



Basic Concepts of Information and Communication Technology

Notes

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Author:

Dario Ilija Rendulić

Expert review:

Victor Kuo

Proofreading:

Ana Dzaja

Cover:

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Preface

Modern society is characterized by sudden growth and development of information technology (IT) resulting in large dependence of the society, in a wider sense, on the individual knowledge and competence of a person in the IT area. Although this dependence grows on daily basis, **the human right to education and information** is not extended to IT area. Problems that affect society as a whole emerge, creating gaps and distancing people from the main reason and motivation for advancement - from **opportunity**. Today, being a computer illiterate person means to be a person who is unable to participate in modern society, a person without opportunity and in spite of acknowledged necessity and benefits of inclusive computer literacy by, for example, European Commission, UNESCO, OECD, there are still groups of people with hindered access to basic computer education (persons with disabilities, persons with learning difficulties, migrant workers, unemployed, persons that live in remote (rural) areas where IT education is not accessible).

These notes, combined with other materials published on ITdesk.info, represent our effort and contribution to realization and promotion of the human right to education and information considering IT area. We hope that this education will help you master basic computer skills and with that hope we wish you to learn as much as you can thus becoming an active member of modern IT society.

Sincerely yours,

ITdesk.info team



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Basics of the information technology

[Information technology \(IT\)](#) is a technology which uses computers to gather, process, store, protect, and transfer information. Today, it is common to use the term [Information and communications technology \(ICT\)](#) because it is unimaginable to work on a computer which is not connected to the network.

The computer consists of:

- [hardware](#) – physical computer parts, palpable and visible
- [software](#) – set of commands that are "understandable" to the computer; instructions to its palpable parts, giving orders what to do

Basic principle of computers:

Data enters the computer through one or more input devices. The computer then processes the data and transmits the resulting data to output devices. Output devices can be human interfaces such as a screen or another electronic device such as a storage device or computer network.

The system unit consists of the following components:

- Motherboard - MBO
 - a computer "backbone" responsible for communication between components and transmission of information
- Central Processing Unit - CPU
 - functions: command execution, data transmission, computer function control
 - basic characteristics:
 - speed (in Mega Hertz (MHz), Giga Hertz (GHz))
 - amount of memory (Cache in Bytes)
- Random Access Memory - RAM
 - a memory container for programs that are currently running and data that is being processed
 - basic characteristics:
 - speed (in MHz, GHz)
 - capacity (in Bytes)
 - data rate class (DDR SDRAM, SDR SDRAM)
- permanent memory:
 - Hard Disk Drive - HDD - device (memory) used for permanent data storage
 - data is stored on magnetic platters; electromagnetic heads are used for reading and recording data with the exception of the newest disk types called Solid State Drive (SSD)
 - basic characteristics:
 - disk platters rotation speed (in RPM)
 - capacity (in GB)
 - connection interface (IDE, SATA)
 - Floppy Disk Drive - FDD
 - optical disks - CD, DVD



- [graphics processing units \(GPU\)](#)
 - function: processing and displaying image on the monitor
 - it consists of a graphics processor and its own working RAM memory
 - basic characteristics:
 - type of graphics processing units ([ATI Radeon](#), [Nvidia GeForce](#), or other)
 - RAM size
 - connection interface/slot type
- ports:
 - Parallel Port
 - Serial Port
 - Universal Serial Bus (USB)

Input and output devices

- [Input devices:](#)
 - keyboard
 - scanner
 - *touchpad*
 - mouse
 - *trackball*
 - *joystick*
 - microphone
 - stylus
 - camera (web, digital)
- [Output devices:](#)
 - monitor
 - projector
 - printer
 - plotter
 - speakers
 - earphones
- Device that is both input and output: [touchscreen](#).

[Common devices and media for storing and transferring data:](#)

- hard disk
- [USB flash drive](#)
- diskette and ZIP diskette
- CD and DVD discs
- memory cards
- internal hard disk
- external hard disk
- [network disk drive](#)
- online storage device

Software - a computer program which, as opposed to hardware, is an intangible part of the computer, written to perform a single or multiple tasks on computer using the built-in hardware.

