



NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

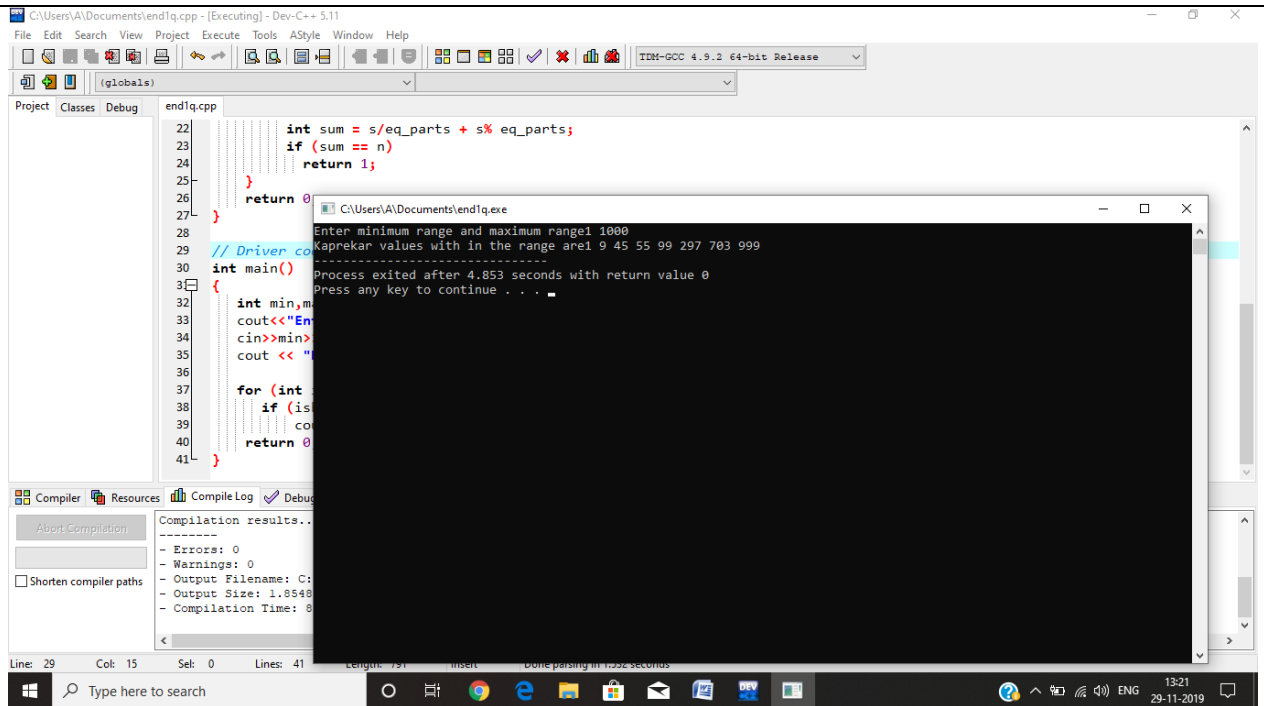
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
I B.Tech., I Semester, END Examination, November 2019
CS101: Problem Solving and Computer Programming

Date: 28-11-2019

Time: 3 Hours

Max. Marks: 50

1	<p>In mathematics, a Kaprekar number is a nonnegative integer whose square can be split into two equal parts that add up to the original number again. For instance, 45 is a Kaprekar number, because $45^2 = 2025$ and $20+25 = 45$. Write a program to find all Kaprekar numbers within a given range.</p> <p>Program:</p> <pre>#include<iostream> #include<math.h> using namespace std; int iskaprekar(int n) { if (n == 1) return 1; int s = n * n; int count_digits = 0; while (s) { count_digits++; s/= 10; } s = n*n; for (int i=1; i<count_digits; i++) { int e= pow(10, i); if (e == n) continue; int sum = s/e + s% e; if (sum == n) return 1; } return 0; } int main() { int min,max; cout<<"Enter minimum range and maximum range"; cin>>min>>max; cout << "Kaprekar values within the range are"; for (int i=min; i<max; i++) if (iskaprekar(i)) cout << i << " "; return 0; }</pre> <p>OUTPUT:</p>	6M
---	---	----



- 2 Write a C++ program to display the leap years that contain the digit 'x' given by the user, between two given year $n1$ and $n2$ both inclusive. For example, if $n1$ and $n2$ are 1990 and 2020 and if the digit 'x' is 6, the outputs need to be: The number of leap years between 1990 and 2020 that contains the digit 6 are: 1996, 2016.

