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```
with the same and 
i)-#indudexstdio.h>
 void binary (Int [], int, int, int); /+ declaring two
   functions starting function is to sost the elements in
   the array #/
                                                                 (1 + (id) yous /> (i = 1)
   void sorting (int[], int); / # binary function is to
   implement binday search in away +/
  int main() produced of aller = grant
          int num, length, i, x, y, sum, peroduct;
        /+ Initialising the array and dedoring variables +/
        int our [100);
pointf (" finter the length of array: ");
         scanf ("xd", & length);
           pointf (" Enter elements in array in: ");
          foor (i=0; ix length; i++)
                                                                                             MAN OF THE WALL
                   scanf ("r.d", & ars [i]);
               sorting (our, length); /* we are calling the softing
      function to sort the elements in array +/
              i("n/") thireq
              porintf (" Enter number to search in away (n"))
              Scanf ("xd", & num);
              binory ( or, o, length, num);
```

```
It by using binary function we done searching
the element given by user +/
3
void sorting ( int ans [7, int length )/ Inside the
  int temp, i, i, sum, peroduct, x, y;
   Ron (i=0; ix length; itt)
         (5=1; jxlength; j++)
       if (our (i) > oon (i)) A By dring this logic we
                       are softing the clement
         temp = ours [i]; in descending order */
         ars (i) = ars [i];
   coscij = temp;
   perintf(" sorted overay is: \n");
   Apriliao; ix length; i++)
   f porintf["/d>t" aversi));
   parintf("Enter 18t position:\n");
   Scanf (4x.d1, bx);
porint ("Enty and position : 10")
   scanf (4xd", ey);
   if (21 > length 11 y > length)
     pourtf ("Enter Valid positions");
```

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else
  sum=ans[x]+ans(y]; A we are calculating sum
                            and peroduct of particular
   parintf (" sum = 1/d", sum); two positions in array
  peroduct = agg[x] * agg[y];
   posint ("poroduct = xd", poroduct); given by uses +/
void binary (inter and []. inta, inty, inthum)
   int mid;
   if (274)
     printf(" Number is not found in agray"))
                         17 By using this logic we
   pointf ("Number is found in agracy"), search
           (over [mid] >num)
     binary (arr, x, mid-1, num);
  else if (aus [mid] < num)
      binory (are, mid+1, y, num);
```

```
#include <stdio.hz
void merge sort (int as], inti, inti);
void merge (int al), int il, int je, intiz, intiz).
4 By using merge sout we are dividing the array
into two halves we are sorting the two arrays
individually +/
At After completion of sorting of two arrays
we are muging the two arrays to get the
sorted array +/
Int main ()
  int ars (100), n, i, K, paroduct;
  pointf ("Enty number of elements in avoray: \n");
  scanf [4 1/d", &n);
  posintf ("Forter elements in assay; ");
  Poorli=0; (<n; i++)
  scant ("y.d", bare si]);
  merge-sort (arr, 0, n-1);
  perintf ("In Sorted array is: ");
  foa(i=0; i<n; i++)
    porintf (4 /d/E", are (i));
  porintf ("Enty the value of K less than
    %d! , 9) 3
```

