Introduction to Information and Communication Technologies

Lecture Week 1

Course Details & Grading Criteria

Week	Topic
1	Introduction
2	Number System
3	Computer Organization
4	Mathematics in Computer Science
5	Operating systems
6	Data Management and its applications
7	Computer Graphics
8	Communication
9	Web development
10	Artificial Intelligence
11	Big data
12, 13, 14	Student Presentations
	FINAL EXAM

- Weekly Activities + Attendance 25%
- Final Presentation 25%
- Exam 50%

What are ICT?

Information
Communication
Technologies

ICT are the hardware and software that enable society to create, collect, consolidate and communicate information in different formats and for various purposes.

The technology used to handle information and aid communication

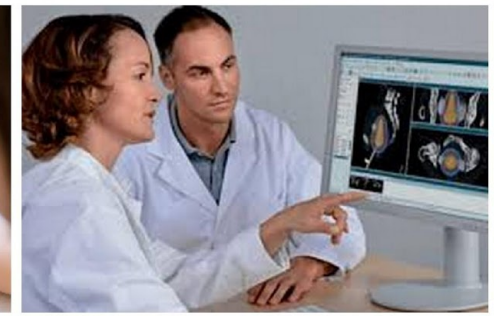
Do you use ICT 

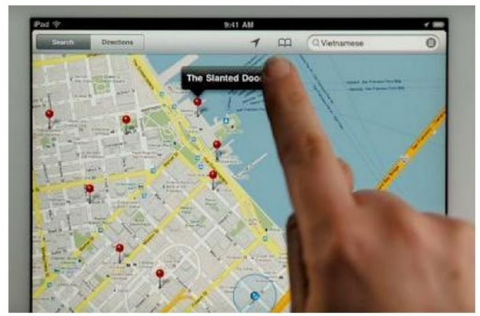

ATMcard


ANGRY BIRDS


UBER
TAXI


ONLINE SHOPPING
View my items
Checkout
3

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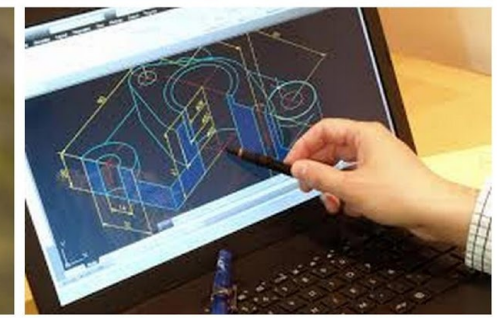
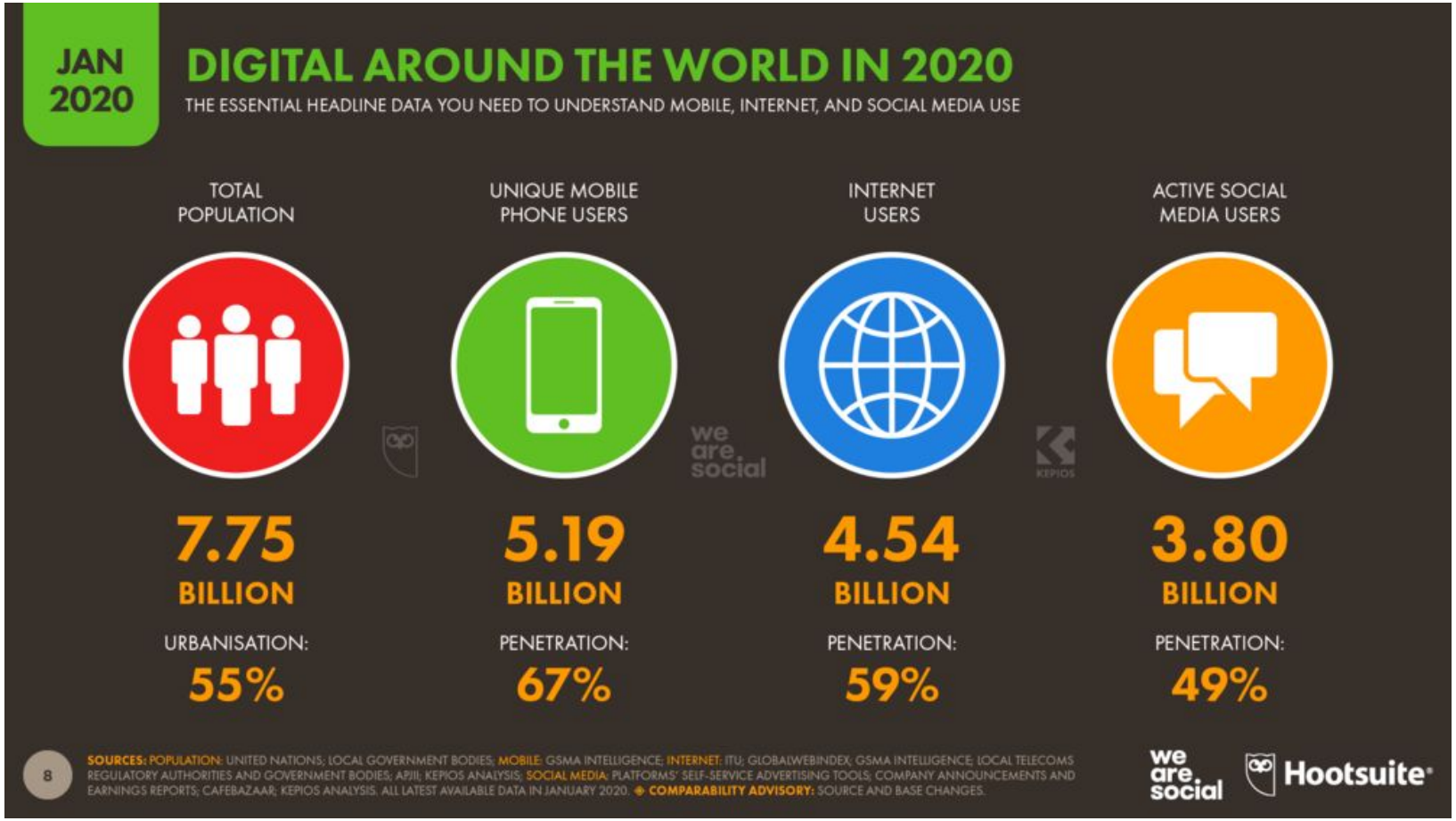


