SuperNovaSchool®
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Computing

Grade 7

(Instructional Resource)

UNIT/STRAND	4: Computer Systems
TOPIC	Types of Software
Sub Topics	Application/System software
Session	2025-26
Prepared By	Qalbeen Khalid

Computer Systems - Types of software

Application Software

- **Definition:**
- Application software is a program or group of programs designed for end-users to perform specific tasks.
- The word **app** is short for application.
- ‘Application’ is another word we can use for a program or a piece of a software.
- Smartphones and tablet apps are application software.

- **Examples:**
- Writing documents
- Browsing the internet
- Editing photos
- Managing finances

A **software** is a set of instructions, data, or programs used to operate computers and perform specific tasks. It's the opposite of **hardware**, which refers to the physical components of a computer (like the keyboard, hard drive, or screen).

Computer Systems – Types of Software

Application Software

- **Characteristics of Application Software**
- User-oriented
- Easy to use
- Designed for specific purposes
- Can be standalone or web-based

- **Examples of Application Software**

Software	Purpose
MS Word	Word processing
Excel	Data organization
Adobe Photoshop	Image editing
Google Chrome	Web browsing
Zoom	Video conferencing

Computer Systems – Types of s/w

System Software

- **Definition:**
- System software is a type of computer program designed to run a computer's hardware and application programs.
- **Key Role:**
- It acts as a bridge between hardware and user applications.

Functions of System Software

- Controls and manages hardware components
- Provides a platform for application software
- Manages system resources
- Facilitates user interaction with the machine

Computer Systems – Types of s/w

System Software

Types of System Software

- **Operating System (OS)**
- Manages hardware and software resources
- Examples: Windows, Linux, macOS
- **Utility Programs**
- Perform maintenance tasks
- Examples: Antivirus, Disk Cleanup, Backup tools

Computer Systems – Types of s/w

System Software

- **VIDEO BASED ON OPERATING SYSTEM**

- https://youtu.be/fkGCLIQx1MI?si=eSpqXqFDFqJkIWls
- After this the learners will perform unplugged activity 4.3 on book pg 245.

Computer Systems – Application vs. System Software

Difference between Application and System software

Application software	**System software**
Allows the user to do specific task.	Enables the system to function. Provides right condition for the application software
Not essential for system to run	essential for system to run
Only runs when user asks	Usually runs when the device is active without any action from the user
User is aware of it. Uses it directly	User is not aware of it. Runs in the background
Interacts with the system software not the hardware	Interacts closely with the hardware.

Computer Systems – Application vs. System Software

Difference between Application and System software

- **Video clip of differences between types of software**

https://www.youtube.com/watch?v=-gVQgyU0Yk4&ab_channel=samuellonzaga

- **Video based on the types of the software and how they are connected with each other and the hardware.**

https://www.youtube.com/watch?v=gxhxcvBuanU&ab_channel=AvantikaNimje

- **Learners will do Question 4.2 and 4.3 given on book pg 244-245 in the booklet.**
- What are two examples of application software?
- What is the purpose of application software?
- What are the two examples of system software?
- What is the purpose of system software?

Denary number system

- Also called the **Decimal Number System.**
- Based on 10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Base-10 number system
- Most commonly used system in everyday life
- First five place values of denary number system are given below:

1000*10=10,000	100*10=1000	10*10=100	1*10=10	1

- First five place values of number system are given below:

27*3=81	9*3=27	3*3=9	1*3=3	1

Then the instructor will explain the steps of conversion from base 10 to base2 and how to proofread the answer with the help of a video clip given below: https://www.youtube.com/watch?v=rsxT4FfRBaM&ab_channel=TheOrganicChemistryTutor

Denary number system DRILL QUESTIONS

Convert the following from base 10 to base 2

- 80
- 150
- 220
- 48
- 148

DRILL QUESTIONS OF PLACE VALUES

- Find the first four place values of octal number systems base 8
- Find the first three place values of senary number system base 6

Denary number system BOOKLET WORK

- **Convert the following numbers from base 10 to base 2**
- 35
- 65
- 230
- 178
- 205
- 255
- 32
- 40

