Python

Strings

Strings are sequences of characters

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No separate character type: just a string of length 1

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No separate character type: just a string of length 1

Indexed exactly like lists

Strings are sequences of characters

No separate character type: just a string of length 1

Indexed exactly like lists

```
name = 'Darwin'
print name[0], name[-1]
```

```
D n
```


`for` iterates through characters

`for` iterates through characters

```
name = 'Darwin'
for c in name:
    print c
```

```
D
a
r
w
i
n
```


Use either ' or " (as long as they match)

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```
print 'Alan', "Turing"
Alan Turing
```


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Use either ' or " (as long as they match)

```
print 'Alan', "Turing"
Alan Turing
```

Strings are the same no matter how they're created

Use either ' or " (as long as they match)

```
print 'Alan', "Turing"
```
```
Alan Turing
```

Strings are the same no matter how they're created

```
print 'Alan' == "Alan"
```
```
True
```


Strings are compared character by character from left to right

Strings are compared character by character from left to right

```
print 'a' < 'b'
```
```
True
```


Strings are compared character by character from left to right

```
print 'a' < 'b'
```
```
True
```

```
print 'ab' < 'abc'
```
```
True
```

Strings are compared character by character from left to right

```
print 'a' < 'b'
True
print 'ab' < 'abc'
True
print '1' < '9'
True
```


Strings are compared character by character from left to right

```
print 'a' < 'b'
True
print 'ab' < 'abc'
True
print '1' < '9'
True
print '100' < '9'
True
```

Python Strings

Strings are compared character by character from left to right

```
print 'a' < 'b'
True
print 'ab' < 'abc'
True
print '1' < '9'
True
print '100' < '9'
True
print 'A' < 'a'
True
```


Strings are *immutable* : cannot be changed in place

Strings are *immutable*: cannot be changed in place

```
name = 'Darwin'
name[0] = 'C'
```

```
TypeError: 'str' object does not support item assignment
```


Strings are *immutable*: cannot be changed in place

```
name = 'Darwin'
name[0] = 'C'
```

```
TypeError: 'str' object does not support item assignment
```

Immutability improves performance

Strings are *immutable* : cannot be changed in place

```
name = 'Darwin'
name[0] = 'C'
```

```
TypeError: 'str' object does not support item assignment
```

Immutability improves performance

See later how immutability improves programmers' performance

Use + to concatenate strings

Use + to concatenate strings

```
name = 'Charles' + ' ' + 'Darwin'
print name
Charles Darwin
```


Use + to concatenate strings

```
name = 'Charles' + ' ' + 'Darwin'
print name
Charles Darwin
```

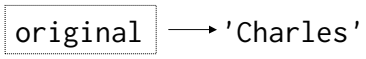
Concatenation always produces a new string

Use + to concatenate strings

```
name = 'Charles' + ' ' + 'Darwin'
print name
```
Charles Darwin

Concatenation always produces a new string

```
original = 'Charles'
```

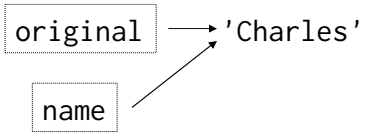


Use + to concatenate strings

```
name = 'Charles' + ' ' + 'Darwin'
print name
```
Charles Darwin

Concatenation always produces a new string

```
original = 'Charles'
name = original
```

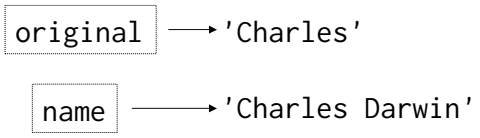


Use + to concatenate strings

```
name = 'Charles' + ' ' + 'Darwin'
print name
Charles Darwin
```

Concatenation always produces a new string

```
original = 'Charles'
name = original
name += ' Darwin'
```



Often used to format output

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```
print 'reagant: ' + str(reagant_id) + ' produced ' + \
      str(percentage_yield) + '% yield'
```


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Often used to format output

```
print 'reagant: ' + str(reagant_id) + ' produced ' + \
      str(percentage_yield) + '% yield'
```

There's a better way...