Amazing Facts and Statistics



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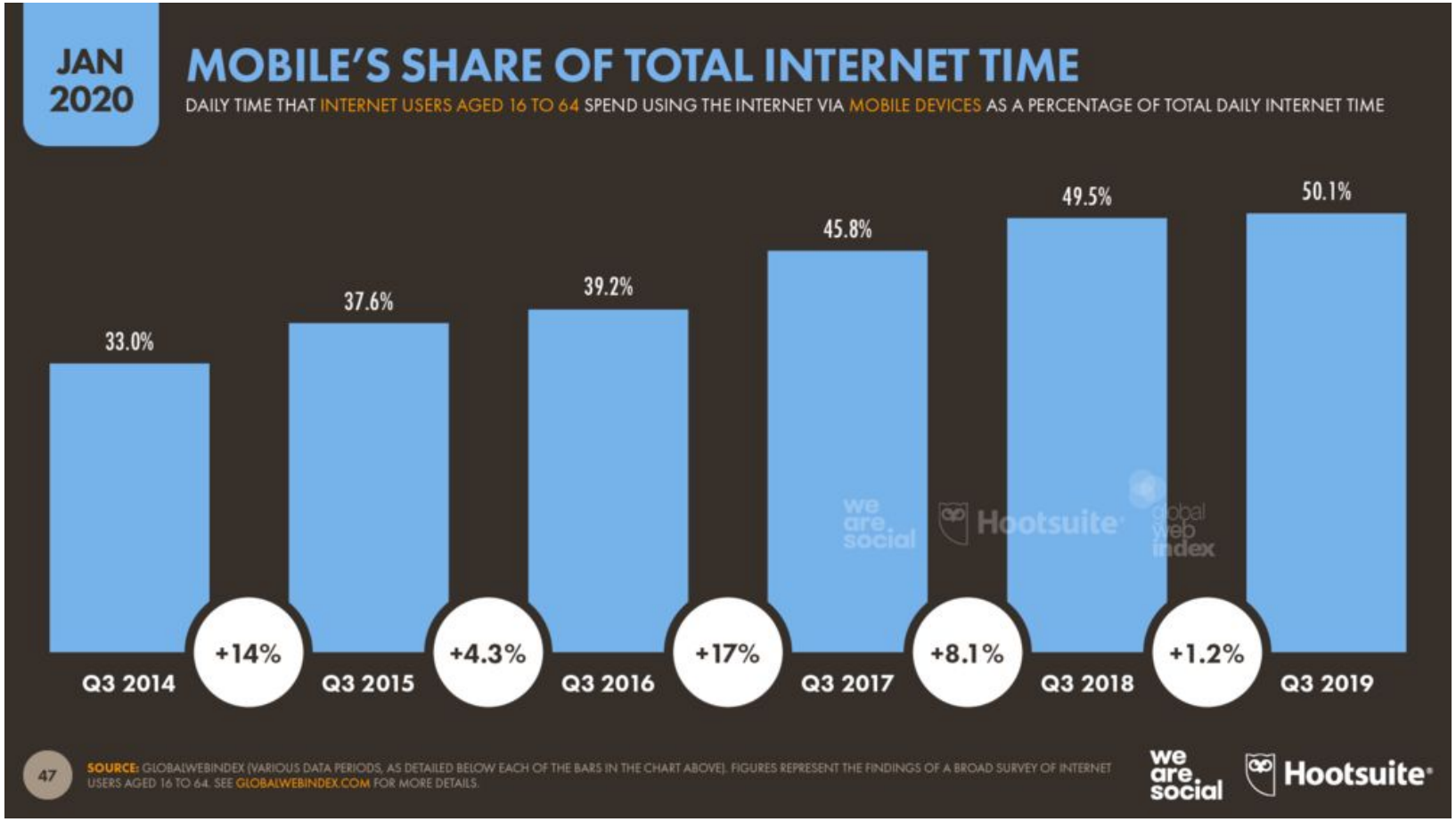

