Cont. Data Structures-II

🎯 Session Objectives

- 🔑 Understand what dictionaries are.
- 🛠️ Understand common methods and operations associated with dictionaries.
- 🤝 Understand the comparison between lists, tuples, sets and dictionaries.

```python
# Copying the set [Shallow Copy]
day_set = {'Mon','Wed','Thurs','Sat','Tues','Fri','Sun'}
copy_day_set = day_set.copy()
print(id(day_set))
print(id(copy_day_set))
copy_day_set.add('Jan')
print(copy_day_set)
print(day_set)
```

```
2373566918080
2373566917856
{'Sun', 'Fri', 'Thurs', 'Sat', 'Jan', 'Tues', 'Wed', 'Mon'}
{'Sun', 'Fri', 'Thurs', 'Sat', 'Tues', 'Wed', 'Mon'}
```

```python
# Copying the set (using set() constructor)
another_day_set = set(copy_day_set)
print(id(copy_day_set)) # 2373566917856
print(id(another_day_set)) # another location in memory
another_day_set.discard('Jan')
print(copy_day_set) # {'Sun', 'Fri', 'Thurs', 'Sat', 'Jan', 'Tues', 'Wed', 'Mon'}
print(another_day_set) # above set without 'Jan'
```

```
2373566917856
2373593430304
{'Sun', 'Fri', 'Thurs', 'Sat', 'Jan', 'Tues', 'Wed', 'Mon'}
{'Fri', 'Sat', 'Wed', 'Mon', 'Thurs', 'Sun', 'Tues'}
```

What is Dictionary in Python?

A dictionary is :

1. Ordered : Items have guaranteed sequence.
2. Mutable : You can change, add or remove items
3. Collection of Key-Value Pair : Each Key is Unique and maps to a values

This makes Dictionaries perfect for representing data as attributes (like a record for a person, settings, or products)

```
_dict = {} # dictionary type
print(type(_dict))
```

```
<class 'dict'>
```

```
# Dictionary # When defining duplicate keys, only the last occurrence is kept.
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python'],
    'course' : 'Data Science'
}
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Science',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python']}
```

```
# Using Tuples as dictionary Key
_dict = {
    ('stud1','stud2') : 98,
    ('stud3','stud4') : 92,
    ('stud5','stud6') : 77,
    ('stud7','stud8') : 99
}
_dict
```

```
{('stud1', 'stud2'): 98,
 ('stud3', 'stud4'): 92,
 ('stud5', 'stud6'): 77,
 ('stud7', 'stud8'): 99}
```

```
# dict() constructor
_dict = dict(name = "Utkarsh",age = 29, gender = "Male", Country = "India")
_dict
```

```
{'name': 'Utkarsh', 'age': 29, 'gender': 'Male', 'Country': 'India'}
```

```python
# With a List of List or tuples
list_of_lists = [
    ['name','Ali'],
    ['age',27],
    ['gender','Male'],
    ['city','Ghaziabad'],
    ['state','UP'],
    ['country','India']
]
_dict = dict(list_of_lists)
_dict
```

```
{'name': 'Ali',
 'age': 27,
 'gender': 'Male',
 'city': 'Ghaziabad',
 'state': 'UP',
 'country': 'India'}
```

```python
list_of_tuples = [
    ('name','Ali'),
    ('age',27),
    ('gender','Male'),
    ('city','Ghaziabad'),
    ('state','UP'),
    ('country','India')
]
_dict = dict(list_of_tuples)
_dict
```

```
{'name': 'Ali',
 'age': 27,
 'gender': 'Male',
 'city': 'Ghaziabad',
 'state': 'UP',
 'country': 'India'}
```

```python
tuples_of_tuples = (
    ('name','Ali'),
    ('age',27),
    ('gender','Male'),
    ('city','Ghaziabad'),
    ('state','UP'),
    ('country','India')
)
_dict = dict(tuples_of_tuples)
_dict
```

```
{'name': 'Ali',
 'age': 27,
 'gender': 'Male',
 'city': 'Ghaziabad',
 'state': 'UP',
 'country': 'India'}
```

```python
_list = [[11,'rupees']]
_dict = dict(_list)
_dict
```

```
{11: 'rupees'}
```

```python
student_details = {
    'name' : 'Prabhakar Shah',
    'another_name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : {'Excel','Power BI','Sql','Python'},
    'course' : 'Data Science'
}
student_details
```

```
{'name': 'Prabhakar Shah',
 'another_name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Science',
 'skills': {'Excel', 'Power BI', 'Python', 'Sql'}}
```

```python
# Nested Dictionaries :
student_record = {
    "Student1" : {
        'name' : 'Prabhakar Shah',
        'age' : 28,
        'gender' : 'Male',
        'city' : 'Indore',
        'State' : 'Madhya Pradesh',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : {'Excel','Power BI','Sql','Python'}
    },
    "Student2" : {
        'name' : 'shalu Kumari',
        'age' : 27,
        'gender' : 'Female',
        'city' : 'Newtown',
        'State' : 'Kolkata',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : {'Excel','Power BI','Sql','Python'}
    }
}
student_record
```

```
{'Student1': {'name': 'Prabhakar Shah',
  'age': 28,
  'gender': 'Male',
  'city': 'Indore',
  'State': 'Madhya Pradesh',
  'country': 'India',
  'course': 'Data Analytics',
  'skills': {'Excel', 'Power BI', 'Python', 'Sql'}},
 'Student2': {'name': 'shalu Kumari',
  'age': 27,
  'gender': 'Female',
  'city': 'Newtown',
  'State': 'Kolkata',
  'country': 'India',
  'course': 'Data Analytics',
  'skills': {'Excel', 'Power BI', 'Python', 'Sql'}}}
```

