Introduction to Computing

Lecture 1

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Welcome

Who am I? Dr. Naveed Anwar Bhatti

Hometown: Islamabad

Last Job:
Senior Researcher
RISE, Stockholm, Sweden
Joined on April, 2018
ERCIM Post-Doc (April, 2018 – Sep, 2019)

Education:

PhD 2018
Computer Science
Politecnico di Milano, Italy
System Support for Transiently Powered Embedded Systems

MS 2013
Computer Science
FAST-NUCES, Islamabad, Pakistan
Long range RFID System: Decoupling sensing and energy in sensor networks using energy transferenc

BS 2011
Telecom
FAST-NUCES, Islamabad, Pakistan
Internet Controlled Unmanned Ground Vehicle

How to reach me?

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Lectures available here:
naveedanwarbhatti.github.io/ITC.html

Your Turn

Course Objectives: Why are you here?

- Introduction

  Week 1-2

- Data Storage

  Week 3-5

- Data Processing

  Week 6-7

- Application and Classification of Computers
- Basic Components of Computer
- Input/Output Devices
- Mass Storage Devices
- Ports, Buses and Expansion Slots

- Data Organization
- Data Representation
- Physical and Logical Storage
- Magnetic Storage Devices
- Optical Storage Devices

- Data Structures
- Flow Charts
- Process Flow Diagram

Course Objectives: Why are you here?

- Introduction

  Week 1

  - Introduction to IT
  - Application of Computers
  - Classification of Computers

- Number System

  Week 2-3

  - Decimal System
  - Binary System
  - Octal System
  - Hexadecimal System
  - Digit and Positions
  - Bits, Bytes & Words
  - Conversions
  - Negative Numbers

Course Objectives: Why are you here?

- Introduction to C++

  Week 4

  - Computer Languages
  - History of C and C++
  - Output
  - User Input
  - Identifiers
  - Data types
  - Basic arithmetic operators

- Arithmetic Expression

  Week 5

  - Mathematical Expressions
  - Type Conversion
  - Type Casting
  - Named Constants
  - Multiple Assignments and Combined Assignment

Course Objectives: Why are you here?

- Control Structures

  Week 6-9

  - If/else
  - Goto
  - Switch
  - Forloop
  - Do-While loop
  - Pass by copy
  - Overloaded Functions

- User Defined Functions

  Week 10-12

  - Function return types
  - Function parameters
  - Recursion
  - Pass by reference
  - Pass by copy
  - Overloaded Functions

Course Objectives: Why are you here?

- Arrays and Pointers

  Week 13-15

  - 1 – Dimensional Arrays
  - 2 – Dimensional Arrays
  - Address Of Operator ‘&’
  - Dereference Operator *
  - Pointer Arithmetic
  - Dynamic Allocation Of Arrays
  - "new“ vs “malloc” Operator
  - Buffer overflow problem

Administrivia and more

- **Pre-requisite**
  - Willingness to work hard!
  - Initiative (very little spoon feeding)

- **Easy Course with fair marking**

Administrivia and more

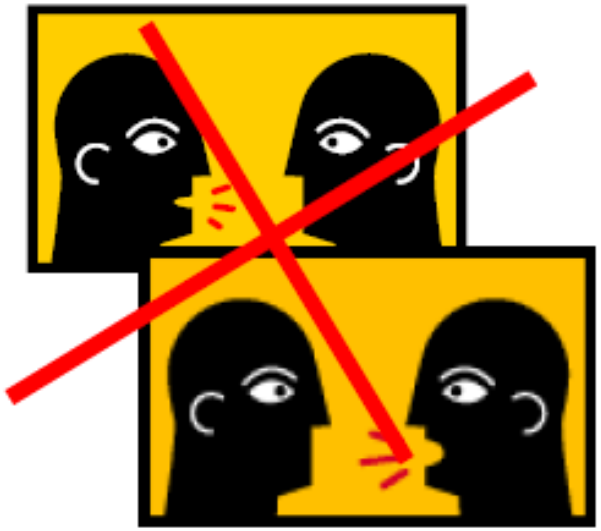
- **Grading split**

  - Assignments: 5%
  - Quizzes: 5% (start of class, <4 min long)
  - Always bring paper and pen to class
  - Midterm Exam: 30%
  - Final Exam: 40%
  - Lab: 20%