5M

Program:

```
#include<iostream>
using namespace std;
//function to check leap year
int checkLeapYear(int year)
{
    if( (year % 400==0)||((year%4==0 && year%100!=0) )

        return year;
    else
        return 0;
}

int main()
{
    int i,start_year,ending_year,match_digit,year1,y;

    cout<<"Enter the starting year: ";
    cin>>start_year;
    cout<<"Enter the ending year:";
    cin>>ending_year;
    cout<<"Enter the digit : ";
    cin>>match_digit;
    cout<<"Leap years from:"<<start_year<<" to "<<ending_year<<endl;

    for(i = start_year; i <= ending_year; i++)
    {
        year1 = checkLeapYear(i);
```

```

        while(year1!=0)
        {

                y = year1%10;
                year1 = year1/10;
                if(y == match_digit)
                {

                        cout<<i<<" ";
                        break;
                }

        }

return 0;
}

```

OUTPUT:

The screenshot shows a C++ IDE with the following code:

```

1 #include<iostream>
2 using namespace std;
3
4 //function to check leap year
5 int checkLeapYear(int year)
6 {
7     if( (year % 400==0)||((year%4==0 && year%100!=0)) )
8     {
9         return year;
10    }
11    else
12    {
13        return 0;
14    }
15 }
16
17 int main()
18 {
19     int i,start_year,ending_year,match_digit,year1,y;
20     cout<<"Enter the starting year: ";
21     cin>>start_year;
22     cout<<"Enter the ending year: ";
23     cin>>ending_year;
24     cout<<"Enter the digit : ";
25     cin>>match_digit;
26     cout<<"Leap years from:"<<start_year<<" to "<<ending_year<<endl;
27     for(i = start_year; i <= ending_year; i++)
28     {
29         year1 = checkLeapYear(i);
30         while(year1!=0)
31         {
32             y = year1%10;
33             year1 = year1/10;
34             if(y == match_digit)
35             {
36                 cout<<i<<" ";
37                 break;
38             }
39         }
40     }
41     return 0;
42 }

```

The output window shows the following text:

```

Enter the starting year: 1
Enter the ending year: 500
Enter the digit : 4
Leap years from:1 to 500
1 4 40 44 48 54 84 104 124 144 164 184 204 224 240 244
248 254 284 304 340 344 364 384 404 440 444 448 452 456 460 464 468 472 476 480 484
488 492 496
Process exited after 0.805 seconds with return value 0
Press any key to continue . . .

```

- 3 Assume that you need to re order the numbers given in a 2D array of $n \times n$, where n is odd. The user will be inputting the rotation factor. By using this rotation factor, the outer most layer need to rotated in the clock wise direction, the next layer in anti-clock direction, the next layer in clock wise, and so on till we go to inner most layer. Example:

Enter the size of the array:7 Rotation factor: 2

Input:

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

Output:

15	8	1	2	3	4	5
22	11	12	13	20	27	6
29	10	31	24	17	34	7
36	9	32	25	18	41	14
43	16	33	26	19	40	21
44	23	30	37	38	39	28
45	46	47	48	49	42	35

Program:

```
#include<iostream>
#include<iomanip>

void acrotate(int b[],int n,int r){
    int t,i,j;
    for(j=0;j<r;j++){
        t=b[0];
        for(i=0;i<n;i++){
            b[i]=b[i+1];
        }
        b[n-1]=t;
    }
}

void crotate(int b[],int n,int r){
    int t,i,j;
    for(j=0;j<r;j++){
        t=b[n-1];
        for(i=n-1;i>0;i--){
            b[i]=b[i-1];
        }
        b[0]=t;
    }
}

void arraySeries(int b[],int &id,int a[][7],int n,int k){
    int i,j;
    i=k;
    for(j=k;j<n-k;j++){
        b[id++]=a[i][j];
    }
    j=n-k-1;
    for(i=k+1;i<n-k;i++){
        b[id++]=a[i][j];
    }
    i=n-k-1;
    for(j=n-k-2;j>=k;j--){
        b[id++]=a[i][j];
    }
    j=k;
    for(i=n-k-2;i>k;i--){
        b[id++]=a[i][j];
    }
}

void seriesIntoArray(int b[],int &id,int a[][7],int n,int k){
    int i,j;
    i=k;
```

```

        id=0;
        for(j=k;j<n-k;j++){
            a[i][j]=b[id++];
        }
        j=n-k-1;
        for(i=k+1;i<n-k;i++){
            a[i][j]=b[id++];
        }
        i=n-k-1;
        for(j=n-k-2;j>=k;j--){
            a[i][j]=b[id++];
        }
        j=k;
        for(i=n-k-2;i>k;i--){
            a[i][j]=b[id++];
        }
    }

using namespace std;
int main(){
    int r;
    int n=7;
    int a[7][7]={
        1,2,3,4,5,6,7,\
        8,9,10,11,12,13,14,\
        15,16,17,18,19,20,21,\
        22,23,24,25,26,27,28,\
        29,30,31,32,33,34,35,\
        36,37,38,39,40,41,42,\
        43,44,45,46,47,48,49\
    };
    int b[n*n],i,j,id;
    for(i=0;i<n;i++){
        for(j=0;j<n;j++){
            cout<<setw(2)<<a[i][j]<<" ";
            cout<<endl;
        }
        cout<<"enter rotating factor:";
        cin>>r;
        for(i=0;i<n/2;i++){
            id=0;
            if(i%2==0){
                arraySeries(b,id,a,n,i);
                crotate(b,id,r);
                seriesIntoArray(b,id,a,n,i);
            }
            else{
                arraySeries(b,id,a,n,i);
                acrotate(b,id,r);
            }
        }
    }
}