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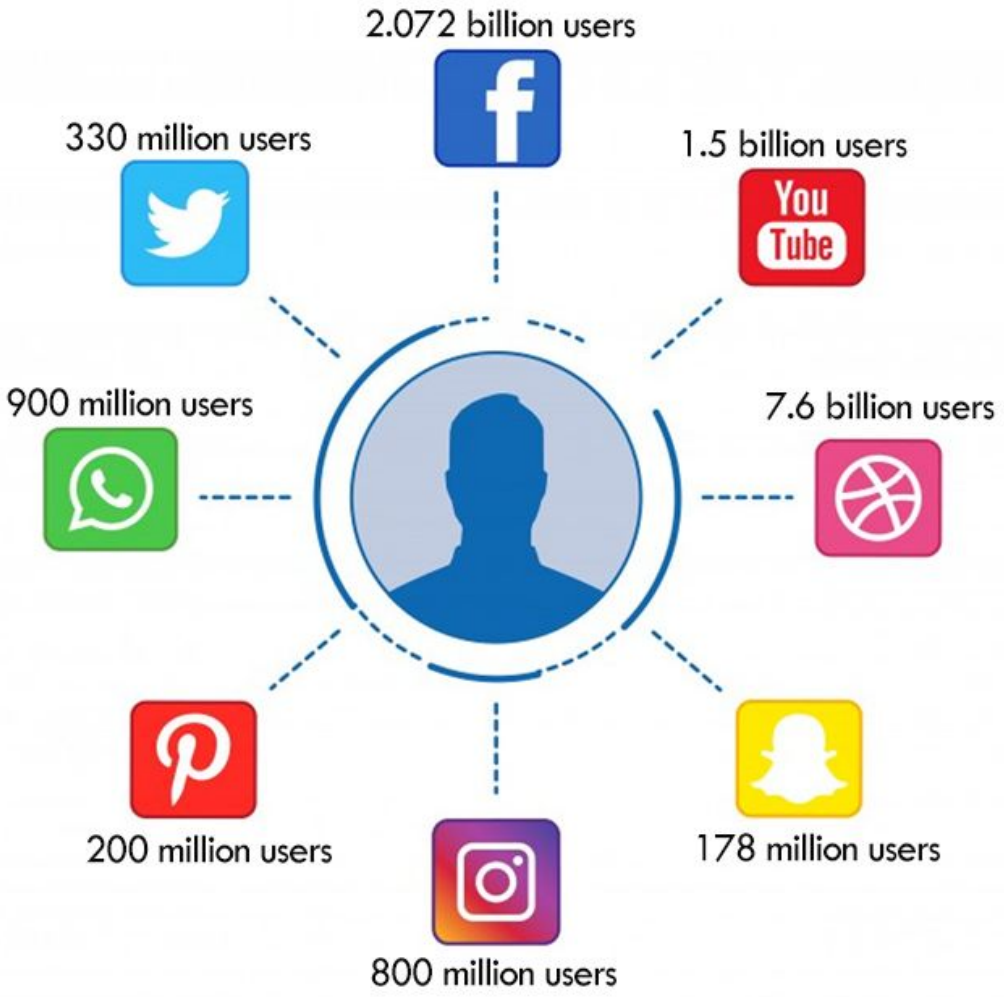


Components of ICT

Information & Communication Devices

- Computers
- Mobile phones
- Cameras
- Gaming consoles
- Home entertainment Systems

Information & Communication Software

- Spreadsheet programs (such as MS Excel)
- Word Processor (such as MS Word)
- Web Browser
- Skype
- Home entertainment Systems

Device Evolution

Internal and Abstract View

FIGURE 1.2 A car engine and the abstraction that allows us to use it

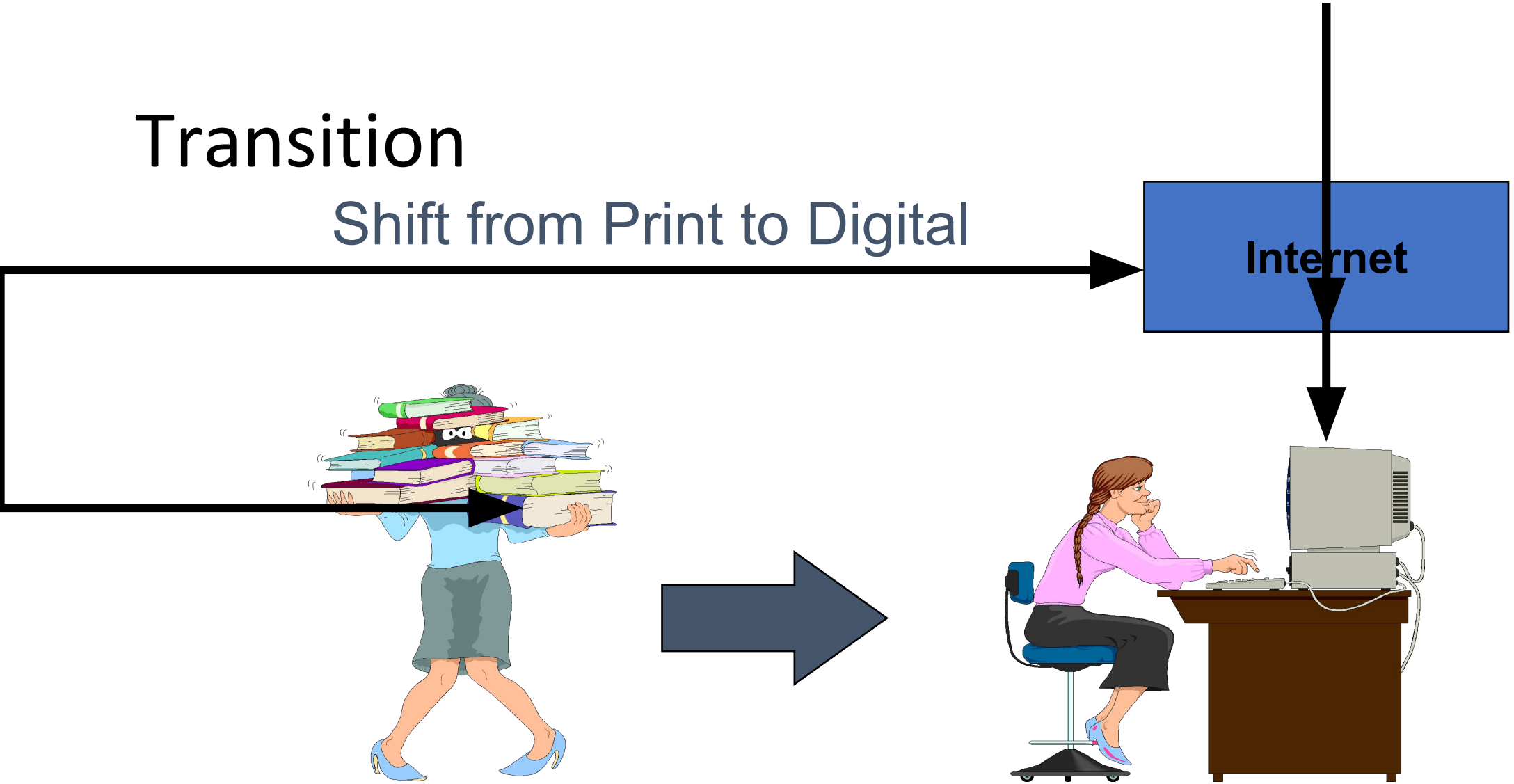
Impact of ICT on society

- Developments in ICT have brought about the merger of
  - the computing,
  - information,
  - communications,
  - entertainment,
  - mass media industries

  thereby providing a means of exchanging information in the digital format used by computers.

Transition

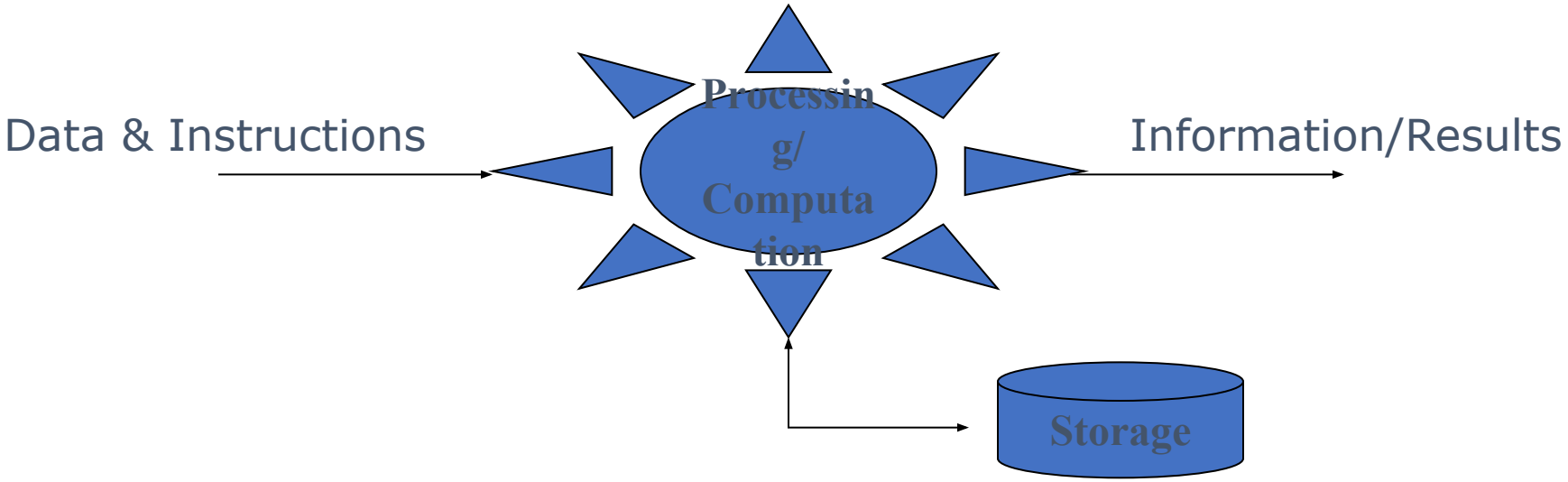
Shift from Print to Digital



Innovations in ICT have made the transfer of digital information from remote sites possible

Few Basics

- **Computers**
  - A computer is an electronic machine that has the capability to perform certain types of processing/computation on the supplied data. It can also store the data as well as generated results.



Few Basics

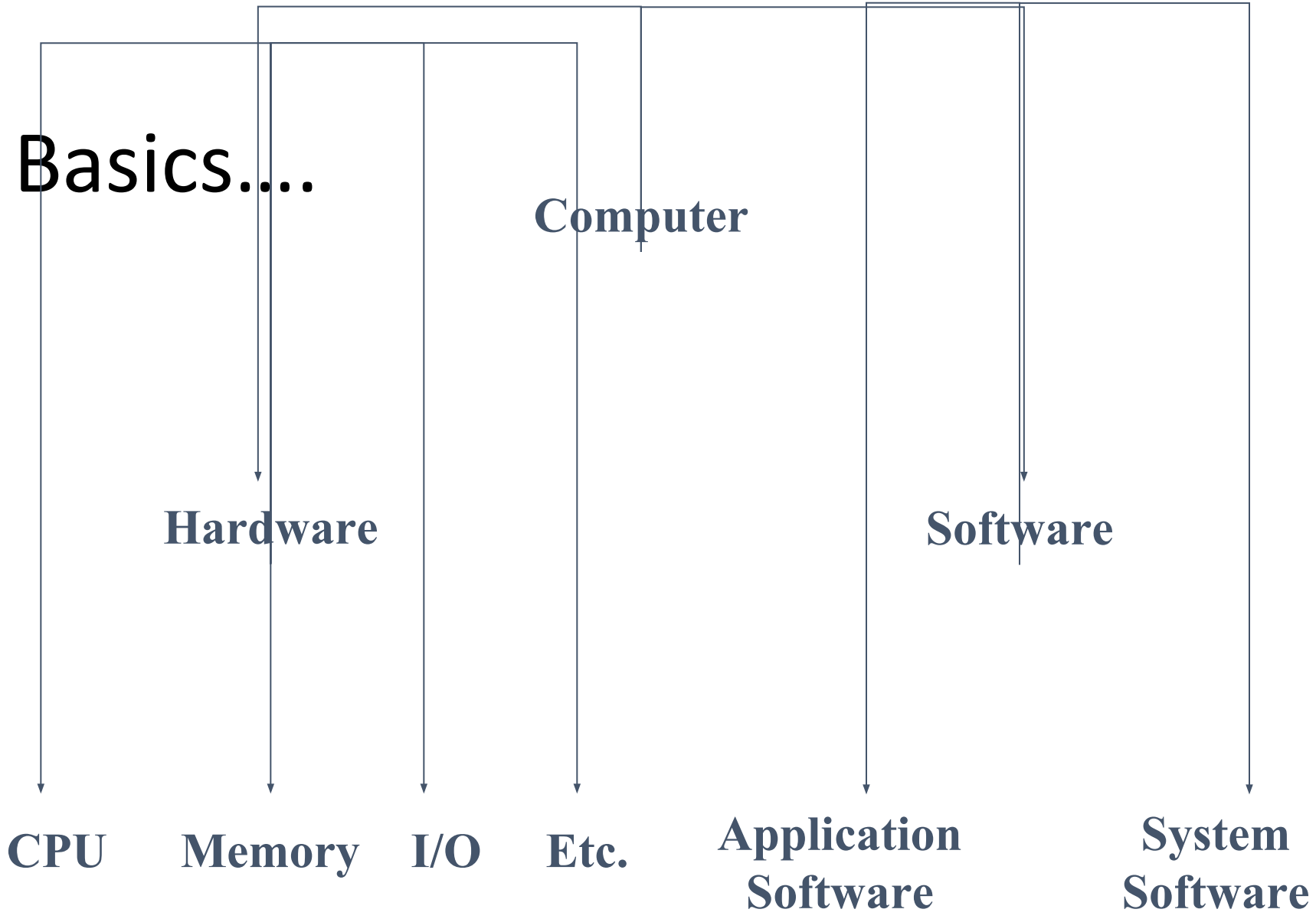
- **Computers**
  - **Device that accepts input, process and stores data, and gives output**
  - **Device that can execute specific set of instructions in a well-defined manner**

Difference between Hardware & Software?

Application Software vs System Software

System Software	Application Software
System software controls hardware.	Application software fulfils user requests
Acts as an interface between hardware and application software	Runs on the platform provided by system software
Examples include, Operating Systems, device drivers, etc.	Word processors, media players, etc.

Few Basics….

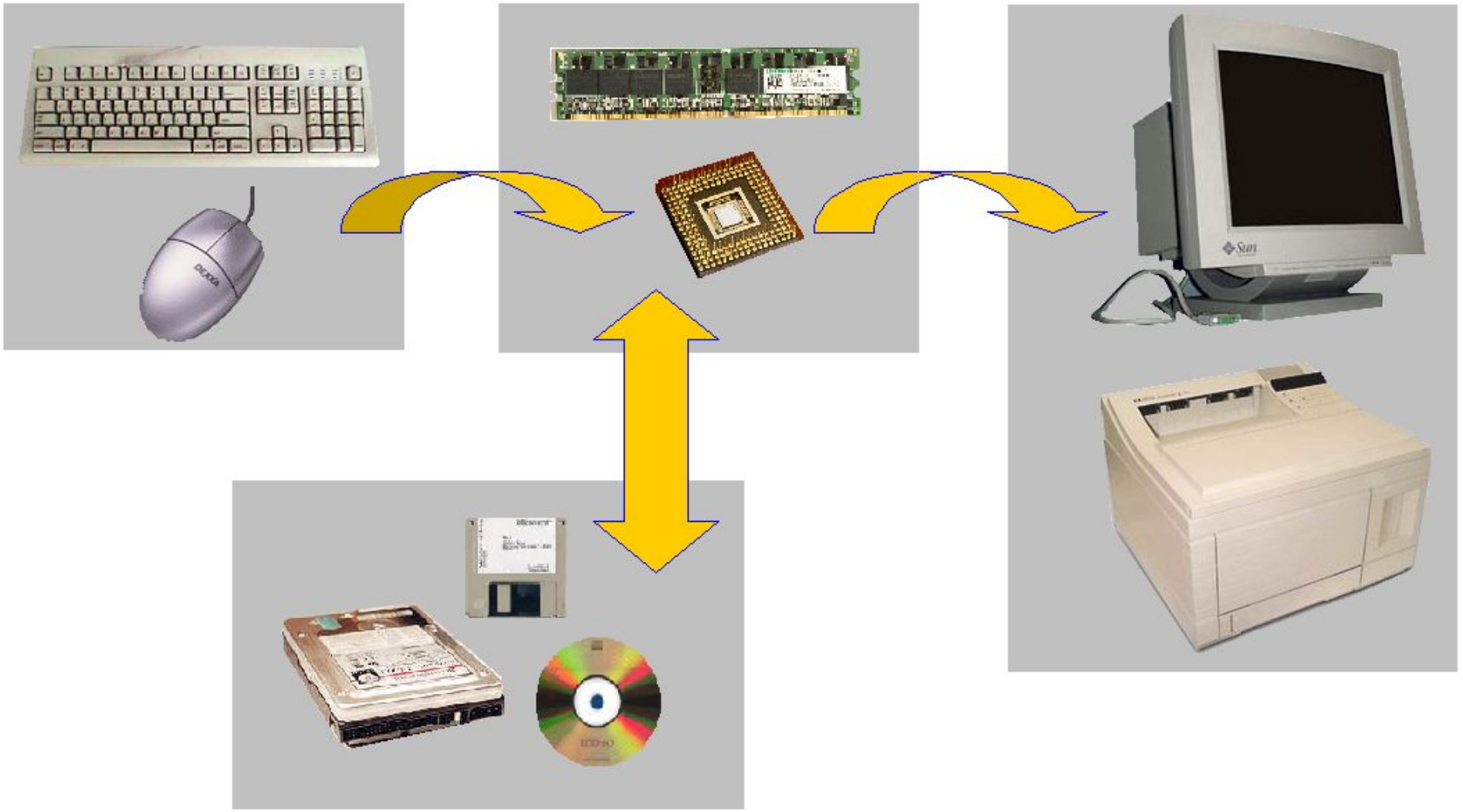

Computer
Hardware
Software
CPU
Memory
I/O
Etc.
Application Software
System Software

Few Basics

- **Computer Hardware**
  - Electric, electronic, and mechanical devices

- **Computer Software**
  - Programs and data in electronic form on a storage medium
  - Program- Sequence of Instructions

Few Basics: Hardware



Few Basics

- Input devices
- Processor & Memory
- Storage devices
- Output devices

Few Basics: Input Devices

- Mouse
- Keyboard
- Joystick
- Camera
- Microphone

Few Basics : Output Devices

- Peripheral Devices:
  - Printer - laser, inkjet, dotmatrix
  - Plotter - flatbed, drum
  - Speakers
  - Monitor - CRT, LCD, projector

Few Basics : Processor/CPU

- Pentium
- 8086
- Celeron
- SPARC
- Alpha

What are Control Unit and ALU?

The arithmetic/logic unit (ALU) contains the electronic circuitry that executes all arithmetic and logical operations.

The control unit (CU) of the CPU contains circuitry that uses electrical signals to direct the entire computer system to carry out, or execute, stored program instructions.

History

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Early History of Computing

ENIAC, UNIVAC I

ENIAC first electronic general purpose computer

Early computers launch new era in mathematics, physics, engineering and economics

ENIAC

UNIVAC 1

EDVAC

First Generation Hardware (1951-1959)

Vacuum Tubes - circuitry
Large, not very reliable, generated a lot of heat

Magnetic Drum - memory
Memory device that rotated under a read/write head

Card Readers Magnetic Tape Drives
Sequential auxiliary storage devices

Computers relied on machine language, input was based on punch cards and paper tape, output displayed on printouts

FIGURE 1.6 A vacuum tube

Second Generation Hardware (1959-1965)

Transistor

Replaced vacuum tube (1-40), fast, small, durable, cheap

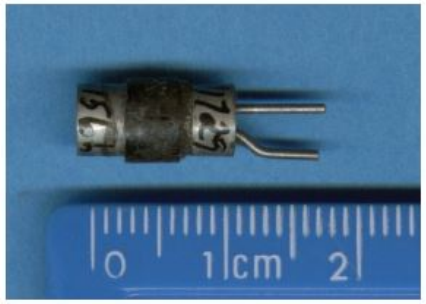


FIGURE 1.7 A transistor, which replaced the vacuum tube

Courtesy of Dr. Andrew Wylie

Magnetic Cores

Replaced magnetic drums, information available instantly

Magnetic Disks

Replaced magnetic tape, data can be accessed directly

Computers relied on symbolic/assembly language

Third Generation Hardware And Computers (1965-1971)

Integrated Circuits

Replaced circuit boards, smaller, cheaper, faster, more reliable

Transistors

Now used for memory construction

Terminal

An input/output device with a keyboard and screen

Third-generation languages (3GLs) are high-level programming languages, such as FORTRAN, COBOL, BASIC, Pascal, C/C++ and Java.

Fourth Generation Hardware (1971-?)

Large-scale Integration

Great advances in chip technology, microprocessor (thousands of ICs on single chip)

PCs, the Commercial Market, Workstations

Personal Computers and Workstations emerge
New companies emerge: Apple, Sun, Dell …

Laptops, Tablet Computers, and Smart Phones

Everyone has his/her own portable computer

Everyone has his/her own portable computer languages that consist of statements similar to statements in a human language. Fourth generation languages are commonly used in database programming and scripts examples include Perl, PHP, Python, Ruby, and SQL.

Computer Applications

- Business
  - Payroll calculations
  - E-Commerce
  - Sales analysis
  - Managing employees record
  - Stock maintenance

Computer Applications

- Banking
  - Online banking (checking balance, funds transfer etc.)
  - ATM (automated teller machine)

Computer Applications

- Education
  - The computer provides a tool in the education system known as CBE (Computer Based Education).
  - CBE involves control, delivery, and evaluation of learning.
  - Computer education is rapidly increasing the graph of number of computer students.
  - There are a number of methods in which educational institutions can use a computer to educate the students.
  - It is used to prepare a database about performance of a student and analysis is carried out on this basis.

Computer Applications

- Marketing
  - **Advertising** − With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
  - **Home Shopping** − Home shopping has been made possible through the use of computerized catalogues that provide access to product

    information and permit direct entry

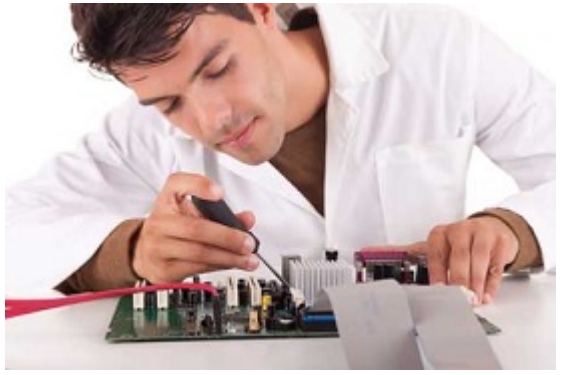
    of orders to be filled by the customers.

Computer Applications

- Healthcare
  - **Diagnostic System** − Computers are used to collect data and identify the cause of illness.
  - **Lab-diagnostic System** − All tests can be done and the reports are prepared by computers.
  - **Patient Monitoring System** − These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
  - **Pharma-Information System** − Computer is used to check drug labels, expiry dates, harmful side effects, etc.
  - **Surgery** − Nowadays, computers are also used in performing surgery.

Computer Applications

- Engineering Design
  - **Structural Engineering** − Requires stress and strain analysis for design of ships, buildings, budgets, airplanes, etc.
  - **Industrial Engineering** − Computers deal with design, implementation, and improvement of integrated systems of people, materials, and equipment.
  - **Architectural Engineering** − Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.



Computer Applications

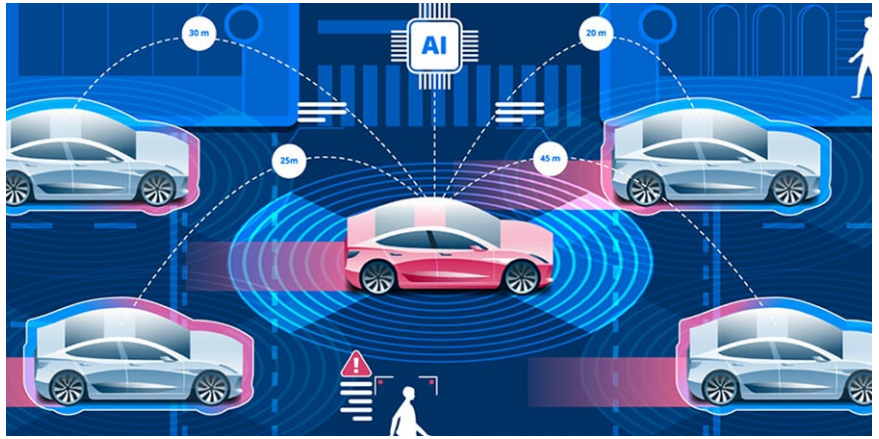
- Military
  - Missile Control
  - Military Communication
  - Military Operation and Planning
  - Smart Weapons

Computer Applications

- Communication
  - E-mail
  - Chatting
  - FTP
  - Video-conferencing
  - Web-browsing

Computer Applications

- Transport
  - Flying (Fly-by-Wire, autopilot)
  - Self-driving cars
  - GPS Navigation
  - Online booking (uber, careem, etc.)



Types of Computer

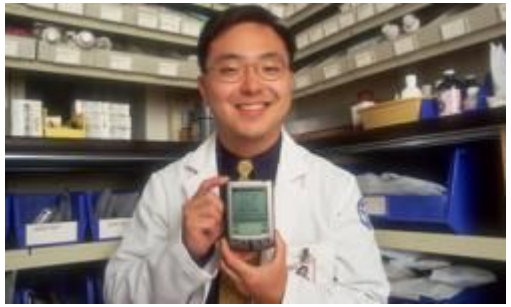
- PC (Personal Computer)
  - Small
  - Inexpensive
  - Business Use
    - Word processing, running spreadsheets etc.
  - Personal Use
    - Playing games, surfing the internet, movies, games etc.
  - Single user system

Types of Computer

- Desktop
  - PC not designed for portability
  - More storage and computation with less cost
- Laptop (notebook)
  - Portable with integrated display
  - Battery operated

Types of Computer

- Netbook
  - Smaller and cheaper than laptops
  - Less powerful than laptop
- PDA (personal digital assistant)
  - Tightly integrated computer
  - Flash memory instead of hard disk
  - Touch screen instead of keyboard
  - Lightweight and reasonable battery life



Types of Computer

- Workstation
  - Desktop computer with more processing power
  - More memory
  - More capabilities in performing specialized tasks

Types of Computer

- Server
  - Computer that serves other computers over network
  - More processing power, memory and storage
  - Large in size

Types of Computer

- Mainframe
  - Very large size
  - Now known as enterprise server
  - More processing power

- Supercomputer
  - Very expensive
  - Fastest computers
  - Employed for specific applications which require immense amount of calculations
    - weather forecasting
    - scientific simulations
    - (animated) graphics
    - nuclear energy research
    - electronic design

Activity

- Discuss at least 3 types of components used by computer. Also explain the purpose of the components in computer.
- Discuss all digital devices that you own, such as laptop, mobile, smart watch, etc. and explain their unique functionalities.

Thank You