PROGRAMMING PYTHON

Lecture # 6 - Collectables

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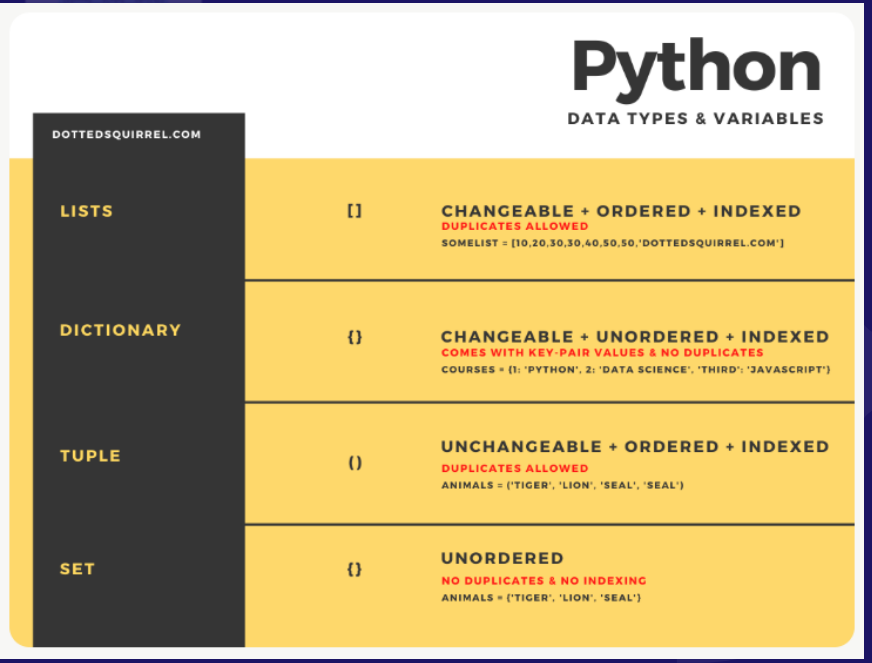
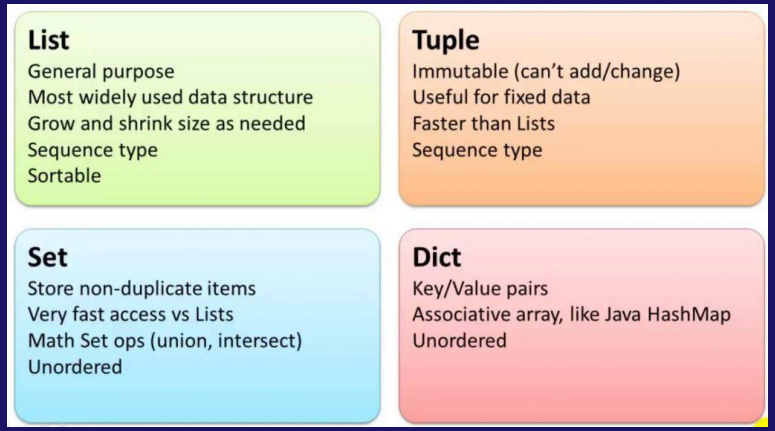


Collectables

- Collectables are used to store multiple values.
- There are collection types in Python:
  - List
  - Tuples
  - Set
  - Dictionary
- Each collectable serve a different purpose.



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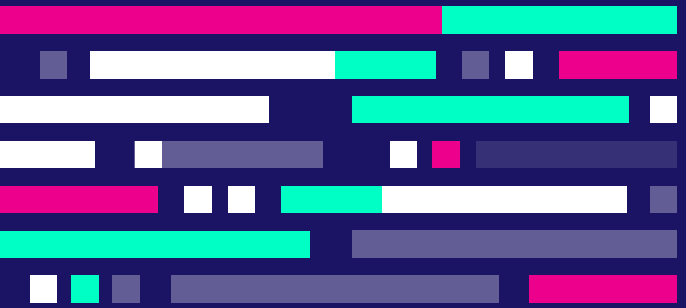

Lists

- Lists are created using square brackets []
- List items are ordered, changeable, and duplicates are allowed
- **Ordered** = Values are indexed and can be accessed via indexes.
- **Changeable** = We can update values, there are methods available for this in lists
- **Duplicates** = Since each value is stores at a particular index, duplicates are ok
- Lists can store any data type.
- We can create list in two ways:
  - `mylist = ["cat", "dog", "sheep"]`
  - `mylist1 = list(("apple", "dog", "sheep"))`
- The second method is called list constructor method.
- The length of the list (like how many members it contains) can be checked using `len()` function.

