Lecture 1

Introduction to 5COSC004W Client-Server Architecture

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Computing Models

Computing Models

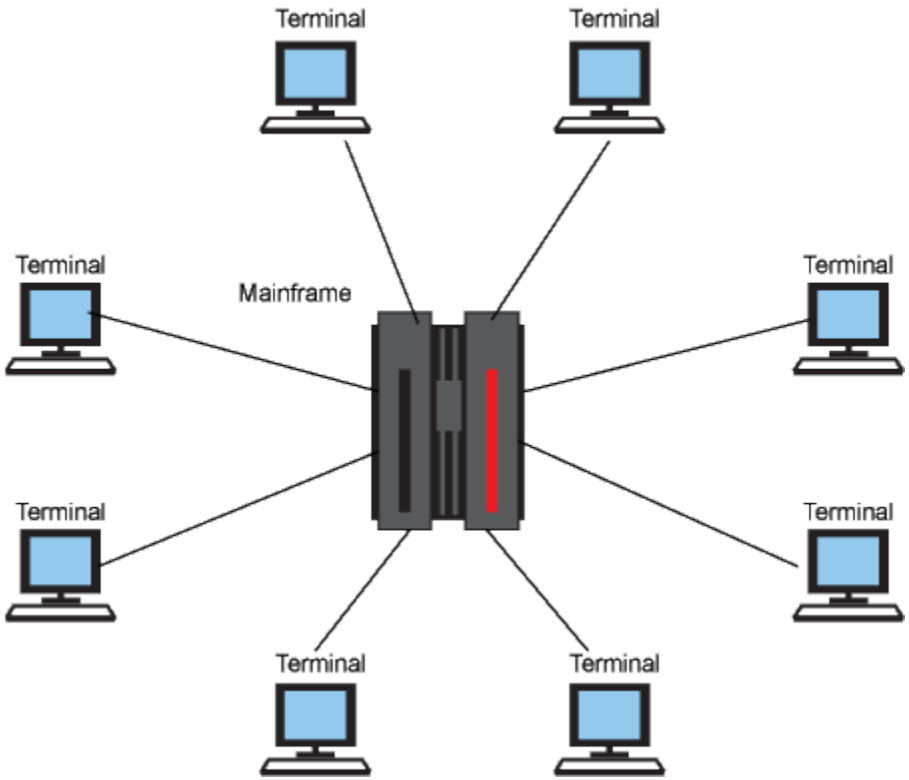
System architecture

- High-level design on which the system is based
- It contains
  - Components
  - Collaborations (how components interact)
  - Connectors (how components communicate)

