Control

September 16, 2025

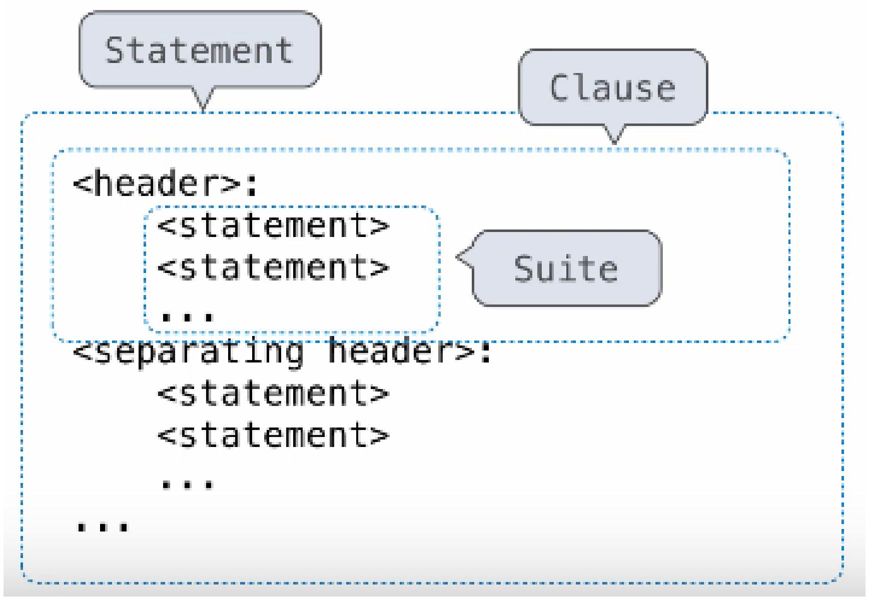
Contents

1 Statements

A **statement** is executed by the interpreter to *perform an action.*

We can also define **compound statements**, which are statements that span multiple lines. Generally, there is some header, followed by an indented block of statements known as the **suite**. The header with its suite is known as a **clause**. Compound statements can have multiple clauses.

In a compound statement, the first header determines the statement's type. For each clause, the header of that clause *controls* the suite that follows. An example of a compound statement are def statements.



```
<header>:
    <statement>
    <statement>
    ...
<separating header>:
    <statement>
    <statement>
    ...
...
```

2 Conditional Statements

A **conditional statement** is a compound statement that controls execution flow. The following example is a conditional statement that uses `if`, `elif`, and `else`:

```
def absolute_value(x):
    """Return the absolute value of x."""
    if x < 0:
        return -x
    elif x == 0:
        return 0
    else:
        return x
```

This conditional statement consists of one statement, three clauses, three headers, and three suites. A conditional statement:

1. Always starts with an `if` clause.
2. Followed by zero or more `elif` clauses.
3. Ends with zero or one `else` clause.

2.1 Procedure for Conditional Statements

Each clause is considered in order. For each clause:

1. Evaluate the header's expression.
2. If it is a `True` value, execute the suite and skip the remaining clauses.

Notice that a conditional statement only ever executes one clause.

2.2 Boolean Contexts

A **boolean context** is a context in which we only care if the expression evaluates to `True` or `False`. Examples of `False` values include `False`, `0`, '', `None`, and others. Anything other than a `False` value is a `True` value. Examples of boolean contexts include the headers for conditional statements and `while`.

3 Iteration

3.1 `while` Statements

While statements contain statements that are repeated as long as some condition is true. The following is a `while` statement:

```
i, total = 0, 0
while i < 3:
    i = i + 1
    total = total + i
```

This loop calculates the `total` sum of the numbers from 1 through 3. osbe-bgHTMLe5f5e5osbe-fggreen

[colback=osbe-bg,colframe=osbe-fg,title=The Fibonacci sequence,sharp corners,boxrule=0.4pt] We can write a function using a `while` loop to find the nth Fibonacci number:

```
def fib(n):
    """Compute the nth Fibonacci number, for N >= 1."""
    pred, curr = 0, 1
    k = 1
    while k < n:
        pred, curr = curr, pred + curr
        k = k + 1
    return curr
```

3.1.1 Procedure for `while` Statements

1. Evaluate the header's expression.

2. If it is a true value, execute the whole suite, then return to step 1.

Note that the while condition *must eventually become a false value* for the statement to end, otherwise you have an infinite loop.