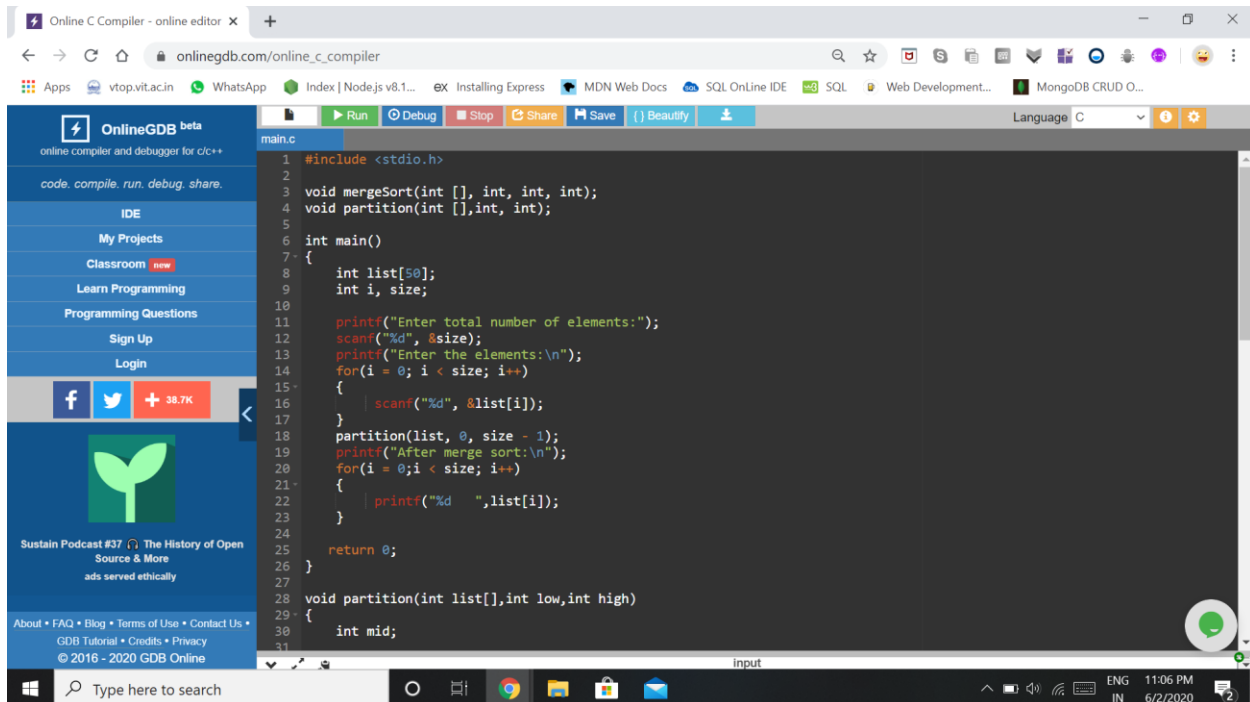


Name:Kulvir Singh

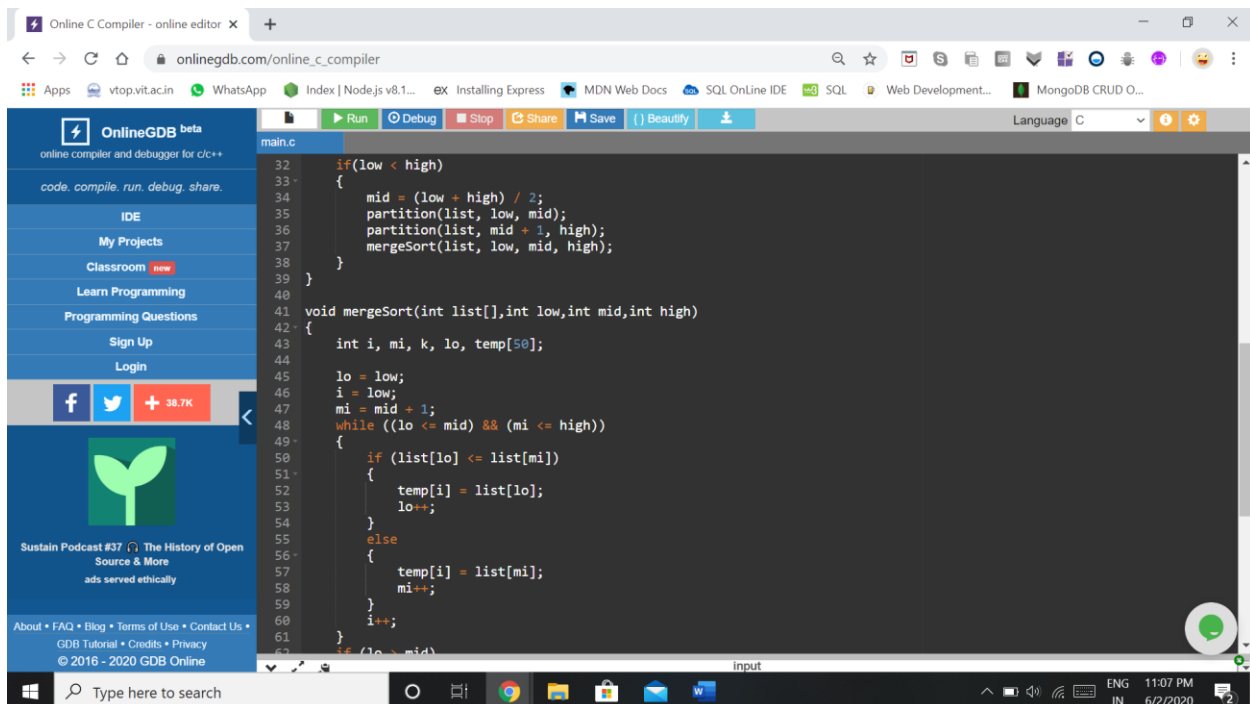
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Assessment 5

