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высшего профессионального образования  
«Владимирский государственный университет»

Е.Н. Морозова

## **English for IT Students**

Учебное пособие по английскому языку  
для студентов, изучающих вычислительные системы  
и информационные технологии

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В учебном пособии представлены специально подобранные тексты и разработанная система упражнений, способствующие овладению профессиональной лексикой, формированию навыков и умений чтения, перевода, реферирования и аннотирования специальной литературы, а также развитию умений речевого профессионального общения на английском языке в пределах пройденной тематики.

Учебное пособие предназначается для студентов технических вузов, изучающих электронные вычислительные системы, информационные технологии, прикладную информатику, а также для тех, кто совершенствует свои знания английского языка в профессиональной сфере.

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## ПРЕДИСЛОВИЕ

Данное учебное пособие предназначено для студентов технических вузов, изучающих электронные вычислительные системы, информационные технологии, прикладную информатику, которые изучили школьный курс английского языка и овладели лексическим и грамматическим минимумом для осуществления речевой деятельности в ситуациях социально-бытовой сферы общения, а также для всех тех, кто интересуется компьютерными системами и информационными технологиями и совершенствует свои знания английского языка в профессиональной сфере.

Цель пособия – способствовать овладению профессиональной лексикой, формировать навыки и умения чтения и перевода специальной литературы, а также развивать умения речевого профессионального общения на английском языке в пределах проработанной тематики. Реализация поставленных задач осуществляется с помощью специально подобранных аутентичных текстов и разработанной системы упражнений.

Учебное пособие состоит из двух частей и англо-русского словаря. Материалом для пособия послужило американское издание для изучающих компьютер Р. Norton “Introduction to Computers”.

Первая часть пособия **PART I. COMPUTER BASICS** может быть использована в качестве основного учебного материала при обучении студентов, изучающих компьютерные системы и информационные технологии в соответствии с требованиями программы для неязыковых вузов данного профиля. Она состоит из пяти разделов (UNITS), каждый из которых представляет собой тематически завершённое целое. Раздел 1 посвящён аппаратному и программному обеспечению компьютерной системы, раздел 2 рассматривает основные вопросы программирования, в разделе 3 даётся информация о базах данных, раздел 4 посвящён компьютерным сетям, в разделе 5 описываются типы информационных систем. Все разделы имеют единую структуру, что позволяет осуществлять поэтапное формирование языковых навыков и речевых умений. Каждый раздел включает в себя текст, после которого даются словарь и система заданий и упражнений, направленных на активное усвоение лексического и речевого материала. К каждому тексту предусмотрены вопросы и тестовые задания, целью которых является проверка понимания текста. Для формирования умений монологической речи после текста предлагается схема, на основе которой

студенты строят свои высказывания по прочитанному. Тексты первой части пособия адаптированы и могут использоваться на начальном этапе работы со специальной литературой.

Вторая часть пособия **PART II. SUPPLEMENTARY READING** включает 8 разделов, каждый из которых содержит дополнительные неадаптированные тексты для самостоятельной работы. Эти тексты подобраны в соответствии с тематикой, с которой студенты ознакомились в первой части пособия, и могут использоваться для чтения, перевода, тренировки в аннотировании и реферировании как на занятиях, так и вне аудитории.

Прилагаемый англо-русский словарь (**VOCABULARY**), включающий в себя основные компьютерные термины и лексику текстов, рекомендуется использовать в течение всего учебного процесса.

Данное учебное пособие в целом предназначено для использования в процессе обучения чтению специальной литературы на иностранном языке в вузе, но его отдельные разделы и тексты могут использоваться и на более продвинутом этапе.

***PART I***  
**COMPUTER BASICS**

UNIT 1. Computer System

Text 1

**Overview of the Computer System**

**I. Read and translate the text.**

*The Parts of a Computer System*

A *computer* is an electronic device used to process data, converting it into information that is useful to people. A complete computer system includes hardware, software, data, and people. Hardware consists of electronic devices, the parts you can see. Software, also known as programs, consists of organized sets of instructions for controlling the computer. Data consists of text, numbers, sounds, and images that the computer can manipulate.

*Looking Inside the Machine*

The hardware, or physical components, of a computer consists of a processor, memory, input and output (I/O) devices, and storage. The processing function is divided between the processor and memory. The processor, or CPU, is the brain of the machine. Memory holds data and program instructions as the CPU works with them. The units of measure for memory are the byte, kilobyte, megabyte, gigabyte, and terabyte. The role of input devices is to provide data from the user or another source. The most popular input devices are a keyboard and a mouse. The function of output devices is to present processed data to the user or to another computer. The most commonly used output devices are a monitor and a printer. Communications devices, such as modems and network interface cards, perform both input and output functions, allowing computers to share information. Storage devices hold data not currently being used by the CPU. The most common storage devices are: a floppy disk, a compact disk, a Digital Video Disk.

*Software: Bringing the Machine to Life*

Programs are electronic instructions that tell the computer how to accomplish certain tasks. When a computer is using a particular program, it is said to be running or executing the program. The operating system tells the computer how to interact with the user and how to use the hardware devices attached to the computer. Application software tells the computer how to accomplish tasks that the user requires. Some important kinds of application software are word processing programs, spreadsheets, database management software, presentation programs, graphics programs, multimedia applications, entertainment and education software, Web design tools and Web browsers, Internet applications, utilities, and networking and communications software.

*Vocabulary*

1. overview [ˈoʊvəˈvju:] – обзор
2. computer system [kəmˈpjʊ:tə ˈsɪstəm] – компьютерная система
3. electronic [ɪlekˈtronɪk] – электронный
4. device [diˈvaɪs] – устройство
5. to use [juːz] – применять, использовать  
user [ˈjuːzə] – пользователь  
useful [ˈjuːsfʊl] – полезный
6. to process [prəʊˈses] = to manipulate [mənɪpjuˈleɪt] – обрабатывать  
processing [prəʊˈsesɪŋ] – обработка  
word processing [wɜːd prəʊˈsesɪŋ] – текстовая обработка
7. data [ˈdeɪtə] – данные
8. to convert [kənˈvɜːt] – преобразовывать
9. complete [kəmˈpliːt] – полный, завершённый, законченный
10. to include [ɪnˈkluːd] – включать в себя
11. hardware [ˈhɑːdweə] – аппаратное обеспечение
12. software [ˈsoftweə] – программное обеспечение
13. application [æpliˈkeɪʃn] – приложение  
application software [æpliˈkeɪʃn ˈsoftweə] – прикладное программное обеспечение
14. to consist (of) [kənˈsɪst] – состоять (из)
15. part [pɑːt] – часть
16. to know [nəʊ] (knew, known) – знать  
known (as) [nəʊn] – известный (как)
17. set [set] – набор
18. instruction [ɪnˈstrʌkʃn] – инструкция, команда
19. to control [kənˈtrəʊl] – управлять, контролировать
20. number [ˈnʌmbə] – число
21. sound [saʊnd] – звук
22. image [ˈɪmɪdʒ] – изображение
23. inside [ɪnˈsaɪd] – внутрь, внутри
24. machine [məˈʃiːn] – машина, механизм
25. processor [prəʊˈsesə] – процессор = central processing unit (CPU)  
[ˈsentrəl prəʊˈsesɪŋ ˈjuːnɪt] – центральный процессор (ЦП)
26. memory [ˈmeməri] – память
27. input device [ɪnˈput diˈvaɪs] – устройство ввода
28. output device [ˈaʊtput diˈvaɪs] – устройство вывода
29. storage [ˈstɒrɪdʒ] – запоминающее устройство
30. function [ˈfʌŋkʃn] = task [tɑːsk] = purpose [ˈpʊrəs] – функция =  
задача = цель, назначение
31. to divide [diˈvaɪd] – делить

- 32. brain [breɪn] – мозг
- 33. to hold [həʊld] (held, held) – хранить (информацию)
- 34. common ['kɒmən] – общий, обычный, универсальный
- 35. unit of measure ['ju:nɪt əv 'meɪʒə] – единица измерения
- 36. to provide [prə'vaɪd] – обеспечивать
- 37. another [ə'nʌðə] – другой
- 38. source [sɔ:s] – источник
- 39. keyboard ['ki:bɔ:d] – клавиатура
- 40. mouse [maʊs] – мышь
- 41. to present [pri'zent] – представлять
- 42. communication [kə,mju:nɪ'keɪʃn] – обмен информацией
- 43. network interface card ['netwɜ:k 'ɪntəfeɪs kɑ:d] – сетевая интерфейсная плата
- 44. to perform [pə'fɔ:m] = to accomplish [ə'kɒmplɪʃ] – выполнять
- 45. both ... and ... [bəʊθ ənd] – как ... так и ...
- 46. to allow [ə'lau] – позволять
- 47. to share [ʃɛə] – разделять, совместно (коллективно) использовать
- 48. currently ['kʌrəntli] – в настоящее время
- 49. floppy disk ['flɒpi disk] – гибкий диск
- 50. Digital Video Disk (DVD) ['dɪdʒɪtəl 'vɪdɪəʊ disk] – цифровой видеодиск
- 51. certain ['sɜ:tn] – определённый
- 52. particular [pə'tɪkjʊ:lə] – особый, особенный, специфический
- 53. to run [rʌn] (ran, run) = to execute ['eksɪkjʊ:t] – выполнять (программу, команду), исполнять
- 54. operating system ['ɒpəreɪtɪŋ 'sɪstəm] – операционная система
- 55. to interact ['ɪntərækt] – взаимодействовать
- 56. to attach [ə'tætʃ] – прикреплять, присоединять
- 57. to require [rɪ'kwaɪə] – требовать
- 58. important [ɪm'pɔ:tənt] – важный
- 59. kind [kaɪnd] – вид, тип
- 60. spreadsheet ['spredʃi:t] – электронная таблица
- 61. database management ['deɪtəbeɪs 'mænədʒmənt] – управление данными
- 62. entertainment [entə'teɪnmənt] – развлечение
- 63. education [edju:'keɪʃn] – образование
- 64. design tools [dɪ'zaɪn tu:lz] – средства проектирования
- 65. utility [ju:'tɪlɪti] – обслуживающая программа, служебная программа
- 66. network ['netwɜ:k] – сеть  
networking ['netwɜ:kɪŋ] – организация сети, создание сети, объединение в сеть

**II. Answer the following questions.**

1. What is a computer?
2. What components does a computer system include?
3. What is hardware? software? data?
4. What does the hardware consist of?
5. What components of a computer system perform data processing?
6. What is the function of memory?
7. What are the most common units of measure for memory?
8. What task do input devices perform?
9. What is the purpose of output devices?
10. What devices perform input and output functions?
11. What function do storage devices perform?
12. What is a program?
13. What is the task of an operating system?
14. What are the examples of application software?

**III. Tell whether the following statements are true or false.**

1. A computer is an electronic device used to process data.
2. To perform processing, the computer uses two components: the processor and memory.
3. The most common unit of measurement for computer memory is the bit.
4. Printers and monitors are the most common types of output devices.
5. A network interface card can perform both input and output functions.
6. The purpose of storage devices is to hold data.
7. Storage and memory are the same thing.
8. DVD stands for “Digital Video Device”.
9. Software is a set of electronic instructions, which allows a computer to perform a certain task.
10. When a computer is using a program, it is said to be controlling that program.
11. The operating system is an example of application software.
12. Application software helps people accomplish specific tasks.

**IV. Fill in the blanks.**

1. A computer is an \_\_\_\_\_ device used for processing data.
2. A computer system consists of \_\_\_\_\_, \_\_\_\_\_, people and data.
3. Software, or \_\_\_\_\_, includes \_\_\_\_\_ for controlling the computer.



4. Data is \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
5. The hardware of a computer consists of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
6. The units of measure for memory are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
7. Input devices \_\_\_\_\_ data from the user or another source.
8. Communications devices allow computers \_\_\_\_\_ information.
9. Programs are electronic \_\_\_\_\_ that tell the computer how to accomplish certain tasks.
10. Some important kinds of application software are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

**V. Choose the right answer.**

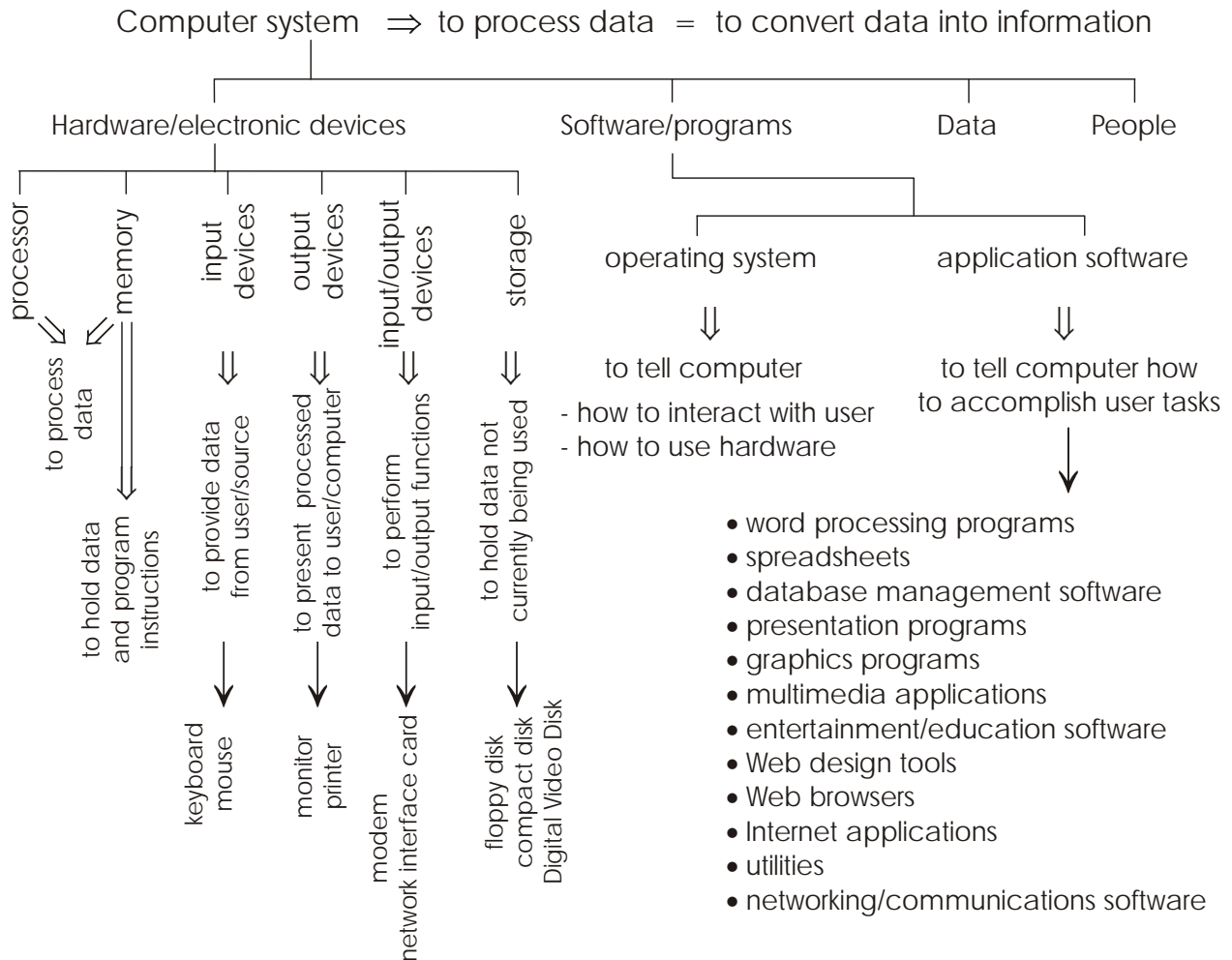
1. The *term* (термин) “hardware” *refers to* (относится к) ...
  - a. the physical parts of the computer.
  - b. *interconnected* (взаимосвязанные) electronic devices.
  - c. any part of the computer you can *touch* (трогать).
  - d. all the above.
2. The term “software” refers to ...
  - a. electronic instructions that allow the computer perform tasks.
  - b. disks.
  - c. anything that is not hardware.
  - d. none of the above.
3. Data consists of ...
  - a. electronic instructions.
  - b. *raw* (сырые) facts the computer stores and reads.
  - c. only text.
  - d. files.
4. Which of the following is not a category of computer hardware?
  - a. Processor.
  - b. Data.
  - c. Input and output devices.
  - d. Storage.
5. Which of the following is an example of an input device?
  - a. Printer.
  - b. Floppy disk.
  - c. Keyboard.
  - d. All the above.
6. In a computer, what type of device *accepts* (принимает) data and instructions from the user?
  - a. Output devices.
  - b. Storage devices.
  - c. Input devices.
  - d. Memory.

7. The most common storage is ...
  - a. network interface card.
  - b. memory.
  - c. floppy disk.
  - d. none of the above.
8. Because *early* (первые) diskettes were *thin* (тонкие), they came to be known as ...
  - a. compact disks.
  - b. floppy disks.
  - c. magnetic disks.
  - d. all the above.

**VI. Match each item to the correct statement below.**

- a. Input device
  - b. Output device
  - c. Storage device
  - d. Communications device
1. Modem.
  2. Network interface card.
  3. Keyboard.
  4. Printer.
  5. Digital Video Disk.
  6. Monitor.
    - a. Input
    - b. Output
    - c. Processing
    - d. Memory
    - e. Operating system
  7. Devices such as a keyboard and a mouse fall into this category.
  8. Transforming raw data into useful information.
  9. UNIX.
  10. A printer is an example of this type of device.
  11. Stores data and programs.

**VII. Speak on the contents of the text using the following chart.**



Text 2

**Central Processing Unit (CPU)**

**I. Read and translate the text.**

Two components handle processing in a computer: the central processing unit, or CPU, and the memory. They are located on the computer's motherboard, the circuit board that connects the CPU to the other hardware devices.

The *CPU*, or *processor*, is the place where data is manipulated. In a personal computer, the processor usually consists of one or more microprocessors (sometimes called "chips") which are slivers of silicon or other material with many tiny electronic circuits. The CPU has two basic parts: the *control unit* and the *arithmetic logic unit*.

*The Control Unit*

All the computer's resources are managed from the control unit. The control unit directs the flow of data through the CPU, and to and from other devices. The CPU's instructions for carrying out commands are

built into the control unit. The instructions, or instruction set, list all the operations that the CPU can perform. Each instruction in the instruction set is expressed in microcode – a series of basic directions that tells the CPU how to execute more complex operations. When the control unit encounters an instruction that involves arithmetic or logic, it passes that instruction to the second component of the CPU, the arithmetic logic unit, or ALU.

### *The Arithmetic Logic Unit*

Because all computer data is stored as numbers, the processing involves comparing numbers or carrying out mathematical operations. The computer performs two types of operations: arithmetic operations and logical operations. Arithmetic operations include addition, subtraction, multiplication, and division. Logical operations include the following ones: “equal to”, “not equal to”, “greater than”, or “less than”. The ALU includes a group of registers – high-speed memory locations in the CPU that are used to hold the data currently being processed. For example, the control unit may load two numbers from memory into the registers in the ALU. Then it may tell the ALU to divide the two numbers (an arithmetic operation) or to see whether the numbers are equal (a logical operation).

Each time the CPU executes an instruction, it takes a series of steps that is called a machine cycle. A machine cycle can be broken down into two smaller cycles: the instruction cycle and the execution cycle. During the instruction cycle the CPU takes two steps: fetching (the control unit retrieves, or “fetches”, a command or data from the computer's memory) and decoding (the control unit breaks down, or decodes, the command into instructions that correspond to those in the CPU's instruction set).

At this point, the CPU is ready to begin the execution cycle. When the command is executed, the CPU carries out the instructions in order by converting them into microcode. The CPU may be required to store the results of an instruction in memory (but this condition is not always required).

### *Vocabulary*

1. to handle [ˈhændl] – оперировать, манипулировать, обрабатывать
2. to locate [ləʊˈkeɪt] – располагать, размещать  
to be located – располагаться, размещаться
3. motherboard [ˈmʌðəˈbɔːd] – системная плата, материнская плата
4. circuit board [ˈsɜːkɪt bɔːd] – монтажная плата
5. to connect [kəˈnekt] – соединять
6. chip [tʃɪp] – микросхема, кристалл (полупроводника)
7. sliver [ˈslɪvə] – здесь пластина
8. silicon [ˈsɪlɪkən] – кремний

9. tiny ['taini] – крошечный
10. circuit ['sə:kit] – схема
11. basic ['beisik] – основной
12. control unit [kən'trəul 'ju:nit] – устройство (блок) управления
13. arithmetic logic unit (ALU) [ə'riθmətik 'lədʒik 'ju:nit] – арифметико-логическое устройство (АЛУ)
14. to manage ['mænidʒ] – управлять
15. flow [fləu] – поток (данных)
16. through [θru:] – через
17. to carry out ['kæri aut] – выполнять
18. command [kə'mɑ:nd] – команда
19. to build [bild] (built, built) – строить, создавать
20. to list [list] – перечислять, составлять список
21. each [i:tʃ] – каждый
22. to express [iks'pres] – выражать
23. microcode ['maikrəkəud] – микрокоманда, микрокод
24. a series (of) ['siəriəs] – ряд (чего-л.)
25. to direct [di'rekt] – направлять, указывать, предписывать  
direction [di'rekʃn] – направление, указание, предписание
26. complex ['kompleks] – сложный
27. to encounter [in'kauntə] – сталкиваться
28. to involve [in'volv] – включать в себя, содержать
29. to pass [pɑ:s] – передавать, пропускать
30. because [bi'kɔ:z] – так как, поскольку
31. to store [stɔ:] – хранить, запоминать
32. to compare [kəm'preə] – сравнивать
33. addition [ə'diʃn] – сложение
34. subtraction [səb'trækʃn] – вычитание
35. multiplication [mʌltipli'keiʃn] – умножение
36. division [di'viʒn] – деление
37. the following ['fɒləuiŋ] – следующее
38. equal (to) ['i:kwəl] – равный (чему-л.)
39. greater (than) ['greitə] – больше (чем)
40. less (than) [les] – меньше (чем)
41. register ['redʒistə] – регистр
42. high-speed ['haɪspi:d] – высокоскоростной
43. memory location ['meməri læu'keɪʃn] – ячейка памяти
44. for example [fə'rig'zɑ:mpl] = for instance [fər'instəns] – например
45. to load [ləud] – загружать
46. whether ['weðə] – ли
47. step [step] – шаг

- 48. to call [kɔ:l] – называть
- 49. machine cycle [mə'ʃi:n 'saɪkl] – машинный цикл
- 50. to break down [breɪk 'daʊn] (broke, broken) – разбивать
- 51. instruction cycle [ɪns'trʌkʃn 'saɪkl] – командный цикл
- 52. execution cycle [ɪk'sɪ'kju:ʃn 'saɪkl] – исполнительный цикл
- 53. to fetch [fetʃ] – выбирать (команду или данные из памяти)  
fetching – выборка, загрузка
- 54. to retrieve [rɪ'tri:v] – отыскивать
- 55. to correspond (to) [kɒrɪs'pɒnd] – соответствовать (чему-л.)
- 56. to be ready ['redi] – быть готовым
- 57. order ['ɔ:də] – порядок  
in order – по порядку
- 58. condition [kən'dɪʃn] – условие

## II. Answer the questions.

1. What components of a computer system handle data processing?
2. Where are the memory and the central processing unit located?
3. What is the computer's motherboard?
4. What is a microprocessor?
5. What are the basic parts of a microprocessor?
6. What is the function of the control unit?
7. What does the instruction set include?
8. What is a microcode?
9. What two types of operations does the computer perform?
10. What do arithmetic operations include?
11. What logical operations are performed by the ALU?
12. What is the task of registers?
13. What is a machine cycle?
14. What are the parts of a machine cycle?
15. What operations does the CPU perform during the instruction cycle? execution cycle?

## III. Tell whether the following statements are true or false.

1. The CPU's instruction set tells the computer what operations any application program can perform.
2. Data is manipulated in memory.
3. In a personal computer, the processor usually consists of one or more microprocessors.
4. The computer can perform two types of operations: arithmetic operations and geometric operations.
5. Arithmetic and logical operations are carried out by the CPU's arithmetic logic unit.

6. The control unit directs the flow of data through the CPU, and to and from other devices.
7. The CPU's instructions for carrying out commands are built into the arithmetic logic unit.
8. Processing is a series of basic directions that tells the CPU how to execute more complex operations.
9. Addition and subtraction are logical operations.
10. Registers are used to hold the data currently being processed.
11. Arithmetic logic unit performs only logical operations.
12. When the CPU executes an instruction, it takes a series of steps, called an instruction cycle.

#### IV. Fill in the blanks.

1. The CPU has two basic parts: the \_\_\_\_\_ and the \_\_\_\_\_.
2. When the control unit encounters an instruction that involves \_\_\_\_\_ or \_\_\_\_\_, it passes the instruction to the ALU.
3. A machine cycle can be broken down into two smaller steps: the \_\_\_\_\_ and the \_\_\_\_\_.
4. The central processing unit, or CPU, and the memory are located on \_\_\_\_\_.
5. The control unit directs \_\_\_\_\_ through the CPU.
6. Each instruction in the instruction set is expressed in \_\_\_\_\_.
7. The processing involves \_\_\_\_\_ numbers or \_\_\_\_\_ mathematical operations.
8. Arithmetic operations include \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
9. A series of steps the CPU takes is called \_\_\_\_\_.
10. During the instruction cycle the CPU takes two steps: \_\_\_\_\_ and \_\_\_\_\_.

#### V. Choose the right answer.

1. Which two components handle processing in a computer?
  - a. The CPU and the motherboard.
  - b. The CPU and memory.
  - c. The CPU and the *hard disk* (жесткий диск).
  - d. None of the above.
2. Which of the following manages all the computer's resources?
  - a. The control unit.
  - b. The arithmetic logic unit.

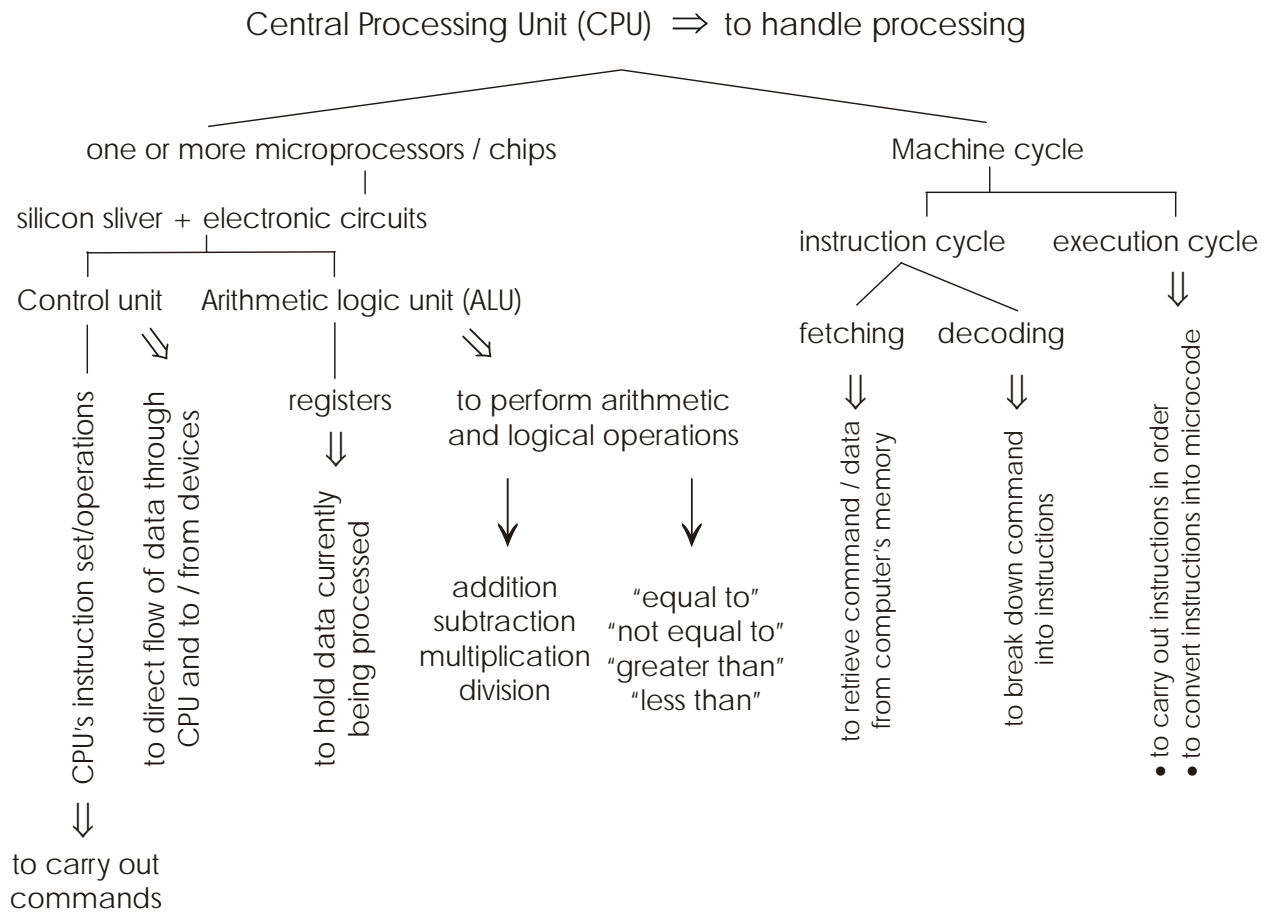
- c. The memory.
- d. The motherboard.
- 3. Registers are built into the ...
  - a. motherboard.
  - b. memory.
  - c. CPU.
  - d. none of the above.
- 4. Which of the following is not a step in a CPU's machine cycle?
  - a. Fetching.
  - b. Decoding.
  - c. Executing.
  - d. Processing.
- 5. Every logical operation has a(an) ...
  - a. microcode.
  - b. instruction set.
  - c. *opposite* (противоположная).
  - d. arithmetic logic unit.
- 6. Which of the following is not an arithmetic operation?
  - a. Addition.
  - b. Subtraction.
  - c. Equal to.
  - d. Division.
- 7. What operation does the CPU perform during the instruction cycle?
  - a. Machine cycle.
  - b. Fetching.
  - c. Executing.
  - d. Storing.

**VI. Match each item to the correct statement below.**

- a. Control unit
  - b. Arithmetic logic unit
  - c. Machine cycle
  - d. Memory
- 1. Performs math operations.
  - 2. Fetching is the first step.
  - 3. Includes registers.
  - 4. Manages all the computer's resources.
  - 5. Stores the results of operations.
  - 6. Directs the flow of data.
    - a. Microcode
    - b. Microprocessor
    - c. Register
    - d. Motherboard
  - 7. Place where the CPU and memory are located.
  - 8. A sliver of silicon or other material with many tiny electronic circuits.
  - 9. Used to hold the data currently being processed.
  - 10. Tells the CPU how to execute more complex operations.



**VII. Speak on the contents of the text using the following chart.**



**Text 3**

**Memory**

**I. Read and translate the text.**

The CPU contains the basic instructions to operate the computer, but it cannot store entire programs or large sets of data permanently. It contains registers which are small areas that can hold only a few bytes at a time. In addition to registers, the CPU has millions of bytes of space where it can quickly read or write programs and data in use. This area is called memory. Physically, memory consists of chips either on the motherboard or on a small circuit board attached to the motherboard. This electronic memory allows the CPU to store and retrieve data quickly.

There are two types of memory: read-only memory, or ROM, and random access memory, or RAM.

*Read-only memory (ROM)* is nonvolatile (or permanent); it holds instructions that run the computer when the power is first turned on. ROM contains a set of start-up instructions, which ensures that the rest of memory is functioning properly, checks for hardware devices, and checks for an operating system on the computer's disk drives. The data in ROM cannot be changed.

