



Stream Manipulators

ELEC1006: ENGINEERING COMPUTING

Formatting Output

- Can control how output displays for numeric, string data:
 - size
 - position
 - number of digits
- Requires `iomanip` header file
 - `#include <iomanip>`

Stream Manipulators

- Used to control how an output field is displayed
- Some affect just the next value displayed:
 - `setw(x)` : print in a field at least `x` spaces wide.
Use more spaces if field is not wide enough.

setw() Demo

```
// This program displays three rows of numbers.
#include <iostream>
#include <iomanip>      // Required for setw
using namespace std;

int main()
{
    int num1 = 2897, num2 = 5,    num3 = 837,
        num4 = 34,  num5 = 7,    num6 = 1623,
        num7 = 390, num8 = 3456, num9 = 12;

    // Display the first row of numbers
    cout << setw(6) << num1 << setw(6)
         << num2 << setw(6) << num3 << endl;

    // Display the second row of numbers
    cout << setw(6) << num4 << setw(6)
         << num5 << setw(6) << num6 << endl;

    // Display the third row of numbers
    cout << setw(6) << num7 << setw(6)
         << num8 << setw(6) << num9 << endl;
    return 0;
}
```

Decimal Display Control

- Some affect values until changed again:
 - `fixed`: use decimal notation for floating-point values
 - `setprecision(x)`: when used with `fixed`, print floating-point value using `x` digits after the decimal. Without `fixed`, print floating-point value using `x` significant digits
 - `showpoint`: always print decimal for floating-point values

Decimal Display Control Demo

```
// This program asks for sales figures for 3 days. The total
// sales are calculated and displayed in a table.
#include <iostream>
#include <iomanip>
using namespace std;

int main()
{
    double day1, day2, day3, total;

    // Get the sales for each day.
    cout << "Enter the sales for day 1: ";
    cin >> day1;
    cout << "Enter the sales for day 2: ";
    cin >> day2;
    cout << "Enter the sales for day 3: ";
    cin >> day3;

    // Calculate the total sales.
    total = day1 + day2 + day3;

    // Display the sales figures.
    cout << "\nSales Figures\n";
    cout << "-----\n";
    cout << setprecision(2) << fixed;
    cout << "Day 1: " << setw(8) << day1 << endl;
    cout << "Day 2: " << setw(8) << day2 << endl;
    cout << "Day 3: " << setw(8) << day3 << endl;
    cout << "Total: " << setw(8) << total << endl;
    return 0;
}
```

Types of Stream Manipulators

Stream Manipulator	Description
<code>setw(n)</code>	Establishes a print field of n spaces.
<code>fixed</code>	Displays floating-point numbers in fixed point notation.
<code>showpoint</code>	Causes a decimal point and trailing zeroes to be displayed, even if there is no fractional part.
<code>setprecision(n)</code>	Sets the precision of floating-point numbers.
<code>left</code>	Causes subsequent output to be left justified.
<code>right</code>	Causes subsequent output to be right justified.

More info on C++

- [1] learncpp.com: 18.3 - Output with ostream and ios
<https://www.learncpp.com/cpp-tutorial/183-output-with-ostream-and-ios/>