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Roll no: 41	**Tutorial No: 8**	
Title of LAB Assignment: To implement Threads in Python		
DOP: 25-09-2023	**DOS:02-10-2023**	
CO Mapped:	**PO Mapped:**	**Signature:**

1. Aim:
To understand and implement Python threading with a focus on synchronization and multithreaded priority queue.

2. Theory:
In this practical, we will cover the following topics:

Threading in Python: Python's threading module allows you to create and manage threads.
Synchronization: We'll explore synchronization techniques using locks to ensure that multiple threads work together harmoniously without interfering with each other.

Multithreaded Priority Queue: We will implement a multithreaded priority queue using Python's queue module.

3. Code:

Here's the Python code for each part of your practical:

Starting a Thread:

```
import threading

def print_numbers():
   for i in range(1, 6):
       print(f"Number {i}")

# Create a thread
thread = threading.Thread(target=print_numbers)

# Start the thread
thread.start()
```

2. Synchronization:

```
import threading

counter = 0
lock = threading.Lock()

def increment():
   global counter
   for _ in range(100000):
       with lock:
           counter += 1

thread1 = threading.Thread(target=increment)
thread2 = threading.Thread(target=increment)

thread1.start()
thread2.start()

thread1.join()
thread2.join()
```

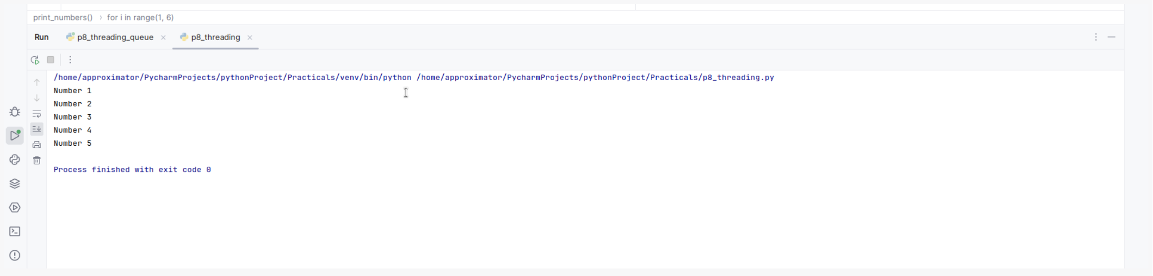
```
print("Counter:", counter)
```

3. Multithreaded Priority Queue:

```
import threading
import queue

priority_queue = queue.PriorityQueue()

def producer():
   for i in range(5):
       priority_queue.put(i)

def consumer():
   while True:
       item = priority_queue.get()
       print(f"Consumed: {item}")
       priority_queue.task_done()

producer_thread = threading.Thread(target=producer)
consumer_thread = threading.Thread(target=consumer)

producer_thread.start()
consumer_thread.start()

producer_thread.join()
```

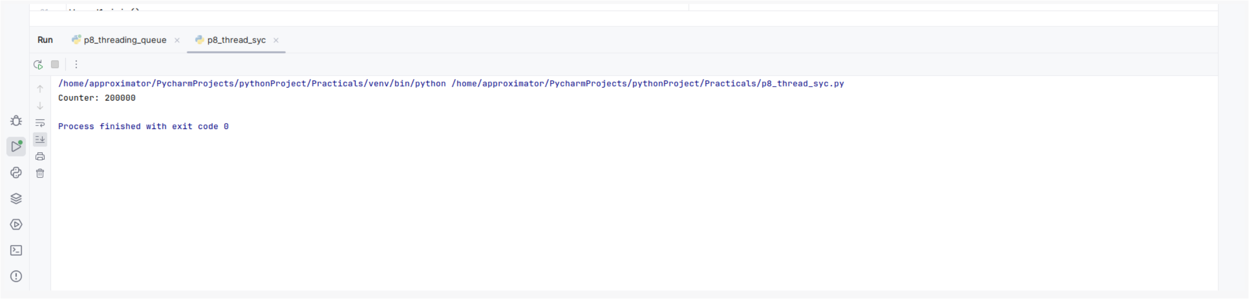
Output:

1.



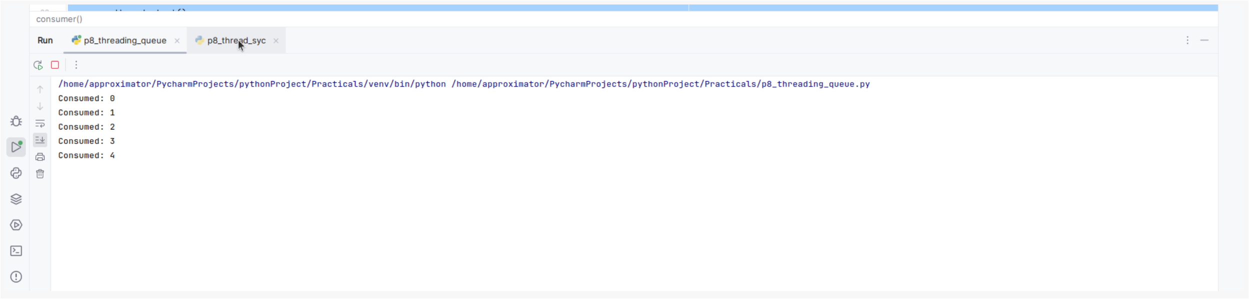
```
/home/approximator/PycharmProjects/pythonProject/Practicals/venv/bin/python /home/approximator/PycharmProjects/pythonProject/Practicals/p8_threading.py
Number 1
Number 2
Number 3
Number 4
Number 5

Process finished with exit code 0
```

2.



```
/home/approximator/PycharmProjects/pythonProject/Practicals/venv/bin/python /home/approximator/PycharmProjects/pythonProject/Practicals/p8_thread_syc.py
Counter: 200000

Process finished with exit code 0
```

3.



```
/home/approximator/PycharmProjects/pythonProject/Practicals/venv/bin/python /home/approximator/PycharmProjects/pythonProject/Practicals/p8_threading_queue.py
Consumed: 0
Consumed: 1
Consumed: 2
Consumed: 3
Consumed: 4
```