



Iterators in C++ STL

Prerequisite : Introduction to Iterators

Iterators are used to point at the memory addresses of **STL** containers. They are primarily used in sequence of numbers, characters etc. They reduce the complexity and execution time of program.

Operations of iterators :-

1. begin() :- This function is used to return the **beginning position** of the container.

2. end() :- This function is used to return the **after end position** of the container.

```
// C++ code to demonstrate the working of
// iterator, begin() and end()
#include<iostream>
#include<iterator> // for iterators
#include<vector> // for vectors
using namespace std;
int main()
{
    vector<int> ar = { 1, 2, 3, 4, 5 };

    // Declaring iterator to a vector
    vector<int>::iterator ptr;

    // Displaying vector elements using begin() and end()
    cout << "The vector elements are : ";
    for (ptr = ar.begin(); ptr < ar.end(); ptr++)
        cout << *ptr << " ";

    return 0;
}
```

Output:

```
The vector elements are : 1 2 3 4 5
```

3. advance() :- This function is used to **increment the iterator position** till the specified number mentioned in its arguments.

```
// C++ code to demonstrate the working of
// advance()
#include<iostream>
#include<iterator> // for iterators
#include<vector> // for vectors
using namespace std;
int main()
{
    vector<int> ar = { 1, 2, 3, 4, 5 };

    // Declaring iterator to a vector
    vector<int>::iterator ptr = ar.begin();

    // Using advance() to increment iterator position
    // points to 4
    advance(ptr, 3);

    // Displaying iterator position
    cout << "The position of iterator after advancing is : ";
    cout << *ptr << " ";

    return 0;
}
```

Output:

```
The position of iterator after advancing is : 4
```

4. next() :- This function **returns the new iterator** that the iterator would point after **advancing the positions** mentioned in its arguments.

5. prev() :- This function **returns the new iterator** that the iterator would point **after decrementing the positions** mentioned in its arguments.

```
// C++ code to demonstrate the working of
// next() and prev()
#include<iostream>
#include<iterator> // for iterators
#include<vector> // for vectors
using namespace std;
int main()
{
    vector<int> ar = { 1, 2, 3, 4, 5 };

    // Declaring iterators to a vector
    vector<int>::iterator ptr = ar.begin();
    vector<int>::iterator ftr = ar.end();

    // Using next() to return new iterator
    // points to 4
    auto it = next(ptr, 3);

    // Using prev() to return new iterator
    // points to 3
    auto it1 = prev(ftr, 3);

    // Displaying iterator position
    cout << "The position of new iterator using next() is : ";
    cout << *it << " ";
    cout << endl;

    // Displaying iterator position
    cout << "The position of new iterator using prev() is : ";
    cout << *it1 << " ";
    cout << endl;

    return 0;
}
```

Output:

```
The position of new iterator using next() is : 4
The position of new iterator using prev() is : 3
```

6. inserter() :- This function is used to **insert the elements at any position** in the container. It accepts **2 arguments, the container and iterator to position where the elements have to be inserted.**

```

// C++ code to demonstrate the working of
// inserter()
#include<iostream>
#include<iterator> // for iterators
#include<vector> // for vectors
using namespace std;
int main()
{
    vector<int> ar = { 1, 2, 3, 4, 5 };
    vector<int> ar1 = {10, 20, 30};

    // Declaring iterator to a vector
    vector<int>::iterator ptr = ar.begin();

    // Using advance to set position
    advance(ptr, 3);

    // copying 1 vector elements in other using inserter()
    // inserts ar1 after 3rd position in ar
    copy(ar1.begin(), ar1.end(), inserter(ar,ptr));

    // Displaying new vector elements
    cout << "The new vector after inserting elements is : ";
    for (int &x : ar)
        cout << x << " ";
}

return 0;
}

```

Output:

