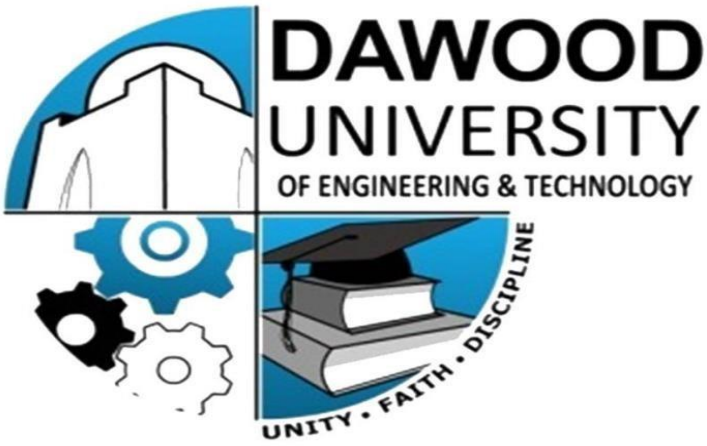


NAME : ***SAFI AHMED***

ROLL NO : ***22F-BSCS-35***

SUBJECT: ***PROGRAMMING FUNDAMENTAL***

SUBMITTED TO : ***ENGR. SOFIA HAJANO***

DAWOOD UNIVERSITY OF ENGINEERING AND TECHNOLOGY
M.A JINNAH ROAD KARACHI-74800 (PAKISTAN)

PROGRAMMING FUNDAMENTALS

ASSIGNMENT NO:02

1. Write a C++ program that takes input for an array of characters and counts the number of vowels present in the array.

Programiz C++ Online Compiler

main.cpp | Run | Output

```cpp
#include <iostream>
using namespace std;

int countVowels(char arr[], int size) {
    int count = 0;
    char vowels[] = {'a', 'e', 'i', 'o', 'u'};

    for (int i = 0; i < size; i++) {
        for (int j = 0; j < 5; j++) {
            if (arr[i] == vowels[j] || arr[i] == vowels[j] - 32) {
                count++;
                break;
            }
        }
    }

    return count;
}

```

```
/tmp/n5kZaL9haw.o
Enter the size of the array: 5
Enter the elements of the array: a e i o u
Number of vowels in the array: 5
```

Programiz C++ Online Compiler

main.cpp | Run | Output

```cpp
int main() {
    const int MAX_SIZE = 100;
    char arr[MAX_SIZE];
    int size;

    cout << "Enter the size of the array: ";
    cin >> size;

    cout << "Enter the elements of the array: ";
    for (int i = 0; i < size; i++) {
        cin >> arr[i];
    }

    int vowelCount = countVowels(arr, size);
cout << "Number of vowels in the array: " << vowelCount << endl;

    return 0;
}
```

```
/tmp/nSKZaL9haw.o
Enter the size of the array: 5
Enter the elements of the array: a e i o u
Number of vowels in the array: 5
```

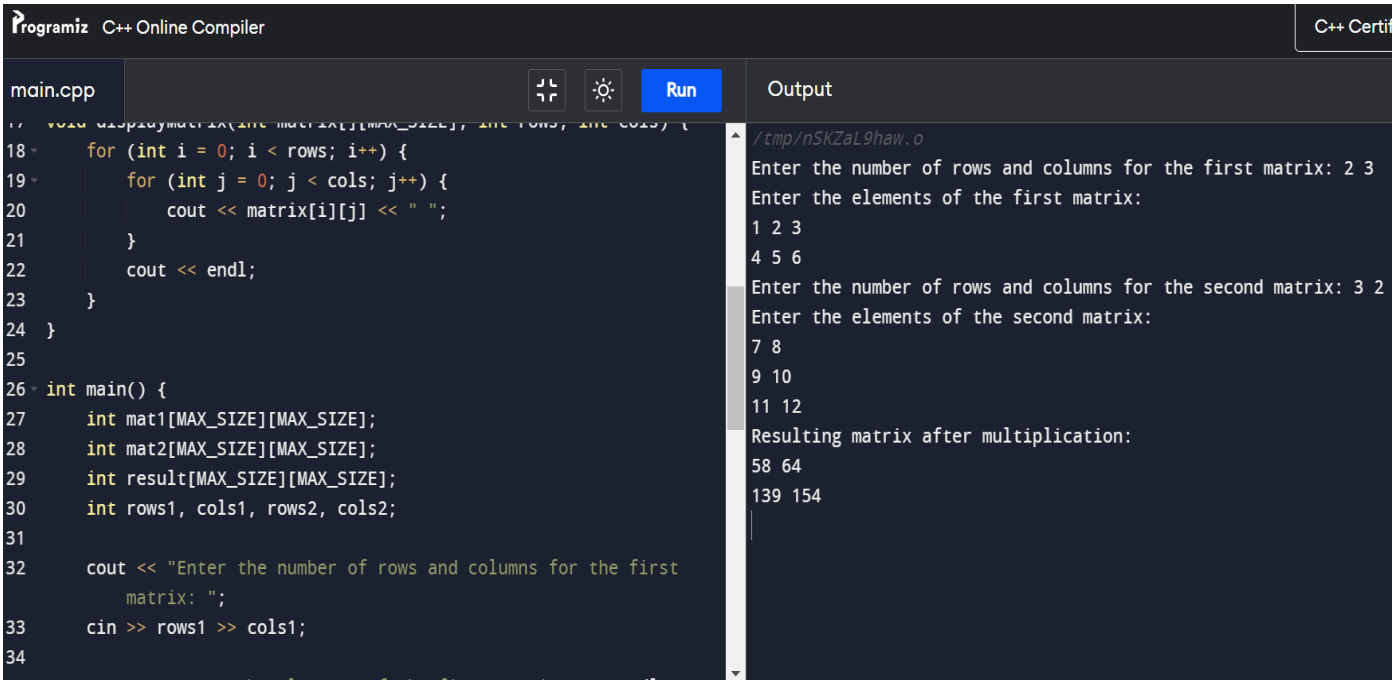
2. Create a C++ program to perform matrix multiplication. Take input for two matrices and display the resulting matrix.

