

UNIVERSITY *of* WISCONSIN
LA CROSSE
COMPUTER SCIENCE

CS 224 Introduction to Python

Strings

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Python Strings

Python strings are **immutable**:

```
s = 'abc'
```

```
s[0] = 'd'
```

```
s = 'abd'
```

```
s = s[:-1] + 'd'
```

These don't change the string 'abc'
they reassign the string variable s

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Accessor and Slices

```
s = 'A diamond necklace played the pawn'

print(s[5])           # prints m
print(s[len(s)-1])  # prints n
print(s[-1])         # prints n
print(s[-2])        # prints w
print(s[10:18])     # prints necklace
t = s[19:]          # t is 'played the pawn'
u = s[:9]           # u is 'A diamond'
print(s[-4:])       # prints pawn
v = s[:-16]        # v is 'A diamond necklace'
```

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Methods

Python provides a broad array of string operations.

Because strings are immutable, the operations do not modify the string.

Most methods fall into one of the following categories:

- Return a new string
- Return a Boolean
- Return an int
- Return a tuple or list

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Methods that return a string

- `s.capitalize()`
- `s.lower()`
- `s.upper()`
- `s.join(t)`
- `s.replace(old, new)`
- `s.strip()`
- `s.rstrip()`

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Upper and lower case

`s.lower()`
returns an all lower case conversion of s

`s.upper()`
returns an all upper case conversion of s

`s.capitalize()`
returns s with first character capitalized

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Examples: upper and lower case

```
s = 'Hand in hand some drummed along'

s.lower()
    returns 'hand in hand some drummed along'

s.upper()
    returns 'HAND IN HAND SOME DRUMMED ALONG'

s.lower().capitalize()
    returns 'Hand in hand some drummed along'

'123'.capitalize()
    returns '123'
```

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Join

```
s.join(t)
    t is an iterable of strings

    returns a concatenation of strings in t with
    string s as a separator
```

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Examples: join

```
s = ''
t = ['child', 'is', 'the', 'father']

s.join(t)      # t is an iterable of strings
               returns 'child is the father'

','.join(t)
               returns 'child,is,the,father'

' la '.join(t)
               returns 'child la is la the la father'
```

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Replace

```
s.replace(old, new)
   old is a string
   new is a string

returns a string in which occurrences of old
have been replaced with new
```

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Examples: replace

```
s = 'child is the father'

s.replace('the', 'a')
    returns 'child is a faar'
    # unintended consequences

s.replace(' the', 'a')
    returns 'child isa father'
    # d'oh!

s.replace(' the', ' a')
    returns 'child is a father'
```

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Strip

```
s.strip()
    returns s without leading and trailing whitespace

s.lstrip()
    returns s without leading whitespace

s.rstrip()
    returns s without trailing whitespace
```

All versions can take a string parameter that specifies the characters to replace (rather than whitespace).

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Examples: strip

```
s = '  Early one mornin the sun was shinin  \n'

s.strip()
    returns 'Early one mornin the sun was shinin'

s.lstrip()
    returns 'Early one mornin the sun was shinin  \n'

s.rstrip()
    returns '  Early one mornin the sun was shinin'
```

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Examples: strip

```
s = 'de do do do de da da da'

s.strip('a')
    returns 'de do do do de da da d'

s.strip('ad')
    returns 'e do do do de da da '

s.lstrip(' De')
    returns 'de do do do de da da da'

s.rstrip('a d')
    returns 'de do do do de'
```

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Methods that return a Boolean

- `s.startswith(prefix)`
- `s.endswith(suffix)`
- `s.isalnum()`
- `s.isalpha()`
- `s.isdigit()`
- `s.isupper()`
- `s.islower()`
- `s.isspace()`
- `s.istitle()`

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Examples: startswith & endswith

```
s = 'She loves you, yeah, yeah, yeah'

s.startswith('She lov')
    returns True

s.startswith('she')
    returns False

s.lower().startswith('she')
    returns True

s.endswith('ah, yeah')
    returns True
```

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Examples: isalnum, isalpha, & isdigit

```
s = 'Waiting for the break of day'
t = '25 or 6 to 4'
u = '314159'

s.isalnum()
    returns True

s.isalpha()
    returns True

t.isalnum()
    returns True
```

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Examples: isalnum, isalpha, & isdigit

```
s = 'Waiting for the break of day'
t = '25 or 6 to 4'
u = '314159'

t.isalpha()
    returns False

t.isdigit()
    returns False

u.isdigit()
    returns True
```

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Examples: islower & isupper

```
s = 'Waiting for the break of day'
t = '25 or 6 to 4'
u = '314159'

s.islower()
    returns False

t.islower()
    returns True

u.islower()
    returns False
```

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Examples: islower & isupper

```
s = 'Waiting for the break of day'
t = '25 OR 6 TO 4'

s.isupper()
    returns False

s.upper().isupper()
    returns True

t.isupper()
    returns True
```

