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КАФЕДРА ІНОЗЕМНИХ МОВ

Навчально-методична розробка до курсу «Англійська мова» для спеціальності «Комп'ютерна інженерія»

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Англійська мова для студентів спеціальності «Комп'ютерна інженерія» (English for ……): Навчально-методична розробка до курсу «Англійська мова» для спеціальності «Комп'ютерна інженерія» / Уклад. Н.І.Годованець, В.П.Леган. Ужгород: Видавництво УжНУ «Говерла», - Ч-1, 2021. 46 с.

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Мета навчально-методичного посібника − забезпечити практичне оволодіння студентами лексичними та мовленнєвими моделями, необхідними для спілкування англійською мовою за фахом.

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ПЕРЕДМОВА

З прискоренням глобалізації і поширенням міжнародних ділових зв'язків України з іншими державами на політичному та економічному рівнях зростає потреба у висококваліфікованих фахівцях, які здатні вільно володіти основами ділового іншомовного спілкування. У таких умовах важливим є усвідомлення майбутніми фахівцями різних галузей необхідності їх майбутніх зв'язків із міжнародним середовищем, а одним з першочергових завдань освіти стає якісна підготовка фахівців, здатних до успішної професійної діяльності в межах світової спільноти. В цьому контексті істотно змінюються вимоги до володіння іноземною мовою фахівцями всіх рівнів, першорядного значення набувають практичні навички, що передбачають знання ділової іноземної мови в усному та писемному мовленні, вміння використовувати іноземну мову у своїй професійній діяльності.

Пропонований посібник має на меті ознайомити з основами іншомовного ділового спілкування, розширити словниковий запас за рахунок спеціальної лексики, виробити комунікативні навички ділового мовлення та навички ділового листування, організації ділових зустрічей та переговорів, оволодіння мовним матеріалом, необхідним під час здійснення ділових подорожей.

Посібник складається з тематичних розділів, кожен з яких містить 1) тексти інформативного характеру, які допоможуть орієнтуватися в певних ситуаціях професійної сфери, 2) лексичний матеріал з найчастіше вживаними мовленнєвими конструкціями відповідної тематики, та 3) систему вправ для успішного засвоєння та вдосконалення комунікативних навичок професійного спілкування.

C O N T E N T S

TOPIC 1.
FUNDAMENTALS OF COMPUTER SCIENCE

Active vocabulary

engineering activities — конструкторська робота
theoretical activities — теоретична діяльність
design — розробка
hardware — апаратне забезпечення
software — програмне забезпечення (ПЗ)
encompass — охоплювати
performance studies — дослідження експлуатаційних характеристик
technique — метод
queueing theory — теорія черг
estimation — оцінка
reliability — надійність
availability — експлуатаційна готовність, працездатність
complicated — складний
experimentation — експериментування, проведення експериментів
incorporate — включати (до свого складу)
development cycle — цикл розробки
overlap — перекривати
instruction — команда
carry out — виконувати
software engineering — програмотехніка, інженерія розроблення ПЗ
artificial intelligence — штучний інтелект
date to — датуватися
numerical analysis — числовий аналіз
digital computer — цифровий комп’ютер
electrical engineering — електротехніка
primarily — передусім
basics — основи
circuit — схема (електрична, електронна)
input — 1) n вхід; 2) n введення; 3) v вводити
output — 1) n вихід; 2) n виведення; 3) v виводити
arbitrary — довільний

storage — зберігання
represent — представляти
device — пристрій
binary digit — двійкова цифра
transmission — передача
notational system — система позначень
yield — давати
calculus — числення
interpretable symbol — інтерпретовний символ
employ — застосовувати, використовувати
gate — вентиль, логічний елемент
needed — необхідний, потрібний
extension — розширення, доповнення
milestone — віха
specification — тут деталізація, уточнення
infinite — нескінченний
proof — випробування
breakthrough — прорив
access — доступ
execution — виконання
critical — важливий
approach — підхід

BASICS OF COMPUTER SCIENCE

The field of computer science includes engineering activities such as the design of computers and of the hardware and software that make up computer systems. It also encompasses theoretical, mathematical activities, such as the design and analysis of algorithms, performance studies of systems and their components by means of techniques like queueing theory, and the estimation of the reliability and availability of systems by probabilistic techniques. Since computer systems are often too large and complicated to allow a designer to predict failure or success without testing, experimentation is incorporated into the development cycle. Computer science is generally considered a discipline separate from computer engineering, although the two disciplines overlap extensively in the area of computer architecture, which is the design and study of computer systems. The major subdisciplines of computer science have traditionally been: 1) architecture (including all levels of hardware design, as well as the integration of hardware and software components to form computer systems); 2) software (the programs, or sets of instructions, that tell a computer how to carry out tasks), here subdivided into software engineering, programming languages, operating systems, information systems and data bases, artificial intelligence, and computer graphics; 3) theory, which includes computational methods and numerical analysis on the one hand and data structures and algorithms on the other. Computer science as an independent discipline dates to only about 1960, although the electronic digital computer that is the object of its study was invented some two decades earlier. The roots of computer science lie primarily in the related fields of electrical engineering and mathematics. Electrical engineering provides the basics of circuit design — namely, the idea that electrical impulses input to a circuit can be combined to produce arbitrary outputs. The invention of the transistor and the miniaturization of circuits, along with the invention of electronic, magnetic, and optical media for the storage of information, resulted from advances in electrical engineering and physics. Mathematics is the source of one of the key concepts in the development of the computer — the idea that all information can be represented as sequences of zeros and ones. In the binary number system numbers are represented by a sequence of the binary digits 0 and 1 in the same way that numbers in the familiar decimal system are represented using the digits 0 through 9. The relative ease with which two states (e.g., high and low voltage) can be realized in electrical and electronic devices led naturally to the binary digit, or bit, becoming the basic unit of data storage and transmission in a computer system. Boolean algebra, a notational system developed in the 19th century by an English mathematician George Boole, supplied formalism for designing a circuit with binary input values of 0s and 1s (false or true, respectively, in the terminology of logic) to yield any desired

combination of 0s and 1s as output. One of the primary requirements when dealing with digital circuits is to find ways to make them as simple as possible. This constantly requires that complex logical expressions be reduced to simpler expressions that nevertheless produce the same result. Boolean algebra permits an algebraic manipulation of logical statements that can demonstrate whether or not a statement is true and show how a complicated statement can be rephrased in a simpler, more convenient form without changing its meaning. George Boole believed in what he called the 'process of analysis', that is, the process by which combinations of interpretable symbols are obtained. It is the use of these symbols according to well-determined methods of combination that he believed presented 'true calculus'. Today, all our components employ Boole's logic system — using microchips that contain thousands of tiny electronic switches arranged into logical gates that produce predictable and reliable conclusions. A gate is an electronic circuit such that its output is fully determined by the state of its inputs. Theoretical work on computability, which began in the 1930s, provided the needed extension to the design of whole machines. A milestone was the 1936 specification of the conceptual Turing machine (a theoretical device that manipulates an infinite string of 0s and 1s) by the British mathematician Alan Turing and his proof of the model's computational power. Another breakthrough was the concept of the stored-program computer, usually credited to the Hungarian-American mathematician John von Neumann. This idea — that instructions as well as data should be stored in the computer's memory for fast access and execution — was critical to the development of the modern computer. Previous thinking was limited to the calculator approach, in which instructions are entered one at a time.

Exercise 1. Find in text the English for:

зберігання інформації; база даних; обчислювальні методи; один за одним; мова програмування; споріднені області; цифри від 0 до 9; електротехніка; процес (цикл) розробки; комп'ютерна графіка; приписувати що-небудь кому-небудь (вважати що-небудь чиєюсь заслугою); дослідження експлуатаційних характеристик систем; теорія черг; відносна простота; булева алгебра; структури даних; забезпечити формалізацію; успіхи в розвитку електротехніки; обчислювальна техніка; передбачити відмову; магнітні та оптичні носії; значною мірою перекриватися; так само, як; схемотехніка; штучний інтелект; з одного боку, ... з іншого боку; методи теорії ймовірностей; числовий аналіз; поряд із; бути (стати) наслідком чого-небудь; двійкова система числення; операційна система; система позначень; інженерія розроблення програмного забезпечення.

Exercise 2. Say whether the following sentences are true or false. Correct the false ones.

1. The field of computer science includes engineering activities such as performance studies of systems, numerical analysis and artificial intelligence. 2. Since computer systems are often too large and complicated to allow a designer to predict failure or success without testing, the estimation of their reliability is incorporated into the development cycle. 3. Theoretical work on computability, which began in the 1930s, provided the needed extension to the design of whole machines. 4. The major subdisciplines of computer science have traditionally been architecture, software, and computer security. 5. Architecture includes all levels of hardware design, as well as the integration of hardware and software components to form computer systems. 6. Software includes algorithms that tell a computer how to carry out tasks. 7. Theory includes computational methods and numerical analysis on the one hand and data structures and algorithms on the other. 8. Computer science as an independent discipline dates to only about I950, although the electronic digital computer that is the object of its study was invented some two decades later. 9. Mathematics is the source of one of the key concepts in the development of the computer — the idea that all information can be represented as sequences of zeros and ones. 10. John von Neumann's idea was that instructions as well as data should be entered into the computer one at a time.

Exercise 3. Answer the questions.

