

## ITEC 1000

## Lecture 1:

- Network interface must conform to standard agreements known as **protocols**
- A **system** is a set of components that interact with one another and serve a common purpose or goal.
  - Abstract system – a product of a human mind (Social, theological, cultural systems are abstract systems)
  - Physical system – has material nature (material basis rather ideas and theoretical notions)
- A **component** is either an irreducible part or an aggregate of parts, also called a **subsystem**
- A system has a boundary, within which all its components are contained and which **establishes the limits of a system**, separating it from other systems
- **Input** is anything entering the system from the environment. **Output** is anything leaving the system crossing the boundary to the environment.
- **Negative feedback** is corrective feedback that helps maintain the system
- **Positive feedback** reinforces the operation of a system by causing it to continue its performance and activities without change
- System's Method and functions...
  - Decomposition – is the process of breaking down a system into its smaller components
  - Modularity – refers to dividing a system into chunks or modules of a relatively uniform size
  - Coupling – means that subsets are dependent on each other
  - Cohesion – extent to which a subsystem performs a single function
- **Information** – a description of a thing or process
- **Technology** – a set of tools with a common purpose
- **Information Technology** – a set of tools for managing descriptions of things or processes
- **Information system** – is a collection of interrelated components that collect, store, and provide as output the information needed to complete a business task
- Every system, in turn is part of a larger system called a **super system**.
- **Information System Components (IS)**
  - Hardware
  - Software
  - Inputs
  - Outputs
  - Data
  - People
  - Procedures
- **Data:** are raw facts
- **Information:** data organized in a form that humans can interpret
- **Data flow:** groups of data that move and flow through a system
- **Processing logic:** steps that transform the data and events that trigger these steps
- **Types of Information Systems:**
  - **Transaction processing system (TPS)** – capture and record information about the transactions that effect the organization
  - **Management information system (MIS)** – systems that take information captured by TPS and produce reports that management needs for planning and controlling the business
  - **Executive information system (EIS)** – provide information for executives to use in strategic planning
  - **Decision support system (DSS)** – allow a user to explore the impact of available options or decisions
  - **Expert systems (ES)** – replicate the decision-making process rather than manipulating information
  - **Communication support system (CSS)** – allow employees to communicate with each other and with customers and suppliers
  - **Office support system (OSS)** – help employees create and share documents, including reports, proposals and memos
- **Computer systems foundations:**
  - User
  - Programmer
  - System analyst
  - System administrator/manager
  - Web designer
- **Hardware** – physical mechanism (modem, network interface card {NIS})
- **Software** – application and systems instructions (established connections, controls the flow of data, directs data to the proper applications)
- **Data:** numeric, character, graphic
- **Communications:** data transport support – hardware and software
- **CPU** – ALU (Arithmetic/logic unit), CU (Control unit) and IU (Interface unit)
- **Memory** – primary storage (main, RAM)
- **Input/output devices** – monitor, keyboard, floppy/CD/DVD drives, speaker, printer, scanner, light pen, etc.
- **Bus** – a bundle of wires that carry signals and power between different components
- **Channels** – separate processor
- **Arithmetic/logic unit** – performs arithmetic and Boolean logic calculations
- **Control unit** – controls processing of instructions
- **Interface unit** – moves program instructions and data between the CPU and other hardware components
- Systems software programs that manage the computer are collectively known as **operating system (OS):** Windows, UNIX, Mac OS, MS-DOS
  - Software consists of programs that tell the computer what to do.
- **Protocols** - common ground rules of communication between computers, I/O devices and software programs
  - HTTP – between web server and web browser
  - TCP/IP – between computers on the internet and local area networks
  - ATAPI – between a CD-ROM and CPU
- **Standards** are agreements among interested parties, often manufacturers, to assure that various system components will work together interchangeably.

- Standards apply to many aspects of computing: **hardware, software, data, and communications; the voltage of a power supply; the physical spacing of pins on a connector, etc...**
- Ex: C++, Java, SQL, PostScript, MPEG-2, JPEG, GIF, ASCII, Unicode, VGA, RGB

**Lecture 2:**

- The **Base** of a number system – how many different digits (incl. zero) are used in the system
- **Bit** – a cell holding a single binary number (0 or 1)
- **Byte** – 8 bits (can hold  $2^8 = 256$  different patterns/ values)
- **1K** = 1024 bytes
- **Number point or radix point**
  - Decimal point in base 10
  - Binary point in base 2

**Lecture 3:**

- Human communication includes language, image and sounds
- Computers process and store all forms of data in binary format
- Conversion to computer-usable representation using data formats
- Proprietary formats – unique to a product or company (MS Word, Word Perfect)
  - Proprietary formats become **De facto standards** – adobe PostScripts
  - Invented by an **International standards** organization – Motion pictures experts group, MPEG

Type of Data	Standard(s)
<b>Alphanumeric</b>	Unicode, ASCII, EBCDIC
Image (bitmapped)	<ul style="list-style-type: none"> <li>■ GIF (graphical image format)</li> <li>■ TIF (tagged image file format)</li> <li>■ PNG (portable network graphics)</li> </ul>
Image (object)	PostScript, JPEG, SWF (Macromedia Flash), SVG
Outline graphics and fonts	PostScript, TrueType
Sound	WAV, AVI, MP3, MIDI, WMA
Page description	PDF (Adobe Portable Document Format), HTML, XML
Video	Quicktime, MPEG-2, RealVideo, WMV

- Four numbers:
  - BCD
  - ASCII
  - **Interchange)**
  - EBCDIC (**Extended Binary Coded Decimal Interchange Code**)
- OCR (optical character recognition) – scans text and inputs it as character data
- **Image Data**
  - *Bitmap* or *raster images* of photos and printings with continuous variation
  - *Object* or *vector images* composed of **graphical shapes** like lines and curves defines geometrically
  - **JPEG** – (joint photographers’ expert group) suitable for highly detailed photographs and paintings
- PostScript – list of procedures and statements that describe each of the objects to be printed on a page
- Compression – recoding data so that it requires fewer bytes of storage space

codes/standards to represent letters and  
**Alphanumeric Data**  
 (Binary-Coded Decimal)  
 Unicode  
 (American Standard Code for Information

**Lecture 4:**

- Number representation – an **integer** is a number which has no fraction part
- Numbers can be represented as a combination of **value or magnitude – sign (plus or minus)**
- Unsigned integer
  - 8-bit storage location –  $2^8$  different values between 0 and 255
  - 16-bit storage location –  $2^{16}$  different values between 0 and 65535
- Sign-and-Magnitude
  - Use left-most bit for sign 0 = plus; 1 = minus
- Overflow – combination of numbers that adds to result outside the range
  - Result of addition or subtraction overflow into the sign bit
- Carry flag – set when the result of an addition or subtraction exceeds fixed number of bits allocated

**Lecture 5:**

- Floating point format specification
- **Normalization:** shift numbers from left by increasing the exponent until leading zero eliminated