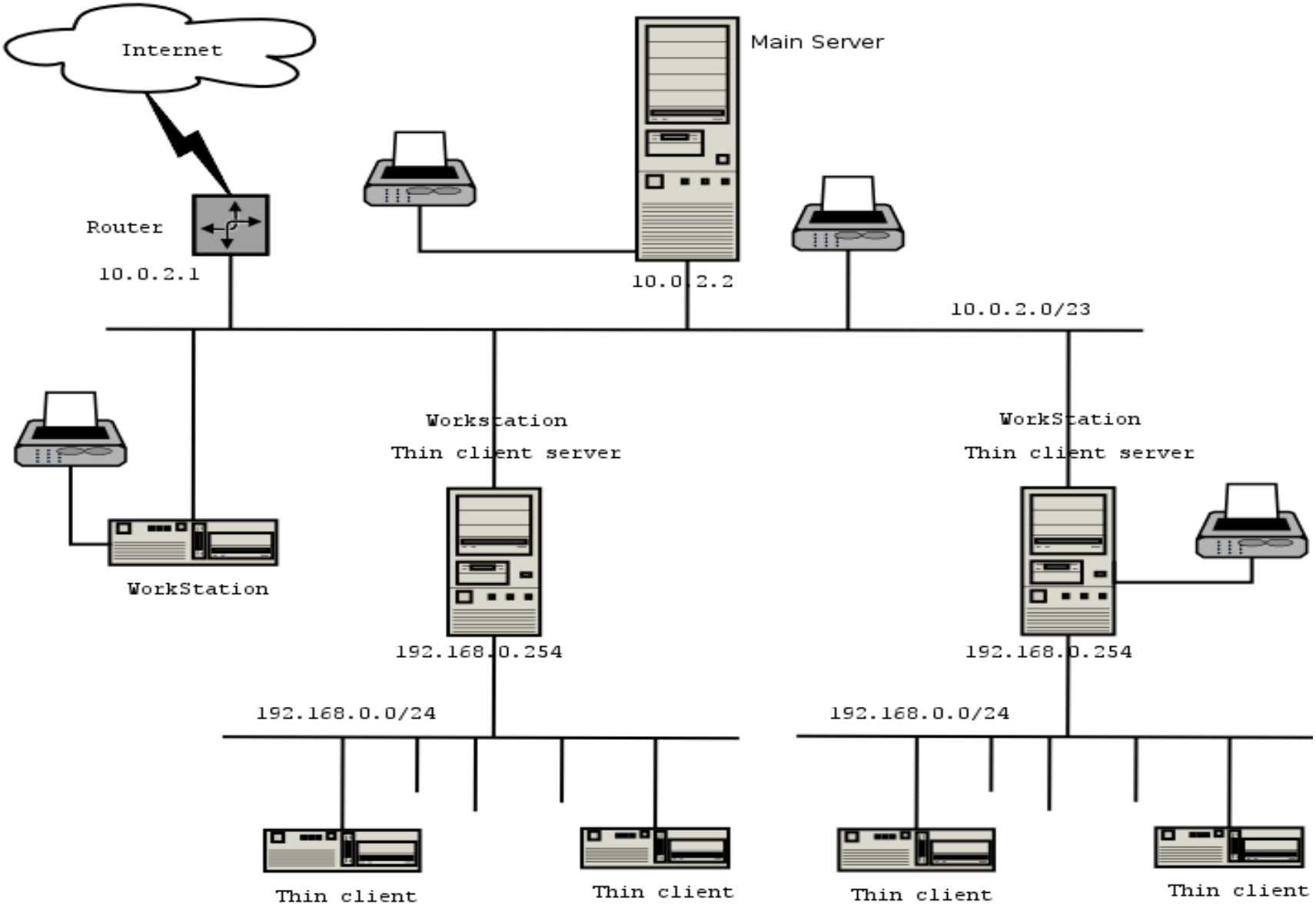
Computing models

- Centralized (or mainframe) model
- Distributed model

Mainframe Model



Distributed Model



Client-Server Middleware

Client-Server Middleware (1)

Middleware:

- **Software which allows an application to interoperate with other software, without requiring the user to understand and code the low-level operations required to achieve interoperability**

- **Types of interoperation:**
  - **synchronous systems - the requesting system waits for a response to the request in real time**

  - **asynchronous systems - send a request but do not wait for a response in real time – the response is accepted whenever it is received .**

Client-Server Middleware (2)

Asynchronous Remote Procedure Calls (RPC)

- **Client makes calls to procedures running on remote computers but does not wait for a response. If connection is lost, client must re-establish the connection and send request again.**

Synchronous RPC

- **Distributed program using this may call services available on different computers – makes it possible to achieve this without undertaking detailed coding (e.g. RMI in Java)**

Publish/Subscribe

- **Push technology - server monitors client activities and sends information to the client when available.**
- **Asynchronous, the clients (subscribers) perform other activities between notifications from the server.**
- **Useful for monitoring situations where actions need to be taken when particular events occur.**

Client-Server Middleware (3)

Message-Oriented Middleware (MOM)

- **Asynchronous – sends messages that are collected and stored until they are acted upon, while the client continues with other processing.**

Object Request Broker (ORB)

- **Object-oriented management of communications between clients and servers.**
- **ORB tracks the location of each object and routes requests to each object.**

SQL-oriented Data Access

- **Middleware between applications and database servers. Has the capability to translate generic SQL into the SQL specific to the database**

