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# Loop Vocabulary

Variables and values can have multiple roles, but it is useful to mention three different roles in the context of loops:

**Counter** Variable that is incremented every time a given event occurs.

```
int i = 0; // i is a counter
while (i < 10){
    Console.WriteLine($"{i}");
    i++;
}
```

**Sentinel Value** A special value that signals that the loop needs to end.

```
Console.WriteLine("Give me a string.");
string ans = Console.ReadLine();
while (ans != "Quit") // The sentinel value is "Quit".
{
    Console.WriteLine("Hi!");
    Console.WriteLine("Enter \"Quit\" to quit, or
 ↪  anything else to continue.");
    ans = Console.ReadLine();
}
```

**Accumulator** Variable used to keep the total of several values.

```
int i = 0, total = 0;
while (i < 10){
    total += i; // total is the accumulator.
    i++;
}

Console.WriteLine($"The sum from 0 to {i} is {total}.");
```

We can have an accumulator and a sentinel value at the same time:

```
Console.WriteLine("Enter a number to sum, or \"Done\" to
 ↪  stop and print the total.");
string enter = Console.ReadLine();
int sum = 0;
while (enter != "Done")
{
    sum += int.Parse(enter);
```

```
    Console.WriteLine("Enter a number to sum, or \"Done\"
 ↪  to stop and print the total.");
    enter = Console.ReadLine();
}
Console.WriteLine($"Your total is {sum}.");
```

You can have counter, accumulator and sentinel values at the same time:

```
int a = 0;
int sum = 0;
int counter = 0;
Console.WriteLine("Enter an integer, or N to quit.");
string entered = Console.ReadLine();
while (entered != "N") // Sentinel value
{
    a = int.Parse(entered);
    sum += a; // Accumulator
    Console.WriteLine("Enter an integer, or N to quit.");
    entered = Console.ReadLine();
    counter++; // counter
}
Console.WriteLine($"The average is {sum /
 ↪  (double)counter}");
```

We can distinguish between three "flavors" of loops (that are not mutually exclusive):

**Sentinel controlled loop** The exit condition tests if a variable has (or is different from) a *specific value*.

**User controlled loop** The number of iterations depends on the *user*.

**Count controlled loop** The number of iterations depends on a *counter*.

Note that a user-controlled loop can be sentinel-controlled (that is the example we just saw), but also count-controlled ("Give me a value, and I will iterate a task that many times").