



Types of Computers and Data Representations

Introduction

A computer is an electronic device that accepts input, processes data according to instructions, stores results and produces output that people can use. A program is a set of step-by-step instructions that tells the computer what to do. Software is a collection of programs designed for various tasks, whereas hardware refers to the physical components of a computer, including the keyboard, screen, processor and storage devices. Data refers to information in any form, such as numbers, text, images, audio or video that a computer handles during its work. Computers are essential today because they enable faster, more accurate and easier work management in daily life. In education, computers support smart classrooms, digital content and online examinations used by schools and colleges. In banking and finance, computers enable UPI payments, ATMs, and secure online transactions for families and businesses. Computers are essential in modern life, allowing communication through messaging and video calls, managing patient records in healthcare and delivering government services via e-governance portals. They also offer a vast collection of entertainment options, ranging from streaming platforms and music to interactive games on various devices. It is essential to recognize that different computers are designed for specific tasks. Laptops are ideal for school work, phones are versatile for use anywhere, and supercomputers excel at handling large tasks, such as weather forecasting. Understanding these types helps us learn how computers process information internally. Computers represent text, pictures, and sound as numbers, allowing data to be stored and processed reliably. Learning the basics of number systems and storage builds the foundation for making good choices in education, banking, healthcare, public services and entertainment.

Types of Computer Systems

When we refer to a computer, we typically mean a computer system. A computer system consists of two main components: hardware and software. Think of it like a human body. The hardware refers to all the physical parts that you can see and touch, such as the screen, keyboard, mouse and the memory chips inside. The software is the set of instructions and programs that tell the hardware what to do. It is like the brain or the thoughts that make the body work. An app on your phone is software, and so is the operating system, like Android or Windows. Imagine a computer like a bicycle. The hardware consists of the frame, pedals, and wheels that make up the bicycle. The software is the rider who knows how to use it and decides where to go. Now, let us learn about the common types of computer systems in the subsection.

Laptops and Desktops

Laptops and desktops, as shown in figure 2.1, are the workhorses of personal and professional computing. The primary difference lies between portability and upgradability. A desktop is modular, meaning you can easily upgrade



Figure 2.1 : Laptop and Desktop



individual components, such as the graphics card, RAM or storage over time. This makes them cost-effective and powerful for specialized tasks, such as high-end gaming or professional video editing. Laptops integrate everything into a single, portable unit, offering convenience at the cost of limited upgradability. They are ideal for students and professionals who need to work from different locations. Laptops and desktops represent key subtypes of microcomputers. Both these are widely used for improving personal efficiency by enabling the use of applications that allows us to create documents, presentations, software or play multimedia. The main distinction lies in portability versus power and compatibility.

Technical Specifications:

- CPU (Central Processing Unit): The "brain" of the computer. Standard options include Intel's Core series (i3, i5, i7, i9) and AMD's Ryzen series (3, 5, 7, 9). A higher number generally means better performance.
- RAM (Random Access Memory): This is the computer's short-term memory for multitasking. A minimum of 8 GB is required for smooth performance, 16 GB is recommended for most users and 32 GB or more is recommended for professionals and gamers.
- HDD (Hard Disk Drive): A slower, mechanical drive that offers large storage capacity at a low price.
- SSD (Solid-State Drive): Much faster than an HDD, SSDs enable the computer to boot up quickly and feel responsive. 512 GB is a good starting point for an SSD.
- GPU (Graphics Processing Unit): Essential for gaming, video editing and design software. NVIDIA's GeForce (RTX series) and AMD's Radeon (RX series) are the market leaders. For general use, the integrated graphics in the CPU are sufficient.
- Display: For laptops, standard sizes are 14 inches and 15.6 inches. A Full HD (1920x1080 pixels) resolution is standard.

Tablets

Tablets, as shown in figure 2.2, occupy a space between smartphones and laptops. They are primarily designed for media consumption, web browsing and light productivity. Their main advantage is a large touchscreen interface that is intuitive and excellent for reading watching videos and drawing. With accessories like a detachable keyboard and a stylus, a high-end tablet can perform many of a laptop's functions, making it a versatile tool for students and artists.

