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NAME – RAJDEEP JAISWAL **DATE – 05 Oct 2021**

BRANCH – BTECH CSE **SEC = 13 A**

UID -20BCS2761

SUB- DS LAB

Q - Write a program to sort an array of integers in descending order using merge sort?
SOLUTION –

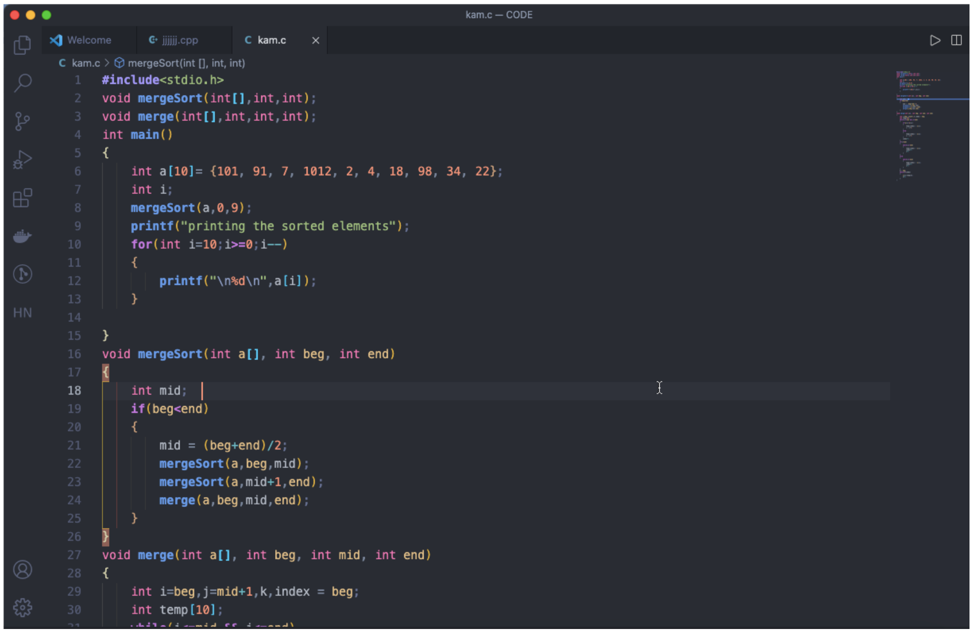
ALGORITHM -

```
Step 1: [INITIALIZE] SET I = BEG, J = MID + 1, INDEX = 0
Step 2: Repeat while (I <= MID) AND (J<=END)
    IF ARR[I] < ARR[J]
        SET TEMP[INDEX] = ARR[I]
        SET I = I + 1
    ELSE
        SET TEMP[INDEX] = ARR[J]
        SET J = J + 1
    [END OF IF]
    SET INDEX = INDEX + 1
[END OF LOOP]
Step 3: [Copy the remaining
elements of right sub-array, if
any]
IF I > MID
    Repeat while J <= END
        SET TEMP[INDEX] = ARR[J]
        SET INDEX = INDEX + 1, SET J = J + 1
    [END OF LOOP]
[Copy the remaining elements of
left sub-array, if any]
ELSE
    Repeat while I <= MID
        SET TEMP[INDEX] = ARR[I]
        SET INDEX = INDEX + 1, SET I = I + 1
    [END OF LOOP]
[END OF IF]
Step 4: [Copy the contents of TEMP back to ARR] SET K = 0
Step 5: Repeat while K < INDEX
    SET ARR[K] = TEMP[K]
    SET K = K + 1
[END OF LOOP]
Step 6: Exit
```

MERGE_SORT(ARR, BEG, END)

