**UNIVERSITI TUNKU ABDUL RAHMAN**

**LEE KONG CHIAN FACULTY OF ENGINEERING AND SCIENCE**

**UECS1013 INTRODUCTION TO COMPUTER ORGANIZATION AND ARCHITECTURE**

**ASSIGNMENTS**

**February 2025 Trimester**

|  |  |  |  |
| --- | --- | --- | --- |
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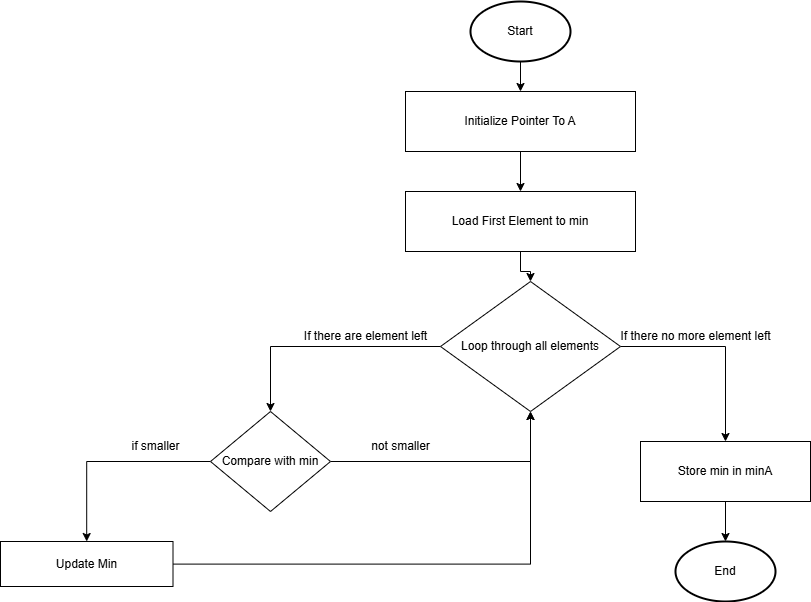
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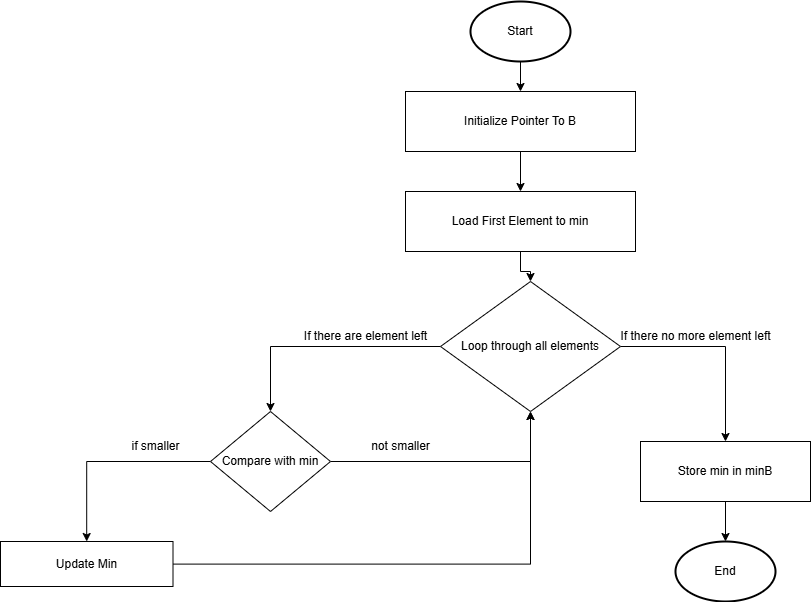
# 