*Random-access memory (RAM)* is volatile (read/write, or temporary); programs and data can be written to and erased from RAM as needed. The purpose of RAM is to hold programs and data while they are in use. The more RAM a computer has, the more it can do and the faster it can perform certain tasks. The CPU accesses each location in memory by using a unique number called the memory address. A memory address is a number that indicates a location on the memory chips.

There are two types of RAM: dynamic and static. Dynamic RAM (DRAM) must be refreshed, or recharged with electricity frequently; otherwise, it will lose its contents. Static RAM (SRAM) is not refreshed often and can hold its contents longer than dynamic RAM. SRAM is also considerably faster than DRAM.

Moving data between RAM and the CPU's registers is one of the most time-consuming operations a CPU must perform, simply because RAM is much slower than the CPU. A partial solution to this problem is to include a cache memory in the CPU. *Cache memory* is a type of high-speed memory that contains the most recent data and instructions loaded by the CPU. The amount of cache memory has a tremendous impact on the computer's speed.

### Vocabulary

1. to contain [kən'tein] – содержать
2. to operate ['opəreit] – работать
3. entire [in'taiə] – целостный, весь
4. permanent ['pə:mənənt] – постоянный  
*permanently* ['pə:mənəntli] – постоянно
5. area ['ɛəriə] – область, участок
6. a few [ə'fju:] – несколько
7. in addition to [in ə'diʃn tə] – в дополнение к, кроме того
8. space [speɪs] – пространство, область
9. either ... or ... ['aɪðə ɔ:] – или ... или ..., либо ... либо ...
10. read-only memory (ROM) [ri:d 'əʊnli 'meməri] – постоянное запоминающее устройство (ПЗУ)
11. random access memory ['rændəm 'ækses 'meməri] (RAM) – оперативное запоминающее устройство (ОЗУ)  
dynamic RAM [daɪ'næmɪk ræm] (DRAM) – динамическое ОЗУ  
static RAM ['stætɪk ræm] (SRAM) – статическое ОЗУ
12. volatile ['volətail] – энергозависимый  
*nonvolatile* [non'volətail] – энергонезависимый
13. to run [rʌn] (ran, run) – запускать
14. power ['paʊə] – мощность, питание
15. to turn on ['tɔ:n 'on] – включать

16. start-up instructions ['sta:tʌpɪns'trʌkʃnz] – начальные инструкции, команды
17. to ensure [ɪn'ʃʊə] – гарантировать, обеспечивать
18. rest (of) [rest] – оставшаяся часть (чего-л.)
19. to function ['fʌŋkʃn] – работать, функционировать
20. proper ['prɒpə] – правильный, надлежащий, должный  
properly ['prɒpəli] – правильно, должным образом, как следует
21. to check [tʃek] – проверять
22. disk drive ['disk draɪv] – дисковод
23. to change [tʃeɪndʒ] – менять, изменять
24. temporary ['tempərəri] – временный, промежуточный
25. to erase [ɪ'reɪz] – стирать
26. to need [ni:d] – нуждаться
27. fast [fɑ:st] = quickly ['kwɪkli] – быстро  
ant. slowly ['sləuli] – медленно
28. to access [ə'kses] – иметь доступ
29. unique [ju:'ni:k] – уникальный
30. to indicate ['ɪndɪkeɪt] – указывать
31. to refresh [rɪ'freʃ] – обновлять
32. to charge [tʃɑ:ʒ] – заряжать  
to recharge [rɪ'tʃɑ:ʒ] – перезаряжать
33. frequently ['fri:kwəntli] = often ['ɒfn] – часто
34. otherwise ['ʌðəwaɪz] – в противном случае
35. to lose [lu:z] (lost, lost) – терять
36. contents ['kɒntents] – содержание, содержимое
37. considerable [kən'sɪdərəbl] – значительный  
considerably [kən'sɪdərəbli] – значительно
38. to move [mu:v] – перемещать(ся), пересылать
39. time-consuming ['taɪmkən'sju:mɪŋ] – забирающий много времени, трудоемкий
40. simple ['sɪmpl] – простой  
simply ['sɪmpli] – просто
41. partial ['pɑ:ʃl] – частичный
42. solution (to) [sə'lu:ʃn] – решение (чего-л.)
43. cache memory ['kæʃ 'meməri] – кэш-память
44. speed [spi:d] – скорость
45. recent ['ri:snt] – последний, недавний
46. amount [ə'maʊnt] – количество
47. to have an impact (on) [hæv ən 'ɪmpækt] – иметь, оказывать влияние (на)
48. tremendous [trə'mendəs] – огромный

**II. Answer the following questions.**

1. What is memory?
2. What does memory consist of?
3. What types of memory are there?
4. Which type of memory is permanent? temporary?
5. What does the term “non-volatile” mean?
6. What are the functions of ROM instructions?
7. Can the data in random access memory be changed?
8. What is the purpose of RAM?
9. How does the amount of RAM affect the computer’s speed?
10. How does the CPU access memory locations?
11. What is a memory address?
12. What are the types of RAM?
13. What is the difference between these two types?
14. What do you know about cache memory?

**III. Tell whether the following statements are true or false.**

1. The CPU can hold large amounts of data permanently.
2. Memory consists of chips on the motherboard or on a small circuit board.
3. The data in ROM can be changed.
4. The amount of ROM has an impact on the computer’s speed.
5. ROM is a form of cache memory.
6. RAM stands for “readable access memory”.
7. If a memory chip loses its contents when the computer’s power is turned off, the type of memory is said to be volatile.
8. More RAM can make a computer run faster.
9. A memory address is a number that indicates a location on a memory chip, and helps the CPU locate data in memory.
10. Dynamic RAM chips do not need to be recharged with electricity very often, and can hold their contents longer than static RAM chips.
11. Static RAM is faster than dynamic RAM.
12. Cache memory is a type of high-speed memory that contains the most recent data.

**IV. Fill in the blanks.**

1. Memory allows the CPU to \_\_\_\_\_ and \_\_\_\_\_ data quickly.
2. A set of start-up instructions in ROM checks for \_\_\_\_\_ and for \_\_\_\_\_ on the computer's disk drives.
3. Because RAM is \_\_\_\_\_, it needs a constant supply of power.

4. Memory that can be instantly changed is called, \_\_\_\_\_ or \_\_\_\_\_.
5. The purpose of RAM is to \_\_\_\_\_ programs and data while they are in use.
6. The \_\_\_\_\_ RAM a computer has, the \_\_\_\_\_ it can do and the \_\_\_\_\_ it can perform certain tasks.
7. A \_\_\_\_\_ is a number that indicates a location on the memory chips.
8. Dynamic RAM (DRAM) must be \_\_\_\_\_, or recharged with electricity frequently.
9. Static RAM can hold its \_\_\_\_\_ longer than dynamic RAM.
10. Cache memory is a type of \_\_\_\_\_ memory that contains the most recent data and instructions loaded by the CPU.

**V. Choose the right answer.**

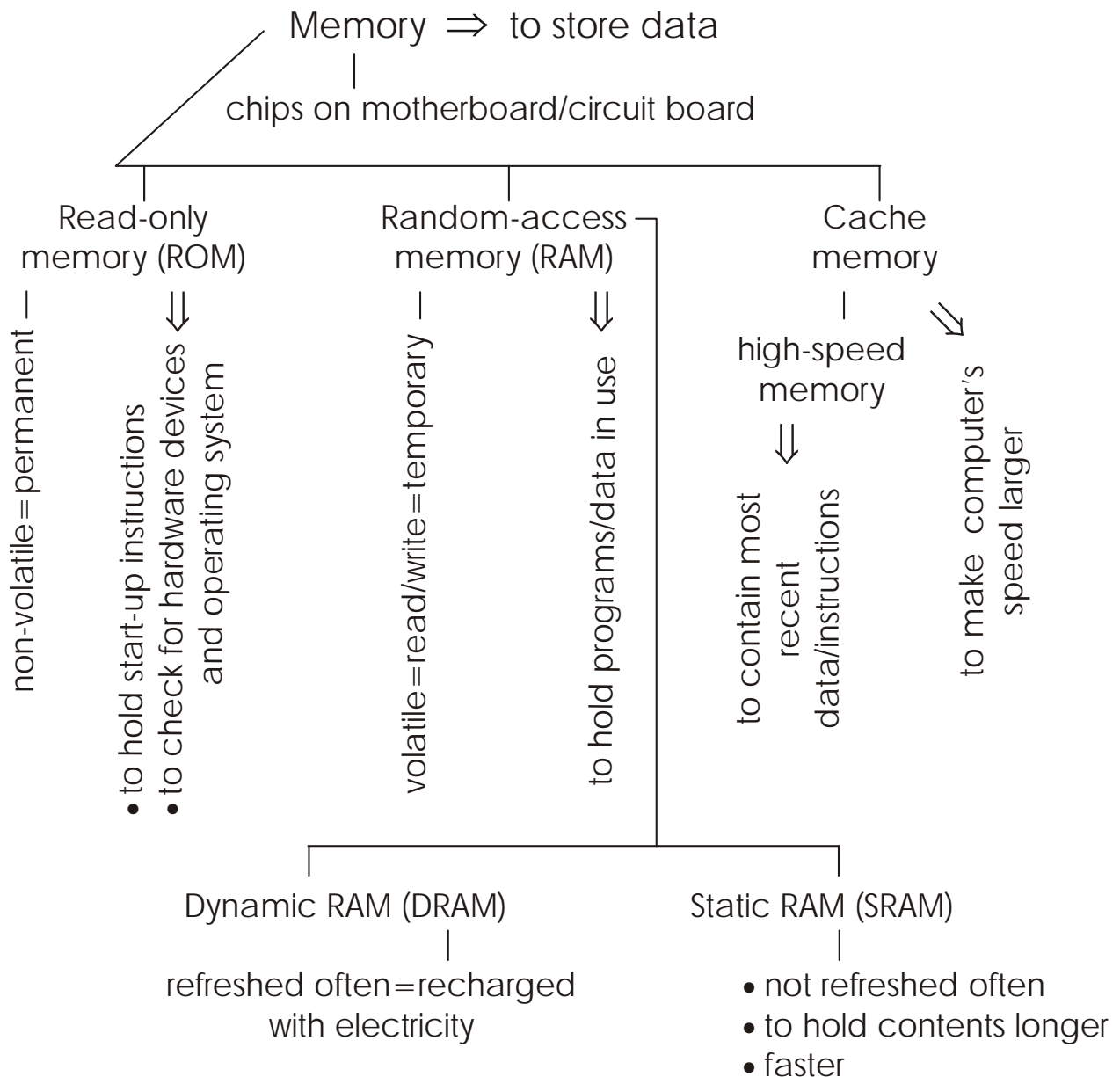
1. Registers are built into the ...
  - a. motherboard.
  - b. RAM.
  - c. CPU.
  - d. none of the above.
2. Another term for “random access memory” is ...
  - a. read-only memory.
  - b. storage.
  - c. short-term memory.
  - d. read/write memory.
3. In this type of memory chip, data cannot be changed.
  - a. Volatile.
  - b. Nonvolatile.
  - c. Random access memory.
  - d. All the above.
4. This type of RAM stores data even when the power is turned off.
  - a. SRAM.
  - b. DRAM.
  - c. ROM.
  - d. All the above.
5. In this type of memory programs and data can be written to and erased from as needed.
  - a. Read/write memory.
  - b. Read-only memory.

- c. Cache memory.
  - d. All the above.
6. This type of memory must be refreshed frequently.
- a. SRAM.
  - b. DRAM.
  - c. ROM.
  - d. RAM.
7. The amount of this type of memory has an impact on the computer's speed.
- a. Cache memory.
  - b. Non-volatile memory.
  - c. ROM.
  - d. All the above.
8. This type of memory holds programs and data while they are in use.
- a. ROM.
  - b. Non-volatile.
  - c. RAM.
  - d. All the above.

**VI. Match each item to the correct statement below.**

- a. Memory
  - b. RAM
  - c. ROM
  - d. Cache memory
1. Described as volatile.
2. Randomly accessed space.
3. The more, the better.
4. Stores start-up instructions.
5. Stores programs and data in use.
6. Described as non-volatile.
- a. Volatile
  - b. Non-volatile
  - c. SRAM
  - d. DRAM
7. Holds its contents longer.
8. Slower type of random access memory.
9. Loses its contents when the power is turned off.
10. Read-only memory belongs to this type.

**VII. Speak on the contents of the text using the following chart.**



Text 4

## Creating Computer Programs

### I. Read and translate the text.

A *computer program* is a set of commands that tell the CPU what to do. Software may contain only an executable program file, or it may have several other supporting files such as dynamic link libraries, initialization files, and help files.

An *executable file (EXE)* is the part of a program that sends commands to the processor that executes the commands in the file. In fact, when you run a program, you are running the executable file. A *dynamic link library (DLL)* is a partial EXE file, it contains a part of an executable program and does not run on its own; its commands are accessed by another running program. These files allow programmers to break large programs into small components; it makes the entire program easier to upgrade. DLL files can also be shared by several programs at one time. This feature makes them efficient for program storage. An *initialization file (INI)* contains configuration information, such as the size and starting point of a window, the color of the background, the user's name, and so on. Initialization files help programs start running or contain information that programs can use as they run. Although initializing files are still in use, many newer programs now store user preferences and other program variables in the Windows Registry. By including a *help file (HLP)*, programmers can provide the user with PC-based help.

To create a program, using a programming language a programmer creates source code, which is compiled or interpreted to create object code that the computer can understand. Object code, also known as machine code, is the binary language file that tells the CPU what to do.

When you launch a program, the computer begins reading and carrying out its statements. The order in which program statements are executed is called program *flow control*. When mapping a program, a programmer creates a flowchart. The steps represented in a flowchart are called an *algorithm* and usually lead to some desired result.

To perform certain tasks, the actual programming process uses variables and functions. Variables are placeholders for data being processed (e.g. variable Age). Functions, or mini-algorithms, are discrete sets of codes used to perform one task like finding the square root of a number or the average of a set of numbers.



*Vocabulary*

1. to create [kri:'eit] – создавать
2. to tell [tel] (told, told) – сообщать
3. several ['sevərəl] – несколько
4. other ['ʌðə] – другой
5. to support [sə'pɔ:t] – поддерживать
6. executable file (EXE) ['eksikju:təbl fail] – исполняемый файл
7. to send [send] (sent, sent) – отправлять, посылать
8. in fact [in'fækt] – фактически
9. dynamic link library (DLL) [dai'næmik liŋk 'laibrəri] – динамически подключаемая библиотека
10. on one's own [on wʌnz 'əun] – самостоятельно
11. easy ['i:zi] – лёгкий
12. to upgrade ['ʌp'greɪd] – модернизировать, усовершенствовать
13. feature ['fi:tʃə] – особенность, признак, свойство
14. efficient [i'fiʃənt] – эффективный
15. storage ['stɔ:riɔ] – хранение, запоминание
16. initialization file (INI) [i,nɪʃəli'zeɪʃn fail] – файл инициализации
17. size [saɪz] – размер
18. to start [stɑ:t] – начинать  
starting point ['stɑ:tiŋ point] – начальная точка, начальный пункт
19. window ['windəu] – окно
20. color ['klɒlə] – цвет
21. background ['bækgraund] – фон
22. and so on [ænd səu 'on] – и тому подобное
23. still [stil] – всё ещё, пока
24. preference ['prefərəns] – предпочтение; здесь настройка
25. variable ['vɛəriəbl] – переменная
26. Windows Registry ['windəuz 'redʒistri] – системный реестр, файл системного реестра
27. help file ['help fail] – файл справок
28. to base [beɪs] – основывать
29. programming language ['prəʊgræmɪŋ 'læŋgwɪdʒ] – язык программирования
30. source code ['sɔ:s kəʊd] – исходный код, исходный текст (программы)
31. to compile [kəm'pail] – компилировать, транслировать
32. to interpret [in'tə:prɪt] – переводить
33. object code ['ɒbʃɪkt kəʊd] – объектный код, объектная программа
34. to understand [ʌndə'stænd] (understood, understood) – понимать
35. binary ['bainəri] – двоичный
36. to launch [ləʊntʃ] – запускать

- 37. statement ['steɪtmənt] – утверждение, высказывание
- 38. flow control [fləʊ kən'trəʊl] – управление ходом программы
- 39. to map [mæp] – наносить на карту, составлять карту или схему, отображать в виде карты
- 40. flowchart ['fləʊtʃɑ:t] – блок-схема
- 41. to represent [ˌreprɪ'zent] – представлять
- 42. to lead [li:d] (led, led) (to) – приводить (к)
- 43. desired [dɪ'zaɪəd] – желаемый
- 44. actual ['æktʃuəl] – фактический
- 45. placeholder ['pleɪs'həʊldə] – метка-заполнитель
- 46. age [eɪdʒ] – возраст
- 47. discrete [dɪs'kri:t] – дискретный
- 48. to find [faɪnd] (found, found) – находить
- 49. square root ['skwɛə ru:t] – квадратный корень
- 50. average ['ævərɪdʒ] – средний

## **II. Answer the questions.**

- 1. What is a computer program?
- 2. What types of files can a program contain?
- 3. What is an executable file?
- 4. What is a dynamic link library?
- 5. What feature makes DLL files efficient for program storage?
- 6. What information do initialization files contain?
- 7. What information is stored in the Windows Registry?
- 8. What is the purpose of help files?
- 9. What tasks does a programmer perform to create a program?
- 10. What is a machine code?
- 11. What is called program flow control?
- 12. What does a programmer create when mapping a program?
- 13. What is an algorithm?
- 14. What is called a variable? a function?

## **III. Tell whether the following statements are true or false.**

- 1. A computer program is a set of instructions or statements that is carried out by the computer's RAM.
- 2. Software may contain not only an executable program file, but also have several other supporting files.
- 3. An executable file provides the user with PC-based help.
- 4. A DLL is a complete, fully functioning executable program file.
- 5. DLL files can also be shared by several programs at one time.

6. A help file contains information about the size and starting point of a window, the color of the background, the user's name.
7. Programmers use tools that convert their human-language instructions into codes that computers can understand.
8. Using a flowchart, you can *depict* (изобразить) any step-by-step process, *regardless of* (независимо) the desired result.
9. The steps in a flowchart represent an algorithm.
10. When writing a program, the programmer's first step is to create a source code.
11. Although it is possible for programmers to write programs in machine code, it is more practical to use special tools called programming languages, to write programs.
12. Programming process can use variables and functions.

#### IV. Fill in the blanks.

1. When you run a program, you are running its \_\_\_\_\_ file.
2. A (an) \_\_\_\_\_ file is a partial EXE file.
3. \_\_\_\_\_ files can help the programs start running or contain information that programs can use as they run.
4. By including a help file (HLP), programmers can provide the user with \_\_\_\_\_.
5. When mapping a program, a programmer creates a (an) \_\_\_\_\_.
6. \_\_\_\_\_ also known as machine code, is the binary language file that tells the CPU what to do.
7. \_\_\_\_\_ is the order in which program statements are executed.
8. The steps represented in a flowchart are called \_\_\_\_\_.
9. A (an) \_\_\_\_\_ is a placeholder for data being processed.
10. Discrete sets of code used to perform one task are \_\_\_\_\_, or mini-algorithms.

#### V. Choose the right answer.

1. Which of the following types of files actually sends commands to the processor?
  - a. EXE.
  - b. DLL.
  - c. INI.
  - d. HLP.
2. Which of the following types of files contains configuration information?
  - a. EXE.
  - b. DLL.
  - c. INI.
  - d. HLP.

3. To be understood by the computer's hardware, program instructions must be formatted as ...
  - a. programming language.
  - b. machine language.
  - c. object language.
  - d. source language.
4. A programming language enables the programmer to create a *description* (описание) of a program, and save the description in a file. The resulting description is called ...
  - a. source code.
  - b. machine code.
  - c. object code.
  - d. compiler code.
5. Before it can be run on a computer, source code must be converted into ...
  - a. compiler code.
  - b. assembler code.
  - c. interpreter code.
  - d. machine code.
6. The order in which program statements are executed is called ...
  - a. flowchart.
  - b. structure.
  - c. program control flow.
  - d. algorithm.
7. An algorithm is a set of steps that always ...
  - a. leads to a solution.
  - b. looks the same in a flowchart.
  - c. runs the program.
  - d. none of the above.
8. To perform certain tasks, the actual programming process uses...
  - a. variables.
  - b. HLP files.
  - c. all the above.
  - d. none of the above.

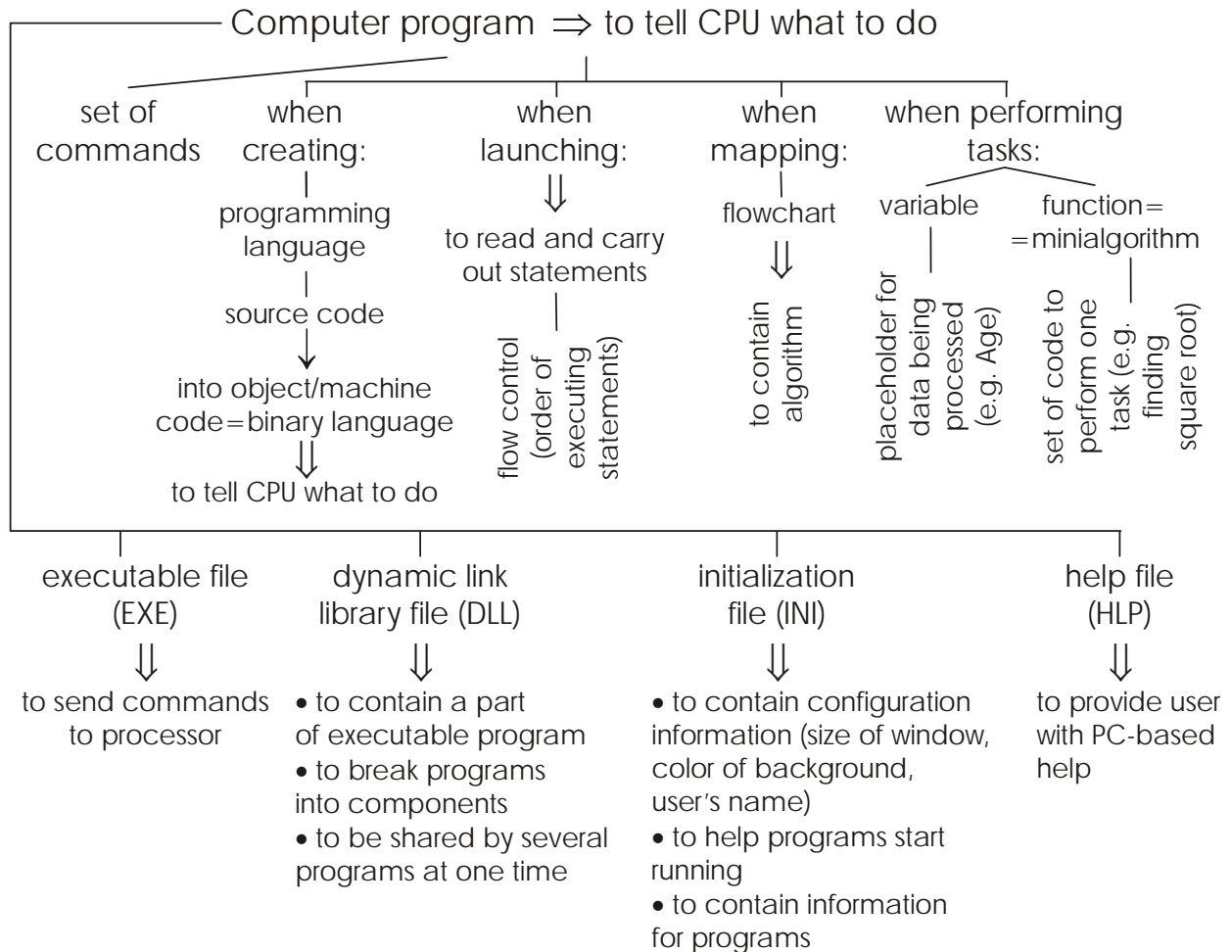
**VI. Match each item to the correct statement below.**

- |             |             |
|-------------|-------------|
| a. EXE file | c. INI file |
| b. DLL file | d. HLP file |

1. Can be shared by several programs.
2. Stores configuration information.
3. Sends commands to the processor.
4. Newer programs use Windows Registry instead of this.
5. A partial EXE file.
6. When you run a program, you are running this.
7. Provides PC-based help.
8. Allows programmers to break large programs into small components.
  - a. Source code
  - b. Object code
  - c. Algorithm
  - d. Program control flow
9. A description of a program.
10. The contents of an executable file.
11. Order of execution.

12. A set of steps that always leads to a solution.
13. The same whether done by a PC or by hand.
14. Can be depicted by a flowchart.

**VII. Speak on the contents of the text using the following chart.**



Text 5

**Structured and Object-Oriented Programming**

**I. Read and translate the text.**

*Structured Programming*

Structured programming evolved in the 1960s and 1970s. The name refers to the practice of building programs using a set of well-defined structures:

*Sequence structure* defines the default control flow in a program. This structure is built into programming languages. A computer executes lines of code in the order in which they are written. It is possible, as a result of a conditional statement or a function call, that the flow may have the option of going in one of several different directions.

*Selection structures* are built around the conditional statements. If the conditional statement is true, certain lines of code are executed. If the conditional statement is false, those lines of code are not executed.

*Repetition structures* (or looping structures) use the loops. In a repetition structure, the program checks a conditional statement and executes a loop based on the condition. If the condition is true, then a block of one or more commands is repeated until the condition is false.

### *Object-Oriented Programming*

In the 1980s object-oriented programming (OOP) was developed. Many programmers claim that an object orientation is a natural way of thinking about the world and it makes programs simpler and programming faster.

Concepts of object-oriented programming are *objects* and *classes*. OOP enhances structured programming. Objects are composed of structured program pieces, and the logic of manipulating objects is also structured. Every object has attributes and functions and may contain other objects. For example, the car object has attributes (color, size, shape, top speed), functions (moves forward, moves backward, opens its windows) and may encapsulate other objects (tires, chassis, motor) with their own attributes and functions.

All objects belong to classes. A class consists of attributes and functions shared by more than one object. All cars, for example, have a steering wheel and four tires. All cars can drive forward, reverse, park, and accelerate. Class attributes are called *data members*, and class functions are represented as *member functions* or methods.

Classes can be divided into subclasses. The car class, for example, could have a luxury sedan class, a sports car class, and an economy car class. Subclasses typically have all the attributes and methods of the parent class. Every sports car, for example, has a steering wheel and can drive forward. This phenomenon is called *class inheritance*. In addition to inherited characteristics, subclasses have unique characteristics of their own (fuel economy, trunk space, appearance).

When an object is created, it automatically has all the attributes and methods associated with that class. In the language of OOP, objects are instantiated (created).

Objects do not typically perform behaviors spontaneously. A car, for example, cannot move forward and backward at the same time or drive forward spontaneously. You send a signal to the car to move forward by pressing on the accelerator. Likewise, in OOP, *messages* are sent to objects, requesting them to perform a specific function. Part of designing a program is to identify the flow of sending and receiving messages among the objects.

## Vocabulary

1. to structure ['strʌktʃə] – структурировать  
structured programming ['strʌktʃəd 'prəʊgræmɪŋ] – структурное программирование
2. object ['ɒdʒɪkt] – объект  
object-oriented programming (OOP) ['ɒdʒɪkt 'ɔːriəntɪd 'prəʊgræmɪŋ] – объектно-ориентированное программирование
3. to evolve [i'vɒlv] – возникать, появляться
4. to refer (to) [rɪ'fəː] – иметь отношение, относиться (к ч.-л.)
5. default [di'fɔːlt] – используемый по умолчанию
6. control flow [kən'trəʊl fləʊ] – управляющая логика (программы)
7. line [laɪn] – строка
8. possible ['pɒsəbl] – возможный
9. conditional statement [kən'dɪʃənl 'steɪtmənt] – условное утверждение, условный оператор
10. function call ['fʌŋkʃn kɔːl] – вызов функции, обращение к функции
11. option ['ɒpʃn] – опция
12. different ['dɪfrənt] – различный, разный
13. selection [sə'lekʃn] – выбор, отбор
14. true [truː] – истинный
15. false [fɔːls] – ложный
16. to repeat [rɪ'pi:t] – повторять  
repetition [ˌrepɪ'tɪʃn] – повторение
17. loop [luːp] – цикл
18. to become [bi'kʌm] (became, become) – становиться
19. concept ['kɒnsɛpt] – понятие
20. to enhance [ɪn'hɑːns] – расширять, совершенствовать
21. to compose [kəm'pəʊz] – составлять  
to be composed (of) – быть составленным, состоять (из)
22. attribute ['ætrɪbjʊːt] – атрибут, свойство, характеристика
23. top speed [tɒp spiːd] – максимальная скорость
24. forward ['fɔːwəd] – вперёд  
backward ['bækwəd] – назад
25. to encapsulate [ɪn'kæpsjuːleɪt] – заключать в себе, включать в себя
26. tire ['taɪə] – шина, покрышка
27. chassis ['ʃæsiː] – шасси
28. motor ['mɔːtə] – двигатель
29. to belong (to) [bi'lɒŋ] – принадлежать (ч.-л.)
30. steering wheel ['stiəriŋ wiːl] – рулевое колесо
31. to drive [draɪv] (drove, driven) – ехать
32. reverse [rɪ'vɜːs] – обратный, в обратном направлении

- 33. to accelerate [ək'seləreɪt] – увеличивать скорость  
accelerator [ək'seləreɪtə] – педаль для газа
- 34. member ['membə] – член, элемент набора, элемент множества
- 35. luxury ['lʌksjəri] – роскошь
- 36. parent ['peərənt] – родительский, порождающий
- 37. to inherit [ɪn'herɪt] – наследовать  
inheritance [ɪn'herɪtəns] – наследование
- 38. to instantiate [ɪns'tæntɪeɪt] – создавать экземпляр
- 39. behavior [bi'heɪvjə] – поведение, линия поведения; здесь действие
- 40. spontaneously [spən'teɪnjəsli] – спонтанно, самопроизвольно
- 41. to press [pres] – нажимать, надавливать
- 42. likewise ['laɪkwaɪz] – подобно, так же, таким же образом
- 43. message ['mesɪdʒ] – сообщение, передаваемый блок информации
- 44. to request [rɪ'kwest] – запрашивать
- 45. to identify [aɪ'dentɪfaɪ] – идентифицировать, распознавать

## II. Answer the questions.

- 1. What is structured programming?
- 2. What are the three structures used in structured programming?
- 3. How does sequence structure work?
- 4. What is the difference between selection structure and repetition structure?
- 5. When was object-oriented programming developed?
- 6. What are the basic concepts of object-oriented programming?
- 7. What is an object made up of?
- 8. What is an object characterized by?
- 9. Give an example of an object and its attributes and functions.
- 10. What does a class consist of?
- 11. What are class attributes and functions called?
- 12. Give an example of a subclass.
- 13. What is meant by class inheritance?
- 14. How do objects perform functions in object-oriented programming?

## III. Tell whether the following statements are true or false.

- 1. There are three basic structures used in structured programming.
- 2. Sequence structure defines the default control flow in a program.
- 3. Sequence structure and selection structure are similar.
- 4. With selection structure, if the condition is true, then a block of one or more commands is repeated until the condition is false.
- 5. With the repetition structure, the program checks a conditional statement and executes a loop based on the condition.
- 6. Object-oriented programming was developed in the 1970s.



7. With the OOP programming becomes faster.
8. The basic concepts of object-oriented programming are objects, classes and structures.
9. Every object in OOP may encapsulate other objects.
10. All objects belong to subclasses.
11. Class inheritance means that subclasses of objects typically have all the attributes and methods of the parent class.
12. In OOP, messages are sent to objects for them to perform a specific function.

