Information Technology

Chapter One

Introduction



Outline

- Introduction
- Types of Data
- Simple Model of A Computer
- Fundamentals of Computer System
- Applications of Information Technology
- IT Advancements
- Future of Information Technology

Introduction

Information Technology (IT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data. Typically, IT is used in the context of business operations, as opposed to technology used for personal or entertainment purposes. The commercial use of IT encompasses both computer technology and telecommunications.

Information is a *proceed data* that improved our knowledge, enabling us to take decisions and initiate actions. In other words, IT combines people with computing resources, software, data, and computer networks (Fig.(1.1)).



Figure 1.1: Diagram of Information Technology.

Introduction

Common information technology types include the following:

1. Internet and web technologies.
2. Cloud computing.
3. Databases.
4. Artificial intelligence and machine learning.
5. Cybersecurity.
6. Internet of things.
7. IT governance.
8. Data analytics and business intelligence.

Introduction

What does information technology encompass?

The IT department ensures that the organization's systems, networks, data and applications all connect and function properly. The IT team handles three major areas:

1. deploys and maintains business applications, services and infrastructure (servers, networks, storage);
2. monitors, optimizes and troubleshoots the performance of applications, services and infrastructure; and
3. oversees the security and governance of applications, services and infrastructure.

Information technology components and functions



Introduction

Most IT staff have different responsibilities within the team that break into several key areas including:

- **Administration.** Administrators handle the day-to-day deployment, operation and monitoring of an IT environment, including systems, networks and applications.
- **Support.** Help desk staff specialize in answering questions, gathering information and directing troubleshooting efforts for hardware and software.
- **Applications.** Businesses rely on software to perform work.
- **Compliance.** Businesses are obligated to observe varied government- and industry-driven regulatory requirements.

Introduction

Example 1:- As an example of how organizing data enhances our understanding, let us consider the marks obtained by students in an examination. The marks by themselves do not give any immediate idea about the performance of the class. By processing this data, a bar chart may be obtained, which gives the number of students with marks between 100 and 90, 90 and 80, 80 and 70 and so on. This chart gives the teacher of class information on the performance of the class that would enable him or her to initiate appropriate action such as which students need special attention (Fig. (1.2)).