Common Methods and operations Associated with Dictionaries

```python
# Length() -> Use len() to find how many key-value pairs are in dictionary
print(len(student_details))
```

```
9
```

```python
print(len(student_record))
```

```
2
```

```python
print(len(student_record['Student1']))
```

```
8
```

```python
# Accessing Elements
# Use Square Bracket TableName['key']
student_details = {
    'name' : 'Prabhakar Shah',
    'another_name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : {'Excel','Power BI','Sql','Python'},
    'course' : 'Data Science'
}
student_details['skills']
```

```
{'Excel', 'Power BI', 'Python', 'Sql'}
```

```python
student_details['course']
```

```
'Data Science'
```

```
student_record = {
    "Student1" : {
        'name' : 'Prabhakar Shah',
        'age' : 28,
        'gender' : 'Male',
        'city' : 'Indore',
        'State' : 'Madhya Pradesh',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : {'Excel','Power BI','Sql','Python'}
    },
    "Student2" : {
        'name' : 'Shalu Kumari',
        'age' : 27,
        'gender' : 'Female',
        'city' : 'Newtown',
        'State' : 'Kolkata',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : ['Excel','Power BI','Sql','Python']
    }
}
student_record['Student2']['name']
```

```
'Shalu Kumari'
```

```
student_record['Student2']['skills']
```

```
['Excel', 'Power BI', 'Sql', 'Python']
```

```
student_record['Student2']['skills'][-1]
```

```
'Python'
```

```
student_record['Student2']['skills'][0:2] # ['Excel','PowerBI']
```

```
['Excel', 'Power BI']
```

```
_dict = {
    ('stud1','stud2') : 98,
    ('stud3','stud4') : 92,
    ('stud5','stud6') : 77,
    ('stud7','stud8') : 99
}
_dict[('stud5','stud6')]
```

```
77
```

```
# .get(key,default) -> It will safely retrieve the value; returns None or a default if key not found.
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
student_details.get('course','Data Science')
```

```
'Data Analytics'
```

```
student_details.get('email','xyz@gmail.com')
```

```
'xyz@gmail.com'
```

```
student_details.get('skills')
```

```
['Excel', 'Power BI', 'Sql', 'Python']
```

```
student_details.get('country_code') # Won't throw an error
```

```
student_record = {
    "Student1" : {
        'name' : 'Prabhakar Shah',
        'age' : 28,
        'gender' : 'Male',
        'city' : 'Indore',
        'State' : 'Madhya Pradesh',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : {'Excel','Power BI','Sql','Python'}
    },
    "Student2" : {
        'name' : 'Shalu Kumari',
        'age' : 27,
        'gender' : 'Female',
        'city' : 'Newtown',
        'State' : 'Kolkata',
        'country' : 'India',
        'course' : 'Data Analytics',
        'skills' : ['Excel','Power BI','Sql','Python']
    }
}
student_record.get("Student2", {}).get('name','Unknown')
```

```
'Shalu Kumari'
```

```
student_record.get("Student7", {}).get('name','Unknown')
```

```
'Unknown'
```

```
student_record
```

```
{'Student1': {'name': 'Prabhakar Shah',
  'age': 28,
  'gender': 'Male',
  'city': 'Indore',
  'State': 'Madhya Pradesh',
  'country': 'India',
  'course': 'Data Analytics',
  'skills': {'Excel', 'Power BI', 'Python', 'Sql'}},
 'Student2': {'name': 'Shalu Kumari',
  'age': 27,
  'gender': 'Female',
  'city': 'Newtown',
  'State': 'Kolkata',
  'country': 'India',
  'course': 'Data Analytics',
  'skills': ['Excel', 'Power BI', 'Sql', 'Python']}}
```

```
# .keys() -> Returns all the keys from student_details
# .values() -> Returns all the values from student_details
# .items() -> Returns all the (key,value) from student_details
student_details.keys()
```

```
dict_keys(['name', 'age', 'gender', 'city', 'State', 'country', 'course', 'skills'])
```

```
student_details.values()
```

```
dict_values(['Prabhakar Shah', 28, 'Male', 'Indore', 'Madhya Pradesh', 'India', 'Data Analytics', ['Excel', 'P
ower BI', 'Sql', 'Python']])
```

```
student_details.items()
```

```
dict_items([('name', 'Prabhakar Shah'), ('age', 28), ('gender', 'Male'), ('city', 'Indore'), ('State', 'Madhya
Pradesh'), ('country', 'India'), ('course', 'Data Analytics'), ('skills', ['Excel', 'Power BI', 'Sql', 'Pytho
n'])])
```

```
# setdefault() -> Retrieves the value if the key exist , else insert key with default
# if no default provided , inserts None
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
student_details.setdefault('course')
```

```
'Data Analytics'
```

```
