Pemrosesan Paralel
“Message Passing Interface pada Ubuntu Dekstop menggunakan Bahasa Python”

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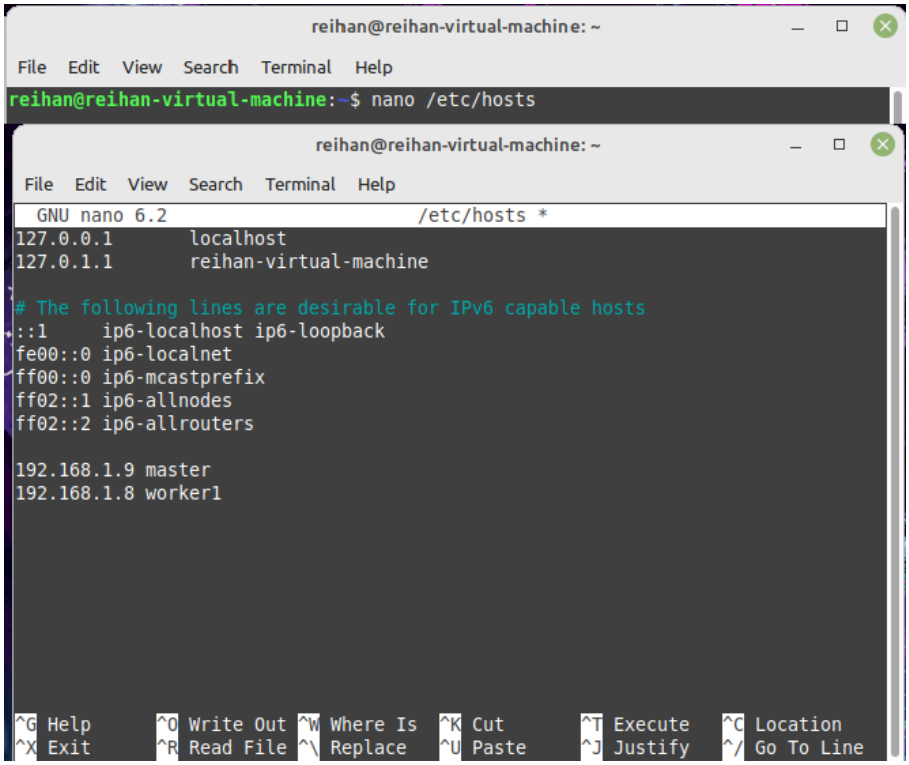
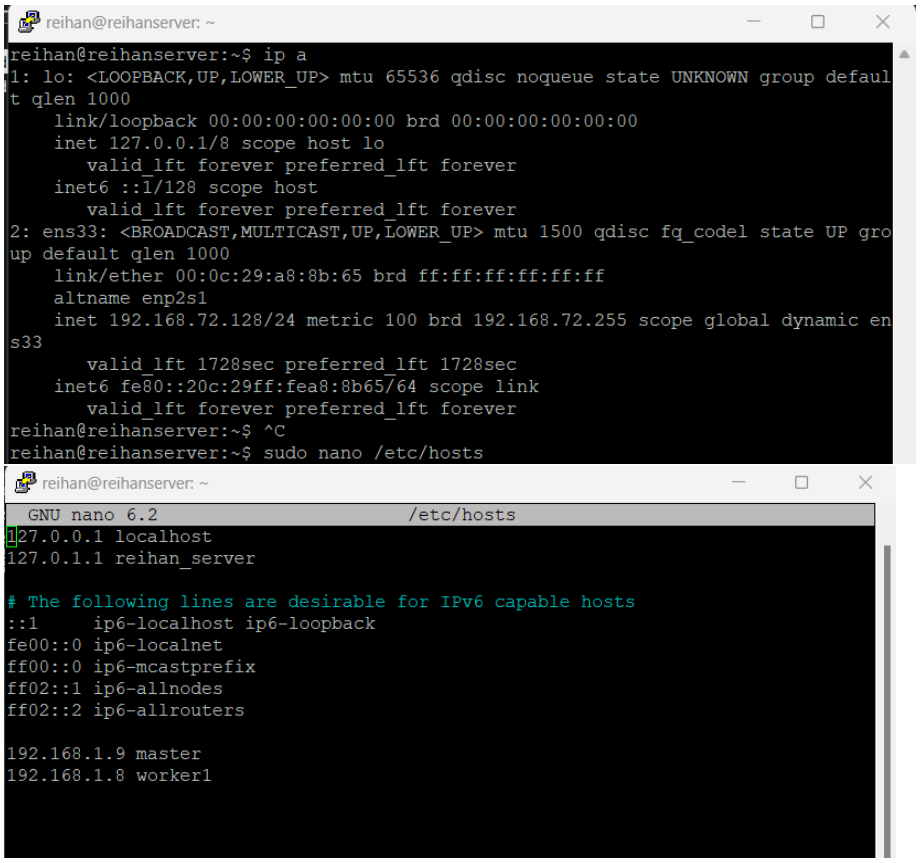
Message Passing Interface pada ubuntu dekstop menggunakan bahasa python