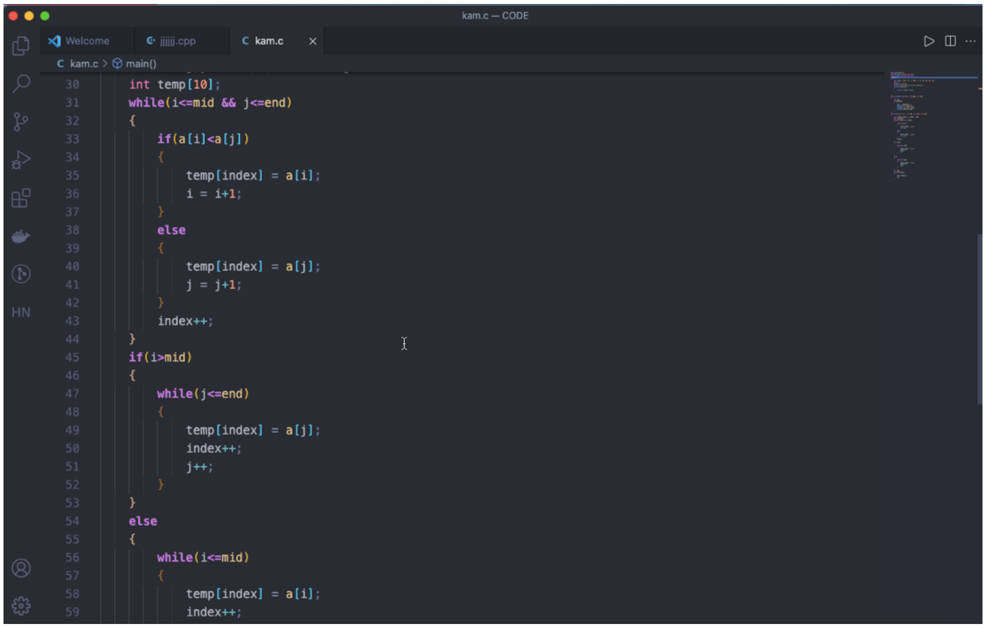
```
Step 1: IF BEG < END
    SET MID = (BEG + END)/2
    CALL MERGE_SORT (ARR, BEG, MID)
    CALL MERGE_SORT (ARR, MID + 1, END)
    MERGE (ARR, BEG, MID, END)
[END OF IF]
Step 2: END
```

CODE IN COMPILER-

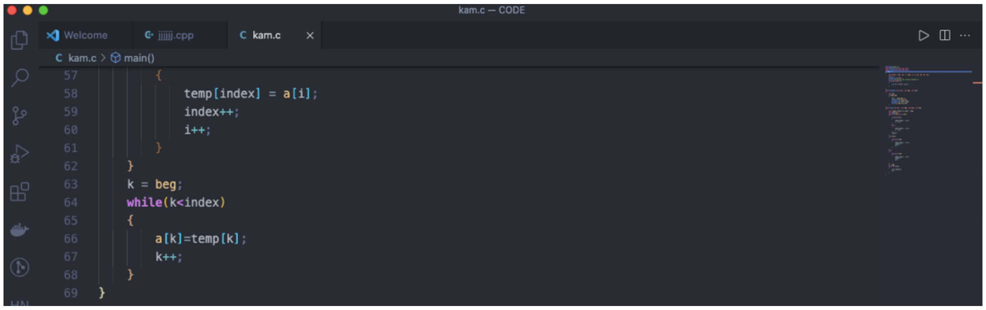


```c
#include<stdio.h>
void mergeSort(int[],int,int);
void merge(int[],int,int,int);
int main()
{
    int a[10]= {101, 91, 7, 1012, 2, 4, 18, 98, 34, 22};
    int i;
    mergeSort(a,0,9);
    printf("printing the sorted elements");
    for(int i=10;i>=0;i--)
    {
        printf("\n%d\n",a[i]);
    }

}
void mergeSort(int a[], int beg, int end)
{
    int mid;
    if(beg<end)
    {
        mid = (beg+end)/2;
        mergeSort(a,beg,mid);
        mergeSort(a,mid+1,end);
        merge(a,beg,mid,end);
    }
}
void merge(int a[], int beg, int mid, int end)
{
    int i=beg,j=mid+1,k,index = beg;
    int temp[10];
```

