Programming Fundamentals

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C++ Manipulators

Definition: Manipulators are special functions in C++ that can be used with ~~format~~ output stream (like cout) to format the output on the console.

To use manipulators like setw, setprecision, fixed, and scientific, the headerfile < iomanip > must be included.

- **endl:** It is used to move the cursor to the next line. It works the same as (\n).

  example:-   cout << "Hello world" << endl;

- **setw (n):** It is used to set the width of the output field to n characters. That means it specifies how many spaces will be used to print the next value.

example:

```
double pi = 3.14159265359;
cout << setw (6) << pi;
```

This will only print the value of pi upto 6 spaces.

- **set precision (n):** It is used to set the number of digits to display after the decimal point for floating point numbers, upto n number of digits.

example:

```
double pi = 3.1415926359;
cout << fixed << set precision (3) << pi << endl;
```

This will print " 3.141".

- **Setfill (ch):** When the output is shorter than specified width, it is used to fill the extra space with specified character (s).

example:

```
double pi = 3.141▬▬▬▬;
cout << setfill ('*') << setw (10) << pi << endl;
```

This will print " *****3.141 ".

Re-Written Code:

```cpp
#include <iostream>
#include <iomanip>
using namespace std;
int main(){
    string msg = "Afraz Haider";
    double value = 123.456789;
    cout << setfill('*') << setw(25) << msg << endl;
    cout << setfill('@') << setw(20) << msg << endl;
    cout << setfill('=') << setw(16) << msg << endl;
    cout << endl << "Using setprecision:" << endl;
    cout << fixed << setprecision(2);
    cout << "Value with 2 decimal places:" << value << endl;
    cout << fixed << setprecision(4);
    cout << "Value with 4 decimal places:" << value << endl;
    return 0;
}
```

```cpp
#include<iostream>
#include<iomanip>
using namespace std;
int main(){
    string msg = "Afraz Haider";
    double value = 123.456789;

    cout << setfill('*') << setw(25) << msg << endl;
    cout << setfill('@') << setw(20) << msg << endl;
    cout << setfill('=') << setw(16) << msg << endl;
    cout << endl << "Using setprecision: " << endl;
    cout << fixed << setprecision(2);
    cout << "Value with 2 decimal places: " << value << endl;
    cout << fixed << setprecision(4);
    cout << "Value with 4 decimal places: " << value << endl;

    return 0;
}
```

```
*************Afraz Haider
@@@@@@@@Afraz Haider
====Afraz Haider

Using setprecision:
Value with 2 decimal places: 123.46
Value with 4 decimal places: 123.4568


----------------------------------------

Process exited after 0.559 seconds with return value 0
Press any key to continue . . .
```