



Computer Programming (b)

E1124



Lecture 7

File input/output

INSTRUCTOR

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- Introduction
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File input/output

➤ **File input/output**

- getting input from the keyboard and sending output to the screen have several limitations.
- Inputting data in a program from the keyboard is comfortable if the amount of input is very small.
- Sending output to the screen works well if the amount of data is small (no larger than the size of the screen) and you do not want to distribute the output in a printed format to others.

➤ **File input/output (cont.)**

- The standard I/O header file, `iostream`, contains data types and variables that are used only for input from the standard input device and output to the standard output device.
- C++ provides a header file called `fstream`, which is used for file I/O.
- Among other things, the `fstream` header file contains the definitions of two data types:
 - ❑ `ifstream`, which means input file stream.
 - ❑ `ofstream` which means output file stream.

➤ **File input/output (cont.)**

- File: area in secondary storage to hold info
- File I/O is a five-step process
 - Include fstream header
 - Declare file stream variables
 - Associate the file stream variables with the input/output sources
 - Use the file stream variables with `>>`, `<<`, or other input/output functions
 - Close the files

➤ File input/output (cont.)

- Step 1 requires that the header file `fstream` be included in the program.
- The following statement accomplishes this task:

```
#include <fstream>
```

- Step 2 requires you to declare file stream variables:

```
ifstream inData;
```

```
ofstream outData;
```

➤ **File input/output (cont.)**

- Step 3 requires you to associate file stream variables with the input/output sources.
- This step is called opening the files. The stream member function open is used to open files.
- The syntax for opening a file is:


```
fileStreamVariable.open(sourceName);
```
- Here, fileStreamVariable is a file stream variable, and source Name is the name of the input/output file.

➤ File input/output (cont.)

- Suppose that the input data is stored in a file called **prog.dat**.
- The following statements associate **inData** with **prog.dat** and **outData** with **prog.out**.
- That is, the file **prog.dat** is opened for inputting data, and the file **prog.out** is opened for outputting data.

```
inData.open("prog.dat");
```

```
outData.open("prog.out");
```

➤ **File input/output (cont.)**

- Step 4 You use the file stream variables with `>>`, `<<`, or other input/output functions.
- The syntax for using `>>` or `<<` with file stream variables is the same as the syntax for using `cin` and `cout`.
- Instead of using `cin` and `cout`, however, you use the file stream variable names that were declared.

➤ File input/output (cont.)

```
inData >> payRate;
```

- reads the data from the file prog.dat and stores it in the variable payRate.

```
outData << "The paycheck is: $" << pay << endl;
```

- stores the output:

```
The paycheck is: $ 565.78
```

- in the file prog.out. This statement assumes that the pay was calculated as 565.78.

➤ **File input/output (cont.)**

- Once the I/O is complete, Step 5 requires closing the files.
- Closing a file means that the file stream variables are disassociated from the storage area and are freed. Once these variables are freed, they can be reused for another file I/O.

```
inData.close();
```

```
outData.close();
```

➤ File input/output (cont.)

```
#include <fstream>

//Add additional header files you use

using namespace std;

int main()
{
    //Declare file stream variables such as the following
    ifstream inData;
    ofstream outData;
    .
    .
    .

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

    //Code for data manipulation

    //Close files
    inData.close();
    outData.close();

    return 0;
}
```

➤ **PROGRAMMING EXAMPLE: Student Grade**

- Write a program that reads a student name followed by five test scores.
- The program should output the student's name, the five test scores, and the average test score.
- The data to be read is stored in a file called test.txt. The output should be stored in a file called testavg.out.

➤ **Input:** A file containing the student's name and the five test scores. A sample input is:

Ahmed Ali 87 89 65 37 98

➤ **Output:** The student's name, the five test scores, and the average of the five test scores, saved to a file.

➤ File input/output (cont.)

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;
int main ()
{
    ifstream inFile;
    ofstream outFile;
    double test1, test2, test3, test4, test5;
    double average;
    string firstName;
    string lastName;

    inFile.open("test.txt");
    outFile.open("testavg.out");
```

```
    cout << "Processing data" << endl;
    inFile >> firstName >> lastName;
    outFile << "Student name: " << firstName << " " << lastName
    << endl;
```

```
    inFile >> test1 >> test2 >> test3 >> test4 >> test5;
    outFile << "Test scores: " << test1 << " " << test2 <<
    " " << test3 << " " << test4 << " " << test5 << endl;
    average = (test1 + test2 + test3 + test4 + test5) / 5.0;
    outFile << "Average test score: " << average << endl;
```

```
    inFile.close();
    outFile.close();
    return 0;
}
```

Thank
you

