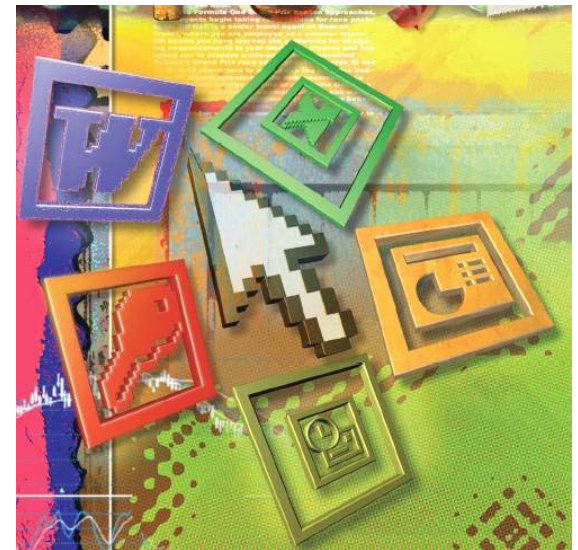
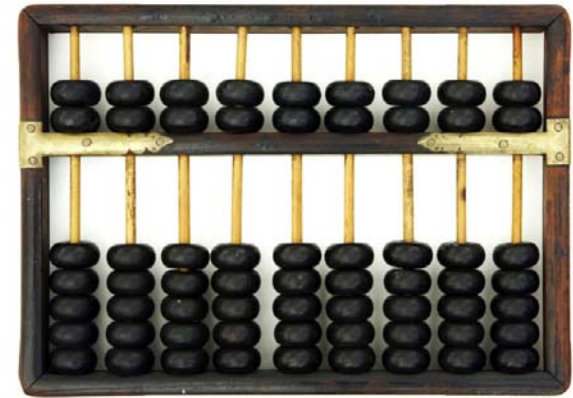


# A Brief Introduction to Computers



# Abacus - 2700–2300 BCE



- Used by many ancient civilizations
- Still used by merchants, traders and clerks in some parts of Eastern Europe, Russia, China and Africa

# Antikythera Mechanism - 2<sup>nd</sup> Century BCE

- First known analogue computer



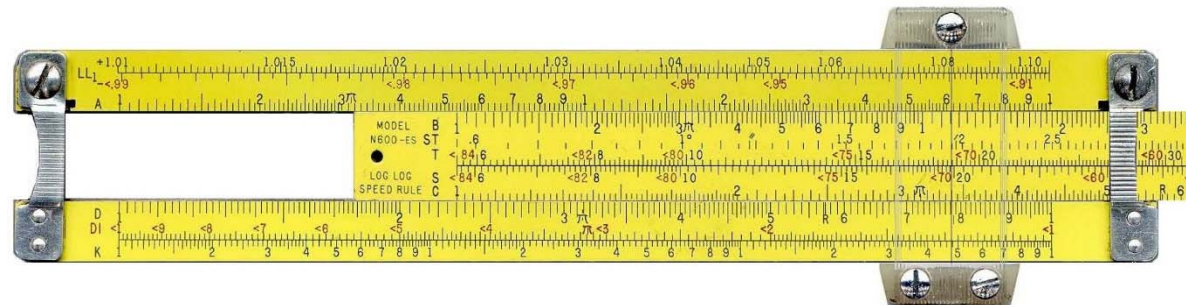
- Discovered in 148 ft. of water near the Greek island of Antikythera in 1902

# John Napier (1550-1617)

- Invented logarithms
- Napier's Bones



- Led to the development of the slide rule



# Blaise Pascal (1623-1662)

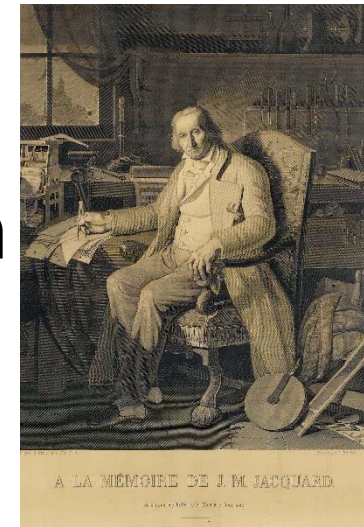
- Invented the Pascaline
  - Addition and subtraction



- “*Can computers think?*”

# Joseph Marie Jacquard (1752-1834)

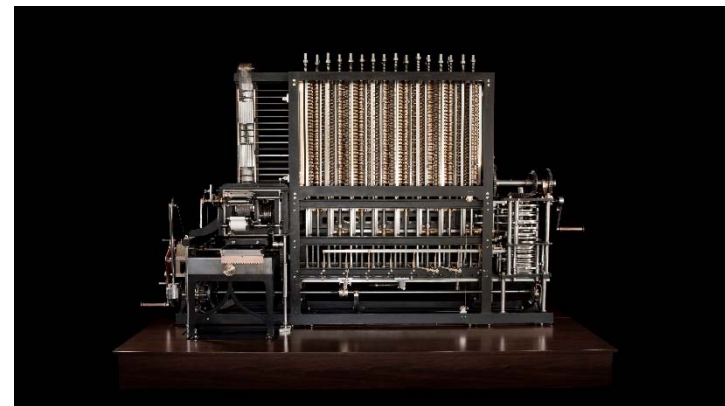
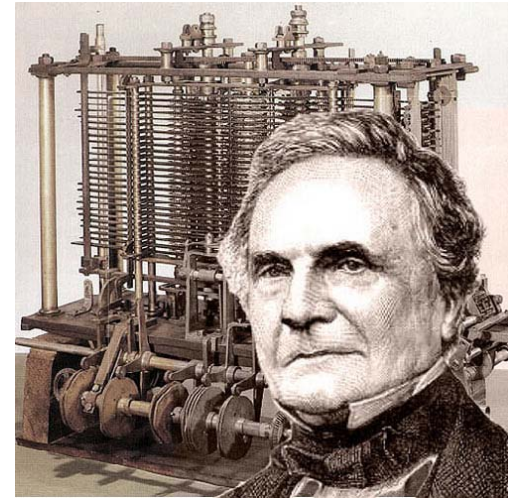
- Invented the automatic loom
- Father of the Industrial Revolution
- Forerunner of the punched card



