Preparing for the Certified LabVIEW Associate Developer (CLAD) Exam

Note: Use his preparation guide if you are planning to take the CLAD exam on or after February 1st, 2020.

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CLAD Question Format & Style

- Question format.
  - Multiple choice, application based (not just memory).
  - Graphical - questions/answers may contain screenshots of VIs, functions, controls and indicators.
- Question style.
  - Given a scenario, determine the best function/method for solving the problem or for completing the functionality.
  - Given a block diagram, predict the outcome.

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Preparation Resources

- CLAD Exam Preparation Guide
  - Preparation guide includes a set of example questions.
  - Use these to understand scope of exam, type of questions.
  - Study the areas covered by the example questions (these are not a sample exam).
- LabVIEW Key Topics Review
  - Use this slide deck to review important LabVIEW topics. Two versions available.
- Fundamentals of Data Acquisition Using NI-DAQmx
  - Use this slide deck to review key data acquisition concepts.
  - Topics include: fundamentals of data acquisition, programming with the DAQmx functions.
- The Daily CLAD Blog
  - Additional practice questions.

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Overview of Topics

- Hardware (10% of exam questions)
- LabVIEW Programming Environment (25% of exam questions)
- LabVIEW Programming Fundamentals (50% of exam questions)
- Programming Best Practices (15% of exam questions)

Note: All sections draw on data acquisition familiarity with DAQmx to some extent.

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Example Questions

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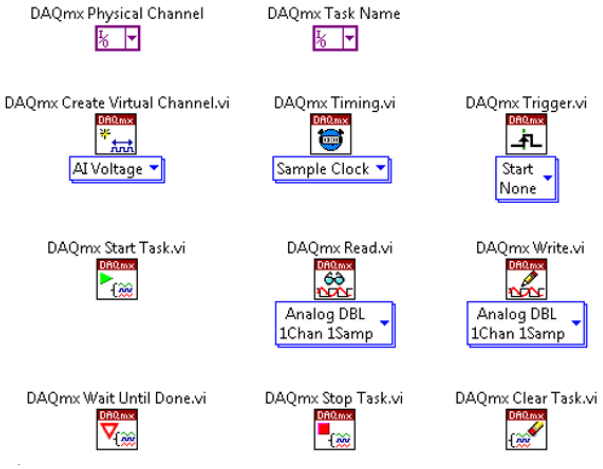
Hardware

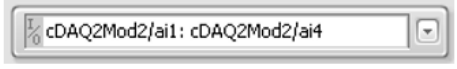
Must Know How to Use Hardware

Be familiar with the DAQmx functions



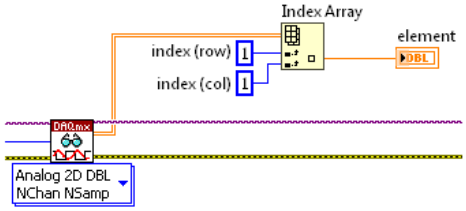
Example:

Q2: The DAQmx Read VI is set up to read these channels:



Which VI snippet will correctly extract and display all the data from channel ai2?

A:



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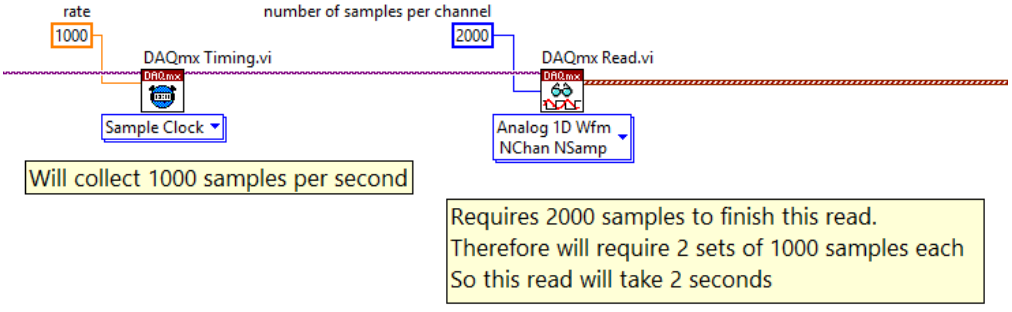
Hardware

Sampling & Timing

- Ratio of **Number of Samples Per Channel** (Read VI) and **Rate** (Timing VI) determines how long **Read** will take to complete an iteration



  - **Important**: Notice the **DAQmx Read** does not need to be in a loop to complete collection of both sets of samples. This is handled within the DAQmx.