Tablets are compact, portable microcomputers with touchscreen interface. It uses a mobile operating systems, it lies between smartphones and laptops in terms of size. As it is small and very portable, it allows to consume multimedia on the move.



Figure 2.2 : Tablet

Technical Specifications:

- Processor: Tablets use mobile-first processors designed for efficiency. Key players are Apple's A-series and M-series chips (in iPads) and Qualcomm's Snapdragon series or MediaTek's Dimensity series (in Android tablets).
- RAM: Typically ranges from 4 GB in budget models to 8 GB or 16 GB in high-end ones.
- Storage: Internal Storage usually ranges from 64 GB to 512 GB. Some Android tablets offer expandable storage via a microSD card.
- Display: Screen size is typically between 10 to 13 inches. Display quality is a key feature, with high-resolution LCD or vibrant OLED panels.
- Connectivity: Models are available as Wi-Fi only or Wi-Fi + Cellular, allowing you to use a SIM card for internet access on the go.

Mobile Phones

For most people in India and around the world, the smartphone is their primary computing device. It is shown in figure 2.3. It is a powerful, connected, all-in-one device. Beyond communication, it serves as a wallet (UPI), a navigator (GPS), a high-quality camera, and an entertainment hub. The modern smartphone's power lies in its SoC (System on a Chip), which integrates multiple components efficiently, and its access to vast app ecosystems (Google Play Store and Apple App Store). Mobile phones, often classified as microcomputers are handheld personal devices. They are highly portable computing systems with compact designs that integrate telephony, internet connectivity, and touch-sensitive screens. It allows for seamless communication, app-based tasks and multimedia access on the move.



Figure 2.3 : Mobile Phone

Technical Specifications:

- SoC (System on a Chip): This single chip houses the CPU, GPU, and other critical components. Dominant SoCs include Apple's Bionic series, Qualcomm's Snapdragon 8 series, and MediaTek's Dimensity 9000 series.
- RAM: Ranges from 6 GB in budget phones to 12 GB or 16 GB in flagship models.
- Camera System: This is a major focus. Specifications include megapixels (MP), aperture size, and multiple lens options (wide, ultra-wide, and telephoto). Computational photography (software processing) is just as important as the hardware.
- Battery: Measured in milliampere-hours (mAh), with 4500-5000 mAh being common. Fast charging capability (e.g., 30W, 67W, 120W) is also a key feature.
- Display: Most phones now use bright and colourful AMOLED or OLED displays with high refresh rates (90Hz or 120Hz) for smoother scrolling.



Servers

Servers, as shown in figure 2.4, are the backbone of the Internet and corporate networks. Unlike personal computers, they are designed for extreme reliability, scalability, and performance under a constant workload. A server's job is to manage network resources and respond to requests from client computers 24 x 7. They often feature redundant components (such as dual power supplies) so that if one part fails, the server continues to run. They typically run specialized server operating systems, such as Windows Server or a Linux distribution (e.g., Ubuntu Server, Red Hat Enterprise Linux). Servers are a type of computer often classified as minicomputers (midrange systems) or powerful workstations based on their size and performance characteristics. They often fall within the category of microcomputer and mainframe. They are specifically designed for a particular purpose, such as managing emails, files or web pages. They are designed to handle a high volume of concurrent users and data transactions.