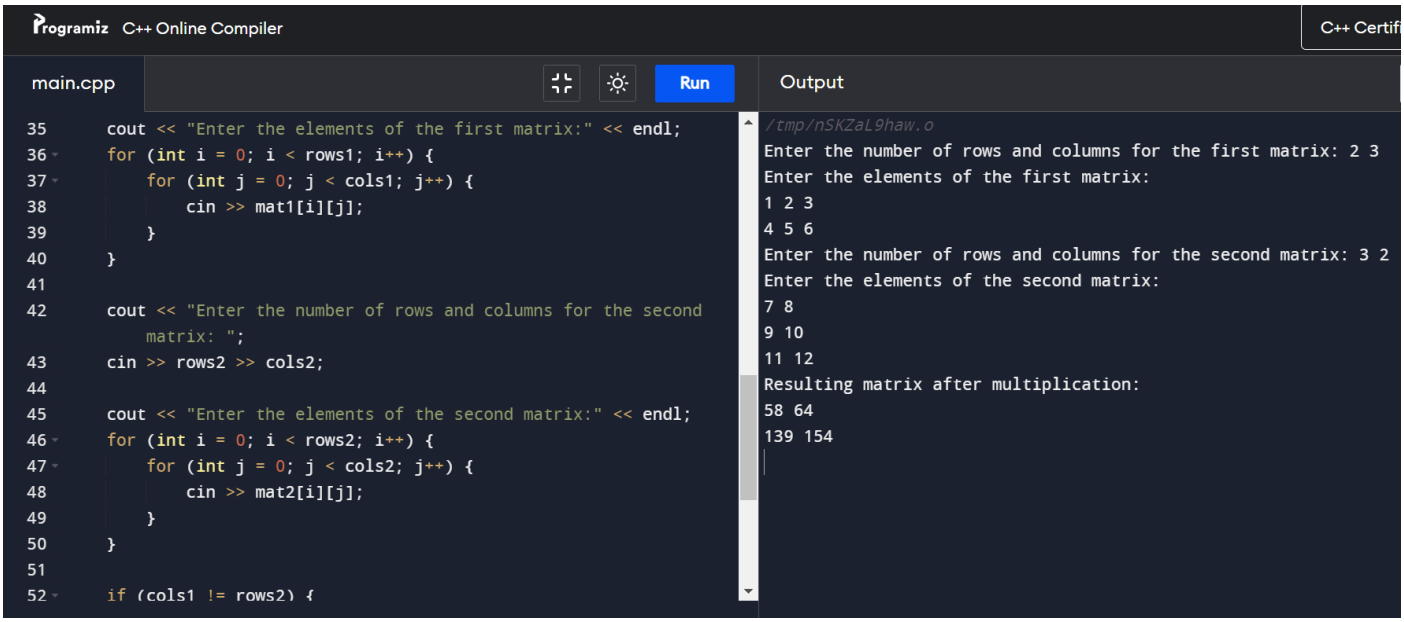
Programiz C++ Online Compiler

main.cpp | Run | Output

```cpp
#include <iostream>
using namespace std;

const int MAX_SIZE = 10;

void matrixMultiplication(int mat1[][MAX_SIZE], int
    mat2[][MAX_SIZE], int result[][MAX_SIZE], int rows1, int cols1,
    int cols2) {
    for (int i = 0; i < rows1; i++) {
        for (int j = 0; j < cols2; j++) {
            result[i][j] = 0;
            for (int k = 0; k < cols1; k++) {
                result[i][j] += mat1[i][k] * mat2[k][j];
            }
        }
    }
}

void displayMatrix(int matrix[][MAX_SIZE], int rows, int cols) {
```

```
/tmp/nSKZaL9haw.o
Enter the number of rows and columns for the first matrix: 2 3
Enter the elements of the first matrix:
1 2 3
4 5 6
Enter the number of rows and columns for the second matrix: 3 2
Enter the elements of the second matrix:
7 8
9 10
11 12
Resulting matrix after multiplication:
58 64
139 154
```


Programiz C++ Online Compiler
C++ Certi
main.cpp
Run
Output
for (int i = 0; i < rows; i++) {
for (int j = 0; j < cols; j++) {
cout << matrix[i][j] << " ";
}
cout << endl;
}
}
int main() {
int mat1[MAX_SIZE][MAX_SIZE];
int mat2[MAX_SIZE][MAX_SIZE];
int result[MAX_SIZE][MAX_SIZE];
int rows1, cols1, rows2, cols2;
cout << "Enter the number of rows and columns for the first matrix: ";
cin >> rows1 >> cols1;
/tmp/nSKZaL9haw.o
Enter the number of rows and columns for the first matrix: 2 3
Enter the elements of the first matrix:
1 2 3
4 5 6
Enter the number of rows and columns for the second matrix: 3 2
Enter the elements of the second matrix:
7 8
9 10
11 12
Resulting matrix after multiplication:
58 64
139 154