# **Flowchart**

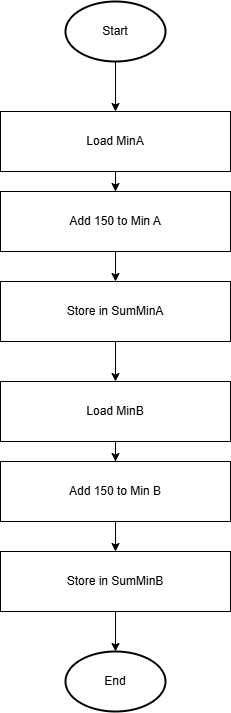
## Find minimum value in A



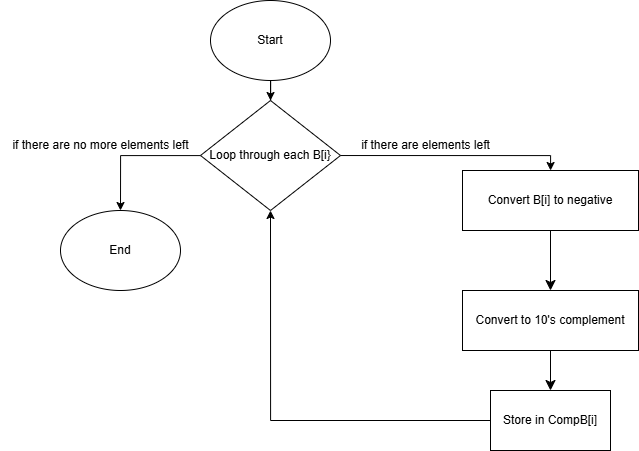
## Find minimum value in B



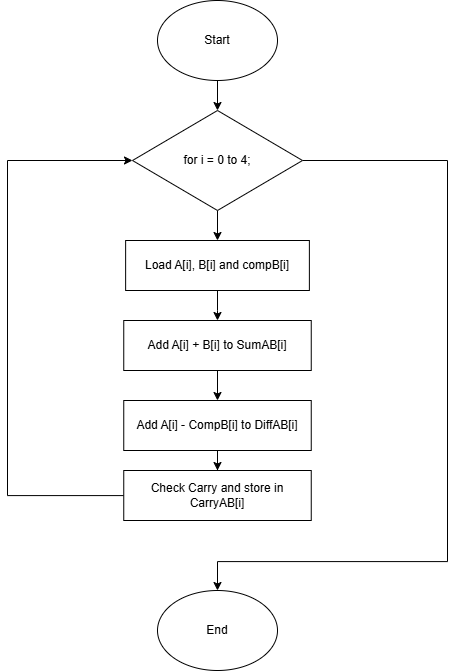
