



Computer Fundamentals

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Lecture 12



Outline

➤ Network basics



Objectives

➤ Upcoming lectures

- ☐ Identify benefits of using a network
- ☐ Differentiate between LANs and WANs
- ☐ Identify common network topologies
- ☐ Name common network media
- ☐ Identify network hardware and linking devices



Network Definition

- Set of technologies that connects computers
- Allows communication and collaboration between users



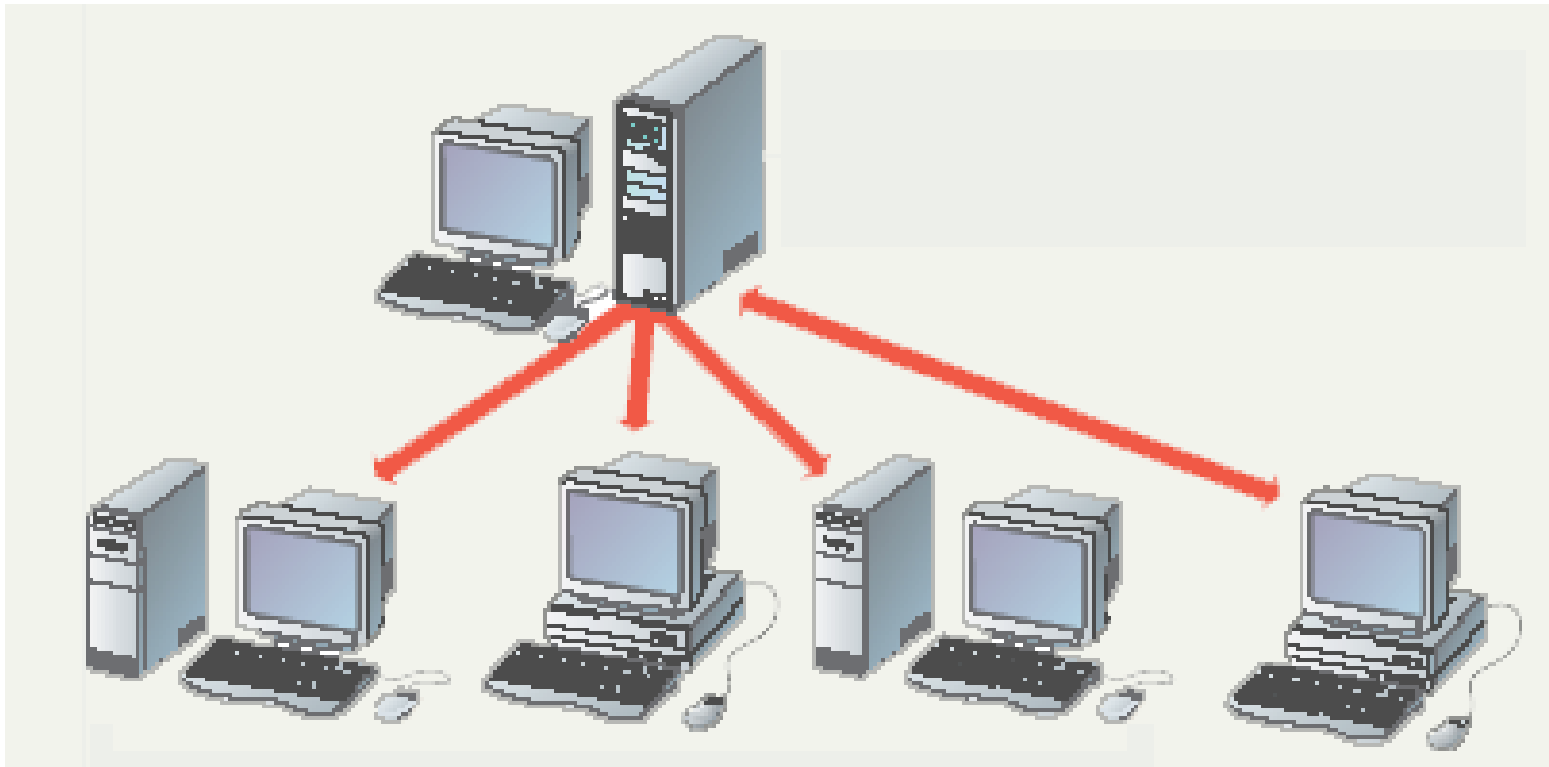
The Uses of a Network

- Simultaneous access to data
 - ❑ Data files are shared
 - Access can be limited
 - ❑ Shared files stored on a server
 - File server



The Uses of a Network (cont.)

➤ Sharing data





The Uses of a Network (cont.)

➤ Program server

- ❑ Shared programs stored on a server
 - Software can be expensive
 - Installing and configuring takes a lot of time
- ❑ Software can be a shared version
 - E.g. site licenses, network versions, application servers



The Uses of a Network (cont.)

- Shared peripheral device
 - ❑ Printers and faxes are common shares
 - ❑ Reduces the cost per user
 - ❑ Two common ways to share
 - Devices can be connected to the network
 - Print servers control network printing, manage print queue



The Uses of a Network (cont.)

➤ Personal communication

❑ Email

- Instantaneous communication

❑ Conferencing

- Tele conferencing
 - Videoconferencing, virtual presence
 - Audio-conferencing
 - Data-conferencing, whiteboard

❑ Voice over IP

- Phone communication over network wires



The Uses of a Network (cont.)

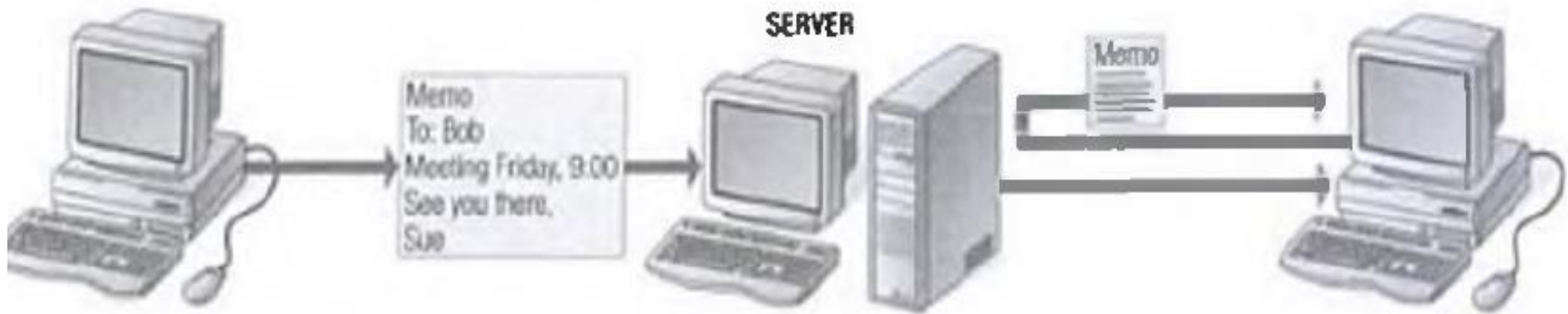
➤ Email

1 The sender composes an e-mail message and sends it.

2 The message is stored on the server.

3 The server alerts the recipient that there is a message.

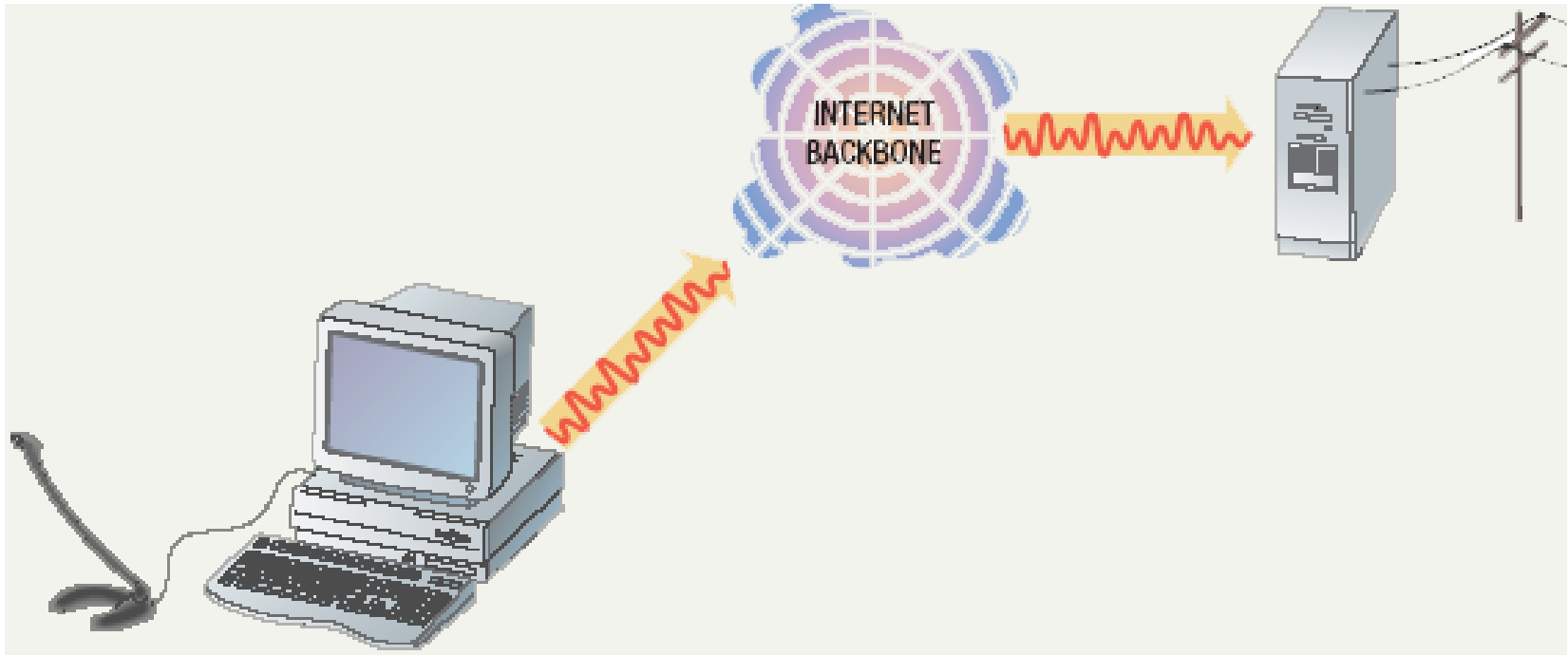
4 When the recipient is ready to read the message, the recipient's computer retrieves it from the server.





The Uses of a Network (cont.)

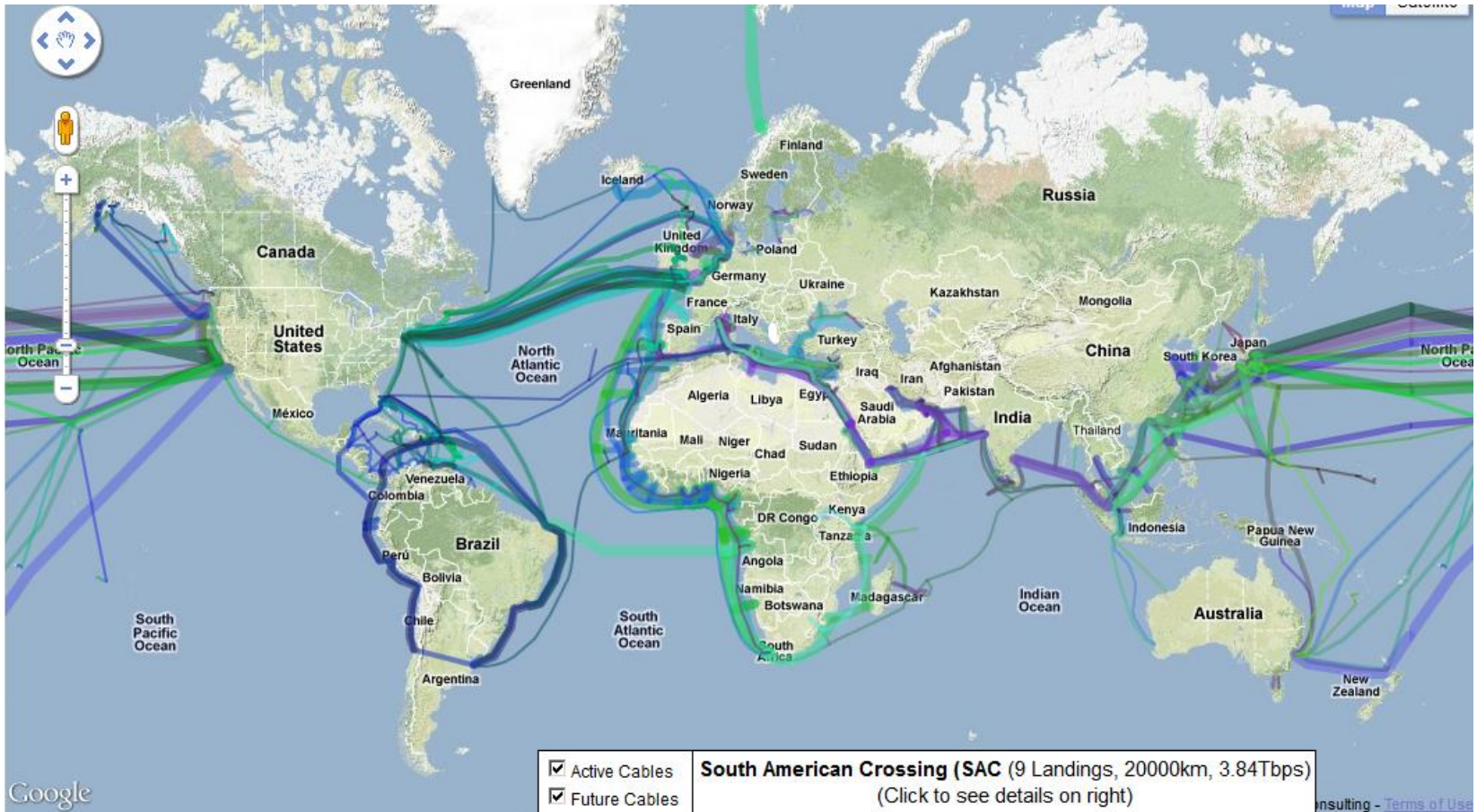
➤ Voice over IP





The Uses of a Network (cont.)

- Submarine fiber optic cables
 - ❑ Talk with people in other continents



Source: <http://artofmapping.blogspot.com>



The Uses of a Network (cont.)

- Easier data backup
 - ❑ Backup copies data to removable media
 - ❑ Use of backup software



Network Types

➤ Common network types

- ☐ BAN
- ☐ PAN
- ☐ LAN
- ☐ WAN

➤ Hybrid network types

- ☐ CAN
- ☐ MAN
- ☐ HAN

➤ Private network types

- ☐ Intranets and extranets



➤ Body Area Network (BAN)

- ❑ Consists of several miniaturized body sensor units (BSUs)
 - Together with a single body central unit (BCU)
- ❑ Implement communications on, near, and around human body
- ❑ Placed on patient
- ❑ Alert hospital before patient enters emergency condition
 - E.g. heart attack detected by measuring changes in vital signs
 - E.g. diabetic patient could auto inject insulin through a pump, as soon as their insulin level declines



- Personal Area Network (PAN)
 - ❑ Very small scale network
 - ❑ Range is less than 2 meters
 - ❑ Cell phones, PDAs, MP3 players
 - ❑ Interconnecting devices centered on an individual person's workspace
 - ❑ Connections are wireless
 - ❑ Based on the standard IEEE 802.15
 - ❑ E.g. Bluetooth, Infrared and ZigBee



LAN

➤ Local Area Network (LAN)

- ❑ Contains printers, servers and computers
- ❑ Systems are close to each other
- ❑ Contained in one office or building
- ❑ Organizations often have several LANs



WAN

- Wide Area Network (WAN)
 - ❑ Two or more LANs connected
 - ❑ Over a large geographic area
 - ❑ Typically use public or leased lines
 - Phone lines
 - Satellite
 - ❑ E.g. Internet



Hybrid Networks

- Networks between LAN and WAN
 - ❑ Geographical area neither too large nor too small



➤ Campus Area Network (CAN)

- ❑ College or university area networks
- ❑ Network in one large geographic area
- ❑ Resources related to the same organization