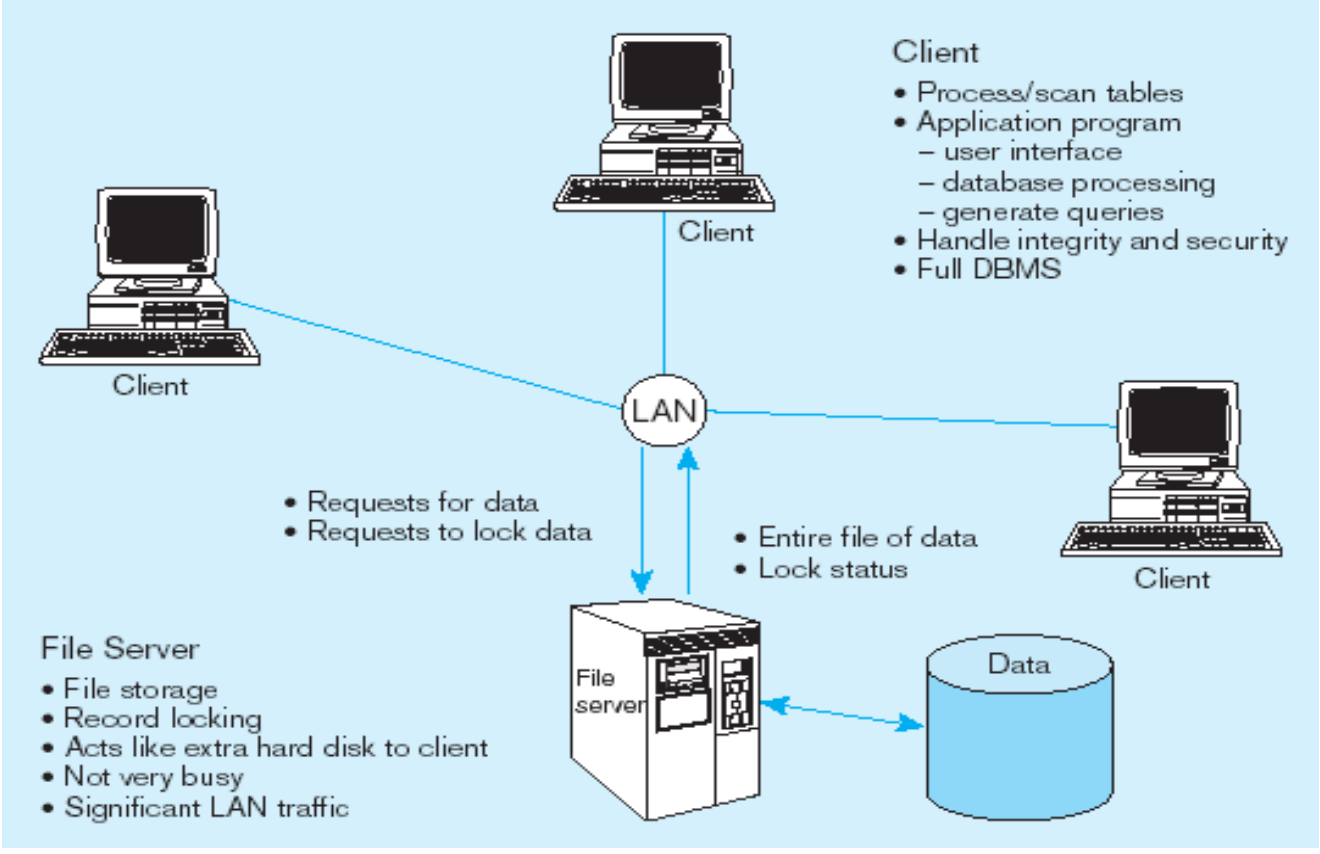
Client-Server Architecture: Server Types

Client-Server Architecture: Server Types

- File and print
- Web
- Proxy
- Caching
- Mail
- Mailing list
- Media
- DNS
- FTP
- News
- Certificate
- Directory
- Catalog
- Transaction