```

```

        seriesIntoArray(b,id,a,n,i);
    }
}
for(i=0;i<id;i++){
    cout<<setw(2)<<b[i]<<" ";
    cout<<endl<<endl;
    for(i=0;i<n;i++){
        for(j=0;j<n;j++){
            cout<<setw(2)<<a[i][j]<<" ";
            cout<<endl;
        }
    }
}

```

OUTPUT:

The screenshot shows a C++ IDE with the following source code:

```

2 #include<iomanip>
3
4 void acrotate(int b[],int n,int r){
5     int t,i,j;
6     for(j=0;j<r;j++){
7         t=b[j];
8         for(i=0;i<n;i++){
9             b[i]=b[i+1];
10        }
11        b[n-1]=t;
12    }
13 }
14
15 void crotate(int b[],int n,int r){
16     int t,i,j;
17     for(j=0;j<r;j++){
18         t=b[n-1];
19         for(i=n-1;i>=0;i--){
20             b[i]=b[i-1];
21         }
22         b[0]=t;
23     }
24 }
25
26 void arraySeries(int b[],int &id,int a[][7],int n,int k){
27     int i,j;
28     isk;
29     for(j=k;j<n-k;j++){
30         b[id++]=a[j][j];
31     }
32     j=n-k-1;
33     for(isk=j;isk<n-k;j++){
34         b[id++]=a[j][j];
35     }
36     isk=j;
37     for(j=n-k-2;j>=0;j--){
38         b[id++]=a[j][j];
39     }
40     j=k;
41     for(isk=n-2;isk>=j;j--){
42         b[id++]=a[j][j];
43     }
44 }
45
46 void main(){
47     int n;
48     cout<<"Enter the no of names::";
49     cin>>n;
50     string arr[n];
51     for(i=0;i<n;i++){
52         cout<<"Enter the name::";
53         getche();
54         arr[i]=getstr(arr[i]);
55     }
56     arraySeries(arr,n,id,a,n,n);
57     acrotate(arr,n,n);
58     crotate(arr,n,n);
59     for(i=0;i<n;i++){
60         cout<<setw(2)<<arr[i]<<" ";
61         cout<<endl<<endl;
62     }
63 }

```

The output window shows the following output:

```

43 44 45 46 47 48 49
4432 12345678910111213141516171819202122232425
31 24 17 10 13 18 15 6 5
15 8 1 2 3 4 5
25 11 12 13 18 17 6
27 10 21 24 17 24 7
18 9 32 52 18 43 14
43 16 23 26 19 40 21
44 21 38 27 38 27 38
45 46 47 48 49 42 35

```

Process exited after 6.686 seconds with return value 0
Press any key to continue . . .

4 You are given with n number of names. Write a C++ program to sort the given names based on their length? Example: 6M

INPUT: Enter the names: Sridhar Kumar A Mahesh B Siva Sai Ram U Sri Ramana U

OUTPUT: Mahesh B Sri Ramana U Siva Sai Ram U Sridhar Kumar A

Program:

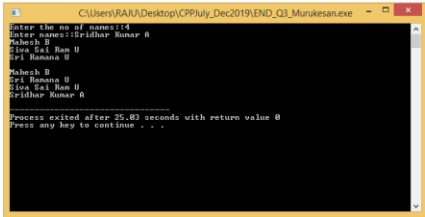
```

#include<iostream>
#define MAX_STR 100
using namespace std;
int main(){

    string arr[MAX_STR];
    int l[MAX_STR];
    int no;
    cout<<"Enter the no of names::";
    cin>>no;

