
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(EXIT_FAILURE);
}
```

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

Marker value 

0
2
10
43
-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.
```

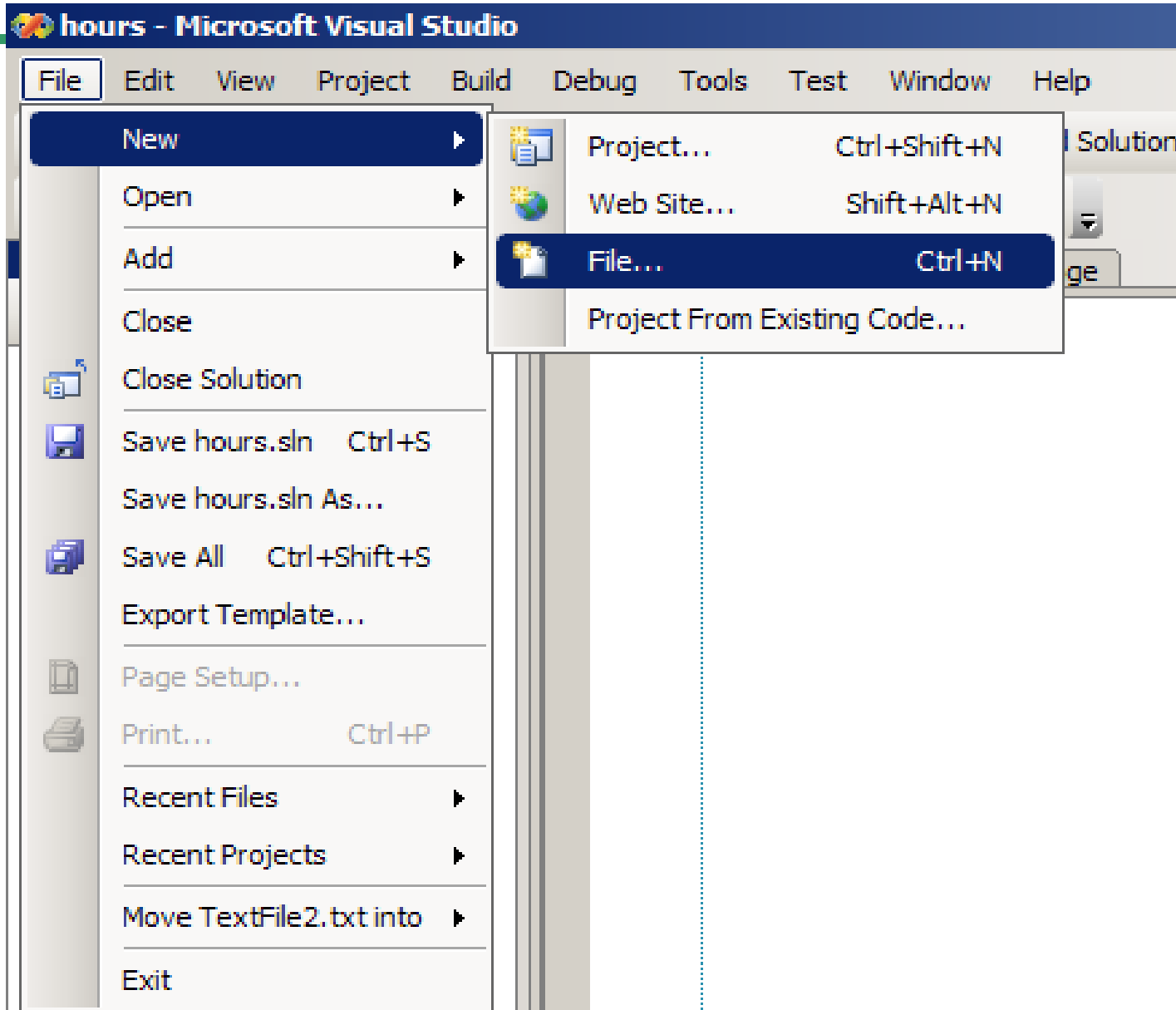
```
inputFile.get( )
```

```
char letter;
```

