Set

1. Unordered & Unindexed collection of items.
2. Set elements are unique. Duplicate elements are not allowed.
3. Set elements are immutable (cannot be changed).
4. Set itself is mutable. We can add or remove items from it.

In [2]:
```
s = {1,2,3,4,5} # set of numbers
```

In [3]:
```
len(s)
```

Out[3]:
```
5
```

In [4]:
```
s1 = {1,1,2,2,3,4,5,5} # Duplicate elements are not allowed
```

In [5]:
```
s1
```

Out[5]:
```
{1, 2, 3, 4, 5}
```

In [6]:
```
s2 = {1.79,2.08,3.99,4.56,5.45} # set of float numbers
s2
```

Out[6]:
```
{1.79, 2.08, 3.99, 4.56, 5.45}
```

In [7]:
```
s3 = {'Gopi','Ajay','Deekshi'} # set of strings
s3
```

Out[7]:
```
{'Ajay', 'Deekshi', 'Gopi'}
```

In [10]:
```
s4 = {10,20,"Veda",(11,22,32)} # Mixed datatypes
s4
```

Out[10]:
```
{(11, 22, 32), 10, 20, 'Veda'}
```

In [11]:
```
s4 = {10,20,"Veda",[11,22,32]}
s4
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
Cell In[11], line 1
----> 1 s4 = {10,20,"Veda",[11,22,32]}
      2 s4

TypeError: unhashable type: 'list'
```

In [12]:
```
s5 = set()
print(type(s5))
```

```
<class 'set'>
```

In [13]:
```
s6 = set(('one','two','three','four'))
s6
```

```
Out[13]: {'four', 'one', 'three', 'two'}
```

Loop through a Set

```
In [14]: myset = {'one','two','three','four','five','six','seven','eight'}

         for i in myset:
             print(i)
```

```
eight
five
seven
two
one
four
six
three
```

```
In [15]: for i in enumerate(myset):
             print(i)
```

```
(0, 'eight')
(1, 'five')
(2, 'seven')
(3, 'two')
(4, 'one')
(5, 'four')
(6, 'six')
(7, 'three')
```

Set Membership

```
In [16]: myset
```

```
Out[16]: {'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [17]: 'one' in myset
```

```
Out[17]: True
```

```
In [18]: 'seven' in myset
```

```
Out[18]: True
```

```
In [24]: if 'six' in myset: # Check if 'six' exist in the set
             print('six is present in the set')
         else:
             print('six is not present in the set')
```

```
six is present in the set
```

```
In [25]: if 'twelve' in myset: # Check if 'twelve' exist in the set
             print('twelve is present in the set')
         else:
             print('twelve is not present in the set')
```

```
twelve is not present in the set
```

Add & Remove Items

In [26]:
```
myset
```

Out[26]:
```
{'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

In [27]:
```
myset.add('NINE')
myset
```

Out[27]:
```
{'NINE', 'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

In [28]:
```
myset.update(['TEN','ELEVEN','TWELVE'])
myset
```

Out[28]:
```
{'ELEVEN',
 'NINE',
 'TEN',
 'TWELVE',
 'eight',
 'five',
 'four',
 'one',
 'seven',
 'six',
 'three',
 'two'}
```

In [35]:
```
myset.remove('six')
myset
```

Out[35]:
```
{'ELEVEN', 'TWELVE', 'eight', 'five', 'four', 'one', 'seven', 'three', 'two'}
```

In [37]:
```
myset.discard('TEN')
myset
```

Out[37]:
```
{'ELEVEN', 'TWELVE', 'eight', 'five', 'four', 'one', 'seven', 'three', 'two'}
```

In [39]:
```
myset.clear() # Delete all items in a list
myset
```

Out[39]:
```
set()
```

In [40]:
```
del myset # Delete the set object
myset
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[40], line 2
      1 del myset # Delete the set object
----> 2 myset

NameError: name 'myset' is not defined
```