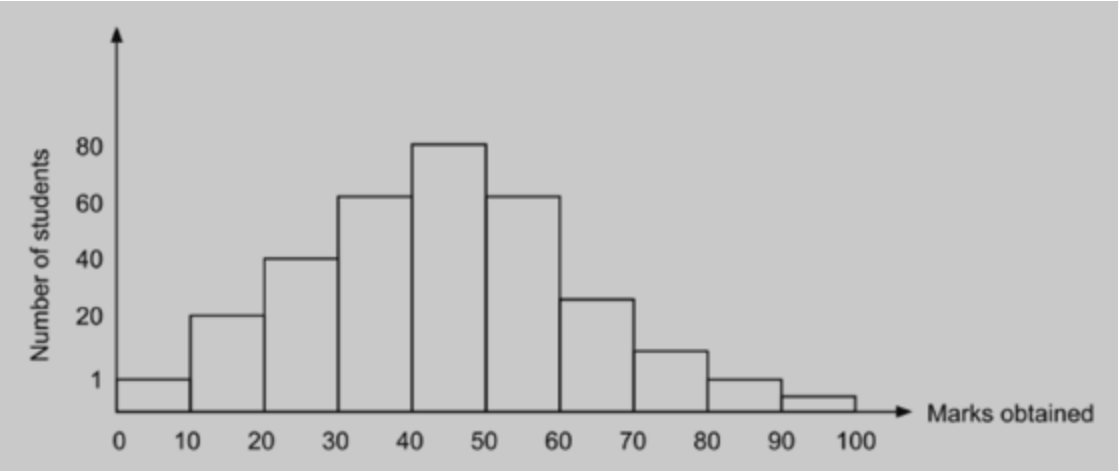
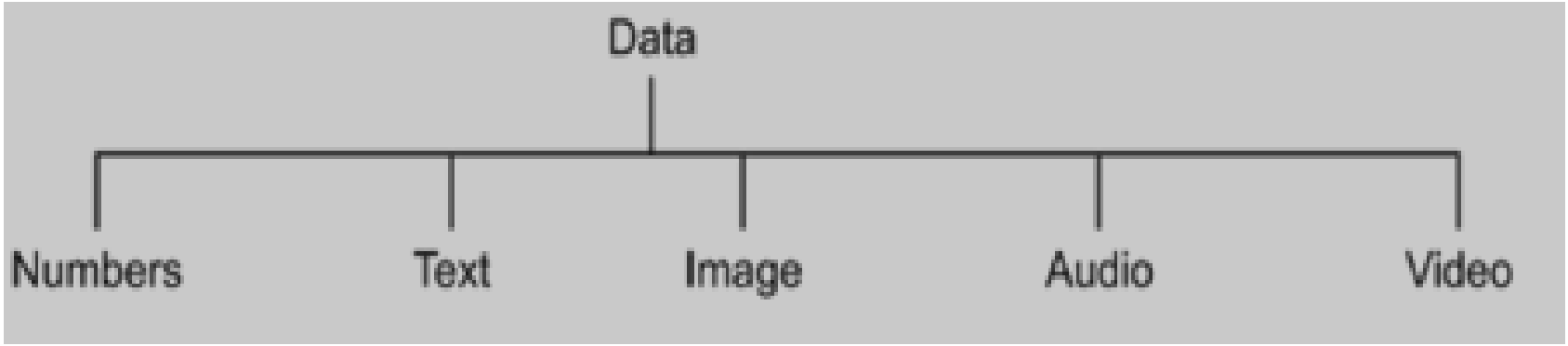


Figure 1.2: Bar chart giving performance of students in a class.

Types of Data

In Example 1 the data was numbers. This is the simplest data type and historically the earliest data type to be processed. The versatility of IT comes from the ability to process a variety of data types such as text, image, audio, and video (Fig. (1.3)).



Types of Data

Some additional data types, besides numbers, are:

- Text. For example, a paragraph in any book is textual data.
- Picture or image. For example, your photograph (both black and white and color), a fingure print, a line drawing, an image transmitted by a satellite, and an X-ray of your chest.
- Audio or sound. For example, speeches, songs, telephone conversations, street noise, etc.
- Video or moving pictures. For example, silent movies (e.g., Charlie Chaplin in the 1930) and animation used in computer games.

In modern IT, all these types of data are required to be processed. All these data types taken together are called "multimedia".

Simple Model of A Computer

- Information Technology is concerned with:

1. Acquisition of data
2. Storage of data
3. Organization of data
4. Processing of data
5. Output of processed data, i.e., information.
6. Distribution of information.



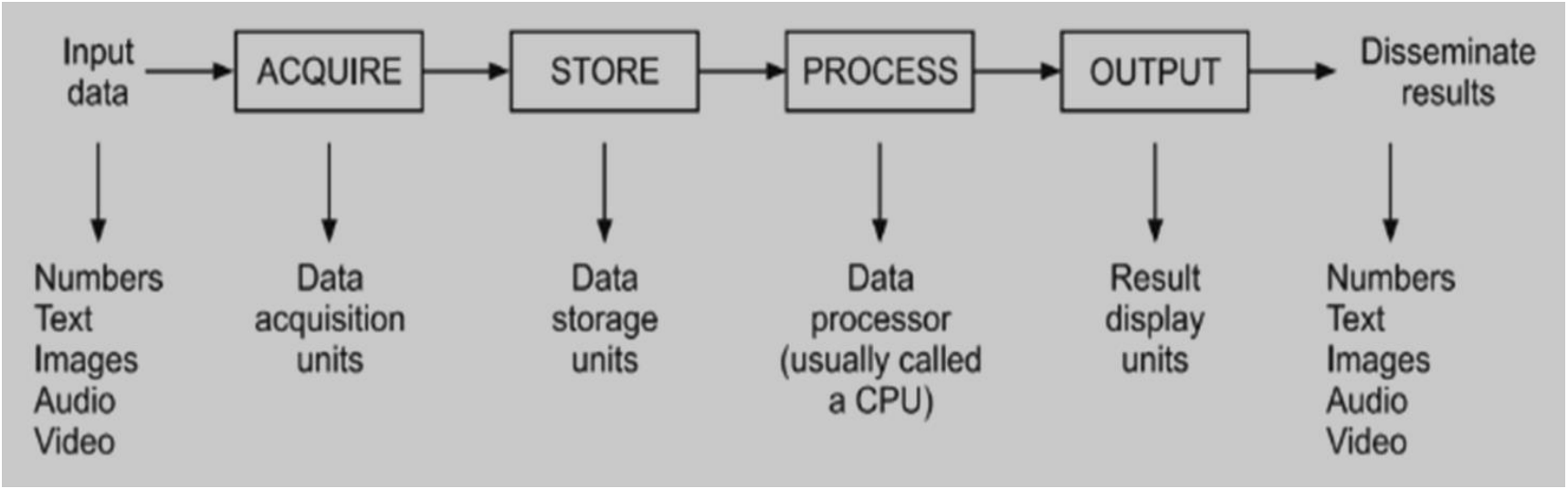


Figure 1.4: Various steps of in data processing

Fundamentals of Computer System

It has been a long-held belief by many philosophers that knowledge is power and that knowledge stems from understanding of information; information, in turn, is the assigning of meaning to data. To develop learners' understanding of information technology, we start by defining these three related concepts as shown in Figure (1.5).

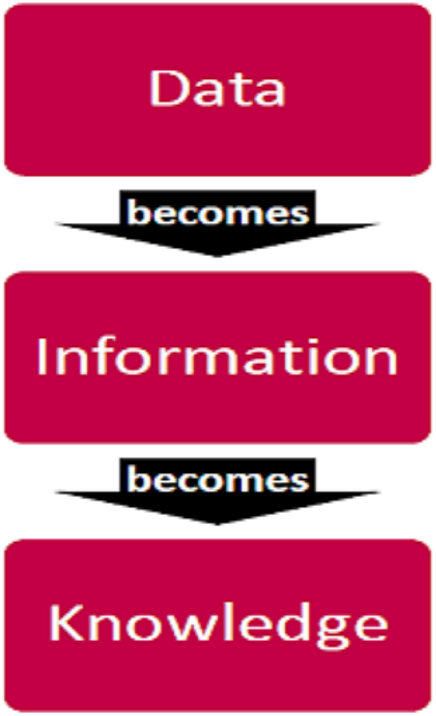


Figure 1.5: Data – Information – Knowledge

Fundamentals of Computer System

- **Data**

The concept of data is commonly referred to as ‘raw’ data – a collection of text, numbers and symbols with no meaning.

Example 2:

- The following are some types of user data:
- • 3, 6, 9, 12, …etc
- • 161.2, 175.3, 166.4, 164.7, 169.3, …etc.
- • Cat, Dog, Lion, Rabbit,… etc.
- • Ahmed, Ali, Khalid,… etc.
- • &, $, #, @,… etc.

Fundamentals of Computer System

➢ Information

Information is the result of processing data, usually by computer.

Technically, data are raw facts and figures that are processed into information. It may be helpful to view information the way it is structured and used, namely: data, text, spreadsheets, pictures, voice and video. Data are discretely defined fields. Text is a collection of words. Spreadsheets are data in matrix (row and column) form. Pictures are lists of vectors or frames of bits. Voice is a continuous stream of sound waves. Video is a sequence of image frames.

