# PRAKTIKUM
# ARSITEKTUR DAN ORGANISASI KOMPUTER

## "MPI (Master, Slave1,Slave2,Slave3)"

**Disusun Oleh :**

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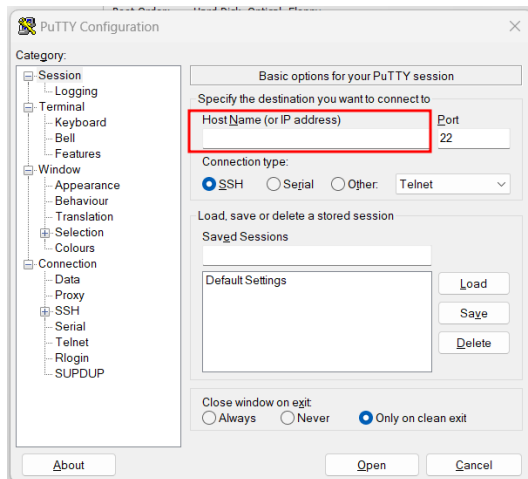
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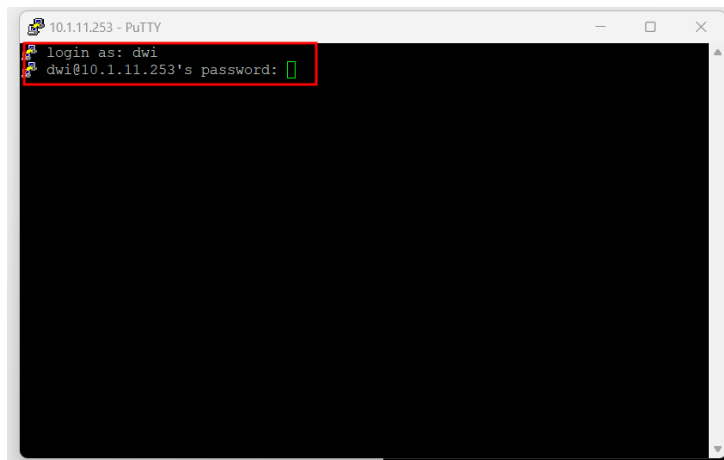**2023**

**ANGGOTA KELOMPOK :**

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## OPEN MPI (Parallel Computing)

Tahap pertama masukkan ip ke putty



Ketika berhasil masukkan login dan password

Ketik "sudo adduser Dwi".



Ketik "sudo usermod -aG sudo dwi".

Ketik "su – dwi".



Ketik "sudo apt update && sudo apt upgrade

sudo apt install net-tools vim".

Ketik "sudo apt install openssh-server".

Ketik "cd .ssh
cat id_rsa.pub | ssh mpiuser@slave1 "mkdir .ssh; cat >> .ssh/authorized_keys".



Ketik "sudo exportfs -a
sudo systemctl restart nfs-kernel-server".

Ketik "sudo apt install python3-pip
pip install mpi4py".

```
GNU nano 4.8                                                    bubble.py
from mpi4py import MPI

def parallel_bubble_sort(arr):
    comm = MPI.COMM_WORLD
    rank = comm.Get_rank()
    size = comm.Get_size()

    local_arr = arr[rank::size]

    for i in range(len(local_arr)):
        for j in range(0, len(local_arr) - i - 1):
            if local_arr[j] > local_arr[j + 1]:
                local_arr[j], local_arr[j + 1] = local_arr[j + 1], local_arr[j]

    sorted_arr = comm.gather(local_arr, root=0)

    if rank == 0:
        combined_arr = [item for sublist in sorted_arr for item in sublist]
        combined_arr.sort()
        for i in range(len(arr)):
            arr[i] = combined_arr[i]

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

    if rank == 0:
        arr = [5, 3, 4, 1, 2]
    else:
        arr = None

    arr = comm.bcast(arr, root=0)   # Broadcast the arr from rank 0 to all nodes

    comm.barrier()

    parallel_bubble_sort(arr)

    if rank == 0:
        print(f"List sorted with bubble sort in ascending order: {arr}")



File Name to Write: bubble.py
^G Get Help                          M-D DOS Format              M-A Append
^C Cancel                            M-M Mac Format              M-B Prepend
```

Berhasil dwi menjadi "Slave2".



```
  my node:   aurelia
  target node:  master

This is usually an internal programming error that should be
reported to the developers. In the meantime, a workaround may
be to set the MCA param routed=direct on the command line or
in your environment. We apologize for the problem.
--------------------------------------------------------------------------
[aurelia:06260] 2 more processes have sent help message help-errmgr-base.txt / no-path
[aurelia:06260] Set MCA parameter "orte_base_help_aggregate" to 0 to see all help / error messages
dwi@aurelia:~/bubble$ mpirun -np 4 -host master,slave2 python3 bubble.py
ssh: Could not resolve hostname master: Temporary failure in name resolution
ssh: Could not resolve hostname slave2: Temporary failure in name resolution
--------------------------------------------------------------------------
ORTE was unable to reliably start one or more daemons.
This usually is caused by:

* not finding the required libraries and/or binaries on
  one or more nodes. Please check your PATH and LD_LIBRARY_PATH
  settings, or configure OMPI with --enable-orterun-prefix-by-default

* lack of authority to execute on one or more specified nodes.
  Please verify your allocation and authorities.

* the inability to write startup files into /tmp (--tmpdir/orte_tmpdir_base).
  Please check with your sys admin to determine the correct location to use.

*  compilation of the orted with dynamic libraries when static are required
   (e.g., on Cray). Please check your configure cmd line and consider using
   one of the contrib/platform definitions for your system type.

* an inability to create a connection back to mpirun due to a
  lack of common network interfaces and/or no route found between
  them. Please check network connectivity (including firewalls
  and network routing requirements).
--------------------------------------------------------------------------
--------------------------------------------------------------------------
ORTE does not know how to route a message to the specified daemon
located on the indicated node:

  my node:   aurelia
  target node:  slave2

This is usually an internal programming error that should be
reported to the developers. In the meantime, a workaround may
be to set the MCA param routed=direct on the command line or
in your environment. We apologize for the problem.
--------------------------------------------------------------------------
dwi@aurelia:~/bubble$
```