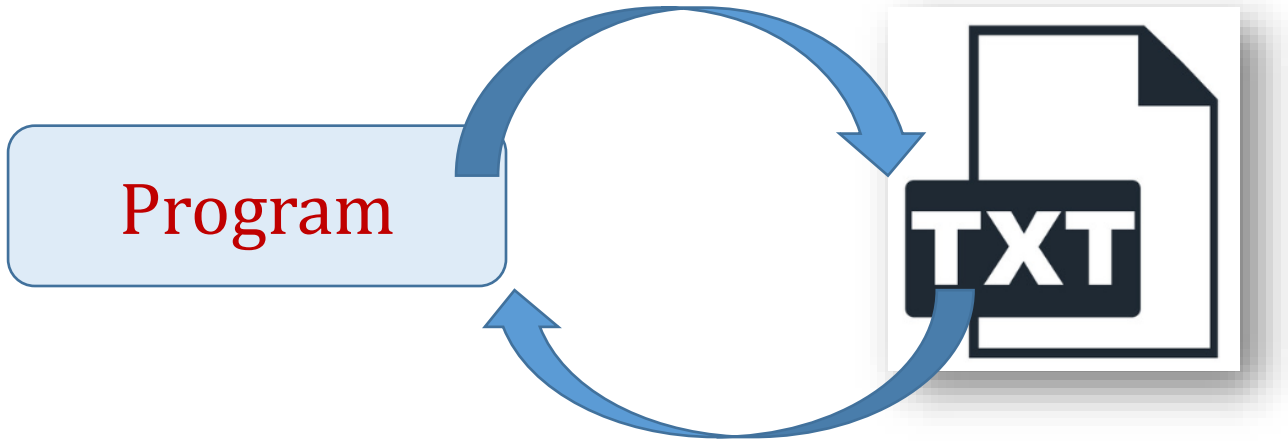
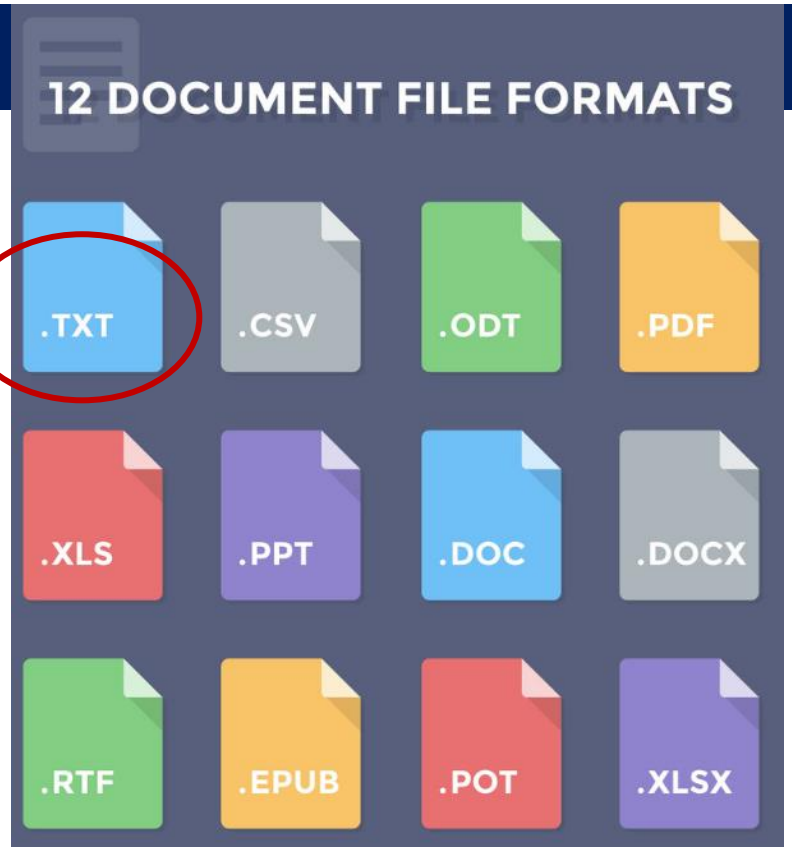
Data Structure and Programming II

Chapter 14: File IO (Input/Output) in C++



Outline

- What is File IO? File extensions?
- File Operations
  - Read data from file
  - Write data to file
- Examples

