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31124

Assignment 07

Title: clock synchronization

Problem statement:

Implementation of clock synchronisation in python:

a) NTP

b) Lamport clock

learning objectives:

1. To understand the concept of clock synchronisation
2. To implement NTP and lamport clock synchronisation.

S/W H/W requirements:

Python programming language, Windows 10, 64 bit, vscode editor

Theory:

In a computer network or distrubuted system, importance is given to the order in which events occur to carry out processes, this requires to have the internal clocks on each endpoint in sync

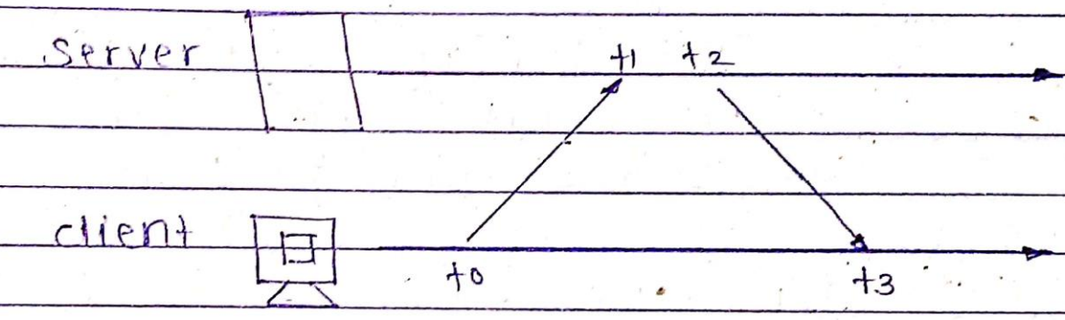
with other endpoints. This process of syncing the clocks is called clock synchronization.

Clock synchronization methods:

1. NTP
2. Lamport clock sync.

NTP:

network time protocol is used to sync time in networks. It requests time to time server and using given equations, system time is calculated.



$$\text{offset} = \left| \frac{((t_1 - t_0) + (t_2 - t_3))}{2} \right|$$

$$\text{delay} = (t_3 - t_0) - (t_2 - t_1)$$

above equations are used to calculate systems time.

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Lamport clock sync:

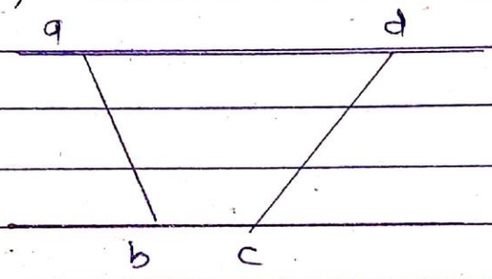
This method works on relative time. This means that the accuracy of time with actual time can be ignored to a point.

$a \longrightarrow b$

means

'a' happened before 'b'

this imply time of a should be less than b.



this imply

time a < time b

time b c < time d.

test cases

Sr no.	expected o/p	actual o/p	result
	NTP		
1.	offset round trip 2.0 10	same as expected	pass
2.	lamport: to tr tf 8137 8136 8138	same as expected	pass

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concusing:

Clock synchronization was studied successfully. Implemented NTP and lamport clock synchronization

