

Classifying Loops

Classifying loops according to where their condition is tested is not really very useful when it comes to deciding which loop to use. It is much more useful to classify loops by the **kind of bounds** that they employ.

A loop's bounds are the conditions under which it will repeat its actions. In a simple, loop, the this might be expressed as "the counter has a value less than ten". In more complex loops, the bounds may be a combination of conditions. There are **three major kinds of loops** that can be built using the basic loop syntax available in C++.

- A **definite** or (**counter-controlled**) loop repeats its actions a fixed number of times—a "gimme fifty pushups" kind of loop. Ideally you can read the code and tell how many times the loop will run.



Sometimes you won't know the **exact** number of repetitions until runtime; it may be based upon the number of characters in a **string**, for instance, or some other number which is not computed until then.

- With an **indefinite loop** you can **never** tell how many times the loop will repeat by examining the code. An indefinite loop is a loop that tests for the occurrence of a particular event, not a count of the number of repetitions.



"Read characters until you encounter a period" is an indefinite loop. The bounds may be reached after reading three characters, or, after reading three-thousand. It's also possible that the period might be the first character or might not occur at all.

- **Range-based** loops were added to the language in C++11. Range loops iterate over a collection of elements, such as a **string**, array or **vector**. The informal name for a range loop is a **foreach** loop. The range-based **for** loop looks like this:

```
for (declaration : collection)
    statement
```

where *collection* is an object of a type that represents a sequence (such as a **string**), and **declaration** defines the variable that is used to access the underlying elements in the sequence. On each cycle of the loop, the variable in **declaration** is initialized from the value of the next element in **collection**.

Now, let's look at different kinds of **indefinite** loops.



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