Binary number system

- **Definition:** A number system that uses only two digits: 0 and 1
- Also called **Base-2** system
- Used extensively in digital electronics and computing

- **How Binary Numbers Work**
- Each digit represents a power of 2
- **Example Binary:**
- $1011 = (1\times2^3) + (0\times2^2) + (1\times2^1) + (1\times2^0) = 8 + 0 + 2 + 1$
- = **11 in decimal**

Binary number system

- **Video based on conversion from base 2 to base 10:**
- https://www.youtube.com/watch?v=M41M9ATm49M&ab_channel=LearnFree

- **Conversion drill question from base 2 to base 10**
- 1000111
- 01010111
- 11111000
- 1010110
- 00001100

Binary number system Booklet work

- **RECAP Video based on conversion from base 2 to base 10:**
- https://www.youtube.com/watch?v=2Z03p3yhGmk&ab_channel=PotatoPirates

BOOKLET WORK

- **Convert the following from base 2 to base 10**
  - 1100110
  - 1111000
  - 0111110
  - 0101010
  - 0000001
  - 1011110
  - 0011111
  - 1111000

ASCII CODE

- **ASCII** stands for: American Standard Code for Information Interchange
- It's a character encoding standard used for representing text in computers
- Each character is assigned a numerical value (in binary, decimal, or hexadecimal)
- Uses 7 bits to represent each character (values from 0 to 127)
- Commonly extended to 8 bits (0–255) in Extended ASCII
- Represents letters, digits, punctuation marks, control characters
- Video clip based on the concept of ASCII is given below:
- https://www.youtube.com/watch?v=5aJKKgSEUnY&ab_channel=TheTechTrain.

- **ASCII in Action (Example)**
- **Text Hi**
- **ASCII Codes :**
- **H → 72 → 1001000**
- **i → 105 → 1101001**
- **Binary Representation of "Hi":**
- **1001000 1101001**

Unicode

- **Unicode:** A universal character encoding standard
- Designed to support **all characters** in all **languages and scripts**
- Uses **1 to 4 bytes** per character
- Supports over **143,000 characters**
- **ASCII and UNICODE difference table is given below:**

VIDEO BASED ON UNICODE:
https://www.youtube.com/watch?v=pJC8gmKa4hA&ab_channel=EE241S6D

Feature	ASCII	Unicode
Bit Size	7 bits	8, 16, or 32 bits
Characters	128	143,000+
Language Support	English only	All languages (global)
Emoji Support	✗ Not supported	✓ Supported
Compatibility	Older systems	Modern systems/internet

Pixels

- **A pixel** (short for “picture element”) is the smallest unit of a digital image or display.
- Each pixel holds color and brightness information.
- Millions of pixels form an image.
- Example: A screen with 1920×1080 has 2,073,600 pixels.
- **Pixel video clip:**
- https://www.youtube.com/watch?v=wsFROq2jVSQ&ab_channel=TechUpbeat

Resolution

- **Resolution** refers to the number of pixels in an image or display, usually given as width × height.
- Higher resolution = more detail and clarity.
- **Example:**
- HD = 1280×720
- Full HD = 1920×1080
- 4K = 3840×2160
- **Resolution video clip:**
- https://www.youtube.com/watch?v=3kz2GAof9tI&ab_channel=AMD

Bitmaps

- A **bitmap** is a type of image file where the image is made up of a grid of individual pixels, each storing color values.
- Also called a raster image.
- Common bitmap formats: .bmp, .jpg, .png
- **Bitmap video clip:**
- https://www.youtube.com/watch?v=2mWc3YqlM7c&ab_channel=JonathanMolson

Colored Images and bit-depth

- **In <u>colored (RGB) images</u>**:
  Each pixel has **3 channels**: Red, Green, and Blue.
  Bit depth is usually per channel.
- **<u>Bit depth</u>** refers to the **number of bits used to represent the color of a single pixel**.
- It determines how many **colors** an image can display.
- **<u>Video based on colored images:</u>**
- https://www.youtube.com/watch?v=V63LXT_hQHk&ab_channel=KshitijVivanInstituteAhmedabad