## Add 150 to minimum A and minimum B



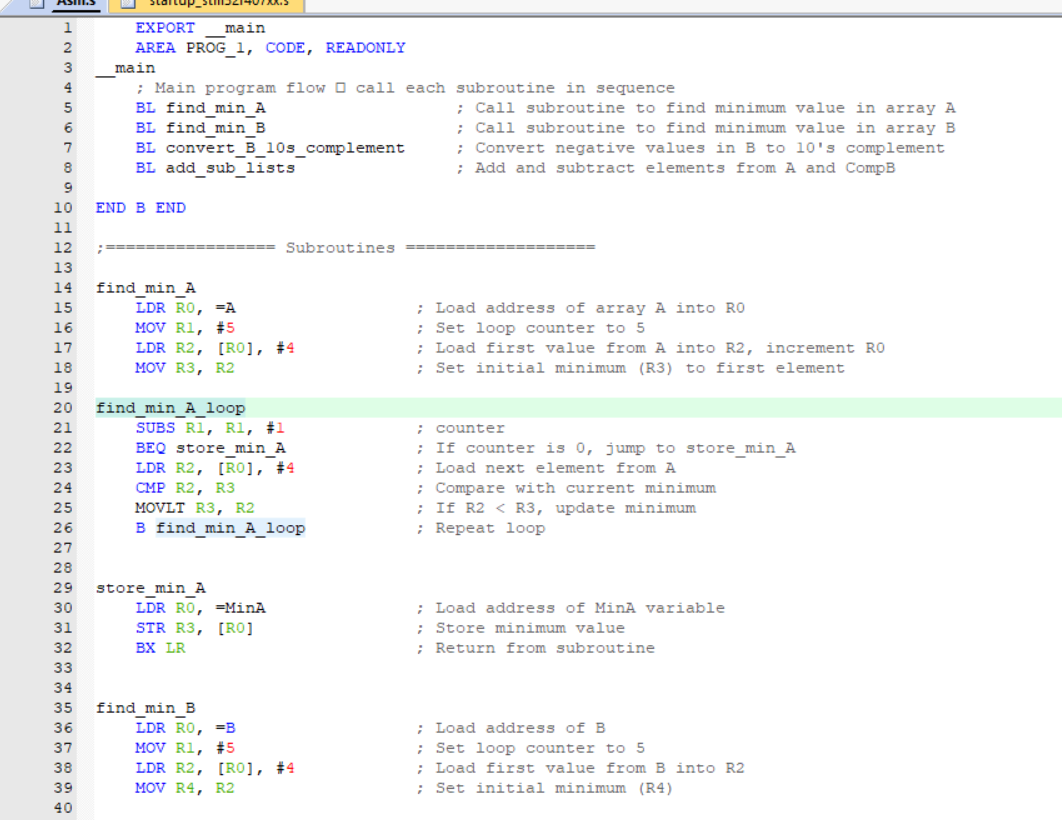
## Convert List B to 10’s Complement

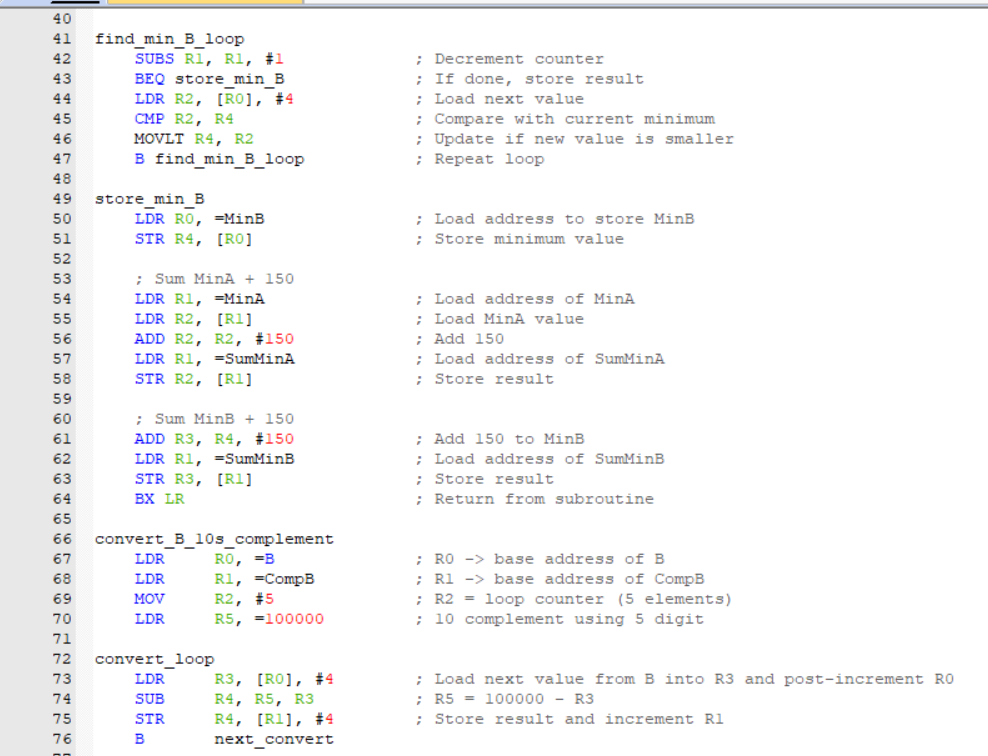
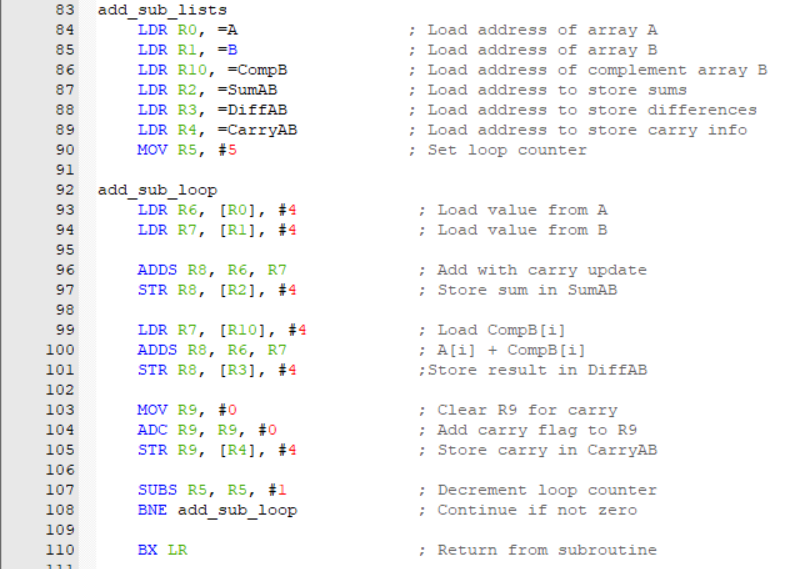


