

# What are iterable objects?

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON



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# Definition

**iterable objects / Iterables** - any object that can be used in a `for` loop

- list
- tuple
- set
- dictionary
- string

# Iterating through a list or tuple

list:

```
droids = ['R2-D2', 'TC-16', 'C-3P0']
```

```
for droid in droids:  
    print(droid)
```

R2-D2

TC-16

C-3P0

tuple:

```
droids = ('R2-D2', 'TC-16', 'C-3P0')
```

```
for droid in droids:  
    print(droid)
```

R2-D2

TC-16

C-3P0

# Iterating through a set

```
battleships = {'X-Wing Fighter', 'Millennium Falcon', 'TIE Fighter'}  
  
for battleship in battleships:  
    print(battleship)
```

```
TIE Fighter  
X-Wing Fighter  
Millennium Falcon
```

# Iterating through a string

```
title = 'Star Wars'

for char in title:
    print(char)
```

```
S
t
a
r

W
a
r
s
```

# Iterating through a dictionary

```
episodes = {  
    'Episode I': 'The Phantom Menace',  
    'Episode II': 'Attack of the Clones',  
    'Episode III': 'Revenge of the Sith',  
    'Episode IV': 'A New Hope',  
    'Episode V': 'The Empire Strikes Back',  
    'Episode VI': 'Return of the Jedi'  
}
```

```
for episode in episodes:  
    print(episode)
```

```
Episode I  
Episode II  
Episode III  
Episode IV  
Episode V  
Episode VI
```

# Getting key-value pairs

```
episodes = {  
    'Episode I': 'The Phantom Menace',  
    'Episode II': 'Attack of the Clones',  
    'Episode III': 'Revenge of the Sith',  
    'Episode IV': 'A New Hope',  
    'Episode V': 'The Empire Strikes Back',  
    'Episode VI': 'Return of the Jedi'  
}
```

```
for item in episodes.items():  
    print(item)
```

```
('Episode I', 'The Phantom Menace')  
( 'Episode II', 'Attack of the Clones')  
( 'Episode III', 'Revenge of the Sith')  
( 'Episode IV', 'A New Hope')  
( 'Episode V', 'The Empire Strikes Back')  
( 'Episode VI', 'Return of the Jedi')
```

# Getting key-value pairs

```
episodes = {  
    'Episode I': 'The Phantom Menace',  
    'Episode II': 'Attack of the Clones',  
    'Episode III': 'Revenge of the Sith',  
    'Episode IV': 'A New Hope',  
    'Episode V': 'The Empire Strikes Back',  
    'Episode VI': 'Return of the Jedi'  
}
```

```
for title, subtitle in episodes.items():  
    print(title + ': ' + subtitle)
```

```
'Episode I': 'The Phantom Menace'  
'Episode II': 'Attack of the Clones'  
'Episode III': 'Revenge of the Sith'  
'Episode IV': 'A New Hope'  
'Episode V': 'The Empire Strikes Back'  
'Episode VI': 'Return of the Jedi'
```



# Less visual objects: range

```
interval = range(0, 10)
print(interval)
```

```
range(0, 10)
```

```
for num in interval:
    print(num)
```

```
0
1
2
...
9
```

# Less visual objects: enumerate

```
villains = ['Darth Maul', 'Palpatine', 'Darth Vader']  
enum_villains = enumerate(villains)
```

```
for item in enum_villains:  
    print(item)
```

```
(0, 'Darth Maul')  
(1, 'Palpatine')  
(2, 'Darth Vader')
```

# Less visual objects: enumerate

```
villains = ['Darth Maul', 'Palpatine', 'Darth Vader']  
enum_villains = enumerate(villains)
```

```
for idx, name in enum_villains:  
    print(str(idx) + ' - ' + name)
```

```
0 - Darth Maul  
1 - Palpatine  
2 - Darth Vader
```

# Iterables as arguments

`list()` , `tuple()` , `set()` , *etc.*

```
villains = [  
    'Darth Maul',  
    'Palpatine',  
    'Darth Vader'  
]
```

```
list(enumerate(villains))
```

```
[  
    (0, 'Darth Maul'),  
    (1, 'Palpatine'),  
    (2, 'Darth Vader')  
]
```

# Iterables as arguments

`list()` , `tuple()` , `set()` , *etc.*

```
villains = [  
    'Darth Maul',  
    'Palpatine',  
    'Darth Vader'  
]
```

```
list(enumerate(villains))
```

```
[  
    (0, 'Darth Maul'),  
    ...  
]
```

```
set(enumerate(villains))
```

```
{  
    (0, 'Darth Maul'),  
    (1, 'Palpatine'),  
    (2, 'Darth Vader')  
}
```

