In [1]:
```
print("""String: are used to storing words or combinations of words having letters, num

Why?
Strings are like an array of characters that can be accessed like array elements. This
depicts the textual representation of data. In data science and Machine, learning Strin
for labeling the data. Strings can further be used for creating classical dictionary pr

When?
Strings are rigorously used for prompting the users for input or any other message.

Where?
Strings are used in text comparison, OOP (to.string() methods), and string concatenatio

""")
```

```
String: are used to storing words or combinations of words having letters, numbers, spec
ial characters, etc.

Why?
Strings are like an array of characters that can be accessed like array elements. This s
tructure is used because it
depicts the textual representation of data. In data science and Machine, learning String
s are a crucial ingredient
for labeling the data. Strings can further be used for creating classical dictionary pro
grams.

When?
Strings are rigorously used for prompting the users for input or any other message.

Where?
Strings are used in text comparison, OOP (to.string() methods), and string concatenatio
n.
```

In [2]:
```
print("Example 1")
name = "Arose Niazi"
name[:name.find(" ")]
```

```
Example 1
```

Out[2]:
```
'Arose'
```

In [3]:
```
print("Example 2")
name[name.find(" ")+1:]
```

```
Example 2
```

Out[3]:
```
'Niazi'
```

In [4]:
```
print("Example 3","This is an example of multi line string with escape characters as we
message = """Hey,
\tI hope you are all right last night you didn't come only to play 'Among us'.
Your one and only,
Arose Niazi"""

print(message)
```

```
Example 3 This is an example of multi line string with escape characters as well
Hey,
        I hope you are all right last night you didn't come only to play 'Among us'.
Your one and only,
Arose Niazi
```

In [5]:
```
print("""List: A list is a collection. It's ordered and changeable which allows duplica

Why?
A list is used for storing data in an ordered/unordered manner statically inside the me
It works like arrays in 'Java' and 'C'.

When?
Lists are used when we have to elements of specific data types inside the memory in a s
This data could be ascending or descending depending on the data.

Where?
Lists are used in applications where a list of data has to be stored.
For example, names of products for a business, etc. They are also used in backend progr

""")
```

```
List: A list is a collection. It's ordered and changeable which allows duplicates as wel
l.

Why?
A list is used for storing data in an ordered/unordered manner statically inside the mem
ory.
It works like arrays in 'Java' and 'C'.

When?
Lists are used when we have to elements of specific data types inside the memory in a sp
ecific order.
This data could be ascending or descending depending on the data.

Where?
Lists are used in applications where a list of data has to be stored.
For example, names of products for a business, etc. They are also used in backend progra
mming as Adjacency Matrices.
```

In [6]:
```
print("Example 1")
fruits = ['Apple', 'Bananana', 'Grape', 'Mango', 'Orange']
fruits
```

```
Example 1
```

Out[6]:
```
['Apple', 'Bananana', 'Grape', 'Mango', 'Orange']
```

In [7]:
```
print("Example 2")
gta_games = ['Grand Theft Auto', 'Grand Theft Auto 2', 'Grand Theft Auto 3', 'Grand The
gta_games
```

```
Example 2
```

Out[7]:
```
['Grand Theft Auto',
 'Grand Theft Auto 2',
 'Grand Theft Auto 3',
 'Grand Theft Auto: Vice City',
 'Grand Theft Auto: San Andreas']
```

In [8]:
```
print("Example 3")
ash_pokemon = ['Pikachu', 'Caterpie', 'Pidgeotto', 'Bulbasaur', 'Charmander', 'Squirtle
ash_pokemon
```

```
Example 3
```

Out[8]:
```
['Pikachu', 'Caterpie', 'Pidgeotto', 'Bulbasaur', 'Charmander', 'Squirtle']
```

In [9]:
```
print("""Dictionaries: A dictionary is a collection that is unordered, changeable, and
are written with curly brackets, and they have keys and values.

Why?
Dictionaries are used because they have labeled data which is very useful when it comes
Annotation is one of the keys that is done very efficiently by dictionaries.

When?
Dictionaries are used when labeled data with key values is needed which are predefined
user as well.

Where?
Dictionaries are used in applications like profile management systems where different d
is associated with different attributes.

""")
```

```
Dictionaries: A dictionary is a collection that is unordered, changeable, and indexed. I
n Python dictionaries
are written with curly brackets, and they have keys and values.

Why?
Dictionaries are used because they have labeled data which is very useful when it comes
to Machine learning where
Annotation is one of the keys that is done very efficiently by dictionaries.

When?
Dictionaries are used when labeled data with key values is needed which are predefined o
r can be redefined by the
user as well.

Where?
Dictionaries are used in applications like profile management systems where different da
ta has to be stored that
is associated with different attributes.
```