**IV. Fill in the blanks.**

1. \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ are used in structured programming.
2. Selection structures are built around \_\_\_\_\_.
3. In a repetition structure, the program \_\_\_\_\_ a conditional statement and \_\_\_\_\_ a loop based on the condition.
4. The acronym "OOP" stands for \_\_\_\_\_.
5. With the object-oriented programming programs become \_\_\_\_\_ and programming becomes \_\_\_\_\_.
6. A(an) \_\_\_\_\_ is a component of an object's overall description.
7. Class attributes are called \_\_\_\_\_, and class functions are represented as \_\_\_\_\_.
8. Subclasses have \_\_\_\_\_ and \_\_\_\_\_ characteristics.
9. In the language of OOP, objects are \_\_\_\_\_.
10. Objects send \_\_\_\_\_ to one another, to make requests.

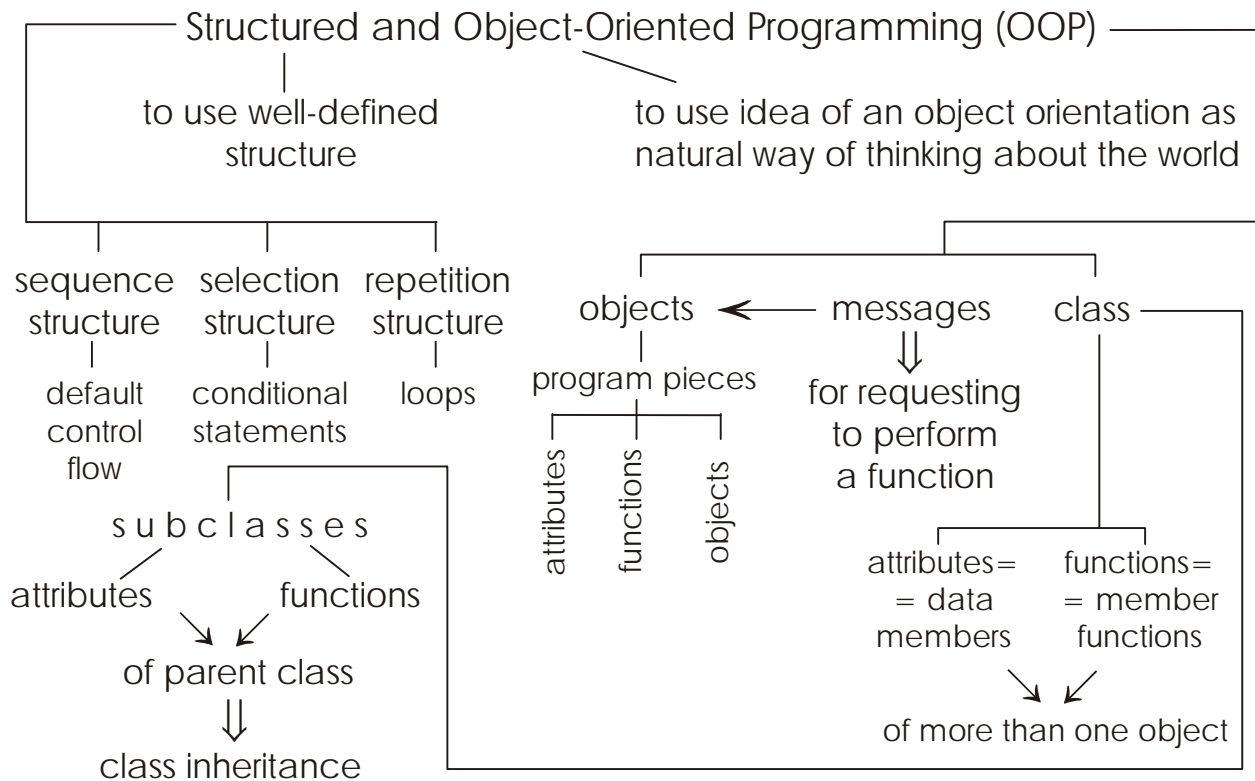
**V. Choose the right answer.**

1. With this structure, if the condition is true, then a block of one or more commands is repeated until the condition is false.
  - a. Selection structure.
  - b. Repetition structure.
  - c. Sequence structure.
  - d. All the above.
2. In structured programming selection structures *rely* (полагаются) on the use of ...
  - a. conditional statements.
  - b. loops.
  - c. functions.
  - d. objects.
3. The basic concepts of object-oriented programming are ...
  - a. classes.
  - b. objects.
  - c. none of the above.
  - d. all the above.

4. In object-oriented programming attributes and functions define a (an) ...
  - a. object.
  - b. statement.
  - c. class.
  - d. subclass.
5. In object-oriented programming the term “encapsulate” means...
  - a. contain.
  - b. enhance.
  - c. evolve.
  - d. none of the above.
6. Objects can share attributes and functions. Taken together, these shared attributes and functions *constitute* (составляют) a ...
  - a. class.
  - b. message.
  - c. member.
  - d. condition.
7. All objects belong to ...
  - a. members.
  - b. classes.
  - c. messages.
  - d. statements.
8. In the language of object-oriented programming the term “instantiate” means ...
  - a. send.
  - b. inherit.
  - c. create.
  - d. include.

**VI. Match each item to the correct statement below.**

- a. Structured programming
  - b. Object-oriented programming
  - c. Sequence structure
  - d. Selection structure
1. Uses attributes and functions.
  2. Controls program flow in three ways.
  3. Built around the conditional statements.
  4. Built into programming languages.
  5. Earlier development.
  6. Makes programming faster.
    - a. Classes
    - b. Subclasses
    - c. Data members
    - d. Data functions
  7. Have all the attributes and methods of the parent class.
  8. Objects belong to them.
  9. Class attributes are referred to them.
  10. Class functions are called so.
  11. Have both inherited and unique characteristics.
  12. Consist of attributes and functions shared by more than one object.

**VII. Speak on the contents of the text using the following chart.**

Text 6

**Programming Languages****I. Read and translate the text.**

*Programming* is a way of sending instructions to the computer. To create these instructions, programmers use programming languages to create source code, and the source code is then converted into machine (or object) code, the only language that a computer understands. People, however, have difficulty understanding machine code. As a result, first assembly languages and then higher-level languages were developed. Programming languages require that information be provided in a certain order and structure, that symbols be used, and sometimes even that punctuation be used. These rules are called the *syntax* of the programming language, and they vary a great deal from one language to another.

**Categories of Languages**

Based on evolutionary history, programming languages fall into one of the following three broad categories:

**Machine Languages.** Machine languages consist of the 0s and 1s of the binary number system and are defined by hardware design. A computer understands only its machine language – the commands in its instruction set that instruct the computer to perform elementary operations such as loading, storing, adding, and subtracting.

*Assembly Languages.* These languages were developed by using English-like mnemonics. Programmers worked in text editors to create their source files. To convert the source files into object code, researchers created translator programs called assemblers. Assembly languages are still much easier to use than machine language.

*Higher-Level Languages.* These languages use syntax that is close to human language, they use familiar words instead of communicating in digits. To express computer operations, they use operators, such as the plus or minus sign, that are the familiar components of mathematics. As a result, reading, writing, and understanding computer programs is easier.

Machine languages are considered first-generation languages, and assembly languages are considered second-generation languages. The higher-level languages began with the third generation. Third-generation languages (3GLs) can support structured programming, use true English-like phrasing, make it easier for programmers to share in the development of programs. Besides, they are portable, that is, you can put the source code and a compiler or interpreter on practically any computer and create working object code. Some of the third-generation languages include the following: FORTRAN, COBOL, BASIC, Pascal, C, C++, Java, ActiveX.

Fourth-generation languages (4GLs) use either a text environment, much like a 3GL, or a visual environment. In the text environment, the programmer uses English-like words when generating source code. In a 4GL visual environment, the programmer uses a toolbar to drag and drop various items like buttons, labels, and text boxes to create a visual definition of an application. Many 4GLs are database-aware; that is, you can build programs with a 4GL that work as front end (an interface that hides much of the program from the user) to databases. Programmers can also use 4GLs to develop prototypes of an application quickly. Some of the fourth-generation languages are Visual Basic and Visual Age.

A 5GL would use artificial intelligence to create software based on your description of what the software should do.

### *Vocabulary*

1. as a result [əzəri'zʌlt] – в результате
2. assembly language [ə'sembli 'læŋgwɪdʒ] – язык ассемблера
3. higher-level language ['haɪə'levl 'læŋgwɪdʒ] – язык более высокого уровня, высокоуровневый язык
4. punctuation [ˌpʌŋktju'eɪʃn] – пунктуация
5. syntax ['sɪntæks] – синтаксис, синтаксическая структура
6. to vary ['veəri] – отличаться  
various ['veəriəs] – различный

7. a great deal [ə'greɪt di:l] – очень, сильно
8. evolutionary [i:və'lu:ʃnəri] – эволюционный
9. to fall [fɔ:l] (fell, fallen) (into) – распадаться (на ч.-л.)
10. broad [brɔ:d] – общий, широкий
11. binary number system ['bainəri 'nʌmbə 'sɪstəm] – система двоичных чисел
12. mnemonics [ni:'moniks] – мнемоника, символика
13. text editor ['tekst 'editə] – текстовый редактор
14. researcher [ri'sə:tʃə] – исследователь
15. translator program [træns'leɪtə 'prəʊgræm] – транслирующая программа
16. close (to) [kləʊs] – близкий (чему-л.)
17. human ['hju:mən] – человеческий
18. familiar [fə'miliə] – знакомый
19. instead (of) [ɪns'ted] – вместо (ч.-л.)
20. to communicate [kə'mju:nikeɪt] – обмениваться информацией
21. digit ['dɪdʒɪt] – одноразрядное число
22. plus [plʌs] – плюс
23. minus ['maɪnəs] – минус
24. sign [saɪn] – знак
25. to consider [kən'sɪdə] – считать, рассматривать
26. generation [dʒenə'reɪʃn] – поколение
27. to begin [bi'ɡɪn] (began, begun) – начинать
28. phrasing ['freɪzɪŋ] – выражение, оборот, синтаксическая конструкция
29. besides [bi'saɪdɪz] – кроме того
30. portable ['pɔ:təbl] – машинонезависимый, мобильный, переносимый
31. that is ['ðætɪz] – то есть
32. to compile [kəm'paɪl] – компилировать, транслировать  
    compiler [kəm'paɪlə] – компилятор, компилирующая программа
33. to interpret [ɪn'tə:prɪt] – интерпретировать, переводить  
    interpreter [ɪn'tə:prɪtə] – интерпретатор, интерпретирующая программа
34. environment [ɪn'vaɪərənmənt] – среда
35. visual ['vɪʒu:əl] – визуальный, зрительный
36. toolbar ['tu:lba:] – панель инструментов
37. to drag and drop ['drægən'drɒp] – перетаскивать
38. item ['aɪtəm] – элемент
39. button ['bʌtn] – кнопка
40. label ['leɪbl] – метка, ярлык
41. text box ['tekst bɒks] – текстовое поле
42. definition [defɪ'niʃn] – определение, описание
43. aware [ə'weə] – осведомлённый
44. front end ['frʌnt end] – внешний интерфейс
45. to hide [haɪd] – скрывать

- 46. prototype ['prəʊtətaɪp] – макет, прототип
- 47. artificial intelligence [ɑːti'fɪʃəl in'telɪdʒəns] – искусственный интеллект
- 48. description [dis'kripʃn] – описание

## II. Answer the questions.

1. What is programming?
2. How are instructions created?
3. What is called the syntax of the programming language?
4. What are the categories of programming languages?
5. What is a machine language?
6. What is the difference between machine language and assembly language?
7. What is a translator program?
8. Why is programming in higher-level languages easier than in machine and assembly languages?
9. What languages are considered first- and second-generation languages?
10. What are third-generation languages characterized by?
11. Give the names of third-generation languages.
12. What types of environment are used with fourth-generation languages?
13. Give the names of some fourth-generation languages.
14. What would fifth-generation languages be characterized by?

## III. Tell whether the following statements are true or false.

1. Assembly-languages and higher-level languages were developed because people have difficulty understanding machine code.
2. Programming languages require the programmer to follow rules of syntax.
3. Compilers and interpreters can *correct* (исправлять) the programmer's syntax errors when creating object code.
4. Programming languages are usually grouped by their place in the evolution of programming languages.
5. Machine languages are the most advanced of all programming languages.
6. Machine languages and assembly languages are both considered first-generation programming languages.
7. Assembly languages are based on binary number system.
8. Third-generation languages use a visual environment.
9. Third-generation languages are highly portable.

10. Because they are more complex and sophisticated, fourth-generation languages are considerably more difficult to use than third-generation languages.
11. One benefit of fourth-generation languages is their *ability* (способность) to generate prototype applications quickly.
12. Visual Basic lets programmers create applications only in a text environment.

#### IV. Fill in the blanks.

1. Many programming languages follow a set of rules called \_\_\_\_\_.
2. Programming languages fall into \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
3. Machine languages are defined by \_\_\_\_\_ design.
4. A computer understands only its machine language and performs elementary operations such as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
5. \_\_\_\_\_ languages were developed by using English-like mnemonics for commonly used *strings* (строка) of machine language.
6. \_\_\_\_\_ are used for converting the source files into object code.
7. The term \_\_\_\_\_ means that you can put the source code and a compiler or interpreter on practically any computer and create working object code.
8. Fourth-generation languages use either a \_\_\_\_\_ environment or a \_\_\_\_\_ environment.
9. Examples of fourth-generation languages are \_\_\_\_\_ and \_\_\_\_\_.
10. A(n) \_\_\_\_\_ is an interface to a program that hides much of the program from the user.

#### V. Choose the right answer.

1. To create source code, programmer use ...
  - a. programming languages.
  - b. object code.
  - c. compilers.
  - d. interpreters.
2. A programming language's syntax rules may require that ...

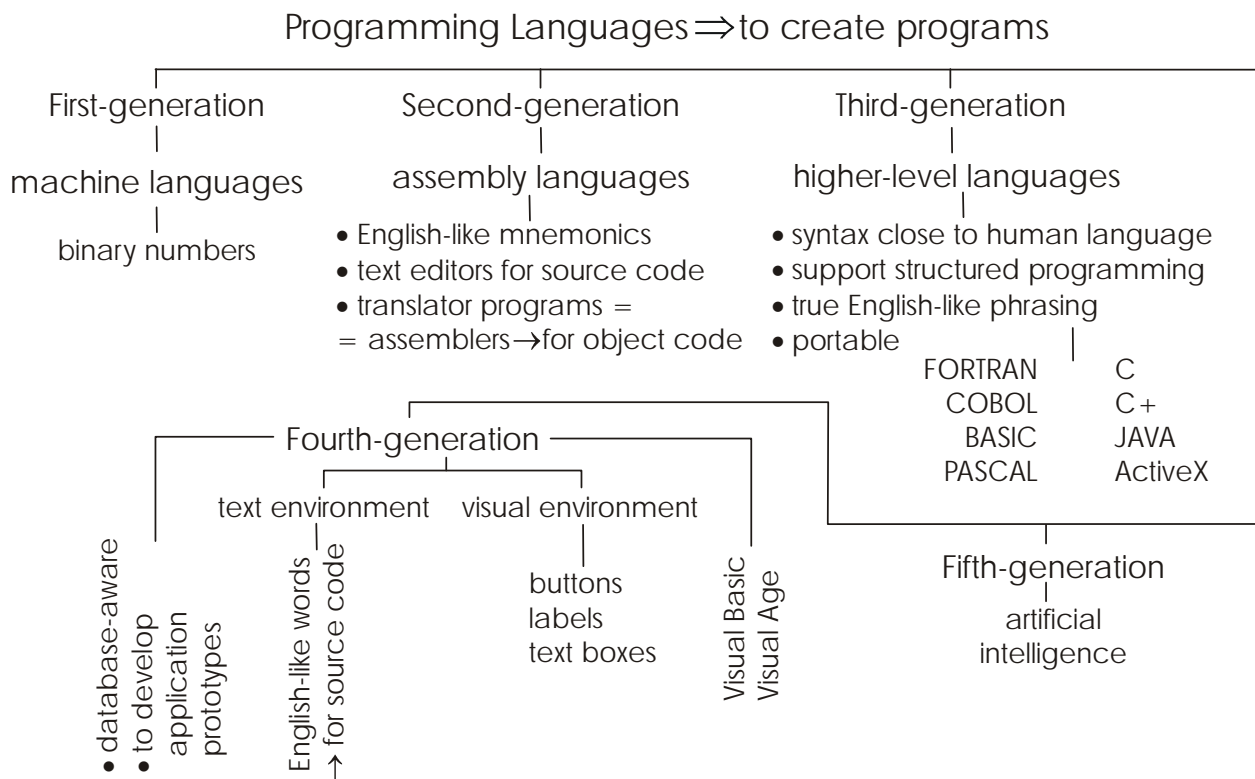
- a. information is provided in a certain order.
  - b. symbols are used.
  - c. punctuation is used.
  - d. all the above.
3. Which of the following is not a major category of programming languages?
- a. Machine languages.
  - b. Assembly languages.
  - c. Lower-level languages.
  - d. Higher-level languages.
4. Machine languages are defined by ...
- a. hardware design.
  - b. portability.
  - c. compilers.
  - d. syntax.
5. Which of the following is closest to human language?
- a. Machine languages.
  - b. Assembly languages.
  - c. Higher-level languages.
  - d. All are similar to human language.
6. Which of the following is not a category of higher-level languages?
- a. Third-generation languages.
  - b. Fourth-generation languages.
  - c. Fifth-generation languages.
  - d. Sixth-generation languages.
7. Which of the following is considered to be a second-generation programming language?
- a. Machine language.
  - b. Assembly language.
  - c. Higher-level language.
  - d. None of the above.
8. Which type of language was the first to use true English-style phrasing?
- a. First-generation language.
  - b. Second-generation language.
  - c. Third-generation language.
  - d. Fourth-generation language.



**VI. Match each item to the correct statement below.**

- a. Machine languages
  - b. Assembly languages
  - c. Higher-level languages
  - d. Third-generation languages
  - e. Fourth-generation languages
  - f. Fifth-generation languages
1. The most basic of languages.
  2. Consist of strings of numbers.
  3. Use familiar words.
  4. *Utilize* (используют) artificial intelligence.
  5. Were the first to use English-like mnemonics.
  6. Use a text environment and a visual environment.
  7. Developed to make programming easier.
  8. Support structured programming.
  9. Visual Basic is an example of them.
  10. Translator programs are used with them.

**VII. Speak on the contents of the text using the following chart.**



UNIT 3. Databases

Text 7

**Databases and Database Management Systems**

**I. Read and translate the text.**

A *database* is a collection of related data or facts arranged in a specific structure. A *database management system (DBMS)* is a program, or collection of programs, that allows multiple users to store, access, and process data or facts into useful information.

Three of the most important terms to know about databases are *a table, a record, a field*. Data is stored in tables. A table is divided into records (unnamed rows), and each record is divided into fields (named columns). The table consists of a set number of fields and an arbitrary number of records. For a record to exist, it must have data in at least one field.

To help you understand how a database stores data, think about a typical address book. Each piece of information in the address book is stored in its own location, called a field. For example, each entry has a field for First Name and another field for Last Name, as well as fields for Address, City, State, ZIP Code, and Phone Number. Each unique type of information is stored in its own field. One full set of fields – that is, all the related information about one person or object – is called a record. Therefore, all the information for the first person is record 1, all the information for the second person is record 2, and so on. A complete collection of records makes a table. Once you have a structure for storing data (whether it is a printed address book, phone book, or electronic table), you can enter and view data, create reports, and perform other tasks with the data. For example, you may create a customer report that lists customers by ZIP Code.

A DBMS provides tools to perform data management functions: creating tables, sorting tables, entering and editing data, querying the database, viewing data, generating reports.

Many different DBMS programs are available. Enterprise-level products, such as Oracle, DB2, and Sybase, are designed to manage large special-purpose database systems. Programs such as Microsoft Access, Corel's Paradox, and Lotus Approach are popular among individual and small-business database users.

*Vocabulary*

1. database ['deɪtəbeɪs] – база данных
2. collection [kə'lekʃn] – совокупность
3. to relate [ri'leɪt] – соотносить  
related [ri'leɪtɪd] – здесь связанный  
relationship [ri'leɪʃnʃɪp] – отношение
4. to arrange [ə'reɪndʒ] – компоновать, размещать, располагать, упорядочивать
5. specific [spi'sɪfɪk] – заданный, специфический
6. database management system (DBMS) ['deɪtəbeɪs 'mænədʒmənt 'sɪstəm] – система управления базой данных (СУБД)
7. multiple ['mʌltɪpl] – множественный, многочисленный
8. term [tɜ:m] – термин
9. table ['teɪbl] – таблица
10. record ['rekɔ:d] – запись
11. field [fi:ld] – поле
12. to name [neɪm] = to call [kɔ:l] – называть
13. row [rəʊ] – ряд, строка
14. column ['kɒləm] – колонка, столбец, графа
15. to set [set] (set, set) – устанавливать
16. number (of) ['nʌmbə] – ряд, число (чего-л.)
17. arbitrary ['ɑ:bitrəri] – произвольный
18. to exist [ɪg'zɪst] – существовать
19. at least [ət'li:st] – по крайней мере, не менее
20. to think [θɪŋk] (thought, thought) – здесь представлять себе
21. typical ['tɪpɪkl] – типичный, обычный
22. piece [pi:s] – порция, кусок
23. own [əʊn] – собственный
24. location [ləu'keɪʃn] – расположение
25. entry ['entri] – запись, содержимое, введенные данные
26. as well as [əz 'wel æz] – а также
27. ZIP Code ['zɪp kəʊd] – почтовый индекс
28. full [fu:l] = complete [kəm'pli:t] – полный
29. therefore ['ðeəfɔ:] – следовательно
30. once [wʌns] – как только
31. to enter ['entə] – вводить
32. to view [vju:] – просматривать
33. to generate ['dʒenəreɪt] – создавать, производить
34. report [rɪ'pɔ:t] – отчет, сообщение
35. customer ['kʌstəmə] – клиент, заказчик, покупатель
36. to sort [sɔ:t] – сортировать, упорядочивать

- 37. to edit ['edit] – редактировать
- 38. to query ['kwɪəri] – делать запрос  
query – запрос
- 39. available [ə'veiləbl] – доступный, наличный
- 40. enterprise ['entəpraɪz] – предприятие
- 41. level ['levl] – уровень
- 42. such as ['sʌtʃ əz] – такие, как
- 43. to design [di'zain] – проектировать, конструировать, разрабатывать
- 44. special-purpose ['speʃəl 'rə:pəs] – специализированный
- 45. popular ['pɒpjulə] – популярный
- 46. among [ə'mʌŋ] – среди
- 47. individual [indi'vidjuəl] – отдельный

**II. Answer the following questions.**

- 1. What is a database?
- 2. What is a database management system?
- 3. What are the most important terms to know about databases?
- 4. Where is data stored in a database?
- 5. What is a table? a record? a field?
- 6. What type of information is stored in the field?
- 7. What data can a field contain?
- 8. What functions does a DBMS provide?
- 9. What enterprise-level DBMS programs do you know?
- 10. What DBMS programs are popular among individual and small-business users?

**III. Tell whether the following statements are true or false.**

- 1. A database management system is a *repository* (архив) for collections of related data or facts.
- 2. A database is *at the heart* (в центре) of many types of computer applications.
- 3. In a database, each piece of information is stored in its own location, called a directory.
- 4. In a database, a record contains all the related information about a *single* (единственный) person or object.
- 5. In a database table, all the records are organized according to the same set of fields.
- 6. One full set of fields is called a table.
- 7. A database management system allows to view data, create reports and perform other tasks with the data.
- 8. DBMS programs are used only by individual users.

9. In a database, the number of records is set, but the number of fields is arbitrary.
10. A record must have data in at least one field.

**IV. Fill in the blanks.**

1. The three most important terms to know about databases are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. The table \_\_\_\_\_ a set number of fields and an arbitrary number of records.
3. In a database, each unique type of information is stored in its own \_\_\_\_\_.
4. All the \_\_\_\_\_ information about one person or object is called a record.
5. For a database record to exist, it must have data in at least one \_\_\_\_\_.
6. The DBMS \_\_\_\_\_ the user with data and the tools to work with the data.
7. A DBMS provides tools to \_\_\_\_\_ tables, \_\_\_\_\_, \_\_\_\_\_ data, \_\_\_\_\_ the database, \_\_\_\_\_ reports.
8. A database management system \_\_\_\_\_ multiple users to store, access, and process data or facts into useful information.

**V. Choose the right answer.**

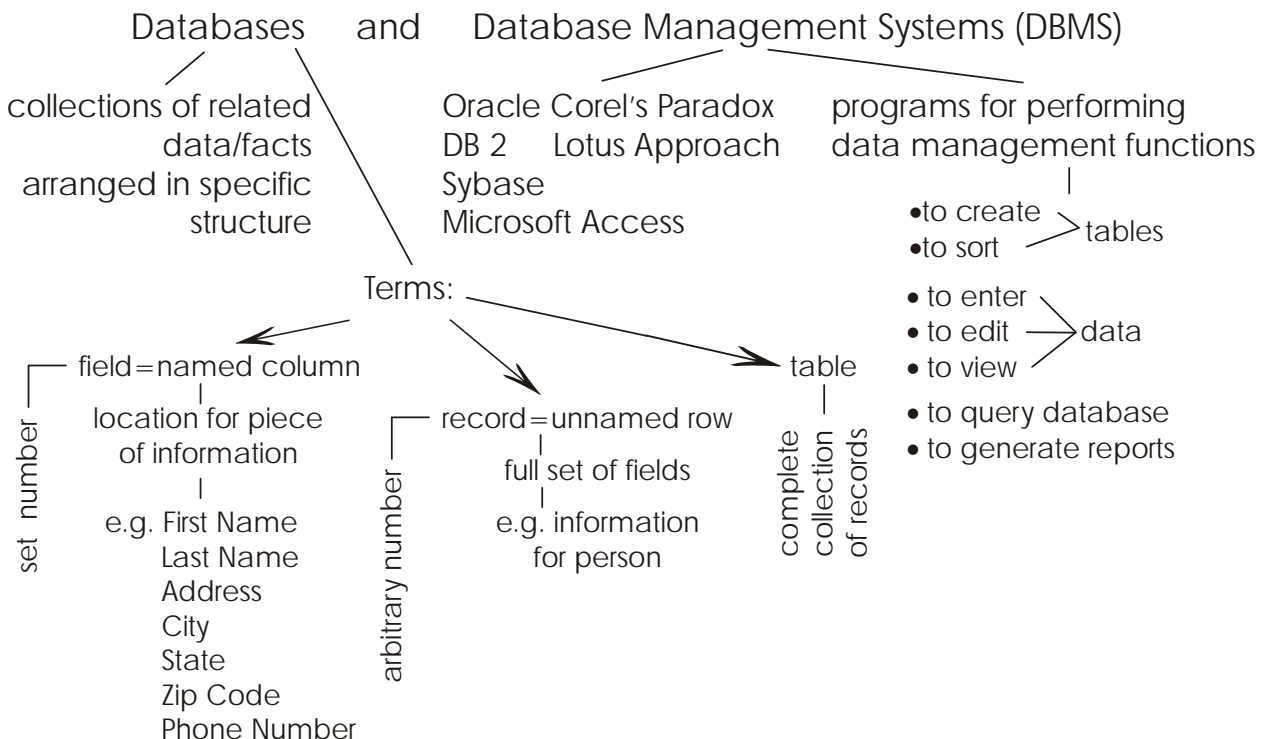
1. A tool that allows users to store, access, and process data is called...
  - a. database.
  - b. database management system.
  - c. form.
  - d. query.
2. A database is a collection of related facts arranged in a specific...
  - a. database management system.
  - b. structure.
  - c. field.
  - d. application.
3. In a database, names such as “Last name” and “Address” may be given to the ...
  - a. records.
  - b. files.
  - c. fields.
  - d. DBMS.
4. A database table is a collection of ...
  - a. records.
  - b. fields.
  - c. rows.
  - d. columns.
5. In a database table, fields are stored as ...
  - a. columns
  - b. rows
  - c. reports
  - d. none of the above

6. Each object's record *contains* (содержит) a limited number of...
- a. data.
  - b. tables.
  - c. fields.
  - d. characters.

**VI. Match each item to the correct statement below.**

- a. Database
  - b. Record
  - c. Database management system
  - d. Field
  - e. Table
1. A data repository.
  2. A software tool.
  3. Helps users process data into information.
  4. At the heart of many types of applications.
  5. A complete collection of records.
  6. All the related information about one thing.
  7. Each piece of information is stored in one.
  8. The database has arbitrary number of them.
  9. Can store any number of records.
  10. The database has a set number of them.

**VII. Speak on the contents of the text using the following chart.**



## Text 8

**Database Structures****I. Read and translate the text.**

There are several types of database structures, such as flat-file, relational, hierarchical, network and object-oriented ones.

A database that consists of a single data table is called a *flat-file (sequential file) database*. Flat-file databases are useful for certain single-user or small-group situations, especially for maintaining address lists or inventories. Flat-file database systems are easy to learn and use, but difficult to maintain and limited in their power. When numerous files exist (one for each table or related document), there is often a lot of data redundancy, which increases the chance for errors, wastes time, and uses excess storage space.

A *relational database* is made up of a set of tables, and a common field existing in any two tables creates a relationship between the tables. For example, a Customer ID Number field in both the Customers table and the Orders table links the two tables, while a Product ID field links the Orders and Products tables. The relational database structure is widely used in today's business organizations. In a business, a typical relational database contains such data tables, as Customer information, Employee information, Vendor information, Order information, Inventory information.

The *hierarchical database* is an older style of database. The tables are organized into a fixed treelike structure, with each table storing one type of data. The trunk table (the main table) stores general information. Any field in that table may reference another table that contains subdivisions of data. Each one of those tables may, in turn, reference other tables that store finer subdivisions of data. The relationship between tables is said to be a parent-child relationship, or one-to many relationship, with any child table relating to only one parent table. Each parent table may have many child tables, but each child has only one parent. Hierarchical databases require little duplicated data and may locate data quickly. However, the tables' fixed relationships limit the flexibility of the database, making some kinds of queries or reports difficult or impossible.

The *network database* model is similar to the hierarchical structure except that any one table can relate to any number of other tables. The network database's tables, therefore, are said to have a many-to-many relationship. Like the hierarchical structure, the network database is used in older (primarily mainframe) systems.

The *object-oriented database (OODB)* developed in the late 1980s, groups data items into complex items called objects. These objects can represent anything: a product, an event, a customer complaint, or even a purchase. An object is defined by its characteristics (e.g. text, sound, graphics, video), attributes (e.g. color, size, style, quantity, price), and procedures (the processing associated with an object).

