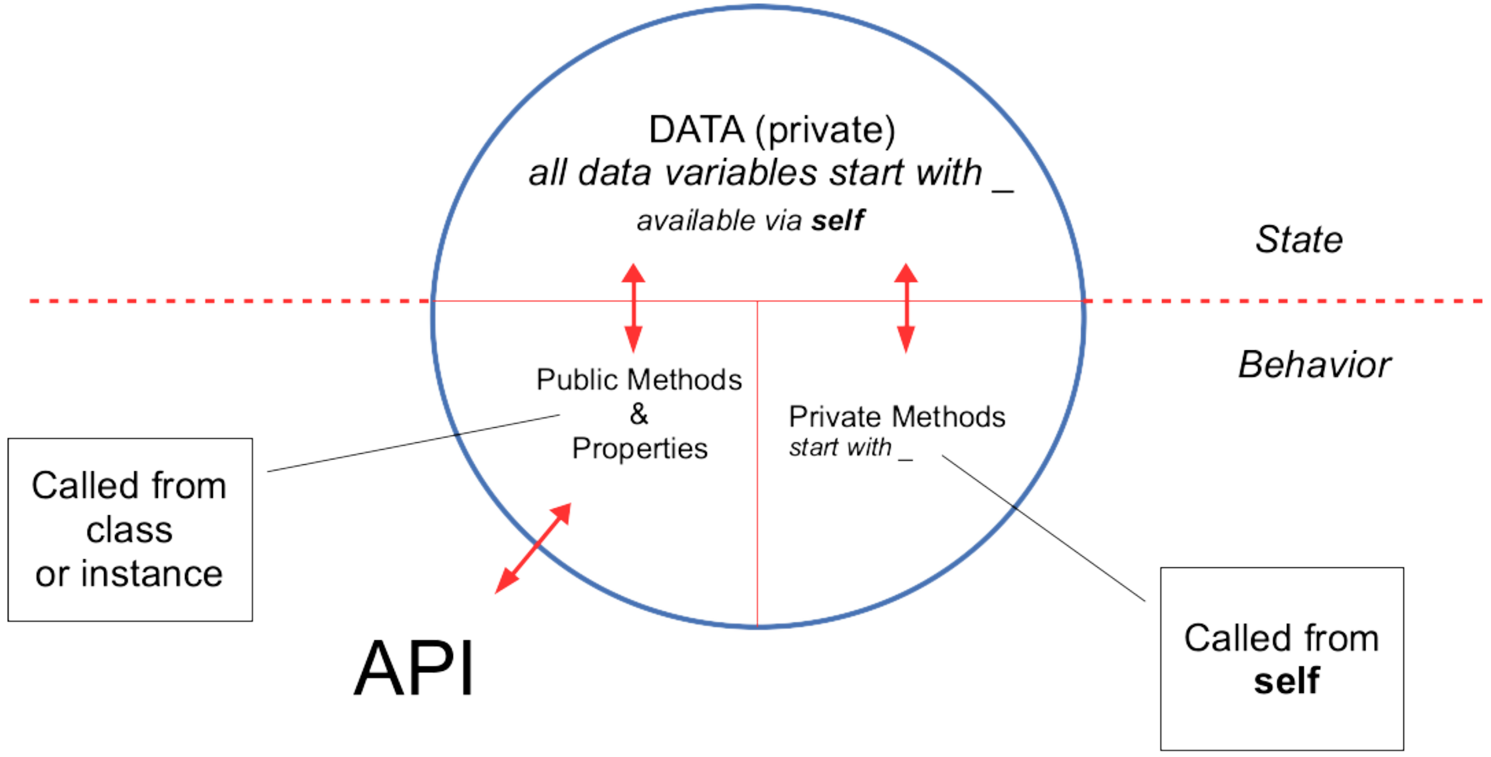
Advanced Python Programming

TTPS4805-GKJ

A Python Class



`str()` vs `repr()`

`str()`	**`repr()`**
For humans	How to **repr**oduce object
"Informal" form	"Official" form
Info about object	Code to create object
If undefined, uses `repr()`	If undefined, uses `object.__repr__()`