In [10]:
```
print("Example 1")
goku_a_name = ['Goku', 'Kakarot']
goku_m_name = ['Son Goku', 'Kakarot']
goku = {
    "Anime Name": goku_a_name,
    "Manga Name": goku_m_name,
    "Race": "Sayian",
    "Height (CM)": 175
}
goku
```

```
Example 1
```

Out[10]:
```
{'Anime Name': ['Goku', 'Kakarot'],
 'Manga Name': ['Son Goku', 'Kakarot'],
 'Race': 'Sayian',
 'Height (CM)': 175}
```

In [11]:
```
print("Example 2")
goku.update({
    "Weight (KG)" : 62,
    "Gender" : "Male",
    "Alive" : True
})
goku
```

```
Example 2
```

Out[11]:
```
{'Anime Name': ['Goku', 'Kakarot'],
 'Manga Name': ['Son Goku', 'Kakarot'],
 'Race': 'Sayian',
 'Height (CM)': 175,
 'Weight (KG)': 62,
 'Gender': 'Male',
 'Alive': True}
```

In [12]:
```
print("Example 3")
del goku['Manga Name']
goku['Alive'] = False
goku
```

```
Example 3
```

Out[12]:
```
{'Anime Name': ['Goku', 'Kakarot'],
 'Race': 'Sayian',
 'Height (CM)': 175,
 'Weight (KG)': 62,
 'Gender': 'Male',
 'Alive': False}
```

In [13]:
```
print("""Tuples: A Tuple is a collection of Python objects separated by commas. In some
list in terms of indexing, nested objects, and repetition but a tuple is immutable, unl

Why?
Tuples are used because they can have multiple data types and are immutable which makes
other data structures as they are Read Only.

When?
Tuples are used when we need to store data of different nature. A tuple lets us “chunk”
and use it as a single thing.

Where?
Tuples are used in Machine learning and programming algorithms as a means to group data

""")
```

```
Tuples: A Tuple is a collection of Python objects separated by commas. In some ways, a t
uple is similar to a
list in terms of indexing, nested objects, and repetition but a tuple is immutable, unli
ke mutable lists.

Why?
Tuples are used because they can have multiple data types and are immutable which makes
them secure and better than
other data structures as they are Read Only.

When?
Tuples are used when we need to store data of different nature. A tuple lets us “chunk”
together with related information
and use it as a single thing.

Where?
Tuples are used in Machine learning and programming algorithms as a means to group data
like done with lists.
```

In [14]:
```
print("Example 1: Creating")
my_name = ("Muhammad", "Arose", "Sibram")
my_name
```

```
Example 1: Creating
```

Out[14]:
```
('Muhammad', 'Arose', 'Sibram')
```

In [15]:
```
print("Example 2: Adding Two as it can not be modified.")
surname = ("Khan", "Niazi", "Bharamkhel")
complete_name = my_name + surname
complete_name
```

```
Example 2: Adding Two as it can not be modified.
```

Out[15]:
```
('Muhammad', 'Arose', 'Sibram', 'Khan', 'Niazi', 'Bharamkhel')
```

In [16]:
```
print("Example 3: Deleting")
del complete_name
complete_name
```

```
Example 3: Deleting
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
<ipython-input-16-f087f3e37445> in <module>
      1 print("Example 3: Deleting")
      2 del complete_name
----> 3 complete_name

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

In [17]:
```
print("""Sets: A set is a collection which is unordered and unindexed. In Python, sets

Why?
Sets are a mathematical notion of sets that make mathematical problems easy to solve be

When?
Sets are used whenever there is a need for highly optimized checking of data in systems
For example, a set of +ve values and -ve values which represent graphical curves in a m

Where?
Sets are used in applications related to the structure known as hash tables. Wherever t
is a wide possibility of using sets for the sake of ease. E.g.: Phone Books.