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Examples: isspace & istitle

```
s = ' \t \n'  
t = 'Let Him Run Wild'  
  
s.isspace()  
    returns True  
  
t.istitle()  
    returns True  
  
t.upper().istitle()  
    returns False
```

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Methods that return an int

- `s.count(sub)`
- `s.find(sub)`
- `s.rfind(sub)`
- `s.index(sub)`
- `s.rindex(sub)`

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Count

```
s.count(sub)
  sub is a string

  returns the number of occurrence of sub in s
```

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Examples: count

```
s = 'de do do do de da da da'

s.count('da')
  returns 3

s.count('da ')
  returns 2

s.count('do do')
  returns 1
```

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Find

```
s.find(sub)
    sub is a string

    returns index of first occurrence of sub in s
    or -1 if not found

s.rfind(sub)
    sub is a string

    returns index of last occurrence of sub in s
    or -1 if not found
```

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Examples: find and rfind

```
s = 'De do do do de da da da'

s.find('do')
    returns 3

s.rfind('do')
    returns 9

s.find('de')
    returns 12

s.find('Do')
    returns -1
```

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Index

```
s.index(sub)
    sub is a string

    returns index of first occurrence of sub in s
    or gives an error if not found
```

```
s.rindex(sub)
    sub is a string

    returns index of last occurrence of sub in s
    or gives an error if not found
```

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Examples: index and rindex

```
s = 'And the fever gets worse every day'

s.index('eve')
    returns 9

s.rindex('eve')
    returns 25

s.index('a')
    returns 32

s.index('Eve')
    Crash and burn – should have used find
```

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Methods that return a tuple or list

- `s.partition(sep)`
- `s.rpartition(sep)`
- `s.split(sep)`
- `s.rsplit(sep)`
- `s.splitlines()`

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Partition

```
s.partition(sep)
    first occurrence of sep partitions s

returns tuple:
    (s_up_to_sep, sep, s_after_sep)
```

```
s.rpartition(sep)
    last occurrence of sep partitions s

returns tuple:
    (s_up_to_sep, sep, s_after_sep)
```

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Examples: partition

```
s = 'de do do do de da da da'

s.partition('do')
returns ('de ', 'do', ' do do de da da da')

s.rpartition('do')
returns ('de do do ', 'do', ' de da da da')

s.partition('do do do')
returns ('de ', 'do do do', ' de da da da')

s.rpartition('do do do')
returns ('de ', 'do do do', ' de da da da')
```

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Examples: partition

```
s = 'Help me Rhonda help help me Rhonda'

s.partition('Rhonda')
returns ('Help me ', 'Rhonda', ' help help me Rhonda')

s.rpartition('Rhonda')
returns ('Help me Rhonda help help me ', 'Rhonda', '')
```

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Split

```
s.split(sep [, max])
  each occurrence of sep partitions s, up to max times
  returns list of tokens
```

```
s.rsplit(sep [, max])
  each occurrence of sep partitions s, up to max times
  returns list of tokens
```

split and rsplit are same unless occurrences > max

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Examples: split

```
s = 'de do do do de da da da'
```

```
s.split(' ') or s.split()
returns ['de', 'do', 'do', 'do', 'de', 'da', 'da', 'da']
```

```
s.rsplit(' ') or s.rsplit()
returns ['de', 'do', 'do', 'do', 'de', 'da', 'da', 'da']
```

```
s.split(' ', 3)
returns ['de', 'do', 'do', 'do de da da da']
```

```
s.rsplit(' ', 3)
returns ['de do do do de', 'da', 'da', 'da']
```

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Examples: split

```
s = '12,657,489,306'  
t = 'de do do do de da da da'  
  
s.split(',')  
returns ['12', '657', '489', '306']  
  
t.split('do')  
returns ['de ', ' ', ' ', ' ', ' de da da da']  
  
s.rsplit('do', 2)  
returns ('de do ', ' ', ' de da da da']
```

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Splitlines

```
s.splitlines()  
splits s at newlines; consumes the newlines  
  
returns list of lines
```

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Examples: splitlines

```
s = 'A diamond necklace played the pawn
    Hand in hand some drummed along
    To a handsome man and baton
    Bygone, bygone'
```

```
s.splitlines()
```

```
returns ['A diamond necklace played the pawn',
        'Hand in hand some drummed along',
        'To a handsome man and baton',
        'Bygone, bygone']
```

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Song Credits

"Surf's Up" – The Beach Boys (1971): 7, 9, 11, 37

"Tangled Up in Blue" – Bob Dylan (1975): 13

"De Do Do Do, De Da Da Da" – The Police (1980): 14, 24, 26,
28, 31, 34, 35

"She Loves You" – The Beatles (1964): 16

"25 or 6 to 4" – Chicago (1970): 17-20

"Let Him Run Wild" – The Beach Boys (1965): 21

"The Fever" – Bruce Springsteen (1973, unreleased): 28

"Help Me, Rhonda" – The Beach Boys (1965): 32

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