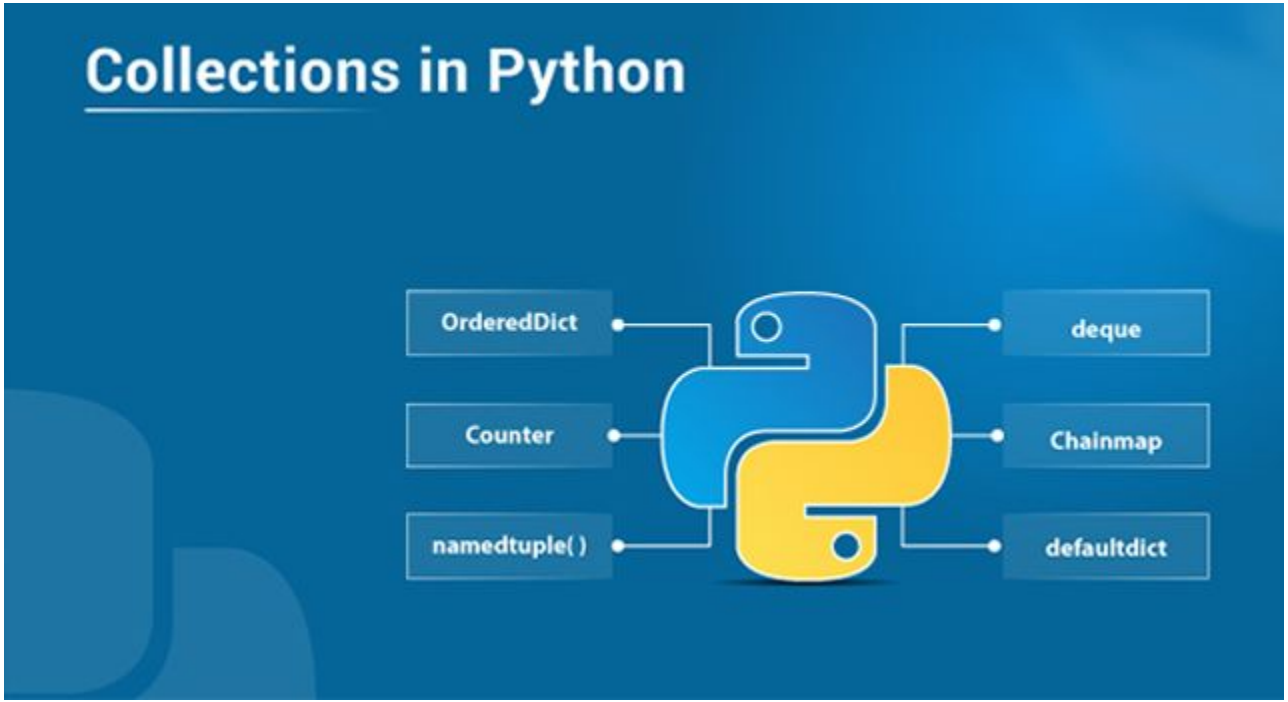
collections



collections overview

Python has a number of built-in collections which we use every day - lists, tuples, sets, dicts. In addition to them we have several useful data types in standard library

Today we are gonna to cover these ones

- Counter - useful when you need to … well, count something
- defaultdict - nice in case of dicts with some objects as values

Counter

```
s = '''Lorem ipsum dolor sit amet, consectetur
adipiscing elit, sed do eiusmod tempor incididunt ut
labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud exercitation ullamco laboris
nisi ut aliquip ex ea commodo consequat. Duis aute
irure dolor in reprehenderit in voluptate velit esse
cillum dolore eu fugiat nulla pariatur. Excepteur
sint occaecat cupidatat non proident, sunt in culpa
qui officia deserunt mollit anim id est laborum. '''
```

```
from collections import Counter, defaultdict
```

```
Counter(text)
```

```
Counter({' ': 69, 'i': 42, 'e': 37, 't': 32, 'o': 29, 'a': 29, 'u': 28, 'n': 24, 'r': 22,
'l': 21, 's': 18, 'd': 18, 'm': 17, 'c': 16, 'p': 11, 'q': 5, ',': 4, '.': 4, 'g': 3, 'b': 3,
'v': 3, 'x': 3, 'f': 3, 'L': 1, 'U': 1, 'D': 1, 'h': 1, 'E': 1})
```

What's going on

As you can see, Counter applied to string counts frequency of each symbol

```
bag = ['pea', 'orange', 'pea', 'apple', 'apple',
       'grape', 'mango', 'mango', 'mango']
```

```
Counter(bag)
```

```
Counter({'mango': 3, 'pea': 2, 'apple': 2, 'orange': 1, 'grape': 1})
```

This is generalized to every iterable with hashable elements (they can be dict keys) - elements of iterable are counted

Counter: You get counted

element: Counted by noob!