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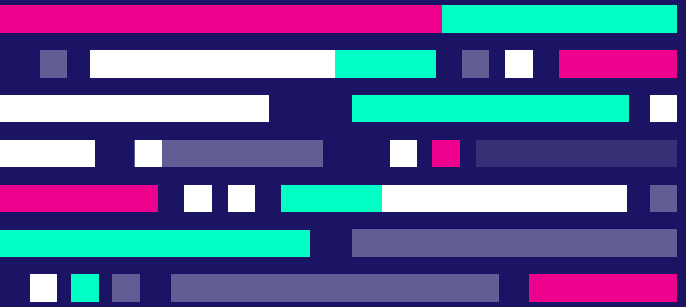

Lists Items – Access

- We can access list items via indexes
  - Pet = list[1]
- Indexing follow all the rules of indexing like
  - Range
  - Negative indexing
  - Negative range
  - thislist = ["apple", "banana", "cherry", "orange", "kiwi", "melon", "mango"]
  - print(thislist[2:5])
- We can also check if an item is in the list using membership function
  - If apple in thislist:
    print("Exists")

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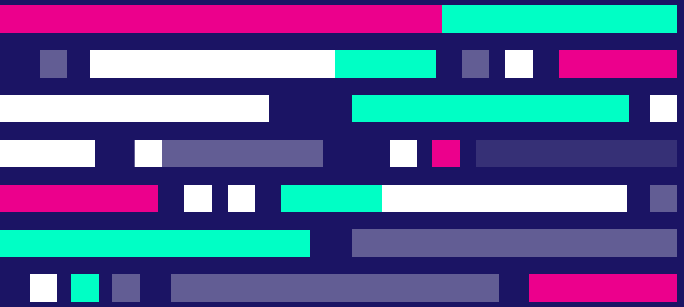

Lists Items – Update

- We can change the value of a particular item using indexing
  - thislist = ["apple", "banana", "cherry"]
  - thislist[1] = "blackcurrant"
- Also we can a range of items if we select a range of indexes
  - thislist = ["apple", "banana", "cherry", "orange", "kiwi", "mango"]
  - thislist[1:3] = ["blackcurrant", "watermelon"]
  - Note: If you insert more items than you replace, the new items will be inserted where you specified, and the remaining items will move accordingly (This is an alternate to insertion)
  - Also, If you insert less items than you replace, the new items will be inserted where you specified, and the remaining items will move accordingly. (This is an alternate to deletion).

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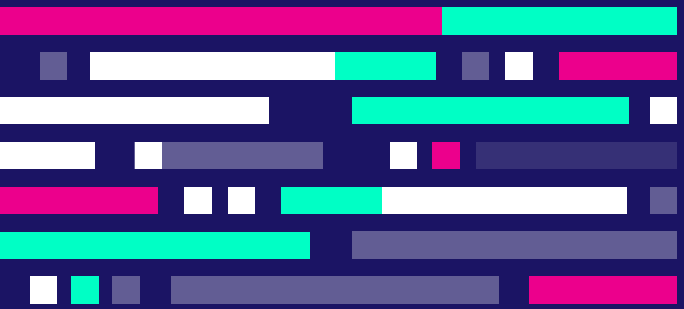

Lists Items - Add

- We can insert an item at a specified location by using insert()
  - thislist = ["apple", "banana", "cherry"]
  - thislist.insert(2, "watermelon")
  - print(thislist)

- We Use append() method to add an item to the list in the end.
  - thislist = ["apple", "banana", "cherry"]
  - thislist.append("orange")
  - print(thislist)
- We use extend() method to combine two or more lists. The appended items are added to the main list.
  - thislist = ["apple", "banana", "cherry"]
  - tropical = ["mango", "pineapple", "papaya"]
  - thislist.extend(tropical)
  - print(thislist)
- Note: Extend() methods can be used to combine any iterables.

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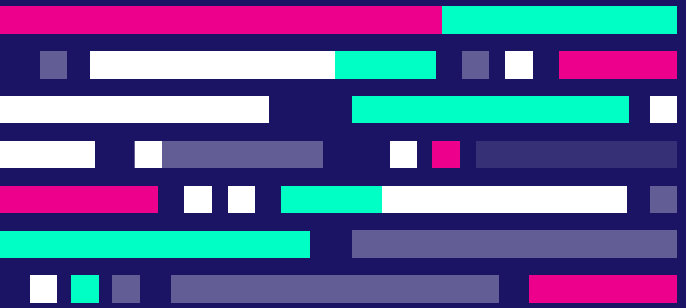

Lists Items - Remove

- We can use remove method to remove and specific item
  - thislist = ["apple", "banana", "cherry"]
  - thislist.remove("banana")
  - If there are more than one occurrences then only the first occurrence is deleted.
- We can use pop() to delete a specific index.
  - thislist = ["apple", "banana", "cherry"]
  - thislist.pop(1)
  - If index is not specified, pop() method removes the last index.
- The delete method del() also deletes a particular location or can also be used to delete an entire list.
- The clear() method is used to empty a list.
  - thislist = ["apple", "banana", "cherry"]
  - thislist.clear()

- NOTE: How methods are utilized. We use a name.method syntax.

