Assignment 2

Wednesday, May 18, 2022 8:54 AM

Assignment 2

Assignment 2

Q1. Calculate the complexity for the following algorithm:

```
int findElement(int arr[], int x, int n)
{
        // Finding block size to be jumped
        int step = sqrt(n);

        // Finding the block where element is
        // present (if it is present)
        int prev = 0;
        while (arr[min(step, n)-1] < x)
        {
                prev = step;
                step += sqrt(n);
                if (prev >= n)
                        return -1;
        }

        // Doing a linear search for x in block
        // beginning with prev.
        while (arr[prev] < x)
        {
                prev++;

                // If we reached next block or end of
                // array, element is not present.
                if (prev == min(step, n))
                        return -1;
        }
        // If element is found
        if (arr[prev] == x)
                return prev;

        return -1;
}
```

Q2. Write a full class to implement Array list with its complete operations: initialization, insertion, delete, binary search. The class should accept any type of data (use templates). Also, write the main function to test your code.

Anton Gucman
202014155
ECE 4400
Dr. Eltantawy

Assignment 2

Question 1:

if $n = 4$ prev = 0
$x = 8$
step = 2

	step	prev	x	n
①	4	2	8	4
②	6	4	8	4

$step = k^2$ will end when $arr[min(step, n) - 1] \geq x$

$k^2 = x$

$k = \sqrt{x}$ = $k = \sqrt{n}$

The same will occur for second loop

Thus $O(n) = O(\sqrt{n}) + O(\sqrt{n}) + O(1) + O(1)$

$O(n) = 2O(\sqrt{n}) = \sqrt{n}$

$O(n) = \sqrt{n}$

Question 2:

→ submitted in a cpp file