





# CSE3103 : Database

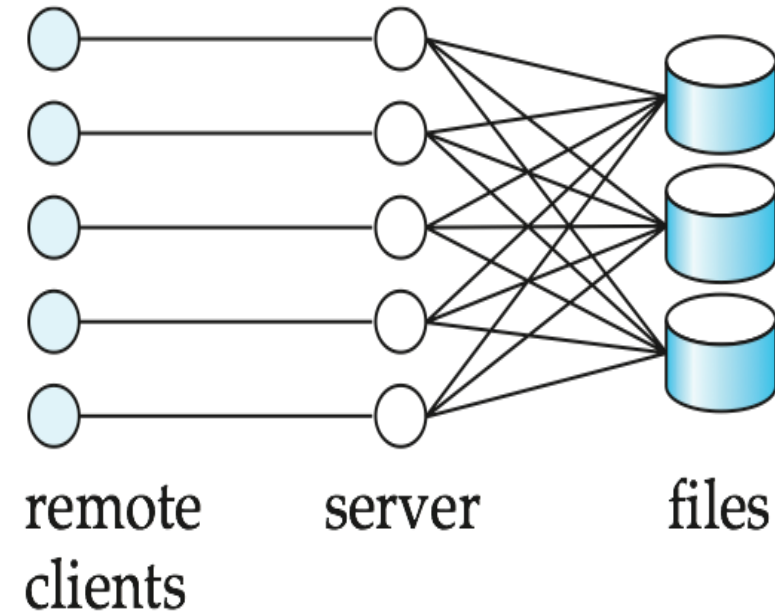
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# Transaction Processing Monitors

- **Transaction Processing (TP) monitors** initially developed as multithreaded servers to support large numbers of terminals from a single process.
- Provide infrastructure for building and administering complex transaction processing systems with a large number of clients and multiple servers.
- Provide services such as:
  - Presentation facilities to simplify creating user interfaces
  - Persistent queuing of client requests and server responses
  - Routing of client messages to servers
  - Coordination of two-phase commit when transactions access multiple servers.

# TP Monitor Architectures

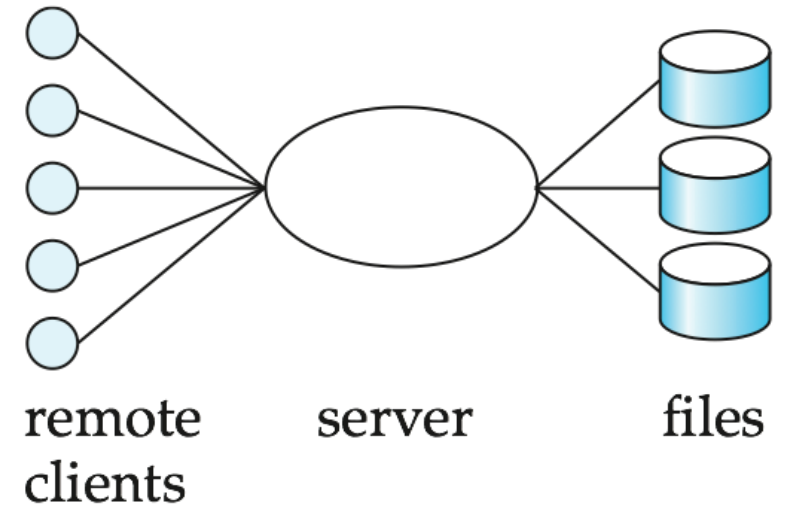
- **Process per client model** - instead of individual login session per terminal, server process communicates with the terminal, handles authentication, and executes actions.
  - Memory requirements are high
  - Multitasking- high CPU overhead for context switching between processes