1. What does the field of computer science include? 2. Why is experimentation incorporated into the computer system development cycle? 3. What can you say about the interconnection of computer science and computer engineering? Is computer science a distinct field of 17 knowledge? 4. Could you outline the major subdisciplines of computer science? 5. What fields of knowledge do the roots of computer science lie in? 6. What did advances in electrical engineering and physics result in? 7. Why was the binary number system chosen for representing data in the digital computer? 8. What is Boolean algebra? What was it designed for? 9. What does Boolean algebra permit by algebraic manipulations of logical statements? 10. How is Boole's logic system employed in the computer engineering of today? What is a gate? 11. What was the merit of Alan Turing? And that of John von Neumann? 12. What is the importance of Neumann's idea?

Exercise 4. Complete the sentences translating their Ukrainian parts into English.

1. The field of computer science also encompasses theoretical activities, such as (розробка та аналіз алгоритмів, дослідження експлуатаційних характеристик систем та їхніх компонентів за допомогою методів, таких як теорія черг). 2. Computer science is generally considered a discipline separate from computer engineering, (хоча ці дві дисципліни значною мірою

перекриваються в галузі комп'ютерної архітектури, якою є розробка та дослідження комп'ютерних систем). 3. (Електротехніка стала джерелом основ схемотехніки, а саме), the idea that electrical impulses input to a circuit can be combined to produce arbitrary outputs. 4. The invention of the transistor and the miniaturization of circuits, (поряд із винайденням електронних, магнітних та оптичних носіїв для зберігання інформації стали наслідком досягнень в електротехніці та фізиці). 5. (Відносна простота, з якою два стани — наприклад, високий та низький рівні напруги — можна реалізувати в електронних пристроях), led naturally to the binary digit, or bit. 6. (Джордж Буль вірив у те, що він називав «процесом аналізу», тобто) the process by which combinations of interpretable symbols are obtained. 7. (Саме використання цих символів) according to well-determined methods of combination (він вважав «справжнім численням»). 8. A milestone was the 1936 specification of the conceptual Turing machine (теоретичного пристрою, який оперує нескінченною послідовністю нулів та одиниць).

Exercise 5. Translate into English.

1. Поле діяльності комп'ютерних наук також охоплює оцінку надійності та працездатності систем методами теорії ймовірностей. 2. Корені обчислювальної техніки лежать переважно у споріднених галузях електротехніки та математики. 3. У двійковій системі числення числа представлені послідовністю двійкових цифр 0 та 1 так само, як числа у знайомій десятковій системі представлені цифрами від 0 до 9. 4. Булева алгебра забезпечила формалізацію для розробки схем із двійковими вхідними величинами. 5. Логічний елемент — це електронна схема, така, що її вихід повністю визначається станом її входів. 6. Ще одним проривом стала концепція комп'ютера з програмою, що зберігається у пам'яті, автором якої вважають угорсько-американського математика Джона фон Неймана. 7. Булева алгебра робить можливими алгебраїчні операції над логічними твердженнями, які показують, чи є твердження істинним, чи ні.

TOPIC 2.
SEQUENCE OF TENSES

Direct speech	Indirect speech
I. Present Tenses	
Present Simple →	Past Simple
Present Progressive →	Past Progressive
Present Perfect →	Past Perfect
Present Perfect Progressive →	Past Perfect Progressive
II. Past Tenses	
Past Simple →	Past Perfect
Past Progressive →	Past Perfect Progressive
Past Perfect →	Past Perfect
III. Future Simple	
Future Simple →	Future-in-the-Past
Future Perfect →	Future-in-the-Past Perfect

Exercise 1. Use the proper tense form of the verbs in brackets.

1. The students (go) to the party yesterday. 2. We (look) at the calculating device made in the XVII century. 3. They (change) their 39 teachers every year. 4. They (interrupt) our talk. 5. My friend (work) at this project three months ago. 6. Our lecturer (be) at the lecture at 8 o'clock. 7. She (stay) at home tomorrow. 8. I (ask) him about it before he (go). 9. I (wait) for my friend when the phone (ring). 10. I'll come at 3 o'clock. — Good. I (wait) for you. 11. If I receive any message from him I (let) you know. 12. He (know) me for over 10 years. 13. We lived here when I (be) five. 14. I just (tell) you the answer. 15. My friends (go) away five minutes ago.

Exercise 2. Choose the right form of the verb in brackets. Mind the sequence of tenses.

1. I said, "I … you, and … probably persuade you to come" (know/knows/knew; can/could/will be able to). 2. The dean asked them several times what …

(happens/happen/is happening/has happened/had happened). 3. I asked her what her name … and she said “Try to guess!” (am/is/are/was/were). 4. My friend dragged me here. He said it … good for us to get these lectures (is/are/was/were). 5. He 40 asked her if she … to be in London for long (is going/was going/were going). 6. I didn’t know you … here (is/was/are/were). 7. Our boss expected that his subordinate … the first opportunity to apologize for his rudeness (take/takes/will take/would take). 8. They … yesterday that the IT company … all accounts promptly (are informed/have informed/ were informed; paid/ have paid/ has paid). 9. He asked me where I … (study/ studied/ was studying). 10. We … that many system administrators and programmers … for new inventions, designs and production processes (find out/ found out/ have found out; have been awarded/ were awarded/ had been awarded).

Exercise 3. Change the sentences into indirect speech.

1. The professor told his student, “You’ve written an excellent program”. 2. The salesman said to us, “This is the best version of a general-purpose computer”. 3. My friend told me, “We have plenty of time to do our work”. 4. The lecturer said to me, “You will make a report on computer science”. 5. “Did they understand what you said to them?” he asked. 6. My friend said to me, “Collect all the needed devices for our laboratory work”. 7. “We have a computer but very often it doesn’t work”, they said. 8. The teacher came to the class-room and asked the students, “What are you doing?” 9. The professor told me, “Be ready to take part in the conference”. 10. I asked my group-mate, “Are you going to repair you computer on Saturday or on Sunday?”

Exercise 4. Fill in the blanks with an appropriate tense form.

1. She noticed she ..... already late.

-is - was - had been

2. She said that it ..... her an hour to finish the report.

-takes -took -has taken

3. She asked him if he ..... her name.

-knows -knew -had known

4. What did you do with the money you ..... from me?

-borrowed -have borrowed -borrow

5. When I opened the door, the cat ..... out.

-jump -jumped -had jumped

6. When I was ten I already ..... I wanted to be a scientist.
-know -knew -had known
7. I went to see if she ..... up yet.
-woke -has woken -had woken
8. I ..... 80 kilos three months ago.
-was weighing -have weighed -weighed
9. I ..... that I would get the promotion but it is beginning to look difficult now.
- hoped -have hoped -had hoped
10. When I arrived at the party, they ..... home.
-already went -have already gone -had already gone
11. I was hot because I ..... in the sun for a long time.
-was walking -walked -had been walking

Exercise 5. Rewrite the sentences in the past tense, paying attention to the Sequence of Tenses.

1. My uncle says he has just come back from the Brighton. 2. He says he has spent a fortnight in the Brighton. 3. He says it did him a lot of good. 4. He says he feels better now. 5. He says his wife and he spent most of their time on the beach. 6. He says they did a lot of sightseeing. 7. He says he has a good camera. 8. He says he took many photographs while travelling in the Brighton. 9. He says he will come to see us next Sunday. 10. He says he will bring and show us the photographs he took during his stay in the Brighton.

Exercise 6. Fill in the blanks using appropriate verb forms. Observe the rule of the sequence of tenses.

1. I found that my son …… awake.

2. The pickpocket confessed that he ……. (pick) my pocket.

3. He was so tired that he …….. scarcely stand.

4. He said that I …… a lazy good-for-nothing boy.

5. No one could explain how the prisoner …….. (escape) from the prison.

6. Euclid proved that the three angles of a triangle …… equal to two right angles.

7. Italy went to war that she …….. (extend) her empire.

8. The passage is so difficult that I …… not comprehend it.

9. The boy was so indolent that he …….. not pass.

10. In my perplexity I requested my guide to tell me what I …….. to do.

TOPIC 3.
COMPUTER HARDWARE

Active vocabulary

addition — додавання
subtraction — віднімання
multiplication — множення
division — ділення
operate on smth — виконувати операцію / операції над чим-небудь
series — послідовність, ряд
consecutive — послідовний
arrangement — розташування, організація
SBCS (Single-Byte Character Set) — набір однобайтових символів
DBCS (Double-Byte Character Set) — набір двобаштових символів
ASCII (American Standard Code for Information Interchange) — Американський стандартний код для обміну інформацією
Unicode — стандарт кодування символів усіх національних мов
specify — тут вказувати
magnitude — значення
redundant bit — надлишковий розряд
reservation — бронювання, попереднє замовлення
desktop publishing — комп'ютерна верстка (друкованих видань)
control unit — пристрій керування
arithmetic-logic unit — арифметико-логічний пристрій
memory unit — пристрій пам'яті
input/output units — пристрої введення-виведення
communications network — мережа зв'язку
random-access memory — пам'ять із довільним доступом (оперативний запам'ятовувальний пристрій)
fetch — вибирати (інформацію з пам'яті)
effect — тут забезпечувати виконання
feed (into) — подавати, вводити (інформацію, сигнал)
drive — 1) привід; 2) накопичувач
disk drive — 1) дисковод; 2) дисковий накопичувач
removable — знімний
read-only memory — пам'ять лише для читання (постійний запам'ятовувальний пристрій)

cache — кеш-пам’ять
highly — дуже; надзвичайно
accomplish — досягати
oscillator — генератор
clock rate — тактова частота
cycle per second — герц