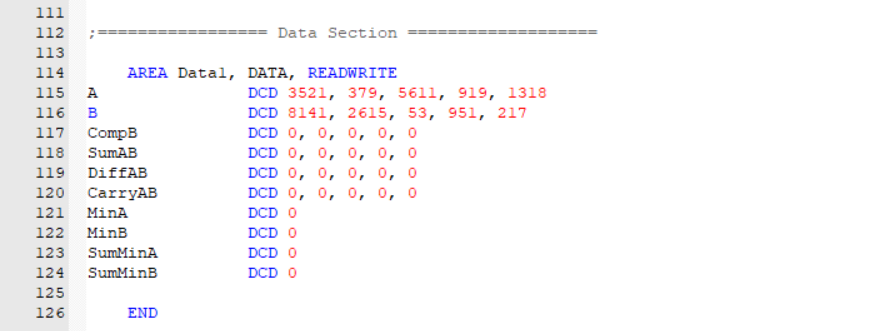
## Add A[i] + B[i], A[i] - B[i] (10’s complement) and Detect Carry



# **Complete Code**





# **Operations and Expected Results**

## Find Minimum Value in List A:

* Load the first value of A into R3 as the initial minimum value
* Loop through the remaining elements of A
* Compare each element with the current minimum value
* If smaller value is found, update the minimum to new minimum value
* Store minimum value in MinA

Expected Output:

List A = {3521, 379, 5611, 919, 1318}

MinA = 379

## Find Minimum Value in List B:

* Load the first value of B into R4 as the initial minimum value
* Loop through the remaining elements of B
* Compare each element with the current minimum value
* If smaller value is found, update the minimum to new minimum value
* Store minimum value in MinB

Expected Output:

List B = {8141, 2615, 53, 951, 217}

MinB = 53

## Adding 150 to MinA and MinB

* Load MinA and add 150
* Store result in SumMinA
* Load MinB and add150
* Store result in SumMinB

Expected Output:

SumMinA = 379 + 150 = 529

SumMinB = 53 + 150 = 203

## Converting List B to 10’s Complement

Assume List B = {8141, 2615, 53, 951, 217}

* Loop through each element in B
* Convert each element to negative value
* Convert to 10’s complement using this formula:

10’s Complement of B[i] = (−B[i]) +100000

* Store result in CompB

Expected Output:

