

## CS 162C++ StringStream

StringStream is an expansion of the stream concept to strings for input and output.

### What??

C++ uses the concepts of streams for input and output; for example cin and cout are istream objects (or more correctly cin is an istream and cout is an ostream). Similarly, we can use filestreams to read and write to files.

All input streams support operator>>, get, getline, peek, unget, and other functions we have not covered yet.

All output streams support operator<<, put, flush, and other functions we have not covered yet.

All streams support eof, fail, good, bad, clear, and other functions we have not covered yet.

### Why

Using one methodology makes it simpler to design programs that work the same way no matter what the input and output devices are. For example, all of them support the use of <iomanip> for formatting output.

## How to do input

The following code shows creating two stringstream objects, one with a series of words and one with a series of numbers. For each object, we read using the >> operator until the stringstream is empty. Then we display what was read.

```
#include <iostream>
#include <sstream>

using namespace std;

int main()
{
    // define two starting strings
    string words = "apple banana cherry date";
    string numbers = "1 3 5 7 9 11 13";

    // create two stringstream objects containing those two strings
    stringstream wordExample(words);
    stringstream numExample(numbers);

    // extract each word one at a time
    // store in wordArray, quit when stringstream is exhausted
    string wordArray[10];
    int index = 0;
    while ( wordExample >> wordArray[index++] )
        ;

    // now output from wordArray
    index--;
    for(int i = 0; i < index; i++)
        cout << wordArray[i] << endl;
    cout << endl;

    // extract each integer one at a time
    // store in numArray, quit when stringstream is exhausted
    index = 0;
    int numArray[10];
    while ( numExample >> numArray[index++] )
        ;

    // now output from numArray
    index--;
    for(int i = 0; i < index; i++)
        cout << numArray[i] << " ";
    cout << endl;

    return 0;
}
```

## How to do output

The following code shows creating a stringstream object in a function, writing to it with formatted output, then returning the string to main where it is displayed:

```
#include <iostream>
#include <sstream>
#include <iomanip>

using namespace std;

string display(int array[], int length);

int main()
{
    // define array and fill with 20 odd numbers
    const int SIZE = 20;
    int values[SIZE] = {1, 3, 5, 7, 9, 11, 13, 15, 17, 19,
                        21, 23, 25, 27, 29, 31, 33, 35, 37, 39};

    // convert the array to a string
    string output = display(values, SIZE);

    // output the string that was returned.
    cout << output;

    return 0;
}

string display(int array[], int length)
{
    // define the stringstream object for catching the output
    stringstream buffer;

    // output the array, five numbers per line, five spaces per number
    for(int i = 0; i < length; i++)
    {
        buffer << setw(5) << array[i];
        // see if we have put out five integers, if so add a newline
        if ( (i+1) % 5 == 0 )
            buffer << endl;
    }
    // add a terminating newline
    buffer << endl;

    // extract and return the string from buffer
    return buffer.str();
}
```