CS211: Algorithms & Data structures

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Lab06

1 Laboratory Objectives:

- To understand the basic operations of arrays and analysing their cost in terms of Big-$\mathcal{O}$.
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2 Exercises

1. Write Java program to update an item of an array and calculate its time complexity?

Listing 1: Updating

```java
public static void update(int[] a, int loc, int k){
   a[loc]=k;
}
```

The time complexity of updating an item in array is : $\mathcal{O}(1)$.

2. Write Java program to lookup an item of an array and calculate its time complexity?

Listing 2: lookup

```java
public static void lookup(int[] a, int loc){
    System.out.println(a[loc]);
}
```

The time complexity of inspecting an item in array is : $\mathcal{O}(1)$.

3. Write Java program to print all elements in an array and calculate its time complexity?

Listing 3: Traverse

```java
public static void print_ar(int[] a){
    for(int i=0;i<a.length;i++)
        System.out.print(a[i] + " ,");
    System.out.println();
}
```

The time complexity of traversing all items in array is : $\mathcal{O}(n)$.

4. Write Java code to insert an item into an array and calculate its time complexity?

Listing 4: Insertion

```java
public static void insert(int[] a, int loc, int k){
    for (int i=a.length-1;i>loc;i--)
        a[i]=a[i-1];
    a[loc]=k;
}
```

Or you can write it like the following:

Listing 5: Insertion

```java
public static void insert(int[] a, int loc, int k){
int i=a.length-1;
    while(i>loc){
        a[i]=a[i-1];
        i--;
    }
    a[loc]=k;
}
```

The time complexity of insertion in array is : $\mathcal{O}(n)$, which is in linear time.

5. Write Java code for deleting an item from an array

Listing 6: Deleting an array's element

```java
public static void delete(int[] a, int loc){
    int i=loc;
    while (i<a.length-1){
        a[i]=a[i+1];
        i++;
    }
    a[a.length-1]=0;
}
```

The time complexity of deleting an array's item is : $\mathcal{O}(n)$, which is in linear time.