**RIASSUNTI DEL LIBRO WORKING WITH NEW TECHNOLOGY.**

**Where Computers Are Used:**

Computers have an enormous range of applications in many different fields.

* **Industry:** They enable engineers and architects to create 3D models and help managers in planning and controlling automated machinery.
* **Science:** Computers collect, store, and analyze data, running simulations that study real-life systems. Chemists design and test new drugs, while meteorologists base their predictions on simulated weather models.
* **Government:** Vital for national and local administration, computers compile statistics, manage social security benefits, handle tax records, and maintain criminal records.
* **Telecomunication:** Modern communication systems depend on computers. They control telephone systems, satellite operations, and TV and radio broadcasting, linking computers globally through the Internet.
* **Education:** Increasingly used in teaching, computers offer lessons ranging from simple exercises to complex simulations, essential in medical schools and training centers. E-books and online resources are replacing traditional textbooks.
* **Entertainment:** Popular for video games, artists use them for creating realistic images and music compositions. The film industry relies on computer technology for special effects and CGI (Computer-Generated Images).

**Types of Application and Their Functions:**

* **Spreadsheet programs:** Main tools in the financial sector. Input economic data into table cells, with mathematical equations linking the cells. Used by accountants to create financial models and test economic decisions. Includes graphic tools to represent data in graphs and charts. *Examples*: Microsoft Excel, Google Sheets.
* **Database programs:** Allow storing large amounts of information and searching them in various ways. Used in business, government, science, and libraries to organize and store data. *Examples*: Microsoft Access, MySQL.
* **Word processing programs:** Allow typing, editing, and correcting documents like articles, reports, and letters. Offer tools to check grammar, spelling, and punctuation. *Examples*: Microsoft Word, Google Docs.
* **Graphics programs:** Used to create, transform, and view images. Allow working with original or digitized images, changing size, layout, and colors. Some programs manage moving images for special effects and animations. *Examples*: Adobe Photoshop, GIMP, Paint 3D, Microsoft Paint.
* **CAD programs:** Essential for engineering and other professions. Create detailed 2D or 3D plans of components and machinery. Used to design and test projects before physical construction. *Examples*: AutoCAD, SolidWorks.
* **CAM programs:** Assist industrial managers in planning and managing production, organizing materials, and controlling robots and assembly lines. *Examples*: Mastercam, Fusion 360.
* **Simulation software:** Used in all sciences to develop and test theories. From galaxy formation theories to medical analysis of internal organs. *Examples*: MATLAB, ANSYS, Tinkercad.
* **Educational programs:** Teaching tools for schools and training centers. Useful for subjects requiring repetitive practice, like math and foreign languages. Some offer simulations for practical training. *Examples*: Khan Academy, Duolingo, Google Classroom.
* **Video/Audio-Editing programs:** Allow modifying and enhancing video and audio files. Examples include Adobe Premiere, Final Cut Pro, and Audacity. *Examples*: Adobe Premiere Pro, Final Cut Pro, Audacity.
* **Voice Recognition programs:** Recognize and transcribe spoken language into written text. Used for voice commands, dictation, and voice assistants like Siri and Google Assistant. *Examples*: Dragon NaturallySpeaking, Google Assistant.

**The spreadsheet:**

A spreadsheet is a program designed to process and display data, both numerical and textual, in various ways. It allows users to record data, perform calculations, and create charts and graphs. A spreadsheet is structured with vertical columns (labeled A, B, C, etc.) and horizontal rows (labeled 1, 2, 3, etc.), and each cell is identified by its coordinates (e.g., B2, D4). Users can input text, numerical data, or formulas into cells by clicking on them.

The main functions of a spreadsheet include:

* **Recording data for easy searching**
* **Performing calculations with the data**
* **Producing graphs and charts**

Cells in a spreadsheet are interlinked, so changing the value in one cell will automatically update related calculations. This feature allows users to see the effects of hypothetical scenarios, such as tax changes, instantly. Spreadsheets can also be linked to other spreadsheets or databases for more complex data exchanges and calculations.