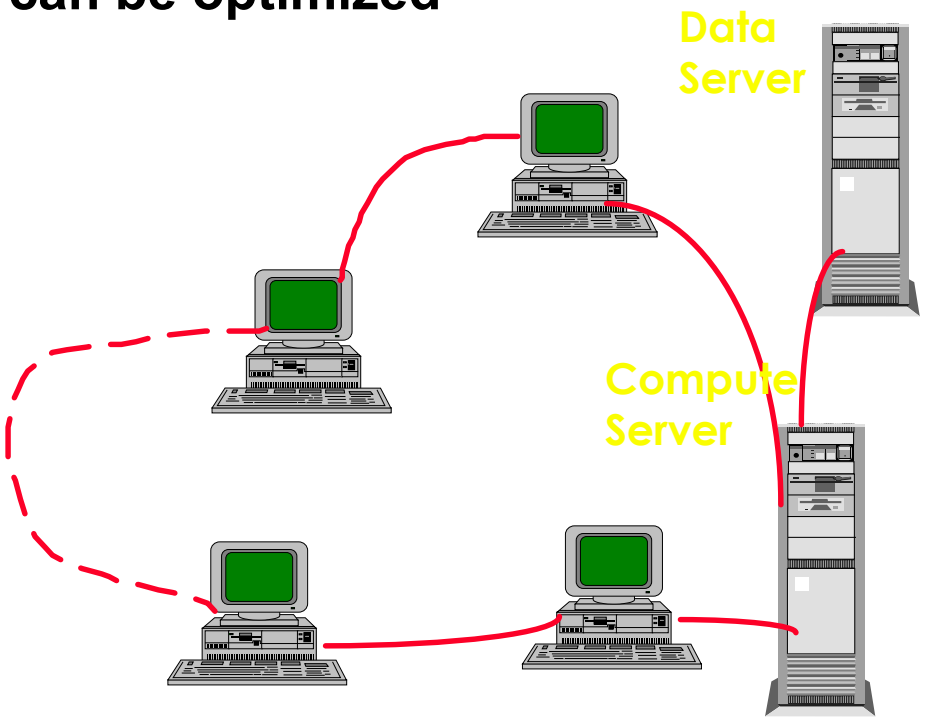
File Servers

- **They manage client applications files providing shared access**
- **They pull large amount of data off the storage subsystem and pass the data over the network**
- **They require many slots for network connections, large-capacity and fast hard disk subsystem**



