

Assignment #4.4

Problem: Sorting operation, Selection sort

Assume there are 100 integer numbers stored in a specific SRAM area, with each integer having a value ranging from 0 to 255. Sort these numbers in ascending order using Selection sort.

Solutin: The C code for Selection Sort is given below:

```
1 Selection_sort() {
2     int int arr[100], size=100, i, j, min_index;
3     int temp;
4     for (i = 0; i < size - 1; i++) {
5         min_index = i;
6         for (j = i + 1; j < size; j++) {
7             if (arr[j] < arr[min_index]) {
8                 min_index = j;
9             }
10        }
11        if (min_index != i) {
12            temp = arr[i];
13            arr[i] = arr[min_index];
14            arr[min_index] = temp;
15        }
16    }
17 }
```

Below sorting the 100 elements using Assembly language:

```
1 Selection_sort() {
2     int int arr[100], size=100;----->    MOV R0,#0x20001000    [R0,arr]
3                                           MOVT R0,#0x20002000
4                                           MOV R1,#0x63        [R1,size]
5     int temp;----->                    MOV R2,#0x00        [R2,temp]
6                                           Branch1:          [[loop1]
7     for (i = 0; i < size - 1; i++) {----->    MOV R3,0x00        [R3,i]
8         int min_index = i; ----->          MOV R4,R3        [R4,min_index]
9                                           Branch2:
10        for (j = i + 1; j < size; j++) { --->    MOV R5,R3        [R5,j]
11            if (arr[j] < arr[min_index]) { --->    LDRB R6,[R0,R5]    [R6,arr[j]]
12                                           LDRB R7,[R0,R4]    [R7,arr[min_index]]
13                                           CMP R6,R7
14                                           IT LT
15            min_index = j; ----->          MOVLT R4,R5
```

16			ADD R5,R5,#1
17			CMP R5,R1
18			IT LTE
19			BLE Branch2
20		}	
21	{		
22	if (min_index != i) {	----->	CMP R4,R3
23			ITTT NE
24			LDRBNE R8,[R0,R3] [R8,arr[i]]
25	temp = arr[i];	----->	STRBNE R2,R8
26	arr[i] = arr[min_index];	----->	STRBNE R8,R7
27	arr[min_index] = temp;	----->	STRBNE R7,R2
28			
29	}	----->	CMP R3,R1
30			IT LT
31			BLT Branch1
32	}		
