Reading from and Writing to Files

Section 3.12 & 13.1 & 13.5

Files (3.12)

- Data stored in variables is temporary

- We will learn how to write programs that can
  - Create files
  - Write to files
  - Read from files

Steps to Using Files

- There are five steps that must be taken in order to use files in C++

  1. Include header files

  2. Define a file stream object
     - variable to represent a file

  3. Open the file

  4. Use the file

  5. Close the file

1. Libraries

- To access files you will need to

  #include <iostream>

  #include <fstream>

2. File Stream Objects (Variable)

```
ifstream inputFile;

ofstream outputFile;

fstream inAndOut;
```

- Can open many files at once
- One variable per file

3. Opening Files

```
ifstream inputFile;

inputFile.open("input.dat");
```

The file name must be a string literal

OR


```
string filename;
cin >> filename;
inputFile.open(filename.c_str());
```

Check File Opened Correctly

- Make sure that it opened correctly

```
if(false == inputFile)

{

    cout << "Error opening input file ";

    exit(1);

}
```

4. Using File Streams

- Use input file variable wherever you use cin

- Examples:

  ○ `inputFile >> num;`

- Output output file variable wherever you use cout

- Examples:

  ○ `outputFile << num;`

Example: Writing to a File

- Write a program to ask the user for 5 integers and write each integer to the file numbers.txt, each integer on a new line.

- Write a program to read 5 integers from a file named numbers.txt and display the average

How do we know when to stop reading?

- Marker : read until some value

```
0
2
10
43
-999
```

Marker value ⟶ -999

- Count: First integer tells us how much data to read

```
3
Chadd
Doug
Shereen
```

Let's write code to do each of these.

Reading Until the EOF (p 811)

- It is possible to read from a file until the end is reached

```
while (inputFile >> num)

{

    cout << num << " ";

}
```

Reading from a File

- Write a program that will read in a sequence of numbers (doubles) from a file and calculate the sum and average. There is an unknown number of numbers in the file.

- Write the sum and average to the screen and a file named "output.txt"

Practice

- Read Pacific Soccer scores from a file. Calculate the Pacific team's record.

- How long is their longest winning streak?

Pacific 5 NorthwestChristian 0
Redlands 2 Pacific 1
LaVerne 0 Pacific 6

.....
Pacific 1 PacificLutheran 0

The home team is listed first.

No team name contains a space.

Reading Characters

- Write a program that reads in some text from a file (in.txt) and outputs that text to the screen

