Lab Tutorial 5

File I/O

C++ provides the following classes to perform output and input of characters to/from files:

- ofstream: Stream class to write on files.
- Ifstream: Stream class to read from files.
- fstream: Stream class to both read and write from/to files.

Declare a file name variable

```
#include <fstream>
ifstream input_filename;      // input file
ofstream output_filename;  // output file
```

Opening Files

Associate the file name variable with the disk file name and open it

input_filename.open("*myInput.txt",* ios::in);

output_filename.open("*myOutput.txt*", ios::out);

- where ios::in and ios::out are optional. Files may be opened in other modes such as ios::app (append) and ios::binary (binary input or output)

Opening Files

- File name declaration and opening/ association may be combined:

ifstream i*nput_filename*(“*myInput.txt”*);

ofstream i*nput_filename*(*“myOutput.txt”*);

Use the File

Use an input file as you would use the cin input stream.

```
ifile1 >> x >> y;        // x and y are integers
ifile2 >> ch;            // ch is a char
ch = ifile3.get();       // ch is a char
ifile4.getline(buffer, buffer_size)  // buffer is char*
```

Use the File

Use an output file as you would use the cout output stream.

```
ofile1 << x << y;        // x and y are integers
ofile2 << ch;            // ch is a char
ofile3 << “Hi there!” << endl;      // literal string
ofile4 << str;           // str is a char*
```

Close the File

- Close the file
  - *input_filename*.close();
  - *output_filename*.close();

All files are closed automatically upon termination of program execution, but it is a good habit to close them explicitly. Also, close them as soon as they are no longer needed by the program.

Checking File Open

Always check that all files (input or output) have been successfully opened

```
ifstream myFile("inputData");
if (!myFile) {
    cerr << "Input file could not be opened" << endl;
    exit(0)
}
```

Example: Write File

```
#include <iostream>
#include <fstream>
using namespace std;
int main () {
  ofstream myfile;
  myfile.open ("example.txt");
  if(!myfile)
     break;                    // error: bail out
  myfile << "Writing this to a file.\n";
  myfile.close();
  return 0;
 }
```

Output:
[file example.txt]
Writing this to a file.

Example: Read File

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;
void main () {
  string line;
  ifstream myfile ("example.txt");
  if (!myfile)
    break;                    // error: bail out
  while ( getline (myfile,line) ) {
    cout << line << '\n';
  }
  myfile.close();
}
```

Exercise

1. Write a function to open a file for input and read its contents into a *vector* of *strings, storing each line as a separate element in the vector.*
2. Rewrite the previous program to store each word in a separate element.