Counter methods

`Counter` is a variant of dictionary with additional methods

```
issubclass(Counter, dict)
```
True

- `most_common(n=None)` - returns list with tuples (element, count) sorted from most abundant to most rare; if `n` was specified returns list with tuples for `n` most abundant elements
- `elements()` - returns specific iterator, where you iterate count times for each corresponding element

```
numbers = (1, 2, 3, 1, 2, 1, 1, 10, 2, 1, 3, 4, 2, 5, 1, 7)

# Count it
freqs = Counter(numbers)
freqs
Counter({1: 6, 2: 4, 3: 2, 10: 1, 4: 1, 5: 1, 7: 1})

# Similar to list(freqs.items())
freqs.most_common()
[(1, 6), (2, 4), (3, 2), (10, 1), (4, 1), (5, 1), (7, 1)]

# Get most common element data
freqs.most_common(1)
[(1, 6)]
```

```
for elem in freqs.elements():
    print(elem)
```

```
1
1
1
1
1
1
2
2
2
2
3
3
...
```

defaultdict

Really cool sometimes, because can free your code from unnecessary blocks of defining initial key values

```
orders = defaultdict(list)
orders
```

defaultdict(<class 'list'>, {})

```
orders['today'].append('destroy enemies')
orders['today'].extend(('conquer the world', 'celebrate it'))

orders['today']
```

['destroy enemies', 'conquer the world', 'celebrate it']

```
orders
```
defaultdict(<class 'list'>, {'today': ['destroy enemies', 'conquer the world',
'celebrate it']})

```
# Analogous to this block
orders2 = []
# Create empty list as start point for this key
if 'today' not in orders2:  # Also there is setdefault method
    orders2['today'] = []

orders2['today'].append('destroy enemies')
orders2['today'].extend(('conquer the world', 'celebrate it'))

orders2
```
{'today': ['destroy enemies', 'conquer the world', 'celebrate it']}

Typical pipeline

1. Think do you need some default value for keys in your dict
2. If so, which value should it be?
    a. you are going to store many things for 1 key - tuple, list, set ot dict
    b. you are going to operate with numbers - int or float
    c. you wanna modify some complex object for each key - object of this class
3. Create defaultdict with selected default value
4. Operate with it in a proper manner
5. Profit!

```
# 1st example - store words and numbers in different keys
text = '2430 AD is a good story, really. Read it if you
        haven\'t yet'
# Initial value will be []
words = defaultdict(list)

for word in text.split():
    if word.isdigit():
        words['numbers'].append(word)
    else:
        words['words'].append(word)

words
defaultdict(<class 'list'>, {'numbers': ['2430'], 'words':
 ['AD', 'is', 'a', 'good', 'story,', 'really.', 'Read',
  'it', 'if', 'you', "haven't", 'yet']})
```

```
# 2nd example - I would like to store product of some
 values for 2 keys
some_values = [1, 2, 3, 3, 4, 5]
keys = cycle('AB')

# Let initial value be 1
products = defaultdict(lambda: 1)

# Simulate hard work
for key, number in zip(keys, some_values):
    products[key] *= number

products
defaultdict(<function <lambda> at 0x7ff5e7e5d488>, {'A':
 12, 'B': 30})
```

```
Starting work...
Job's done!
```

That's all - only messages with logging level info or higher get written

Time formatting

Here is an example of adding time to your logs

```
# Turn logging on
logging.basicConfig(filename='my_log.log',
                    filemode='w',
                    format='%(asctime)s: %(message)s',
                    datefmt='%Y-%m-%d %H:%M:%S',
                    level=logging.DEBUG)
logger = logging.getLogger(__name__)
```

```
logger.info('Starting work...')
summa = 0
for i in range(10):
    summa += i
    logger.debug('i is %s', i)
    logger.debug('summa is %s', summa)

print(summa)
logger.info("Job's done!")
```

```
2020-04-17 00:14:59: Starting work...
2020-04-17 00:14:59: i is 0
2020-04-17 00:14:59: summa is 0
2020-04-17 00:14:59: i is 1
2020-04-17 00:14:59: summa is 1
2020-04-17 00:14:59: i is 2

...

2020-04-17 00:14:59: i is 7
2020-04-17 00:14:59: summa is 28
2020-04-17 00:14:59: i is 8
2020-04-17 00:14:59: summa is 36
2020-04-17 00:14:59: i is 9
2020-04-17 00:14:59: summa is 45
2020-04-17 00:14:59: Job's done!
```

Some format parts

These options are available inside `logging.basicConfig format` argument

- `%(message)s` - for passed message
- `%(asctime)s` - for log record time
- `%(levelname)s` - for level of log record
- `%(funcName)s` - for name of function from which log record was created
- `%(pathname)s` - for path to file from which log record was created