- The file contains:

```
Hello Everyone!

I'm a file that

contains some text.
```
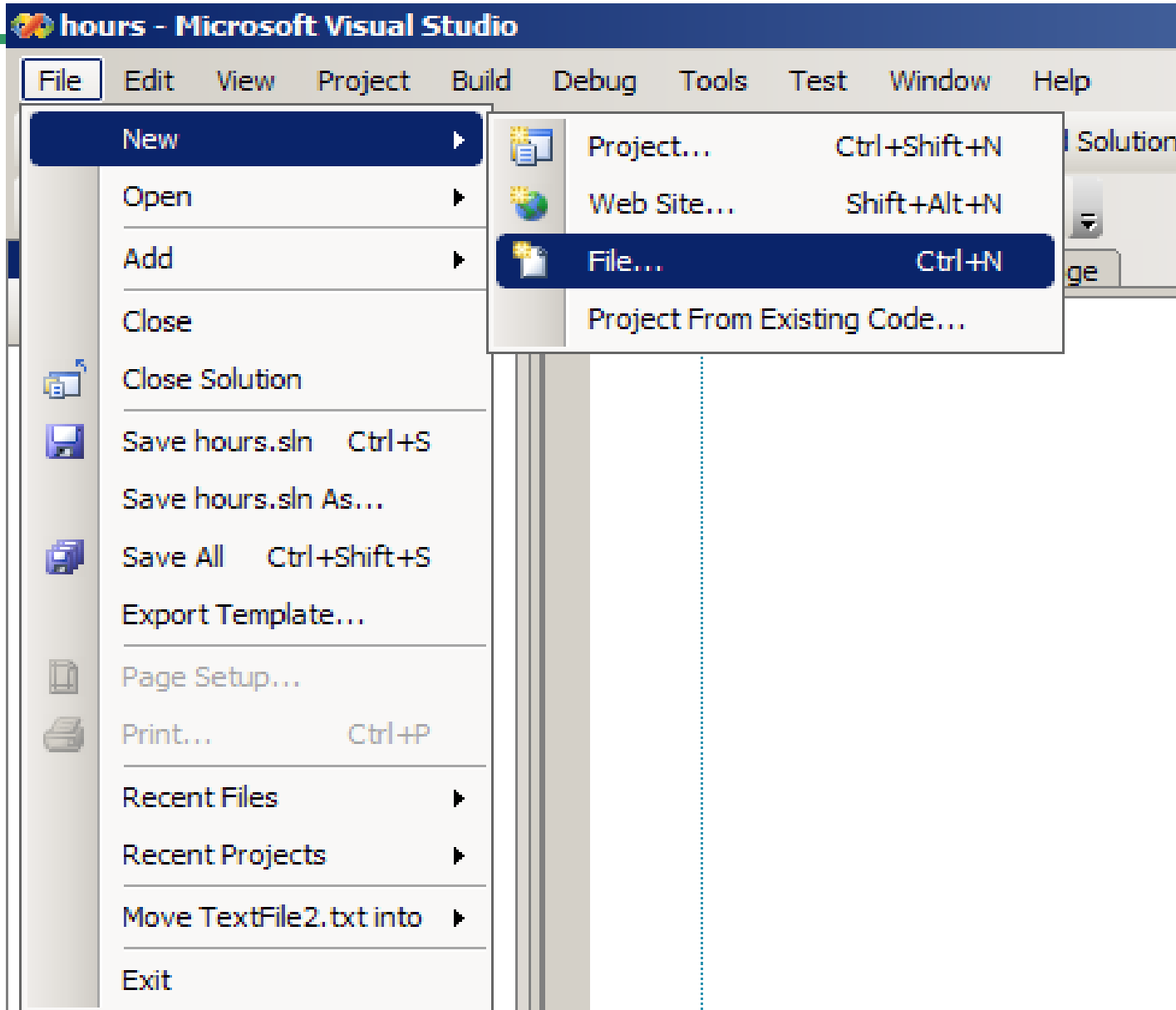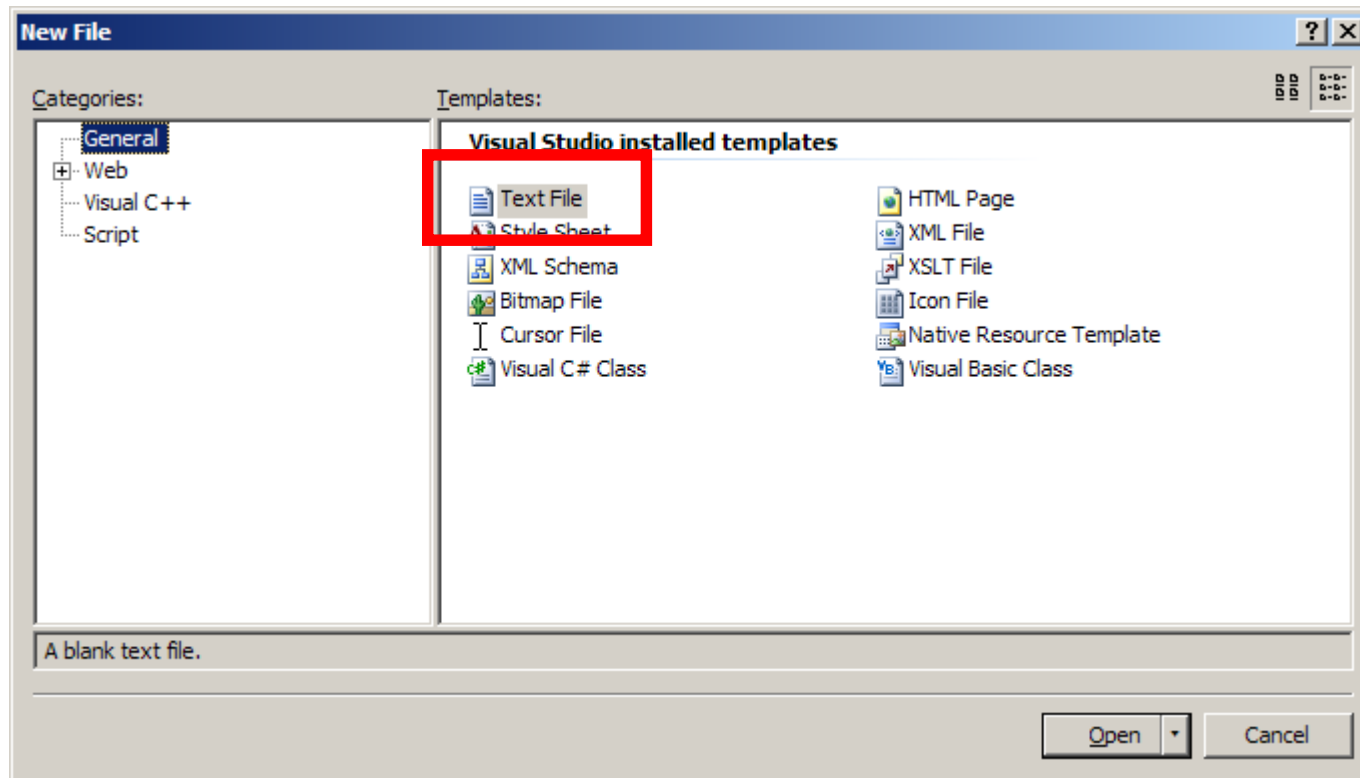
inputFile.get( )

```
char letter;

inputFile.get( letter );
```