# How to know if we deal with an Iterable

```
interval = range(0, 5)
```

```
interval_iter = iter(interval)
```

```
print(interval_iter)
```

```
<range_iterator object at 0x7f3bdf8ad300>
```

**Iterator** - an object knowing how to retrieve consecutive elements from an Iterable one by one

```
next(interval_iter)
```

```
0
```

```
next(interval_iter)
```

```
1
```

```
next(interval_iter)
```

```
2
```

# StopIteration

```
next(interval_iter)
```

3

```
next(interval_iter)
```

4

```
next(interval_iter)
```

```
StopIteration
```

# Describing a for loop

```
droids = ['R2-D2', 'TC-16', 'C-3P0']
```

```
for droid in droids:  
    print(droid)
```

R2-D2

TC-16

C-3P0

```
iter_droids = iter(droids)
```

```
while True:
```

```
    try:
```

```
    except StopIteration:
```

```
        break
```



# Describing a for loop

```
droids = ['R2-D2', 'TC-16', 'C-3P0']
```

```
for droid in droids:  
    print(droid)
```

R2-D2

TC-16

C-3P0

```
iter_droids = iter(droids)
```

```
while True:
```

```
    try:
```

```
        droid = next(iter_droid)
```

```
        print(droid)
```

```
    except StopIteration:
```

```
        break
```

R2-D2

TC-16

C-3P0

# Many Iterables are Iterators

- `iter()`
- `next()`

*e.g. enumerate, finditer etc.*

```
import re
pattern = re.compile(r'[\w\.] +@[a-z]+\.[a-z]+')

text = 'john.smith@mailbox.com is the e-mail of John. He often writes to his boss '\
'at boss@company.com. But the messages get forwarded to his secretary at info@company.co

result = re.finditer(pattern, text)
```

# iter() or next()

iter()

```
result = re.finditer(pattern, text)
```

```
for item in result:  
    print(item)
```

```
<_sre.SRE_Match object; span=(0, 22), match='john.smith@mailbox.com'>  
<_sre.SRE_Match object; span=(77, 93), match='boss@company.com'>  
<_sre.SRE_Match object; span=(146, 162), match='info@company.com'>
```

# iter() or next()

next()

```
result = re.finditer(pattern, text)
```

```
next(result)
```

```
<_sre.SRE_Match object; span=(0, 22),  
match='john.smith@mailbox.com'>
```

```
next(result)
```

```
<_sre.SRE_Match object; span=(77, 93),  
match='boss@company.com'>
```

```
next(result)
```

```
<_sre.SRE_Match object; span=(146, 162),  
match='info@company.com'>
```

# Expendable Iterables

```
result = re.finditer(pattern, text)
for item in result:
    print(item)
```

```
<_sre.SRE_Match object; ...
<_sre.SRE_Match object; ...
<_sre.SRE_Match object; ...
```

```
for item in result:
    print(item)
```

```
# nothing
```

```
short_list = [2, 4]
for item in short_list:
    print(item)
```

```
2
4
```

```
for item in short_list:
    print(item)
```

```
2
4
```

# Traversing a DataFrame

```
pars = {'weight': [168, 183, 198], 'height': [77, 79, 135]}  
characters = pd.DataFrame(pars, index=['Luke Skywalker', 'Han Solo', 'Darth Vader'])  
print(characters)
```

	weight	height
Luke Skywalker	168	77
Han Solo	183	79
Darth Vader	198	135

# Direct approach

```
for item in characters:  
    print(item)
```

```
weight  
height
```

# .iterrows()

```
result = characters.iterrows()
```

```
print(result)
```

```
<generator object DataFrame.iterrows at 0x7f5dfff6b9c50>
```



# .iterrows()

```
result = characters.iterrows()
```

```
for item in result:  
    print(item)
```

item → (index name, Series)

```
('Luke Skywalker',  
weight      168  
height      77  
Name: Luke Skywalker, dtype: int64)  
('Han Solo',  
weight      183  
height      79  
Name: Han Solo, dtype: int64)  
('Darth Vader',  
weight      198  
height      135  
Name: Darth Vader, dtype: int64)
```

# .iterrows()

```
result = characters.iterrows()
```

```
for index, series in result:  
    print(index)  
    print(series)
```

```
Luke Skywalker  
weight      168  
height      77  
Name: Luke Skywalker, dtype: int64)  
Han Solo  
weight      183  
height      79  
Name: Han Solo, dtype: int64)  
Darth Vader  
weight      198  
height      135  
Name: Darth Vader, dtype: int64)
```

# .iteritems()

```
result = characters.iteritems()
```

```
print(result)
```

```
<generator object DataFrame.iteritems at 0x7f5dfff69f938>
```