DIGITAL COMPUTERS

Data representation in a digital computer. The digital computer is one of the types of electronic computers. It is called so as it is designed to process data in numerical (digitized) form; its circuits perform directly the mathematical operations of addition, subtraction, multiplication, and division. The numbers operated on by a digital computer are expressed in the binary system; binary digits, or bits, are 0 and 1, so that 0, 1, 10, 11, 100, 101, etc., correspond to 0, 1, 2, 3, 4, 5, etc. Binary digits are easily expressed in the computer circuitry by the presence (1) or absence (0) of a current or voltage. A series of eight consecutive bits is called a “byte”; the eight-bit byte permits 256 different “on-off” combinations. Each byte can thus represent one of up to 256 alphanumeric characters, and such an arrangement is called a “single-byte character set” (SBCS); the de facto standard for this representation is the extended ASCII character set. Some languages, such as Japanese, Chinese, and Korean, require more than 256 unique symbols. The use of two bytes, or 16 bits, for each symbol, however, permits the representation of up to 65,536 characters or ideographs. Such an arrangement is called a “double-byte character set” (DBCS). Unicode is the international standard for such a character set. One or more bytes, depending on the computer’s architecture, is sometimes called a digital word. It may specify not only the magnitude of the number in question, but also its sign (positive or negative), and may also contain redundant bits that allow automatic detection, and in some cases correction, of certain errors. A digital computer can store the results of its calculations for later use, can compare results with other data, and on the basis of such comparisons can change the series of operations it performs. Digital computers are used for reservations systems, scientific investigation, 174 data-processing and word-processing applications, desktop publishing, electronic games, and many other purposes. The main components of a digital computer. A digital computer typically consists of a control unit, an arithmetic-logic unit, a memory unit, input/output units, and a communications network. The arithmetic-logic unit (ALU) performs simple addition, subtraction, multiplication, division, and logic operations — such as OR and AND. The main computer memory, usually high-speed random-access memory (RAM), stores instructions and data. The control unit fetches data and instructions from memory and effects the

operations of the ALU. The control unit and ALU usually are referred to as a processor, or central processing unit (CPU). The operational speed of the CPU primarily determines the speed of the computer as a whole. The basic operation of the CPU is analogous to a computation carried out by a person using an arithmetic calculator. The control unit corresponds to the human brain and the memory to a notebook that stores the program, initial data, and intermediate and final computational results. In the case of an electronic computer, the CPU and fast memories are realized with transistor circuits. I/O units, or devices, are commonly referred to as computer peripherals and consist of input units (such as keyboards and optical scanners) for feeding instructions and data into the computer and output units (such as printers and monitors) for displaying results. In addition to RAM, a computer usually contains some slower, but larger and permanent, secondary memory storage. Almost all computers contain a magnetic storage device known as a hard disk, as well as a disk drive to read from or write to removable magnetic media known as floppy disks. Various optical and magnetic-optical hybrid removable storage media are also quite common, such as CD-ROMs (compact disk read-only memory) and DVD-ROMs (digital video [or versatile] disk read-only memory). Computers also often contain a cache — a small, extremely fast (compared to RAM) memory unit that can be used to store information that will be urgently or frequently needed. Current research includes cache design and algorithms that can predict what data is likely to be needed next and preload it into the cache for improved performance. Processing of Data. The operations of a digital computer are carried out by logic circuits, which are digital circuits whose single output 175 is determined by the conditions of the inputs, usually two or more. The various circuits processing data in the computer's interior must operate in a highly synchronized manner; this is accomplished by controlling them with a very stable oscillator, which acts as the computer's "clock". Typical computer clock rates range from several million cycles per second to several hundred million, with some of the fastest computers having clock rates of about a billion cycles per second. Operating at these speeds, digital computer circuits are capable of performing thousands to trillions of arithmetic or logic operations per second, thus permitting the rapid solution of problems that would be impossible for a human to solve by hand. In addition to the arithmetic and logic circuitry and a small number of registers (storage locations that can be accessed faster than main storage and are used to hold the intermediate results of calculations), the heart of the computer — called the central processing unit, or CPU — contains the circuitry that decodes the set of instructions, or program, and causes it to be executed.

Exercise 1. Find in the text the English for:

арифметико-логічний пристрій; цифрове слово; мережа зв'язку (комунікаційна мережа); обробка тексту; цифробуквенні символи; схеми

комп’ютера; пристрій керування; оперативний запам’ятовувальний пристрій; двійкова система; надлишковий розряд; центральний процесор; комп’ютерна верстка; початкові дані; наукове дослідження; проміжні (остаточні) результати обчислень; розв’язувати задачу вручну; число, про яке йдеться; реалізований на транзисторних схемах; периферійні пристрої; в оцифрованій формі; система попереднього замовлення; пристрої введення виведення; вводити команди в комп’ютер; виконувати функцію чого-небудь; відображати результати; працювати синхронізовано; тактовий генератор комп’ютера; постійний запам’ятовувальний пристрій; комірка пам’яті.

Exercise 2. Complete the sentences translating their Ukrainian parts into English.

1. The digital computer is called so as it (призначений для оброблення інформації в цифровій формі). 2. (В схемах комп’ютера двійкові цифри легко представляються) by the presence or absence of a current or voltage. 3. A digital word may specify not only the magnitude of the number in question, but also its sign, and may also contain (надлишкові розряди, які уможливлюють автоматичнее визначення, а в деяких випадках і виправлення, певних помилок). 4. The operational speed of the CPU (значною мірою визначає швидко дію комп’ютера в цілому). 5. The control unit corresponds to the human brain and the memory to a notebook that stores the program, (початкові дані, результати проміжних та остаточних обчислень). 6. In the case of an electronic computer, the CPU and fast memories (реалізовані на транзисторних схемах). 7. Computer peripherals consist of input units (для введення даних і команд в комп’ютер) and output units (для відображення результатів). 8. (Різні оптичні та магнітооптичні засоби зберігання) are also quite common, such as CD-ROMs and DVD-ROMs. 9. Digital computers are capable of performing thousands to trillions of arithmetic and logic operations per second, thus permitting (швидке розв’язання задач, які людина булла би не взмозі розв’язати вручну). 10. (Крім арифметичних та логічних схем центральний процессор має схеми, які) decodes the set of instructions, or program, and causes it to be executed.

Exercise 3. Say whether the following sentences are true or false. Correct the false ones.

1. A series of eight consecutive bytes is called a bit. 2. The use of two bytes for each symbol permits the representation of up to 256 characters. 3. One or more bytes, depending on a computer’s performance, is called a digital word. 4. The numbers operated on by a digital computer are expressed in the binary system. 5. A digital computer typically consists of a control unit, an arithmetic-logic unit, a

memory unit, input/output units, and a central processing unit. 6. The main computer memory, usually high-speed read-only memory, stores instructions and data. 7. The control unit and arithmetic-logic unit are usually referred to as a processor, or central processing unit. 8. In the case of an electronic computer, the CPU and fast memories are realized with magnetic cores. 9. In addition to RAM, a computer usually contains some slower, but larger and permanent, secondary memory storage. 10. Current research includes cache design and algorithms that can predict what data is likely to be needed next and preload it into the read-only memory for permanent storage.

Exercise 4. Translate the following sentences into English.

1. Схеми цифрового комп'ютера безпосередньо виконують арифметичні та логічні операції. 2. Деякі мови, такі як китайська, японська, корейська потребують більш ніж 256 лише їм притаманних символів. 3. Цифрові комп'ютери використовуються в системах попереднього замовлення, наукових дослідженнях, для обробки даних та редагування текстів, для настільних видавничих систем, в електронних іграх та ін. 4. Арифметико-логічний пристрій виконує прості операції додавання, віднімання, множення і ділення та логічні операції, такі як «АБО» та «І». 5. Пристрій керування вибирає з пам'яті дані і команди та забезпечує виконання операцій арифметико-логічного пристрою. 6. Функціонування процесора аналогічне обчисленням, що їх виконує людина, яка користується арифметичним калькулятором. 7. Числа, над якими виконує операції цифровий комп'ютер, представлені в двійковій системі. 8. Пристрої введення-виведення зазвичай називають периферійними пристроями. 9. Майже всі комп'ютери мають магнітний пристрій пам'яті, відомий як жорсткий диск, а також дисковод для запису та читання зі знімного магнітного носія, відомого як гнучкий диск. 10. Кеш — це невеликий, надзвичайно швидкий пристрій пам'яті, який застосовується для зберігання інформації, в якій часто виникає потреба. 11. Різні схеми, що обробляють інформацію всередині комп'ютера, повинні функціонувати дуже синхронізовано. 12. Тактова частота комп'ютера коливається від декількох МГц до декількох сотен МГц, а найшвидші комп'ютери мають тактову частоту близько 1 000 МГц.

Exercise 5. Answer the questions.

1. What accounts for the term digital computer? 2. How are binary digits expressed in the computer circuitry? 3. What is a byte? What does it permit? 4. What does the use of two bytes allow? 5. What is a digital word? What kinds of information may it contain? 6. What sorts of systems are digital computers used for? 7. What are the main components of a digital computer? What functions do they perform? 8. What is a processor? What is its basic operation analogous to?

9. What is referred to as computer peripherals? 10. What storage devices does a computer contain in addition to RAM? Dwell on them. 11. By what kind of circuits are digital computer operations carried out? 12. What is the function of a computer's clock? 13. How wide is the range of computer clock rates? What do these speeds permit? 14. What kind of circuitry, apart from the arithmetic and logic ones, does the CPU contain?

