2.3 - Tuple

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1. Tuple

- A tuple is a **fixed-length**, **immutable** sequence of Python objects.

```
tup = 4, 5, 6
tup
```

```
## (4, 5, 6)
```

```
tup2 = (1, 2)
tup2
```

```
## (1, 2)
```

- A tuple can contain objects of different types!
  - A big difference between Python tuple and R vector!

```
tup3 = (1, "2", True)
tup3
```

```
## (1, '2', True)
```

- You can also create a tuple of tuples:

```
nested_tup = (4, 5, 6), (7, 8)
nested_tup
```

```
## ((4, 5, 6), (7, 8))
```

- You can convert any sequence or iterator to a tuple by invoking `tuple()` :

```
tuple([4, 0, 2])
```

```
## (4, 0, 2)
```

```
tuple("string")
```

```
## ('s', 't', 'r', 'i', 'n', 'g')
```

2. Elements of a Tuple

- Elements of a tuple can be accessed with square brackets `[]` :
  - Note: In Python (unlike R), index starts at 0.

```
tup = ('hello', 2, 'you')
tup[0]
```

```
## 'hello'
```

- While the objects stored in a tuple may be **mutable themselves**, once the tuple is created, it's not possible to modify which object is stored in each slot.

```
e1 = 'foo'
e2 = [1, 2]
tup = (e1, e2)
tup
```

```
## ('foo', [1, 2])
```

- We know `e1` (string) is immutable and `e2` (list) is mutable.

```
e2[0] = 3
e2
```

```
## [3, 2]
```

```
tup
```

```
## ('foo', [3, 2])
```

```
tup[1][1] = 4
tup
```

```
## ('foo', [3, 4])
```

3. Tuple Concatenation

- You can concatenate tuples using the `+` operator to produce longer tuples:
  - Note that this is NOT the same as mutate/change the original tuple!

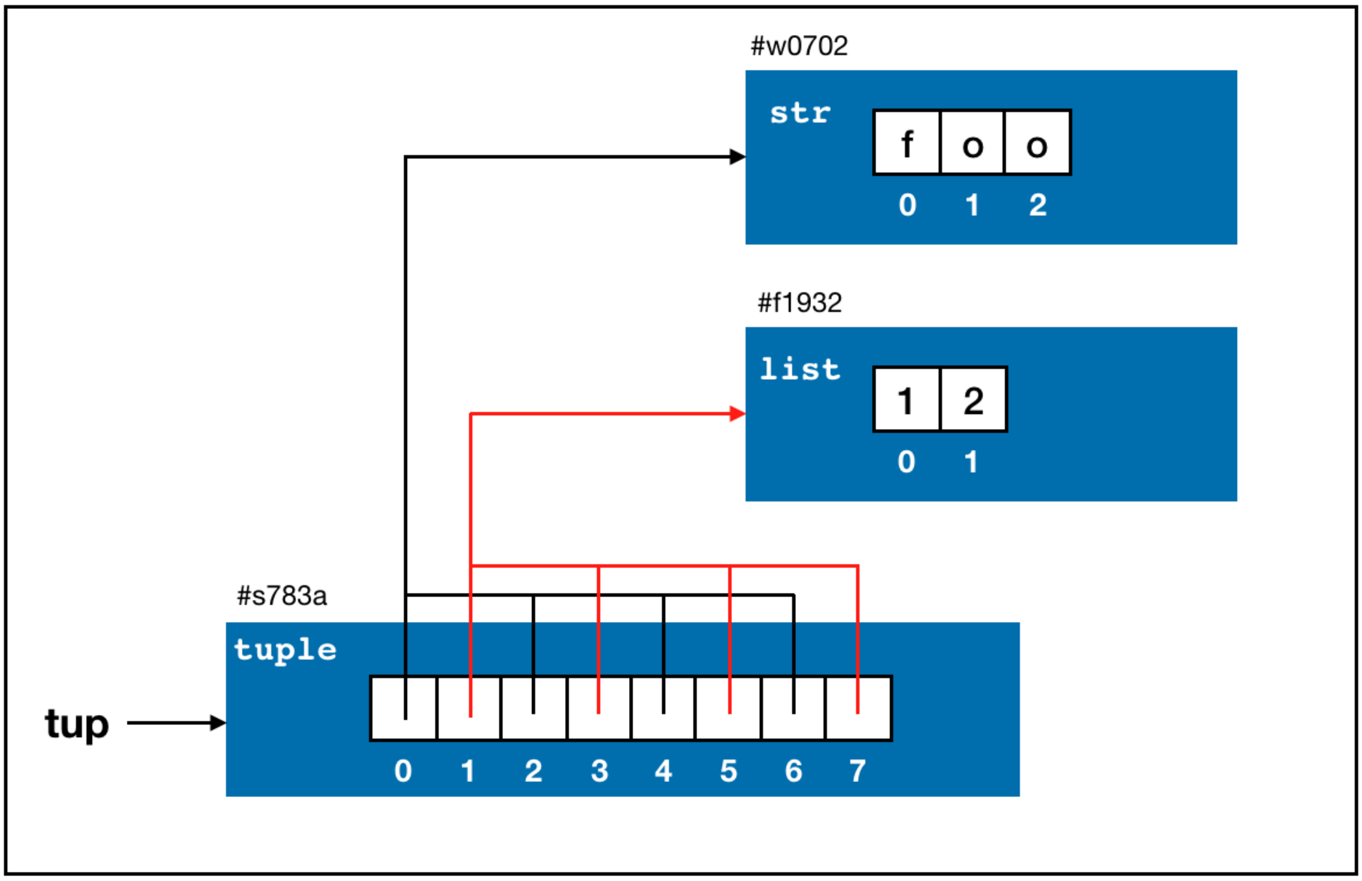
```
(4, None, 'foo') + (6, 0) + ('bar',)
```

```
## (4, None, 'foo', 6, 0, 'bar')
```