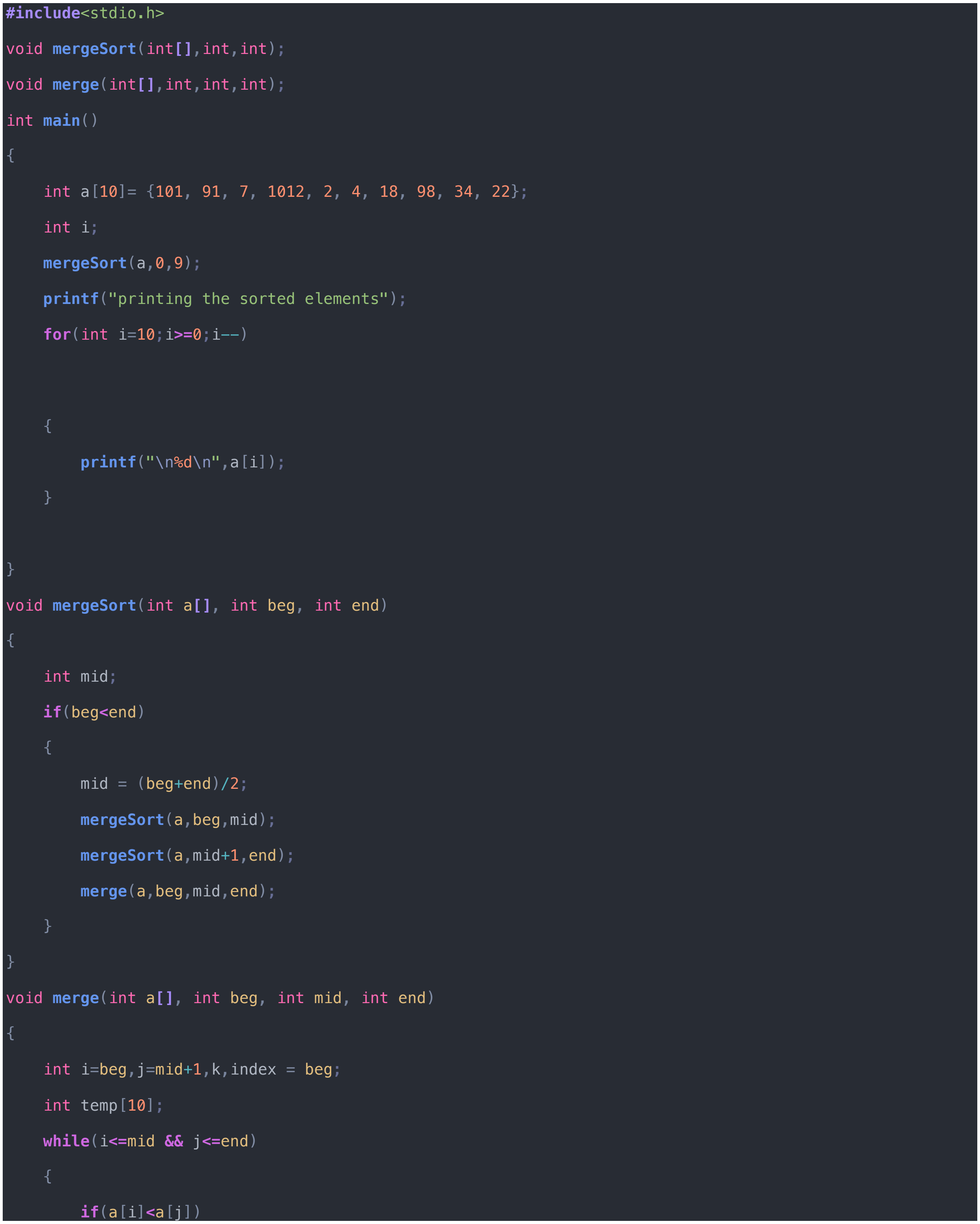


```c
    int temp[10];
    while(i<=mid && j<=end)
    {
        if(a[i]<a[j])
        {
            temp[index] = a[i];
            i = i+1;
        }
        else
        {
            temp[index] = a[j];
            j = j+1;
        }
        index++;
    }
    if(i>mid)
    {
        while(j<=end)
        {
            temp[index] = a[j];
            index++;
            j++;
        }
    }
    else
    {
        while(i<=mid)
        {
            temp[index] = a[i];
            index++;
```



```c
        {
            temp[index] = a[i];
            index++;
            i++;
        }
    }
    k = beg;
    while(k<index)
    {
        a[k]=temp[k];
        k++;
    }
}
```