1. Konfigurasi file /etc/hosts

Server

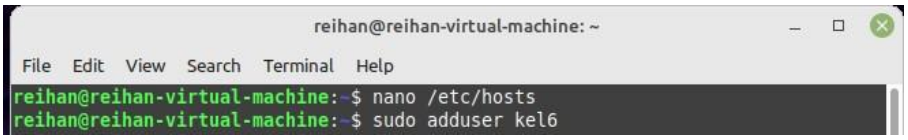


Client

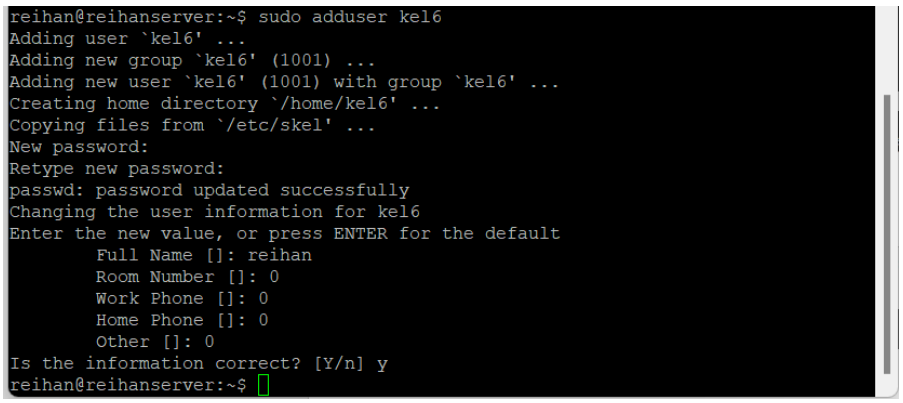


2. Menambahkan user

Server

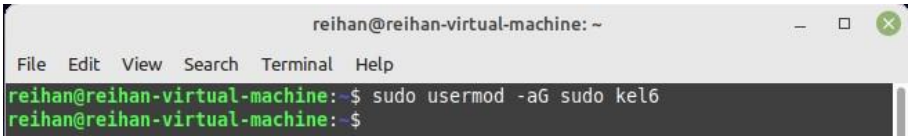


Client

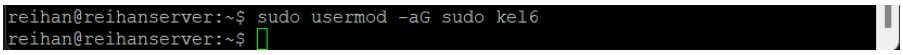


3. Memberikan akses root kepada user

Server

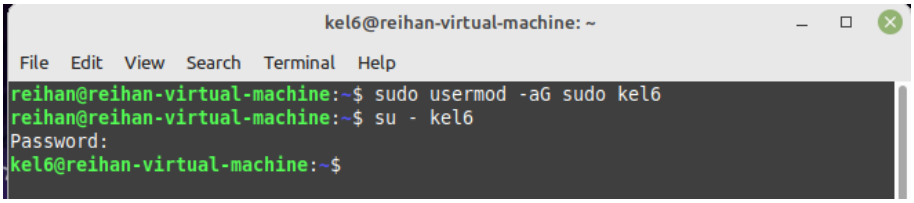


Client

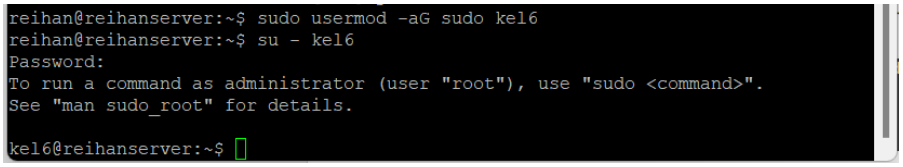


4. Melakukan login akun user

Server

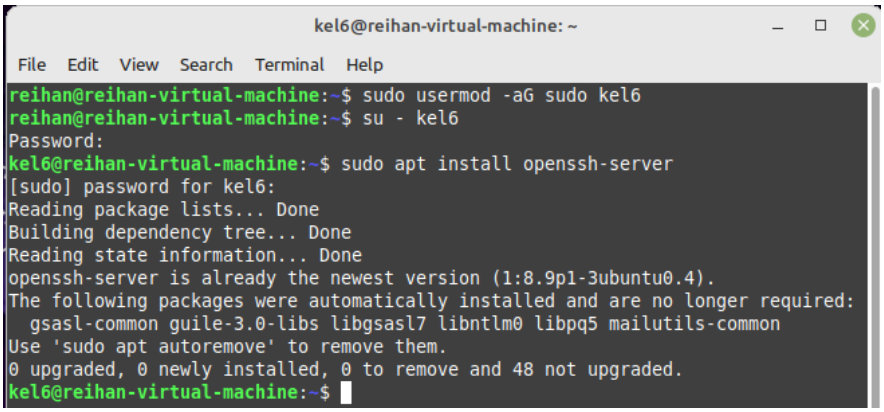


Client