Academic integrity

- **Vital to building trust!**
  - Both in you and the university
- **Very serious consequences**
  - In assignment/project will result in a **direct F grade**
  - Code will be checked for similarity
- **A serious offence**
  - Offensive on both religious and secular levels

Prohibitions



Class Attendance and Late arrival

- **University and HEC cares about it**
  - **I do not !**
  - I shall say you are present as long as you tell me before class
  - If you are not serious about the course, its your loss
    - Both money wise
    - And grade wise (quizzes and exams)

- **If you arrive late**
  - Be discrete (come in with minimal fanfare)
  - Be courteous (to other students trying to listen)

Late submission policy

- **One Assignment can be submitted late**

  - Total of 72 hrs late submission allowed
  - Any thing greater means your assignment is rejected
  - Choose your late submission carefully.

Information Technology & Your Life

What is IT?

"Information technology (IT) is a general term that describes any technology that helps to produce, manipulate, store, communicate, and/or disseminate information"

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COMPUTER TECHNOLOGY

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COMPUTER TECHNOLOGY

COMMUNICATION TECHNOLOGY

What is IT?

COMPUTER TECHNOLOGY

A computer is a programmable, multiuse machine that **accepts data—raw facts and figures**—and **processes, or manipulates, it into information** we can use

COMMUNICATION TECHNOLOGY

Communications technology, also called telecommunications technology, consists of electromagnetic devices and systems for communicating over long distances

Applications of Computers

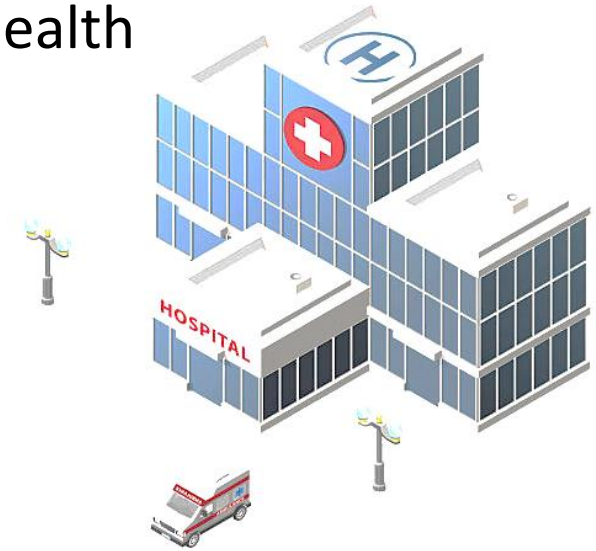
Application of Computers?

Computers have become indispensable part of our lives

Application of Computers?

Government

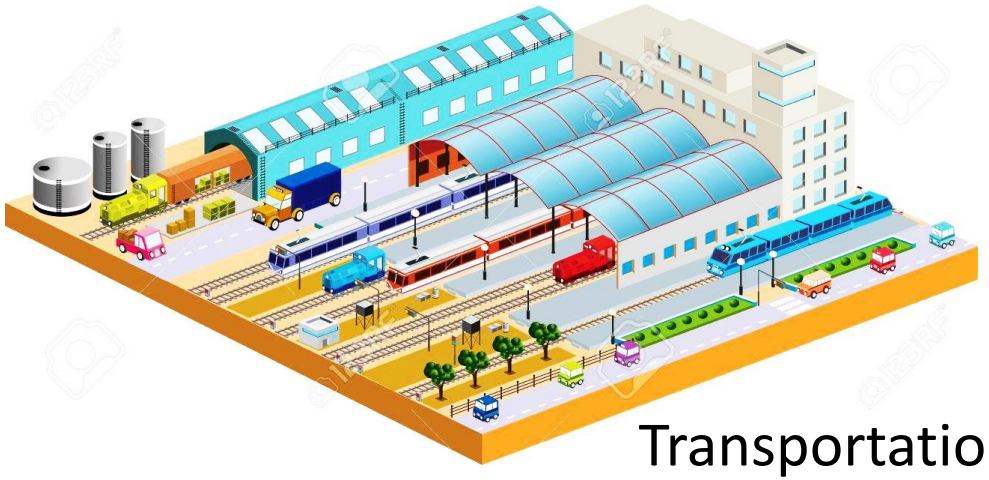
Health



Bank

Applications of Computers

Education



Transportation

Application of Computers?