TOPIC 4.
PASSIVE VOICE

TENSE	ACTIVE	PASSIVE
Present Simple	I make a cake	A cake is made
Present Contin.	I'm making a cake	A cake is being made.
Past Simple	I made a cake.	A cake was made.
Past Continuous	I was making a cake.	A cake was being made.
Present Perfect	I have made a cake	A cake has been made.
Past Perfect	I had made a cake.	A cake had been made.
Future Simple	I will make a cake.	A cake will be made.
Future be going to	I'm going to make a cake.	A cake is going to be made.
Modal	I must make a cake.	A cake must be made.
Modal Perfect	I should have made a cake.	A cake should have been made.

Exercise 1. Write the number of Past Simple Passive examples

1.was interviewed by 2.was found 3.was stolen 4.was arrested with 5.were started by 6.were interviewed with 7.were found 8.were stolen 9.was arrested by 10.were started with

The famous Emperor Diamonds were exhibited by their owner, Lady Rocks, last January at the Russe Gallery in Paris, but on 13th January they … during the night. Investigations … the Paris police. And even the owner of the diamonds … detectives. To everyone's surprise the jewels … in her bag. Lady Rocks … the police and taken to the court for trial.

Exercise 2.Circle the Past Simple Passive

1. Irish coffee … with whiskey. (a) is made (b) is maked
2. I … with an umbrella. (a) am hit (b) am hitted

3. I … an old lady. (a) am hit by (b) am hitted with
4. Taxes … to be reduced soon. (a) are expected (b) is expected
5. The president … to be seriously ill. (a) is reported (b) is report

Excercise 3. Circle the Past Simple Passive .

1. The garage … a new kind of a paint. (a) was painted by (b) was painted with
2. The garage … a friend of mine. (a) was painted by (b) was painted with
3. The room … smoke. (a) was filled by (b) was filled with

Exercise 4. Change the sentences into the Passive Voice.

1. Modern computers can solve a great variety of tasks. 2. The specialists introduced computer graphics in the 1959s. 3. Mainframes control businesses and industrial facilities. 4. Supercomputers process complex and time-consuming calculations, such as those used to create weather predictions. 5. Electronic devices are doing simple but humanlike thinking. 6. Computers use a form of digital information called binary information. 7. Analog computers perform mathematical operations on continuous electric values. 8. Analog refers to numerical values that have a continuous range. 9. The demand for better computational techniques caused a resurgence of interest in numerical methods and their analysis. 10. A computer can take in information, perform different operations and provide answers. 11. Electronic devices have revolutionized our life. 12. We may consider a hybrid computer as a combination of digital and analog ones. 13. We use communication devices to send information to or from external storage. 14. Today computers have profoundly changed the way in which people do many kinds of work. 15. The input devices receive signals from the control unit.

Exercise 5. Rewrite the sentences in the passive voice.

1. The mechanic cannot repair mother's car because they have not delivered the spare parts.

_____

_____

2. Farmers have grown wheat in this part of the country for decades.

_____

3. All the newspapers are reporting the scandal.

_____

4. How did you make this delicious meal?

_____

5. The police didn't find the missing girl, so they issued a statement.

_____

6. You should keep white wine at about 8°C.

_____

7. Shop security will report all shoplifters to the police.

_____

8. The doctors told Judy that she has six months to live.

_____

9. Pupils must not step on the freshly cut lawn.

_____

__10.People speak English all over the world.

_____

Exercise 6. Form the question.

a. Paper is made from wood. Is paper made from wood ?

b. The telephone was invented by Mr Bell.

_____?

c. This picture was painted by Peter.

_____?

d. The thieves will be arrested by the police.

_____?

e. Champagne is made in France.

_____?

f. The letters will be sent next week.

_____?

g. The animals are fed three times a day.

_____?

h. This article was written by Stanley.

_____?

i. CDs are made of plastic.

_____?

j. The party was organised by Paul._____?

TOPIC 5.
COMPUTERS AND THEIR TYPES

Active vocabulary

originally — спочатку
origin — походження
count — лічити
extensively — широко
various — різноманітний
human activities — людська діяльність
diverse — різний, різноманітний
accountant — бухгалтер
researcher — дослідник
investigation — дослідження
store — зберігати
volume — обсяг
computer-aided, computer-assisted — автоматизований
computer-aided design — автоматизоване проектування
industrial process control — керування технологічним процесом
lastly — зрештою
captivating — захоплюючий
retrieve — здійснювати пошук (інформації)
process — обробляти
processing — обробка
word processing — обробка текстів
device — пристрій
operation — 1) робота, функціонування (технічногопристрою); 2) операція
speciallyarranged — спеціально, в особливий спосіб організований
machinery — 1) устаткування; 2) корпус
special-purposecomputer — комп’ютер спеціального призначення
generalpurposecomputer — комп’ютер загального призначення
embed — вмонтовувати
appliance — пристрій
wristwatch — наручний годинник
preprogram — запрограмовувати наперед
tune — настроювати
personaldigitalassistant (PDA) — електронний секретар

notepad — блокнот
schedulingsystem — планувальник
cellularphone — стільниковий телефон
computernetwork — комп'ютерна мережа
regardlessof — незважаючи на, незалежно від, попри
laptopcomputer — портативний комп'ютер
versatile — універсальний
enable — давати можливість, дозволяти
trackfinances — вести облік фінансів
keyboard — клавіатура
trackball — трекбол (кульковий маніпулятор)
pointingdevice — пристрій управління курсором
(«миша», світлове перо, джойстик)
videodisplaymonitor — відеомонітор
liquidcrystaldisplay (LCD) — рідкокристалічний дисплей
manipulating capabilities — можливості обробки (інформації)
handle — оперувати, маніпулювати
records — документація
accounting records — бухгалтерська документація
inventory records — інвентарна документація
workstation — автоматизоване робоче місце (АРМ)
exchange — обмінюватися
mainframe computer — мейнфрейм, комп'ютер великої потужності (як правило,використовується в режимірозподілучасу, длянауковихрозрахунків, длякеруваннярозподіленоюсистемою)
speed — швидкодія
attain — досягати

MODERN COMPUTERS

Originally computers were meant to perform mathematical calculations. This accounts for the origin of the word itself coming from the Latin word computo which means to count. The development of electronic computation, however, has resulted in the fact that modern computers are used extensively in various fields of human activities, not for calculations only; and these fields are becoming more and more diverse. Now you can hardly imagine an accountant's desk without a computer, to say nothing of a research laboratory. Modern computers can solve a great variety of tasks: to perform mathematical calculations, to help researchers in their investigations, to help doctors in making

diagnoses, to store large volumes of information, etc. And who has not heard about computer-aided design, or computer-assisted industrial process control and fault diagnosis, or computer-based learning, or, lastly, computer games which are extremely captivating not for children only but for adults as well? Thus, at its simplest, the computer can be defined as a programmable electronic device that can store, retrieve and process information (data). The word programmable here means that computer's operation is based on a program — a specially arranged list of instructions. Every computer incorporates hardware and software. The former includes machinery and devices, the latter — all computer systems and programs. According to the purpose the following classification of computers may be suggested. Special-purpose, or dedicated, computers. They are designed to perform special tasks; their operations are limited to the programs built into their microchips. The smallest are embedded within the circuitry of appliances, such as TV-sets and wristwatches. These computers are preprogrammed for a specific task, such as tuning to a particular television frequency or keeping accurate time. Among special-purpose 67 computers there are also so called personal digital assistants (PDAs). These computers can be held in one hand and are used as notepads, scheduling systems, and address books; if equipped with a cellular phone, they can connect to worldwide computer networks to exchange information regardless of location. General-purpose computers, such as personal computers (PC) and laptop computers. They are much more versatile because they can accept new sets of instructions. Each new set of instructions (program) enables the same computer to perform a different type of operation. Laptop computers and PCs are typically used in businesses and at home for word processing, to track finances, to play games, and to communicate on computer networks. They have large amounts of internal memory to store hundreds of programs and documents. They are equipped with a keyboard, a mouse, a trackball or other pointing devices and a video display monitor or liquid crystal display (LCD) to display information. Laptop computers usually have similar hardware and software as PCs, but they are more compact and have flat, lightweight LCDs instead of video display monitors. Minicomputers are fast computers that have greater manipulating capabilities than personal computers and can be used simultaneously by many people. These machines are primarily used by larger businesses to handle extensive accounting and inventory records. Workstations are similar to personal computers but have greater memory and more extensive mathematical abilities, and they are connected to other workstations or PCs to exchange data. They are typically found in scientific, industrial, and business environments that require high levels of computational abilities. Mainframe computers have more memory, speed, and capabilities than workstations and are usually shared by multiple users through a series of interconnected computers. They are large, extremely fast, multi-user computers that often contain complex arrays of processors, each designed to perform a

specific function. Mainframes control businesses and industrial facilities and are used for scientific research. The most powerful mainframe computers also called supercomputers are the fastest class of computers. Their speed and power are almost beyond human comprehension. Supercomputers process complex and time-consuming calculations, such as those used to create weather predictions. They attain these speeds through the use of several ad- 68 vanced engineering techniques. Because these computers can cost millions of dollars, they are used mostly by government, large businesses, scientific institutions and the military.

