Python Module and Packages

What are Modules?

1. Collections of classes, variables and functions are called modules.
2. Each and Every file in Python is a Module.
3. Each and Every file that is having .py extension is a module.

What are Packages?

Collections of modules are known as a Package. (Folder that is having n number of Module).

1. The *__init__.py* file lets the Python interpreter know that a directory contains code for a Python module. An __init__.py file can be blank. Without one, you cannot import modules from another folder into your project.

The role of the __init__.py file is similar to the *__init__* function in a Python class. The file essentially the constructor of your package or directory without it being called such. It sets up how packages or functions will be imported into your other files.

In its simplest case, the *__init__.py* file is an empty file. However, it is also used to set up imports, so they can be accessed elsewhere. There are three main ways to do that:

1. `main_package/__init__.py and explicit imports`**:**

```
from .file1 import file_1 # Where file_1 is the name of the function and .file1 is the name of the module/file

from .file2 import file_2

from .file3 import file_3
```

We use relative imports to import each of the files into __init__.py. Inside these files are functions that are unique to each file.

In *main.py*, we can now access these functions by creating an import statement at the top of the file using explicit import statements:

```
from main_package import file_1, file_2, file_3 # This imports only what you need
```

```
file_1() # This is my file 1!
file_2() # And this is file 2!
file_3() # Finally, here is file 3!
```

This tells us exactly which modules we are using out of main_package.

2.`main_package/__init__.py and standard import:`

```
import main_package # This imports the entire package
main_package.file_1() # This is my file 1!
main_package.file_2() # And this is file 2!
main_package.file_3() # Finally, here is file 3!
```

The only difference between this one and the previous one is that the former imports only what we need (file_1, file_2, file_3). The other imports the module – so we use dot notation to access the function names.

Types of Modules

Two Types of Modules:

Builtin Modules --> that modules which we can directly use by importing it. There is no need

To define that module. Internally Pvm knows the variables/functions/classes that are present in

that module.

Example:

math module

random module

User Defined Modules --> that modules which are prepared by the developer as per the

business requirement.

Example:

addf

subt

About Import Module?

--> If we want to **import** any Python File(Module) to my current File then we need to use **import** keyword.
--> **import** keyword to make code **in** one module available **in** another**.**
--> Imports **in** Python are important **for** structuring your code effectively.
Syntax: **import** Module_Name Syntax **for** Calling any Method**/**Variable of that Module: Module_name**.**FunctionName**/**Variable_Name

Few important Builtin Module

Help Function

Help **is** a function that **is** used to give the description of a module.

Math Module

```
import math

#print(help(math))

print(math.sqrt(144)) #math.sqrt() is used to return square root of a number

print(math.factorial(5)) #math.factorial() is used to return the factorial of a number

print(math.sin(200))

print(math.tanh(200))

print(math.pi) #math.pi is used to return the pi value

print(math.ceil(5.4)) #math.ceil() is used to return the ceil value

print(math.floor(6.5)) #math.floor() is used to return the floor value
```

Output:

```
12.0

120

-0.8732972972139946
```

```
1.0

3.141592653589793

6

6
```

Random Module

In Random Module Three Functions are Very Important:

1.random.random()

2.random.randint()

3.random.uniform()

random.random() Function

random.random() --> Function is used to generate a random number from 0 to 1

```
import random

#print(help(random))

for i in range(10):

print(random.random()) #random number between 0 to 1
```

```
0.8416114160074224

0.8294094026760904

0.7685731903672596

0.21528987083822326

0.49567720618502364

0.5204319481599796

0.504787493191886
```

```
0.014157233756902698

0.34142647030943163

0.7745919869020532
```

random.randint():

random.randint(start,end)

--> Function **is** used to **return** a random number between a given range**.**

--> It **is** always expecting Two Arguments(start **and** end)

```
for i in range(5):

            print(random.randint(1,200))
```

Output:

```
61

138

20

12

149
```

```
import randomfor i in range(5):
            print(random.randint(999,9999))
```

OP:

```
1367
6619
4028
8524
7026
```

```
x=random.randint(999,9999)

print(x)

y=int(input("Enter OTP"))
```

```
if x==y:

	print("Successfully Logged In")

else:

	print("Invalid OTP")
```

OP:

```
8180

Enter OTP99909

Invalid OTP.
```

random.uniform() Function

random.uniform(start,end) **-->** Function **is** used to **return** a random floating number between a given range**.**
--> It **is** always expecting two arguments to be passed(start,end)

```
#uniform function --> return random number within a given range(floating number)

for i in range(10):

	print(random.uniform(1,200))
```