Software types:

- [operating systems \(OS\)](#) - the basic program on your computer that is automatically loaded when computer is started up:
 - [Linux](#) ([Debian](#), [Ubuntu](#), [Fedora](#), [Knoppix](#)...)
 - [Microsoft Windows](#) ([XP](#), [Vista](#), [7](#)...)
 - [Mac OS X](#) ([Cheetah](#), [Panther](#), [Snow Leopard](#)...)



- [application software](#) – some types of software that can be used on an installed operating system:
 - office programs - [OpenOffice.org](#), [LibreOffice](#), [Microsoft Office](#)
 - [antivirus program](#) – [Avira](#), [Sophos](#), [Kaspersky](#) etc.
 - [Web browser](#): [Mozilla Firefox](#), [Microsoft Internet Explorer](#), [Opera](#), [Safari](#)

E -accessibility options:

- [voice recognition software](#),
- [screen reader](#),
- [magnifying tool](#),
- [on-screen keyboard](#).

Computer types:

- [Mainframe Computer](#)
 - large, powerful and expensive computers,
 - often used within large systems and organizations,
 - can be used by more than one user simultaneously.
- [Personal Computer – PC](#)
 - first PC was made by IBM in 1981,
 - it was originally made for executing a single task by a single user at the time.
 - today: a single person can execute many tasks simultaneously (multitasking).
- [Apple Macintosh \(Mac\)](#)
 - personal computer made by Apple company,
- [Laptop computer \(notebook\)](#)
 - relatively small computers, easily carried around,
 - consists of LCD display and a small keyboard,
 - do not fall behind PCs by their functions
- [Personal Digital Assistant - PDA \(Palm\)](#)
 - small computers that can fit into a pocket or user's palm,
 - meant for performing basic personal/business functions:
 - managing personal or business tasks and assignments,
 - maintaining the address book,
 - accessing and browsing the Internet,
 - sending/receiving e-mails, etc.
 - PDAs have now been replaced by modern smart phones that combine the features of a PDA with a mobile phone and camera.
- [Network connected computer](#)
 - every computer (PC, notebook, PDA) connected to the network is considered a network computer; can be connected either through network cable or through a phone line (at least to one more computer)



Beside notebooks and palms, there are other portable digital devices:

- [mobile phone](#)
- [smartphone](#) – mobile phone with advanced functions such as e-mail, Internet browser, e-book reader
- multimedia player: [iPod](#), [iRiver](#), [Zune](#)

Networks:

- [LAN \(Local Area Network\)](#) - a small network that physically connects nearby computers (computers within the firm, organization, or a household)
- [WAN \(Wide Area Network\)](#) - a larger network that covers a city or a region,
- [Internet](#) – a world network of connected computers, connected through WAN and LAN
- [Intranet](#) - a smaller network, closed version of internet to which only certain (authorized) people are granted access (members of an organization)
- [Extranet](#) – an intranet version, to which only certain people are granted access (not exclusively members of an organization, but also outsourced experts for performing common tasks),
- [World Wide Web \(WWW\)](#) - one of the services that can be used on Internet which enables us to view and search contents in a form of web-pages
- other services on Internet that can be used:
 - [Instant messaging \(IM\)](#) - [Google Talk](#), [Skype](#), [Windows Live Messenger](#), [Yahoo! Messenger](#)
 - [Voice over Internet Protocol \(VoIP\)](#) - protocol used for voice transfer over IP network; it basically enables us to use internet in order to make phone-calls
 - [Really Simple Syndication \(RSS\)](#) – used for dissemination of information or articles etc. published on web page using RSS channel (RSS news usually consists of title, few sentences and link to a web page where users can read the whole article). Users have to subscribe to RSS channel in order to receive news in their RSS reader. This eliminates a need for visiting a web page in order to find out latest news
 - web log → [blog](#)
 - [podcast](#) - digital file that contains audio or video record

Network communication:

- [PSTN \(Public Switched Telephone Network\)](#) – a technical expression for public telephone system
- [ISDN \(Integrated Services Digital Network\)](#)
- [ADSL \(Asymmetric Digital Subscriber Line\)](#) – most common communication standard in the consumer market

Internet data transfer:

- [download](#) - data storing from internet onto personal computer
- [upload](#) - data storing from personal computer to internet server
- [data rate units](#):
 - bit per second (bps), kilobit per second (kbps), and megabit per second (mbps).
- Internet access:
 - [dial-up](#) – use of phone line in order to connect to the internet. The bill for the internet usage is directly proportional to the time spent on the Internet and/or the amount of data transferred.
 - [broadband](#) – the bill is formed according to speed of data transfer. Additionally, in areas where informational infrastructure for broadband is not developed enough (or for other reason), amount of data transfer is also charged. Unlike dial-up, time spent on the



internet is not charged and as a consequence there is a greater risk from hacker intrusion in computers or networks that are connected to internet 24/7

- Internet can also be accessed through phone, mobile, and cable line, as well as through wireless access or via satellite connection.

Virtual (online) communities

- social networking websites: [Facebook](#), [Bebo](#), [Twitter](#), [MySpace](#), [LinkedIn](#), [Nexopia](#), [Hi5](#), [Tagged](#), [XING](#), [Orkut](#), etc.
- Internet forums – [Forum.hr](#), [Download.hr](#), etc.
- chat rooms, e.g. [Chat Rooms](#)
- multiplayer games: [Silkroad Online](#), [Knight Online](#), [Anarchy Online](#), [Guild Wars](#), [World of Warcraft](#)

Ways to publish and share contents on the internet: blog, podcast, photos, video and audio contents.

Advices on how to protect oneself while using virtual communities:

- protect privacy of your profile,
- limit publishing and use of your personal data,
- be aware that published information can be publicly accessible,
- be cautious while communicating with strangers.

Computer in the workplace:

- tasks more suited to a computer than a human:
 - repetitive tasks,
 - easy automated tasks ,
 - mathematical operations,
 - tasks that require high precision and speed.
- tasks more suited to a human than a computer:
 - logical reasoning and shape interpretation,
 - consulting and social interaction,
 - new product presentation,
 - developing business plan and strategies.

Information and Communication Technology (ITC) exists in every aspect of modern society. Some well known applications include:

- applications for corporations (airlines, insurance companies, internet banking)
- applications for state organizations (electronic voting, tax refund)
- applications for healthcare (data about patients, diagnostic tools and instruments, special surgical equipment)
- applications for education (computer based training - CBT, distance learning, [e-learning](#)): adaptive learning time, flexible learning location, multimedia learning experience, reduced costs.

Telecommuting (telework)

- Advantages:
 - increasing the employment of vulnerable groups: parents with small children, people with mobility problems and people living in the remote areas,



- Increased level of the data security can be reached through the use of the following procedures:
 - username and password
 - properly shut down computer
 - the use of continuous power supply (UPS - Un-interruptible Power Supply) - in a case of power failure, without UPS your desktop computer will shut down and all data that are not saved on hard disk will be lost. Documents should be often saved in order to narrow down the possibility for losing data but only UPS will enable saving your work as well as shutting down the computer properly without losing anything.
 - professional maintenance of computer is recommended
 - creating backups of all important data on portable memory devices, network disk etc. (i.e. copy them from your computer to another location)

Malware - computer code - program that can infect computer, spread on other computer independently or with a help from a user thus stealing or damaging data, and enabling crackers to take over control of your computer.

- most commonly spread via attachments in e-mail,
- symptoms of infection: slow performance, computer not responding to commands or crashes and restarts; in extreme situations malware damages files responsible for proper functioning of the operating system which can totally disable computer.
- removing malware: use one of the antimalware programs
- malware protection:
 - never use pirated software which is usually infected with malicious software,
 - install antimalware software which detects computer malware,
 - open e-mails and web pages from recognized senders and authors(the safest way is not to connect to the Internet or any other computer network)

Copyright - the right of an author of text, images, music, film, etc. to protect their intellectual property.

Product identification number (PID) is a number that comes with legally purchased software as an authenticity validation.

- Licensed software identification: serial number check-up, registration, software license inspection.

Software License Agreement- EULA (end-user license agreement).

Freeware - software free for personal use; for example: Adobe Reader.

Open source - software whose source code is publicly available for inspection, use, modification and redistribution; for example, OpenOffice.org - office suite software, Mozilla Firefox, Mozilla Thunderbird, MediaWiki, Joomla.

