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E l e k t r o n s k i f a k u l t e t

Slađana Živković, Nadežda Stojković

ENGLISH FOR STUDENTS OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Edicija: **Udžbenici**

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Odlukom Nastavno-naučnog veća Elektronskog fakulteta u Nišu, br. 07/05-003/12-003 od 15. 03. 2012. godine, rukopis je odobren za štampu kao univerzitetski udžbenik.

ISBN 978-86-6125-067-5

CIP – Каталогизација у публикацији
Народна библиотека Србије, Београд
811.111'276.6:007(075.8)
811.111'276.6:621.391(075.8)
ЖИВКОВИЋ, Слађана, 1960-
English for Students of Information and Communication Technologies / Slađana Živković, Nadežda Stojković. – Niš : Elektronski fakultet, 2012 (Niš : Unigraf) – 154 str. : ilustr. : 24cm
Tiraž 300. – Napomene i bibliografske reference uz tekst. –
Bibliografija: str. 150-154.
ISBN 978-86-6125-067-5

1. Стојковић, Надежда, 1969 - [аутор]

а) Енглески језик – Информациона терминологија

б) Енглески језик – Телекомуникациона терминологија

COBISS.SR – ID 190806796

Preštampavanje ili umnožavanje ove knjige nije dozvoljeno bez pismene dozvole izdavača.

Tiraž: 300 primeraka
Štampa: *Unigraf, Niš*

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Preface

’Tell me what you need English for and I will tell you the English that you need’ [Hutchinson & Waters, 1987]

New trends in education in Serbia allow our educational system to be more open and to create competitive (globally as well as locally) standards and quality of education and training, more specifically, to modernize the course structure in university education, so as to satisfy students’ needs and respond to labour market demands. It should have become clear that we have entered a period in which language and communication play a key role in economic, political and cultural life. The English language has become a global language, and it has taken new forms in ways of speaking.

Modern technologies, such as computer and the Internet technologies, have a great impact on foreign language courses. As a powerful technological tool, the Internet provides a great amount of information in order to create new knowledge. It has been used in a creative way in order to develop communicative skills.

This textbook has two parts. The first part contains 25 units covering a wide range of current ICT topics, using authentic texts as well as visual materials. Each unit contains a text, selected terms, practice work and discussion. Among the practice work parts are sections dealing with most often and most appropriate formats of speaking and writing characteristic for the ICT field. The second part contains CV, its definition, usage, structure, format and samples.

The textbook is intended for a wider public: for students of Information and Communication Technologies in universities and colleges, as well as for technicians and engineers already working in ICT sector.

It is our intention and hope that this book will also be useful for future engineers enhancing their knowledge of English about their own area of expertise in an easy and interesting way. Only in that way shall we find our great efforts in writing this book fruitful and meaningful.

Authors

PART I

UNIT 1

Computer Science

Computer science is both the study of the theoretical foundations of information and computation, and of practical techniques for their implementation and application in computer systems. Theoretical computer science involves areas of study such as the theory of computation, information and coding theory, algorithms and data structure, database and information retrieval, and language theory. Applied computer science involves using computers for dealing with complex issues and ideas such as artificial intelligence, the architecture and engineering of computer systems, graphics and visualization, security and cryptography, computational science, information science and software engineering.

It is frequently described as the systematic study of algorithmic processes that describe and transform information. Computer science has many sub-fields. Hereby, we shall name but a few. Computer graphics emphasizes the computation of specific results, while others, such as computational complexity theory studies the properties of computational problems. Others focus on the challenges in implementing computations. For example, programming language theory studies approaches to describing computations, while computer programming applies specific programming languages to solve specific computational problems, and human-computer interaction focuses on the challenges in making computers and computations useful, usable, and universally accessible to humans.

It can be said that computer science is about learning and understanding the mathematical, scientific and engineering principles underlying every kind of computing system, from mobile

phones and the Internet, via systems that interpret natural language, to the supercomputers that forecast tomorrow's weather or simulate the effects of disease on the human heart.
Computer science has strong connections to other scientific disciplines. It is practiced by various scientists, primarily mathematicians and engineers. Mathematics provides reason and logic. Engineering provides the techniques for building hardware and software. And it is in the foundation of science per se to provide the methodology for learning and refinement. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers. Yet finding a solution requires the interaction of both computer science expertise and knowledge of the particular application domain.

Major areas of Computer Science include:

1. Operating Systems – concerned with the development and structure of complex programs which facilitate man-machine communications.
2. Computational Science – the analysis of numerical methods for solving mathematical problems with a computer.
3. Programming Languages - the study of the design and properties of languages by which humans communicate with computers.
4. Architecture - the study and use of mathematical logic to design electronic circuits.
5. Intelligent Systems - concerned with means by which computers may perform tasks which might be characterized as 'intelligent' if performed by humans.
6. Automata Theory - an abstract study of computers and their capabilities.
7. Information Storage and Retrieval - the study of methods for storing a vast amount of data in a computer and methods for searching and retrieving this data.
8. Software Engineering - the study of tools and techniques for software design, development, testing and maintenance.

Another way to view any science is to look at the methods used within that science. In some sense these methods are similar in many sciences, but they can take on different characteristics in each discipline. Four important methods used in the study of computer science are:

- invention - formulation of new algorithmic and new architectural paradigms,
- design - software engineering uses design principles to build complex systems to

solve computational problems,
- analysis - certainly a major focus within computer science is the analysis and evaluation of software, algorithms and architecture,
- experimentation - use of experiments to reveal computing principles is an important method of scientific investigation within computer science.

Major achievements

Despite its short history as a formal academic discipline, computer science has made a number of fundamental contributions to science and society. These include:

- The start of the 'digital revolution', which includes the current Information Age and the Internet.
- A formal definition of computation and computability, and proof that there are computationally unsolvable and intractable problems.
- The concept of a programming language, a tool for the precise expression of methodological information at various levels of abstraction.
- Scientific computing enabled practical evaluation of processes and situations of great complexity, as well as experimentation entirely by software. It also enabled advanced study of the mind, and mapping of the human genome became possible.
- Algorithmic trading has increased the efficiency and liquidity of financial markets by using artificial intelligence, machine learning, and other statistical and numerical techniques on a large scale.
- Image synthesis, including video by computing individual video frames.
- Human language processing, including practical speech-to-text conversion and automated translation of languages.
- Simulation of various processes, including computational fluid dynamics, physical, electrical, and electronic systems and circuits, as well as societies and social situations (notably war games) along with their habitats, among many others. Modern computers enable optimization of such designs as complete aircraft.

SELECTED TERMS

browser – a software program that is used to navigate through web pages stored on the Internet

computation – 1) the operations on numbers and data usually done by a computer;
2) an operation on numbers and data that produces a result

programming language – an artificial language that can be used for writing instructions that a computer can process and execute

simulation – the imitation of the operation of a real-world process or system over time. Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education, and video games

PRACTICE WORK

1) An Engineering Student - write your own timetable in English:

Monday	Tuesday	Wednesday	Thursday	Friday
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---
---	---	---	---	---

2) In practice work part of this book we shall be looking into some crucial formats of speaking and writing relevant for an engineer's work. Those formats are indispensable and inseparable parts of a professional's expert knowledge.

It is important to note that the structure of prose is almost the same whether it is delivered in speaking or in writing.

PARAGRAPH

A paragraph[1] is the basic structural unit of both written and spoken formats. It is a nucleus piece of thinking, it conveys one idea and explains it. Paragraph consists of a topic or defining sentence, supporting sentences, and a closing sentence. This structure is consistent with the analytical tradition of presenting argumentation, description or elaborating an explanation.

Defining sentence is the opening one. Its purpose is to clearly and precisely state what the paragraph is about. It should be in a form of a definition of the following type:
A = B + specific characteristics. In this kind of defining, we start with naming the subject, then state the class to which it belongs, and then specify the main distinguishing features of the subject. If written in a formula form that is:

The concept + general classification + its specific characteristics that differentiate that concept from the rest of the general class

For example: A motor is a device that transforms electrical into mechanical energy.

If we analyze this definition we can see that the concept in question is a motor, the general class to which it belongs is a device, and the specific characteristics that it possesses and which make it special are that it transforms mechanical into electrical energy.

When writing this first, defining sentence it is advisable to use the Present Simple Tense, the indefinite article a/an if the concept in question is singular, and no article if it is plural, and also relative pronouns.

[1] Nadežda Stojković, *Written and Spoken Communications in English for Science and Technology,* Elektronski fakultet, Univerzitet u Nišu, 2005, p. 13

Here are some useful defining phrases:

- *is/ are*
- *can/be defined as*
- *can/be called as*
- *can/be termed as*
- *... known as*
- *... referred to as*
- *... used to*
- *Have/exhibit/display/ show the capacity to/ the property of*

Supporting sentences are at least two sentences that come after the paragraph opening sentence. They can be elaborations on constituent parts or functions of the device or item in question, defined in the first sentence. The supporting sentences present facts, details, examples of the concept that the paragraph is about.

Closing sentence summarizes the idea of the defining sentence by simply restating it, and if possible gives an example of the use of the concept.[2]

Here are examples of properly written analytical paragraphs:

Typical Computer

A computer is an electronic machine that accepts, processes, stores and outputs information. A typical computer consists of two parts: hardware and software. Hardware is any electronic or mechanical part of the computer system that you can see or touch. Software is a set of instructions, called a program, which tells a computer what to do. At the back of the computer there are ports into which we can plug external devices (e.g. a scanner, a modem, etc). They allow communication between the computer and the devices.

What is a Mouse

A mouse is a hand-held device that lets you move a pointer (or cursor) and select items on the screen. It has one or more buttons to communicate with the PC. A scroll wheel lets you move through your documents or web pages. The pointer looks like an I-bar, an arrow or a pointing hand. An optical mouse has an optical sensor instead of a ball underneath. A cordless (wireless) mouse has no cable; it sends data via infrared signals or radio waves. Mouse actions include: to click, press and release the left button; to double-click, press and release the left button twice; to drag, hold down the button, move the pointer to a new place and then release the button; to right-click, press and release the right button by which a list of commands are displayed.

Robot

A robot is a computer-programmed machine that performs actions, manipulates objects, etc. in a precise and, in many cases, repetitive way. Robots may be automata, or

[2] Nadežda Stojković, 'Modeling Academic English Language Instruction according to Vocational Demands – Teaching Presentation Formats', in *The International Language Conference on the Importance of Learning Professional Foreign Languages for Communication Between Cultures,* Celje, 2009

man-like machines, whose basic components are similar to a human body. They have mechanical links, joints, which connect their movable parts. Their heart and muscles are the electric and pneumatic motors or systems, the actuators, which create the movement. Robots also have hands, usually tools or grippers, called end effectors. They may be equipped with cameras or infrared controls, sensors, which transmit information to the central system in order to locate objects or adjust movements. Finally, robots depend on a computer system, the brain that directs the actions.

*

When writing a defining sentence *relative pronouns* need to be used. Relative pronouns are words like *who, that, which, whose, when, where.* Who is exclusively used for people.

Exercise:

a) RELATIVE PRONOUNS FOR DEFINING:
Complete these definitions using *who, which, that, where, when.*

1. A satellite phone is a kind of phone …
2. A geophysicist is a scientist …
3. CAT5 cabling is a kind of wire …
4. A Telecommunications Manager is someone …
5. An internet café is a place …

b) DEFINING RELATIVE CLAUSES:
1. That's the computer _____ I'd like to buy.
2. This is a new intel processor _____ contains about 300 million transistors.
3. A webmaster is a person _____ designs, develops and maintains a website.
4. A bus is an electronic pathway _____ carries signals between computer devices.
5. Here's the DVD _____ you lent me.
6. Last night I met someone _____ works as a software engineer.

c) NOW WRITE A PARAGRAPH ON SOME MAJOR CONCEPT IN YOUR AREA OF EXPERTISE.

*

DISCUSSION

- History of computer science
- Information age
- A computer scientist
- Informatics
- List of open problems in computer science
- Computer education

UNIT 2

Areas of Computer Science

As a discipline, computer science spans a range of topics from theoretical studies of algorithms and the limits of computation to the practical issues of implementing computing systems in hardware and software. There are four areas crucial to the discipline of computer science: *theory of computation*, *algorithms and data structures*, *programming methodology and languages*, and *computer elements and architecture*. In addition to these four areas, there are also identified fields such as: software engineering, artificial intelligence, computer networking and communication, database systems, parallel computation, distributed computation, computer-human interaction, computer graphics, operating systems, and numerical and symbolic computation as being important areas of computer science.
The broader field of theoretical computer science encompasses both the classical theory of computation and a wide range of other topics that focus on the more abstract, logical, and mathematical aspects of computing.

Theory of computation
The study of the theory of computation is focused on answering fundamental questions about what can be computed and what amount of resources are required to perform those computations. In an effort to answer the first question, computability theory examines which computational problems are solvable on various theoretical models of computation. The second question is addressed by computational complexity theory, which studies the time and

space costs associated with different approaches to solving a multitude of computational problems.

Algorithms and data structures

Algorithm is a set of rules used to define or perform a specific task or to solve a specific problem. In mathematics and computer science, an algorithm is an effective method expressed as a finite list of well-defined instructions for calculating a function. Algorithm is used for calculation, data processing, and automated reasoning. In simple words an algorithm is a step-by-step procedure for calculations. In computer science, a data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently.

Different kinds of data structures are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.

Data structures are used in almost every program or software system. Data structures provide a means to manage huge amounts of data efficiently, such as large databases and Internet indexing services. Usually, efficient data structures are a key to designing efficient algorithms. Some formal design methods and programming languages emphasize data structures, rather than algorithms, as the key organizing factor in software design.

Data structures are generally based on the ability of a computer to fetch and store data at any place in its memory, specified by an address – a bit string that can be itself stored in memory and manipulated by the program. Thus the record and array data structures are based on computing the addresses of data items with arithmetic operations; while the linked data structures are based on storing addresses of data items within the structure itself.

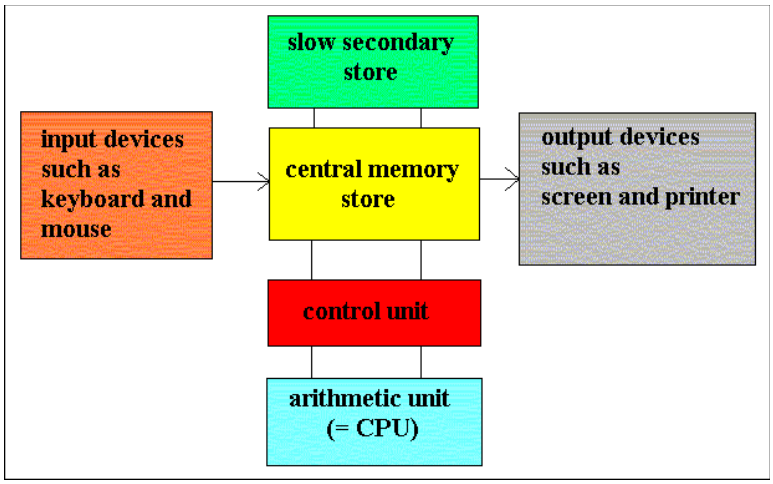
The implementation of a data structure usually requires writing a set of procedures that create and manipulate instances of that structure. The efficiency of a data structure cannot be analyzed separately from those operations. This observation motivates the theoretical concept of an abstract data type, a data structure that is defined indirectly by the operations that may be performed on it, and the mathematical properties of those operations (including their space and time cost).

Programming language theory

Programming language theory (PLT) is a branch of computer science that deals with the design, implementation, analysis, characterization, and classification of programming languages and their individual features. It falls within the discipline of computer science, both depending on and affecting mathematics, software engineering and linguistics. It is a well-recognized branch of computer science, and an active research area, as well as in general computer science and engineering publications.

Computer architecture

Computer architecture, or digital computer organization, is the conceptual design and fundamental operational structure of a computer system. It focuses largely on the way by which the central processing unit performs internally and accesses addresses in memory. The field often involves disciplines of computer engineering and electrical engineering, selecting and interconnection hardware components to create computers that meet functional, performance, and cost goals.



Von Neumann's computer architecture

SELECTED TERMS

data – a collection of facts made up of numbers, characters and symbols, stored on a computer in such a way that it can be processed by the computer
hardware – the physical components of a computer and related devices. Internal hardware devices include motherboards, hard drives, and RAM. External hardware devices include monitors, keyboards, mice, printers, and scanners
software – any program or group of programs which instructs the hardware on how it should perform, including operating systems, word processors and applications programs

PRACTICE WORK

ARGUMENTATIVE ESSAY/SPOKEN DELIVERY[3]

In this section we shall study how to build a properly structured argumentation in scientific discourse. Building an argument is ever present in scientific and professional communication. Argumentation means that there is a question over possible advantages or disadvantages of some issue and that you are asked to take a side and support your opinion.

Whether you write or present orally your argumentation it is advisable to organize it into *four or five segments or paragraphs*. Those are the opening or introductory paragraph, two supporting paragraphs, one optional paragraph that presents the other side of the issue, the one you do not favor yet acknowledge some of its value. And there should be a concluding paragraph. It should be obvious that the structure of an argumentative essay or presentation relies on the same analytical logic that a simple paragraph is based upon. Hereby, it is important to emphasize that it is the logic inherent in scientific thinking that is then only reflected in the forms of scientific communication.

The introductory paragraph has an opening sentence that is again a definition. It should be a clear statement of your thesis, of your opinion on the subject, the direct answer to

[3] Nadežda Stojković,'Teaching Principles and Types of Written and Spoken Communications in English for Academic/Occupational Purposes' u *Languages for Specific Purposes in Higher Education - Searching for Common Solutions,* Cambridge Scholars Publishing, 2007. p. 64

the theme. Then, it is to be followed with at least two sentences that contain at least two major arguments that support your stance taken. After that, you can give credit to the other viewpoint in as much as you consider it valid. In the concluding sentence you need to rephrase your thesis.

Second and third paragraphs are developments, explanations of your first and second argument, respectively. They have the already explained paragraph structure.

The fourth paragraph that is not a must elaborates on the other side of the issue, affirming its value.

The concluding, fifth paragraph is where you repeat your thesis for the sake of showing that your initial statement has been well supported by valid arguments. It is a sort of rephrasing your major thesis.

ADVICE: As this needs to be an essay that defends your opinion on some topic, it would be of a very good use to use 'signposting', signal words that direct the audience's attention, and which often emphasize the strength and value of your arguments.

HERE ARE SOME USEFUL PHRASES FOR SIGNPOSTING[4]

Introduction:
major, most important/most relevant, crucial, first, second, one, another, …
Supporting paragraphs:
first, second, moreover, in addition, related to, furthermore, also, …
Contrast:
yet, however, it must be admitted that, on the other side, …
Conclusion:
in conclusion, to sum up, as illustrated above, …
To add arguments:
In addition… Futhermore…
To introduce opposing ideas:
On the one hand… On the other…
Some people say… Others say… However…
To express opinions:
In my opinion… I believe that…
It seems to me that…. It's clear that…

NOW CHOOSE A TOPIC AND WRITE A PROPERLY ORGANIZED ARGUMENTATIVE ESSAY:

- Our society has developed *technological dependence.* When computers are down, our way of life breaks down: planes stop flying, telephones don't work, banks have to close.
- Computers produce *electronic waste,* plastic cases and microchips that are not biodegradable and have to be recycled or just thrown away.
- They are responsible for *health problems,* e.g. computer addiction, an inappropriate and excessive use of computers.
- *Cybercrime*, crime committed with the help of computers, is creating serious problems.

[4] Ibid. pp. 61-71

- Citizens may feel a *loss of privacy* because of unauthorized use of personal data or receiving unwanted electronic messages.
- *The Pros and Cons of Gaming.* Comment on the following statements. Give reasons for your answers.
    - TV and video games are amusing and can be educational. But too much of this kind of entertainment can be addictive and make children become accustomed to violence.
    - Massively multiplayer online games are interactive and fun.
    - Video games have negative effects on children and distract them from school and homework.
    - Modern games and simulations offer a great deal of adventure and challenge. In addition, they can teach skills such as strategic thinking, interpretative analysis and problem solving.

*

DISCUSSION
- Computer networking
- List of software engineering topics
- Programming languages
- Database systems
- Computer-human interaction

UNIT 3

How to Operate a Computer

This unit will help you revive the basics of operating a computer through a series of exercises.

Getting started

Using the mouse – *use the mouse to confidently navigate the desktop environment*
- How to hold the mouse
- Using the mouse on a mat
- How moving the mouse moves a pointer on the screen
- The types of mouse
- Clicking the mouse buttons – single and double clicks
- Dragging and dropping
- Drop Down Menus
- Scrollbars and Scrolling
- Buttons on the screen

The Desktop – *develop a general awareness of the desktop's appearance and features*
- Definition of the term *Desktop*
- Icons and the Taskbar
- The Start Button
- Changing the Start Menu to XP style
- Changing the rest of the display to XP Style

Shutdown procedure – *become aware of the need to shut down the computer safely and instruct on the methods to achieve this*

- How to turn off the PC using the Keyboard
- How to turn off the PC using the Mouse

What's inside your computer

This part explores the important components and raises awareness of the necessary technical words that computer user's meet.

Hardware – *develop a general understanding of the PC's physical anatomy*

- The definition of Hardware
- The base Unit
- Monitors
- Other peripherals
- The Motherboard
- The CPU (central processing unit) and speeds

Data storage – *develop an awareness of the different ways of storing PC data and how they work*

- Hard Disk and capacities
- Memory (RAM) and size
- Media – CD (CD-R, CD-RW) floppy disk and DVD
- Formatting Floppy Disks

Software – *develop an understanding of files and software, the different types available, and how they relate to the hardware*

- The definition of files, folders and their size
- The definition of software
- The Operating System

Talking to your computer

Mouse – *provide further opportunities to gain familiarity with the mouse, how it works, and the ability to use it*

- The scroll wheel
- Autoscrolling

Keyboard – *allow students to develop basic keyboard orientation and skills*

- An overview of keyboards and the layout of the keys
- Type (lowercase only)
- Type capital letters using *Shift* or *Caps Lock*
- Use the *Shift* key for symbols
- Type numbers (from the top row or number pad) including mathematical symbols and the decimal point
- Use the function keys including *F1* often gives help
- Use the *Ctrl* and *Alt* keys including *Ctrl+P* for printing

Cursor control – *discover the cursor, what it does and how to control it*

- Use the cursor for editing including the Enter and Backspace keys
- Move round text with the cursor keys and Edit it

Mouse alternatives – *become acquainted with a range of input devices other than the mouse and keyboard*

- Definitions of Trackballs, Joysticks and Touchpads (Graphic Tablets)

Audiovisual input – *develop an awareness of various audiovisual methods of inputting data into the PC*

- Definitions of Scanners, Cameras (digital and webcam) and microphones

Running your computer

Working with the desktop – *develop competence in the use of the desktop to view and access folders and files, or to run software*

- A description of the function of the desktop
- Using the Start Button and Menus
- Using Icons on the Desktop
- Using Windows Explorer
- Opening files and what their extensions mean
- Starting programs from Desktop Icons, the Start Button or from Windows Explorer

Window controls – *develop the ability to open, configure and close windows*

- The Windows controls including the three symbols at the top right
- Moving and re-sizing windows
- Having more than one window open at a time
- Creating shortcuts – *learn to create shortcuts to folders or files*
- Creating Shortcuts
- Renaming Shortcuts

Managing folders and files – *gain knowledge of PC folders and files, and how to manipulate or delete them*

- Creating new folders (on the Desktop, Using Windows Explorer and within other folders)
- Moving folders (Drag and Drop, the Move button and Cut and Paste)
- Copying and Moving Multiple Files
- Copying and Moving items between disks
- Renaming files and folders
- Sending files and folders
- Printing files
- Deleting a file and deleting multiple files

Getting Help – *know where to find on-screen help and how to benefit from it*

- Using the Windows Help and Support Centre – by Topic, Search and Index
- Using available help in a dialogue box
- Using the F1 key

More commands and techniques – *become oriented to the most common commands for controlling folder and program windows, and be able to use them*

- Using the Menu Bar and Drop down Menus
- The File Menu specifically including New, Open (Load), Save, Save As, Print and Exit
- The Edit Menu specifically including Undo and Select All
- Other Menus specifically including Tools and Format

Taking care of your computer

You are provided with details of how they should take care of equipment – both hardware and software. They will discover the importance of backing up work, defragging drives and looking after equipment in many other ways.

Looking after your hard disk – *recognise that the hard disk requires regular maintenance and discover how to maintain it*

- How to check for disk errors
- Defragmenting – the need and how to do it

Computer viruses and antivirus – *become aware of the danger of computer viruses and learn how to avoid or tackle them*

- What viruses are and precautions to avoid them
- Antivirus software

Backing up your files – *understand the importance of data backup and the different methods of backing up files*

- The need for backups
- Backing up to floppy disks and CDs

Customising and upgrading your computer

You are given an insight into the many ways their equipment can be personalised and improved. They will discover how easy it is to give the computer a personal feel and add new peripherals to the system.

Customising your desktop – *develop the ability to adjust the appearance, features and function of the desktop*

- Changing the Desktop appearance including themes, style, colour schemes, wallpaper
- Screen Savers – their purpose and implementation
- Changing Taskbar and Start Menu properties specifically including auto-hide and Classic and XP styles

Control settings – *become capable of modifying the PC's response to input devices and knowing how to change settings*

- Changing the Keyboard repeat rate
- Changing the mouse properties specifically including the double-click rate and converting it to Left Handed
- Changing the mouse pointer and its speed and trail

Customising programs – *develop the ability to modify the appearance and function of computer programs*

- Using the View Menu
- Using the Windows Menu
- Changing Options, Preferences and Properties

Enhancing the Operating System – *learn how to add accessories to Windows*

- Adding further Windows Accessories to the computer if they are not already installed – e.g. Paint, Calculator and games

Installing new software – *learn how to install and remove PC applications*

- How to install software via the Wizard
- How to install software through Windows
- How to remove programs

Adding and upgrading hardware – *know how to install upgraded components or extra hardware, and any software required to run them*

- How to add external devices to USB, serial and parallel ports
- How to add a printer
- What internal cards are and recommendation that professionals upgrade them if necessary

How to get the most from your PC

This supplies you with ideas for uses of the PC so they can make the most of the technology available.

Recreation – *become aware of the PC's recreational potential and the range of recreational software available*

- The range of games available
- How the PC can be used for music
- How the PC can be used for drawing/display
- Digital photography and the PC
- How the PC can be used for Video clips and animation
- How the PC can be used for DTP

Education and career – *learn how the PC can be used to help the learner further their education and career*

- How the PC can be used for educational software
- Distance learning using the Internet

SELECTED TERMS

- CPU (*central processing unit*) – the part of a computer controls the interpretation and execution of instructions

- *cursor* – an indicator used to show the position on a computer monitor or other display device that will respond to input from a text input or pointing device
- *icon* – a pictogram displayed on a computer screen and used to navigate a computer system or mobile device
- *menu* – an onscreen list of available options or commands for a computer program or for the computer's operating system
- *printer* – a device for printing text and graphics, especially onto paper

PRACTICE WORK

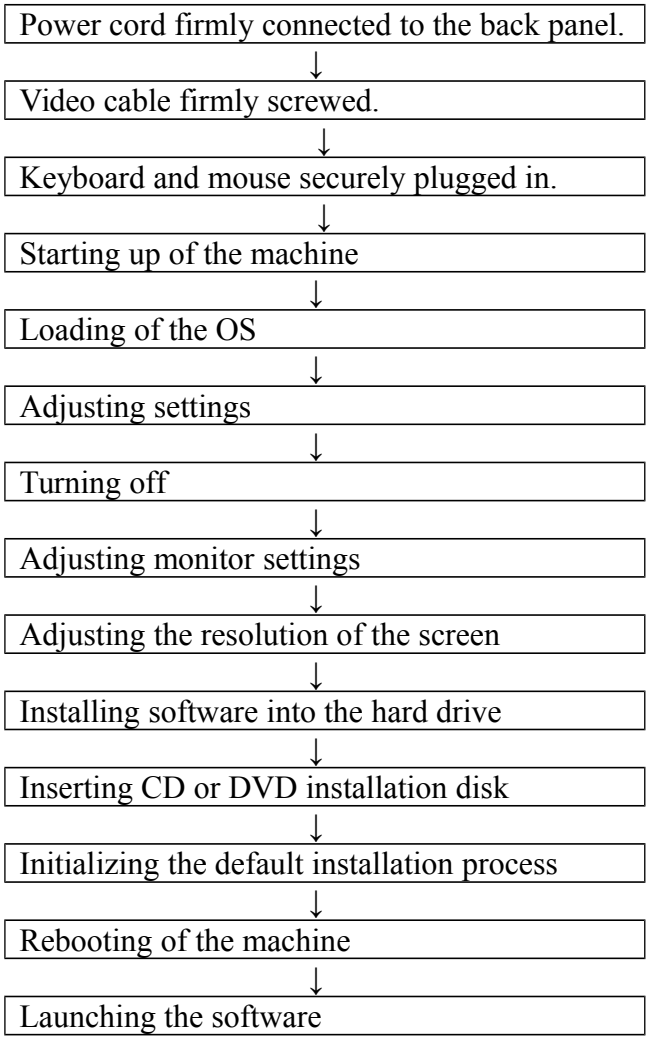
In this unit we saw how a *process* is described and how *instructions*[5] should be presented. Process description and writing or giving instructions are very frequent both written and spoken formats in scientific, science and technical communication. Therefore, they need to be properly mastered.

PROCESS DESCRIPTION

Process description is a step by step explanation on stages in which some operation is performed. The explanation of each stage should be brief and clear. Here it is often appropriate to use the passive voice. *Signal words* such as first, second, …, then, after that, next, finally, add much to the clarity of your explanation. It is also highly useful to illustrate your process description with a *flow chart* that visually represents the flow, stages in a process. The verbal descriptions in the flow chart are usually in the form of newspaper headlines, that is, those are incomplete sentences.

Example: This is a flow chart illustration of a process of operating a computer.

[5] The form of instructions is presented in practice work following unit 4.