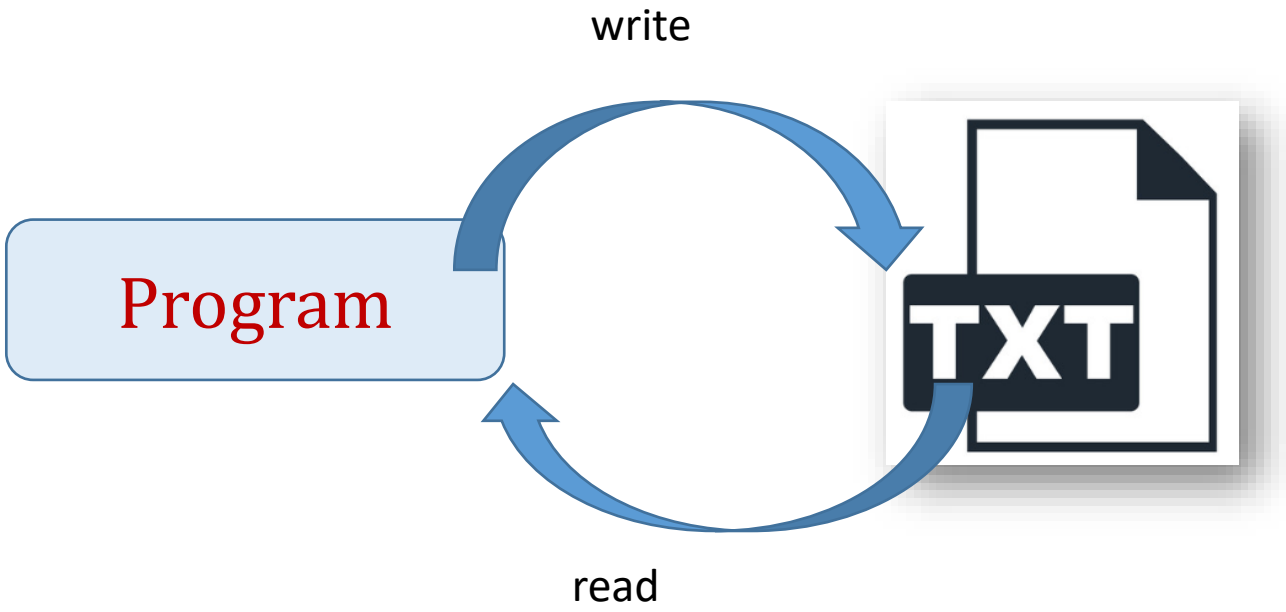


"File IO refers to the transfer of data either to or from a ***storage medium.***"

File IO

❑ What?

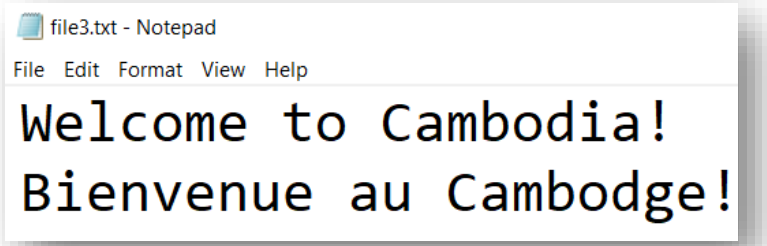
- "File IO refers to the transfer of data either to or from a ***storage medium.***"



File IO

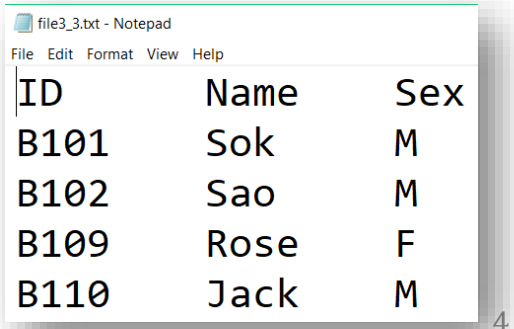
❑ What?

- **iostream** library provides *cin* and *cout* methods for reading from keyboard and writing/displaying on screen
- **fstream** library is used for writing and reading file
  - ofstream : only for wring data to file
  - ifstream : only for reading data from file
  - fstream : can write/read data to/from file




```
#include <iostream>
#include <fstream>
```

2:45pm



File IO

❑ Opening a file

- To read or write file, we have to open a file first.
  - We can use either ofstream or fstream

```
open(filename)
```

```
open(filename, mode)
```

Mode	Description
ios::app	Append mode. Data is added more
ios::in	Open file for reading.
ios::out	Open file for writing. If file does not exist, create a new file. If file exists, content is overridden

```
ofstream file;
file.open("filename.dat")
```

```
fstream file;
file.open("filename.dat", ios::out)
```

```
fstream file;
file.open("filename.dat", ios::in)
```