Copy

```
In [41]: myset = {'one', 'two', 'three', 'four', 'five', 'six', 'seven', 'eight'}
         myset
```

```
Out[41]: {'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [42]: myset1 = myset
         myset1
```

```
Out[42]: {'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [43]: id(myset) , id(myset1)
```

```
Out[43]: (1549443976992, 1549443976992)
```

```
In [44]: myset2 = myset.copy()
         myset2
```

```
Out[44]: {'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [45]: id(myset2)
```

```
Out[45]: 1549443976544
```

```
In [46]: myset.add('nine')
         myset
```

```
Out[46]: {'eight', 'five', 'four', 'nine', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [47]: myset1
```

```
Out[47]: {'eight', 'five', 'four', 'nine', 'one', 'seven', 'six', 'three', 'two'}
```

```
In [48]: myset2
```

```
Out[48]: {'eight', 'five', 'four', 'one', 'seven', 'six', 'three', 'two'}
```

Set operation

Union (|)

```
In [50]: A = {1,2,3,4,5}
         B = {4,5,6,7,8}
         C = {8,9,10}
```

```
In [55]: A | B
```

```
Out[55]: {1, 2, 3, 4, 5, 6, 7, 8}
```

```
In [51]: A.union(B) # union of A and B
```

```
Out[51]: {1, 2, 3, 4, 5, 6, 7, 8}
```

```
In [52]: A.union(B,C) # union of A,B and C
```

```
Out[52]: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
```

```
In [53]: A.update(B,C)
         A
```

```
Out[53]: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
```

Intersection (&)

```
In [60]: A = {1,2,3,4,5}
         B = {4,5,6,7,8}
```

```
In [61]: A & B
```

```
Out[61]: {4, 5}
```

```
In [62]: A.intersection(B)
```

```
Out[62]: {4, 5}
```

```
In [64]: A.intersection_update(B)
         A
```

```
Out[64]: {4, 5}
```

Difference (-)

```
In [66]: A = {1,2,3,4,5}
         B = {4,5,6,7,8}
```

```
In [67]: A - B
```

```
Out[67]: {1, 2, 3}
```

```
In [68]: A.difference(B)
```

```
Out[68]: {1, 2, 3}
```

```
In [69]: B - A
```

```
Out[69]: {6, 7, 8}
```

```
In [70]: B.difference(A)
```

```
Out[70]: {6, 7, 8}
```

Symmetric Difference (^)

```
In [71]: A = {1,2,3,4,5}
         B = {4,5,6,7,8}
```

```
In [72]: A ^ B
```

```
Out[72]: {1, 2, 3, 6, 7, 8}
```

```
In [73]: A.symmetric_difference_update(B)
         A
```

```
Out[73]: {1, 2, 3, 6, 7, 8}
```

Subset,Superset & Disjoint

```
In [75]: A = {1,2,3,4,5,6,7,8,9}
         B = {3,4,5,6,7,8}
         C = {10,20,30,40}
```

```
In [76]: B.issubset(A)
```

```
Out[76]: True
```

```
In [77]: A.issuperset(B)
```

```
Out[77]: True
```

```
In [78]: C.isdisjoint(A)
```

```
Out[78]: True
```

```
In [79]: B.isdisjoint(A)
```

```
Out[79]: False
```

Other Builtin functions

```
In [80]: A
```

```
Out[80]: {1, 2, 3, 4, 5, 6, 7, 8, 9}
```

```
In [81]: sum(A)
```

```
Out[81]: 45
```

```
In [82]: max(A)
```

```
Out[82]: 9
```

```
In [83]: min(A)
```

```
Out[83]: 1
```

```
In [84]: len(A)
```

```
Out[84]: 9
```

```
In [85]: list(enumerate(A))
```

```
Out[85]: [(0, 1), (1, 2), (2, 3), (3, 4), (4, 5), (5, 6), (6, 7), (7, 8), (8, 9)]
```

```
In [86]: D = sorted(A,reverse=True)
         D
```

```
Out[86]: [9, 8, 7, 6, 5, 4, 3, 2, 1]
```

```
In [87]: sorted(D)
```

```
Out[87]: [1, 2, 3, 4, 5, 6, 7, 8, 9]
```