This is an example on how a complete verbal presentation of the same process should be like:

First, power cord is firmly connected to the back panel. Secondly, video cable is firmly screwed and keyboard and mouse securely plugged. Thirdly, there is a starting of the machine. Then, the OS is loaded. The settings are adjusted and the computer is turned off. Furthermore, monitor settings are adjusted as well as the resolution of the screen. Next, software is installed into the hard drive by inserting the CD or DVD installation disk. This is followed by initializing of the default installation process and the rebooting of the machine. Finally, software is launched.

NOW WRITE A PROCESS FROM YOUR FIELD OF STUDY

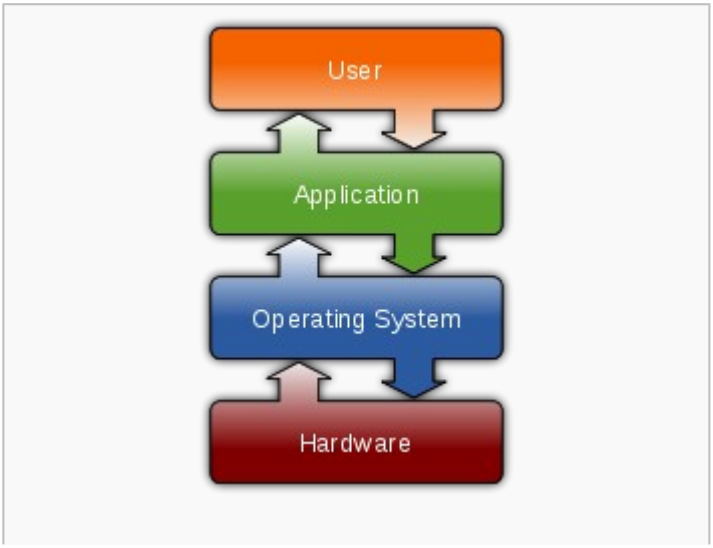
*

DISCUSSION

- Using a computer – starting up/shut down
- Basic operations a computer can perform
- Operational efficiency
- Keyboard and mouse pointing device

UNIT 4

Operating System



Common features

- Process management
- Interrupts
- Memory management
- File system
- Device drivers
- Networking (TCP/IP, UDP)
- Security (Process/Memory protection)
- I/O

An operating system – Common features

An operating system (OS) is a set of programs that manages computer hardware resources, and provides common services for application software. The operating system is the most important type of system software in a computer system. Without an operating system, a user cannot run an application program on their computer, unless the application program is self-booting.
An operating system consists of many parts. One of the most important components is the kernel, which controls low-level processes that the average user usually cannot see: it controls how memory is read and written, the order in which processes are executed, how information is received and sent by devices like the monitor, keyboard and mouse, and decides how to interpret information received from networks. The user interface is a component that interacts with the computer user directly, allowing them to control and use programs. The user interface may be graphical with icons and a desktop, or textual, with a command line. Application programming interfaces provide services and code libraries that let applications developers write modular code reusing well defined programming sequences in user space libraries or in the operating system itself. Which features are considered part of the operating system is defined differently in various operating systems. For example, Microsoft Windows considers its user interface to be:
Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting for cost allocation of processor time, mass storage, printing, and other resources.
For hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between application programs and the computer hardware, although the application code is usually executed directly by the hardware and will frequently call the OS or be interrupted by it. Operating systems are found on almost any device that contains a computer - from cellular phones and video game consoles to supercomputers and web servers. Examples of popular modern operating systems include Android, iOS, Linux, Mac OS X and Microsoft Windows.

Types
A real-time operating system is a multitasking operating system that aims at executing real-time applications. Real-time operating systems often use specialized scheduling algorithms so that they can achieve a deterministic nature of behavior. The main objective of real-time operating systems is their quick and predictable response to events. They have an event-

driven or time-sharing design and often aspects of both. An event-driven system switches between tasks based on their priorities or external events while time-sharing operating systems switch tasks based on clock interrupts.

A multi-user operating system allows multiple users to access a computer system concurrently. Time-sharing system can be classified as multi-user systems as they enable a multiple user access to a computer through the sharing of time. Single-user operating systems, as opposed to a multi-user operating system, are usable by a single user at a time. Being able to have multiple accounts on a Windows operating system does not make it a multi-user system. Rather, only the network administrator is the real user. But for a Unix-like operating system, it is possible for two users to login at a time and this capability of the OS makes it a multi-user operating system.

Multi-tasking vs. Single-tasking system

When only a single program is allowed to run at a time, the system is grouped under a single-tasking system. However, when the operating system allows the execution of multiple tasks at one time, it is classified as a multi-tasking operating system. Multi-tasking can be of two types: pre-emptive or co-operative. In pre-emptive multitasking, the operating system slices the CPU time and dedicates one slot to each of the programs. *Unix-like operating systems* such as Solaris and Linux support pre-emptive multitasking. Cooperative multitasking is achieved by relying on each process to give time to the other processes in a defined manner. MS Windows prior to Windows 2000 used to support cooperative multitasking.

A distributed operating system manages a group of independent computers and makes them appear to be a single computer. The development of networked computers that could be linked and communicate with each other, gave rise to distributed computing. Distributed computations are carried out on more than one machine. When computers in a group work in cooperation, they make a distributed system.

Embedded operating systems are designed to be used in embedded computer systems. They are designed to operate on small machines like PDAs with less autonomy. They are able to operate with a limited number of resources. They are very compact and extremely efficient by design. Windows CE and Minix 3 are some examples of embedded operating systems.

Networking

Currently most operating systems support a variety of networking protocols, hardware, and applications for using them. This means that computers running dissimilar operating systems can participate in a common network for sharing resources such as computing, files, printers, and scanners using either wired or wireless connections. Networks can essentially allow a computer's operating system to access the resources of a remote computer to support the same functions as it could if those resources were connected directly to the local computer. This includes everything from simple communication, to using networked file systems or even sharing another computer's graphics or sound hardware. Some network services allow the resources of a computer to be accessed transparently, such as SSH (secure shell) which allows networked users direct access to a computer's command line interface.

Client/server networking allows a program on a computer, called a client, to connect via a network to another computer, called a server. Servers offer (or host) various services to other network computers and users. These services are usually provided through ports or numbered access points beyond the server's network address. Each port number is usually associated with a maximum of one running program, which is responsible for handling requests to that port. A daemon, being a user program, can in turn access the local hardware resources of that computer by passing requests to the operating system kernel.

Many operating systems support one or more vendor-specific or open networking protocols as well, for example, SNA (systems network architecture) on IBM (international business machines) systems, DECnet on systems from Digital Equipment Corporation, and Microsoft-

specific protocols on Windows. Specific protocols for specific tasks may also be supported such as NFS (network file system) for file access. Protocols, like ESound, can be easily extended over the network to provide sound from local applications, on a remote system's sound hardware.

Security

A computer being secure depends on a number of technologies working properly. A modern operating system provides access to a number of resources, which are available to software running on the system, and to external devices like networks via the kernel.

The operating system must be capable of distinguishing between requests which should be allowed to be processed, and others which should not be processed. While some systems may simply distinguish between 'privileged' and 'non-privileged', systems commonly have a form of requester identity, such as a user name. To establish identity there may be a process of authentication. Often a username must be quoted, and each username may have a password. Other methods of authentication, such as magnetic cards or biometric data, might be used instead. In some cases, especially connections from the network, resources may be accessed with no authentication at all (such as reading files over a network share). Also covered by the concept of requester identity is authorization; the particular services and resources accessible by the requester once logged into a system are tied to either the requester's user account or to the variously configured groups of users to which the requester belongs.

Internal security, or security from an already running program is only possible if all possibly harmful requests must be carried out through interrupts to the operating system kernel. If programs can directly access hardware and resources, they cannot be secured. Internal security is especially relevant for multi-user systems; it allows each user of the system to have private files that the other users cannot tamper with or read. Internal security is also vital if auditing is to be of any use, since a program can potentially bypass the operating system, inclusive of bypassing auditing.

External security involves a request from outside the computer, such as a login at a connected console or some kind of network connection. External requests are often passed through device drivers to the operating system's kernel, where they can be passed onto applications, or carried out directly. Security of operating systems has long been a concern because of highly sensitive data held on computers, both of a commercial and military nature.

Network services include offerings such as file sharing, print services, email, web sites, and file transfer protocols (FTP), most of which can have compromised security. At the front line of security are hardware devices known as firewalls or intrusion detection/prevention systems. At the operating system level, there are a number of software firewalls available, as well as intrusion detection/prevention systems. Most modern operating systems include a software firewall, which is enabled by default. A software firewall can be configured to allow or deny network traffic to or from a service or application running on the operating system. Therefore, one can install and be running an insecure service, such as Telnet or FTP, and not have to be threatened by a security breach because the firewall would deny all traffic trying to connect to the service on that port.

SELECTED TERMS

device driver – a program that controls a particular type of device that is attached to your computer

server – a software program, or the computer on which that program runs, that provides a specific kind of service to client software running on the same computer or other computers on a network
multitasking – the simultaneous performance of two or more tasks by a computer's central processing unit

PRACTICE WORK:

INSTRUCTIONS

Instructions are step-by-step explanations of how to perform a process, or how to do something. They have some usual aspects of style. They are written in the *imperative mood*, they contain cautions in the form of 'do not, be ware, mind, …', and sequence words like 'first, second, … then, after that, finally/in the end'. Instructions may be written in numbered steps or bullet form. They are often made clearer by the use of graphics or other pictorial illustrations. Procedures consists of tasks (semi-independent group of activities), which in turn consist of steps which are details on how to complete tasks.[6]

Example: Instructions on how to operate a computer.

- First, firmly connect the power cord to the back panel.
- Secondly, firmly screw the video cable.
- Plug in the keyboard and mouse.
- Start up the machine.
- Then, load the OS.

NOW WRITE A SET OF DETAILED INSTRUCTIONS ON THE TOPIC YOU CHOOSE.

*

DISCUSSION

- Computer systems architecture
- Virtual memory
- List of operating systems
- Microcontrollers
- Operating System Projects

[6] Nadežda Stojković, 'Possibilities and Justifications for Communicating Cultural Issues in Teaching English for Science and Technology' u *Education Landscapes in the 21st Century: Cross-cultural Challenges and Multi-disciplinary Perspectives,* Cambridge Scholars Publishing, UK, 2008, pp. 179-188

UNIT 5

Uses of Computers

A computer is an electronic device that stores and processes data, according to a list of instructions. It allows a user to manipulate data easily. The speed of performance of a computer is incomparable. The computer displays output through devices like a monitor and printer. The size of a computer varies considerably from small personal computers to gigantic supercomputers which require an entire building to host them. The speed of computers also has a very large range. Computers have become indispensable in today's world. Let us take a look at some of the uses of computers.

What do we use computers for?

- *Word Processing* - Word processing software automatically corrects spelling and grammar mistakes. If the content of a document repeats you don't have to type it each time. You can use the copy and paste features. You can printout documents and make several copies. It is easier to read a word-processed document than a handwritten one. You can add images to your document.

- *Internet* - It is a network of almost all the computers in the world. You can browse through much more information than you could do in a library. That is because computers can store enormous amounts of information. You also have very fast and convenient access to information. Through e-mail you can communicate with a person sitting thousands of miles away in seconds. There is chat software that enables one to chat with another person on a real-time basis. Video conferencing tools are becoming readily available to the common man.
- *Digital video or audio composition* - Audio or video composition and editing have been made much easier by computers. It no longer costs thousands of dollars of equipment to compose music or make a film. Graphics engineers can use computers to generate short or full-length films or even to create three-dimensional models. Anybody owning a computer can now enter the field of media production. Special effects in science fiction and action movies are created using computers.
- *Desktop publishing* - It is the creation of documents using page layout software on a personal computer. The term has been used for publishing at all levels, from small-circulation documents such as local newsletters to books, magazines and newspapers. With desktop publishing, you can create page layouts for entire books on your personal computer.
- *Computers in Medicine* - You can diagnose diseases. You can learn the cures. Software is used in magnetic resonance imaging to examine the internal organs of the human body. Software is used for performing surgery. Computers are used to store patient data.
- *Mathematical Calculations* - Thanks to computers, which have computing speeds of over a million calculations per second we can perform the biggest of mathematical calculations. Simple Arithmetic – most programming languages can use addition, subtraction, multiplication, and division. Date Maths – many programming languages can calculate the number of days, weeks, months between two dates, provided the dates are defined using consistent computer programming/types. Higher maths - some programming languages can compute values using mathematics beyond simple arithmetic, such as square roots, sine, cosine, logarithms, imaginary numbers.
- *Banks* - All financial transactions are done by computer software. They provide security, speed and convenience. Computer banking starts from the very basic. When a customer steps into the bank all entries are made with electronic recording.
- *Travel* - Travel technology is a term used to describe applications of Information Technology (IT), or Information and Communications Technology (ICT), in travel, tourism and hospitality industry. Travel technology may also be referred to as tourism technology, hospitality automation, travel tracking and flight tracking. Travel technology includes the computer reservations system; one can book air tickets or railway tickets and make hotel reservations online.
- *Telecommunications* - There are a variety of ways to use computers in telecommunications, and it is not limited to work only. Individuals use telecommunications to stay in touch with friends and family around the world. Video conferencing is a tool used for business and pleasure. Many companies offer free video conferencing software available to download online. Call centers are facilities where a company's customer service representatives make outbound calls to potential customers, receive inbound calls from prospective customers and help others with product issues. Web broadcasting allows individuals to watch live streaming from one source.
- *Defense* - There is software embedded in almost every weapon. Software is used for controlling the flight and targeting in ballistic missiles. Software is used to control access to atomic bombs.
- *E-learning* - is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered

via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio. (Examinations) - You can give online exams and get instant results. You can check your examination results online.
- *Computers in business* - Shops and supermarkets use software, which calculate the bills. Taxes can be calculated and paid online. Accounting is done using computers. One can predict future trends of business using artificial intelligence software. Software is used in major stock markets. One can do trading online. There are fully automated factories running on software.
- *Robotics* - Robots are controlled by software. A typical robot completes its task by following a set of specific instructions that tell it what and how the job is to be completed. These instructions are programmed and stored in the robot's control center, a computer or partial computer. Engineers have also developed mobile robots with video cameras for sight and electronic sensors for touch. These new generation robots are controlled by both their stored instructions (software programs) and by feedback that they receive from the sensors.
- *Planning and scheduling* - Software can be used to store contact information, generating plans, scheduling appointments and deadlines, overview information on how long tasks will take to complete, early warning of any risks to the project, cost maintenance.
- *Airplanes* - Modern autopilots use computer software to control the aircraft. The software reads the aircraft's current position, and then controls a Flight Control System to guide the aircraft. In such a system, besides classic flight controls, many autopilots incorporate thrust control capabilities that can control throttles to optimize the airspeed, and move fuel to different tanks to balance the aircraft in an optimal altitude in the air.
- *Weather forecasting* - Supercomputers are used to analyze and predict weather (the state of the atmosphere for a given location).

SELECTED TERMS

data processing – conversion of data into a form that can be processed by computer
desktop – the screen background in Windows, Mac or other graphical user interface (GUI)
digitizing (or *digitization*) – the representation of an object, image, sound, document or a signal (usually an analog signal) by a discrete set of its points or samples. The result is called digital representation or, more specifically, a digital image, for the object, and digital form, for the signal. Strictly speaking, digitizing means simply capturing an analog signal in digital form
supercomputer – a very powerful mainframe computer used for high speed mathematical tasks

PRACTICE WORK:

a) Complete with: *There are two types of..., ...are made up of, ...is composed of, there are four main classes of..., ... is a type of*

- _____microchips: microprocessors, used as CPUs in computers, memory chips, used to store data, digital signal processors, used in mobiles and digital TVs, and application- specific integrated circuits, used in cars and appliances.
- In the future, people may have biochips inserted under their skin. Biochips _____two components: a small chip, called a transponder, and scanner.

- A network _____two or more computers connected together to share information and resources.
- _____network architecture: peer to peer, where all PC have the same capabilities and client servers, where sources store...
- Bluetooth _____of wireless technology for transferring data between devices.

b) Fill in the gapped text with:

1. it is a calculating machine that speeds up financial calculations
2. we visit shops and offices which have been designed with the help of the computer
3. you can even use your PC to relax with computer games
4. for example calculators, the car's electronic ignition, the timer in the microwave, or the programmer inside the VCR
5. as does making a flight reservation or bank transaction

THE USES OF COMPUTERS

Computers and microchips have become part of our everyday lives: _____; we pay bills prepared by computers; just picking up a telephone and dialing a number involves the use of a sophisticated computer system, _____.

Every day we encounter computers that spring to life the instant they are switched on, _____, all of which use chip technology.

What makes your computer such a miraculous device? Each time you turn it on, it is a blank slate (tabula rasa) that, with appropriate hardware and software, is capable of doing anything you ask. _____; it is an electronic filing cabinet with manages large collections of data, such as customer's lists, accounts, or inventories; it is a magical typewriter that allows you to type and print any kind of document; it is a personal communicator; if you like gadgets and electronic entertainment, _____.

Nowadays, it is almost impossible to imagine life without the magic of computers.

*

DISCUSSION

- Computer age
- Computer skills
- Computer business
- Computer speed
- Virtual machine
- Online shopping
- What are the advantages and disadvantages of technology in general?
- Advantages of mini computers
- Advantages of using computers at home
- The harmful influence of computers
- What are computers going to be like in the future

UNIT 6

Personal Computers (PCs)

A personal computer (PC) is any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals, and which is intended to be operated directly by an end user, with no intervening computer operator.
A personal computer may be a desktop computer, a laptop, tablet PC or a handheld PC (also called palmtop). Software applications for personal computers include word processing, spreadsheets, databases, Web browsers and e-mail clients, games, and myriad personal productivity and special-purpose software. Modern personal computers often have high-speed or dial-up connections to the Internet, allowing access to the World Wide Web and a wide range of other resources.
A PC may be used at home, or may be found in an office. Personal computers can be connected to a local area network (LAN) either by a cable or wirelessly.

Types
A workstation is a high-end personal computer designed for technical or scientific applications. Intended primarily to be used by one person at a time, they are commonly connected to a local area network and run multi-user operating systems.
Desktop computer
Prior to the wide spread of PCs a computer that could fit on a desk was considered remarkably small. Today the phrase usually indicates a particular style of computer case. Desktop computers come in a variety of styles ranging from large vertical tower cases to small form factory models that can be tucked behind an LCD (liquid crystal display) monitor. In this sense, the term 'desktop' refers specifically to a horizontally-oriented case, usually intended to have the display screen placed on top to save space on the desk top. Most modern desktop computers have separate screens and keyboards.
Single unit PCs (also known as all-in-one PCs) are a subtype of desktop computers, which combine the monitor and case of the computer within a single unit. The monitor often utilizes a touchscreen as an optional method of user input however detached keyboards and mice are normally still included. The inner components of the PC are often located directly behind the monitor.
A subtype of desktops, called *nettops*, was introduced to describe low-cost, lean-function, desktop computers. A similar subtype of laptops (or notebooks) are the netbooks.
A *laptop* computer or simply laptop, also called a notebook computer, is a small personal computer designed for portability. Usually all of the interface hardware needed to operate the laptop, such as parallel and serial ports, graphics card, sound channel, etc., is built into a single unit. Laptops contain high capacity batteries that can power the device for extensive periods of time, enhancing portability. Once the battery charge is depleted, it will have to be recharged through a power outlet. In the interest of saving power, weight and space, they usually share RAM (random access memory) with the video channel, slowing their performance compared to an equivalent desktop machine.
A subtype of notebooks, called subnotebooks, are computers with most of the features of a standard laptop computer, but smaller. They are larger than hand-held computers, and usually run full versions of desktop/laptop operating systems.

Netbooks are a rapidly evolving category of small, light and inexpensive laptop computers suited for general computing and accessing web-based applications; they are often marketed as 'companion devices', that is, to augment a user's other computer access.
As smaller notebooks optimized for low weight and low cost - netbooks omitted key features (e.g., the optical drive), featured smaller screens and keyboards, and offered reduced specification and computing power.
In the short period since their appearance, netbooks have grown in size and features, now converging with new smaller, lighter notebooks.
A tablet PC is a notebook or slate-shaped mobile computer. Its touchscreen or graphics tablet/screen hybrid technology allows the user to operate the computer with a stylus or digital pen, or a fingertip, instead of a keyboard or mouse. The form factor offers a more mobile way to interact with a computer. Tablet PCs are often used where normal notebooks are impractical or unwieldy, or do not provide the needed functionality.
The ultra-mobile PC (UMPC) is a specification for a small form factor of tablet PCs. It was developed as a joint development exercise by Microsoft, Intel, and Samsung, among others. Current UMPCs typically feature the Windows XP, Windows Vista, Windows 7, or Linux operating system and low-voltage Intel Atom or VIA C7-M processors.
A *home theater PC* (HTPC) is a convergence device that combines the functions of a personal computer and a digital video recorder. It is connected to a television or a television-sized computer display and is often used as a digital photo, music, video player, TV receiver and digital video recorder. Home theater PCs are also referred to as media center systems or media servers. The general goal in a HTPC is usually to combine many or all components of a home theater setup into one box.
A *pocket PC* is a hardware specification for a handheld-sized computer (personal digital assistant) that runs the Microsoft Windows Mobile operating system. It may have the capability to run an alternative operating system like NetBSD or Linux. It has many of the capabilities of modern desktop PCs.
Currently there are tens of thousands of applications for handhelds adhering to the Microsoft Pocket PC specification, many of which are freeware. Some of these devices also include mobile phone features. Microsoft compliant Pocket PCs can also be used with many other add-ons like GPS receivers, barcode readers, RFID readers, and cameras.

SELECTED TERMS

barcode reader – an optical device that reads data from a bar code
LCD screen (liquid crystal display screen) – a screen that uses LCD technology to create a thin display and is normally found in laptop computers and flat-screen monitors
PC (*personal computer*) – the general name for a microcomputer designed for home or business use
online – the condition of being connected to a network of computers or other devices

PRACTICE WORK:

a) Match the words with the correct meanings:

1. perform	a) keep, save
2. word processor	b) execute, do
3. online	c) monetary
4. download	d) screen
5. built-in	e) integrated
6. digital	f) connected to the Internet
7. store	g) collection of facts and figures
8. financial	h) describes information that is recorded or broadcast using computers
9. monitor	i) program used for text manipulation
10. data	j) copy files form a server to your PC or mobile

b) COMPUTER ESSENTIALS
Match the terms with their definitions:

1. software	a) the brain of the computer
2. peripherals	b) physical part that make up a computer system
3. main memory	c) programs which can be used on a particular computer system
4. hard drive	d) the information that is presented to the computer
5. hardware	e) results produced by a computer
6. input	f) input devices attached to the CPU
7. ports	g) section that holds programs and data while they are executed or processed
8. output	h) magnetic device used to store information
9. CPU	i) sockets into which an external device may be connected

c) COMPOUND WORDS

A word that is made by joining two words is called *a compound word*[7]. There are many words that have grown from the merging of two words. Some have changed over time and merged into a single word, ex: *gateway*. Some require a hyphen, ex: *one-dimensional*. Others seem to work well as separate words, ex: *compact disk*.

[7] Slađana Živković, Složenice u kompjuterskom registru (monografija), Studentski kulturni centar, Niš, 2010.

Join each word on list A to a word on list B to make a compound word.

A	B
1. user	a. graphics
2. upward	b. dependent
3. key	c. computer
4. computer	d. band
5. data	e. sensitive
6. mouse	f. compatibility
7. machine	g. cast
8. general	h. wave
9. personal	i. friendly
10. clip	j. stream
11. broad	k. board
12. long	l. readable
13. wide	m. purpose
14. level	n. board
15. code	o. pad

*

DISCUSSION

- How has computer technology affected our lives?
- Role of computers in education
- Creative use of your computer can make language learning easier
- Looking for computer networking jobs

UNIT 7

PC Operating Systems

Once loaded, the operating system's tasks fall into six broad categories:

- Processor management - Breaking the tasks down into manageable chunks and prioritizing them before sending to the CPU,

- Memory management - Coordinating the flow of data in and out of RAM and determining when virtual memory is necessary,

- Device management - Providing an interface between each device connected to the computer, the CPU and applications,

- Storage management - Directing where data will be stored permanently on hard drives and other forms of storage,

- Application interface - Providing a standard communications and data exchange between software programs and the computer,

- User interface - Providing a way for you to communicate and interact with the computer.

Say, for example, that you open up a word processing program and type a letter, save it and then print it out. Several components work together to make this happen:

- The keyboard and mouse send your input to the operating system.

- The operating system determines that the word-processing program is the active program and accepts your input as data for that program.

- The word-processing program determines the format that the data is in and, via the operating system, stores it temporarily in RAM.

- Each instruction from the word-processing program is sent by the operating system to the CPU. These instructions are intertwined with instructions from other programs that the operating system is overseeing before being sent to the CPU.

- All this time, the operating system is steadily providing display information to the graphics card, directing what will be displayed on the monitor.

- When you choose to save the letter, the word-processing program sends a request to the operating system, which then provides a standard window for selecting where you wish to save the information and what you want to call it. Once you have chosen the name and

file path, the operating system directs the data from RAM to the appropriate storage device.

- You click on ‘Print’. The word-processing program sends a request to the operating system, which translates the data into a format the printer understands and directs the data from RAM to the appropriate port for the printer you requested.

- You open up a Web browser and check out HowStuffWorks**.** Once again, the operating system coordinates all of the action. This time, though, the computer receives input from another source, the Internet, as well as from you. The operating system seamlessly integrates all incoming and outgoing information.

- You close the Web browser and choose the ‘Shut Down’ option.

- The operating system closes all programs that are currently active. If a program has unsaved information, you're given an opportunity to save it before closing the program.

- The operating system writes its current settings to a special configuration file so that it will boot up next time with the same settings.

- If the computer provides software control of power, then the operating system will completely turn off the computer when it finishes its own shut-down cycle. Otherwise, you will have to turn the power off manually.

How to connect your cellular phone with your computer?
There are three common and easy ways to connect cellular phone with computer:
1. Infrared
2. USB or data cable
3. Bluetooth
In order to connect your personal computer with cellphone, you must have at least one of these in your mobile.

How to connect via Infrared?
Materials:
1. Infrared dongle for personal computers.
2. An infrared-enabled cell phone.
3. Cellular phone's software for example PC Suite.

What is infrared dongle?
Infrared dongle is an electronic-USB device that enables your personal computer to receive and send infrared signals. The procedure of connectivity through infrared is different from bluetooth.

A method to connect via infrared:
1. Firstly, switch on the infrared reception in the cell phone and connect the infrared dongle with the computer.

2. Now just align the device horizontally with the infrared dongle, so that it is connected to your computer.
3. Open up and run the cell phone-PC software in order to communicate with the cellphone. Most of the mobile phone companies provide PC suite software or you can download it from the net.
4. Now, you can send and receive data from computer to the device.

How to connect via data cable?
Materials:
1.USB data cable.
2.PC Suite mobile software.

What is a data cable?
A data cable is a long cord, which connects your computer with your cell phone in order to share data between them. The data cable transfers electrical signals from cell phone to computer and computer to cell phone.

A method to connect via data cable:
1. Connect the data cable at the serial port or USB port of your computer. Just connect one end of the data cable to your cellphone and other end to your computer.
2. Open and run cell phone PC suite software to start transferring data from your cell phone. Most mobile companies provide data cables with the mobile or you can buy it from a mobile store.

How to connect via Bluetooth?
Materials:
1. USB bluetooth dongle for computers.
2. A bluetooth-enabled cell phone.
3. Cell phone software (PC Suite).

What is a Bluetooth dongle?
A bluetooth dongle is an electronic-USB device which can be connected to your computer and then you can send and receive all types of bluetooth signals.

A method to connect via bluetooth:
1. Firstly, connect the bluetooth dongle to your computer and install its driver as provided.
2. Then, switch on your cell phone's bluetooth reception, so you can send and receive the bluetooth signals to the computer.
3. Now, run the installed personal computer software for that particular cell phone, which you are going to connect. For most of the bluetooth-enabled cellular phones, PC Suite is already provided when you initially buy a cell. There is one more option, you can also download it from the net.
4. Now what, you are already on your way to send and receive data from your computer to your handset.

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SELECTED TERMS

bluetooth – a wireless networking technology that uses short-wave radio frequencies to interconnect cell phones, portable computers, and other wireless electronic devices
portability – the quality of being easily movable from one physical place to another. In the context of transmission systems, wireless technologies offer the advantage of portability. Radio systems and free space optics (FSO) systems are inherently somewhat portable, and many are lightweight, collapsible, and otherwise specifically designed to be highly portable
workstation – 1) a high-performance, single-user computer typically used for graphics, CAD, software development and scientific applications. A workstation may be a RISC-based computer that runs under some version of Unix or Linux, the major vendors being Sun, HP, IBM and SGI. It may also refer to a high-end PC using Intel or AMD CPUs from any PC vendor. In all cases, the term implies a machine with a fast CPU and large amounts of memory and disk that is geared toward the professional user rather than the consumer

2) a terminal or desktop computer in a network. In this context, workstation is just a generic term for a user's machine (client machine) in contrast to a "server" or "mainframe"

PRACTICE WORK:

a) Complete with: application software, operating system, software, system software

The set of program instructions that tell the computer what to do is known as _____. It can be classified into two basic categories: the _____, which includes all the programs that control the basic functions of a computer (e.g. operating systems, programming software, device drivers and utilities); the _____ which comprises programs that let you do specific tasks. Typical applications include word processing, databases, educational programs, email and video games. The _____ is a set of programs that control the hardware and software resources of a computer system.

b) Articles: a, an, the, or nothing.

Linux is _____ operating system and it was initially created as _____ hobby by a young student, Linus Torvalds. Version 1.0 of the Linux Kernel was released in 1994. _____ Kernel, at the heart of all Linux systems, is developed and its source code is freely available to everyone.
Apart from the fact that it's freely distributed, _____ Linux's functionality, adaptability and robustness has made it the main alternative for proprietary Unix and Microsoft operating systems. More than _____ decade after its initial release, Linux is being adopted worldwide, primarily as _____ server platform. This

operating system can also be incorporated directly into _____ microchips in a process called _____ embedding.

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DISCUSSION

- A brief history of PCs
- PC parts
- Computer case
- Cellular phones
- Technical innovations in the field of microelectronics
- The future of PC

UNIT 8

Telecommunications

Telecommunications represents the transmission of signals over a distance for the purpose of communication. It involves the use of electronic device such as telephones, television, radio or computers.
A basic telecommunication system consists of three elements:
- a transmitter that takes information and converts it to a signal;
- a transmission medium that carries the signal; and,
- a receiver that receives the signal and converts it back into usable information.

