

IC152 Lec 13

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Tuples

- Tuple: An ordered collection of values
- Eg. (x,y,z) coordinates in 3-D space

```
In [11]: t1 = (1,2,5)
In [12]: t2 = (1,2,'test')
In [13]: t1[0]
Out[13]: 1
In [14]: t2[2]
Out[14]: 'test'
```

Index operator to access elements

```
In [16]: t2[1:]
Out[16]: (2, 'test')
```

Slicing works

Tuples are **immutable**

- Tuples are immutable
- Tuples can be used as arguments to functions
- Functions can return tuples

```
In [27]: empty = ()
```

```
In [28]: singleton = 'hello',
```

```
In [29]: len(empty)
```

```
Out[29]: 0
```

```
In [30]: len(singleton)
```

```
Out[30]: 1
```

```
In [31]: singleton
```

```
Out[31]: ('hello',)
```

```
In [32]: type(empty)
```

```
Out[32]: tuple
```

Trailing comma for tuple with one element

- In general, tuples are faster than lists (since they are immutable)
- Tuples are used with dictionaries

```
nested = ["first", ("second", "third"), ["fourth", "fifth", "sixth"]]
```

Dictionaries

- Dictionaries are like lists, except that the index is any immutable type
- key:value pairs
- Also called **associative arrays** or **hashtables**
- Store a value and then retrieve it
- Dictionaries are **mutable**

```
In [35]: tel = {'jack': 4098, 'sape': 4139}
```

Defining a dictionary

```
In [36]: tel['guido'] = 4127
```

Add another element

```
In [37]: type(tel)
```

```
Out[37]: dict
```

```
In [38]: tel
```

```
Out[38]: {'jack': 4098, 'sape': 4139, 'guido': 4127}
```

```
In [39]: tel['jack']
```

```
Out[39]: 4098
```

Retrieve a value

```
In [40]: del tel['sape']
```

```
In [41]: tel['irv'] = 4127
```

```
In [42]: tel
```

```
Out[42]: {'jack': 4098, 'guido': 4127, 'irv': 4127}
```

```
In [43]: list(tel)
```

```
Out[43]: ['jack', 'guido', 'irv']
```

```
In [44]: sorted(tel)
```

```
Out[44]: ['guido', 'irv', 'jack']
```

```
In [45]: 'guido' in tel
```

```
Out[45]: True
```

in keyword

```
In [46]: 'paddy' in tel
```

```
Out[46]: False
```

```
In [47]: 'jack' not in tel
```

```
Out[47]: False
```

```
In [55]: tel
Out[55]: {'jack': 4098, 'guido': 4127, 'irv': 4127}

In [56]: tel['anu']
Traceback (most recent call last):

  File "<ipython-input-56-d4043dc6d20f>", line 1, in <module>
    tel['anu']
```

KeyError: 'anu'

→ KeyError

```
In [57]: tel.keys()
Out[57]: dict_keys(['jack', 'guido', 'irv'])
```

→ Returns a view

```
In [58]: tel.values()
Out[58]: dict_values([4098, 4127, 4127])
```

```
In [60]: tel.items()
Out[60]: dict_items([('jack', 4098), ('guido', 4127), ('irv', 4127)])
```

```
In [61]: tel.get('anu', 'Not found')
Out[61]: 'Not found'
```

Remember:

- Cannot have multiple items with same key
- Keys have to be immutable
- Values need not be unique, they can be mutable or immutable

```
In [62]: {x: x**2 for x in (2, 4, 6)}  
Out[62]: {2: 4, 4: 16, 6: 36}
```

Dict comprehension

```
squares = [x**2 for x in range(10)]
```

List comprehension