*Vocabulary*

1. flat-file database ['flætfaɪl 'deɪtəbeɪs] – база данных с последовательным доступом
2. relational database [ri'leɪʃənl 'deɪtəbeɪs] – реляционная база данных
3. hierarchical database [haɪə'rɑ:kɪkəl 'deɪtəbeɪs] – иерархическая база данных
4. network database ['netwɜ:k 'deɪtəbeɪs] – сетевая база данных
5. object-oriented database ['ɒbdʒɪkt 'ɔ:riəntɪd 'deɪtəbeɪs] – объектно-ориентированная база данных
6. single ['sɪŋɡl] – единственный
7. sequential [si'kwɛnʃəl] – последовательный
8. especially [ɪs'peʃəli] – особенно
9. to maintain [men'teɪn] – поддерживать
10. list [lɪst] – перечень, список
11. inventory [ɪn'ventəri] – инвентаризационная опись, товары
12. to learn [lə:n] – изучать
13. difficult ['dɪfɪkəlt] – трудный
14. to limit ['lɪmɪt] – ограничивать  
limited – ограниченный
15. power ['paʊə] – мощность, производительность
16. numerous ['nju:mərəs] – многочисленный
17. data redundancy ['deɪtə rɪ'dʌndənsi] – избыточность данных
18. to increase [ɪn'kri:s] – увеличивать, возрастить
19. chance [tʃɑ:ns] – возможность
20. error ['erə] – ошибка
21. to waste time [weɪst taɪm] – тратить время
22. excess [ɪk'ses] – излишний
23. storage space ['stɔ:ridʒ speɪs] – объём памяти
24. to make up [meɪk'ʌp] – составлять  
to be made up (of) [meɪd'ʌp] – быть составленным, состоять (из)
25. any ['eni] – любой  
anything ['eniθɪŋ] – (всё) что угодно
26. order ['ɔ:də] – заказ
27. to link [lɪŋk] – связывать, соединять
28. wide [waɪd] – широкий  
widely ['waɪdli] – широко
29. employee [ˌemploɪ'i:] – служащий
30. vendor ['vɛndə] – поставщик, производитель, продавец
31. treelike ['tri:lɪk] – древовидный
32. trunk table (main table) [trʌŋk 'teɪbl] ([meɪn 'teɪbl]) – главная (основная) таблица
33. general ['dʒenərəl] – общий



- 34. to reference ['refrəns] – ссылаться
- 35. subdivision ['sʌbdɪvɪʒn] – подраздел, подразделение
- 36. fine [faɪn] – мелкий
- 37. little ['lɪtl] – мало
- 38. to duplicate ['dju:plikeɪt] – дублировать, копировать
- 39. however [haʊ'evə] – однако, тем не менее
- 40. flexibility [fleksɪ'bɪlɪtɪ] – гибкость
- 41. impossible [ɪm'pɒsəbl] – невозможный
- 42. similar (to) ['sɪmɪlə] – аналогичный (чему-л.), сходный (с чем-л.)
- 43. except [ɪk'sept] (that) – за исключением (того, что)
- 44. like [laɪk] – как, подобно
- 45. mainframe ['meɪnfreɪm] – большой компьютер, мэйнфрейм
- 46. to develop [dɪ'veləp] – разрабатывать
- 47. data item ['deɪtə 'aɪtəm] – элемент данных
- 48. event [ɪ'vent] – событие
- 49. complaint [kəm'pleɪnt] – жалоба
- 50. purchase ['pɜ:tʃəs] – покупка
- 51. to define [dɪ'faɪn] – определять, описывать
- 52. quantity ['kwɒntəti] – количество
- 53. price [praɪs] – цена
- 54. procedure [prə'si:dʒə] – процедура
- 55. to associate [ə'səʊʃieɪt] – соединять, связывать

## II. Answer the questions.

- 1. What types of database structures are there?
- 2. What is a flat-file database?
- 3. Where are flat-file databases used?
- 4. What are the drawbacks of flat-file databases?
- 5. What is the structure of a relational database?
- 6. What tables can a relational database contain?
- 7. How are the tables in a hierarchical database organized?
- 8. What information does the trunk table store?
- 9. What is the relationship between tables in a hierarchical database?
- 10. What are the advantages and drawbacks of a hierarchical database?
- 11. What does the network database structure differ from the hierarchical database model in?
- 12. What kind of systems are the network and hierarchical databases used in?
- 13. When was the object-oriented database developed?
- 14. What does it group data items into?
- 15. What can the objects represent?
- 16. What is an object defined by?

**III. Tell whether the following statements are true or false.**

1. If a database file contains only one data table, it is called an informational database.
2. Flat-file database systems are difficult to learn and use.
3. A relational database is made up of two tables.
4. In a relational database, a common field existing in any two tables creates a relationship between the tables.
5. A parent-child relationship is *the same* (то же самое) as a one-to-many relationship.
6. Network databases and hierarchical databases function in the same *way* (способ).
7. In an object-oriented database, items of data are grouped into complex objects.
8. In an object-oriented database, each object can have only one characteristic.

**IV. Fill in the blanks.**

1. Older database systems that used only a single table are called \_\_\_\_\_.
2. In an object-oriented database, an object is defined by its \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. There are several types of database structures, such as \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ ones.
4. Flat-file database systems are \_\_\_\_\_ in their power.
5. A \_\_\_\_\_ is made up of a set of tables, and a common field existing in any two tables creates a \_\_\_\_\_ between the tables.
6. In a hierarchical database the tables are organized into a fixed \_\_\_\_\_ structure.
7. The network database's tables have a \_\_\_\_\_ relationship.
8. The relationship between tables in a hierarchical database is called a \_\_\_\_\_ relationship.

**V. Choose the right answer.**

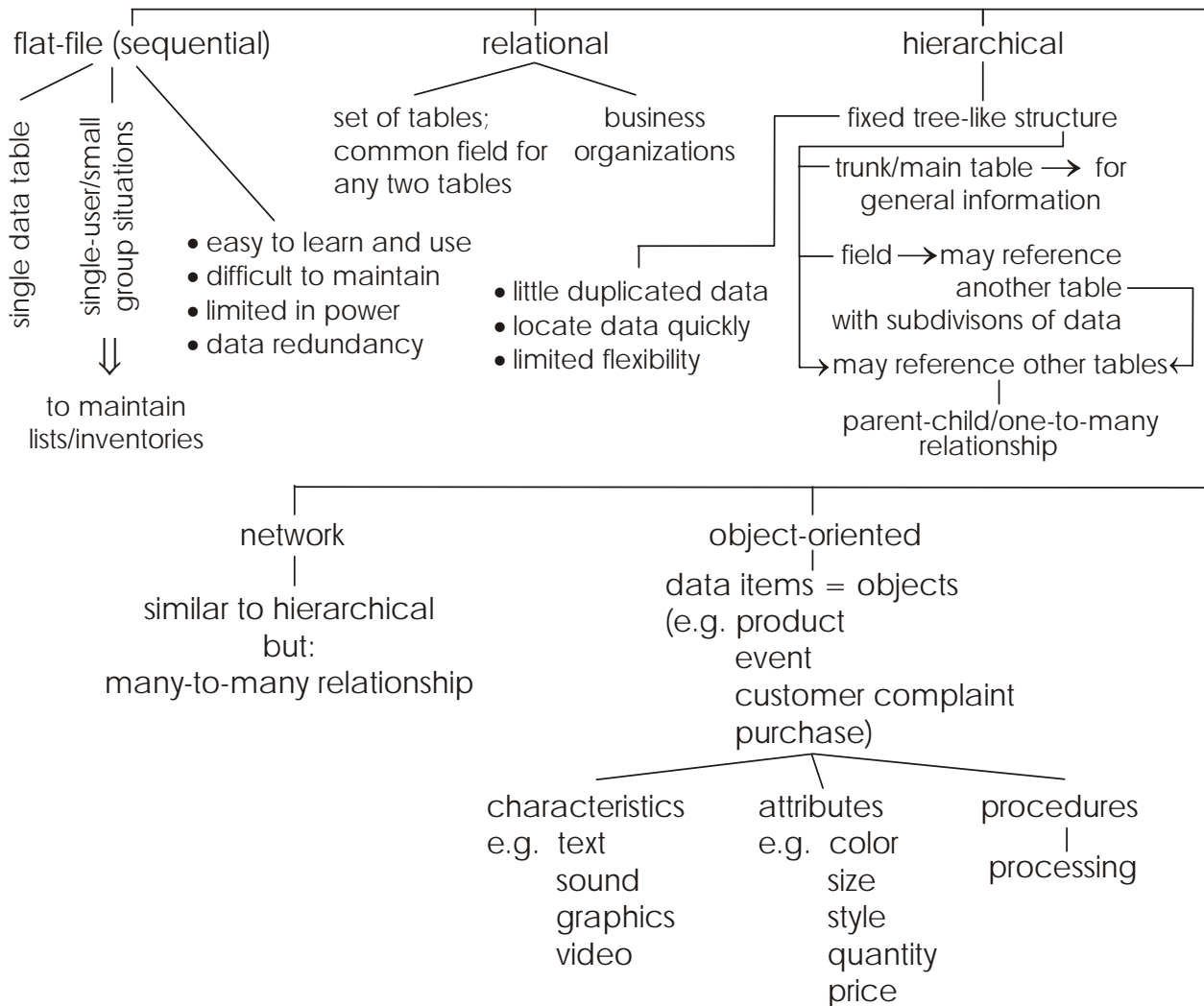
1. In flat-file databases with numerous files, a common problem is ...
  - a. data redundancy.
  - b. data entry errors.

- c. disk space *restrictions* (ограничения).
  - d. all the above
2. "Sequential file database" is another term for ...
- a. hierarchical database.
  - b. flat-file database.
  - c. network database.
  - d. relational database.
3. If a database allows any table to have a relationship with any other table, the tables are said to have ...
- a. one-to-many relationship.
  - b. parent-child relationship.
  - c. many-to-one relationship.
  - d. many-to-many relationship.
4. If a database is made up of a set of tables, it is called ...
- a. flat-file database.
  - b. sequential database.
  - c. relational database.
  - d. network database.
5. Which of the following kinds of database structures is most widely used in organizations today?
- a. Flat-file database.
  - b. Relational database.
  - c. Sequential database.
  - d. Hierarchical database.
6. In an object-oriented database, an object can be used to represent ...
- a. characteristics.
  - b. nothing.
  - c. procedures.
  - d. anything.

**VI. Match each item to the correct statement below.**

- a. Flat-file database
  - b. Relational database
  - c. Object
  - d. Hierarchical database
  - e. Network database
  - f. Attribute
1. Same as a sequential database.
2. Uses only one table.
3. Uses a set of tables.
4. Its tables have a one-to many relationship.
5. Its tables have a many-to-many relationship.
6. Has characteristics and attributes.
7. Similar to the hierarchical structure.
8. Used in older systems.
9. An object has it.
10. Used for maintaining address lists or inventories.
11. Widely used in business organizations.
12. Characterized by procedures.

## Database Structures



UNIT 4. Networks

## Text 9

**Network Structures****I. Read and translate the text.**

A *network* is a way to connect computers for communication, information exchange, and resource sharing. The four most important benefits of networking are simultaneous access to programs and data, peripheral sharing, streamlined communications, and easier backups. E-mail, videoconferencing, and teleconferencing are examples of the personal communications that can be conducted over a network or the Internet.

Networks can be categorized in different ways, such as by geography (how much terrain they cover) or by the use or absence of a central server.

A *local area network (LAN)* consists of computers that are relatively near one another. A LAN can have a few PCs or hundreds of them in a single building or in several buildings. On a network, data is broken into small groups called packets before being transmitted from one computer to another. A packet is a data segment that includes a header, payload, and control elements that are transmitted together. The receiving computer reconstructs the packet into the original structure. The payload is the part of the packet that contains the actual data being sent. The header contains information about the type of data in the payload, the source and destination of the data, and a sequence number so that data from multiple packets can be reassembled at the receiving computer in the proper order. Each LAN is governed by a protocol, which is a set of rules and formats for sending and receiving data. TCP/IP, IPX/SPX, and NetBEUI are examples of network protocols. LANs can be connected by a bridge or router to create a much larger network that covers a larger geographic area. To connect LANs, a gateway may be required to enable them to share data in a way that the different LANs can understand.

A *wide area network (WAN)* is the result of connecting LANs through public utilities.

Many networks are built around a central server. The PCs that connect to the server are called nodes. In a *file server network*, each node has access to the files on the server but not necessarily to files on other nodes. In a *client/server network*, nodes and the server share the storage and processing workload.

A *peer-to-peer network* is a small network that usually does not include a central server. In a peer-to-peer network, users can share files and resources on all the network's nodes.

*Vocabulary*

1. network ['netwə:k] – сеть  
to network – организовывать, создавать сеть
2. way [wei] – способ
3. information exchange [infə'meiʃn iks'tʃeindʒ] – обмен информацией
4. resource [ri'sɔ:s] – ресурс
5. benefit ['benifit] – преимущество
6. simultaneous access [siməl'teinjəs 'ækses] – одновременный доступ
7. peripheral [pə'rifərəl] – периферийное оборудование
8. streamlined ['stri:mlaɪnd] – потоковый
9. to back up [bæk'ʌp] – создавать резервную копию  
backup ['bæk 'ʌp] – создание резервной копии
10. electronic mail (e-mail) [ilek'tronik meɪl] – электронная почта
11. videoconference ['vɪdiəu'konfərəns] – видеоконференция
12. teleconference ['teli'konfərəns] – телеконференция
13. to conduct [kən'dʌkt] – проводить
14. to categorize ['kætɪgəraɪz] – классифицировать
15. terrain ['tereɪn] – территория, район
16. to cover ['kʌvə] – покрывать, охватывать
17. absence ['æbsəns] – отсутствие
18. central server ['sentrəl 'sɜ:və] – центральный сервер
19. local area network (LAN) ['ləukəl 'ɛəriə 'netwə:k] – локальная вычислительная сеть (ЛВС)
20. relatively ['relətɪvli] – относительно
21. near [niə] – близкий
22. packet ['pækit] – пакет, блок данных
23. to transmit [trænz'mɪt] – передавать
24. header ['hedə] – заголовок
25. payload ['peɪləʊd] – блок данных
26. to receive [ri'si:v] – получать
27. to reconstruct ['ri:kəns'trʌkt] – восстанавливать
28. original [ə'ri:dʒənəl] – первоначальный
29. destination [desti'neiʃn] – пункт назначения, адресат информации
30. sequence number ['si:kwəns 'nʌmbə] – порядковый номер
31. to reassemble ['ri:ə'sembl] – перетранслировать
32. to govern ['gʌvən] – управлять
33. rule [ru:l] – правило
34. bridge [brɪdʒ] – мост
35. router ['ru:tə] – маршрутизатор сети
36. gateway ['geɪtwei] – машина-шлюз
37. to enable [i'neɪbl] – давать возможность

38. wide area network (WAN) [waɪd 'ɛəriə 'netwɜ:k] – глобальная вычислительная сеть
39. public utilities ['pʌblɪk ju:'tɪlɪtɪz] – коммунальные службы
40. node [nəʊd] – узел сети
41. file server network [faɪl 'sɜ:və 'netwɜ:k] – сеть с сервером файлов
42. necessarily ['nesɪsərɪli] – необходимо
43. client ['klaɪənt] – клиент
44. workload ['wɜ:kləʊd] – рабочая нагрузка
45. peer-to-peer network ['pi:tə'piə 'netwɜ:k] – одноранговая сеть

## II. Answer the questions.

1. What is a network?
2. What are the most important benefits of networking?
3. What types of the personal communications can be conducted over a network?
4. How can networks be categorized?
5. What is a LAN?
6. What is called a packet? What does it include?
7. What does the payload contain?
8. What information does the header include?
9. How is a network governed?
10. Give the names of some most commonly used protocols.
11. What devices can LANs be connected by?
12. What is a WAN?
13. What is the difference between a file server network and a client/server network?
14. What is a peer-to-peer network?

## III. Tell whether the following statements are true or false.

1. E-mail systems enable users to exchange text messages, but not to share data files such as word processing documents.
2. A teleconference is the same thing as a videoconference.
3. Any network within a single building is considered to be a LAN, but if the network *extends* (простирается) *beyond* (за пределы) that building, it is *no longer* (больше не) considered a LAN.
4. On a network, data is broken into small groups – called payloads – before being transmitted from one computer to another.
5. TCP/IP, IPX/SPX, and NetBEUI are examples of common networking protocols.
6. If you need to connect two different types of networks, you can use a bridge to translate the data so the networks can communicate.

7. The individual computers on a network are called gateways.
8. In a client/server network, individual computers share the processing and storage workload with a central server.
9. In a peer-to-peer network, individual computers can access one another's resources.
10. All peer-to-peer networks include a network server.

#### IV. Fill in the blanks.

1. A(an) \_\_\_\_\_ is a way to connect computers so that they can communicate, exchange information, and share resources in real time.
2. In a process known as \_\_\_\_\_, audio and video signals are transmitted across a network, enabling participants to see and hear one another.
3. A(an) \_\_\_\_\_ is a network of computers located relatively near each other and connected so that they can communicate with one another.
4. \_\_\_\_\_ is known as the most commonly used protocol.
5. The individual computers on a network are called \_\_\_\_\_.
6. A (an) \_\_\_\_\_ is a data segment that includes a header, payload, and control elements that are transmitted together.
7. A (an) \_\_\_\_\_ and a (an) \_\_\_\_\_ are used for connecting LANs to create a much larger network.
8. In a peer-to-peer network, users can \_\_\_\_\_ files and resources on all the network's nodes.

#### V. Choose the right answer.

1. A network can include the computers and devices in ...
  - a. a department.
  - b. a building.
  - c. multiple buildings.
  - d. any of the above.
2. This type of network service is like a *cross* (пересечение) between the postal system and a telephone answering system.
  - a. E-mail.
  - b. Peripheral sharing.
  - c. Data sharing.
  - d. Data backup.
3. This type of network software allows people in different locations to communicate by typing messages to one another. Each message is seen by all the *participants* (участники).
  - a. E-mail.
  - b. Teleconferencing.
  - c. Videoconferencing.
  - d. All the above.

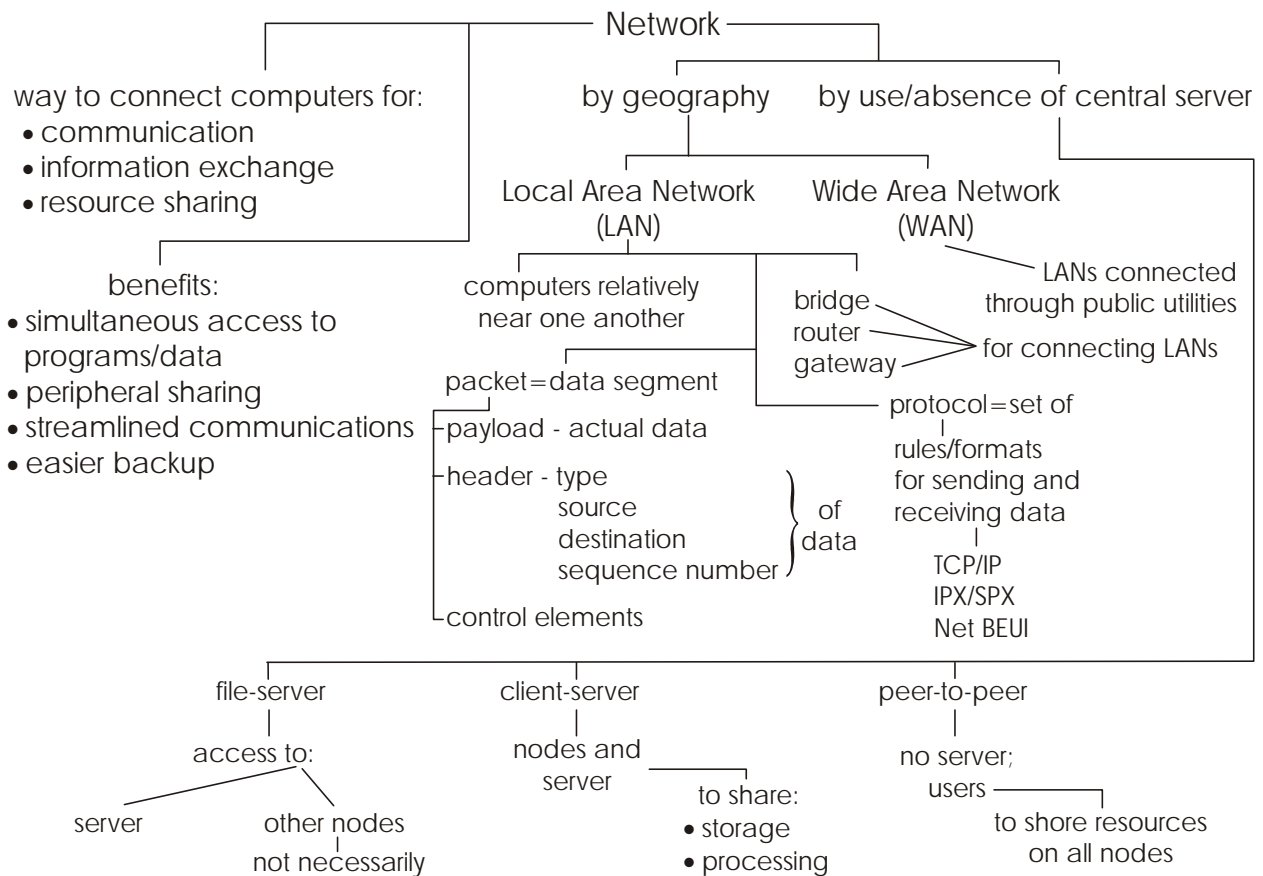


4. LANs and WANs are *distinguished* (отличаются) from one another mainly by ...
- a. size.
  - b. servers used.
  - c. backup methods.
  - d. geography.
5. Within a packet, a payload contains ...
- a. information about the data being sent.
  - b. the data itself.
  - c. control elements.
  - d. all the above.
6. This type of device simply *forwards* (пересылает) data from one LAN to another LAN.
- a. Bridge.
  - b. Router.
  - c. Gateway.
  - d. Protocol.
7. When two or more LANs are connected together, the result is a ...
- a. client/server network.
  - b. gateway.
  - c. peer-to-peer network.
  - d. wide area network.
8. This type of network allows a node to access files on the server, but not necessarily on other nodes.
- a. Node network.
  - b. File server network.
  - c. Peer-to-peer network.
  - d. Router network.

**VI. Match each item to the correct statement below.**

- a. LAN
  - b. WAN
  - c. Server
  - d. Node
1. Can be two LANs connected together.
  2. Provides a shared storage device.
  3. Connects computers that are relatively close together.
  4. An individual computer on a network.
  5. Can be as small as two or three PCs.
  6. Usually covers a large geographic area.
  7. A way to connect computers.
  8. In this type of network users can share files and resources on all the network's nodes.
  9. Allows nodes and the server to share the storage and processing workload.
  10. Allows each node to have access to the files on the server but not necessarily to files on other nodes.

**VII. Speak on the contents of the text using the following chart.**



Text 10

## Network Topologies

### I. Read and translate the text.

A *topology* is the physical layout of the cables and devices that connect the nodes of a network. The three basic topologies are bus, star, and ring. These topologies are so named because of the shape of the network they create. The less common type of physical topology is the mesh topology.

The *bus network* uses a single conduit to which all the network nodes and peripheral devices are attached. Each node is connected in series to a single cable. At the cable's start and end points, a special device called a terminator is attached. A terminator stops the network signals so they do not bounce back down the cable.

The *star network* is the most common topology in use today. In a star network, a device called a hub is placed in the center of the network; that is, all nodes are connected to the central hub and communicate through it. Groups of data are routed through the hub and sent to all the attached nodes, thus eventually reaching their destinations. Some hubs known as intelligent hubs can monitor traffic and help prevent collisions.

In a star topology, a broken connection (between a node and the hub) does not affect the rest of the network. If you lose the hub, however, all nodes connected to that hub are unable to communicate.

The *ring topology* connects the nodes of the network in a circular chain, with each node connected to the next. The final node in the chain connects to the first to complete the ring. With this methodology, each node examines data sent through the ring. If the data known as a token is not addressed to the node examining it, that node passes it along to the next node in the ring.

The *mesh topology* is the least used network topology and the most expensive to implement. In a mesh environment, a cable runs from every computer to every other computer. If you have four computers, you must have six cables – three coming from each computer to the other computers. The big advantage to this arrangement is that data can never fail to be delivered; if one connection goes down, there are other ways to route the data to its destination. The mesh topology is used for connecting routers on the Internet to make sure that data always gets through.

### Vocabulary

1. topology [tə'pɒlədʒi] – топология сети
2. layout ['leɪ'au] – расположение, схема расположения
3. cable ['keɪbl] – кабель
4. bus [bʌs] – шина
5. star [stɑ:] – звезда
6. ring [rɪŋ] – кольцо
7. shape [ʃeɪp] – форма
8. mesh [meʃ] – петля, ячейка, сетка
9. conduit ['kɒnd(ju)ɪt] – канал
10. in series [ɪn'siəriəs] – последовательно
11. terminator ['tə:mineɪtə] – терминатор, заглушка
12. to bounce [baʊns] – здесь возвращаться
13. hub [hʌb] – концентратор, ядро сети
14. to monitor ['mɒnɪtə] – осуществлять текущий контроль, контролировать
15. traffic ['træfɪk] – поток данных в сети, трафик
16. to prevent [prɪ'vent] – предотвращать, мешать
17. collision [kə'liʒn] – столкновение
18. to affect [ə'fekt] – влиять
19. to be *unable* ['ʌn'eɪbl] – быть не способным
20. circular ['sə:kjʊlə] – круговой
21. chain [tʃeɪn] – цепь
22. to complete [kəm'pli:t] – завершать

- 23. to examine [ig'zæmin] – исследовать, рассматривать
- 24. token ['təukən] – маркер, метка
- 25. to address [ə'dres] – адресовать
- 26. expensive [iks'pensiv] – дорогостоящий
- 27. to implement ['impliment] – разрабатывать, внедрять, реализовывать
- 28. environment [in'vaiəgənmənt] – конфигурация сети
- 29. to run [rʌn] – тянуться
- 30. advantage [əd'vɑ:ntidʒ] – преимущество
- 31. arrangement [ə'reindʒmənt] – размещение, расположение
- 32. to fail [feil] – повреждаться, давать сбой
- 33. to deliver [di'livə] – доставлять
- 34. to go down [gəu 'daun] (went, gone) – здесь разрываться
- 35. to route [ru:t] – передавать, направлять
- 36. to make sure [meik 'ʃuə] – убедиться, удостовериться
- 37. to get through [get 'θru:] (got, got) – проходить

## **II. Answer the questions.**

- 1. What is a topology?
- 2. What are the basic topologies?
- 3. Why are they so called?
- 4. What is the bus network?
- 5. What is a terminator used for?
- 6. What is the most common topology in use today?
- 7. How is the star network organized?
- 8. How do the groups of data reach their destinations?
- 9. What tasks do intelligent hubs perform?
- 10. Characterize the ring topology.
- 11. What happens if the data is not addressed to the node examining it?
- 12. How are computers connected in the mesh topology?
- 13. What is the advantage of the mesh topology?
- 14. What is the mesh topology used for?

## **III. Tell whether the following statements are true or false.**

- 1. There are five basic network topologies.
- 2. In the bus network each node is connected in series to a single cable.
- 3. In the star network all nodes are connected to the terminator and communicate through it.
- 4. A terminator stops the network signals so they do not bounce back down the cable.

5. In the star network groups of data are routed through the hub and sent to all the nodes.
6. A broken connection in a star topology does not affect the rest of the network.
7. In the ring topology the nodes are connected in a circular chain, with each node connected to the next.
8. In the ring topology if the data is not addressed to the node examining it, that node passes it along to the next node in the ring.
9. The mesh topology is the most widely used network topology.
10. The mesh topology is used for connecting routers on the Internet.

**IV. Fill in the blanks.**

1. There are the following network topologies: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
2. The \_\_\_\_\_ uses a single conduit to which all the network nodes and peripheral devices are attached.
3. The bus network uses a device called a (an) \_\_\_\_\_ for stopping the network signals.
4. In the star network all nodes are connected to the \_\_\_\_\_ and communicate through it.
5. Some intelligent hubs can \_\_\_\_\_ traffic and help prevent \_\_\_\_\_.
6. If the hub is \_\_\_\_\_, all nodes connected to that hub are unable to communicate.
7. In the ring network, a \_\_\_\_\_ is sent through the ring from one computer to the next, until it reaches its destination.
8. With the mesh topology, if one connection goes down, there are other ways to route the data to its \_\_\_\_\_.

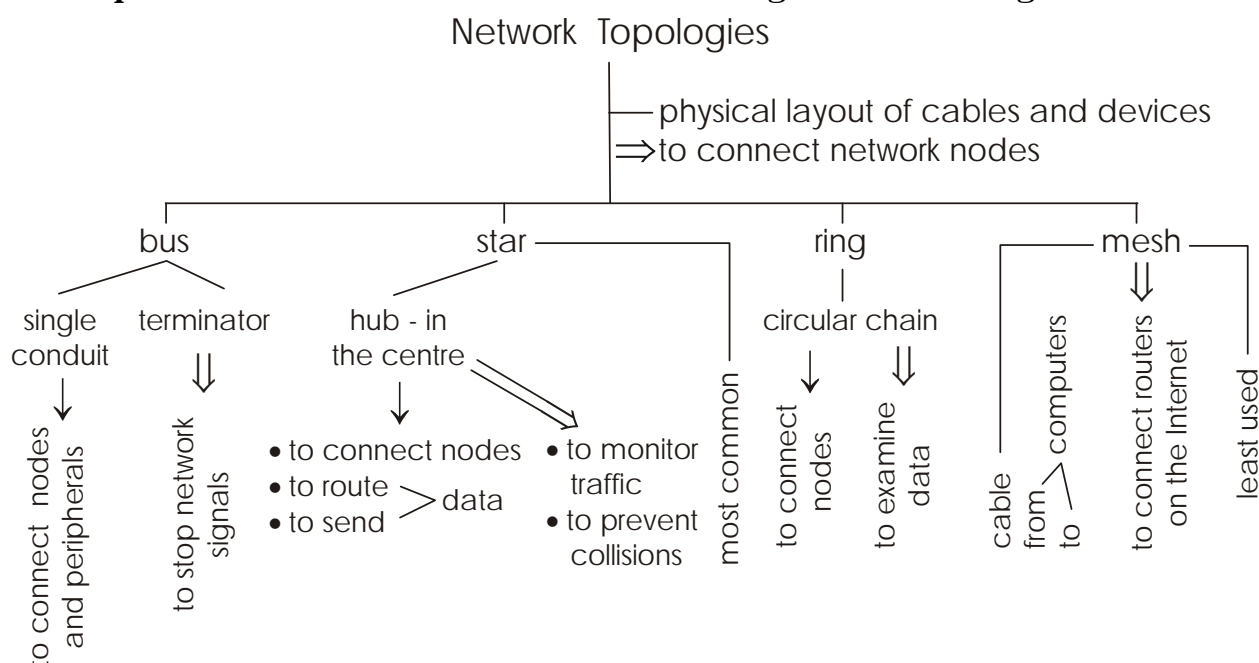
**V. Choose the right answer.**

1. Bus, ring, and mesh are examples of ...
  - a. network protocols.
  - b. network interface cards.
  - c. network topologies.
  - d. all the above.
2. In a star-topology network, all computers connect to a central device called a ...
  - a. server.
  - b. router.
  - c. hub.
  - d. gateway.
3. Which is the biggest advantage of a mesh-topology network?
  - a. It is the most expensive to implement.

- c. ring network.
  - d. all the above.
  - b. It requires two cables for every computer.
  - c. It never fails to deliver data.
  - d. It is a good way to connect to the Internet.
4. A terminator stops the network signals in the ...
- a. bus network.
  - b. star network.
  - c. ring network.
  - d. all the above.
5. The star network is ...
- a. the most expensive topology.
  - b. the most common topology.
  - c. the least common topology.
  - d. the cheapest topology.
6. A device called a hub is placed in the center of the ...
- a. ring network.
  - b. mesh network.
  - c. star network.
  - d. all the above.
7. This network topology allows to pass a token from node to node.
- a. Mesh network.
  - b. Star network.
  - c. Bus network.
  - d. None of the above.
8. In the star network all the nodes are connected to it.
- a. Terminator.
  - b. Token.
  - c. Cable
  - d. Hub

**VI. Match each item to the correct statement below.**

- a. Bus
  - b. Star
  - c. Ring
  - d. Mesh
1. The most expensive topology.
2. Uses a single conduit.
3. Requires a hub.
4. Passes a token from node to node.
5. Uses terminators.
6. The most common topology.
- a. Hub
  - b. Terminator
  - c. Conduit
  - d. Token
7. Data passed through the ring network.
8. Device for stopping network signals.
9. All the network nodes and peripheral devices are attached to it.
10. Device placed in the center of the star network.

**VII. Speak on the contents of the text using the following chart.**

Text 11

**Internet****I. Read and translate the text.****Part I****How the Internet Works**

The Internet was created for the U.S. Department of Defense as a tool for communications. Today, the Internet is a network of inter-connected networks. It is a huge, cooperative community with no central ownership. The Internet connects thousands of networks and more than 100 million users around the world. The Internet carries messages, documents, programs, and data files that contain every imaginable kind of information for businesses, educational institutions, government agencies, and individuals.

All computers on the Internet use *TCP/IP protocols*. Any computer on the Internet can connect to any other computer. Individual computers connect to local and regional networks, which are connected together through the Internet backbone. A computer can connect directly to the Internet, or as a remote terminal on another computer, or through a gateway from a network that does not use TCP/IP.

Every computer on the Internet has a unique four-part numeric *IP address*, and most also have an address that uses the *domain name system (DNS)*. DNS addresses have two parts: a host name (a name for a computer connected to the Internet) followed by a domain that generally identifies

the type of institution that uses the address. This type of domain is often called *top-level domain*. For example, many companies have a DNS address whose first part is the company name followed by ".com" - ibm.com (International Business Machines Corp.). Some large institutions and corporations divide their domain addresses into smaller subdomains. For example, a business with many branches might have a subdomain for each office - such as boston.widgets.com and newyork.widgets.com. In 1996 a new set of top-level domain names was created because it was difficult for organizations to find suitable domain names for their Internet sites, for example .firm (businesses or firms), .shop (business that offer items for purchase over the Internet), .arts (organizations promoting artistic or entertainment activities over the Internet). Geographic domains usually identify the country in which the system is located, such as .ca for Canada or .fr for France.

The Internet has a lot of uses:

- Inexpensive electronic mail systems enable you to exchange messages with any other user anywhere.
- TELNET allows a user to operate a second computer from his or her machine.
- File Transfer Protocol (FTP) is the Internet tool for copying data and program files from one computer to another.
- News and mailing lists are public conferences distributed through the Internet and other electronic networks.
- Chats are public conferences, conducted in real time, where people discuss topics of interest.

## Part II

### The World Wide Web

One part of the Internet is the World Wide Web. It was created in 1989 at the European Particle Physics Laboratory in Geneva, Switzerland as a method for incorporating footnotes, figures, and cross-references into online hypertext documents. A *hypertext* document, or a *Web page*, is a specially encoded file that uses the *hypertext markup language (HTML)*. This language allows a document's author to embed hypertext links, or *hyperlinks*, in the document. A collection of related Web pages is called a *Web site*. Web sites are housed on *Web servers*, Internet host computers that often store thousands of individual pages. Copying a page onto a server is called posting the page. Downloading a page from the Web server to your computer for viewing is commonly called "*hitting*" the Web site. Many Web pages feature a hit counter to display the number of times the page has been viewed.



A *Web browser* is a software application designed to find hypertext documents on the Web and then open the documents on the user's computer. A point-and-click browser provides a graphical user interface (GUI) that enables the user to click graphical objects and hyperlinks. The most popular browsers are Microsoft's Internet Explorer and Netscape Navigator. A Web browser displays a Web page as specified by the page's underlying HTML code. To format a document in HTML, a designer places *HTML tags* throughout the document. The HTML tags enclosed in angle brackets (<>), tell the browser how to display individual elements on the page. The internal structure of the World Wide Web is built on a set of rules called *Hypertext transfer protocol (HTTP)*. HTTP uses Internet addresses in a special format, called a *Uniform Resource Locator (URL)*. URLs look like this: type://address/path/. In a URL, type specifies the type of the server in which the file is located, address is the address of the server, and path is the location within the file structure of the server. The path includes the list of folders (or directories) where the desired file is located.

You probably have heard the term *home page* used to reference a page named index.htm on a Web site. This term is important and actually has two meanings:

*Personalized Start Page.* On your computer, you can choose a Web page that opens immediately when you launch your Web browser by using a command in your browser to specify the URL for the desired page. This personalized start page can be on your computer's hard drive or a page from any Web site. For example, if you want to see today's copy of USA Today Online when you launch your browser, use the address <http://www.usatoday.com/> as your personal home page.

*Web Site Home Page.* A Web site's primary page is also called its home page. This page is the first one you see when you type the site's basic URL. From this page, you can navigate to other pages on the Web site (and possibly to other sites). For example, if you type the URL <http://www.cnn.com/> into your browser's address box, the CNN home page opens in your browser window.

### Vocabulary

#### Part I

1. Department of Defense [di'pɑ:tmənt əv di'fens] – Министерство Обороны
2. tool [tu:l] – инструмент
3. to interconnect ['intəkə'nekt] – (взаимно) связывать
4. huge [hju:dʒ] – огромный

5. cooperative [kəu'opərətɪv] – совместный, участвующий в совместной работе
6. community [kə'mju:nɪti] – сообщество, объединение
7. ownership ['əʊnəʃɪp] – собственность, право собственности
8. to carry ['kæri] – переносить, передавать
9. imaginable [i'mædʒɪnəbl] – вообразимый
10. educational institution [edju:'keɪʃənəl, insti'tju:ʃən] – учебное заведение, образовательное учреждение
11. government agency ['gʌvnmənt 'eɪdʒənsi] – правительственное учреждение
12. backbone ['bækbəʊn] – основа, стержень
13. directly [di'rektli] – прямо, непосредственно
14. remote [ri'məʊt] – дистанционный, отдалённый, удалённый
15. numeric [nju:'merɪk] – цифровой, числовой
16. domain [də'mein] – домен  
domain name system (DNS) [də'mein neɪm 'sɪstəm] – система имени домена
17. host [həʊst] – главный
18. top-level ['tɒp'levl] – высокого уровня
19. business ['bɪznɪs] – предприятие
20. branch [brɑ:ntʃ] – филиал
21. suitable ['sju:təbl] – подходящий, соответствующий
22. to offer ['ɒfə] – предлагать
23. to promote [prə'məʊt] – продвигать
24. to exchange [ɪks'tʃeɪndʒ] – обмениваться
25. anywhere ['eniwɛə] – везде, повсюду
26. TELNET ['tel'net] – базовая сетевая услуга в Интернет
27. File Transfer Protocol (FTP) [faɪl 'trænsfə: 'prəʊtəkɒl] – протокол передачи файлов
28. to copy ['kɒpi] – копировать
29. mailing list ['meɪlɪŋ list] – почтовый список
30. to distribute [dɪs'trɪbjʊ:t] – распределять, распространять
31. chat [tʃæt] – переговоры
32. to discuss [dɪs'kʌs] – обсуждать
33. topic of interest ['tɒpɪk əv 'ɪntrɪst] – интересующая тема

## Part II

34. World Wide Web (WWW) [wɜ:ld waɪd web] – Всемирная паутина
35. to incorporate [ɪn'kɔ:pəreɪt] – объединять(ся), включать(ся)
36. footnote ['fʊtnəʊt] – сноска, примечание, комментарий
37. figure ['fɪɡə] – рисунок, чертёж
38. cross-reference ['kros'refərəns] – перекрёстная ссылка
39. hypertext ['haɪpə'tekst] – гипертекст
40. page [peɪdʒ] – страница  
home page ['həʊm peɪdʒ] – базовая, основная страница

- 41. to encode [in'kəud] – кодировать, шифровать
- 42. hypertext markup language (HTML) ['haipə'tekst 'mɑ:k'ʌp 'læŋɡwɪdʒ]  
– язык разметки гипертекста
- 43. to embed [im'bed] – внедрять, встраивать
- 44. hyperlink ['haipəliŋk] – гиперсвязь
- 45. to host [haʊz] – размещать
- 46. posting ['pəʊstɪŋ] – отправка сообщения (в сети)
- 47. to download ['daʊnləʊd] – загружать (в память); принимать файлы  
(по модему)
- 48. hitting ['hɪtɪŋ] – ответ, ответная справка
- 49. to feature ['fi:tʃə] – быть характерной чертой, отличаться
- 50. counter ['kaʊntə] – счётчик
- 51. to display [dis'pleɪ] – отображать
- 52. browser ['braʊzə] – браузер, навигатор
- 53. point-and-click ['point ənd 'kɪk] – навести и щёлкнуть
- 54. to specify ['spesɪfaɪ] – задавать, специфицировать
- 55. to underlie [ˌʌndə'laɪ] (underlay, underlain) – лежать в основе (чего-л.)
- 56. tag [tæg] – ярлык, метка
- 57. to enclose [in'kləʊz] – заключать (в скобки, кавычки и т.п.)
- 58. angle brackets ['æŋɡl 'brækɪts] – угловые скобки
- 59. internal [in'tə:nəl] – внутренний
- 60. Hypertext transfer protocol (HTTP) ['haipə'tekst 'trænsfə: 'prəʊtəkəl]  
– транспортный протокол передачи гипертекста
- 61. Uniform Resource Locator (URL) ['ju:nɪfɔ:m ri'sɔ:s ləʊ'keɪtə] – универсальный указатель ресурса
- 62. path [pɑ:θ] – путь
- 63. within [wi'ðɪn] – внутри, в пределах
- 64. folder ['fəʊldə] – папка
- 65. directory [di'rektəri] – каталог
- 66. probably ['prɒbəbli] – вероятно
- 67. meaning ['mi:nɪŋ] – значение
- 68. to personalize ['pə:snəlaɪz] – индивидуализировать
- 69. to choose [tʃu:z] (chose, chosen) – выбирать
- 70. immediately ['ɪmi:dʒətli] – немедленно
- 71. hard drive ['hɑ:d draɪv] – жёсткий диск
- 72. primary ['praɪməri] – основной
- 73. to type [taɪp] – вводить, набирать на клавиатуре
- 74. to navigate ['nævɪgeɪt] – перемещать(ся)
- 75. address box [ə'dres bɒks] – адресное окно

**II. Answer the questions.**

1. What is the role of the Internet?
2. What role does the TCP/IP play in the Internet?
3. Do most computers connect directly to the Internet?
4. What addresses have computers on the Internet?
5. What are the two parts of a DNS address?
6. Why was a new set of top-level domain names created?
7. What uses has the Internet?
8. Why was the World Wide Web created?
9. What is a Web page? a Web site? a Web server?
10. What is called posting? “hitting”?
11. What is the function of a Web browser?
12. What are the most popular browsers?
13. What are HTML tags used for?
14. What does the acronym “HTTP” stand for? What is its task?
15. What is a Uniform Resource Locator? List its three parts.
16. What is the difference between a personalized start page and a Web site home page?

**III. Tell whether the following statements are true or false.**

1. Today the Internet connects more than one billion users around the world.
2. The Internet is open to anyone who can access it.
3. Every computer connected to the Internet uses the same set of protocols.
4. Every computer on the Internet has a three-part Internet protocol address.
5. The “.com” or “.org” portion of a DNS address identifies the type of institution that uses the address.
6. A new set of top-level domain names was created because it was difficult for organizations to find suitable domain names for their Internet sites.
7. E-mail is an efficient way to send and receive messages and documents, but can be expensive.
8. A user’s name is an *essential* (неотъемлемая) part of an e-mail address.
9. Hypertext documents are commonly called hyperlinks.
10. The act of downloading a Web page from its server to your computer is called posting.
11. HTML tags tell a Web browser how to display elements in a Web page.

12. Because they lead to specific documents on a server's disks, URLs are usually very short.
13. A personalized start page is a Web page that opens immediately when you launch your Web browser.
14. TELNET enables you to use a remote computer as though you were sitting in front of it.

**IV. Fill in the blanks.**

1. The acronym "TCP/IP" stands for \_\_\_\_\_.
2. Most computers have an address that uses the \_\_\_\_\_.
3. 205.46.117.104 is an example of a(n) \_\_\_\_\_.
4. \_\_\_\_\_ is the Internet tool for copying data and program files from one computer to another.
5. The \_\_\_\_\_ was created as a method for incorporating footnotes, figures, and cross-references into online hypertext documents.
6. A hypertext document is a specially encoded file that uses the \_\_\_\_\_.
7. Web sites are housed on computers called \_\_\_\_\_.
8. A(n) \_\_\_\_\_ is an application that finds hypertext documents on the Web and opens them on the user's computer.
9. Every document on the Web has its own unique \_\_\_\_\_.
10. The internal structure of the World Wide Web is built on a set of rules called \_\_\_\_\_.

**V. Choose the right answer.**

1. The Internet is an *indispensable* (исключительный) tool for ...
  - a. personal communication.
  - b. research.
  - c. commerce.
  - d. all the above.
2. Who owns the Internet?
  - a. The Internet Society.
  - b. The World Wide Web Consortium.
  - c. The U.S. Government.
  - d. None of the above.
3. An Internet address that uses words *rather than* (а не) numbers is called a(n) ...
  - a. IP address.
  - b. TCP/IP address.
  - c. DNS address.
  - d. top-level address.

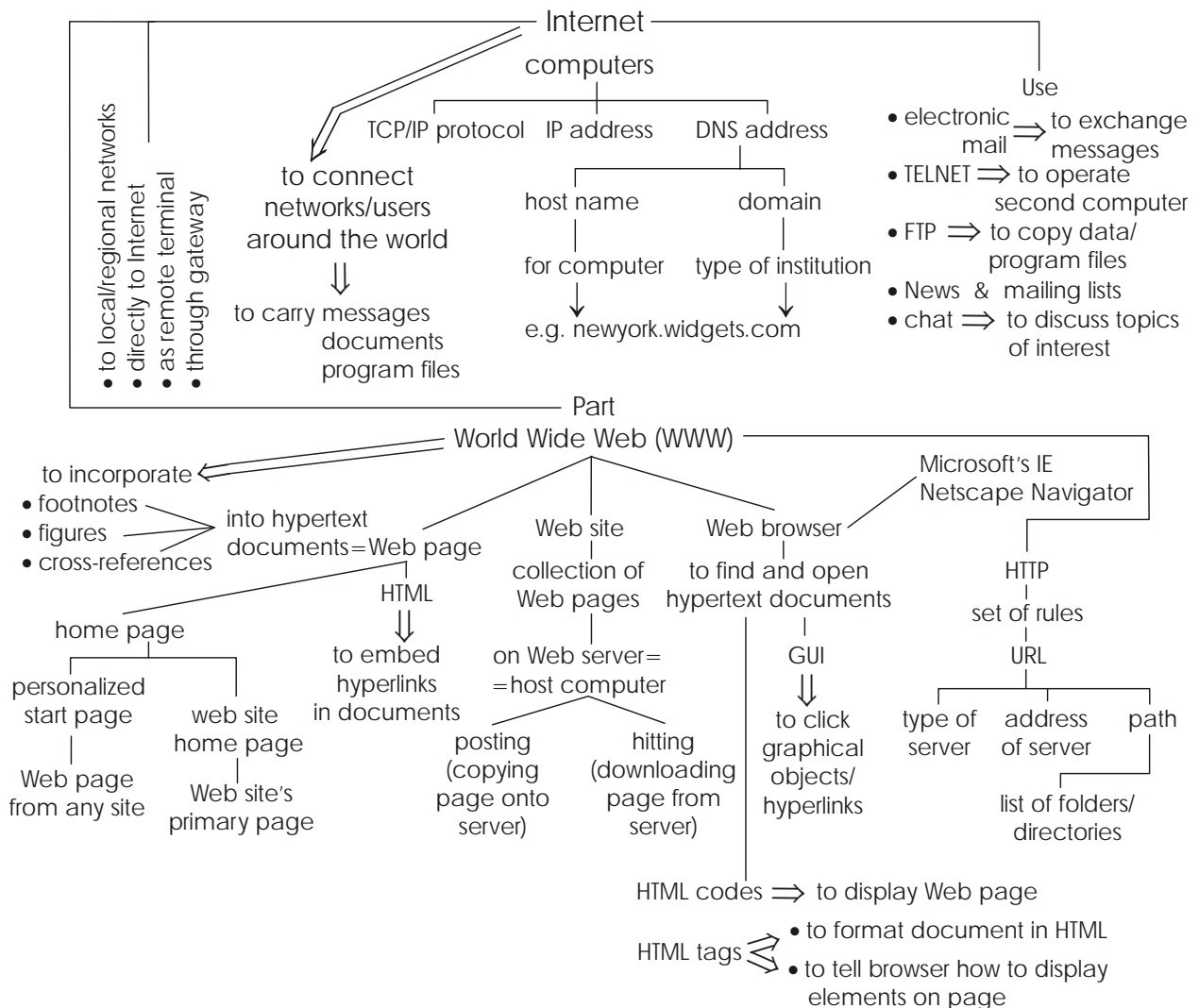
4. The Internet address *newyork.widgets.com* is an example of an address that uses a(n) ...
  - a. internet protocol.
  - b. subdomain.
  - c. domain.
  - d. none of the above.
5. A Web page is a document that uses the ...
  - a. TCP/IP protocol.
  - b. HTML.
  - c. home page.
  - d. backbone.
6. A collection of Web pages is called a(n) ...
  - a. Web server.
  - b. Web site.
  - c. domain name system.
  - d. newsgroup.
7. `<HI>` is a(n) example of a(n) ...
  - a. HTML tag.
  - b. hyperlink.
  - c. Uniform Resource Locator.
  - d. Hypertext Transfer Protocol.
8. *www.Glencoe.com/norton/online/welcome.html* is a(n) example of a(n) ...
  - a. IP address.
  - b. Uniform Resource Locator.
  - c. DNS address.
  - d. Hypertext Transfer Protocol.
9. A Web site's primary page is called its ...
  - a. Uniform Resource Locator.
  - b. personalized start page.
  - c. home page.
  - d. browser.
10. To exchange e-mail messages with other people, you need a unique ...
  - a. IP address.
  - b. DNS address.
  - c. E-mail address.
  - d. URL.

**VI. Match each item to the correct statement below.**

- a. TCP/IP
  - b. IP address
  - c. DNS address
  - d. Domain
1. Identifies a type of institution on the Internet.
  2. A numeric address.
  3. The protocol used by the Internet.
  4. Uses words, not numbers.
  5. Enables any two computers to exchange data.
  6. Many computers have this and IP address.
  7. ".gov" is an example.

8. Uses four sets of numbers.
  - a. World Wide Web
  - b. HTML
  - c. Browser
  - d. URL
9. Enables an author to place links in a document.
10. A software application.
11. Includes a type, an address and a path.
12. Hypertext links are its *foundation* (основа).
13. Interprets HTML code to display pages.
14. Requires the use of tags.
15. A special type of address.
16. Organizes widely *scattered* (разбросанные) resources.

**VII. Speak on the contents of the text using the following chart.**



Unit 5. Information Systems

Text 12

**Development of Information Systems**

**I. Read and translate the text.**

An *information system (IS)* is a mechanism that helps people collect, store, organize, and use information. An information system includes a means of storing information, a set of procedures for handling information, and rules that govern the delivery of information to people in an organization. Traditionally, information systems were manual. One popular type of manual information system is the card-based system, such as a card catalog in a library.

Because there are so many types of information and uses for it many kinds of information systems have been developed: office automation systems, transaction processing systems, management information systems, decision support systems, expert systems.

*Office automation systems* automate routine office tasks, such as word processing, accounting, document management or communications. *Transaction processing systems* not only track and store information about individual events but also provide information that is useful in running an organization, such as inventory status, billing, and so on. *Management information systems* produce reports for different types of managers. *Decision support systems* is a specialized application used to collect and report certain types of business data which can aid managers in the decision-making process. *Expert systems* include the knowledge of human experts in a particular area (such as medicine or technology) in a knowledge base. They analyze requests from users and assist the users in developing a course of action.

A well-structured IS department includes IS managers, computer scientists, systems analysts, programmers, database specialists, user assistance architects, technical writers, system or network managers, trainers, and hardware maintenance technicians. IS professionals support an organization's information, provide technical support for hardware and software and are involved in the design and implementation of an organization's entire information system.

*Building Information Systems*

The *systems development life cycle (SDLC)* is an organized method for building an information system. The SDLC includes five phases: needs analysis, systems design, development, implementation, and maintenance.



During the *needs analysis phase*, the development team focuses on completing three tasks: (1) defining the problem and whether to proceed, (2) analyzing the current system and developing possible solutions to the problem, and (3) selecting the best solution and defining its function.

During the *systems design phase*, the project team decides how the selected solution will work; each system activity is defined.

During the *development phase*, programmers play the key role: creating or customizing the software for the various parts of the system. There are two alternative paths through this phase: the acquisition path or the development path. The project team may decide to buy and then customize some components for an information system or develop the needed components themselves. Technical and user documentation is written during the development phase. Testing is also an integral part of this phase.

In the *implementation phase*, the hardware and software are installed in the user environment. The process of moving from an old system to a new one is called conversion. The project team may follow four different conversion methods: direct, parallel, phased, and pilot.

During the *maintenance phase*, IS professionals provide ongoing training and support to the system's users. Fixes or improvements are made regularly throughout the remaining life of the system.

### Vocabulary

1. information system (IS) [infə'meɪʃn 'sɪstəm] – информационная система
2. mechanism ['mekənɪzəm] – механизм
3. to collect [kə'lekt] – собирать
4. means [mi:nz] – средство
5. delivery [di'livəri] – доставка
6. manual ['mænjuəl] – ручной, неавтоматизированный
7. card catalog [kɑ:d 'kætəlog] – картотека
8. office automation system ['ofɪs ɔ:tə'meɪʃn 'sɪstəm] – система автоматизации учрежденческой деятельности; учрежденческая автоматизированная система
9. transaction processing system [træn'zækʃn prəu'sesiŋ 'sɪstəm] – система обработки транзакций
10. management information system ['mænidʒmənt infə'meɪʃn 'sɪstəm] – управленческая информационная система, информационно-управляющая система (ИУС)
11. decision support system [di'si:zn sə'pɔ:t 'sɪstəm] – система поддержки принятия решений (СППР)
12. expert system ['ekspə:t 'sɪstəm] – экспертная система

13. to automate ['ɔ:təmeɪt] – автоматизировать
14. routine [ru:'ti:n] – рутинный, повседневный
15. accounting [ə'kauntɪŋ] – бухгалтерский учёт, бухгалтерское дело
16. to track [træk] – отслеживать
17. to run [rʌn] – вести (дело, предприятие); работать
18. status ['steɪtəs] – состояние
19. billing ['bɪlɪŋ] – выписывание счёта, накладной
20. to aid [eɪd] = to assist [ə'sɪst] – помогать, оказывать помощь
21. to decide [dɪ'saɪd] – решать, принимать решение  
decision-making [dɪ'sɪzn 'meɪkɪŋ] – принятие решения
22. knowledge ['nɒlɪdʒ] – знание, знания  
knowledge base ['nɒlɪdʒ beɪs] – база знаний
23. expert ['ekspə:t] – специалист; эксперт
24. to analyze ['ænəlaɪz] – анализировать
25. course of action ['kɔ:s əv 'ækʃn] – ход действий
26. computer scientist [kəm'pjʊ:tə 'saɪəntɪst] – специалист по вычислительным системам
27. systems analyst ['sɪstəmz 'ænəlist] – системный аналитик, специалист по системному анализу
28. programmer ['prəʊgræmə] – программист
29. user assistance architect ['ju:zə ə'sɪstəns 'ɑ:kɪtekt] – специалист по оказанию помощи пользователям
30. technical writer ['teknɪkəl 'raɪtə] – технический писатель, редактор технической документации
31. to train [treɪn] – обучать  
trainer ['treɪnə] – специалист по обучению  
training ['treɪnɪŋ] – обучение
32. hardware maintenance technician ['hɑ:dwɛə 'meɪntɪnəns tek'nɪʃn] – специалист по аппаратному обеспечению
33. to be involved (in) [ɪn'vɒlvd] – заниматься (ч.-л.)
34. systems development life cycle (SDLC) ['sɪstəmz dɪ'veləpmənt laɪf 'saɪkl] – жизненный цикл разработки системы
35. phase [feɪz] – фаза, этап
36. needs analysis [ni:dz ə'nælɪsɪs] – анализ потребностей
37. systems design ['sɪstəmz d'ɪzəɪn] – проектирование системы
38. development [dɪ'veləpmənt] – разработка
39. implementation [ɪmplɪmən'teɪʃn] – внедрение, реализация, ввод в работу
40. maintenance ['meɪntɪnəns] – эксплуатация, техническое обслуживание
41. team [ti:m] – группа
42. to proceed [prə'si:d] – продолжать
43. current ['kʌrənt] – текущий

- 44. to select [si'lekt] – выбирать, отбирать
- 45. activity [æk'tiviti] – действие, операция
- 46. key [ki:] – ключевой
- 47. to customize ['kʌstəmaɪz] – настроить
- 48. alternative [ɔ:l'tə:nətɪv] – альтернативный
- 49. acquisition [ækwi'zɪʃn] – получение, приобретение
- 50. to test [test] – испытывать, проверять, контролировать, тестировать
- 51. integral ['ɪntɪgrəl] – неотъемлемый
- 52. to install [ɪn'stɔ:l] – устанавливать, вводить в действие
- 53. conversion [kən'vɜ:ʃn] – преобразование, переход
- 54. to follow ['fɒləu] – следовать
- 55. pilot ['pailət] – пробный, экспериментальный
- 56. ongoing ['ɒn,gəʊɪŋ] – непрерывный
- 57. fix [fiks] – настройка
- 58. improvement [ɪm'pru:vmənt] – усовершенствование
- 59. throughout [θru:'aʊt] – повсюду, везде
- 60. to remain [ri'mein] – оставаться

## **II. Answer the questions.**

- 1. What is an information system?
- 2. What are the three basic components of an information system?
- 3. What is an example of a manual information system?
- 4. What types do information systems fall into?
- 5. What are the tasks of office automation systems?
- 6. What is the role of transaction processing systems?
- 7. What is the purpose of management information systems?
- 8. What is a decision support system?
- 9. What role do expert systems play?
- 10. What kind of specialists does an Information Systems department include?
- 11. What tasks do they perform?
- 12. What is the systems development life cycle?
- 13. What tasks does the development team perform during the needs analysis phase?
- 14. What is the systems design phase?
- 15. Why is the development phase the most important one?
- 16. What are two alternative paths through this phase?
- 17. What are the tasks of the implementation phase?
- 18. What does the term “conversion” mean? What are its types?
- 19. What is the last phase of the SDLC?

**III. Tell whether the following statements are true or false.**

1. An information system helps people collect and use information.
2. Information systems do nothing more than store and retrieve data.
3. There is only one type of a computerized information system.
4. An office automation system is designed to help users handle information-related tasks more efficiently.
5. A well-designed transaction processing system helps users track every part of a transaction, from the moment it begins until its completion.
6. Decision support systems are used to process business transactions.
7. A management information system can produce reports that are useful to different types of managers in an organization.
8. Expert systems are based on a large collection of human expertise in a specific area.
9. In large organizations the IS department may include hundreds or even thousands of workers.
10. The systems development life cycle is composed of six phases.
11. The systems development life cycle is so called because it covers the entire life of an information system.
12. The needs analysis phase begins when a solution is identified for a new or modified information system.
13. Programmers play the key role in the development phase of the systems development life cycle.
14. Programmers have the option of developing software *from scratch* (на пустом месте) or *acquiring* (приобрести) existing software and modifying it as needed.
15. Testing typically begins during the last phase of the SDLC.
16. In the implementation phase the system is installed in the user environment.
17. After a new information system has been implemented changes can be made during the maintenance phase of the SDLC.

**IV. Fill in the blanks.**

1. A(n) \_\_\_\_\_ system uses computers to carry out various operations, such as word processing, accounting, document management or communications.
2. Decision support systems generate specific \_\_\_\_\_ that managers can use in making mission-critical decisions.
3. The IS department is responsible for generating the \_\_\_\_\_ that a business needs to run effectively and efficiently.

4. The \_\_\_\_\_ is an organized method for building an information system.
5. During the \_\_\_\_\_ phase of the SDLC the project team tackles the “how” of the selected solution.
6. During the development phase developers may \_\_\_\_\_ some components and \_\_\_\_\_ others.
7. The four conversion methods commonly used in information system implementation are called \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
8. The final phase of the SDLC is called the \_\_\_\_\_ phase.

**V. Choose the right answer.**

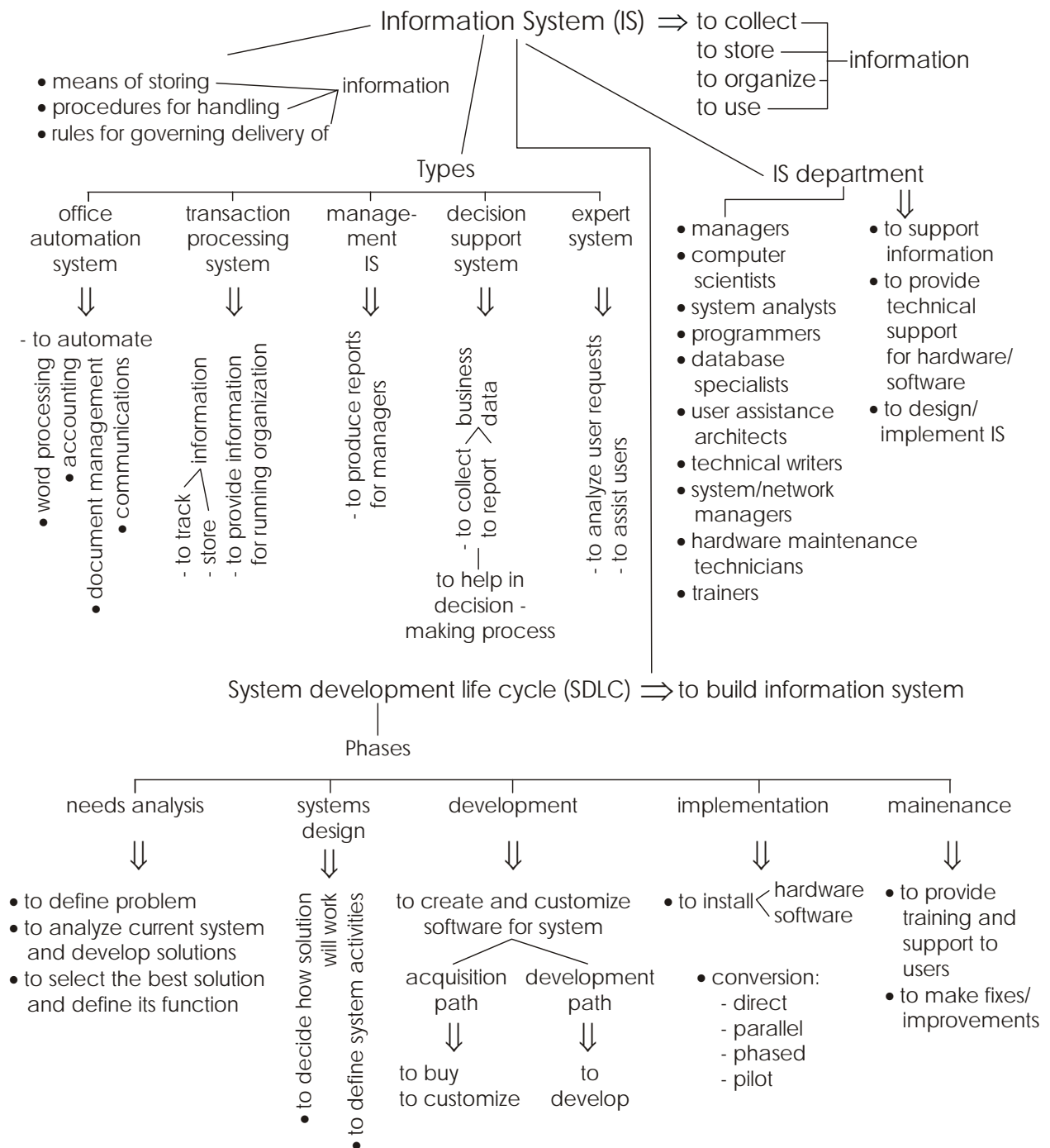
1. Modern information systems feature tools that enable users to..  
a. sort information.                      c. analyze information.  
b. categorize information.              d. all the above.
2. Office automation systems are used to perform operations, such as..  
a. transaction processing.              c. decision making.  
b. word processing.                      d. developing a course of action.
3. To collect and report certain types of business data which can aid managers in the decision-making process companies typically use..  
a. transaction processing systems.  
b. expert systems.  
c. management information systems.  
d. decision support systems.
4. In many companies computerized information systems are created and managed by a(n) ...  
a. Information Systems department.  
b. Decision Support department.  
c. Expert Systems department.  
d. nobody.
5. The acronym “SDLC” stands for ...  
a. systems development life cycle.  
b. system design local creation.  
c. systematic development of logical constructs.  
d. none of the above.
6. The first phase of the SDLC is called the ...  
a. systems design phase.              c. needs analysis phase.  
b. development phase.                  d. none of the above.
7. During the needs analysis phase the first task is to ...