ElementTree

XML	ElementTree
see below	see below

XML

```
<presidents>
    <president term="1">
        <first>George</first>
        <last>Washington</last>
    </president>
    <president term="2">
        <first>John</first>
        <last>Adams</last>
    </president>
</presidents>
```

ElementTree

```
Element
       tag="presidents"
   Element {"term": "1" }
      tag="president"
        Element
            tag="first"
            text="George"
        Element
            tag="last"
            text="Washington"
   Element {"term": "2" }
      tag="president"
        Element
            tag="first"
            text="John"
        Element
            tag="last"
            text="Adams"
```

Decorators Save Typing

Instead of

```
def spam():
    pass

spam = deco(spam)
```

use

```
@deco
def spam():
    pass
```

`spam` is only typed once, instead of 3 times

Decorator Syntax

```
@DECORATOR
def some_function():
    pass
```

same as

```
some_function = DECORATOR(some_function)
```

Implementation

```
def DECORATOR(original_function):
    @wraps(original_function)
    def WRAPPER(*args, **kwargs):
        # add code here
        result = original_function(*args, **kwargs)
        return result
    return WRAPPER
```

Decorator with parameters

```
@DECORATOR(param, ...)
def some_function():
    pass
```

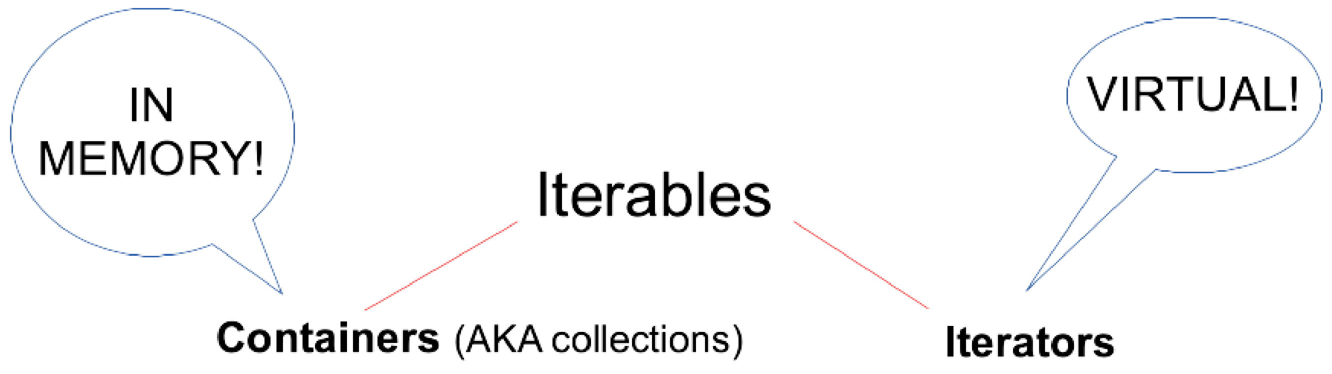
same as

```
some_function = DECORATOR(param, ...)(some_function)
```

Implementation

```
def DECORATOR(param, ...):
    def WRAPPER_FACTORY(original_function):
        @wraps(original_function)
        def WRAPPER(*args, **kwargs):
            # add code here using decorator params
            result = original_function(*args, **kwargs)
            return result
        return WRAPPER
    return WRAPPER_FACTORY
```

Iterables



Sequences
str
bytes
list
tuple
collections.namedtuple
range*()*

returned by
sorted()
list comprehension
str.split()
etc.

Mappings

dict
    collections.defaultdict
    collections.Counter
set
frozenset

returned by
dict comprehension
set comprehension
etc.

Iterators

returned by
open()
reversed()
enumerate()
zip()
Itertools.groupby()
Itertools.chain()
itertools.zip_longest()
iterator class
generator expression
generator function
etc.

