

## Chapter 6: I/O and Streams

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### 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:

```
1 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`

```
1 // Reads three numbers from the file infile.dat, sums the numbers, and
  // writes
2 // the sum to the file outfile.dat. (A better version of this program
  // will be
3 // given in Display 6.2.)
4
5 #include <fstream>
6
7 int main()
8 {
9     using namespace std;
10
11     ifstream in_stream;
12     ofstream out_stream;
13
14     in_stream.open("infile.dat");
15     out_stream.open("outfile.dat");
16
17     int first, second, third;
18     in_stream >> first >> second >> third;
19     out_stream << "The sum of the first 3\n"
20                 << "numbers in infile.dat\n"
21                 << "is " << (first + second + third) << endl;
22
23     in_stream.close();
24     out_stream.close();
25
```

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