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Creating a Matrix using 2D vector in C++ – Vector of Vectors

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In this article will discuss how to create 2D Matrix using vector of vectors in c++.

Requirement

Represent a 2D Matrix using vector in C++ i.e.

```
1, 1, 1, 1
1, 1, 1, 1
1, 1, 1, 1
1, 1, 1, 1
1, 1, 1, 1
```

Declaration of 2D vector or vector of vector in C++

```
1 | std::vector <std::vector<int> > vec2D
```

Initializing Vector of Vector – 2D vector

A vector can be initialized using parametrized constructor i.e.

std::vector <NUMBER OF ELEMENTS, VALUE OF EACH ELEMENT>

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- 2.) Different ways to initialize a vector
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- 4.) User Defined Objects & std::vector
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- 7.) Remove repeated elements from a vector
- 8.) Fill a vector with random numbers
- 9.) Hidden cost of std::vector
- 10.) Adding elements in Vector

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So,

```
1 std::vector<int> (4, 1)
```

Will create a vector of 4 integers whose values will be 1.

Now to create a vector of 5 vectors in which each vector is initialized as above, we will use following syntax,

```
1 std::vector <std::vector > vec2D(5, std::vector(4, 1));
```

Let's see the code to initialize and print 2D vector as follows,

```
1 std::vector <std::vector<int> > vec2D(5, std::vector<int>(4, 1))
2
3 for(auto vec : vec2D)
4 {
5     for(auto x : vec)
6         std::cout<<x<<" , ";
7     std::cout << std::endl;
8 }
```

Output

```
1, 1, 1, 1,
1, 1, 1, 1,
1, 1, 1, 1,
1, 1, 1, 1,
1, 1, 1, 1,
```

Iterator over 2D vector in C++

We can iterate over a vector of vector using `[][]` . Checkout the code below,

```
1 for(int i = 0; i < 5; i++)
2     for(int j = 0; j < 5; j++)
3         vec2D[i][j] = i*j;
```

Adding a new row in 2D vector

To add a new row, just `push_back` a new vector in the vector of vector i.e.



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```
1 vec2D.push_back(std::vector<int>(4, 11));
```

Complete working Code is as follows,

```
C++
2 #include <vector>
3
4 int main()
5 {
6     std::vector <std::vector<int> > vec2D(5, std::vector<int>(4,
7
8     for(auto vec : vec2D)
9     {
10         for(auto x : vec)
11             std::cout<<x<<" , ";
12
13         std::cout << std::endl;
14     }
15
16     std::cout << std::endl;
17
18     for(int i = 0; i < 5; i++)
19         for(int j = 0; j < 5; j++)
20             vec2D[i][j] = i*j;
21
22     for(auto vec : vec2D)
23     {
24         for(auto x : vec)
25             std::cout<<x<<" , ";
26
27         std::cout << std::endl;
28     }
29
30
31     vec2D.push_back(std::vector<int>(4, 11));
32
33     std::cout << std::endl;
34
35     for(auto vec : vec2D)
36     {
37         for(auto x : vec)
38             std::cout<<x<<" , ";
39
40         std::cout << std::endl;
41     }
42     return 0;
43 }
```

Compile the above code using following command,

```
g++ -std=c++11 2dvector.cpp
```

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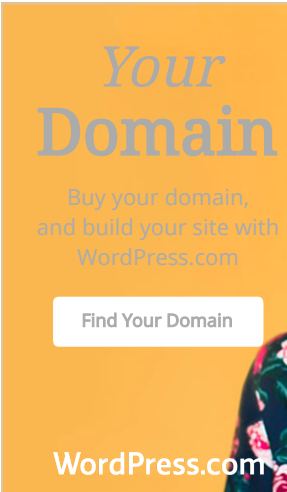


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