```

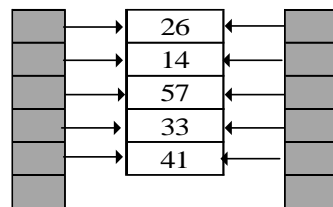
OUTPUT:



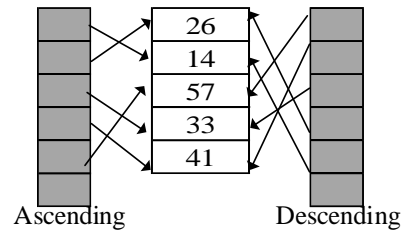
5

Write a program that reads integers from the keyboard and places them in an array. The program then will sort the array into ascending and descending order and print the sorted list. The program must not change the original array or create any other integer array. Hint: The solution to this problem requires two pointer arrays shown in the following figure. The first pointer array is rearranged so that it points to the data in ascending sequence. The second pointer array is rearranged so that it points to the data in descending sequence. (i) By using the original array we must be in a position to print the given values, (ii) By using the first pointer array we need to display the values in ascending order and similarly (iii) by using the second pointer array we need to display the values in descending order.

7M



Before Sorting



After Sorting

Program:

```
#include<iostream>
using namespace std;
int main()
{
    int i,x,y,a[30],n,*temp;
    cout<<"Enter the size of array"<<endl;
    cin>>n;
    cout<<"\n Enter elements into array"<<endl;
    for(i=0;i<n;i++)
    {
        cin>>a[i];
    }
    int **p=new int*[n];
    for(i=0;i<n;i++)
        p[i]=&a[i];
    for(x=0;x<n;x++)
    {
        for(y=0;y<n-x-1;y++)
        {
            if(*p[y]>*p[y+1])
            {
                temp=p[y];
                p[y]=p[y+1];
                p[y+1]=temp;
            }
        }
    }
    int **q=new int*[n];
    for(i=0;i<n;i++)
        q[i]=&a[i];
    for(x=0;x<n;x++)
    {
        for(y=0;y<n-x-1;y++)
```



```

{
    if(*q[y]<*q[y+1])
    {
        temp=q[y];
        q[y]=q[y+1];
        q[y+1]=temp;
    }
}
}
cout<<"\n Array in ascending order using first pointer array"<<endl;
for(i=0;i<n;i++)
{
    cout<<*p[i]<<" ";
}
cout<<"\n Array in descending order using second pointer array"<<endl;
for(i=0;i<n;i++)
{
    cout<<*q[i]<<" ";
}
    cout<<"\n Original array elements are"<<endl;
for(i=0;i<n;i++)
{
    cout<<a[i]<<" ";
}
return 0;
}

```

OUTPUT:

```

C:\Users\A\Documents\final_end5Q.exe
Enter the size of array
5
Enter elements into array
26 14 57 33 41

Array in ascending order using first pointer array
14 26 33 41 57
Array in descending order using second pointer array
57 41 33 26 14
Original array elements are
26 14 57 33 41
-----
Process exited after 22.44 seconds with return value 0
Press any key to continue . . .

```

6	<p>Write the definition for a class called time that has hours and minutes as integers. The class has the following member functions:</p> <p>void settime(int, int) to set the specified value in object</p> <p>void showtime() to display time object</p> <p>time sum(time, time) to sum two time objects & return time</p> <p>Write the definitions for each of the above member functions. Write main function to create three time objects. Set the value in two objects and call sum() to calculate sum and assign it in third object. Display all time objects.</p> <p>Program:</p> <pre>#include<iostream></pre>	6M
---	--	----

```

using namespace std;
class time
{
    int hours;
    int minutes;
public: void settime(int x, int y)
    {
        hours=x;
        minutes=y;
    }
    void showtime()
    {
        cout<<hours<<" hours "<<minutes<<" minutes "<<endl;
    }
    time sumtime(time t1)
    {
        time t3;
        t3.hours=hours+t1.hours;
        t3.minutes=minutes+t1.minutes;
        if(t3.minutes>60)
        {
            t3.minutes-=60;
            t3.hours++;
        }
        return t3;
    }
};
int main()
{
    time t1,t2,t3;
    t1.settime(10,59);
    t2.settime(11,23);
    t3=t1.sumtime(t2);
    t1.showtime();
    t2.showtime();
    cout<<"sum of two times is"<<endl;
    t3.showtime();
    //cout<<"sum of \n "<<t1.showtime()<<"\n and \n"<<t2.showtime()<<"\n is
\n"<<t3.showtime();
    return 0;
}

```

OUTPUT:

Select C:\Users\s\Documents\q6.exe

```
10 hours 59 minutes
11 hours 23 minutes
sum of two times is
22 hours 22 minutes
```

```
-----
Process exited after 0.1669 seconds with return value 0
Press any key to continue . . .
```

7 You are given with three text files namely: file1.txt, file2.txt and file3.txt. Write a C++ program to copy the contents of file1 to file2, file2 to file3 and file3 to file1.

