Chapter 6: I/O and Streams

Instructor: Mark Edmonds

edmonds_mark@smc.edu

File I/O

- Thus far, we have either printed to the screen or gotten input directly from the user
- What if we could read data from files and save data to files?
- This would enable us to save information beyond the current program execution and use the data later
- Your program *reads* from a file when it takes input from a file
- Your program *writes* to a file when it sends information to a file
- This chapter examines *streams* to accomplish I/O

Streams

- Streams will serve as our first introduction to objects
- A **stream** is a flow of characters
  - If the flow is into your program, the stream is called an **input stream**
  - If the flow is out of your program, the stream is called an **output stream**
- The data in the stream can come from a file or from a keyboard - the stream does not care
- `cin` and `cout` are both special stream *objects* included from the `iostream` header
- Suppose your program defines an input stream `in_stream` that comes from a file (this does not show how to create `in_stream`):

```
1 int some_number;
2 instream >> some_number
```

- This **`int`** is filled with a number from this file.

```
1 out_stream <<  some_number << endl;
```

- This will output the value stored in `some_number` to the file.
  - This effectively saves `some_number` to the file
- Input streams are created with:

```
1 ifstream in_stream
```

- Output streams are created with:

```
ofstream out_stream;
```

- Both types are provided by `fstream`, which can be included with `#include <fstream>`
- Important functions:
  - `open()` - opens a file
  - `close()` - close a file
- See documentation at
  - http://www.cplusplus.com/reference/fstream/ifstream/
  - http://www.cplusplus.com/reference/fstream/ofstream/

Example: `simple_io.cpp`

```
// Reads three numbers from the file infile.dat, sums the numbers, and writes
// the sum to the file outfile.dat. (A better version of this program will be
// given in Display 6.2.)

#include <fstream>

int main()
{
  using namespace std;

  ifstream in_stream;
  ofstream out_stream;

  in_stream.open("infile.dat");
  out_stream.open("outfile.dat");

  int first, second, third;
  in_stream >> first >> second >> third;
  out_stream << "The sum of the first 3\n"
             << "numbers in infile.dat\n"
             << "is " << (first + second + third) << endl;

  in_stream.close();
  out_stream.close();

```

```
26    return 0;
27  }
```