- a. talk to users of the system.
  - b. decide whether to buy or build the needed software.
  - c. define the problem.
  - d. all of above.
8. There are two alternative paths through this phase: the acquisition path or the development path.
- a. Needs analysis.
  - b. Implementation.
  - c. Systems design.
  - d. Development.
9. The process of moving from an old system to a new system is called ...
- a. implementation.
  - b. conversion.
  - c. development.
  - d. maintenance.
10. During which phase are errors corrected in the system?
- a. Development.
  - b. Needs analysis.
  - c. Implementation.
  - d. Maintenance.

**VI. Match each item to the correct statement below.**

- a. Office automation system
  - b. Expert system
  - c. Decision support system
  - d. Transaction processing system
  - e. Management information system
1. Helps to perform tasks, such as word processing, accounting, document management or communications.
2. Provides information for different types of managers.
3. Does tasks normally done by humans.
4. Tracks series of events.
5. Helps managers to make decisions.
6. Recommends a course of action.
- a. Needs analysis
  - b. Systems design
  - c. Development
  - d. Implementation
  - e. Maintenance
7. The first phase of the SDLC.
8. Programmers are key players.
9. Focuses on “how” the system will work.
10. The last phase of the SDLC.
11. Software is created now.
12. Conversion of some type is performed.

**VII. Speak on the contents of the text using the following chart.**



**PART II**  
**SUPPLEMENTARY READING**

- I. Read and translate the text.**
- II. Make up a chart and speak on the contents of the text.**
- III. Write an abstract for the text.**
- IV. Give the summary of the text.**

UNIT 1. Computers around Us

**Importance of Computer Literacy**

Computers are becoming increasingly important tools in all types of workplaces, from offices to factories.

Today, computers are no longer specialized tools used only by scientists or engineers. They do not hum behind sealed, glass walls in climate-controlled environments. Computer systems are everywhere – in places you cannot see or would not expect to find them. They are a fact of life, a common thread that ties together our education, work, and home life.

With computers touching nearly every facet of our lives, the issue of computer literacy becomes important. But what is computer literacy, and why is it so crucial? Why should you spend your time and energy studying and becoming "computer literate"?

Technically, to be "literate" in a subject means to have knowledge of that subject. You understand its basic terms and concepts. As an example, consider driving a car. If you have a driver's license, then you are literate in driving-related terms and you understand the rules of the road. You were not born with such knowledge or abilities, but it may be hard to imagine living without them today.

Someday, perhaps sooner than you think, you may not be able to imagine living without computer skills. Consider the fact that computers are an essential part of business today, whether you are an auto mechanic or a surgeon, a journalist or an airline pilot. Like the cars that take us to work each day, we rely on computers more with each passing year.

How will you benefit from computer literacy?

*Increased Employability.* If you have basic computer knowledge along with specific job skills, employers will consider you more trainable in and adaptable to the computerized work environment.

*Greater Earnings Potential.* As you increase your computer skills, you become a more valuable worker, especially if you focus on high-tech skills such as programming, network administration, or hardware maintenance. However, you do not have to become a computer expert to



increase your earnings. Skills that involve application of the computer to specific tasks (such as desktop publishing or database management) are highly valued.

*Greater Access to Resources.* Computers are incredible learning tools, especially when you have access to data on CD-ROMs or the Internet. You can use a PC to access vast knowledge bases on almost any topic, search archives of information dating back decades, and even take online courses for credit.

*Greater Control of Assets.* Using the power of the Internet and only a little knowledge of computers, you can manage your personal finances and indulge your interests in ways that were not possible just a few years ago. Online banking and investing give you control of the money you earn. Online shopping makes it easier than ever to spend your money, too. New technologies enable you to monitor your entire household via a PC – to set your air conditioner or alarm clock, start your coffee maker or sprinklers, and activate your alarm system.

Because of the growth of computer technologies, we now live in an information society – where information is considered to be an extremely valuable commodity. Those who control important information, or who simply know how to access and use it, are key players in the information-based economy. Computer literacy and the skills you can build with that literacy are essential to success in this society, not just in our working lives, but in the way we learn, manage our finances, and improve our standard of living.

### **Shapes of Computers Today**

*Supercomputers* are the most powerful computers in terms of processing. They are useful for problems requiring complex calculations. Because of their size and expense, supercomputers are relatively rare. They are typically used by large organizations such as universities, government agencies, and very large businesses.

*Mainframe computers*, which generally have many terminals or PCs connected to them, handle massive amounts of input, output, and storage. Mainframe computers are commonly used in corporations and government agencies, but they are also used as e-commerce servers, handling transactions over the Internet.

*Minicomputers* are smaller than mainframes but larger than microcomputers. They usually have multiple terminals. Minicomputers are used more and more often as network servers and Internet servers.

*Workstations* are powerful single-user computers that are used by engineers, scientists, and graphic artists. Like minicomputers, workstations are often used as network and Internet servers.

*Microcomputers* are more commonly known as *personal computers*. The term PC often denotes microcomputers that are either IBM-PCs or compatibles. The term can also refer to personal computers made by other manufacturers, such as Apple. *Desktop computers* are the most common type of personal computer. *Notebook computers (laptops)* are used by people who need portable computing power outside the office or away from home. *Handheld personal computers* are the smallest computing devices. They lack the power of a desktop or notebook PC, but they offer specialized features for users who need only limited functions and small size.

### Technical Documentation

Whether you are using an off-the-shelf software application at home or your employer's proprietary data-mining tools, you should find that both programs (and almost any other piece of software or hardware you use) are accompanied by documentation. Documentation can take several forms, but complete and useful documentation should always be part of any well-developed product – whether you buy the product from a store or your company developed it from scratch as part of the corporate information system.

Technical documentation takes two basic forms:

*Printed Manuals.* Most software and hardware products feature some sort of printed documentation, although printed manuals are used less frequently now than in the past. At the least, most commercial products include a short "getting started" manual, which offers guidance on installation or basic use. More complex products, like those developed for use in corporate information systems, may include multiple printed manuals with hundreds of pages.

*Online Documents and Help Systems.* In recent years, manufacturers have begun providing users with online documentation rather than printed manuals because electronic documents are less expensive to produce. This point is especially important for companies that develop their own software tools for in-house use. For these businesses, printing documentation can be a time-consuming and expensive process.

Depending on the product, documentation may be developed for different types of users, based on the expertise or experience:

*User Guides.* These are designed for end users – people who use the product simply to perform specific tasks. Generally, user documentation is tutorial in nature, providing step-by-step instructions, lots of illustrations, and little or no explanatory text.

*Reference Manuals.* These manuals may be developed for various users. Instead of providing step-by-step instructions, reference manuals include detailed descriptions of commands, features, and capabilities as well as glossaries of special terms.

*Technical Reference Guides.* Intended for high-level users or developers who will customize the product or develop other applications to work with the product, these guides are filled with technical details and are generally of little interest to end users.

*Installation Guides.* These are designed to lead the user or administrator through the installation process. For many products, installation is a simple matter requiring little or no documentation. For complex products, however, especially those designed to work with corporate networks and database management systems, installation is filled with potential pitfalls. In these cases, detailed installation guides attempt to describe and resolve any problems the user may encounter.

*Configuration Guides.* These guides are important references for high-level users or administrators who must change system settings to make the product work as desired.

*Administration Guides.* These guides are written for system administrators who must ensure that the product works in tandem with all the other products in the information system, such as the operating system, network operating system, and DBMS.

Other specialized types of documentation include *troubleshooting guides*, *technical specifications*, and *performance-assessment guides*.

## **Computing Issues That Affect Us All**

### *Computer Crime*

Our legal system is gradually developing a legal framework for working with computers and working on the Internet. The most prevalent breach of law in cyberspace is software piracy, or the illegal copying or use of a program. Several types of copy protection schemes can be used to stop or slow down pirates.

### *Computer Viruses*

A computer virus is a parasitic program that can replicate itself, infect computers, and destroy data. Viruses are most commonly spread by infected disks and when users download infected files over a network or from the Internet. A new breed of e-mail viruses is spread via files attached to e-mail messages or in the body of an e-mail message. Users can protect their data and software by using an antivirus program and by keeping the program's virus definitions up to date.

### *Theft*

Computer-related theft is a costly problem for organizations and individual users, especially those who use portable computers. Many companies literally lock their computer systems with anti-theft devices. Software theft is a common problem in organizations where software is left unattended. Companies can combat the problem by keeping software

in a locked storage location and overseeing its installation on individual computers. Data theft is perhaps the greatest concern to organizations. Hackers steal data by accessing a computer's disks over a network. In addition to stealing data, hackers have been known to destroy data, crash computer networks, and steal funds electronically. Organizations can protect the data on their networks by taking appropriate security measures. Basic measures include requiring users to provide identification and passwords before accessing the network. More sophisticated measures include encrypting data to make it unusable to anyone without the proper decoding key.

*Computers and the Environment*

The computer industry has become known for planned obsolescence, with both hardware and software being replaced or upgraded every couple of years. When disposed of improperly, obsolete hardware and software contribute to pollution and negatively affect the environment. Many newer devices are designed under the Energy Star program, which sets power-consumption standards for computer equipment.

*Ethical Issues in Computing*

Widespread access to computer technologies has created many ethical dilemmas. Government, legal, and computing professionals continue to debate computer-related ethical questions and attempt to develop laws that protect the freedoms of computer users while limiting immoral or illegal use of computers.

## UNIT 2. Input, Output, Storage Devices

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### Standard Methods of Input

#### *The Keyboard*

A standard computer keyboard has about 100 keys; each key sends a different signal to the CPU. Most keyboards follow a similar layout, with their keys arranged in five groups. Those groups include the alphanumeric keys, numeric keypad, function keys, modifier keys, and cursor-movement keys. Most keyboards use the QWERTY layout, which gets its name from the first six keys in the top row of letters. Several ergonomically correct keyboards are available to help users prevent hand and wrist injuries. When you press a key, the keyboard controller notes that a key was pressed and places a code in the keyboard buffer to indicate which key was pressed. The keyboard sends the computer an interrupt request, which tells the CPU to accept the keystroke.

#### *The Mouse*

The mouse is a pointing device that lets you control the position of a graphical pointer on the screen without using the keyboard. Using the mouse involves five techniques: pointing, clicking, double-clicking, dragging, and right-clicking.

#### *Variants of the Mouse*

A *trackball* is like a mouse turned upside-down. It provides the functionality of a mouse – but takes less space on the desktop.

A *trackpad* is a touch-sensitive pad that may be built into the keyboard or added to the PC as a separate unit. It provides the same functionality as a mouse. To use a trackpad, you glide your finger across its surface.

Many notebook computers provide a *joystick-like pointing device* built into the keyboard. You control the pointer by moving the joystick. On IBM systems, this device is called a TrackPoint. Generically, it is called an integrated pointing device.

### Brief History of the Mouse

The mouse's history actually goes back to the early 1960s and a group of scientists and engineers at the Stanford Research Institute (SRI) in California. One of those scientists – Doug Engelbart – part of a team charged with developing ways to "augment human intellect." Specifically, Engelbart's group was looking for ways to use computer systems to help people solve complex problems.

In his vision of this problem-solving system, Engelbart saw the need for a device that would enable the computer user to input data more efficiently than could be done using other standard input devices of the time, such as keyboards, light pens, and joysticks. With funding from NASA, Engelbart's

team developed a series of simple tests to determine which input device enabled users to move a cursor around the screen in the least amount of time and with the least effort. In those tests, all the other devices were outdone by a simple wooden gadget – the mouse – that Engelbart had created with fellow scientist Bill English.

The first mouse was a small wooden box. Rather than the hard rubber ball used in modern mice, Engelbart's mouse actually used two small wheels, placed perpendicular to one another on the mouse's underside. The user could move the mouse only up and down or side to side (moving diagonally was a problem), but the device worked well nonetheless and served as a prototype for the mouse we know today.

The mouse was not noticed immediately by industry titans. In fact, few people, including leaders at SRI and Palo Alto Research Center (PARC), saw the mouse's value. Many did not see much of a future for computers in general, except for use by the military and some large businesses.

This lack of vision, however, did not stop (or even slow) the visionary Engelbart. Throughout his career, he has described or developed technology that was considered to be ahead of its time. His discoveries and inventions in the fields of networking, hypertext, user interface technologies, and other computing disciplines continue to affect everyday computer users. Although the mouse did not make him rich, it helped launch one of the most brilliant and innovative careers in the history of computing science.

### **Alternative Methods of Input**

#### *Devices for the Hand*

With a pen-based system, you use a "pen" (also called a stylus) to write on a special pad or directly on the screen. Pen-based computers are handy for writing notes or selecting options from menus, but they are not well suited for inputting long text documents because handwriting-recognition technology has not yet achieved 100 percent reliability.

*Touch-screen* systems accept input directly through the monitor. Touch-screen systems are useful for selecting options from menus, but they are not useful for inputting text or other types of data in large quantities.

A *game controller* is a special input device that accepts the user's input for playing a game. The two primary types of game controllers are joysticks and game pads.

#### *Optical Input Devices*

*Bar code readers*, such as those used in grocery stores, can read bar codes, translate them into numbers, and input the numbers into a computer system.

*Image scanners* convert printed images into digitized formats that can be stored and manipulated in computers. An image scanner equipped with OCR software can translate a page of text into a string of character codes in the computer's memory.

#### *Audiovisual Input Devices*

*Microphones* can accept auditory input. Using speech-recognition software, you can use your microphone as an input device for dictating text, navigating programs, and choosing commands. To use a microphone or other audio devices for input, your computer must have a sound card installed. A sound card takes analog sound signals and digitizes them. A sound card can also convert digital sound signals to analog form.

PC *video cameras* and *digital cameras* can digitize full-motion and still images, which can be stored and edited on the PC or transmitted over a LAN or the Internet.

### **Monitors and Sound Systems**

#### *Monitors*

Computer monitors are roughly divided into two categories: *CRT* and *flat-panel displays*.

Monitors can also be categorized by the number of colors they display. Monitors are usually *monochrome*, *grayscale*, or *color*. A CRT monitor works with one or more electron guns that systematically aim a beam of electrons at every pixel on the screen. Most LCD displays are either active matrix or passive matrix. When purchasing a monitor, you should consider its size, resolution, refresh rate, and dot pitch.

The video controller is an interface between the monitor and the CPU. The video controller determines many aspects of a monitor's performance; for example, the video controller lets you select a resolution or set the number of colors to display. The video controller contains its own on-board processor and memory, called video RAM.

#### *PC Projectors*

A PC projector is a portable light projector that connects to a PC. This type of projector is rapidly replacing traditional slide projectors and overhead projectors as a means for displaying presentations. Many PC projectors provide the same resolutions and color levels as high-quality monitors, but they project the image on a large screen. The newest PC projectors use digital light processing to project bright, crisp images. A DLP projector uses a special microchip that contains tiny mirrors to produce images.

#### *Sound Systems*

Multimedia PCs generally come with sound systems, which include a sound card, speakers, a CD-ROM or DVD drive, and a video controller.

## Printers

Printers fall into two general categories: *impact* and *nonimpact*. Impact printers create an image on paper by using a device to strike an inked ribbon, pressing ink from the ribbon onto the paper. Nonimpact printers use various methods to place ink (or another colored substance) on the page.

When evaluating printers for purchase, you should consider four criteria: image quality, speed, initial cost, and cost of operation.

A *dot matrix printer* is a common type of impact printer. A dot matrix printer uses a print head, which contains a cluster of pins. The printer can push the pins out to form patterns, in rapid sequence. The pins are used to press an inked ribbon against paper, thus creating an image. The lowest resolution dot matrix printers have an array of nine pins; the highest resolution dot matrix printers have twenty-four pins. The speed of dot matrix printers is measured in characters per second.

An *ink jet printer* is an example of a nonimpact printer. It creates an image by spraying tiny droplets of ink onto the paper. Ink jet printers are inexpensive for both color and black printing, have low operating costs, and offer quality and speed comparable to low-end laser printers.

*Laser printers* produce higher-quality print and are fast and convenient to use, but they are also more expensive than ink jet printers. Laser printers are nonimpact printers. They use heat and pressure to bond tiny particles of toner (a dry ink) to paper. Laser printers are available in both color and black and white, and the highest end laser printers provide resolutions of 1200 dpi and greater.

*Snapshot printers* are specialized, small-format printers used to print small color photographs. Snapshot printers are popular among users who own digital cameras. Snapshot printers are fairly slow, and they can be more expensive to operate than standard ink jet or laser printers.

*Thermal-wax, dye-sublimation, fiery, and IRIS printers* are used primarily by print shops and publishers to create high-quality color images.

*Plotters* create large-format images, usually for architectural or engineering purposes, using mechanical drawing arms, ink jet technology, or thermal printing technology.

## Types of Storage Devices

Storage devices can be categorized as *magnetic* or *optical*. The most common magnetic storage devices are diskettes, hard disks, high-capacity floppy disks, disk cartridges, and magnetic tape. The primary types of optical storage are compact disk read-only memory (CD-ROM), digital



video disk read-only memory (DVD-ROM), CD-Recordable (CD-R), CD-ReWritable (CD-RW), DVD-Recordable (DVD-R), DVD-ReWritable (DVD-RW) and PhotoCD.

### *Magnetic Storage Devices*

Magnetic storage devices work by polarizing tiny pieces of iron on the magnetic medium. Read/write heads contain electromagnets that create magnetic charges on the medium. Diskette drives, also known as floppy disk drives, read and write to diskettes. *Diskettes* are used most often to transfer files between computers, as a means for distributing software, and as a backup medium. 3.5 inches diskettes are available at present. Before a magnetic disk can be used, it must be formatted – a process that maps the disk's surface and creates tracks and sectors where data can be stored. When a disk is formatted, the operating system creates four distinct areas on its surface: the boot sector, FAT, root folder, and data area.

*Hard disks* can store more data than diskettes because of their higher-quality media, faster rotational speed, and the tiny distance between the read/write head and the disk's surface. Removable hard disks combine high capacity with the convenience of diskettes.

*High-capacity floppy disks* are becoming a popular add-on for many computers. They offer capacities up to 250 MB and the same portability as standard floppy disks.

*Data cartridges* are like small removable hard disks and can store up to 200 GB.

Magnetic tape systems offer slow data access, but because of their large capacities and low cost, they are a popular backup medium.

### *Optical Storage Devices*

CD-ROM uses the same technology as a music CD does; a laser reads lands and pits on the surface of the disk. Standard CD-ROM disks can store up to 700 MB. Once data is written to the disk, it cannot be changed.

DVD-ROM technology is a variation on standard CD-ROM. DVDs offer capacities up to 17 GB.

Other popular variations of CD-ROM and DVD-ROM are CD-Recordable, CD-ReWritable, DVD-Recordable, DVD-ReWritable and PhotoCD.

UNIT 3. Operating System

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**Operating System**

An operating system (OS) is a software program that provides you with the tools (commands) that enable you to interact with the PC.

Most modern operating systems employ a graphical user interface (GUI) with which users control the system by pointing and clicking graphical objects on the screen. A GUI is based on the desktop metaphor. Icons, windows, menus, dialog boxes, and other graphical objects appear on the desktop for the user to manipulate. Applications designed to run under a specific operating system use the same interface elements, so users can see a familiar interface no matter what programs they are using. Some older operating systems, such as DOS and UNIX, use command-line interfaces, which the user controls by typing commands at a prompt.

The operating system manages all the other programs that run on the PC. The operating system also provides system-level services, including file management, memory management, printing, and others, to those programs. Some operating systems, such as Windows, enable programs to share information. This capability enables you to create data in one program and use it again in other programs without recreating it. Modern operating systems support multitasking, which is the capability of running multiple processes simultaneously.

The operating system keeps track of all the files on each disk. To track the location of each file, the operating system maintains a running list of information on each file, in a table that is typically called the file allocation table (FAT). Users can make their own file management easier by creating a hierarchical file system that includes folders and subfolders arranged in a logical order.

The operating system uses interrupt requests (IRQs) to maintain organized communication with the CPU and other pieces of hardware. Each of the hardware devices is controlled by another piece of software, called a driver, which allows the operating system to activate and use the device.

The operating system also provides the software necessary to link computers and form a network.

**Types of Operating Systems**

UNIX was the first multi-user, multiprocessor, multitasking operating system available for use on PCs. In many ways, UNIX served as the model for other PC operating systems.

*DOS* is a single-user OS that supports only 640 KB of memory. It features a command-line interface and does not support multitasking or multiprocessing.

The *Macintosh operating system* supports the graphical nature of the Macintosh computer. The Mac OS brought the first truly graphical user interface to consumers. It also brought interface conformity to the desktop.

*Windows 3.0, 3.1, and 3.11* brought a graphical user interface and multitasking capabilities to PCs that ran DOS. Windows 3.x is an operating environment.

IBM's *OS/2 Warp* was the first true GUI-based operating system for Intel-based PCs. OS/2 is a multitasking operating system that provides support for networking and multiple users.

Microsoft's *Windows NT* was originally meant as a replacement for DOS but was too resource-intensive to work on most PCs at the time of its release. Microsoft issued two versions – Windows NT Workstation and Windows NT Server.

*Windows 95* was Microsoft's first true GUI-based, 32-bit operating system for Intel PCs. Its strengths include multitasking and the capability to run older DOS and Windows 3.x programs.

The features of *Windows 98* include advanced Internet capabilities, an improved user interface, and enhanced file system performance, among others.

*Linux* is a version of UNIX and is available free or at a low cost from various sources. Despite its low cost, it is a powerful 32-bit OS that supports multitasking, multiple users, networking, and almost any application.

*Windows 2000* includes the same interface and features of Windows 98, with the file system, networking, power, and stability of Windows NT. Several versions of Windows 2000 are available, each targeting a specific user or computing environment.

### **Windows XP**

*Windows XP* is a line of operating systems developed by Microsoft for use on general-purpose computer systems, including home and business desktops, notebook computers, and media centers. The letters «XP» stand for *experience*. Windows XP is the successor to Windows 2000 and is the first consumer-oriented operating system produced by Microsoft to be built on the Windows NT kernel and architecture. Windows XP was first released in October 2001. The most common editions of the operating system are *Windows XP Home Edition*, which is targeted at home users, and *Windows XP Professional*, which has additional features, such as support for Windows Server domains and dual processors, and is targeted

at power users and business clients. *Windows XP Media Center Edition* consists of Windows XP Professional with new features enhancing the ability to record and watch TV shows, watch DVDs, listen to music and more. *Windows XP Tablet PC Edition* is designed to run the ink-aware Tablet PC platform. Two separate 64-bit versions of Windows XP were also released, *Windows XP 64-bit Edition* for IA-64 (Itanium) processors and *Windows XP Professional x64 Edition* for AMD64/EM64T processors. Windows XP is known for its improved stability and efficiency over previous versions of Windows. It presents a significantly redesigned graphical user interface (GUI), a change Microsoft promoted as more user-friendly than previous versions of Windows. New software management capabilities were introduced to avoid the “DLL hell” that plagued older consumer versions of Windows. It is also the first version of Windows to use product activation to combat software piracy, a restriction that did not sit well with some users and privacy advocates. Windows XP has also been criticized by some users for security vulnerabilities, tight integration of applications such as Internet Explorer and Windows Media Player, and for aspects of its user interface.

*Windows Vista* is scheduled to be the next major revision of Microsoft Windows, with a planned release date of November 2006 for business editions, and January 2007 for other editions.

### **Brief History of Linux**

Linus Torvalds was a student at the University of Helsinki in 1991 when he decided to create a new and different “UNIX clone.” Torvalds decided the new OS would be named “Linux,” a combination of his name and “UNIX.”

Torvalds had two goals. First, he wanted to create a powerful, feature-rich OS that provided the same functioning of UNIX. His OS would run on almost any computer, regardless of its architecture or the type of applications it hosted. Second, the OS would be completely open; anyone could contribute to its development and adapt or change its code, as long as they made their innovations public and did not take credit for anyone else's work. As part of its openness, Linux would be available for free to anyone who wanted it, although no one would be prohibited from selling their version of Linux as long as they made their innovations public and kept the OS completely open.

To achieve these goals, Torvalds decided that Linux would be built from the ground up, without using any code from any commercial version of UNIX. To keep Linux open, Torvalds posted a message on the Internet in 1991 inviting programmers around the world to help him develop the new operating system.

The call was taken up by dozens of programmers, who immediately wanted to share Torvalds' dream. Piecing the work out among themselves, different programmers tackled different aspects of the program, sharing code and ideas over the Internet. By 1994, enough pieces had been stitched together and the first version of Linux was released to anyone who wanted to download it.

Although commercial versions of the OS now exist, Linux remains open and still attracts a community of developers interested in contributing to it. By some estimates, Linux runs on more than 10 million computers, a number that is growing rapidly. An ever-increasing number of corporate IT and database managers, Web site operators, and ISPs are using Linux as the core operating system on mission-critical computer networks.

There is probably no greater mark of Linux's acceptance, however, than the acknowledgment it has received from Microsoft. Although few people believe that Linux will ever replace Windows as the desktop operating system of choice (or replace Windows NT as the primary network OS), Microsoft executives have said that they view Linux as a legitimate competitor.

Leading hardware vendors – including Intel, IBM, Compaq, and others – have announced their support of Linux. In fact, some server-class computers are now being shipped with Linux, rather than UNIX or Windows NT, installed. In the software world, leading database companies such as Informix and Oracle have announced that their corporate database products will be tailored to run under Linux.

For computer users in the home and in most average business settings, Linux is not an issue. With its cryptic command-driven interface, Linux is not likely to become the operating system of the masses, even though developers have created a Windows-like GUI for it.

UNIT 4. Application Software

**Word Processing and Desktop Publishing Software**

*Word Processing Software*

A word processor provides tools for creating, editing, and formatting text-based documents. Leading word processing programs include Microsoft Word, Corel WordPerfect, and Lotus WordPro. In a typical word processor interface, you will find a document area, menu bar, toolbars, rulers, scroll bars, and a status bar.

While entering a text, a blinking insertion point in the document window shows you where characters will be placed as you type. The Backspace and Delete keys let you remove characters quickly. An AutoCorrect feature can correct some errors as you type. To perform most kinds of editing or formatting on text, you must first select the text; then any editing or formatting commands you issue are applied to all the selected text.

A word processor allows you to format the text. Character formats include fonts, type size, type styles, and color. Paragraph formats include line and paragraph spacing, indents and alignment, borders, and shading. Document formats include margins, page size and orientation, headers, and footers.

Word processing programs have special features. They enable you to add graphics and sound files to your documents. You can use a spell checker, grammar checker, and thesaurus to improve the language of a word-processed document. Using mail merge, you can combine a form letter with contents from an address database and create a separate copy of the letter for each person in the database. Templates are predesigned documents. They simplify document design, enabling you to create professional-looking documents simply by typing your text.

Word processing programs can create documents in HTML format, which are ready to be published as pages on the World Wide Web. To create an HTML document in a word processor, create a document as you normally would. The word processor converts the document by inserting all the required HTML codes.

*Desktop Publishing Software*

Desktop publishing (DTP) software is specialized for designing and laying out long or complex documents. Documents created in DTP software are ready to be sent to a professional printer.

### **Spreadsheet Software**

Spreadsheet programs provide tools for working with numerical data. Leading spreadsheet programs include Microsoft Excel, Corel Quattro Pro, and Lotus 1-2-3. In addition to standard interface components, a spreadsheet also provides a formula bar where you can enter, view, and edit data. In a spreadsheet program, you work in a worksheet. Worksheets can be collected into groups called workbooks. A worksheet contains a series of columns and rows. Each row-and-column intersection is called a cell. Cells contain the data in the worksheet. Each cell is identified by a cell address, which is the combination of the cell's column letter and row number. You can enter text, values, dates, and formulas in the cells of a worksheet.

Formulas are used to perform calculations in the worksheet. Formulas can use cell references to use data in other cells. A function is a predefined formula provided by the spreadsheet program.

Spreadsheets provide many of the same formatting tools found in word processors. You can select a contiguous group of cells, called a range, for formatting or editing. Values and dates can be formatted in numerous ways.

Spreadsheet programs provide charting tools, which let you create graphical representations of your data. To create a chart, select the data to be charted, select a chart type, and set the desired chart options. The spreadsheet program creates the chart for you.

Spreadsheets are useful for analyzing your data. Analysis can help you reach a desired numeric result. What-if analysis lets you test different scenarios to see how each affects the results of a calculation. Goal seeking and sorting are other common data analysis tools found in spreadsheets.

### **Database Management System**

A database management system is a program, or collection of programs, that allows any number of users to access and modify the data in a database.

Many different DBMS programs are available. Enterprise-level products, such as Oracle, DB2, and Sybase, are designed to manage large corporate or special-purpose database systems. Programs such as Microsoft Access, Corel's Paradox, and Lotus Approach are popular among individual and small-business database users.

The DBMS interface presents the user with data and the tools required to work with the data. Data management functions include: creating tables, entering and editing data, viewing data, sorting records, querying the database, generating reports.

To create a new database, you must first determine what kind of data will be stored in each table. In other words, you must define the table's fields with a three-step process: name the field, specify the field type, specify the field size. Most modern database systems can work with seven predefined field types: text fields, numeric fields, date fields, logical fields (called Boolean fields), binary fields, counter fields (sometimes called autonumber fields) and memo fields (also called description fields).

After the table has been set up, data can be entered. In most cases, entering data is a matter of typing characters at the keyboard. Most DBMSs allow you to create a data entry form to make data entry easier.

Sometimes viewing the entire table is unwieldy because there are too many entries. For displaying a selected list or subset of records from a table filters can be used. They tell the DBMS to display those records that satisfy the condition while hiding – or filtering out – those that do not.

One of the most powerful features of a DBMS is the ability to sort a table of data, either for a printed report or for display on the screen. Sorting arranges records according to the contents of one or more fields. For example, in a table of products, you can sort records into numerical order by product name or into alphabetical order by product name.

You can enter expressions or criteria that allow the DBMS to locate records, establish relationships or links between tables to update records, list a subset of records, perform calculations, delete obsolete records, perform other data management tasks. Any of these types of requests is called a query, a user-constructed statement that describes data and sets criteria so that the DBMS can gather the relevant data and construct specific information. In the mid 1970s mainframe database developers created the Structured English QUery Language (SEQUEL), and its later variant SQL. They are English-like query languages that allow the user to query a database without knowing much about the underlying database structure. In addition to SQL, PC-based databases sometimes use a query /programming language called Xbase.

Not all DBMS operations have to occur on screen. Just as forms can be based on queries, so can reports. A report is printed information that, like a query result, is assembled by gathering data based on user-supplied criteria. In fact, report generators in most DBMSs create reports from queries.

### **Presentation Programs**

Presentation programs enable you to create a series of slides that can be used to support a discussion. A presentation can be saved as a single file containing one slide or many slides that are used together. Slides can include different types of text, charts, tables, and graphics. Most presen-



tation programs provide templates, which are predesigned slides. Slides can be formatted with different fonts, colors, backgrounds, and borders. Using frames, you can resize many of the elements in a slide. Presentation programs provide several special features that enable you to add annotations to your slide show, create animations within slides, convert a slide to an HTML document, and more.

You can add different media types, such as audio or video files, to your slides. If you present your slide show directly from your PC's disk (and if the system is connected to a suitable video and audio output device), you can present its multimedia elements.

You can print your slides and present them using a slide projector or overhead projector. An efficient way to present a slide show is to display the slides directly from the PC's disk. This technique enables you to present slides out of order or even mark slides as they appear on the screen. Depending on the size of your audience and room, you can display slides on the PC's monitor, project them onto a screen, or connect the PC to a television or larger display. You can move from one slide to the next manually, or you can automate the presentation so that each slide appears on screen for a set amount of time before being replaced by the next slide.

