

Strings

Python Reference

Indexing

A string 字符串 is text inside quotes. Each character 字符 has a position, called its index 索引. The first index is 0, not 1.

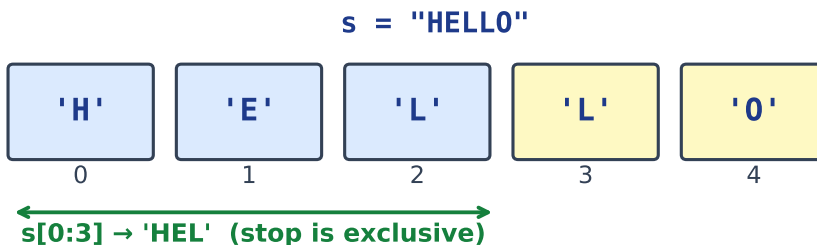
Read one character with square brackets:

```
word = "Python"
print(word[0])    # P  (the first character)
print(word[2])    # t
print(len(word))  # 6  (how many characters)
```

- Counting starts at 0, so the last index is `len(word) - 1`.
- A negative index counts back from the end: `word[-1]` is the last character.

```
word = "Python"
print(word[-1])   # n
print(word[-2])   # o
```

- An index that is too large gives an error 错误 (an `IndexError`).



Exam tip: slice is half-open [start, stop); omit ends for defaults; step is optional

s[start:stop] is a half-open window of characters

Slicing

A slice 切片 takes a part of a string. Write `word[start:end]`. The slice keeps **start** but stops **before** end.

```
word = "Python"
print(word[0:3])    # Pyt    (positions 0, 1, 2)
print(word[2:5])    # tho
```

- Leave out **start** to begin at 0; leave out **end** to go to the end.

```
word = "Python"
print(word[:3])     # Pyt
print(word[3:])     # hon
```

- A third number is the step 步长. `word[::-1]` reverses 反转 the string.

```
print("Python"[::-1])    # nohtyP
```

String methods & length

A method 方法 is a function that belongs to a value. You call it with a dot:

```
name = "mei chen"
print(name.upper())    # MEI CHEN
print(name.title())    # Mei Chen
print(len(name))       # 8
```

Strings are immutable 不可变: a method returns a **new** string and never changes the original 原始 one.

```
name = "mei"
print(name.upper())    # MEI    (the returned value)
print(name)            # mei    (the original is unchanged)
```

Common methods (each returns a new value):

Method	Meaning	Example	Result
<code>.upper()</code> / <code>.lower()</code>	change case	<code>"Hi".lower()</code>	hi
<code>.strip()</code>	remove edge spaces	<code>" hi ".strip()</code>	hi
<code>.replace(a, b)</code>	swap text	<code>"cat".replace("c", "b")</code>	bat
<code>.split(sep)</code>	break into a list	<code>"a,b".split(",")</code>	<code>['a', 'b']</code>

Join strings with `+`. This is called concatenation 拼接:

```
first = "Mei"
last = "Chen"
print(first + " " + last)    # Mei Chen
```

f-strings

An f-string 格式化字符串 builds text from values. Put `f` before the quote, then write `{...}` around a value.

```
name = "Mei"
age = 17
print(f"{name} is {age} years old")    # Mei is 17 years old
```

- Any expression 表达式 can go inside the braces.
- `{value:.2f}` rounds to 2 decimal places 小数位.

```
price = 9.5
print(f"Two cost {price * 2}")          # Two cost 19.0
print(f"Pi is about {3.14159:.2f}")     # Pi is about 3.14
```

Common mistakes

- Strings cannot be changed in place: `s[0] = "x"` raises an error. Build a new string instead.
- Indexing starts at 0; the last character is `s[-1]`, and `s[len(s)]` is out of range.
- A slice `s[a:b]` includes `a` but stops **before** `b`.
- String methods return a NEW string: `s.upper()` does nothing unless you store the result.