Example 3:

- The following are some types of information:
- 3, 6, 9, and 12 are integer numbers.
- Cat, Dog, Lion, and Rabbit are animals.

Fundamentals of Computer System

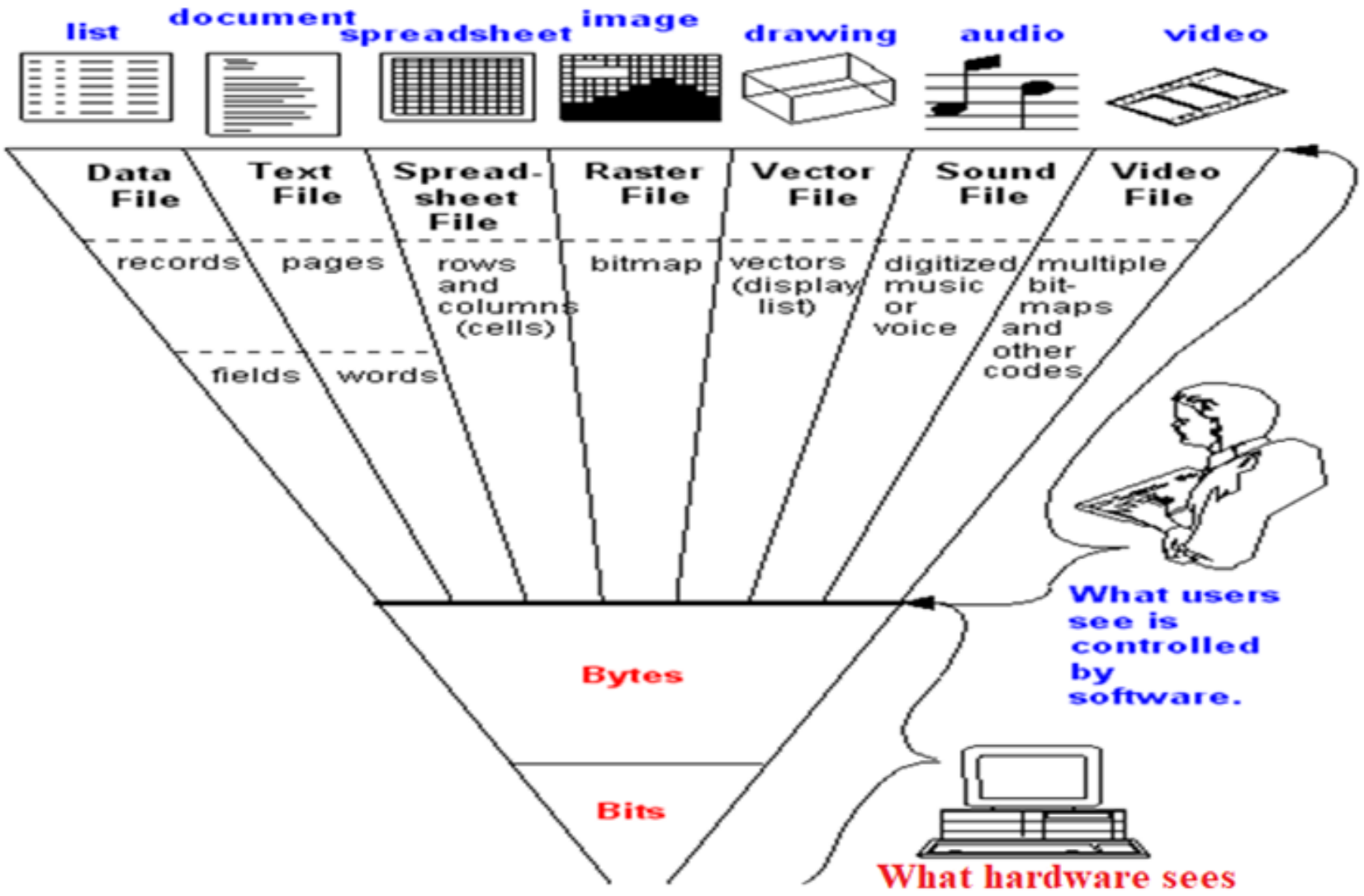


Figure 1.6: Types of information file

Fundamentals of Computer System

The digital Information can be explained as digital data bits (original data bits) called user data, encapsulated with extra bits, these extra bits are used for flag, address, and control, these can always be positioned before user data, these bits are called