Exercise 1. **Find in text the English for:**

Виконувати обчислення, дослідницька лабораторія, найрізноманітніші завдання, встановити діагноз, діагностика несправностей, автоматизоване проектування, програмований пристрій, здійснювати обмін інформацією, внутрішня пам'ять, широкі можливості, одночасно, наукові дослідження, за межами людської уяви, прогноз погоди, передові технології.

Exercise 2.**Answer the questions.**

1. What was the original purpose of computers? 2. What has the development of electronic computation resulted in? 3. What kind of tasks can modern computers solve? 4. How can the computer be defined? 5. What does the word programmable mean? 6. What are dedicated computers designed for? 7. How are personal digital assistants usually used? 8. Why are general-purpose computers versatile? 9. Where are laptop computers and personal computers typically used? 10. What are the advantages of computers? 11.Where are workstations typically found? 12. What is the fastest class of computers? 13. Owing to what do supercomputers attain their high speeds? 14. What accounts for the limited applications of supercomputers? 15. Why do we say that computers made our life easier?

Exercise 3. Say whether the following statements are true or false. Correct the false ones.

1. One can hardly imagine a computer that helps doctors in making a diagnosis. 2. Personal digital assistants are equipped with a cellular phone to connect them to worldwide computer networks. 3. Only one type of computers can accept new sets of instructions. 4. Laptop computers are as compact as PCs, but have different hardware and software. 5. Workstations are typically found in schools and universities. 6. Minicomputers are usually used by large businesses. 7. Mainframes often contain complex arrays of processors and cannot be used by many people. 8. Only government and the military use supercomputers.

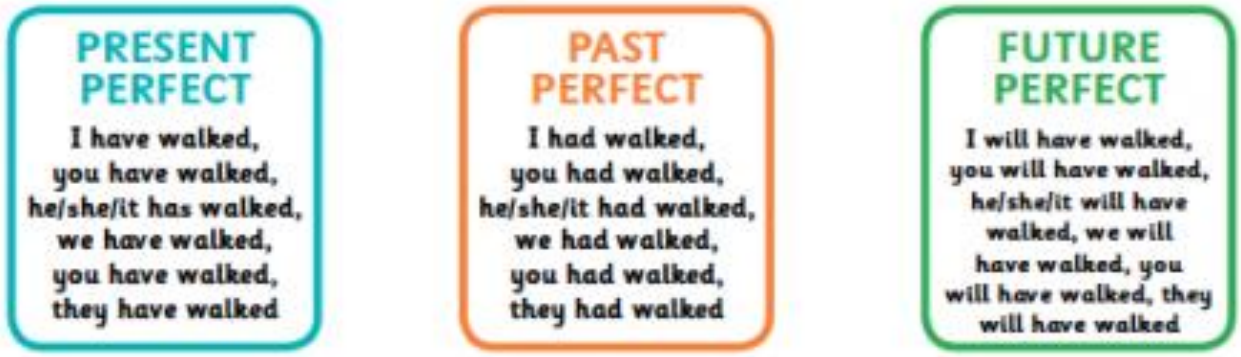
Exercise 4. Complete the sentences translating their Ukrainian parts into English.

1. (Навряд чи можна уявити) an accountant's desk without a computer, (не кажучи вже про дослідницьку лабораторію. 2. Every computer (об'єднує апаратне та програмне забезпечення). 3. Special-purpose computers (призначені для виконання конкретних задач). 4. The program is (організований в особливий спосіб список команд). 5. Personal computers are typically found in businesses and at home (для редагування текстів, ведення фінансового обліку, ігор та спілкування в комп'ютерних мережах). 6. Laptop computers have large amounts of (внутрішньої пам'яті для зберігання сотень програм і документів). 7. Minicomputers have greater (можливості роботи з інформацією, ніж персональні комп'ютери). 8. Workstations are connected to other workstations or personal computers (для обміну інформацією). 9. Mainframes control businesses and industrial facilities and are used (для наукових досліджень). 10. Supercomputers process complex and time-consuming operations, (такі, які використовуються для створення прогнозів погоди).

Exercise 5. Translate into English.

1. Від самого початку комп'ютери призначалися для виконання математичних обчислень. 2. Комп'ютерні ігри є надзвичайно захоплюючими не лише для дітей, а й для дорослих. 3. Апаратне забезпечення включає в себе устаткування та пристрої, а програмне забезпечення — всі комп'ютерні системи та програми. 4. Функції комп'ютерів спеціального призначення обмежуються програмами, вмонтованими в їхні мікрочіпи. 5. Кожна нова програма дає можливість одному й тому самому комп'ютеру виконувати інші операції. 6. Мінікомп'ютери можуть використовуватися одночасно багатьма людьми. 7. Автоматизовані робочі місця подібні до персональних комп'ютерів, але мають більший об'єм пам'яті. 8. Швидкодія та потужність суперкомп'ютерів є майже недоступними людській уяві. 9. Комп'ютер — це програмований електронний пристрій, що може зберігати, здійснювати пошук та оброблення інформації. 10. Найменші комп'ютери вмонтовують у схеми пристрою, такого, як, наприклад, годинник або телевізор. 11. Комп'ютери мають можливість виконувати декілька завдань одночасно, витрачаючи мінімум часу та зусиль.

TOPIC 6.
PERFECT TENSES



Excersise 1. Incert (Past Simple або Present Perfect).
1.I (to study) … English since 1991. 2.We (to study) … English at school. 3.From 1991 to 1992 Jim (to work) … as a customs officer. 4.He (to go out) … three hours ago and (to return) … yet. 5.When he was a sales representative, he (to work) … twelve hours a day. 6.I (to be) … very busy all this week. 7.How many pages (to read) … you … yet?8.How much (to get) … you … at your present job? 9.Where (to go) … all the managers …? 10.I (to go)… home at 5 o'clock yesterday. 11. Last summer Jim and Jane (to travel) … to the conference in New-York together. 12. He (not to finish) … his work yet and is not ready to go with us.

Excersise 2. Write thwe proper word *:*
after, since, many, long before, never, of, by, yet, already, this morning, ever.
1. Have you discussed the terms of delivery ...? 2.They've ... discussed the terms of payment. 3.I've ... been to Kiev. 4.I haven't seen the Director ... . 5.Have you ... been to Moscow? 6.I'll have finished my work ... 6 o'clock. 7.Jane had completed the report ... you left. 8.How ... have you been here? 9.We have received your letter ... 18th November. 10.I have known Jane ... 1961. 11.How ... orders have you received this month? 12. ... they had finished their work, they went home.

Excersise 3. Complete the sentences using the correct form of the present perfect tense.
1. I _____ several books about sailing and I am quite fascinated by the sport . (READ)

2. You look absolutely exhausted. What _____ ? (YOU DO)
3. He _____ that book for over two weeks and he _____ yet. He's such a slow reader . (READ, NOT FINISH)
4. My sister _____ in Norwich for two months. She seems to like it there and is not planning to leave. (LIVE)
5. My dad _____ a new job. (JUST START)
6. You should put some boots on. It _____ for several days now and the ground is pretty muddy. (RAIN)
7. _____ your homework yet ? You _____ on it for hours . (YOU FINISH , WORK)
8. Maria _____ for a job since she left school last summer. She still _____ one . (LOOK, NOT FIND)
9. They _____ TV the whole evening. It's their favourite film and they _____ it several times. (WATCH, SEE)
10.I _____ him about his new girl friend twice this week. He doesn't seem to want to answer. (ASK)

Excersise 4. Complete the sentences using the simple form of the past or past perfect tense.

1. By the time we _____ to the stadium, the performance _____, so we missed the first two songs. (GET, ALREADY START)
2. When we _____ in Spain the airport management told us that they _____ our luggage. (ARRIVE, LOSE)
3. After I _____ a large meal, I _____ to feel sick. (HAVE, START)
4. The shoes were very clean because I _____ hours cleaning them. (SPEND)
5. It _____ his first trip to India. He _____ there several times before. (NOT BE, BE)
6. My neighbour told me that she _____ a new car a month before. (BUY)
7. Yesterday I _____ downtown to see Peter. I _____ him for months. (GO, NOT MEET)
8. I _____ Matrix for the first time yesterday. I _____ it before. (SEE, NEVER SEE)

9. She _____ him for very long when she _____ to get married. (NOT KNOW, DECIDE)
10.When he _____, the party was over. Everyone _____. (ARRIVE, ALREADY LEAVE)

Excersise 5. Fill in the correct form of the verb in brackets: Past Simple or Present Perfect Simple

1. The weather around here _____ terrible in the last few weeks. (BE)
2. Maria _____ her suitcase last night. (PACK)
3. I _____ volleyball since I was a teenager. (NOT PLAY)
4. We _____ wash the dishes. They're all clean now (HELP)
5. They _____ the factory. – Really? When _____? (CLOSE, THAT HAPPEN)
6. _____ yet? (YOUR BUSINESS COURSE – START)
7. How long _____ that camera? – About a month. I _____ it because it was on sale just before Christmas. (YOU HAVE, BUY)
8. _____ last week's magazine? – It must be here because I _____ it on Monday. (YOU SEE, BUY)
9. The books you ordered _____. The delivery service _____ them an hour ago. (ARRIVE, BRING)
10.The Queen _____ her two-week tour through Australia yesterday. (START)

Excersise 6. Put the verb in brackets in the correct form using either present perfect or past simple. Use continuous forms if necessary.