Q1>Merge Sort



```
1 #include <stdio.h>
2
3 void mergeSort(int [], int, int, int);
4 void partition(int [],int, int);
5
6 int main()
7 {
8     int list[50];
9     int i, size;
10
11     printf("Enter total number of elements:");
12     scanf("%d", &size);
13     printf("Enter the elements:\n");
14     for(i = 0; i < size; i++)
15     {
16         scanf("%d", &list[i]);
17     }
18     partition(list, 0, size - 1);
19     printf("After merge sort:\n");
20     for(i = 0; i < size; i++)
21     {
22         printf("%d ", list[i]);
23     }
24
25     return 0;
26 }
27
28 void partition(int list[],int low,int high)
29 {
30     int mid;
```



```
32     if(low < high)
33     {
34         mid = (low + high) / 2;
35         partition(list, low, mid);
36         partition(list, mid + 1, high);
37         mergeSort(list, low, mid, high);
38     }
39 }
40
41 void mergeSort(int list[],int low,int mid,int high)
42 {
43     int i, mi, k, lo, temp[50];
44
45     lo = low;
46     i = low;
47     mi = mid + 1;
48     while ((lo <= mid) && (mi <= high))
49     {
50         if (list[lo] <= list[mi])
51         {
52             temp[i] = list[lo];
53             lo++;
54         }
55         else
56         {
57             temp[i] = list[mi];
58             mi++;
59         }
60         i++;
61     }
62     if (lo > mid)
```

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```
main.c
53         lo++;
54     }
55     else
56     {
57         temp[i] = list[mi];
58         mi++;
59     }
60     i++;
61 }
62 if (lo > mid)
63 {
64     for (k = mi; k <= high; k++)
65     {
66         temp[i] = list[k];
67         i++;
68     }
69 }
70 else
71 {
72     for (k = lo; k <= mid; k++)
73     {
74         temp[i] = list[k];
75         i++;
76     }
77 }
78 for (k = low; k <= high; k++)
79 {
80     list[k] = temp[k];
81 }
82 }
83 }
```

input

Windows Taskbar: Type here to search, Chrome, File Explorer, Mail, W

System Tray: ENG IN, 11:07 PM, 6/2/2020

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```
Enter total number of elements:10
Enter the elements:
2
3
4
1
2
7
8
5
9
After merge sort:
1 2 2 3 4 5 5 7 8 9
...Program finished with exit code 0
Press ENTER to exit console.
```

