# APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGY

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# MODERN CPUS

# A LOOK INSIDE THE PROCESSOR

- Architecture
  - Processor's internal design
  - *Determines*
    - Location of CPU parts and their interconnection
    - How CPU connects with other parts of computer
    - Number of transistors in a CPU
      - More transistors mean more powerful CPU
      - Hundreds of millions of transistors
    - Bit size
      - Number of bits the CPU can move or process at once
      - 32-bit processor; 64-bit processor

# A LOOK INSIDE THE PROCESSOR

- Architecture
  - Main difference between CPUs
  - Every processor is differentiated by its design
  - Architectures of processors can be so different that they cannot run the same software
    - E.g. IBM PCs vs. Apple Computers
    - OS and programs must be written to run on each processor's specific architecture

# MICROCOMPUTER PROCESSORS

- Intel
  - Leading manufacturer of processors
  - Intel 4004 was worlds first microprocessor
  - First IBM PC powered by Intel 8086
  - Current processors
    - Core i3
    - Core i5
    - Core i7
    - Core i9

# MICROCOMPUTER PROCESSORS

- Advanced Micro Devices (AMD)
  - Main competitor to Intel
  - Originally produced budget products

# MICROCOMPUTER PROCESSORS

- IBM
  - Historically manufactured mainframes
  - Partnered with Apple to develop G5
    - Advertised as “fastest Desktop Processor ever”
    - First consumer 64 bit chip
    - *Finding Nemo* created on G5 Desktop Computers

# COMPARING PROCESSORS

- Speed of processor
- Size of cache
- Number of registers
- Bit size
- Speed of Front side bus

| Specification | AMD Athlon 64 FX | Intel Pentium IV | PowerMac G5 |
|---|---|---|---|
| **Number of Registers** | 16 | 16 | 80 |
| **Word Size** | 64 bits | 64 bits | 64 bits |
| **System Bus Speed** | 1.6 GHz | 800 MHz | 1 GHz |
| **L1 cache** | 128 KB | na | na |
| **L2 cache** | 1024 KB | 512 | 512 |

# ADVANCED PROCESSOR TOPICS

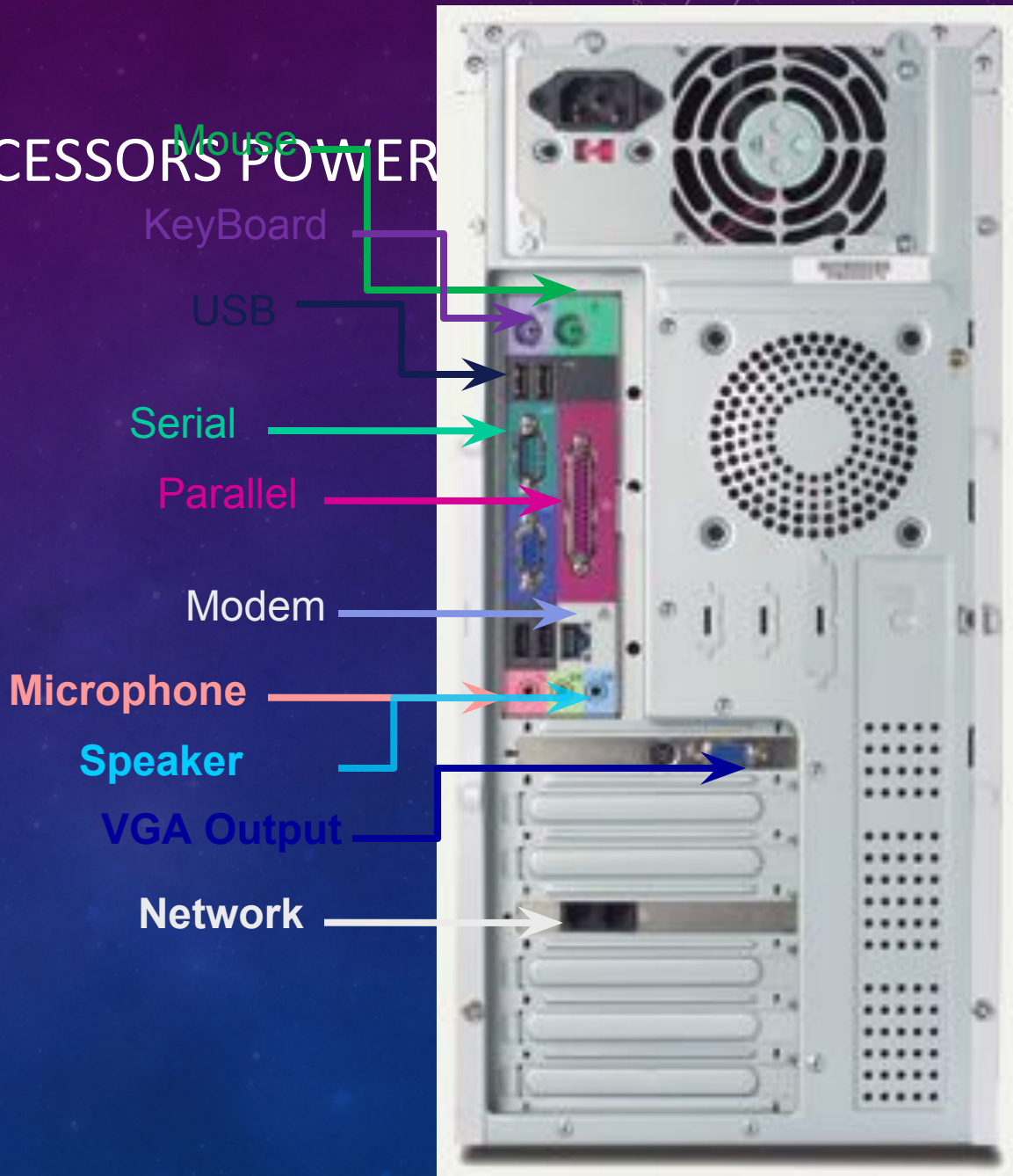
- CISC processors
  - Complex Instruction Set Computing
  - Large instruction sets; ~200-300 instructions
  - In IBM-compatible PCs
- RISC processors
  - Reduced Instruction Set Computing
  - Smaller instruction sets
  - May process data faster
  - PowerPC (used in G4) and G5

# ADVANCED PROCESSOR TOPICS

- Parallel Processing
  - Multiple processors in a system
    - Greater Flow of Data
    - More tasks done in less time
  - Symmetric Multiple Processing
    - Number of processors is a power of 2
    - Systems are easier to design
  - Massively Parallel Processing
    - Thousands of processors
    - Mainframes and super computers

- Standard computer ports

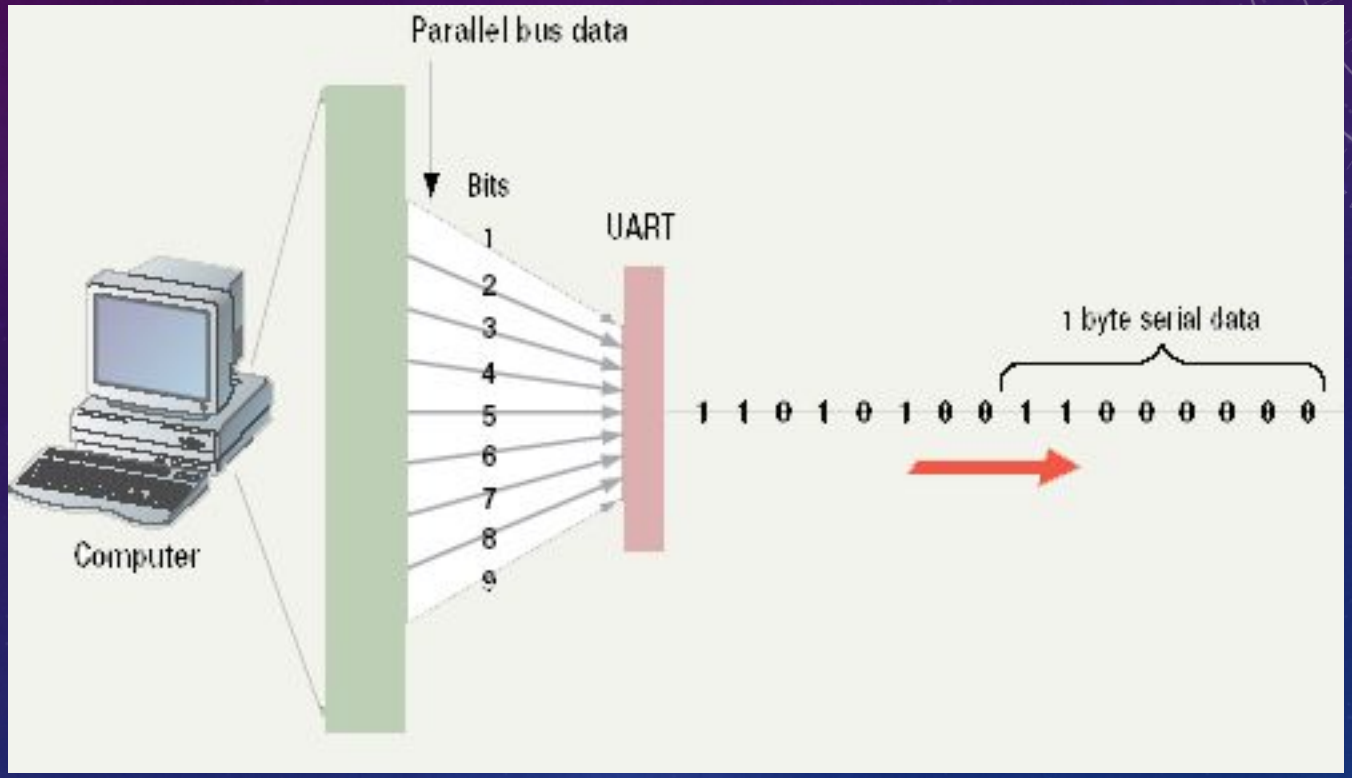
# EXTENDING THE PROCESSORS POWER



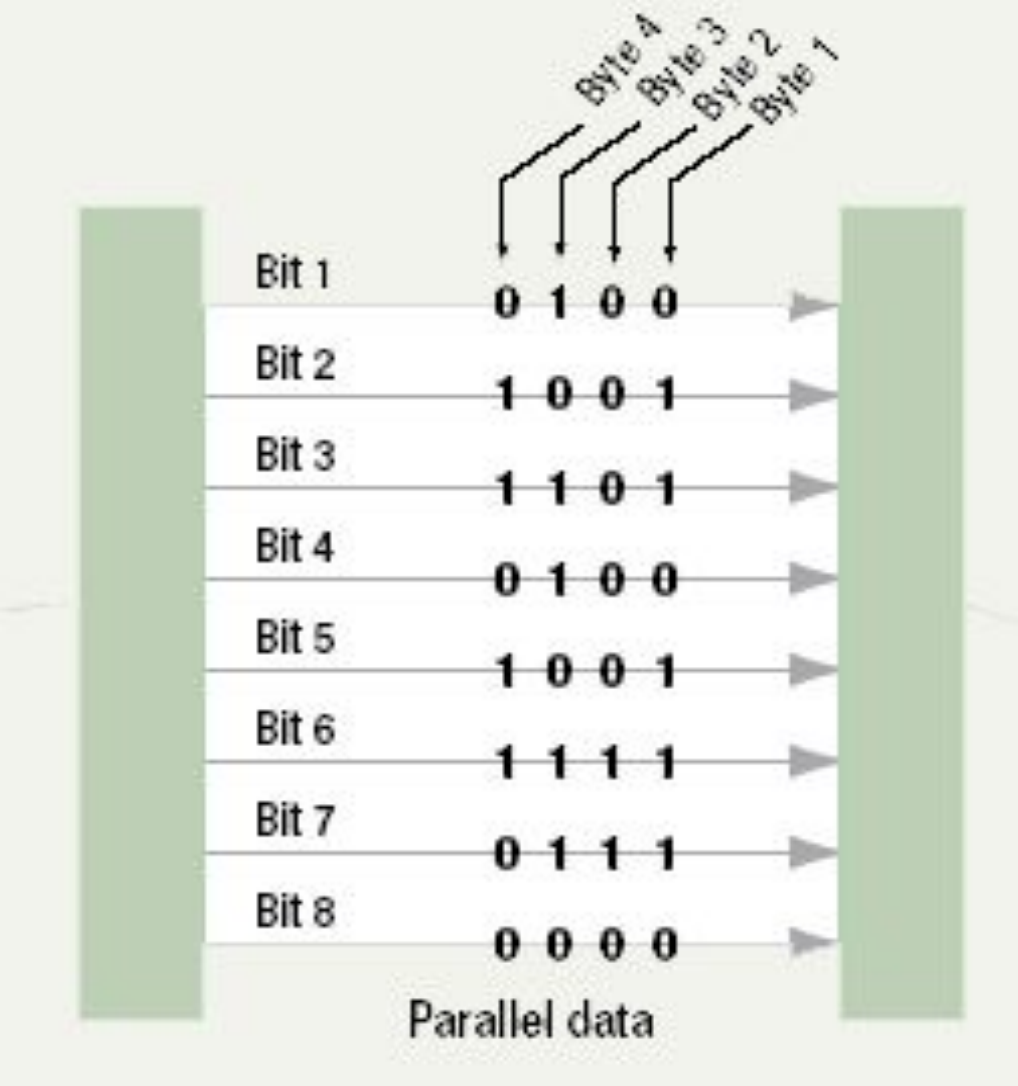
# EXTENDING THE PROCESSORS POWER

- Serial and parallel ports
  - Connect to printers or modems
  - Parallel ports move bits simultaneously
    - Made of 8 – 32 wires
    - Internal busses are parallel
  - Serial ports move one bit
    - Lower data flow than parallel
    - Requires control wires
    - UART converts from serial to parallel

# SERIAL COMMUNICATIONS



# PARALLEL COMMUNICATIONS



# EXTENDING THE PROCESSORS POWER

- SCSI
  - Small Computer System Interface
  - Extends the bus outside the computer
  - Supports dozens of devices
  - External devices daisy chain

# EXTENDING THE PROCESSORS POWER

- USB
  - Universal Serial Bus
  - Most popular external bus
  - Supports up to 127 devices
  - Hot swappable
  - Easy to use

# EXTENDING THE PROCESSORS POWER

- FireWire
  - IEEE 1384
  - Cameras and video equipment
  - Hot swappable
  - Port is very expensive

# EXTENDING THE PROCESSORS POWER

- Expansion slots and boards
  - Allows users to configure the machine
  - Slots allow the addition of new devices
  - Devices are stored on cards
  - Computer must be off before inserting

# EXTENDING THE PROCESSORS POWER

- PC Cards
  - Expansion bus for laptops
  - PCMCIA
  - Hot swappable
  - Small card size
  - Three types, I, II and III
    - Type I usually contain memory
    - Type II used for network adapters
    - Type III houses tiny hard drives
  - Type II is most common

# EXTENDING THE PROCESSORS POWER

- Plug and play
  - New hardware detected automatically
  - Prompts to install drivers
  - Non-technical users can install devices