Programiz C++ Online Compiler
C++ Certif
main.cpp
Run
Output
cout << "Enter the elements of the first matrix:" << endl;
for (int i = 0; i < rows1; i++) {
for (int j = 0; j < cols1; j++) {
cin >> mat1[i][j];
}
}
cout << "Enter the number of rows and columns for the second matrix: ";
cin >> rows2 >> cols2;
cout << "Enter the elements of the second matrix:" << endl;
for (int i = 0; i < rows2; i++) {
for (int j = 0; j < cols2; j++) {
cin >> mat2[i][j];
}
}
if (cols1 != rows2) {
/tmp/nSKZaL9haw.o
Enter the number of rows and columns for the first matrix: 2 3
Enter the elements of the first matrix:
1 2 3
4 5 6
Enter the number of rows and columns for the second matrix: 3 2
Enter the elements of the second matrix:
7 8
9 10
11 12
Resulting matrix after multiplication:
58 64
139 154

Programiz C++ Online Compiler

main.cpp

Run

Output

```
    for (int i = 0; i < rows2; i++) {
        for (int j = 0; j < cols2; j++) {
            cin >> mat2[i][j];
        }
    }

    if (cols1 != rows2) {
    cout << "Error: Matrix multiplication not possible." <<endl;
        return 0;
    }

    matrixMultiplication(mat1, mat2, result, rows1, cols1, cols2);

    cout << "Resulting matrix after multiplication:" << endl;
    displayMatrix(result, rows1, cols2);

    return 0;
}

```

```
/tmp/nSkZaL9haw.o
Enter the number of rows and columns for the first matrix: 2 3
Enter the elements of the first matrix:
1 2 3
4 5 6
Enter the number of rows and columns for the second matrix: 3 2
Enter the elements of the second matrix:
7 8
9 10
11 12
Resulting matrix after multiplication:
58 64
139 154
```

3. Create a C++ program that takes input for an array of strings and sorts them in alphabetical order using the bubble sort algorithm.