""")
```

```
Sets: A set is a collection which is unordered and unindexed. In Python, sets are writte
n with curly brackets.

Why?
Sets are a mathematical notion of sets that make mathematical problems easy to solve bec
ause of which they are used widely.

When?
Sets are used whenever there is a need for highly optimized checking of data in systems
or mathematical problems.
For example, a set of +ve values and -ve values which represent graphical curves in a ma
thematical problem.

Where?
Sets are used in applications related to the structure known as hash tables. Wherever th
e concept of hashing is used there
is a wide possibility of using sets for the sake of ease. E.g.: Phone Books.
```

In [18]:
```
print("Example 1: Creating")
prime = [2, 3, 5, 7, 11]
```

```
prime = set(prime)
prime
```

```
Example 1: Creating
```

Out[18]:
```
{2, 3, 5, 7, 11}
```

In [19]:
```
print("Example 2: Adding/Updating")
prime.add(13)
prime.update([17, 19, 23])
prime
```

```
Example 2: Adding/Updating
```

Out[19]:
```
{2, 3, 5, 7, 11, 13, 17, 19, 23}
```

In [20]:
```
print("Example 3: Adding/Updating")
prime.discard(5)
prime.pop()
prime
```

```
Example 3: Adding/Updating
```

Out[20]:
```
{3, 7, 11, 13, 17, 19, 23}
```

In [21]:
```
print("""Dataframe: A Data frame is a two-dimensional data structure, i.e., data is ali

Why?
A dataframe is used to represent data in form of a table i.e. rows and columns.

When?
When manipulating large data, the data frame makes it easier to work on it. We can edit
and much more.

Where?
Dataframe is used where a lot of calculations/manipulation of data is required. Usually
data manipulation.

""")
```

```
Dataframe: A Data frame is a two-dimensional data structure, i.e., data is aligned in a
tabular fashion in rows and columns.

Why?
A dataframe is used to represent data in form of a table i.e. rows and columns.

When?
When manipulating large data, the data frame makes it easier to work on it. We can edit
columns, rows do calculations on all at the same time
and much more.

Where?
Dataframe is used where a lot of calculations/manipulation of data is required. Usually
in applications related to data analysis or
data manipulation.
```

In [26]:
```
import pandas as pd
print("Example 1: Creating")
cousins_data = {
    'Name': ['Afreen', 'Arooj', 'Nigarish', 'Sarosh', 'Roshaan', 'Jazib', 'Rahima', 'Fa
    'Age': [35, 32, 31, 28, 28, 27, 24, 23, 21, 20, 20, 14],
    'Gender' : ['M','F','M','M','M','M','F','M','M','F','F','M']
```

```
}
cousins = pd.DataFrame(cousins_data)
cousins
```

```
Example 1: Creating
```

Out[26]:

	Name	Age	Gender
0	Afreen	35	M
1	Arooj	32	F
2	Nigarish	31	M
3	Sarosh	28	M
4	Roshaan	28	M
5	Jazib	27	M
6	Rahima	24	F
7	Farasat	23	M
8	Faiq	21	M
9	Shafaq	20	F
10	Meeral	20	F
11	Shafay	14	M

In [27]:
```
print("Example 2: Changing Index")
cousins.index = cousins['Name']
cousins
```

```
Example 2: Changing Index
```

Out[27]:

	Name	Age	Gender
Name			
Afreen	Afreen	35	M
Arooj	Arooj	32	F
Nigarish	Nigarish	31	M
Sarosh	Sarosh	28	M
Roshaan	Roshaan	28	M
Jazib	Jazib	27	M
Rahima	Rahima	24	F
Farasat	Farasat	23	M
Faiq	Faiq	21	M
Shafaq	Shafaq	20	F
Meeral	Meeral	20	F
Shafay	Shafay	14	M

In [28]:
```
print("Example 3: Dropping Column")
```

```
cousins.drop(["Name"], axis = 1, inplace = True)
cousins
```

Example 3: Dropping Column

Out[28]:

Name	Age	Gender
Afreen	35	M
Arooj	32	F
Nigarish	31	M
Sarosh	28	M
Roshaan	28	M
Jazib	27	M
Rahima	24	F
Farasat	23	M
Faiq	21	M
Shafaq	20	F
Meeral	20	F
Shafay	14	M

In [ ]: