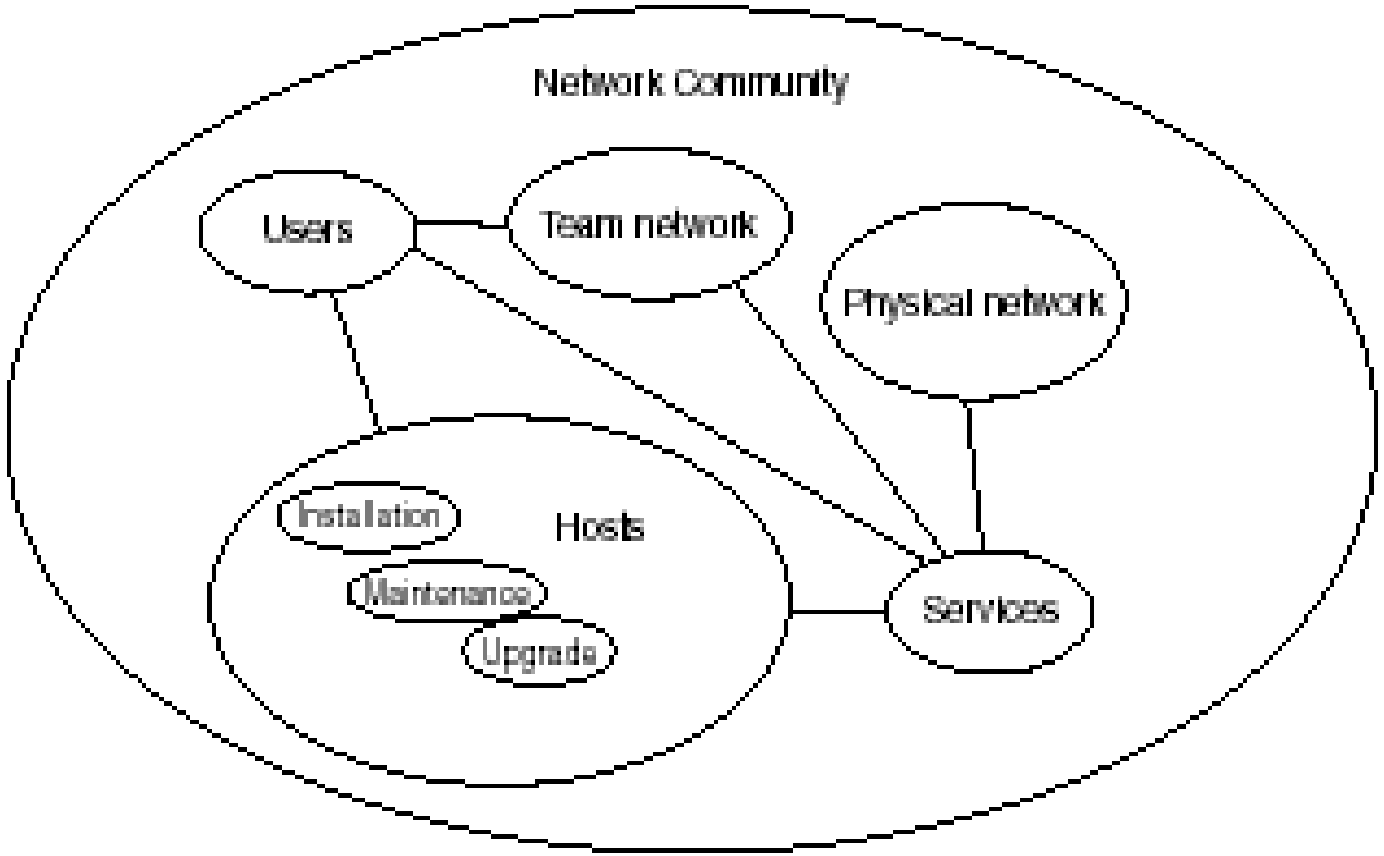
Lecture 2#

System Components and there Managements
Operating System : Windows and UNIX variants