Containers

- All elements in memory
- Can be indexed with [ ]
- Have a length

Builtin containers

Sequences	**Mapping types**
`list`	`dict`
`tuple`	`set`
`string`	`frozenset`
`bytes`	
`range`	

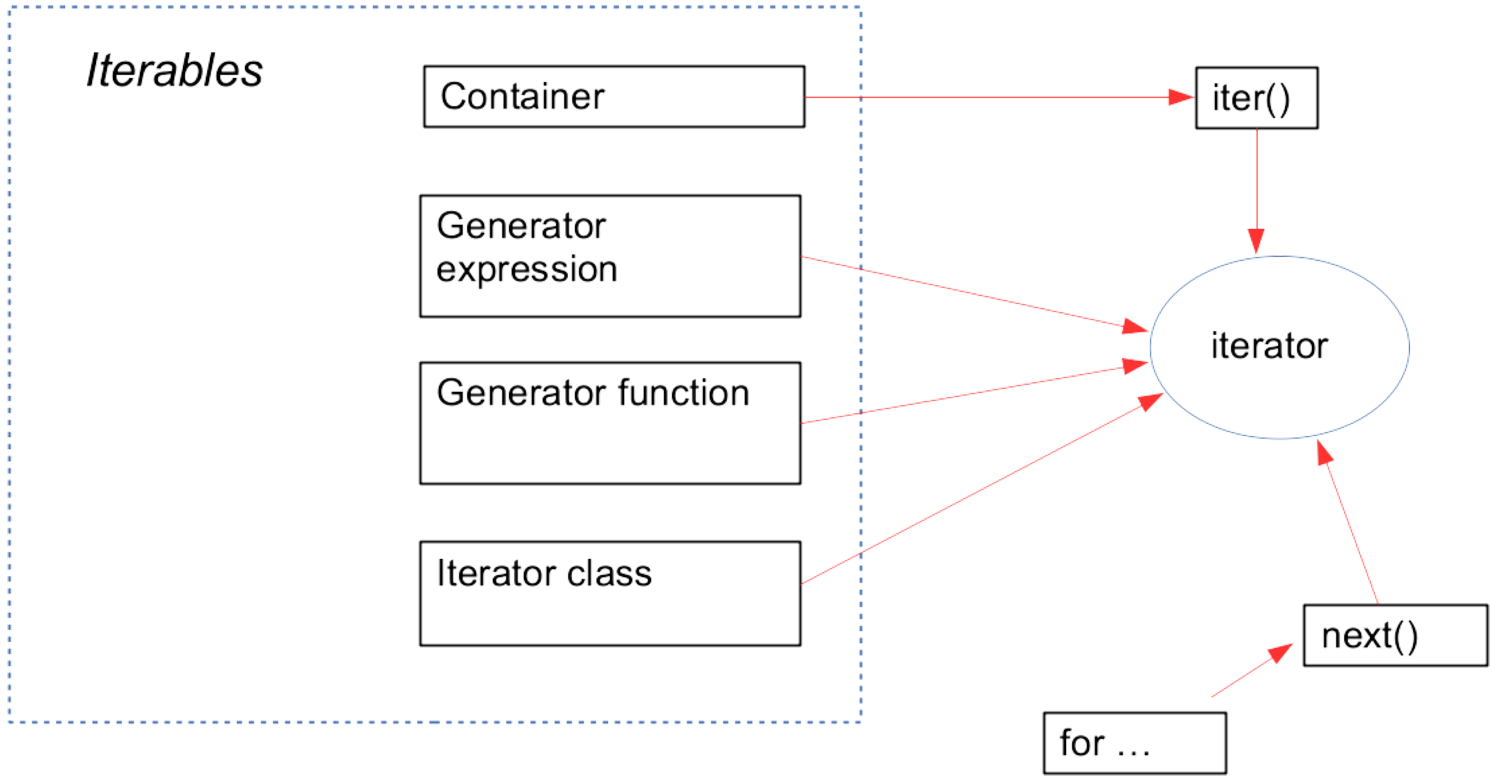
Iterators

- Virtual (no memory used for data)
- Lazy evaluation (JIT)
- Cannot be indexed with [ ]
- Do not have a length
- One-time-use

