Tugas Pemrosesan Paralel
MPI pada ubuntu server

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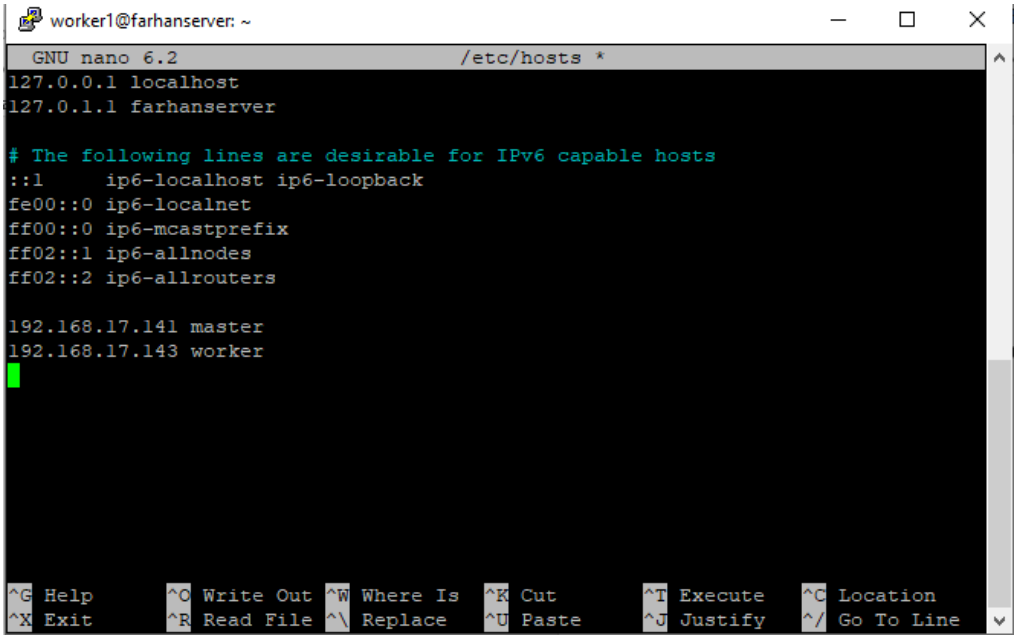
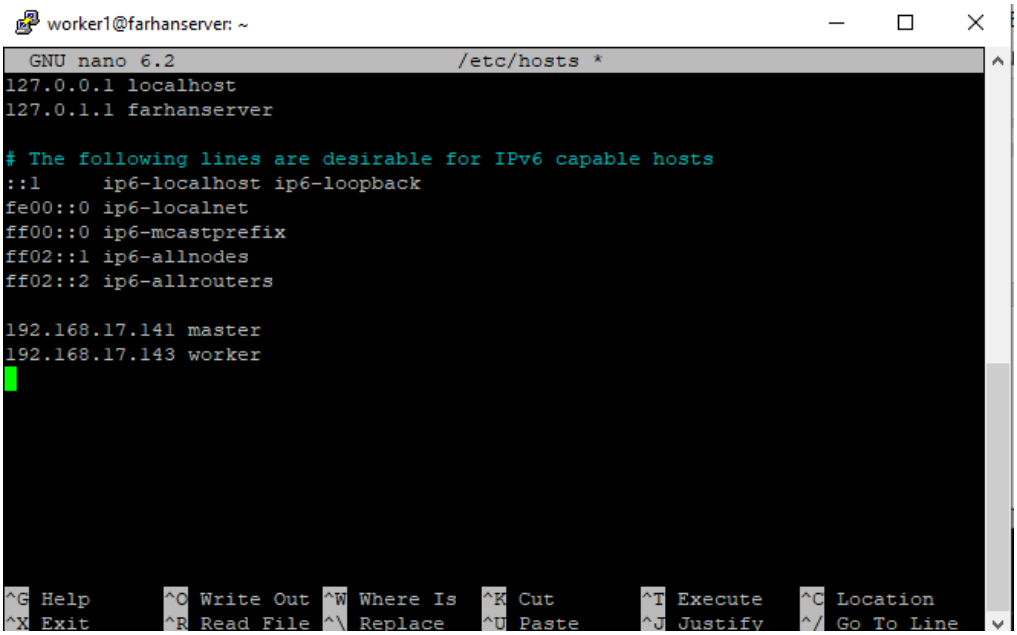
1. Konfigurasi /etc/hosts