For example, in a radio broadcast the broadcast tower is the transmitter, free space is the transmission medium and the radio is the receiver. Often telecommunication systems are two-way with a single device acting as both a transmitter and receiver or transceiver. For example, a mobile phone is a transceiver.
Telecommunication over a telephone line is called point-to-point communication because it is between one transmitter and one receiver. Telecommunication through radio broadcasts is called broadcast communication because it is between one powerful transmitter and numerous receivers.

Analogue or digital signals
Signals can be either analogue or digital. In an analogue signal, the signal is varied continuously with respect to the information. In a digital signal, the information is encoded as a set of discrete values (for example ones and zeros). During transmission the information contained in analogue signals will be degraded by noise. Conversely, unless the noise exceeds a certain threshold, the information contained in digital signals will remain intact. Noise resistance represents a key advantage of digital signals over analogue signals.

Networks
A network is a collection of transmitters, receivers and transceivers that communicate with each other. Digital networks consist of one or more routers that work together to transmit information to the correct user. An analogue network consists of one or more switches that establish a connection between two or more users. For both types of network, repeaters may be necessary to amplify or recreate the signal when it is being transmitted over long distances. This is to combat attenuation that can render the signal indistinguishable from noise.

Channels
A channel is a division in a transmission medium so that it can be used to send multiple streams of information. For example, a radio station may broadcast at 96.1 MHz while another radio station may broadcast at 94.5 MHz. In this case, the medium has been divided by frequency and each channel has received a separate frequency to broadcast on.

Alternatively, one could allocate each channel a recurring segment of time over which to broadcast - this is known as time-division multiplexing and is used in optic fibre communication.

Modulation

The shaping of a signal to convey information is known as modulation. Modulation can be used to represent a digital message as an analog waveform. This is known as coding and several coding techniques exist (these include phase-shift coding, frequency-shift coding and amplitude-shift coding). Bluetooth, for example, uses phase-shift coding to exchange information between devices.

Modulation can also be used to transmit the information of analogue signals at higher frequencies. This is helpful because low-frequency analogue signals cannot be effectively transmitted over free space. Hence the information from a low-frequency analogue signal must be superimposed on a higher-frequency signal (known as the carrier wave) before transmission. There are several different modulation schemes available to achieve this (two of the most basic being amplitude modulation and frequency modulation). An example of this process is a DJ's voice being superimposed on a 96 MHz carrier wave using frequency modulation (the voice would then be received on a radio as the channel "96 FM").

Local Area Network and Wide Area Network

Despite the growth of the Internet, the characteristics of local area networks ('LANs' – computer networks that do not extend beyond a few kilometers in size) remain distinct. This is because networks on this scale do not require all the features associated with larger networks and are often more cost-effective and efficient without them. When they are not connected with the Internet, they also have the advantages of privacy and security. However, purposefully lacking a direct connection to the Internet will not provide 100% protection of the LAN from hackers, military forces, or economic powers. These threats exist if there are any methods for connecting remotely to the LAN.

There are also independent wide area networks (WANs – private computer networks that can and do extend for thousands of kilometers.) Once again, some of their advantages include their privacy, security, and complete ignoring of any potential hackers – who cannot 'touch' them. Of course, prime users of private LANs and WANs include armed forces and intelligence agencies that *must* keep their information completely secure and secret.

As the Internet grew in popularity and a larger percentage of traffic became Internet-related, LANs and WANs gradually moved towards the TCP/IP protocols, and today networks mostly dedicated to TCP/IP traffic are common. The move to TCP/IP was helped by technologies such as DHCP that allowed TCP/IP clients to discover their own network address — a function that came standard with the AppleTalk/IPX/NetBIOS protocol sets.

The telecommunications industry

The telecommunications industry delivers telephone, television, Internet, and other services to customers. Providing the primary means of communication to virtually all businesses, households, and individuals, telecommunications firms supply an essential

service to the economy. In addition to offering traditional services such as wired phone and cable TV, telecommunications companies also offer services such as cellular phone, broadband and mobile Internet, and satellite TV, among others.

The telecommunications industry is divided into four main sectors: wired, wireless, satellite, and other telecommunications establishments. The largest sector of the telecommunications industry continues to be made up of wired telecommunications carriers. Establishments in this sector mainly provide telecommunications services such as such as wired telephone, digital subscriber line (DSL) Internet, and cable TV and Internet services. These organizations route TV, voice, Internet, data, and other content over a network of wires and cables, and control access to this content. They may own and maintain networks, share networks with other organizations, or lease network capacity from other companies.

Wireless telecommunications carriers provide telephone, Internet, data, and other services to customers through the transmission of signals over networks of radio towers. The signals are transmitted through an antenna directly to customers, who use devices, such as cell phones and mobile computers, to receive, interpret, and send information. A large component of this industry segment consists of companies that provide cellular phone service, which has grown rapidly over the past decade. Another component includes establishments that deliver mobile Internet services to individuals with Internet-enabled cellular phones and computers.

Satellite telecommunications establishments are made up mostly of government and private organizations that transmit a variety of data through satellites, including photos of the earth, messages to and from public safety officials, and a variety of other information. Direct-to-home satellite TV providers, however, are classified with wired telecommunications.

Other sectors in the telecommunications industry include telecommunications resellers, as well as operators of other communication services ranging from radar stations to radio networks used by taxicab companies.

Recent developments

Telecommunications carriers are expanding their data transmission capabilities, known as ‘bandwidth’, by replacing copper wires with fiber optic cables. Fiber optic cable, which transmits light signals along glass strands, permits faster, higher capacity transmissions than traditional copper wire. In some areas, carriers are extending fiber optic cable to residential customers, enabling them to offer cable television, video-on-demand, faster high-speed Internet, and conventional telephone communications over a single line.

Wireless telecommunications carriers are deploying several new technologies to allow faster data transmission and better Internet access in an effort to make them more competitive in a market that includes wired Internet carriers. With faster connection speeds, wireless carriers can transmit music, videos, applications, and other content that can be downloaded and played on cellular phones, giving users mobile access to large amounts of data. In addition, as use of this mobile technology increases, wireless companies continue to develop the next generation of technologies that will allow even faster data transmission.

SELECTED TERMS

bandwidth – the measure of the capacity of a circuit or channel. More specifically, bandwidth refers:
(1) to the total frequency range on the available carrier in Hertz (Hz) for the transmission of data;
(2) the capacity of a circuit in bits per second (bps)
transmission – the process of sending signals from one device to another
transceiver – a combination of a transmitter/receiver in a single package. The term applies to wireless communications devices such as cellular telephones, cordless telephone sets, handheld two-way radios, and mobile two-way radios. Occasionally the term is used in reference to transmitter/receiver devices in cable or optical fiber systems

PRACTICE WORK:

COLLOCATIONS

A collocation is a pair or group of words that are often used together.

You need to learn them in order to sound native in English. For example, in computing we say 'attach a file', not 'enclose a file'.

a) Practice these collocations:

receive, transmit, demodulate SIGNAL
distribute, compress, stream, decode, play back, watch, copy, protect CONTENT
CONTENT provider, maker

b) Complete these sentences using some of the above mentioned collocations:

- A lot of _____ _____ are concerned that their programs are being copied illegally.
- It is important for a national broadcaster to be able to _____ to every part of the country.
- MPEG techniques make it possible to _____ into much smaller files.
- A PC media player can _____ the _____ in MPEG, wmv and MP3 files.
- Digital rights management allows film makers to _____ _____ to a certain extent.
- Most TV viewers still need an aerial pointing in the right direction to _____ _____ from the national broadcaster.
- A CRT creates images from the _____ _____ it receives from the antenna.

- As broadband capacities have increased, it has become easier to _____ _____ across networks in IP packets.

c) Allowing/Preventing verbs
Complete with underlying the correct words:

1. … there's a setting on the GPS that allows/prevents it to detect the movement.
2. … an alarm sounds to warn you, and allows/prevents the boat from drifting unnoticed.
3. … and enables/ensures that you don't lose track of where you were, which then enables/ensures you to turn round and come back to the same point.

d) Complete with an allowing or preventing verb:

The core function of your GPS receiver is to _____ you to locate your precise geographical position. To _____ the device to function, it receives at least three signals simultaneously from the GPS constellation – 30 dedicated satellites which _____ receivers to function anywhere on earth. To _____ extremely precise positioning and _____ errors from occurring due to external factors, this device is designed to receive four separate signals (enhanced system accuracy).

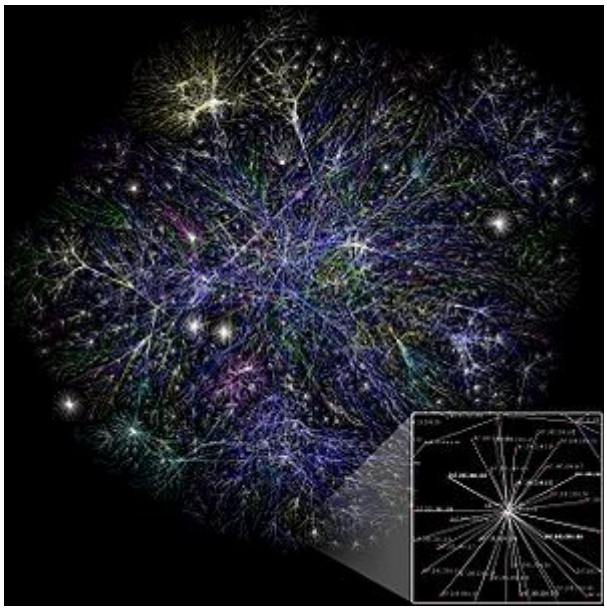
*

DISCUSSION

- History of telecommunications
- Telecommunications infrastructure
- Teleconferencing
- Radiometry
- Analog versus digital communications
- Communication channels
- Wavelength-division multiplexing (WDM)
- Wired communication
- Active networks
- Nanoscale networks

UNIT 9

Internet



Visualization of the various routes through a portion of the Internet

The Internet (or simply 'the Net'), is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).
Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (transmission control protocol/Internet protocol.
The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail.
Most traditional communications media, such as telephone and television services, are reshaped or redefined using the technologies of the Internet, giving rise to services such as Voice over Internet Protocol (VoIP) and IPTV. The Internet has enabled or accelerated the creation of new forms of human interactions through instant messaging, Internet forums, and social networking sites.

Types of connections

Common methods of consumer Internet access in 2011 include:
- dial-up (including ISDN),
- Asymmetric digital subscriber line (ADSL),
- Internet over cable television lines,
- LAN (PPPoE) - usually in areas of high population density,
- Wi-Fi hotspots,
- Wireless Internet service provider - sometimes simply called 'microwave',
- Mobile broadband over terrestrial mobile phone networks using CSD, GPRS, EDGE, EVDO, HSPA, etc. either through mobile phones or PCs,
- Satellite Internet.

As of 2011, the following methods see a smaller usage share:
- data-only cellular networks like WiMAX and LTE,
- Leased line,
- broadband over power line,
- IP over DVB,
- fiber to the home,
- Wireless mesh network - mostly military and One laptop per child use,
- Packet radio,
- Free-space optical communication,
- Wizzy Digital Courier.

Access technologies generally use a modem, which converts digital data to analog for transmission over a particular analog network (ex. the telephone or cable networks).

How to get online
Before you even start thinking about a website, you need to make sure your organisation has the correct equipment to connect to the Internet. Every organization will be at a different stage of this process. To get connected to the Internet you will need:
- a computer (e.g. a Mac or PC),
- a modem (broadband or dial-up modem, wireless, modem/router, local area network access to the Internet),
- an account with an Internet Service Provider (ISP),
- a browser (software to browse the web, pick up email and download files).

Computers
All new computers, whether PC or Mac, are Internet-ready and most come with a modem and Internet browser software already installed. A sufficient low standard specification for an internet-connected PC would be 256 megabyte RAM memory (working memory) with a processor of 1.0 GHz clock speed. The larger RAM memory and faster processor you can get, the faster your computer will process information and run software. But the speed you access the Internet at also depends on the type of Internet connection and modem you are using.

Modem

If you are going to connect up via a dial-up modem and your telephone provider then get the fastest modem you can afford. Internal modems (i.e. you fit it inside the computer) are usually cheaper, but external modems are easier to install and can be easier to troubleshoot if they go wrong. A modem allows you to connect to the Internet service provider (ISP) over your standard phone line. It dials up the provider in exactly the same way you dial a friend.

Internet Service Providers (ISP)
An ISP provides you with your connection to the Internet. They can be split into two broad camps: those who provide just an Internet connection and those who provide a connection and additional services such as news, discussion forums and child-friendly content.
Well known ISPs are BT, NTL, Tiscali and Excalibur which can provide both dial-up and broadband connections. Examples of ISPs providing additional services are MSN and AOL. Which one you choose depends on whether you put a value on these additional services. You need to research what is available in your area according to your needs.

Broadband
You can get a faster connection (broadband) to the Internet by using newer technologies such as ISDN (Integrated Services Digital Network), DSL (Digital Subscriber Line), or via a cable modem. DSL and cable modems are 'always on' and provide fast access to a richer multimedia experience. You don't need an extra phone line for the Internet connection and you can of course use your phone at the same time as connected to the Internet.

Wireless network
Wireless connections are now available in many public areas such as airports, hotels and cafés. To set up a wireless network in your own organisation requires an 'access point', i.e. a device connected to the Internet that can transmit data to other wirelessly enabled devices – and wireless enabled computers (e.g., by installing internal cards, USB devices).

CD-Rom player
Your computer will also need a CD player as most Internet installation software comes on a CD-Rom.

Software
You will need software to 'surf' the web and to use email. To surf the web you will need a web browser such as Internet Explorer, Firefox or Opera. With a program such as Outlook Express, Mail (on Macs) or Eudora you can send and receive email from your desktop machine. Many ISPs also provide a web-based email service, allowing you to receive and send email from anywhere with the Internet connection, e.g. Internet café.

Advantages of the Internet
Some of the things that you can do via the Internet are:

- E-mail: E-mail is an online correspondence system. With e-mail you can send and receive instant electronic messages which work like writing letters. Your messages are delivered instantly to people anywhere in the world, unlike traditional mail that takes a lot of time.
- Access Information: The Internet is a virtual treasure trove of information. Any kind of information on any topic under the sun is available on the Internet. The 'search engines' on the Internet can help you to find data on any subject that you need.
- Shopping: Along with getting information on the Internet, you can also shop online. There are many online stores and sites that can be used to look for products as well as buy them using your credit card. You do not need to leave your house and can do all your shopping from the convenience of your home.
- Online Chat: There are many 'chat rooms' on the web that can be accessed to meet new people, make new friends, as well as to stay in touch with old friends.
- Downloading Software: This is one of the most happening and fun things to do via the Internet. You can download innumerable, games, music, videos, movies, and a host of other entertainment software from the Internet, most of which are free.

Communication on the Internet
Communication is the most popular use of the Internet, with email topping the list of all the technologies used. Some of the types of communication technologies used also include email discussion groups, Usenet news, chat groups. These are unique to networked computer environments and have come into wide popularity because of the Internet. Other technologies, including video and audio conferencing and Internet telephony, are also available on the Internet. They require more multimedia capabilities of computer systems and are more taxing of network resources than the others. They also are adaptations of other technologies to the Internet.
Most of the technologies that are unique to the Internet require communication to be done in text-letters with some symbols and punctuation. Communicating effectively involves taking the time, except in informal communications, to use correct grammar, spelling, and punctuation and writing an appropriate message. Replying to a message include the pertinent parts of the message and use an appropriate and interesting subject header in any case.
The Internet is allowing greater flexibility in working hours and location, especially with the spread of unmetered high-speed connections and web applications.
The Internet can now be accessed almost anywhere by numerous means, especially through mobile Internet devices. Mobile phones, datacards, handheld game consoles and cellular routers allow users to connect to the Internet from anywhere there is a wireless network supporting that device's technology. Within the limitations imposed by small screens and other limited facilities of such pocket-sized devices, services of the Internet, including email and the web, may be available. Service providers may restrict the services offered and wireless data transmission charges may be significantly higher than other access methods.
The Internet has also become a large market for companies; some of the biggest companies today have grown by taking advantage of the efficient nature of low-cost advertising and commerce through the Internet, also known as e-commerce. It is the fastest way to spread information to a vast number of people simultaneously.

The low cost and nearly instantaneous sharing of ideas, knowledge, and skills has made collaborative work dramatically easier, with the help of collaborative software. Not only can a group cheaply communicate and share ideas, but the wide reach of the Internet allows such groups to easily form in the first place. Messages can be exchanged even more quickly and conveniently than via e-mail.
The Internet allows computer users to remotely access other computers and information stores easily, wherever they may be across the world. They may do this with or without the use of security, authentication and encryption technologies, depending on the requirements. This is encouraging new ways of working from home, collaboration and information sharing in many industries. Now we can communicate with a person who is sitting in the other part of the world.

Entertainment
Downloading games, visiting chat rooms or just surfing the Web are some of the uses people have discovered. There are numerous games that may be downloaded from the Internet for free. The industry of online gaming has tasted dramatic and phenomenal attention by game lovers. Chat rooms are popular because users can meet new and interesting people. In fact, the Internet has been successfully used by people to find life long partners. When people surf the Web, there are numerous things that can be found. Music, hobbies, news and more can be found and shared on the Internet.

Services
Many services are now provided on the Internet such as online banking, job seeking, purchasing tickets for your favorite movies, guidance services on array of topics engulfing every aspect of life, and hotel reservations. Often these services are not available off-line and can cost you more.

E-Commerce
E-commerce is the concept used for any type of commercial maneuvering, or business deals that involves the transfer of information across the globe via Internet. It has become a phenomenon associated with any kind of shopping, almost anything. You name it and E-commerce with its giant tentacles engulfing every single product and service will make you available at your door steps. It has got a real amazing and wide range of products from household needs, technology to entertainment.

Disadvantages
There are certain cons and dangers relating to the use of the Internet that can be summarized as:

Isolation
Using the Internet for long periods of time can isolate people from family and friends. Though many develop online relationships, these ‘cyber’ buddies cannot replace ‘real life’ socializing.

Addiction

It is possible for Internet users to become habitually addicted. Though different from chemical addiction, it is a real problem as some lose employment and suffer other adverse effects from overuse.

Theft of Personal information
If you use the Internet, you may be facing grave danger as your personal information such as name, address, credit card number etc. can be accessed by other culprits to make your problems worse.

Spamming
Spamming refers to sending unwanted e-mails in bulk, which provide no purpose and needlessly obstruct the entire system. Such illegal activities can be very frustrating for you, and so instead of just ignoring it, you should make an effort to try stopping these activities so that using the Internet can become that much safer.

Virus threat
Going online often means subjecting your computer to viruses that can crash your system, causing you to lose important files and sometimes destroying your operating system. Virus is nothing but a program which disrupts the normal functioning of your computer systems. Computers attached to internet are more prone to virus attacks and they can end up into crashing your whole hard disk.

SELECTED TERMS

chat room – an area of a website where visitors can exchange messages with other visitors in real time
Web conferencing – a form of real-time communications RTC in which multiple computer users, all connected to the Internet, see the same screen at all times in their Web browsers. Some Web conferencing systems include features such as texting, VoIP (voice over IP) and full-motion video. Web conferencing allows users to carry on business meetings and seminars, make presentations, conduct demonstrations, provide online education and offer direct customer support
virtual community – a community (a group) of people who communicate (share common interests, ideas and feelings) with each other via the Internet
visualization – technique for creating images, diagrams, or animations to communicate a message. Visualization today has ever-expanding applications in science, education, engineering (e.g., product visualization), interactive multimedia, etc. Typical of a visualization application is the field of computer graphics

PRACTICE WORK:

COLLOCATIONS

a) Here are some examples that you may find useful:

Browse sites
Broadband access
Stream files
Tune in to the Internet radio
Play video/music
Optical disc
Read and write data
High-definition television
Fully compatible
Go online
Connect to the Internet
Transmit data
Install the software
Access the Web
Send/receive emails
Plug into the computer
Log onto your account
Hack into computers
High-speed networks
Outgoing/incoming mail
Instant messaging
Electronic commerce
Wireless hotspots
Virtual environment
Interactive TV
Highly sensitive information
Freely available
Chat room
Real time
Plug and play
Drag and drop

b) Match one word on the left with a partner on the right.

1. high definition	a) Internet radio
2. read and write	b) disc
3. play	c) videos and music
4. tune in to	d) television
5. broadband	e) data
6. optical	f) your favourite sites
7. browse	g) compatible
8. fully backward	h) access

c) Complete with a suitable collocation:

- I have a program that monitors both _____ and _____ mail and also blocks spam.
- With a webcam you can add video to online chats and _____ messaging. Simply _____ the software included, plug the webcam _____ your PC, and start having video conferences.
- This software enables you to burn _____ and DVDs containing any data files.
- I use a media player to _____ audio and video files from the Web; I can play them directly.
- This program allows us to perform video conferencing in _____ time, without any delay.
- We have decided to make the material _____ available on the Web.
- I often log _____ my Internet bank account to make payments; I never forget to log off.

d) Complete the collocations in this text:

Fast connections
Connecting to the _____ using DSL lines, cable TV and satellite increases bandwidth dramatically, making the Web more useful. Increased speed has ignited an explosion of _____ commerce, video on demand, telecommuting, collaborative scientific projects, video conferencing and _____ environments.

Internet2
Internet2 is not a single network, but a consortium of hundreds of _____ networks linked by fibre-optic backbones that span the United States and link to other countries. The network transmits _____ at speeds up to 2.4 gigabits per second – 45000 times faster than 56Kbps modem – allowing scientists to test their laboratory discoveries in the real world. The next generation network went _____ in February, 1999, linking a number of universities around the world. When it is in commercial use, services will be available like _____ television, virtual 3-D video conferencing, and much more.

A new kind of Web

While PCs were once the primary means of accessing the Internet, we're now sending Internet-enabled devices such as PDAs and cell phones that send and receive _____- and access the _____. Soon, everything from your car to your refrigerator will be connected to the global network, all communicating with each other wirelessly.

e) Make collocations and then use them in sentences:

1. give	a) money
2. keep	b) a PIN
3. access	c) databases
4. enter	d) presentations
5. transfer	e) records
6. perform	f) transactions
7. do	g) exercises
8. make	h) information
9. send	i) letters
10. display	j) research
11. write	k) operations
12. store	l) data
13. complete	m) texts
14. carry out	n) calls

- Thanks to Wi-Fi, it's now easy to _____ from cafes, hotels, parks and many other public places.
- Online banking lets you _____ between your accounts easily and securely.
- Skype is a technology that enables users to _____ over the Internet for free.
- In many universities, students are encouraged to _____ using Power Point in order to make their talks more visually attractive.
- The Web has revolutionised the way people _____ - with sites such as Google and Wikipedia, you can find the information you need in a second.
- Cookies allow a website to _____ on a user's machine and later retrieve it. When you visit the website again, it remembers your preferences.
- With the latest mobile phones, you can _____ with multimedia attachments – pictures, audio, video.

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DISCUSSION

- History of the Internet
- The wireless Internet

- Internet design
- English on the Internet
- Internet slang (Netspeak)
- Social impact of the Internet

UNIT 10

Email

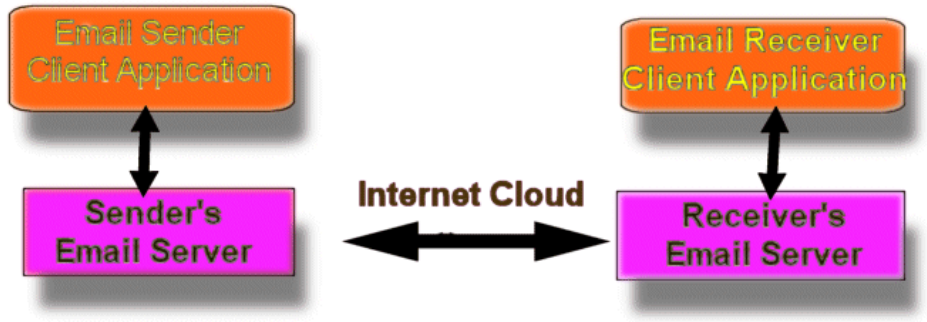
Electronic mail, commonly known as email (e-mail), is a method of exchanging digital messages from an author to one or more recipients.
Email as a medium of communication has become an almost indispensable tool for business, educational, social and personal purposes. Its importance in the future will, in all likelihood, continue to grow at an almost exponential rate, despite the plague of spam that is choking the Internet.
Email has the advantage of regular postal mail in that it is delivered into the recipient's mailbox for them to read and reply to at their convenience, but without the lengthy time delay involved with 'snail mail'. Email also has the advantage of being quick and easy. It doesn't oblige the sender to engage in small-talk with the recipient, as telephones do. Using the phone to convey a simple message to a friend might involve a 10-15 minute conversation because no one wants to appear rude by hanging up too soon. In an increasingly busy world, email allows the same message to be conveyed in a minute or two without implied rudeness.

Using email
An email consists of two components, the *header*, and the *body*. The message header contains control information, including, minimally, an originator's email address and one or more recipient addresses. Usually descriptive information is also added, such as a subject header field and a message submission date/time stamp.

Email body is the actual content of the message; message that you send to other side; text that you write into your body field.

Email header containt fields that tell us more about email location of sender, receiver, and it is always used to trace email location of sender.
Here is a breakdown of the most commonly used and viewed headers, and their values:
- *From*: sender's name and email address
- *To*: recipient's name and email address
- *Date*: sent date/time of the email; the local time and date when the message was written
- *Subject*: whatever text the sender entered in the subject heading before sending

Email Via the Internet



E-mail transmission via the Internet

The email sender creation functions

The email creation functions are:

- Creating the address book of email addresses of the user's family, friends, and business associates.

The address book may contain the full information about the individuals including phone numbers (business, home, fax, cell, etc.), mailing addresses, business information, and notes. The address book also allows the grouping of the individuals into email lists for sending news letters, reports, team schedules, etc. These lists can make office and personal communications productive and efficient. If they are misused, they create an overload to the email system and a waste of valuable time.

- The composition and editing of the email content.

The subtasks include the filling the header information: the To, CC, and subject fields the creating and editing the content, body, the adding of attachments (files such as images, audio, multi media, and office documents), the adding of signature files that contain addition information about the sender, and finally adding any special handling instructions like reporting the receipt and/or the time and date of the email being read.

- The adding of a digital signature (a recently approved law that allows the adding of a digital signature that makes the email into a legal document or contract) and the encryption of the email so that it can only be read by the intended reader.
- Finally the sending of the email.

In actual fact, this is the transmission of the email to the creator's email server. This email server is the electronic post office. Thus the send function is similar to the act of dropping the letter into the mail box.

The email receiver creation functions

The email functions on the receiving end are:

- The handling of multiple mail boxes (the user may multiple accounts on several different email servers).

The tasks include contacting the various servers and fetching the email. Depending on the type of server, the email file may be kept on the server or send to the client that the user is using.

- Lists the new and/or unread mail that has been received and to sort it by date or arrival, or sender, or priority.
The listing may also present the subject or the first part or the message.
- Provide means of display for the email message and the attachment(s).
- Provide means of response via a reply to the sender, or the sender and all or some of the recipients, or forwarding it to entirely new individuals or groups (lists).
- Provides means of disposal either by: storage in a directory, placing in a disposal directory for deletion at the end of the session, or immediate deletion.
- Provide means of filtering the email that is creating a set of rules about what to do with email if one or more facts are true.

Email servers
The email server has to communicate between:
- the server's client applications and
- other email server that it is sending email *to* via the Internet
- other email server that it is receiving email *from* via the Internet.
The email server is an electronic version of a normal post office. There two types of the email servers:
- the POP3 server that transfers the email to the client and,
- the IMAP that saves the email on the server.
The email post office is responsible for providing its clients with individual postal boxes (directories) that hold the incoming email for the user and a postal drop box to pick up the client's outgoing missives. The email server makes the transmission of the email transparent to the user, i.e. the user sees only the initial send and the final receipt. The server allows the user to set up directories to organize the email in a file system. The email server mail may automatically save the various emails in a Sent Mail directory if not the writer may want to use the Bcc: to send a copy for a file copy.
Unlike the postal serve the email server can have functions that monitor our email. Opening letters is another more serious matter and is almost always requires a court order based on a risk to national security. In general we can safely assume that mail is not read by our government or our employers. The email server and the Internet are not similarly prohibited at this time from any of these procedures. More and more companies are screening email.

The Email Server Sender functions
- Receive email from the email client that created it,
- Verify that the user has privileges of sending and receiving email through this post office. Email found to be sent promiscuously via through an ISP is greatly frowned upon as it is a major source of junk email called spam. ISPs that allow such practices are now told by members of the Internet community that their email will not be forwarded or allowed to be received unless this practice is stopped. The threat normally affects the desired result.
- The letter is then prepared for transmission over the Internet - translate the email address into an IP address and a routing.
- The email is sent via Simple Mail Transfer Protocol (SMTP) to the email server of the recipient.

- If the email address is not valid or the destination server is not up, then it makes several attempts and finally reports a delivery error back to the sender.

The Email Server Recipient functions

- The server is responsible for receiving the client's rules for filtering the mail, for storing these rules for the individual, and upon receiving email acting on the rules. For instance, if the user does not want email from another user, the rule can be if sender is XX then delete.
- Receive email from other servers and place it in the correct mailbox (directory). If there is no such mailbox, then generate an error message back to the sender.
- Optional - send a recipient to the client that the message arrived and or was read.
- The server delivers the email to the client when requested then:
    - follows the filter rules,
    - sorts the mail via criteria such as by date, sender, subject, etc., and
    - deletes and otherwise manages the storage issue.

