Lists

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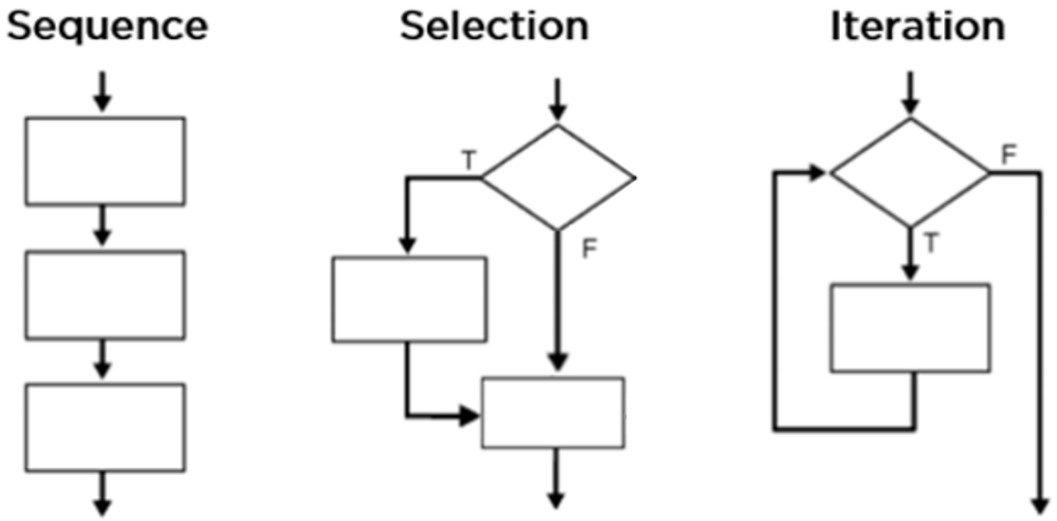
1 Control Flow

Ahmed Moustafa

2 Definition of control flow

- Control flow is the order in which statements and instructions are executed in a program.
- Control flow can be affected by decision-making statements, loops, and function calls.



Source Core Electronics: Control Structures with Python

3 Lists

- Lists can be thought of the most general version of a sequence in Python.
- Unlike strings, they are **mutable**, i.e. elements inside a list can be changed.
- Lists are constructed with brackets `[ ]` and commas `,` separating every element in the list.

4 Creating a List

[2]:
```
weights = [65.0, 70.5, 72.3, 68.0, 77.2] # list of numbers
weights
```

[2]:
```
[65.0, 70.5, 72.3, 68.0, 77.2]
```

[3]:
```
cities = ["London", "Paris", "New York", "Tokyo", "Berlin"] # list of strings
cities
```

[3]:
```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin']
```

[4]:
```
types = [1, 2.5, "hello", "world", 42, "python"] # list of different data types
types
```

[4]:
```
[1, 2.5, 'hello', 'world', 42, 'python']
```

5 List of Lists

We can also create a list of lists. For example, combining the two list we just created, `cities` and `weights` into a new list `my_list`:

[5]:
```
my_list = [cities, weights]
my_list
```

[5]:
```
[['London', 'Paris', 'New York', 'Tokyo', 'Berlin'],
 [65.0, 70.5, 72.3, 68.0, 77.2]]
```

[6]:
```
len(my_list)
```

[6]:
```
2
```

6 Indexing and Slicing 1/3

Indexing and slicing work just like in strings:

[7]:
```
cities[0]
```

[7]:
```
'London'
```

[8]:
```
cities[1:]
```

[8]:
```
['Paris', 'New York', 'Tokyo', 'Berlin']
```

[9]:
```
cities[::-1]
```

[9]:
```
['Berlin', 'Tokyo', 'New York', 'Paris', 'London']
```

[10]:
```
cities + ["Cairo", "Alexandria"]
```

[10]:
```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

7 Indexing and Slicing 2/3

[11]:
```
cities
```

[11]:
```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin']
```

[12]:
```
cities += ["Cairo", "Alexandria"]
cities
```

[12]:
```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[13]:
```
cities * 2
```