# .iteritems()

```
result = characters.iteritems()
```

```
for item in result:  
    print(item)
```

`item` → (column name, Series)

```
('weight',  
Luke Skywalker      168  
Han Solo             183  
Darth Vader         198  
Name: weight, dtype: int64)  
('height',  
Luke Skywalker      77  
Han Solo            79  
Darth Vader        135  
Name: height, dtype: int64)
```

# .iteritems()

```
result = characters.iteritems()
```

```
for name, series in result:  
    print(name)  
    print(series)
```

```
weight  
Luke Skywalker      168  
Han Solo            183  
Darth Vader         198  
Name: weight, dtype: int64  
height  
Luke Skywalker      77  
Han Solo            79  
Darth Vader         135  
Name: height, dtype: int64
```

# Let's practice!

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON

# What is a list comprehension?

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON



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# List comprehension

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
nums_new = []  
for i in range(1, 6):  
    nums_new.append(2*i)  
  
print(nums_new)
```

```
[2, 4, 6, 8, 10]
```



# List comprehension

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
for num in range(1, 6)
```

# List comprehension

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
[  
    for num in range(1, 6)]
```

# List comprehension

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
[(2 * num) for num in range(1, 6)]
```

# List comprehension

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
nums_new = [(2 * num) for num in range(1, 6)]
```

```
print(nums_new)
```

```
[2, 4, 6, 8, 10]
```

# Summing up

List comprehension is defined by:

- 
-

# Summing up

List comprehension is defined by:

- an iterable object (*e.g.* list, tuple, set)
- 

```
[  
    for num in range(1, 6)]
```

# Summing up

List comprehension is defined by:

- an iterable object (*e.g.* list, tuple, set)
- an operation on an element

```
[(2 * num) for num in range(1, 6)]
```

- (optional) conditions

# List comprehension with condition

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

```
1 2 3 4 5 6 7 8 9 10
```



# List comprehension with condition

```
nums = [2, 4, 6, 8, 10]  
print(nums)
```

```
[2, 4, 6, 8, 10]
```

1 2 3 4 5 6 7 8 9 10 → 2 4 6 8 10

# Adding a condition

```
nums_new = [num for num in range(1, 11)]
```

```
print(nums_new)
```

```
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

# Adding a condition

```
nums_new = [num for num in range(1, 11) if num % 2 == 0]
```

```
print(nums_new)
```

```
[2, 4, 6, 8, 10]
```

# More examples

```
text = 'list COMPREHENSION is A way TO create LISTS'
```

## Task:

Create a list that contains the length of each lowercased word.

list, is, way, create → [4, 2, 3, 6]

# More examples

```
text = 'list COMPREHENSION is A way TO create LISTS'
```

## Task:

Create a list that contains the length of each lowercased word.

list, is, way, create → [4, 2, 3, 6]

```
output = [          for word in text.split()          ]
```

# More examples

```
text = 'list COMPREHENSION is A way TO create LISTS'
```

## Task:

Create a list that contains the length of each lowercased word.

list, is, way, create → [4, 2, 3, 6]

```
output = [                for word in text.split() if word.islower()]
```

# More examples

```
text = 'list COMPREHENSION is A way TO create LISTS'
```

## Task:

Create a list that contains the length of each lowercased word.

list, is, way, create → [4, 2, 3, 6]

```
output = [len(word) for word in text.split() if word.islower()]
```

```
print(output)
```

```
[4, 2, 3, 6]
```

# Multiple loops

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

Create all the possible pairs between `numbers` and `letters` :

```
[
    (1, 'a'), (1, 'b'), (1, 'c'),
    (2, 'a'), (2, 'b'), (2, 'c'),
    (3, 'a'), (3, 'b'), (3, 'c'),
]
```



# Iterating through multiple loops

```
numbers = [1, 2, 3]  
letters = ['a', 'b', 'c']
```

```
pairs = [          for i in numbers          ]
```

# Iterating through multiple loops

```
numbers = [1, 2, 3]  
letters = ['a', 'b', 'c']
```

```
pairs = [          for i in numbers for j in letters]
```

# Iterating through multiple loops

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in numbers for j in letters]
```

```
print(pairs)
```

```
[
    (1, 'a'), (1, 'b'), (1, 'c'),
    (2, 'a'), (2, 'b'), (2, 'c'),
    (3, 'a'), (3, 'b'), (3, 'c'),
]
```

# Deeper look

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in numbers for j in letters]
```

```
pairs = []
for i in numbers:
    for j in letters:
        pairs.append((i, j))
```

# Deeper look

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j)                for j in letters]
```