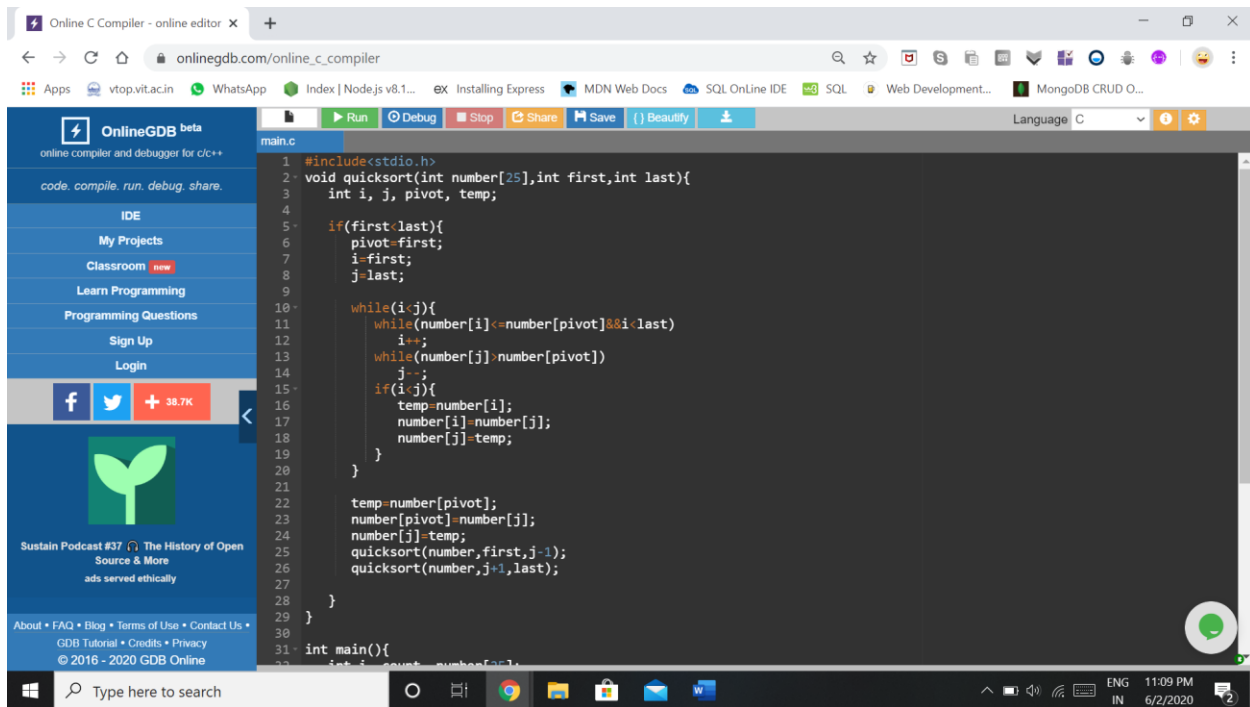
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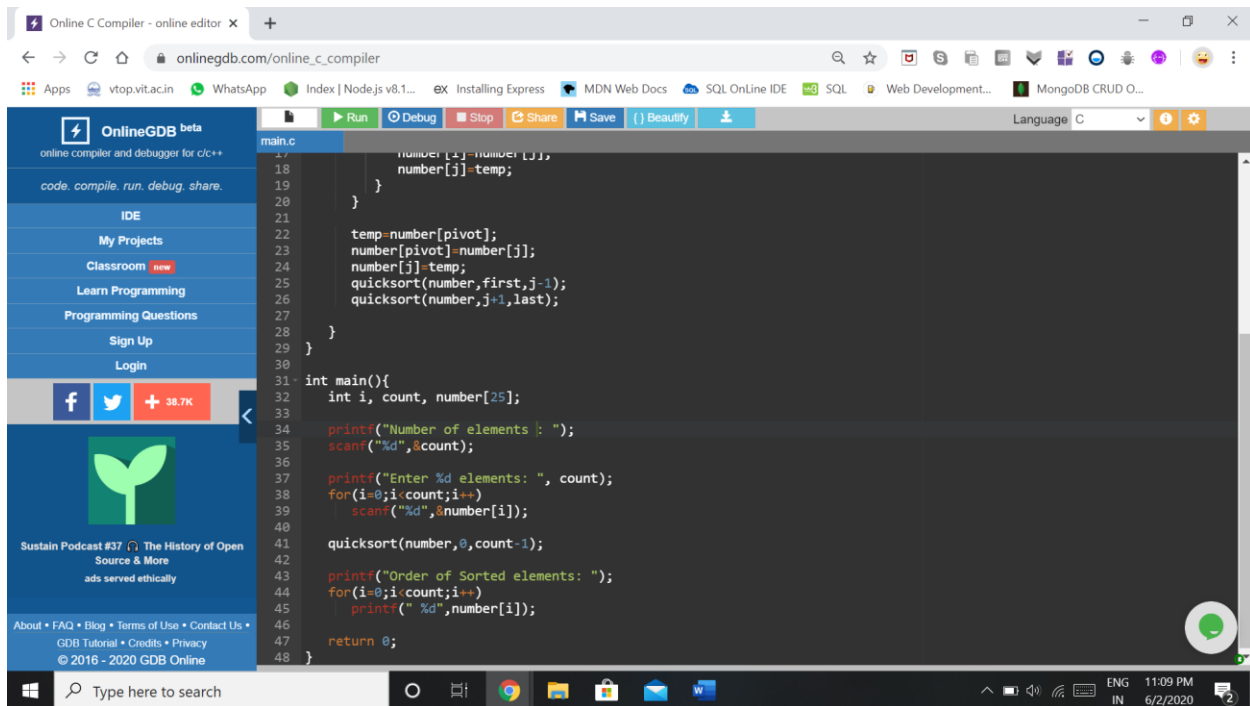
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Q2>Quick Sort