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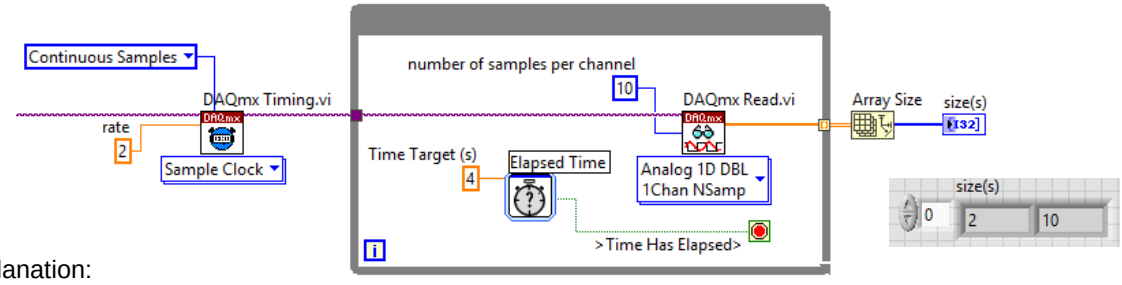
Hardware

Sampling & Timing

Example Question: What will show in the **size(s)** array indicator after the VI runs?



Explanation:

- 2 rows, because:
  - At start of first loop iteration, time has not elapsed, so DAQmx runs and loop runs a second time. Takes apx 5 seconds (10/2)
  - At start of second loop iteration, time has elapsed so DAQmx runs to completion but loop does not run a third time.
- 10 columns, one for each sample the DAQmx collects each time it runs

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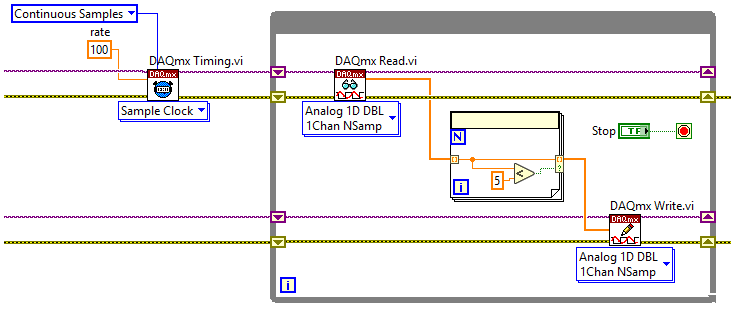
Hardware

Sampling & Timing

- Parallel data in same loop must be acquired at same speeds.
- Example VI does not meet this criteria and may produce an error.



Explanation:

- Conditional loop may not output a value for each input value from the DAQmx Read.
- → DAQmx Write may receive fewer values than the DAQmx Read puts out.

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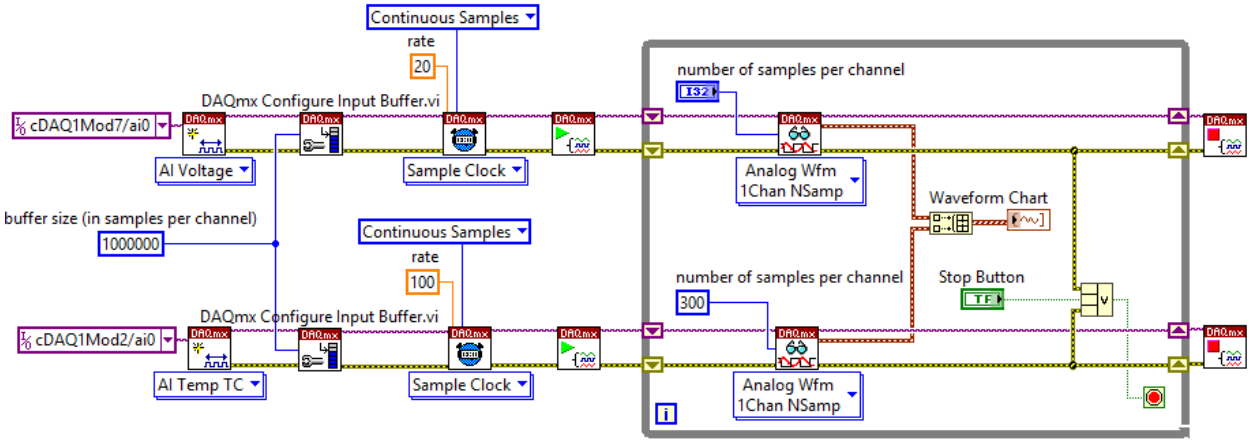
Hardware

Sampling & Timing

What value must be entered in the **number of samples per channel** control for this VI to execute continuously until the **Stop Button** is pressed?