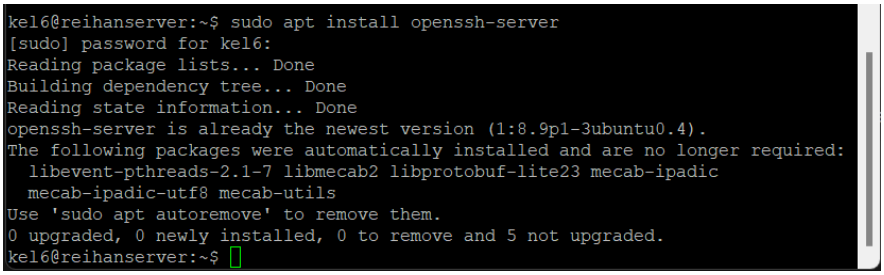


5. Instalasi paket openssh-server

Server

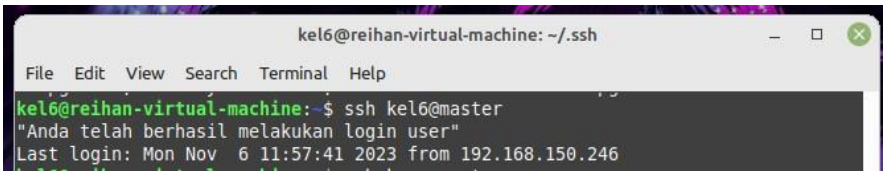


Client

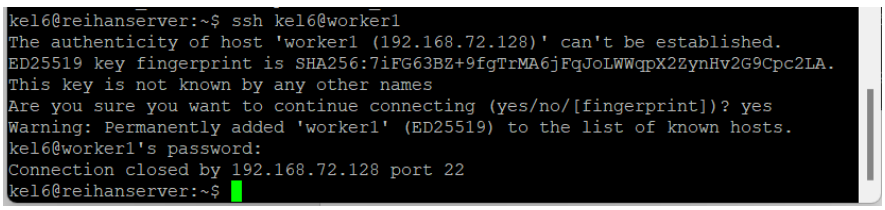


6. Pengecekan ssh

Server

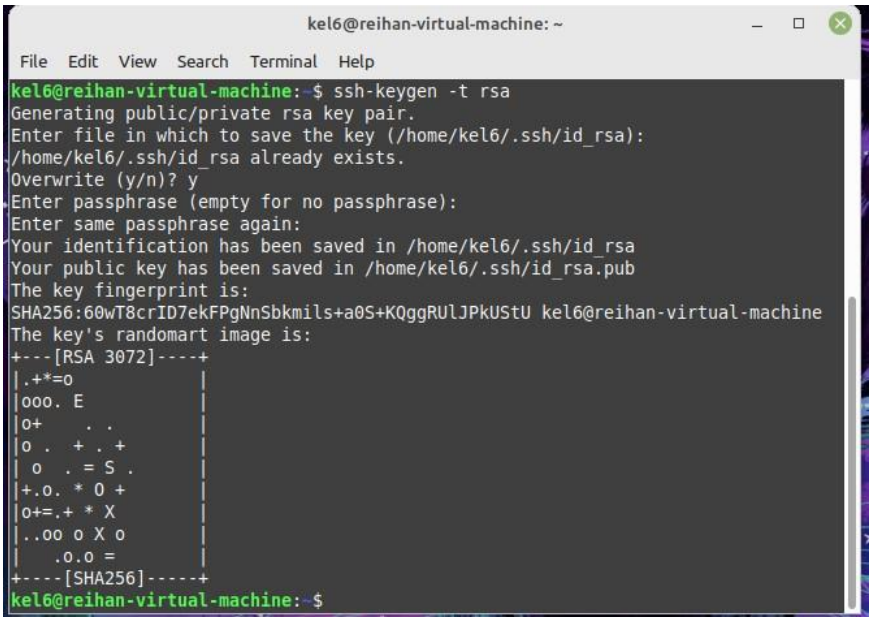


Client



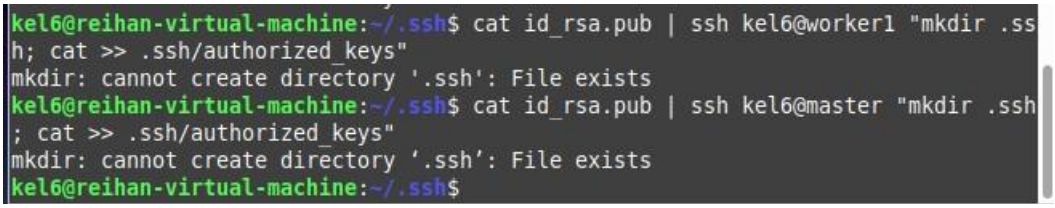
7. Membuat keygen

Server



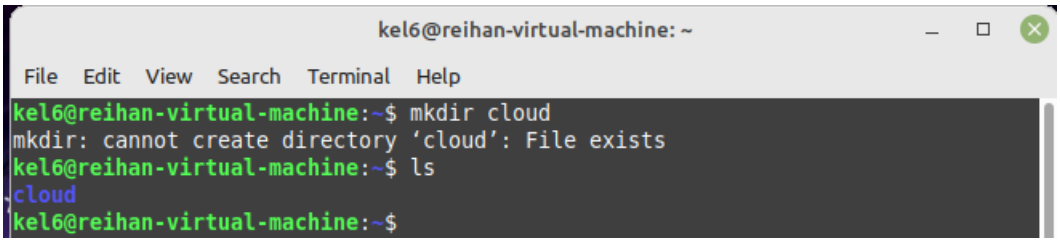
8. Menyalin keygen ke Server dan Client

Server

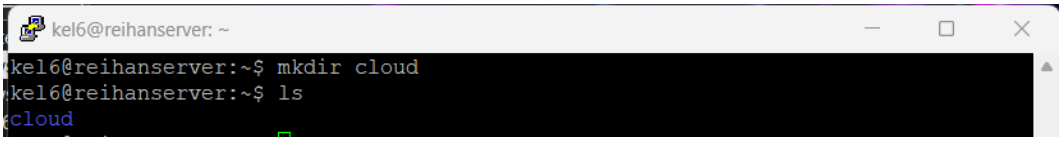


9. Membuat sharing file

Server



Client



10. Instalasi nfs server

Server

```
kel6@reihan-virtual-machine:~$ sudo apt install nfs-kernel-server
[sudo] password for kel6:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nfs-kernel-server is already the newest version (1:2.6.1-1ubuntu1.2).
The following packages were automatically installed and are no longer required:
  gsasl-common guile-3.0-libs libgsasl7 libntlm0 libpq5 mailutils-common
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 48 not upgraded.
kel6@reihan-virtual-machine:~$
```