❖ Was opposed bitterly by the Luddites

# Charles Babbage (1791-1871)

- Difference Engine – never completed
- Analytic Engine – never completed
- Contains all the essential ideas of modern computers
- Father of the Computer



# Augusta Ada King-Noel, Countess of Lovelace (*née* Byron; 1815 –1852)

- Worked with Babbage
  - Wrote a set of notes on the plans of the Analytic Engine
- Consider to be the first computer programmer
- Ada Lovelace's Objection

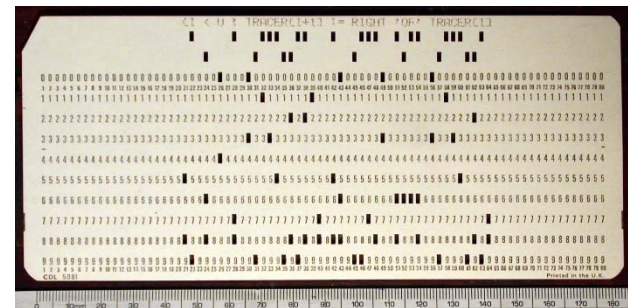


*The Analytical Engine has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform. It can follow analysis; but it has no power of anticipating any analytical relations or truths.*



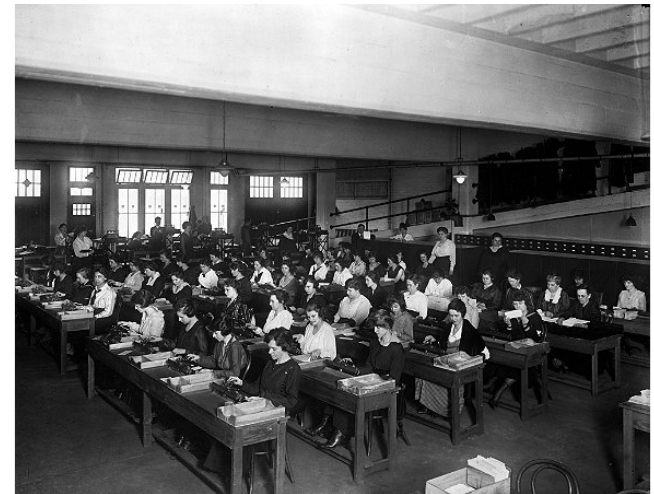
# Herman Hollerith (1860 –1929)

- Invented an electromechanical punched card tabulator for the US Census Bureau
- His company later became IBM
- Developed the standard punched card



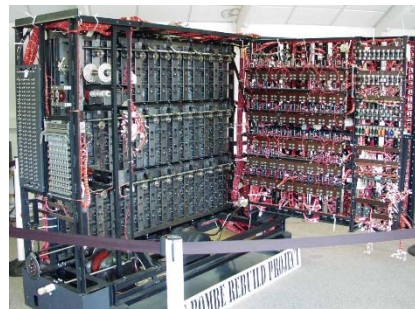
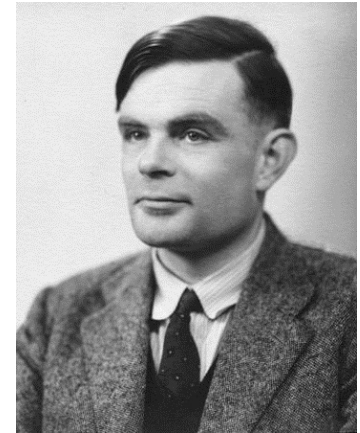
# Women Computers in World War II

- Before the invention of electronic computers, “computer” was a job description, not a machine.
- In 1942, just after the United States entered World War II, hundreds of women were employed around the country as computers.
- The results of these calculations were compiled into tables and published for use on the battlefields by gunnery officers.



# Alan Turing (1912-1954)

- British Mathematician and Philosopher
- Let a team at Bletchley Park to crack the German Enigma cipher
- Designed the Bombe to find the settings for the Enigma



# Alan Turing

- Turing machine
  - Provides for a formalization of the concepts of an algorithm and computation
- Known as the Father of Theoretical Computer Science and Artificial Intelligence
- Life was profiled in the movie the *Imitation Game*



# Can Computers Think?

- Turing, A.M., *Computing machinery and intelligence*. *Mind*, 59, 433-460
- What does it mean to *think*?

# Nine Common Objections

1. Religious Objection

2. Heads in the Sand Objection

3. Mathematical Objection -

Use Gödel's incompleteness theorem, to show that there are limits to what questions a computer system based on logic can answer.

4. Argument From Consciousness –

*“not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain.”*

# Nine Common Objections

5. Arguments from various disabilities – all have the form “a computer will never do X”

*Be kind, resourceful, beautiful, friendly, have initiative, have a sense of humor, tell right from wrong, make mistakes, fall in love, enjoy strawberries and cream, make someone fall in love with it, learn from experience, use words properly, be the subject of its own thought, have as much diversity of behavior as a man, do something really new.*

# Nine Common Objections

## 6. Lady Lovelace's Objection

“The Analytical Engine has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform. It can follow analysis; but it has no power of anticipating any analytical relations or truths.”

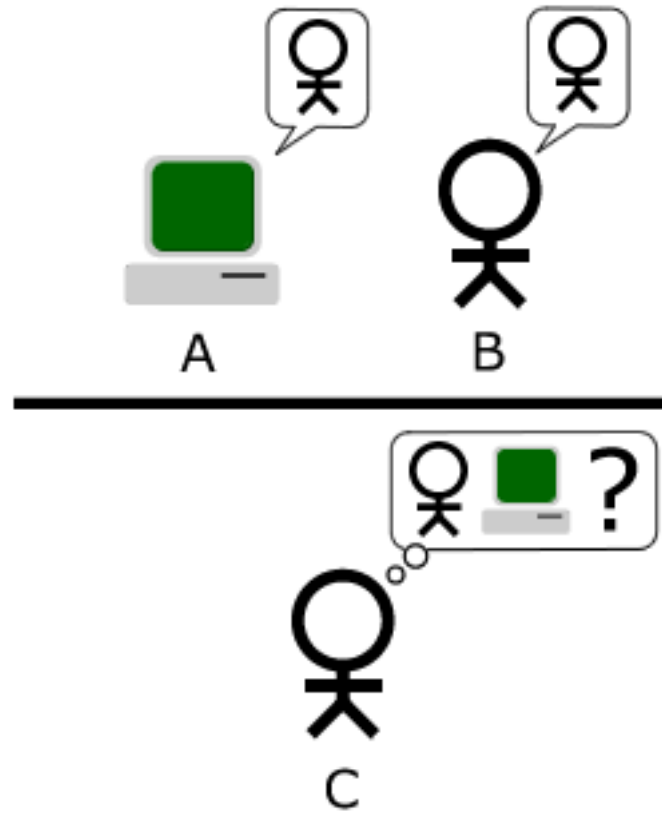
## 7. Argument from continuity in the nervous system

## 8. *Argument from the informality of behavior*

## 9. Extra-sensory perception



# Turing Test: The Imitation Game



# Eliza

- An early natural language processing computer program created in 1964 at the MIT Artificial Intelligence Laboratory by Joseph Weizenbaum
- Many early users were convinced of ELIZA's intelligence and understanding, despite Weizenbaum's insistence to the contrary
- Lay responses to ELIZA were disturbing to Weizenbaum

# Typical conversation

Men are all alike.

IN WHAT WAY?

They're always bugging us about something or other.

CAN YOU THINK OF A SPECIFIC EXAMPLE?

Well, my boyfriend made me come here.

YOUR BOYFRIEND MADE YOU COME HERE

He says I'm depressed much of the time.

I AM SORRY TO HEAR YOU ARE DEPRESSED

It's true. I am unhappy

DO YOU THINK COMING HERE WILL HELP YOU NOT TO BE UNHAPPY

I need some help, that much seems certain.

WHAT WOULD IT MEAN TO YOU IF YOU GOT SOME HELP

Perhaps I could learn to get along with my mother.

TELL ME MORE ABOUT YOUR FAMILY

# Typical conversation (cont.)

My mother takes care of me.

WHO ELSE IN YOUR FAMILY TAKES CARE OF YOU

My father.

YOUR FATHER

You are like my father in some ways.

WHAT RESEMBLANCE DO YOU SEE

You are not very aggressive but I think you don't want me to notice that.

WHAT MAKES YOU THINK I AM NOT VERY AGGRESSIVE

You don't argue with me.

WHY DO YOU THINK I DON'T ARGUE WITH YOU

You are afraid of me.

DOES IT PLEASE YOU TO BELIEVE I AM AFRAID OF YOU

My father is afraid of everybody.

# Typical conversation (cont.)

WHAT ELSE COMES TO YOUR MIND WHEN YOU THINK OF YOUR FATHER

Bullies.

DOES THAT HAVE ANYTHING TO DO WITH THE FACT THAT YOUR BOYFRIEND MADE YOU COME HERE

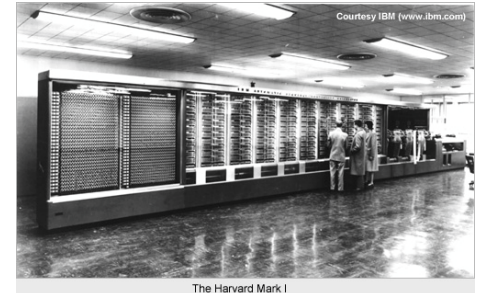
# Von Neuman (1903-1957)

- Stored Program Concept
- Sequential Programming

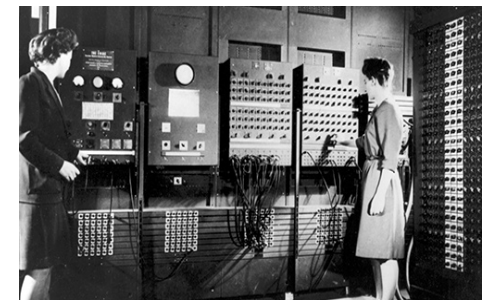


# Early Computers

- Mark1 1944
  - General purpose electromechanical computer
  - Used in WW-II Manhattan Project
- ENIAC 1946
- Univac 1
  - First commercial Computer
  - 50 were made



The Harvard Mark I



# First Calculators



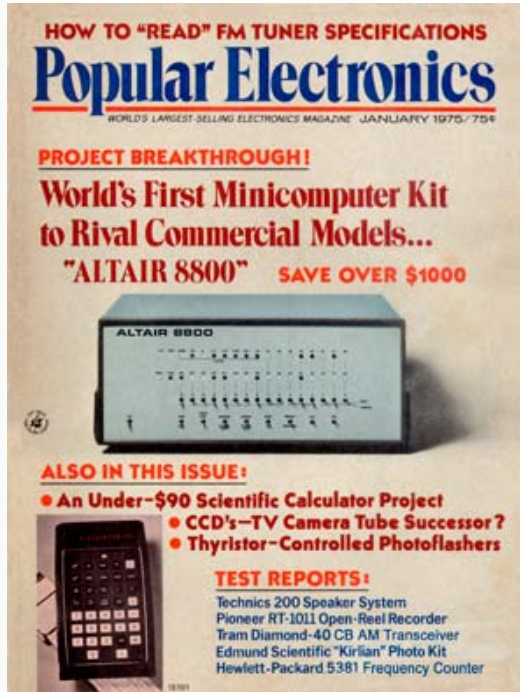
Texas Instruments  
TI – SR10



Hewlett Packard  
HP 33



# First Personal Computer



**MIT'S Altair 8800 Personal Computer Kit - 1975**

# Apple Personal Computers



Apple 1  
1976  
Steve Wozniak

Apple II  
1977  
Steve Jobs



Apple Macintosh  
1984

# First IBM PC (1982)



# First Portable (Laptop?) Computer

- Osborne Laptop



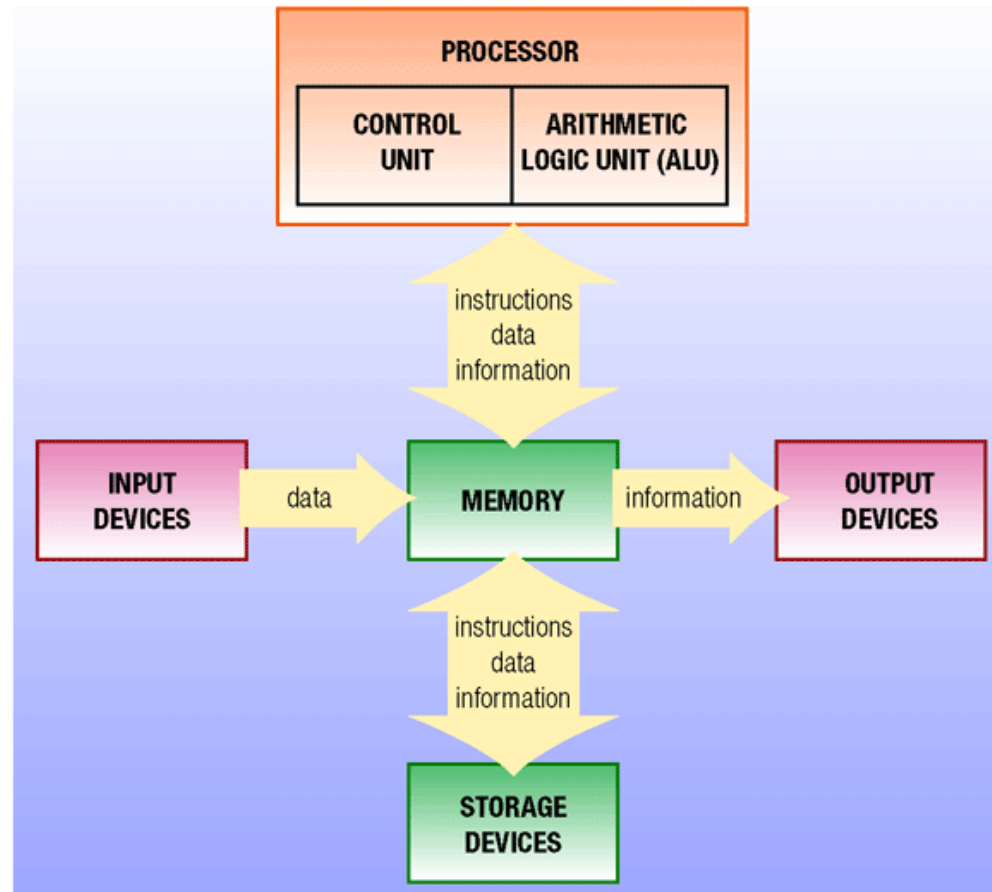
# What Is a Computer?

- A computer is an electronic device, operating under the control of instructions stored in its own memory, that can accept data (input), process the data according to specified rules (process), produce results (output), and store the results (storage) for future use
- Information Processing Cycle

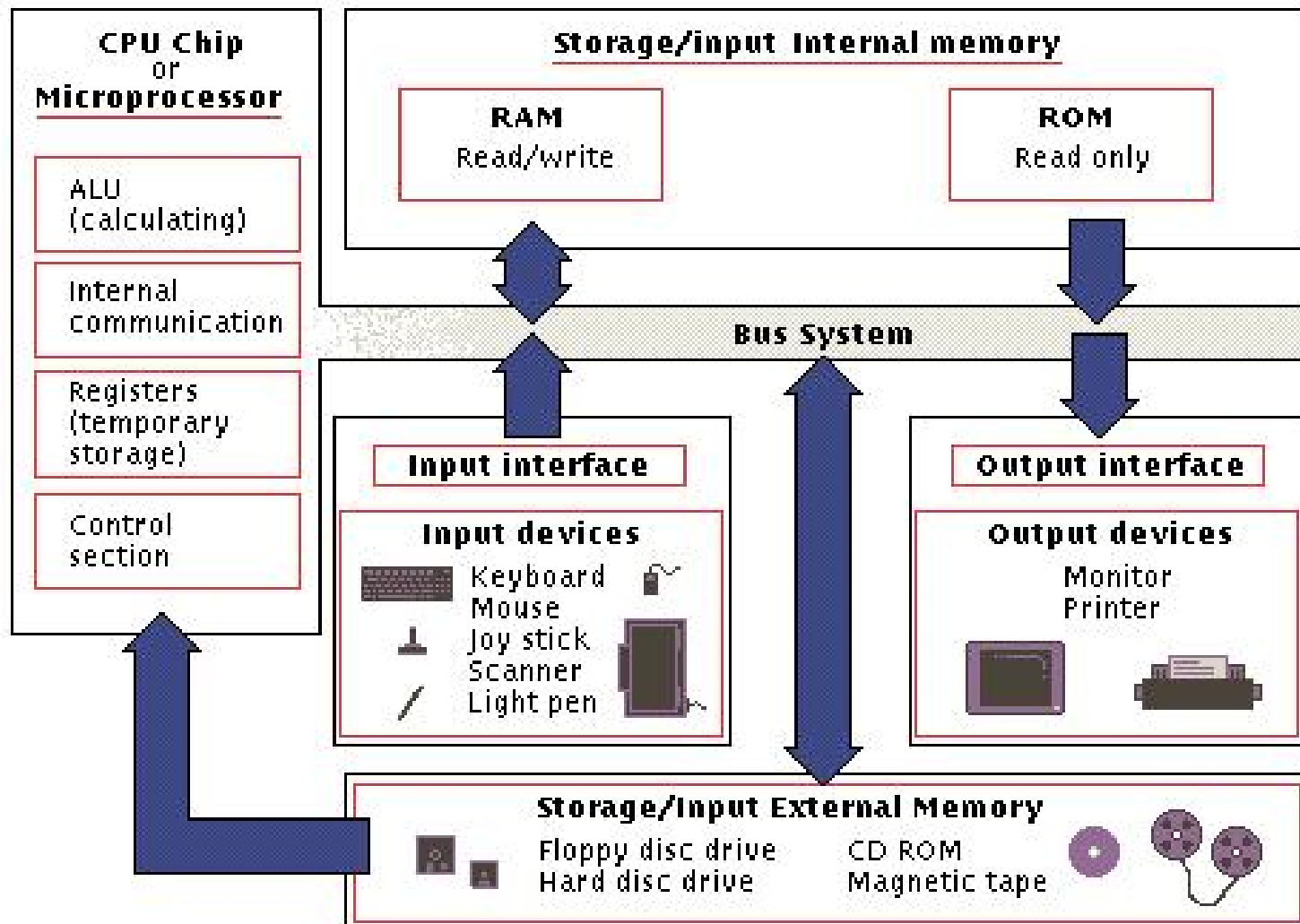
FIGURE 1 Common computer hardware components.



# What Are the Components of a Computer?



# PC Block Diagram



# Input Devices

- Any hardware component that allows you to enter data, programs, commands, and user responses into a computer
- Input Device Examples
  - Keyboard
  - Mouse





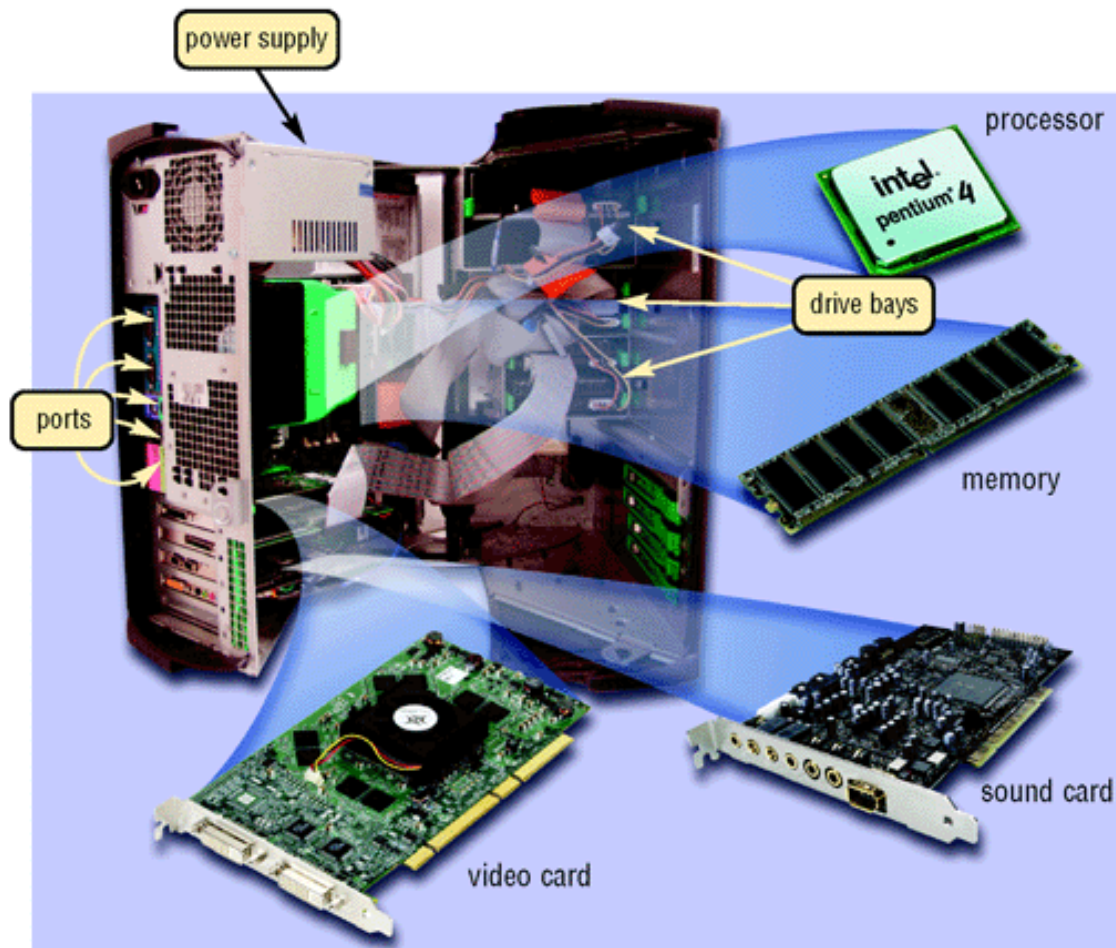
# System Unit

- The motherboard, or system board, is the main circuit board of the system unit
- The processor, also called the central processing unit (CPU), interprets and carries out the basic instructions that operate a computer
- The control unit interprets the instructions
- The arithmetic/logic unit performs the logical and arithmetic processes
- Memory, also called random access memory (RAM) and read only memory (ROM) consists of electronic components that store data, instructions, and information, as needed by the processor

# Memory

- How does the computer Remember?
  - Binary System
  - Bits
  - Bytes
  - ASCII and Unicode

# System Unit



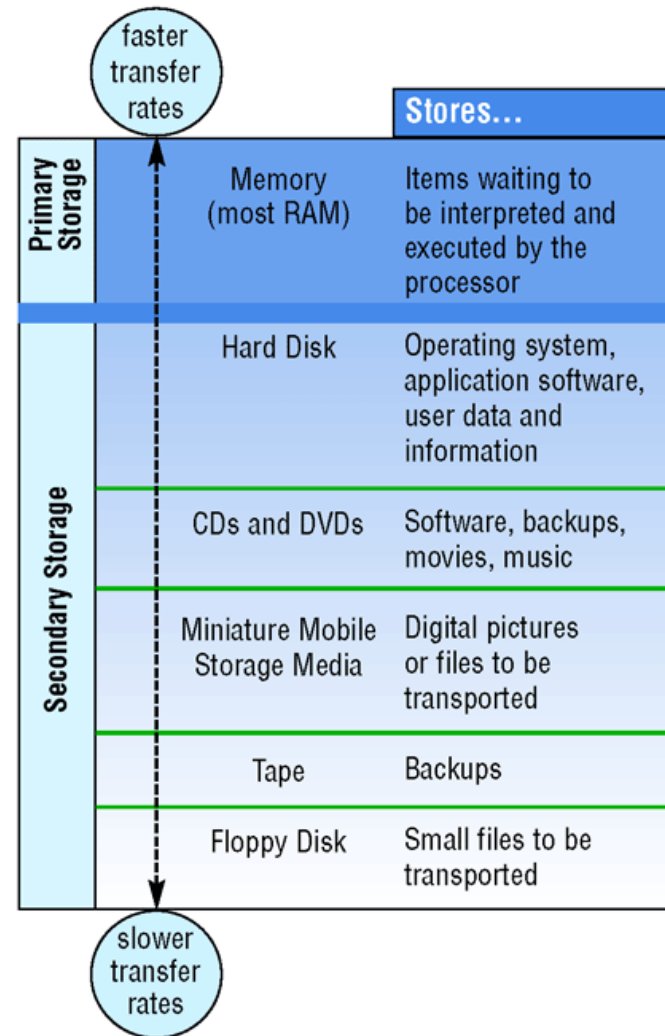
# Output Devices

- Output devices make the information resulting from processing available for use
- Output Device Examples
  - Printers
    - Impact
    - Nonimpact
    - Photo
  - Display Devices
    - CRT
    - LCD



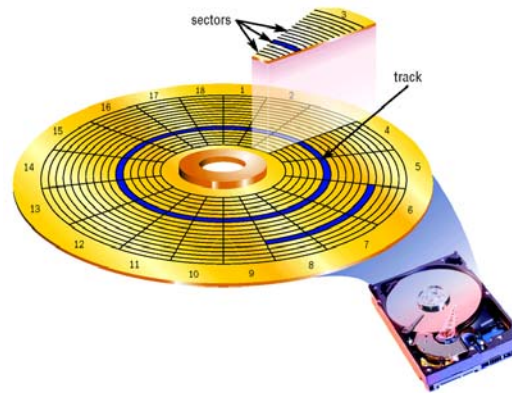
# Storage Devices

- Used to store instructions, data, and information when they are not being used in memory



# Storage Devices

- Magnetic disks use magnetic particles to store items on a disk's surface
  - Floppy disks
  - Zip disks
  - Hard disks



# Storage Devices

- Optical discs
  - CD-ROM
  - CD-R
  - CD-RW
  - DVD-ROM
  - DVD-R
  - DVD+R
  - DVD-RW
  - DVD+RW
  - DVD+RAM
  - HD/BluRay
- Tape



## OPTICAL DISC FORMATS






Optical Disc	Read	Write	Erase
 CD-ROM	Y	N	N
 CD-R	Y	Y	N
 CD-RW	Y	Y	Y
 DVD-ROM	Y	N	N
 DVD-R DVD+R	Y	Y	N
 DVD-RW DVD+RW DVD+RAM	Y	Y	Y

# Storage Devices

- Miniature mobile storage media



## VARIOUS FLASH MEMORY CARDS

Media Name	Storage Capacity
CompactFlash	32 MB to 4 GB
	
SmartMedia	32 MB to 128 MB
	
Secure Digital	64 MB to 1 GB
	
xD Picture Card	64 MB to 512 MB
	
Memory Stick	256 MB to 2 GB
	



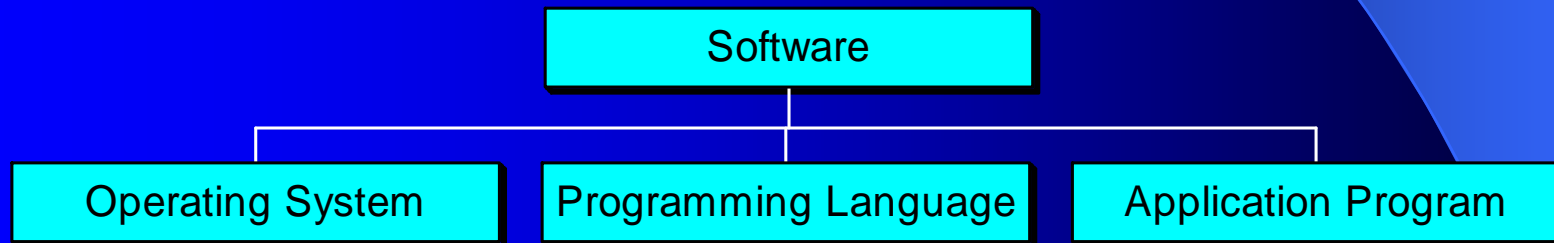
# Communications Devices

- A communications device is a hardware component that enables a computer to send (transmit) and receive data, instructions, and information to and from one or more computers
- Communications occur over transmission media, such as telephone lines, cables, cellular radio networks, and satellites