The screenshot shows the OnlineGDB website interface. On the left is a sidebar with navigation links: 'code, compile, run, debug, share.', 'IDE', 'My Projects', 'Classroom' (marked 'new'), 'Learn Programming', 'Programming Questions', 'Sign Up', and 'Login'. Below these are social media icons for Facebook, Twitter, and a '+ 38.7K' button. A 'Sustain Podcast #37' section is also visible. The main area displays a C program for Quick Sort. The code defines a 'quickSort' function that recursively sorts an array. The 'main' function calls 'quickSort' on an array of 25 elements. The browser's address bar shows 'onlinegdb.com/online_c_compiler'. The Windows taskbar at the bottom indicates the time is 11:09 PM on 6/2/2020.

```
1 #include<stdio.h>
2 void quicksort(int number[25],int first,int last){
3     int i, j, pivot, temp;
4
5     if(first<last){
6         pivot=first;
7         i=first;
8         j=last;
9
10        while(i<j){
11            while(number[i]<=number[pivot]&& i<last)
12                i++;
13            while(number[j]>number[pivot])
14                j--;
15            if(i<j){
16                temp=number[i];
17                number[i]=number[j];
18                number[j]=temp;
19            }
20        }
21        temp=number[pivot];
22        number[pivot]=number[j];
23        number[j]=temp;
24        quicksort(number,first,j-1);
25        quicksort(number,j+1,last);
26    }
27 }
28
29 int main(){
30     int i, count, number[25];
```



This screenshot continues the C program from the previous one. It shows the completion of the 'main' function. The program prints the number of elements, prompts the user to enter 25 elements, reads them into the array, calls 'quickSort', and then prints the sorted array. The browser and taskbar details are consistent with the previous screenshot.

```
31 int main(){
32     int i, count, number[25];
33
34     printf("Number of elements : ");
35     scanf("%d",&count);
36
37     printf("Enter %d elements: ", count);
38     for(i=0;i<count;i++)
39         scanf("%d",&number[i]);
40
41     quicksort(number,0,count-1);
42
43     printf("Order of Sorted elements: ");
44     for(i=0;i<count;i++)
45         printf("%d",number[i]);
46
47     return 0;
48 }
```

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Run Debug Stop Share Save () Beautify

Language C

Input

```
Number of elements : 10
Enter 10 elements: 2
3
4
5
6
7
8
9
Order of Sorted elements: 1 2 2 3 4 5 5 6 7 8 9
...Program finished with exit code 0
Press ENTER to exit console.
```

Type here to search

ENG 11:09 PM 6/2/2020

Q3>Insertion Sort

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https://www.onlinegdb.com/online_c_compiler#tab-stdin

main.cpp

```
1 #include <iostream>
2 using namespace std;
3 void printArray(int array[], int size) {
4     for (int i = 0; i < size; i++) {
5         cout << array[i] << " ";
6     }
7     cout << endl;
8 }
9
10 void insertionSort(int array[], int size) {
11     for (int step = 1; step < size; step++) {
12         int key = array[step];
13         int j = step - 1;
14         while (key < array[j] && j >= 0) {
15             array[j + 1] = array[j];
16             --j;
17         }
18         array[j + 1] = key;
19     }
20 }
21
22 int main() {
23     int data[] = {9, 5, 1, 4, 3, 2, 7, 8, 6, 0};
24     int size = sizeof(data) / sizeof(data[0]);
25     insertionSort(data, size);
26     cout << "Sorted array in ascending order:\n";
27     printArray(data, size);
28 }
```