11. Konfigurasi file /etc/exports

Server

```
kel6@reihan-virtual-machine: ~
File  Edit  View  Search  Terminal  Help
kel6@reihan-virtual-machine:~$ sudo nano /etc/exports
```

```
kel6@reihan-virtual-machine: ~
File  Edit  View  Search  Terminal  Help
  GNU nano 6.2                    /etc/exports
# /etc/exports: the access control list for filesystems which may be exported
#               to NFS clients.  See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes       hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_sub>
#
# Example for NFSv4:
# /srv/nfs4        gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes  gss/krb5i(rw,sync,no_subtree_check)
#

/home/kel6/cloud *(rw,sync,no_root_squash,no_subtree_check)
```

12. Simpan dan restart nfs-kernel-server

Server

```
kel6@reihan-virtual-machine:~$ sudo nano /etc/exports
kel6@reihan-virtual-machine:~$ sudo exportfs -a
kel6@reihan-virtual-machine:~$ sudo systemctl restart nfs-kernel-server
kel6@reihan-virtual-machine:~$
```

13. Instalasi nfs client

Client

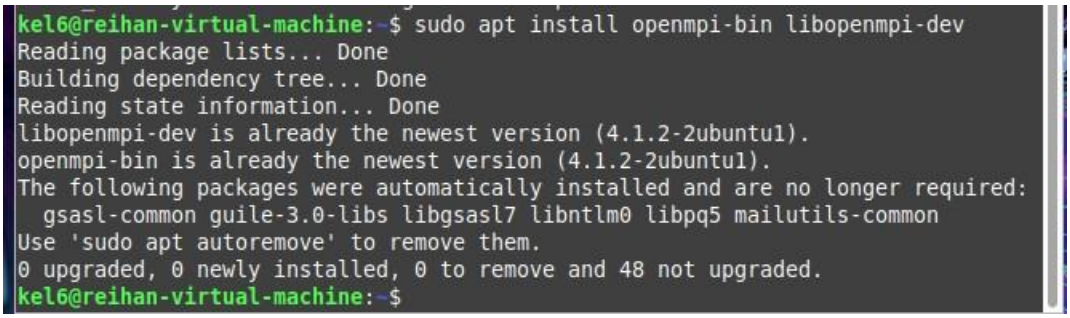
```
kel6@reihanserver:~$ sudo apt install nfs-common
[sudo] password for kel6:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libevent-pthreads-2.1-7 libmecab2 libprotobuf-lite23 mecab-ipadic
  mecab-ipadic-utf8 mecab-utils
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  keyutils libnfsidmap1 rpcbind
Suggested packages:
  watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap1 nfs-common rpcbind
0 upgraded, 4 newly installed, 0 to remove and 5 not upgraded.
```

