

Summary

Basics of IT



EASY4ME 

Hardware

A hardware is all the components of the computer and peripheral devices – all the parts you can touch: monitor, printer, mouse, computer, hard drive...

1.1. input devices are devices used to input data

- **mouse, keyboard,**
- **touchpad:** to move the cursor on notebooks
- **touchscreen:** smartphones, tablets, ebook reader, navigation devices, machines like ticket machines, ATM's (Automatic teller machines) at banks have a touch-sensitive monitor which are used with fingers or stylus.
A touchscreen is an input and output device!
- **scanner:** to digitize images or texts.
Files in the computer are generated from photos and printed texts.
Large companies, such as insurance companies, immediately scan every letter they receive. Clerks receive, read and edit the scanned documents only on the PC.
- **webcam:** for video transmission via the Internet
- **microphone**

1.2. output devices make data visible or audible

- **printer:** laser printer or inkjet printer
- **screen/monitor**
- **speaker**

1.3. types of computers

- **personal computers (PCs):** are used by individuals (in contrast to mainframes)
- **desktop computers:** computers that are on or next to a table
- **notebook/laptop:** portable computer
- **tablet PC:** refers to a portable computer with a touch screen without a keyboard. Unlike notebooks, the user can input with stylus or fingers directly on the screen.

1.4. main parts of the computer

- **processor - CPU (Central Processing Unit)**
The CPU is the central processing unit of a computer.
- **ports/interfaces:**
USB (universal serial bus): for the connection of a variety of external devices such as mouse, keyboard, printer, scanner, hard drives, USB flash drives, cameras, printers...
(parallel and serial ports have been replaced by USB.)
HDMI: (High Definition Multimedia Interface) for the connection of monitors and projectors

VGA



network connection



a mouse with USB port



HDMI

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- **main memory / working memory (RAM)** for the short-term storage of data.

1.5. Which factors affect computer performance?

- **processor speed (= CPU speed):** is measured in MHz (megahertz) or GHz (gigahertz). Current processors have a clock frequency of up to 4 GHz.
- **working memory/random access memory (RAM):** the larger the RAM memory, the less frequently has computer to read from the much slower hard disk. Current PCs have 8 GB and more RAM. Special activities such as video editing may require more RAM (up to 64 GB!).

An older and slower computer can be made faster by installing an additional RAM and using an SSD instead of an HDD.

- **hard drive, HDD:** current PCs have hard drive sizes from 500 GB up to 3 TB storage capacity. SSD are much faster than HDD.
- **number of running programs:** when a computer slows down while you are working, close any unnecessary programs to free up RAM space. This speeds up the computer again.

1.6. storage of data

storage sizes

bit: the smallest unit of information
It is the state of either 0 or 1.

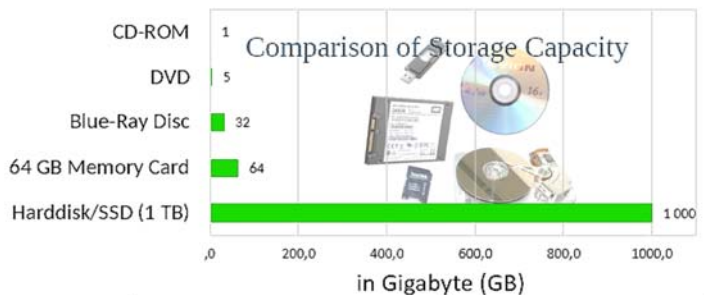
byte: 1 byte = 8 bits

kilobyte (KB) \approx 1,000 bytes

megabyte (MB) \approx 1,000 KB

gigabyte (GB) \approx 1,000 MB

terabyte (TB) \approx 1,000 GB



Instead of writing the correct conversion number of 1024 (= 2¹⁰), it is simpler to just write it as 1000.

mass storage devices

- **CD-ROM (Compact Disc):** an optical storage medium for music and various forms of data. CD-ROMs are burnt with a CD writer containing a laser light.
- **USB flash drives and memory cards** (SD card – they need a card reader)
- **DVDs:** distinguished from CD-ROMs by their higher storage capacity
- **blue-ray discs:** for storing videos
- a **hard disk** consists of one or more magnetic discs, which store data permanently. Hard drives can be installed in your PC or be external devices. Current PCs have hard drives of 500 GB to 3 TB, but uses **SSD** instead of HDD.
- **NAS (Network Attached Storage)** are storage devices connected to the network.
- **online storage:** offered by service providers on the Internet.

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working memory (RAM = Random Access Memory)

The RAM is the amount of working memory (RAM) of a computer. When the computer starts up, a part of the operating system is loaded into RAM.

The RAM is a volatile memory: when the electricity is switched off, the memory content is lost. A current PC has RAM memory of 8 GB or more.

ROM (Read Only Memory)

ROM is also a memory, normally its content can only be read, but not written. The content of the memory is not deleted by turning off the computer.

Each PC has a ROM memory where the BIOS is stored (**BIOS – Basic Input Output System**). The task of the BIOS is, among other things, to make the PC functional after switching it on and to start up (boot up) the operating system.