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Looping through lists

- We can use for and while to loop through entire lists.
- FOR LOOPS
  - thislist = ["apple", "banana", "cherry"]
  - for x in thislist:
  - print(x)
- We can also assign range in for loops if we want to iterate over a particular range.
  - thislist = ["apple", "banana", "cherry"]
  - for i in range(len(thislist)):
  - print(thislist[i])
- WHILE LOOP
  - thislist = ["apple", "banana", "cherry"]
  - i = 0
  - while i < len(thislist):
  - print(thislist[i])
  - i = i + 1

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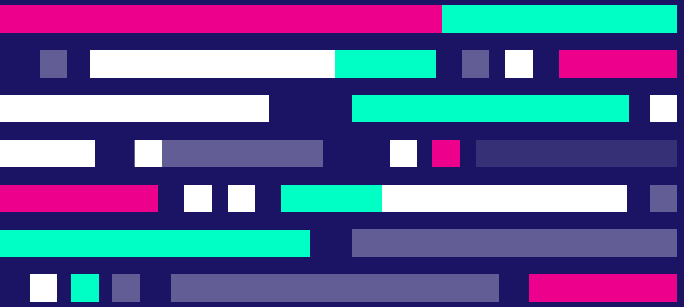
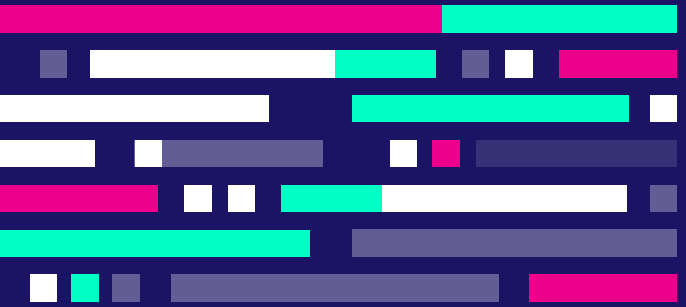
List comprehensions – shortcuts



- Suppose we have a list of months as
  - Months = ["Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov",Dec"]
- Now if we want to separate a list of months starting with letter "J", conventionally we can use ifs in list but with list comprehensions can do in just a single line
  - Months_J = [x for x in Months if "J" in x]
  - print(Months_J)
- Syntax:
  - newlist = [expression for item in iterable if condition == True]
  - Here condition is like a filter that only accepts the items that valuate to True.
  - Conditions can be omitted.
  - Iterable is any object which can be iterated (like range, list etc.)
  - Expression is current item.
- Highly recommended: Check this list for more on this and practice: https://www.w3schools.com/python/python_lists_comprehension.asp



Lists items - Sorting

- We can use sort() to list items alphanumerically.
  - thislist = ["orange", "mango", "kiwi", "pineapple", "banana"]
  - thislist.sort()
  - NOTE: By default sorting is ascending but we can also reverse the order
  - thislist.sort(reverse = True)
  - Sort is case sensitive, it use sorts capital letters first.
  - But this method can be used to sort by using small letters
  - thislist.sort(key = str.lower)
- The reverse() method reverses the current sorting order of the elements.
  - thislist = ["banana", "Orange", "Kiwi", "cherry"]
  - thislist.reverse()

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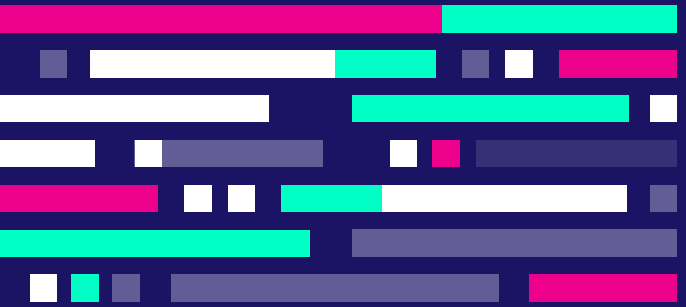

Lists items - Copying / Joining

- We can also copy the contents of a list into another list
  - thislist = ["apple", "banana", "cherry"]
  - mylist = thislist.copy()
- Or with this method:
  - thislist = ["apple", "banana", "cherry"]
  - mylist = list(thislist)
- We can also join lists
  - With Concatenation
  - list1 = ["a", "b", "c"]
  - list2 = [1, 2, 3]
  - list3 = list1 + list2
  - With extend()
  - list1 = ["a", "b" , "c"]
  - list2 = [1, 2, 3]
  - list1.extend(list2)
  - print(list1)

Check

https://www.w3schools.com/python/python_lists_methods.asp