```
pairs = []

for j in letters:
    pairs.append((i, j))
```

# Deeper look

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in numbers
```

```
for i in numbers:
    pairs.append((i, j))
```

# Adding square brackets

```
pairs = [ (i, j) for i in numbers for j in letters]
```

# Adding square brackets

```
pairs = [(i, j) for i in numbers] for j in letters]
```

```
print(pairs)
```

```
[  
    [(1, 'a'), (2, 'a'), (3, 'a')],  
    [(1, 'b'), (2, 'b'), (3, 'b')],  
    [(1, 'c'), (2, 'c'), (3, 'c')]  
]
```



# Adding square brackets

```
pairs = [(i, j) for i in numbers] for j in letters]
```

```
pairs = []  
for j in letters:  
    temp = []  
    for i in numbers:  
        temp.append((i, j))  
    pairs.append(temp)
```

# Adding square brackets

```
pairs = [(i, j) for i in numbers]
```

```
pairs = []  
  
temp = []  
for i in numbers:  
    temp.append(i)  
pairs.append(temp)
```

# Adding square brackets

```
pairs = [(i, j) for j in letters]
```

```
pairs = []  
for j in letters:  
    temp = []  
  
    temp.append((i, j))  
    pairs.append(temp)
```

# Swap numbers and letters

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in numbers for j in letters]
print(pairs)
```

```
[
    [(1, 'a'), (2, 'a'), (3, 'a')],
    [(1, 'b'), (2, 'b'), (3, 'b')],
    [(1, 'c'), (2, 'c'), (3, 'c')]
]
```

# Swap numbers and letters

```
numbers = [1, 2, 3]
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in letters for j in numbers]
print(pairs)
```

```
[
    [('a', 1), ('b', 1), ('c', 3)],
    [('a', 2), ('b', 2), ('c', 3)],
    [('a', 3), ('b', 3), ('c', 3)]
]
```

# Difference between list comprehensions

