RIASSUNTI DEI TESTI DEL LIBRO WORKING WITH NEW TECHNOLOGY:

A computer, which is an electronic device, consists of both hardware and software. Computers come in all shapes and sizes, from a tiny ‘embedded computer’ (these are microchips found inside a variety of machinery and equipment, such as pocket calculators, car engines, and video-game consoles) to a gigantic ‘mainframe computer’ (these are large powerful ‘supercomputers’, with thousands of linked microprocessors). The most common type of computer is the PC (Personal Computer), and it can come in many forms.

Hardware refers to all the pieces of equipment that you can see and touch. The software, instead, refers to all the programs which tell the hardware what to do. For example, operating systems like Windows or macOS control how the hardware interacts with the user and other software, while applications like Microsoft Office or Adobe Photoshop provide specific functionalities.

Hardware can be divided into four groups corresponding to the computer’s four basic functions:

* **Takes data:** Input devices such as keyboards, mice, and touchscreens allow users to input data into the computer.
* **Processes the data according to the instructions in the programs:** The CPU (Central Processing Unit) performs calculations and executes instructions provided by software programs.
* **Show the results to the user:** Output devices like monitors, printers, and speakers display or present the processed data to the user.
* **Stores this result in its memory:** Storage devices such as hard drives and solid-state drives store data and programs for later use.

All the different pieces of hardware are interlinked through a communication network called a ‘bus’. The centre of communications is the ‘motherboard’ under the control of the CPU. The CPU has got a speed, named ‘clock speed’ and it’s measured in Hertz (cycles per second), with each cycle representing one operation. A CPU with a higher clock speed can perform a greater number of operations per second, leading to faster data processing and overall system performance. The computer works with two types of internal memory:

* **ROM (Read Only Memory):** is a small permanent store of data which cannot be erased or changed. It contains essential details about the computer and programs which enable the CPU to start working when the computers are switched on. Other types of permeant memory are **PROM (Programmable Read Only Memory)** and **EPROM (Erasable Programmable Read Only Memory)**. The first one is programmable only once, and the second one can be programmed multiple times.
* **RAM (Random Access Memory):** is the memory used by the computer temporarily to store files and programs which the user is working on at thew moment. This memory can only keep the data when the computer is powered on otherwise the data is lost. Other types of permeant memory are **SRAM (Static Random Access Memory)** and **DRAM (Dynamic Random Access Memory)**. SRAM and DRAM differ primarily in their internal structure and intended purpose.

The data can also be stored permanently using a method called ‘backing storage’. Devices used for this purpose include:

* **Magnetic memories:** These memories exploit the phenomenon of polarization, where each bit is stored by magnetizing the corresponding cell in one direction or the other. Reading and writing occur through a head. An example of this type of memory is the **hard disk**, which consists of a series of magnetized metal discs stacked on top of each other. Each disc spins rapidly while a small arm moves just above them, reading or writing data. The storage capacity of hard disks is measured in gigabytes.
* **Optical memories:** These memories utilize light for reading and writing data. Each bit is stored by modulating the intensity or presence of light in the corresponding cell. Reading and writing occur through a head that interacts with the optical properties of the storage medium. Optical memories are resistant to physical damage and provide a high data density, long lifespan, and protection against data being overwritten. Examples of these memories are **ROM (Read Only Memory)**, **WROM (Write Once Read Many)** and **ERASABLE**.
* **Flash memory:** These memories have a semiconductor circuit, are rewritable, lightweight, and compact. An example of this type is the **USB flash drive**.

The computer has ports and connections to enable the operation of other devices with it. Examples are **power button**, **Ethernet port**, **HDMI port**, **USB ports** (there can be various types of USB ports in computers, depending on the year of production of the model itself), **SD card slot**, **power port**, **Firewire port**, **mini display port**, **audio in port** and **audio out port**. The connections may also be made wirelessly like **Bluetooth**, **Wi-fi** and **a network receiver.**

When you buy a computer, you should consider the intended purpose beforehand, and based on that, choose a specific type by examining the computer's features:

* **Size: r**efers to the physical dimensions of the computer, which can range from small portable devices to large desktops.
* **Display: i**ndicates the size and quality of the computer's screen, including resolution and the technology used (e.g., LCD or LED).
* **Processor: r**epresents the computer's "brain" that performs operations and calculations. Its speed and the number of cores influence performance.
* **Memory: r**efers to the computer's RAM, which is used for running programs and temporary processes.
* **Storage: i**ndicates the permanent storage space available on the computer, such as the hard disk drive or solid-state drive (SSD).
* **Graphics & videos:** refers to the computer's ability to handle graphics and video, important for gaming and multimedia applications.
* **Connections:** indicates the various types of ports and connections available on the computer, such as USB, HDMI, and others.
* **Wireless:** refers to the computer's wireless capabilities, such as Wi-Fi and Bluetooth.
* **Audio:** indicates the quality and audio capabilities of the computer, including built-in speakers and headphone jacks.
* **Battery:** represents the battery capacity in the case of a portable device, indicating battery life.
* **Operating requirements:** refers to the minimum system requirements of the operating system and applications you want to use on the computer.
* **Operating system:** indicates the preinstalled or available operating system for the computer, such as Windows, macOS, or Linux.