- ❑ Each department shares the LAN
- ❑ Often interconnect a variety of buildings
 - Administrative buildings
 - Academic buildings
 - University libraries
 - Campus or student centers
 - Residence halls
 - Gymnasiums
 - Outlying structures (conference centers, technology centers, training institutes)
- ❑ Made up of interconnection of LANs



- Metropolitan Area Network (MAN)
 - ❑ Large network that connects different organizations
 - ❑ Shares regional resources
 - ❑ A network provider sells time
 - ❑ Optimized for larger geographical area than LAN
 - ❑ Ranging from several blocks of buildings to entire cities
 - ❑ Might be owned and operated by a single organization
 - Used by many individuals and organizations
 - ❑ Provide means for inter networking of local networks



➤ Home Area Network (HAN)

- ❑ Small scale network
- ❑ Connects computers and entertainment appliances
- ❑ Found mainly at homes
 - HAN contained within a user's home
- ❑ Connects person's digital devices
- ❑ Multiple computers and their peripheral devices such as
 - Printer, telephones, VCRs, DVDs, televisions, video games, home security systems, "smart" appliances, fax machines
 - Other digital devices that are wired into the network



Private Networks

➤ Intranet

- ❑ Company's internal version of Internet
 - However, differs from internet
- ❑ Limits access to employees and selected contractors
 - Having ongoing business with company

➤ Extranet

- ❑ Partially accessible internal company Website
 - For authorized users physically located outside organization
- ❑ Access extranet only possible with credentials
 - Valid username and password



Virtual Private Networks

- VPNs use public telecom infrastructure
 - ❑ Maintain privacy through security procedures
- VPNs provide secure network connections
 - ❑ For distant computers
 - ❑ Without using dedicated, private channels
- Key benefit of VPNs over conventional PNs
 - ❑ Lower cost
- From user point-of-view, VPN looks like secure and private