

Aim: To study C++ console I/O operations**Theory:****1. Input and Output Streams:**

- `<iostream>` library provides input and output stream classes.
- `<cin>` for standard input (keyboard).
- `<cout>` for standard output (console).

2. Output (cout):

- Used to display text and variables on the console.

3. Input (cin):

- Used to accept input from the user.

4. Formatting Output:

- Manipulators like `<setw>`, `<setprecision>`, and `<fixed>` control output format.

Common Manipulators:

`setw(int n)`: Sets the field width to n spaces.

`setprecision(int n)`: Sets the precision of floating-point numbers to n digits.

`fixed`: Forces floating-point notation.

`boolalpha`: Outputs boolean values as "true" or "false" instead of 1 or 0.

`setw(int n)`: Sets the field width to n spaces.

`left` and `right`: Align output to the left or right.

Custom Manipulator Function:

Users can create their manipulators by defining functions.

Typically take a stream as an argument and return the modified stream.

5. Formatted Input:

- Using `>>` operator with manipulators for formatted input.

6. endl vs. '\n':

- `<endl>` inserts a newline and flushes the buffer.
- `<'\n'>` inserts a newline but doesn't flush the buffer.
- Use `<'\n'>` for better performance unless flushing is needed.

7. Error Handling:

- `<fail()>` checks for failed input operations.

8. Unformatted Input (getline):

- `<getline>` reads a whole line of text, including whitespaces.

9. File I/O:

- `<ofstream>` for writing to a file, `<ifstream>` for reading.

10. Streams Manipulation:

- `<setf>` and `<unsetf>` for setting and clearing format flags.

[A] Write a C++ program to print the following output using ios class member functions(fig-expt4A)

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

int main()
```

```

{
    cout.setf(ios::showpoint);
    int n = 1;
    float term, sum = 0;
    cout<<setw(5)<<setiosflags(ios::left)<<"n"<<setw(20)<<"Inverse_of_n"<<setw(20)<<"Sum_of_terms"<<endl;
    for(n = 1; n<=10; n++){
        term = 1.0/n;
        sum = sum + term;
        cout.setf(ios::left,ios::adjustfield);
        cout.width(5);
        cout<<n;
        cout.precision(4);
        cout.setf(ios::scientific,ios::floatfield);
        cout.setf(ios::left,ios::adjustfield);
        cout.width(20);
        cout<<term;
        cout.unsetf(ios::floatfield);
        cout.setf(ios::right,ios::adjustfield);
        cout.width(8);
        cout<<sum<<endl;
    }
    return 0;
}

```

Output:

n	Inverse_of_n	Sum_of_terms
1	1.0000e+000	1.000
2	5.0000e-001	1.500
3	3.3333e-001	1.833
4	2.5000e-001	2.083
5	2.0000e-001	2.283
6	1.6667e-001	2.450
7	1.4286e-001	2.593
8	1.2500e-001	2.718
9	1.1111e-001	2.829
10	1.0000e-001	2.929

[B] Write a C++ program which reads a text from keyboard and display the following information on screen in 3 column format

1. Number of lines
2. Number of words
3. Number of characters

Strings should be left justified and numbers to be right justified. Use suitable field width

```

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

int main()
{
    cout<<"Enter some text: (use ctr + z to end input)"<<endl;
    string text;

```

```

int no_lines = 0, no_words = 0, no_char = 0, char_ctr = 0;
while(getline(cin,text)){
    for(char ch : text){
        if(isspace(ch) && char_ctr != 0){
            no_char += char_ctr;
            no_words ++;
            char_ctr = 0;
        }
        else
            char_ctr ++;
    }
    if(char_ctr !=0 ){
        no_char += char_ctr;
        no_words ++;
        char_ctr = 0;
    }
    no_lines ++;
}
cout<<setiosflags(ios::left)<<setw(15)<<"Number of lines"<<setiosflags(ios::right)<<setw(10)<<no_lines<<endl;
cout<<resetiosflags(ios::adjustfield)<<setiosflags(ios::left)<<setw(15)<<"Number of
words"<<setiosflags(ios::right)<<setw(10)<<no_words<<endl;
cout<<resetiosflags(ios::adjustfield)<<setiosflags(ios::left)<<setw(15)<<"Number of
char"<<setiosflags(ios::right)<<setw(10)<<no_char<<endl;

return 0;
}

```

Output:

```

Enter some text: (use ctr + z to end input)
Hello World!
How are you?
FINE! Thats great!
^Z
Number of lines      3
Number of words      8
Number of char       37

```

[C] Write a C++ program to format the following o/p using manipulators(fig-expt4C)

```

#include<iostream>
#include<string>
#include<iomanip>

```

```
using namespace std;
```

```

ostream &value(ostream &output)
{
    output.setf(ios::right,ios::adjustfield);
    output.setf(ios::internal,ios::adjustfield);
    output.width(5);
    return output;
}

```

```
ostream &multiofvalue(ostream &output){
```

```

        output.unsetf(ios::adjustfield);
        output.precision(4);
        output.setf(ios::right,ios::adjustfield);
        output.setf(ios::showpoint);
        output.width(23);
        return output;
    }

int main()
{

    cout<<"VALUE"<<setfill('*')<<setiosflags(ios::right)<<setw(23)<<"MULTI OF VALUE"<<endl;
    for(int i = 1; i <= 4; i++){
        cout.fill('.');
        cout.setf(ios::showpos);
        cout<<value<<i;
        cout<<multiofvalue<<i*2.0<<endl;
    }

}

```

Output:

```

VALUE*****MULTI OF VALUE
+...1.....+2.000
+...2.....+4.000
+...3.....+6.000
+...4.....+8.000

```

Conclusion: All the concept and methods in console I/O were understood and implemented in the code above.

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