- Multiplying a tuple by an integer, as with lists, has the effect of concatenating together that many copies of the tuple:

```
tup = ('foo', [1, 2])*4
tup
```

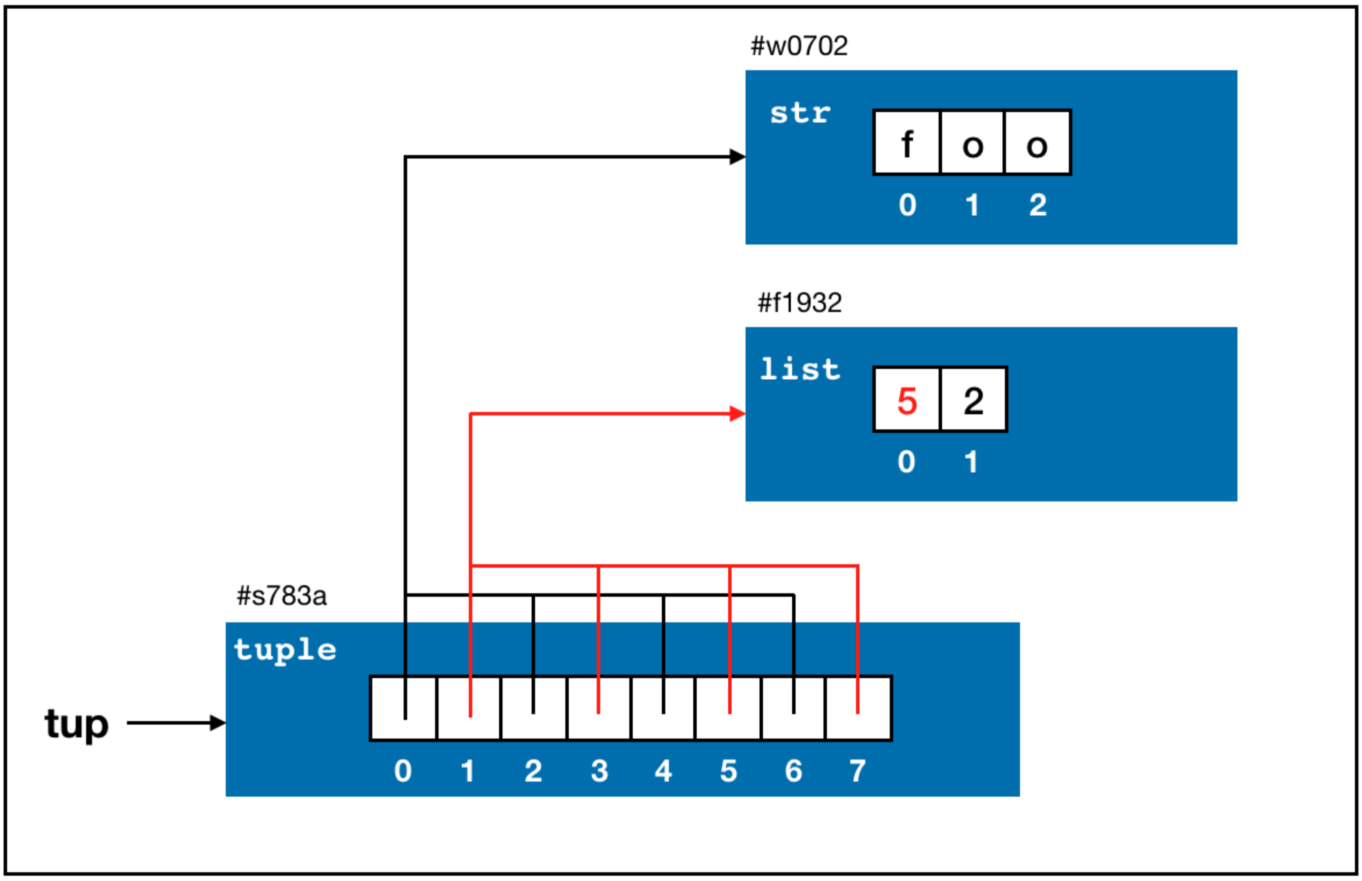
```
## ('foo', [1, 2], 'foo', [1, 2], 'foo', [1, 2], 'foo', [1, 2])
```