OP:

```
70.01275628183346

144.11944035004856

184.36375642622662

48.615149521991526

31.0108295962854

101.71892255984008

153.53749459066776
```

```
25.38816577813439

155.46502401635854

53.661418316957594
```

User Defined module

Example:

```
import info

print(help(info))

print(info.college_name)

print(info.Calculater_info(20,40))

print(info.wish())
```

Output:

```
Help on module info:

NAME

info

FUNCTIONS

Calculater_info(x, y)

wish()

DATA

college_name = 'Edyoda Digital university'

FILE

c:\users\prathm\info.py

None
Edyoda Digital university
Addition is 60
Subtraction is -20
Division is 0
```

```
Modulus is 20
Exponent is 10995116277760000000000000000000000000000000000000000

Hello How are You
Hope Everything is Going well
None
```

2.

```
import info
import importlib
importlib.reload(info)
print(help(info))
print(info.college_name)
print(info.Calculater_info(20,40))
print(info.wish())
print(info.welcome("name","Batch"))
```

Output:

```
Help on module info:
NAME
info
FUNCTIONS
Calculater_info(x, y)
welcome(name, Batch)
wish()
DATA
Batch = 'DS290922B'
college_name = 'Edyoda Digital university'
name = 'Anand'
FILE
c:\users\prathm\info.py

None
Edyoda Digital university
Addition is 60
Subtraction is -20
Division is 0
Modulus is 20
Exponent is 10995116277760000000000000000000000000000000000000000
Hello How are You
Hope Everything is Going well
None
```

```
Hi nameWelcome to edyoda
```

3.

```
import salary
#print(help(salary))
print(salary.company)
#print(salary.Employee())
print(salary.salary_Grade())
```

OP:

```
Edyoda Digital University
Enter your salary(In Lakhs):20
You are a Boss
```

Advantage of Modules is Code Reuseability

User Defined Packages

Example:

```
Edyoda Digital university

Addition is 30

Subtraction is -10

Division is 0

Modulus is 10

Exponent is 100000000000000000000

Hello How are You

Hope Everything is Going well

None
```

Another Way to import a Module

Example

```
Edyoda Digital university

Addition is 30

Subtraction is -10
```

```
Division is 0

Modulus is 10

Exponent is 100000000000000000000

Hello How are You

Hope Everything is Going well

None

Enter Employee Namename

Enter Employee Age23

Enter Employee Citylko

Enter Employee Salary20

Enter Employee Postlko

Employee Name is : name

Employee Age is : 23

Employee City is : lko

Employee Designation is : lko

Help on module Python.info in Python:

NAME

Python.info

FUNCTIONS

Calculater_info(x, y)

welcome(name, Batch)

wish()

DATA

Batch = 'DS290922B'

college_name = 'Edyoda Digital university'
```

```
name = 'Anand'

FILE

c:\users\prathm\python\info.py

None

Edyoda Digital university

Addition is 60

Subtraction is -20

Division is 0

Modulus is 20

Exponent is 10995116277760000000000000000000000000000000000000000

Hello How are You

Hope Everything is Going well

None

Hi nameWelcome to edyoda
Edyoda Digital university
Addition is 60
Subtraction is -20
Division is 0
Modulus is 20
Exponent is 10995116277760000000000000000000000000000000000000000
Hello How are You
Hope Everything is Going well
None
Hi nameWelcome to edyoda
Hello
None
World
None
```

--> Collections of classes , variables and functions is called a modules.

--> Each and Every file in Python is a Module.

--> Each and Every file that is having .py extension is a module.

Collections of modules is known as a Package.(Folder that is having n number of Module).

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that module.

Example:

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random module

User Defined Modules --> that modules which are prepared by the developer as per the

business requirement.

Example:

addf

subt

In [ ]: --> If we want to import any Python File(Module) to my current File then we need to use import keyword.

--> import keyword to make code in one module available in another.

--> Imports in Python are important for structuring your code effectively

Syntax:

import Module_Name

Syntax for Calling any Method/Variable of that Module:

Module_name.FunctionName/Variable_Name

Help is a function that is used to give the description of a module

import math

#print(help(math))

print(math.sqrt(144)) #math.sqrt() is used to return square root of a number

print(math.factorial(5)) #math.factorial() is used to return the factorial of a number

```
print(math.sin(200))

print(math.tanh(200))

print(math.pi) #math.pi is used to return the pi value

print(math.ceil(5.4)) #math.ceil() is used to return the ceil value

print(math.floor(6.5)) #math.floor() is used to return the floor value
```

In Random Module Three Functions are Very Important:

1.random.random()

2.random.randint()

3.random.uniform()

random.random() --> Function is used to generate a random number from 0 to 1

```
In [20]: import random

#print(help(random))

for i in range(10):

print(random.random()) #random number between 0 to 1
```

random.randint(start,end) --> Function is used to return a random number between a given range.