Dictionary

- Dictionary is a mutable data type in Python.
- A python dictionary is a collection of key and value pairs separated by a colon (:) & enclosed in curly braces {}.
- Keys must be unique in a dictionary, duplicate values are allowed.

```
In [88]: d = dict()
         d
```

```
Out[88]: {}
```

```
In [90]: d = {}
         d
```

```
Out[90]: {}
```

```
In [91]: d = {1:'one',2:'two',3:'three'}
         d
```

```
Out[91]: {1: 'one', 2: 'two', 3: 'three'}
```

```
In [92]: d = dict({1:'one',2:'two',3:'three'})
         d
```

```
Out[92]: {1: 'one', 2: 'two', 3: 'three'}
```

```
In [93]: d = {'A':'one' , 'B':'two', 'C':'three'}
         d
```

```
Out[93]: {'A': 'one', 'B': 'two', 'C': 'three'}
```

```
In [94]: d = {1:'one', 'A':'two', 3:'three'}
         d
```

```
Out[94]: {1: 'one', 'A': 'two', 3: 'three'}
```

```
In [95]: d.keys()
```

```
Out[95]: dict_keys([1, 'A', 3])
```

```
In [96]: d.values()
```

```
Out[96]: dict_values(['one', 'two', 'three'])
```

```
In [97]: d.items()
```

Out[97]:
```
dict_items([(1, 'one'), ('A', 'two'), (3, 'three')])
```

In [98]:
```
d = {1:'one',2:'two','A':['ajay','deekshi','Gopi'],'B':('Monkey','dog','cat')}
d
```

Out[98]:
```
{1: 'one',
 2: 'two',
 'A': ['ajay', 'deekshi', 'Gopi'],
 'B': ('Monkey', 'dog', 'cat')}
```

In [100…
```
d= {1:'one' , 2:'two','A':{'Name':'veda', 'Age':5},'B':('Monkey', 'dog', 'cat')}
d
```

Out[100…
```
{1: 'one',
 2: 'two',
 'A': {'Name': 'veda', 'Age': 5},
 'B': ('Monkey', 'dog', 'cat')}
```

In [101…
```
keys = {'a' , 'b' , 'c' , 'd'}
d1 = dict.fromkeys(keys)
d1
```

Out[101…
```
{'a': None, 'c': None, 'b': None, 'd': None}
```

In [102…
```
keys = {'a' , 'b' , 'c' , 'd'}
value = 10
d1 = dict.fromkeys(keys , value)
d1
```

Out[102…
```
{'a': 10, 'c': 10, 'b': 10, 'd': 10}
```

In [103…
```
keys = {'a' , 'b' , 'c' , 'd'}
value = [10,20,30]
d1 = dict.fromkeys(keys , value)
d1
```

Out[103…
```
{'a': [10, 20, 30], 'c': [10, 20, 30], 'b': [10, 20, 30], 'd': [10, 20, 30]}
```

In [104…
```
value.append(40)
d1
```

Out[104…
```
{'a': [10, 20, 30, 40],
 'c': [10, 20, 30, 40],
 'b': [10, 20, 30, 40],
 'd': [10, 20, 30, 40]}
```

In [106…
```
value.append(50)
d1
```

Out[106…
```
{'a': [10, 20, 30, 40, 50],
 'c': [10, 20, 30, 40, 50],
 'b': [10, 20, 30, 40, 50],
 'd': [10, 20, 30, 40, 50]}
```

Accessing items

In [107…
```
d2 = {1:'one',2:'two',3:'three',4:'four'}
```

```
d2
```

Out[107…

```
{1: 'one', 2: 'two', 3: 'three', 4: 'four'}
```

In [108…

```
d2[1]
```

Out[108…

```
'one'
```

In [109…

```
d2.get(1)
```

Out[109…

```
'one'
```

In [131…

```
d3 = {'Name': 'Gopi' , 'ID' : 1821 , 'DOB' : 1998 , 'job' : 'Analyst'}
d3
```

Out[131…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1998, 'job': 'Analyst'}
```

In [132…

```
d3['Name']
```

Out[132…

```
'Gopi'
```

In [133…

```
d3.get('job')
```

Out[133…

```
'Analyst'
```

Add,Remove & Change Items

In [134…

```
d3 = {'Name': 'Gopi' , 'ID' : 1821 , 'DOB' : 1998 , 'Address' : 'KDD'}
d3
```

Out[134…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1998, 'Address': 'KDD'}
```

In [135…

```
d3['DOB'] = 1996
d3['Address'] = 'MLG'
d3
```

Out[135…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1996, 'Address': 'MLG'}
```

In [136…

```
dict = {'DOB':1997}
d3.update(dict)
d3
```

Out[136…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1997, 'Address': 'MLG'}
```

In [137…

```
d3['job'] = 'Analyst'
d3
```

Out[137…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1997, 'Address': 'MLG', 'job': 'Analyst'}
```

In [138…

```
d3.pop('job')
d3
```

Out[138…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1997, 'Address': 'MLG'}
```

In [139…

```
d3.popitem()
```

Out[139…

```
('Address', 'MLG')
```

In [140…

```
d3
```

Out[140…

```
{'Name': 'Gopi', 'ID': 1821, 'DOB': 1997}
```

In [141…

```
del[d3['ID']]
d3
```

Out[141…

```
{'Name': 'Gopi', 'DOB': 1997}
```

In [142…

```
d3.clear()
d3
```

Out[142…

```
{}
```

In [143…

```
del d3
d3
```

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
Cell In[143], line 2
      1 del d3
----> 2 d3

NameError: name 'd3' is not defined
```

Copy Dictionary

In [146…

```
d4 = {'Name':'Varshith' , 'ID': 12345 , 'DOB': 1991 , 'Address' : 'Delhi'}
d4
```

Out[146…

```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Delhi'}
```

In [147…

```
d5 = d4
```

In [148…

```
d5
```

Out[148…

```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Delhi'}
```

In [149…

```
id(d4) , id(d5)
```

Out[149…

```
(1549445294464, 1549445294464)
```

In [150…

```
d6 = d4.copy()
```

In [151…

```
id(d6)
```

Out[151…

```
1549445389824
```

In [152…

```
d4['Address'] = 'Mumbai'
```

In [156…

```
d4
```

Out[156…

```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Mumbai'}
```

In [154…
```
d5
```
Out[154…
```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Mumbai'}
```

In [155…
```
d6
```
Out[155…
```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Delhi'}
```

Loop through a Dictionary

In [157…
```
d5
```
Out[157…
```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Mumbai'}
```

In [159…
```
for i in d5:
    print(i,':',d5[i])
```
```
Name : Varshith
ID : 12345
DOB : 1991
Address : Mumbai
```

In [160…
```
for i in d5:
    print(d5[i])
```
```
Varshith
12345
1991
Mumbai
```

Dictionary Membership

In [161…
```
d5
```
Out[161…
```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Mumbai'}
```

In [162…
```
'Name' in d5
```
Out[162…
```
True
```

In [163…
```
'Address' in d5
```
Out[163…
```
True
```

In [164…
```
12345 in d5
```
Out[164…
```
False
```

All/Any

In [165…
```
d5
```
Out[165…
```
{'Name': 'Varshith', 'ID': 12345, 'DOB': 1991, 'Address': 'Mumbai'}
```

In [166…
```
all(d5)
```

```
Out[166…   True
```