1. This is the first time I _____ (visit) Hungary. 2. On my visit to the school, I _____ (be) pleased to see that many students (know) _____ how to handle computers. 3. This is the best steak I (ever taste) _____. 4. Sally _____ (live) and _____ (work) in Paris for several years now. 5. Forfive years from 1980 to 1985, Tom _____ (live) in Madrid. 6. I (already read) 200 pages and so I expect to finish the book by the weekend. 7. Yesterday I _____ (work) hard and _____ (complete) two reports.

8. Jane is only six and already she _____ (pass) two piano exams. 9. Although I (know) Sarah and Frank for many years now, I _____ (never understand) what _____ (attract) them to each other. 10. His hair is very short. He _____ (have) a haircut.

TEXTS FOR ADDITIONAL READING

Text 1. COMPUTER SCIENCE: THE HISTORY OF DEVELOPMENT

The needs of users and their applications provided the main driving force in the early days of computer science, as they still do to a great extent today. The difficulty of writing programs in the machine language of 0s and 1s led first to the development of assembly language, which allows programmers to use mnemonics for instructions (e.g., ADD) and symbols for variables. Such programs are then translated by a program known as an assembler into the binary encoding used by the computer. Other pieces of system software known as linking loaders combine pieces of assembled code and load them into the machine's main memory unit, where they are then ready for execution. The concept of linking separate pieces of code was important, since it allowed libraries of programs to be built up to carry out common tasks — a first step toward the increasingly emphasized notion of software reuse. Assembly language was found to be sufficiently inconvenient that higher-level languages (closer to natural languages) were invented in the 1950s for easier, faster programming; along with them came the need for compilers, programs that translate high-level language programs into machine code. As programming languages became more powerful and abstract, building efficient compilers that create highquality code in terms of execution speed and storage consumption became an interesting computer science problem in itself. Increasing use of computers in the early 1960s provided the impetus for the development of operating systems, which consist of system resident software that automatically handles input and output and the execution of jobs. Throughout the history of computers, the machines have been utilized in two major applications: 1) computational support of scientific and engineering disciplines and 2) data processing for business needs. The demand for better computational techniques led to a resurgence of interest in numerical methods and their analysis, an area of mathematics that can be traced to the methods devised several centuries ago by physicists for the hand computations they made to validate their theories. Improved methods of computation had the obvious potential to revolutionize how business is conducted, and in pursuit of these business applications new information systems were developed in the 1950s that consisted of files of records stored on magnetic

tape. The invention of magnetic-disk storage, which allows rapid access to an arbitrary record on the disk, led not only to more cleverly designed file systems but also, in the 1960s and 70s, to the concept of the database and the development of the sophisticated database management systems now commonly in use. Data structures, and the development of optimal algorithms for inserting, deleting, and locating data, have constituted major areas of theoretical computer science since its beginnings because of the heavy use of such structures by virtually all computer software — notably compilers, operating systems, and file systems. Another goal of computer science is the creation of machines capable of carrying out tasks that are typically thought of as requiring human intelligence. Artificial intelligence, as this goal is known, actually predates the first electronic computers in the 1940s, although the term was not coined until 1956. Computer graphics was introduced in the early 1950s with the display of data or crude images on paper plots and cathode-ray tube (CRT) screens. Expensive hardware and the limited availability of software kept the field from growing until the early 1980s, when the computer memory required for bit-map graphics became affordable. A bit map is a binary representation in main memory of the rectangular array of points (pixels, or picture elements) on the screen. Because the first bit-map displays used one binary bit per pixel, they were capable of displaying only one of two colours, commonly black and green or black and amber. Later computers, with more memory, assigned more binary bits per pixel to obtain more colours. Bit-map technology, together with high-resolution display screens and the development of graphics standards that make software less machine-dependent, has led to the explosive growth of the field. Software engineering arose as a distinct area of study in the late 1970s as part of an attempt to introduce discipline and structure into the software design and development process.

Text 2. ELECTRIC CURRENT. ELECTRIC AND ELECTRONIC CURCUITS

An electric current is the flow of charges through a conducting circuit caused by a potential difference or electromotive force. In metallic conductors the charges are electrons. In liquids and gases the charges are ions. There are two types of electric current: direct current (DC for short) and alternating current (AC). The current flowing in a circuit is DC if it flows continuously in one direction, and AC if it flows alternately in each direction. Current carries electrical energy from a power supply to the components of the circuit, where it is converted into other forms of energy. Electric current can heat a conductor, it can have a chemical action and it can produce magnetic effects. As compared to direct current, alternating current has several valuable characteristics. The most important of them is the fact that the voltage or the current may be varied to almost any desirable value by means of a transformer. AC is used as a source of

electric power both in industry and in the home. The SI unit of electric current is the ampere. The volt is the SI unit of potential difference. The SI unit of electrical work is the watt. There are two basic types of electric circuits: series and parallel. In a series circuit the components of the circuit are arranged in such a way that they are connected end to end, so that the entire current passes through each component. The total resistance in such a circuit is the sum of the resistances of individual components. In parallel circuits the electric current flows through different pathways. Each branch of such a circuit can be switched on or off independently. This allows the use of some or all of the components by choice. In general, the total resistance of all components in parallel wiring is less than the resistance of any one of them. An electric circuit usually comprises two categories of components: active and passive. Passive elements never supply more energy than they absorb, while active elements can supply more energy than they absorb. Active components are: cells, batteries, generators, electron tubes, and transistors, etc. Passive components include: resistors, capacitors, inductors, relays, fuses, switches, etc. The electric circuit is a path of an electric current. The term means a continuous path made up of conductors and conducting devices, which includes a source of electromotive force that drives the current around the circuit. Such a circuit is called a closed circuit, and a circuit in which the current path is not continuous is termed an open circuit. A short circuit is a closed circuit in which a direct connection is made, with no appreciable resistance, inductance, or capacitance, between the terminals of the source of electromotive force. Current flows in an electric circuit in accordance with several definite laws. The basic law of current flow is Ohm’s law, which states that the amount of current flowing in a circuit made up of pure resistances is directly proportional to the electromotive force impressed on the circuit and inversely proportional to the total resistance of the circuit. Ohm’s law applies to all electric circuits for both DC and AC. Additional principles are used in analyzing complex circuits and AC circuits also involving inductances and capacitances. Electronic circuits are electric circuits the operation of which depends on the flow of electrons for the generation, transmission, reception, and storage of information The information can consist of audio signals as in radio, TV images, or data in a computer. Electronic circuits provide different functions to process this information including amplification of signals, generation of radio waves, extraction of information, control and logic operations. There are two types of electronic circuits: conventional and integrated. Conventional circuits consist of separate electronic components connected by wires. Often components are attached to a circuit board. A circuit board is a small board that contains electronic components connected to form a circuit. The circuit can be designed to accomplish a single electronic task, such as supplying power. It can be designed to accomplish many tasks, such as those performed by a calculator. Typically, the board is a flat piece of non-conducting material. Many circuit

boards are made as printed circuit boards (PCB's). Machines imprint the board with patterns of conducting material that create the desired circuits. The technique used is called photolithography. Electronic components are attached at designated spots along the pathways. Integrated circuits have components and connectors formed on a chip. Chips are tiny pieces of semiconductor material, usually silicon. Semiconductors are substances that conduct electric current better than insulators, but not as well as conductors. Integrated circuits often serve as components of conventional circuits. Because of their small size, integrated circuits have several advantages over conventional ones. Integrated circuits work faster, because the signals have less distance to travel, they also need less power, generate less heat, and cost less to operate than conventional circuits. Integrated circuits are more reliable. A microprocessor, a type of integrated circuit, can perform the mathematical functions and some of the memory functions of a computer.

Text 3. COMPUTER SCIENCE: SUBFIELDS AND HISTORY

Computer science is the study of the theoretical foundations of information and computation, and of practical techniques for their implementation and application in computer systems. It is frequently described as the systematic study of algorithmic processes that create, describe and transform information. According to Peter J. Denning, the fundamental question underlying computer science is, "What can be (efficiently) automated?" Computer science has many sub-fields; some, such as computer graphics, emphasize the computation of specific results, while others, such as computational complexity theory, study the properties of computational problems. Still 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 humancomputer interaction focuses on the challenges in making computers and computations useful, usable, and universally accessible to people. The general public sometimes confuses computer science with vocational areas that deal with computers (such as information technology), or think that it relates to their own experience of computers, which typically involves activities such as gaming, web-browsing, and word-processing. However, the focus of computer science is more on understanding the properties of the programs used to implement software such as games and web-browsers, and using that understanding to create new programs or improve existing ones. The early foundations of what would become computer science predate the invention of the modern digital computer. Machines for calculating fixed numerical tasks, such as the abacus, have existed since antiquity. Wilhelm Schickard built the first mechanical calculator in 1623. Charles Babbage designed a difference engine in Victorian times helped by Ada Lovelace. Around 1900, punch-card machines were introduced. However, all of

these machines were constrained to perform a single task, or at best some subset of all possible tasks. During the 1940s, as newer and more powerful computing machines were developed, the term computer came to refer to the machines rather than their human predecessors. As it became clear that computers could be used for more than just mathematical calculations, the field of computer science broadened to study computation in general. Computer science began to be established as a distinct academic discipline in the 1950s and early 1960s, with the creation of the first computer science departments and degree programs. Since practical computers became available, many applications of computing have become distinct areas of study in their own right. Although many initially believed it impossible that computers themselves could actually be a scientific field of study, in the late fifties it gradually became accepted among the greater academic population. It is the now well-known IBM brand that formed part of the computer science revolution during this time. IBM (short for International Business Machines) released the IBM 704 and later the IBM 709 computers, which were widely used during the exploration period of such devices. During the late 1950s, the computer science discipline was very much in its developmental stages, and such issues were commonplace. Time has seen significant improvements in the usability and effectiveness of computer science technology. Modern society has seen a significant shift from computers being used solely by experts or professionals to a more widespread user base. The German military used the Enigma machine during World War II for communication they thought to be secret. The large-scale decryption of Enigma traffic at Bletchley Park was an important factor that contributed to Allied victory in WWII. 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. • In cryptography, breaking the Enigma machine was an important factor contributing to the Allied victory in World War II. • Scientific computing enabled advanced study of the mind, and mapping the human genome became possible with Humane Genome Project. Distributed computing projects such as Folding @ home explore protein folding. • 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.

