Nigerian Army University Biu.

Faculty:

Computing

Department of:

Computer Science

Course:

Netcentric Computing (CSC-425)

Course Lecturer

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Basic Concepts of Distributed System Job

computing a job on a distributed system

The computing process consists of three phases.

- **In Phase I**, the master initially investigates the resource status of the slaves, divides the job into a number of tasks and distributes the tasks onto the slaves according to the resources availability.

- **In Phase II**: All the computers perform computations. Each computer executes processes allocated by the central computer while simultaneously executing the necessary local processes.

- **In Phase III**: The master computer collects partial results from the slaves and computes the final result.
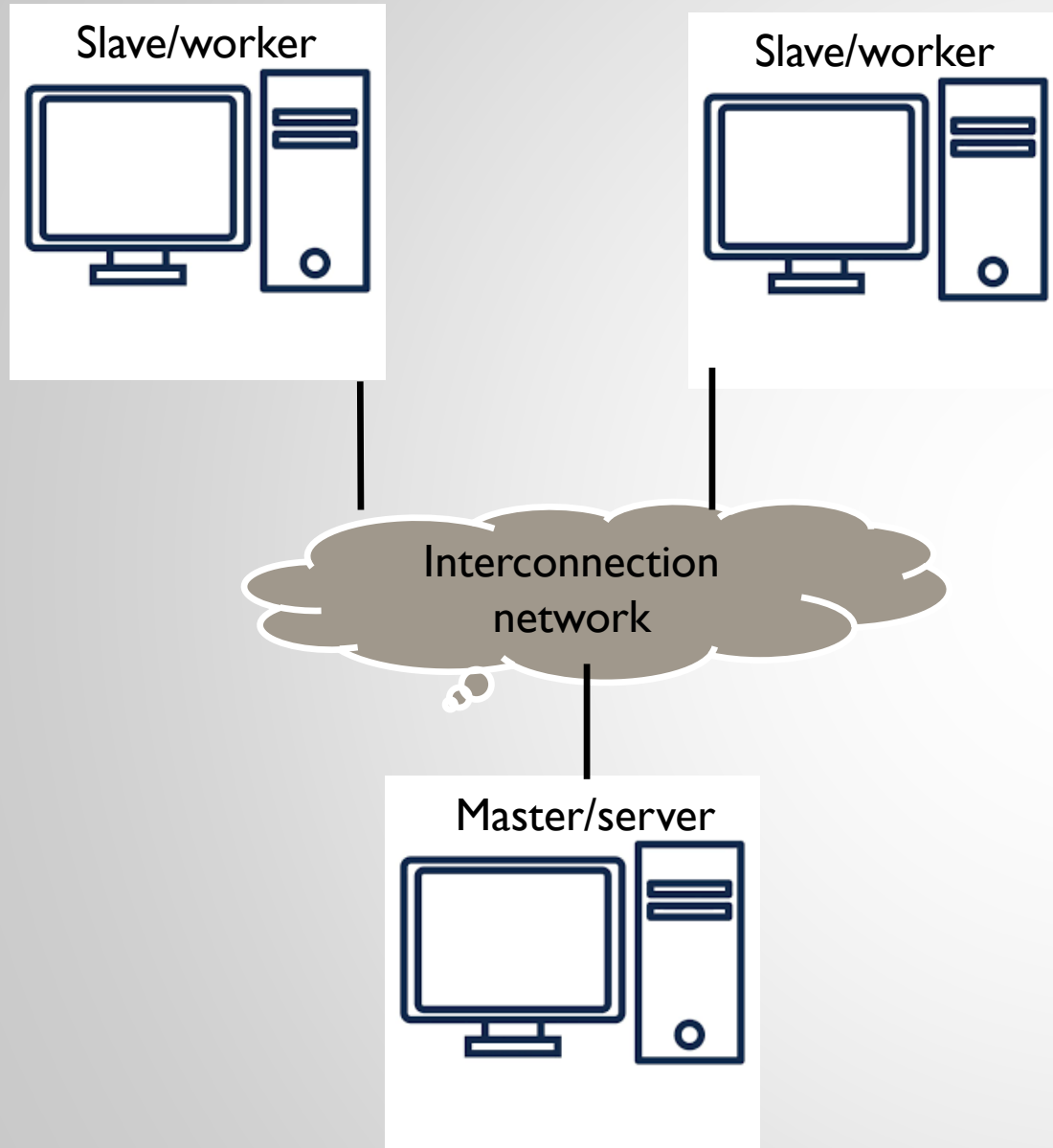
Phase I: pre-process
1. Divide the job into task
2. Get resource status from slaves
3. Assign task onto slaves.