SELECTED TERMS

directory – a simulated file folder on disk. Programs and data for each application are typically kept in a separate directory (spreadsheets, word processing, etc.)
protocol (in computer terminology) – a method for transmitting data and/or establishing communications between different devices
storage (in a computer) – the place where data is held in an electromagnetic or optical form for access by a computer processor

PRACTICE WORK:

a) Prefixes e- and cyber-[8]
Complete with: *e-business/e-commerce, e-card, e-learning, e-zine, e-voting, e-signature, e-assessment, e-cash, e-book, e-pal, cybercafé, cybercrime, cyberculture, cyberslacker, cyberspace.*

- A _____ is an employee who uses his company's internet connection during work hours to chat with friends, play games, etc.
- An _____ is a postcard sent via the Internet.
- An _____ is a small magazine or newsletter published online.
- In a _____ you can use computers with internet access for a fee.
- Examples of _____ include internet fraud, digital piracy, theft of confidential information, etc.
- In the future, all elections will be carried out using _____.
- You can now sign legal documents online using an _____.

[8] Slađana Živković, Leksikološko-tvorbena analiza termina iz oblasti informaciono-komunikacionih tehnologija u engleskom jeziku u poređenju sa srpskim, Doktorska disertacija, Univerzitet u Beogradu, Filološki fakultet, 2010, str. 74

- _____ will revolutionise the way we take exams.
- _____ can be used on some websites instead of real money to make purchases. It reduces the risk of fraud.
- An _____ is like the paper version, but in digital form.

b) **Internet Slang**[9] **-** Interpreting Online Slang, Words, Numbers & Symbols

Internet users have developed many slang terms over the years. Most of these are not actually acronyms as they cannot be pronounced, but that is what they are called nonetheless.

Acronyms
AAMOF - as a matter of fact
AFAIC - as far as I'm concerned, or as far as I care, or as far as I can
AFAIK - as far as I know
AFAIR - as far as I recall, or as far as I remember
AFK - away from keyboard
ASAP - as soon as possible
BBL - be back later
BBS - be back soon
BRB - be right back (usually used in chats and on an instant messenger service).
BTW - by the way
B2B - Business to Business
CMIIW - correct me if I'm wrong
CU - see you, used as a goodbye.
CUL - see you later
FAQ - Frequently Asked Question
FWIW - for what its worth
FYI - for your information
GJ - Good Job
HAND - have a nice day
HTH - hope this helps
IKWUM - I know what you mean
IMHO - in my humble opinion
IMO - in my opinion
IRC - Internet Relay Chat
JOOC - just out of curiosity
KWIM - Know what I mean?
LOL - laughing out loud, or lots of laughs (a reply to something amusing)
"nite" for night
NM (n/m) - never mind" or "not much"
NP - No problem
ROTFL - rolling on the floor laughing

[9] Slađana Živković, Leksikološko-tvorbena analiza termina iz oblasti informaciono-komunikacionih tehnologija u engleskom jeziku u poređenju sa srpskim, Doktorska disertacija, Univerzitet u Beogradu, Filološki fakultet, 2010, str. 222

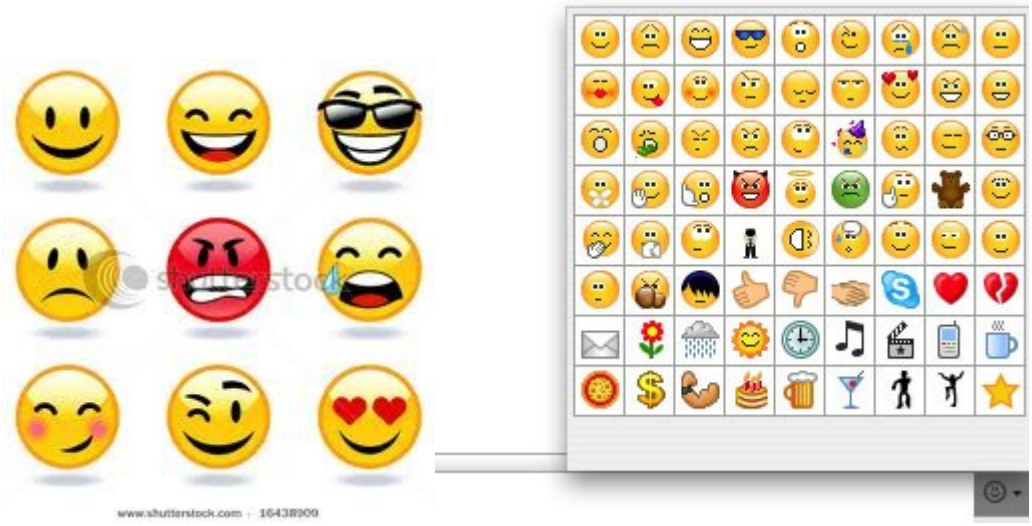
TBH - to be honest
TIA - thanks in advance
TTYL - talk to you later
U - a shorthand spelling of "you"
ur - a shorthand spelling of "you're"
w/e - slang/abbreviation for whatever

Numbers and their meanings as used as online slang in chat rooms, email…:

"2" - to or too
"8" - ate, as l8r for later
"10x" - thanks
10q - Thank you
10x - Thanks
224 - today, tomorrow, forever
2B - to be
2B||!2B - to be or not to be
2m - tomorrow
4 - for
4ever - forever
5/5 - five by five
w8 - wait
2B - To be
2L8 - too late
4 - for
B4N - bye for now

Emoticons
An emoticon is a facial expression pictorially represented by punctuation and letters, usually to express a writer's mood. Emoticons are often used to alert a responder to the tenor or temper of a statement, and can change and improve interpretation of plain text. The word is a portmanteau word of the English words *emotion* and *icon*. In web forums, instant messengers and online games, text emoticons are often automatically replaced with small corresponding images, which came to be called *emoticons* as well.
These are a popular and useful way of expressing emotion in email. There is a growing number, but these are the basic ones that people use:
:) happy
:(sad
:o very surprised
;) wink
;* kiss
8) person with glasses smiling
:& tongue-tied
:-|| Very angry
8-| Wide-eyed surprise
:@ What?
:'(Crying

:-V Shouting
:^D Happy, approving



Emoticons examples

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DISCUSSION

- Email advantages and disadvantages
- Using business email
- Email security
- Why do you need email etiquette?
- What are the email etiquette rules?
- How do you enforce email etiquette?

UNIT 11

Computer Viruses

A computer virus is a computer program that can spread from one computer to another by infecting files on a network file system, or a file system that is accessed by other computers. A computer virus might corrupt or delete data on your computer, use your email program to spread itself to other computers, or even erase everything on your hard disk.
To help avoid computer viruses, it is essential that you keep your computer current with the latest updates and antivirus tools, stay informed about recent threats, run your computer as a standard user (not as administrator), and that you follow a few basic rules when you surf the Internet, download files, and open attachments.
Once a virus is on your computer, its type or the method it used to get there is not as important as removing it and preventing further infection.
To aid the fight against computer viruses and other types of malicious software, many security advisory organizations and developers of anti-virus software compile and publish lists of viruses.
The compilation of a unified list of viruses is made difficult because of naming. When a new virus appears, the rush begins to identify and understand it as well as develop appropriate counter-measures to stop its propagation. Along the way, a name is attached to the virus. As the developers of antivirus software compete partly based on how quickly they react to the new threat, they usually study and name the viruses independently. By the time the virus is identified, many names denote the same virus.
Computer viruses are similar to biological viruses in the way they multiply in number and in the way they need a host to survive. However, in both scenarios there must be a cause, such a weak immune system or an expired anti-virus program, in order for the virus to penetrate and spread. Having a reliable antivirus program is the best solution.
Just as a biological virus spreads by injecting its DNA into a host cell, whereas a computer virus needs to attach itself to a document or program to infect other computers and programs.
The way a computer virus infiltrates your PC depends on the type of virus it is. Because all computers viruses have their own features and factors that make them unique and dangerous to the health of your computer.

Types of computer viruses
Due to the many different types of computer viruses, it can be confusing at times to diagnose what kind of virus your computer is suffering from. To make the identifying process easier, here is a list of the basic types of viruses that you will likely encounter.
The Trojan virus gets its name from an incident that occurs in Homer's Iliad. A Trojan horse appears to be nothing more than an interesting computer program or file on the computer of user who's interested in collecting sound samples. The Trojan virus once on your computer, does not reproduce, but instead makes your computer susceptible to malicious intruders by allowing them to access and read your files. Making this type of virus is extremely dangerous to your computer's security and your personal privacy. Therefore, you should avoid downloading programs or files from sites if you're not 100 percent positive of what the file or program does.

A Worm is a virus program that copies and multiplies itself by using computer networks and security flaws. Worms are more complex than Trojan viruses, and usually attack multi-user systems such as unix environments and can spread over corporate networks via the circulation of emails. Once multiplied, the copied worms scan the network for further loopholes and flaws in the network.

An email virus uses email messages to spread. It can automatically forward itself to thousands of people, depending on whose email address it attacks. To avoid receiving virus-laden emails, always check that your antivirus software is up-to-date and also stay clear of opening attachments, even from friends that you were not expecting or do not know anything about. Also, block unwanted email viruses by installing a spam filter and spam blocker.

A resident virus – this type of virus is permanent which dwells in the RAM memory. From there it can overcome and interrupt all of the operations executed by the system: corrupting files and programs that are opened, closed, copied, renamed etc. Examples include: Randex, CMJ, Meve, and MrKlunky.

A Direct Action Virus – the main purpose of this virus is to replicate and take action when it is executed. When a specific condition is met, the virus will go into action and infect files in the directory or folder that it is in and in directories that are specified in the AUTOEXEC.BAT file PATH. This batch file is always located in the root directory of the hard disk and carries out certain operations when the computer is booted.

An Overwrite Virus – a virus of this kind is characterized by the fact that it deletes the information contained in the files that it infects, rendering them partially or totally useless once they have been infected. The only way to clean a file infected by an overwrite virus is to delete the file completely, thus losing the original content.

A Boot Virus – this type of virus affects the boot sector of a floppy or hard disk. This is a crucial part of a disk, in which information on the disk itself is stored together with a program that makes it possible to boot (start) the computer from the disk. The best way of avoiding boot viruses is to ensure that floppy disks are write-protected and never start your computer with an unknown floppy disk in the disk drive. Examples of boot viruses include: Polyboot.B, AntiEXE.

Macro Viruses – they infect files that are created using certain applications or programs that contain macros. These mini-programs make it possible to automate series of operations so that they are performed as a single action, thereby saving the user from having to carry them out one by one. Examples of macro viruses: Relax, Melissa. A, Bablas, O97M/Y2K.

Directory Viruses – they change the paths that indicate the location of a file. By executing a program (file with the extension .EXE or .COM) which has been infected by a virus, you are unknowingly running the virus program, while the original file and program have been previously moved by the virus. Once infected it becomes impossible to locate the original files.

Polymorphic Viruses – polymorphic viruses encrypt or encode themselves in a different way (using different algorithms and encryption keys) every time they infect a system. This makes it impossible for antiviruses to find them using string or signature searches (because they are different in each encryption) and also enables them to create a large number of copies of themselves. Examples include: Elkern, Marburg, Satan Bug, and Tuareg.

File Infector – this type of virus infects programs or executable files. When one of these programs is run, directly or indirectly, the virus is activated, producing the damaging effects it is programmed to carry out. The majority of existing viruses belong to this category, and can be classified depending on the actions that they carry out.
Companion Viruses – companion viruses can be considered file infector viruses like resident or direct action types. They are known as companion viruses because once they get into the system they "accompany" the other files that already exist. In other words, in order to carry out their infection routines, companion viruses can wait in memory until a program is run (resident viruses) or act immediately by making copies of themselves (direct action viruses). Some examples include: Stator, Asimov.1539, and Terrax.1069
FAT Virus – the file allocation table or FAT is the part of a disk used to connect information and is a vital part of the normal functioning of the computer. This type of virus attack can be especially dangerous, by preventing access to certain sections of the disk where important files are stored. Damage caused can result in information losses from individual files or even entire directories.
Logic Bombs – they are not considered viruses because they do not replicate. They are not even programs in their own right but rather camouflaged segments of other programs. Their objective is to destroy data on the computer once certain conditions have been met. Logic bombs go undetected until launched, and the results can be destructive.

Symptoms of a computer virus
If you suspect or confirm that your computer is infected with a computer virus, obtain the current antivirus software. The following are some primary indicators that a computer may be infected:
- The computer runs slower than usual.
- The computer stops responding, or it locks up frequently.
- The computer crashes, and then it restarts every few minutes.
- The computer restarts on its own. Additionally, the computer does not run as usual.
- Applications on the computer do not work correctly.
- Disks or disk drives are inaccessible.
- You cannot print items correctly.
- You see unusual error messages.
- You see distorted menus and dialog boxes.
- An antivirus program is disabled for no reason. Additionally, the antivirus program cannot be restarted.

- An antivirus program cannot be installed on the computer, or the antivirus program will not run.
- New icons appear on the desktop that you did not put there, or the icons are not associated with any recently installed programs.
- Strange sounds or music plays from the speakers unexpectedly.
- A program disappears from the computer even though you did not intentionally remove the program.

These are common signs of infection. However, these signs may also be caused by hardware or software problems that have nothing to do with a computer virus. Unless you run the Microsoft Malicious Software Removal Tool, and then you install industry-standard, up-to-date antivirus software on your computer, you cannot be certain whether a computer is infected with a computer virus or not.

SELECTED TERMS

attachment – a computer file attached to an e-mail message

file – 1) (in data processing) a related collection of records. For example, you might put the records you have on each of your customers in a file. In turn, each record would consist of fields for individual data items, such as customer name, customer number, customer address, and so forth. By providing the same information in the same fields in each record (so that all records are consistent), your file will be easily accessible for analysis and manipulation by a computer program

2) in any computer system, but especially in personal computers, a file is an entity of data available to system users (including the system itself and its application programs) that is capable of being manipulated as an entity (for example, moved from one file directory to another)

instant messaging – a system for exchanging typed electronic messages instantly via the Internet or a cellular network, using a shared software application on a personal computer or mobile device

multi-user system – a computer system with multiple terminals, enabling several users, each at their own terminal, to use the computer.

PRACTICE WORK:

a) INTERNET SECURITY

Complete with the Past Simple Tense of: show, steal, launch, attempt, overwrite, be, infect, affect

The history of hacking

1992 – David L. Smith _____ persecuted for writing the Melissa virus, which was passed in Word files via email.

1997 – The German Chaos Computer Club _____ on TV how to obtain money from bank accounts.

2000 – A Russian hacker _____ to extort 100,000 $ from online music retailer CD Universe. A Canadian hacker _____ a massive *denial of service* attack against websites like Yahoo! and Amazon.
The *I Love you* virus, cleverly disguised as a love letter, _____ so quickly that email had to be shut down in many companies. The worm _____ image and sound files with a copy of itself.
2001 – *The Code Red* worm _____ tens of thousands of machines.
2006 – Hackers _____ the credit card details of almost 20,000 AT&T online customers. However, subscribers to its service (not) _____.

b) Make questions of as many types as you can:

- 1969 – The US Defence Department establishes ARPANET, a network connecting research centres.
- 1971 – Ray Tomlinson of BBN invents an email program to send messages across the network. The @ sign is chosen for its *at* meaning.
- 1981 – IBM sells the first IBM PC. BITNET provides email and file transfers to universities.
- 1982 – TCP/IP is adopted as the standard language of the Internet.
- 1988 – Jarkko Oikarinen develops the system known as Internet Relay Chat (IRC)
- 1991 – CERN creates the World Wide Web
- 1998 – The Internet 2 network is born. It can handle data and video at high speed but is not a public network.
- 1999 – Online banking, e-commerce and MP3 music become popular.
- 2001 – Napster, whose software allows users to share downloaded music, maintains that it does not perpetrate or encourages music piracy. However, a judge rules that Napster's technology is an infringement of music copyright.
- 2004 – Network Solutions begins offering 100-year domain registration.
- 2006 – Americans spend over &100 billion shopping online.

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DISCUSSION

- Computer crime
- Computer hacking
- Cyber spying
- Macro virus (computing)
- How to determine whether your computer is infected with a computer virus?
- Spam
- Mobile viruses
- Cryptovirology

UNIT 12

Antivirus Software

Antivirus software is used to prevent, detect, and remove malware, including but not limited to computer viruses, computer worm, trojan horses, spyware and adware.

Identification methods

There are several methods which antivirus software can use to identify malware.

Signature based detection is the most common method. To identify viruses and other malware, antivirus software compares the contents of a file to a dictionary of virus signatures. Because viruses can embed themselves in existing files, the entire file is searched, not just as a whole, but also in pieces.

Heuristic-based detection, like malicious activity detection, can be used to identify unknown viruses.

File emulation is another heuristic approach. File emulation involves executing a program in a virtual environment and logging what actions the program performs. Depending on the actions logged, the antivirus software can determine if the program is malicious or not and then carry out the appropriate disinfection actions.

A 'false positive' is when antivirus software identifies a non-malicious file as a virus. When this happens, it can cause serious problems. For example, if an antivirus program is configured to immediately delete or quarantine infected files, a false positive in an essential file can render the operating system or some applications unusable.

Antivirus application interoperability

Running multiple antivirus programs concurrently can degrade performance and create conflicts. However, using a concept called multiscanning, several companies (including G Data and Microsoft) have created applications which can run multiple engines concurrently.

It is sometimes necessary to temporarily disable virus protection when installing major updates such as Windows Service Packs or updating graphics card drivers. Active antivirus protection may partially or completely prevent the installation of a major update.

A minority of software programs are not compatible with antivirus software. For example, the TrueCrypt troubleshooting page reports that antivirus programs can conflict with TrueCrypt and cause it to malfunction.

Support issues also exist around antivirus application interoperability with common solutions like SSL VPN remote access and network access control products. These technology solutions often have policy assessment applications which require that an up to date antivirus is installed and running. If the antivirus application is not recognized by the policy assessment, whether because the antivirus application has been updated or because it is not part of the policy assessment library, the user will be unable to connect.

Effectiveness

Independent testing on all the major virus scanners consistently shows that none provide 100% virus detection. The best ones provided as high as 99.6% detection, while the lowest provided only 81.8% in tests conducted in February 2010.

New viruses

Antivirus programs are not always effective against new viruses, even those that use non-signature-based methods that should detect new viruses. The reason for this is that the virus designers test their new viruses on the major antivirus applications to make sure that they are not detected before releasing them into the wild.
A proof of concept virus has used the GPU (graphics processing unit) to avoid detection from antivirus software. The potential success of this involves bypassing the CPU in order to make it much harder for security researchers to analyse the inner workings of such malware.

Rootkits
Detecting rootkits is a major challenge for antivirus programs. Rootkits have full administrative access to the computer and are invisible to users and hidden from the list of running processes in the task manager. Rootkits can modify the inner workings of the operating system and tamper with antivirus programs.
Damaged files
Files which have been damaged by computer viruses are normally damaged beyond recovery. Antivirus software removes the virus code from the file during disinfection, but this does not always restore the file to its undamaged state. In such circumstances, damaged files can only be restored from existing backups; installed software that is damaged requires re-installation.

Firmware issues
Active antivirus software can interfere with a firmware update process. Any writeable firmware in the computer can be infected by malicious code. This is a major concern, as an infected BIOS (basic input/output operating system) could require the actual BIOS chip to be replaced to ensure the malicious code is completely removed. Antivirus software is not effective at protecting firmware and the motherboard BIOS from infection.

Cloud antivirus
Cloud antivirus is a technology that uses lightweight agent software on the protected computer, while offloading the majority of data analysis to the provider's infrastructure. One approach to implementing cloud antivirus involves scanning suspicious files using multiple antivirus engines. This approach was proposed by an early implementation of the cloud antivirus concept called CloudAV. CloudAV was designed to send programs or documents to a network cloud where multiple antivirus and behavioral detection programs are used simultaneously in order to improve detection rates. Parallel scanning of files using potentially incompatible antivirus scanners is achieved by spawning a virtual machine per detection engine and therefore eliminating any possible issues. CloudAV can also perform ‘retrospective detection’, whereby the cloud detection engine rescans all files in its file access history when a new threat is identified thus improving new threat detection speed. Finally, CloudAV is a solution for effective virus scanning on devices that lack the computing power to perform the scans themselves.

Network firewall

Network firewalls prevent unknown programs and processes from accessing the system. However, they are not antivirus systems and make no attempt to identify or remove anything. They may protect against infection from outside the protected computer or network, and limit the activity of any malicious software which is present by blocking incoming or outgoing requests on certain TCP/IP (transmission control protocol/Internet protocol) ports. A firewall is designed to deal with broader system threats that come from network connections into the system and is not an alternative to a virus protection system.

Online scanning
Some antivirus vendors maintain websites with free online scanning capability of the entire computer, critical areas only, local disks, folders or files. Periodic online scanning is a good idea for those that run antivirus applications on their computers because those applications are frequently slow to catch threats. One of the first things that malicious software does in an attack is disable any existing antivirus software and sometimes the only way to know of an attack is by turning to an online resource that is not already installed on the infected computer.

SELECTED TERMS

adware (advertising-supported software) – 1) type of spyware that records search information and forwards it to an advertising agency or market research firm that later uses it to tailor pop-up ads for delivery to users without their knowledge or consent
firewall – a hardware or software security system between a server or Intranet and the public Internet that allows information to pass out to the Internet but checks any incoming data before passing it on the the private server
infected computer – a computer that carries a virus program
scanner – a device that converts an image or document into graphical data which can be manipulated by a computer
malware (short for malicious software) – malicious computer software that interferes with normal computer functions or sends personal data about the user to unauthorized parties over the Internet
spyware – software that collects personal information about users and their activities without their knowledge or consent. Spyware uses a number of techniques such as logging keystrokes, recording Internet Web browsing activities, and searching hard drives.

PRACTICE WORK:

SUFFIXES

Suffixes change the class of the root word. For example, by adding the suffix *–al*, the noun *digit* is changed into the adjective *digital.*
Common *adjectival suffixes* are: -y, -able, -ible, -ive, -al, -ed, -ful, -ic, -less, -ing.

Common *noun suffixes*[10] are: -er, -or, -ion, -tion, -ation, -ment, -ness, -ity, -ant, -logy, -ing, -y, -ure, -sion.
When you use suffixes, always consult a dictionary to see if any other changes are necessary. For example: scan – scanner (double n).

a) Use suitable suffixes to make adjectives from these nouns:

- color
- profession
- photograph
- wire
- blur
- innovate
- underexpose

b) Complete with the words given and an appropriate suffix.

- Kodak is a (manufacture) _____ of photographic and imaging equipment.
- To avoid red eyes, use the camera's red eye (reduce) _____ feature.
- (Crop) _____ a photograph means cutting out the parts of an image you do not need.
- The (sharp) _____ of a photograph is a combination of resolution and acutance – the ability to represent clear edges.
- Digital (techno) _____ is evolving rapidly.

c) Complete with a word in brackets and the correct suffix:

- IBM's BlueGene is the most _____ (power) supercomputer.
- Most library databases are _____ (access) via the Internet.
- I'll email my report to you as an _____ (attach).
- This book will show you how to _____ (computer) your small business.
- An _____ (erase) optical disc allows data to be deleted and new data to be recorded on it.
- The growth of the Internet has increased the need for effective data _____ (secure).
- The combination of _____ (electron) and new textile materials has made it possible to create musical jackets and smart shirt that can read our heart rate.
- Bluetooth is a _____ (wire) technology designed to connect computers, mobile phones, and other devices, replacing direct cable links.
- Aircraft flight _____ (simulate) is used to train pilots.

d) Complete with a correct form of: magnet, digit, record.

- From kitchen magnets to compute disks, _____ plays a central role in the

[10] Slađana Živković, Sufiksi za tvorbu imenica u engleskom jeziku i njihovi ekvivalenti u srpskom u kompjuterskom registru, Komunikacija i kultura online, godina I, broj 1, 2010.

technology of everyday life.
- Hard disks are _____ storage devices.
- My digital voice _____ has a storage capacity of 2 GB.
- Blu-Ray disc is a new _____ optical disc format developed by nine electronic manufacturers.
- A video _____ is used to convert analogue video into digital video files.
- Sound and pictures can be stored _____ as on a CD.

*

DISCUSSION
- How to protect a computer against viruses
- How to recover from an infection
- Effectiveness of anti-virus software
- Security engineering
- New-generation computer anti-virus system

UNIT 13

Programmers

A computer programmer is a person who writes the instructions that tell computers what to do. The term computer programmer can be used to refer to a software developer, software engineer, computer scientist, or software analyst. Their jobs usually involve:
- Coding
- Compilation
- Documentation
- Integration
- Maintenance
- Requirements analysis
- Software architecture
- Software testing
- Specification
- Debugging

Computer programmers write, test, debug, and maintain the detailed instructions, called computer programs that computers must follow to perform their functions. Programmers also conceive, design, and test logical structures for solving problems by computer. Many technical innovations in programming – advanced computing technologies and sophisticated new languages and programming tools – have redefined the role of a programmer and elevated much of the programming work done today. Job titles and descriptions may vary, depending on the organization.
Programmers work in many settings, including corporate information technology departments, big software companies, and small service firms. Many professional programmers also work for consulting companies at client's sites as contractors. Licensing is not typically required to work as a programmer, although professional certifications are commonly held by programmers.

Programmers' work varies widely depending on the type of business they are writing programs for. For example, the instructions involved in updating financial records are very different from those required to duplicate conditions on an aircraft for pilots training in a flight simulator. Although simple programs can be written in a few hours, programs that use complex mathematical formulas whose solutions can only be approximated or that draw data from many existing systems may require more than a year of work.
Programmers write programs according to the specifications determined primarily by more senior programmers and by systems analysts. After the design process is complete, it is the job of the programmer to convert that design into a logical series of instructions that the computer can follow. The programmer codes these instructions in one of many programming languages. Different programming languages are used depending on the purpose of the program. COBOL, for example, is commonly used for business applications which are run on mainframe and midrange computers, whereas Fortran is used in science and engineering. C++ is widely used for both scientific and business applications. Java and PHP are popular programming languages for Web and business applications. Programmers generally know more than one programming language and, because many languages are similar, they often can learn new languages relatively easily. In practice, programmers often are referred to by the language they know, e.g. as Java programmers, or by the type of function they perform or environment in which they work: for example, database programmers, mainframe programmers, or Web developers.
When making changes to the source code that programs are made up of, programmers need to make other programmers aware of the task that the routine is to perform. They do this by inserting comments in the source code so that others can understand the program more easily. To save work, programmers often use libraries of basic code that can be modified or customized for a specific application. This approach yields more reliable and consistent programs and increases programmers' productivity by eliminating some routine steps.

Testing and debugging
Programmers test a program by running it and looking for bugs. As they are identified, the programmer usually makes the appropriate corrections then rechecks the program until an acceptably low level and severity of bugs remain. This process is called testing and debugging. These are important parts of every programmer's job. Programmers may continue to fix these problems throughout the life of a program. Updating, repairing, modifying, and expanding existing programs sometimes called maintenance programmer. Programmers may contribute to user guides and online help, or they may work with technical writers to do such work.

Application programmers vs. system programmers
Computer programmers often are grouped into two broad types: application programmers and systems programmers. Application programmers write programs to handle a specific job, such as a program to track inventory within an organization. They also may revise existing packaged software or customize generic applications which are frequently purchased from independent software vendors. System programmers, in contrast, write programs to maintain and control computer systems software, such as operating systems and database management systems. These workers make changes in the instructions that

determine how the network, workstations, and CPU of the system handle the various jobs they have been given and how they communicate with peripheral equipment such as printers and disk drives.

Software engineers

Software engineers design and develop many types of software, including computer games, business applications, operating systems, network control systems, and middleware. They apply the theories and principles of computer science and mathematical analysis to create, test, and evaluate the software applications and systems that make computers work. They must be experts in the theory of computing systems, the structure of software, and the nature and limitations of hardware to ensure that the underlying systems will work properly. The tasks performed by these workers evolve quickly, reflecting changes in technology and new areas of specialization, as well as the changing practices of employers.

Computer software engineers begin by analyzing users' needs, and then design, test, and develop software to meet those needs. During this process they create flowcharts, diagrams, and other documentation, and may also create the detailed sets of instructions, called algorithms, that actually tell the computer what to do. They also may be responsible for converting these instructions into a computer language, a process called programming or coding, but this usually is the responsibility of computer programmers.

Computer software engineers can generally be divided into two categories: applications engineers and systems engineers. Computer applications software engineers analyze end users' needs and design, construct, deploy, and maintain general computer applications software or specialized utility programs. These workers use different programming languages, depending on the purpose of the program and the environment in which the program runs. The programming languages most often used are C, C++, Java, and Python. Some software engineers develop packaged computer applications, but most create or adapt customized applications for business and other organizations. Some of these workers also develop databases.

Systems software engineers also work for companies that configure, implement, and install the computer systems of other organizations. These workers may be members of the marketing or sales staff, serving as the primary technical resource for sales workers, or providing logistical and technical support. Since the selling of complex computer systems often requires substantial customization to meet the needs of the purchaser, software engineers help to identify and explain needed changes. In addition, systems software engineers are responsible for ensuring security across the systems they are configuring.

SELECTED TERMS

application program – any data entry, update, query or report program that processes data for the user. It includes the generic productivity software (spreadsheets, word processors, database programs, etc.) as well as custom and packaged programs for payroll, billing, inventory and other accounting purposes

code – 1) a set of rules or conventions that clearly specifies the manner for representing data in symbolic form

2) a system of symbols that provides information about something, like a postal code, a telephone country code or area code, or an Internet Protocol (IP) country code
3) a system by which some combination of bits is used within a computer and between computers to represent a character or symbol, such as a letter, number, punctuation mark, or control character

coding – the act of putting a code on something

PRACTICE WORK:

a) Complete with an –ing[11] form of: design, link, perform, interest, communicate, use, comprise.

- PCs generate graphics by _____ mathematical calculations on data.
- Business people use graphics to make information more _____ visually.
- Graphs and diagrams can be more effective ways of _____ with clients than lists of figures.
- She is _____ a logo for the company.
- If you need to make a presentation, I suggest _____ PowerPoint.
- The Internet is a network _____ other networks.

b) Correct the mistakes in these sentences:

- Computer animation is the process of create objects which move across the screen.
- Texturing involves add paint, colour and filters to drawings and designs.
- You can open the colour palette by click on the corresponding icon.
- CAD programs are very fast at to perform drawing functions.
- A lot of time and money is saved by test a car design before to make the product.
- To render refers to the technique used to make realistic images.

c) Make sentence using the infinitives:

- not easy/write instructions in COBOL
- expensive/set up a data-processing area

[11] Slađana Živković, Sufiksi za tvorbu imenica u engleskom jeziku i njihovi ekvivalenti u srpskom u kompjuterskom registru, Komunikacija i kultura online, godina I, broj 1, 2010.