14. Mounting sharing file pada Client

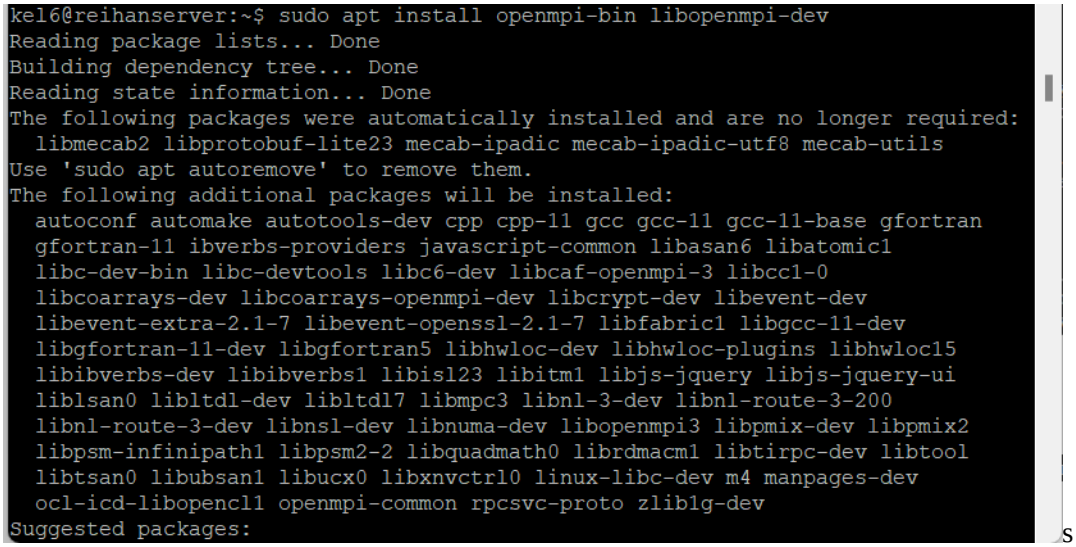
Client

15. Instalasi python3 dan mpi

Server



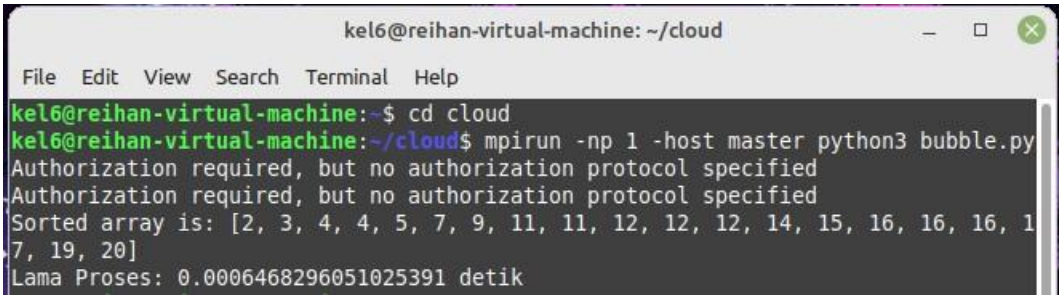
Client



s

16. Menjalankan program bubble sort pada file bubble.py secara multi computing

Server



Kodingan :

```
from mpi4py import MPI
import random
import time
```

```
start_time = time.time()
def bubbleSort(arr):
    n = len(arr)
    swapped = False
    for i in range(n - 1):
        for j in range(0, n - i - 1):
            if arr[j] > arr[j + 1]:
                swapped = True
                arr[j], arr[j + 1] = arr[j + 1], arr[j]

        if not swapped:
            return

if __name__ == '__main__':
    comm = MPI.COMM_WORLD
    size = comm.Get_size()
    rank = comm.Get_rank()

    n = 20 # Jumlah elemen dalam array
    max_number = 20 # Rentang angka acak
    local_data = []

    # Setiap proses mendapatkan data yang berbeda
    for i in range(n):
        local_data.append(random.randint(1, max_number))

    local_data = comm.gather(local_data, root=0)

    if rank == 0:
        sorted_data = [item for sublist in local_data for item in sublist]
        bubbleSort(sorted_data)
        print("Sorted array is:", sorted_data)

# Waktu selesai
end_time = time.time()

# Hitung lama eksekusi
execution_time = end_time - start_time

print(f"Lama Proses: {execution_time} detik")
```

17. Menjalankan program numeric pada file numerik.py secara multi computing Server

```
kel6@reihan-virtual-machine:~/cloud$ mpirun -np 1 -host master python3 numerik.p
y
Authorization required, but no authorization protocol specified
Authorization required, but no authorization protocol specified
Total sum: 55
Lama Proses: 0.0007097721099853516 detik
kel6@reihan-virtual-machine:~/cloud$
```

Kodingan :

```
from mpi4py import MPI
import numpy as np
import time

start_time = time.time()
```

```
def parallel_sum(data):
    comm = MPI.COMM_WORLD
    rank = comm.Get_rank()
    size = comm.Get_size()

    # Bagi data di antara proses
    local_data = np.array_split(data, size)[rank]

    # Hitung jumlah lokal
    local_sum = np.sum(local_data)

    # Gather hasil dari setiap proses
    total_sum = comm.reduce(local_sum, op=MPI.SUM, root=0)

    if rank == 0:
        print("Total sum:", total_sum)

if __name__ == '__main__':
    # Data numerik (gunakan data sesuai kebutuhan Anda)
    data = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10])

    # Panggil fungsi untuk menjalankan program secara paralel
    parallel_sum(data)

# Waktu selesai
end_time = time.time()

# Hitung lama eksekusi
execution_time = end_time - start_time

print(f"Lama Proses: {execution_time} detik")
```