```
numbers = [1, 2, 3]  
letters = ['a', 'b', 'c']
```

```
pairs = [(i, j) for i in numbers for j in letters]
```

```
pairs = [(i, j) for i in numbers] for j in letters]
```

```
pairs = [(i, j) for i in letters] for j in numbers]
```

# Let's practice!

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON

# What is a zip object?

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON



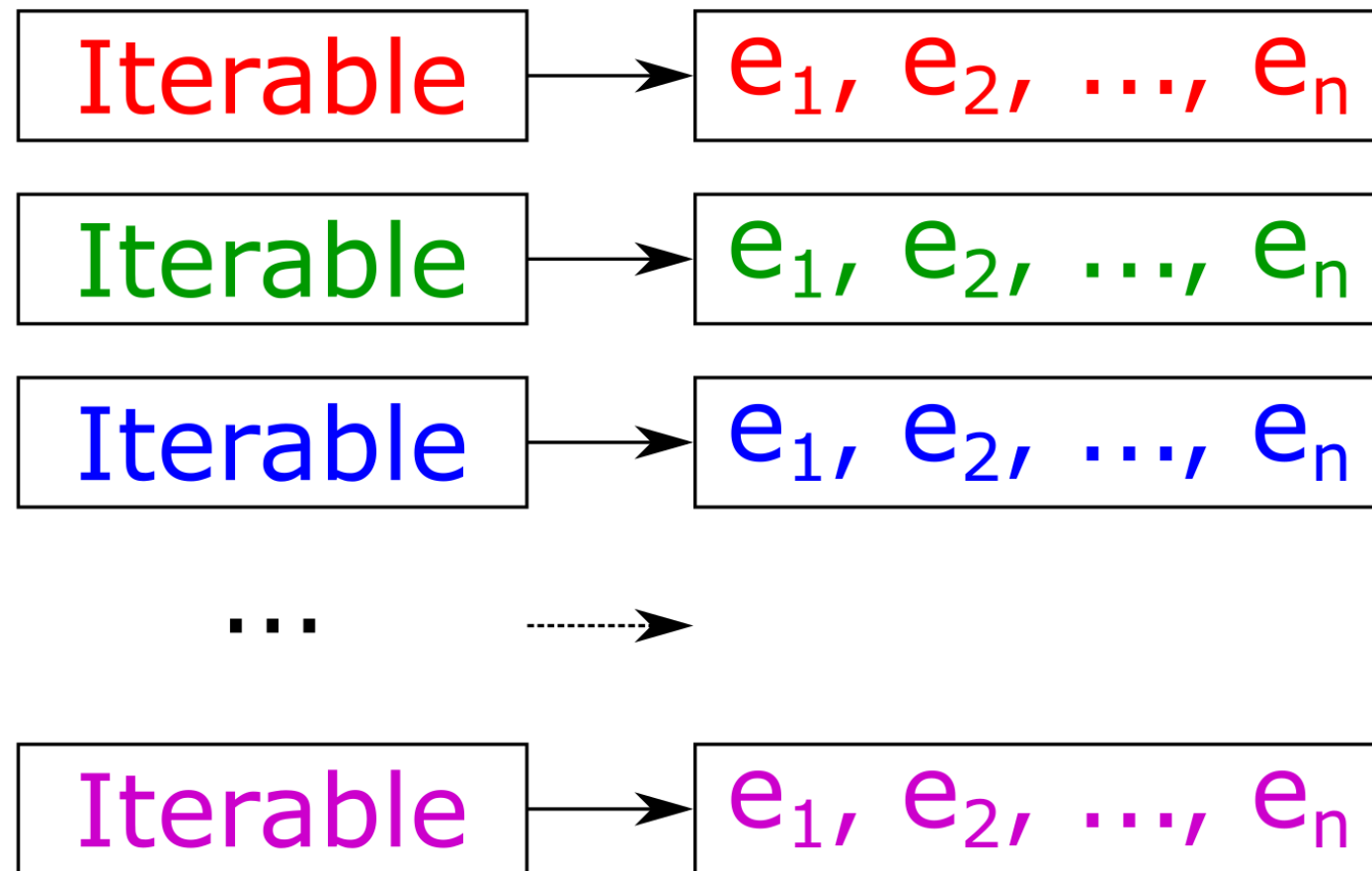
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# Definition

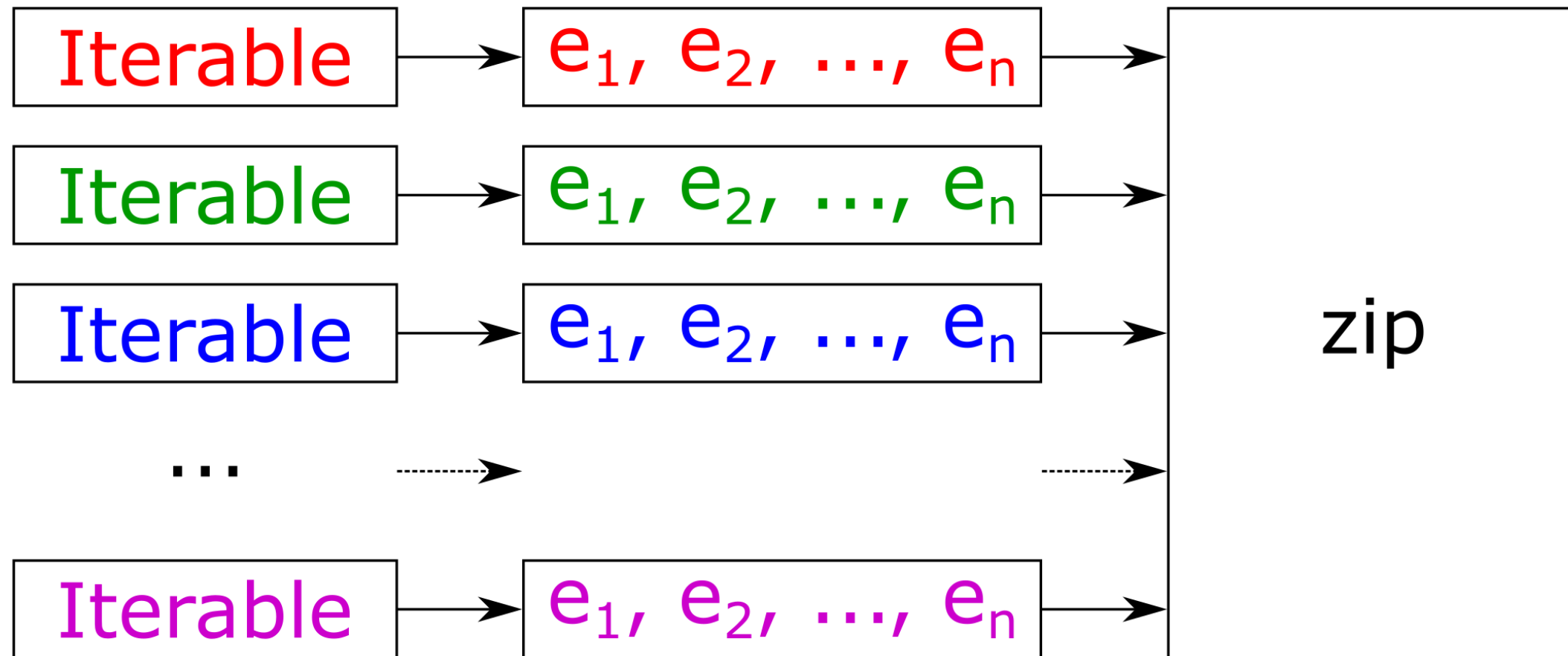
`zip` - object that combines several iterable objects into one iterable object.



$e_i$  - an element from an Iterable

# Definition

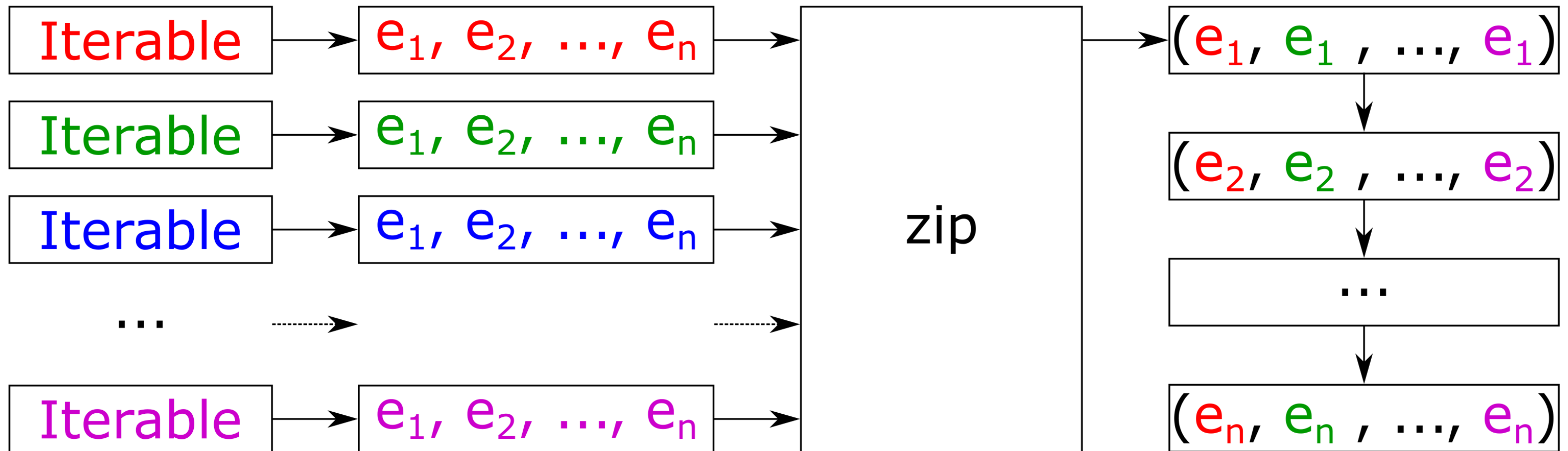
`zip` - object that combines several iterable objects into one iterable object.



$e_i$  - an element from an Iterable

# Definition

`zip` - object that combines several iterable objects into one iterable object.



$e_i$  - an element from an Iterable

# Example

