DATA STORAGE TECHNOLOGIES & NETWORKS
(CS C446, CS F446 & IS C446)

LECTURE 03 – STORAGE

Storage Requirements

- **Persistent Isolated Data**
  - Data is accessible to (or accessible through) a single computer and persistent across computations
    - (Input/Output on the) Storage is controlled by the computer
  - Types of (logical) data accesses:
    - Large streams – either text or binary (e.g. program code, multimedia)
    - Transactional units – records
  - Applications need not be aware of physical details of storage
    - Operating System provides a logical layer – File System
    - Special purpose logical layers are possible – Database System

Storage Requirements

- ## Persistent Shared Data
  - Data is accessible to (or accessible through) multiple computers and persistent across computations
    - Storage is shared by multiple computers i.e. available on a network
    - Question: Is the network same as the "network of computers"?
    - Question: Is the network "transparent" to the computers?

Network Attached Storage
vs.
Storage Area Networks

Storage Requirements

- ## RAID
  - Redundant Array of Independent Disks
 - Developed to address cost, performance and availability requirement of data
- ## DAS
  - Direct Attached Storage
  - Connects directly to a server or group of servers in a cluster
  - Can be internal or external to the server

Storage Requirements

- ## NAS

  - Network Attached Storage

  - Shared storage is on the same network (LAN) as computers & provides file access to heterogeneous clients

  - Computers are aware of the network and the fact that storage is attached over the network

   - Translation: Data are accessed as files or logical units
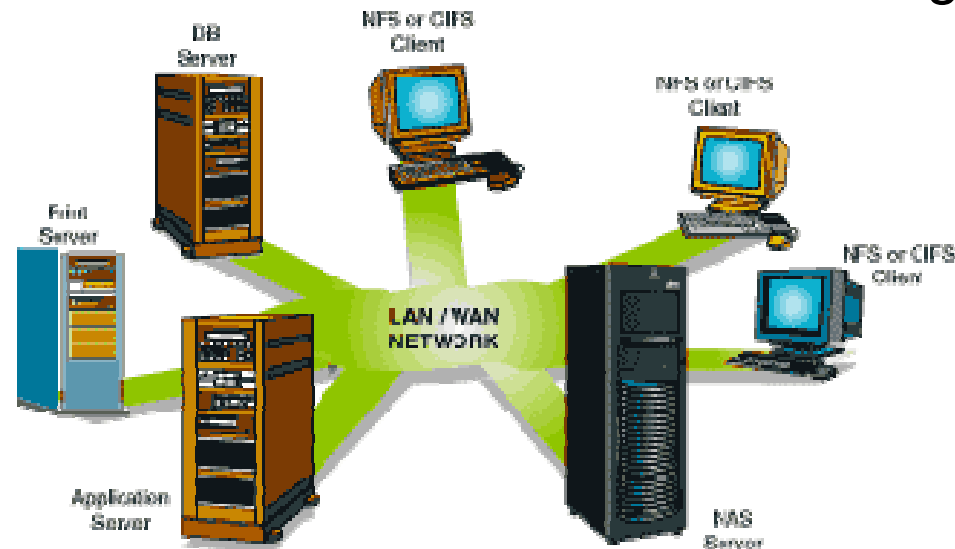
Storage Requirements

- ## SAN

  - ### Storage Area Network

  - Dedicated high performance fibre channel network to facilitate block level communication between servers and storage

  - Shared storage is on a different network from the computer network – but these networks are connected.

  - Computers are not aware of this (storage) network
    - Translation: Data are accessed raw (as from direct storage)
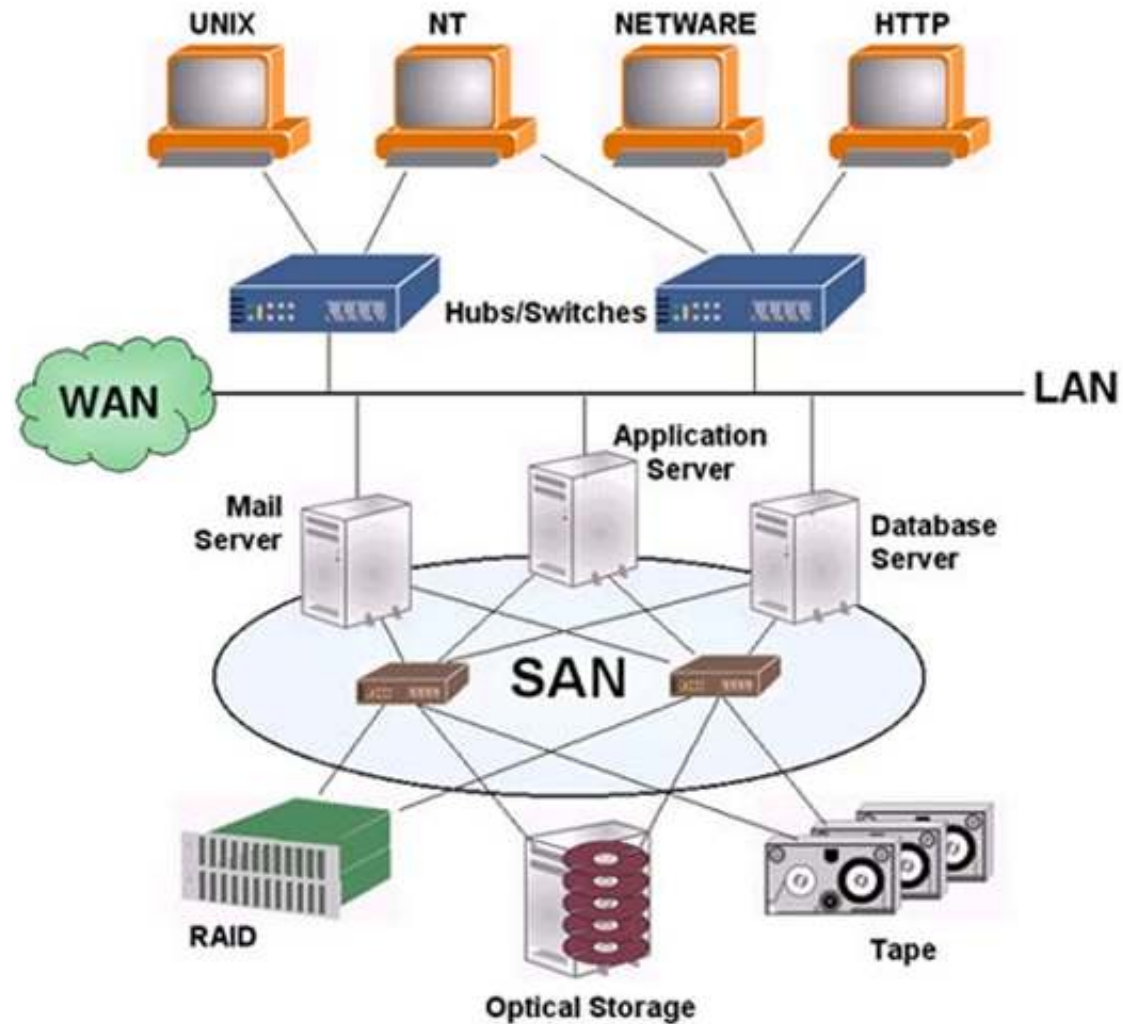
Storage Area Networks

Storage Requirements

- ## IP – SAN
  - Internet Protocol – SAN
  - Convergence of technologies used in SAN & NAS
  - Provides block level communication across a local or wide area network (LAN or WAN).
  - Greater consolidation and availability of data