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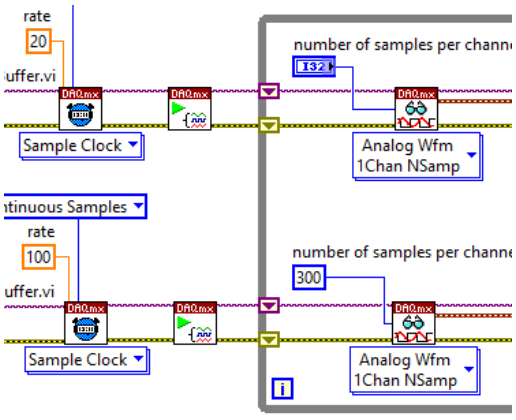
Hardware

Sampling & Timing



- Parallel data in same loop must be acquired at same speeds
- → Same Ratio of the Number of Samples Per Channel to Rate (Timing VI)
  - Bottom DAQmx Read takes 3 seconds to complete (300/100)
  - → Top DAQmxRead VI must also take 3 seconds to complete
  - → Top **Number of samples per channel** must be 60 (rate x 3)

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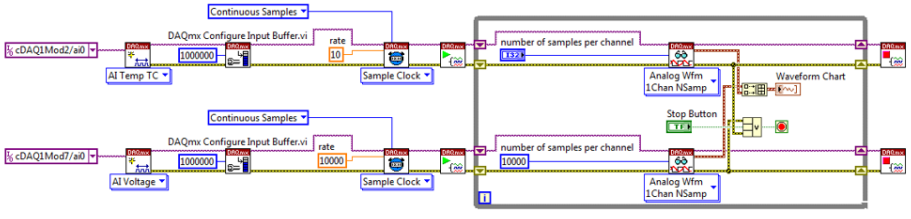
Hardware

Sampling & Timing

Q6: What value must be entered in the **number of samples per channel** control for this VI to execute continuously until the **Stop Button** is pressed?



A: 10 ⬅

B: 1000

C: 10000

D: 1000000

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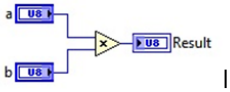
LabVIEW Programming Environment

Data Types

The value in Control **a** is 2 and in Control **b** is 128.

What value does the **Result** indicator display after the VI executes?



A	-128
B	0
C	255
D	256

Careful! This is a U8.
So… if we exceed the limit of a data type…

- The integers shown are unsigned 8-bit integers.
- The range for 8-bit integers is 0-255.
- The product of 2 times 128 is 256.
- 256 is 1 larger than the allowable 255,
- Thus 256 wraps to 0.

Our point is to make sure that you are aware of the data types that wrap.
So think about… what if these were I8? Or another data type?

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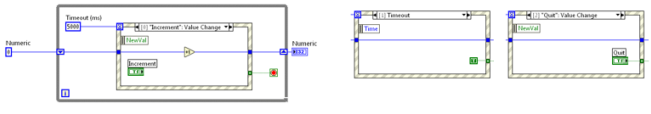
LabVIEW Programming Environment

Dataflow

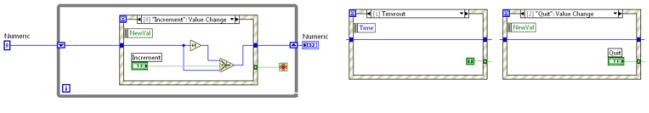
Q1: Your VI must count the number of times the Increment button is pushed between when the Run arrow and the Quit button are pressed.

All Event Cases are shown. Which code best meets these requirements?

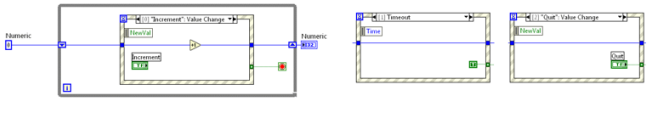
A:



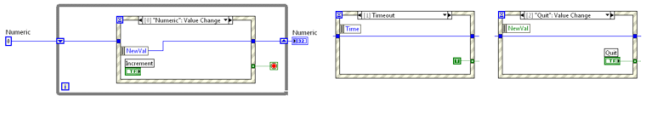
B:



C:



D:



