



CS118 – Programming Fundamentals

Lecture # 26
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What is a File?

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- A computer file
 - Collection of bytes
 - Hold information
 - Stored permanently on a secondary storage device (e.g., disk)
- Types of files
 - Text File: A stream of characters to process sequentially by a computer
 - Image: A visual presentation of any entity
 - Media: Audio/Video file

Filing in programming

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➤ Computer Program

- A process of step by step instructions to perform specified task and to produce result on given input
- File can be used to provide input data to a program or receive output data from a program, or both
- Reading a file from secondary storage
- Writing a file permanently for future

Why File Handling in programming?

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- Convenient way to deal large quantities of data
- Store data permanently (until file is deleted)
- Avoid typing data into program multiple times
- Share data between programs
- Printable reports
- Programming languages provide significant support for file processing
- For file handling, we need to know:
 - how to "connect" file to program
 - how to tell the program to read data
 - how to tell the program to write data
 - error checking and handling **EOF**

Cont'd

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- Limitations of Console Input and output
- Input from Keyboard
 - Large data Input
 - Typos mistakes
 - Time consuming & inefficient
- Screen Output
 - Limited view on screen

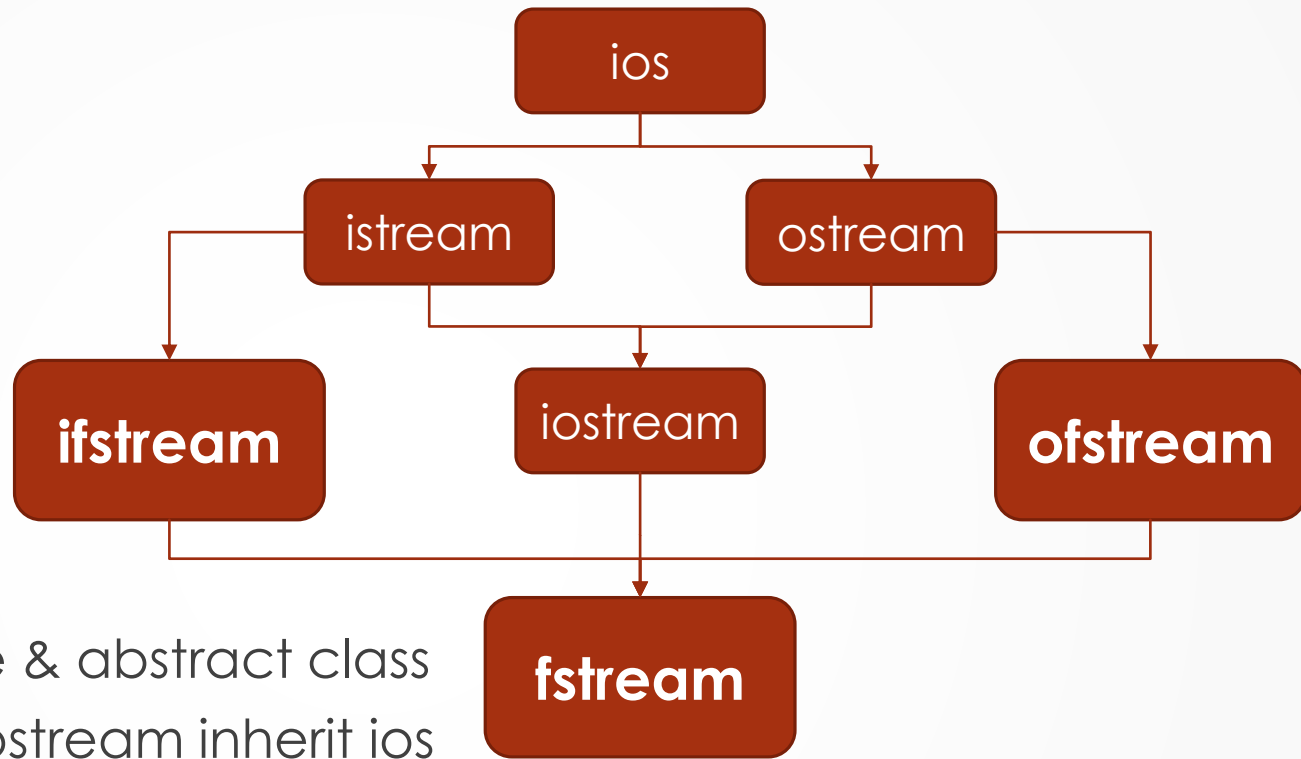
File Handling in C++

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- C++ supports file handling in an attractive way
- Streams are used to communicate with file
 - Stream of bytes to do input and output to different devices
- A program can read data from file or write data to file
- File ends with **End-Of-File (EOF)** marker
- Five steps for file handling in C++ Language
 - I. Include **fstream** header file
 - II. Declare file stream variable(s)
 - III. Associate the file stream variable(s) with the input/output source(s)
 - IV. Performs Read/Write operations
 - V. Close the file(s)