Phase II: main-process
1. Processing task on the different machines

Phase III: post-process
1. Slaves sends back partial results
2. Master combines results
3. Exit

Distributed Computing Models

Models of distributed computing can be classified into five categories:

—Minicomputer model,

—Workstation model,

—Workstation-server model,

—Processor-pool model,

—Hybrid model.

These models are briefly described in the following.

Minicomputer Model

• A few minicomputers interconnected by a communication network.

• Several terminals are connected to each minicomputer so multiple users can simultaneously logged on to it.

• This model is an extension of the centralized time-sharing system.
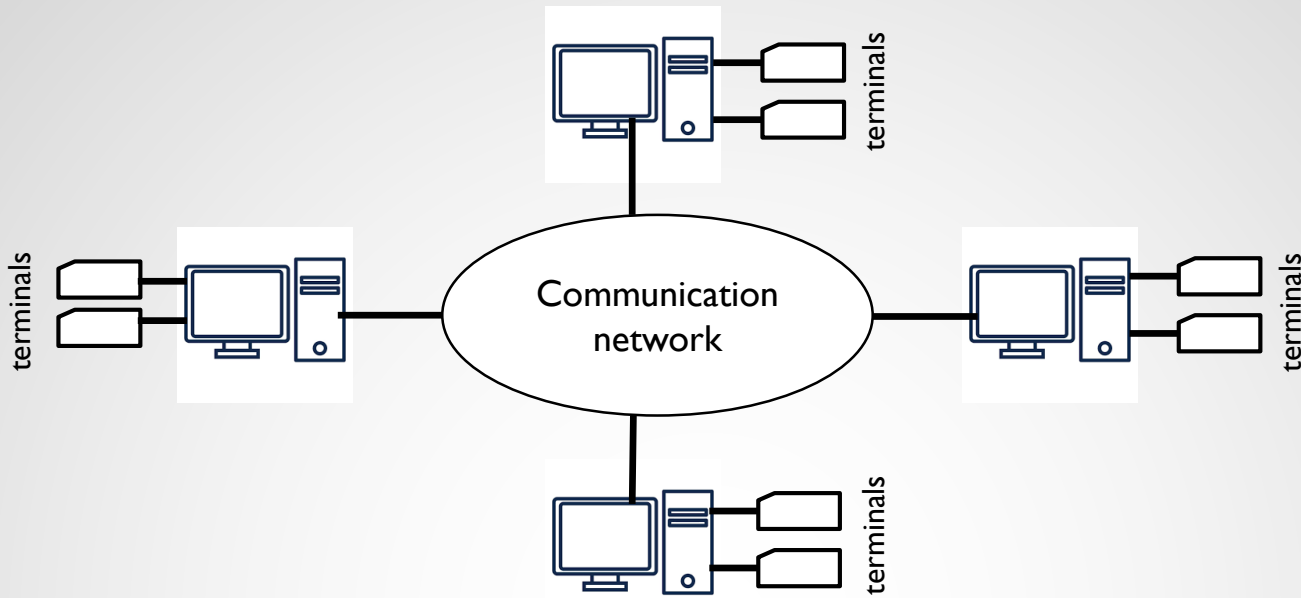
Drawbacks of Minicomputer Model:

—Each user is logged on to one specific minicomputer, with remote access to other minicomputers.

—The processing of tasks are done by the processors of a single minicomputer.

—This model is very expensive.

Workstation Model

• Several workstations (PCs) interconnected by a high-speed communication network (LAN).