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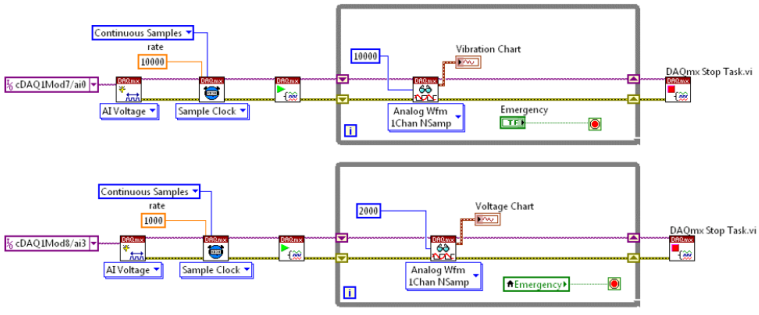
LabVIEW Programming Environment

Dataflow

Q6: After the chart has begun updating, the Emergency button is pressed. The VI will:



1: Stop in less than 1 second.

2: Stop in less than 2 seconds.

3: Stop in less than 4 seconds.

4: Become unresponsive until aborted.

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LabVIEW Programming Environment

Troubleshooting & Error Management

- Given an error situation, select the most appropriate method to:
  - handle/manage the error
  - debug the error

For example…

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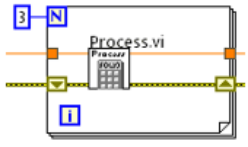
LabVIEW Programming Environment

Troubleshooting & Error Management

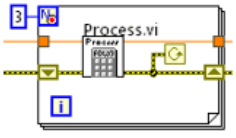
Q4: If SubVI Process.vi generates an error, your VI should clear the error and retry the SubVI two more times to give it a chance to succeed.

Which of the following VIs best meets these requirements?

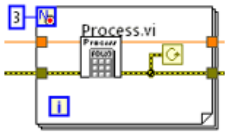
A:



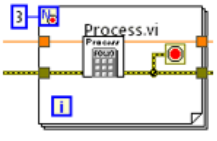
C:



B:



D:



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LabVIEW Programming Fundamentals

Loops

- Select a While Loop or a For Loop for the most appropriate looping structure.
- Predict behavior of a VI that uses one or more loops.
  - With shift registers
    - Initialized
    - Un-initialized
  - With other terminal settings
    - Concatenating
    - Indexing
    - Last value
    - Conditional

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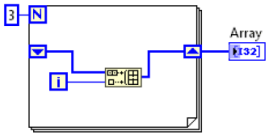
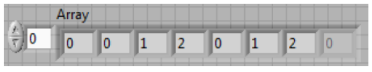
LabVIEW Programming Fundamentals

Loops

Q1: What does the indicator **Array** look like after this VI has run twice?



A: 

B: 

C: 

D: 

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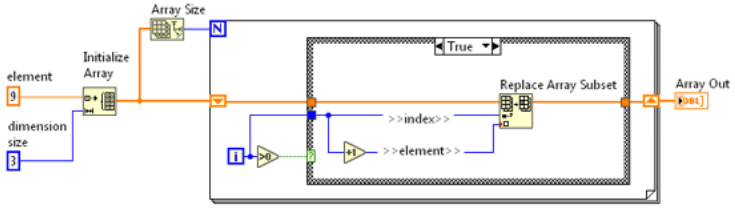
LabVIEW Programming Fundamentals

Arrays

Q6: What will the **Array Out** indicator look like after the VI completes execution?

The False case is wired straight through.



A: 

C: 

B: 

D: 

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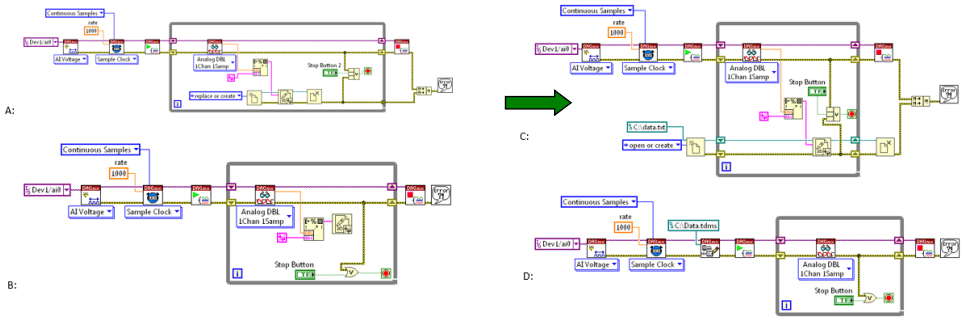
LabVIEW Programming Fundamentals

File I/O

Q11: Which VI will continuously acquire and log data to a human readable text file?



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Questions?

For program information & preparation resources visit :

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