Text 4. 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. The Computer Sciences Accreditation Board (CSAB) — which is made up of representatives of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronics Engineering Computer Society, and the Association for Information Systems — identifies four areas that it considers 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, CSAB also identifies 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. Relationship with other fields. Despite its name, a significant amount of computer science does not involve the study of computers themselves. Because of this, several alternative names have been proposed. Certain departments of major universities prefer the term computing science, to emphasize precisely that difference. The Danish scientist Peter Naur suggested the term datalogy to reflect the fact that the scientific discipline revolves around data and data treatment, while not necessarily involving computers. The first scientific institution to use the term was the Department of Datalogy at the University of Copenhagen, founded in 1969, with Peter Naur being the first professor in datalogy. The term is used mainly in the Scandinavian countries. Also, in the early days of computing, a number of terms for the practitioners of the field of computing were suggested in the Communications of the ACM — turingineer, turologist, flow-charts-man, applied meta-mathematician, and applied epistemologist. Three months later in the same journal, comptologist was suggested, followed next year by hypologist. The term computics has also been suggested. In continental Europe, names such as informatique (French), Informatik (German) or informatica (Dutch), derived from information and possibly mathematics or automatic, are more common than names derived from computer/computation. The renowned computer scientist Edsger Dijkstra stated that computer science was no more about computers than astronomy was about telescopes. The design and deployment of computers and computer systems is generally considered the province of disciplines other than computer science. For example, the study of computer hardware is usually considered part of computer engineering, while the study of commercial computer systems and their deployment is often called information technology or information systems. However, there has been much cross-fertilization of ideas between the various computerrelated disciplines. Computer science research has also often crossed

into other disciplines, such as philosophy, cognitive science, economics, mathematics, physics, and linguistics. Computer science is considered by some to have a much closer relationship with mathematics than many scientific disciplines, with some observers saying that computing is a mathematical science. Early computer science was strongly influenced by the work of mathematicians such as Kurt Gödel and Alan Turing, and there continues to be a useful interchange of ideas between the two fields in areas such as mathematical logic, category theory, domain theory, and algebra. The relationship between computer science and software engineering is a contentious issue, which is further muddied by disputes over what the term “software engineering” means, and how computer science is defined. David Parnas, taking a cue from the relationship between other engineering and science disciplines, has claimed that the principal focus of computer science is studying the properties of computation in general, while the principal focus of software engineering is the design of specific computations to achieve practical goals, making the two separate but complementary disciplines. The academic, political, and funding aspects of computer science tend to depend on whether a department formed with a mathematical emphasis or with an engineering emphasis. Computer science departments with a mathematics emphasis and with a numerical orientation consider alignment computational science. Both types of departments tend to make efforts to bridge the field educationally if not across all research. Computer science education. Some universities teach computer science as a theoretical study of computation and algorithmic reasoning. These programs often feature the theory of computation, analysis of algorithms, formal methods, concurrency theory, databases, computer graphics and systems analysis, among others. They typically also teach computer programming, but treat it as a vessel for the support of other fields of computer science rather than a central focus of high-level study. Other colleges and universities, as well as secondary schools and vocational programs that teach computer science, emphasize the practice of advanced programming rather than the theory of algorithms and computation in their computer science curricula. Such curricula tend to focus on those skills that are important to workers entering the software industry. The practical aspects of computer programming are often referred to as software engineering. However, there is a lot of disagreement over the meaning of the term, and whether or not it is the same thing as programming.

Text 5. COMPUTER PROFESSIONS

In the last decade, computers have become an integral part of everyday life at home, work, school, and nearly everywhere else. Today they are widely used in designing machines, desktop publishing, making credit reports, etc. Of course, almost every computer user encounters a problem occasionally, whether it is the annoyance of a forgotten password or the disaster of a crashing hard drive. The explosive use of computers has created demand for specialists who provide advice to users, as well as for the day-to-day administration, maintenance, and support of computer systems and networks Computer support specialists provide technical assistance, support, and advice to customers and other users. This occupational group includes technical support specialists and help-desk technicians. These troubleshooters interpret problems and provide technical support for hardware, software, and systems. They answer telephone calls, analyze problems by using automated diagnostic programs, and resolve recurring difficulties. Support specialists work either within a company that uses computer systems or directly for a computer hardware or software vendor. Increasingly, these specialists work for help-desk or support services firms, for which they provide computer support to clients on a contract basis. Technical support specialists respond to inquiries from their organizations computer users and may run automatic diagnostics programs to resolve problems. They also install, modify, clean, and repair computer hardware and software. In addition, they may write training manuals and train computer users in how to use new computer hardware and software. These workers also oversee the daily performance of their company's computer systems and evaluate how useful software programs are. Help-desk technicians respond to telephone calls and e-mail messages from customers looking for help with computer problems. In responding to these inquiries, help-desk technicians must listen carefully to the customer, ask questions to diagnose the nature of the problem, and then patiently walk the customer through the problem-solving steps. Help-desk technicians deal directly with customer issues and companies value them as a source of feedback on their products. They are consulted for information about what gives customers the most trouble, as well as other customer concerns. Most computer support specialists start out at the help desk. Network and computer systems administrators design, install, and support an organization's computer systems. They are responsible for local-area networks (LAN), wide-area networks (WAN), network segments, and Internet and intranet systems. They work in a variety of environments, including professional offices, small businesses, government organizations, and large corporations. They maintain network hardware and software, analyze problems, and monitor networks to ensure their availability to system users. These workers gather data to identify customer needs and then use the information to identify, interpret, and evaluate system and network requirements. Administrators also may plan, coordinate, and implement

network security measures. Systems administrators are responsible for maintaining network efficiency. They ensure that the design of an organization's computer system allows all of the components, including computers, the network, and software, to work properly together. Furthermore, they monitor and adjust the performance of existing networks and continually survey the current computer site to determine future network needs. Administrators also troubleshoot problems reported by users and by automated network monitoring systems and make recommendations for future system upgrades. In some organizations, computer security specialists may plan, coordinate, and implement the organization's information security. These workers educate users about computer security, install security software, monitor networks for security breaches, respond to cyber attacks, and, in some cases, gather data and evidence to be used in prosecuting cyber crime. The responsibilities of computer security specialists have increased in recent years as cyber attacks have become more common. Computer support specialists and systems administrators held about 862,000 jobs in 2006. Of these, approximately 552,000 were computer support specialists and about 309,000 were network and computer systems administrators. Although they worked in a wide range of industries, about 23 percent of all computer support specialists and systems administrators were employed in professional, scientific, and technical services industries, principally computer systems design and related services. Substantial numbers of these workers were also employed in administrative and support services companies, financial institutions, insurance companies, government agencies, educational institutions, software publishers, telecommunications enterprises. Employers of computer support specialists and systems administrators range from startup companies to established industry leaders. As computer networks become an integral part of business, industries not typically associated with computers — such as construction — increasingly need computer support workers.

Text 6. COMPUTERS IN EDUCATION

With the advent of the Internet age, all aspects of society have been influenced, including education. Computers and the Internet are used in all levels of education, excluding perhaps preschool and grade school. But with more computer-like educational toys such as the Leap Frog, even younger students are learning with computers. Higher Education. All universities and colleges in the United States are furnished with computer labs. Because many professors require their students to turn in typed documents, it is more convenient to have computer labs on campus for student use. Faculty Usage. Teachers at all levels use computers to administer assignments, keep track of grades or offer online instruction. Many teachers use online resources in their daily lessons. Online Education. There is an entire "sub-industry" of education called "online

education." Online education is done primarily through the usage of computers and the Internet where the student does the class work from home. Self-Learning. In addition to books, video and other materials, self-directed learners often use computers to continue their education outside of, or in addition to, traditional facilities. Social Networking. Popular networking sites like MySpace and Facebook can also be used for educational purposes, as some instructors integrate aspects of those sites into their lessons.