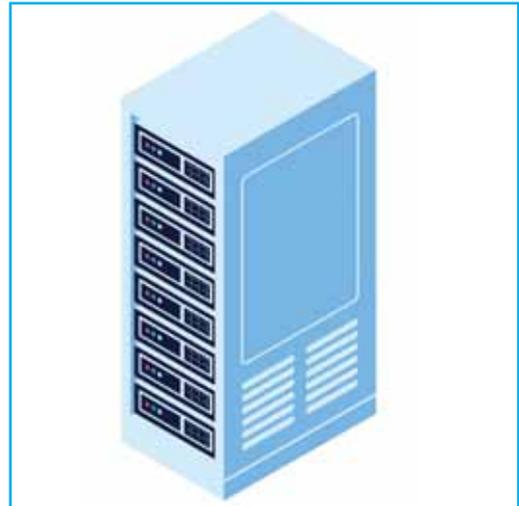


Figure 2.4 : Server

Technical Specifications:

- CPU: Server-grade processors like Intel's Xeon or AMD's EPYC series, which feature a high number of cores to handle thousands of simultaneous tasks.
- RAM: Uses ECC (Error-Correcting Code) RAM, which prevents data corruption.
- Storage: Utilises enterprise-grade SSDs or HDDs configured in a RAID (Redundant Array of Independent Disks) setup. RAID protects data by distributing it across multiple drives.
- Networking: Multiple high-speed network ports are standard for handling high volumes of traffic.
- Form Factor: Can be a Tower (looks like a desktop) for small offices or Rack-mounted (flat units that slide into a cabinet) for data centres.

Supercomputers

Supercomputers, as shown in figure 2.5, are at the absolute peak of computing power, designed to solve problems that are too complex for any other type of machine. Their architecture is based on massive parallel



Figure 2.5 : Supercomputer



processing, where a problem is broken down into millions of smaller tasks that are solved simultaneously by thousands of processors. Their performance is measured in FLOPS (Floating-Point Operations Per Second), with modern systems reaching Petaflops (quadrillions of FLOPS) and Exaflops (quintillions of FLOPS). Building and maintaining them requires a massive infrastructure for power and cooling.

Technical Specifications:

- **Architecture:** Composed of thousands of interconnected servers called nodes. Each node contains multiple CPUs and often several GPUs, which are excellent at parallel tasks.
- **Interconnect:** A custom, extremely high-speed, low-latency network that connects all the nodes. This is a critical component that enables the nodes to function as a single, cohesive system.
- **Storage:** Uses a specialized parallel file system that can read and write terabytes of data per second. Total storage capacity is measured in Petabytes (PB).
- **Cooling:** Advanced liquid cooling systems are necessary to manage the immense heat generated by the processors.

Graphics Processing Unit (GPU) Based System

In a server, a Graphics Processing Unit (GPU) acts as a powerful computational accelerator. Although originally built for graphics, a GPU's primary role in a server is to perform massive calculations for tasks such as AI, data analysis, and scientific simulations. Think of the CPU as a brilliant general manager who can handle any complex task one by one, very quickly. The GPU, on the other hand, is like a massive team of thousands of workers. Each worker is not as skilled as the manager, but they can all perform the same simple task simultaneously. This ability to perform thousands of tasks at once is known as parallel processing, and it is what makes GPUs essential for modern high-performance computing.

Technical Specifications:

- **GPU Cores:** Unlike a CPU's few powerful cores, a GPU has thousands of smaller cores designed for parallel work. More cores generally mean better performance.
- **VRAM (Video RAM):** This is the GPU's own ultra-fast, dedicated memory. It is used to store graphics data, such as high-resolution textures and 3D models.
- **Interconnect:** High-end servers often contain multiple GPUs that need to communicate with each other directly at very high speeds.

Comparison of Computer Systems

To make the differences more straightforward to understand, a simple comparison table is provided in table 2.1.

Type	Portability	Processing Power	Storage	Typical Users	System Classification
Laptop/Desktop	Medium-High	Medium-High	Medium-High	Students, Teachers, Families, Office Workers	Microcomputer/ Workstation
Tablet	High	Low-Medium	Low-Medium	Learners, Field workers, Home users	Microcomputer
Mobile Phone	Very High	Low-Medium	Low-Medium	Everyone	Microcomputer
Server	Low	High	High	Schools, Colleges, Banks, Enterprises	Minicomputer/ Mainframe
Supercomputer	Very Low	Very High	Very High	Scientists, Researchers, Government	Supercomputer
GPU based system	Very Low	Very High	Low-Medium	Gamers, Content Creators, AI Developers	Micro/Mini/ Mainframe/Super Computer

Table 2.1 : Types of Computer Systems

Each category of computer has its own strengths and is designed to meet specific needs, ranging from simple daily tasks, such as chatting with friends to handling complex challenges like weather prediction or space exploration. To perform these tasks, all computer systems rely on a process called data representation. Therefore, in the next section, we will learn about how data is represented inside computers.