Programiz C++ Online Compiler

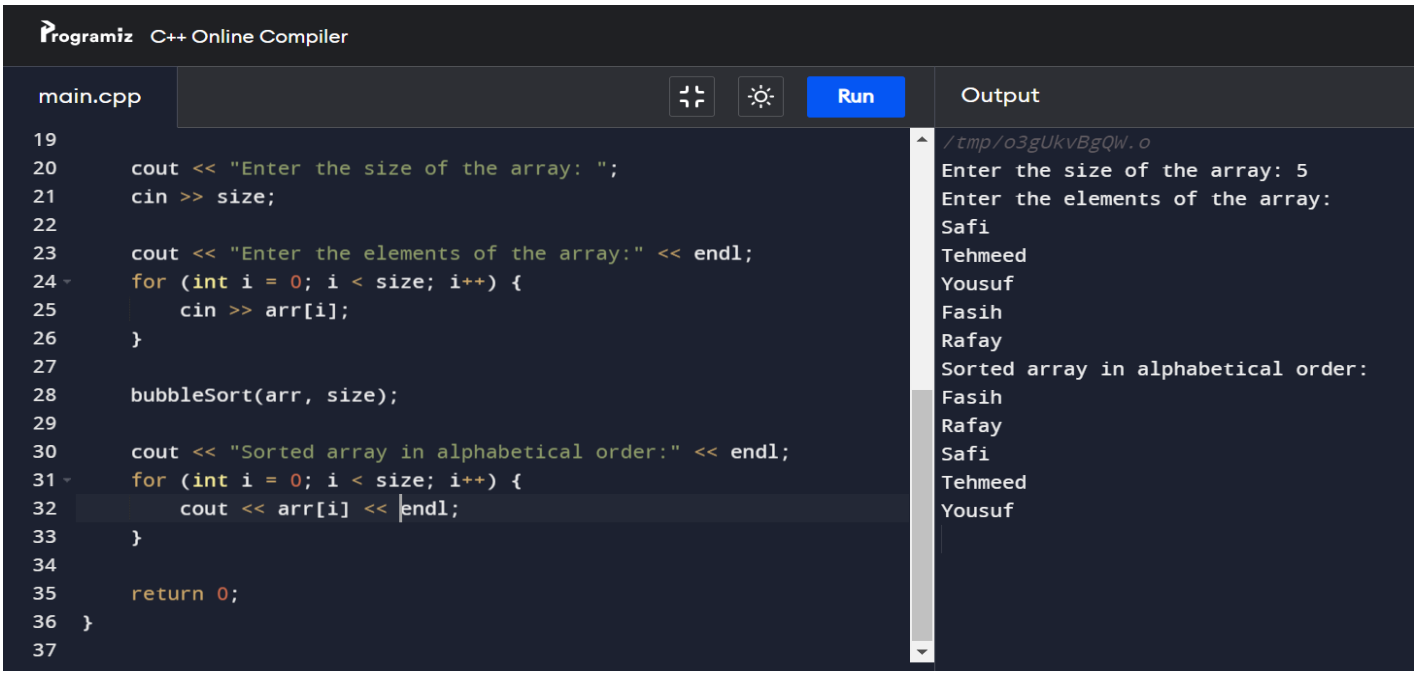
main.cpp

Run

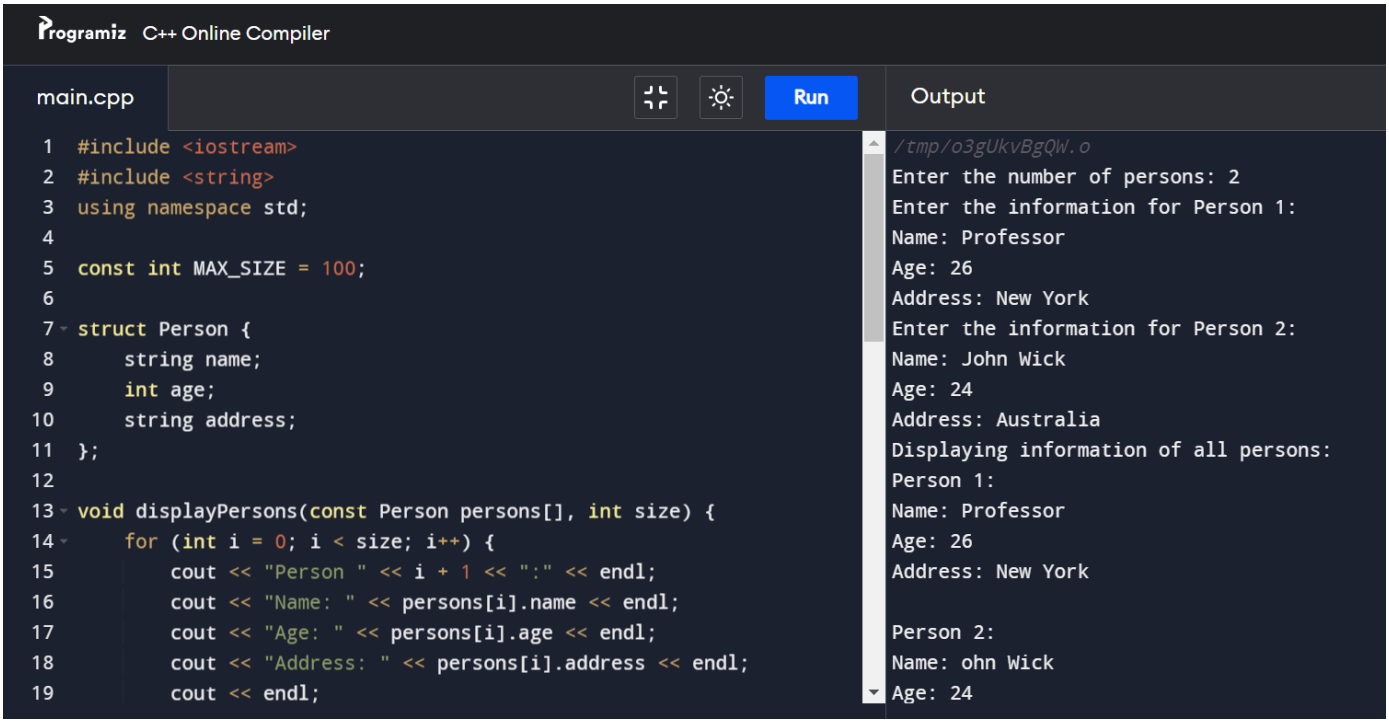
Output

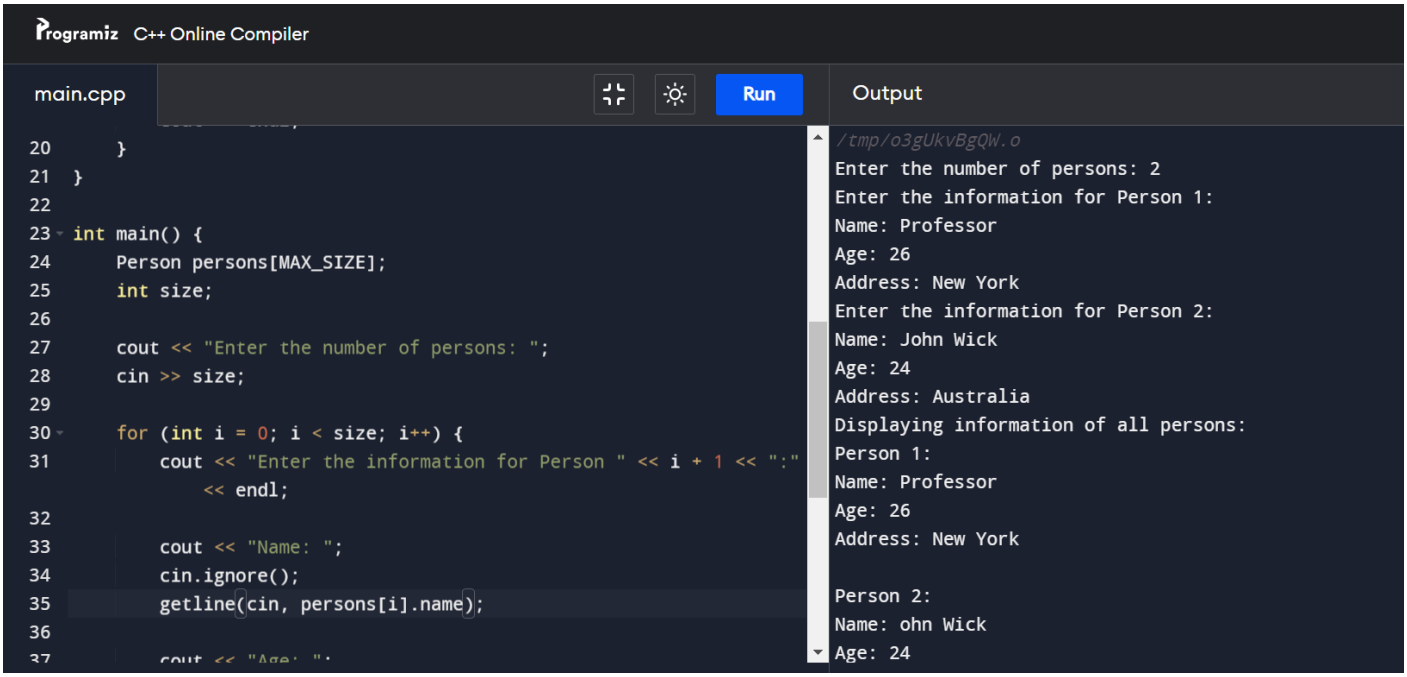
```
#include <iostream>
#include <string>
using namespace std;

void bubbleSort(std::string arr[], int size) {
    for (int i = 0; i < size - 1; i++) {
        for (int j = 0; j < size - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                swap(arr[j], arr[j + 1]);
            }
        }
    }
}

int main() {
    const int MAX_SIZE = 100;
    string arr[MAX_SIZE];
    int size;

