What is data structure?

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

List

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

In [1]:

```
lst = ['ece',12,34,'eswar',7.5,53]
lst
```

Out[1]:

```
['ece', 12, 34, 'eswar', 7.5, 53]
```

In [3]:

```
# mutable
lst[3]
```

Out[3]:

```
'eswar'
```

In [4]:

```
lst[3] = 'cse'
print(lst)
```

```
['ece', 12, 34, 'cse', 7.5, 53]
```

In [5]:

```
lst
```

Out[5]:

```
['ece', 12, 34, 'cse', 7.5, 53]
```

In [6]:

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

```
6
```

In [7]:

```
# indexing|slicing
lst[0]
```

Out[7]:

```
'ece'
```

In [8]:

```
print(lst[5])
```

```
53
```

In [9]:

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

```
53
```

In [13]:

```
lst[0:3:1]
```

Out[13]:

```
['ece', 12, 34]
```

In [15]:

```
lst
```

Out[15]:

```
['ece', 12, 34, 'cse', 7.5, 53]
```

In [16]:

```
lst[0:len(lst):2]
```

Out[16]:

```
['ece', 34, 7.5]
```

In [17]:

```
lst[0::1]
```

Out[17]:

```
['ece', 12, 34, 'cse', 7.5, 53]
```

In [18]:

```
lst[-1]
```

Out[18]:

```
53
```

In [19]:

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

Out[19]:

```
[53, 7.5, 'cse', 34, 12, 'ece']
```

In [20]:

```
lst[-1:-7:-1]
```

Out[20]:

```
[53, 7.5, 'cse', 34, 12, 'ece']
```

In [23]:

```
lst[5::-1]
```

Out[23]:

```
[53, 7.5, 'cse', 34, 12, 'ece']
```

In [24]:

```
lst2 = [53, 7.5, ['cse', 34, 8.7], 12, 'ece']
lst2
```

Out[24]:

```
[53, 7.5, ['cse', 34, 8.7], 12, 'ece']
```

In [32]:

```
len(lst2)
```

Out[32]:

```
5
```

In [34]:

```
print(len(lst2[2]))
```

```
3
```

In [35]:

```
lst2[2]
```

Out[35]:

```
['cse', 34, 8.7]
```

In [31]:

```
lst2
```

Out[31]:

```
[53, 7.5, ['cse', 34, 8.7], 12, 'ece']
```

In [37]:

```
lst2[2][1]
```

Out[37]:

```
34
```

In [38]:

```
lst2[2][0]
```

Out[38]:

```
'cse'
```

In [39]:

```
lst3 = [53, 7.5, ['cse', 34, [8.7,13,15], 12], 'ece']
lst3
```

Out[39]:

```
[53, 7.5, ['cse', 34, [8.7, 13, 15], 12], 'ece']
```

In [40]:

```
lst3[2]
```

Out[40]:

```
['cse', 34, [8.7, 13, 15], 12]
```

In [41]:

```
lst3[2][2]
```

Out[41]:

```
[8.7, 13, 15]
```

In [42]:

```
lst3[2][2][0]
```

Out[42]:

```
8.7
```

In [43]:

```
print(dir(list))
```

```
['__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 [44]:

```
# append()
lst
```

Out[44]:

```
['ece', 12, 34, 'cse', 7.5, 53]
```

In [45]:

```
lst.append('civil')
```

In [46]:

```
lst
```

Out[46]:

```
['ece', 12, 34, 'cse', 7.5, 53, 'civil']
```

In [47]:

```
lst.append([67,1.9])
```

In [48]:

```
lst
```

Out[48]:

```
['ece', 12, 34, 'cse', 7.5, 53, 'civil', [67, 1.9]]
```

In [49]:

```
# extend()
lst.extend(['a','b'])
```

In [50]:

```
lst
```

Out[50]:

```
['ece', 12, 34, 'cse', 7.5, 53, 'civil', [67, 1.9], 'a', 'b']
```

In [51]:

```
l = lst.copy()
print("l: ",l)
print("lst: ",lst)
```

```
l:  ['ece', 12, 34, 'cse', 7.5, 53, 'civil', [67, 1.9], 'a', 'b']
lst:  ['ece', 12, 34, 'cse', 7.5, 53, 'civil', [67, 1.9], 'a', 'b']
```

In [52]:

```
# count()
lst.count(34)
```

Out[52]:

```
1
```

In [53]:

```
lst.count('eswar')
```

Out[53]:

```
0
```

In [54]:

```
# index()
lst.index(7.5)
```

Out[54]:

```
4
```

In [55]:

```
# insert()
lst.insert(4,'cse')
```

In [56]:

```
lst
```

Out[56]:

```
['ece', 12, 34, 'cse', 'cse', 7.5, 53, 'civil', [67, 1.9], 'a', 'b']
```

In [57]:

```
# reverse()
lst.reverse()
```

In [58]:

```
lst
```

Out[58]:

```
['b', 'a', [67, 1.9], 'civil', 53, 7.5, 'cse', 'cse', 34, 12, 'ece']
```

In [59]:

```
# pop()
lst.pop()
```

Out[59]:

```
'ece'
```

In [61]:

```
lst
```

Out[61]:

```
['b', 'a', [67, 1.9], 'civil', 53, 7.5, 'cse', 'cse', 34, 12]
```

In [62]:

```
lst[2]
```

Out[62]:

```
[67, 1.9]
```

In [63]:

```
lst[2].reverse()
```

In [64]:

```
lst
```

Out[64]:

```
['b', 'a', [1.9, 67], 'civil', 53, 7.5, 'cse', 'cse', 34, 12]
```

In [66]:

```
lst.pop(-3)
```

Out[66]:

```
'cse'
```

In [67]:

```
lst
```

Out[67]:

```
['b', 'a', [1.9, 67], 'civil', 53, 7.5, 'cse', 34, 12]
```

In [68]:

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

In [69]:

```
lst
```

Out[69]:

```
[]
```

In [70]:

```
len(lst)
```

Out[70]:

```
0
```

In [71]:

```
# sort()
list2 = [7,4,2,9,-5,0,-12]
list2.sort()
```

In [72]:

```
list2 # will give ascending order
```

Out[72]:

```
[-12, -5, 0, 2, 4, 7, 9]
```

In [73]:

```
list2.reverse()
list2
```

Out[73]:

```
[9, 7, 4, 2, 0, -5, -12]
```

In [76]:

```
ls = [1,2,'a',1.3,'b',4,9.0]
strlst = []
intlst = []
floatlst = []
for items in ls: #items=1,items=2,items='a',items=1.3
    if(type(items) == int):
        intlst.append(items)
    elif(type(items) == str):
        strlst.append(items)
    else:
        floatlst.append(items)
print(strlst)
print(intlst)
print(floatlst)
```

```
['a', 'b']
[1, 2, 4]
[1.3, 9.0]
```

Tuple

- It is collectio of different data types.
- Tuples are written with rounded brackets.
- It is immutable(unchangeable).
- Iterations in tuple is faster than list.

In [77]:

```
t = (3,5,7.5,'cse','ece',6.9)
print(len(t))
```

```
6
```

In [78]:

```
t[0]
```

Out[78]:

```
3
```

In [79]:

```
# immutable
t[0] = 23
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-79-cb8526fa2c9a> in <module>
      1 # immutable
----> 2 t[0] = 23

TypeError: 'tuple' object does not support item assignment
```

In [80]:

```
t[3:5]
```

Out[80]:

```
('cse', 'ece')
```

In [81]:

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

Out[81]:

```
(6.9, 'ece', 'cse', 7.5, 5, 3)
```

In [82]:

```
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 [85]:

```
t
```

Out[85]:

```
(3, 5, 7.5, 'cse', 'ece', 6.9)
```

In [83]:

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

Out[83]:

```
1
```

In [84]:

```
# index()
t.index(7.5)
```

Out[84]:

```
2
```

In [95]:

```
print("Geeks : %02d, Portal : %5.2f" % (1, 05.333))

```

```
Geeks : 01, Portal :  5.33
```

In [ ]:

```

```