Data Representation

Imagine trying to communicate using only a light switch. You have only two signals to send: ON or OFF. This is exactly how a computer works! Since it is an electronic machine, it does not understand words or pictures directly. Instead, it understands the presence of an electric current (ON, which it represents as a '1') or the absence of a current (OFF, which it represents as a '0').

Everything you see and do on a computer, from typing a letter to watching a video, is converted into long strings of 1s and 0s. This simple two-digit language is called the binary number system and it is the only language a computer truly understands. To learn the computer's language, we must first understand how it uses just two digits to represent everything. To understand how computers “think”, we first need to look at the number system we use every day.

The Decimal System (Base-10)

The number system we use in our daily lives is called the decimal or base-10 system. It is called base-10 because it uses ten different digits: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. The value of a digit in a decimal number depends on its position, which is referred to as its place value. Each place value is a power of



10. For example, let us look at the number 257.

We can break it down like this:

$$257 = (2 \times 100) + (5 \times 10) + (7 \times 1)$$

Or, using powers of 10:

$$257_{10} = (2 \times 10^2) + (5 \times 10^1) + (7 \times 10^0)$$

The small '10' written after the number is called the base or radix, which tells us it is a decimal number.

The Binary System (Base-2): The Computer's Language

Computers use the binary or base-2 system. It is called base-2 because it uses only two digits: 0 (representing OFF) and 1 (representing ON). Each of these digits is called a bit (short for binary digit). Just like the decimal system, the binary system also has place values, but instead of being powers of 10, they are powers of 2.

...	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
...	128	64	32	16	8	4	2	1

To work with computers, it is helpful to know how to convert numbers between the decimal and binary systems.

Converting Binary to Decimal

To convert a binary number to a decimal number, you multiply each binary digit by its place value (a power of 2) and add all the results together. The table method makes this easy.

Example 1: Convert 1101_2 to decimal.

Binary Digit	1	1	0	1
Place Value (Power of 2)	$2^3 = 8$	$2^2 = 4$	$2^1 = 2$	$2^0 = 1$
Calculation (Binary Digit * Place Value)	$1 * 8 = 8$	$1 * 4 = 4$	$0 * 2 = 0$	$1 * 1 = 1$

Now, add the results of the calculation: $8+4+0+1 = 13$

So, $1101_2 = 13_{10}$.

Example 2: Convert 10110_2 to decimal.

Binary Digit	1	0	1	1	0
Place Value (Power of 2)	$2^4 = 16$	$2^3 = 8$	$2^2 = 4$	$2^1 = 2$	$2^0 = 1$
Calculation (Binary Digit * Place Value)	$1 * 16 = 16$	$0 * 8 = 0$	$1 * 4 = 4$	$1 * 2 = 2$	$0 * 1 = 0$

Now, add the results of the calculation: $16+0+4+2+0 = 22$

So, $10110_2 = 22_{10}$.

Converting Decimal to Binary

To convert a decimal number to binary, you can use a table of place values. You find the largest power of 2 that is less than or equal to your number, place a '1' in that position, subtract that value from your number, and repeat the process with the remainder.

To convert a decimal number into binary, our goal is to figure out which powers of 2 add up to our number. Think of it like giving someone change, but you only have special coins with the values 1, 2, 4, 8, 16, 32, and so on. The process is a simple game of "What's the biggest coin I can use?" Start with the given decimal number (the total amount of change you need to provide) and follow these steps:

1. Identify the Starting Point: Find the largest "binary coin" (a power of 2) that is less than or equal to the decimal number.
2. Place the First '1': Place a '1' in that coin's position in the binary number. Then, subtract the coin's value from the decimal number to get a new remainder.
3. Move to the Next Coin: Consider the next smaller binary coin.
4. Decide and Place: Compare this coin to the current remainder.
 - If the coin fits, place a '1' in its position and subtract its value from the remainder.
 - If the coin does not fit, place a '0' in its position.
5. Repeat: Continue this process, moving down to the next smaller coin each time, until the remainder is zero.