Text 7. ANALOG, DIGITAL AND HYBRID COMPUTERS

Information can and does take any forms. You can see these different forms every time you use your computer. The words you are reading right now, the signals from the keys you press on your keyboard, the files you load on your hard disk — all are different types of information that your computer manipulates. Depending on the way the information is represented in a computer, the latter can be analog, digital, or hybrid. There are two ways to represent information. Information that is continuous, that is, any piece of information can take on any of an infinite set of values, is said to be analog. For example, time, temperature, the speed of an airplane — all of these have a continuous range of values. Digital information is restricted to a finite set of values. For example, a traffic light is (normally) red, yellow or green; not yellow-green or orange. Computers use a form of digital information called binary information. Here, the information is restricted to only two values: one and zero which represent a switch that is turned on or off by electric current. Analog refers to numerical values that have a continuous range. As an example, consider a desk lamp. If it has a simple on/off switch, then it is digital, because the lamp either produces light at a given moment or it does not. If a dimmer replaces the on/off switch, then the lamp is analog, because the amount of light can vary continuously from on to off and all intensities in between. Analog computers were the first type to be produced. They perform mathematical operations on continuous electric values (voltage) which are converted from physical variables of the problem. The physical variables are velocities, pressure, temperature, accelerations, and so on. Analog electronics existed for close to fifty years before the rise of digital electronics began. This is probably because analog information is similar or analogous to the information form we usually deal with and thus, perhaps, it looks more natural. What is created is a simulation of a real-world event or phenomenon. Acoustic information or sound in analog electronics is simply a variation in voltage, current or frequency which is directly proportional to the varying air pressure or sound. The telephone and radio were also constructed using the principles of analog electronics. In a similar way, analog computers rely on analogies between physical processes to make calculations. If such analogies can be mathematically formalized, a mathematical model of the process can be built, which constitutes

the basis for an analog computer. New interest has been shown recently in analog computers, particularly in areas such as neural networks that respond to continuous electrical signals. Most modern computers, however, are digital machines whose components have a finite number of states — for example, the 0 or 1, or on or off bits. So, the digital computer is a machine that deals with discrete numbers. The original information may be represented as decimal digits, so as alphabetical characters, or as symbols. But for processing in a digital computer all input data are converted into a series of binary digits. In terms of binary digits information is stored in the computer's memory or storage. Computers use binary information for several reasons: 1. Simplicity: It is the simplest, most compact and least doubtful way to express information about something: for example, zero=off and one=on could be used to represent the status of a regular light bulb. 2. Expandability: It is easy to build on and expand: you can use two binary values together to represent the status of two light bulbs. 3. Clarity: Errors are reduced when a value can only be one or zero; the computer knows there are no values in between, which is useful when electrical signals become "dirty". If a 0.95 value shows up on your modem line, the computer knows it is probably really a 1, since 0.95 isn't a valid value. It will interpret the 0.95 as a 1, and no data will be lost as a result. 4. Speed: Computers make millions of decisions a second, and these decisions are easier to make when the number of values is small. The hybrid computer is a machine that incorporates both digital and analog elements. We may consider a hybrid computer as a combination of digital and analog ones. The memory of the hybrid computer can store physical variables by converting them to digital expressions. For converting analog signals to digital ones and vice versa analog-todigital and digital-to-analog converters are used.

Text 8. LAPTOP COMPUTERS

A laptop is a full-blown, genuine computer that can do anything a desktop computer can do. For example, you can do programming, word processing, spreadsheets, databases, accounting and multimedia presentations. The portability of laptops allows you to do many things that you cannot do with a desktop. For example, you can write your sales proposal, article or business presentation while travelling on a plane, or computing on the bus or train or subway. Like all computers, laptops have a central brain called a microprocessor which performs all of the operations of the computer. The microprocessor: – has a set of internal instructions stored in memory, and can access memory for its own use while working; – can receive instructions or data from you through a keyboard in combination with another device (mouse, touchpad, trackball); – can receive and store data through several data storage devices (hard drive, floppy drive, zip drive, CD/DVD drive); – can display data to you on computer monitors

(cathode ray monitors, LCD displays); – can send data to printers, modems, networks and wireless networks through various input/output ports; – is powered by AC power and/or batteries.

Input Device. For a desktop computer, you typically use a keyboard and mouse to enter data. However, because using a mouse takes up room, other devices are built into laptops to take its place. Laptops come with one of three input devices that allow you to move the cursor on the LCD screen: • trackball — rotating the ball allows you to move the cursor on the LCD screen (usually built-in, but add-on ones that clip to the side of a laptop are available); • trackpoint — pushing your finger over the point moves the cursor; • touchpad — moving your finger across the pad moves the cursor. All of these devices have buttons that act like the right and left buttons on a mouse. The type of device you want is purely a matter of preference. Some people prefer the feel of a trackball over a touchpad. If you can, try out various input devices to see what feels right to you. Remember, most laptops have a port that allows you to hook up a mouse to your laptop; but again, that will be another device to carry around if you want to use it on the go.

Keyboard. Because space is a premium for laptops, their keyboards tend to be smaller than desktop keyboards. Although you won't find an ergonomic keyboard, like the Microsoft natural keyboard, on a laptop, most laptop keyboards have some ergonomic features, such as being located at the back half of the unit to provide wrist support. The arrow keys will most likely be in different places to conserve space, and you may not have a numeric keypad. If you can, try out several laptops to see if the keyboard feels comfortable; this is especially important for touch typists.

The use of laptops in education. Students and educators have found that laptops answer a lot of their needs. In fact, some colleges and universities that require incoming freshmen to have computers recommend laptops. Teachers have found a variety of uses for laptops, too. In college, where lectures to large classes are commonplace, many professors can use their laptops, along with other audiovisual equipment, to project slides or lecture notes. And as technology creeps further into public elementary, middle and high schools, there is a growing trend toward teachers using laptops in the classroom for lectures. Students can use laptop computers to take notes during lectures; this is more common in college than in lower schools. However, many special education students do use laptops for notetaking, or to run specialized software, such as hearing interpreters. As another example, if a student is injured and cannot use his/her writing arm, the school system may issue a laptop for notetaking or for downloading notes supplied by the teacher. In both colleges and lower schools, science students can use laptops for gathering data from laboratory experiments. Laptops can also be used in the field to gather data. For example, laptops can be hooked up to probes, such as pH electrodes or temperature probes, and taken to

a salt-marsh, stream or lake. Students can then measure pH and temperature and use the data to study the environment. The further development of laptops brought to notebook (and later — to netbooks) as a next step in microcomputer miniaturization.

Text 9. PERSONAL COMPUTERS AND WORKSTATIONS

The personal computers (PCs) appeared as a result of the evolution of minicomputers while computer circuitry was going over to integrated circuits of large (LSI) and very large scale of integration (VLSI). Being not too expensive, PCs have won very quickly good positions in the computer market and have created preconditions for the development of new software oriented to the end user. There were, first of all, “friendly user interfaces”, also problem-oriented environments and tools for the automation of applications development. Minicomputers may be considered as forefathers for another kind of modern computer system architecture — 32-bit computers. The appearance of RISC-processors and memory microchips whose capacity exceeds 1Mbit has resulted in the creation of high-performance desktop systems known today as workstations (WSs) that represent a class of machines with the computing power of a minicomputer or a mainframe but comparable with a PC in size. Because of rapid technological progress in the development of computer hardware, there are now quite a number of computers that come into this category. They are commonly both multitasking and multiuser machines and often support powerful graphics oriented hardware and software. Most have the ability to run some version or other of UNIX though other operating systems, such as VMS (Virtual Memory System), are also available but less common. Some examples of workstations include Vaxstation, IBM RT PCs, Apollo and Suns. “SPARCstation” is a trademark of Sun microsystems, Inc. They use that term to describe any of their sun4c and sun4m workstations. There are also systems that provide an X Windows interface. They are called X workstations. An X terminal is a combination of a diskless workstation and a standard ASCII (American Standard Code for Information Interchange) terminal. It is a device which provides an X Window interface, but no or little computation. It is designed to be an X Window interface to a remote computer. Workstations vary widely in hardware configuration but, in general, they are suitable for the development and running of numerically intensive programs with requirements that are met by around 4–8 MB or more of physical RAM (plus around 20–30 MB of virtual RAM) and 25–200 MB of user hard-disk storage. Initially workstations were oriented to professional users in contradistinction to PCs which at the beginning were intended for a wide circle of non-professional customers. Such orientation allowed workstations to become well balanced systems in which high speed is combined with large capacity of main and external memory, internal highways

of high throughput, high quality and high speed graphic subsystem and various I/O devices. This property favourably distinguishes WSs from PCs. Even the most powerful IBM compatible PCs are not capable to satisfy growing needs for data processing systems because of “bottlenecks” inherent to their architecture. Nevertheless, the fast growth of PCs performance owing to newest Intel's microprocessors together with the sharp price reduction for these products and the development of multi-bus technology, such as PCI and SCSI allowing removing many “bottlenecks” in PC architecture, makes modern PCs quite an attractive alternative to WSs. In their turn, the manufacturers of workstations have created so called “entry level” products which are close to high-performance PCs in cost characteristics, but are superior in performance and extendibility. The future will show how successfully Pentium-based PCs struggle against WSs, but the concept of “personal workstation” has already appeared combining both directions. Today’s market of “personal workstations” cannot be simply defined. As a matter of fact, it represents an aggregate of architectonic platforms of PCs and WSs which appeared as computer equipment suppliers became more commerce and business market-driven. This market was traditionally occupied by minicomputers and mainframes that supported the operation of non-intelligent desktop terminals. In the past, PCs were not powerful enough and did not have sufficient functional capabilities to be an adequate substitution for the terminals of general-purpose supercomputers. On the other hand, UNIXplatform-based WSs were very strong at scientific and engineering sectors. At the same time, they were almost like PCs inconvenient to carry out serious office applications. Since then the situation has dramatically changed. Up-to-date PCs have sufficient performance and UNIX-based WSs have software capable to carry out most functions usually associated with the “personal workstation” concept. Both these directions can be seriously considered as a network resource for an enterprise-wide system. As a result of these changes, old-fashioned minicomputers with their patented architecture have practically left the stage. As the downsizing process was going on, and the Intel platform performance was going up, the most powerful PCs (but more often open UNIX-based systems) began to play the role of servers, gradually replacing minicomputers.

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