

# 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 input_filename("myInput.txt");
```

```
ofstream input_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.