6M

Example: Before execution:

<i>file1.txt</i>	<i>file2.txt</i>	<i>file3.txt</i>
NITW	IITH	IITP
Warangal	Hyderabad	Tirupati

After Execution:

<i>file1.txt</i>	<i>file2.txt</i>	<i>file3.txt</i>
IITP	NITW	IITH
Tirupati	Warangal	Hyderabad

Program:

```
#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main()
{
    fstream f1,f2,f3,t;
    f3.open("file3.txt");
    t.open("temp1.txt",ios::out|ios::trunc);
    char c;
    while(f3)
    {
        f3.get(c);
        t.put(c);
    }
    f3.close();
    t.close();
    cout<<"file3 to temp1 copied successfully"<<endl;
    f2.open("file2.txt");
    f3.open("file3.txt",ios::out|ios::trunc);
    while(f2)
    {
        f2.get(c);
        f3.put(c);
    }
    f3.close();
    f2.close();
    cout<<"file2 to file3 copied successfully"<<endl;
```

```

f1.open("file1.txt");
f2.open("file2.txt",ios::out|ios::trunc);
while(f1)
{
    f1.get(c);
    f2.put(c);
}
f1.close();
f2.close();
cout<<"file1 to file2 copied successfully"<<endl;
t.open("temp1.txt");
f1.open("file1.txt",ios::out|ios::trunc);
while(t)
{
    t.get(c);
    f1.put(c);
}
t.close();
f1.close();
cout<<"temp1 to file1 copied successfully"<<endl;
return 0;
}

```

OUTPUT:

Before execution see the file contents of file1, file2, file3.

The screenshot shows a C++ IDE with the following code in the editor:

```

1 #include<iostream>
2 #include<fstream>
3 #include<string>
4 using namespace std;
5 int main()
6 {
7     fstream f1,f2,f3,t;
8     f3.open("file3.txt");
9     t.open("temp1.txt",ios::out|ios::trunc);
10    char c;
11    while(f3)
12    {
13        f3.get(c);
14        t.put(c);
15    }
16    f3.close();
17    t.close();
18    cout<<"file3 to temp1 copied successfully"<<endl;
19    f2.open("file2.txt");
20    f3.open("file3.txt",ios::out|ios::trunc);
21    while(f2)
22    {
23        f2.get(c);
24        f3.put(c);
25    }
26    f2.close();
27    f3.close();
28    cout<<"file2 to file3 copied successfully"<<endl;
29    f1.open("file1.txt");
30    f2.open("file2.txt",ios::out|ios::trunc);
31    while(f1)
32    {
33        f1.get(c);
34        f2.put(c);
35    }
36    f1.close();
37    f2.close();
38    cout<<"file1 to file2 copied successfully"<<endl;
39    t.open("temp1.txt");
40    f1.open("file1.txt",ios::out|ios::trunc);
41    while(t)
42    {
43        t.get(c);
44        f1.put(c);
45    }
46    t.close();
47    f1.close();
48    cout<<"temp1 to file1 copied successfully"<<endl;
49    return 0;
50 }

```

The output window shows the following messages:

```

- Warnings: 0
- Output Filename: C:\Users\RAJIT\Desktop\CPPJuly_Doc2019\END_Q3_Murugesan.exe
- Output Size: 1.8360576623639 MB
- Compilation Time: 0.95s

```

Three Notepad++ windows are open, showing the contents of file1, file2, and file3 after execution:

- file1.txt: NITM Warangal
- file2.txt: IIIT Hyderabad
- file3.txt: IIITP Tirupati

After Execution the see the contents of file1, file2 and file3.

```

1 #include<iostream>
2 #include<fstream>
3 #include<string>
4 using namespace std;
5 int main()
6 {
7     fstream f1,f2,f3,t;
8     f3.open("file3.txt");
9     t.open("temp1.txt",ios::out|ios::trunc);
10    char c;
11    while(f3)
12    {
13        f3.get(c);
14        t.put(c);
15    }
16    f3.close();
17    t.close();
18    cout<<"file3 to temp1 copied successfully"<<endl;
19    f2.open("file2.txt");
20    f3.open("file3.txt",ios::out|ios::trunc);
21    while(f2)
22    {
23        f2.get(c);
24        f3.put(c);
25    }
26    f3.close();
27    f2.close();
28    cout<<"file2 to file3 copied successfully"<<endl;
29    f1.open("file1.txt");
30    f2.open("file2.txt",ios::out|ios::trunc);
31    while(f1)
32    {
33        f1.get(c);
34        f2.put(c);
35    }
36    f1.close();
37    f2.close();
38    cout<<"file1 to file2 copied successfully"<<endl;
39    t.open("temp1.txt");
40    f1.open("file1.txt",ios::out|ios::trunc);
41    while(t)
42    {
43        t.get(c);
44        f1.put(c);
45    }
46    t.close();
47    }