2. software

All types of computer programs are called software. Distinction is made between the Operating System (OS) and Application Software (Apps).

2.1. operating systems

An operating system is the software that enables you to use a computer. It manages the access to the hardware (storage, input and output devices) and controls the execution of programs.

Well-known operating systems are **Window 10**, **Linux**, **Android** (for smartphones), and **MacOS**.

2.2. application programs

- **word processing:** e.g. Word
- **spreadsheet program:** e.g. Excel
- **databases** work with large amounts of data entered in tables: e.g. Access
- **presentation:** e.g. PowerPoint. With a presentation program, you can make slides for a lecture or presentation. The contents of the page can be animated and accompanied with sound, graphics, video.
- **e-mail programs:** e.g. Outlook, Windows Mail, Thunderbird
- **web browser:** e.g. Microsoft Edge, Firefox, Chrome, Opera, Safari
- You can edit images with an **image editing program:** e.g. Photoshop, GIMP
- **computer games**

AIDS for people with disabilities:

- **speech recognition software** allows you to input commands and texts with spoken instructions. You can, thus, control the computer without keyboard or mouse.
- a **screen reader program** reads the contents of a page on the screen. This way, visually impaired and blind can work with a PC (This is also possible on smartphones)

2.3. graphical user interface (GUI)

To operate a PC, commands and data must be entered into your computer. Nowadays, this is done using a graphical user interface (GUI).

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A **GUI** makes it possible to operate application software by means of graphical elements, like icons, shortcuts, buttons, etc. Most of the time, this is done by using a mouse to click on or select the graphical items. Smartphones and tablets have a touch screen to do so.

3. network terminology

- **LAN** (Local Area Network): network within a school or a company.
- **WAN** (Wide Area Network): connects distant computers, also across countries. (e.g. the Internet is a WAN).
- **W-LAN** (Wireless-Local Area Network): multiple hosts are connected through wireless network cards (almost all laptops have Wi-Fi).
- **client**: e.g. a student computer. Several client computers can be connected to one server computer.
- **server**: a computer that provides services to clients is such as file server, print server, mail server, web server...
- **intranet**: is a network (LAN), which is available only within a company (usually in the same building).
- **extranet**: offers the possibility to access the company's network from the Internet, e.g. a representative abroad may log on to the internal corporate network to determine prices, orders, invoices etc.
- **Internet**: is the largest computer network. It consists of many smaller networks that link millions of computers. The most important services of the Internet are: e-mail (electronic mail), www (World Wide Web), and FTP (file transfer)

3.1. data transfer

upload, download and transfer speed of data

- **upload**: you copy data from your computer onto the Internet - for example, a photo on Facebook.
- **download**: you download something from the Internet to your own PC - such as a music file or a program.
- **bit rate = transfer speed = data transfer rate**:
It is measured in:
bps or **bit/s** (bits per second) = the number of bits transmitted per second
kpbs or **kbit/s** (kilobits per second) = 1024 bps (approx. 1000 bps)
mbps (megabits per second) = 1 048 576 bps (approx. 1 million bps)
A faster Internet connection (broadband connection) can reach up to 50 mbps.

4. information technology in everyday life

With the rapid development of computer technology, our everyday life has changed significantly. Many jobs were created in the IT (**I**nformation **T**echnology) or ICT (**I**nformation and **C**ommunication **T**echnology) sectors: technician, network administrator, programmer, web designer...

4.1. technical terms:

- **e-commerce** (electronic-commerce): this concerns shopping on the Internet, such as eBay, Amazon or mail orders. It is not bound by time and you can shop at home!
- **e-banking** or **online banking**: previously you had to go to the bank to transfer money. Nowadays, you can transfer money and ask for the account balance via online banking.
- **e-government** means governing and managing with the help of IT:
 - submit electronic questions and requests to authorities online
 - receive information electronically
 - cut through bureaucracy, e.g. by downloading forms, submitting employee tax assessments at the tax office over the Internet, etc.
 - also see help.gv.at

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- **e-learning:** learning on the computer, e.g. using platforms such as Microsoft Teams, easy4me.info, or various other tutorials.
 - **CBT (Computer Based Training):** using tutorials on DVD's and CD's.
 - **WBT (Web Based Training):** learning via the Internet
 - you can learn (almost) anywhere, anytime
 - tutorials with pictures and movies make learning more interesting and easier
- **telework** from home: the results of the work are transmitted to the company via the Internet.
 - advantages: fewer trips to work, flexible working hours, less office space needed in the company
 - disadvantages: less contact with colleagues, team work is more difficult

4.2. electronic communications

- **e-mail:** electronic mail
- **instant messaging:** conversations in real time, e.g. chat via Facebook Messenger or WhatsApp
- **internet telephoning (VOIP: Voice over IP)**
e.g. Skype or WhatsApp. The conversation is transmitted over the Internet. **RSS feed:** service on web pages similar to a news ticker. It contains the headings with a short text and a link to the original webpage.
- **web log (blog):** a kind of diary on the Internet, e.g. <http://scienceblogs.de>
- **podcast:** Podcasting refers to the production and supply of audio or video files over the Internet. Podcast is composed of the two words iPod and broadcasting.
- You can regard podcasts as radio or television broadcasts which you can view or listen to independent of broadcasting times. You'll find many podcasts on: **www.podcast.at**

4.3. online communities - virtual communities

e.g. Facebook, Twitter, WhatsApp have millions of members and provide an opportunity for geographically distant people to form a community.