File IO

❑ Closing a file

- We should close file before terminate the program

```
file.close( );
```

```
fstream file;
file.open("filename.dat", ios::out)
……..
//read/write code here
……..

file.close( );
```

File IO

❑ Writing data to a file

- We can use ofstream or fstream for creating file variable
- Then use << to write data
  - file<<data1<<data2<<endl;

```
ofstream file;
file.open("MyFile.dat");
```

```
fstream file;
file.open("MyFile.data", ios::out);
```

```
fstream file;
string filename="MyFile.dat";
//file.open(filename, ios::out); //error
file.open(filename.c_str( ), ios::out);
```

Functions for write data to file

Function	Description
file<<word;	Write one data in word to file
file<<word1<<"\t" <<word2;	Write two data (word1 and word2) separated by a tab to file

Remark: You can write data to file just similar way you display data using *cout*

Writing data to a file

```
#include <fstream>
#include <iostream>
using namespace std;

int main () {
  string data;
  // open a file in write mode.
  ofstream file;
  file.open("filename.txt");
  //file.open("filename.txt", ios::app); //append

  cout<<"Writing data to the file"<< endl;
  cout<<"Enter your name: ";
  cin>>data;
  file<<data<<endl;

  cout<<"Enter your age: ";
  cin>>data;
  file<<data<<endl;

  file.close();
}
```

```
#include <fstream>
#include <iostream>
using namespace std;

int main () {
  string data;  //char data[100];
  // open a file in write mode.
  fstream file;
  file.open("filename.txt", ios::out);
  //file.open("filename.txt", ios::app); //append

  cout<<"Writing data to the file"<< endl;
  cout<<"Enter your name: ";
  ciin>>data;
  file<<data<<endl;

  cout<<"Enter your age: ";
  cin>>data;
  file<<data<<endl;

  file.close();
}
```

File IO

❑ Reading from a file

- We can use ifstream or fstream for creating file variable
- Then use >> to read data

```
ifstream file;
file.open("filename.dat");
```

```
fstream file;
file.open("filename.dat", ios::in);
```

Functions for reading data from file

Mode	Description
file>>word	Read data from file one word at a time
file.eof( )	Return true when reach end of file (data has been read till the end). Otherwise, return false
file.get(ch)	Read data from file one character at a time.
getline(file, line)	Read data from file one line at a time. Return false when no data to read

Break
Continue: 2:45pm

Reading from a file: One word at a time

```
#include <fstream>
#include <iostream>
using namespace std;

int main () {
  string data;

  // open a file in read mode.
  ifstream file;
 file.open("filename.txt");

  if(!file){
     cout<<"Error opening file OR file does not exist"<<endl;
  }else{
     cout << "Reading from the file" << endl;
     file >> data;
     cout << data << endl;
     file >> data;
     cout << data << endl;

     file.close();
   }
}
```

```
#include <fstream>
#include <iostream>
using namespace std;

int main () {
  string data;

  // open a file in read mode.
  fstream file;
  file.open("filename.txt", ios::in);

  if(!file){
     cout<<"Error opening file OR file does not
exist"<<endl;
  }else{
     cout << "Reading from the file" << endl;
     file >> data;
     cout << data << endl;
     file >> data;
     cout << data << endl;

     file.close();
   }
}
```

File IO

❑ Examples

- Read and write data from/to file

```
1  #include <fstream>
2  #include <iostream>
3  using namespace std;
4  int main (){
5      char data[100];
6      // open a file in write mode.
7      ofstream outfile;
8      outfile.open("afile.dat");
9      cout << "Writing to the file" << endl;
10     cout << "Enter your name: ";
11     cin.getline(data, 100);
12     // write inputted data into the file.
13     outfile << data << endl;
14     cout << "Enter your age: ";
15     cin >> data;
16     // again write inputted data into the file.
17     outfile << data << endl;
18     // close the opened file.
19     outfile.close();
```

```
21
22     // open a file in read mode.
23     ifstream infile;
24     infile.open("afile.dat");
25     cout << "Reading from the file" << endl;
26     infile >> data;
27     // write the data at the screen.
28     cout << data << endl;
29     // again read the data from the file and
30     infile >> data;
31     cout << data << endl;
32     // close the opened file.
33     infile.close();
34 }
```

```
Writing to the file
Enter your name: Jack Rose
Enter your age: 18
Reading from the file
Jack
Rose
```

Q & A

Practice

❑ Exercise

1. Write a program to read data from a file below. Store those data in an array of structure. Then add one more info of a student to that array. Ask a user for that info. Finally store all data in this array to a file having the same name as the previously read file.