CODE IN TEXT –

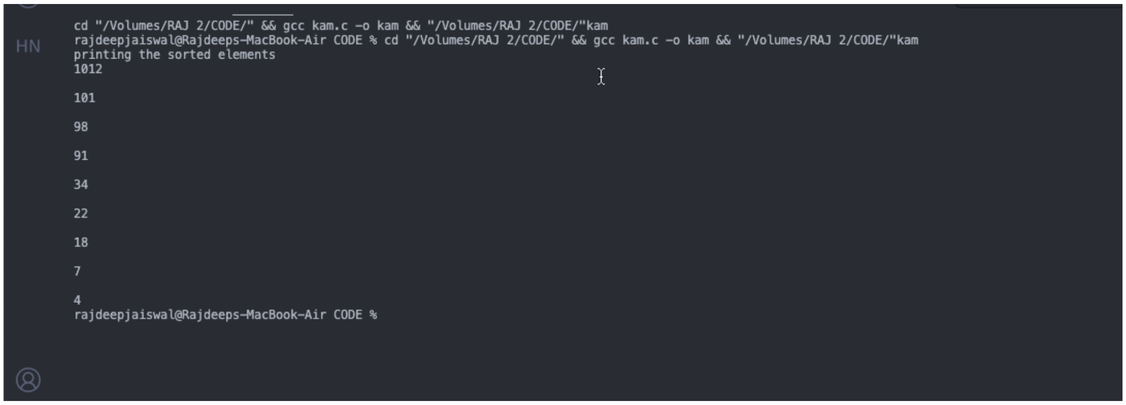


```
#include<stdio.h>
void mergeSort(int[],int,int);
void merge(int[],int,int,int);
int main()
{
    int a[10]= {101, 91, 7, 1012, 2, 4, 18, 98, 34, 22};
    int i;
    mergeSort(a,0,9);
    printf("printing the sorted elements");
    for(int i=10;i>=0;i--)


    {
        printf("\n%d\n",a[i]);
    }


}
void mergeSort(int a[], int beg, int end)
{
    int mid;
    if(beg<end)
    {
        mid = (beg+end)/2;
        mergeSort(a,beg,mid);
        mergeSort(a,mid+1,end);
        merge(a,beg,mid,end);
    }
}
void merge(int a[], int beg, int mid, int end)
{
    int i=beg,j=mid+1,k,index = beg;
    int temp[10];
    while(i<=mid && j<=end)
    {
        if(a[i]<a[j])
        {
            temp[index] = a[i];
            i = i+1;
        }
        else
        {
            temp[index] = a[j];
            j = j+1;
        }
        index++;
    }
    if(i>mid)
    {
        while(j<=end)
        {
            temp[index] = a[j];
            index++;
            j++;
        }
    }
    else
    {
        while(i<=mid)
        {
            temp[index] = a[i];
            index++;
            i++;
        }
    }
    k = beg;
    while(k<index)
    {
        a[k]=temp[k];
        k++;
    }
}
```

OUTPUT –



```
cd "/Volumes/RAJ 2/CODE/" && gcc kam.c -o kam && "/Volumes/RAJ 2/CODE/"kam
rajdeepjaiswal@Rajdeeps-MacBook-Air CODE % cd "/Volumes/RAJ 2/CODE/" && gcc kam.c -o kam && "/Volumes/RAJ 2/CODE/"kam
printing the sorted elements
1012

101

98

91

34

22

18

7

4
rajdeepjaiswal@Rajdeeps-MacBook-Air CODE %
```