Young people and children should observe a few rules:

- be careful with your personal/private information: don't use your complete name and address, use your first name or nickname.
- think about your profile image - you cannot know what others will do with your picture! Rather choose neutral and harmless images. The whole world can see these pictures!
- be careful with online friends you should not easily meet them in person! You cannot be sure whether someone really is who they say they are. Be very careful of meeting online friends - only meet in public and safe places!
- posts in forums are visible to the public: write only what you still want to read in some years! Careless statements can still be found years later, when you might have a completely different opinion.
- Don't use pictures or videos of other people without asking for their permission! Copyright issues can result in high fines.
- Do not join in cyber-bullying; rather help the victims! Bullying is not only despicable behaviour; it is even considered a criminal offence!

4.4. ergonomics and health

Ergonomics aim to protect workers from physical harm caused by their work. The workplace and its surroundings should be optimally designed:

- proper lighting - no glare - no backlight (E.g. monitor at a right angle to the window)
- correct position of the keyboard and monitor - height-adjustable, swivel chair.
- long working hours on the computer - you should take breaks in between, stand up and stretch.

Un-ergonomic workplaces can lead to physical ailments and chronic conditions!

4.5. computers and the environment - What can I do?

- printer and toner cartridges - if possible, refill or recycle.
- electricity - PC needs to be turned off when not in use. Current PCs go into a sleep-mode with minimal power consumption when not in use.

5. data security

5.1. not everyone has access to data - user identification

On many computers, important data is stored, which not everyone should read or copy. Users must, therefore, log on with a **username** and **password**, so that they only have access to the data to which they are entitled.

Your user name and password is confidential and may not be passed on to unauthorised persons.

A good password is a password that cannot be guessed easily:

- use capital and small case letters
- use numbers
- use special characters
- the password should be more than 8 characters
- the password should not be from a dictionary

5.2. backup – securing data

The computer is broken - where is my data?

If a hard disk is faulty or if a fire breaks out, computer data can be destroyed. Therefore, making security copies (backups) on external disks (hard drives, DVDs, etc.) which you store in a different location helps you recover data in the event of an accident.

Also, through computer theft, data can be lost. Notebooks can be protected against theft by a steel cable with a lock.

5.3. firewall

The firewall controls data transfer between computers. It protects computers from unwanted access over the network. Modern operating systems, like Windows 10, have a firewall software, but it can also be provided through a different hardware (e.g. Many routers also have a firewall feature).

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5.4. computer viruses - malicious software

What is a computer virus?

Computer viruses are unwanted programs that spread independently.

If the computer responds more slowly than usual, or no longer works as usual, a computer virus can be the cause.

Computer viruses can spy out important personal data and forward it or even destroy it. Therefore, you should seriously avoid a virus

How does a virus get on my PC?

Infected files can be sent as an e-mail attachment or can be copied to your PC via Internet downloads. When an infected program is opened, the virus spreads.

Also, when you visit a web page, your computer can be infected. The risk is particularly high when using an operating system or browser without the latest security updates.

How do I protect myself against computer viruses?

- don't install any programs from unsafe sources
- don't open any e-mail attachments from unknown senders
- activate an antivirus software, such as Microsoft Defender
- antivirus programs update automatically, so that they recognize the latest viruses
- The latest security updates for your operating system should be installed

6. copyright

Every person who writes a text, paints a picture, composes music, takes photos, automatically owns the copyright. They can sell copies of their work and can claim financial compensation for illegal copies.

So, if someone copies third-party images or text without permission and publishes them on their home page, they commit a breach of copyright that may result in paying a fine.

There are several terms that describe the permitted use of a software:

- **freeware:** Freeware can be used free of charge.
- **shareware:** These programs may be used free of charge for a certain period of time to test them. After this trial period expires, the program will prompt the user to purchase the full version.
- **open source:** in addition to allowing users to share this software with others freely, it also allows users to view its source code and to make changes to it. Examples of this are the Linux operating system and the programs LibreOffice, Firefox, GIMP, and many other programs.
- **commercial software** - such as Microsoft Word, Excel, PowerPoint, Windows 10, Photoshop...

You need to buy this software, copying it is illegal! At the time of purchase, a registration code is given which needs to be entered when installing the program for the first time.

The permitted use of a purchased program is regulated in the user license or end user license: it usually states that the program may only be installed on one computer.

Lawfully purchased (licensed) software can be recognized by the product ID and product registration to your name or company name.

7. epilogue

Help to improve this text! If you have suggestions, write our team at easy4me.info

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