Amplitude

- **Amplitude** is the height of a sound wave, representing its loudness.
- Higher amplitude = louder sound
- Measured in decibels (dB)
- **Video of a sound wave:**
- https://www.youtube.com/watch?v=TsQL-sXZOLc&ab_channel=ScienceSauce

Frequency

- **Frequency** is the number of sound wave cycles per second.
- It determines the pitch of a sound.
- Measured in Hertz (Hz)
- High frequency = High pitch (e.g., whistle)
- Low frequency = Low pitch (e.g., drum)
- **Video clip of frequency:**
- https://www.youtube.com/watch?v=XLfQpv2ZRPU&ab_channel=MED-EL

Sample +Sampling Rate

- A **sample** is a snapshot of the amplitude of a sound wave at a specific point in time
- In digital audio, the sound wave is divided into many samples for storage and processing
- **Sampling rate** is the number of samples taken per second from a sound wave
- Measured in Hertz (Hz)
- Example: CD-quality audio = 44,100 samples/second (44.1 kHz)
- Higher sampling rate = better sound quality
- **Video based on how MIC works:**
- https://www.youtube.com/watch?v=vRmEeNNXSfk&ab_channel=HowItWorks%3F

Booklet work

- **<u>Question 4.6 (Book pg 261 will be done in the booklet)</u>**
    1. How do you think sample rate affects the size of digital sound file?
    2. Why do you think a low sample rate can be used for voice calls, but a much higher one is needed for music?

Automated systems in manufacturing

- **Artificial Intelligence (AI)** is the ability of machines to perform tasks that typically require **human intelligence**, such as decision-making, learning, and problem-solving.
- **An automated system** uses machines and control systems to perform tasks without continuous human intervention.
- Includes mechanical, electrical, and computerized systems.

- **Real-World Examples:**
- Smart factories with AI-driven robots
- Automated inspection systems
- Predictive analytics for machine maintenance
- Autonomous guided vehicles (AGVs) in warehouses

Automated systems in manufacturing

Unplugged activity 4.8 on book pg 274 will be done

Automated systems in health

- **Automated systems in healthcare** use technology and machines to perform tasks with minimal human intervention, improving efficiency, accuracy, and safety.
- These systems can handle monitoring, diagnosis, treatment, and administrative tasks.
- **Benefits of Automation in Healthcare:**
- Faster diagnosis and treatment
- Improved accuracy and patient safety
- Reduces human workload
- Enables 24/7 patient monitoring
- Streamlines administrative tasks

Automated systems in health

- **Real-World Examples:**
- AI-powered Chabot for symptom checking
- Robotic surgery systems like the Da Vinci robot
- Wearable health monitors (e.g., heart rate, oxygen level tracking)
- Automated medication dispensers in hospitals

AI in image recognition

- **AI in image recognition** uses machine learning and deep learning algorithms to analyze and interpret images automatically.
- **Real-World Applications**
- Facial recognition (e.g., phone unlocking)
- Medical imaging (e.g., detecting tumors in X-rays)
- Self-driving cars (recognizing road signs and obstacles)

How It Works (Simplified Process):

Input: Image is fed to the system

Preprocessing: Image is resized, filtered

Feature Extraction: Key elements (edges, shapes, colors) are detected

Classification: AI model identifies the object (e.g., dog, car, face)

Booklet work

Check your progress book pg 282
Question 3 and 4 will be done in the booklet

AI in computer games

- **AI in computer games** refers to the simulation of intelligent behavior in non-player characters (NPCs) or game systems to make the game more challenging, interactive, and realistic.

- **Real-World Examples:**
- **Pac-Man** – ghosts follow smart chase patterns
- **FIFA** – AI-controlled players act like real teammates
- **Chess games** – AI learns and challenges players

AI in computer games

- **Activity 4.7 will be done in the lab.**

Booklet work

Question 4.8 will be done in the booklet.

1. What is artificial intelligence?
2. What is an automated system?
3. What are two ways an automated system can be used in health?
4. How are automated systems are used in retail?