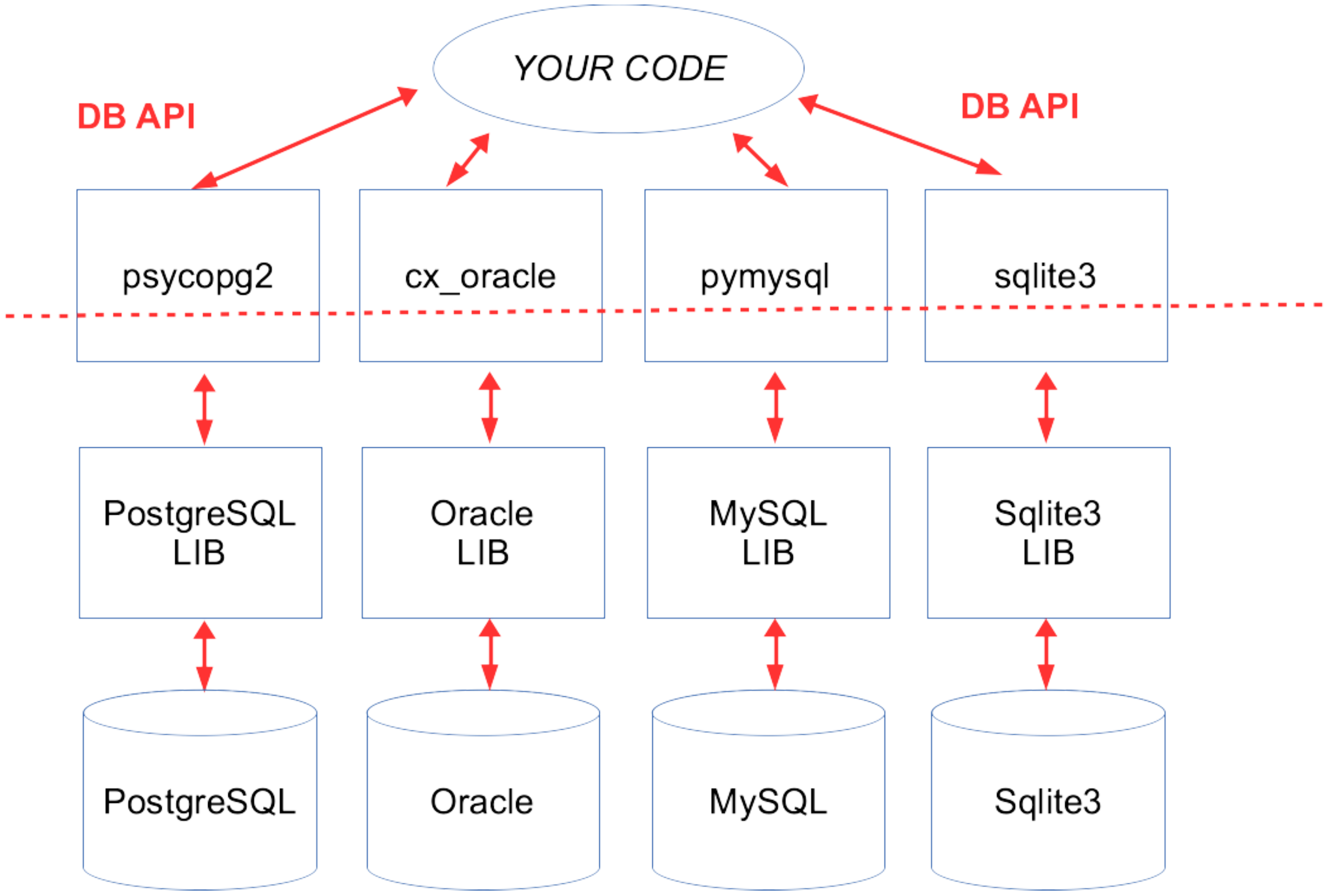
Iterators returned by

- `open()`
- `enumerate()`
- `*DICT*.items()`
- `zip()`
- `reversed()`
- *generator expression or function*
- *iterator class*

Iterators


Iterables
Container
Generator expression
Generator function
Iterator class
iter()
iterator
next()
for …

