UNIVERSITY OF ENGINEERING AND TECHNOLOGY PESHAWAR, JALOZAI CAMPUS

Lab 10: Modules and Packages

Lab Title: EE-271 "OOP & Data Structures Lab"

Time: 10 min/ Task

Lab report task:

1. Convert labs 7, 8, and 9 into modules, package them with name inheritance, and revise the corresponding tasks.

Lab work tasks:

2.

- Make add.py and save in the same folder.
- Make sub.py and save in the same folder.
- Make mul.py and save in the same folder.
- Make divide.py and save in the same folder.

a. Import and run different modules (at least 3).

3. Creating Modules

```
def add(x, y):
    return x + y
```

a. Save the file as adder.py in a new directory called myproject/ somewhere on your computer.
   a. Use this module as given below.

```
import adder
value = adder.add(2, 2)
print(value)
```

   b. Add another function to double a given value.

```
def double(x):
  return x + x
```

   - Run the following code.

```
import adder
value = adder.add(2, 2)
double_value = adder.double(value)
print(double_value)
```

c. `import <module> as <other_name>`

You can change the name of an import using the as keyword:

- When you import a module this way, the module's namespace is accessed through <other_name> instead of <module>.

i. Run the following code and note what you observe and why this happened.

```
import adder as a # <-- Change this line
# Leave the code below unchanged
value = adder.add(2, 2)
double_value = adder.double(value)
```

```
print(double_value)
```

ii. Run the following code and note what you observe and why this happened.

```
import adder as a
value = a.add(2, 2) # <-- Change this line
double_value = a.double(value) # <-- Change this line, too
print(double_value)
```

d. `from <module> import <name>`

Instead of importing the entire namespace, you can import only a specific name from a module.

- Run the following code.

```
from adder import add # <-- Change this line
value = adder.add(2, 2)
print(value)
```

- Run the following code and note what you observe and why this happened.

```
from adder import add # <-- Change this line
value = adder.add(2, 2)
double_value = adder.double(2, 2)
print(double_value)
```

- Run the following code and note what you observe and why this happened.

```
from adder import add, double # <-- Change this line
# Leave the code below unchanged
value = add(2, 2)
double_value = double(value)
print(double_value)
```

Note:

Import Statement	Result
`import <module>`	Import all of `<module>`'s namespace into the name `<module>`. Import module names can be accessed from the calling module with `<module>.<name>`.
`import <module> as <other_name>`	Import all of `<modules>`'s namespace into the name `<other_name>`. Import module names can be accessed from the calling module with `<other_name>.<name>`.
`from <module> import <name1>, <name2>, ...`	Import only the names `<name1>`, `<name2>`, etc, from `<module>`. The names are added to the calling modules's local namespace and can be accessed directly.

4. Convert labs 7, 8, and 9 into modules, package them with name inheritance, and revise the corresponding tasks.
5. Convert the Geometry classes covered in lab 6 to modules, create a package with the classes' names, and repeat the corresponding tasks.
6. Convert the circuit tasks in lab 6 to module/s, create a package with the circuit's name, and revise the tasks.
7. Make a package with the name oop and make the module of all the labs that are on classes and use it for some tasks.
8. Master the above different ways of importing.
   Sometimes, modules contain a single function or class with the same name as the module itself. For example, the DateTime module in the Python standard library contains a class called DateTime.
   a. Run the following code and understand how different ways of importing are important.

```
import datetime
datetime.datetime(2020, 2, 2)
```

   b. Run the following code and understand how different ways of importing are important.

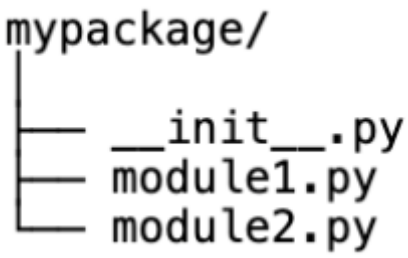
```
import datetime as dt
dt.datetime(2020, 2, 2)
```

   c. Run the following code and understand how different ways of importing are important.

```
from datetime import datetime
datetime(2020, 2, 2)
```

9. Creating Packages

A **package** is a folder that contains one or more Python modules. It must also contain a special module called _init_.py. Here is an example of a package so that you can see this structure:



Note: The _init_.py module doesn't need to contain any code!

- Open a script and save.

```
# __init__.py
```

- Make module1.py and save in the same folder.

```
# module1.py
def greet(name):
  print(f"Hello, {name}!")
```

- Make module2.py and save in the same folder.

```
# module2.py
def depart(name):
  print(f"Goodbye, {name}!")
```

b. Run the following code and observe what happens and why.

```
import mypackage
mypackage.module1.greet("Pythonista")
mypackage.module2.depart("Pythonista")
```

c. Run the following code and observe what happens and why.

```
import mypackage.module1 # <-- Change this line
# Leave the below code unchanged
mypackage.module1.greet("Pythonista")
mypackage.module2.depart("Pythonista")
```

d. Run the following code and observe what happens and why.

```
import mypackage.module1
import mypackage.module2 # <-- Add this line
# Leave the below code unchanged
mypackage.module1.greet("Pythonista")
mypackage.module2.depart("Pythonista")
```

Note:

Import Statement Variations For Packages

There are three variations of the `import` statement that you learned for importing names from modules. These three variations translate to the following four variations for importing modules from packages:

1. `import <package>`
2. `import <package> as <other_name>`
3. `from <package> import <module>`
4. `from <package> import <module> as <other_name>`

e. Run the following code and observe what happens and why.

```
# main.py
from mypackage import module1, module2
module1.greet("Pythonista")
module2.depart("Pythonista")
```

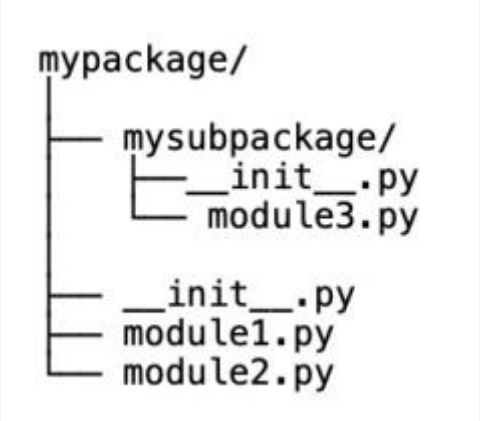
f. Run the following code and observe what happens and why.

```
from mypackage import module1 as m1, module2 as m2
m1.greet("Pythonista")
m2.depart("Pythonista")
```

g. Run the following code and observe what happens and why.

```
from mypackage.module1 import greet
from mypackage.module2 import depart
greet("Pythonista")
depart("Pythonista")
```

Note: A package nested inside of another package is called a **subpackage**.



Recommended reading:

1. **Chapter 11**: Python Basics: A Practical Introduction to Python 3 By Real Python