- advisable/test the programs under different condition
- unusual/write a program that works correctly the first time it's tested
- important/use a good debugger to fix errors
- easy/learn Visual BASIC

d) Complete with the right form of the word given:

- We use high-level languages because machine code is too difficult _____ (read), understand and debug.
- I went on the course _____ (learn) how to be a better programmer.
- I'm not interested in _____ (learn) computer language.
- He refuses _____ (do) the project with me.
- The engineers warned the employees not _____ (touch) the cables.
- They may not _____ (come) to the conference.
- Spyware can make your PC _____ (perform) more slowly.
- This program is too slow _____ (do) the simulation.

*

DISCUSSION

- How to become a computer programmer
- Advancement possibilities and employment outlook
- Education and training requirements
- A day in a computer programmer's life

UNIT 14

Programming Languages

A programming language is an artificial language designed to express computations that can be performed by a machine, particularly a computer. It can be used to create programs that control the behaviour of a machine, to express algorithms precisely, or as a mode of human communication.

Function

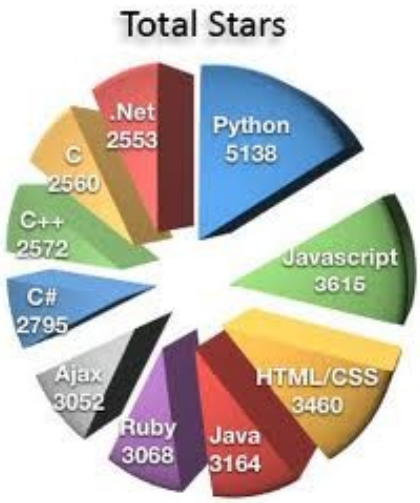
A computer programming language is a language used to write computer programs, which involve a computer performing some kind of computation or algorithm and possibly control external devices such as printers, disk drives, robots, and so on. For example PostScript programs are frequently created by another program to control a computer printer or display. More generally, a programming language may describe computation on some, possibly abstract, machine. It is generally accepted that a complete specification for a programming language includes a description, possibly idealized, of a machine or processor for that language. In most practical contexts, a programming language involves a computer; consequently programming languages are usually defined and studied this way. Programming languages differ from natural languages in that natural languages are only used for interaction between people, while programming languages also allow humans to communicate instructions to machines.

Abstractions

Programming languages usually contain abstractions for defining and manipulating data structures or controlling the flow of execution. The practical necessity that a programming language support adequate abstractions is expressed by the abstraction principle; this principle is sometimes formulated as recommendation to the programmer to make proper use of such abstractions.

Expressive power

The theory of computation classifies languages by the computations they are capable of expressing. All Turing complete languages can implement the same set of algorithms. ANSI/ISO SQL and Charity are examples of languages that are not Turing complete, yet often called programming languages.



Types of programming languages

Design and implementation

Programming languages share properties with natural languages related to their purpose as vehicles for communication, having a syntactic form separate from its semantics, and showing language families of related languages branching one from another. But as artificial constructs, they also differ in fundamental ways from languages that have evolved through usage. A significant difference is that a programming language can be fully described and studied in its entirety, since it has a precise and finite definition. By contrast, natural languages have changing meanings given by their users in different communities. While constructed languages are also artificial languages designed from the ground up with a specific purpose, they lack the precise and complete semantic definition that a programming language has.

Many languages have been designed from scratch, altered to meet new needs, combined with other languages, and eventually fallen into disuse. Although there have been attempts to design one 'universal' programming language that serves all purposes, all of them have failed to be generally accepted as filling this role. The need for diverse programming languages arises from the diversity of contexts in which languages are used:

- Programs range from tiny scripts written by individual hobbyists to huge systems written by hundreds of programmers.
- Programmers range in expertise from novices who need simplicity above all else, to experts who may be comfortable with considerable complexity.

- Programs must balance speed, size, and simplicity on systems ranging from microcontrollers to supercomputers.
- Programs may be written once and not change for generations, or they may undergo continual modification.
- Finally, programmers may simply differ in their tastes: they may be accustomed to discussing problems and expressing them in a particular language.

One common trend in the development of programming languages has been to add more ability to solve problems using a higher level of abstraction. The earliest programming languages were tied very closely to the underlying hardware of the computer. As new programming languages have developed, features have been added that let programmers express ideas that are more remote from simple translation into underlying hardware instructions. Because programmers are less tied to the complexity of the computer, their programs can do more computing with less effort from the programmer. This lets them write more functionality per time unit.
Different programming languages support different styles of programming (called programming paradigms). The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference. Ideally, the programming language best suited for the task at hand will be selected. Trade-offs from this ideal involve finding enough programmers who know the language to build a team, the availability of compilers for that language, and the efficiency with which programs written in a given language execute.
The details look different in different languages, but a few basic instructions appear in just about every language:
- input: get data from the keyboard, a file, or some other device.
- output: display data on the screen or send data to a file or other device.
- arithmetic: perform basic arithmetical operations like addition and multiplication.
- conditional execution: check for certain conditions and execute the appropriate sequence of statements.
- repetition: perform some action repeatedly, usually with some variation.

Many computer languages provide a mechanism to call functions provided by libraries. Provided the functions in a library follow the appropriate run time conventions (e.g., method of passing arguments), then these functions may be written in any other language.

Usage

Thousands of different programming languages have been created, mainly in the computing field. Programming languages differ from most other forms of human expression in that they require a greater degree of precision and completeness. When using a natural language to communicate with other people, human authors and speakers can be ambiguous and make small errors, and still expect their intent to be understood.

Programming languages on the Internet

The capabilities of the Internet have been enhanced and extended by using programming languages with HTML. These languages have been responsible for the dynamics and interactive nature of the Net. New languages and language extensions are being

developed to increase the usability of the Internet. Here are some of the important languages that have shape the Internet over the years.

HTML - HyperText Markup Language

HTML (hypertext markup language) is the lingua franca of the Internet. It is the language used to develop web pages. Hypertext means that some text in the HTML document carries a link to a different location, which can be on the same page or another page. On clicking this 'hot spot', the viewer is transferred to that location. Markup means that specific portions of a document are marked up to indicate how they should be displayed in the browser.

According to purists, HTML is not a language per se, and they are right in one way. HTML simply consists of tags that are placed around elements, which then changes the properties of these enclosed elements. There are hundreds of HTML tags and some of these are proprietary, which means that only some browsers recognize them.

CGI - Common Gateway Interface

The Common Gateway Interface (CGI) has been around for a long time. It allows the web server software to communicate with other programs running on the server. These external programs are called CGI scripts or CGI programs and are usually written in Perl or 'C'. CGI programs are generally used to process information submitted by visitors via a form on a web page. For example, you might use the search form on a web site to look for 'cars'. When you submit your query, the server receives your request, passes it to the CGI program. The program then looks up the search query term in a database and responds with the appropriate result formatted in HTML code.

Javascript/Jscript

Javascript is a programming language that runs on a web browser. It was developed by the same folks who gave us Netscape and was first implemented in version 2 of the browser. Jscript is Microsofts' implementation of Javascript for Internet Explorer. By the by, Javascript is not a subset of Java, infact, the two languages share little in common (yes, they share a few basic concepts but the syntax is different and so is the application). Naming their language ‘JavaScript’, was just a clever marketing ploy by Netscape Communications. It was initially called Livescript but when Sun Microsystems released Java and it became very popular, Netscape renamed their scripting language to JavaScript.

Javascript runs on the browser (client) and does not require any server software. Thus, it is a client-side scripting language. Since all execution takes place on the browser, Javascript is responsible for most of the interactivity on a web page. Image change or text color change on mouseover, creating mouse trails are all possible through Javascript. The language has also been widely used for basic form validation. This seems logical, as it is better to validate a form on the client side than to make several trips to the server. Javascript is commonly embedded inside the HTML page and is thus visible to the visitor.

Javascript can also be written to run on a server and this is based on the ASP model promoted by Microsoft.

Java
Developed by Sun Microsystems, Java is a very powerful, object-oriented language. A lot many platform dependency issues have been ironed out with the advent of Java. Thus, Java programs for Unix can be made to run on Windows or the Mac system with little or no effort. Much development is taking place on the Java front with new arrivals like Java Beans, Extended Java Beans, and Java applications for various databases and XML. Using Java servlets one can also develop dynamic Java Server Pages (JSP).
Java can also be seen on the Internet in the form of applets embedded in an HTML page. Applets are small Java programs that run on a Java compatible browser.

VBScript
VBScript is a client-based language that runs only on the Internet Explorer and quite naturally, has been developed by Microsoft. Though, the browser market share of Internet Explorer has steadily risen and overtaken that of Netscape, it is still not advisable to use VBScript as a client side language for web pages.

ASP - Active Server Pages
Active Server Pages (ASP) is a technology promoted by Microsoft. The ASP utilizes some special tags, which can be embedded in the HTML code, to generate dynamic web pages. ASP scripts run on the server, typically, IIS on Windows NT. ASP pages carry the .asp extension that differentiates them from plain HTML pages and instructs the web server to pass the pages through the ASP interpreter. You can use VBScript, Javascript/Jscript or a combination of the two to write ASP pages. The great advantage in using ASP is the ease of maintenance of the web site. However, the downslide is that you become too dependent on Microsoft technologies.

PHP
Open source, great development environment - PHP is a cult. This has been the answer of open source programmers to Microsofts ASP. PHP not only carries all the goodness of ASP but also is more secure and handles databases more easily. It is a known fact that PHP on Apache Web server runs faster than ASP. PHP code is embedded inside the HTML page and can link to databases to generate dynamic HTML content. Furthermore, PHP scripts can be made to run on any operating system with little or no modification.

XML - eXtensible Markup Language
The eXtensible Markup Language is a web page developing language that enables programmers to create customized tags. These customized tags can provide the much-needed functionality not available with HTML. XML documents can be accessed using JSP, PHP etc.

SELECTED TERMS

gateway – 1) a node that interconnects two or more disparate networks, both physically and logically, serving as a protocol converter (e.g., PSTN to IP) and media converter (e.g., electrical twisted pair to optical fiber) as necessary

2) the collection of hardware and software required to interconnect two or more disparate networks, including performing protocol conversion

3) In H.323-compliant multimedia networks, a gateway is an optional element used for various levels of protocol conversion.The gateway serves as a protocol converter between devices and networks that have native H.323 capability and those that do not. The gateway also may translate between audio, video, and data formats, and may perform signaling conversions between the H.225 packet protocol and external protocols such as SS7 and Q.931

tag – 1) a format code used in a document language

2) a set of bits or characters that identifies various conditions about data in a file and is often found in the header records of such files

PRACTICE WORK:

a) Complete with an adverbial form of the word in brackets:

- Simulation games are (wide) _____ used in both universities and businesses.
- Massively multiplayer online RPGs have (recent) _____ become more popular, mainly due to faster internet connections.
- Strategy is a genre (main) _____ restricted to PC.
- Video games often come with a clear set of motivation tools, such as scores and moving to higher levels when a player performs (good) _____.
- Cheap PCs don't process data (fast) _____ enough to support high-end games.

b) Complete with words that come from *use*:

- Then you've got associated applications, _____ that are related to navigating…
- … tracking systems you can _____ for monitoring delivery vehicles…
- … from the end-user's_____ point of view, accuracy is no longer the main selling point. Most devices are accurate enough. The key is to make them more _____.

c) Simplifying and illustrating technical explanations

Complete with: *basically (2x), call, effectively, essentially, imagine, other, picture, refer, simple, simply*

Simplifying the language:
in simple terms/put_____/
in _____ words/ _____

Simplifying the concept:
_____/_____/_____

Focusing on technical terms:
what we _____/what we _____ to as

Illustrating with images:
if you _____/ if you _____

*

DISCUSSION

-
- Latest programming languages
- Programming domain
- Debugging
- Architecture description language

UNIT 15

Computer Programming

Computer programming is the process of writing, testing, debugging/troubleshooting, and maintaining the source code of computer programs. This source code is written in a programming language. The code may be a modification of an existing source or something completely new. The purpose of programming is to create a program that exhibits a certain desired behaviour (customization). The process of writing source code often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic.

Overview

There is an ongoing debate on the extent to which the writing of programs is an art, a craft or an engineering discipline. In general, good programming is considered to be the measured application of all three, with the goal of producing an efficient and evolvable software solution (the criteria for 'efficient' and 'evolvable' vary considerably). The discipline differs from many other technical professions in that programmers, in general, do not need to be licensed or pass any standardized (or governmentally regulated) certification tests in order to call themselves 'programmers' or even 'software engineers'. Said another way, programming is the craft of transforming requirements into something that a computer can execute.

Quality requirements

Whatever the approach to software development may be, the final program must satisfy some fundamental properties. The following properties are among the most relevant ones:

- efficiency/performance: the amount of system resources a program consumes (processor time, memory space, slow devices such as disks, network bandwidth and to some extent even user interaction): the less, the better. This also includes correct disposal of some resources, such as cleaning up temporary files and lack of memory leaks;
- reliability: how often the results of a program are correct. This depends on conceptual correctness of algorithms, and minimization of programming mistakes, such as mistakes in resource management (e.g., buffer overflows and race conditions) and logic errors (such as division by zero);
- robustness: how well a program anticipates problems not due to programmer's error. This includes situations such as incorrect, inappropriate or corrupt data, unavailability of needed resources such as memory, operating system services and network connections, and user error;
- usability: the ergonomics of a program: the ease with which a person can use the program for its intended purposes, or in some cases even unanticipated purposes. Such

issues can make or break its success even regardless of other issues. This involves a wide range of textual, graphical and sometimes hardware elements that improve the clarity, intuitiveness, cohesiveness and completeness of a program's user interface;
- portability: the range of computer hardware and operating system platforms on which the source code of a program can be compiled/interpreted and run. This depends on differences in the programming facilities provided by the different platforms, including hardware and operating system resources, expected behaviour of the hardware and operating system, and availability of platform specific compilers (and sometimes libraries) for the language of the source code;
- maintainability: the ease with which a program can be modified by its present or future developers in order to make improvements or customizations, fix bugs and security holes, or adapt it to new environments. Good practices during initial development make the difference in this regard. This quality may not be directly apparent to the end user but it can significantly affect the fate of a program over the long term.

Measuring language usage
It is very difficult to determine what are the most popular of modern programming languages. Some languages are very popular for particular kinds of applications (e.g., COBOL is still strong in the corporate data center, often on large mainframes, FORTRAN in engineering applications, scripting languages in web development, and C in embedded applications), while some languages are regularly used to write many different kinds of applications.

Debugging
Debugging is a very important task in the software development process, because an incorrect program can have significant consequences for its users. Some languages are more prone to some kinds of faults because their specification does not require compilers to perform as much checking as other languages. Use of a static analysis tool can help detect some possible problems.
Debugging is often done with IDEs (Integrated Development Environments) like Visual Studio, NetBeans, and Eclipse. Standalone debuggers like gdb are also used, and these often provide less of a visual environment, usually using a command line.

SELECTED TERMS

debugging – the routine process of locating and removing computer program bugs, errors or abnormalities, which is methodically handled by software programmers via debugging tools. Debugging checks, detects and corrects errors or bugs to allow proper program operation according to set specifications
ergonomics – the science of people-machine relationships. Computers are a major area where ergonomics is relevant; other areas are automobiles, cockpits, machinery and factories
troubleshooting – the identification of “trouble” in the management flow of a corporation or a system caused by a failure of some kind. The problem is initially described as

symptoms of malfunction, and troubleshooting is the process of determining and remedying to the causes of these symptoms

PRACTICE WORK:

a) Complete with relative pronouns:

- Mobile TV broadcasting is a system _____lets you watch TV on a PDA or mobile phone.
- A computer geek is someone _____ is an enthusiastic user of computers, sometimes to an obsessive degree.
- The Recycle Bin is the folder _____ deleted files are stored until you decide to delete them completely.
- Digital Terrestrial TV is a technology _____ allows you to receive more channels and a better picture through a conventional aerial instead of a satellite dish.
- That's the computer _____I'd like to buy.
- Core2Duo is a new Intel processor _____ contains about 291 million transistors.
- A webmaster is a person _____ designs, develops and maintains a website.
- A bus is an electronic pathway _____ carries signals between computer devices.
- Here's the DVD _____ you lent me.
- Last night I met someone _____ works for GM as a software engineer.
- A satellites phone is kind of phone _____ is used satellites communications.
- A geophysicist is a scientist _____ studies the physics of the Earth.
- CAT5 cabling is a kind of wire _____ is used for carrying signals.
- A telecommunications Manager is someone _____ monitoring all the channels of communications.
- An internet café is a place _____ users can browse internet pages.

*

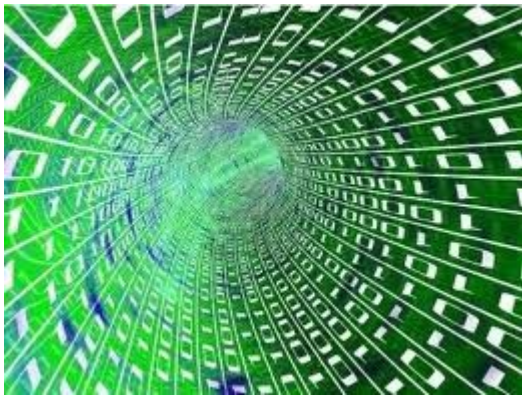
DISCUSSION

- The art of computer programming
- Data structures
- Pixels
- Programming in a natural language
- Debugging
- Hello world program
- Programming paradigms
- Software engineering

UNIT 16

Digital Electronics

Modern world is driven by digital electronics: computers, automation systems, cars and missiles, telecommunication and advanced networks are all based on digital technology.
Digital electronics is the foundation of modern computers and digital communications. Massively complex digital logic circuits with millions of gates can now be built onto a single integrated circuit such as a microprocessor and these circuits can perform millions of operations per second.
Digital electronics handles digital signals. This means that in digital system the signals can be either logic 0 or logic 1. In digital circuits different voltage or current levels are used to represent the logc 0 and logic 1 levels. The used voltage or current values depend on the logic system used (logic IC family and operating voltage generally).



Digital Revolution
The Digital Revolution marked the beginning of the Information Age. The Digital Revolution is the change from analog mechanical and electronic technology to digital technology that has taken place since 1980 and continues to the present day. Implicitly, the term also refers to the sweeping changes brought about by digital computing and communication technology during the latter half of the 20th century. Central to this revolution is the mass production and widespread use of digital logic circuits, and its derived technologies, including the computer, digital cellular phone, and fax machine.

Technological basis
Underlying the digital revolution was the development of personal computer, and particularly the microprocessor with its steadily increasing performance (as described by Moore's law), which enabled computer technology to be embedded into a huge range of objects from cameras to personal music players. Equally important was the development of transmission technologies including computer networking, the Internet and digital

broadcasting. 3G phones, whose social penetration grew exponentially in the 2000s, also played a very large role in the digital revolution as they simultaneously provide ubiquitous entertainment, communications, and online connectivity.

Positive effects

Positive aspects include greater interconnectedness, easier communication, and the exposure of information. The economic impact of the digital revolution has been large. Without the World Wide Web (WWW), for example, globalization and outsourcing would not be nearly as viable as they are today. The digital revolution radically changed the way individuals and companies interact. Small regional companies were suddenly given access to much larger markets. Concepts such as On-demand services and manufacturing and rapidly dropping technology costs made possible new innovations in all aspects of industry and everyday life.

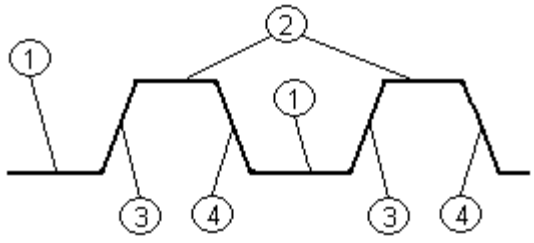
Negative effects

Negative effects include information overload, Internet predators, and media saturation. In some cases, company employees' pervasive use of portable digital devices and work related computers for personal use - email, instant messaging, computer games - were often found to, or perceived to, reduce those companies' productivity. Personal computing and other non-work related digital activities in the workplace thus helped lead to stronger forms of privacy invasion, such as keystroke recording and information filtering applications (spyware and content-control software).

A digital system

A digital system is a system that deals with digital signals. Although digital representations are discrete, the information represented can be either discrete, such as numbers, letters or icons, or continuous, such as sounds, images, and other measurements of continuous systems. It is most commonly used in computing and electronics, especially where real-world information is converted to binary numeric form as in digital audio and digital photography.

Waveforms in digital systems



A digital signal waveform: (1) low level, (2) high level, (3) rising edge, and (4) falling edge.

Digital signal

A digital signal is a physical signal that is a representation of a sequence of discrete values (a quantified discrete-time signal), for example of an arbitrary bit stream, or of a digitized (sampled and analog-to-digital converted) analog signal. The term digital signal can refer to a continuous-time waveform signal used in any form of digital communication; a pulse train signal that switches between a discrete number of voltage levels or levels of light intensity, also known as a a line coded signal, for example a signal found in digital electronics or in serial communications using digital baseband transmissionin, or a pulse code modulation (PCM) representation of a digitized analog signal.

A signal that is generated by means of a digital modulation method (digital passband transmission), produced by a modem, is in the first case considered as a digital signal, and in the second case as converted to an analog signal.

Digital noise

When data is transmitted, or indeed handled at all, a certain amount of noise enters into the signal. Noise can have several causes: data transmitted wirelessly, such as by radio, may be received inaccurately, suffer interference from other wireless sources, or pick up background noise from the rest of the universe. Microphones pick up both the intended signal as well as background noise without discriminating between signal and noise, so when audio is encoded digitally, it typically already includes noise.

Electric pulses transmitted via wires are typically attenuated by the resistance of the wire, and changed by its capacitance or inductance. Temperature variations can increase or reduce these effects. While digital transmissions are also degraded, slight variations do not matter since they are ignored when the signal is received. With an analog signal, variances cannot be distinguished from the signal and so provide a kind of distortion. In a digital signal, similar variances will not matter, as any signal close enough to a particular value will be interpreted as that value. Care must be taken to avoid noise and distortion when connecting digital and analog systems, but more when using analog systems.

SELECTED TERMS

flip flop – an electronic circuit that alternates between two states. When current is applied, it changes to its opposite state (0 to 1 or 1 to 0). Made of several transistors, it is used in the design of static memories and hardware registers

input data – data to be entered into a computer for processing

modem (modulator/demodulator) – a device that sends and receives a signal to create a network and Internet connection

PRACTICE WORK:

PASSIVE VOICE

IBM makes computers. – active sentence
S + V + OBJECT

→ Computers are made by IBM. – passive sentence

OBJECT of the active becomes SUBJECT of the passive sentence.

VERB is split into TO BE + PAST PARTICIPLE.

TO BE (number and tense)

PAST PARTICIPLE (meaning)

Passive through tenses:

Make → is/are made
Is/are making → is/are being made
Made → was/were made
Was/were making → was/were being made
Will make → will be made
Can make → can be made

a) Complete the sentences using the passive form of the verb in brackets:

- Microprocessors (make) _____ of silicon.
- Call centres (use) _____ to deal with telephone enquiries.
- In recent years, most mobile phones (equip) _____ with Bluetooth.
- GPS (develop) _____ in the 1970s as a military navigation system.
- Sorry about the mess – the computers (replace) _____ at the moment.
- In the near future, the Internet (access) _____ more frequently from PDAs and mobile phones than from desktop computers.
- Networks (can connect) _____ via satellite.
- I had to use my laptop this morning while my PC (fix) _____.

*

DISCUSSION
- Introduction to digital electronics
- Structure of digital systems
- Digital signal processing
- Digital cameras
- Advantages and disadvantages of digital systems

UNIT 17

Analog Electronics

Analog electronics are **electronic** systems with a **continuously** variable signal, in contrast to **digital electronics** where signals usually take only two different levels. The term *analog* describes the proportional relationship between a signal and a voltage or current that represents the signal. The word analog is derived from the Greek word *analogos* meaning *proportional*.

Analog signals

An analog signal is any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity, i.e., analog to another time varying signal. It differs from a digital signal in terms of small fluctuations in the signal which are meaningful. Analog is usually thought of in an electrical context; however, mechanical, pneumatic, hydraulic, and other systems may also convey analog signals.

The signals take any value from a given range, and each unique signal value represents different information. Any change in the signal is meaningful, and each level of the signal represents a different level of the phenomenon that it represents. For example, suppose the signal is being used to represent temperature, with one volt representing one degree Celsius. In such a system 10 volts would represent 10 degrees, and 10.1 volts would represent 10.1 degrees.

Another method of conveying an analog signal is to use modulation. In this, some base carrier signal has one of its properties altered: amplitude modulation (AM) involves altering the amplitude of a sinusoidal voltage waveform by the source information, frequency modulation (FM) changes the frequency. Other techniques, such as phase modulation or changing the phase of the carrier signal, are also used.

In an analog sound recording, the variation in pressure of a sound striking a microphone creates a corresponding variation in the current passing through it or voltage across it. An increase in the volume of the sound causes the fluctuation of the current or voltage to increase proportionally while keeping the same waveform or shape.

Modulation

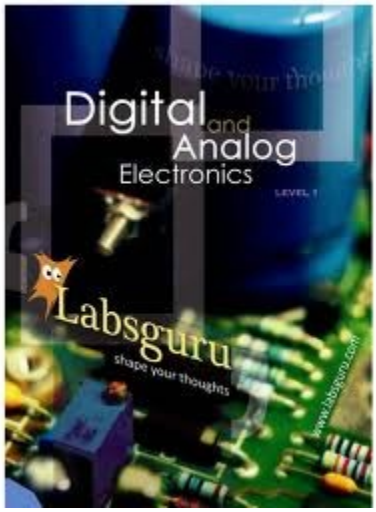
Analog signal processing is any signal processing conducted on analog signals by analog means. 'Analog' indicates something that is mathematically represented as a set of continuous values. This differs from 'digital' which uses a series of discrete quantities to represent signal. Analog values are typically represented as a voltage, electric current or electric charge around components in the electronic devices. An error or noise affecting such physical quantities will result in a corresponding error in the signals represented by such physical quantities.

Examples of analog signal processing include crossover filters in loudspeakers, 'bass', 'treble' and 'volume' controls on stereos, and 'tint' controls on TVs. Common analog processing elements include capacitors, resistors, inductors and transistors.

Advantages
The main advantage is the fine definition of the analog signal which has the potential for an infinite amount of signal resolution. Compared to digital signals, analog signals are of higher density.
Another advantage with analog signals is that their processing may be achieved more simply than with the digital equivalent. An analog signal may be processed directly by analog components, though some processes are not available except in digital form.

Disadvantages
The primary disadvantage of analog signaling is that any system has noise – i.e., random unwanted variation. As the signal is copied and re-copied, or transmitted over long distances, these apparently random variations become dominant. Electrically, these losses can be diminished by shielding, good connections, and several cable types such as coaxial or twisted pair.
The effects of noise create signal loss and distortion. This is impossible to recover, since amplifying the signal to recover attenuated parts of the signal amplifies the noise (distortion/interference) as well. Even if the resolution of an analog signal is higher than a comparable digital signal, the difference can be overshadowed by the noise in the signal.

Analog vs. Digital Electronics



Since the information is encoded differently in analogue and digital electronics, the way they process a signal is consequently different. All operations that can be performed on an analogue signal such as amplification, filtering, limiting, and others, can also be duplicated in the digital domain. Every digital circuit is also an analogue circuit, in that the behaviour of any digital circuit can be explained using the rules of analogue circuits.
The first electronic devices invented and mass produced were analogue. The use of microelectronics has reduced the cost of digital techniques and now makes digital

methods feasible and cost-effective as in the field of human-machine communication by voice.

Noise

Because of the way information is encoded in analogue circuits, they are much more susceptible to noise than digital circuits, since a small change in the signal can represent a significant change in the information present in the signal and can cause the information present to be lost. Since digital signals take on one of only two different values, a disturbance would have to be about one-half the magnitude of the digital signal to cause an error; this property of digital circuits can be exploited to make signal processing noise-resistant. In digital electronics, because the information is quantized, as long as the signal stays inside a range of values, it represents the same information. Digital circuits use this principle to regenerate the signal at each logic gate, lessening or removing noise.

Precision

A number of factors affect how precise a signal is, mainly the noise present in the original signal and the noise added by processing. See signal-to-noise ratio. Fundamental physical limits such as the shot noise in components limits the resolution of analogue signals. In digital electronics additional precision is obtained by using additional digits to represent the signal; the practical limit in the number of digits is determined by the performance of the analogue-to-digital converter (ADC), since digital operations can usually be performed without loss of precision. The ADC takes an analogue signal and changes into a series of binary numbers. The ADC may be used in simple digital display devices e. g. thermometers, light meters but it may also be used in digital sound recording and in data acquisition. However, a digital-to-analogue converter (DAC) is used to change a digital signal to an analogue signal. A DAC takes a series of binary numbers and converts it to an analogue signal. It is common to find a DAC in the gain-control system of an op-amp which in turn may be used to control digital amplifiers and filters.

Design difficulty

Analogue circuits are harder to design, requiring more skill, than comparable digital systems. This is one of the main reasons why digital systems have become more common than analogue devices. An analogue circuit must be designed by hand, and the process is much less automated than for digital systems. However, if a digital electronic device is to interact with the real world, it will always need an analogue interface. For example, every digital radio receiver has an analogue preamplifier as the first stage in the receive chain.

Analog-to-digital converter

An analog-to-digital converter is a device that converts a continuous quantity to a discrete time representation. An A/D may also provide an isolated measurement. The reverse operation is performed by a digital-to-analog converter.

Typically, an A/D is an electronic device that converts an input analog voltage or current to a digital number proportional to the magnitude of the voltage or current. However, some non-electronic or only partially electronic devices, such as rotary encoders, can also be considered A/Ds.

The digital output may use different coding schemes. Typically the digital output will be a two's complement binary number that is proportional to the input, but there are other possibilities. An absolute encoder, for example, might output a Gray code.

Analog issues in digital circuits

Digital circuits are made from analog components. The design must assure that the analog nature of the components does not dominate the desired digital behaviour. Digital systems must manage noise and timing margins, parasitic inductances and capacitances, and filter power connections.