as a (Head), while the extra bits for detection and correction of errors can be positioned at the end after the user data, these bits can be expressed as a (Tail) as shown in Figure (1.7) and (1.8).

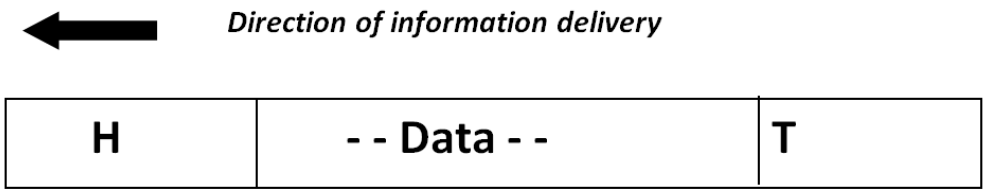


Figure 1.7: Fields of digital information steam

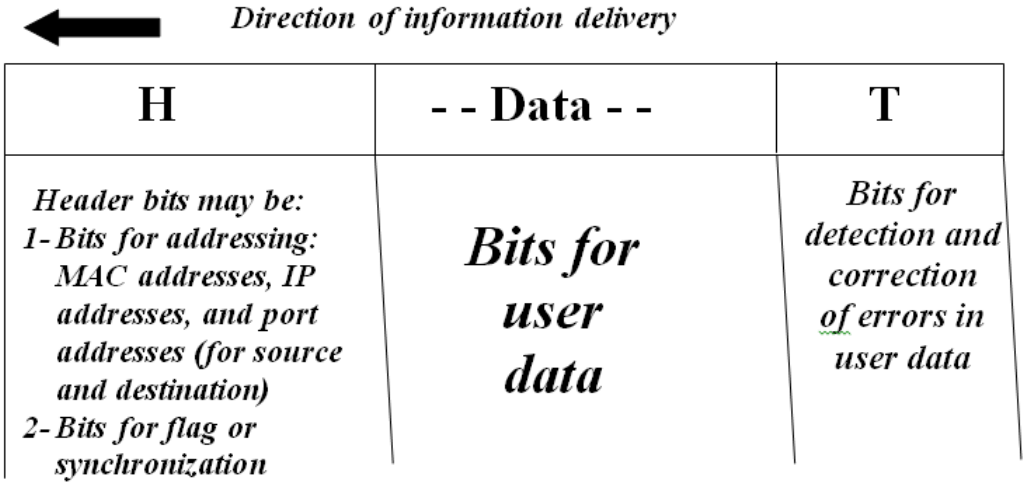


Figure 1.8: Descriptions of head and tail fields in information stream.

Fundamentals of Computer System

Generally, information can be created from a group of data under certain process as shown in Figure (1.9).