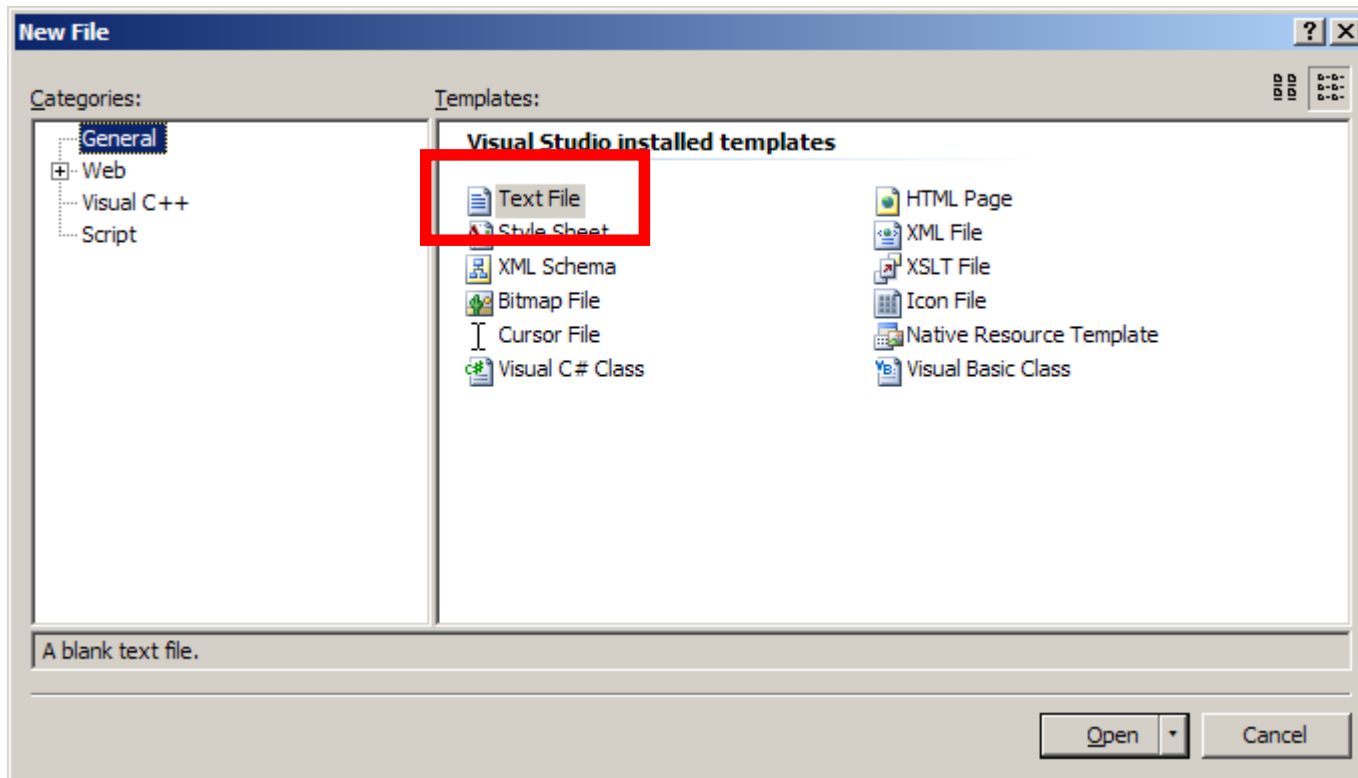
```
inputFile.get( letter );
```

`.get()` reads every character, including whitespace

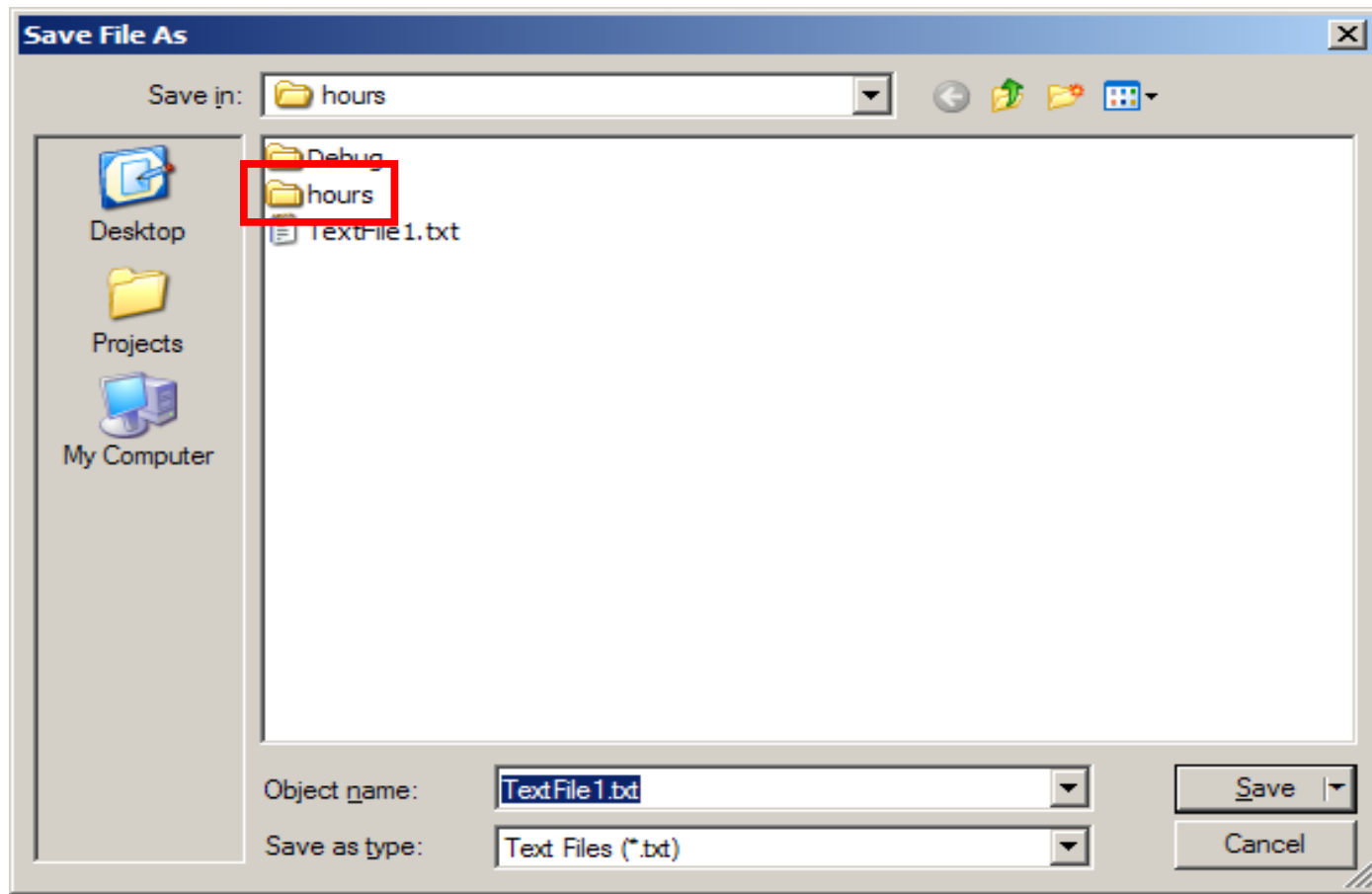