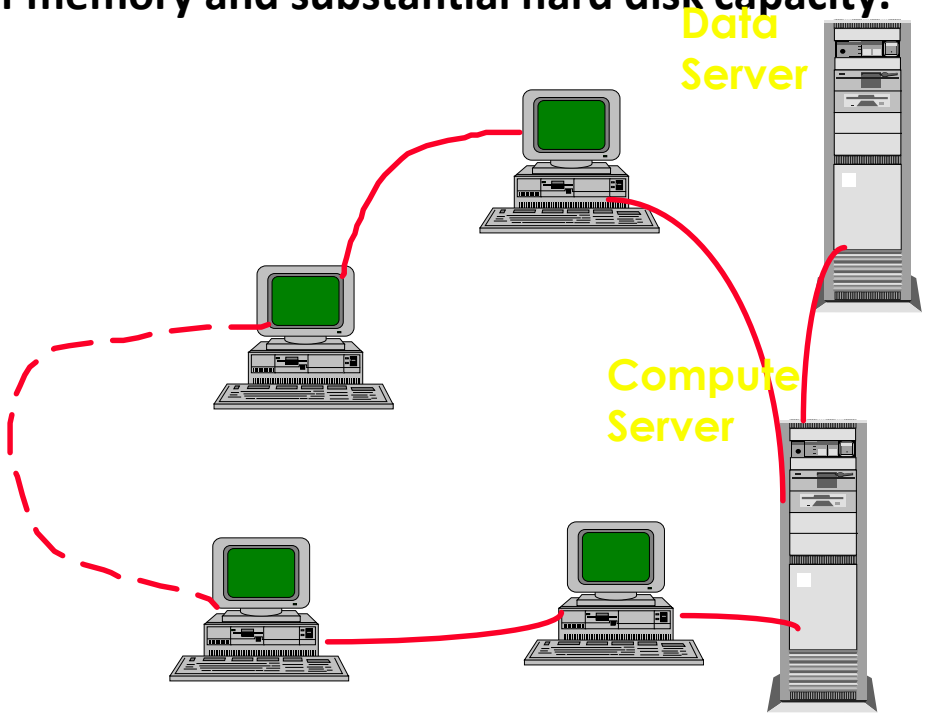
Computer Servers

- **Performs application logic processing**
- **Compute servers requires**
  - **processors with high performance capabilities**
  - **large amounts of memory**
  - **relatively low disk subsystems**
- **By separating data from the computation processing, the compute server's processing capabilities can be optimized**