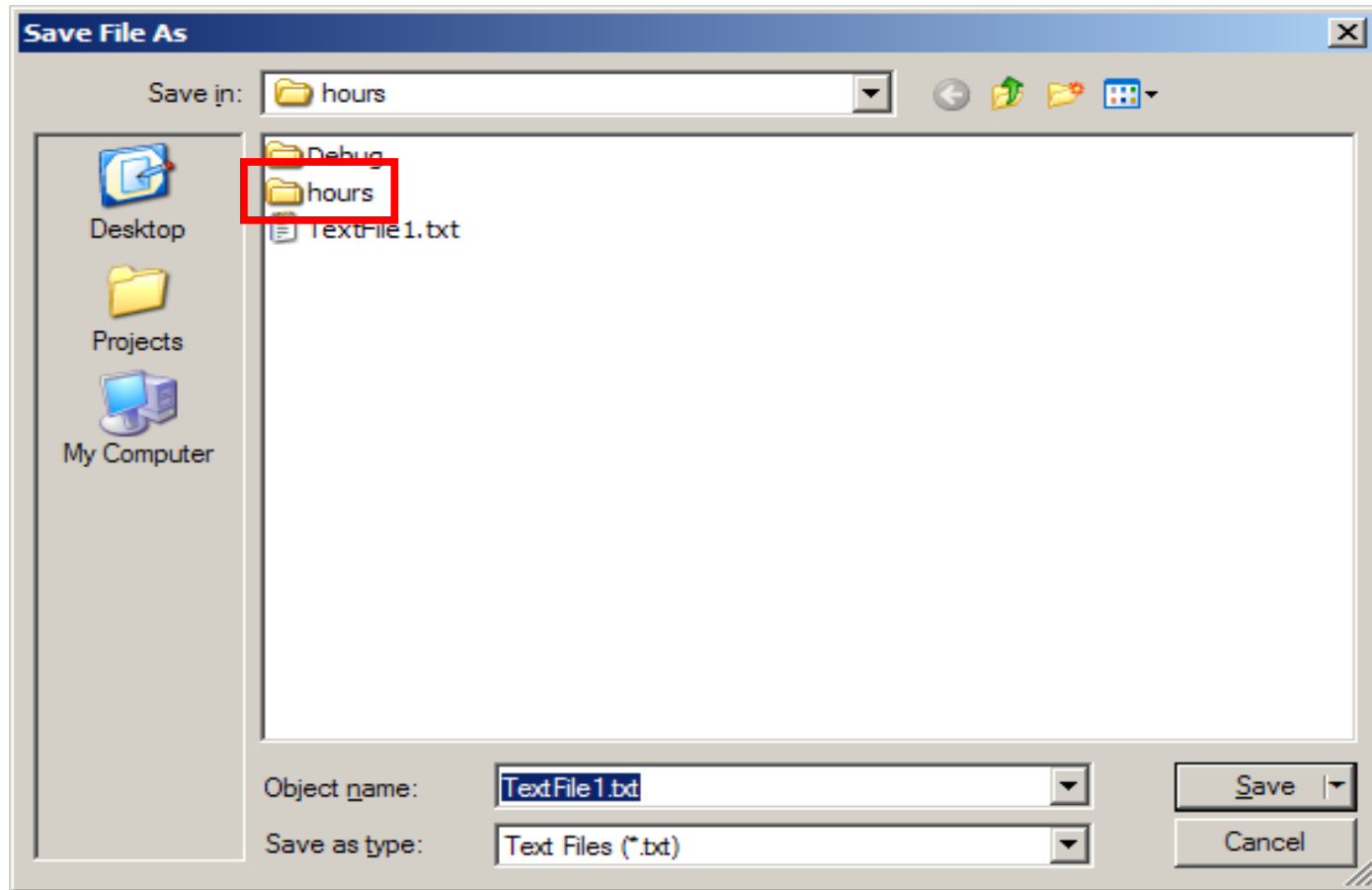**.get()** reads every character, including whitespace
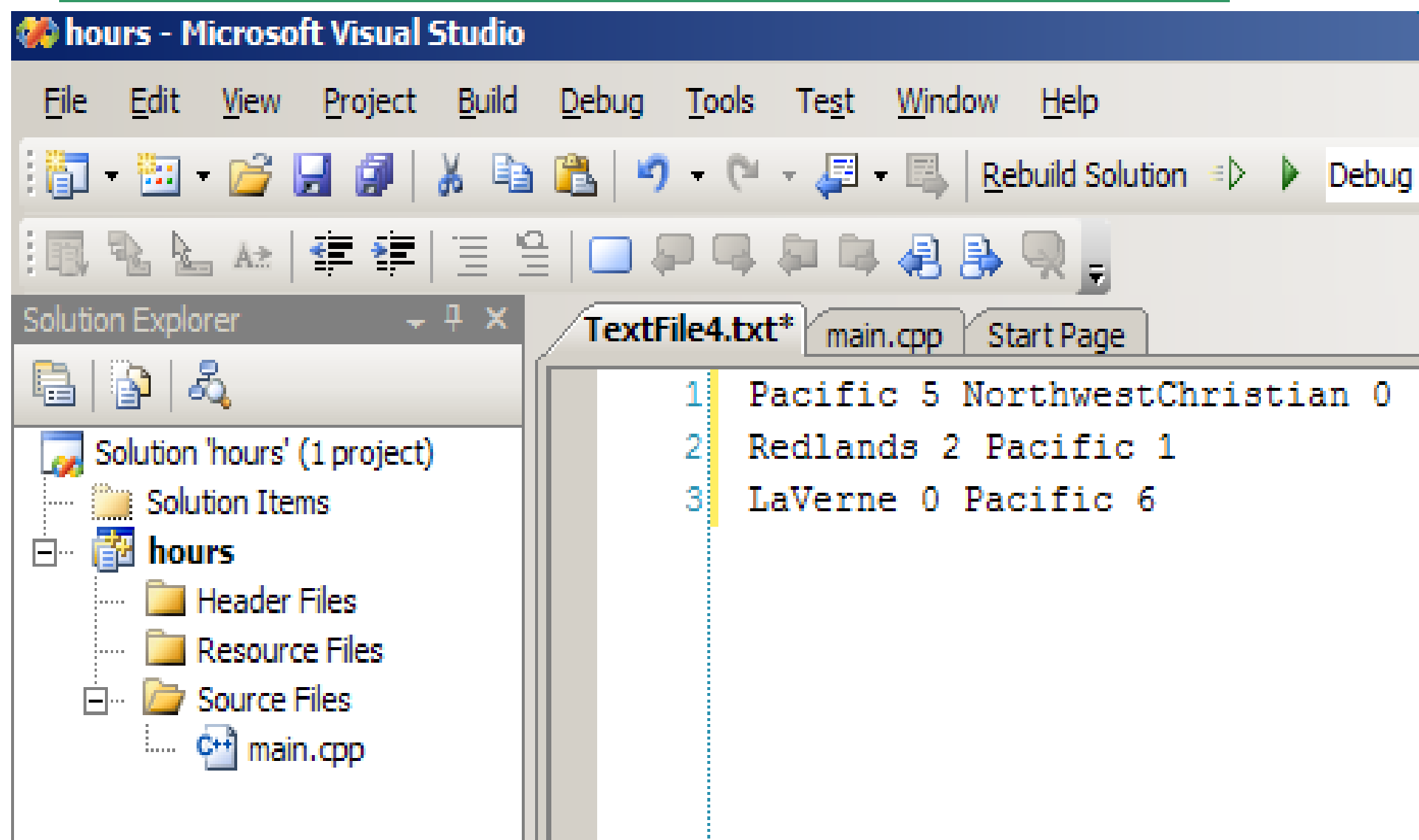
Add a Text File

Add a TextFile

Save As!

- Be sure you "Save As" and save the file into the correct directory

Write the Data!

Practice

- Write a program that will read the following file and find the 2rd largest value. The file may contain any number of values.

- Output the 2rd largest value to the screen and to the file SecondLargest.txt.

- File:

  59
  98
  99
  77
  66
  73
  85

Practice

The rows represent students, the columns represent assignments. Each student's name is followed by 5 scores. Find the average grade for each student and for each assignment. Print the results to the screen and the file "results.txt" There are an unknown number of students.

Patty 99.0 98.0 89.5 77.5 66.0
Charlie 73.0 85.0 77.5 89.5 89.0
Lucy 62.0 84.0 83.0 77.0 88.5

Patty: 86.0
Charlie: 82.8
Lucy: 78.9
Assignment 1: 78.0
Assignment 2: 89.0
....