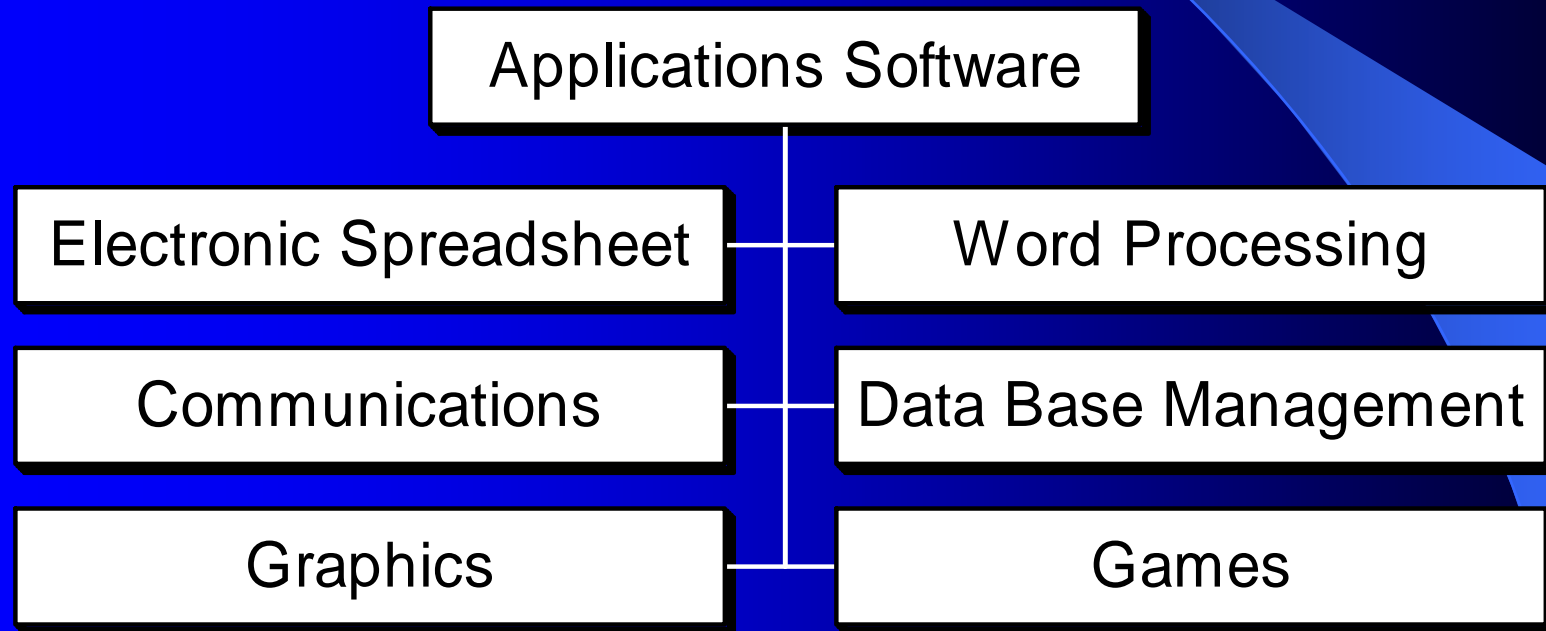
# Peripherals

- Serial
- Parallel
- USB
- SCSI
- Firewire (IEEE-1394)
- Joystick/Game port
- TV in/out
- Infrared
- Audio in/out
- WiFi
- Broadband
- Bluetooth
- Modems
- External Storage
- Printers
- Music Synthesizers

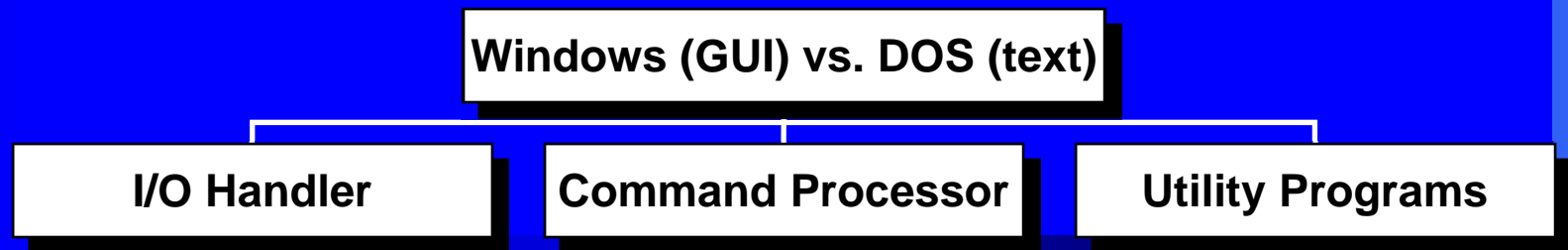
# Software



# Applications Software



# Operating Systems



# Computer Software

- System software consists of programs to control the operations of computer equipment
- Instructions in the operating system tell the computer how to perform the functions of loading, storing, and executing an application program and how to transfer data
- When a computer is turned on, the operating system is loaded into the computer's memory from auxiliary storage, a process called booting
- Most computers use an operating system that has a graphical user interface (GUI)

# Computer Software



# Turning on the Computer

- Boot process (cold vs. warm)
- Power on self – test (POST)
- BIOS from ROM
- Operating System from disk
  - a:, c:, d:, etc.
- Application software



# Networks and the Internet

- A network is a collection of computers and devices connected via communications media and devices
- A local area network (LAN) connects computers in a limited geographic area
- A wide area network (WAN) covers a large geographical area

# Networks and the Internet

- The world's largest network is the Internet
- Most users connect to the Internet in one of two ways:
  - Internet service provider
  - Online service provider



FIGURE 36 A wealth of information is available on the Web.

# Internet Applications

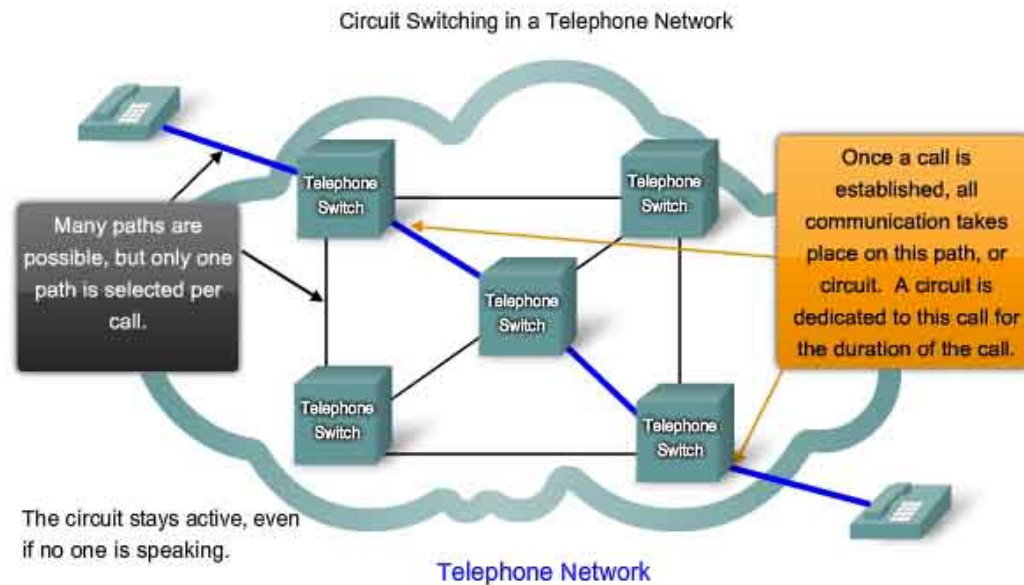
- WWW
- Email
- IM
- VOIP (voice over IP)
- Video Conferencing
- BLOGs
- Interactive multi-user gaming