```
title = 'TMNT'  
villains = ['Shredder', 'Krang', 'Bebop', 'Rocksteady']  
turtles = {  
    'Raphael': 'Sai', 'Michelangelo': 'Nunchaku',  
    'Leonardo': 'Twin katana', 'Donatello': 'Bo'  
}
```

```
result = zip(title, villains, turtles)  
print(result)
```

```
<zip object at 0x7f37bab6e608>
```

# Traversing through a zip object

```
result = zip(title, villains, turtles)
```

```
for item in result:  
    print(item)
```

```
('T', 'Shredder', 'Raphael')  
( 'M', 'Krang', 'Michelangelo')  
( 'N', 'Bebop', 'Leonardo')  
( 'T', 'Rocksteady', 'Donatello')
```

# Returning a list of tuples

```
result = zip(title, villains, turtles)
```

```
tuples = list(result)  
print(tuples)
```

```
[  
    ('T', 'Shredder', 'Raphael'), ('M', 'Krang', 'Michelangelo'),  
    ('N', 'Bebop', 'Leonardo'), ('T', 'Rocksteady', 'Donatello')  
]
```

# zip object as Iterator

```
result = zip(title, villains, turtles)
```

```
next(result)
```

```
('T', 'Shredder', 'Raphael')
```

```
next(result)
```

```
('M', 'Krang', 'Michelangelo')
```

```
next(result)
```

```
('N', 'Bebop', 'Leonardo')
```

```
next(result)
```

```
('T', 'Rocksteady', 'Donatello')
```

```
next(result)
```

```
StopIteration
```

# zip object is expendable

```
result = zip(title, villains, turtles)
```

```
for item in result:  
    print(item)
```

```
('T', 'Shredder', 'Raphael')  
( 'M', 'Krang', 'Michelangelo')  
( 'N', 'Bebop', 'Leonardo')  
( 'T', 'Rocksteady', 'Donatello')
```



# zip object is expendable