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scanf (4xd", & 10);
 peroduct = ars [K] + ars [n-K];
porintf! In Poroduct of two elements is y.d", poroduct);
void mage sost (int agg(7, inti, inti)
  int mid;
   if (iki) " " of seek , sugarate per to the
   d mid= (itj)/2)
    - mesqe_sort (asa, i, mid);
      meage_sout ( arr, mid+1,j))
      merge (aix, i, mid, mid +1, j)
void mage (int ase [], intil, intjl, int 12, intj2)
a int temp(100) is, K;
   i=il j=il j=i20, K=0
   while (1<= 1 22 j<=j2)
  1 if [arisi] < are (j))
      f temp[K++] = are li++)
        temp(K+t) = a918[j++];
while (i' <= ji) &
         temp[K++) = a913 [i++]; }
  while (j <= j'2) {
    temp[k+t)=an(j+t);}
69(i=i11j=0;bix=j2;i+t);
            OBATIT = temp(j); 3
```

## 3) Insertion south and selection souti-

Insertion sout is a souting algorithm where the askay is sorted by taking one element at a time. The posinciple behind the insertion sout is to take one element, iterate through the sorted areay and find its correct position in the sorted array. Insertion array works in a similar way as we arrange the deck of courds, o, i have if her, I had , I'll her a deposition of a

Algorithmi

step 1: 2f the element is the first one, it is already sorted.

Step 2: Move to the next element.

step 3; compare the aurent element with all the elements in the souled array.

Step 4: If the element is the sorted agay is smaller than the aurent element, Herate to the next element. Otherwise, shift all the greater element in the array by one position towards the right.

Step 5: Insert the value at the correct position step 6: Repeat until the complete list is sorted. As the average and worst case complexity of this algorithm are o(n2) where n is the norge elements, insertion sout is not good for Jaage data sets.

Selection Soati selection sout is the most conceptually simple of all the scorting algorithms. It wasts by selecting the smallest element of the array and placing it at the head of avaay. Then the process is repeated for the remainder of array; the next largest element is selected and put into the next slot, and so on down the line-Because a selection sout looks at pargressively smaller parts of array each time, a selection sort is slightly faster than bubble sout and can be better

than a modified bubble sort.

Examples

From sorting the array 52314 first, 2 is inverted before s, resulting in as 314 Then, 3 is instear inserted between a and 5, Resulting in 23514, one is inserted at start, 12354 finally, I is inserted between 3 and 5, 18345

Time complexity:

O(n2) as there are two nested loops -

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```
H) #include <stdio.h>
int main() {
 int agrissol, n, i, j, temp, sum=0, poroduct=1, K;
  pointf(" Enter no of elements in everag \n");
  8 canf (4xd", 2n);
  non(120) izn; i+t)
     2conf (4x.d", ass (i));
  fon (i=0, i<n-1) i++)
    for (j=0; j'xn-i-1; j'++)
     € if ( ders (j) > aers ( y' +1))
       { temp = ass(j);
          099(j) = 099(j'ti)
         ous(jti) = temp;
              N & Publish Man 11315 - 1 10
  printfl" sorted array in ascending order is in")
  foor(i=0;i<n;i+t)
     posintf("xd10", are (i));
  possible ("sorted array in atternate order is \n");
   foorli=0; i<n; ?= i+2)
     perint[4y.d\n", anti));
   4
    3
```

```
pointfl' sum of all elements in odd positions
   ase = 10"5"
                                                                The Man Contract of the Man of th
   faq(i = 0; (< n; i = i + 2))
              sum = sum + are si);
                 paintf (My.dxn, Sum);
    posintfl" foroduct of all elements in even
     position : (n") i
    fon(i=01; (<n)i=1+2)
     £
                peroduct = peroduct + and si)
                 porintflyxain" paroductss
    pount- ("Enter a number:")>
    Sounf (4/2 3K);
  pointf lu Elements divisible by xd age: 10", x) ]
   fan(i=0; i<n;i++)
    { \( \( \alpha \) \( \alpha \) = = \( \alpha \) \( \alpha \)
                   porint (">d\n" auxi));
                                                                                   P. Pront Brown
  setiono;
```

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5) #induderstdio: h7
roid binary (int (), int, int, int);
void souting (int[], int);
int main() {
   int numz length, i'j
    int ass (100);
   porint ("Enter length of array",");
    & canf (" ).d", & length)
   pointf ("Fater elements for agaay (n");
   foor (i=0; ix length ; i++)
     Scanf (4x.d", & aus (i));
    sorting (our, length);
    ·porintf (4Fnty number to search: ");
    scanf (4 /d", brum) grun I bom mo = sel
    binary (ars, o, length, num),
                 min Wilt-pur (1800) & rearing
void sorting (int aux (), int length)
& int temp, i, j;
   for (i=0; i< length; i+1)
   d. fooij=1; j< length.j++)
         if (agr [i] > agra [j])
            (ز که دی = (۱) عدی ز
       by ass() stemp;
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```
void kinary lint aser [7, int x, inty, int num)
  int mid;
            a ( do not a for the seal of
 if(スフy)
  paint / Number is not found ") jui
 mid = (2+4)/23
 if (ass (mid) == num)
else if (ass(mid) > num)
  binary (vor, n, mid-1, num);
        else if lass [mid] < rum)
 binary (arr, mid+1, y, num);
       daniel to district the fires bi
           111162 119 20013
```