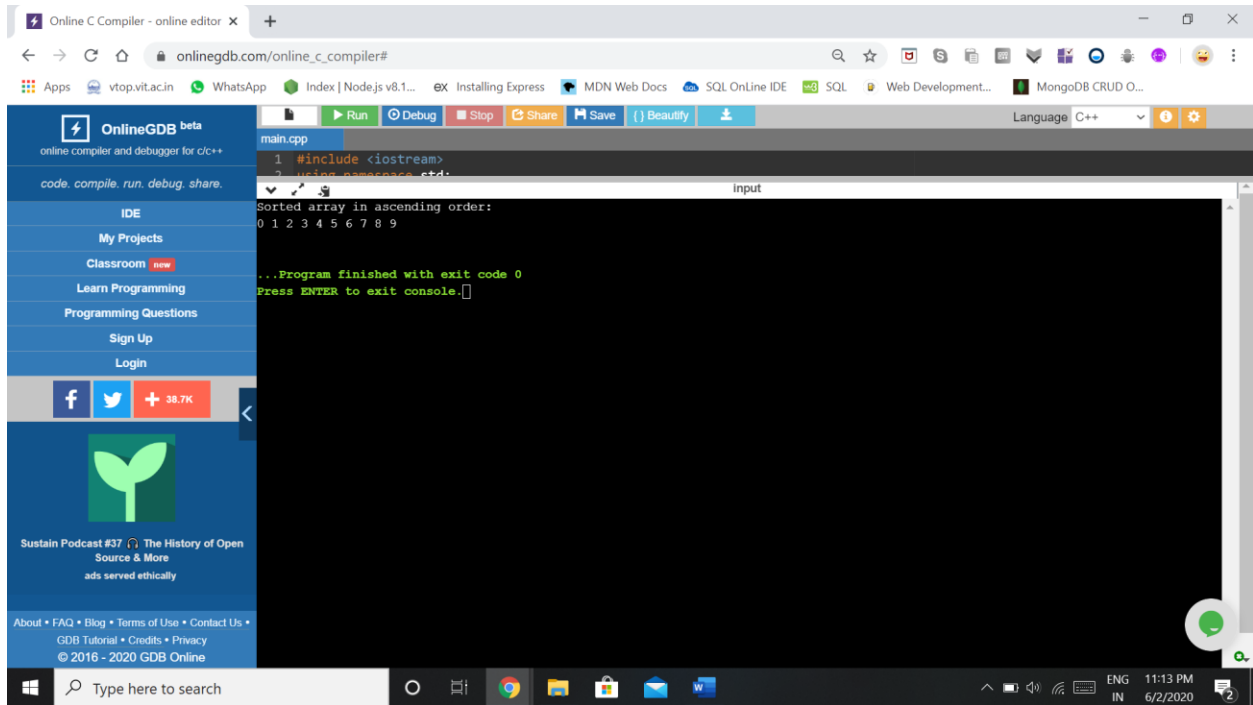
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Language C++

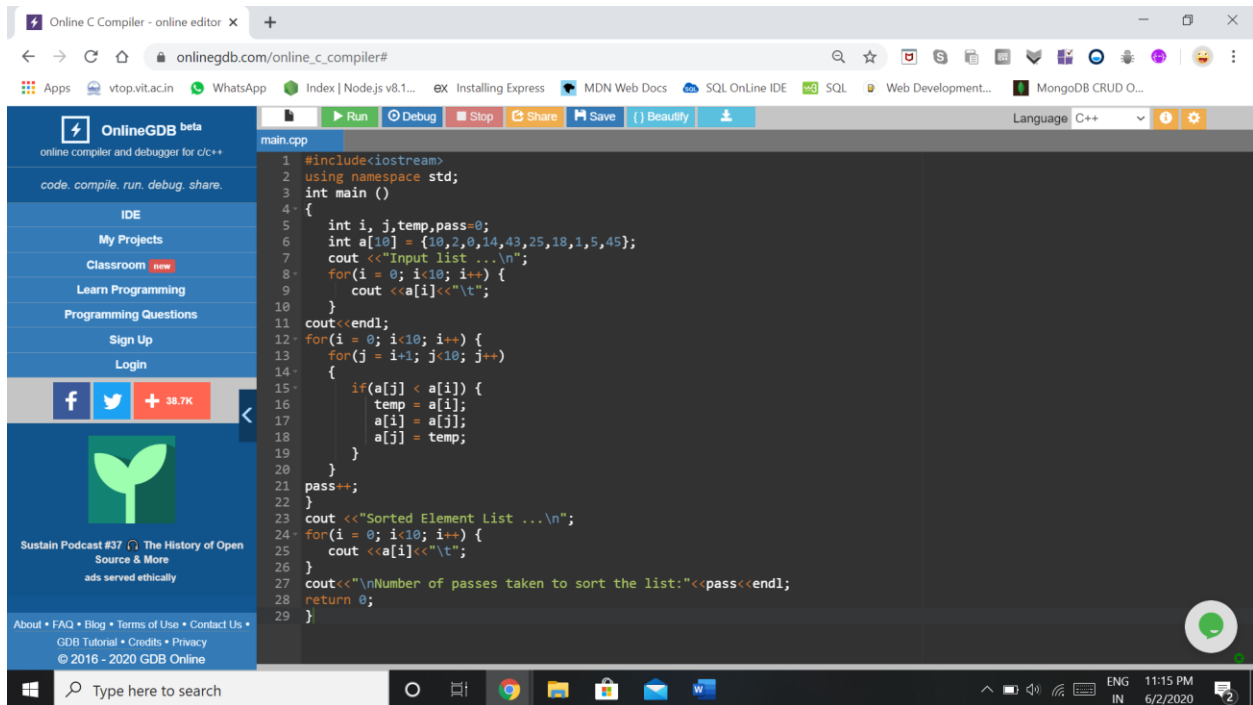
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Q4>Bubble Sort



