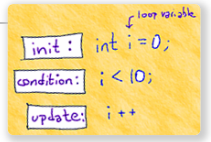
Definite Loops with *for*



C++ has a loop designed for repeating an operation a fixed number of times: the for loop. You already met the **range-based *for*** loop in the last section. In this section we'll cover the traditional **classic counter-controlled** version.

The pattern used when you simply want to **repeat an action `n` times** is this:

```
times <- times to repeat
i <- 0
While i is less than times
  Do action
  i <- i + 1
```

Here is this pattern translated into C++ using the ***for*** loop.

```
int times = 5;    // repeat 5 times;
for (int i = 0; i < times; ++i)
{
    cout << "Hello" << endl;
}
```

The traditional ***for*** loop has **three sections** inside its parentheses:

- The **initialization expression** is evaluated once before the loop is entered. It creates and initializes the **loop control variable**, often named **`i`**. You may create other variables of the same type in this section. These variables have **statement scope**; they are not available after the loop body. The initialization section ends with a semicolon.
- The **test condition** is first evaluated after the initialization. If **`true`**, the body is entered; if **`false`**, it is skipped. The condition also ends in a semicolon.
- The **update expression** is evaluated **after** the loop body is completed. It does not end in a semicolon. The update expression must change one of the variables in the condition, which is evaluated again, immediately following the update.

Often, the **index** or **loop control variable** is not used inside the body of the loop; it simply controls the number of repetitions. Single letter names such as **`i`** and **`j`** are conventional. If you want others to understand your code, you'll conform to this convention.

The loop shown here goes from **`0`** to **less-than** **`times`**, so we say that this loop uses **asymmetric bounds**. This means the **lower** bounds is **included** while the **upper** bound is **excluded**.