

ECED3403 – Lab 1

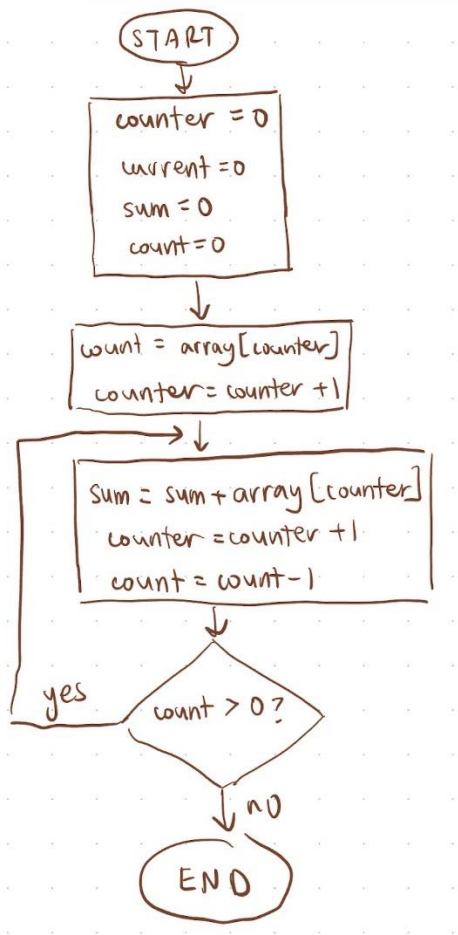
Grace Yu

B00902046

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Design

Flow Chart



Data Dictionary

Array = {Numeric}

Numeric = ["\$" + [Unsigned | Signed] | "'" + Char + "'" | "#" = Hex]

Unsigned = [0 ... 65535]

Signed = [-32768 ... +0 ... +65535]

Char = [Alphanumeric | Escaped]

Hex = 1{0 ... 9 | A ... F | a ... f}4 * Hex values range from #0 to #FFFF *

Escaped = "\" + Alphanumeric

String = 1{Char}128

Testing

1. Adds integers in array

Purpose: Checks for successful addition of integers within the array.

Configuration: Fill an array of size 6 with a first word of 5, and integers of value 1.

Expected Results: The five integers of value 1 will be added together. The final computed sum, R3, should equal 5 after the program ends.

Actual results: The final computed sum in R3 equals 5 as expected.

```
End: PC: 101a Clk: 26130
Option: r
R0: 004C
R1: 0000
R2: 0001
R3: 0005
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option: |
```

2. Add negative number

Purpose: Checks for the successful addition of integers where some are negative.

Configuration: Fill an array of size 6 with a first word of 5, and integers of varying values. These values will be 1, 2, -3, 4, and -5.

Expected Results: The final computed sum, R3, should equal -1 after the program ends.

Actual results: The counter register R1 equals -1 as expected.

```
End: PC: 101a Clk: 75192
Option: r
R0: 004C
R1: 0000
R2: FFFB
R3: FFFF
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option: |
```

3. When counter reaches zero

Purpose: Checks for the counter reaching 0 when program ends.

Configuration: Fill an array of size 6 with a first word of 5, and integers of value 1.

Expected Results: The counter register, R1, should equal 0 after the program ends.

Actual results: The counter register R1 equals 0 as expected.

```
End: PC: 101a Clk: 26130
Option: r
R0: 004C
R1: 0000
R2: 0001
R3: 0005
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option: |
```

4. Negative first word

Purpose: Checks for the counter reaching 0 when program ends.

Configuration: Fill an array of size 6 with a first word of -5, and integers of value 1.

Expected Results: The counter register, R1, should equal 0 after the program ends.

Actual results: The counter register R1 equals 0 as expected.

```
End: PC: 101a Clk: 27713
Option: r
R0: 0042
R1: FFFB
R2: 0000
R3: 0000
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option:
```

5. Empty array

Purpose: Checks for what final register values are at the end of the program if the array is empty.

Configuration: The array has no starting word or integers.

Expected Results: The register values after the program ends should be:

- R0 array current memory value: 0044
- R1 count: FFFF
- R2 array current value: 0000
- R3 total sum: 0000

Actual results: The registers equal the expected values.

```
End: PC: 101a Clk: 10357
Option: r
R0: 0044
R1: FFFF
R2: 0000
R3: 0000
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option: |
```

6. Larger first word than array size

Purpose: Checks for how the program handles fewer array integers than expected.

Configuration: Fill an array of size 3 with a first word of 5, and integers of value 1.

Expected Results: The register values after the program ends should be:

- R0 array current memory value: 004C
- R1 count: 0000
- R2 array current value: Some memory value
- R3 total sum: Some value

Actual results: The registers equal the expected values.

```
End: PC: 101a Clk: 73029
Option: r
R0: 004C
R1: 0000
R2: 0000
R3: 0003
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option:
```

7. Smaller first word than array size

Purpose: Checks for how the program handles more array integers than expected.

Configuration: Fill an array of size 5 with a first word of 3, and integers of value 1.

Expected Results: The program will stop in the middle of the array instead of at the end. The register values after the program ends should be:

- R0 array current memory value: 0048
- R1 count: 0000
- R2 array current value: Some memory 0000
- R3 total sum: 0003

Actual results: The counter register R1 equals 0 as expected.

```
End: PC: 101a Clk: 16973
Option: r
R0: 0048
R1: 0000
R2: 0001
R3: 0003
R4 (BP): 0000
R5 (LR): 0000
R6 (SP): 0800
R7 (PC): 101A
Option:
```