Streams Hierarchy in C++

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- ios is the base & abstract class
- istream and ostream inherit ios
- ifstream inherits istream
- ofstream inherits ostream
- iostream inherits istream and ostream
- fstream inherits ifstream, iostream, and ofstream

C++ File Stream Functions

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Function	Description
<code>open()</code>	To open a file to read or write
<code>is_open()</code>	To test file either open or not
<code>eof()</code>	To check in reading a file either marker reach End-Of-File (EOF)
<code>close()</code>	To close the file
<code>>></code>	Read data from file in general (operator)
<code><<</code>	Write data in file in general (operator)
<code>getline()</code>	Reading a single line

Program Skelton for File Processing

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```
#include <fstream> // the header file/class for file stream objects
using namespace std;
int main()
{
    //Declare file stream variables such as the following
    ifstream my_input_file; //an input file stream object
    ofstream my_output_file; // an output file stream object

    //Open the files
    my_input_file.open("prog.dat"); //open the input file
    my_output_file.open("prog.out"); //open the output file

    //Code for data manipulation

    //Close files
    my_input_file.close(); // close the file associated with this stream
    my_output_file.close(); // close the file associated with this stream
    return 0;
}
```

Reading from a File

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```
#include<iostream>
#include<fstream>
using namespace std;
int main(){
    ifstream my_input_file;
    my_input_file.open("myData.txt");
    if(!(my_input_file.is_open()))
    {
        cout<<"File cannot be opened.";
        return 0;
    }
    cout<<"File Contents: \n";
    char ch;
    while(!my_input_file.eof())
    {
        my_input_file.get(ch); // using get() function
        cout << ch;
    }
    my_input_file.close();
    return 0;
}
```

Input File: myData.txt
Reading a text file. Thank You.



Last character
will be
printed
twice???

Output
File Contents:
Reading a text file. Thank You.

Reading from a File

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```
#include<iostream>
#include<fstream>
using namespace std;
int main()
{
    ifstream my_input_file;
    my_input_file.open("myData.txt");
    if(!(my_input_file.is_open()))
    {
        cout<<"File cannot be opened.";
        return 0;
    }
    cout<<"File Contents: \n";
    char ch;
    while(!my_input_file.eof())
    {
        my_input_file.get(ch); // using get() function
        if(!my_input_file.eof())
            cout << ch;
    }
    my_input_file.close();
    return 0;
}
```

Input File: myData.txt
Reading a text file. Thank You.

Solution

Output
File Contents:
Reading a text file. Thank You.

Writing to a File

