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MASTER DATA STRUCTURE AND ALGORITHM WITH C++

**DAY-1 ASSIGNMENT**

1. What is the time complexity of the following code?

int a=0;

for(int i=0; i<n; i++)

{

for(int j = n; j >i; j--)

{

a = a + i + j;

}

}

**ANSWER:-**

The above code runs total no of times

= n + (n – 1) + (n – 2) + … 1 + 0

= n \* (n + 1) / 2

= 1/2 \* n2 + 1/2 \* n

*The time complexity of the following code is* ***O(n2)*** times.

1. What is the time complexity of the following code?

int count =0;

for(int i = 1; i<= n; i\*2)

{

for (int j = 1; j<= i; j++)

{

count = count + 1;

}

}

**ANSWER:-**

The above code runs total no of times

= 1+2+4+8+16+32+64+128+……..+2n-1

= 20+21+22+23+24+25+26+27+…..+2n-1

From sum of Geometric Series , we get

= 1\*(1-2n)/(1-2)

= (1-2n)/(-1)

= (2n-1)/1

= 2n - 1

*The time complexity of the following code is* ***O(log n)*** times.

1. Find the best case, average case and worst case of the Linear search algorithm.

**ANSWER:-**

ALGORITHM:-

LinearSearch(A, N, Val)

**Step 1:** [Initialize] Set POS = -1

**Step 2:** [Initialize] Set I = 1

**Step 3:** Repeat Step 4 While I<=N

**Step 4:** If A[I] = Val  
Set POS = I  
Print POS  
go to Step 6  
[end of if]  
Set I = I + 1  
[end of loop]

**Step 5:** If POS = -1  
Print " Value is not presenting the array "  
[end of if]

**Step 6:** Exit

In linear search, we observed that when counting comparisons:

Best case is - **1**  
Worst case is - **n**  
Average case is - **(n+1)/2 = ½ n + ½**

In big-O terminology, we would say this about linear search:

Best case time is -***O(1)***  
Worst case time is - ***O(n)***  
Average case time is -***O(n)***