# Web Application Development using Python

## Introduction to Data Structures

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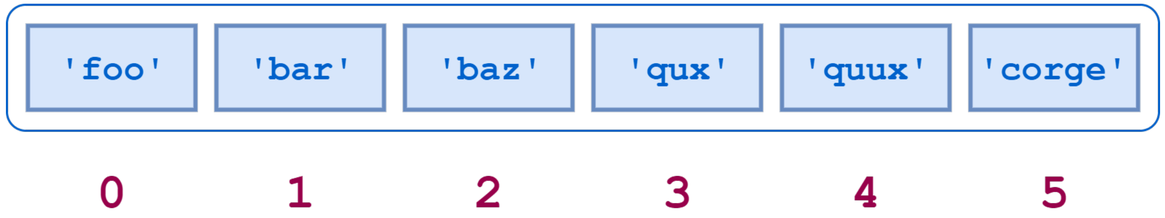
# Outline

- Lists
- Tuples
- Sets
- Dictionaries

# Lists

## W1/S2/ex0.py

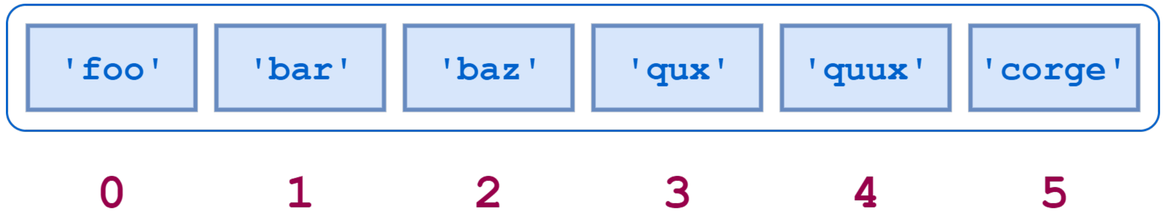
- **Declaring a list**
  - list = [1,2,3,4]
- **Accessing an element**
  - list[0] —> 1
  - list[1] —> 2
  - list[-1] —> 4
  - list[-2] —> 3
- **Slicing a list**
  - my_new_list = list[1:2]
- **Updating an element — Lists are mutable**
  - list[0]=1
  - list[1]=1
- **Updating a slice — Lists are mutable**
  - list[2:3] = [1,1]



# Lists

## W1/S2/ex0.py

- **append()** — Adds an element at the end of the list
- **clear()** — Removes all elements from the list
- **count()** — Count the number of elements in the list
- **index()** — Returns the index of the first occurrence of an element
- **extend()** — Joins lists together
- **insert(i, obj)** — Inserts **obj** at index **i**
- **remove()** — Removes an element at a specific position
- **pop() / pop(i)**— Removes the last element in the list / element at index **i**
- **reverse()** — Reverses the order of elements
- **sort()** — Sorts the list in ascending order
- **len()** — Returns the length of the list



# Tuples

## W1/S2/ex1.py

- **Packing a tuple**
  - colors = (‘Red’, ‘Blue’, ‘Green’)
- **Unpacking a tuple**
  - color1, color2, color3 = colors
  - print(color1, color2, color3)

- **Updating an element — Tuples are immutable**
- **You can still use most of the methods on a list**
  - .count(), .index(), len(), min(), max(), etc.

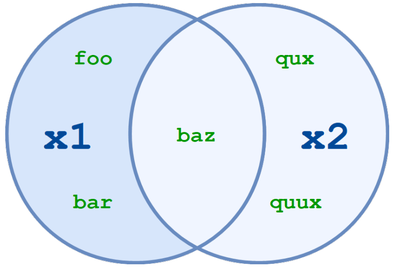
| z = | (3, | 7, | 4, | 2) |
|---|---|---|---|---|
| index | 0 | 1 | 2 | 3 |

# Sets

## W1/S2/ex2.py

- **Declaring a set**
  - set = {1,2,3,4}
- **Accessing a set**
  - print(set)

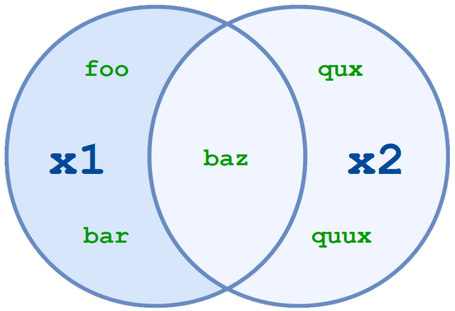
- **Slicing a set**
  - set[1:3]
- **Updating an element — Sets are immutable**
  - set[0]=1
  - set[1]=1
- **Updating a slice — Sets are immutable**
  - set[3:4] = [1,1]



# Sets

## W1/S2/ex2.py

- **add()** — Adds an element to the set
- **clear()** — Removes all elements from the set
- **copy()** — Create a copy of the set
- **difference()** — Returns a new set with the difference between the two sets




- **intersection()** — Returns a set containing all elements in both sets
- **union()** — Returns a new set with the union of both sets
- **pop()** — Removes the last element in the set
- **remove()** — Removes element from the set
- **discard()** — Checks then removes an element from the set if exists
- **You can still use most of the methods on a list**
  - .count(), .index(), len(), min(), max(), etc.

# Dictionaries

## W1/S2/ex{3,4}.py

- **Declaring a dictionary**
  - car = {
  - 'brand': 'Maserati',
  - 'model': 'Quattroporte'
  - }
- **Getting a value**
  - car_model = car[‘model’]
    - **Be careful with invalid keys!**
  - car_model = car.get(‘model’)
- **Getting the list of items**
  - items = car.items()
- **Getting the list of keys**
  - keys = car.keys()
- **Getting the list of values**
  - values = car.values()
- **Updating a value**
  - car[‘model’]= “Levant”
- **You can still use most of the methods on a list**
  - .count(), .index(), len(), min(), max(), etc.

# Dictionaries

## W1/S2/ex{3,4}.py

- **clear()** — Removes all elements from the dictionary
- **copy()** — Returns a shallow copy of the dictionary
- **from_keys()** — Creates a new dictionary from the given sequence of elements with a value provided by the user
- **get(key)** — For key key, returns value or default if key not in dictionary
- **pop(key)** — Removes and returns an element from a dictionary having the given key
- **popitem()** — Removes and returns the (key, value) pair from the dictionary in the Last In, First Out (LIFO) order

# Resources

- https://docs.python.org/3/tutorial/introduction.html#lists
- https://docs.python.org/3/tutorial/datastructures.html#more-on-lists
- https://docs.python.org/3/tutorial/datastructures.html#tuples-and-sequences
- https://docs.python.org/3/tutorial/datastructures.html#sets
- https://docs.python.org/3/tutorial/datastructures.html#dictionaries