Python DB Interface



Python DB API

- conn = *package*.connect(*server, db, user, password, etc.*)
- cursor = conn.cursor()
- num_lines = cursor.execute(*query*)
- num_lines = cursor.execute(*query-with-placeholders, param-iterable*))
- all_rows = cursor.fetchall()
- some_rows = cursor.fetchmany(n)
- one_row = cursor.fetchone()
- conn.commit()
- conn.rollback()

Creating Variables

```
x = 5
```

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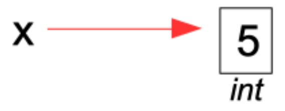
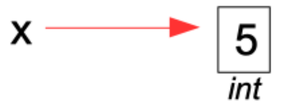
x = 5
```



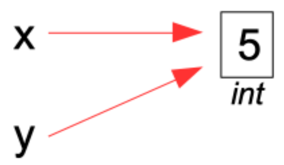
Creating Variables

```
x = 5
y = x
```



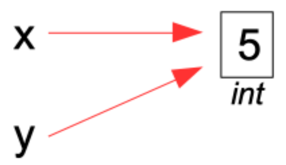
Creating Variables

```
x = 5
y = x
```



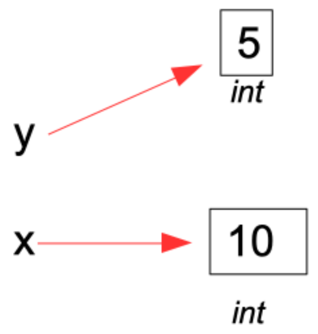
Creating Variables

```
x = 5
y = x
x = 10
```



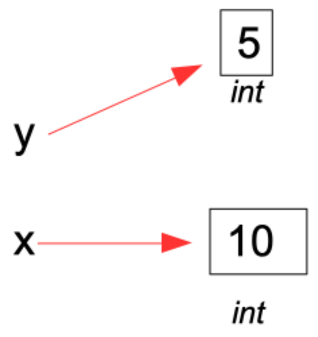
Creating Variables

```
x = 5
y = x
x = 10
```



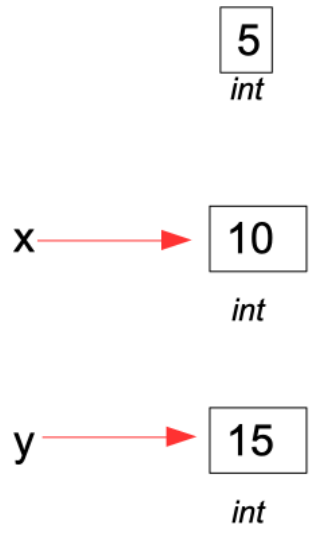
Creating Variables

```
x = 5
y = x
x = 10
y = 15
```



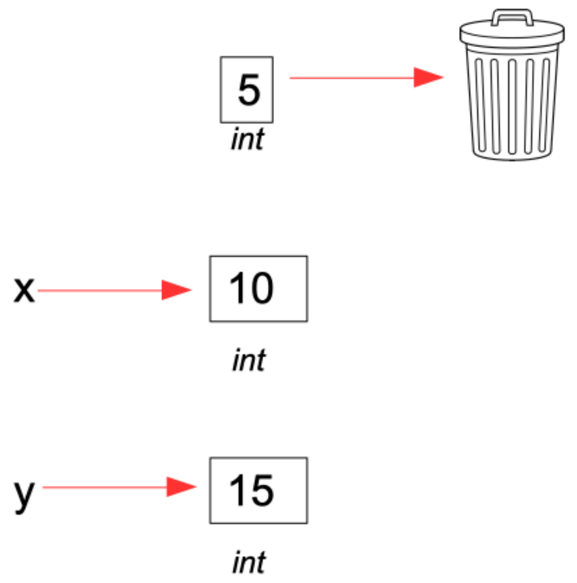
Creating Variables

