

Lab 6 - Bubble Sort and Binary Search Algorithm

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CS311 - Computer Architecture 1

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The sixth laboratory exercise requires you to code the **Bubble Sort algorithm** and sort a given array of integers and then find the index of a given value using the **Binary Search algorithm**.

Please create a file named `SortSearch.asm` in EBE.

Question 1 - Bubble Sort Algorithm.

Write an assembly language program to sort an array (a) of **double words** ($a = \{14, 10, 23, 45, 17, 9, 54, 22, 1, 76\}$) using the Bubble Sort algorithm. Please allocate the array size as `size = 10` in memory. The Bubble Sort algorithm is defined as:

```
do{
    swapped = false;
    for ( i = 0; i < n-1; i++ ) {
        if (a[i] > a[i+1]) {
            swap a[i] and a[i+1];
            swapped = true;
        }
    }
}
while (swapped)
```

Question 2 - Binary Search Algorithm.

Using the above sorted array (a), find the location (index) of value 9 (stored in memory location `val`) in the array using the Binary Search algorithm and save it in a memory location `loc`. The Binary Search algorithm is given as the following:

```
lower = 0
upper = size - 1
while lower  $\leq$  upper do {
    middle = (lower + upper)/2
    if (number = a[middle]) {
        return middle
    }
    else if (number < a[middle]) {
        upper = middle - 1
    }
    else {
        lower = middle + 1
    }
}
end while
```

Submission

All submitted files **MUST** have the **student name**, **student CWU ID** and the **honor code** in them (and not written on Canvas). If any of these mandatory requirements are missing from the submission, it will not be graded and the student will be given **0 points** for the lab.

The file must be submitted through Canvas before 5pm May 28, 2021. The grading rubric is given in Table 1.

Table 1: Grading rubric

File	Aspects	Points
SortSearch.asm	Correct Bubble Sort	20
	Correct Binary Search	20
	Correct use of runtime stack	25
	Correct register usage in functions	25
	Documentation	10