Example 1: Convert 13_{10} to binary.

First, a list of the binary place values (powers of 2) is needed. For converting the number 13, the relevant values are: ..., 16, 8, 4, 2, 1.

The goal is to find the largest place value that is less than or equal to 13.

Start with the largest value, 16.

Is 16 less than or equal to 13? No, it's too big. Move to the next smaller value, 8.

Is 8 less than or equal to 13? Yes, it fits! Since 8 is the largest power of 2 that fits into 13, it becomes the starting point for the conversion. Therefore, a '1' is placed in the 8's position.

Place Value	8	4	2	1
Binary Digit	1			

Remainder: $13 - 8 = 5$.

Now, the remainder is 5, and the next smaller place value is 4. Is 4 less than or equal to the remainder, 5? Yes, it fits. So, '1' is placed in the 4's position.

Place Value	8	4	2	1
Binary Digit	1	1		

Remainder: $5 - 4 = 1$.

Now, the remainder is 1, and the next smaller place value is 2. Is 2 less than or equal to the remainder, 1? No, it is bigger than 1. So, '0' is placed in the 2's position.



Place Value	8	4	2	1
Binary Digit	1	1	0	

Remainder: There is no update in the remainder, and it remains 1 only.

The remainder is still 1. The final place value is 1. Is 1 less than or equal to 1? Yes, it fits exactly. So, '1' is placed in the 1's position.

Place Value	8	4	2	1
Binary Digit	1	1	0	1

Remainder: $1 - 1 = 0$.

Since the remainder is now 0, the conversion is complete.

By combining the digits placed at each step, the final binary number is 1101.

So, $13_{10} = 1101_2$.

Example 2: Convert 125_{10} to binary.

First, a list of the binary place values (powers of 2) is needed. For converting the number 125, the relevant values are: ..., 128, 64, 32, 16, 8, 4, 2, 1.

The goal is to find the largest place value that is less than or equal to 125.

Start with the largest value, 128.

Is 128 less than or equal to 125? No, it's too big. Move to the next smaller value, 64.

Is 64 less than or equal to 125? Yes, it fits! Since 64 is the largest power of 2 that fits into 125, it becomes the starting point for the conversion. Therefore, a '1' is placed in the 64's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1						

Remainder: $125 - 64 = 61$.

Now, the remainder is 61, and the next smaller place value is 32. Is 32 less than or equal to the remainder, 61? Yes, it fits. So, '1' is placed in the 32's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1					

Remainder: $61 - 32 = 29$.

Now, the remainder is 29, and the next smaller place value is 16. Is 16 less than or equal to the remainder, 29? Yes, it fits. So, '1' is placed in the 16's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1	1				

Remainder: $29 - 16 = 13$.

Now, the remainder is 13, and the next smaller place value is 8. Is 8 less than or equal to the remainder, 13? Yes, it fits. So, '1' is placed in the 8's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1	1	1			

Remainder: $13 - 8 = 5$.

Now, the remainder is 5, and the next smaller place value is 4. Is 4 less than or equal to the remainder, 5? Yes, it fits. So, '1' is placed in the 4's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1	1	1	1		

Remainder: $5 - 4 = 1$.

Now, the remainder is 1, and the next smaller place value is 2. Is 2 less than or equal to the remainder, 1? No, it is bigger than 1. So, '0' is placed in the 2's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1	1	1	1	0	

Remainder: There is no update in the remainder, and it remains 1 only.

The remainder is still 1. The final place value is 1. Is 1 less than or equal to 1? Yes, it fits exactly. So, '1' is placed in the 1's position.