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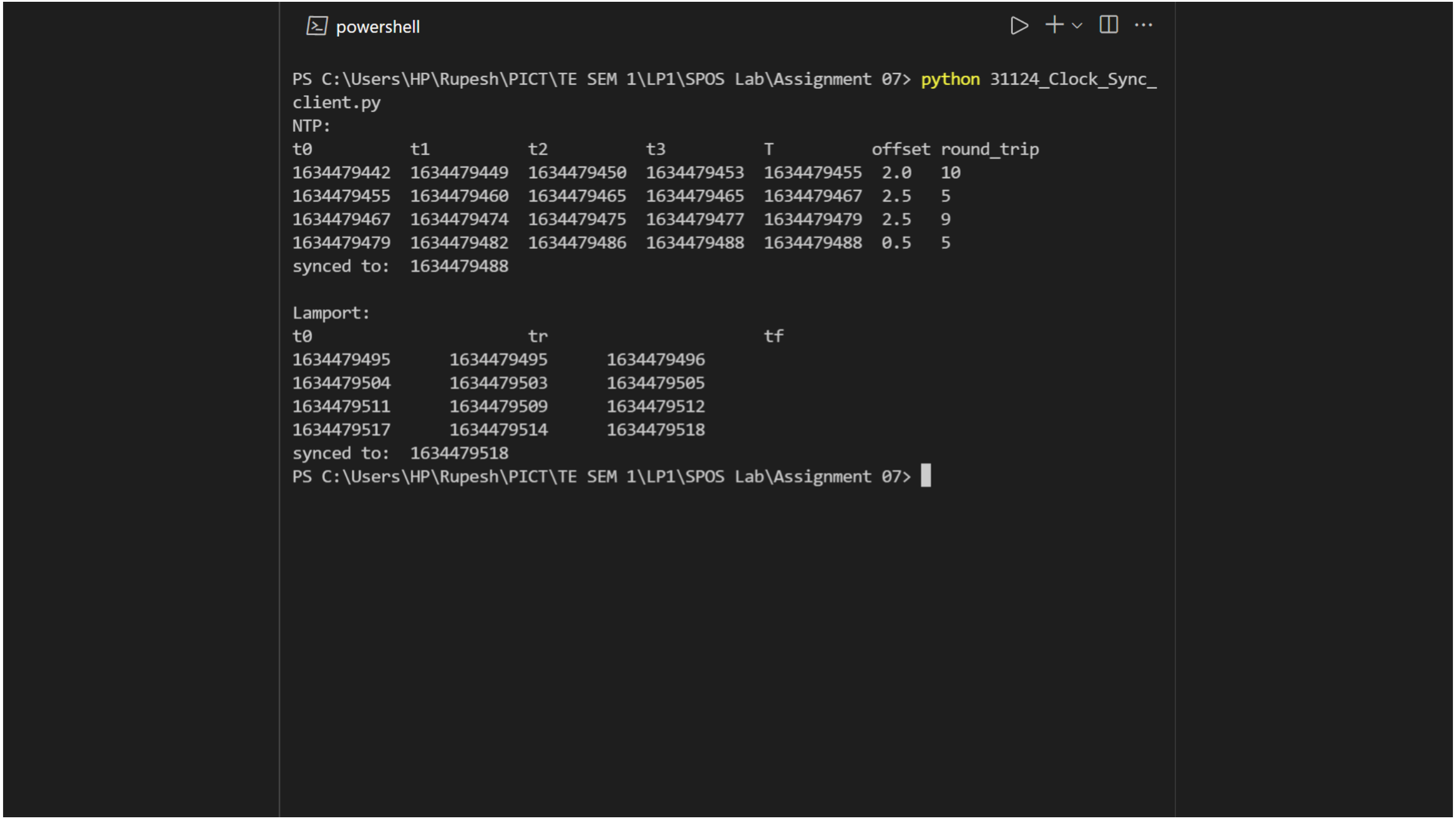
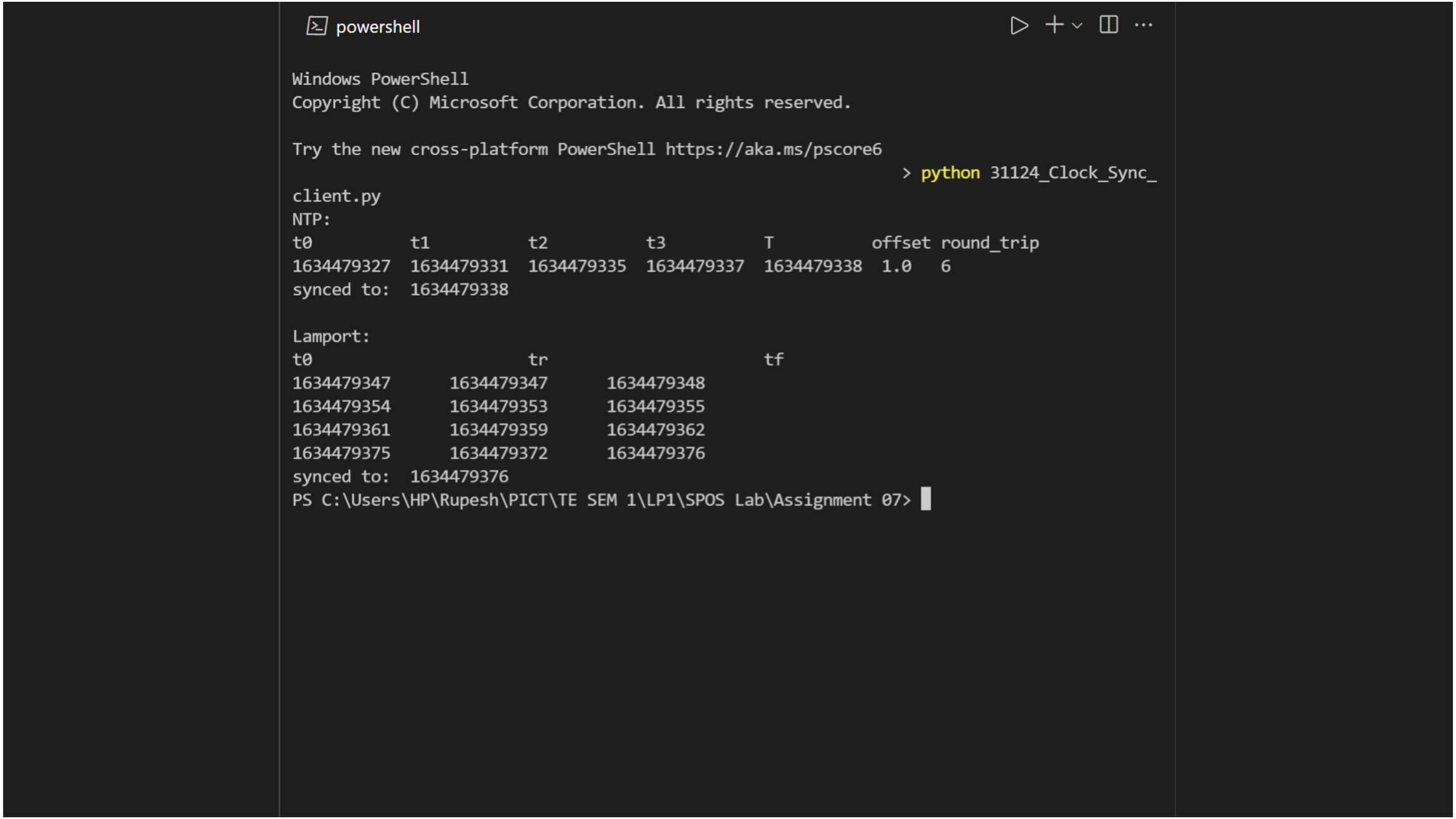