• Each workstation is equipped with its own disk and serving as a single-user computer (the WS is called diskfull).
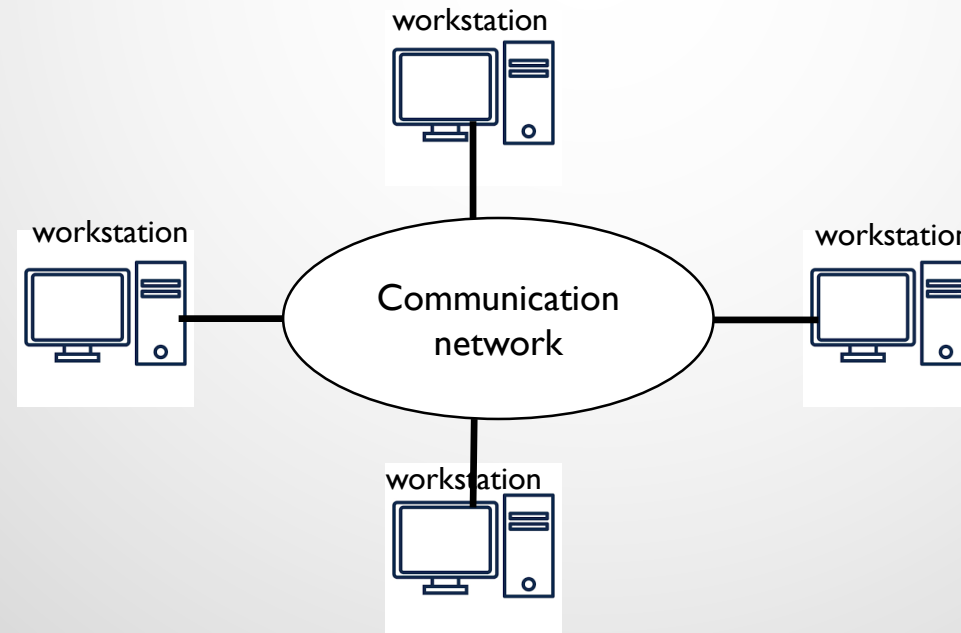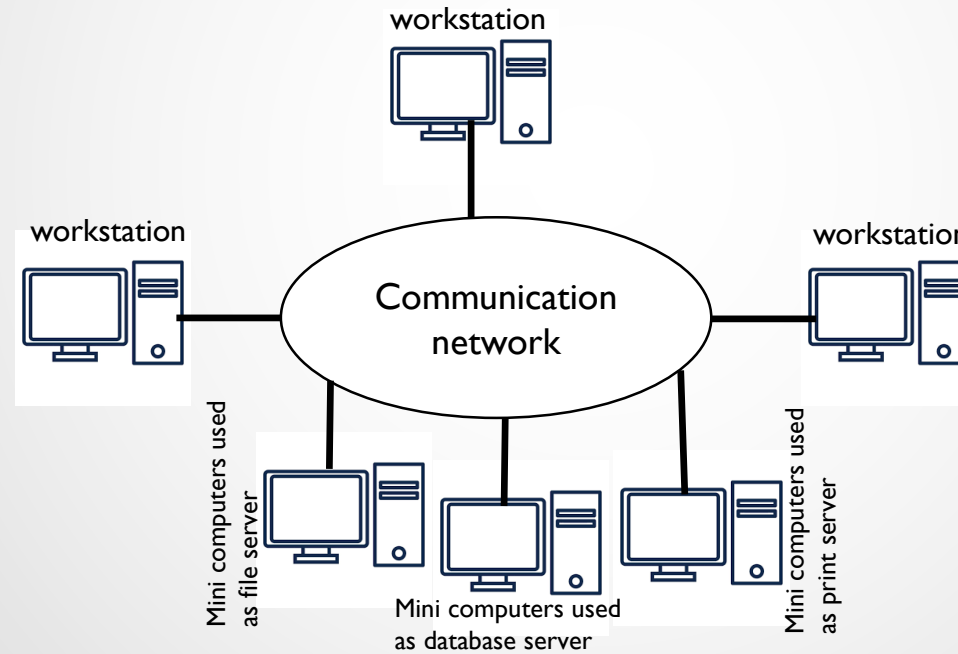
Workstation Model

• **Drawbacks of workstation Model:**

— A user logs onto one of the workstations called his or her "home" workstation.