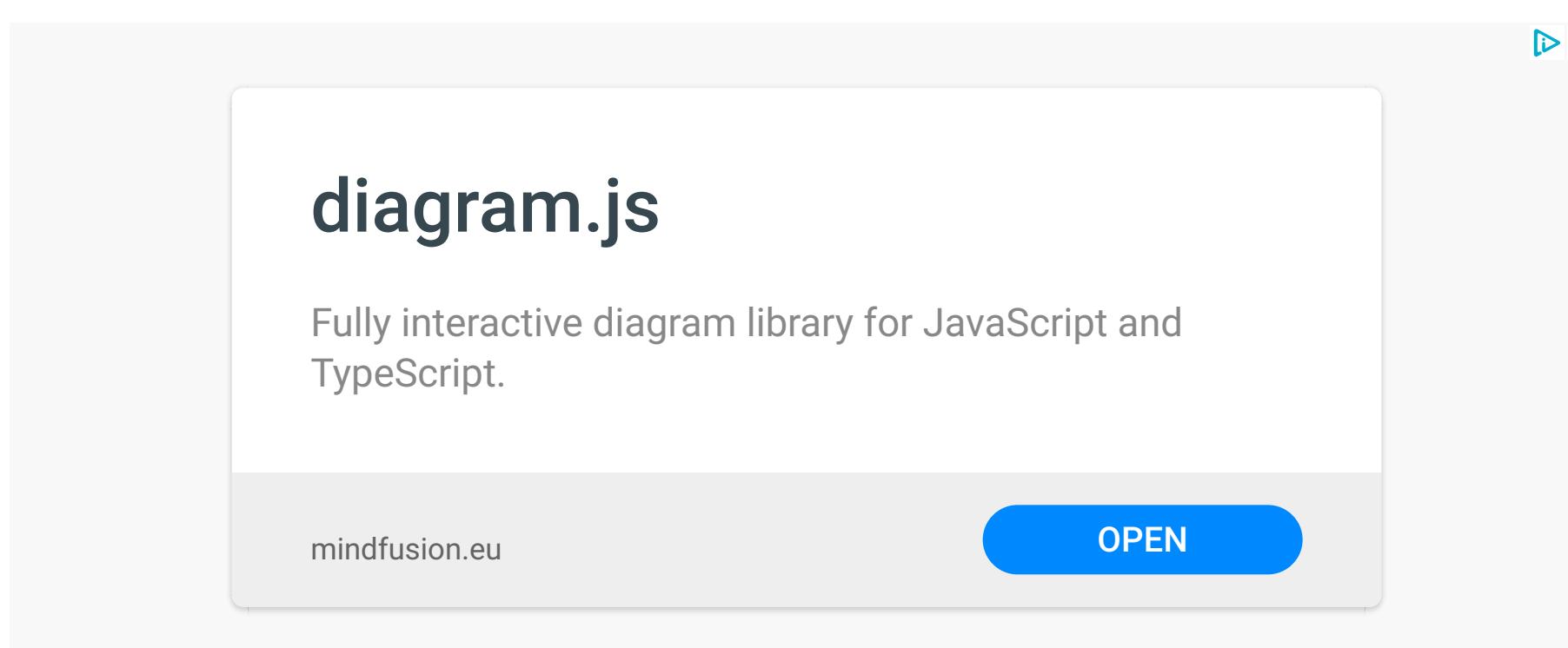
The new vector after inserting elements is : 1 2 3 10 20 30 4 5

Types of Iterators :

1. Input Iterators
2. Output Iterators
3. Forward Iterator
4. Bidirectional Iterators
5. Random-Access Iterators

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Count of distinct remainders when N is divided by all the numbers from the range [1, N]

C++ | asm declaration

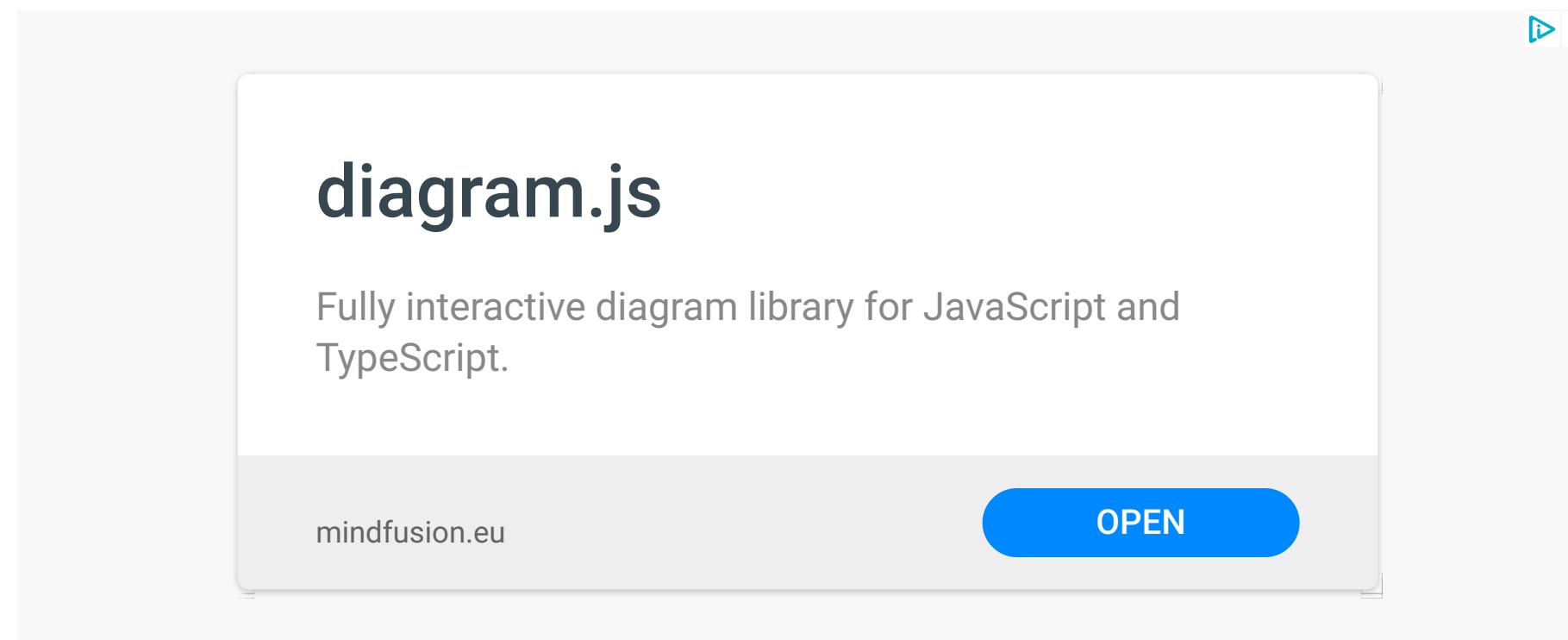
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