Health: High Tech for Wellness

1. **Telemedicine:** medical care delivered via telecommunications
2. **Robots:** automatic devices that perform functions ordinarily
3. **Artificial Intelligence:** better diagnosis of disease
4. **Fitness Bands**

Application of Computers?

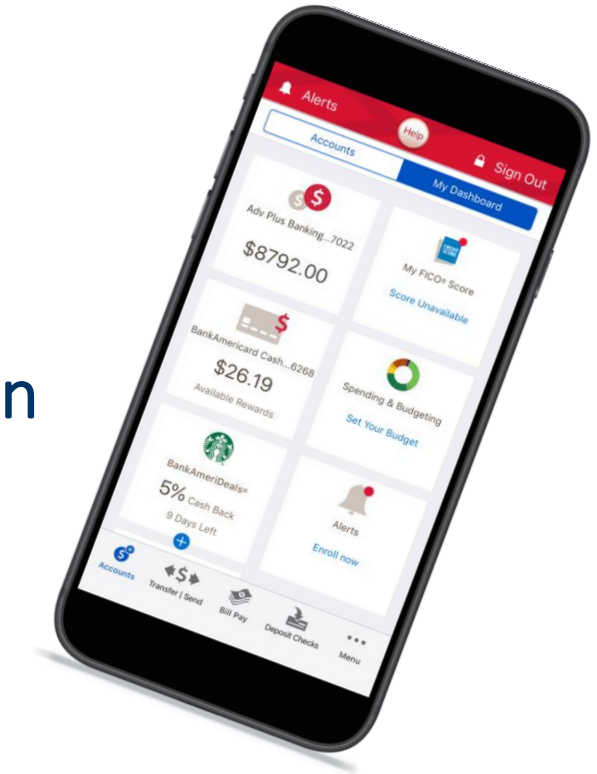
Education:

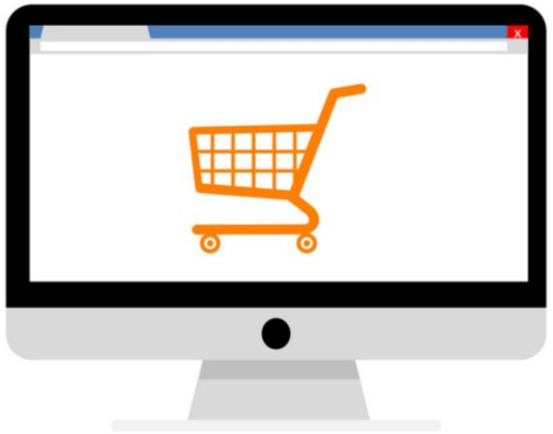
1. **Interactive tools:** digital boards, presentations, etc.
2. **e-learning:** bringing courses to high school students in remote towns, through teachers in other parts of the country
3. **Course-management software:** reduce the teacher's workload and automate many tasks

Application of Computers?

