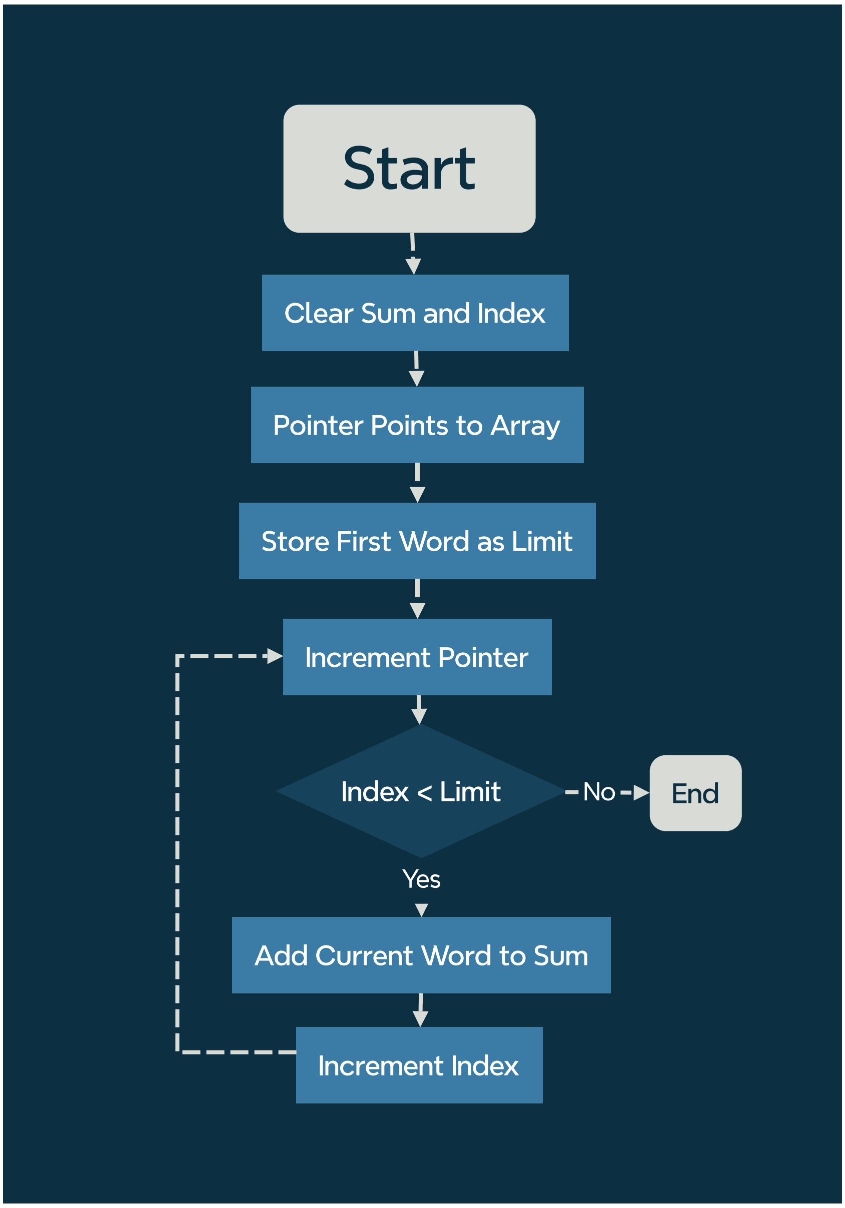
Lab 1 Report - Zachary Fraser B00863025

Design

Data Dictionary

```
ARRAY POINTER = 2{BYTE}2
LIMIT = 2{BYTE}2
VALUE = 2{BYTE}2
SUM = 2{BYTE}2
INDEX = 2{BYTE}2

BYTE = 8{BIT}8
BIT = [0|1]
```



Testing

Six tests were designed for the program:

1. Limit 0 Test
2. Limit Within Range Test
3. Limit Outside Range Test
4. Limit 0xFFFF Test
5. Sum of Five 0xFFFF Test

1. Limit 0 Test

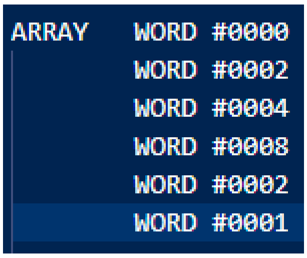
Purpose

This test aims to ensure that no array members are added when the limit is 0.