- Note that the objects themselves are not copied, only the **references** to them.

```
tup[1][0] = 5
tup
```

```
## ('foo', [5, 2], 'foo', [5, 2], 'foo', [5, 2], 'foo', [5, 2])
```



4. Unpacking Tuples

- If you try to *assign* to a tuple-like expression of variables, Python will attempt to *unpack* the value on the righthand side of the equals sign:

```
tup = (4, 5, 6)
a, b, c = tup
```

```
a
```

```
## 4
```

```
b
```

```
## 5
```

```
c
```

```
## 6
```

- Even sequences with nested tuples can be unpacked:

```
tup = 4, 5, (6, 7)
a, b, (c, d) = tup
```

```
d
```

```
## 7
```

- A common use of variable unpacking is iterating over sequences of tuples or lists:

```
seq = [(1, 2, 3), (4, 5, 6), (7, 8, 9)]
for a, b, c in seq:
  print('a={0}, b={1}, c={2}'.format(a, b, c))
```

```
## a=1, b=2, c=3
## a=4, b=5, c=6
## a=7, b=8, c=9
```

- Python also allows unpacking only a few elements at the beginning of a tuple:

```
values = 1, 2, 3, 4, 5
a, b, *rest = values
```

```
a
```

```
## 1
```

```
b
```

```
## 2
```

```
rest
```

```
## [3, 4, 5]
```

- The special key here is `*` (not `rest`). In fact, you can also run the above code with `a, b, *_ = values` instead.

5. `count()`

- The `count()` function/method counts the number of occurrences of a value.

```
a = (1, 2, 2, 2, 3, 4, 5)
a.count(2)
```

```
## 3
```

Exercise

Some students' information is stored in a nested tuple where each inner tuple represents a student.

```
students = (('Ha', 25, True), ('Alex', 50, False), ('Dave', 34, False), ('Lelys', 50,
True))
```

For each inner tuple, the information is stored in the following format (name, age, is female?).

Unpack this tuple and store all students name in a string (separated by comma `,`), and all students' ages together and count the number of female and male students (store them in `female_count` and `male_count`).

This lecture note is modified from Chapter 3 of Wes McKinney's Python for Data Analysis 2nd Ed (https://www.oreilly.com/library/view/python-for-data/9781491957653/).