector. Any data-type can be wired to this terminal and the Selector Label will reflect the data-type. The first example shows a Boolean input to the case selector with two cases: True and False, available to be executed. The second example shows a numeric input, with the cases labeled 0, 1 and 2 and a default (assigned to be the same as the 0 case). If the case structure has an output terminal then each case must assign a value (of the same data-type) to that terminal.

Example

Examples:

1) Connect the following circuit in the block diagram window and then run the project:

The numeric output will change as the following: 0, 1, 2, 3, 4, 5, 6, 7, 8, and then 9.

**But we will see the final result only which is 9 why?**

Simply because the change between frames is so fast and we will not be able to notice it. So we need to do some modifications to this block diagram to see the counting from 0 to 9. The modifications are done in the next example.
2) Connect the following circuit in the block diagram window and then run the project:

We used the tool `wait(ms)` so that we can see the change in the iteration (i). Now the numeric output will change as the following: 0, 1, 2, 3, 4, 5, 6, 7, 8, and then 9 with 500 msec between each change.

3) Use for loop structure to make a flasher and then control the flashing speed of this flasher.

**Output:**
Control Panel:
Front Panel:

4) Use for loop structure to make a flashing wave on five leds and then control the flashing speed of this flashing wave.

Output:
Control Panel:
Front Panel:

5) Connect the following circuit in the block diagram window and then run the project:

The numeric output will change as the following: 0, 1, 2, 3, 4 and then 5 with a delay of 1000 msec.
6) Use while loop structure to make a flasher and then control the flashing speed of this flasher.

Output:
Control Panel:

Front Panel:
7) Use while loop structure to make a flashing wave on five leds and then control the flashing speed of this flashing wave.

**Output:**
Control Panel:

![Control Panel Diagram](image1)

Front Panel:

![Front Panel Diagram](image2)
8) Use the case structure to choose between two graphs: triangular and sine, then control the amplitude and the frequency of both graphs.

Output:
Control Panel:

Front Panel:
9) Create a simple case structure application to add, subtract or multiply two numbers and then show the result on an indicator.

**Output:**
Control Panel:

![Control Panel Diagram]

Front Panel:

![Front Panel Diagram]
**Exercise**

You are asked as a Control Engineer to design a system with the following description:

- The system consists of a flashing wave containing four leds.
- Also the system has 3 different types of control; which are speed control, direction control, and mode control.
- Speed control is to control the speed of the flashing wave.
- Direction control is to control the direction of the flashing wave (there are two possible choices Left & Right).
- Mode control (there are two possible choices single or double mode).

The following table gives more illustration:

<table>
<thead>
<tr>
<th>Single Mode and Right Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image 1" /></td>
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<table>
<thead>
<tr>
<th>Single Mode and Left Direction</th>
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<tbody>
<tr>
<td><img src="image2.png" alt="Image 2" /></td>
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<tr>
<td><img src="image3.png" alt="Image 3" /></td>
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<table>
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<th>Double Mode and Left Direction</th>
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<tbody>
<tr>
<td><img src="image4.png" alt="Image 4" /></td>
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And the speed control is to control the flashing speed in any one of these modes. Use LabView program to build this design?