Use `string % value` to format output

Use `string % value` to format output

```
output = 'reagant: %d' % 123
print output
reagant: 123
```

Use `string % value` to format output

```
output = 'reagant: %d' % 123
print output
reagant: 123

percentage_yield = 12.3
print 'yield: %6.2f' % percentage_yield
yield:  12.30
```


And `string % (v1, v2, ...)` for multiple values

And `string % (v1, v2, ...)` for multiple values

```
reagant_id = 123
percentage_yield = 12.3
print 'reagant: %d produced %f%% yield' % \
      (reagant_id, percentage_yield)
reagant: 123 produced  12.30% yield
```


And `string % (v1, v2, ...)` for multiple values

```
reagant_id = 123
percentage_yield = 12.3
print 'reagant: %d produced %f%% yield' % \
      (reagant_id, percentage_yield)
reagant: 123 produced  12.30% yield
```

`%` operator turns double `'%%'` into single `'%'`

Use \n to represent a newline character

Use \n to represent a newline character

Use \' for single quote, \" for double quote

Use \n to represent a newline character

Use \' for single quote, \" for double quote

```
print 'There isn\'t time\nto do it right.'
There isn't time
to do it right.
```


Use \n to represent a newline character

Use \' for single quote, \" for double quote

```
print 'There isn\'t time\nto do it right.'
There isn't time
to do it right.

print "But you said,\n\"There is time to do it over.\""
But you said,
"There is time to do it over."
```

Use \\ for a literal \ character

Use \\ for a literal \ character

```
print 'Most mathematicians write a\\b instead of a%b.'
```

```
Most mathematicians write a\b instead of a%b.
```

Use \\ for a literal \ character

```
print 'Most mathematicians write a\\b instead of a%b.'
Most mathematicians write a\b instead of a%b.
```

Common pattern with *escape sequences*

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Use \\ for a literal \ character

```
print 'Most mathematicians write a\\b instead of a%b.'
Most mathematicians write a\b instead of a%b.
```

Common pattern with *escape sequences*

- Use a character to mean "what follows is special"

Use \\ for a literal \ character

```
print 'Most mathematicians write a\\b instead of a%b.'
Most mathematicians write a\b instead of a%b.
```

Common pattern with *escape sequences*

- Use a character to mean "what follows is special"
- Double it up to mean "that character itself"

Use triple quotes (either kind) for multi-line strings

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```
quote = '''We can only see
a short distance ahead,
but we can see plenty there
that needs to be done.'''
```


Use triple quotes (either kind) for multi-line strings

```
quote = '''We can only see
a short distance ahead,
but we can see plenty there
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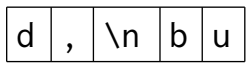

Use triple quotes (either kind) for multi-line strings

```
quote = '''We can only see
a short distance ahead,
but we can see plenty there
that needs to be done.'''

quote = 'We can only see\na short distance ahead\n' + \
    'but we can see plenty there\nthat needs to be done.'
```


Strings have methods

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```
name = 'newTON'
print name.capitalize(), name.upper(), name.lower(), name
Newton NEWTON newton newTON
```


Strings have methods

```
name = 'newTON'
print name.capitalize(), name.upper(), name.lower(), name
Newton NEWTON newton newTON
dna = 'acggtggtcac'
print dna.count('g'), dna.count('x')
4 0
```

Strings have methods

```
name = 'newTON'
print name.capitalize(), name.upper(), name.lower(), name
Newton NEWTON newton newTON
dna = 'acggtggtcac'
print dna.count('g'), dna.count('x')
4 0
print dna.find('t'), dna.find('t', 5), dna.find('x')
4 7 -1
```


Strings have methods

```
name = 'newTON'
print name.capitalize(), name.upper(), name.lower(), name
Newton NEWTON newton newTON
dna = 'acggtggtcac'
print dna.count('g'), dna.count('x')
4 0
print dna.find('t'), dna.find('t', 5), dna.find('x')
4 7 -1
```

```
print dna.replace('t', 'x'), dna
acggxggxcac acggtggtcac
```

Strings have methods

```
name = 'newTON'
print name.capitalize(), name.upper(), name.lower(), name
Newton NEWTON newton newTON
dna = 'acggtggtcac'
print dna.count('g'), dna.count('x')
4 0
print dna.find('t'), dna.find('t', 5), dna.find('x')
4 7 -1
print dna.replace('t', 'x')
acggxggxcac acggtggtcac
print dna.replace('gt', '')
acggcac
```


Can chain method calls together

Can chain method calls together

```
element = 'cesium'
print element.upper().center(10, '.')
```


Can chain method calls together

```
element = 'cesium'
print element.upper().center(10, '.')
```


convert to upper case

Can chain method calls together

```
element = 'cesium'
print element.upper().center(10, '.')
```

center in a field

10 characters wide

Can chain method calls together

```
element = 'cesium'
print element.upper().center(10, '.')
..CESIUM..
```

Python Strings

narrated by

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