### **Managing the Small or Home Office**

Because resources are so limited for the small-business owner, application suites and a new breed of financial software are making it easy to run a small office/home office (SOHO). Instead of relying on outside accountants, marketers, designers, and other consultants, many SOHO workers can do many nontraditional chores – as well as their normal work-by using sophisticated software packages. These applications help small business owners solve various problems without making a large educational or monetary investment.

Application suites such as Microsoft Office, Corel's WordPerfect Office, and Lotus's SmartSuite include the following *types of programs*:

*Word Processor.* Most word processors include professional templates to give documents a clean look and help the user with spelling, grammar, and word choices. Word processors greatly simplify mass mailings and can print envelopes, brochures, and other complex documents. For SOHO workers who want to design their own Web pages, a word processor may be the only tool they need.

*Spreadsheet.* Spreadsheets help managers tackle crucial financial tasks. The resulting files can be imported into many financial or accounting programs and can be useful to an accountant or consultant.

*Database.* These packages enable the small-business owner to track products, orders, shipments, customers, and much more. When used as part of an application suite, the database program can provide much of the data required for invoices, receipts, form letters, and other mission-critical documents.

*Presentation.* These programs help the user quickly create impressive presentations for use in slide shows in overheads and on the computer screen. Color graphics, animation, and concise text can help persuade clients and close sales.

*E-Mail, Contact, and Schedule Management.* Even in a small office, time is valuable and people cannot afford to confuse schedules. Programs like Microsoft Outlook and Lotus Organizer help people (individually and in groups) manage and coordinate their schedules, set appointments, and manage contacts. These programs offer e-mail software, making it even easier to send a message to someone from the contact list.

The specialty software market for small businesses is growing rapidly. Here are three examples of the *types of special business-oriented programs* targeted at small businesses:

*Financial.* These inexpensive yet powerful packages can track inventories, billings, expenses, and much more. They can also help the user categorize income and expenses and do tax planning.

*Business Planning.* New business-planning programs provide templates to help the user create business plans and customize documents by industry, product type, or market type. These programs can help the aspiring business owner find investors.

*Tax Planning and Preparation.* Tax software enables business owners to prepare their own taxes without using an accountant or consultant. The user plugs in the numbers; the software does the rest.

## **Working With Images**

### *Computer Platforms Used for Graphics*

Today, almost all commercial graphics work, design, and illustration is done on the computer rather than by hand. Designers need to be as skilled with computers and software as they are with artistic techniques.

The era of art on personal computers was started in 1984, with the release of the first Apple computers. Their use of pointing devices, the WYSIWYG interface, and graphics programs made Apple and Macintosh computers a good choice for artists and designers.

With the advent of Windows, IBM-compatible PCs caught up with the Macintosh in terms of graphics performance. Today, PCs are also used extensively in the graphics and design fields.

Because of their power and expense, workstations are reserved for the most demanding graphics applications.

Graphics software is available for different computer platforms, including Macintosh computers and IBM-compatible PCs. Some graphics applications are available only for workstations.

#### *Types of Graphics Files*

Graphics files fall into one of two basic types: bitmap and vector.

*Bitmap graphics* define images as a grid of cells, with each cell filled with a color. Vectors define objects in a drawing by using mathematical equations to pinpoint their location and other features.

A *file format* is a means of encoding data for storage. Many different file formats are used with graphics. Common bitmap file formats are BMP, PICT, TIFF, JPEG, and GIF. Not all file formats work in all programs, a problem called incompatibility. To solve this problem, developers have created universal file formats that are compatible across various software applications.

#### *Getting Images Into Your Computer*

*Scanners* enable the user to digitize hard-copy images such as photographs so they can be stored and edited in a computer.

*Digital cameras* are gaining popularity among professional and casual photographers. A digital camera stores images in its memory or on a disk until they can be loaded into a computer.

Clip art and electronic photographs are images that are already available in digital form. These images cover a wide range of subjects, from cartoons to business. Clip art can include sketches and drawings as well as high-quality photographs.

### **Graphics Software**

*Paint programs* work with bitmap images and manage the individual pixels that make up an image. Paint programs include various tools and can be used to add special effects to an image.

*Photo-manipulation programs* work with bitmap images and are widely used to edit digitized photographs. You can use a photo-manipulation program to repair problems with an image, such as adjusting colors or hiding mistakes. Powerful photo-manipulation programs can produce sophisticated effects, such as combining multiple images into a seamless whole, hiding parts of an image, creating text, and more.

*Draw programs* work with vectors and give the designer a great deal of flexibility in editing an image. Objects created in a draw program can be altered easily and without loss of image quality. Draw programs work well with text.

*Computer-Aided Design* (CAD) software is used in technical design fields to create models of objects that will be built or manufactured. CAD software allows users to design objects in three dimensions (3-D), and can produce 3-D wireframe and solid models.

*Three-dimensional (3-D) modeling programs* are used to create spectacular visual effects.

Three-dimensional modeling programs work by creating objects via surface, solid, polygonal, or spline-based modeling.

Computers are used to create animation for use in various fields, including games and movies. *Fly-bys* and *walk-throughs* are basic types of computer animation. *Character animation* is the art of creating a character and making it move in a lifelike manner. *Compositing tools* allow game makers and filmmakers to add characters and objects to scenes that did not originally contain them.

The GIF and JPEG image formats are the most widely used formats on the World Wide Web. Animation can be added to a Web page by using simple animated GIF images or plug-in software such as Flash or Shockwave.

### **Digital Photography**

Digital cameras are rapidly increasing in popularity, to the point that many professional photographers now use digital equipment almost exclusively. As prices drop and more models become available, digital cameras are also finding their way into an ever-increasing number of homes.

#### *Photography the Old Way*

Traditional cameras work by exposing a piece of film (celluloid covered with a light-sensitive emulsion, such as silver nitrate) to light for a fixed amount of time. The film reacts to the light that passes through the camera's lens, "capturing" reflected images.

The biggest advantage of traditional photography is that, depending on the equipment and conditions, a photograph can have almost infinite resolution. That is, its quality is not limited by the finite number of "dots" that comprise the image.

Traditional photography also has some drawbacks. Film must be processed before the results can be seen. Great care must be taken to preserve the negative image produced on the film. It can be extremely difficult to modify a film-based photograph, using traditional processing methods. Finally, film processing and printing can be a slow, expensive process.

#### *And the New Way*

Instead of using only a lens to capture light, most digital cameras use a charge-coupled device (CCD) to convert light into a digital image. CCDs are commonly used on scanners and video cameras as well as digital cameras.

After capturing an image, a digital camera stores it in a special type of memory or on a magnetic disk. Manufacturers have developed a variety of storage technologies. Some cameras use a standard 3.5-inch floppy disk for storage. Other cameras use PC Cards or special "memory sticks" to hold photos; these devices use flash memory to store data even when the camera is turned off.

Digital cameras can store photos in a variety of formats, which may require different amounts of storage and provide varying resolutions. Most digital cameras can store images in high-resolution JPEG or TIFF formats, but these formats consume a great deal of storage space.

The biggest advantage of digital photography is convenience. Many cameras provide LCD screens so you can review a picture right after taking it. This lets you decide whether you want to keep or delete the picture. Instead of taking film to a developing lab, you can copy the images to a PC and print them out.

Printing is both the biggest blessing and biggest curse of digital photography. Even though digital cameras store pictures at very high resolutions (millions of pixels per image), the printed image's quality is restricted to the printer's quality. So, if you use a color ink jet printer with a resolution of 300 x 600 dpi, that's as good as your images will look. For best results when printing digital photographs, use premium-quality photo printing paper, which is available at any office supply store.

You can use color laser printers for higher-resolution printing, but they are very expensive. A less expensive option is the snapshot printer, which offers near-photographic resolution, but snapshot printers are slow and most print only small formats.

Even so, digital cameras are a boon to many people. You can use digital photos in Web pages and documents. Using PhotoCD or a CD-R device, you can store hundreds of photos on a single disk. And, in spite of their limited resolution, home-printed photos are faster and cheaper than professionally printed photos from film.

### **Multimedia**

A *medium* is a way of communicating information, such as speech or text. *Multimedia* is the use of more than one unique medium at a time. *Multimedia programs* are described as interactive if they accept input from the user and enable the user to direct the flow of information or action in the program. The term *new media* is used to describe the combination of multimedia programming and communications technologies that enable multimedia to be distributed in different ways (such as on disk, via the Internet, or over television).

Effective multimedia programming provides information that is layered and multidimensional. In *layered multimedia*, multiple types of information may be presented simultaneously. In *multidimensional programming*, the user can approach information in different ways, such as a text-only description or an animated demonstration.

*Navigation* is the act of moving through electronic information. Multimedia products typically provide the user with a set of navigation tools.

*Hypermedia* is commonly used in multimedia products. When the user chooses a hypermedia link, the program moves to a different piece of information, possibly represented by a different type of media.

In creating multimedia products, developers must be aware of the capabilities and features of the user's computer. Hardware and software manufacturers have developed sets of standards for computer systems that will be used with multimedia products.

Multimedia programs are used in a wide variety of ways.

Multimedia is commonly used in schools, where students use CD-ROM-based reference materials and tutorials and use the Internet to collaborate with students in other locations. By using multimedia programs and delivery mechanisms like the Internet and television, schools can support distance learning, which allows students to take classes without actually traveling to school. Online courses are typically called virtual universities. In the workplace, companies commonly use multimedia programs to train employees. These training programs (called computer-based training, or CBT) are sometimes done online but can also be provided on disk. Multimedia is frequently used in the home, whether on a PC, television, or the Internet. Home users consume a wide variety of multimedia products for entertainment and learning.

### **Creating and Distributing New Media Content**

The process of creating a multimedia product usually results from the effort of a group of professionals who follow a multistep process. The development process involves defining the audience, designing the product, choosing development tools, creating content, multimedia authoring, and testing. Multimedia developers must gain a detailed understanding of the audience who will use the final product to make sure it will succeed. Using basic tools such as outlines and storyboards, designers lay out and organize the content and flow of the information for their products. Because a multimedia product can use so many types of media, designers use a wide variety of tools to create individual components, ranging from text editors to video editors. After the individual components of a multimedia product are created, the developer uses sophisticated multimedia authoring tools to assemble them into a single working program.

### *Technologies That Support New Media*

A wide range of new technologies has been created to support multimedia on CD-ROM and the Internet. These technologies enable developers to create sophisticated content using almost any type of medium and allow the end user to play the content in a seamless manner.

The *MPEG*, *AVI*, and *QuickTime* formats are just a few technologies that allow full-motion video files to be compressed and played back on a PC, whether from a CD or an Internet connection. The *RealAudio* and *RealVideo* formats are the current standard for streaming audio and video played over an Internet connection. Formats such as *Macromedia's Shockwave* allow developers to create entertaining, colorful animation that not only displays directly within a browser but also accepts input from the user.

### *Distributing New Media Content*

The three primary means of distributing new media content are CD-ROM (or DVD-ROM), the Internet, and television. CD-ROM is the most widely used vehicle for distributing multimedia programs. Because of its storage capacity and ease of use, CD-ROM is used for games, references, CBTs, and many other types of multimedia products. The *Internet* is rapidly becoming an effective way to distribute new media content as new technologies emerge to enhance interactivity and performance. *Television* is seen as the ultimate multimedia delivery vehicle, but its interactive capabilities are limited. This limitation may change, however, as two-way Internet and satellite connections are integrated into television programming.

## **Virtual Reality**

Virtual reality (VR) – the computer-generated simulation of a real or imagined physical space – is probably the ultimate multimedia experience because it immerses you in a completely artificial environment. VR environments typically produce one of three possible image types:

*Simulations of Real Places.* You might find yourself in a virtual room, car, or cave.

*Simulations of Imaginary Places.* In this kind of simulation, you could be riding alongside King Arthur or battling aliens.

*Simulations of Real Things That Do Not Exist.* In this kind of simulation, you could walk through a building that has not been built yet.

### *Uses for Virtual Reality*

People use these VR simulations in many situations:

*Training.* VR simulations of air combat, space shuttle flights, or nuclear reactor meltdowns provide excellent low-cost training areas.

*Document and Facilities Management.* Virtual reality allows you to file electronic documents visually. Using such a system, you can create a virtual model of a factory and then attach maintenance records to each item within the factory.

*Design.* By building a prototype in VR, a designer can work out design and construction flaws before the product leaves the drawing board.

*Entertainment.* VR games and adventures are the ultimate fantasy experience.

#### *VR Hardware and Software*

VR technology appears in the following formats:

*On-Screen.* Images are displayed on a computer screen. The user is outside the environment, which limits the "reality" effect.

There are many different head-mounted VR displays. Using such a device, the wearer feels immersed in the virtual environment, without distractions from outside.

*Head-Mounted Displays.* Developers have created helmets and goggles that display stereoscopic images close to the user's eyes. The images block the outside world and create the illusion of a world that wraps around the wearer. As the wearer turns his or her head, tracking devices tell the computer to change the image, allowing the wearer to look around the virtual environment rather than stare straight ahead.

*Rooms.* These rooms, called Cave Automatic Virtual Environments (CAVEs), contain complex projection and stereo equipment that create a complete virtual world. The user can move around the room and move objects with the aid of a wand.

*Clothing.* Developers are working on VR clothing, like chest pads and gloves, that provide tactile feedback when you touch a virtual object.

The most impressive VR equipment costs hundreds of thousands of dollars. Nevertheless, home users can experience convincing VR using low-end equipment and a home PC.

### **PC As an Entertainment Center**

Except for the occasional beep, computers were once silent machines. And they were not much to look at, with their black-and-white screens displaying nothing but rows of text. But the increasing demand for multimedia has made color, graphics, animation, full-motion video, and stereo sound important capabilities for nearly every new computer and many software applications.

With the introduction of sound cards in the late 1980s, computers could play recorded sounds and music (from an application or a compact disk) and even synthesize sounds. Thanks to recent innovations in computer audio, sound has become an integral part of everyday computing, and computers have become an integral part of the audio industry.



The same is true with graphics and video. The PCs of a decade ago could barely display menus, let alone graphics with millions of colors, animation, and video. As video technologies have improved, however, users expect their computers to function like a television. The advent of graphically rich programs, multimedia events, the Internet, and DVD has made the PC a video-on-demand resource. For a growing number of users, the PC is part of the home entertainment system or is replacing some home entertainment components entirely. Here are just a few examples of entertainment options that you can access with a typical multimedia PC:

*Music on CD.* If your PC includes a CD-ROM drive, a sound card, and speakers, you can play music from any audio compact disk. Most multimedia PCs include simple audio-playback software that lets you start, stop, pause, and random-play songs from a CD. Many audio-playback programs let you create favorites lists and log your CDs to identify artists and tracks.

*Movies on DVD.* Many newer model multimedia PCs include DVD drives rather than CD-ROM drives. DVD drives can play audio compact disks just like CD-ROM drives but can also play digital video disks. You can watch full-length movies with stereophonic sound at your PC.

*Watch Television.* If your PC has a television tuner card (a special video card that can accept a broadcast signal through television antennae or cable), you can use your PC as a television. Special services like WebTV enable users to access program listings, set reminders to tune in, and more.

*Listen to Radio.* Around the world, hundreds of radio stations are now Webcasting their programs over the Internet. Multimedia players, such as Windows Media Player, RealPlayer G2, and others, enable you to tune into traditional broadcast stations and dozens of net radio outlets, which distribute their audio exclusively over the World Wide Web. Most of these stations broadcast live, in real time, on the Internet. Some also provide prerecorded programming. Formats include music of all kinds, news and sports, talk, call-in, and more.

*Watch Streaming Video and Audio.* With an Internet connection and a player like RealPlayer G2, you can tune into The Weather Channel, CNN, and other cable television channels without connecting cable TV or an antenna to your PC. These services use streaming audio and video technology to transmit programming to your PC so it plays smoothly. For best results, you need a fast PC and a broadband Internet connection, such as a cable modem or an ISDN line.

*Enjoy Recorded Music Over the Internet.* Using technologies like RealPlayer, LiquidAudio, and others, you can listen to prerecorded music over your Internet connection. Using newer multimedia file-compression

technologies like MP3 or a2b, you can download songs to your computer and listen to them any time. If you have a CD-ROM drive that records compact disks or a portable MP3 player (such as Diamond Multimedia's Rio player), you can take your recordings with you anywhere.

### Utility Software

A utility is a program that performs a task not typically handled by the operating system or that enhances the operating system's functioning. Some of the major categories of utilities include file defragmentation utilities, data compression programs, backup utilities, antivirus programs, and screen savers.

Using a *file defragmentation utility* like the Disk Defragmenter (built into Windows 95, 98, and 2000), you can rearrange the fragmented pieces of data so your files are stored in contiguous sectors.

*Data compression utilities* such as WinZip, StuffIT, and others use special algorithms to search files for unnecessary bits, which are stripped out. The process can significantly shrink some types of files. In this collection of compressed files, some files have shrunk by more than 80 percent.

*Backup software* can help you copy large groups of files from your hard disk to another storage medium, such as tape or a CD-R disk. Many newer operating systems feature built-in backup utilities, but feature-rich backup software is available from other sources. These utilities not only help you transfer files to a backup medium, they also help organize the files, update backups, and restore backups to disk in case of data loss.

A virus is a parasitic program that can delete or scramble files, or replicate itself until the host disk is full. Computer viruses can be transmitted in numerous ways, and users should be especially vigilant when downloading files over the Internet or reusing old diskettes that may be infected. *Antivirus utilities* examine specific parts of a disk for hidden viruses and files that may act as hosts for virus code. Effective antivirus products not only detect and remove viruses, they also help you recover data that has been lost because of a virus.

*Screen savers* are popular utilities, although they serve little purpose other than to hide what would otherwise be displayed on the screen. A screen saver automatically displays when the system has been unused for a specified period of time. Screen savers display a constantly moving image on the screen and were originally created to prevent constantly displayed images from "burning" into the monitor. Today's monitors do not suffer from this problem, but screen savers remain a popular utility because they add personality to the user's system.

## UNIT 5. Processor and Memory

### **CPUs Used in Personal Computers**

Since 1978, Intel's processors have evolved from the 8086 and the 8088 to the 80286, 80386, and 80486, and then to the *Pentium family* of processors (which includes the Pentium, Pentium Pro, Pentium with MMX, Pentium II, Pentium III, Celeron, and Xeon processors). With the Pentium III processor, Intel achieved clock speeds greater than 500 MHz.

Advanced Micro Devices (AMD) was long known as a provider of low-performance processors for use in low-cost computers. That reputation changed in 1998, however, with the release of the K6 line of processors, which challenged Intel's processors in terms of both price and performance. With the *K6-III processor*, AMD broke the 600 MHz barrier, claiming the fastest processor title for the first time in IBM-compatible computers.

Cyrix began as a specialty chip maker but eventually began producing microprocessors including the *MediaGX processor* and now the *MII series* of processors.

Motorola makes the CPUs used in Macintosh and PowerPC computers. Macintosh processors use a different architecture than IBM-compatible PC processors. PowerPC processors are *RISC processors*. Instruction sets for RISC processors are kept smaller than those used in CISC chips. This smaller size enables the processor to run faster and process more instructions per second. RISC processors are found in Apple microcomputers, some workstations, and many minicomputers and mainframe systems. They are also the basis for many small digital devices, such as H/PCs.

### **Universal Serial Bus (USB)**

The USB standard may someday eliminate the need for multiple types of buses in a single computer. Currently, a USB port can accept as many as 127 devices, extending the system's bus to many peripherals. The USB standard also provides for a data transfer rate of 12 Mb per second, which compares favorably to standard parallel and serial port throughput and is more than adequate for many peripheral devices.

Specifically, the USB standard provides the following advantages over traditional expansion bus designs:

*No Expansion Cards.* You simply plug a USB-compliant device into the computer's existing USB port. Because the computer's USB port is already built in, you do not need to add a new port to the computer by installing an expansion card.

*You Can Leave Your System in One Piece.* Installing an expansion board means opening your computer – a daunting task for most users. Because the USB port is already built into newer systems, you may never need to remove the system's cover again.

*True "Plug and Play."* Whenever you add an expansion card to a computer, you may need to make other changes to enable the card to work. USB devices require no special settings, which means that the dream of true "Plug and Play" is nearly a reality. Because USB devices all adhere to the same standards, you plug the new device into the USB port, turn it on (an optional step for some devices), and start using it. The system will recognize the new device right away, which means that you will not need to reboot the computer.

*Never Run Out of Ports.* With traditional expansion bus technologies, you are limited to the number of available expansion slots. Once they are filled, you cannot add any other devices, unless you want to invest in a SCSI adapter and SCSI-compliant devices. (SCSI devices are considerably more expensive than non-SCSI devices.) Most USB-compliant computers have two built-in ports, each capable of supporting 127 devices at one time. To connect multiple peripherals, you can use an inexpensive USB "hub," which provides additional ports for chaining multiple devices together.

*More Power and Control.* The USB port supplies power to the connected devices, which means that you do not have to plug them into a power supply. Most USB devices can be controlled from the PC, so you do not have to adjust settings manually.

The USB standard is being developed through a joint effort of leaders in the computer and telecommunications industries, including Intel, Microsoft, and several others. If the standard is universally adopted (hence its name), its proponents believe that it will apply to almost any device that can be plugged into a computer, including keyboards, pointing devices, monitors, scanners, digital cameras, game controllers, printers, modems, and more.

### **Musical Computers**

Using MIDI-compliant sound cards and instruments, musicians can use the PC to control the creative, recording, and performing processes. A single MIDI controller can run various instruments connected together.

MIDI (Musical Instrument Digital Interface) is a digital communication protocol and hardware specification that allows electronic instruments, controllers, and computers to talk to one another. The MIDI protocol gives musicians a language to use when talking to electronic musical equipment. MIDI thus allows a musician to focus on creating and playing music rather than worrying about the ins and outs of digital communications or computer circuitry.

MIDI commands can work in real time to allow you to control several pieces of interconnected equipment from one central point. However, you can also store MIDI commands in a MIDI file. Once stored, you can re-create your sound again and again by playing the MIDI file back through a MIDI instrument or MIDI sound card with speakers.

Musicians and engineers proposed MIDI in the early 1980s as a way of standardizing the communications protocols used in the growing field of synthesized music, which at the time included keyboard synthesizers and their controllers, called sequencers. (A sequencer tells a synthesizer to play specific sounds in specific patterns). Prior to any standard, there was no guarantee that synthesizers and sequencers from different companies could talk to one another.

Since the development of the MIDI standards, MIDI has grown to include controls for many types of equipment:

*MIDI Instruments.* MIDI instruments are the devices that actually make sound when they receive a MIDI signal. These devices are synthetic instruments, so they are called synthesizers. The most common MIDI instrument is a keyboard synthesizer. Other MIDI instruments include drum machines and guitar synthesizers.

*MIDI Sequencers.* MIDI sequencers are devices that record, edit, and output MIDI signals. Sequencers may be hardware, similar to a traditional studio soundboard, or they may be software within a computer.

*Other Devices.* With compatible MIDI hardware, a stage manager can turn on a microphone or fade out a light from the same sequencer used to control a drum machine or keyboard.

Because MIDI commands tell a device what to do rather than actually describing a sound, it is possible for MIDI instruments and their controllers to communicate back and forth. A musician can create music with these devices in several ways:

*Instrument to Sequencer.* A musician can use a MIDI instrument to program a sequencer. The musician plays a song on an instrument like a keyboard. The keyboard then transmits a MIDI description back to the sequencer. Once the MIDI code is stored on the sequencer, the musician can convert the codes to written music or transmit the codes to a different instrument to get a different sound.

*MIDI Codes.* A second option is for the musician to create a MIDI file manually on a sequencer. This file contains the MIDI codes that describe each MIDI event, such as playing a particular note on a keyboard.

*Sheet Music.* The final option is for the musician to write the music using the sequencer's software and then let the sequencer interpret the musical notation and turn it into MIDI codes.

MIDI devices have their own built-in computers to interpret MIDI commands. However, PC sound cards may also be MIDI devices. To work with MIDI on your PC, you must have a MIDI-compatible sound card, a set of speakers or a MIDI instrument, and sequencer software.

### **Flash Memory and Cache Memory**

#### *Flash Memory*

Standard RAM is volatile; when power to the PC is lost, all data currently stored in RAM is lost. This fact explains why you must save your work when using an application. One type of memory, called flash memory, stores data even when the power is turned off. ROM is a form of flash memory used in PCs. Other machines that use flash memory are digital cameras. When you take pictures with some digital cameras, the pictures are stored in a flash memory chip rather than on photographic film. Because you do not want to lose the pictures you have taken, the memory must store the pictures until you can transfer them to your PC, even when the camera is turned off.

#### *Cache Memory*

Moving data between RAM and the CPU's registers is one of the most time-consuming operations a CPU must perform, simply because RAM is much slower than the CPU. A partial solution to this problem is to include a cache memory in the CPU. Cache (pronounced cash) memory is similar to RAM, except that it is extremely fast compared to normal memory and it is used in a different way.

When a program is running and the CPU needs to read data or program instructions from RAM, the CPU checks first to see whether the data is in cache memory. If the data is not there, the CPU reads the data from RAM into its registers, but it also loads a copy of the data into cache memory. The next time the CPU needs that same data, it finds it in the cache memory and saves the time needed to load the data from RAM.

Since the late 1980s, cache memory has been built into most PC CPUs. This CPU-resident cache is often called Level-1 (L1) cache. The first CPU caches came with 0.5 KB, then 8 KB, then 16 KB, then 32 KB. Today Celeron processors have 128-256 KB built in.

In addition to the cache memory built into the CPU, cache is also added to the motherboard. This motherboard-resident cache is often called Level-2 (L2) cache. Many PCs sold today have 512 KB or 1024 KB of motherboard cache memory; higher-end systems can have from 2 MB to 4 MB of L2 cache.

### **Memory and Computing Power**

The amount of RAM in a computer can have a profound effect on the computer's power. More RAM means the computer can use bigger, more powerful programs, and those programs can access bigger data files.

More RAM also can make the computer run faster. The computer does not necessarily have to load an entire program into memory to run it. However, the greater the amount of the program that fits into memory, the faster the program runs. For example, a PC with 16 MB of RAM is able to run Microsoft Windows 98, even though the program actually occupies about 195 MB of disk storage space. When you run Windows, the program does not need to load all its files into memory to run properly. It loads only the most essential parts into memory. When the computer needs access to other parts of the program on the disk, it can unload, or swap out, nonessential parts from RAM to the hard disk. Then the computer can load, or swap in, the program code or data it needs. While this is an effective method for managing a limited amount of memory, it can result in slow system performance because the CPU, memory, and disk are continuously occupied with the swapping process. If your PC has 64 MB of RAM (or more), you will notice a dramatic difference in how fast Microsoft Windows 98 runs because the CPU will need to swap program instructions between RAM and the hard disk much less often.

If you own a PC and decide that it needs more RAM, you should be able to buy more, open up your computer, and plug it in. (Some newer PCs come "stuffed" with all the RAM they can hold, making it difficult to upgrade.) In some computers, chips are usually grouped together on small circuit boards called single in-line memory modules (SIMMs) or dual in-line memory modules (DIMMs). Each SIMM or DIMM can hold between 1 MB and 64 MB of RAM and connects to the motherboard with 30-pin, 72-pin, or 168-pin connections. In newer computers both these modules are replaced by DDR that can hold up to 2 Gb of RAM.

The cost of upgrading the memory of a computer has actually gone down, so upgrading RAM is often the most cost-effective way to get more speed from your computer.

## UNIT 6. Programming

### Visual Programming

The object-oriented, event-driven environment of modern programming has changed how information flows through a program. It has given the control of a program's actions to the user.

In the past, programmers created program-centered processing, in which the flow of action was dictated totally by the program. Even in an interactive program, where information flowed in two directions, the central focus was always the program with its preset logic and processing path.

Object-oriented, event-driven programming has changed the programming environment by putting the user in control. The user now chooses which actions are used, chooses how each action is started, and directs the flow of the entire activity. As a result, the programmer cannot presume which objects the user will choose or the order in which they will be chosen.

Event-driven programs are designed around the interface options available to the user. An event is initiated by the user. When the user clicks an icon with the mouse, presses the Enter key, or moves the pointer on the screen, an event occurs. Each event causes an object to gather its data, structure it, and process it.

Event-driven programs are created in a visual WYSIWYG environment that uses a visual programming language (VPL). A VPL allows the programmer to create visually the graphical images the user will see and use.

The programmer combines graphical icons, forms, diagrams, and expressions to create two-or three-dimensional programs to run in a graphical user environment.

Some of the most commonly used visual languages are Prograph CPX for the Apple Macintosh, Microsoft's Visual Basic, and Visual C++ for the Windows environment. Visual programs for Java and scripting environments – JavaScript and VBScript – have recently emerged. These languages use graphical objects, such as icons, forms, or diagrams, to create programs that run in a visual environment. Programming in a visual language involves placing controls in the graphical presentation so that users can interact with them. Controls are the various tools through which the user can enter data, begin a process, or indicate a choice.

The Open dialog box (found in nearly all Windows-based programs), for example, is filled with various types of controls, such as buttons, lists, text boxes, and more. Placing controls on a graphical environment typically



is done using the drag-and-drop technique. The programmer chooses the control to be made available to the user for an event and places it on the window form. Usually, the available controls are contained in a menu, list, or dialog box for the programmer's ease of access and use, as in the Visual Basic toolbox.

Visual programming is much easier for the programmer because it is based on how a programmer (and the user) sees items on the screen rather than on the structure of the program. As in many other areas of computer software, the visual interface is making highly complex functions accessible to the everyday user.

### **Third-generation Programming Languages** (Part I)

There are many higher-level languages and there is no reason why you should have to know the details of each. However, it is always helpful to know a little about the more common languages you may hear about in programming circles. Some of the fading third-generation languages include the following:

*FORTTRAN (FORMula TRANslator).* FORTRAN was designed specifically for mathematical and engineering programs. FORTRAN has not been widely used with personal computers. Instead, FORTRAN remains a common language on mainframe systems, especially those used for research and education.

*COBOL (COmmon Business Oriented Language).* COBOL was developed in 1960 by a government-appointed committee to help solve the problem of incompatibilities among computer manufacturers. Although COBOL was once popular, especially on mainframe systems, it has lost some of its following over the past ten years.

*BASIC (Beginner's All-Purpose Symbolic Instruction Code).* BASIC was developed in the mid-1960s, mainly as a tool for teaching programming to students. Because of its simplicity, BASIC quickly became popular. When the use of personal computers became widespread, it was the first high-level language to be implemented on these new machines. One early version of BASIC shipped on the newly popular PCs was GWBASIC. As you might have guessed, GW stands for "Gates, William" so you can see how influential Bill Gates was in the early development of PC software. Today, popular examples of BASIC include Microsoft's Visual Basic, Visual Basic for Applications (the scripting language behind Microsoft Office), and VBScript (which is common in many Web pages).

*Pascal.* Named after the seventeenth-century French inventor Blaise Pascal, Pascal was intended in the early 1970s to overcome the limitations of other programming languages and to demonstrate the benefits of

structured programming. More recently, developers have taken Pascal a step further, and it is now well-known for its implementation of object-oriented principles of programming.

### **Third-generation Programming Languages**

#### **(Part II)**

Unlike such third-generation languages as FORTRAN, COBOL, BASIC, Pascal, the following languages still have a thriving following and a bright future:

**C.** Often regarded as the thoroughbred of programming languages, C produces programs with fast and efficient executable code. C is also a powerful language. With it, you can make a computer do just about anything it is possible for a computer to do. Because of this programming freedom, C is extremely popular with professional developers, although it is now being replaced by C++.

**C++.** C++ is the object-oriented implementation of C. Like C, C++ is an extremely powerful and efficient language. Learning C++ means learning everything about C and then learning about object-oriented programming and its implementation with C++. Nevertheless, more C programmers move to C++ every year, and the newer language has replaced C as the language of choice among software development companies.