Expectation

The sum should be zero, and the program should not loop.

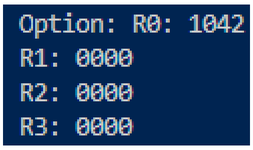
Configuration



```
ARRAY   WORD #0000
        WORD #0002
        WORD #0004
        WORD #0008
        WORD #0002
        WORD #0001
```

Result

Pass - The sum was 0, and the Loop Index did not increment



```
Option: R0: 1042
R1: 0000
R2: 0000
R3: 0000
```

R1 = Loop Index
R3 = Sum

2. Limit Within Range Test

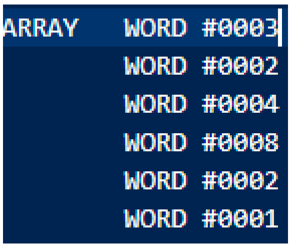
Purpose

This test aims to ensure that the program correctly adds all numbers up to the limit.

Expectation

The sum should be 14 (0x000E) as this is the sum of the first three array members.

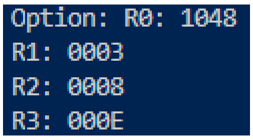
Configuration



```
ARRAY   WORD #0003
        WORD #0002
        WORD #0004
        WORD #0008
        WORD #0002
        WORD #0001
```

Result

Pass - The sum was 000E, and the Loop Index indicated three loops.



```
Option: R0: 1048
R1: 0003
R2: 0008
R3: 000E
```

R1 = Loop Index
R3 = Sum

3. Limit Outside Range Test

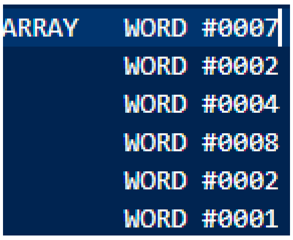
Purpose

This test aims to demonstrate that the program will continue to sum memory outside of the array.

Expectation

The sum should be 0x0011, as this is the sum of `2 + 4 + 8 + 2 + 1`.

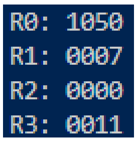
Configuration



```
ARRAY    WORD #0007
         WORD #0002
         WORD #0004
         WORD #0008
         WORD #0002
         WORD #0001
```

Result

Pass - The sum was 0011 as expected, and the Loop Index indicated that it looped 7 times.



```
R0: 1050
R1: 0007
R2: 0000
R3: 0011
```

R1 = Loop Index
R3 = Sum

4. Limit 0xFFFF Test

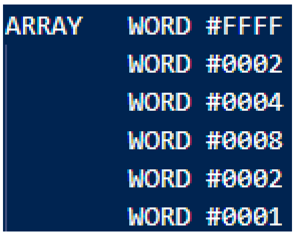
Purpose

This test aims to show that 0xFFFF is evaluated as -1, and will not sum any members as it is <= 0

Expectation

The sum should be zero, and the program should not loop.

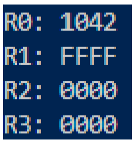
Configuration



```
ARRAY   WORD #FFFF
        WORD #0002
        WORD #0004
        WORD #0008
        WORD #0002
        WORD #0001
```

Result

Pass - The sum was 0, and the Loop Index did not increment



```
R0: 1042
R1: FFFF
R2: 0000
R3: 0000
```

R0 = Loop Index
R3 = Sum

5. Sum of Five 0xFFFF Test

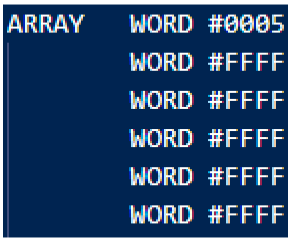
Purpose

This test aims to demonstrate overflow during addition.

Expectation

The sum should be 0xFFFB as the carry bit is lost on every addition

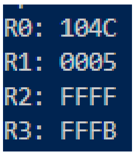
Configuration



```
ARRAY   WORD #0005
        WORD #FFFF
        WORD #FFFF
        WORD #FFFF
        WORD #FFFF
        WORD #FFFF
```

Result

Pass - The sum was FFFB, and the Loop Index incremented 5 times



```
R0: 104C
R1: 0005
R2: FFFF
R3: FFFB
```

R0 = Loop Index

R3 = Sum