System Components and there Managements

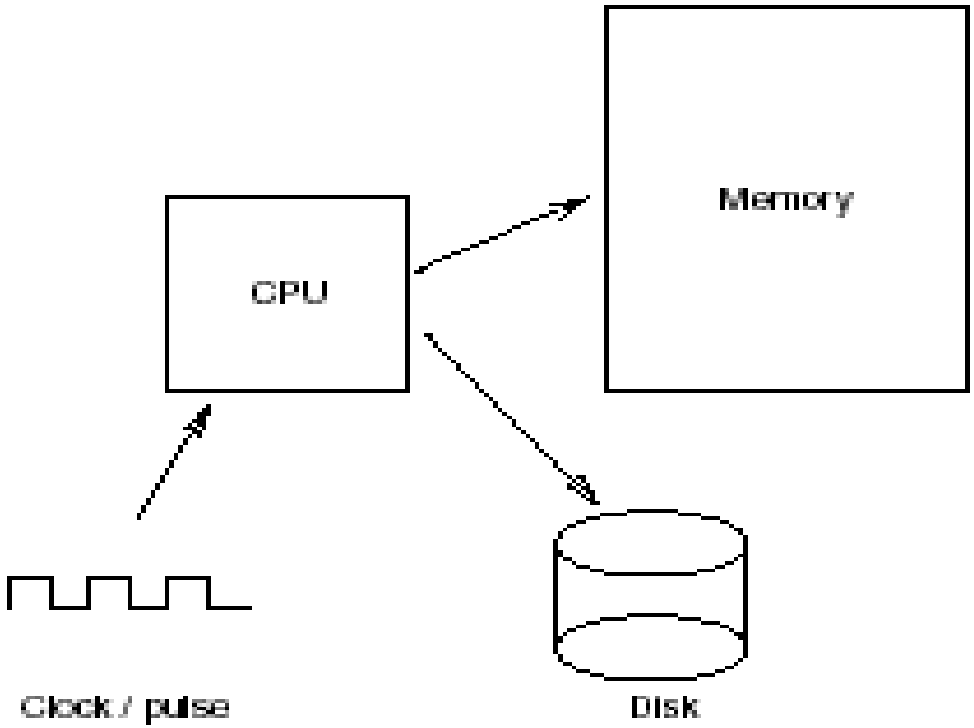
- **1.1 What is ‘the system’?**
- In system administration, the word system is used to refer both to the operating system of a computer and often, collectively the set of all computers that cooperate in a network. If we look at computer systems analytically, we would speak more precisely about human–computer systems:
- **Definition 1 (human–computer system).** An organized collaboration between humans and computers to solve a problem or provide a service. Although computers are deterministic, humans are non-deterministic, so human–computer systems are non-deterministic.

- **1.1.1 Network infrastructure**
- There are three main components in a human–computer system (see figure below)
- **Humans:** who use and run the fixed infrastructure, and cause most problems.
- Host computers: computer devices that run software. These might be in a fixed location, or mobile devices.
- Network hardware: This covers a variety of specialized devices including the following key components:
- Dedicated computing devices that direct traffic around the Internet. Routers talk at the IP address level, or ‘layer 3’, by simple speaking.
- **Switches:** fixed hardware devices that direct traffic around local area networks. Switches talk at the level of Ethernet or ‘layer 2’ protocols.
- **Cables:** There are many types of cable that interconnect devices: .fiber optic cables, twisted pair cables, null-modem cables etc.