Place Value	64	32	16	8	4	2	1
Binary Digit	1	1	1	1	1	0	1

Remainder: $1 - 1 = 0$.

Since the remainder is now 0, the conversion is complete.

By combining the digits placed at each step, the final binary number is 1111101.

So, $125_{10} = 1111101_2$.

In the previous section, we understood the concepts of the binary and decimal number systems. Computers only understand binary, but long strings of 0s and 1s, such as 1101011010001101, are complicated for people to read without making errors. To fix this, programmers use the Octal (base-8) and Hexadecimal (base-16) number systems as a compact, human-friendly shorthand for long binary numbers.

The Octal System (Base-8)

The octal system uses eight digits: 0, 1, 2, 3, 4, 5, 6, and 7. Its power lies in its simple relationship with binary: one octal digit represents exactly a group of three binary bits.

Example: Convert the binary number 101110_2 to its equivalent octal representation.

- Group the bits: Starting from the right, group the binary digits into sets of three. The first three digits from the rightmost are 110, and the next three digits are 101. However, we read it from left to right. So, the sequence is 101 followed by 110.
- Convert each group: Find the decimal value of each three-bit group.
 - $101 = (1 \times 4) + (0 \times 2) + (1 \times 1) = 5$
 - $110 = (1 \times 4) + (1 \times 2) + (0 \times 1) = 6$
- Combine the results: The octal number is 56. So, $101110_2 = 56_8$.



The Hexadecimal System (Base-16)

The hexadecimal system is even more common in modern computing. It uses sixteen digits: 0-9 and the letters A, B, C, D, E, F to represent the values 10, 11, 12, 13, 14, and 15. Each hexadecimal digit represents exactly a group of four binary bits.

Example: Convert binary 11010100_2 to hexadecimal.

1. Group the bits: Starting from the right, group the binary digits into sets of four. The first four digits from the right side are 0100, and the next four digits are 1101. However, we read it from left to right. So, the sequence is 1101 followed by 0100.
2. Convert each group: Find the value of each four-bit group.
 - $1101 = (1 \times 8) + (1 \times 4) + (0 \times 2) + (1 \times 1) = 13$. The hexadecimal digit for 13 is D.
 - $0100 = (0 \times 8) + (1 \times 4) + (0 \times 2) + (0 \times 1) = 4$. The hexadecimal digit for 4 is 4.
3. Combine the results: The hexadecimal number is D4. So, $11010100_2 = D4_{16}$.

Note: If a binary number doesn't have an exact number of digits to form complete groups for octal (3 bits) or hexadecimal (4 bits) conversion, add leading zeros to the leftmost group. This process is called padding. Adding zeros to the left of a number does not change its value (for example, the number 5 is the same as 05 or 005). This allows us to create a complete group for the final conversion step.

Data Storage

Data storage functions like a digital filing cabinet for a computer, providing a secure location to store all kinds of digital information for future use. Once the computer processes data, such as writing an assignment or editing a photo, data storage ensures that the work is saved. It enables the computer to retain everything from school projects and family pictures to games and applications, whether for a brief period or many years. The key concepts and terms related to data storage are summarised in table 2.2 below for easier review.

Concept	Explanation
Bit	The smallest possible unit of data, representing a single 0 or 1.
Byte	A group of 8 bits, typically used to represent a single character like the letter 'A' or the number '5'.
Storage Units	Measures for data capacity, increasing in size: KB (Kilobyte - a text file), MB (Megabyte - a photo), GB (Gigabyte - a movie), TB (Terabyte - a computer's hard drive).
Primary Storage (RAM)	The computer's fast, short-term memory is used for currently running apps. It is volatile, meaning data is lost when the power is turned off. Think of it as a temporary work desk.
Secondary Storage	The computer's permanent, long-term memory, which saves files even when the computer is powered off. It is non-volatile or persistent. Examples include HDDs, SSDs, and USB pen drives. Think of it as a bookshelf.
Good Storage Practices	Methods for keeping data safe include making backups (extra copies), utilizing cloud storage (such as Google Drive), and organizing files into folders for easy retrieval and access.