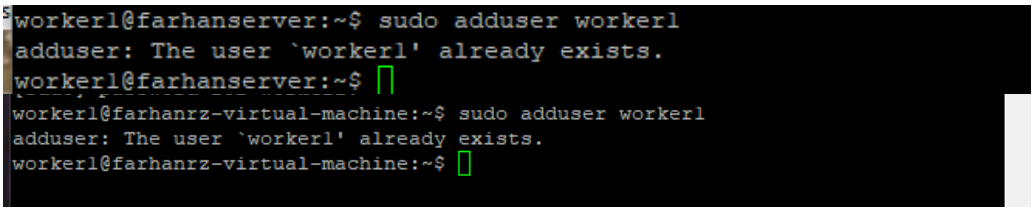
server



Client



2. Menambahkan user



3. Install open-ssh

```
Last login: Mon Nov 13 04:48:21 2023 from 192.168.17.1
worker1@farhanserver:~$ sudo nano /etc/hosts
[sudo] password for worker1:
worker1@farhanserver:~$ sudo adduser worker1
adduser: The user `worker1' already exists.
worker1@farhanserver:~$ sudo apt install open-ssh
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package open-ssh
worker1@farhanserver:~$ sudo apt install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
openssh-server is already the newest version (1:8.9p1-3ubuntu0.4).
The following packages were automatically installed and are no longer required:
  libpython2-stdlib libpython2.7-minimal libpython2.7-stdlib
  python-pkg-resources python-setuptools python2 python2-minimal python2.7
  python2.7-minimal
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 31 not upgraded.
worker1@farhanserver:~$
```

4. Pengecekan ssh

```
Last login: Tue Nov 14 01:59:19 2023 from 192.168.17.1
worker1@farhanrz-virtual-machine:~$
```

5. Instalasi keygen ssh

```
worker1@farhanserver:~$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/worker1/.ssh/id_rsa):
```

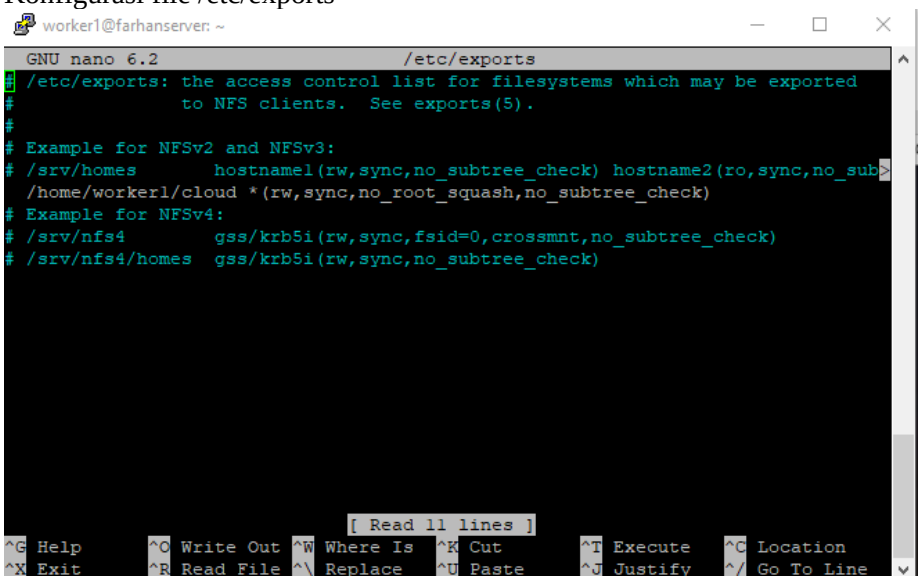
6. Instalasi nfs server

```
worker1@farhanserver:~$ sudo apt install nfs-kernel-server
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:
  libpython2-stdlib libpython2.7-minimal libpython2.7-stdlib
  python-pkg-resources python-setuptools python2 python2-minimal python2.7
  python2.7-minimal
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 31 not upgraded.
worker1@farhanserver:~$
```

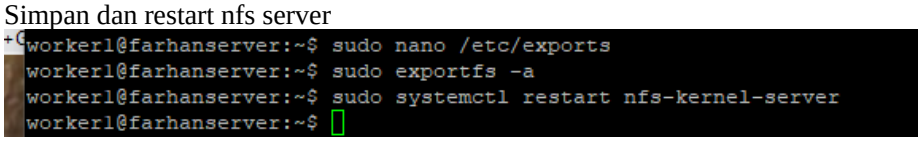
7. Pembuatan shared file pada server dan client

```
worker1@farhanserver:~$ mkdir cloud
mkdir: cannot create directory ‘cloud’: File exists
worker1@farhanserver:~$
```