Bad designs have intermittent problems such as 'glitches', vanishingly-fast pulses that may trigger some logic but not others, 'runt pulses' that do not reach valid 'threshold' voltages, or unexpected ('undecoded') combinations of logic states.

Since digital circuits are made from analog components, digital circuits calculate more slowly than low-precision analog circuits that use a similar amount of space and power. However, the digital circuit will calculate more repeatedly, because of its high noise immunity. On the other hand, in the high-precision domain (for example, where 14 or more bits of precision are needed), analog circuits require much more power and area than digital equivalents.

In analog electronics (e.g. musical instruments and recordings) the signal is a waveform, which can continuously vary across a number of frequencies. When the signal is transferred to a recording or output device, the range of frequencies is infinite, depending on the limitations of the equipment. Unfortunately, this can include unwanted inputs created by mechanical, electrical, or thermal effects. Recreating or copying analog data can produce additional noise or distortion due to the nature of the mechanical devices. (In analog video and sound, devices include electrical switches and vacuum tubes, and recording media can include vinyl records and magnetic tape.)

In digital electronics, a number of separate frequencies are 'sampled' for their amplitude (magnitude) at a specific time, and assigned a numerical value in binary form. When the signal is recreated, it contains the same values as were sampled (i.e. the information does not change). As opposed to the continuous flow of an analog signal, the digital signal consists of values recorded at many distinct and different times, then presented in order. To recreate an approximation of the original signal, a large number of frequencies have to be sampled within the original range then played back simultaneously at the same rate as they were recorded. (Common digital video and sound equipment includes musical synthesizers, iPods, CD players, and computer DVD's.)

SELECTED TERMS

A/D converter (or *A/D convertor*) – a device that converts continuously varying analog signals from instruments and sensors that monitor conditions, such as sound, movement, into binary code for the computer

microelectronics – branch of electronic technology dealing with the theory, design, and applications of microcircuits

PRACTICE WORK:

a) Describing automated systems
Match these words: *detect, detector, pick up, reading, regulate, set off, trigger,* with their synonyms.

- sensor/_____
- measurement/_____
- control (adjust)/ _____
- sense/ _____/_____
- activate/ _____/ _____

b) Close test – fill in with a suitable word:

A digital era
Computers have changed the way we do everyday things, such as working, shopping and looking for information. We _____ houses with the help of PCs; we buy books or make flight reservations on the _____; we use gadgets that spring to life the instant they are switched on, for example the mobile phone, the music player, or the car ignition, all of which use _____. Many people now work at home, and they communicate with their office by computer and telephone. This is called 'teleworking'. With the appropriate hardware and software, a PC can do almost anything you ask. It's a magical typewriter that allows you to type and _____ any sort of document. It's a calculating machine that makes _____ calculations. It's a filing cabinet that manages large collections of data. It's a personal communicator that lets you interact with friends. It's a small lab that helps you edit photos and movies. And if you like _____ entertainment, you can also use it to relax with games.

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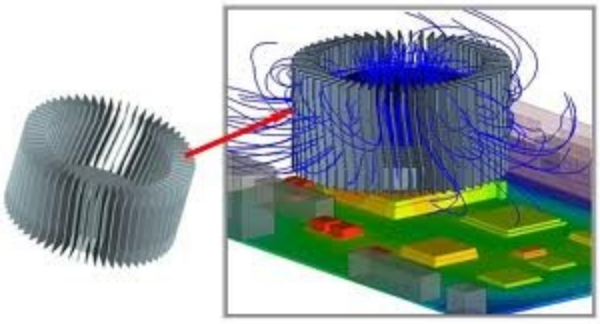
DISCUSSION

- What is the difference between analog and digital electronics?
- Analog computer
- Analog signals
- Analog chip
- Analog circuit design

UNIT 18

CAD: Computer-Aided Design



An example of CAD model

Basic concepts
Computer-Aided Design (CAD) is the use of computer software and systems to design and create 2D and 3D virtual models of goods and products for the purposes of testing. CAD is the use of computer technology for the design of objects, real or virtual. CAD often involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD often must convey also symbolic information such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

Using CAD
CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, and many more. CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals. The modern ubiquity and power of computers means that even perfume bottles and shampoo dispensers are designed using techniques unheard of by engineers of the 1960s. Because of its enormous economic importance, CAD has been a major driving force for research in computational geometry, computer graphics (both hardware and software), and discrete differential geometry.
CAD is used in the design of tools and machinery and in the drafting and design of all types of buildings, from small residential types (houses) to the largest commercial and industrial structures (hospitals and factories).
CAD is mainly used for detailed engineering of 3D models and/or 2D drawings of physical components, but it is also used throughout the engineering process from conceptual design and layout of products, through strength and dynamic analysis of assemblies to definition of manufacturing methods of components. It can also be used to design objects. CAD may be used to design curves and figures in two-dimensional (2D) space; or curves, surfaces, and solids in three-dimensional (3D) objects.

CAD has become an especially important technology within the scope of computer-aided technologies, with benefits such as lower product development costs and a greatly shortened design cycle. CAD enables designers to lay out and develop work on screen, print it out and save it for future editing, saving time on their drawings.
Occupations that use CAD include designers, architects, and developers.
Computer-Aided Design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question. There are several different types of CAD. Each of these different types of CAD systems requires the operator to think differently about how he or she will use them and he or she must design their virtual components in a different manner for each.
There are many producers of the lower-end 2D systems, including a number of free and open source programs. These provide an approach to the drawing process without all the fuss over scale and placement on the drawing sheet that accompanied hand drafting, since these can be adjusted as required during the creation of the final draft.
3D wireframe is basically an extension of 2D drafting. Each line has to be manually inserted into the drawing. The final product has no mass properties associated with it and cannot have features directly added to it, such as holes. The operator approaches these in a similar fashion to the 2D systems, although many 3D systems allow using the wireframe model to make the final engineering drawing views.
3D parametric solid modeling requires the operator to use what is referred to as 'design intent'. The objects and features created are adjustable. Any future modifications will be simple, difficult, or nearly impossible, depending on how the original part was created.
Some software packages provide the ability to edit parametric and non-parametric geometry without the need to understand or undo the design intent history of the geometry by use of direct modeling functionality. This ability may also include the additional ability to infer the correct relationships between selected geometry (e.g., tangency, concentricity) which makes the editing process less time and labor intensive while still freeing the engineer from the burden of understanding the model's design intent history.
Top end systems offer the capabilities to incorporate more organic, aesthetics and ergonomic features into designs (Catia, GenerativeComponents). Freeform surface modeling is often combined with solids to allow the designer to create products that fit the human form and visual requirements as well as they interface with the machine.

Benefits of Computer-Aided Design

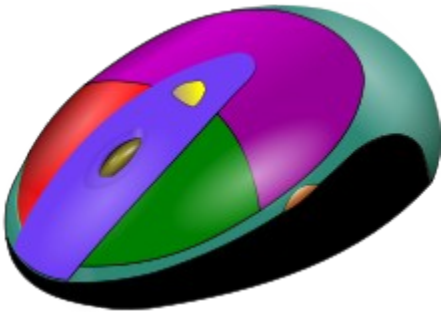
In the field of product development there are often immense costs associated with the testing of new products. Every new product must undergo at least a small measure of physical testing – not only to ensure that it meets minimum safety standards but also to ensure that it will successfully operate under the range of conditions to which it can expect to be exposed. For instance, the wing of an airplane must undergo stress tests to ensure that it will retain its integrity even under the most grueling weather and turbulence conditions before it is approved for use.
Unfortunately, this testing can be ruinously time-consuming and expensive. If an aeronautical company has to physically build dozens of wings in the course of testing a new design then the final cost and time scale of the project can be far higher than

projected.
Fortunately, there is no need to physically test all of these designs. Instead, developers can run virtual stress tests using computer-aided design, substituting a wind tunnel for a CAD application that can simulate the same conditions.
The benefits of virtual simulations are obvious. In addition to a reduction in the cost of product development and the time required to run tests there is also the advantage that conceptual designs can be modified instantly as the tests progress.
The science of aerodynamics is complex, and it is often the case that certain wing shapes can create unexpected turbulence under certain conditions. When this occurs during physical testing it can be a challenge to discover the problem and make alterations. When running virtual tests using CAD, however, alterations to the design can be made quickly and easily, so new designs can be tested and retested until the problem is resolved.

Types
There are several different types of CAD, each requiring the operator to think differently about how to use them and design their virtual components in a different manner for each.
There are many producers of the lower-end 2D systems, including a number of free and open source programs. These provide an approach to the drawing process without all the fuss over scale and placement on the drawing sheet that accompanied hand drafting, since these can be adjusted as required during the creation of the final draft.
3D wireframe is basically an extension of 2D drafting (not often used today). Each line has to be manually inserted into the drawing. The final product has no mass properties associated with it and cannot have features directly added to it, such as holes. The operator approaches these in a similar fashion to the 2D systems, although many 3D systems allow using the wireframe model to make the final engineering drawing views.
3D 'dumb' solids are created in a way analogous to manipulations of real world objects (not often used today). Basic three-dimensional geometric forms (prisms, cylinders, spheres, and so on) have solid volumes added or subtracted from them, as if assembling or cutting real-world objects. Two-dimensional projected views can easily be generated from the models. Basic 3D solids don't usually include tools to easily allow motion of components, set limits to their motion, or identify interference between components.
3D parametric solid modeling require the operator to use what is referred to as 'design intent'. The objects and features created are adjustable. Any future modifications will be simple, difficult, or nearly impossible, depending on how the original part was created. One must think of this as being a 'perfect world' representation of the component. If a feature was intended to be located from the center of the part, the operator needs to locate it from the center of the model, not, perhaps, from a more convenient edge or an arbitrary point, as he could when using 'dumb' solids. Parametric solids require the operator to consider the consequences of his actions carefully.
Some software packages provide the ability to edit parametric and non-parametric geometry without the need to understand or undo the design intent history of the geometry by use of direct modeling functionality. This ability may also include the additional ability to infer the correct relationships between selected geometry (e.g., tangency, concentricity) which makes the editing process less time and labor intensive

while still freeing the engineer from the burden of understanding the model's. These kind of non history based systems are called Explicit Modelers or Direct CAD Modelers.
Top end systems offer the capabilities to incorporate more organic, aesthetics and ergonomic features into designs. Freeform surface modeling is often combined with solids to allow the designer to create products that fit the human form and visual requirements as well as they interface with the machine.

Technology



A CAD model of a computer mouse

Originally software for computer-aided design systems was developed with computer languages such as Fortran, but with the advancement of object-oriented programming methods this has radically changed. Typical modern parametric feature based modeler and freeform surface systems are built around a number of key C modules with their own APIs (application programming interfaces). A CAD system can be seen as built up from the interaction of a graphical user interface (GUI) with NURBS (non-uniform rational basis spline) geometry and/or boundary representation (B-rep) data via a geometric modeling kernel. A geometry constraint engine may also be employed to manage the associative relationships between geometry, such as wireframe geometry in a sketch or components in an assembly.
Unexpected capabilities of these associative relationships have led to a new form of prototyping called digital prototyping. In contrast to physical prototypes, which entail manufacturing time in the design. That said, CAD models can be generated by a computer after the physical prototype has been scanned using an industrial CT Computerized tomography) scanning machine. Depending on the nature of the business, digital or physical prototypes can be initially chosen according to specific needs.
Today, CAD systems exist for all the major platforms (Windows, Linux, UNIX and Mac OS X); some packages even support multiple platforms.
Right now, no special hardware is required for most CAD software. However, some CAD systems can do graphically and computationally intensive tasks, so a modern graphics card, high speed (and possibly multiple) CPUs and large amounts of RAM may be recommended.
The human-machine interface is generally via a computer mouse but can also be via a pen and digitizing graphics tablet. Manipulation of the view of the model on the screen is

also sometimes done with the use of a Spacemouse/SpaceBall. Some systems also support stereoscopic glasses for viewing the 3D model.

The Future of CAD

Since the early development of computer-aided design we have seen a trend towards increasing accessibility. When CAD applications became available for product development in the 1960s it was only the largest of enterprises that could afford to make use of the technology – the aerospace and automobile industries, for instance.

As computer technology developed, computer-aided design made the move from dedicated systems to general-use personal computers, opening the door for smaller enterprises and individual users. Today it is possible to run most CAD software (and even some high-end 3D packages) on typical desktop PCs.

In the future we can expect further advances in 3D software packages, allowing users a more simple and intuitive experience. Perhaps the most exciting for CAD users is the fact that the cost of 3D printing will steadily decline, thus opening up a whole new avenue in the product development process. Not only will CAD users be able to make instant modifications to their conceptual designs, but they will also be able to instantly create a physical prototype – solving an inherent drawback of virtual product development.

SELECTED TERMS

computer animation – the creation of moving images (animation) using computer technology

computer graphics – the use of a computer to produce and manipulate pictorial images on a video screen, as in animation techniques or the production of audiovisual aids

software package – multiple software programs that work together (or performs similar functions) and is bundled and sold together as a software package; an application program developed for sale to the general public

PRACTICE WORK:

a) COMPARISON AND CONTRAST

Here are some useful phrases for expressing comparison and contrast:

Similarity	Contrast
Both X and Y …	While X is … Y is …
X is … and Y too.	Unlike X, Y is …
X and Y are …	X is …, but Y is …

b) Make comparison and contrast sentences on analogue and digital electronics.

c) QUALIFYING AND COMPARING

Complete with: *slimmer, more (2x), as, the, best, as well as, unlike, similar, while, both, than, but.*

_____ desktops and laptops have _____ components but they are built in a different way. _____ desktops have _____ space to expand the system, they are less manageable _____ laptops. On the other hand, laptops are fully portable: they are lighter and _____ and so more practical if you travel a lot and need to take your computer with you. _____ desktops, the screen, keyboard and mouse of a laptop are integrated. However, most laptop owners prefer to have a separate mouse _____ the touchpad. Similarly, as the keyboard is miniaturised, some people buy an external one for use at home. You can type _____ easily if you use a full-size keyboard. A laptop's CPU is slower _____ access to data must be quicker, so its performance can be _____ good as a desktop's. It's hard to say what _____ option is. But remember: in the computer world, _____ smaller the device, the more money it costs.

d) Comparatives of adjectives:

- A laser printer is generally (quiet) _____ than a low-cost inkjet printer.
- Multi-function printers are now only slightly (expensive) _____ than conventional printers, and offer much (great) _____ versatility.
- The print quality of this network printer is noticeably (good) _____ than any inkjet, and as (good) _____ as similar laser printers.
- The Agfa platesetter is (reliable) _____ and (easy) _____ to use than most printers of its type.
- Your printer is only as (good) _____ as the paper you use.
- The final result is always (accurate) _____ than the original image.
- An imagesetter is (heavy) _____ than a laser printer.

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DISCUSSION

- Using CAD
- The effects of CAD
- 3D modeling
- AutoCAD
- Computer-aided industrial design
- CAD standards
- Digital architecture
- Molecular design software

UNIT 19

Web Design

Web design is the process of planning and creating a website. Text, images, digital media and interactive elements are used by web designers to produce the page seen on the web browser. Web designers utilize markup language, most notably HTML (hyper text markup Language) for structure and CSS (cascading style sheet) for presentation as well as JavaScript to add interactivity to develop pages that can be read by web browsers.
As a whole, the process of web design can include conceptualization, planning, producing, post-production, research, advertising. The site itself can be divided up into pages. The site is navigated by using hyperlinks, which are commonly blue and underlined but can be made to look like anything the designer wishes. Images can also be hyperlinks.
Web designing is all about writing code that is valid HTML and CSS which make it easier to correct problems, and edit pages. HTML and CSS are the fundamental technologies for building web pages: HTML and XHTML for structure, CSS for style and layout, including WebFonts. By separating the presentation style of documents from the content of documents, CSS simplifies Web authoring and site maintenance. For example, having a separate CSS file allows for making aesthetic changes to the entire website than just to a single web page. If CSS rules are included within a single HTML page, changes would have to be made to each and every page that used the element in question. The reasoning is that HTML should only be used for raw content and CSS be used to manipulate the content for aesthetic style.

HTML and XHTML
XHTML (extensible hyper text markup language) is currently the most widely used standard for websites on the internet, despite the fact that the new standard, HTML5, is available. XHTML can support different browsers, like Internet Explorer 9, Google Chrome, Mozilla Firefox, Opera and Safari. It can support all browsers run on mobile phone and other similar small devices. Small devices often cannot interpret the bad HTML. XHTML is a family of current and future document types and modules that reproduce, subset, and extend HTML 4. It extends HTML 4 by utilizing extensible markup language (XML), which is a language that is designed to carry data, not display it. By combining HTML with XML it retains the flexibility of HTML but allows for cleaner, well-formed coding. What this means is that a web page can now have dynamic, interactive content as XHTML is actually an XML application.

A presentation program
A presentation program (also called a presentation graphics program) is a computer software package used to display information, normally in the form of a slide show. It typically includes three major functions:
- an editor that allows text to be inserted and formatted,
- a method for inserting and manipulating graphic images,
- a slide-show system to display the content.

There are many different types of presentations including professional (work-related), education, entertainment, and for general communication. Presentation programs can either supplement or replace the use of older visual aid technology, such as pamphlets, handouts, chalkboards, flip charts, posters, slides and overhead transparencies. Text, graphics, movies, and other objects are positioned on individual pages or slides. Slides can be printed, or (more usually) displayed on-screen and navigated through at the command of the presenter. Transitions between slides can be animated in a variety of ways, as can the emergence of elements on a slide itself. Typically a presentation has many constraints and the most important being the limited time to present consistent information.
With the growth of digital photography and video, many programs that handle these types of media also include presentation functions for displaying them in a similar "slide show" format. For example, Apple's iPhoto allows groups of digital photos to be displayed in a slide show with options such as selecting transitions, choosing whether or not the show stops at the end or continues to loop, and including music to accompany the photos.

Features

A presentation program is supposed to help both: the speaker with an easier access to his ideas and the participants with visual information which complements the talk. There are many different types of presentations including professional (work-related), education, entertainment, and for general communication. Presentation programs can either supplement or replace the use of older visual aid technology, such as pamphlets, handouts, chalkboards, flip charts, posters, slides and overhead transparencies. Text, graphics, movies, and other objects are positioned on individual pages or 'slides' or 'foils'. The 'slide' analogy is a reference to the slide projector, a device that has become somewhat obsolete due to the use of presentation software. Slides can be printed, or (more usually) displayed on-screen and navigated through at the command of the presenter. Transitions between slides can be animated in a variety of ways, as can the emergence of elements on a slide itself. Typically a presentation has many constraints and the most important being the limited time to present consistent information.
Recently a new presentation paradigm has emerged: zooming presentation programs. Instead of individual slides these ZUIs (zoom user interfaces) are based on one infinite canvas on which all content is presented. This allows for non-linear presentations, the option to present richer detail of content, and to give a better overview and understanding of complex visual messages and relations.
Another recent development which internet based software such as Slide Rocket, Office Web Apps or Google Docs has enabled is collaborative development of the presentation. Several people can work on the presentation at the same time revising content or reviewing the changes as they are made by others.
Many presentation programs come with pre-designed images (clip art) and/or have the ability to import graphic images. Custom graphics can also be created in other programs such as Adobe Photoshop or Adobe Illustrator and then exported. The concept of clip art originated with the image library that came as a complement with VCN Execu Vision, beginning in 1983.

With the growth of digital photography and video, many programs that handle these types of media also include presentation functions for displaying them in a similar 'slide show' format. For example, Apple's iPhoto allows groups of digital photos to be displayed in a slide show with options such as selecting transitions, choosing whether or not the show stops at the end or continues to loop, and including music to accompany the photos.
Similar to programming extensions for an operating system or web browser, 'add ons' or plug-ins for presentation programs can be used to enhance their capabilities. For example, it would be useful to export a PowerPoint presentation as a Flash animation or PDF document. This would make delivery through removable media or sharing over the Internet easier. Since PDF files are designed to be shared regardless of platform and most web browsers already have the plug-in to view Flash files, these formats would allow presentations to be more widely accessible.
Certain presentation programs also offer an interactive integrated hardware element designed to engage an audience (e.g. audience response systems) or facilitate presentations across different geographical locations (e.g. web conferencing). Other integrated hardware devices ease the job of a live presenter such as laser pointers and interactive whiteboards.

SELECTED TERMS

clip-art – a set of pre-drawn images or drawings used to illustrate word processing and desktop publishing documents
hyperlink – a word, phrase, picture, icon, etc, in a computer document on which a user may click to move to another part of the document or to another document;
zoom user interface (ZUI) – a graphical environment where users can change the scale of the viewed area in order to see more detail or less, and browse through different documents

PRACTICE WORK;

The language of guarantees

a) Match the formal phrases in 1-10 with the explanations in a-j:

1. faulty workmanship
2. the date of purchase
3. undertake to exchange
4. taking further actions
5. consequential
6. in the event that
7. free of charge
8. statutory
9. to attend to
10. making a claim

a) error in manufacture
b) legal
c) following/as a result of
d) to deal with
e) at no cost
f) doing something else
g) when you bought the item
h) demanding money or replacement
i) if it happens
j) promise to replace

b) Now complete the guarantee card below using the formal phrases.

GUARANTEE
This instrument is guaranteed for twelve months from _____ by the original owner against failure due to _____ or component breakdown, subject to the procedure stated below. Should any component or part fail during the guarantee period it will be repaired or replaced _____.
The guarantee does not cover:

1. the damage resulting from incorrect use,
2. _____ damage,
3. receivers with removed or defaced serial numbers.

Procedure: any claim under this guarantee should be made through the dealer from whom the instrument was purchased. It is likely that your dealer will be able _____ any defect quickly and efficiently, but should it be necessary the dealer will return the instrument to the company's service department for attention. _____ it is not possible to return the instrument to the dealer from whom it was purchased, please contact Radio service department at the address below before _____.
These statements do not affect the _____ rights of a consumer.

*

DISCUSSION

- Cross-browser
- Cybermosaic
- Interaction design
- User interface design
- Web colors
- Web usability
- Website architecture
- Website builder
- Website wireframe

UNIT 20

Multimedia

As the name implies, multimedia is the integration of multiple forms of media. This includes a combination of text, graphics, animation, video and sound. For example, a presentation involving audio and video clips would be considered *a multimedia presentation*. Educational software that involves animations, sound, and text is called *multimedia software*. CDs and DVDs are often considered to be *multimedia formats* since they can store a lot of data and most forms of multimedia require a lot of disk space.

Usage

Multimedia finds its application in various areas, such as: engineering, industry, commercial uses, entertainment and fine arts, education, medicine, mathematics, scientific research, etc.

- *Engineering*

Software engineers may use multimedia in computer simulations for anything from entertainment to training such as military or industrial training. Multimedia for software interfaces are often done as collaboration between creative professionals and software engineers.

- *Industry*

In the industrial sector, multimedia is used as a way to help present information to shareholders, superiors and coworkers. Individual multimedia designers may cover the spectrum throughout their career; request for their skills range from technical, to analytical, to creative. Multimedia is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technology.

- *Commercial uses*

Exciting presentations are used to grab and keep attention in advertising. Business to business, and interoffice communications are often developed by creative services firms for advanced multimedia presentations beyond simple slide shows to sell ideas or liven-up training.

- *Entertainment and fine arts*

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online.

- *Education*

In education, multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopedia and almanacs. A CBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment.

- *Medicine*

In medicine, doctors can get trained by looking at a virtual surgery or they can simulate how the human body is affected by diseases spread by viruses and bacteria and then develop techniques to prevent it.

- *Mathematical and scientific research*
In mathematical and scientific research, multimedia is mainly used for modeling and simulation. For example, a scientist can look at a molecular model of a particular substance and manipulate it to arrive at a new substance.

Major characteristics of multimedia
Multimedia presentations may be viewed in a person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation. Broadcasts and recordings can be either analog or digital electronic media technology. Digital online multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand.
Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.
The various formats of technological or digital multimedia may be intended to enhance the users' experience, for example to make it easier and faster to convey information, or in entertainment or art, to transcend everyday experience.

A laser show is a live multimedia performance

Enhanced levels of interactivity are made possible by combining multiple forms of media content. Online multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end-user innovation and personalization on multiple forms of content over time. Examples of these range from multiple forms of content on Web sites like photo galleries with both images (pictures) and title (text) user-updated, to simulations whose co-efficients, events, illustrations, animations or videos are modifiable, allowing the multimedia 'experience' to be altered without reprogramming. In addition to seeing and hearing, haptic technology (technology that interfaces with the user through the sense of touch) enables virtual objects to be felt. Emerging technology involving illusions of taste and smell may also enhance the multimedia experience.

Interactive multimedia
Interactive multimedia can be defined as a two-way interaction with multimedia course material, another computer, or another user with direct response to the input, as opposed to one-way communication from TV, video, and other non-responsive media. There are certain characteristics and technologies that assist in creating an interactive environment,

some of these include mouse input, touch screens, voice commands, video capture and real-time interaction.

Interactive multimedia involves using applications that allow users to actively participate in courses and activities rather than being passive recipients of information. From this it can be inferred that interactive multimedia allows participants to be engaged in the learning process, as they make their own decisions regarding what and when different components will be delivered throughout the course.

Hypermedia

The concept of hypermedia can be described as a multimedia system in which related items of information are connected and can be presented together. Hypermedia is a term used for hypertext (a text which is not constrained to be linear) which is not constrained to be text: it can include graphics, video and sound.

These definitions result in the understanding that hypermedia describes whereas multimedia possesses hyperlinks and links to information which discuss similar ideas. It provides for a network of information that can be accessed at the learners own leisure and allows for greater flexibility and interactivity throughout the learning experience. It is assumed that hypermedia is a non-linear approach to multimedia, as learners are given control through the provision of different links to a variety of information.

Multimedia and e-learning

With the extensive use of e-learning in education it is necessary to reflect on the importance and usage of multimedia in today's e-learning context. Multimedia is now considered to play a major role in adding variety and interaction to e-learning courses. In an e-learning context, multimedia is being used in the production of computer-based training courses which allow users to navigate through a series of presentations, involving text about the particular topic, and associated illustrations in different information formats. Multimedia, when compared with other mediums, provides greater flexibility and therefore positively enhances the online learning experience for users. Greater flexibility is achieved by multimedia's provisions for allowing learner navigation through the material. It would therefore appear that multimedia allows for the customization of learning for different participants.

Furthermore, multimedia is advantageous to e-learning as it allows courses to be continually updated, that is, the great thing about multimedia is that it consists of a large number of individual files - video clips, audio files, graphics, etc. - any one of which can be deleted or replaced. Through the ability to easily and effectively update multimedia, it allows e-learning courses to be constantly adapted to suit changes that may be occurring in the industry.

Finally, in today's e-learning context, it is important to ensure that learners are engaged throughout the learning process. Multimedia assists in this process, as it is a 'fully participative medium' and demands more of its users. Due to multimedia involving the integration of different mediums, it forces learners to engage different senses when undertaking a learning course. Not only are learners expected to read text, but they may be required to listen to audio, view animations and/or watch videos which although may sound confusing results in a participatory learning experience that engages a multitude of senses.

From this it can be inferred that the utilization of multimedia in an e-learning context will result in a lasting impact on learners and hopefully a greater retention of the information taught. Studies have been conducted that prove the advantages of multimedia in relation to knowledge retention and recall. It has been found that training programs that require learners to simply listen to training normally result in low levels of 'recall and knowledge retention (25%)', as compared to programs that combine both text and audio which are proved to yield a higher recall rate. Training programs that utilize a mix of hearing, seeing and interacting elements in training methods and materials result in the highest recall and knowledge retention rates (75%) (Cybermedia Creations, 2005). Therefore from these studies it can be concluded that multimedia training programs are of benefit to e-learning as they create an 'engaging learning environment that can train people consistently and with higher learning retention'.

Multimedia and the future

As technology progresses, so will multimedia. Today, there are plenty of new media technologies being used to create the complete multimedia experience. For instance, virtual reality integrates the sense of touch with video and audio media to immerse an individual into a virtual world. Other media technologies being developed include the sense of smell that can be transmitted via the Internet from one individual to another. Today's video games include biofeedback. In this instance, a shock or vibration is given to the game player when he or she crashes or gets killed in the game. In addition, as computers increase their power, new ways of integrating media will make the multimedia experience extremely intricate and exciting.

SELECTED TERMS

linear programming – mathematical technique used in computer modeling (simulation) to find the best possible solution in allocating limited resources (energy, machines, materials, money, personnel, space, time, etc.) to achieve maximum profit or minimum cost

simulator (general definition) – a device which simulates another system;

1) software that enables the execution of an application written for a different computer environment;

2) software that models the interactions of hypothetical or real-world objects or business processes;

3) hardware and software that models the interaction of real-world objects. For example, a flight simulator is used to train pilots. It models the operation and interactions within an airplane cockpit

PRACTICE WORK:

a) Match the words with the definitions:

1. hypertext a) the process of manipulating video images

2. hypermedia b) text with links which take you to other pages
3. streaming c) a technique for playing sound and video files while they are downloading
4. webcast d) a live event broadcast over the Internet
5. video editing e) a form of enriched multimedia which allows an interactive and dynamic linking of visual and audio elements

b) Complete with the following words: *graphics, interactive, video games, consoles, multiplayer:*

Video Games

There are games you play on video _____ such as Nintendo, Sega, and the PlayStation. And there are games you play on a computer, either alone or at multiplayer online sites such as Microsoft's Internet Gaming Zone and Battle.net.

_____ have been made into films, such as Mortal Combat 1 and 2, and film stars now sometimes appear in video games. The _____ in many games have taken on such a high degree of realism that they almost seem like film. The X-Files game was practically an _____ movie, full of actors from the show and section of dialogue and video. Some people claim that the Blade Runner video game was better than the movie – not only were the sets incredible but you also got to control the action and the ending.

_____ online gaming is the next wave in the video game world. It provides a better gaming experience, simply because people are more creative and more challenging adversaries than computers. Thousands of people can play simultaneously all over the world.