```
x = 5
y = x
x = 10
y = 15
```

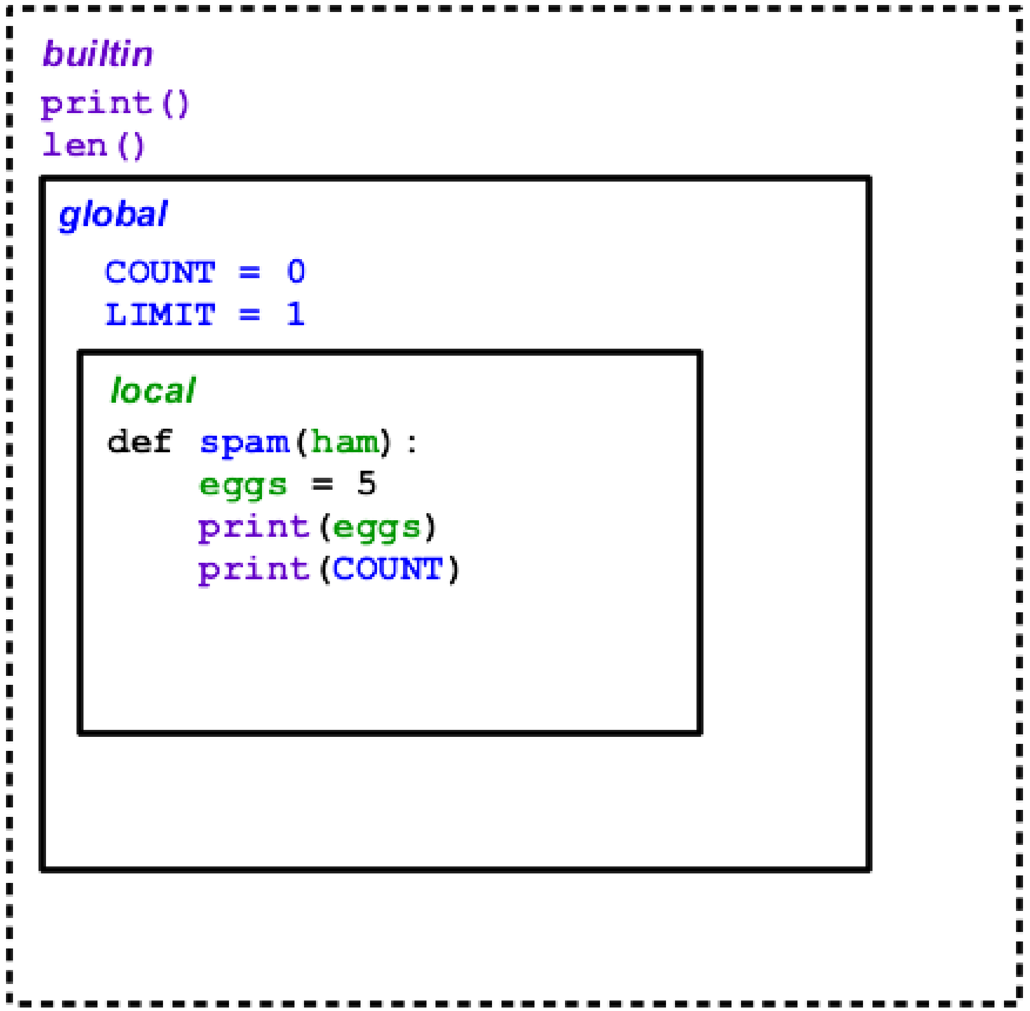


Creating Variables

```
x = 5
y = x
x = 10
y = 15
```



Variable Scope



```
def spam(ham):
    eggs = 5
    print(eggs)
    print(COUNT)
```

Variable scope