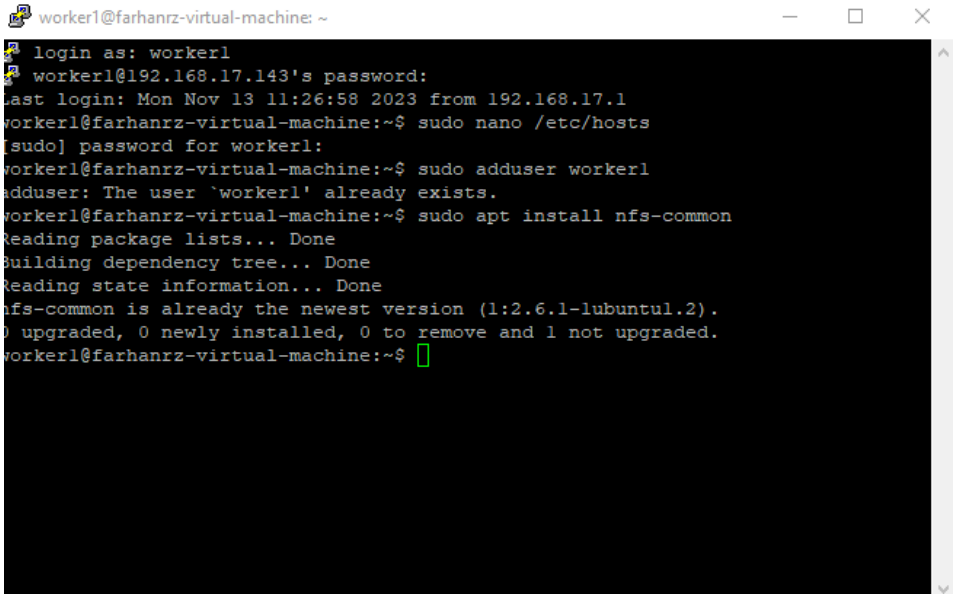
8. Konfigurasi file /etc/exports



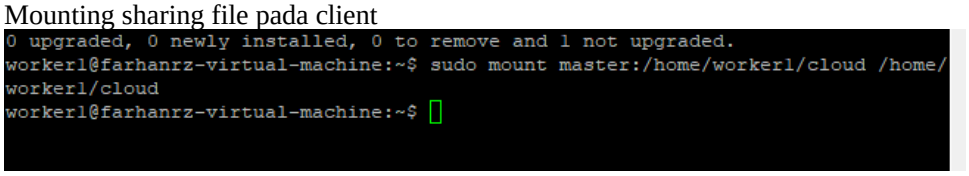
9. Simpan dan restart nfs server



10. Instalasi nfs pada client



11. Mounting sharing file pada client



12. Instalasi MPI

Client

```
worker1@farhanrz-virtual-machine:~$ sudo apt install openmpi-bin libopenmpi-dev
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
libopenmpi-dev is already the newest version (4.1.2-2ubuntu1).
openmpi-bin is already the newest version (4.1.2-2ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
worker1@farhanrz-virtual-machine:~$
```

Server

```
libopenmpi-dev is already the newest version (4.1.2-2ubuntu1).
openmpi-bin is already the newest version (4.1.2-2ubuntu1).
openmpi-bin set to manually installed.
The following packages were automatically installed and are no longer required:
  libpython2-stdlib libpython2.7-minimal libpython2.7-stdlib
  python-pkg-resources python-setuptools python2 python2-minimal python2.7
  python2.7-minimal
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 31 not upgraded.
worker1@farhanserver:~$
```

13. Menjalankan program bubble sort menggunakan cloud computing

```
worker1@farhanserver:~/cloud$ mpirun -np 2 -host master,worker python3 testbro.p
y
Authorization required, but no authorization protocol specified
Authorization required, but no authorization protocol specified
[2, 10, 12, 23, 24, 43, 87, 2004]
waktu dikerjakan 4.696846008300781e-05
[2, 10, 12, 23, 24, 43, 87, 2004]
waktu dikerjakan 6.341934204101562e-05
worker1@farhanserver:~/cloud$
```

Keterangan code

```
rom mpi4py import MPI
import time

start = time.time()
def BubbleSort(val):
    for passnum in range (len(val)-1,0,-1):
        for i in range(passnum):
            if val[i]>val[i+1]:
                temp = val[i]
                val[i] = val[i+1]
                val[i+1] = temp

DaftarAngka = [23,87,2,10,2004,24,43,12]
BubbleSort(DaftarAngka)
print(DaftarAngka)
end = time.time()
print("waktu dikerjakan", end-start)
```