Network Community
Users
Team network
Physical network
Hosts
Installation
Maintenance
Upgrade
Services

- **1.1.2 Computers**
- All contemporary computers in common use are based on the Eckert–Mauchly–von Neumann architecture as shown in figure below
- Each computer has a clock which drives a central processor unit (CPU), a random access memory (RAM) and an array of other devices, such as disk drives. In order to make these parts work together, the CPU is designed to run programs which can read and write to hardware devices.
- The most important program is the operating system kernel. On top of this are software layers that provide working abstractions for programmers and users. These consist of files, processes and services. Part of ‘the system’ refers to the network devices that carry messages from computer to computer, including the cables themselves. Finally, the system refers to all of these parts and levels working together

- Figure: The basic elements of the von Neumann architecture



- **1.2 Handling hardware**
- To be a system administrator it is important to have a basic appreciation of the frailties and procedures surrounding hardware.
- All electronic equipment should be treated as highly fragile and easily damaged, regardless of how sturdy it is.
- Never insert or remove power cords from equipment without ensuring that it is switched off.
- Take care when inserting multi-pin connectors that the pins are oriented the right way up and that no pins are bent on insertion

- **1) Read instructions:** When dealing with hardware, one should always look for and read instructions in a manual.
- Interfaces and connectors: Hardware is often connected to an interface by a cable or connector. Obtaining the correct cable is of vital importance.
- **2) Handling components:** Modern day CMOS chips work at low voltages (typically 5 volts or lower). Standing on the floor with insulating shoes, you can pick up a static electric charge of several thousand volts. Such a charge can instantly destroy computer chips. Before touching any computer components, earth yourself by touching the metal casing of the computer. If you are installing equipment inside a computer, wear a conductive wrist strap.

- **3) Disks:** Disk technology has been improving steadily for two decades. The most common disk types, in the workplace, fall into two families: ATA (formerly IDE) and SCSI.
- **4) Memory:** Memory chips are sold on small pluggable boards. They are sold in different sizes and with different speeds. A computer has a number of slots where they can be installed. When buying and installing RAM, remember
- The physical size of memory plug-in is important. Not all of them fit into all sockets.
- Memory is sold in units with different capacities and data rates. One must find out what size can be used in a system.