Software can be divided in two basic types:

* **Systems software:** this software is a permanent component of the computer that controls its fundamental functions. An example is the **Operating System (OS)** which manages the computer’s resources and allows all the various hardware and software components to work together. An advanced OS allows multiprocessing, in which several programs can run at the same time. The OS is stored in a ROM. The OS stores data in collections, named ‘files. The files can also be grouped together, for more convenience, into directories of folders. Modern Operating Systems provide a **Graphical User Interface (GUI)** to make programs easier to use.
* **Application software:** this software is chosen by the user, and it’s loaded into the computer to perform specific tasks, such as word processing or drawing. Application software depends on the functions provided by the systems software.

Software programs are created by system analysts and computer programmers. The system analyst studied the requirements and objectives of the potential users and decides what the program should do and how it should work. The programmers then write the detailed programs based on these guidelines. The programs require two things:

* **Database:** thisis an information that the program processes.
* **Algorithms:** this is a sequence of steps that the program follows to process an information.

Preparing a program begins with a complete description of the job that the computer must perform. This job is written after detailed consultation with the office managers or engineers. The job description is then used to prepare diagrams, called ‘system flowchart’, that show in graphics form all the steps needed to complete the task. Based on this masterplan, the program instructions are then written, encoded in a particular programming language. After it’s written, it is tested to see if it works according to the specifications (this phase is called ‘**alpha testing**’) and to eliminate any programming mistakes, named **bugs**. The program is then given to the users for **beta testing**. The users put the program to work under real-life conditions to see whether it really can carry out its tasks correctly. Further modifications may be needed before it is given final approval.

In the world of computer science, there are two types of languages:

* **Low-level languages:** these languages are comprised of a set of machine instructions, which are sequences of bits, namely 0s and 1s. One example of these language is Assembly.
* **High-level languages:** these languages also called ‘programming languages’ resemble spoken or mathematical languages, and they are used by programmers to write programs. Examples of these are SQL, Java, JavaScript, C++, C#, Python, PHP, Ruby, Swift and C.

In recent years, especially in the business world, an alternative way to save data has developed, which is named ‘**cloud computing**’. We already use this method of storage nowadays when we use Google (drive, documents, etc.), or Facebook and Instagram. Cloud computing services are growing rapidly and are being offered by major firms in the IT word. In the business this technology is used to keep many information and the company invest large sums of money for this service. With cloud computing, information technology begins to resemble a utility, such as electricity, gas or water, to be used and paid for according to consumption. There are five benefits for the business:

* **Cost:** the IT provider can cut costs by offering similar services to numerous companies. Each company only pays for services it uses.
* **Efficiency:** IT providers constantly update their software, adding new improved features. Problems are solved by them, and the companies can concentrate on their main business.
* **Flexibility:** cloud services are built to respond to sudden increases in workload. This can resolve the seasonal variations in their IT services
* **Mobility:** cloud services are designed to be easily accessible from any location.
* **Ecology:** many users sharing large systems means less waste of energy and lower carbon emission.

In the ever-evolving digital age, the use of passwords has become essential to ensure the security of online accounts and protect personal data from unauthorized access, representing a fundamental element in safeguarding privacy and cybersecurity. The password is a **combination of letters, symbols and numbers mixed**. When you create a password, you must **avoid the obvious**, you mustn't **use any single word** or **base passwords on personal data**. You could **use a password manager** for creating it. Security experts agree to **use a long password**, a minimum of 12-14 characters (8-digit passwords can be cracked in a few hours). Unfortunately, a long password is difficult to remember and to type. The solutions to this problem are **use a ‘passphrase’ rather than a ‘password’** or **take a line from a favourite song**. These are easy to remember, but very difficult to crack. In the most critical contexts, such as hiding credit card numbers or confidential government documents, **encryption** is used. This thing is an essential element in software used for storing or transmission data which needs to be a secret. In involves the conversion of the original data, called ‘**plaintext**’, into a form called ‘**ciphertext**’ that cannot be read by unauthorised people. The conversion of encrypted data back into its original form is called ‘decryption’. There is a cipher that is the key. This key normally takes the form of a series of characters selected from the 256 ASCII character available on a standard keyboard. Because of the vast number of different combinations possible, a key just ten characters long could take billions of years to decode. With conventional ‘**symmetric encryption**’ the same key is used for both encryption and decryption. Asymmetric encryption, also known as ‘**public key cryptography**’, requires two separate keys (one for encryption and one for the decryption’). The public key is used for encrypting the data and is freely available. The data can only decrypt using a private key, which is exclusive to the proprietors (or homers) of the data. This is used today for example when we make payments.