

WIA1002 Data Structure

Tutorial 9: Searching

1. Write a program that generates 10 random characters. Then, perform the following using **Linear Search**:
 - a. A method that returns true if the element can be found.
 - b. A method that returns the number of occurrence for the element.
 - c. A method that returns a list of index for the element.
 - d. A method that returns true if the elements can be found. (search by range)
 - e. A method that returns the number of occurrence for the elements. (search by range)
 - f. A method that returns a list of index for the elements. (search by range)

Example output:

```
The Character data set are : Q S X K U B M J Q E
Linear Search
Enter a letter to search: L
L is not found
Enter two letters to search (begin end) : N P
No character can be found in between N and P

The Character data set are : Z M L F B N I G U F
Linear Search
Enter a letter to search: F
F is found
The number of F in the data set is 2
The location of the F are : 3 9
Enter two letters to search (begin end) : A G
The character can be found in between A and G
The number of the elements in between A and G in the data set is 4
The location of the elements in between A and G are : 3 4 7 9
```

2. Write a program that generates 10 random integers. Then, perform the following using **Binary Search**:
 - a. A method that returns true if the element can be found.
 - b. A method that returns the number of occurrence for the element.
 - c. A method that returns a list of index for the element.
 - d. A method that returns true if the elements can be found. (search by range)
 - e. A method that returns the number of occurrence for the elements. (search by range)
 - f. A method that returns a list of index for the elements. (search by range)

Example output:

The Integer data set are : 2 3 4 5 6 8 14 15 15 19

Binary Search

Enter a number to search: 10

10 is not found

Enter two numbers to search (begin end) : 9 12

No integer can be found in between 9 and 12

The Integer data set are : 0 3 5 6 10 13 14 17 17 19

Binary Search

Enter a number to search: 17

17 is found

The number of 17 in the data set is 2

The location of 17 are : 7 8

Enter two numbers to search (begin end) : 1 4

The integer can be found in between 1 and 4

The number of the elements in between 1 and 4 in the data set is 1

The location of the elements in between 1 and 4 are : 1

3. Create the MapNode.java and HashTable.java file (only the methods required based on the lecture notes). Then, insert the table below into the HashTable.

| Code (Key) | Name (Value) |
|------------|----------------------------|
| 100-101 | ICND 1 |
| 200-101 | ICND 2 |
| 200-120 | CCNA Routing and Switching |
| 210-260 | CCNA Security |

After that, enter a code to search.

Example output:

Hash Table

The number of elements in the Hash Table 4

100-101:ICND1 --> 200-101:ICND2 --> 200-120:CCNA Routing and Switching --> 210-260:CCNA -->

Enter a code to search : 125-450

The course 125-450 cannot be found

Hash Table

The number of elements in the Hash Table 4

100-101:ICND1 --> 200-101:ICND2 --> 200-120:CCNA Routing and Switching --> 210-260:CCNA -->

Enter a code to search : 200-120

Course 200-120 : CCNA Routing and Switching