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Input

```
Input list ...
10 2 0 14 43 25 18 1 5 45
Sorted Element List ...
0 1 2 5 10 14 18 25 43 45
Number of passes taken to sort the list:10

...Program finished with exit code 0
Press ENTER to exit console.
```

Type here to search

ENG 11:16 PM 6/2/2020

Q5>Knapsack Problem

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main.cpp

```
1 #include <iostream>
2 #include <limits>
3 using namespace std;
4 int knapSack(int v[], int w[], int n, int W) {
5     if (W < 0)
6         return INT_MIN;
7     if (n < 0 || W == 0)
8         return 0;
9     int in = v[n] + knapSack(v, w, n - 1, W - w[n]);
10    int ex = knapSack(v, w, n - 1, W);
11    return max (in, ex);
12 }
13 int main() {
14     int v[] = { 10, 20, 30, 40, 60, 70 };
15     int w[] = { 1, 2, 3, 6, 7, 4 };
16     int W = 7;
17     int n = sizeof(v) / sizeof(v[0]);
18     cout << "Knapsack value is " << knapSack(v, w, n - 1, W);
19     return 0;
20 }
```

Input

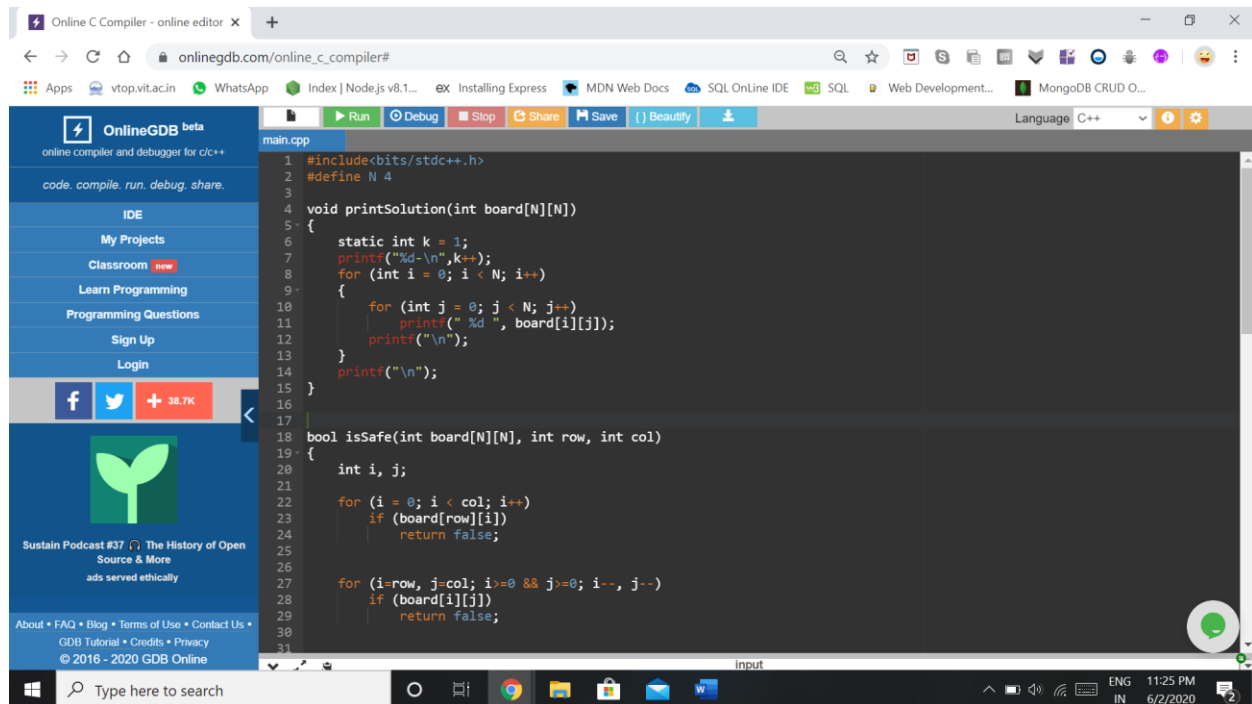
```
Knapsack value is 100

...Program finished with exit code 0
Press ENTER to exit console.
```