# IP addresses

- 146.245.249.58
- IPv4 vs. IPv6
- Static vs. Dynamic

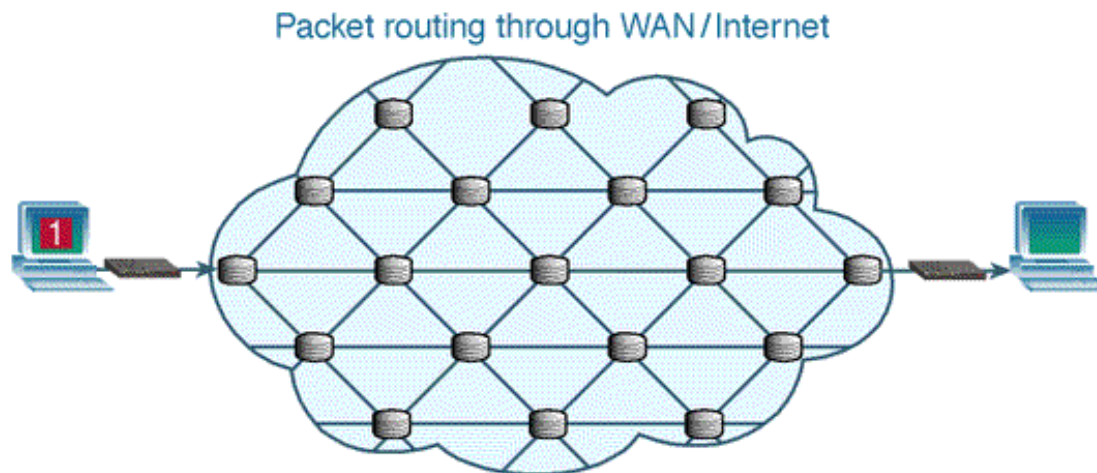
# Networking Technology

- Point-to-point networks
  - Telephony



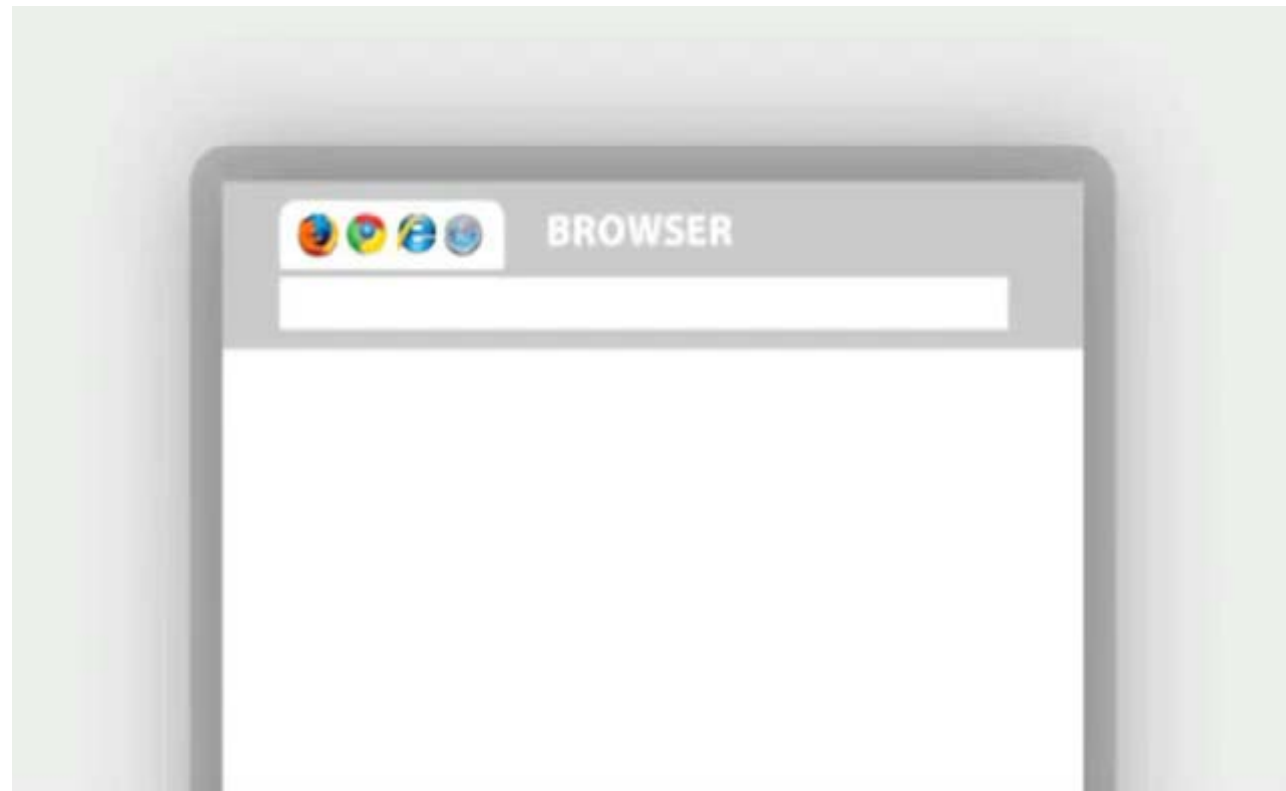
# Networking Technology

- Packet-based networks
  - Data is sent over a network in packets.
  - Each packet contains
    - data
    - the name of the sender and the receiver
    - error-control information
    - sequence information



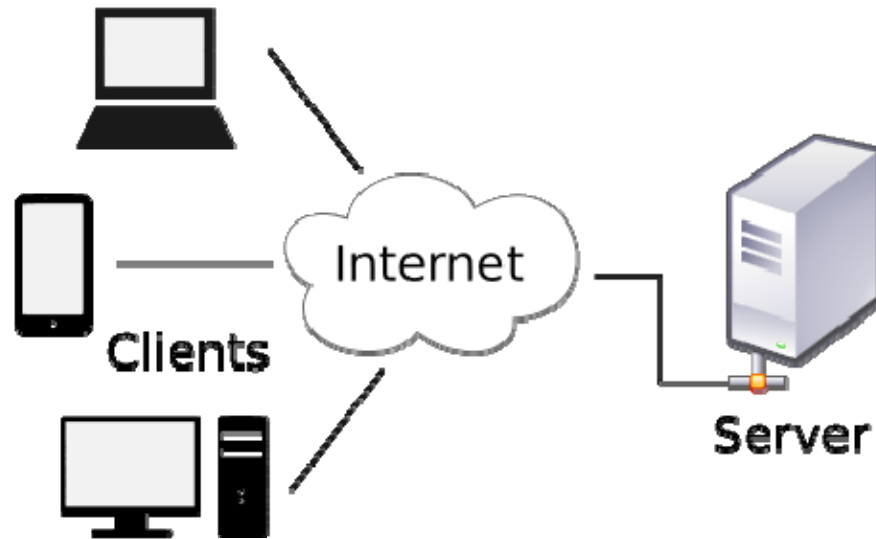
# Uniform Resource Locator (URL)

- <http://www.dnssec.nl>
- Protocol://host-domain-name
- DNS



Click to play

# Server Client Model





# Peer to Peer Model