(a) Process-per-client model

# TP Monitor Architectures

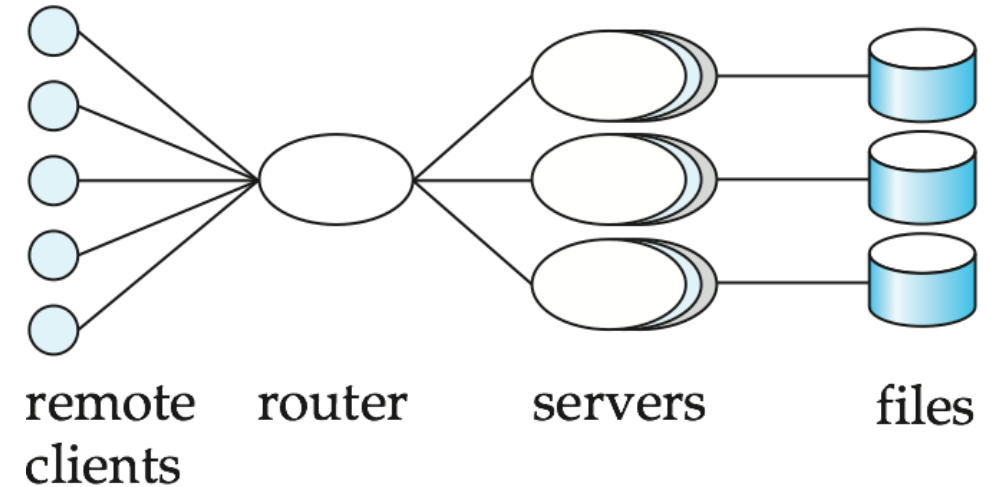
- **Single process model** - all remote terminals connect to a single server process.
  - Used in client-server environments
  - Server process is multi-threaded; low cost for thread switching
  - No protection between applications
  - Not suited for parallel or distributed databases



(b) Single-server model

# TP Monitor Architectures

- **Many-server single-router model** - multiple application server processes access a common database; clients communicate with the application through a single communication process that routes requests.
  - Independent server processes for multiple applications
  - Multithread server process
  - Run on parallel or distributed database