Charts are a common feature of spreadsheets, and there are several types, such as:

* **Bar Chart:** Used for direct comparisons, using horizontal bars.
* **Vertical Bar Chart:** Used for direct comparisons, using vertical bars (columns).
* **Pie Chart:** Shows how a total amount is shared among different categories. Each "slice" represents a percentage of the total.
* **Segmented Bar Chart:** Similar to a pie chart, where the complete bar represents 100%.
* **Line Graph:** Displays changes over time, providing a clear visual indication of trends. Several lines can be shown together for comparison.
* **Scatter Graph:** Used to show the relationship between two variables. Each point represents an observation with its coordinates.

For example, Microsoft Excel is a prime example of a spreadsheet program. Excel offers a wide range of features for recording data, performing calculations, creating charts and graphs, and much more. Excel allows users to input text, numbers, and formulas into cells, which can be interconnected for complex data analysis and visualization. Other spreadsheet programs include Google Sheets, LibreOffice Calc, and Apple Numbers.

**Databases: An Overview.**

A database is a way of storing large quantities of information so that, using a computer, it can be:

* **Searched** to find specific data.
* **Sorted** (i.e., organized in different ways) to compare data and create reports.

Databases are essential in various areas of modern life, such as government, business, science, and education. For example:

* **Tax authorities** use databases to keep records of taxpayers and payments.
* **Businesses** use them to keep customer accounts.
* **Schools** use them to maintain student records.

A simple flat-file database is like a table with vertical columns, called "fields", and horizontal rows, called "records." The records refer to the people or things with which the database is concerned (students, customers, products, etc.), and the fields contain various categories of information about them. Fields can consist of different types of data:

* **Text:** For example, names or brief descriptions (codes, such as M/F for male/female, are often used to save space).
* **Dates or times:** Which must follow a standardized format (e.g., 18/09/02).
* **Numbers:** Which may be integers (whole numbers: 6) or decimal numbers (6.5).
* **Calculated numbers:** Which are automatically worked out using a formula (e.g., a person's age based on their date of birth + today's date).
* **Graphics:** Which may be a photograph or any other type of image.

A flat-file database enables a user to view data from only one file at a time. A relational database is a more complex system in which data from many different files are interlinked. In this case, a database management system (DBMS) is necessary to organize and analyze all this data. A programming language, called Structured Query Language (SQL), allows users to define the sort of data they are looking for and perform various operations on the data, such as:

* **Retrieve data:** Asking the database to show specific information (e.g., all students enrolled in a particular course).
* **Add data:** Inserting new records into the database (e.g., adding a new student with their name, age, and course of study).
* **Update data:** Modifying existing information in the database (e.g., updating a student's age if there was an error in the record).
* **Delete data:** Removing records from the database (e.g., deleting a student's record if they have withdrawn from the course).

SQL is essential for organizing and managing large amounts of data efficiently and is widely used across various sectors, including businesses, governments, and educational institutions.

**Computer graphics:**

* **Pixel-based Programs (Painting Programs):**

Pixel-based programs are created by a scanner or digital camera. They are typically photographs or examples of artwork. The image consists of a collection of small colored dots called 'pixels' in a file known as a 'bitmap.' The quality of the image depends on the resolution: the number of pixels per square inch. The more pixels, the sharper and more detailed the image is. Bitmap files are very large and are usually converted into JPEG files (Joint Photographic Experts Group). JPEG compresses the image to occupy less memory without noticeable loss of quality. Graphics software can manipulate pixel-based images in various ways such as sharpening the image to make it clearer, adjusting brightness and contrast, altering colors or converting to grayscale, resizing the image (though increasing size lowers quality), rotating or flipping the image, selecting areas of the image for cutting or copying.

* **Vector-based Programs (Drawing Programs):**

Vector-based programs are produced by drawing programs such as CorelDraw and Adobe Illustrator. They are typically technical drawings, plans, and diagrams. Most clip-art is vector-based. The image is created from basic shapes like lines, circles, and rectangles, and saved as coordinates and equations, resulting in smaller files than bitmap files. Vector graphics offer greater flexibility; images are built from separate objects which can be independently moved, resized, or altered. Background colors and line properties can be changed instantly. The whole image or parts can be enlarged without loss of quality.

**Additional Clarification on JPEG and Other Formats:**

* **JPEG (.jpeg or .jpg):** A method of lossy compression for digital images, balancing storage size and image quality.
* **PNG (.png):** Lossless compression format that retains all image data and quality but results in larger files compared to JPEG.
* **GIF (.gif):** Lossless format, limited to 256 colors, suitable for simpler images like graphics or logos.
* **TIFF (.tiff or .tif):** High quality and flexibility, often used in professional photography and publishing, supports layers and multiple pages.
* **BMP (.bmp):** Uncompressed bitmap image file, high quality but large file size.
* **HEIF (.heif or .heic):** Efficient compression without loss of quality, commonly used on Apple devices.
* **SVG (.svg):** Scalable vector graphics, used for interactive and animated web graphics.
* **RAW (.raw):** Raw image file containing minimally processed data, preferred by professional photographers for post-processing.
* **WebP (.webp):** Superior compression for the web, supports both lossy and lossless compression.
* **ZIP (.zip):** A compressed archive file format that can contain multiple files and directories. Utilizes lossless compression and is used to bundle and compress large sets of files, making it easier to transfer and store.

**Is Information Technology making us more stupid?**

This article explores how the increasing reliance on technology, such as satellite-navigation systems and search engines like Google, impacts the brain's ability to remember and process information. The enlargement of the brain area storing mental maps in London cab drivers is highlighted as evidence that frequent and intensive use of spatial navigation can enhance this area of the brain. However, there are concerns that this ability might diminish due to technological dependence, as people rely more on GPS and similar tools instead of developing their own mental maps.

The article, written by Paul Owen, explains how technology influences brain activity, enhancing decision-making speed but reducing concentration and calmness. Owen discusses an experiment where participants were divided into two groups. One group used less intuitive software that required more effort to navigate and solve problems, while the other group used more user-friendly software designed to simplify tasks. The results showed that participants using the less intuitive software retained their problem-solving skills better than those using the more user-friendly software. This suggests that simpler tools may impede proper learning by reducing the cognitive effort required to solve problems, which in turn can affect the brain's ability to concentrate and process information effectively.

**Technology and Healt:**

The use of modern technology, such as computers, smartphones, and tablets, has led to various physical issues. These problems arise from poor posture, prolonged use of electronic devices, and other harmful habits. Below are the main health issues related to technology use, along with advice on how to alleviate these problems.

**Health Issues and Advice:**

* **Toasted Skin Syndrome**
* Description: This condition is caused by balancing a hot laptop on knees or upper legs, similar to the effects of sunburn.
* Advice: Avoid direct contact with hot laptops by using a desk or cushion between the laptop and your legs
* **Obesity**
* Description: Excessive screen time contributes to expanding waistlines and related health problems.
* Advice Engage in regular physical exercise and limit screen time.
* **Vision Problems**
* Description: Prolonged screen time can lead to headaches and tired eyes.
* Advice: Adjust screen settings, take regular breaks, and follow the 20-20-20 rule (every 20 minutes, look at an object 20 feet away for 20 seconds).
* **Hearing Problems**
* Description: Listening to loud music through headphones can damage hearing, especially in teenagers.
* Advice: Use automatic volume control and set a maximum volume limit.
* **Thumb Muscle Issues**
* Description: Repetitive pressing of small mobile phone keys can cause thumb muscle problems.
* Advice: Use a touchscreen or reduce prolonged phone use.
* **Back and Neck Pain**
* Description: Slumped sitting positions in front of computers can cause back and neck pain.
* Advice: Maintain good posture, use ergonomic furniture, and take breaks to stretch muscles.
* **RSI (Repetitive Strain Injury)**
* Description: Prolonged use of the mouse or keyboard can cause repetitive strain injury affecting the wrist and other body parts.
* Advice: Use supportive gear for RSI, take regular breaks, and use ergonomically designed devices.

**Linking Computers:**

Computers can be interconnected via telephone lines, cables, or other communication links, creating a network that enables the sharing of information and resources. The Internet is the largest network of all, but there are also private networks for accessing confidential databases. There are several network topologies, each with unique characteristics:

* **Bus Network**: All computers are connected to a single communication line.
* **Star Network**: Each computer is connected to a central node. There is also an **Extended Star Network**, where multiple stars are connected.
* **Mesh Network**: Each computer is connected to multiple other computers. This can be a **Full Mesh** (where every computer is connected to every other computer) or a **Partial Mesh** (where each computer is connected to only some of the others).
* **Ring Network**: Each computer is connected to the next, forming a ring.

Computers must be connected via a modem, which modulates digital signals into tones to travel over telephone lines. The concept of a protocol is introduced, along with the roles of routers, servers, and clients. Furthermore, there **are Local Area Networks (LANs)**, **Wide Area Networks (WANs)**, and **Metropolitan Area Networks (MANs)**:

* **LAN (Local Area Network)**: A network that covers a small geographic area, such as a building or campus.
* **WAN (Wide Area Network)**: A network that covers a large geographic area, such as a city, country, or even the world.
* **MAN (Metropolitan Area Network)**: A network that covers a larger area than a LAN but smaller than a WAN, such as a city or metropolitan area. Within a LAN, computers can be connected in different topologies: bus, ring, or star. Additionally, separate LANs can be connected via bridges and private intranet networks.

**How the Internet began:**

* **1960s**: The origins of the Internet date back to the Cold War when the US military was concerned about nuclear attacks destroying vital communications. They designed a communication system based on computers to resist nuclear damage.
* **1969**: ARPANET (Advanced Research Projects Agency Network) was established, linking dozens of military sites across the USA. Computers were programmed to relay messages, ensuring network functionality even if some sites were destroyed.
* **1974**: The creation of TCP/IP, a common system of addresses and communications procedures, allowed the rapid expansion of the Internet. This enabled the incorporation of other networks developed in universities and institutions.
* **Late 1970s**: The new network's potential for communication, especially for research and business, became evident. More sites, including those outside the USA, joined the network, leading to the development of an international network, the Internet.
* **1980s**: The military encouraged other organizations, such as academic institutions and large companies, to join ARPANET, recognizing that a larger network would be more robust in case of attack.
* **Early 1990s**: Until the early 1990s, the Internet was mainly used by academic and research organizations, and most information was text-based.
* **1991**: The introduction of the World Wide Web enabled the inclusion of graphics, animation, video, and sound, attracting a larger number of ordinary users.
* **1990s**: The explosion in personal computer sales made the Internet accessible to more people. Commercial organizations saw business opportunities, and specialist Internet companies developed. The web was increasingly used for advertising and sales.
* **2000**: By the year 2000, Internet usage had spread globally. Governments, companies, and ordinary people worldwide were using the Internet for communication, information, and business.

**Internet Protocols: OSI & TCP/IP models:**

The **OSI (Open Systems Interconnect) model**, created in **1984**, aims to standardize networking protocols to enable diverse systems to communicate. It consists of seven layers:

* **Application Layer**: This is the closest layer to the end user, which includes applications like email, web browsers, and file transfer programs.
* **Presentation Layer**: Responsible for translating data between application and network formats, this layer handles data encryption, compression, and transformation.
* **Session Layer**: This layer manages sessions or connections between devices, ensuring that data exchange is properly synchronized.
* **Transport Layer**: Ensuring reliable data transfer, the transport layer manages error detection, correction, and data flow control.
* **Network Layer**: This layer deals with data addressing and routing, determining the best path for data to travel across the network.
* **Data Link Layer**: Responsible for packaging data into frames, this layer also handles error detection and correction at the data link level.
* **Physical Layer**: The lowest layer, concerned with the physical aspects of the network, including cables, switches, and other hardware components.

The **TCP/IP (Transmission Control Protocol/Internet Protocol) model** was developed in the **1970s** and became the foundation of the modern Internet in the **1980s**. It is a more practical framework and has become the foundation of modern networking. It simplifies the OSI model into four layers:

* **Application Layer**: Similar to the OSI model's application layer, includes protocols like HTTP, FTP, and SMTP.
* **Transport Layer**: Responsible for end-to-end communication, includes the TCP and UDP protocols, managing data transfer reliability and flow control.
* **Network Layer**: Corresponding to the OSI network layer, handles data addressing and routing, primarily using the IP protocol.
* **Physical Layer**: Encompasses the OSI data link and physical layers, dealing with data framing, error detection, and physical network components.

These models, while different in complexity, provide essential frameworks for understanding and implementing computer networks. They enable devices and systems to communicate efficiently, making the Internet the powerful tool it is today.