student_details.setdefault('course','Data Science')
```

```
'Data Analytics'
```

```
student_details.setdefault('email','xyz@gmail.com')
```

```
'xyz@gmail.com'
```

```
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python'],
 'email': 'xyz@gmail.com'}
```

```
student_details.setdefault('phone_number') # None [Values]
```

```
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python'],
 'email': 'xyz@gmail.com',
 'phone_number': None}
```

```python
# .min() , max() , sum()
_dict = {
    ('stud1','stud2') : 98,
    ('stud3','stud4') : 92,
    ('stud5','stud6') : 77,
    ('stud7','stud8') : 99
}
min(_dict.values()) # 77 [98,92,77,99]
```

```
77
```

```python
max(_dict.values()) # 99 [98,92,77,99]
```

```
99
```

```python
sum(_dict.values()) # 366  [98,92,77,99]
```

```
366
```

```python
min(_dict.keys())
```

```
('stud1', 'stud2')
```

```python
max(_dict.keys())
```

```
('stud7', 'stud8')
```

```python
_dict = {
    77 : ['stud1','stud2'],
    92 : ['stud3','stud4'],
    99 : ['stud5','stud6'],
    98 : ['stud7','stud8']
}
min(_dict.keys())
```

```
77
```

```python
max(_dict.keys())
```

```
99
```

```python
sum(_dict.keys())
```

```
366
```

```python
# Changing or Adding a Dictionary Items
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
student_details['city'] = 'Lucknow'
```

```python
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Lucknow',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python']}
```

```
student_details['email'] = 'prabhakar.shah123@gmail.com'
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Lucknow',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python'],
 'email': 'prabhakar.shah123@gmail.com'}
```

```
# update()
stud_info = {'name' : 'Bhupinder Jogi', 'age' : 33, 'State' : 'UP', 'RollNo.' : '123'}
student_details.update(stud_info)
student_details
```

```
{'name': 'Bhupinder Jogi',
 'age': 33,
 'gender': 'Male',
 'city': 'Lucknow',
 'State': 'UP',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python'],
 'email': 'prabhakar.shah123@gmail.com',
 'RollNo.': '123'}
```

```
# Zip -> Combine 2 iterables into key-value pairs
key = ['name','age','city','gender','Country']
value = ('Utkarsh',29,'Delhi','Male','India')
zip_dict = dict(zip(key,value))
zip_dict
```

```
{'name': 'Utkarsh',
 'age': 29,
 'city': 'Delhi',
 'gender': 'Male',
 'Country': 'India'}
```

```python
# Removing a Dictionary items
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
del student_details['city']
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Excel', 'Power BI', 'Sql', 'Python']}
```

```python
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
del student_details # delete the entire dictionary
```

```
student_details # NameError: name 'student_details' is not defined
```

```python
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
del student_details['skills'][0]
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics',
 'skills': ['Power BI', 'Sql', 'Python']}
```

```python
# pop() -> Removes a specific key and returns its value
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
skills_info = student_details.pop('skills')
print(skills_info)
```

```
['Excel', 'Power BI', 'Sql', 'Python']
```

```
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India',
 'course': 'Data Analytics'}
```

```python
# popitem() -> Removes last inserted values
course_detail = student_details.popitem()
print(course_detail)
```

```
('course', 'Data Analytics')
```

```
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh',
 'country': 'India'}
```

```python
country_detail = student_details.popitem()
print(country_detail)
```

```
('country', 'India')
```

```
student_details
```

```
{'name': 'Prabhakar Shah',
 'age': 28,
 'gender': 'Male',
 'city': 'Indore',
 'State': 'Madhya Pradesh'}
```

```
# clear -> empty the dictionary
student_details.clear()
student_details
```

```
{}
```

```
student_details = {
    'name' : 'Prabhakar Shah',
    'age' : 28,
    'gender' : 'Male',
    'city' : 'Indore',
    'State' : 'Madhya Pradesh',
    'country' : 'India',
    'course' : 'Data Analytics',
    'skills' : ['Excel','Power BI','Sql','Python']
}
stud_details = student_details.copy() # shallow copy
print(id(student_details))
print(id(stud_details))
```

```
2373625930176
2373625928064
```

```
# shallow copy -> using dict() constructor
shallow_dict = dict(stud_details)
print(id(stud_details))
print(id(shallow_dict))
```

```
2373625928064
2373625712960
```