```

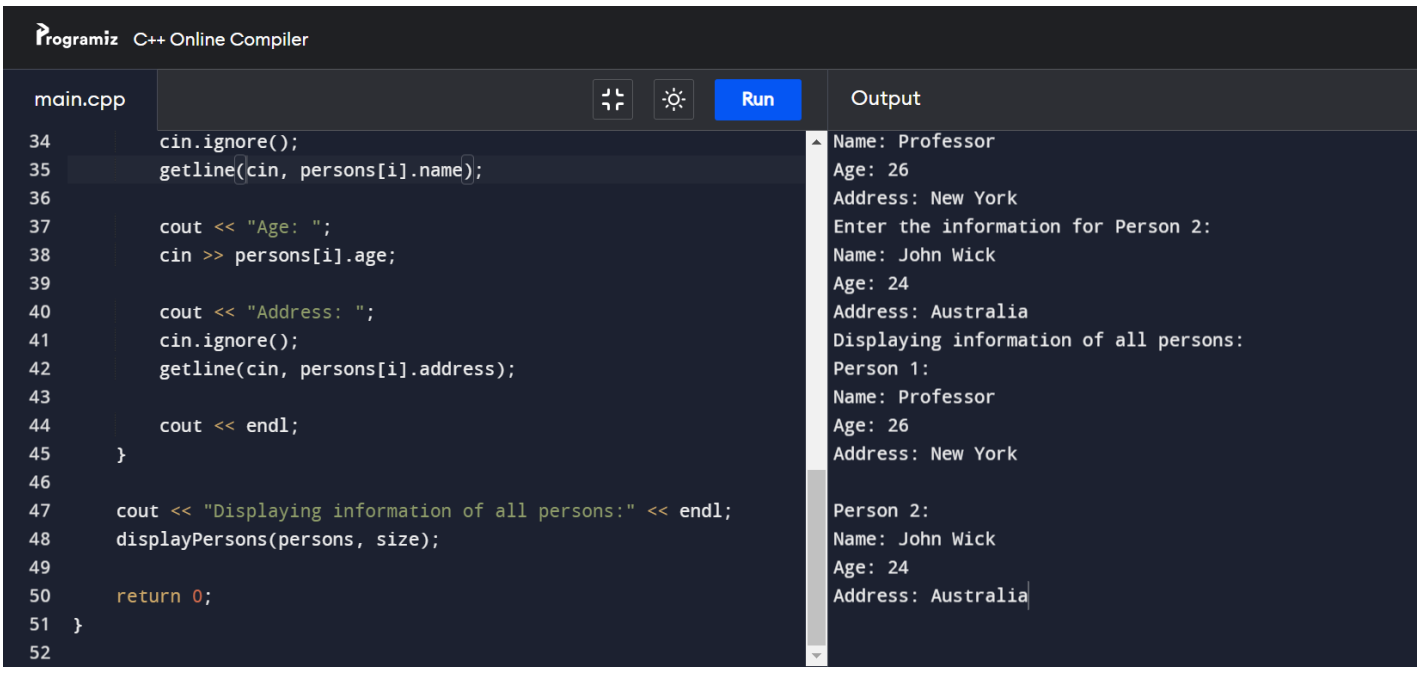
```
/tmp/o3gUkvBgQW.o
Enter the size of the array: 5
Enter the elements of the array:
Safi
Tehmeed
Yousuf
Fasih
Rafay
Sorted array in alphabetical order:
Fasih
Rafay
Safi
Tehmeed
Yousuf
```



4. Create a structure called "Person" with fields for name, age, and address. Write a C++ program that takes input for multiple persons, stores them in an array of structures, and then displays their information.



