Chapter 5
Loops and Files

- Reading: Chapter 5 (5.2 pp. 232-238)
Loops

• A loop is a section of code that repeats
• C++ has three looping control structures:
  1. while
  2. for
  3. do-while
• The difference in these structures is how the repetition is controlled
while loop

- pre-tested loop
- General format

```c
while (expression) {
    // statements
}
```
while Loop Example

- Let the user determine how many times to run the loop.

```cpp
int theCounter = 0; // initialize the counter
int maxValue;

cout << "How many times should we run the loop? ";
cin >> maxValue;

while ( ) // test the counter
{
    cout << "theCounter : " ;
    cout << theCounter << endl;
        // update the counter
}
```
Practice

- Write a snippet of code that will ask the user for an integer. Print the integers from 0 to the square of the number (inclusive) the user supplied.
Running Totals

- Write a snippet of code using a while loop that will calculate the sum of all the integers from 0 to 10.

- Write a snippet of code that will ask the user for a number. Print the sum of all the integers from 0 to the number the user supplied.
How many inches of rain did we get last week?

```c++
const int DAYS_IN_A_WEEK = 7;
int currentDay = 1; // initialize the counter
double totalRain = 0.0; // initialize the total
double currentRain;

// loop for each day in a week
while (currentDay <= DAYS_IN_A_WEEK) // test the counter
{
    cout << "How much rain fell on day " << currentDay << " : ";
    cin >> currentRain;
    totalRain = totalRain + currentRain;
    currentDay = currentDay + 1; // update the counter
}
cout << "The total rainfall last week was ";
cout << fixed << setprecision(2) << totalRain;
```
Practice

- Write a snippet of code that will ask the user for a number. Print the sum of all the even numbers from 0 to the square of the number the user supplied.
Practice

- Write a snippet of code that will ask the user for an integer. Print all the integers from 0 to the number the user supplied as well as the running total of the integers.

Enter a number: 3

<table>
<thead>
<tr>
<th>counter</th>
<th>running total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>
Practice

- Write a snippet of code that will ask for a student’s exam score and then print the appropriate letter grade (A,B,C,D,F).

- Continue asking for exam scores and printing letter grades until the user enters a negative exam score

```java
double examScore;
```