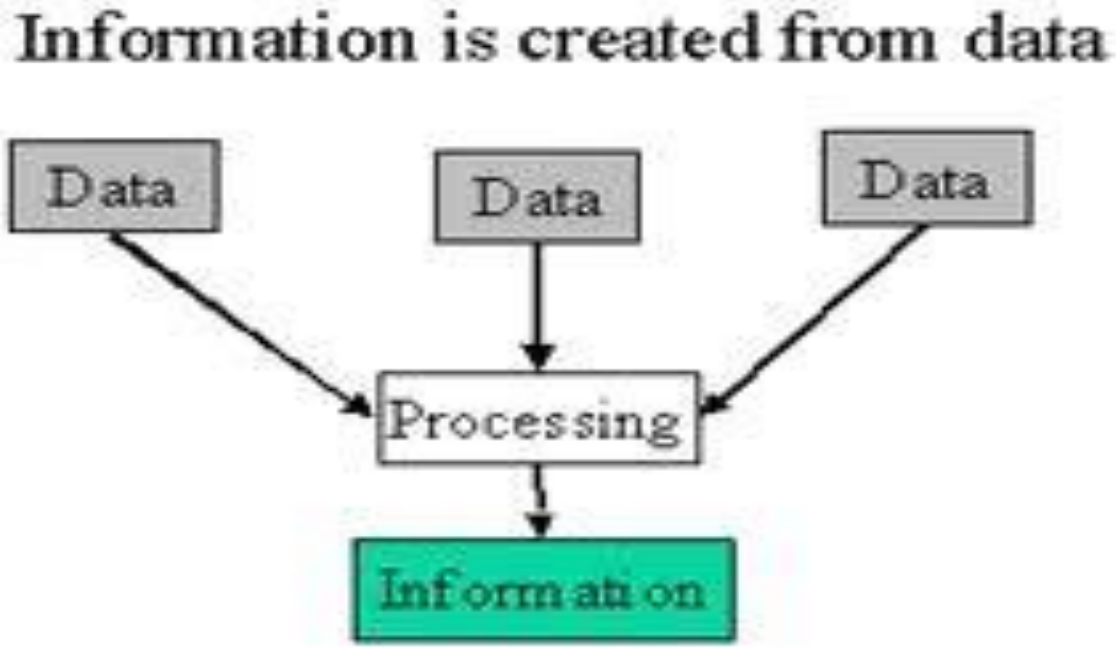


Figure 1.9: Information as a group of data under process

Fundamentals of Computer System

➢ Knowledge

Basically, knowledge is produced as a result of understanding information that has been given to us, and using that information to gain knowledge of how to express facts or solve problems.

In fact, ***data*** when aggregated become ***information***, and information when aggregated become ***knowledge*** as shown in Figure (1.10).



Figure 1.10: Grouping of Data - Information – Knowledge.

Applications of Information Technology

➢ Information technology in entertainment

In the past the sources of entertainment were stories, magic shows, drama, music, books, and physical games but as our interests evolved we changed our mode of entertainment to online gaming, watching movies, social media, browsing, and many more.

➢ Information technology in education

It can be applied in several ways. This can be accomplished through virtual lectures, PowerPoint presentations, homework, online classroom assignments, and educational video games.

➢ Information technology in business

The goal of business information technology is to meet firms' growing needs and customers' rising expectations.

➢ Information Technology in Health

Health information technology (IT) offers the ability to improve individual health and provider performance, resulting in a higher quality of life.

Key IT Advancements

Technology	Description
Cloud Computing	On-demand computing resources delivered over the internet for scalability.
Artificial Intelligence	Intelligent machines that are capable of human-like tasks such as speech recognition.
Internet of Things	Networked physical devices that exchange data and interact with the environment.
Big Data	Management and analysis of large and complex datasets.
Cybersecurity	Measures to protect computer systems and networks from unauthorized access.
Blockchain	Distributed ledger system ensuring transparency and security in transactions.
Virtual Reality	Creation of simulated environments for immersive experiences.
5G Networks	Fifth-generation wireless technology enabling advanced applications.
Edge Computing	Decentralized computing closer to data source, reducing latency.
Quantum Computing	Utilizes quantum mechanics for exponential processing power in specific tasks.

Future of Information Technology

The base of information technology is going to be the same, more technologies will be developed to ease how we utilize IT at work, at home, and everywhere else in our life.

Textbooks[الكتاب المنهجي]

Authorized by members of academic staff in Cambridge University “Cambridge International AS & A Level - Information Technology - Topic 1.1 Data, information and knowledge”, Cambridge International A-Level, 2017.
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