Shareware - programs that are free for temporary use at home.



Legislation and conventions on data protection

(source: http://europa.eu/legislation_summaries/information_society/internet/l14012_en.htm)

“This Directive applies to data processed by automated means (e.g. a computer database of customers) and data contained in or intended to be part of non automated filing systems (traditional paper files).

It does not apply to the processing of data:

- *by a natural person in the course of purely personal or household activities;*
- *in the course of an activity which falls outside the scope of Community law, such as operations concerning public security, defence or State security.*

The Directive aims to protect the rights and freedoms of persons with respect to the processing of personal data by laying down guidelines determining when this processing is lawful. The guidelines relate to:

- *the **quality** of the data: personal data must be processed fairly and lawfully, and collected for specified, explicit and legitimate purposes. They must also be accurate and, where necessary, kept up to date;*
- *the **legitimacy** of data processing: personal data may be processed only if the data subject has unambiguously given his/her consent or processing is necessary:*
 1. *for the performance of a contract to which the data subject is party or;*
 2. *for compliance with a legal obligation to which the controller is subject or;*
 3. *in order to protect the vital interests of the data subject or;*
 4. *for the performance of a task carried out in the public interest or;*
 5. *for the purposes of the legitimate interests pursued by the controller;*
- *special **categories** of processing: it is forbidden to process personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade-union membership, and the processing of data concerning health or sex life. This provision comes with certain qualifications concerning, for example, cases where processing is necessary to protect the vital interests of the data subject or for the purposes of preventive medicine and medical diagnosis;*
- ***information** to be given to the data subject: the controller must provide the data subject from whom data are collected with certain information relating to himself/herself (the identity of the controller, the purposes of the processing, recipients of the data etc.);*
- *the data subject's **right of access** to data: every data subject should have the right to obtain from the controller:*
 1. *confirmation as to whether or not data relating to him/her are being processed and communication of the data undergoing processing;*
 2. *the rectification, erasure or blocking of data the processing of which does not comply with the provisions of this Directive in particular, either because of the incomplete or inaccurate nature of the data, and the notification of these changes to third parties to whom the data have been disclosed.*
- ***exemptions and restrictions:** the scope of the principles relating to the quality of the data, information to be given to the data subject, right of access and the publicising of processing may be restricted in order to safeguard aspects such as national security, defence, public security, the prosecution of criminal offences, an important economic or financial interest of a Member State or of the European Union or the protection of the data subject;*



- *the **right to object** to the processing of data: the data subject should have the right to object, on legitimate grounds, to the processing of data relating to him/her. He/she should also have the right to object, on request and free of charge, to the processing of personal data that the controller anticipates being processed for the purposes of direct marketing. He/she should finally be informed before personal data are disclosed to third parties for the purposes of direct marketing, and be expressly offered the right to object to such disclosures;*
 - *the **confidentiality and security of processing**: any person acting under the authority of the controller or of the processor, including the processor himself, who has access to personal data, must not process them except on instructions from the controller. In addition, the controller must implement appropriate measures to protect personal data against accidental or unlawful destruction or accidental loss, alteration, unauthorised disclosure or access;*
 - *the **notification** of processing to a supervisory authority: the controller must notify the national supervisory authority before carrying out any processing operation. Prior checks to determine specific risks to the rights and freedoms of data subjects are to be carried out by the supervisory authority following receipt of the notification. Measures are to be taken to ensure that processing operations are publicised and the supervisory authorities must keep a register of the processing operations notified.”*
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These notes are intended for learning in conjunction with materials published on the following links:

***Handbook:**

http://www.itdesk.info/handbook_basic_ict_concepts.pdf

***Video presentation for a basic concepts overview of information technology:**

<http://www.itdesk.info/en/concepts-of-information-and-communication-technology/>

***Sample exam:**

http://www.itdesk.info/sample_exam/sample_exam_module_1.pdf

***Sample exam solution module:**

http://www.itdesk.info/sample_exam/sample_exam_solution_module_1.pdf

***Self-evaluation quiz:**

<http://www.itdesk.info/en/basic-concepts-ict-quiz/>

(to open the link contained within PDF document, just press the left mouse button on one of above links. Web page that link points to will open in a browser that you have installed on your computer.)



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