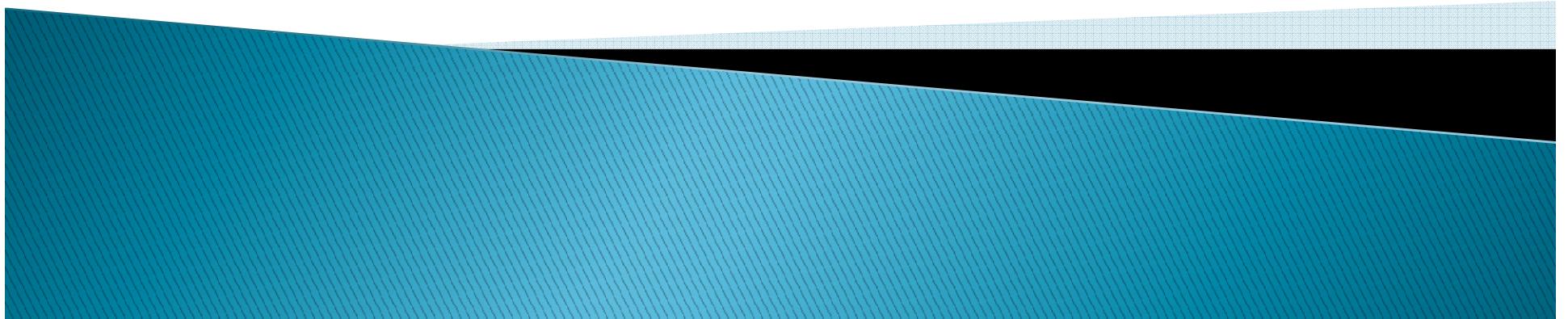


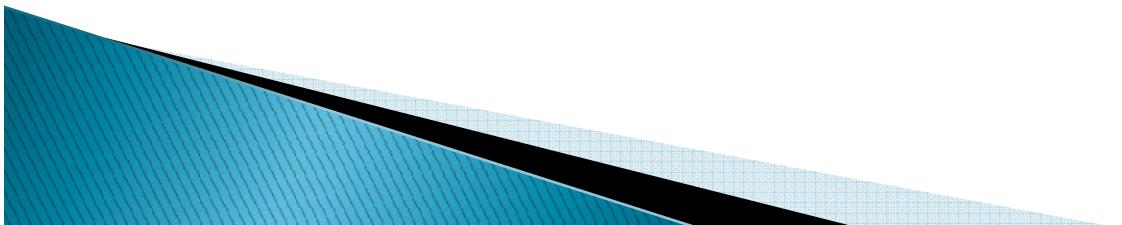
Lecture 1

Introducing Computer Systems



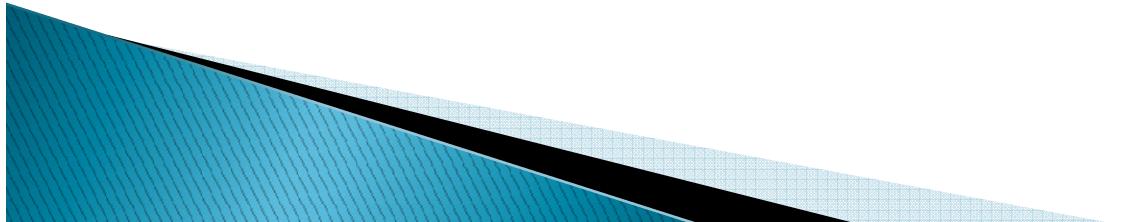
Root of the word “Computer”

- ▶ The word ‘compute’ comes from the Latin word *computare*, meaning "arithmetic, accounting, reckoning"
- ▶ The Latin word *computare* itself comes from:
 - Latin *com*, meaning "with", and
 - Latin *putare*, meaning "to settle, clear up, reckon"
- ▶ So, in ancient Rome “Compute” means "to settle things together" or maybe "to reckon with (something)".



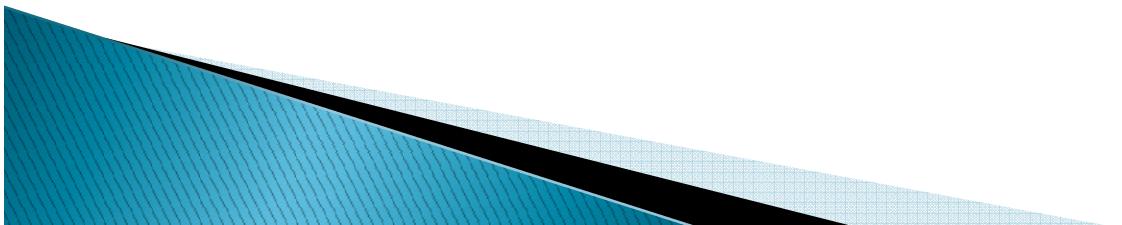
Root of the word “Computer”

- ▶ The derivative “computer” was coined in the mid-17th century, and originally meant simply ‘person who computes’;
- ▶ The modern meaning developed via ‘device for calculating’ at the end of the 19th century and ‘electronic brain’ by the 1940s.



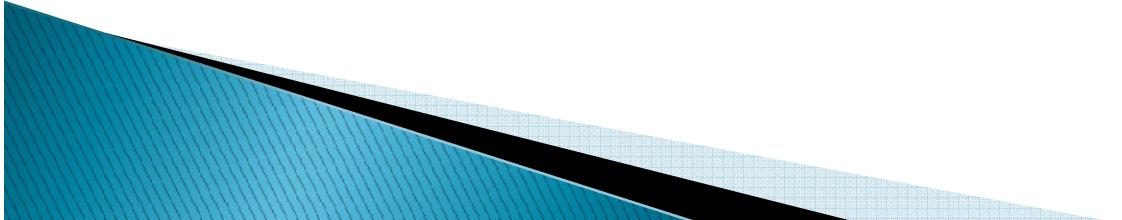
What a computer does?

- ▶ A computer does two things, and two things only:
 - it performs calculations and
 - it remembers the results of those calculations.
- ▶ But it does those two things extremely well.
- ▶ The typical computer that sits on a desk or in a briefcase performs a billion or so calculations a second.



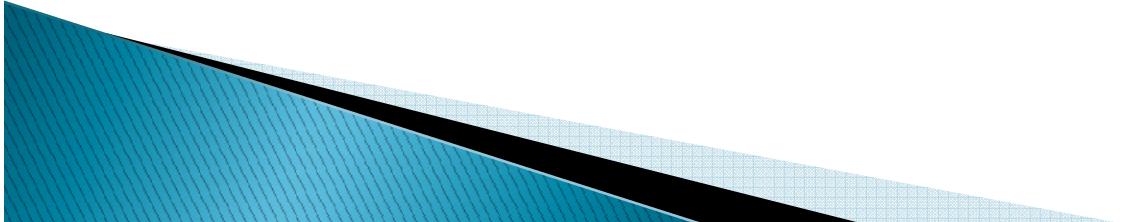
What a computer does?

- ▶ Think about holding a ball a meter above the floor, and letting it go. By the time it reaches the floor, your computer could have executed over a billion instructions.
- ▶ As for memory, a typical computer might have hundreds of gigabytes of storage. How big is that?



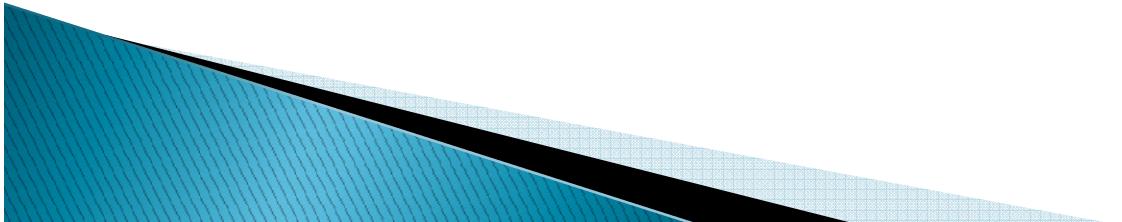
What a computer does?

- ▶ If a byte (the number of bits, typically eight, required to represent one character) weighed one ounce (which it doesn't), 100 gigabytes would weigh more than 3,000,000 tons.
 - For comparison, that's roughly the weight of all the coal produced in a year in the U.S.



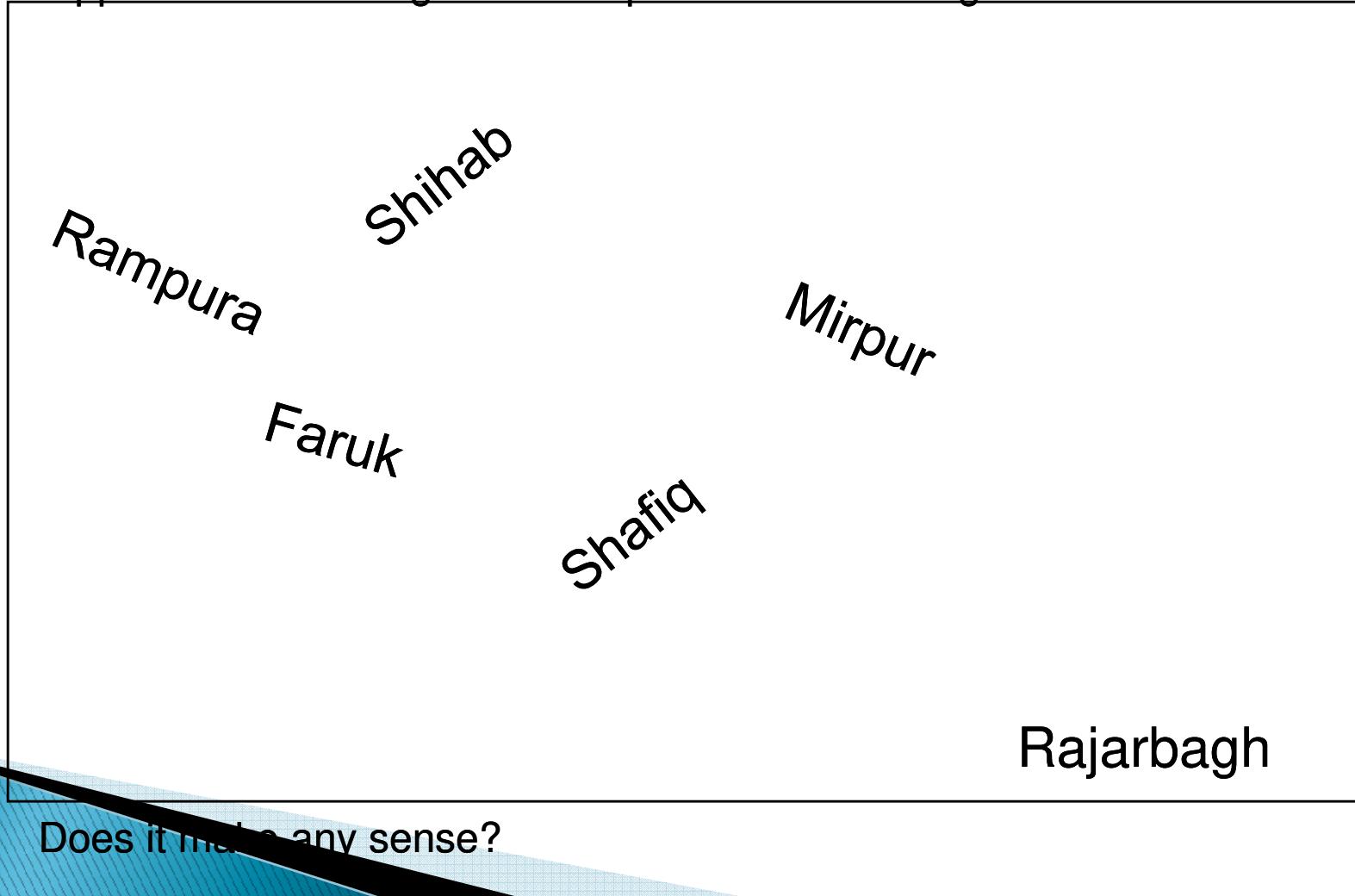
The Computer Defined

- ▶ A computer is an electronic device that process data, converting it into information that is useful for people.
- ▶ Key components of the definition:
 - Electronic device
 - Converts data into information
- ▶ Consider following situation:
Shihab was told to give a report to his teacher regarding the different areas students of his class living.

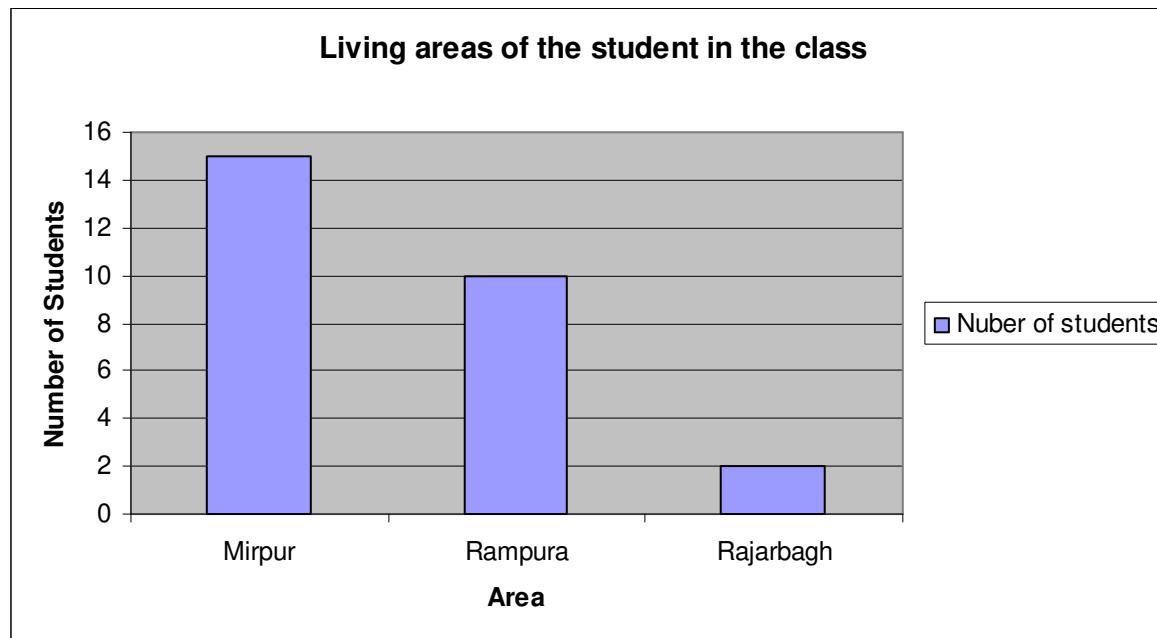


Data and information

Suppose shihab has given the report in the following manner:

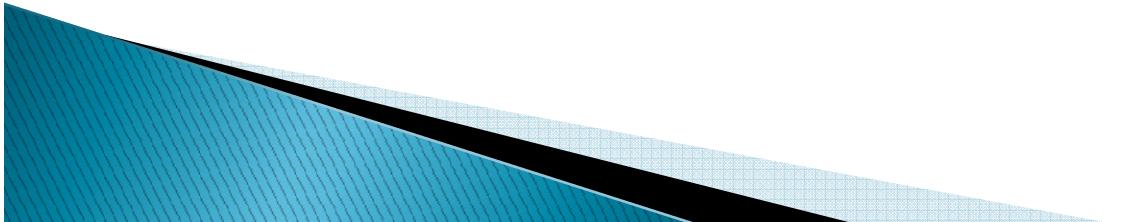


Data and Information



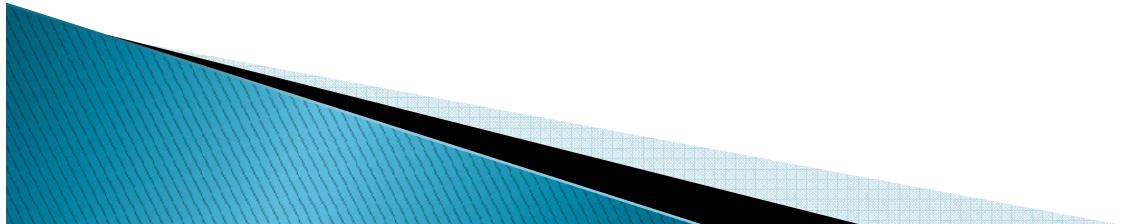
Data

- ▶ Data consists of individual facts or pieces of information that by themselves may not make much sense to a person.
- ▶ Data are essentially raw, unorganized facts. Almost any kind of fact or set of facts can become computer data: a letter, text and pictures, a budget, a colorful graph etc.
- ▶ Data can exist in many forms. Common types of data for computer: text, graphics, audio and the video data



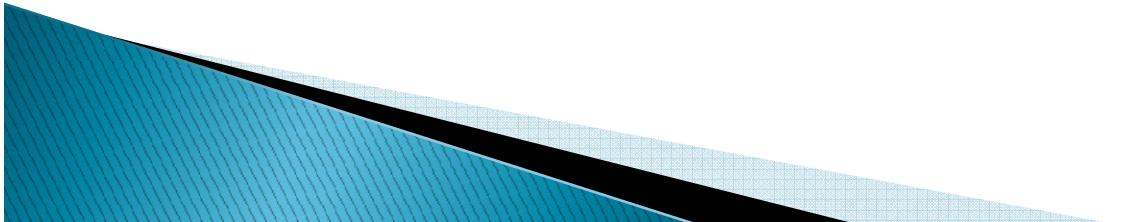
Information

- ▶ **Information** is data that has been processed in such a way as to be meaningful to the person who receives it.



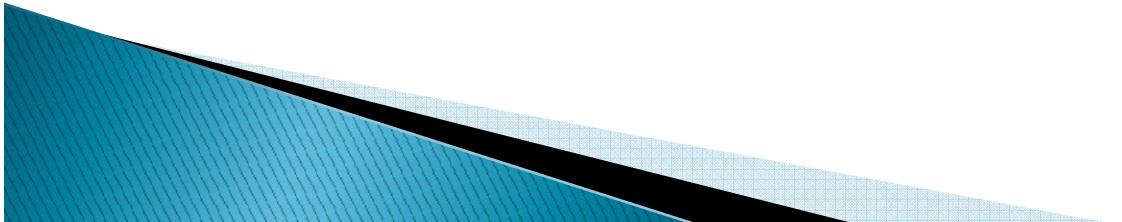
Data and Information

- ▶ All the information is data but all the data is not information.
- ▶ The difference between data and information lies in the word *meaningful*.
- ▶ Information is a relative term; it identifies something that has significance to a specific person in a specific situation.
- ▶ So, one must not assume that there is always a clear distinction between data and information.



Data processing

- ▶ We don't need a computer to process data.
- ▶ Anyone can go thorough an employee file and make a list of people earning a certain salary.
- ▶ But this would take a lot of time. (if there is 1000 employee!)
- ▶ Conversion of data into information is called *information processing*.



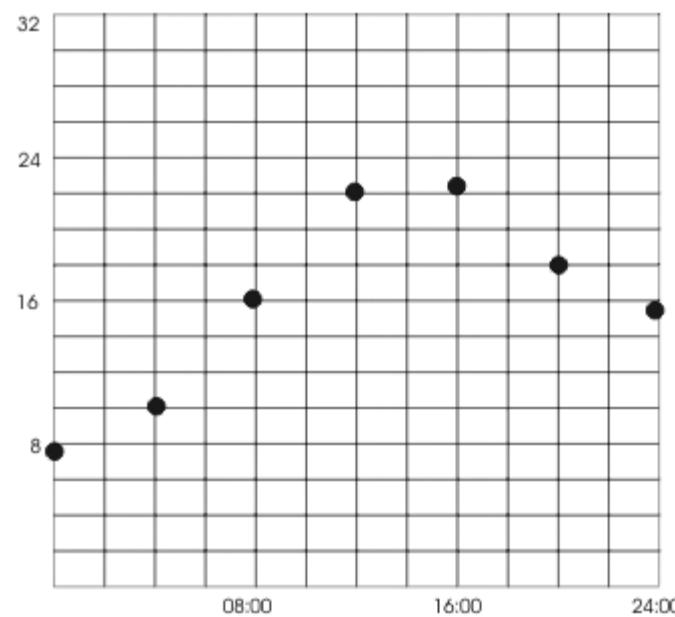
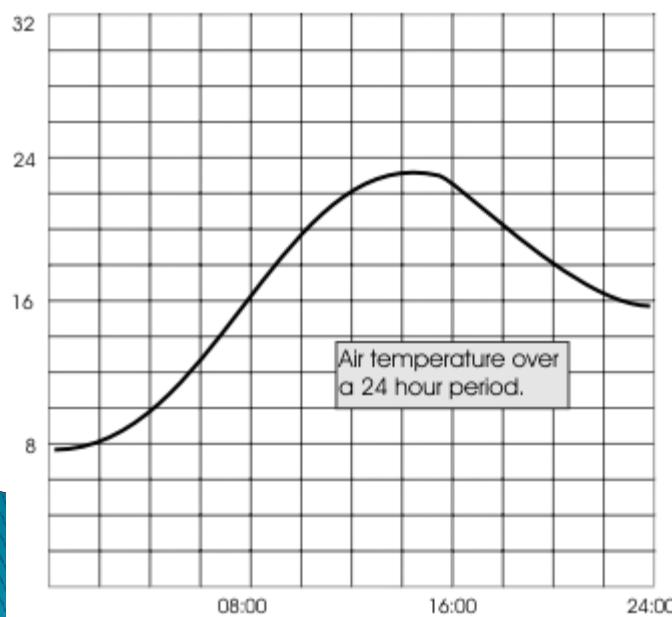
Digital and Analog Data

- ▶ Analog data is real world stuff like sounds, electrical currents, paintings, temperatures, time.
- ▶ It has no precisely measurable or discrete value – we measure to the accuracy of our recording instruments.
- A range of values made data.



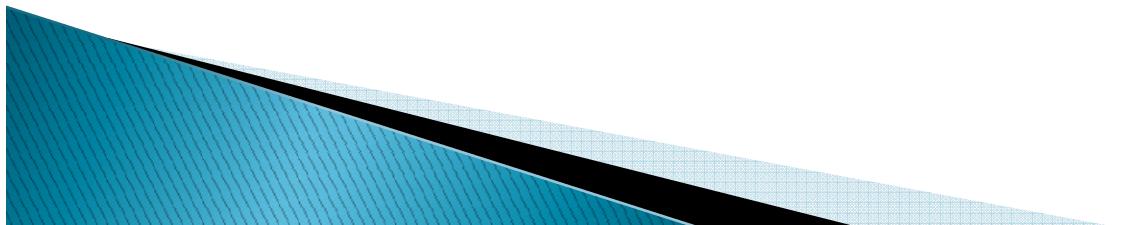
Digital and Analog Data

- ▶ Digital data, on the other hand is discrete.
- ▶ When sounds are digitised they must be stored as discrete values representing the pitch, volume, duration and other qualities of the sound.



Digital and Analog Data

- ▶ Computers can only work with digital data.
- ▶ To convert analog data to digital data, the analog data has to be sampled and then converted to an approximate value.



Processes, Procedures, Computers

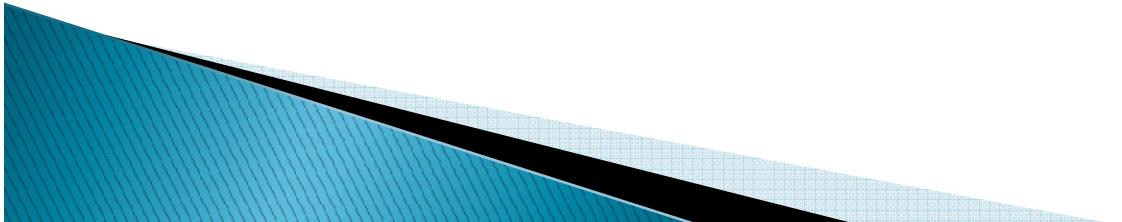
- ▶ A process is a sequence of steps.
 - Each step changes the state of the world in some small way, and the result of all the steps produces some goal state. For example, baking a cake
- ▶ A procedure is a description of a process.
 - A simple process can be described just by listing the steps.
- ▶ A procedure that can be followed without any thought is called a mechanical procedure.
- ▶ An **algorithm** is a mechanical procedure that is guaranteed to eventually finish.

(Read more about it in “Introduction to Computing”
by David Evans (University of Virginia))



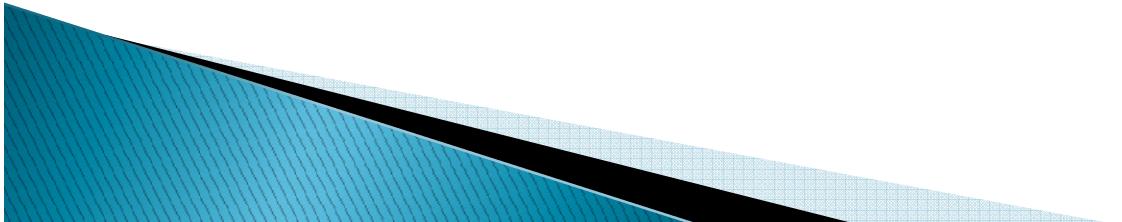
Processes, Procedures, Computers

- ▶ A computer is a machine that can:
 1. Accept input. Input could be entered by a human typing at a keyboard, received over a network, or provided automatically by sensors attached to the computer.
 2. Execute a mechanical procedure, that is, a procedure where each step can be executed without any thought.
 3. Produce output. Output could be data displayed to a human, but it could also be anything that effects the world outside the computer such as electrical signals that control how a device operates



Information Systems

- ▶ An information system is a complete interconnected environment in which raw data—quantifiable facts and figures—is turned into useful information.



Parts of Information Systems

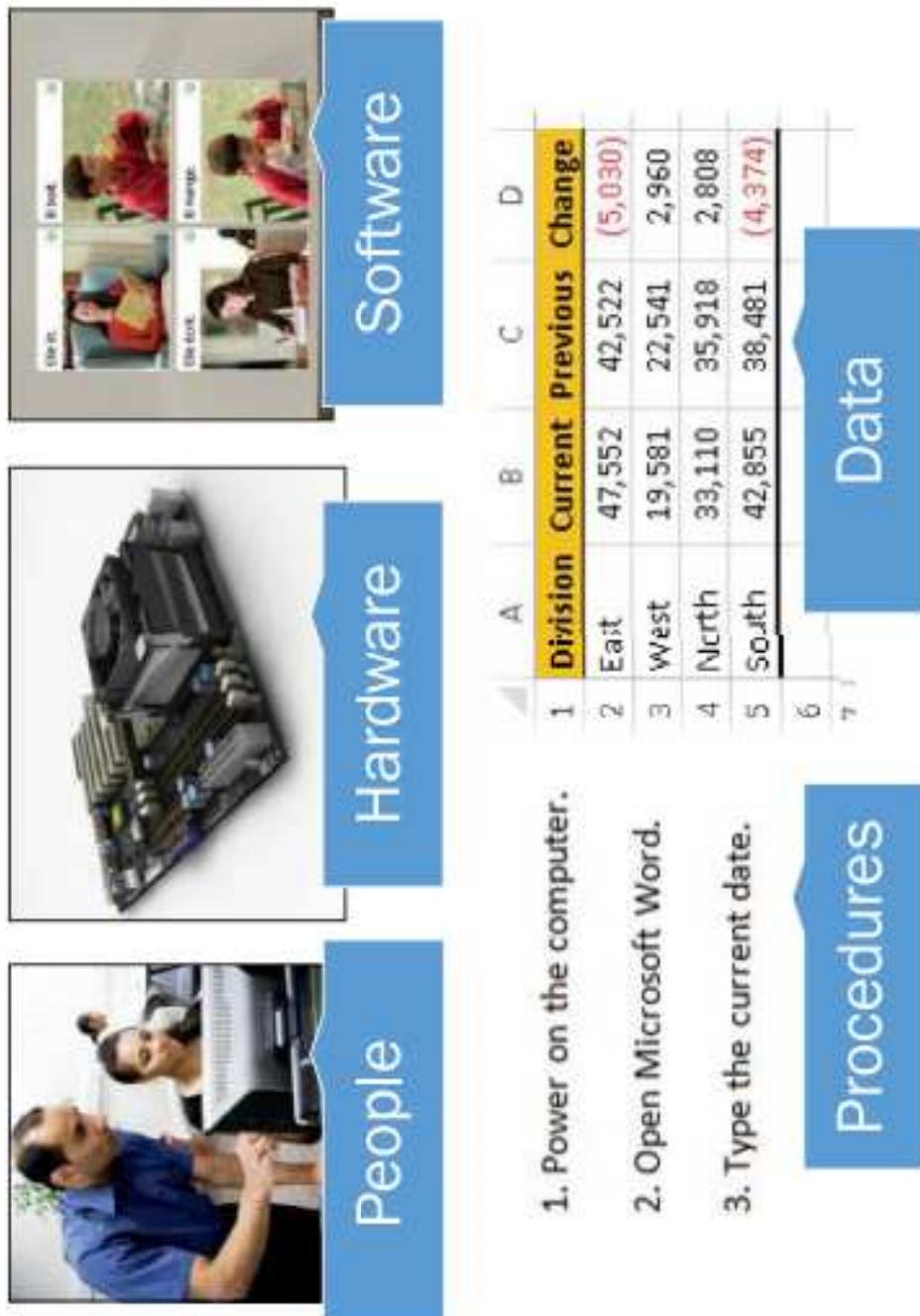
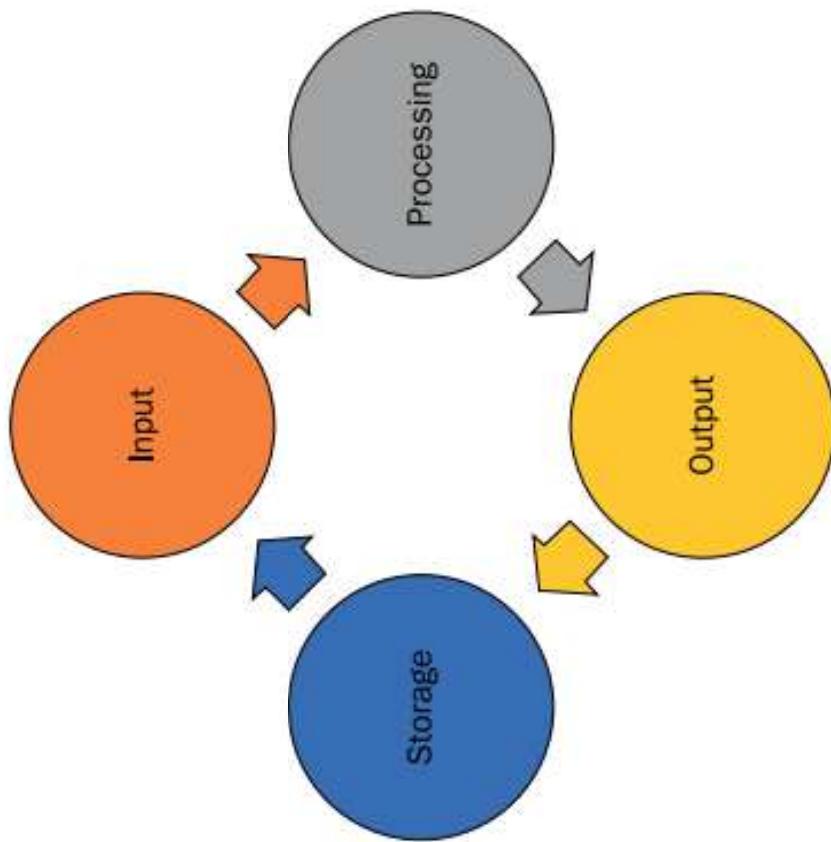


Figure 1.1 An information system involves these five components.

Computer System Components



The information processing cycle.

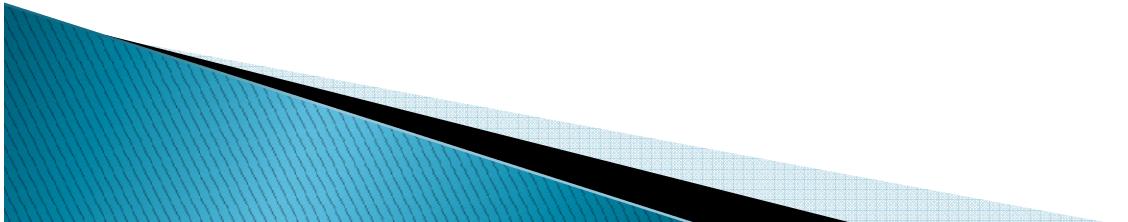
Computer System Components

- ▶ **Input:** Components that help humans put data into the computer. Examples include a keyboard, mouse, and touch screen.
- ▶ **Processing:** Components that move and process the data inside the computer. The motherboard and its processor and memory chips fall into this category.
- ▶ **Output:** Components that provide the results of the processing to humans. The monitor is the primary output device; other examples include printers and speakers.
- ▶ **Storage:** Components that store software and data until it is needed. Storage components include hard drives, USB flash drives, and DVDs.



Types of computers

- ▶ Computers exist in a wide range of forms, and thousands of computers are hidden in devices we use every day but don't think of as computers such as cars, phones, TVs, microwave ovens, and access cards.
 - Personal Computer
 - Multi-user computer



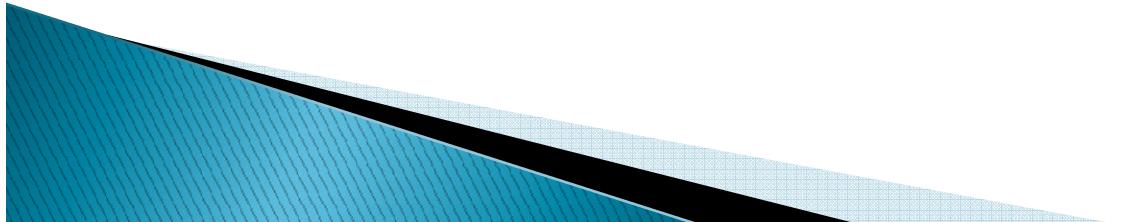
Desktop PC

- ▶ designed to be used at a desk, and seldom moved
- ▶ consists of a large metal box called a system unit that contains most of the essential components



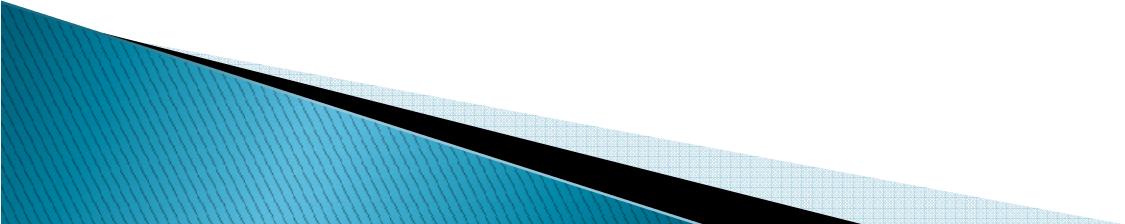
Notebook PC

- ▶ portable computer designed to fold up
- ▶ built-in screen, keyboard, and pointing device
- ▶ Netbook (internet book)



Tablet PC

- ▶ portable computer that consists of a touch-sensitive display
- ▶ No keyboard
- ▶ software-based keyboard pops up onscreen when needed



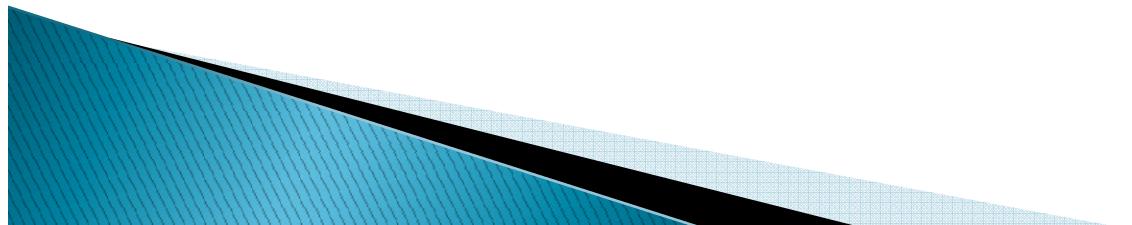
Smartphone

- ▶ A mobile phone that have a touch-sensitive screen, and provide voice calls, text messaging, and Internet access.
- ▶ GPS is a device that determines current position by communicating with an orbiting satellite and provides maps and driving directions.



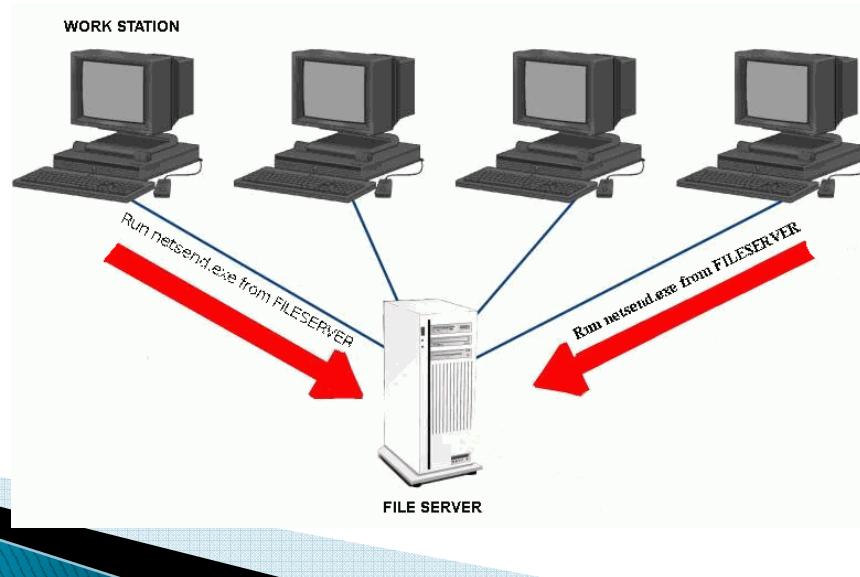
Multi user computer

- ▶ Server
- ▶ Mainframe
- ▶ Supercomputer



Server

- ▶ A computer dedicated to serving and supporting a network, a group of network users, and/or their information needs.
- ▶ It performs network tasks such as managing files, printers, or email for multiple users.
- ▶ Server farm or server cluster



Mainframe

- ▶ A large and powerful computer capable of processing and storing large amounts of business data.

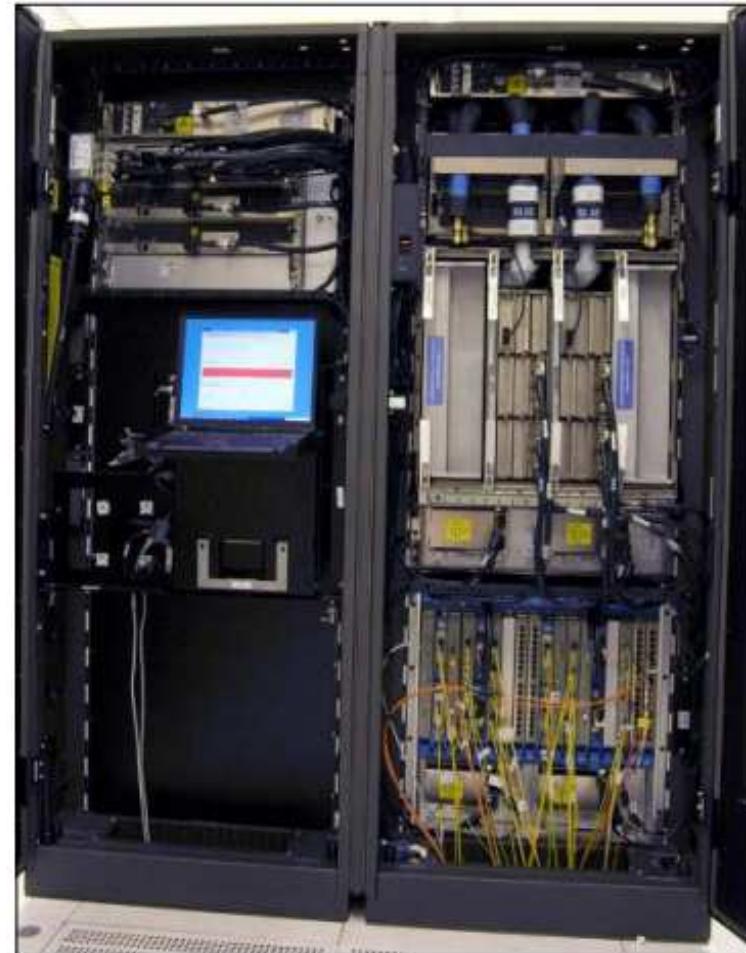


Figure 1.6 A mainframe is a powerful business computer system that can receive and process data from many sources at once.

First computer of Bangladesh

- ▶ The first computer in Bangladesh (erstwhile East Pakistan) was installed at the atomic energy centre, Dhaka of Pakistan Atomic Energy Commission in 1964. It was an IBM **Mainframe Computer** of 1620 series. The main use of the machine was resolving complicated mathematical calculations in different research works.

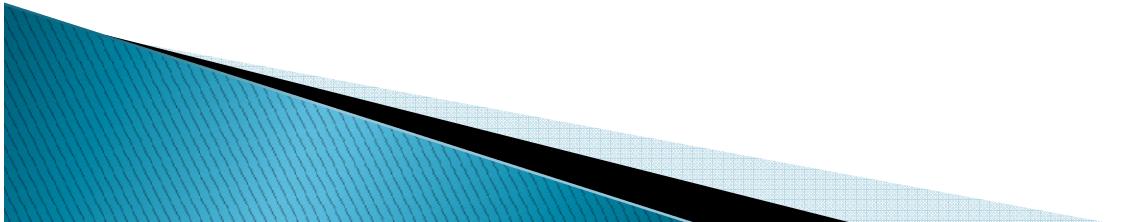


Supercomputers

- ▶ The most powerful computers in terms of performance and data processing are the Supercomputers.
- ▶ These are high capacity, specialized and task specific machines with hundreds of thousands of processors that can perform trillions of operations per second.
- ▶ It is used for the processing of enormous volumes of data. These computers are used by large high-tech academic, governmental, and scientific research facilities.

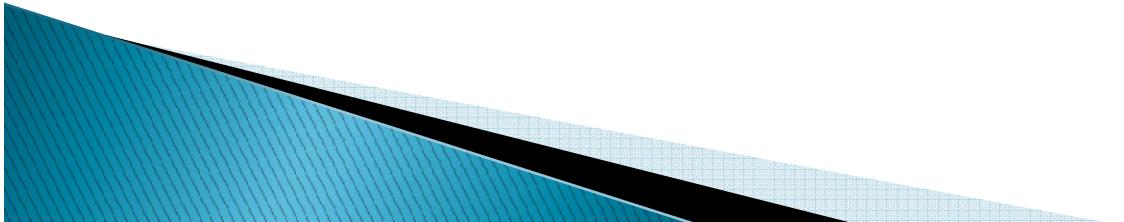
Supercomputer

- ▶ Recently it is used for business purpose also, for example: sifting demographic marketing information and for creating film animation.
- ▶ The supercomputers are very expensive and very large in size. It can be accommodated in large air-conditioned rooms; some super computers can span an entire building.



Supercomputer

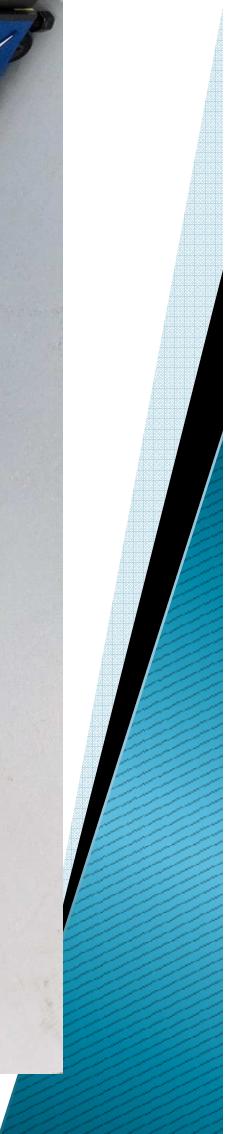
- ▶ For example, NASA uses supercomputers for launching space shuttles, controlling them and for space exploration purpose. It is also used for sifting demographic marketing information and for creating film animation
- ▶ The supercomputers are very expensive and very large in size. It can be accommodated in large air-conditioned rooms; some super computers can span an entire building.



Fastest supercomputer

- ▶ Currently (till November 2018) the fastest supercomputer in the world is IBM's Summit with a peak performance of 200 petaflops, or 200,000 trillion calculations per second.
- ▶ The complete list of Top 500 Supercomputers in the world can be viewed from the website [top500.org](https://www.top500.org/lists/2018/11/).
- ▶ <https://www.top500.org/lists/2018/11/>

Fastest supercomputer



Lecture 1

End of Lecture

