



# 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



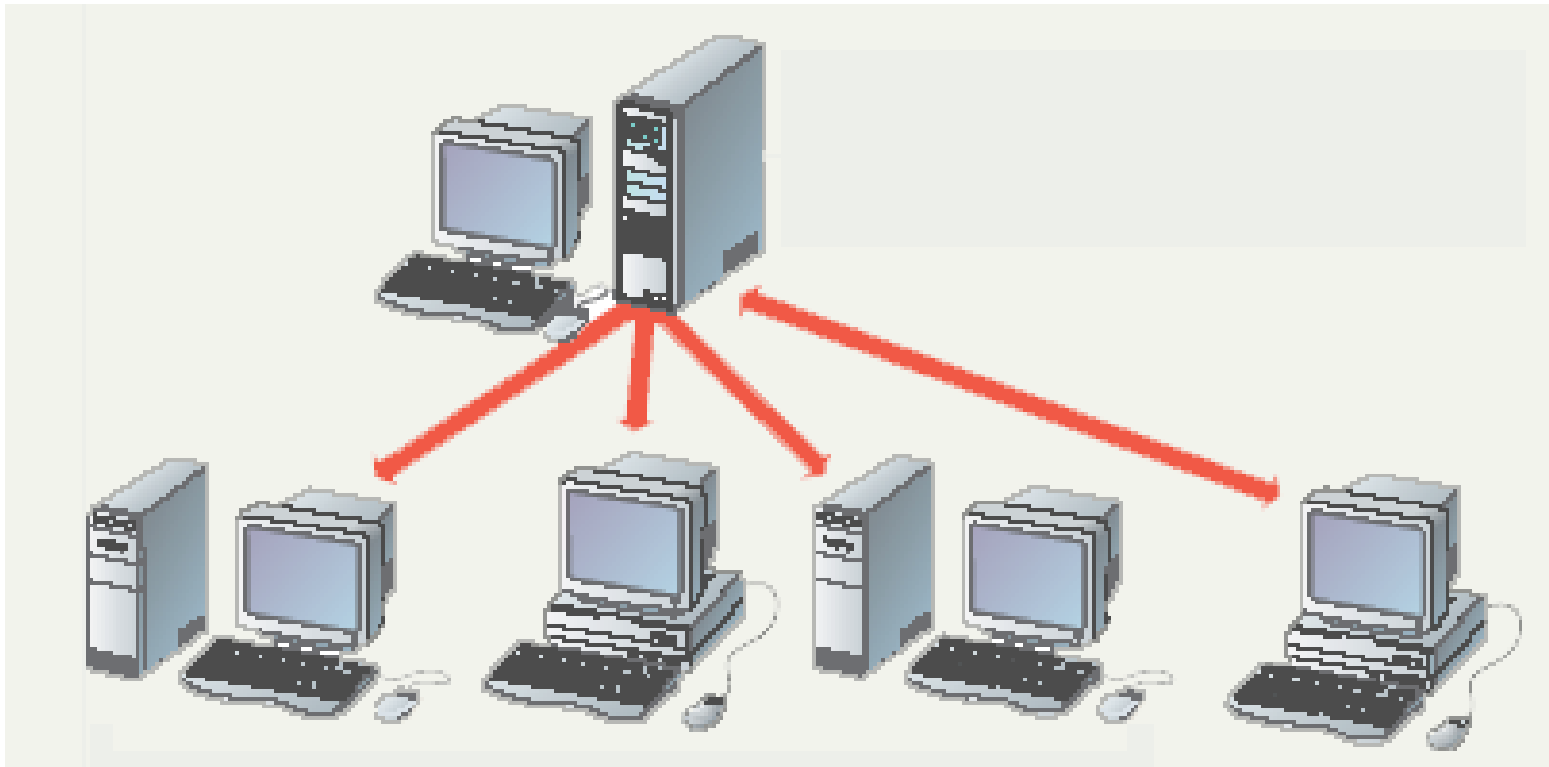
# The Uses of a Network

- 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.)

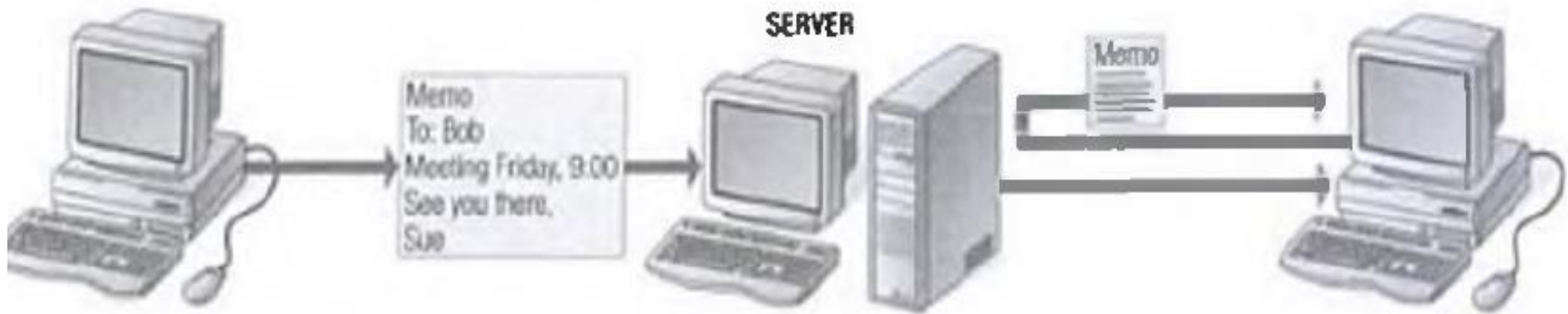
## ➤ Email

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.

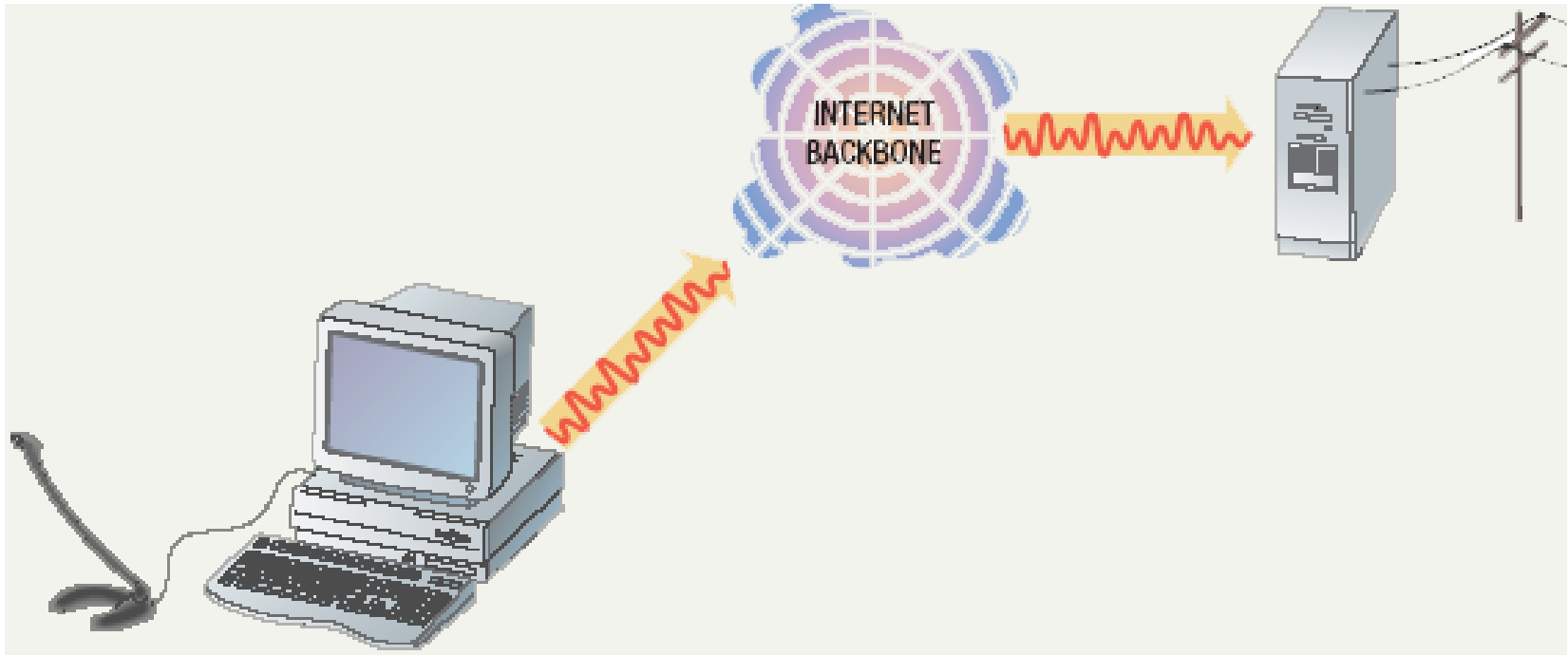
4 When the recipient is ready to read the message, the recipient's computer retrieves it from the server.





# The Uses of a Network (cont.)

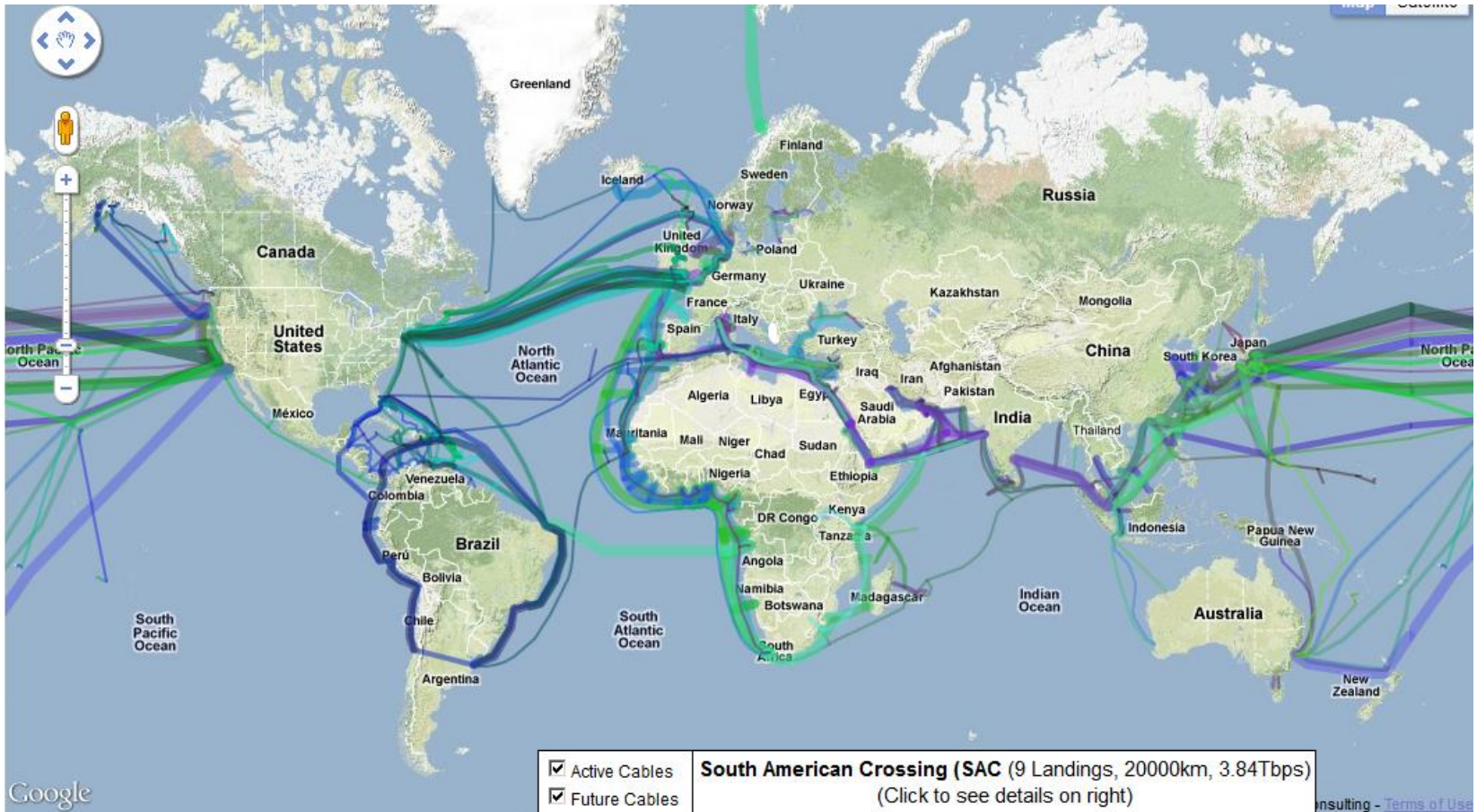
## ➤ Voice over IP





# 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



# PAN

## ➤ 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