```
result = zip(title, villains, turtles)
```

```
for item in result:  
    print(item)
```

```
('T', 'Shredder', 'Raphael')  
('M', 'Krang', 'Michelangelo')  
...
```

```
for item in result:  
    print(item)
```

```
# nothing
```

```
result = zip(title, villains, turtles)
```

```
tuples = list(result)  
print(tuples)
```

```
[  
    ('T', 'Shredder', 'Raphael'),  
    ('M', 'Krang', 'Michelangelo'),  
    ('N', 'Bebop', 'Leonardo'),  
    ('T', 'Rocksteady', 'Donatello')  
]
```

# 'zip' object is expendable

```
result = zip(title, villains, turtles)
```

```
for item in result:  
    print(item)
```

```
('T', 'Shredder', 'Raphael')  
( 'M', 'Krang', 'Michelangelo')  
...
```

```
for item in result:  
    print(item)
```

```
# nothing
```

```
result = zip(title, villains, turtles)
```

```
tuples = list(result)  
print(tuples)
```

```
[  
    ('T', 'Shredder', 'Raphael'),  
    ...  
]
```

```
tuples = list(result)  
print(tuples)
```

```
[]
```

# Unequal Iterable sizes

```
title = 'TMNT'  
villains = ['Shredder', 'Krang', 'Bebop', 'Rocksteady']  
turtles = {  
    'Raphael': 'Sai', 'Michelangelo': 'Nunchaku',  
    'Leonardo': 'Twin katana', 'Donatello': 'Bo'  
}
```

# Unequal Iterable sizes

```
title = 'Teenage Mutant Ninja Turtles'
villains = ['Shredder', 'Krang', 'Bebop', 'Rocksteady']
turtles = {
    'Raphael': 'Sai', 'Michelangelo': 'Nunchaku',
    'Leonardo': 'Twin katana', 'Donatello': 'Bo'
}
```

```
result = zip(title, villains, turtles)
```

# Traversing through the 'zip' object

```
result = zip(title, villains, turtles)
```

```
for item in result:  
    print(item)
```

```
('T', 'Shredder', 'Raphael')  
( 'e', 'Krang', 'Michelangelo')  
( 'e', 'Bebop', 'Leonardo')  
( 'n', 'Rocksteady', 'Donatello')
```

# Reverse operation

```
turtle_masks = [  
    ('Raphael', 'red'), ('Michelangelo', 'orange'),  
    ('Leonardo', 'blue'), ('Donatello', 'purple')  
]
```

```
result = zip(*turtle_masks)  
print(result)
```

```
[  
    ('Raphael', 'Michelangelo', 'Leonardo', 'Donatello'),  
    ('red', 'orange', 'blue', 'purple')  
]
```

# Unequal tuple sizes

```
turtle_masks = [  
    ('Raphael', 'red'), ('Michelangelo', 'orange'),  
    ('Leonardo', 'blue', 'cyan'), ('Donatello', 'purple', 'magenta')  
]
```

```
result = zip(*turtle_masks)  
print(result)
```

```
[  
    ('Raphael', 'Michelangelo', 'Leonardo', 'Donatello'),  
    ('red', 'orange', 'blue', 'purple')  
]
```

# Relation to a dictionary

A `zip` object can be used to create a dictionary

```
keys = ['movie', 'year', 'director']
values = [
    ['Forest Gump', 'Goodfellas', 'Se7en'],
    [1994, 1990, 1995],
    ['R.Zemeckis', 'M.Scorsese', 'D.Fincher']
]
```

```
movies = dict(zip(keys, values))
```

```
print(movies)
```

```
{
    'director': [
        'R.Zemeckis',
        'M.Scorsese',
        'D.Fincher'
    ],
    'movie': [
        'Forest Gump',
        'Goodfellas',
        'Se7en'
    ],
    'year': [1994, 1990, 1995]
}
```



# Creating a DataFrame

```
import pandas as pd
```

```
df_movies = pd.DataFrame(movies)
```

```
print(df_movies)
```

	director	movie	year
0	Robert Zemeckis	Forest Gump	1994
1	Martin Scorsese	Goodfellas	1990
2	David Fincher	Se7en	1995

```
list()
```

# Creating a DataFrame

```
import pandas as pd
```

```
df_movies = pd.DataFrame(movies)
```

```
print(df_movies)
```

	director	movie	year
0	Robert Zemeckis	Forest Gump	1994
1	Martin Scorsese	Goodfellas	1990
2	David Fincher	Se7en	1995

`list()` → `zip()`

# Creating a DataFrame

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```
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```