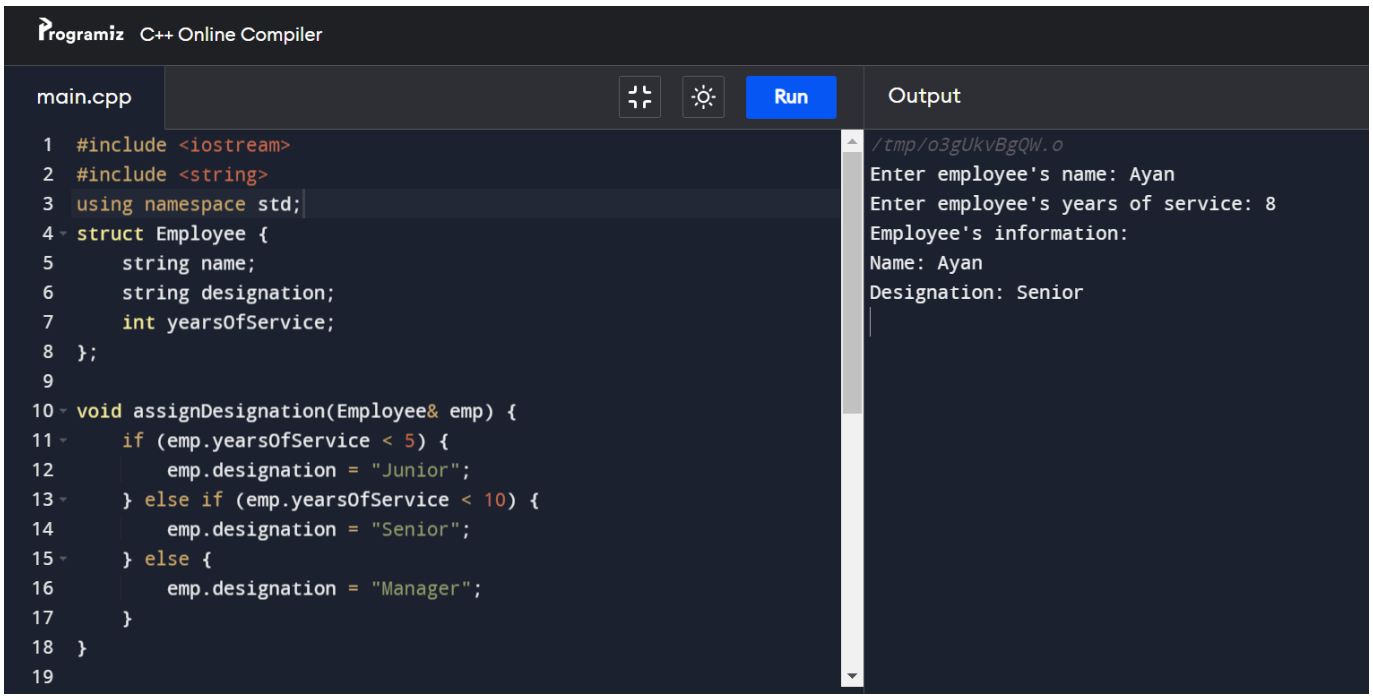


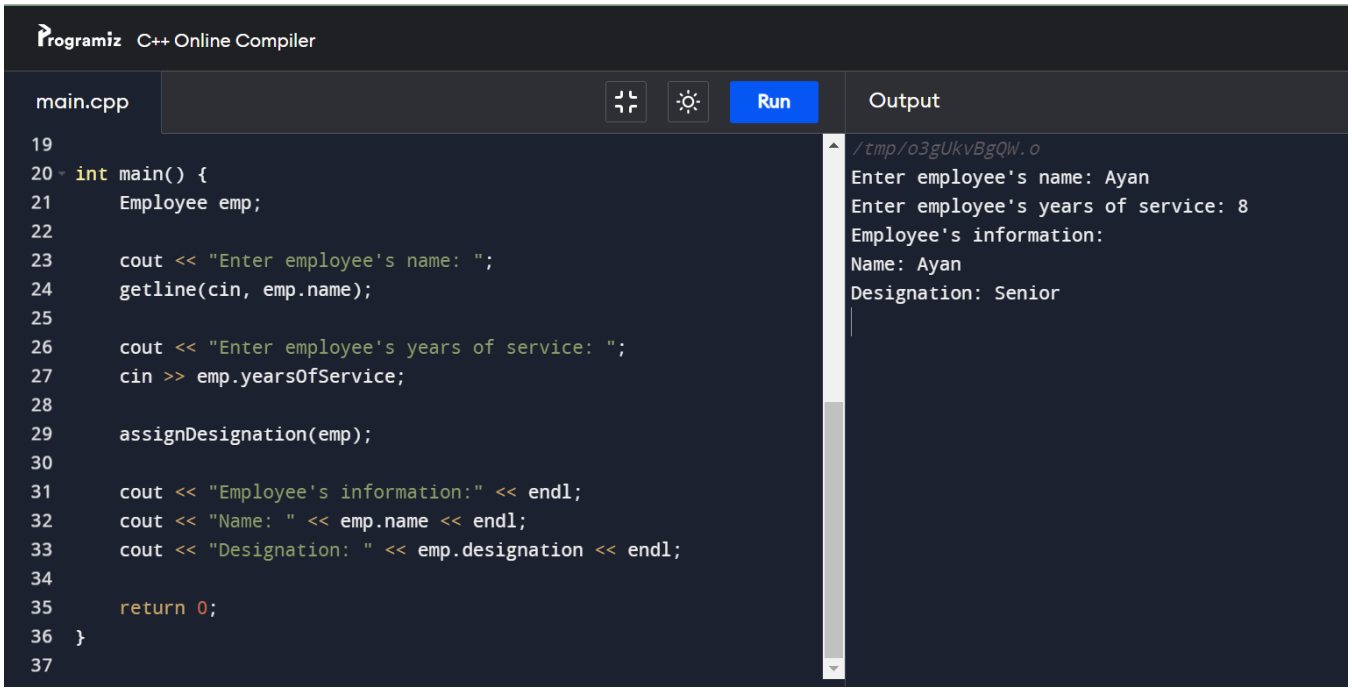


5. Define a structure called "Employee" with fields for name, designation, and years of service. Write a C++ program that takes input for an employee's years of service, and based on the years of service, assigns the designation as "Junior," "Senior," or "Manager."

```
#include <string>


struct Employee {
    std::string name;
    std::string designation;
    int yearsOfService;
};
```