Banking

1. To transfer money
2. To access account information
3. Withdraw money from ATM
4. Online Shopping
5. Crypto Currency





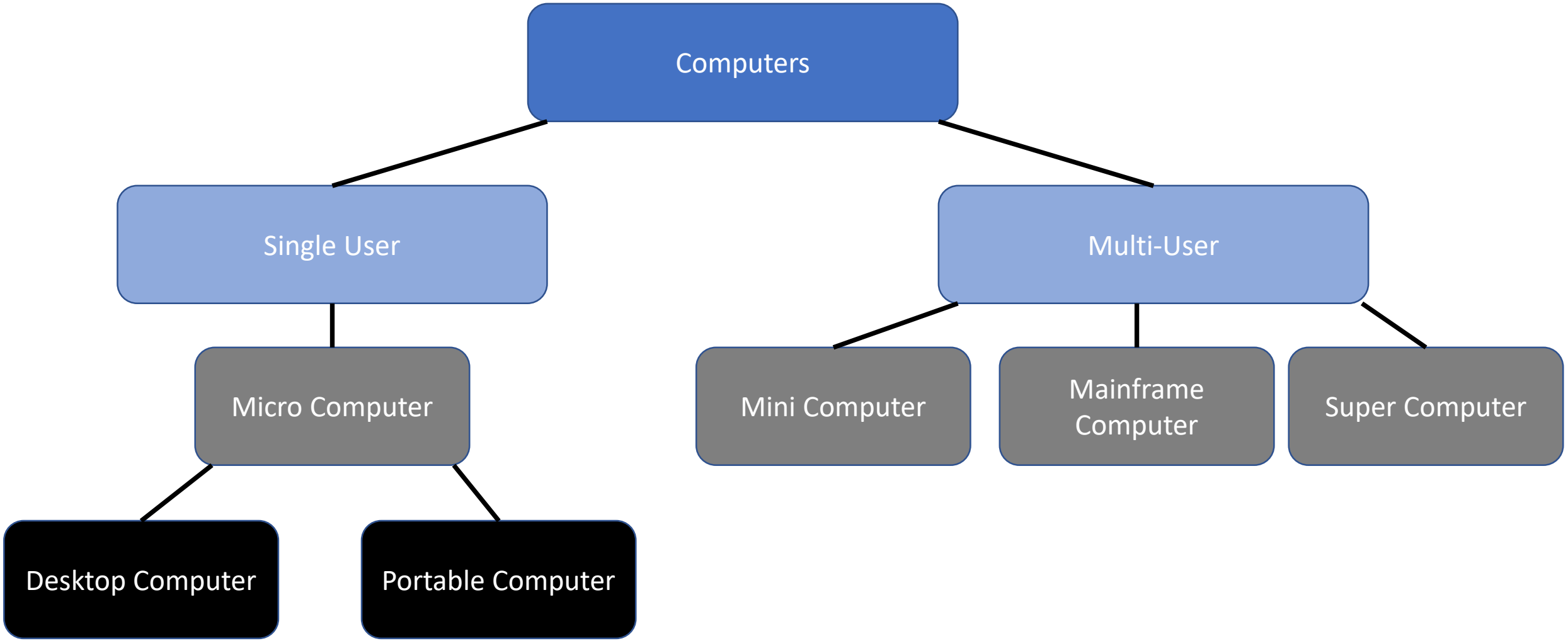
Application of Computers?

Leisure: Infotech in Entertainment & the Arts

Government & Electronic Democracy:

Jobs & Careers

Classification of Computers



Microcomputers

Desktop Computer

1. Sits on desks, rarely moved, large and bulky
2. Memory capacity, graphics capacity and software availability vary from one computer to another
3. Used both for business and home applications

Workstations

1. More power and features than a desktop!
2. Popular among scientists, animators, engineers, graphic designers, etc.

Portable PC

1. Can be moved easily from place to place
2. Weight may vary
3. Small size, Low cost, low computing power
4. Widely used by students, reporters, etc. for personal applications