CompB = {91859, 97385, 99947, 99049, 99783}

## Addition Subtraction and Carry detection:

* For each index i from 0 to 4:
* Load A[i], B[i] and CompB[i]
* Perform SumAB[i] = A[i] + B[i]
* Perform DiffAB[i] = A[i] + compB[i]
* Find and store carry for each result

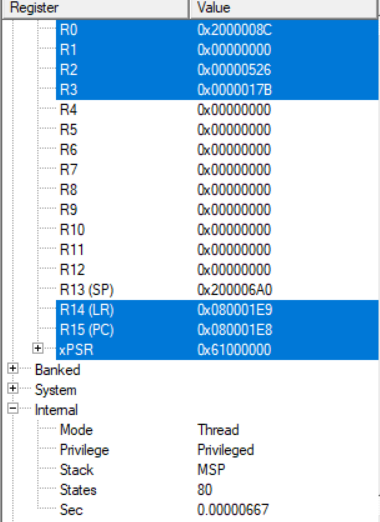
Expected Output:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| i | A[i] | B[i] | CompB[i] | SumAB[i] | DiffAB[i] (10s) | Carry |
| 0 | 3521 | 8141 | 91859 | 11662 | 95380 | 0 |
| 1 | 379 | 2615 | 97385 | 2994 | 97764 | 0 |
| 2 | 5611 | 53 | 99947 | 5664 | 105558 | 1 |
| 3 | 919 | 951 | 99049 | 1870 | 99968 | 0 |
| 4 | 1318 | 217 | 99783 | 1535 | 101101 | 1 |

# **Results and final values**

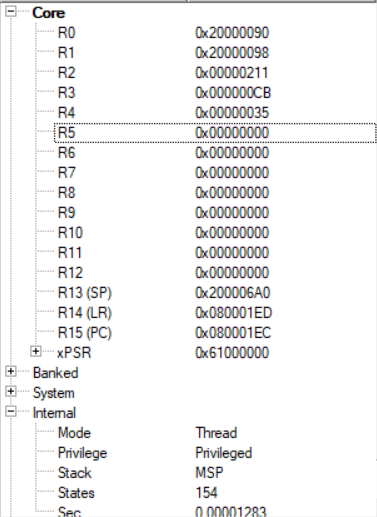
## Find minimum value in list A

* R0 is the address pointing to MinA
* R1 is the loop counter
* R2 is the last loaded value from the list
* R3 is the final minimum value = 379



## Find minimum value in list B and add 150 to both minimum value of A and B

* R0 pointing to a variable
* R1 is the address of SumMinA
* R2 is the value of minimum A + 150 = 529
* R3 is the value of minimum B + 150 = 203
* R4 is the minimum value of list B = 53



## Convert list B to 10’s complement assuming there are negative values

* B = {8141, 2615, 53, 951, 217}
* R1 is pointing to CompB

A screenshot of a computer

AI-generated content may be incorrect.

* CompB = {000166D3, 00017C69, 0001866B, 000182E9, 000185C7}
* CompB = {91859, 97385, 99947, 99049, 99783}

A screenshot of a computer

AI-generated content may be incorrect.

## Addition Subtraction and Carry detection:

A = {3521, 379, 5611, 919, 1318}

B = {8141, 2615, 53, 951, 217}

CompB = {91859, 97385, 99947, 99049, 99783}

* R2 is address of SumAB (A + B)
* R3 is address of DiffAB (A + CompB)
* R4 is to store info of carry

A screenshot of a computer

AI-generated content may be incorrect.

* SumAB = {00002D8E, 00000BB2, 00001620, 0000074E, 000005FF}
* SumAB = {11662, 2994, 5664, 1870, 1535}

A screenshot of a computer

AI-generated content may be incorrect.

* DiffAB = {00017494, 00017DE4, 00019C56, F00018680, 0000018A}
* DiffAB = {95380, 97764, 105558, 99968, 101101}

A white rectangular object with numbers

AI-generated content may be incorrect.