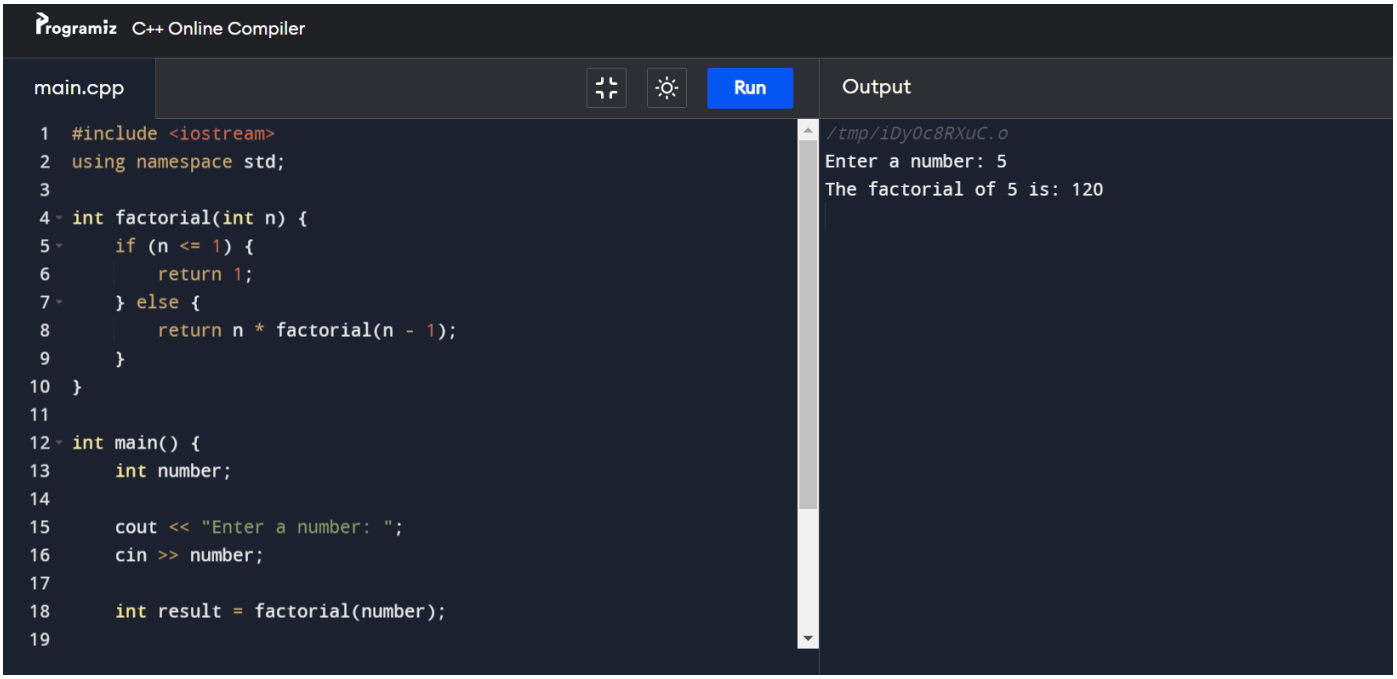
- name of type std::string to store the name of the employee.
- designation of type std::string to store the designation of the employee.
- yearsOfService of type int to store the number of years of service of the employee.






```cpp

int main() {
    Employee emp;

    cout << "Enter employee's name: ";
    getline(cin, emp.name);

    cout << "Enter employee's years of service: ";
    cin >> emp.yearsOfService;

    assignDesignation(emp);

    cout << "Employee's information:" << endl;
    cout << "Name: " << emp.name << endl;
    cout << "Designation: " << emp.designation << endl;

    return 0;
}

```

6. Write a C++ program that includes a function to calculate the factorial of a given number. Use this function to find the factorial of a user-inputted number.




```cpp
#include <iostream>
using namespace std;

int factorial(int n) {
    if (n <= 1) {
        return 1;
    } else {
        return n * factorial(n - 1);
    }
}

int main() {
    int number;

    cout << "Enter a number: ";
    cin >> number;

    int result = factorial(number);

