Reading from and Writing to Files

Section 3.14 & 4.16

Files

- 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. Check that the file opened correctly
  5. Use the file
  6. Close the file

1. Header files

- To access files you will need

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

2. File Stream Objects (Variable)

```
ifstream inputFile;
ofstream outputFile;
fstream inAndOut;
```

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

3. Opening Files

```
inputFile.open("filename")
```

- Same syntax for both input and output files
- Filename is a string literal
- Example:

```
ifstream inputFile;
inputFile.open("input.txt");
```

4. Check File Opened Correctly

- Make sure that it opened correctly

```
inputFile.open("input.txt");
if(!inputFile)
{
    cout << "Error opening input file ";
    exit(-1);
}
```

5. Using File Variables

- Use input file variable wherever you use **cin**

```
inputFile >> num;
```

- Use output file variable wherever you use **cout**

```
outputFile << num;
```

- Can read/write
  - **double, char, int, string**

6. Closing Files

- Any files that have been opened must be closed at the end of the program

```
inputFile.close();
outputFile.close();
```

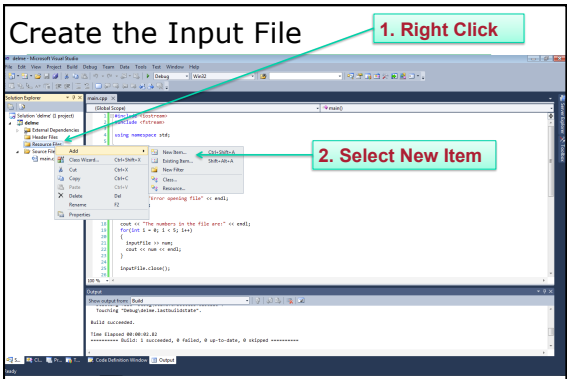
Example: Writing to a File

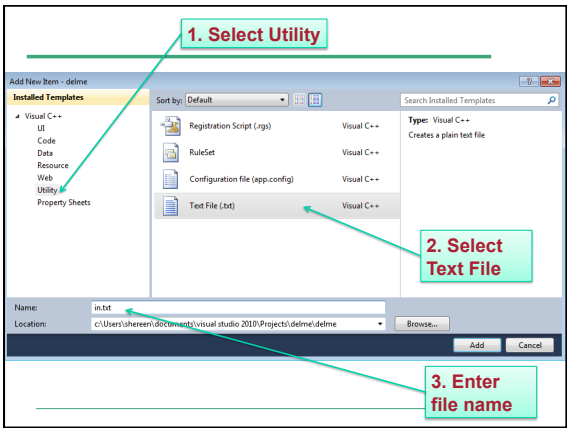
- Write a program to ask the user for 5 integers and write each integer to the file numbers.txt, each integer on a new line.
- Where is the file?
  - It is in the same directory as your main.cpp

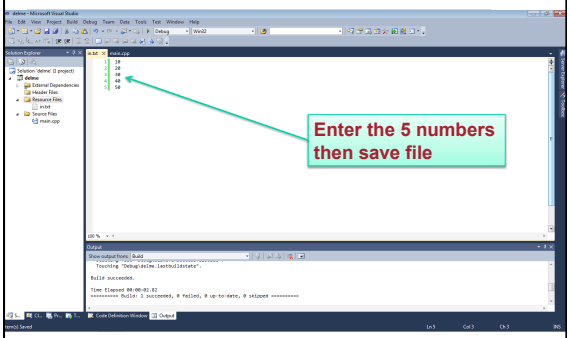
Example: Reading from a file

- Write a program to read 5 integers from a file named in.txt and display them to the screen.
- Modify the program to also display the average of the 5 integers.

Create the Input File







Practice

- Write a program that will read the following file and find the largest value. The file will contain 100 integers. Output the largest value to the screen.
- Part of the file (data.txt):

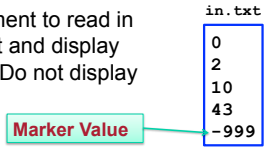
```
59
98
99
77
66
73
85
```

Practice

- Change the previous program so that the data is displayed both to the screen and to a file named output.txt

When to Stop

- What if we don't know the number of items in the file?
- Marker : read until some value
  - Write the code segment to read in the numbers in in.txt and display them to the screen. Do not display the marker value!



When to Stop

- Count: First integer tells us how much data to read
  - Write the code segment to read in the strings in the file in.txt and display them to the screen. Do not display the count value!