[13]:
```
['London',
 'Paris',
 'New York',
 'Tokyo',
 'Berlin',
 'Cairo',
 'Alexandria',
 'London',
 'Paris',
 'New York',
 'Tokyo',
 'Berlin',
 'Cairo',
 'Alexandria']
```

8 Indexing and Slicing 3/3

[14]:
```
my_list
```

[14]:
```
[['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria'],
 [65.0, 70.5, 72.3, 68.0, 77.2]]
```

[15]:
```
len(my_list)
```

[15]:
```
2
```

[16]:
```
my_list[0]
```

[16]:
```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[17]:
```
my_list[1][2]
```

[17]:
```
72.3
```

9 List Methods: append

The `append()` method adds an item to the end of the list

[18]:
```
print(cities)
len(cities)
```

```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[18]:
```
7
```

[19]:
```
cities.append ("Aswan")
print(cities)
len(cities)
```

```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria',
'Aswan']
```

[19]:
```
8
```

10 List Methods: pop

The `pop()` method removes the item at the given index from the list and returns the removed item

[20]:
```
cities.pop() # pop (remove) the last element
```

[20]:
```
'Aswan'
```

[21]:
```
print(cities)
len(cities)
```

```
['London', 'Paris', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[21]:
```
7
```

[22]:
```
cities.pop(1) # pop (remove) at the given index
```

[22]:
```
'Paris'
```

[23]:
```
print(cities)
len(cities)
```

```
['London', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[23]:
```
6
```

11 List Methods: `reverse`

The `reverse()` method reverses the elements of the list

[24]:
```
print ("Before: ", cities)
```

```
Before:  ['London', 'New York', 'Tokyo', 'Berlin', 'Cairo', 'Alexandria']
```

[25]:
```
cities.reverse()
```

[26]:
```
print ("After: ", cities)
```

```
After:  ['Alexandria', 'Cairo', 'Berlin', 'Tokyo', 'New York', 'London']
```

12 List Methods: `sort`

The `sort()` method sorts the items of a list in ascending or descending order

[27]:
```
cities.sort()
cities
```

[27]:
```
['Alexandria', 'Berlin', 'Cairo', 'London', 'New York', 'Tokyo']
```

13 List Methods: `index`

The `index()` method returns the index of the specified element in the list

[28]:
```
cities.index("Tokyo")
```

[28]: 5

[29]:
```
# cities.index("Dubai")
```

14 Lists Exercise

GitHub Classroom Assignment https://classroom.github.com/a/a24f_RDP

15 Dictionaries

Dictionaries in Python is a form of mapping, between keys and their corresponding value

16 Constructing a Dictionary

[31]:
```
my_dict = {'key1':'value1','key2':'value2'} # Make a dictionary with {} and :␣
↪to signify a key and a value
my_dict
```

[31]:
```
{'key1': 'value1', 'key2': 'value2'}
```

[32]:
```
my_dict['key2'] # Call values by their key
```

[32]:
```
'value2'
```

[33]:
```
my_dict = {'key1':123,'key2':[12,23,33],'key3':['item0','item1','item2']}␣
↪#dictionaries are very flexible
my_dict['key3']
```

[33]:
```
['item0', 'item1', 'item2']
```

17 Dictionary Methods

[34]:
```
d = {'key1':1,'key2':2,'key3':3} # Create a typical dictionary
d
```

[34]:
```
{'key1': 1, 'key2': 2, 'key3': 3}
```

[35]:
```
d.keys() # Method to return a list of all keys
```

[35]:
```
dict_keys(['key1', 'key2', 'key3'])
```

[36]:
```
d.values() # Method to grab all values
```

[36]:
```
dict_values([1, 2, 3])
```

[37]:
```
d.items() # Method to return tuples of all items  (we'll learn about tuples␣
↪soon)
```

```
[37]: dict_items([('key1', 1), ('key2', 2), ('key3', 3)])
```