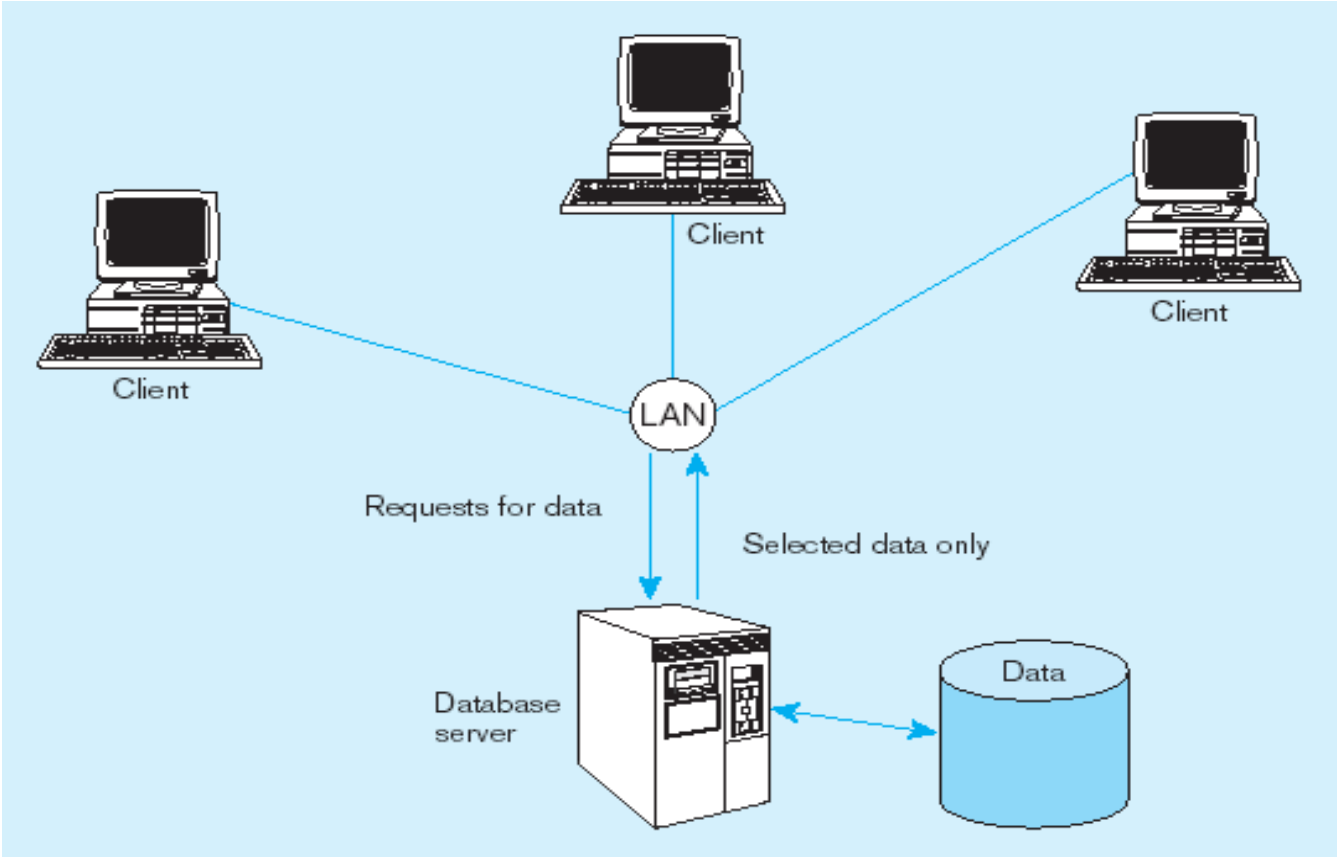
Data Servers

- **Data-oriented used only for data storage and management and does not perform any application logic**
- **Perform processes such as data validation, required as part of the data management function.**
- **Since a data server can serve more than one compute server, compute-intensive applications can be spread among multiple severs**
- **Requires fast processor, large amount of memory and substantial hard disk capacity.**



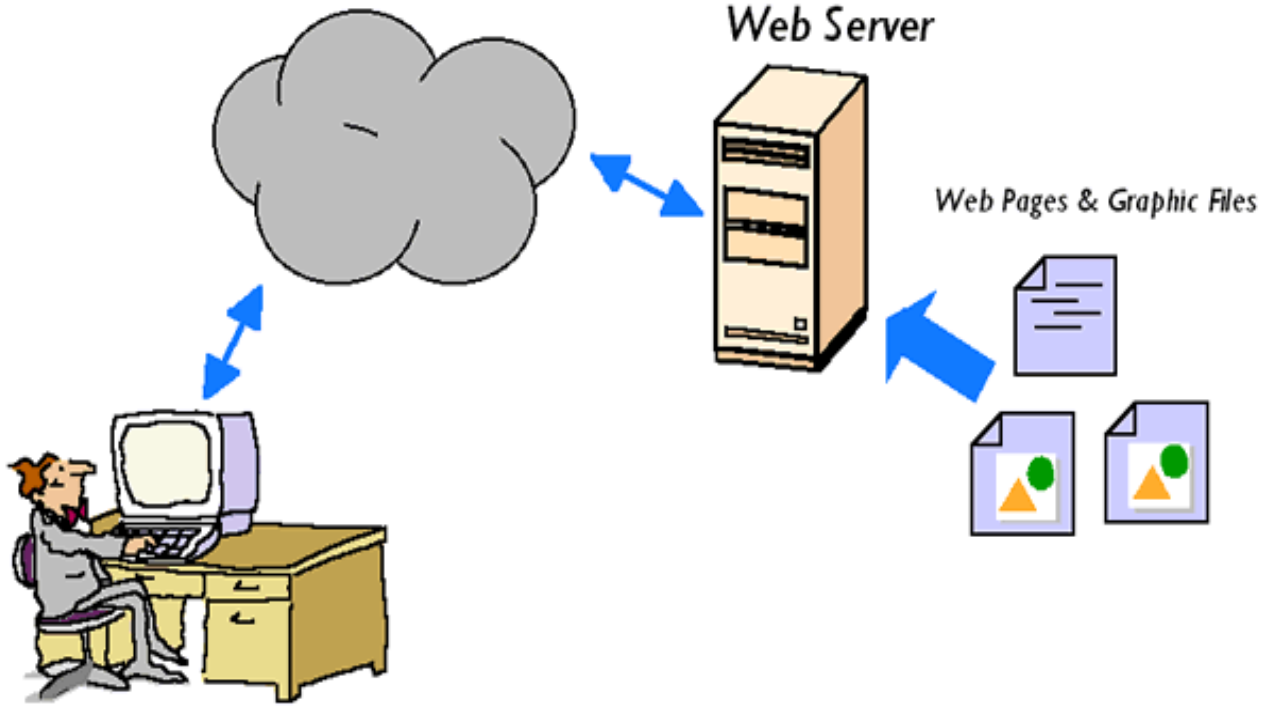
Database Servers

- They accepts requests for data, retrieve the data from its database (or requests data from another node) and pass the results back.
- The server requirement depends on the size of database, speed with which the database must be updated, number of users and type of network used.



