

# Chapter 11

## Streams

# ostream/cout

- Streams allow a program to output data somewhere (screen/file/elsewhere)
- `ostream` (output stream)
  - Class that supports output
  - `#include <iostream>`
- `<<operator` (insertion operator)
  - Converts data to characters in a buffer, which is output by the system
  - Returns a reference to the `ostream`
    - Allows for chaining
      - `cout << a << b << endl;`
  - Overloaded to support many data types
- `cout`
  - Predefined `ostream` object connected to `stdout` (usually the screen)

# istream/cin

- `istream (input stream)`
  - `#include <iostream>`
- `>>`operator
  - Extraction operator
  - Takes data from a data buffer and write into different types of variables
- `cin`
  - Predefined istream associated with standard input (usually the keyboard)
  - Skips leading whitespace, stops at whitespace

# Output formatting

- manipulator
  - Function that overloads the << or >> operators to adjust output
  - Defined in `iomanip` and `ios` libraries
- Floating-Point Manipulators
- Text alignment Manipulators
- Buffer manipulators

# Input string stream

- `istringstream`
  - Reads input from a string instead of the keyboard
  - `#include <sstream>`
  - [Example](#)
  - [Using getline with string streams to parse line-by-line input](#)
  - [Reaching the end of a string stream](#)
  - [Phone number formats](#)

# Output String Stream

- `ostringstream`
  - Insert characters into a string buffer instead of the screen (stdout)
  - Derived from `ostream`
  - `ostringstream.str()` retrieves the contents
  - [Example](#)

# File Input

- `ifstream`
  - Stream from a file
  - `#include <fstream>`
  - Example
- Stream Errors and functions
- Parsing and validating an input file

# File output

- `ofstream`
- Analogous to `ifstream`
- Example: [Saving and retrieving program data](#)



# Overloading stream operators

- Overloading the << operator (insertion)
  - Class can define insertion in their own way
  - Example: [Vote Counter](#)
- Overloading the >> operator (extraction)
  - WaitingLine [class](#), [usage](#)
- Making a class work with cin/cout
  - [Stream friend functions](#)

# Labs

- [Parsing Food Data](#)
- [Movie Show Times](#)