*

DISCUSSION

- Crossmedia
- Modern web browsers
- Multimedia formats
- What is a still image video
- What is display advertising
- Haptic technology

UNIT 21

Computer Animation

Computer animation is the art of creating moving images with the use of computers. It is created by means of 3D computer graphics, though 2D computer graphics are still widely used for stylistic, low bandwidth, and faster real-time rendering needs. Sometimes the target of the animation is the computer itself, but sometimes the target is another medium, such as film. It is also referred to as CGI (computer-generated imaging), especially when used in films.

To create the illusion of movement, an image is displayed on the computer screen and repeatedly replaced by a new image that is similar to the previous image, but advanced slightly in the time domain (usually at a rate of 24 or 30 frames/second). This technique is identical to how the illusion of movement is achieved with television and motion pictures.

For 3D animations, objects (models) are built on the computer monitor (modeled) and 3D figures are rigged with a virtual skeleton. For 2D figure animations, separate objects (illustrations) and separate transparent layers are used, with or without a virtual skeleton. Then the limbs, eyes, mouth, clothes, etc. of the figure are moved by the animator on key frames. The differences in appearance between key frames are automatically calculated by the computer in a process known as tweening or morphing. Finally, the animation is rendered.

For 3D animations, all frames must be rendered after modeling is complete. For 2D vector animations, the rendering process is the key frame illustration process, while tweened frames are rendered as needed. For pre-recorded presentations, the rendered frames are transferred to a different format or medium such as film or digital video. The frames may also be rendered in real time as they are presented to the end-user audience. Low bandwidth animations transmitted via the Internet (e.g. 2D Flash, X3D) often use software on the end-users computer to render in real time as an alternative to streaming or pre-loaded high bandwidth animations.

Architectural animation

Architectural animation is usually a short architectural movie created on a computer. A computer-generated building is created along with landscaping and sometimes moving people and vehicles. Unlike an architectural rendering, which is a single image from a single camera point of view, an architectural animation is a series of hundreds or even thousands of still images made by a moving camera. When these thousands of images are assembled and played back they produce a movie effect much like a real movie camera except all images are artificially created by computer. It is possible to create a computer environment around the building to enhance reality and to better convey its relation to the surrounding area; this can all be done before the project is built giving designers and shareholders a realistic view of the completed project. Architectural renderings are often used along with architectural animation.

Models

3D models represent a 3D object using a collection of points in 3D space, connected by various geometric entities such as triangles, lines, curved surfaces, etc. Being a collection of data (points and other information), 3D models can be created by hand, algorithmically (procedural modeling), or scanned.

3D models are widely used anywhere in 3D graphics. Actually, their use predates the widespread use of 3D graphics on personal computers. Many computer games used pre-rendered images of 3D models as sprites before computers could render them in real-time.

Today, 3D models are used in a wide variety of fields:

- *The medical industry* uses detailed models of organs.
- *The movie industry* uses them as characters and objects for animated and real-life motion pictures.
- *The video game industry* uses them as assets for computer and video games.
- *The science sector* uses them as highly detailed models of chemical compounds.
- *The architecture industry* uses them to demonstrate proposed buildings and landscapes through software architectural models.
- *The engineering community* uses them as designs of new devices, vehicles and structures as well as a host of other uses.
- In recent decades *the earth science community* has started to construct 3D geological models as a standard practice.

Modeling processes

Computer-generated animation

There are five popular ways to represent a model:

Polygonal modeling - Points in 3D space, called vertices, are connected by line segments to form a polygonal mesh. Used, for example, by blender. The vast majority of 3D models today are built as textured polygonal models, because they are flexible and because computers can render them so quickly. However, polygons are planar and can only approximate curved surfaces using many polygons.

NURBS (non-uniform rational basis spline) *modeling* is mathematical representation of 3-D geometry that can accurately describe any shape from a simple 2-D line, circle, arc, or curve to the most complex 3-D organic free-form surface or solid. Because of their flexibility and accuracy, NURBS models can be used in any process from illustration and animation to manufacturing. NURBS surfaces are defined by spline curves, which are influenced by weighted control points. The curve follows (but does not necessarily interpolate) the points. Increasing the weight for a point will pull the curve closer to that point. NURBS are truly smooth surfaces, not approximations using small flat surfaces, and so are particularly suitable for organic modeling. Maya, Rhino 3d and solidThinking are the most well-known commercial software that uses NURBS natively.

Splines & Patches modeling - Like NURBS, *Splines and Patches* depend on curved lines to define the visible surface. Patches fall somewhere between NURBS and polygons in terms of flexibility and ease of use.

Primitives modeling - This procedure takes geometric primitives like balls, cylinders, cones or cubes as building blocks for more complex models. Benefits are quick and easy construction and that the forms are mathematically defined and thus absolutely precise, also the definition language can be much simpler. Primitives modeling is well suited for technical applications and less for organic shapes. Some 3D software can directly render from primitives (like POV-Ray), others use primitives only for modeling and convert them to meshes for further operations and rendering.

Sculpt modeling - Still fairly new method of modeling 3D sculpting has become very popular. There are 2 types of this modeling: *displacement* which is the most widely used among applications at this moment, and *volumetric*. *Displacement* uses a dense model (often generated by subdivision surfaces of a polygon control mesh) and stores new locations for the vertex positions through use of a 32bit image map that stores the adjusted locations. *Volumetric* which is based loosely on voxels has similar capabilities as displacement but does not suffer from polygon stretching when there are not enough polygons in a region to achieve a deformation. Both of these methods allow for very artistic exploration as the model will have a new topology created over it once the models form and possibly details have been sculpted. The new mesh will usually have the original high resolution mesh information transferred into displacement data or normal map data if for a game engine.

Computer animation education

Advantages of wireframe 3D modeling over exclusively 2D methods include:
- flexibility, ability to change angles or animate images with quicker rendering of the changes;
- ease of rendering, automatic calculation and rendering photorealistic effects rather than mentally visualizing or estimating;
- accurate photorealism, less chance of human error in misplacing, overdoing, or forgetting to include a visual effect.

3D model market
3DCT (3D Catalog Technology) has revolutionized the 3D model market by offering quality 3D model libraries free of charge for professionals using various CAD programs. Some believe that this uprising technology is gradually eroding the traditional 'buy and sell' or 'object for object exchange' markets although the quality of the products do not match those sold on specialized 3D marketplaces.
A large market for 3D models (as well as 3D-related content, such as textures, scripts, etc.) still exists - either for individual models or large collections. Online marketplaces for 3D content allow individual artists to sell content that they have created. Often, the artists' goal is to get additional value out of assets they have previously created for projects. By doing so, artists can earn more money out of their old content, and companies can save money by buying pre-made models instead of paying an employee to create one from scratch. These marketplaces typically split the sale between themselves and the artist that created the asset, often in a roughly 50-50 split. In most cases, the artist retains ownership of the 3D model; the customer only buys the right to use and present the model.

Future
Architectural animations require a larger team of artists and animators than single renderings and a much longer time frame is required to complete an animation project. However, many architectural firms are now opening their arms to architectural animation because it attracts investors and customers who may not know much about building designs. Architectural animation is considered to have a bright future ahead of it as more and more architects and real estate developers are including computer animations in there marketing programs.
Some of the greatest challenges for animators are creating realistic characters. Movies have come very close to making character look more human. They fall short in details when the complexities and movements of the human body go beyond current cutting edge software tools. Engineers are currently working to solve this problem. Future software packages will come with the necessary tools to not only capture real movement and features, but represent it on the screen in a way that will mimic a vision of reality.

SELECTED TERMS

key frame (graphics) – a frame in an animated sequence of frames which was drawn or otherwise constructed directly by the user rather than generated automatically, e.g. by tweening

texture mapping (in computer graphics) – the application of a type of surface to a 3D image. A texture can be uniform, such as a brick wall, or irregular, such as wood grain or marble. The common method is to create a 2D bitmapped image of the texture, called a "texture map," which is then "wrapped around" the 3D object

PRACTICE WORK:

a) Tenses and comparison:

1. Digital radio sets _____ (become) less and less popular.
2. More and more people _____ (listen) to radio over the Internet.
3. Laptops are getting _____ (cheap).
4. Handheld devices are becoming _____ (sophisticated).
5. Battery life _____ (get) _____ (long).
6. In some areas, VoIP _____ (take over) from PSTN.
7. Mobile broadband speeds _____ (increase) dramatically.

b) Computers and work – fill in with: *telemedicine, desktop publishers, computer animators, online teachers, teleworking/telecommuting, teleworkers.*

The use of ICT has caused the development of new ways of working. People no longer need to be stuck in an office. Laptops, the Internet and wireless technologies allow _____. What's more, there are more and more people who have decided to become _____ and so have no need to travel to work at all. The Internet has also enabled doctors to practice _____ and educators to work as _____ _____. ICT technologies have introduced changes in the artistic world, too. Cartoons are now made by _____ _____ and _____ _____ who produce material for publication.

*

DISCUSSION

- Computer animation development equipment
- How does computer animation work
- Creating characters and objects on a computer
- Methods of animating virtual characters
- The future of computer animation

UNIT 22

Information Systems

Information systems organisation

Information system is an integrated set of components for collecting, storing, processing, and communicating information. Business firms, other organizations, and individuals in contemporary society rely on information systems to manage their operations, compete in the marketplace, supply services, and augment personal lives. For instance, modern corporations rely on computerized information systems to process financial accounts and manage human resources; municipal governments rely on information systems to provide basic services to its citizens; and individuals use information systems to study, shop, bank, and invest.
In a broad sense, the term *information system* refers to the interaction between algorithmic processes and technology. This interaction can occur within or across organizational boundaries. An information system is not only the technology an organization uses, but also the way in which the organizations interact with the technology and the way in which the technology works with the organization's business processes.

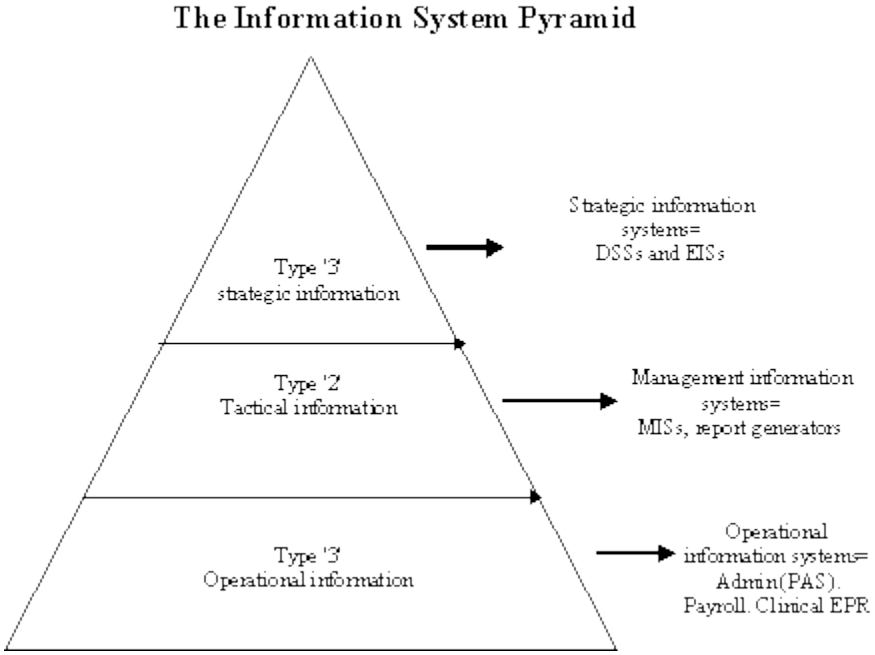
A computer-based information system
A computer-based information system (CBIS) is an information system in which the computer plays a major role. Such a system consists of the following elements:
- *Hardware*: the term *hardware* refers to machinery. This category includes the computer itself, which is often referred to as the central processing unit (CPU), and all of its

support equipments. Among the support equipments are input and output devices, storage devices and communications devices.

- *Software*: the term *software* refers to computer programs and the manuals (if any) that support them. Computer programs are machine-readable instructions that direct the circuitry within the hardware parts of the CBIS to function in ways that produce useful information from data. Programs are generally stored on some input/output medium – often a disk or a tape.
- *Data*: data are facts that are used by a program to produce useful information. Like programs, data are generally stored in a machine-readable form on disk or tape until the computer needs them.
- *Procedures*: procedures are the policies that govern the operation of a computer system. Operating procedures are used to operate the computer, data entry, communication, maintenance, back up and error recovery.

Types of information systems

The 'classic' view of information systems was of a pyramid of systems that reflected the hierarchy of the organization, usually transaction processing systems at the bottom of the pyramid, followed by management information systems, decision support systems and ending with executive information systems at the top.



A three-level pyramid model of information systems

Although the pyramid model remains useful, since it was first formulated a number of new technologies have been developed and new categories of information systems have emerged, some of which no longer fit easily into the original pyramid model. Some examples of such systems are:

- data warehouses,

- enterprise resource planning,
- enterprise systems,
- expert systems,
- geographic information system,
- global information system,
- office automation.

A data warehouse (DW) is a database used for reporting and analysis. The data stored in the warehouse is uploaded from the operational systems. The data may pass through an operational data store for additional operations before it is used in the DW for reporting. A data warehouse maintains its functions in three layers: staging, integration, and access. Staging is used to store raw data for use by developers. The integration layer is used to integrate data and to have a level of abstraction from users. The access layer is for getting data out for users. This architectural complexity provides the opportunity to:
- maintain data history, even if the source transaction systems do not;
- integrate data from multiple source systems, enabling a central view across the enterprise. This benefit is always valuable, but particularly so when the organization has grown by merger;
- improve data, by providing consistent codes and descriptions, flagging or even fixing bad data;
- present the organization's information consistently;
- provide a single common data model for all data of interest regardless of the data's source;
- restructure the data so that it makes sense to the business users;
- restructure the data so that it delivers excellent query performance, even for complex analytic queries, without impacting the operational systems;
- add value to operational business applications, notably customer relationship management CRM (customer relationship management) systems.

Enterprise resource planning (ERP) *systems* integrate internal and external management information across an entire organization, embracing finance/accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. Their purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders.
Enterprise resource planning systems typically include the following characteristics:
- an integrated system that operates in real time (or next to real time), without relying on periodic updates,
- a common database, which supports all applications,
- a consistent look and feel throughout each module,
- installation of the system without elaborate application/data integration by the Information Technology (IT) department.

Enterprise systems (ES) are large-scale, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology to support business processes, information flows, reporting, and data analytics

within and between complex organizations. Enterprise systems are built on, though do not include, software platforms such as SAP's NetWeaver and Oracle's Fusion and, usually, a relational database. Although data warehousing or business intelligence systems are enterprise-wide packaged application software often sold by ES vendors, since they do not directly support execution of business processes.

Expert systems are computer systems that emulate the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning about knowledge, like an expert, and not by following the procedure of a developer as is the case in conventional programming. The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of artificial intelligence (AI) software.
Expert systems offer many advantages for users when compared to traditional programs because they operate like a human brain. These are:
- quick availability and opportunity to program itself,
- ability to exploit a considerable amount of knowledge,
- reliability,
- scalability,
- preservation and improvement of knowledge,
- new areas neglected by conventional computing.

A geographic information system is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographically referenced data. A GIS can be thought of as a system - it digitally creates and 'manipulates' spatial areas that may be jurisdictional, purpose or application-oriented for which a specific GIS is developed. Hence, a GIS developed for an application, jurisdiction, enterprise or purpose may not be necessarily interoperable or compatible with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. GIS technology can be used for:
- earth surface-based scientific investigations,
- resource management,
- reference and projections of a geospatial nature, both artificial and natural,
- asset management and location planning,
- archaeology,
- environmental impact-assessment,
- infrastructure assessment and development,
- urban planning and regional planning,
- cartography, for a thematic and/or time-based purpose,
- criminology,
- geospatial intelligence,
- GIS data development,
- geographic history,
- marketing,
- logistics,
- population and demographic studies,
- public health planning,
- prospectivity mapping,

- statistical analysis,
- GIS in environmental contamination,
- disease surveillance,
- military planning.

A global information system is any information system which attempts to deliver the totality of measurable data worldwide within a defined context. Common to this class of information systems is that the context is a global setting, either for its use or development process. This means that it highly relates to distributed systems / distributed computing where the distribution is global. The term also incorporates aspects of global software development and there outsourcing (when the outsourcing locations are globally distributed) and offshoring aspects. A specific aspect of global information systems is the case (domain) of global software development. A main research aspect in this field concerns the coordination of and collaboration between virtual teams. Critical tasks in the design of global information systems are: process and system design, technical architecture and support mechanisms.

Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks and goals. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Generally, there are three basic activities of an office automation system: data storage of information, data exchange, and data management. Within each broad application area, hardware and software combine to fulfill basic functions.

SELECTED TERMS

application software – software designed to make the computer do what is required and perform particular tasks
database – an integrated collection of files of data stored in a structured form in a large memory, which can be accessed by one or more users at different terminals
local area network (LAN) – a network where the various terminals and equipment are all within a short distance of one another, ex. in the same building, and can be interconnected by cables

PRACTICE WORK:

Allowing/Preventing verbs

a) Complete with underlying the correct words:
1. … there's a setting on the GPS that allows/prevents it to detect the movement.
2. … an alarm sounds to warn you, and allows/prevents the boat from drifting unnoticed.

3. … and enables/ensures that you don't lose track of where you were, which then enables/ensures you to turn round and come back to the same point.

b) Complete with an allowing or preventing verb:

The core function of your GPS receiver is to _____ you to locate your precise geographical position. To _____ the device to function, it receives at least three signals simultaneously from the GPS constellation – 30 dedicated satellites which _____ receivers to function anywhere on earth. To _____ extremely precise positioning and _____ errors from occurring due to external factors, this device is designed to receive four separate signals (enhanced system accuracy).

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DISCUSSION

- Business informatics
- Geoinformatics
- Data architect
- Data modeling
- Metadata

UNIT 23

Virtual Reality

Virtual reality (VR) is a computer simulation of a real or imaginary system that enables a user to perform operations on the simulated system and shows the effects in real time. It is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. Virtual reality is a term that applies to computer-simulated environments that can simulate physical presence in places in the real world, as well as in imaginary worlds. Most current virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays, but some simulations include additional sensory information, such as sound through speakers or headphones. Some advanced, haptic systems now include tactile information, generally known as force feedback, in medical and gaming applications. Furthermore, virtual reality covers remote communication environments which provide virtual presence of users with the concepts of telepresence and telexistence or a virtual artifact (VA) either through the use of standard input devices such as a keyboard and mouse, or through multimodal devices such as a wired glove, the Polhemus, and omnidirectional treadmills. The simulated environment can be similar to the real world in order to create a lifelike experience - for example, in simulations for pilot or combat training - or it can differ significantly from reality, such as in VR games. In practice, it is currently very difficult to create a high-fidelity virtual reality experience, due largely to technical limitations on processing power, image resolution, and communication bandwidth; however, the technology's proponents hope that such limitations will be overcome as a processor, imaging, and data communication technologies become more powerful and cost-effective over time.

Virtual reality is often used to describe a wide variety of applications commonly associated with immersive, highly visual, 3D environments. The development of CAD (computer-aided design) software, graphics hardware acceleration, head mounted displays, database gloves, and miniaturization have helped popularize the notion.

The simplest form of virtual reality is a 3-D image that can be explored interactively at a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out. More sophisticated efforts involve such approaches as wrap-around display screens, actual rooms augmented with wearable computers, and haptics devices that let you feel the display images.

Popular products for creating virtual reality effects on personal computers include Bryce, Extreme 3D, Ray Dream Studio, trueSpace, 3D Studio MAX, and Visual Reality. The virtual reality modeling language (VRML) allows the creator to specify images and the rules for their display and interaction using textual language statements.

The practical applications of virtual reality

Virtual reality will lead to a number of important changes in human life and activity. It will be integrated into daily life and activity, and will be used in various human ways; techniques will be developed to influence human behavior, interpersonal communication, and cognition.

As we spend more and more time in virtual space, there will be a gradual "migration to virtual space", resulting in important changes in economics, worldview, and culture.
Many science fiction books and films have imagined characters being "trapped in virtual reality".
Immersive virtual musical instruments build on the trend in electronic musical instruments to develop new ways to control sound and perform music, and to represent musical events and sound parameters in a virtual reality in such a way that they can be perceived not only through auditory feedback, but also visually in 3D and possibly through tactile as well as haptic feedback, allowing the development of novel interaction metaphors beyond manipulation such as prehension.
The use of VR in a therapeutic role is its application to various forms of exposure therapy, ranging from phobia treatments to newer approaches to treating PTSD (posttraumatic stress disorder). A very basic VR simulation with simple sight and sound models has been shown to be invaluable in phobia treatment, like zoophobia, and acrophobia, as a step between basic exposure therapy such as the use of simulacra and true exposure. Other research fields in which the use of virtual reality is being explored are physical medicine, rehabilitation, physical therapy, and occupational therapy.
Virtual reality could also be used in business, advancing video conferencing to a level in which people located in widely dispersed parts of the world can interact in a shared environment and carry out tasks together. Meeting the engineering challenge of allowing dispersed people to seamlessly see, hear, and touch each other, as well as share real objects and equipment, would be particularly useful for the military and emergency response teams, too.

Implementation
To develop a real time virtual environment, a computer graphics library can be used as embedded resource coupled with a common programming language, such as C++, Perl, Java, or Python. Some of the most popular computer graphic libraries are OpenGL, Direct3D, Java3D, and VRML, and their use are directly influenced by the system demands in terms of performance, program purpose, and hardware platform. The use of multithreading can also accelerate 3D performance and enable cluster computing with multi-user interactivity.

Manufacturing
Virtual reality can serve to new product design, helping as an ancillary tool for engineering in manufacturing processes, new product prototypes, and simulation. Among other examples, Electronic Design Automation, CAD, Finite Element Analysis, and CAM (computer-aided manufacturing) are widely utilized programs. The use of Stereolithography and 3D printing shows how computer graphic modeling can be applied to create physical parts of real objects used in naval, aerospace, and automotive industries. Beyond modeling assembly parts, 3D computer graphics techniques are currently used in the research and development of medical devices for therapies, treatments, patient monitoring, and early diagnoses of complex diseases.

SELECTED TERMS

CAD (*computer-aided design*) – the use of computer technology for the process of design and design-documentation
CAM (*computer-aided manufacturing*) – the use of computer software to control machine tools and related machinery in the manufacturing of workpieces
stereoscopy – a photography system which provides a three dimensional (3D) effect

PRACTICE WORK:

a) Match the words with definitions:

1. connecting	a) carried (objects, over a distance)
2. raise	b) hold something firmly/bear its weight
3. transported	c) climb down
4. support	d) provided with energy/moved by a force
5. attached	e) joining
6. ascend	f) driven/have movement directed
7. descend	g) fixed
8. powered	h) climb up
9. controlled	i) lift/make something go up

b) Discussing technical requirements

Focusing on specific subjects – use *concerned, regarding, regards, for, terms,* to complete the phrases:

- … with ___regards_____ to the capacity…
- … in __terms_____ of the number of people …
- … as far as size is _____....
- … And as for_____ graphics…
- … _____regarding_____ the schedule…

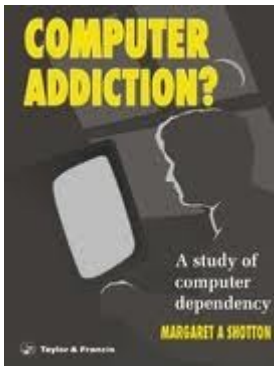
*

DISCUSSION

- Flight simulation
- Methods of virtual reality
- Simulated reality
- Virtual worlds
- Lifelike experience

UNIT 24

Computer Addiction



Computer and Cyberspace Addiction

- Do you feel preoccupied with the Internet or online services and think about it while offline?
- Do you feel a need to spend more and more time online to achieve satisfaction?
- Are you unable to control your online use?
- Do you feel restless or irritable when attempting to cut down or stop your online use?
- Do you go online to escape problems or relieve feelings such as helplessness, guilt, anxiety or depression?
- Do you lie to family members or friends to conceal how often and how long you stay online?
- Do you risk the loss of a significant relationship, job, or educational or career opportunity because of your online use?
- Do you keep returning even after spending too much money on online fees?
- Do you go through withdrawal when offline, such as increased depression, moodiness, or irritability?
- Do you stay online longer than originally intended?

If the answer to these questions is YES, you ARE computer addicted.

What is Internet Addiction? – general facts
First, let us talk about addiction in general. We usually think about addictions as involving chemicals, such as alcohol, nicotine, or other drugs to which we can become tolerant, drugs that can create a physiological dependence. But most psychologists agree that any type of behaviour that is stimulating or rewarding can become addictive. Any behaviour that provides reinforcement or reward can become a habit or a compulsion,

whether it is gambling, video games, day-trading, food, wine, etc. When a behaviour becomes more than a passion, when it becomes more than just a compulsion, and when it becomes harmful or maladaptive, we call it an addiction.
Sometimes we dismiss evidence of addiction (like gambling) by saying that the addiction is 'merely psychological'. This is not, however, a relevant distinction. Research has shown that a 'psychological addiction' can be just as powerful as one that is based on a physiological process, and that 'psychological addictions' actually involve chemical and biological changes in the brain.

Definition of computer addiction
Computer addiction is a term for the excessive use of computers to the extent that it interferes with daily life. Excessive use may explain problems in social interaction, mood, personality, work ethic, relationships, thought processes, or sleep deprivation. Some people develop bad habits in their computer use that cause them significant problems in their lives. The types of behaviour and negative consequences are similar to those of known addictive disorders.

Internet addiction disorder
How do you know when a habit is an addiction?
Symptoms that an addiction may be present include:
- excessive time devoted to Internet use
- a persistent pursuit of the behaviour even when it means neglecting other important aspects of one's life, or betraying one's value system
- poor grades or poor job performance, even loss of a job
- mood changes or altered states of consciousness associated with the behaviour
- fatigue, lack of sleep, depression and other physical symptoms
- a decreased investment in social relationships and activities
- neglecting your family and friends
- a person may lie about how much time was spent online or deny that they have a problem
- a person may be irritable when offline, or angry toward anyone who questions his/her time on the Internet

Internet addiction disorder (IAD), or, more broadly, *Internet overuse, problematic computer use or pathological computer use*, is excessive computer use that interferes with daily life. These terms avoid the distracting and divisive term addiction and are not limited to any single cause.
Online activities which, if done in person, would normally be considered troublesome, such as compulsive gambling or shopping, are sometimes called net compulsions. Others, such as reading or playing computer games, are troubling only to the extent that these activities interfere with normal life. Supporters of disorder classification often divide IAD into subtypes by activity, such as excessive, overwhelming, gaming, online social networking, blogging, email, or Internet shopping. Opponents note that compulsive behaviours may not themselves be addictive.

It is possible that a person could have a pathological relationship with a specific aspect of the Internet, such as bidding on online auctions, online gaming, or online gambling, but that does not make the Internet medium itself addictive. For example, whether gambling is done on a computer or face-to-face does not affect whether or not it is pathological; a person with poor impulse control can lose sleep over a suspenseful novel or favourite television show or a computer game or the temptation to click on another web link.
Also, there are significant and critical differences between common Internet activities (e-mail, chatting, web surfing) and pathological gambling, which the IAD notion heavily parallels. The Internet is largely a pro-social, interactive, and information-driven medium, while gambling is seen as a single, anti-social behaviour that has very little social redeeming value. Many so-called Internet addicts do not suffer from the same damage to health and relationships that are common to established addictions.

Treatments
Since Internet addiction disorder is a relatively new phenomenon, there is little research on the effectiveness of treatment procedures. Some professionals advocate abstinence from the Internet. Others argue that it may be unrealistic to have a person completely end all Internet use. As society becomes more and more dependent on computers for business transactions, educational programs, entertainment, and access to information as well as interpersonal communication, it will be difficult for a computer-literate person to avoid using the Internet. Learning how to use the Internet in moderation is often the main objective in therapy, in a way analogous to the way that people with eating disorders need to come to terms with food. Many of the procedures that have been used to treat Internet addiction have been modeled after other addiction treatment programs and support groups.

Internet Addiction Quiz

If you already know or strongly believe you are addicted to the Internet, this guide will assist you in identifying the areas in your life most impacted by your excessive Net use. If you are not sure whether you are addicted or not, this will help determine the answer and begin to assess the damage done. Remember when answering, only consider the time you spent on-line for non-academic or non-job related purposes.
To assess your level of addiction, answer the following questions using this scale:
1 = Rarely
2 = Occasionally
3 = Frequently
4 = Often
5 = Always

1. How often do you find that you stay online longer than you intended?
2. How often do you neglect household chores to spend more time online?
3. How often do you prefer the excitement of the Internet to intimacy with your partner?
4. How often do you form new relationships with fellow online users?
5. How often do others in your life complain to you about the amount of time you spend online?
6. How often do your grades or school work suffer because of the amount of time you spend online?
7. How often do you check your e-mail before something else that you need to do?
8. How often does your job performance or productivity suffer because of the Internet?
9. How often do you become defensive or secretive when anyone asks you what you do online?
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?
11. How often do you find yourself anticipating when you will go online again?
12. How often do you fear that life without the Internet would be boring, empty, and joyless?
13. How often do you snap, yell, or act annoyed if someone bothers you while you are online?
14. How often do you lose sleep due to late-night log-ins?
15. How often do you feel preoccupied with the Internet when offline, or fantasize about being online?
16. How often do you find yourself saying "just a few more minutes" when online?
17. How often do you try to cut down the amount of time you spend online and fail?
18. How often do you try to hide how long you've been online?
19. How often do you choose to spend more time online over going out with others?
20. How often do you feel depressed, moody, or nervous when you are offline, which goes away once you are back online?

Results:
After you have answered all the questions, add the numbers you selected for each response to obtain a final score. The higher your score, the greater your level of addiction

and the problems your Internet usage causes. Here is a general scale to help measure your score:

20 - 49 points: You are an average online user. You may surf the Web a bit too long at times, but you have control over your usage.

50 -79 points: You are experiencing occasional or frequent problems because of the Internet. You should consider their full impact on your life.

80 - 100 points: Your Internet usage is causing significant problems in your life. You should evaluate the impact of the Internet on your life and address the problems directly caused by your Internet usage.