powershell
PS C:\Users\HP\Rupesh\PICT\TE SEM 1\LP1\SPOS Lab\Assignment 07> python 31124_Clock_Sync_client.py
NTP:
t0 t1 t2 t3 T offset round_trip
1634479442 1634479449 1634479450 1634479453 1634479455 2.0 10
1634479455 1634479460 1634479465 1634479465 1634479467 2.5 5
1634479467 1634479474 1634479475 1634479477 1634479479 2.5 9
1634479479 1634479482 1634479486 1634479488 1634479488 0.5 5
synced to: 1634479488
Lamport:
t0 tr tf
1634479495 1634479495 1634479496
1634479504 1634479503 1634479505
1634479511 1634479509 1634479512
1634479517 1634479514 1634479518
synced to: 1634479518
PS C:\Users\HP\Rupesh\PICT\TE SEM 1\LP1\SPOS Lab\Assignment 07>


powershell
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6
> python 31124_Clock_Sync_
client.py
NTP:
t0 t1 t2 t3 T offset round_trip
1634479327 1634479331 1634479335 1634479337 1634479338 1.0 6
synced to: 1634479338
Lamport:
t0 tr tf
1634479347 1634479347 1634479348
1634479354 1634479353 1634479355
1634479361 1634479359 1634479362
1634479375 1634479372 1634479376
synced to: 1634479376
PS C:\Users\HP\Rupesh\PICT\TE SEM 1\LP1\SPOS Lab\Assignment 07>