— Several issues must be resolved to distribute tasks on different WS:

– How does the system find an idle workstation?

– How a process can be transferred from one workstation to get it executed on another workstation?

– What happens to a remote process if a user logs onto a workstation that was idle until now and was being used to execute a process of another workstation?

Workstation-Server Model

• A few minicomputers represent servers and several workstations (most of which are diskless) interconnected by a communication network.

Workstation-Server Model

• **Advantages of workstation-server Model:**

— **It is much cheaper** to use a few minicomputers equipped with large, fast disks that are accessed over the network than a large number of diskful workstations, with each workstation having a small, slow disk.

— **Backup and hardware maintenance** are easier to perform with a few large disks than with many small disks scattered all over a building or campus.

— **Installing new releases of software** (such as a file server with new functionalities) is easier when the software is to be installed on a few file server machines than on every workstation.

—users have the flexibility to use any workstation and access the files in the same manner irrespective of which workstation the user is currently logged on, because all files are managed by the file servers.

—A user has guaranteed response time because workstations are not used for executing remote processes.

• **Drawbacks of workstation-server Model:**

—this model does not utilize the processing capability of idle workstations.

Processor-Pool Model

• The pool of processors consists of a large number of microcomputers and minicomputers attached to the network.

• Each processor in the pool has its own memory to load and run a system program or an application program of the distributed computing system.
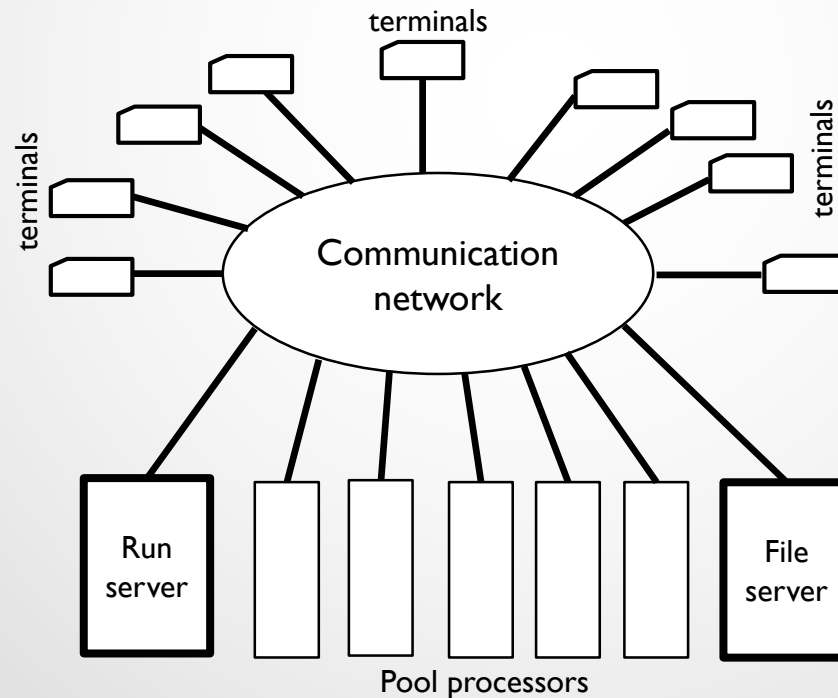
- Unlike the workstation-server model in which a processor is allocated to each user, in the processor pool model the processors are pooled together to be shared by the users as needed

- **Advantages:**

—The entire processing power of the system is available for use by the currently logged-on users.

—The system's services can be easily expanded without the need to install any more computers.

Hybrid Model

• A hybrid model combines the advantages of both the workstation-server and processor-pool models. This model is based on the workstation-server model but with the addition of a pool of processors. The processors in the pool can be allocated dynamically for computations that are too large for workstations or that requires several computers concurrently for efficient execution.

The hybrid model gives guaranteed response to interactive jobs by allowing them to be processed on local workstations of the users.

• *The hybrid model is more expensive to implement than the workstation-server model or the processor-pool model.*

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