Tutorial 60 - File I/O in C++: Reading and Writing Files

Introduction to File I/O in C++

- **File I/O (Input/Output)** allows us to read from and write to files in C++.
- C++ provides three important file-handling classes from the `fstream` library:
  a. `fstreambase` → Base class for file operations.
  b. `ifstream` → Derived from `fstreambase`, used for reading from files.
  c. `ofstream` → Derived from `fstreambase`, used for writing to files.

Opening a File in C++

To perform file operations, a file must be **opened** using either of these two methods:

1. **Using the constructor** (directly while declaring the file object).
2. **Using the `open()` function** of the file class.

Writing to a File in C++

📌 Code Example: Writing to a File

```
#include<iostream>
#include<fstream>
using namespace std;
int main(){
    string st = "Hello, this is a test file!";
    // Opening a file using constructor and writing to it
    ofstream out("sample60.txt"); // Write operation
    out << st;  // Writing string to file
    out.close(); // Closing file
    return 0;
}

```

Explanation:

1. A **string variable** `st` is created with the value `"Hello, this is a test file!"`.
2. An `ofstream` **object** `out` is created and linked to `"sample60.txt"`.
3. The **string** `st` **is written into the file** using `out << st`.
4. The file is **closed** using `out.close()` (good practice).

📌 Output:
A new file `"sample60.txt"` is created with the text:

```
Hello, this is a test file!

```

Reading from a File in C++

📌 Code Example: Reading from a File

```cpp
#include<iostream>
#include<fstream>
using namespace std;
int main(){
    string st2;
    // Opening a file using constructor and reading from it
    ifstream in("sample60b.txt"); // Read operation
    getline(in, st2); // Read full line from file
    cout << st2; // Display content on console
    in.close(); // Closing file
    return 0;
}

```

Explanation:

1. A **string** `st2` is declared (initially empty).
2. An `ifstream` **object** `in` is created and linked to `"sample60b.txt"`.
3. The `getline()` **function** is used to read a full line from the file into `st2`.
4. The **content of** `st2` **is displayed** using `cout`.
5. The file is **closed** using `in.close()`.

📌 **Output:**
If `"sample60b.txt"` contains:

```
This is coming from a file

```

The console output will be:

```
This is coming from a file

```

Short Notes

Key File I/O Classes in C++

1. `ifstream` → Used for reading files.
2. `ofstream` → Used for writing to files.
3. `fstream` → Can handle both reading and writing.

Methods to Open Files

- **Using Constructor:** `ofstream out("file.txt");`
- **Using** `open()` **Method:**

```cpp
ofstream out;
out.open("file.txt");

```

File Operations

Operation	Function

Write to a file	`ofstream` and `<<` operator
Read from a file	`ifstream` and `getline()`
Close a file	`.close()` function