Type here to search

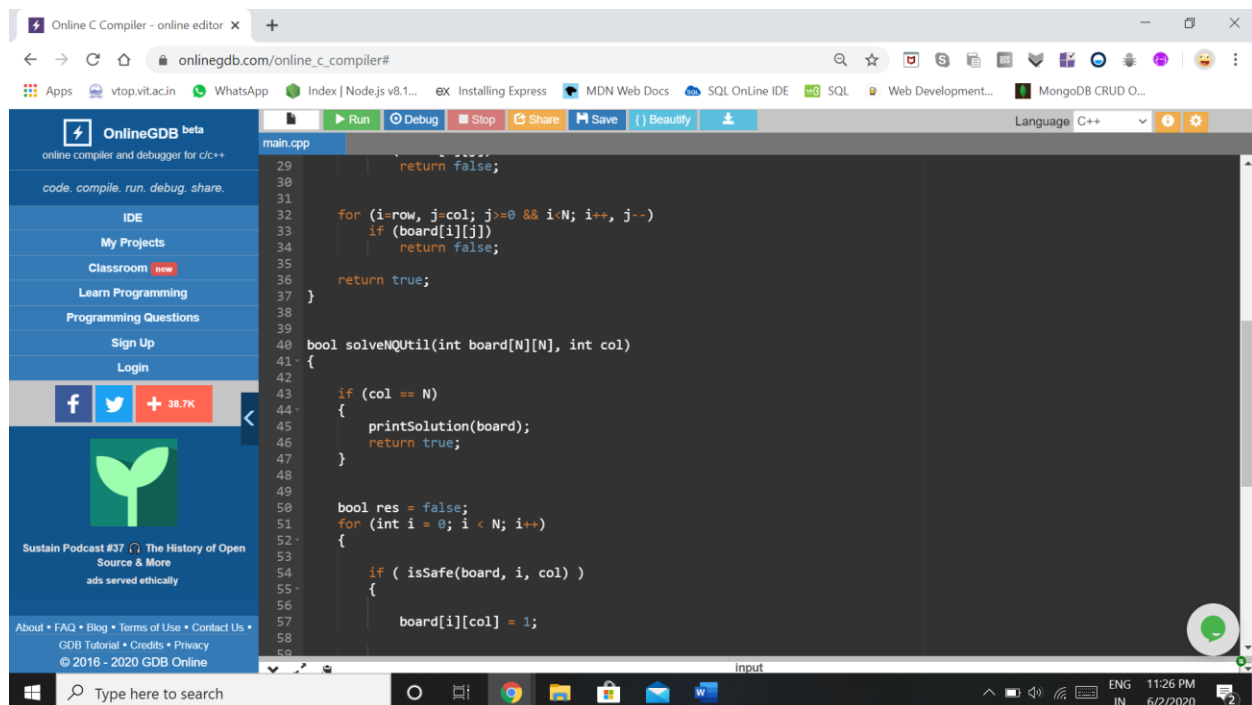
ENG 11:17 PM 6/2/2020

Q6>N Queen Problem



The screenshot shows the OnlineGDB IDE interface. The left sidebar contains navigation links: IDE, My Projects, Classroom (new), Learn Programming, Programming Questions, Sign Up, and Login. Below these are social media icons for Facebook, Twitter, and a '+38.7K' button. A 'Sustain Podcast #37' advertisement is also visible. The main editor area displays the following C++ code:

```
1 #include<bits/stdc++.h>
2 #define N 4
3
4 void printSolution(int board[N][N])
5 {
6     static int k = 1;
7     printf("%d-\n",k++);
8     for (int i = 0; i < N; i++)
9     {
10         for (int j = 0; j < N; j++)
11             printf(" %d ", board[i][j]);
12         printf("\n");
13     }
14     printf("\n");
15 }
16
17 bool isSafe(int board[N][N], int row, int col)
18 {
19     int i, j;
20
21     for (i = 0; i < col; i++)
22         if (board[row][i])
23             return false;
24
25     for (i=row, j=col; i>=0 && j>=0; i--, j--)
26         if (board[i][j])
27             return false;
28
29     for (i=row, j=col; i<N && j<N; i++, j++)
30         if (board[i][j])
31             return false;
32 }
```



The screenshot shows the OnlineGDB IDE interface with the completed code for the N-Queen problem. The code is as follows:

```
29         return false;
30
31     for (i=row, j=col; j>=0 && i<N; i++, j--)
32         if (board[i][j])
33             return false;
34     return true;
35 }
36
37 bool solveNQutil(int board[N][N], int col)
38 {
39     if (col == N)
40     {
41         printSolution(board);
42         return true;
43     }
44
45     bool res = false;
46     for (int i = 0; i < N; i++)
47     {
48         if ( isSafe(board, i, col) )
49         {
50             board[i][col] = 1;
51
52             res = solveNQutil(board, col+1);
53             if (res)
54                 return true;
55             board[i][col] = 0;
56         }
57     }
58     return res;
59 }
```

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main.cpp

```
57 board[i][col] = 1;
58
59 res = solveNQUtil(board, col + 1) || res;
60
61 board[i][col] = 0;
62 }
63
64 }
65
66 return res;
67 }
68
69 void solveNQ()
70 {
71     int board[N][N];
72     memset(board, 0, sizeof(board));
73
74     if (solveNQUtil(board, 0) == false)