Table 2.2 : Data Storage



Applications of Computers

Computers are highly valuable due to their wide range of applications across various domains. Table 2.3 highlights the significant applications of computer systems in today's world, ranging from everyday communication to advanced scientific research.

Application Area	Description and Examples
Education and E-learning	Makes learning more interactive in schools and colleges. Examples include the use of smart classrooms, digital content, and online examinations.
Business and Finance	Manages financial transactions and business operations. Daily examples include UPI payments, using ATMs, and secure online transactions for families and businesses.
Communication and Social Media	Connects people instantly across the world for easy sharing of information. Typical uses are messaging and video calls, email and social media apps.
Entertainment and Multimedia	Provides a vast collection of digital content for leisure and creativity, ranging from streaming platforms and music to interactive games accessible on various devices.
Science and Research	Solves complex scientific problems using large-scale calculations and data analysis. Supercomputers are utilized for tasks such as weather forecasting and space research.
Healthcare	Improves diagnostics and manages patient information. Computers are used for managing patient records, controlling medical equipment and telemedicine.
Government and Public Services	Delivers faster and more transparent services to citizens. Examples include e-governance portals for accessing public services and Aadhaar-enabled systems.
Embedded Systems	A small computer built inside another machine for a specific function. Examples include the systems inside ATMs, intelligent washing machines and modern cars.

Table 2.3 : Applications of Computers

Summary

A computer system combines physical hardware with instructional software to perform tasks. Systems range from personal laptops and mobile phones to powerful servers and supercomputers, each designed for specific needs. At their core, computers understand only the binary language of 0s and 1s, representing all data in this format. Octal and Hexadecimal systems serve as a human-friendly shorthand for long binary numbers. Data storage is used to save this information in bits (0 or 1) or bytes (8 bits) format. Storage includes temporary Primary Storage (such as RAM) for active tasks and permanent Secondary Storage (like an SSD) for long-term storage. These systems enable countless applications in modern life. Key uses include education, banking, communication and healthcare. The type of application determines the kind of computer needed, but all rely on data representation and storage to function.



EXERCISE

1. Describe two key features and one everyday use of a tablet.
2. What is the primary function of a server and where are they typically located?
3. What is the main difference in design and use between a laptop and a desktop computer?
4. What does it mean for a storage device to be "volatile"? Which type of storage is volatile?
5. Why is it important to back up essential files? Mention one standard method for creating a backup.
6. Describe two ways computers are essential in modern banking and finance.
7. Decimal to Binary Conversion: Convert the number 53 to its binary equivalent. Show the steps used to find the answer.
8. Binary to Decimal Conversion: Convert the binary number 110101 to its equivalent decimal number. Show the steps used to find the answer.
9. Binary to Octal Conversion: Convert the binary number 11110 into its octal equivalent. Explain how you grouped the bits and if any padding was needed.
10. Binary to Hexadecimal Conversion: Convert the binary number 1011010 to its hexadecimal equivalent, explaining the process of grouping and padding.
11. **State whether true or false.**
 - (1) The binary number system uses ten digits (0-9).
 - (2) Primary storage is volatile, meaning it loses all its data when the computer is turned off.
 - (3) A desktop computer is designed to be portable and easily carried around.
 - (4) The computer that controls a smart washing machine is an example of an embedded system.
 - (5) A bit is a group of 8 bytes.
12. **Fill-in the blanks.**
 - (1) A computer is an electronic device that accepts _____ , processes data, stores results and produces output.
 - (2) The physical components of a computer like the keyboard and screen are referred to as _____.
 - (3) The _____ number system is often used as a shorthand for binary because one of its digits can represent a group of four bits.
 - (4) A group of 8 bits is known as a _____.
 - (5) A _____ is the type of computer best suited for complex tasks like weather forecasting.
13. **Multi-choice questions. Choose the most correct answer.**
 - (1) A collection of programs designed to perform various tasks on a computer is known as what?
(a) Hardware (b) Data (c) Software (d) Input