```
#include<iostream>
#include<fstream>
using namespace std;
int main()
{
    ofstream my_output_file;
    my_output_file.open("myData.txt");
    if(!(my_output_file.is_open()))
    {
        Cout << "File cannot open.";
        return 0;
    }
    char ch=' ';
    cout<<"Writing contents to file: \n";
    while(ch!='.')
    {
        ch=getchar();
        my_output_file << ch;
    }
    my_output_file.close();
    return 0;
}
```

Purpose:

This program take input from user and full stop (.) to end. Then write the entered data in a text file.

Sample Output

Writing contents to file:
Trying to write in test file.

References

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- C++ Programming: From Problem Analysis to Program Design, 5th Edition by D.S. Malik
- C++ How to Program, 8th Edition by Deitel & Deitel
- Cplusplus [Online] <http://www.cplusplus.com/>

More I/O Functions & Sample Programs

Sample Problem - I

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- Write a program, which reads an input file of employee's i.e. "employeein.txt", add 200 to the salary of each employee, and write the result in a new file "employeeout.txt".

The sample input file "employeein.txt"

Aamir 12000
Amara 15000
Adnan 13000
Afzal 11500

The output file "employeeout.txt"

Name	Salary
Aamir	14000
Amara	17000
Adnan	15000
Afzal	13500

Analysis & Design

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- Input
 - Employee Names and Salaries
- Output
 - Employ Name & Updated Salary
- Design of Algorithm
 - Define input & output stream variables
 - Open input (employeein.txt) & output (employeeout.txt) files
 - Get data from input file (Name , Salary) of each employee
 - Update salary by adding 2000 to original salary
 - Write Name and Updated Salary to output file of each employee
 - Close the files
 - Test Your program for different input files of same structure

Solution

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```
#include<iostream>
#include<fstream>
#include<string>
#include<conio.h>
using namespace std;
int main()
{
    ifstream inData;
    ofstream outData;
    string name;
    int salary;
    inData.open("employeein.txt");
    outData.open("employeeout.txt");
    if(!inData)
    {
        cout << "Can't open input file"
              << endl;
        return 0;
    }
    if(!outData)
    {
        cout << "Can't open Output file"
              << endl;
    }
}
```

```
outData << "Name" << "\t" << "Salary"
        << endl;
while(inData) // while(!inData.eof())
{
    inData >> name;
    inData >> salary;
    outData << name << "\t"
            << salary+2000 << endl;
}
inData.close();
outData.close();
system("Pause");
system("employeeout.txt");
return 0;
}
```

Input File: employeein.txt

Aamir 12000

Amara 15000

Adnan 13000

Afzal 11500

Output File: employeeout.txt

Name Salary

Aamir 14000

Amara 17000

Adnan 15000

Afzal 13000

Sample Problem - II

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```
//Sample Code#2 Input in file and Display data from file
#include<iostream>
#include<fstream>
using namespace std;

void InputData();
void DisplayData();

void main()
{
    InputData();
    DisplayData();

    system("pause");
}
```

Sample Problem - II

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```
void InputData() {  
    ofstream out;  
    int x;  
    out.open("test.txt");  
    for(int i=0 ; i<5 ; i++) {  
        cin >> x;  
        out << x << endl;  
    }  
    out.close();  
}
```

```
void DisplayData() {  
    ifstream in;  
    int x;  
    in.open("test.txt");  
    for(int i=0 ; i<5 ; i++){  
        in >> x;  
        cout << x << endl;  
    }  
    in.close();  
}
```

Sample Problem - III

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```
//single input string and display
#include<iostream>
#include<fstream>
#include<string>
using namespace std;
void main() {
    //declaration
    string Name;
    ofstream out;
    ifstream in;
    //inserting single string with //space
    out.open("test.txt");
    getline(cin, Name);
    out << Name;
    out.close();
    // displaying string
    in.open("test.txt");
    getline(in,Name);
    cout << Name;
    in.close();
    system("pause");
}
```

Sample Problem - IV

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```
//Append Mode,Get all data from  
file
```

```
#include<iostream>
```

```
#include<fstream>
```

```
#include<string>
```

```
using namespace std;
```

```
void inserStringData();
```

```
void DisplayAllData();
```

```
int counter=0;
```

```
void main()
```

```
{
```

```
    inserStringData();
```

```
    DisplayAllData();
```

```
}
```

```
void inserStringData()
```

```
{
```

```
    ofstream out;
```

```
    string name;
```

```
    out.open("test.txt",ios::app);
```

```
    while(counter!=10){
```

```
        getline(cin, name);
```

```
        out << name << endl;
```

```
        ++counter;
```

```
    }
```

```
    out.close();
```

```
}
```

```
void DisplayAllData()
```

```
{
```

```
    ifstream in;
```

```
    string name;
```

```
    in.open("test.txt");
```

```
    while(!in.eof()) {
```

```
        getline(in, name);
```

```
        cout << name << endl;
```

```
    }
```

```
    in.close();
```

```
}
```

Reading Material

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- http://www.tutorialspoint.com/cplusplus/cpp_files_streams.htm
- <http://www.cppforschool.com/tutorial/Files1.html>
- <http://www.wellho.net/resources/ex.php4?item=c235/file01.cpp>
- <http://msdn.microsoft.com/en-us/library/d3ccyysc.aspx>
- http://www.elearningbio.com/forum/images/RW_20131024105519PM_12_computer_science_notes_CH03_data_file_handling.pdf

Questions

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