75     {
76         printf("Solution does not exist");
77         return;
78     }
79
80     return;
81 }
82
83 int main()
84 {
85     solveNQ();
86     return 0;
87 }
```

Language C++

input

Type here to search

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main.cpp

```
57 board[i][col] = 1;
58
```

input

```
1-
0 0 1 0
1 0 0 0
0 0 0 1
0 1 0 0

2-
0 1 0 0
0 0 0 1
1 0 0 0
0 0 1 0

...Program finished with exit code 0
Press ENTER to exit console.
```

Type here to search

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Q7>Activity Selection Problem

The screenshot shows a web browser window with the URL `onlinegdb.com/online_c_compiler`. The page features a sidebar on the left with navigation links: "IDE", "My Projects", "Classroom" (marked as new), "Learn Programming", "Programming Questions", "Sign Up", and "Login". Below these are social media icons for Facebook, Twitter, and a button with a plus sign and the number "749". A "Remote Ruby" advertisement is also present. The main area displays a C program for the Activity Selection Problem. The code defines a function `printMaxActivities` that takes an array `s`, an array `f`, and an integer `n`. It iterates through the arrays, printing the indices of selected activities. The `main` function initializes `s` as `{1,3,0,5,3,5,6,8,2,12}` and `f` as `{4,5,6,7,8,9,10,11,12,13,14}`, then calls `printMaxActivities(s, f, n)`. The output shows the selected activities: "Following activities are selected n0 3 7 10". The console also displays "Program finished with exit code 0" and "Press ENTER to exit console." The Windows taskbar at the bottom shows the time as 11:35 PM on 6/2/2020.

```
1 #include<stdio.h>
2 void printMaxActivities(int s[], int f[], int n)
3 {
4     int i, j;
5     printf ("Following activities are selected n");
6     i = 0;
7     printf ("%d ", i);
8     for (j = 1; j < n; j++)
9     {
10        if (s[j] >= f[i])
11        {
12            printf ("%d ", j);
13            i = j;
14        }
15    }
16 }
17 int main()
18 {
19     int s[] = {1,3,0,5,3,5,6,8,2,12};
20     int f[] = {4,5,6,7,8,9,10,11,12,13,14};
21     int n = sizeof(s)/sizeof(s[0]);
22     printMaxActivities(s, f, n);
23     return 0;
24 }
25
```

Following activities are selected n0 3 7 10

...Program finished with exit code 0
Press ENTER to exit console.