# Computer Fundamentals

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Lecture 12

# Outline

➢ Network basics

# Objectives

➢ Upcoming topics
  ❑ 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

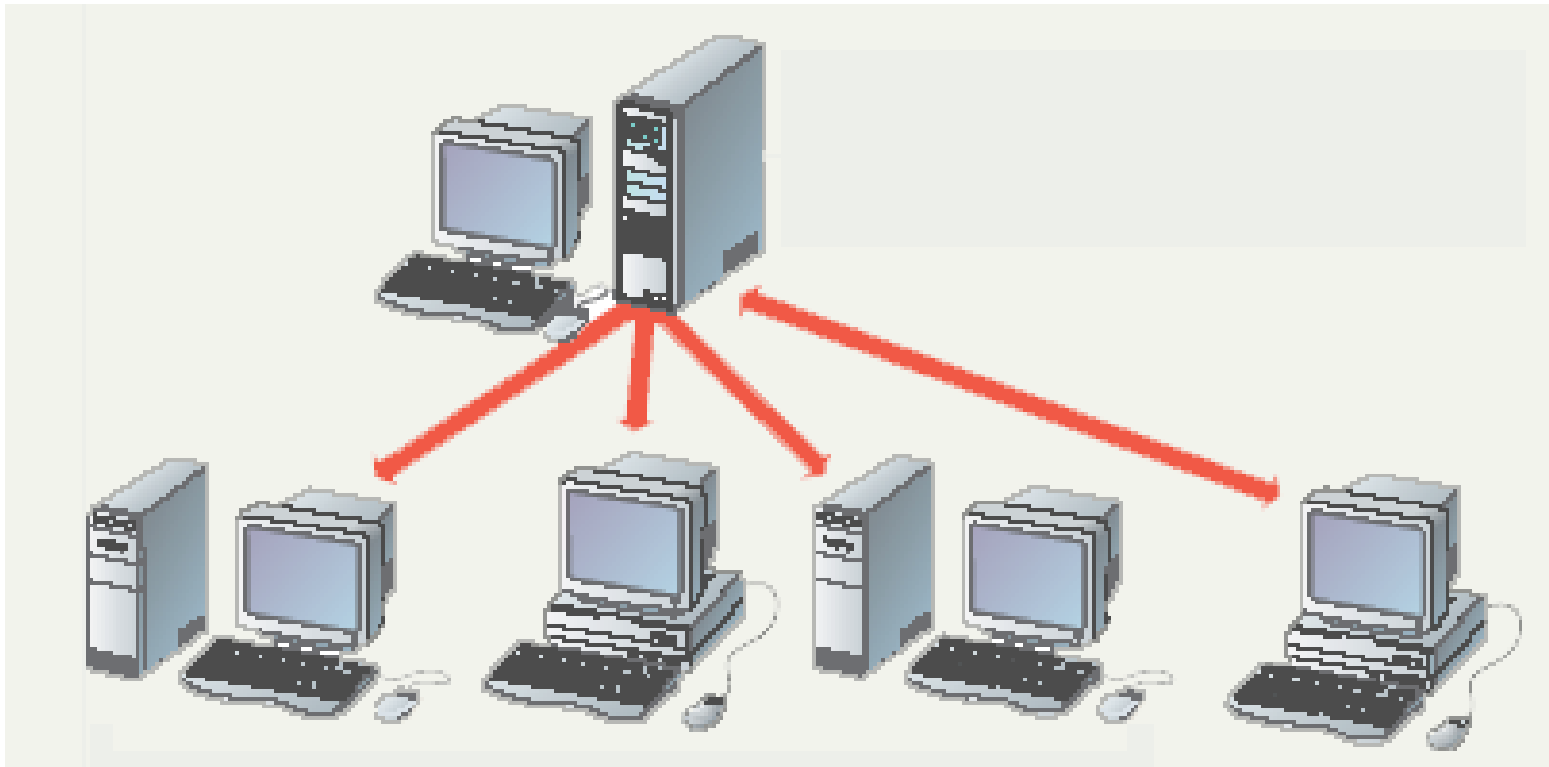➢ Allows communication and collaboration between users

# The Uses of a Network

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

➢ Sharing data

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

➢ Shared peripheral device
- ❑ Printers and faxes are common shares
- ❑ Reduces the cost per user
- ❑ Two common ways to share
    - o Devices can be connected to the network
    - o 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
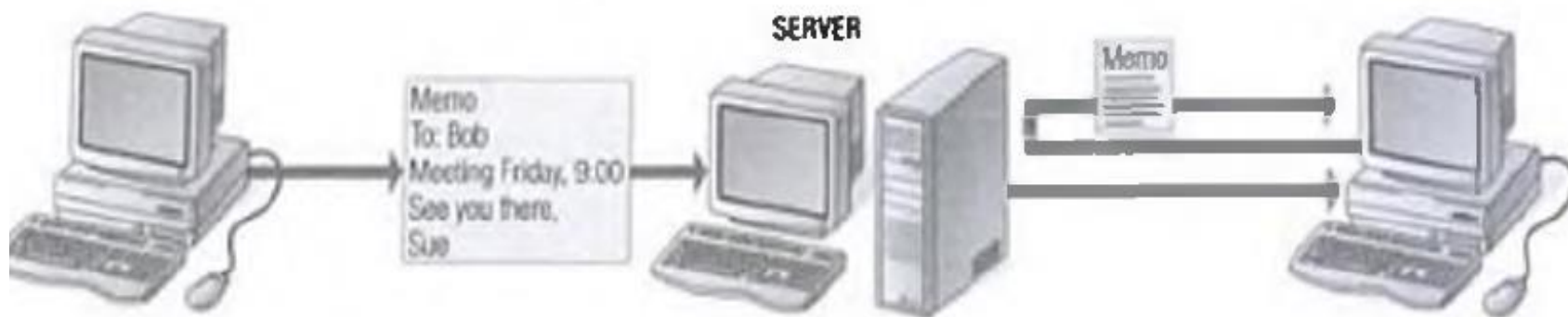   ❑ Voice over IP
     ○ Phone communication over network wires

➤ Email

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

② The message is stored on the server.

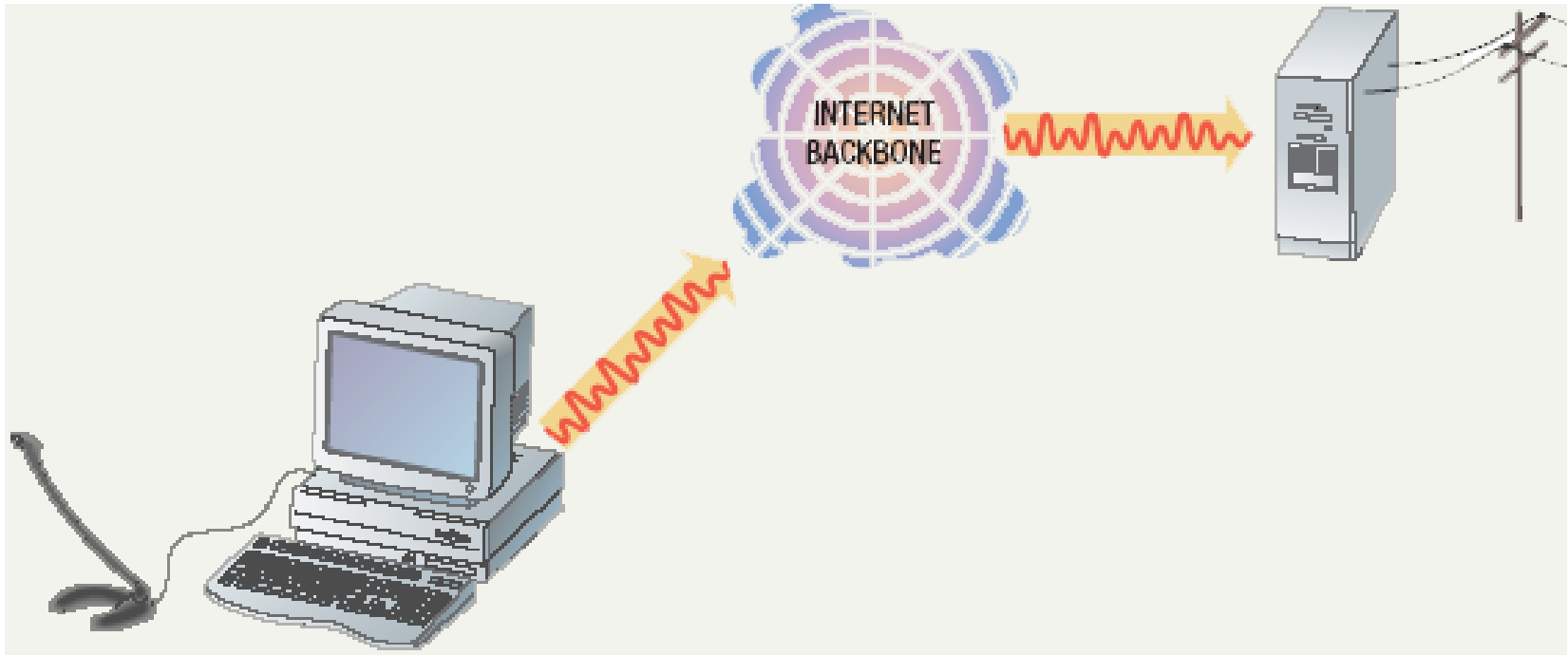③ The server alerts the recipient that there is a message.

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

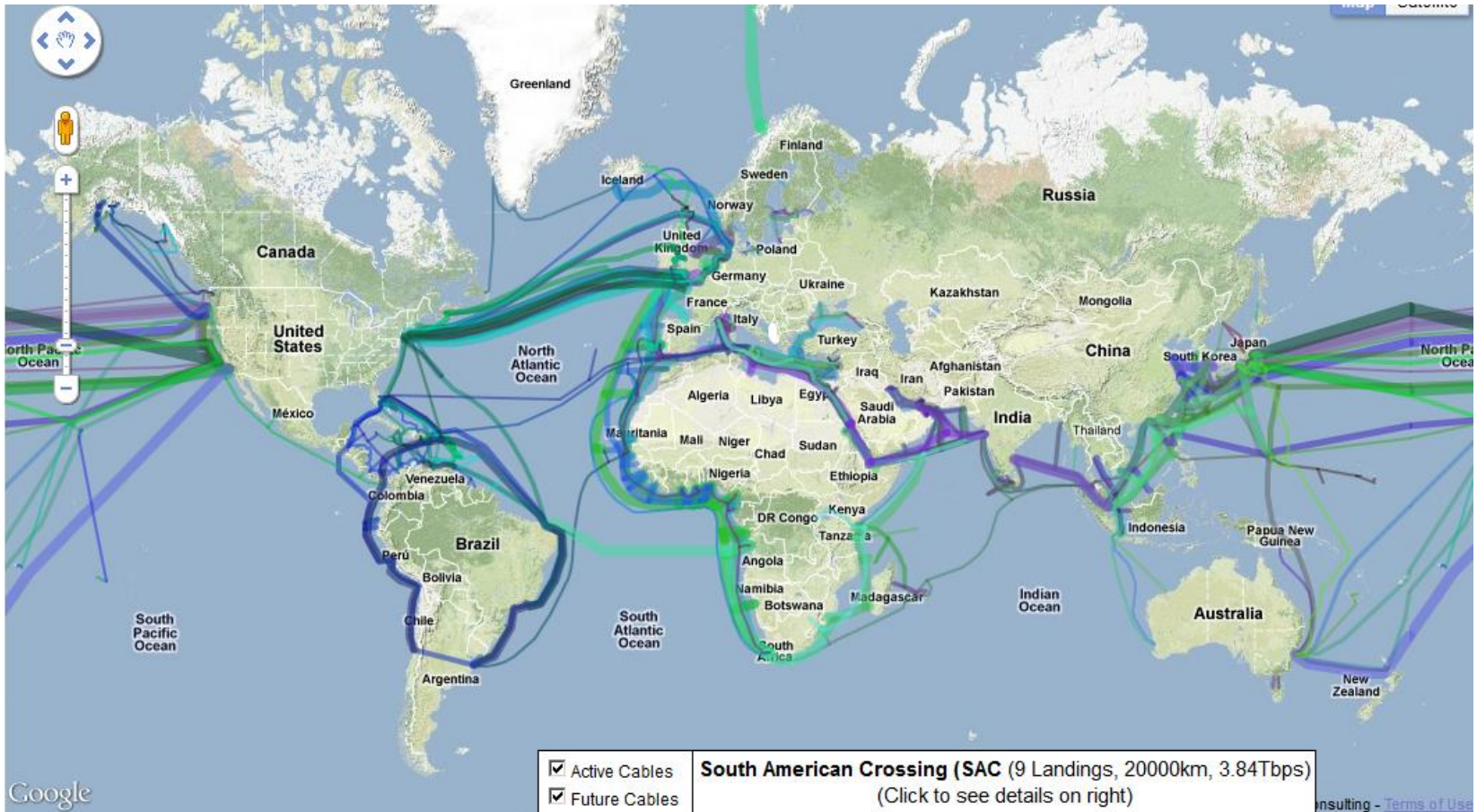Memo
To: Bob
Meeting Friday, 9:00
See you there,
Sue

SERVER

Memo

➢ Voice over IP

# The Uses of a Network (cont.)

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



**Source**: *http://artofmapping.blogspot.com*

➢ 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)

o 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

o E.g. heart attack detected by measuring changes in vital signs

o 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
  - o Phone lines
  - o Satellite
- ❑ E.g. Internet

# Hybrid Networks

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

# CAN

➢ 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
    o Administrative buildings
    o Academic buildings
    o University libraries
    o Campus or student centers
    o Residence halls
    o Gymnasiums
    o Outlying structures (conference centers, technology centers, training institutes)
  ❑ Made up of interconnection of LANs

# MAN

➢ 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

o Used by many individuals and organizations

❑ Provide means for inter networking of local networks

# HAN

➢ 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
    - o However, differs from internet
  - ❑ Limits access to employees and selected contractors
    - o Having ongoing business with company
- ➢ Extranet
  - ❑ Partially accessible internal company Website
    - o For authorized users physically located outside organization
  - ❑ Access extranet only possible with credentials
    - o 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