```

8 In our Indian Railways, the sleeper class bogie contains a total of 72 berths for sleeping. Out of which the berth numbers 7, 15, 23...63, 71 a total of 9 berths can be used for RAC (Reservation Against Cancellation) passenger, in which case the berth will be allotted to two passengers for seating instead of sleeping. i.e. a maximum of 18 RAC passengers in a bogie.

RAC passenger i and $i+1$ will be allotted side lower berth $k = (8 \times j) - 1$; where $j = 1, 2, 3, \dots, 9$ and $i = 1, 3, 5, \dots, 17$.

If any of the berths/RAC passengers are not reported the following rules are applied.

Rule-1: If any of 63 confirmed berth passenger is not reported, the RAC_i passenger will be given the berth k and RAC_{i+1} passenger will be allotted with the non-reported person's berth.

Rule-2: If any of 18 RAC passenger is not reported. If anyone from i and $i+1$ have not reported, then that side lower k will be allotted to the reported person out of these two.

Rule-3: If both i and $i+1$ RAC passenger have not reported, then that side lower berth ' k ' will be given to the next RAC passenger as per the sequence.

Write a C++ program for taking the number of RAC passengers in a bogie, the number of non-reporting for both berth and RAC list and allot the berths as per the rules given and display the final berth allotment after the adjustment.

7M



Example-1:INPUT:

- Enter the number of RAC passengers in the bogie: 14
- Enter the berth numbers of passengers with **confirmed berths** but not reported: 4 12
- Enter the **RAC numbers** of passengers not reported: 8 13

OUTPUT:

The status of passengers is:

RAC1 will be in Berth 7
 RAC2 will be in Berth 4
 RAC3 will be in Berth 15
 RAC4 will be in Berth 12
 RAC7 will be in Berth 31
 RAC14 will be in Berth 55
 NO change for all the other passengers.

Example-2:INPUT:

- Enter the number of RAC passengers in the bogie: 14
- Enter the berth numbers of passengers with **confirmed berths** but not reported: 4 12
- Enter the **RAC numbers** of passengers not reported: 5 6

OUTPUT:

The status of passengers is:

RAC1 will be in Berth 7
 RAC2 will be in Berth 4
 RAC3 will be in Berth 15
 RAC4 will be in Berth 12
 RAC7 will be in Berth 31
 RAC8 will be in Berth 23
 NO change for all the other passengers.

Program:

```
#include<iostream>
using namespace std;
int main()
{
    int i,j,k,r1,r2;
    int allberths[73];
    for(i=1;i<=72;i++) //assigning the berth nos, 7,15,.. to 0s
    {
        if((i)%8==7)
            allberths[i]=0;
    else
        allberths[i]=i;
    }
    //RAC numbers are like 201, 202, ...
    int racs[19]={0};
    cout<<"Enter the number of RACs in the bogie\n";
    cin>>r1;
    for(i=1;i<=r1;i++)
    {
        racs[i]=200+i;
    }

    //Displayig all the RACs
    cout<<"List of RAC passenger\n";
    for(i=0;i<19;i++)
    {
        cout<<racs[i]<<" ";
    }
    cout<<endl;

    //fillin the side lowerBerths based on number of RACs
    r2=(18-r1)/2;
    for(j=72;j>=1;j--)
    {
        if(r2!=0)
        {
            if(allberths[j]==0)
            {
                allberths[j]=j;
                r2=r2-1;
            }
        }
    }

    //Displaying all the berths after knowing the no of RAC passengers
    cout<<endl;
    cout<<"\nBerths Statues: 0 means two are sitting and other numbers are confirmed berths\n";
    int t=1;
```

```

for(i=1;i<=72;i++) //assigning the berth nos, 7,15,.. to 0s
{
    cout<<"\t"<<allberths[i];
    if(i==8*t)
    {
        cout<<"\n";
        t=t+1;
    }
}

//Now dealing with Non reported RACs
int p2,k3;
cout<<"\n\nEnter the number of RACs not reported\n";
cin>>p2;
cout<<"Enter the RAC nos not reported\n";
for(i=1;i<=p2;i++)
{
    cin>>k3; // RAC no not reported
    racs[k3]=1000;
}

//Displayig all the RACs
cout<<"List of RAC passenger: Here 1000 means RAC non reporting\n";
for(i=0;i<19;i++)
{
    cout<<racs[i]<<" ";
}
cout<<endl;

//rule2 and rule3
int onlyracs[18]={0};
j=1;
k3=0;
for(i=1;i<=18;i=i+2)
{
    if(racs[i]==1000 && racs[i+1]!=1000 && racs[i+1]!=1) //case-1
    {
        k=8*j-1;
        allberths[k]=racs[i+1];
        racs[i+1]=1;
    }

    if(racs[i]!=1000 && racs[i+1]==1000 && racs[i]!=1) //case-2
    {
        k=8*j-1;
        allberths[k]=racs[i];
        racs[i]=1;
    }

    if(racs[i]==1000 && racs[i+1]==1000 ) //Both RACs not reported
    {