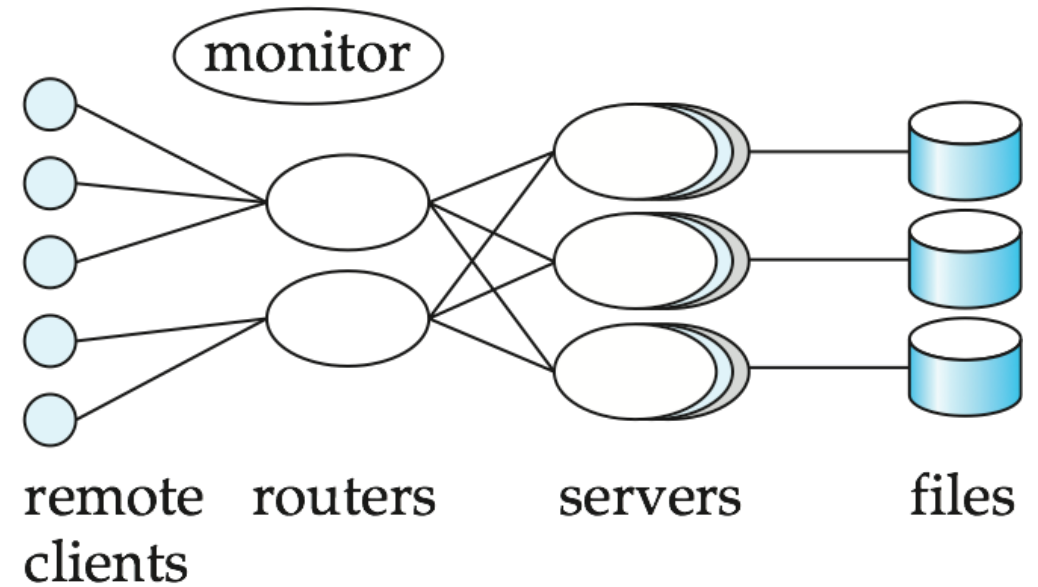


(c) Many-server, single-router model



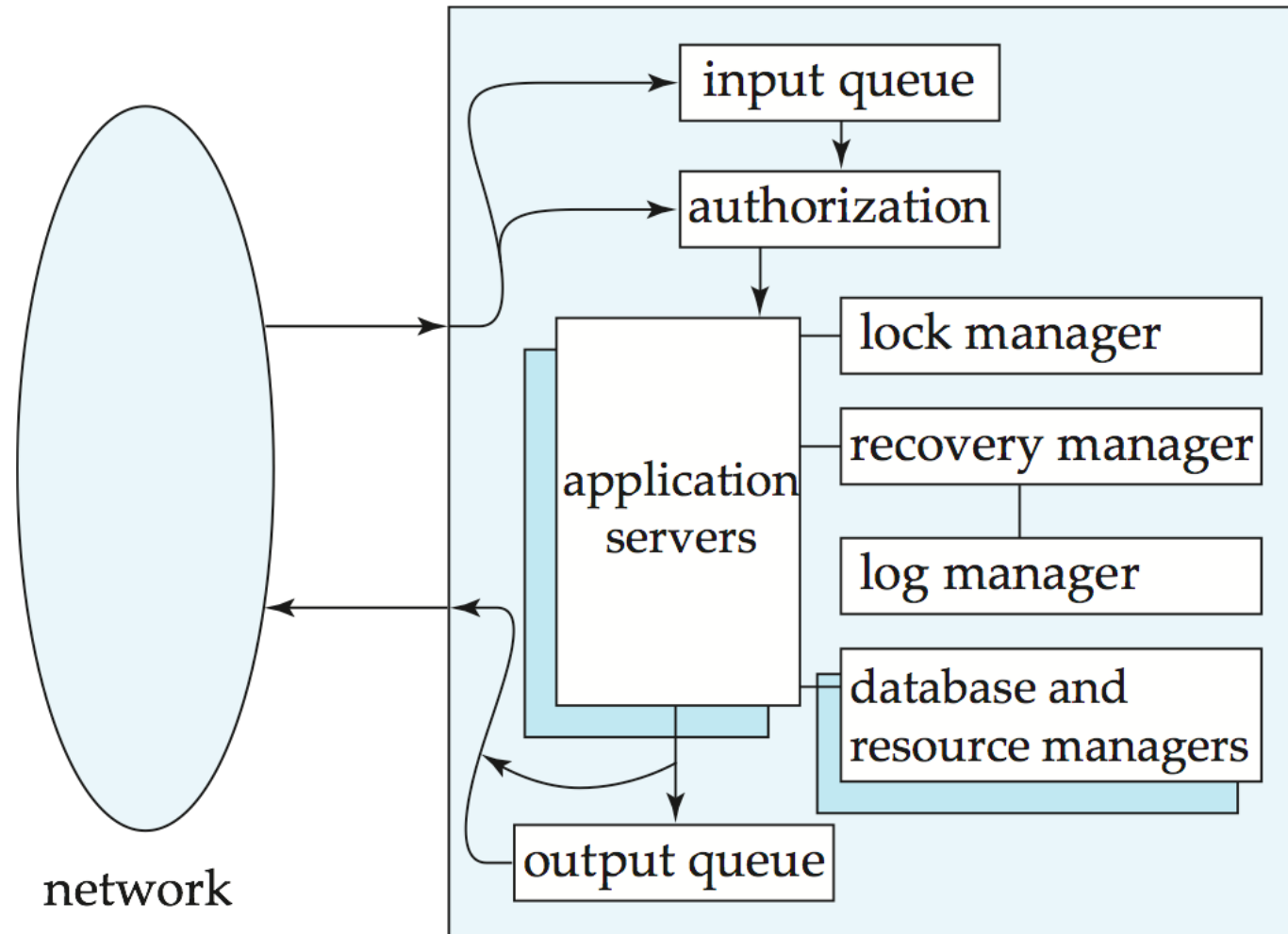
# TP Monitor Architectures

- **Many server many-router model** - multiple processes communicate with clients.
  - Client communication processes interact with router processes that route their requests to the appropriate server.
  - Controller process starts up and supervises other processes.