```
ALPHA = 10

def spam(beta):
    gamma = 20
    print(ALPHA)
    print(beta)
    print(gamma)

spam(1234)
```

BUILTIN

GLOBAL

LOCAL

Lists vs Tuples

Lists	Tuples
Dynamic array	Collection of related fields
Mutable/unhashable	Immutable/hashable
Position doesn't matter	Position matters
Use case: iterating	Use case: indexing or unpacking
"ARRAY"	"STRUCT" or "RECORD"

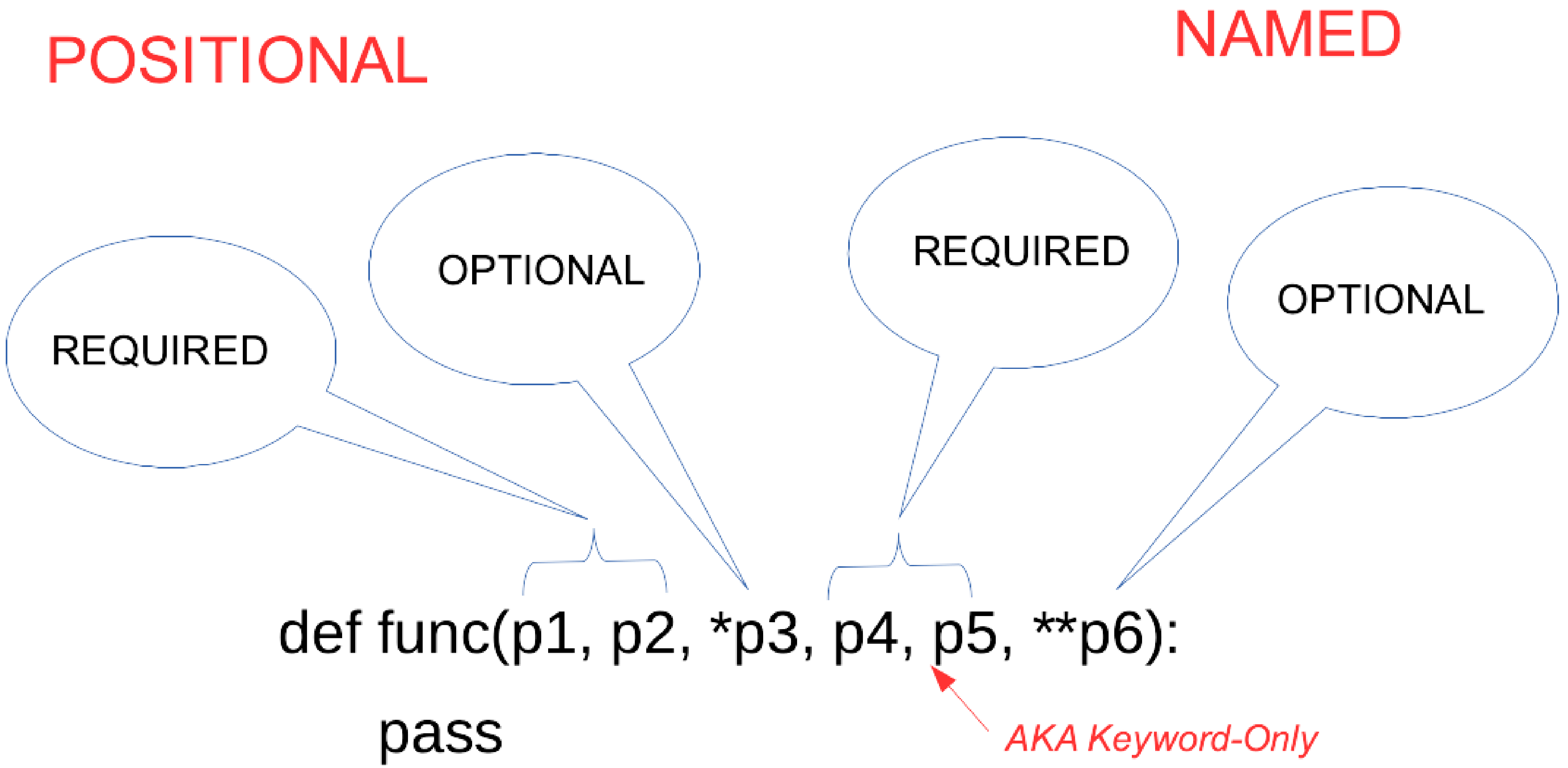
A Myth

Tuples are just read-only lists

Tuple alternatives

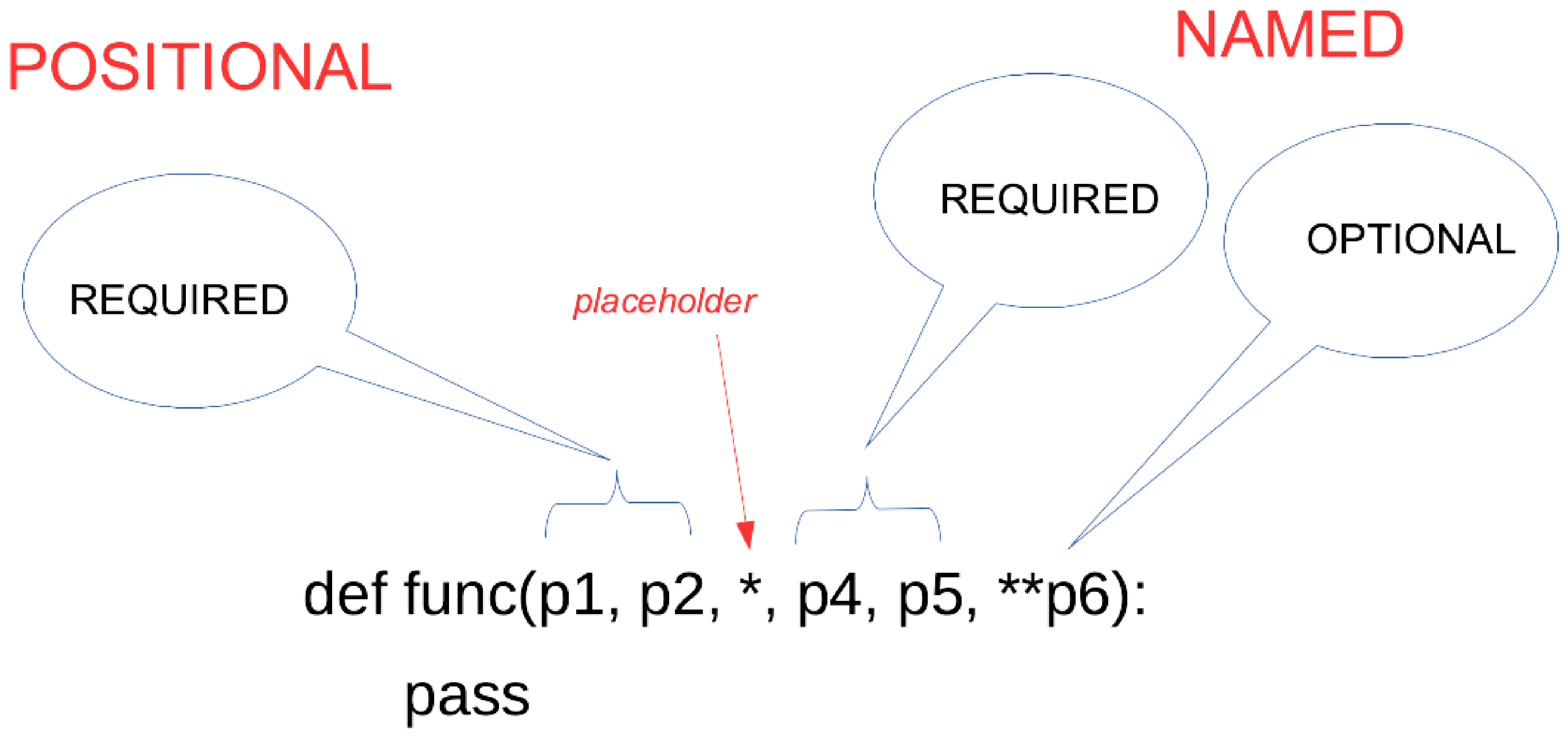
- Standard library
  - namedtuple
  - dataclass
- Third-party
  - attrs
  - Pydantic

Function parameters



```
def func(p1, p2, *p3, p4, p5, **p6):
    pass
```

Function parameters



```
def func(p1, p2, *, p4, p5, **p6):
    pass
```

Concurrency