```

```

        onlyracs[k3]=i+200; //maintaing the list separetely
        onlyracs[k3+1]=i+1+200;
        k3=k3+2;
    }

    j++;

}

int f1,f2;
j=0;
for(i=1;i<=18;i=i+2)
{
    if(racs[i]!=1000 && racs[i+1]!=1000 && racs[i]!=1 && racs[i+1]!=1) //RACs need to be
cleared
    {
        if(onlyracs[j]!=0)
        {

            f1=onlyracs[j]-200;
            f2=(f1+1)/2;
            k=8*f2-1;
            allberths[k]=racs[i+1];
            racs[i+1]=1;

            f1=i;
            f2=(f1+1)/2;
            k=8*f2-1;
            allberths[k]=racs[i];
            racs[i]=1;

            j=j+2;
        }
    }
}

//Displayig all the RACs
cout<<"\n\nList of RAC passenger after first adjustement:\n";
cout<<"Here 1000 means RAC non reporting and 1 means RAC Cleared\n";
for(i=0;i<19;i++)
{
    cout<<racs[i]<<" ";
}
cout<<endl;

```



```

//Displaying all the berths
cout<<"\nBerths Statues: After RACs first adjustemnt based on non reporting RAC passenger\n";
cout<<"Here 201 is RAC1, 202 is RAC2...\n";
t=1;
for(i=1;i<=72;i++)
{
    cout<<"\t"<<allberths[i];
    if(i==8*t)
    {
        cout<<"\n";
        t=t+1;
    }
}

//Rule-1:Take the non reporting of confirmed berths
int p1;
cout<<"\n\nEnter the number of passengers with confirmed berths but not reported\n";
cin>>p1;
cout<<"Enter the berth numbers not reported\n";
int nonrepberths[63]={0};
for(i=0;i<p1;i++)
{
    cin>>nonrepberths[i]; //{4,12}
}
j=0;
for(i=1;i<=72;i++)
{
    if(nonrepberths[j]==i)// i.e.4,12
    {
        allberths[i]=500;
        j=j+1;
    }
}

//int f1,f2;
int k2=1;
for(i=1;i<=r1;i=i+2)
{
    if(racs[i]!=1000 && racs[i+1]!=1000 && racs[i]!=1 && racs[i+1]!=1) //RACs need to be
cleared
    {

        for(k2=1;k2<=72;k2++)
            if(allberths[k2]==500)
            {
                allberths[k2]=racs[i+1];
                racs[i+1]=1;

                f1=i;

```

```

        f2=(f1+1)/2;
        k=8*f2-1;
        allberths[k]=racs[i];
        racs[i]=1;
        break;
    }

}

//Displayig all the RACs
cout<<"List of RAC passenger\n";
for(i=0;i<19;i++)
{
    cout<<racs[i]<<" ";
}
cout<<endl;

//Displaying all the berths all knowing the no of RAC passengers
cout<<"\nFinal Berths Statues: After the entire adjustment\n";
cout<<"Here:\n";
cout<<"201 is RAC1, 202 is RAC2...\n";
cout<<"0 represents two RACs are sitting in that side lower berth\n";
cout<<"500 means an empty berth which is empty after all the entire allocation\n";
t=1;
for(i=1;i<=72;i++) //assigning the berth nos, 7,15,.. to 0s
{
    cout<<"\t"<<allberths[i];
    if(i==8*t)
    {
        cout<<"\n";
        t=t+1;
    }
}

return 0;
}

```

OUTPUT:

