**DS Algorithm Essentials | December 2020**

**Assignment Day 4 | 28th December 2020**

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**Question 1 :**

**In the Binary Search algorithm, it is suggested to calculate the mid as beg + (end - beg) / 2 instead of (beg + end) / 2. Why is it so?**

**Answer :**

**It fails for large values of the int variables low and high. Specifically, it fails if the sum of low and high is greater than the maximum positive int value (2^31 - 1). The sum overflows to a negative value, and the value stays negative when divided by two. In C this causes an array index out of bounds with unpredictable results hence beg+(end-beg/2) is used instead of average**

**Question 2 :**

**Write the algorithm/function for Ternary Search.**

**Code :**

**#include <stdio.h>**

**int ternarySearch(int l, int r, int key, int ar[])**

**{**

**if (r>=l) {**

**int mid1=l+(r-l)/3;**

**int mid2=r-(r-l)/3;**

**if(ar[mid1]==key) {**

**return mid1;**

**}**

**if(ar[mid2]==key)**

**{**

**return mid2;**

**}**

**if(key<ar[mid1]) {**

**return ternarySearch(l,mid1-1,key,ar);**

**}**

**else if(key>ar[mid2]) {**

**return ternarySearch(mid2 + 1,r,key,ar);**

**}**

**else {**

**return ternarySearch(mid1 + 1,mid2 - 1,key,ar);**

**}**

**}**

**return -1;**

**}**

**int main()**

**{**

**int l,r,p,i,key;**

**char ar[10];**

**for(i=0;i<=10;i++)**

**ar[i]=scanf("%s",&ar[i]);**

**l=0;**

**r=9;**

**key=scanf("%d",&key);**

**p=ternarySearch(l,r,key,ar);**

**printf("Index of %d is %d",key,p);**

**}**