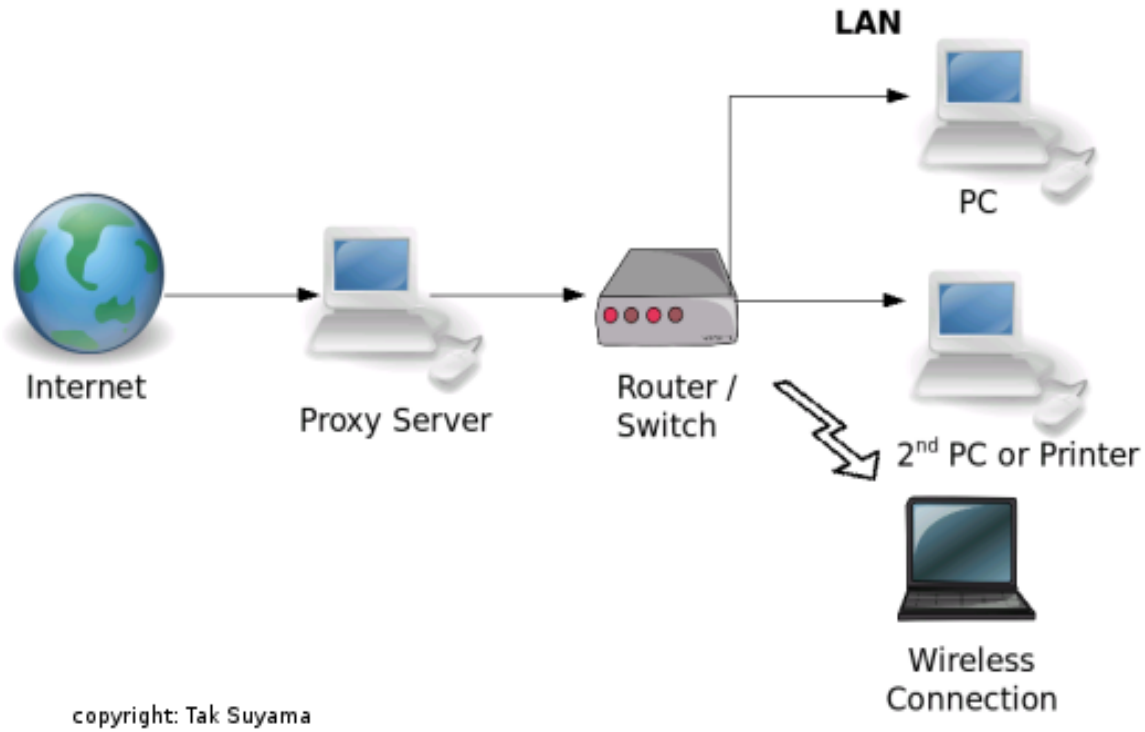
Web Servers

- they to store, process and deliver web pages to clients using the HTTP protocol
- web browser initiates communication sending a request for a resource using HTTP and the server responds with the content
- they run presentation functions such as:
  - gathering and validating inputs
  - request routing
  - authentication
  - load balancing
  - database routing



Proxy Servers

- they are machines which act as an intermediary between the computers of a local area network and the Internet
- they deliver the following features:
  - caching Web documents
  - providing corporate firewall access
  - filtering client transactions
  - logging transactions
  - securing the host
  - enabling enhanced admin



Mail Servers

- **They are high-capacity computing devices that run software dedicated to sending, delivery, and storage of electronic mail messages.**
- **Their software allows the sysadmin to create and manage email accounts**
- **They send and receive email using standard email protocols for example, the SMTP protocol sends messages and handles outgoing mail requests. The IMAP and POP3 protocols receive messages and are used to process incoming mail**