SELECTED TERMS

cyberage – the high-tech era that we are living in today

cyberspace – the term *cyberspace* was first coined by William Gibson in 1982 to refer to a computer generated virtual reality. According to Gibson, *cyberspace* is the name of a non-space world, which is characterised by the ability for virtual presence of, and interaction between, people through 'icons, waypoints and artificial realities'

Internet addiction disorder – problematic (or pathological) excessive computer use

PRACTICE WORK;

a) Assessing and interpreting faults

Match the words in the sentences with their synonyms – *defect, defective, fault, faulty, intermittently, major, minor, properly, systematically.*

- There's a *problem.* _____ / _____
- Perhaps something in the fuel injection is *wrong*. _____ / _____.
- It's a *serious* problem. _____
- It's a *slight* problem. _____
- Is it working *correctly*? _____
- The problem only occurs from *time to time*. _____
- The problem doesn't occur *every time*. _____

b) Describing the causes of faults

Make opposites using the prefixes[12]: *ab-, dis-, im-, in- (x4), ir-, mal-, over-, un-.*

- correct
- undersized
- adequate

[12] N. Lainović Stojanović., S. Živković. Rusko-srpsko-engleski termini u gradjevinsko-arhitektonskoj struci, Zbornik radova sa Medjunarodnog kongresa, Beograd, 2008.

- detected
- normal
- sufficient
- proportionate
- regular
- balance
- function
- operable

c) Complete with those words. Sometimes more than one option is possible.

- The temperature gauge was faulty. That's why it was giving _____ readings.
- The shaft was thinner than it should have been, so its strength was _____.
- The power output from the motor varies. We don't understand why it's _____.
- The bolt's _____. It's too big to fit into the hole.
- The machine's not working as it should. There's some kind of _____.
- The braking force on both front wheels should be the same. There shouldn't be any _____.
- The fault was _____. None of the maintenance technicians had noticed it.
- The control panel isn't working, so you can't control the machine. It's totally _____.

*

DISCUSSION

- Are you a computer addict?
- Addictive personality
- How do people become addicted to the Internet?
- TV addiction
- Video game addiction

UNIT 25

The Future of Computers

Future technology device - Edge Mediaspace

As the world of computers and computer technology continues to evolve and change, many people, from science fiction writers and futurists to computer workers and ordinary users have wondered what the future holds for the computer and related technologies. Many things have been pictured, from robots in the form of household servants to computers so small they can fit in a pocket. Indeed, some of these predicted inventions have already come to pass, with the introduction of PDA's (personal digital assistant) and robotic vacuum cleaners.

Beyond these innovations, however, there are likely to be many, many more. One of the most important areas of research in the world of computers is that of artificial intelligence. When many people think of artificial intelligence, they may picture fully aware machines, complete with emotions, and the problems that can arise from them. Even though this remains the goal of many artificial intelligence researchers, in fact artificial intelligence technology is already in place and already serving the needs of humans everywhere.

One of the most powerful uses of artificial intelligence thus far is in the world of speech recognition. This powerful technology is already in place in banks, brokerage centers, insurance companies and other businesses throughout the world. While speech recognition is still imperfect, it has improved greatly in recent years, and in the future many routine, and even non-routine, phone calls and telephone inquiries may be handled completely without human intervention.

Artificial intelligence includes programming computers to make decisions in real life situations (e.g. some of these “expert systems” help physicians in the diagnosis of diseases based on symptoms), programming computers to understand human languages (natural language), programming computers to play games such as chess and checkers (games playing), programming computers to hear, see and react to other sensory stimuli (robotics) and designing systems that mimic human intelligence by attempting to reproduce the types of physical connections between neurones in the human brain (neural networks).

Robot technology has also come a long way, but it still has a long way to go. Robots in the future are unlikely to take human form, expect in a few specialized applications. Instead, robots are likely to do a great deal of work that is simply too dangerous for humans to accomplish. From spaceflight applications to search and rescue, robots are likely to continue down the learning curve they have already entered, further enhancing human lives and providing valuable services for a fraction of the cost of today's robot helpers.

Nanotechnology

Nanotechnology refers to the manipulation of matter on the scale of the nanometer (one billionth of a meter). Nanoscale science operates in the realm of single atoms and molecules. At present, commercial nanotechnology involves materials science (i.e. researchers have been able to make materials that are stronger and more durable by taking advantage of property changes that occur when substances are reduced to nanoscale dimensions). In the future, as nanoscale molecular self-assembly becomes a commercial reality, nanotech will move into conventional manufacturing. While nanotechnology offers opportunities for society, it also involves profound social and environmental risks, not only because it is an enabling technology to the biotech industry, but also because it involves atomic manipulation and will make possible the fusing of the biological world and the mechanical as well.

Through nanotechnology, computing devices are becoming progressively smaller and more powerful. Everyday devices with embedded technology and connectivity are becoming a reality. Nanotechnology has led to the creation of increasingly smaller and faster computers that can be embedded into small devices.

Nanocomputers

Scientists are trying to use nanotechnology to make very tiny chips, electrical conductors and logic gates. Using nanotechnology, chips can be built up one atom at a time and hence there would be no wastage of space, enabling much smaller devices to be built. Using this technology, logic gates will be composed of just a few atoms and electrical conductors (called nanowires) will be merely an atom thick and a data bit will be represented by the presence or absence of an electron.

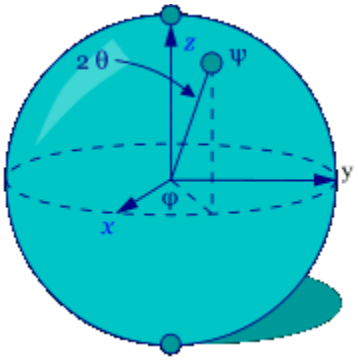
A component of nanotechnology, nanocomputing will give rise to the following types of nanocomputers:

- Electronic nanocomputers
- Mechanical nanocomputers
- Quantum nanocomputers
- Chemical and biochemical nanocomputers
- Optical nanocomputers

Electronic nanocomputers – where nanolithography is used to create microscopic circuits.

Mechanical nanocomputers – use tiny mobile components called nanogears to encode information. Some scientists predict that such mechanical nanocomputers will be used to control nanorobots.

Quantum Computers – Quantum computation aims to use the quantum properties of particles to represent and structure data. A quantum computer is a computer that makes direct use of distinctively quantum mechanical phenomena to perform operations on data. In a classical (or conventional) computer, the amount of data is measured by bits; in a quantum computer, the data is measured by qubits.



The Bloch sphere is a representation of a qubit, the fundamental building block of quantum computers

The quantum mechanical properties of atoms or nuclei allow the particles to work together as quantum bits, or qubits. These qubits work together to form the computer's processor and memory. Qubits can interact with each other while being isolated from the external environment and this enables them to perform certain calculations much faster than conventional computers. A quantum nanocomputer store data in the form of atomic quantum states or spin. Single-electron memory (SEM) and quantum dots are examples of this type of technology.
Quantum computers could prove to be useful for running simulations of quantum mechanics. This would benefit the fields of physics, chemistry, materials science, nanotechnology, biology and medicine because currently, advancement in these fields is limited by the slow speed of quantum mechanical simulations.

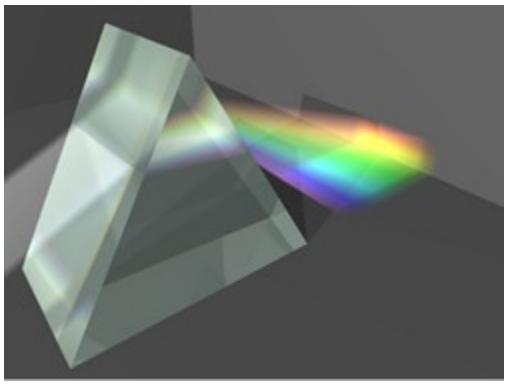
Chemical nanocomputers – The interaction between different chemicals and their structures is used to store and process information in chemical nanocomputers. In order to create a chemical nanocomputer, engineers need to be able to control individual atoms and molecules so that these atoms and molecules can be made to perform controllable calculations and data storage tasks. Chemical nanocomputers would store and process information in terms of chemical structures and interactions.

Biochemical nanocomputers – they are manifested in all living things. But these systems are largely uncontrollable by humans. We cannot, for example, program a tree to calculate the digits of *pi*, or program an antibody to fight a particular disease (although medical science has come close to this ideal in the formulation of vaccines, antibiotics, and antiviral medications).

DNA Computers (biochemical)

DNA (deoxyribonucleic acid) computers use DNA to store information and perform complex calculations. DNA has a vast amount of storage capacity computers might tap the vast storage capacity that enables DNA to hold the complex blueprints of living organisms. The storage capacity of a single gram of DNA can hold as much information as one trillion compact discs.

Optical nanocomputers



Optical nanocomputers make use of light particles called photons. Newer advances have produced a variety of thin films and optical fibers that make optical interconnections and devices practical. We are focusing on thin films made of organic molecules, which are more light sensitive than inorganics. Organics can perform functions such as switching, signal processing and frequency doubling using less power than inorganics. Inorganics such as silicon used with organic materials let us use both photons and electrons in current hybrid systems, which will eventually lead to all-optical computer systems.

So, in the future network technologies will be combined with wireless computing, voice recognition, Internet capability and artificial intelligence with an aim to create an environment where the connectivity of devices is embedded in such a way that the connectivity is not inconvenient or outwardly visible and is always available. In this way, computer technology will saturate almost every facet of our life. What seems like virtual reality at the moment will become the human reality in the future of computer technology.

SELECTED TERMS

artificial intelligence (AI) – an area of computer science that emphasizes the creation of intelligent machines that work and react like humans. The core problems of artificial intelligence include programming computers for certain traits such as: knowledge, reasoning, problem solving, perception, learning, planning, the ability to manipulate and move objects

nanotechnology – the study of manipulating matter on an atomic and molecular scale. Generally, nanotechnology deals with developing materials, devices, or other structures possessing at least one dimension sized from 1 to 100 nanometres

quantum computer – a device for computation that makes direct use of quantum mechanical phenomena, such as superposition and entanglement, to perform operations on data

PRACTICE WORK

SCIENTIFIC DISCUSSION - ARGUMENTATION AND CONTRA ARGUMENTATION[13]

Situations in which engineers finds themselves needing to argue in favour or against a certain concept vary from most informal, a chat after a conference session, for example, to the most formal, like presenting a research paper and having a formal discussion with the audience afterwards. Whatever the occasion, to prove your expertise education and culture, you need to tailor your speech, the flow of your argumentation according to the logic rules inherent in the very nature of science. The formality/informality of the actual words and phrases you employ will vastly depend on the situation.

When having a discussion of a pro and contra type, in order to present and defend your viewpoint you will need to *build a case*. This means your delivery should have the following segments:

BUILDING A CASE:

1. Introduction

You need to direct the audience's attention towards the problem, as to why it concerns them, of what relevance it is.

2. Credentials

State clearly why you speak with authority on the subject. The reasons here may be infinitely varied. You may be an expert in the field, or you may have seen something intriguing on the television. You just need to identify your sources.

3. Position/Solution/Summary

[13] Nadežda Stojković, *Written and Spoken Communications in English for Science and Technology,* Elektronski fakultet, Univerzitet u Nišu, 2005, p. 108

Start the next section of your talk with a brief summary of your thesis and the proposed solution. It is of an equal importance to provide your reasons for advocating that particular solution.

4. Background of the Problem

This is where the elaboration on the problem begins. To give it a proper depth, you need to present your audience with the background of the problem, its origins, reasons for occurrence, how it has been solved so far. Again, it is recommended to relate the audience with the issue by restating how it concerns them.

5. Argument for Position or Solution

As you are now in the core part of your talk, signal it by specifying minutely the criterion for judgment. This is highly important, as it will direct the audience's attention to the aspects you want to highlight and give them the opportunity to assess properly if you have presented and supported your thesis well.

In as much detail as the situation, time and space allow you, explain your thesis. Support it with relevant and illustrative arguments and examples. Two supportive arguments are the basic standard. If there are more instances that confirm your points, perhaps it is more refined to use a general statement like 'There are numerous other arguments that support my idea', then go on enumerating them. In other words, it is better to use two major arguments. The strong, persuasive, well supported speech is incomparably more persuasive and pleasant to listen to and engage in, than an unnecessarily long one.

It is at least a sign of well breeding to account for the different options which you do not approve of. Yet, it is also a way of proving the superiority of your opinion. Give credit to the viewpoints you are against, say what their strengths are. Then go back to your ideas as presented earlier and explicitly show their superiority to those you do not admit.

6. Conclusion

Conclusion is in many respects a variation of the introduction. Never repeat the same words and phrases. Summarise your position and the benefits of your solution. This repeating is in part done as a psychological maneuver intended to once again persuade your audience to confirm the validity of your opinion.

After you have finished talking, it is not only good manners to invite others to comment on what you have just said, but also a sign of your erudition. In that way you show your interest in other opinions which may help you correct or complete your knowledge. Yet, probably the most beautiful aspect of this is that exchange of ideas often leads to the rise of new vistas.

Appropriate phrases for developing an argument[14]

Here are some common phrases that may be useful to remember and that may ease the conversation. Their most important function is to signal the argument/question/suggestion you want to put forward.

[14] Nadežda Stojković, *Written and Spoken Communications in English for Science and Technology,* Elektronski fakultet, Univerzitet u Nišu, 2005, p. 109

Giving your opinion
In my opinion/ view,...
Generally speaking, I think ...
Personally, I haven't the faintest idea about/ weather ...
To my mind ...
I'd just like to say ...
As far as I am concerned ...
I'm quite convinced that ...
To be quite honest/ frank ...
If you ask me ...

Asking for opinion of others
What/ How about you?
Would you care to comment on?
Any comments?
Would you agree with that?
What are your views on?
What's your opinion?
What do you think?

Disagreeing politely
There may be some truth in what you say but don't you think it's more a question of ...?
I take your point but that's not the way I see it.
Yes, but don't you think that ...?
I see what you mean but I am not at all convinced that ...
True, but I am afraid I disagree (with) ...
Perhaps, but I can't help thinking that ...

Admitting you might be mistaken
I hadn't thought of ... in that way.
Come to think of it you may be right.
I must admit it's true that ...
I suppose you are right.
You are quite right, of course.

Commenting on something you know nothing about
Actually, I don't have any first-hand experience of ... but...
Personally, I've had very little to do with ... but ...
I have a sneaking suspicion that ...
I haven't got a clue.
It's rather difficult to say but I would imagine ...

Putting forward another point of view
Yes, but on the other hand, don't you think that ...
But to look at it from another point of view, it is clear that ...
Nobody in their right mind would think that ...
But wouldn't you agree that ...?

Arguing for
I can't see anything against ...
I'm all for/ in favour of ...
I'd certainly give ... my support.
It would make sense to ...
There's a lot to be said for ...

Arguing against
That's all very well, but ...
You can't possibly say that ...
It's absolute nonsense to say that ...
I really couldn't condone ...

Focus on important information
Especially, in particular, above all, the thing/question is ...

Sequencing
First, first of all, secondly, ...
As well as this,
Finally, in conclusion

Generalising
In general, on the whole, typically, ...

Summarising
So, to sum up, in summary, in the end, at last, ...

*

DISCUSSION

Some trends in IT & computers engineering research
Mechatronics
Human-computer interaction
Hybrid manufacturing technologies
Higher performance chips
Intelligent signal processing
Superconductors
Molecular conductors
Optical information transmission
Photonics
Biophotonics
Microphotonics
Nanophotonics
Thermochemical calculator

PART II

CV (curriculum vitae)

A curriculum vitæ (CV) or a resume is a document containing a summary of relevant job experience and education, usually for the purpose of obtaining an interview when seeking employment. More specifically, it includes a summary of your educational and academic backgrounds as well as research experience, publications, presentations, awards, honors, affiliations and other details.
The CV is typically the first item that a potential employer encounters regarding the job seeker and is typically used to screen applicants, often followed by an interview, when seeking employment.
A well-written CV is a vital part of any job application and makes an immediate impression on the people making the selection.

Usage
In a competitive market, graduates need a good CV (or a resume) to succeed in securing a job. Your CV is an advert for you, an opportunity to sell yourself to potential employers. It is the first step in the recruitment process so it has to be right – our CV guide tells you everything you need to know about creating a successful graduate CV.
The purpose of the CV is to inform prospective employers of a job seeker's qualifications and experience for a position.
In the United Kingdom a CV is short (usually a maximum of 2 sides of A4 paper), and therefore contains only a summary of the job seeker's employment history, qualifications and some personal information. It is often updated to change the emphasis of the information according to the particular position the job seeker is applying for. Many CVs contain keywords that potential employers might pick up on and displays the content in the most flattering manner brushing over information like poor grades. A CV can also be extended to include an extra page for the job seeker publications if these are important for the job.
In the United States and Canada, a CV is used specifically in academic circles and medical careers and is far more comprehensive; the term *resume* is used for most recruitment campaigns. A CV elaborates on education to a greater degree than a resume, and is expected to include a comprehensive listing of professional history including every term of employment, academic credential, publication, contribution or significant achievement. In certain professions, it may even include samples of the person's work and may run to many pages.
In the European Union, there has been an attempt to develop a standardized CV model known as Europass (in 2004 by the European Parliament and European Commission) and promoted by the EU to ease skilled migration between member countries, although this is not widely used in most contexts. The Europass CV system is meant to be just as helpful to employers and education providers as it is to students and job seekers. It was designed to help them understand what people changing between the countries have to offer, whilst overcoming linguistic barriers. The Europass documents also provide recognition for non-accredited learning and work experiences.
There are a few companies that prefer not to receive a CV at all in application, but rather produce their own application form which must be completed in applying for any position. Of those, some also allow applicants to attach a CV in support of the application. The reason some companies prefer to process applications this way is to

standardize the information they receive, as there can be many variables within a CV and, therefore, the company often does not get all the information they require at application stage.

Structure
A standard British CV generally includes the following points:

Personal details: name, address, contact numbers, e-mail address, date of birth, nationality (if required), marital status (if required).

Professional experience: The professional experience section of your CV (a resume) is where recruiters will focus most of their attention. You must include the dates of your employment, the job title you held and the name of the employer. For international applications, cite the country in which you were employed. But, focus on your *responsibilities and achievements* rather than just names of companies and dates. Start with your most recent position and work backwards.

Education and qualifications: Start with your most recent education. It is advisable that you include any modules you studied that are relevant to the job application in addition to your thesis/dissertation research or project work. Time spent abroad or work placements attended as part of your degree course should be mentioned. For school education, include dates, name of school/college and A-Levels or equivalent qualifications studied with grades. Unless specified, it is not normally necessary to list every subject studied at GCSE (General Certificate of Secondary Education) or equivalent level. The number of passes achieved is enough but state the grade you got for Mathematics and English.

Skills: Skills include anything vocational that has not appeared elsewhere on your CV, for example, emphasize your skills, for instance, computing, languages, driving. For IT skills, list the software packages and applications you use and your level of competency for each. **Languages –** If you are applying overseas then you should indicate your native language and any additional languages you know accompanied by your level of proficiency. **Conferences –** If it is relevant to the job you are applying for, then you may want to mention any conferences, workshops or seminars you have attended. Give the name of the conference, date, place and organizers.

Interests: Include only what will be viewed positively by the employer.

Referees: It is very common to give the details of two referees: one academic and one employer. Give their names, position, address, phone numbers and email addresses. Always ask for their permission first and remember to keep them informed of your career aspirations and achievements to date.

Curriculum Vitae Samples

Computer engineer

Name**:** Steve Robinson
Address: Gauss Road, CT9
Cell phone: (include number of cell phone)
Email: (include email address)

Objective:

To take a challenging and high performance oriented role in the field of computer engineering and implement the expertise and experience gained in this field to develop complex project with efficiency and quality.

Education:

- BS, Computer engineering, University of Pheonix, NY, 1996
- MS, Computer engineering, University of Georgia, 1998

Professional Certification:

- MCSE Certified, 1998

Responsibilities:

- Excellent technical skills and goal-focused professional offering nine years of experience in computer industry
- Excellent communication skills to present points precisely and clearly
- Work in a complex projects which have scope for learning and challenge
- Good problem solving ability and analytic skill to solve the problem efficiently
- Good team player and have excellent interaction skill to coordinate and work within a team
- Have expertise in working with various operating systems
- Good deliver output in less time without losing efficiency
- Motivated and enthusiastic by new challenges and tasks and take excellent approach to achieve success in all projects

Technical Skills:

- Languages: C, C++, Java, .NET, JavaScript, PHP, HTML, CSS, JAVA Proxy, JDK, SERVLET
- Databases: MySQL, Oracle, Access, DB2
- Operating System: UNIX, Linux, Windows, DOS
- Design: UML
- Have sound knowledge in networking protocols and device programming.
- Have experience in working with C and C++ compiler programming and system level programming

Languages: English

Achievements: Awarded and appreciated for completion of all the projects on time, in the year 2010.

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Computer Operator

Name**:** Richard Smith
Address: East Street, 135
Cell phone: (include number of cell phone)
Email: (include email address)

Objective:
Take a challenging role as a omputer operator and there by monitor, control numerous computer systems, peripherals, equipments and networks with efficiency which makes the operations of organization effective and ease.

Education:
- Bachelor of Computer Programming, XYZ Institute, 1999

Professional Certifications:
Certificate in Tally, Sams Institute, 2000

Skills:
- Have experience and expertise in installation of various software and operating systems
namely UNIX, Windows
- Experience in using Oracle database
- Expertise in the usage of MS office tools namely word, MS- Excel, Power point, Ms-
Access
- Knowledge and certification in using Accounting Package namely Tally
- Have Expertise in using search engine tools and Internet.

Work history:
Nov. 2005 to Present
PQR Communication Limited, NY, USA
Senior Computer Operator
As a Senior Computer Operator I took the responsibility of monitoring multiple computers, peripherals and networks. With wide knowledge and exposure in this field I took the task of handling complex tasks with efficiency and ease. I also involved in the

establishment of computer equipment room by taking tasks of establishing wiring at appropriate places, security systems installation and installation of systems. I am also given the responsibility of training of new computer operators. As and when needed I also take part in Emergency Operations by taking the tasks of troubleshooting computer operations and fixing errors in computer operations.

Feb 2004 to Nov. 2005
XYZ Communication Limited, NY, USA
Computer Operator
As a computer operator I took the responsibility of updating files, producing reports as needs by clients or customers and also take hard copy of the reports or documents as required by management or customers. I also take the responsibility of taking the back-up and maintenance of data which are very vital for the organization. I also assisted senior officials and staffs by taking copy of files in Compact Discs as needed by them for giving presentations.

May 2002 to Feb 2004
Some College, Merry Brown, NY
Computer Operator
I was given training as computer operator and was in the supervision of senior computer operator. I received training to operate the various computer systems and peripheral equipments like printers, tape drivers, Compact Disks. I was trained and assigned the responsibility of installing software and operating systems as and when needed for staffs and students in machines. I have operated and expertise in installing and working with UNIX as well as Windows operating system.

Jan 2001 to May 2002
WXYZ College, NY, USA
Administrative Support
I took the role of administrative support of the college and assisted in various activities of the administrations namely producing reports of staffs and students from database as and when needed, maintain daily log of students to monitor their activities. I got training and expertise in the usage of Oracle database along with MS Office tools.

Mar 2000 to Jan 2001
Common Information Systems, NY, USA
Help Desk operator
As a Help Desk operator I assisted the supervisors and customers with various tasks as and when required took the responsibility of producing invoices, reports, daily logs which was utilized by supervisors of the organization for their decision making. I also helped the customers by giving information about the queries asked by them by retrieving data from database.

Languages known: English, French

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Computer Programmer

A computer programmer is an important role who takes the task of developing efficient and quality code for users. They are responsible for producing quality code as output by taking functional specification and project specifications as input. They analyze various ways of coding and take up efficient approach to code which makes the final output to be delivered with quality to customers and thereby gain customer satisfaction. They are also responsible for working with enhancements in the system if any suggested by customers. Computer programmer also take the responsibility of testing sometimes whereby they prepare test plan and test cases and test various cases of the system to check for integrity and validity of system and record it for further reworking if needed. Thus computer programmers test a program by running it across test cases using test plan to ensure the validity and effectiveness of code and check whether the program produces the desired outcome. If error occurs, the programmer records it in test plan and rework is done on code and again testing process is repeated to recheck the program until it produces the correct results.

Name: **David Robinson**
Address: 12 West end, NY 228
Cell phone: (include number of cell phone)
Email: (include email address)

Have several years of experience in development environment as programmer. Have expertise and experience in all phases of project life cycle namely analysis, design, and coding, testing and implementation phases. I have experience in working with different operating system and platforms namely Windows, UNIX, Linux and Dos. Also have efficiently managed the team and took care in delivering quality deliverables from my team which proved my managerial and leadership skill.

Objective:
To take a challenging and managerial role in the field of Computer programming and implement the expertise and experience gained in this field to develop complex project with efficiency and quality.

Education:
- BS in Information Technology, New York University, 1995
- MS Computer Science, Georgia University, 1997

Computer Skills:
- Languages: C, C++, Java, .NET, JavaScript, HTML, CSS, JAVA Proxy, JDK, SERVLET
- Databases: MySQL, Oracle, Access, DB2
- Operating System: UNIX, Linux, Windows, DOS

Strengths:
- Excellent Technical Skill
- Efficient Programming Skill and experience
- Have expertise in working with various operating systems
- Good deliver output in less time without losing efficiency
- Highly skilled in customer service
- Excellent Communication Skill

Work History
Senior Programmer Sep 2004 – Till date
Treeshine Inc, NY
Environment: C, C++

Responsibilities:

I was handling a project for a Major Banking client. I took part as a senior programmer in both the development and maintenance phase of the project. I managed a team of 9 programmers and was responsible for quality code and deliverables from my team. I maintained appropriate documents which helped the induction process for new team mates finish in less time efficiently. In the development stage I wrote less code and took the responsibility of reviewing the code and output and documenting my review comments for rework by my teak mates and continuing the process until the quality is achieved. In the maintenance stage I took the task of fixing the bugs reported by the users and for taking care of enhancements suggested by customers.

Senior Programmer Mar 2001 – Sep 2004
White Chip Technologies Inc,NY
Environment: C, C++

As a Senior Programmer I managed a team of 5 programmers and reviewed their code and test plan for validity and efficiency. I was involved in the total development cycle of the projects given to me from design till implementation stage. I also attended quality training and took care of quality aspects in the code developed by me and in my team. The projects that worked in this organization were using programming language C, C++ that ran on operating system windows as well as UNIX. So I have expertise and experience in using both the operating system efficiently.

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Electronic Engineer

Name: Robert Anderson
Address: West Street, MA 01
Cell phone: (include number of cell phone)
Email: (include email address)

Objective
To gain a dynamic and challenging role in the area of electronics, electrical, electro-mechanical, and communication engineering that will offer be the best opportunity for further development of my abilities, skills and knowledge in an established firm with long term career growth possibilities.

Work Experience
Company: Nigerian Agip Oil Company Ltd, Honolulu, HI
Position: Electronics Engineer
Period: 2008 – Present
Duties:
Installation, repairing and maintenance of electrical and electronic related equipments through the coordination of maintenance teams.
Compiles with constitutional and company policies, standards, and procedures in respect of health, quality, safety and environment.
Give feedback to vendors and engineers to contribute to the non strop improvement of test procedures and manufactured equipments.
ISO compliant at all times.

Company: Lehman Hardware, Maui
Position: Electronic Engineer
Period: 2003 – 2004
Duties:
Responsible for all engineering and administrative management functions as well as P&L for development.
Responsible for service, installation, repair and maintenance of electrical equipments such as water treatment plants, well pumps, vacuum pumps, and heavy equipments used for ventilation, heating, air conditioning and electric power distribution using several troubleshooting and test equipment, signal generators, power meters, volt/ohm meter and oscilloscopes.
Tasks at work include support of senior technicians and system engineers in the troubleshooting, operation, and maintenance of various electronic and electrical equipment such as RF amplifiers, DC power supplies, line drivers and modems.

Education
Industry
Hawaii Heavy Industries Crane Course, Maui, Hawaii, October 07, 2004
Honolulu Westfal Larsen Gantry Crane Course, Honolulu, Hawaii, December 1997
Academic

Hallmark College of Aeronautics, Maui, HW, March 1997
Bachelor of Science, 1997, Electronics and Communication Engineering

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Electronic Engineer

Name: Steve Peterson
Address: Oswin Street, Leeds 038, UK
Cell phone: (include number of cell phone)
Email: (include email address)

Objective: To obtain a dynamic and challenging position in the area of electronics, electrical, electromagnetic, telecommunication engineering in an organization to enhance my interpersonal skills and use my knowledge at the best.

Qualifications:
Experienced in handling electrical testing equipment, like multi-meter and oscilloscope, and how to use these skills in problem solving applications.
Ability to use the Internet and web services to plan technical research, specify and collect information related to engineering devices and hardware.
Expert in the use of basic hand tools, soldering tools and other electronic assembly tools
Strong organizational, multi-tasking skills and excellent interpersonal and communication skills required in an organization.

Experience:
2008-2010
Star Electronics, Leeds
Senior Engineer
Responsible for creating analog and digital hardware design,
Responsible for assembling, wiring, testing new electrical and electronics devices.
Created technical documents, and compiled their results & prepared documented reports.

2005-2008
Lehman Electronics, Leeds
Electronic Engineer
Responsible for all engineering and administrative management functions as well as P&L for development.
Responsible for service, installation, repair and maintenance of electrical devices such as treatment plants, well pumps, and heavy equipments which are used for soldering, molding, heating, and distribution of power.

Education:
1999-2003

Bachelor of Science in Electrical Engineering
University of Leeds, Leeds
2003-2005
Masters of, Engineering, Specialization Control Systems,
Aberdeen University, Aberdeen
Achievements:
Received special recognition to solve the problems and work under pressure.
Recognized for best technical designs and implementation plans
Professional reference

Computing skills: Applications: LabView, MATLAB, OrCAD Capture and Layout, Microchip MPLAB, ModelSim (VHDL using the Altera MAX+plus II 10 compiler), Tina Electronic package, Web design using Dreamweaver, MS Office.
Programming Languages: Java, C++, SQL, , Tlearn,
Operating Systems: Windows Xp, Vista, Symbian, Linux.
Can assemble Intel based PC's from component parts and fault diagnose hardware. Set up a home Ethernet network including wireless networks and firewalls/routers.

Language skills: Speak basic conversational Spanish and French

Other skills: Full current clean driving licence

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