Example-1:

```
File Edit Search View Project Execute Tools AStyle Window Help
C:\Users\RAJU\Desktop\CPJuly_Dec2019\END_Q8_RACS.cpp - [Executing] - Dev-C++ 5.11.0.3
TDM-GCC 4.9.2 64-bit Release

END_Q8_RACS.cpp
191
192     for(k2=1;k2<=72;k2++)
193     {
194         if(allberths[k2]==500)
195         {
196             allberths[k2]=racs[i+1];
197             racs[i+1]=1;
198
199             f1=i;
200             f2=(f1+1)/2;
201             k2=f2-1;
202             allberths[k2]=racs[i];
203             racs[i]=1;
204             break;
205         }
206     }
207
208 }
209
210 //Display all the RACs
211 cout<<"List of RAC passenger\n";
212 for(i=0;i<19;i++)
213 {
214     cout<<racs[i]<<" ";
215 }
216 cout<<endl;
217
218 //Displaying all the berths all knowing the no of RAC passengers
219 cout<<"Final Berths Status: After the entire adjustment\n";
220 cout<<"Here:\n";
221 cout<<"201 is RAC1, 202 is RAC2...\n";
222 cout<<"0 represents two RACs are sitting in that side lower berth\n";
223 cout<<"500 means an empty berth which is empty after all the entire allocation\n";
224
225 int t=1;
226 for(i=1;i<=72;i++) //assigning the berth nos, 7,15,... to 0s
227 {
228     cout<<"t"<<allberths[i];
229     if(i%8==0)
230     {
231         cout<<"\n";
232         t=t+1;
233     }
234 }
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Example-3: Here in this example, after all the final allotment, the berth No.69 is still vacant

The image shows a Visual Studio IDE with a C++ project named 'END_QB_RACS.exe'. The code is a simulation for RAC passengers and berths. It starts by defining the number of RACs (18) and berths (218). The program then enters a loop to assign berths to RACs, with a break statement when a berth is found. The output shows the final berths status, the number of RACs not reported, and the number of berths not reported. The program exits after 21.59 seconds.

```
191 for(k2=1;k2<=72;k2++)
192     if(allberths[k2]==500)
193     {
194         allberths[k2]=racs[i+1];
195         racs[i+1]=1;
196
197         f1=i;
198         f2=(f1+1)/2;
199         k0=f2-1;
200         allberths[k0]=racs[i];
201         racs[i]=1;
202         break;
203     }
204 }
205
206 //Displaying all the RACs
207 cout<<"List of RAC passenger\n";
208 for(i=0;i<19;i++)
209 {
210     cout<<racs[i]<<" ";
211     cout<<endl;
212 }
213
214 //Displaying all the berths all knowing the no of RAC passengers
215 cout<<"\nfinal Berths Status: After the entire adjustment\n";
216 cout<<"Here:\n";
217 cout<<"201 is RAC1, 202 is RAC2...\n";
218 cout<<"0 represents two RACs are sitting in that side lower berth\n";
219 cout<<"500 means an empty berth which is empty after all the entire allocation\n";
220
221 for(i=1;i<=72;i++)//assigning the berth nos, 7,15,... to 0s
222 {
223     cout<<"\t"<<allberths[i];
224     if(i%8==0)
225     {
226         cout<<"\n";
227         i++;
228     }
229 }
230
231
232
233
234 }
```

The terminal output shows the final berths status, the number of RACs not reported, and the number of berths not reported. The program exits after 21.59 seconds.

```
18
Enter the number of RACs in the begin
18
List of RAC passenger
0 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218

Berths Status: 0 means two are sitting and other numbers are confirmed berths
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

Enter the number of RACs not reported
Enter the RAC nos not reported
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List of RAC passenger: Here 1000 means RAC non reporting
0 1000 1000 1000 1000 206 206 207 208 209 210 211 212 213 214 215 1000 1000 218

List of RAC passenger after first adjustment:
Here 1000 means RAC non reporting and 1 means RAC Cleared
0 1000 1 1000 1000 1 1 207 208 209 210 211 212 213 214 1 1000 1000 1

Berths Status: After RACs first adjustment based on non reporting RAC passenger
Here 201 is RAC1, 202 is RAC2...
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72

Enter the number of passengers with confirmed berths but not reported
Enter the berth numbers not reported
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List of RAC passenger
0 1000 1 1000 1000 1 1 1 1 1 1 1 1 1 1 1 1000 1000 1

Final Berths Status: After the entire adjustment
Here:
201 is RAC1, 202 is RAC2...
0 represents two RACs are sitting in that side lower berth
500 means an empty berth which is empty after all the entire allocation
1 200 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 218 72

Process exited after 21.59 seconds with return value 0
Press any key to continue . . .
```