(d) Many-server, many-router model

# Detailed Structure of a TP Monitor





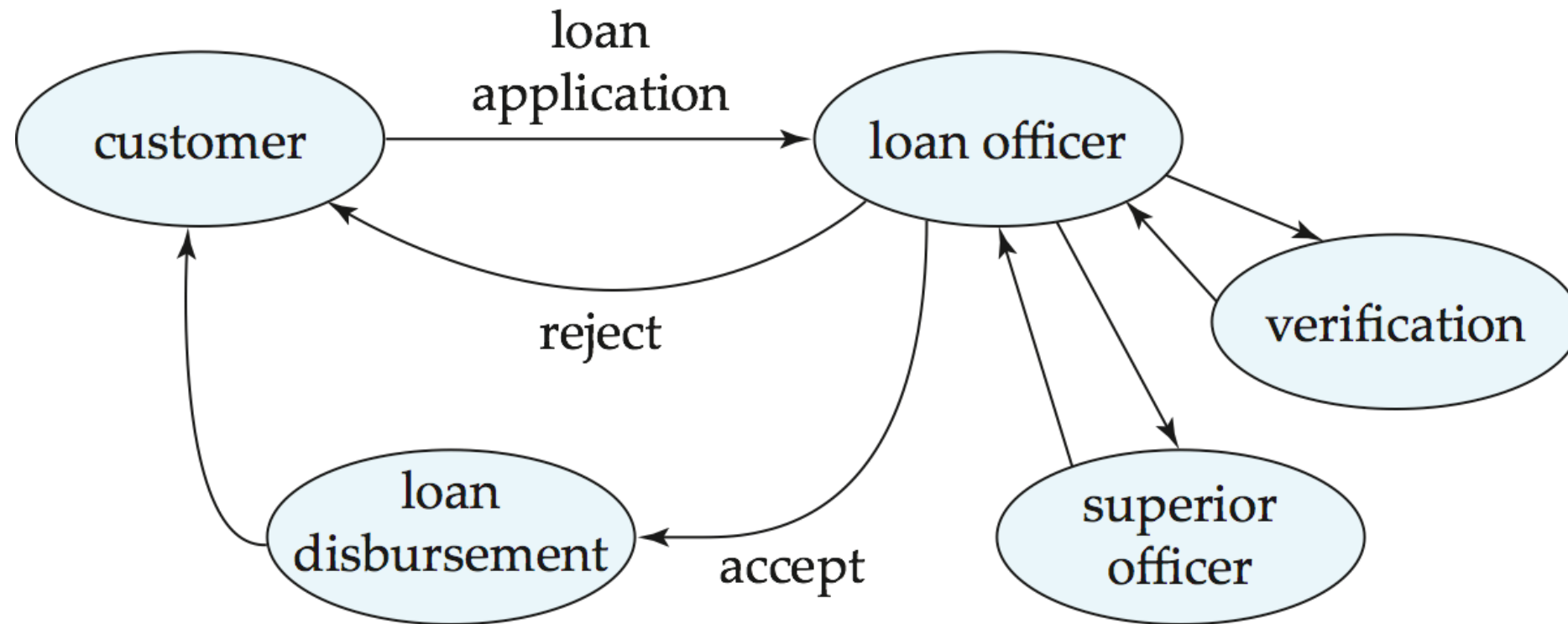
# Transactional Workflows

- **Workflows** are activities that involve the coordinated execution of multiple tasks performed by different processing entities.
- With the growth of networks, and the existence of multiple autonomous database systems, workflows provide a convenient way of carrying out tasks that involve multiple systems.
- Example of a workflow delivery of an email message, which goes through several mails systems to reach destination.
  - Each mailer performs a task: forwarding of the mail to the next mailer.
  - If a mailer cannot deliver mail, failure must be handled semantically (delivery failure message).
- Workflows usually involve humans: e.g. loan processing, or purchase order processing.

# Examples of Workflows

Workflow application	Typical task	Typical processing entity
electronic-mail routing	electronic-mail message	mailers
loan processing	form processing	humans, application software
purchase-order processing	form processing	humans, application software, DBMSs

# Loan Processing Workflow



- In the past, workflows were handled by creating and forwarding paper forms
- Computerized workflows aim to automate many of the tasks. But the humans still play role e.g., in approving loans.

# Transactional Workflows

- Must address following issues to computerize a workflow.
  - Specification of workflows - detailing the tasks that must be carried out and defining the execution requirements.
  - Execution of workflows - execute transactions specified in the workflow while also providing traditional database safeguards related to the correctness of computations, data integrity, and durability.
  - E.g.: Loan application should not get lost even if system fails.
- Extend transaction concepts to the context of workflows.
- State of a workflow - consists of the collection of states of its constituent tasks, and the states (i.e., values) of all variables in the execution plan.