Add a Text File



Add a TextFile

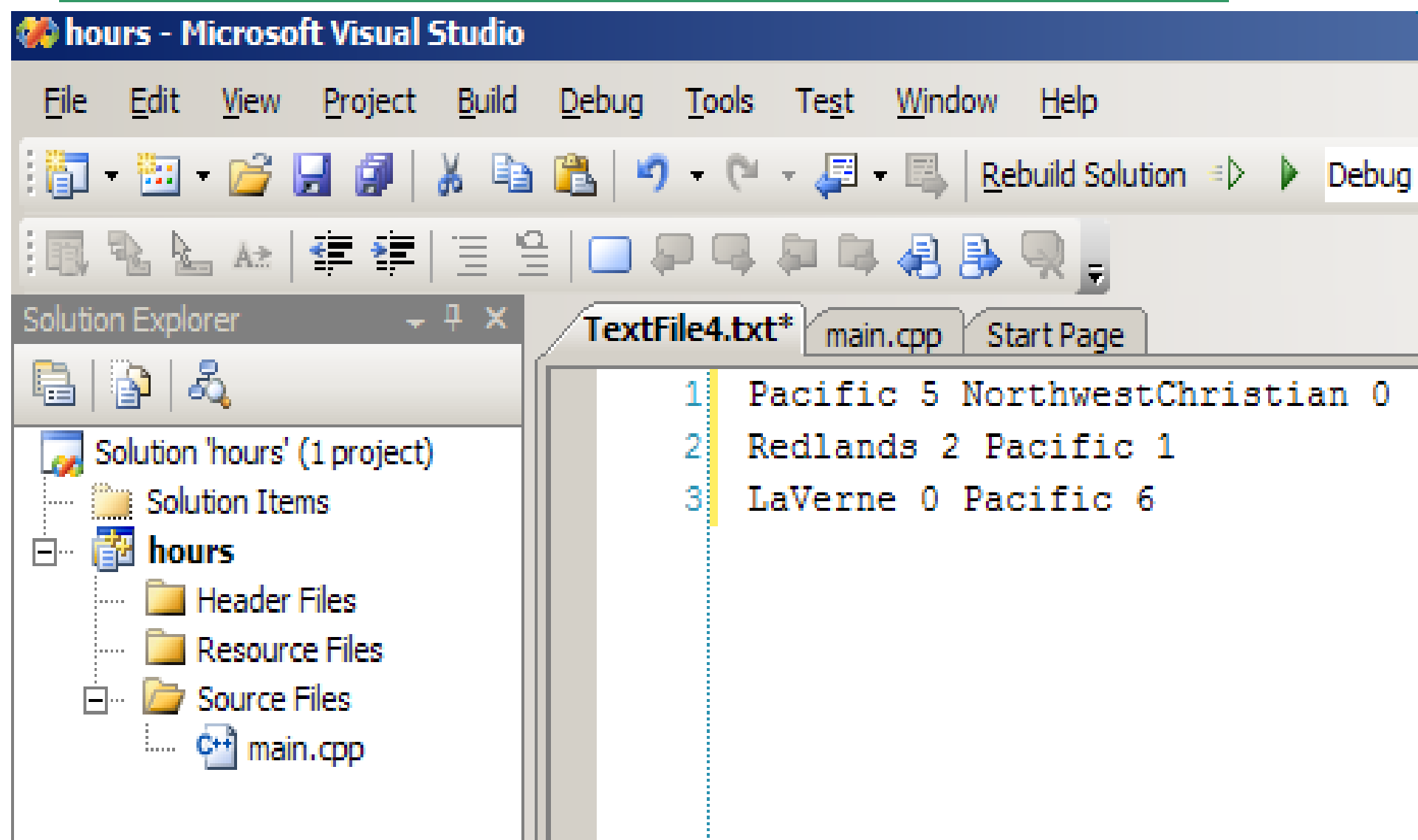


Save As!



- 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 2nd largest value. The file may contain any number of values.
- Output the 2nd 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
.....
```