**Lab Exercise 4 – Package and Sub-Package in Python**

Creating a Python package with subpackages is an excellent way to organize and structure your code, making it more modular and maintainable. In this lab exercise, I'll walk you through creating a Python package with a subpackage and a few modules. Let's assume you want to create a package for geometry calculations with a subpackage for 3D geometry. Here are the steps:

**Directory Structure:**

geometry\_package/

├── \_\_init\_\_.py

├── two\_d/

│ ├── \_\_init\_\_.py

│ ├── area.py

│ ├── perimeter.py

├── three\_d/

│ ├── \_\_init\_\_.py

│ ├── volume.py

│ ├── surface\_area.py

**Module Contents:**

**geometry\_package/init.py (Can be empty)**

**geometry\_package/2d/area.py:**

def calculate\_area(length, width):

return length \* width

**geometry\_package/2d/perimeter.py:**

def calculate\_perimeter(length, width):

return 2 \* (length + width)

**geometry\_package/3d/volume.py:**

def calculate\_volume(length, width, height):

return length \* width \* height

**geometry\_package/3d/surface\_area.py:**

def calculate\_surface\_area(length, width, height):

return 2 \* (length \* width + width \* height + height \* length)

Now, let's create a Python script that uses this package:

**main.py:**

from geometry\_package.three\_d import volume, surface\_area  
from geometry\_package.two\_d import area, perimeter  
  
# 2D Geometry  
length = 5  
width = 4  
print(f"2D Area: {area.calculate\_area(length, width)}")  
print(f"2D Perimeter: {perimeter.calculate\_perimeter(length, width)}")  
  
# 3D Geometry  
length = 3  
width = 2  
height = 4  
print(f"3D Volume: {volume.calculate\_volume(length, width, height)}")  
print(f"3D Surface Area: {surface\_area.calculate\_surface\_area(length, width, height)}")

**Running the Exercise:**

Save the package directory and the main.py script in the same directory.

Open a terminal and navigate to the directory containing these files.

**Run the main.py script:**

python main.py

You should see the results of various geometry calculations (2D and 3D) printed in the console.

This exercise demonstrates how to create a Python package with subpackages and use it in another script. You can expand on this by adding more modules, functions, or even creating deeper subpackages within your package. Creating packages and subpackages is a fundamental concept for organizing and reusing code in larger projects.