

WHILE LOOPS

Sections 3.11, 4.1, 4.2

Boolean Data Type

- A primitive data type that can only be one of two values: true or false
- Boolean expressions use relational and logical operators and the result of a Boolean expression is either true or false

Boolean Data Type

```
const int LEGAL_AGE = 21;
bool isLegalAge;
int studentAge;

cout << "Enter your age: ";
cin >> studentAge;

isLegalAge = (studentAge >= 21);

if (isLegalAge) {
    cout << "You are of legal age" << endl;
}
```

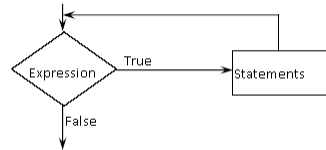
Loops

- 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

```
while (expression) {
    // statements executed if expression is true
}
```



while Loop Example

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

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

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

while (
    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.

Example

```
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
counter running total
    0           0
    1           1
    2           3
    3           6
```

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

```
double examScore;
```