Unit 3

Algorithms

Part 2: Write Algorithms to Solve Mathematical Problems

Types of Computers

Computers exist in many places in modern life. There are many ways to classify the different types of computers. The following are categories into which computers are often organized. Note that some classifications may overlap with others.

Mobile Computers

Computers that are designed to be transported by a single person are considered mobile computers. Mobile computers have been around since the 1990's but exploded in the late 2000's with the proliferation of smartphones like the Apple iPhone. These computers are typically battery-dependent and less powerful than other types of computers in exchange for being easily portable.

Examples: Smartphones, Tablets, Smartwatches, Laptops

Non-Mobile Computers

Computers that are not mobile computers can be classified as non-mobile computers. These computers sacrifice portability for greatly increased computational power. The first computers were non-mobile computers—the were the size of entire rooms.

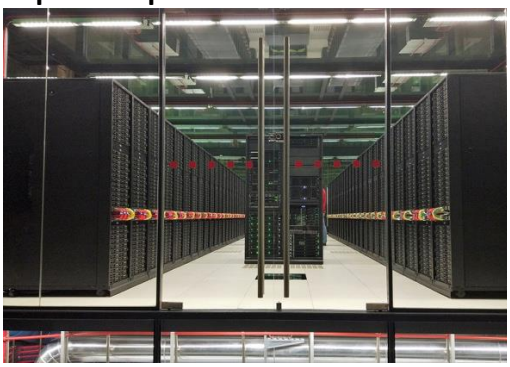
Examples: Desktops, Mainframes, Supercomputers

Embedded Computers

Embedded computers are computers that are integrated with larger devices such as cars or manufacturing equipment. They often serve a single function that helps control the operation of the larger device.

Examples: Cars with automatic transmissions, Guitar amplifiers, Appliance control panels

Super Computers



Super computers trade size and power consumption for raw computing power. They are often the size of several rooms and consume much more power than the average household. These computers are typically only owned and operated by large corporations like Google or governments organizations. Super computers are often made by connecting many thousands of regular computing units together in a parallel fashion. These computers are often used for highly specialized research.

Examples: Sunway TaihuLight, IBM Sequoia, Nvidia DGX SaturnV

Unique Features of Embedded Computers

Embedded computers are unique in that their applications are more highly specialized than all other types of computers mentioned. You cannot download apps onto them, browse the web, check email, or, in many cases, interface directly with them at all. Some key unique features of embedded computers are listen below.

- **Highly Specialized Purpose**
  As previously mentioned, embedded computers are deployed with a very specialized purpose. Whereas smartphones and desktops are designed to run a wide gamut of user applications from web browsers to word processors, embedded computers do only a few specific things.

  Take, for example, the computer that controls an automatic car's transmission. Its sole purpose is to monitor how much pressure you put on the gas pedal, the speed the car is going, the gear the car is currently in, and shift gears for you accordingly.

  Consider an embedded computer in the front panel of an air conditioner. Its sole purpose is to allow you to change settings on the air conditioner and control the air conditioner accordingly.

- **Small Computing Power**
  Because their purposes are so highly specialized, embedded computers do not need to be nearly as powerful as most computers. A modern desktop computer is many orders of magnitude more powerful than an embedded computer that controls an air conditioner.

  Many embedded systems come in the form of a microchip no larger than a quarter. Additionally, embedded systems are often inexpensive compared to more powerful computers. This allows manufacturers to keep the cost of their devices low.

- **Very Minimal User Interface**
  Embedded computers seek to only have as much user interface as necessary. The buttons on the control panels of appliances are often as complicated as it gets. Whereas manufacturers of smartphones spend many millions of dollars designing user interfaces for their devices, embedded computers only interface with users through simple sensors like buttons, gas pedals, or motion sensors.

- **Small Amount of Storage**
  Embedded computers often only store one program and run that program 24/7. There is no need for an operating system because there is no application software. Any data that needs to be stored is passed off to more powerful computers with large storage devices.