Introduction to ICT and Programming

Lecture # 1 : Introduction

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- Outline/Notes: http://www.niit.edu.pk/~nauman/CoursesTaught

Course Objectives

- Discuss Fundamental Concepts of Information Technology (IT)
- Show how Computers are Used as Practical Tools for Solving Personal, Business, and Academic Problems
- Learn Basic Computer Skills that Enables the Students Explore IT World
- Enabling students to work with various office / Productivity software's
- Learn Basics of how to do programming

Course Outline

Part A

- Introduction to IT
- Computing & Communication
- Understanding Computer
- Peripheral Devices
- Connectivity, Interactivity & Multimedia
- Internet Access Devices and connecting medias
- World Wide Web
- Browsers & Search Engines
- Web Page Basic Design
- Application Software
- Microsoft Office
- Operating Systems
- Hardware Technology
- System Unit
- Storage Devices
- Data Entry Devices
- Output Devices
- Telecommunications
- Digital Communication
- Networks & Protocols
- Databases
- Data Mining
- E-Commerce
- Security Issues
- System Development

Course Outline

Part B

- Introduction to Programming
- Programming Languages
- Problems solving Techniques
- Basics of C++
- Control structures
- Functions

Books

- Text Books
  - Using Information Technology by Brian K. Williams and Stacy C. Sawyer (6th Edition)
  - Object Oriented Programming in C ++ by Robert Lafore (4th edition)

Books

- Reference Books
  - **Peter Norton's Introduction** to Computers 2nd Edition
  - **Computers** by Larry Long, Nancy Long 6th Edition
  - **Computer Fundamentals** by P.K. Sinha
  - **C++ Web** material
  - www.howstuffworks.com
  - www.whatis.com

Evaluation

16 Lab Sessions/Project	**15%**
Quizzes (10-15 Min.)	**10%**
Assignments	**05%**
Two One Hour Tests (OHTs)	**30%**
Final	**40%**
Total	**100%**

Usage (Softwares)

- **Operating Systems**
  - Windows 98/2000/XP
- **Microsoft Office**
  - MS Word 2000
  - MS Excel 2000
  - MS Power Point 2000
  - MS FrontPage 2000
- **Programming IDE**
  - Turbo C++ 3.0
- **Web Browsers**
  - MS Internet Explorer 6.0
  - Mozilla Firefox
- **Email Editors**
  - MS Outlook
- **Utilities**
  - Winzip 8.0
  - Winrar
  - System Troubleshooting

Rules

- No late work will be accepted (unless arrangements have been made in advance)
- Ask questions; participate actively in class
- Turn off Cell Phones in the Class and Lab
- You are responsible for what is covered in class – even if you don't show up
- **Deficiency in attendance may lead to termination or relegation**
- You are encouraged to help each other with your homework assignments – but you must turn in your own work
- If you are found to be cheating, you will fail at least the assignment / test and perhaps the entire class

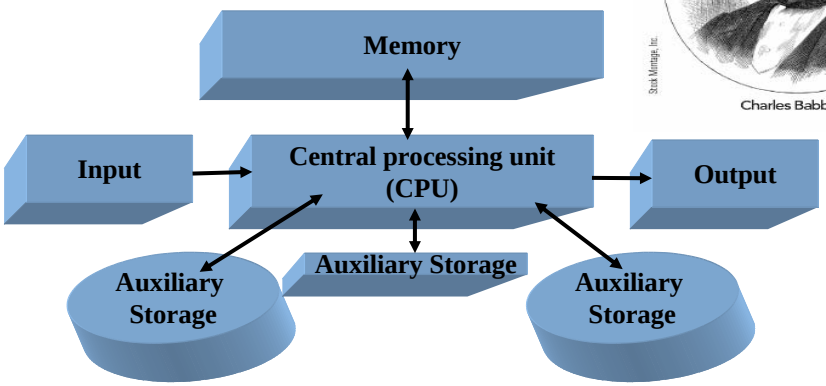
Rules

- If you have any learning disabilities or special needs, please let me know in advance through email or personal meeting
- Check your email regularly for messages
- Quizzes are unannounced

Lecture Topics

- Brief History
- Few Basics
- Current State of Technology
- What is ICT?

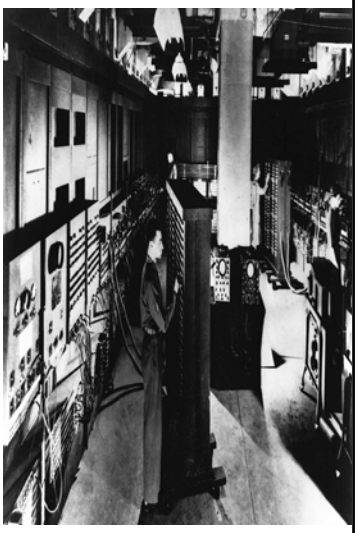
Few Basics: History



The idea for a general purpose computing **'machine'** originated with **Charles Babbage** in the 19th century

Few Basics: History

- The **ENIAC** (Electronic Numerical Integrator And Calculator) 1946. The ENIAC employed 18,000 vacuum tubes;
- Unfortunately, a tube failure occurred every 7 minutes and it took more than 15 minutes to find and replace the faulty tube.
- The Technology has advanced from Vacuum tube to transistors to chips and microchips.

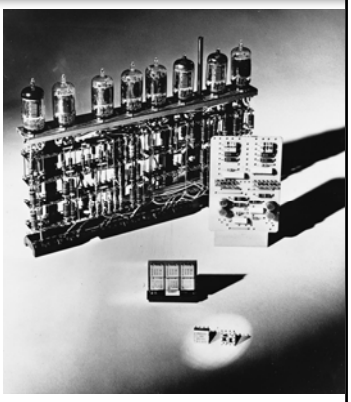


Vacuum Tubes > Transistors > Microchips

- **Transistor:**

  A tiny electrically operated switch, or gate, that can alternate between "on" and "off" many billions of times per second

- Today's transistors are MICROSCOPIC in size.
- Today, transistors are part of an Integrated circuit (IC)



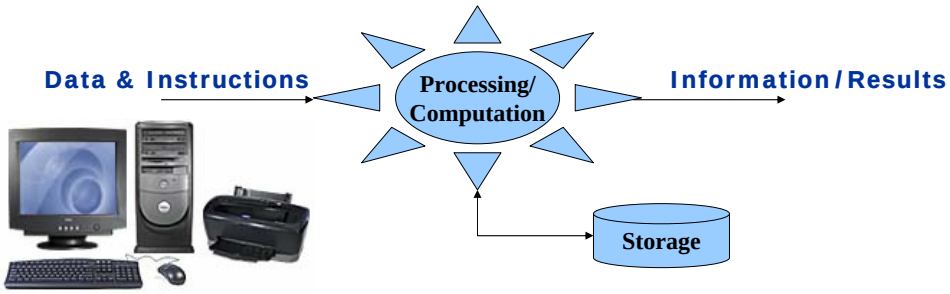
1940s vacuum tube towering over 1950s transistor

Few Basics: The IBM PC

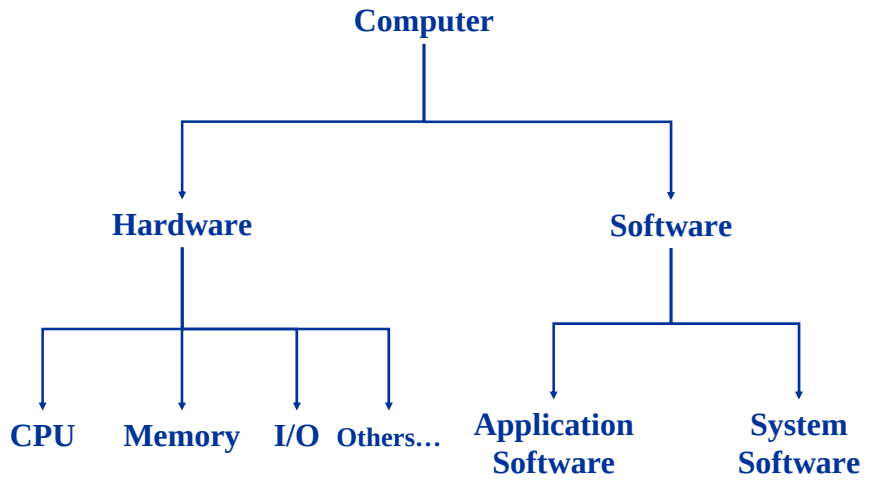
- A combined effort between ***IBM*** (credibility and marketing), ***Microsoft*** (operating system), and ***Intel*** (microprocessor); introduced in 1981
- The PC was created as an **'open'** machine enabling independent contractors to develop hardware and/or software to improve it
- **PC clones** quickly followed and the market soon exploded; IBM has a fraction of the market it created

Few Basics: Computer

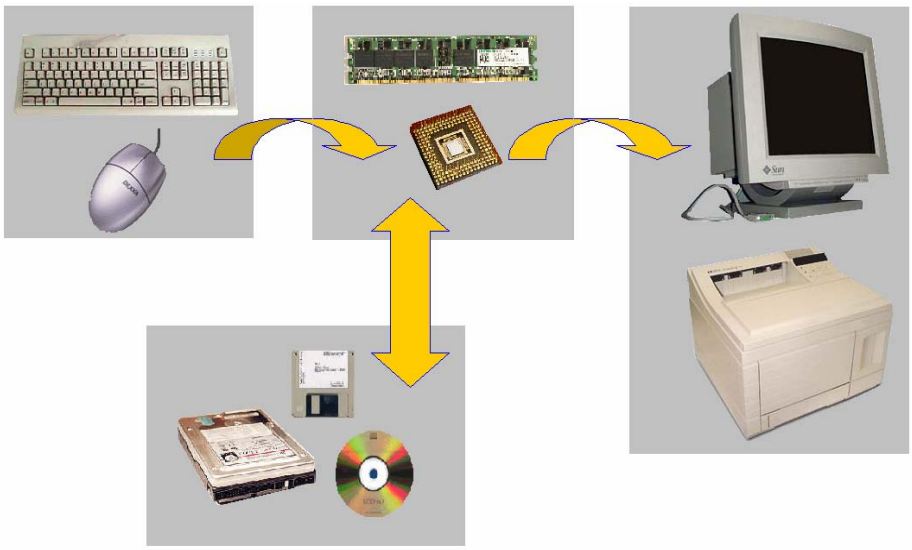
- **Computers**
  - A computer is an electronic machine that has the capability to perform certain types of processing/computation on the supplied data.
  - It can also store the data as well as generated results.
  - Device that can execute specific set of instructions in a well-defined manner



Few Basics….

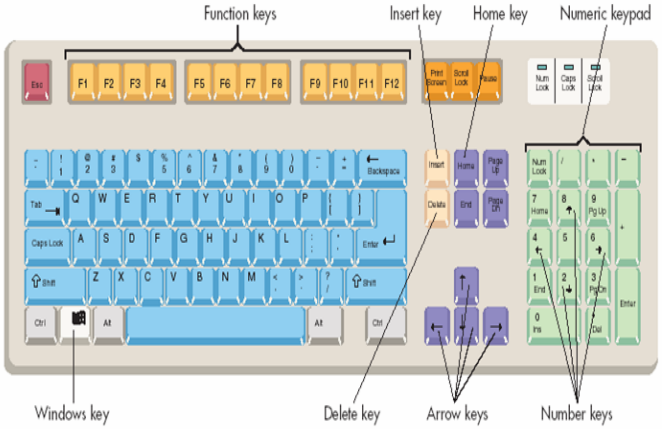


Few Basics: Hardware



Few Basics: Input Devices

- Mouse
- Keyboard
- Joystick
- Light pen
- Tablet
- Camera
- Microphone



Few Basics : Output Devices

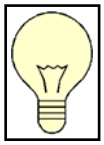
- Peripheral Devices:
  - Printer
    - laser, inkjet, dot-matrix
  - Plotter
    - flatbed, drum
  - Speakers
  - Monitor
    - CRT ***c**athode-**r**ay **t**ubes*,
    - LCD ***l**iquid **c**rystal **d**isplay* / ***thin film transistor*** **(TFT)**

Few Basics: Bits & Bytes

- All computers are based on the binary number system
- A ***bit*** or binary digit has one of two values, zero or one
- A ***byte*** is the smallest addressable unit of memory (8 bits)
- ***American Standard Code for Information Interchange*** (***ASCII).***
  {Standard 8 bit code used in data communications }

- Bit - a binary digit e.g. 1 or 0
- Byte - a binary word = 8 bits
- 1 Kilo Byte = 1024 bytes
- 1 Mega Byte = 1024 KB
- 1 Giga Byte = 1024 MB
- 1 Tera Byte = 1024 GB

- **Example: 01000001 = A**



On

Off

Few Basics : Memory

- Transient (erased when power turned off)
- Permanent

- Measured in bytes
  - 1 Kilobyte = (~1,000 bytes)
  - 1 Megabyte = (~1,000,000 bytes)
  - 1 Gigabyte = (~1,000,000,000 bytes)

- Why Need RAM?
  - Keep multiple programs & data files in memory
  - Graphic-intensive programs demand a lot of memory

- The Original IBM PC had 16Kb of memory

Primary Storage:

1. **RAM (Random Access Memory)**
2. **ROM (Read Only Memory)**

Secondary Storage Devices:

1. **Hard Drive**
2. **Floppy Drive**
3. **Zip Drive**
4. **USB Drive**
5. **Compact Disks (CD)**
6. **DVD's**

Few Basics : The Microprocessor

- The central processing unit (cpu) or “brain” of the PC
- **Microprocessor** - interprets and executes program instructions.

What are Control Unit and ALU?

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

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.

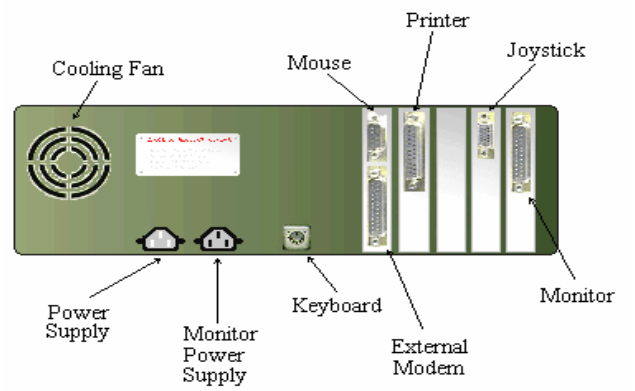
Few Basics : Processor/CPU

- Differentiating Characteristics:
  - **Instruction set** - the set of instructions that the microprocessor can execute.
  - **Bandwidth** - the number of bits processed in a single instruction.
  - **Clock Speed** - megahertz (MHz), the clock speed determines how many instructions per second the processor can execute. All computers contain an internal clock that regulates the rate at which instructions are executed and synchronizes all the various computer components.
  - **Megahertz (MHz)** - one MHz represents one million cycles per second. The speed of microprocessors, called the clock speed, is measured in megahertz.
    - For example, a microprocessor that runs at 300 MHz, executes 300 million cycles per second.

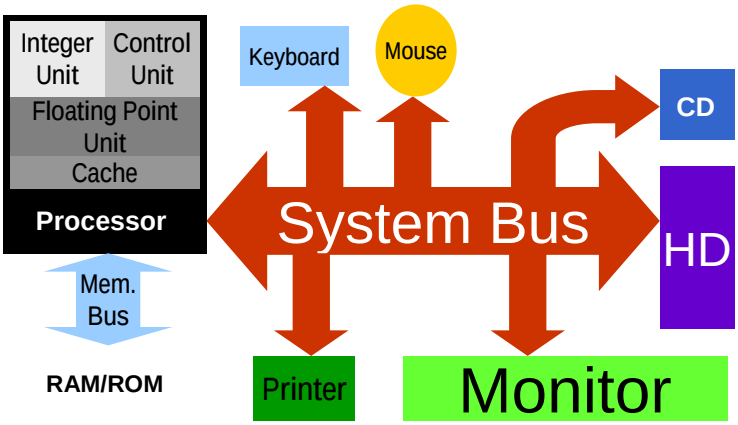
Few Basics: Ports

Every Device is Connected to the Computer through a Port:

1. **Serial**
2. **Parallel**

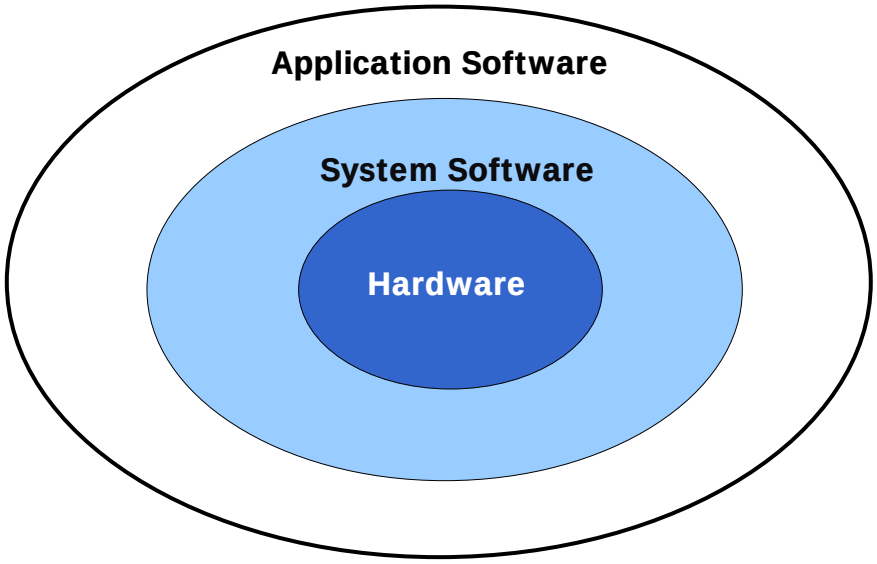


Few Basics: BUS Figure



BUS: consists of electrical pathways

Few Basics: Figure



Few Basics: System Software

Operating systems:

- Works as coordinator between hardware and user software
  - ***Example***: Opening a word document, screen display, print, and save.
- Allocates system resources (CPU, peripherals)
  - ***Examples***: use of key board, mouse, playing music, displaying on monitor

Utility Software:

- Software that augment the system software
  - ***Example:*** preparing disks to store data

Few Basics: System Software

Device Drivers:

- The system software that helps computer to control a peripheral device. Usually supplied by the vendor of the computer device
  - Example: DD for mouse, DD for Laser printer

Programming Languages:

- Tools to create the Application Software

Few Basics: Application Software

Business software:

- Help organization to efficiently do routine tasks

Productivity software:

- **Software which enhance the productivity**
  - Example: Microsoft Office

Entertainment software:

Educational software:

Scientific software:

Games:

Industrial Solutions:

Office Automation Solutions:

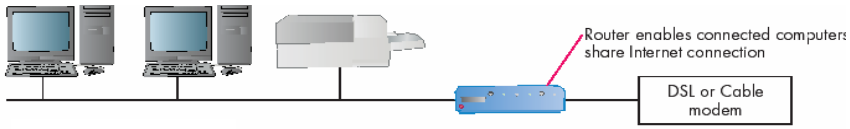
& many more…

Few Basics: Computer Networks

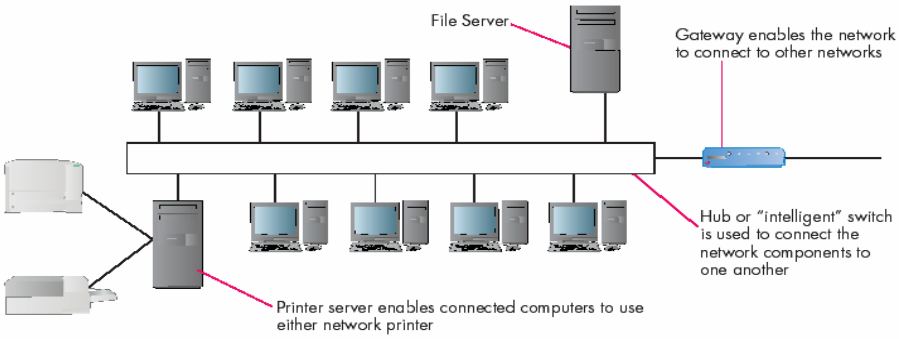
Network:
A collection of computers and other devices that communicate with each other to share data, hardware and Softwares.

- Most people work in a network environment
  - Home network
  - Local Area Network (LAN)
  - Wide Area Network (WAN)
- The physical structure includes: interface cards, cables, hubs, switches, and routers

Few Basics: Computer Networks

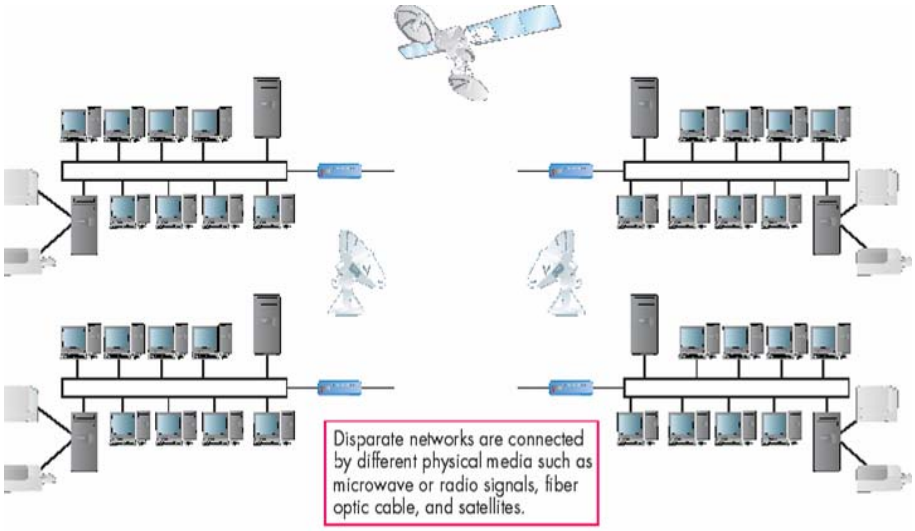


(a) Home Network



(b) Local Area Network

Few Basics: Computer Networks



(c) Wide Area Network

Few Basics: Computer Networks

- **Workgroup computing**
  - Gather remote resources in such a way that they would better utilize each other's power.
  - A *workgroup* is a collection of individuals working together on a task.
- **Computer Network**
  - Linking computers together in such a way that they can share the resources with each other.
- **Internet**
  - Network of networks; largest network available in the form of global village

Few Basics: Internet

- Is a collection of local, regional, and national computer networks that are linked together to exchange data and distribute computing tasks

Concept Check:

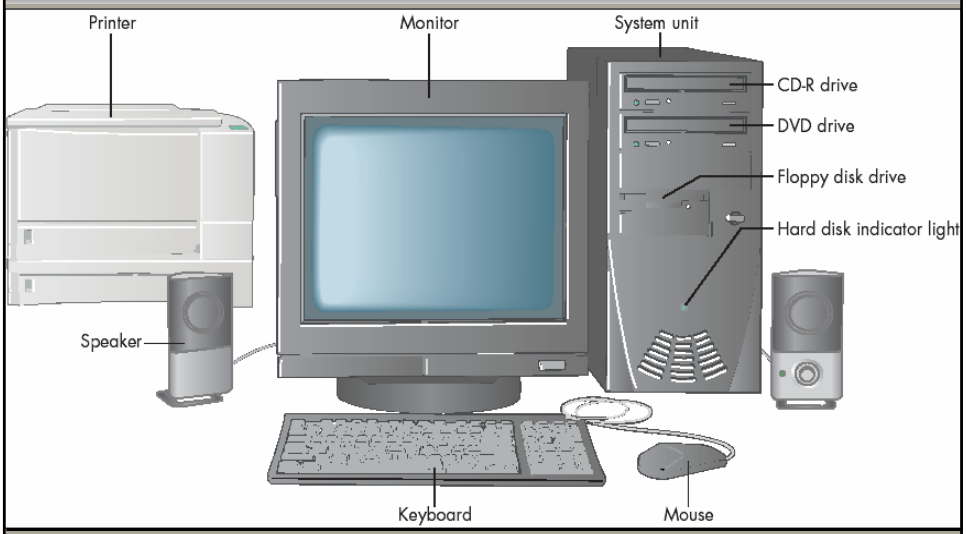
What is the difference between Internet and World Wide Web?

World Wide Web (WWW) and Electronic Mails (E-mail) are among the Internet Services

Few Basics: Internet

- **Top Ten Uses of Internet:**
  - Electronic mail.
  - Research.
  - Downloading files.
  - Discussion groups.
  - Interactive games.
  - Education and self-improvement. On-line courses etc.
  - Electronic newspapers and magazines.
  - Job-hunting.
  - Shopping.

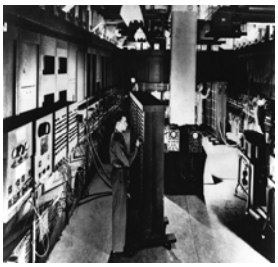
The PC Today



Necessity of TODAY!!

Current State of Technology

- **Drivers:**
  - Miniaturization
  - Speed
  - Affordability



1946

Now

What is ICT?

- **I**nformation
- **C**ommunication
- **T**echnologies

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

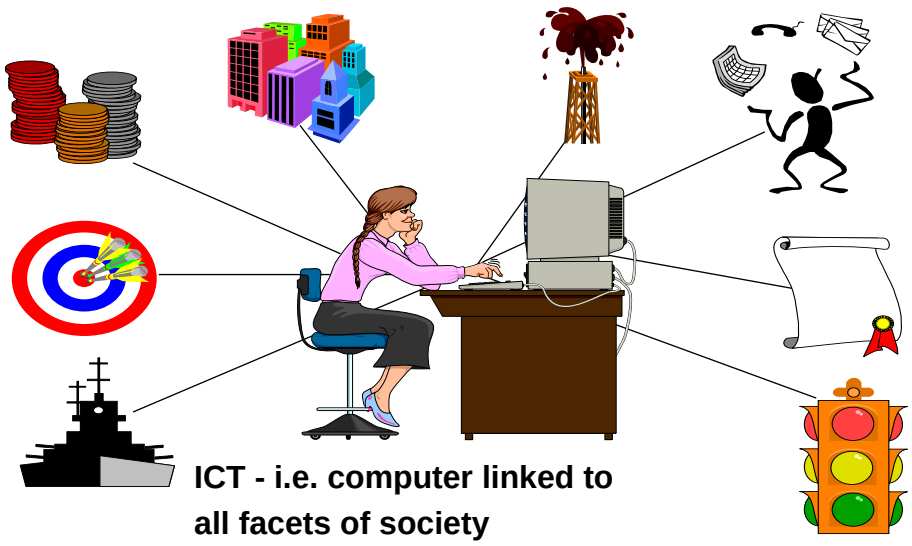
The technology used to handle information and aid communication

Impact of ICT on society

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

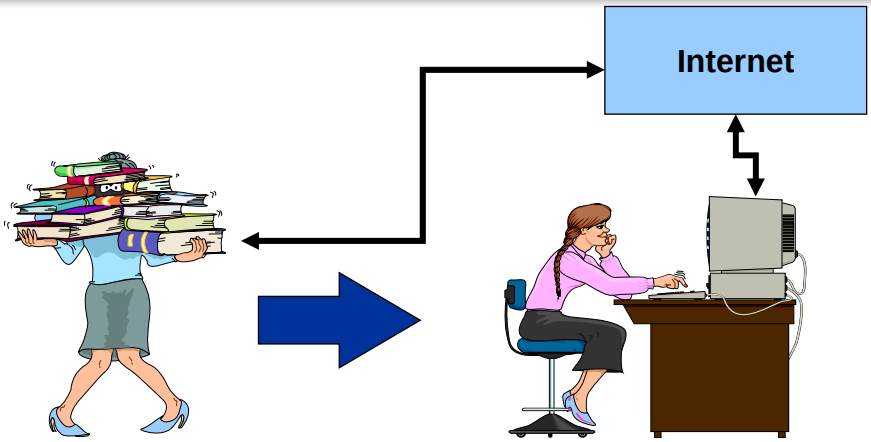
  thereby providing a mean to exchange information in a digital format.

ICT



ICT - i.e. computer linked to all facets of society

Transition: Shift from Print to Digital



- ICT has made the transfer of digital information from remote sites possible

Few Basics: Definitions

- **Information**
  - Data that have been collected and processed into a meaningful form
- **Information System**
  - A computer-based system that provides both data processing capability and information for managerial decision making
- **Information Society**
  - A society in which the generation and dissemination of information becomes the central focus of commerce.
- **Information Technology**
  - A collective reference to the integration of computing technology and information processing

Few Basics: Definitions

- **Telecommuting**
  - Computing via a communications link between home and office
- **Communication Channel**
  - The facility by which data are transmitted between locations in a computer network
- **Communication Protocols**
  - Rules established to govern the way data in a computer network are transmitted

Questions?