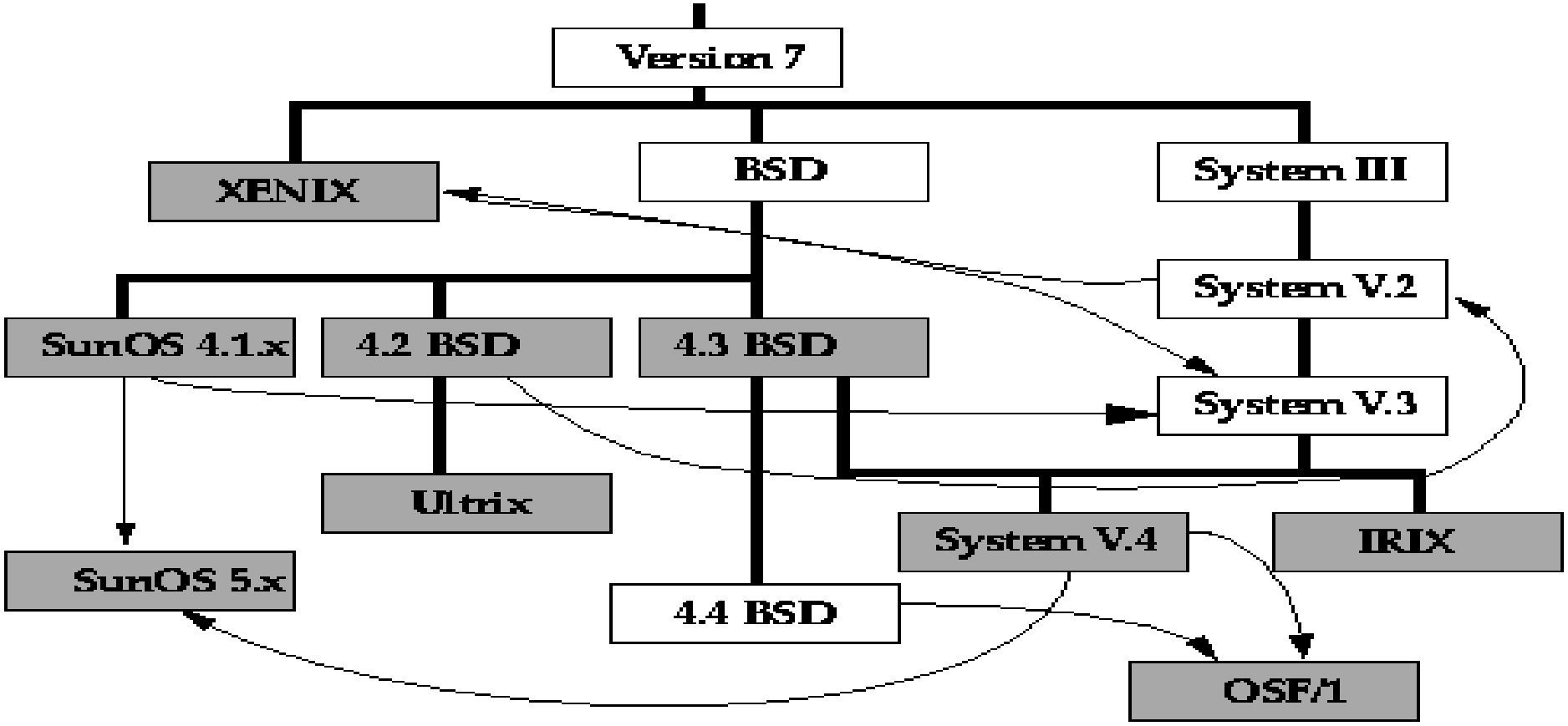
- **5) Lightning:** strikes can destroy fragile equipment. No fuse will protect hardware from a lightning strike. Transistors and CMOS chips burn out much faster than any fuse. Electronic spike protectors can help here, but nothing will protect against a direct strike.
- **6) Power:** failure can cause disk damage and loss of data. A UPS (uninterruptible power supply) can help.
- **7) Heat**: Blazing summer heat or a poorly placed heater can cause systems to overheat and suddenly black out. One should not let the ambient temperature near a computer rise much above 25 degrees Centigrade. Increased temperature also increases noise levels that can reduce network capacities by a fraction of a percent. Heat can cause RAM to operate unpredictably and disks to misread/miswrite. Good ventilation is essential for computers and screens to avoid electrical faults.

- **8) Cold:** Sudden changes from hot to cold are just as bad. They can cause unpredictable changes in electrical properties of chips and cause systems to crash. In the long term, these changes could lead to cracks in the circuit boards and irreparable chip damage.
- **9) Humidity:** In times of very cold weather and very dry heat, the humidity falls to very low levels. At these times, the amount of static electricity builds up to quite high levels without dissipating. This can be a risk to electronic circuitry. Humans pick up charge just by walking around, which can destroy fragile circuitry. Paper sticks together causing paper crashes in laser printers. Too much humidity can lead to condensation and short circuits.

- **UNIX**
- UNIX is a powerful computer operating system originally developed at AT&T Bell Laboratories. It is very popular among the scientific, engineering, and academic communities due to its multi-user and multi-tasking environment, flexibility and portability, electronic mail and networking capabilities, and the numerous programming, text processing and scientific utilities available.

- **UNIX Layers**
- When you use UNIX, several layers of interaction are occurring between the computer hardware and
- you. The first layer is the *kernel* , which runs on the actual machine hardware and manages all interaction
- with the hardware. All *applications* and *commands* in UNIX interact with the kernel, rather than
- the hardware directly, and they make up the second layer. On top of the applications and commands is the command-interpreter program, the *shell* , which manages the interaction between you, your applications, and the available UNIX commands.

- **Unix Variants**



- **Major UNIX variants AIX 4.x**
- Digital Unix 3.x/4.x (originally named OSF/1)
- SunOS 4.1.4 (part of Solaris 1.2)
- SunOS 5.x (part of Solaris 2.x)
- Linux 2.x
- IRIX 5.x/6.x
- HP/UX 9.x/10.x
- Ultrix 4.3a/4.4