What is data structure?

- Data structures are used to stroe a collection of related data.
- There are four built-in data structures in python-list, tuple, dictionary and set.

List

- Data list is a collection of different data types.
- List is mutable(changeable).
- In python lists are written with square brackets.

In [1]:

```
lst = [12,'a','b',8.7,34,'c',9.7]
print(lst)
```

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7]
```

In [6]:

```
print(len(lst))
```

```
7
```

In [7]:

```
print(lst[0])
```

```
12
```

In [8]:

```
print(lst[1:4])
```

```
['a', 'b', 8.7]
```

In [9]:

```
print(lst[0:])
```

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7]
```

In [10]:

```
print(lst[-1])
```

```
9.7
```

In [11]:

```
print(lst[-1::-1])
```

```
[9.7, 'c', 34, 8.7, 'b', 'a', 12]
```

In [2]:

```
lst = [1,2,3,[4,5,[6,7,8],9,10],11,12,13]
len(lst)
```

Out[2]:

```
7
```

In [13]:

```
lst[3]
```

Out[13]:

```
[4, 5, [6, 7, 8], 9, 10]
```

In [15]:

```
lst[3][2]
```

Out[15]:

```
[6, 7, 8]
```

In [16]:

```
lst[3][2][2]
```

Out[16]:

```
8
```

In [3]:

```
lst
```

Out[3]:

```
[1, 2, 3, [4, 5, [6, 7, 8], 9, 10], 11, 12, 13]
```

In [4]:

```
lst[-1::-1]
```

Out[4]:

```
[13, 12, 11, [4, 5, [6, 7, 8], 9, 10], 3, 2, 1]
```

In [5]:

```
1 lst
```

Out[5]:

```
[1, 2, 3, [4, 5, [6, 7, 8], 9, 10], 11, 12, 13]
```

In [6]:

```
1 res = lst[-1::-1]
2 res
```

Out[6]:

```
[13, 12, 11, [4, 5, [6, 7, 8], 9, 10], 3, 2, 1]
```

In [7]:

```
1 res[3][-1::-1]
```

Out[7]:

```
[10, 9, [6, 7, 8], 5, 4]
```

In [8]:

```
1 res[3][2][-1::-1]
```

Out[8]:

```
[8, 7, 6]
```

In [28]:

```
1 res
```

Out[28]:

```
[13, 12, 11, [4, 5, [6, 7, 8], 9, 10], 3, 2, 1]
```

In [10]:

```
1 lst[3]
```

Out[10]:

```
[4, 5, [6, 7, 8], 9, 10]
```

In [14]:

```
1 lst[3][-1::-1]
```

Out[14]:

```
[10, 9, [6, 7, 8], 5, 4]
```

In [17]:

```
lst[3][2][-1::-1]
```

Out[17]:

```
[8, 7, 6]
```

In [18]:

```
lst
```

Out[18]:

```
[1, 2, 3, [4, 5, [6, 7, 8], 9, 10], 11, 12, 13]
```

In [19]:

```
res
```

Out[19]:

```
[13, 12, 11, [4, 5, [6, 7, 8], 9, 10], 3, 2, 1]
```

In [20]:

```
print(dir(lst))
```

```
['__add__', '__class__', '__contains__', '__delattr__', '__delitem__', '__di
r__', '__doc__', '__eq__', '__format__', '__ge__', '__getattribute__', '__ge
titem__', '__gt__', '__hash__', '__iadd__', '__imul__', '__init__', '__init_
subclass__', '__iter__', '__le__', '__len__', '__lt__', '__mul__', '__ne__',
'__new__', '__reduce__', '__reduce_ex__', '__repr__', '__reversed__', '__rmu
l__', '__setattr__', '__setitem__', '__sizeof__', '__str__', '__subclasshook
__', 'append', 'clear', 'copy', 'count', 'extend', 'index', 'insert', 'pop',
'remove', 'reverse', 'sort']
```

In [21]:

```
# append()
lst
```

Out[21]:

```
[1, 2, 3, [4, 5, [6, 7, 8], 9, 10], 11, 12, 13]
```

In [22]:

```
lst = [12,'a','b',8.7,34,'c',9.7]
lst
```

Out[22]:

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7]
```

In [23]:

```
#append()
lst.append('cse')
```

In [24]:

```
print(lst)
```

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7, 'cse']
```

In [25]:

```
lst.append([1,2,3])
```

In [26]:

```
lst
```

Out[26]:

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3]]
```

In [27]:

```
# extend()
lst.extend([1.2,13])
lst
```

Out[27]:

```
[12, 'a', 'b', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3], 1.2, 13]
```

In [28]:

```
# insert()
lst.insert(3,'KKR')
lst
```

Out[28]:

```
[12, 'a', 'b', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3], 1.2, 13]
```

In [29]:

```
# index()
lst.index('KKR')
```

Out[29]:

```
3
```

In [30]:

```
# count()
lst.count('cse')
```

Out[30]:

```
1
```

In [31]:

```
# copy()
lst2 = lst.copy()
print(lst)
print(lst2)
```

```
[12, 'a', 'b', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3], 1.2, 13]
[12, 'a', 'b', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3], 1.2, 13]
```

In [32]:

```
#clear()
lst.clear()
```

In [33]:

```
lst
```

Out[33]:

```
[]
```

In [34]:

```
lst2
```

Out[34]:

```
[12, 'a', 'b', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3], 1.2, 13]
```

In [35]:

```
# pop()
lst2.pop()
```

Out[35]:

```
13
```

In [36]:

```
lst2.pop()
```

Out[36]:

```
1.2
```

In [37]:

```
1 lst2
```

Out[37]:

```
[12, 'a', 'b', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3]]
```

In [38]:

```
1 lst2.pop(2)
```

Out[38]:

```
'b'
```

In [39]:

```
1 lst2
```

Out[39]:

```
[12, 'a', 'KKR', 8.7, 34, 'c', 9.7, 'cse', [1, 2, 3]]
```

In [52]:

```
1 lst = [4,1,6,13,-12]
```

In [53]:

```
1 # sort()
2 lst.sort()
```

In [54]:

```
1 lst
```

Out[54]:

```
[-12, 1, 4, 6, 13]
```

In [50]:

```
1 lst.reverse()
```

In [51]:

```
1 lst
```

Out[51]:

```
[13, 6, 4, 1, -12]
```

In [55]:

```
# remove()
lst
```

Out[55]:

```
[-12, 1, 4, 6, 13]
```

In [56]:

```
lst.remove(4)
```

In [57]:

```
lst
```

Out[57]:

```
[-12, 1, 6, 13]
```

In [58]:

```
lst.remove(9)
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
<ipython-input-58-5bc6dc696b81> in <module>
----> 1 lst.remove(9)

ValueError: list.remove(x): x not in list
```

In [ ]:

```
# input
lst = [2.5,13,8,'kkr',2.3,'ksr','guntur']

# output
charlst = ['kkr','ksr','guntur']
intlst = [13,8]
flst = [2.5,2.3]
```

In [69]:

```
lst = [2.5,13,8,'kkr',2.3,'ksr','guntur']
charlst = []
intlst = []
flst = []
for i in lst: # i = 2.5, i=13, i=8, i = 'kkr'
    if(type(i) == float):
        flst.append(i)
    elif(type(i) == int):
        intlst.append(i)
    else:
        charlst.append(i)
```

In [70]:

```
print(charlst)
print(intlst)
print(flst)
```

```
['kkr', 'ksr', 'guntur']
[13, 8]
[2.5, 2.3]
```

In [74]:

```
lst = [2.5,13,8,'kkr',2.3,'ksr','guntur']
charlst = []
intlst = []
flst = []
for ele in lst: # ele=2.5, ele=13,  ele=8, ele = 'kkr'
    if(str(ele).isalpha()):
        charlst.append(ele) # charlst = ['kkr','ksr','guntur']
    elif(str(ele).isnumeric()):
        intlst.append(ele) #intlst = [13, 8]
    else:
        flst.append(ele) #flst = [2.5, 2.3]
print(charlst)
print(intlst)
print(flst)
```

```
['kkr', 'ksr', 'guntur']
[13, 8]
[2.5, 2.3]
```

In [75]:

```
s = 'kkr'
s.isalpha()
```

Out[75]:

```
True
```

In [76]:

```
s = 'kkr123'
s.isalpha()
```

Out[76]:

```
False
```

In [84]:

```
lst = [2.5,13,8,'kkr',2.3,'ksr','guntur']
charlst = []
intlst = []
flst = []
for i in range(len(lst)):#i=0
    if(str(lst[i]).isalpha()):
        charlst.append(lst[i])
    elif(str(lst[i]).isnumeric()):
        intlst.append(lst[i])
    else:
        flst.append(lst[i])
print("CharList= ",charlst)
print("IntList= ",intlst)
print("FloatList= ",flst)
```

```
CharList=  ['kkr', 'ksr', 'guntur']
IntList=  [13, 8]
FloatList=  [2.5, 2.3]
```

In [80]:

```
lst = [2.5,13,8,'kkr',2.3,'ksr','guntur']
for i in range(len(lst)):#i=0
    print(i,"-->",lst[i])
```

```
0 --> 2.5
1 --> 13
2 --> 8
3 --> kkr
4 --> 2.3
5 --> ksr
6 --> guntur
```

In [78]:

```
lst[0]
```

Out[78]:

```
2.5
```

In [ ]:

```

```

In [61]:

```
l1 = [1, 2, 3, [4, 5, [6, 7, 8], 9, 10], 11, 12, 13]
l1.reverse()
l1
```

Out[61]:

```
[13, 12, 11, [4, 5, [6, 7, 8], 9, 10], 3, 2, 1]
```

In [62]:

```
l2 = l1[3]
l2
```

Out[62]:

```
[4, 5, [6, 7, 8], 9, 10]
```

In [63]:

```
l2.reverse()
```

In [64]:

```
l2
```

Out[64]:

```
[10, 9, [6, 7, 8], 5, 4]
```

In [66]:

```
l1[3][2].reverse()
```

In [67]:

```
l1
```

Out[67]:

```
[13, 12, 11, [10, 9, [8, 7, 6], 5, 4], 3, 2, 1]
```

In [87]:

```
# mutable
lst = [12,'a','b',8.7,34,'c',9.7]
lst[1] = 'kkr'
lst
```

Out[87]:

```
[12, 'kkr', 'b', 8.7, 34, 'c', 9.7]
```

Tuple

- A tuple is a collection of different data types.
- Immutable.
- Iterations in tuple is faster than list.
- In python tuples are written with rounded brackets-->().

In [88]:

```
t = ('cse',12,42,'ece',9.8)
t
```

Out[88]:

```
('cse', 12, 42, 'ece', 9.8)
```

In [89]:

```
t[0]
```

Out[89]:

```
'cse'
```

In [90]:

```
t[0:]
```

Out[90]:

```
('cse', 12, 42, 'ece', 9.8)
```

In [91]:

```
t[-1::-1]
```

Out[91]:

```
(9.8, 'ece', 42, 12, 'cse')
```

In [92]:

```
print(dir(tuple))
```

```
['__add__', '__class__', '__contains__', '__delattr__', '__dir__', '__doc_
_', '__eq__', '__format__', '__ge__', '__getattribute__', '__getitem__', '__
getnewargs__', '__gt__', '__hash__', '__init__', '__init_subclass__', '__ite
r__', '__le__', '__len__', '__lt__', '__mul__', '__ne__', '__new__', '__redu
ce__', '__reduce_ex__', '__repr__', '__rmul__', '__setattr__', '__sizeof__',
'__str__', '__subclasshook__', 'count', 'index']
```

In [93]:

```
# count()
t.count('cse')
```

Out[93]:

```
1
```

In [94]:

```
1 t.index('cse')
```

Out[94]:

```
0
```

In [95]:

```
1 t
```

Out[95]:

```
('cse', 12, 42, 'ece', 9.8)
```

In [96]:

```
1 t2 = ('cse', 12, 42, 'ece', 9.8,'ece')
2 t2
```

Out[96]:

```
('cse', 12, 42, 'ece', 9.8, 'ece')
```

In [97]:

```
1 t2.count('ece')
```

Out[97]:

```
2
```

In [98]:

```
1 t2.index('ece')
```

Out[98]:

```
3
```

In [99]:

```
1 for i in range(len(t2)):
2     print(i)
```

```
0
1
2
3
4
5
```

In [100]:

```
for i in range(len(t2)):
    if(t2[i] == 'ece'):
        print(t2[i],"=",i)
```

```
ece = 3
ece = 5
```

In [ ]:

```

```