```

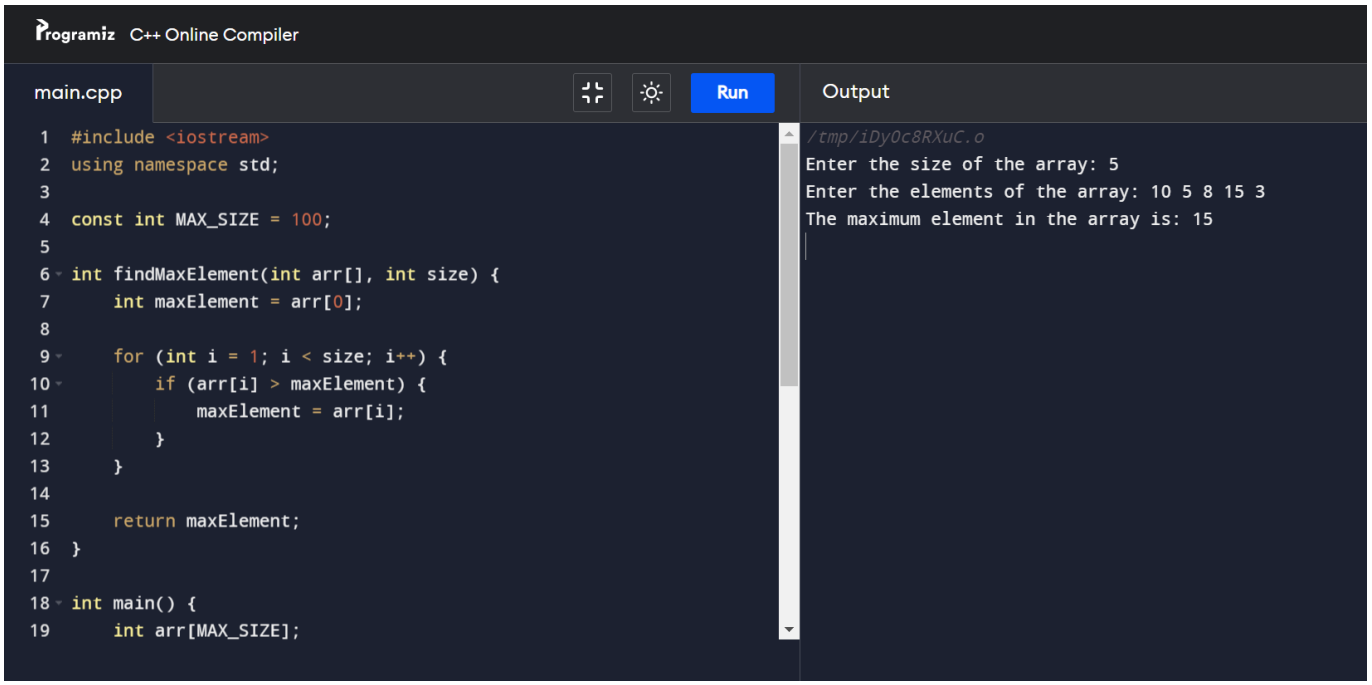
Programiz C++ Online Compiler

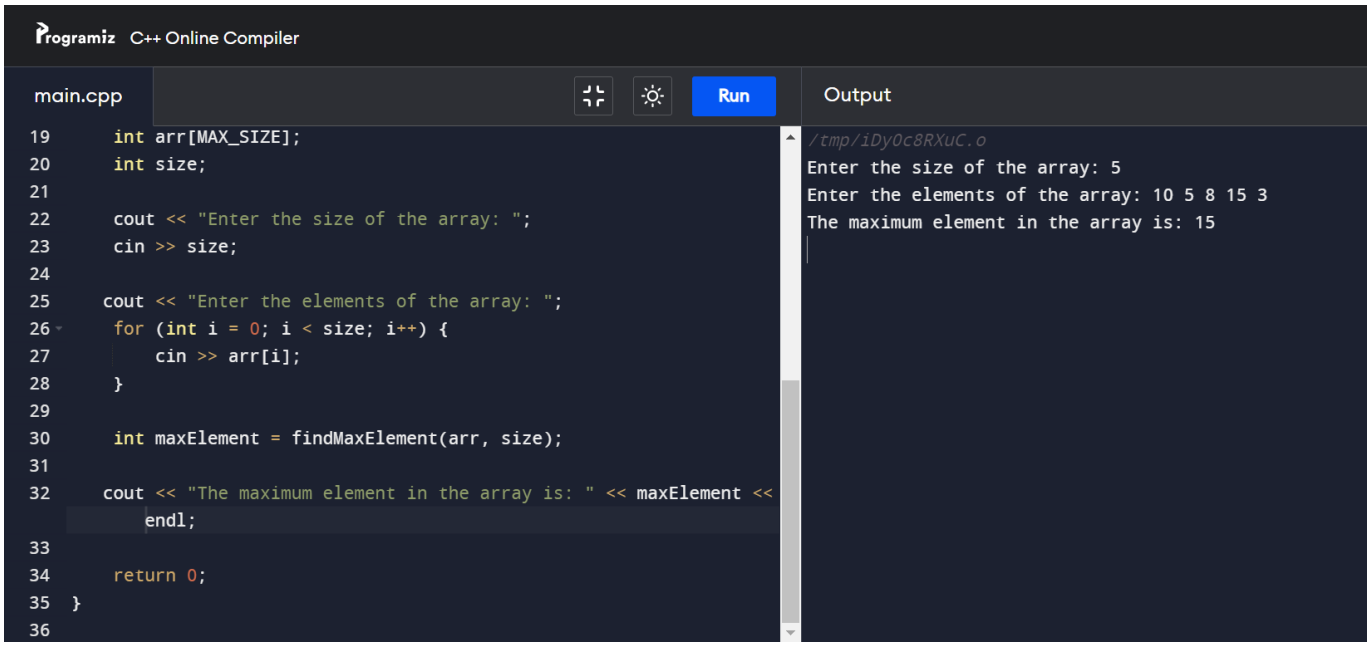
main.cpp | Run | Output

```
    } else {
        return n * factorial(n - 1);
    }
}

int main() {
    int number;

    cout << "Enter a number: ";
    cin >> number;

    int result = factorial(number);

    cout << "The factorial of " << number << " is: " << result
        << endl;

    return 0;
}
```

```
/tmp/iDyOc8RXuC.o
Enter a number: 5
The factorial of 5 is: 120
```

7. Create a C++ program that includes a function to find the maximum element in an array.




Programiz C++ Online Compiler
main.cpp
Run
Output
int arr[MAX_SIZE];
int size;
cout << "Enter the size of the array: ";
cin >> size;
cout << "Enter the elements of the array: ";
for (int i = 0; i < size; i++) {
cin >> arr[i];
}
int maxElement = findMaxElement(arr, size);
cout << "The maximum element in the array is: " << maxElement << endl;
return 0;
}
/tmp/iDyOc8RXuC.o
Enter the size of the array: 5
Enter the elements of the array: 10 5 8 15 3
The maximum element in the array is: 15