--> It is always expecting Two Arguments(start and end)

```
for i in range(5):

print(random.randint(1,200))

import random

for i in range(5):

print(random.randint(999,9999))

In [44]: x=random.randint(999,9999)

print(x)

y=int(input("Enter OTP"))

if x==y:
```

```
print("Successfully Logged In")
else:
print("Invalid OTP")
```

random.uniform(start,end) --> Function is used to return a random floating number between a given range.

--> It is always expecting two arguments to be passed(start,end)

```
#uniform function --> return random number within a given range(floating number)
for i in range(10):
print(random.uniform(1,200))
```

--> Create any file with variables/functions/classes and the extension of the file must be .py only.

--> After creating a python file open a new Python file/notebook and import the previous python file

--> With the help of import statement you can use these functions variables and classes of one file into another.

```
import info
print(help(info))
print(info.college_name)
print(info.Calculater_info(20,40))
print(info.wish())
import info
import importlib
importlib.reload(info)
print(help(info))
print(info.college_name)
print(info.Calculater_info(20,40))
print(info.wish())

print(info.welcome("name","Batch"))

import salary

#print(help(salary))

print(salary.company)

#print(salary.Employee())

print(salary.salary_Grade())
```

OP:

```
Edyoda Digital University

Enter your salary(In Lakhs):20

You are a Boss
```

Advantage of Modules is Code Reuseability

--> That means if you are creating one module then you can use the functionality and variables of that modules in any other file.

User Defined Packages

Packages --> collections of that modules which are prepared by the developer as per the business requirement.

Syntax:

```
import package_name.module_name
```

Example:

```
import Python.info
print(Python.info.college_name)
print(Python.info.Calculater_info(10,20))
print(Python.info.wish())
```

OP:

```
Edyoda Digital university
Addition is 30
Subtraction is -10
Division is 0
Modulus is 10
Exponent is 100000000000000000000

Hello How are You
Hope Everything is Going well
None
```

Another Way to import a Module:

```
#Second way to import a module in current file
```

Syntax:

```
from module_name import Function_name
from module_name import *
```

Benefits of Importing module with from keywords is:

You need not to write whole module name while calling the function/variables/classes of the module.

Example:

```
from Python import *
print(info.college_name)
print(info.Calculater_info(10,20))
print(info.wish())
print(salary.Employee())
```

OP:

```
Edyoda Digital university
```

```
Addition is 30
Subtraction is -10
Division is 0
Modulus is 10
Exponent is 100000000000000000000
Hello How are You
Hope Everything is Going well
None
Enter Employee Namename
Enter Employee Age23
Enter Employee Citylko
Enter Employee Salary20
Enter Employee Postlko
Employee Name is : name
Employee Age is : 23
Employee City is : lko
Employee Designation is : lko
```

```
from info import *
import importlib
importlib.reload(info)
print(help(info))
print(college_name)
print(Calculater_info(20,40))
print(wish())
print(welcome("name","Batch"))
```

OP:

```
Help on module Python.info in Python:
NAME
Python.info
FUNCTIONS
Calculater_info(x, y)
welcome(name, Batch)
wish()

DATA
Batch = 'DS290922B'
college_name = 'Edyoda Digital university'
name = 'Anand'

FILE
```

c:\users\prathm\python\info.py

```
None
Edyoda Digital university
Addition is 60
Subtraction is -20
Division is 0
Modulus is 20
Exponent is 10995116277760000000000000000000000000000000000000000
Hello How are You
Hope Everything is Going well
None
Hi nameWelcome to edyoda
```

Example:

```
from info import Calculater_info
print(college_name)
print(Calculater_info(20,40))
print(wish())
print(welcome("name","Batch"))
```

OP:

```
Edyoda Digital university
Addition is 60
Subtraction is -20
Division is 0
Modulus is 20
Exponent is 10995116277760000000000000000000000000000000000000000

Hello How are You
Hope Everything is Going well
None
Hi nameWelcome to edyoda
```

```
from name import *
print(name())
print(roll())
```

OP:

```
Hello
None
World
```

None