Computers for Organizations

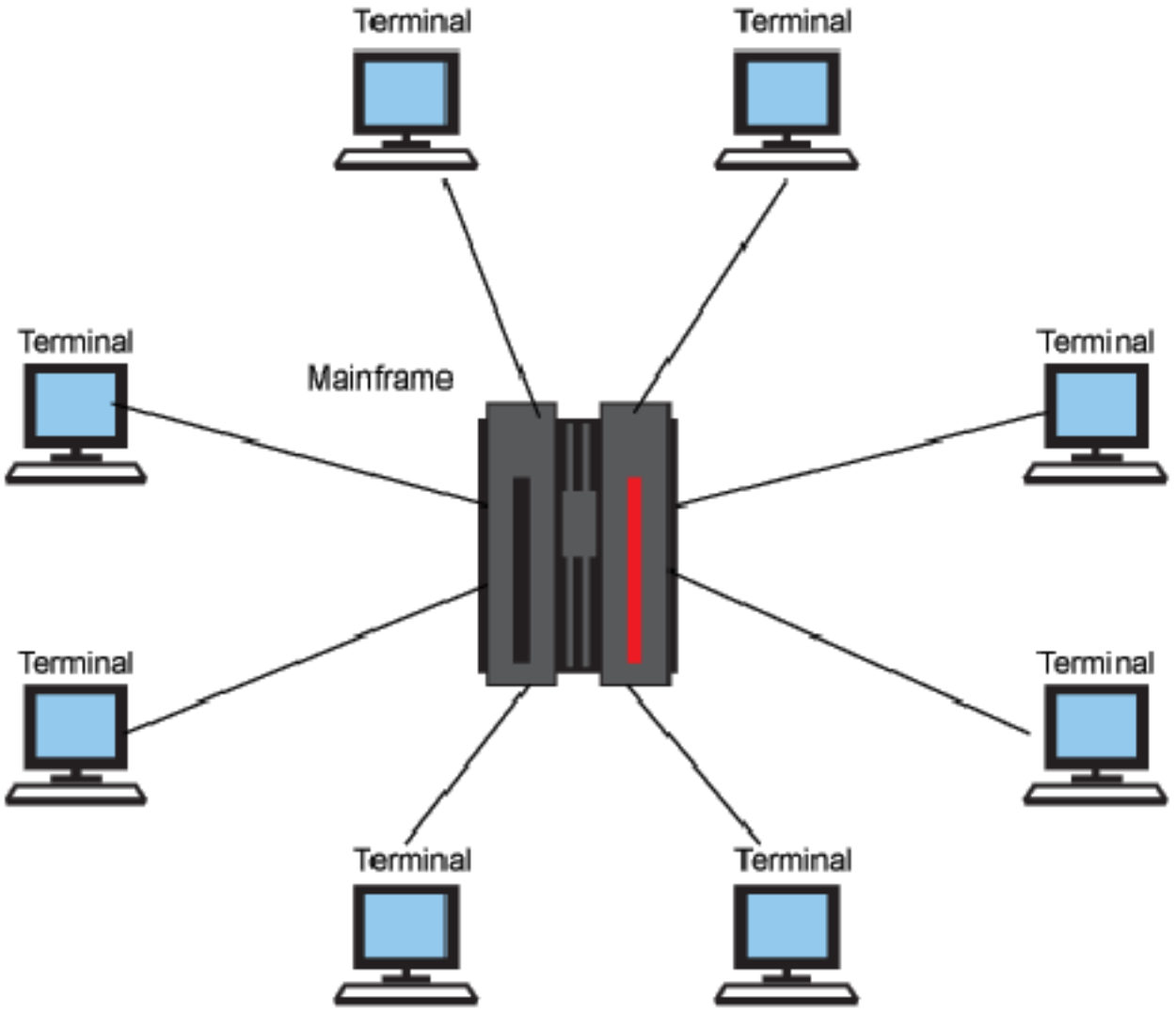
Computers for Organizations

Mainframe

1. Known as enterprise servers
2. Occupies entire rooms or floors
3. Used for centralized computing
4. Large, fast and expensive computer
5. Support a few hundred users simultaneously (Multi-Users)
6. More computing power
7. Have to be kept in a special air-conditioned room
8. Used in big business organizations and government departments where many people frequently need to use same data

Computers for Organizations

Mainframe



Computers for Organizations

Areas where mainframes are used

1. Airline reservation
2. Big banks with hundreds of branches located all over the world
3. Big universities with thousands of enrollment
4. Natural gas and oil exploration companies
5. Space Vehicle control
6. Animated Cartoon

Computers for Organizations

Minicomputers

1. Computing power lies between microcomputer and mainframe computer
2. Bigger size than PCs
3. Expensive than PCs
4. Multi-User
5. Difficult to use
6. More computing power than PCs
7. Used by medium sized business organizations, colleges, libraries and banks

Areas where minicomputers are used

1. Control of Automated Teller Machine (ATMs)
2. Payroll
3. Hospital patient's registration
4. Inventory Control for supermarket
5. Insurance claims processing
6. Small bank accounting and customer details tracking

Computers for Organizations

Supercomputer

1. Fastest and expensive
2. Used by applications for molecular chemistry, nuclear research, weather reports and advanced physics
3. Consists of several computers that work in parallel as a single system
4. Handle large and complex calculations
5. Process trillions of operations per second
6. Found in big research organizations

Computers for Organizations

USA

Mira

- IBM's
- 8.6 petaflops
- 786,000 core processors

JAPAN

K Computer

- Fujitsu's
- 10.5 petaflops petaflops
- 1.6 million core processors

USA

Sequoia

- IBM's
- 17.2 petaflops
- 1.9 million core processors

USA

Titan

- NVIDIA GPUs
- 17.6 petaflops
- 2.1 million core processors

CHINA

Tianhe-2

- Intel
- 33.9 petaflops
- 3.12 million core processors

Thanks a lot

If you are taking a Nap, **wake up**.....Lecture Over