```
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```

	director	movie	year
0	Robert Zemeckis	Forest Gump	1994
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`list()` → `zip()` → `dict()`

# Creating a DataFrame

```
import pandas as pd
```

```
df_movies = pd.DataFrame(movies)
```

```
print(df_movies)
```

	director	movie	year
0	Robert Zemeckis	Forest Gump	1994
1	Martin Scorsese	Goodfellas	1990
2	David Fincher	Se7en	1995

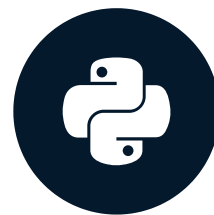
`list()` → `zip()` → `dict()` → `DataFrame()`

# Let's practice!

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON

# What is a generator and how to create one?

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON



**Kirill Smirnov**

Data Science Consultant, Altran

# Definition

**Generator** - a special iterable object created by a function having a `yield` keyword in its body.

```
def func():  
    # Return a value from super complex calculations  
    return 0
```

```
result = func()  
print(result)
```

```
0
```

# Definition

**Generator** - a special iterable object created by a function having a `yield` keyword in its body.

```
def func():  
    # Yield a value from super complex calculations  
    yield 0
```

```
result = func()  
print(result)
```

```
<generator object result at 0x105736e10>
```



# Generator as Iterable

```
def func():  
    # Yield a value from super complex calculations  
    yield 0  
  
result = func()
```

```
for item in result:  
    print(item)
```

0

# More yields!

```
def func():  
    yield 0  
    yield 1  
    yield 2
```

```
result = func()  
for item in result:  
    print(item)
```

```
0  
1  
2
```

# Yield in a loop

```
def func(n):  
    for i in range(0, n):  
        yield 2*i
```

```
result = func(3)  
for item in result:  
    print(item)
```

```
0  
2  
4
```

# Converting a generator to a list

```
def func(n):  
    for i in range(0, n):  
        yield 2*i
```

```
result = func(5)
```

```
list(result)
```

```
[0, 2, 4, 6, 8]
```

# Generator as Iterator

Generator is an Iterable AND an Iterator

```
def func(n):  
    for i in range(0, n):  
        yield 2*i
```

```
result = func(3)
```

```
next(result)
```

```
0
```

```
next(result)
```

```
2
```

```
next(result)
```

```
4
```

```
next(result)
```

```
StopIteration
```

# Generators are expendable

```
def func(n):  
    for i in range(0, n):  
        yield 2*i
```

```
result = func(3)
```

```
for item in result:  
    print(item)
```

```
0  
2  
4
```

```
for item in result:  
    print(item)
```

```
# nothing
```

```
result = func(3)  
for item in result:  
    print(item)
```

```
0  
2  
4
```

# Generators are expendable

```
def func(n):  
    for i in range(0, n):  
        yield 2*i
```

```
result = func(3)  
list(result)
```

```
[0, 2, 4]
```

```
list(result)
```

```
[]
```

```
result = func(3)  
list(result)
```

```
[0, 2, 4]
```

# Generator comprehension

```
result = [2*i for i in range(0, 3)]  
print(result)
```

```
[0, 2, 4]
```

```
result = (2*i for i in range(0, 3))  
print(result)
```

```
<generator object result at 0x105736e10>
```



# Traversal

```
result = (2*i for i in range(0, 3))
```

```
for item in result:  
    print(item)
```

```
0  
1  
2
```

```
next(result)
```

```
StopIteration
```

# Why generators?

- simple way to create a custom iterable object

```
[1, 3, 2, 4, 3, 5]
```

```
def create_jump_sequence(n):  
    for i in range(1, n-1):  
        yield i  
        yield i+2
```

```
jump_sequence = create_jump_sequence(4)  
list(jump_sequence)
```

```
[1, 3, 2, 4, 3, 5]
```

# Why generators?

- simple way to create a custom iterable object
- lazy initialization

```
[1, 3, 2, 4, 3, 5, 4, 6, 5, 7, ...]
```

```
def create_jump_sequence(n):  
    for i in range(1, n-1):  
        yield i  
        yield i+2
```

```
jump_sequence = create_jump_sequence(500)  
next(jump_sequence)
```

```
1
```

# Why generators?

- simple way to create a custom iterable object
- lazy initialization
- possibility to create infinite iterable objects

```
def create_inf_generator():  
    while True:  
        yield 'I am infinite!'
```

```
inf_generator = create_inf_generator()
```

```
next(inf_generator)
```

```
I am infinite
```

# Let's practice!

PRACTICING CODING INTERVIEW QUESTIONS IN PYTHON