**Java.** Java is an object-oriented programming environment for creating cross-platform programs. When the Internet became popular in the mid-1990s, Java's developer, Sun Microsystems, redeveloped Java to become a programming environment for the Web. With Java, Web designers can create interactive and dynamic programs (called applets) for Web pages. Essentially, a Java program is a self-contained, semicompiled function that makes no reference to outside code or operating system functions. Thus, Java code is fully compatible with almost any computer and operating system. To create Java code, a developer writes the applet and then compiles it into bytecode. To run the Java applet, a user accesses the bytecode, perhaps over the Internet. Then, using a Java virtual machine, the client PC converts the bytecode into machine code appropriate to that particular computer.

**ActiveX.** Microsoft's answer to Java is ActiveX. ActiveX code creates self-contained functions similar to Java applets that may be accessed and executed by any other ActiveX-compatible program on any ActiveX system or network. At present, ActiveX is implemented on Windows 9x, Windows NT, and Macintosh systems, and there are plans for supporting UNIX also.

Of the third-generation languages, Java is probably the most important for the future development of PCs and the Internet. In fact, some developers see Java as a way of redefining the PC itself. By replacing the current expensive and platform-defining CPU with a cheap Java-decoding microchip, developers can create a machine that gets all of its software from Java servers on the Internet. To use such a machine, you would load a Web browser (also written in Java), connect to the Internet, and access Java programs for all of your software needs. If this prediction comes true, then all PCs will be both inexpensive and fully compatible.

### **Fourth-generation Programming Languages**

Fourth-generation languages include the following:

*Visual Basic (VB).* Visual Basic is the newest incarnation of BASIC from Microsoft. VB supports object-oriented features and methods. With this language, programmers can build programs in a visual environment. Visual Basic offers several toolbars with lots of tools to assist the programmer in designing the code visually, as well as a window for editing code directly.

*VisualAge.* VisualAge is a family of IBM development tools that allows the user to create entire Java- and Web-based systems using drag-and-drop development techniques.

*Authoring Environments.* Authoring environments are special-purpose programming tools for creating multimedia, computer-based training, Web pages, and so forth. One example of an authoring environment is Macromedia Director (which uses the Lingo scripting language). You can use it to create multimedia titles combining music clips, text, animation, graphics, and so forth. As with other visual development environments, much of the code is written automatically. However, most of the robust authoring environments also include their own languages, called scripting languages, that provide tools for added control over the final product. The programs used to create World Wide Web pages fall into another category of tools that are often lumped together with authoring environments. Some of these programs include Microsoft FrontPage, Netscape Visual JavaScript, and NetObjects Fusion.

### **Artificial Intelligence**

Artificial intelligence (AI) can be defined as a program or machine that can solve problems or recognize patterns. A more "pure" definition of AI might be a computer or program that can fool a human into thinking he or she is dealing with another human. Such a computer could both learn and reason, so yet another definition of artificial intelligence might be a computer that can learn and reason.

Artificial intelligence software is used in many real-world applications, from determining if banks should grant loans, to voice recognition and terrain-following missile guidance systems. Even applications like word processors and e-mail make use of AI concepts. For example, a word processor's grammar checker attempts to understand and correct a language concept that most users cannot fully explain themselves. Regardless of the actual task, artificial intelligence is used in two basic areas:

*Problem Solving.* In problem solving, the artificial intelligence program must look at a problem or collection of data and determine what to do next. For example, a bank may use an artificial intelligence system to look at your credit history and life style before deciding whether or not to lend you money. This type of system is called an expert system.

*Pattern Recognition.* In pattern recognition, the artificial intelligence program must look for repeated or known occurrences of data. Examples include artificial vision and speech recognition.

Of course, many artificial intelligence programs combine elements of both areas to solve a problem. For example, a data compression utility must look for repeated patterns in the data and then decide how to rewrite the data to eliminate the duplications.

#### *Some Examples of AI Techniques*

Artificial intelligence may be applied in many different ways depending on the problem to be solved and the resources available. Some common techniques include the following:

*Decision Trees.* These software guides are simply maps that tell the computer what to do next based on each decision it makes. Each decision leads to a new branch with new decisions and consequences.

*Rules-Based Systems.* These systems work by following a set of rules given by the programmer. So long as the programmer has anticipated every possible circumstance that the program may encounter, it can solve any problem.

*Feedback.* This technique is used to modify programs. Basically, a feedback system monitors the results of a solution to see if the solution worked or in what areas it failed.

*Knowledge-Based Systems.* These systems are similar to a rules-based system, but they use feedback to learn from their mistakes. As a result, knowledge-based systems can actually learn to solve new problems.

*Heuristics.* This software technique is something like a recipe for a problem-solving approach rather than an algorithm that solves a specific problem.

*Building an Artificial Brain*

To create a true artificial intelligence, scientists could try building an artificial brain called a neural network. The human brain consists of billions and even trillions of neurons, each with as many as a million connections to other neurons. Scientists have identified hundreds of different types of neurons and more than fifty different patterns of neuron connections. This level of complexity is simply beyond any computer currently in existence. Even the most powerful parallel computers with tens of thousands of processors don't come close to equaling the number or variety of connections in a human brain.

UNIT 7. Networks and the Internet

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**Networking at Home and Around the World**

*Data Communications Over Standard Telephone Lines*

Networks (especially the Internet and large WANs, with nodes spread over a large geographic area) commonly transmit data across telephone lines. Although telephone companies are offering more digital lines (which are better suited to data transmission), most homes and businesses are still served by analog telephone lines. To transfer digital data over analog telephone lines, computers must use modems. When a computer sends data, its modem translates digital data into analog signals for transmission over standard telephone lines. At the receiving end, the computer's modem converts the analog signals back into digital data. The most important factors to consider when choosing a modem are internal versus external, transmission speed, data compression, and error correction. Modem transmission speeds are measured in bits per second (bps). Currently, the preferred standards for modems are 56.6 Kbps and higher.

Using digital connections, business networks and homes can transmit data many times faster than is possible over standard telephone lines. In areas where digital connection is not possible, homes and businesses are connected with standard analog lines, but high-speed digital lines are run between the telephone company's switching stations. The most popular digital telephone services are integrated services digital network (ISDN), T1, T3, and DSL. They offer faster data transfer rates and higher bandwidths than standard telephone lines.

*Networks in the Home*

New technologies enable homeowners to set up home networks to connect multiple computers. Home networks typically operate on existing media such as the home's telephone lines or cable wiring.

**ISDN, T1, and T3**

Many different kinds of digital services are offered by the phone companies. Some of the best known are called ISDN, T1, and T3. Of these, ISDN (integrated-service digital network) received the most attention in the past few years because it was the most affordable and the one most likely to make its way into homes and small businesses. ISDN, which stands for integrated services digital network, is a system that replaces all analog services with digital services.

When most people talk about ISDN, they are referring to a particular level of service called *BRI* (*basic rate ISDN*). BRI provides three communication channels on one line – two 64 or 56 Kbps data

channels and one 19 Kbps channel that is used to set up and control calls. The two data channels can carry voice or data and they can be used simultaneously, so you can transmit data and carry on a conversation at the same time on the same line. Also, the channels can be combined so that BRI service can be used to transmit data at rates as high as 128 Kbps without compression.

Some telephone companies now offer BRI service in some locations – especially in large metropolitan areas. Installation can be expensive, but the cost of service is slowly coming down to compete with the basic rates offered for analog lines.

A higher level of service for ISDN is called *primary rate ISDN*, or *PRI*. In the United States, PRI provides twenty-four channels at 64 Kbps each, a total bandwidth of 1.544 Mbps. This level of bandwidth is also known as T1 service. In Europe, PRI service provides thirty-one data channels.

Although it is not specified by the ISDN standard, it is also possible to purchase lines from telephone companies that offer even more bandwidth. For example, a T3 line offers 672 channels of 64 Kbps each (plus control lines) for a total of 44.736 Mbps. Many telephone companies also offer services between the levels of BRI and PRI. Different businesses have all kinds of different needs for bandwidth, so telephone companies try to be as flexible as possible in their offerings.

### **DSL Technologies**

One of the latest developments in connectivity is *digital subscriber line (DSL)*. DSL is rapidly outpacing ISDN in areas where DSL is available because it is typically less expensive in terms of hardware, setup, and monthly costs. In fact, many local telephone companies are opting to develop DSL in their markets and are foregoing ISDN altogether.

Two key points that make DSL so attractive are its speed and its medium. DSL can achieve theoretical speeds up to 52 Mbps, a huge speed advantage over the fastest dial-up modems or even some digital connections. The second advantage is that DSL can use POTS lines, the standard copper wire used for telephone communications in most homes and businesses today. The typical home computer user can connect to the Internet or a private network through DSL at high transmission speeds, often for a cost that is competitive with standard dial-up connection.

There are several types of DSL available in different markets, each offering different capabilities and rates:

*Asymmetrical DSL (ADSL)* uses discrete multitone (DMT) or carrierless amplitude phase (CAP) modulation.

*Rate adaptive DSL (RADSL)* adjusts the speed based on signal quality.

*High-bit-rate DSL (HDSL)* allows the telephone company to provide T1 speeds at a lower cost than T1 but requires two wire pairs.

*ISDN DSL (IDSL)* uses existing ISDN facilities.

*Symmetric DSL (SDSL)*, a version of HDSL, uses a single pair of wires and provides slower transfer rates than HDSL.

*Very-high-bit-rate DSL (VDSL)* provides a high bandwidth with a commensurate cost and is geared primarily toward LAN and WAN connectivity.

The actual performance you can achieve with DSL depends on the type of DSL and the distance between the DSL modem and the telephone company's switch.

### **Avoiding a Tangled Mess**

You may think that setting up a network is simple once you have selected the type of network, server, operating system, and other options you need. However, that is only the beginning.

Two of the most time-consuming and costly chores in networking involve choosing the type of wiring that will connect the nodes and servers, and deciding on the most efficient means of running the cable. These issues can be so confusing and costly that many companies have been created to deal with network cabling.

To show how troublesome network cabling issues can become, suppose that you have a warehouse that is 100 feet long and you want to install a network of eleven computers, all lined against one wall. This arrangement places the PCs 10 feet apart, which is the perfect spacing for cubicles.

If you want to use a bus topology, a terminator is placed on the first and last PCs, and ten 10-foot cables are run from one computer to the next. This method means that 100 feet of cable must be purchased and installed.

If you choose a ring or star topology for your network, however, your cabling requirements may increase dramatically. But the additional cabling and equipment (such as a hub) may make your network easier to manage. For instance, it can be easier to add new users to a star network than to a bus network. In such cases, the additional cabling requirements may well be worth the time and expense. Depending on the specific implementation you choose (that is, where you place the hub within the room), your star network may require two or three times more cable than a basic bus network.

There are additional factors to consider. Here are just a few questions networking experts must answer:



*Is the network being installed in an existing building, or is it being added to a building under construction?* It is always easier to work within a building under construction than to have to drill through walls and run cable in an existing building. For example, many historical buildings such as courthouses have brick walls internally and restrictions (by historical societies) on work that can be done. In such cases, creative alternatives have to be considered.

*Can cabling run through the walls or must it run through ceilings?* If the cabling will be run through the ceiling, the price of the material triples. Why? Fire codes prevent running ordinary networking cable in places where it can catch fire without being readily seen because of the noxious fumes given off during the burning.

*Will conduit be required to encase the cabling? Will you need to use wall plates, wiring closets, and the like?*

*How much cabling will be exposed? Are there danger zones where people may trip over or drop items on the cabling or connectors?*

*What if the company wants to be able to rearrange itself on short notice, moving offices, desks, and computers at will?* This option can immediately rule out star and bus topologies because the network cannot be brought down every time someone changes an office.

The picture is further complicated when the network must span multiple buildings or several floors of a building.

### **From the History of the Internet**

The seeds of the Internet were planted in 1969, when the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense began connecting computers at different universities and defense contractors. The goal of this early project was to create a large computer network with multiple paths – in the form of telephone lines – that could survive a nuclear attack or other disaster. If one part of the network were destroyed, other parts of the network would remain functional because data could continue to flow through the surviving lines. ARPA also wanted users in remote locations to be able to share scarce computing resources.

Soon after the first links in ARPANET (as this early system was called) were in place, the engineers and scientists who had access to this system began exchanging messages and data that were beyond the scope of the Defense Department's original objectives. People also discovered that they could play long-distance games and socialize with other people who shared their interests. The users convinced ARPA that these unofficial uses were helping to test the network's capacity.

At first, ARPANET was basically a wide area network serving only a handful of users, but it expanded rapidly. Initially, the network included four primary host computers. A host is like a network server, providing services to other computers that connect to it. ARPANET's host computers (like those on today's Internet) provided file transfer and communications services and gave connected systems access to the network's high-speed data lines. The system grew quickly and spread widely as the number of hosts grew.

The network jumped across the Atlantic to Norway and England in 1973, and it never stopped growing. In the mid-1980s, another federal agency, the National Science Foundation (NSF), joined the project after the Defense Department dropped its funding. NSF established five "supercomputing centers" that were available to anyone who wanted to use them for academic research purposes.

The NSF expected the supercomputers' users to use ARPANET to obtain access, but the agency quickly discovered that the existing network could not handle the load. In response, the NSF created a new, higher capacity network, called NSFnet, to complement the older and by then overloaded ARPANET. The link between ARPANET, NSFnet, and other networks was called the Internet. (The process of connecting separate networks is called internet working. A collection of "networked networks" is described as being internetworked, which is where the Internet – a worldwide network of networks – gets its name.)

NSFnet made Internet connections widely available for academic research, but the NSF did not permit users to conduct private business over the system. Therefore, several private telecommunications companies built their own network backbones that used the same set of networking protocols as NSFnet. Like a tree's trunk or an animal's spine, a network backbone is the central structure that connects other elements of the network. These private portions of the Internet were not limited by NSFnet's "appropriate use" restrictions, so it became possible to use the Internet to distribute business and commercial information.

Interconnections (known as gateways) between NSFnet and the private backbones allowed a user on any one of them to exchange data with all the others. Other gateways were created between the Internet and other networks, large and small, including some that used completely different networking protocols.

The original ARPANET was shut down in 1990, and government funding for NSFnet was discontinued in 1995, but the commercial Internet backbone services have easily replaced them. By the early 1990s, interest in the Internet began to expand dramatically. The system that had been

created as a tool for surviving a nuclear war found its way into businesses and homes. Now, advertisements for movies are far more common online than collaborations on physics research.

### **Getting Online, Working Online**

#### *Accessing the Internet*

Users can connect to the Internet through a direct connection, local area network, high-speed data link, and other means. Individuals and small businesses access the Internet most commonly by setting up an account with an Internet service provider and using a telephone line and modem. High-speed data links such as ISDN and xDSL are more expensive options, but they provide much faster service than standard telephone line connections over a modem. Cable modems are quickly becoming a popular high-speed connection because they use coaxial cable already installed in many homes.

#### *Connecting a PC to the Internet*

The Winsock standard specifies the Windows interface between TCP/IP applications and network connections. Users can mix and match Winsock-compatible applications and ensure they will work with the user's network connection to access the Internet. Internet application suites are available from many suppliers; they combine a full set of applications and drivers in a single package.

#### *Working on the Internet*

By connecting their networks to the Internet, companies are creating new ways to conduct business and for employees to work. Telecommuters work from remote locations by connecting to the company network via the Internet. Businesses that connect their networks to the Internet can use firewalls to prevent unauthorized users from accessing proprietary information. Intranets and extranets are internal networks based on TCP/IP and support the use of Web browsers.

#### *Commerce on the World Wide Web*

The act of conducting business online is called e-commerce. At the consumer level, it is possible to buy a wide range of goods and services at Web sites. Many such sites accept different forms of payment online and provide a secure environment for transactions. At the corporate level, e-commerce technologies enable companies to form online partnerships, conduct business transactions online, and collaborate on projects.

### **Getting Published on the Internet**

One of the most exciting aspects of the Internet is its openness. With the right software and an Internet account, you can go online and view materials that others have published – that is, posted on an Internet

server. Add a little creativity to the mix, and you can publish your own materials for viewing by a worldwide audience. One of the easiest and fastest ways to publish your work online is to create your own page on the World Wide Web.

The Internet is not limited to big businesses. Individuals, private organizations, and small companies actually publish the vast majority of materials on the Internet. The variety of online publishing opportunities is almost limitless, and people are using them to enhance their businesses, share information, and entertain and educate others.

Before it can be viewed in a Web browser, a document must be formatted with special tags called Hypertext Markup Language (HTML) tags. These tags, which surround the text they affect, tell the browser how to display the text, whether as a heading, a table, a link, normal text, and so on.

Fortunately, you do not have to be a computer whiz to create HTML documents. In fact, you do not even need to know anything about HTML. With the right tools, you can quickly create attractive, interesting pages that are ready to be published on the Web.

Almost any new word processor, spreadsheet, database, or presentation application can convert ordinary documents into HTML files. These features let you create any type of document, save it in HTML format, and then immediately open it in a Web browser (such as Netscape Navigator or Microsoft Internet Explorer). Many desktop applications provide tools that embed graphics, create hotlinks, and add other special features to your HTML documents.

Popular Web browsers also provide editors that enable you to create feature-rich Web pages. Using a browser's editing tools, you can create new pages from scratch or use predesigned templates. A popular page-design method is to find a Web page you like, copy it to disk, and then open it in Edit mode in the browser. You then can use that page's HTML formatting as the basis for your page. Using a browser-based editor, you work directly with HTML tags only if you want to. If you prefer, the browser can do all the HTML formatting for you.

After you have created your pages, simply contact your Internet service provider (ISP). Your ISP can provide you with space on a Web server and an address where others can find your pages. Using your chosen HTML editing tools, you can update, expand, and refresh your Web site whenever you want.

If you want complete control over the appearance of your Web pages and like the challenge of learning a completely new software program, then you can use one of the many Web design programs now available.

The programs, such as Microsoft's FrontPage or Adobe's PageMill, are a combination word processor, HTML editor, and graphics program. These applications give you all the tools you need to create complex, feature-rich Web sites with as many pages as you like.

### **Minding Your Manners Online**

Although there is no set of written rules governing behavior on the Internet, the wise user participates in an honor system. On the Internet, appropriate behavior is called netiquette, a combination of Internet etiquette. Netiquette is crucial for keeping the Internet a civil place because the Internet is not policed or run by a single person or group. The basic rules of netiquette are as follows:

*Behave As Though You Are Communicating in Person.* When communicating with someone online, act as if you are talking to that person face to face.

*Remember That Your Words Are Open to Interpretation.* If you post jokes, sarcasm, or other attempts at humor, do not be surprised if someone is offended. Word your postings clearly and carefully, and use appropriate language.

*Do Not "Shout" Online.* Typing in ALL CAPITAL LETTERS is like shouting and is considered rude.

*Do Not "Flame" Other Users.* A flame is a posting that contains insults or other derogatory content. Flamers can be shut out of listservs and chat rooms, and other users can block a flamer's messages from the e-mail and news accounts.

*Do Not Send Spam.* Spam is the online equivalent of junk mail—uninvited messages, usually of a commercial nature. Most ISPs have strict spam policies. If you are caught distributing uninvited messages to multiple recipients (especially if the messages contain commercial, libelous, or vulgar content), your ISP may cancel your account.

*Do Not Distribute Copyrighted Material.* Usenet newsgroups and many private Web pages are filled with copyrighted and trademarked text and graphics, posted without the owner's permission. Do not be fooled into thinking that text or images are "in the public domain" because you found them on the Internet. Copyrights still apply; copyright infringement is illegal and can lead to prosecution.

*Do Not Be a Coward.* As a general rule, you should never conceal your identity on the Internet. If you choose to use a screen name, do not hide behind it to misbehave.

Always check the rules when you go online. Nearly all ISPs post an appropriate use policy on their Web site that lists guidelines for acceptable behavior on the Internet. This document may be a simple disclaimer or

may take the form of an FAQ. If you violate these guidelines and are reported to the ISP, your account may be dropped. Look for an FAQ before using chat rooms, listservs, message boards, newsgroups, and other Internet services, especially moderated ones.

Even though you cannot be seen on the Internet, you can still be identified. Conscientious users of e-mail and newsgroups commonly forward flames or inappropriate postings to the poster's ISP. If an ISP collects enough complaints about an account holder, it can cancel that person's account. In cases where libel, copyright infringement, or other potential crimes are involved, the ISP may also turn the poster over to the authorities. In one such case (in December 1999), a Florida teenager posted a threatening chat-room message to a Colorado student. Even though the poster had used an alias to hide his identity, federal agents were able to track him down and arrest him.

### **Graphics Piracy on the Internet**

One reason the World Wide Web has become so popular is its support of graphics in Web pages. By adding all sorts of images to HTML documents, Web designers make their sites more attractive and appealing to visitors. Similarly, Internet services such as FTP and newsgroups enable users to find, download, and exchange files of all types quickly, including graphics.

This easy access to images, however, has also created a cottage industry of graphics piracy because some Internet users gather large quantities of images and distribute them online. The primary purpose of hundreds of Web sites and Usenet newsgroups is to provide users with a place to find, exchange – and sometimes even purchase – illegally obtained graphics.

The Internet provides a seemingly limitless number of pirated images, including clip art, electronic photographs, scanned artwork and photographs, video clips, and more. Although a small percentage of these online graphics are homemade (created by the person distributing them), the vast majority are illegally acquired by scanning or copying from digital sources.

The real problem is that pirates distribute these copyrighted graphics freely, ignoring the rights of the images' actual owners. The most daring pirates scan images from popular magazines, then attempt to sell them over Web sites, through newsgroups, or on CD-ROM as though this were perfectly legal.

#### *Ignorance Is No Excuse*

Many graphics pirates take up this practice because they do not understand copyright laws or the possible consequences of their actions. They believe that once an image has been digitized, it becomes public

domain – that is, the property of no one and free for anyone to use. Some graphics pirates believe that by making a small change to an image (such as adding a name or logo), they are making it their personal property. However, the pirates are wrong in both cases. Photographic images, illustrations, and other types of graphics are indeed protected – in the United States, at least – by copyright laws that strictly limit the way they can be reused.

#### *Staying Out of Trouble*

Here are some steps you can take to make sure you are handling electronic graphics properly:

*Consider the Source.* If you find images of any kind on a Web site or newsgroup, consider them suspect. If you need electronic images for a document of your own, especially if you want to sell the document, look for sources of license-free images (you do not need to pay a license fee to use them) or be ready to pay a fee for an image from a legitimate source.

*Get Proof and Permission.* Regardless of where you obtain an image, the distributor should be willing and able to provide proof of ownership of the image and to grant or deny permission to use it, regardless of whether a fee is involved. If you cannot obtain this type of documentation in writing (not over e-mail or on a Web page), then do not use the image.

*Never Upload Images to Newsgroups or the Web.* Whether you illegally scan published images or acquire images from a legitimate source, resist the urge to put them on the Internet. Even if you own an image or have the right to use it commercially, you can assume that once it is on the Internet, it will be copied and distributed in ways you never intended.

*Know What You Are Doing.* If you get involved in electronic graphics, become acquainted with copyright laws and the protections in place to safeguard the rights of copyright holders.

### **Freebies on the Web**

If you set up an account with an Internet service provider, you will probably install software, such as a Web browser, an e-mail client, and a newsreader. Many users also install a separate FTP client and Telnet software. All you need, however, is a current version of a Web browser to surf the Web, send and receive e-mail, chat, participate in newsgroup discussions, and more. In fact, you do not necessarily need an account with an ISP or online service to access these features; you can log on to the Web from a computer at a library or your school's computer center, for example. Here are a few of the free services you can access through the Web.

### *E-Mail*

By visiting Web sites like Hotmail, Mail.com, Yahoo!, and others, you can set up a free e-mail account. You must register for the account by creating a user name and password; the service creates a complete e-mail address for you, such as yourname@hotmail.com.

You can send and receive e-mail from these sites, and several offer other useful personalization features. However, some free Web-based e-mail services will store your messages for only a certain amount of time and then automatically delete them. Some will also cancel your account if you do not use it for a given amount of time.

But if you use e-mail regularly and want to access your mail from any browser (without having to log on to your ISP account), Web-based mail is a big time-saver.

### *Personal Web Pages*

Nearly every ISP provides space on its Web servers where clients can create and post personal Web pages. This service is almost always free. As part of the service, ISPs provide online design tools that make it easy to create a personal Web site.

But you do not even need an ISP to get a free Web page. Again, Web sites such as the Microsoft Network, America Online, Yahoo!, and many others provide this kind of service. You simply register for the service, select a URL for your site, and post your Web pages. Free design tools are usually available also.

### *Chat*

It is no longer necessary to log on to an IRC chat channel to participate in a chat room discussion, nor do you have to join an online service like AOL or Prodigy to take advantage of their chat rooms. Now you can access chat in real time through various sources.

Many large Web sites, such as CNN, About.com, Snap, and others, offer Web communities that are basically chat rooms. At these sites, you can register for a user name and a password and choose from dozens of different communities to join. Web-based communities usually conduct chat sessions right in your browser window, although some communities spawn a separate window to contain the chat.



UNIT 8. Information Security

**Protecting Your Online Privacy**

Information about our private lives is available to a degree unimaginable just a few years ago. With the Internet's explosion in popularity, people are revealing more about themselves than ever before. Some examples follow:

If you purchase an item over the World Wide Web, you not only provide the seller with your e-mail address but you often include your credit card number. Many e-commerce Web sites also request other personal information, such as telephone numbers and mailing addresses.

Many Web sites that offer special services, such as travel planning, job hunting, or car buying require clients to complete forms that store vast amounts of information about them.

If you post a message to an Internet newsgroup or participate in a chat room discussion, you reveal your e-mail address and interests to anyone who happens to be in the group at that time.

As an online consumer, you leave a trail of information about yourself wherever you go. This trail can be followed by marketers, spammers, hackers, and thieves right back to your PC – or even to your doorstep. There is not a lot you can do after your information has fallen into the wrong hands.

You can take measures, however, to prevent too many people from getting that information, especially if you use the Internet or an online service regularly. Here are some tips that can help:

*Avoid Being Added to Mailing Lists.* When you fill out a warranty, subscription, or registration form – either on paper or online – make sure it includes an option that prevents your information from being added to a mailing list. If the option is available, check it; if it is not, do not return the form. If there is any doubt, contact the organization and learn its policies regarding mailing lists.

*Make Online Purchases Only Through Secure Web Sites.* Before you purchase anything over the Internet, make sure that the transaction is secure. You can protect your privacy in two ways. First, if you use a current browser, such as Internet Explorer 5.0 or Netscape Navigator 5.0, the browser can tell you whether the server is secure. Check your browser's security settings before proceeding with a transaction. Second, check the vendor's Web site to see whether you have the option to switch to a secure server before making the transaction. If this option is available, take it.

*Never Assume That Your E-Mail Is Private.* Watch what you say, especially when using your company's or school's e-mail system. Never respond to an unsolicited e-mail message, especially if you do not recognize the sender.

*Be Careful When Posting to Newsgroups.* Many Internet newsgroups and chat rooms are unsupervised. If you post a message to a group, your e-mail address and interests can make you easy prey for spammers and pranksters. Before posting a message to any group, watch the group for a few days to determine whether its users are trustworthy. Try to find out if the group is supervised by a system operator and get that person's address, if possible.

*Don't Flame.* An online argument can have disastrous results. There are many documented cases of ISPs being shut down by spam as a result of a flame – a critical or insulting message – posted by one of the ISP's users. This practice can result in a loss of online privacy and in your Internet service being cut off by the ISP. Resist the urge to be critical or argumentative online.

### **E-mail Viruses**

Until recently, it was not considered possible to spread viruses within e-mail messages. Because e-mail messages are predominantly text, they could not carry viruses, which require executable code to run.

Newer-generation e-mail programs, however, support e-mail messages in various formats, including HTML. They also support attachments – you can attach a file (such as a DOC, EXE, or other binary file) to a message and send it to a recipient, who can open the file on receiving it. These features of e-mail programs have made them more convenient and useful. However, both features have also opened the door to new types of viruses – e-mail viruses – which can be devastating to anyone who receives them.

#### *Macro Viruses*

The more common type of e-mail virus called a macro virus relies on a file attached to the message. To create an e-mail virus, the programmer selects a popular application that has a macro language, such as Microsoft Word or Lotus 1-2-3. Then he or she creates a document in that application and places a macro within the document. The macro can contain commands that perform various tasks, including copying and deleting files, changing system settings, creating new e-mail messages, and more. Finally, the programmer attaches the document containing the macro code to an e-mail message and sends the file to one or more unsuspecting recipients. When a recipient downloads the attachment and opens it, the macro in the file runs automatically.

Once released, the virus looks for the recipient's e-mail address book and sends copies of the infected attachment to people in the address book. The virus may also remain on the first recipient's machine and do considerable damage, like a regular virus.

A newer and more frightening breed of e-mail virus does not require an attached file to inflict damage.

*Viruses That Do Not Require Attachments*

This type of virus can reside directly within the text of an HTML-format e-mail message, in unseen code and written in a programming language such as Visual Basic Script (VBScript). The first known virus of this type called "BubbleBoy" was transmitted in November 1999. Although the virus did not become widespread, it aroused a new sense of urgency in development and antivirus communities. To become infected with the BubbleBoy virus, the recipient did not have to do anything; it was enough simply to receive the infected message. On restarting the computer, the user activates the virus code and the virus makes changes to the Windows Registry settings and sends copies of the infected e-mail message to everyone in the recipient's address book.

*Protecting Yourself*

Unlike other types of viruses, there may not be much you can do to protect yourself from e-mail viruses, but you should take the following precautions:

*Do not open e-mail attachments from people you do not know.*

Install a reputable antivirus program, run it frequently, and keep its virus definitions up to date. Some experts suggest using two different antivirus programs and running them on an alternating schedule.

*Check your Web browser, e-mail program, and newsreader and make sure that their security settings are set to the highest possible level.* In addition, you may want to set your e-mail program not to accept messages delivered in HTML format.

*Be alert to new developments in viruses by periodically checking virus-related sites on the Web.* These sites are hosted by the makers of antivirus programs, universities, and security experts.

## VOCABULARY

### – A –

- absence** – отсутствие  
**accelerate** – увеличивать скорость  
**accelerator** – педаль для газа  
**access** – иметь доступ  
**accomplish** – выполнять  
**accounting** – бухгалтерский учёт, бухгалтерское дело  
**acquisition** – получение, приобретение  
**activity** – действие, операция  
**actual** – фактический  
**addition** – сложение  
**in addition to** – в дополнение к, кроме того  
**address** – адресовать  
**address box** – адресное окно  
**advantage** – преимущество  
**a few** – несколько  
**affect** – влиять  
**age** – возраст  
**a great deal** – очень, сильно  
**aid** – помогать, оказывать помощь  
**allow** – позволять  
**alternative** – альтернативный  
**among** – среди  
**amount** – количество  
**analyze** – анализировать  
**and so on** – и тому подобное  
**angle brackets** – угловые скобки  
**another** – другой  
**any** – любой  
**anything** – (всё) что угодно  
**anywhere** – везде, повсюду  
**application** – приложение  
**application software** – прикладное программное обеспечение  
**arbitrary** – произвольный  
**area** – область, участок  
**arithmetic logic unit (ALU)** – арифметико-логическое устройство (АЛУ)  
**arrange** – компоновать, размещать, располагать, упорядочивать  
**arrangement** – размещение, расположение  
**artificial intelligence** – искусственный интеллект  
**as a result** – в результате

**assembly language** – язык ассемблера  
**assist** – помогать, оказывать помощь  
**associate** – соединять, связывать  
**as well as** – а также  
**at least** – по крайней мере, не менее  
**attach** – прикреплять, присоединять  
**attribute** – атрибут, свойство, характеристика  
**automate** – автоматизировать  
**available** – доступный, наличный  
**average** – средний  
**aware** – осведомлённый

– В –

**backbone** – основа, стержень  
**background** – фон  
**back up** – создавать резервную копию; создание резервной копии  
**backward** – назад  
**base** – основывать  
**basic** – основной  
**because** – так как, поскольку  
**become (became, become)** – становиться  
**begin (began, begun)** – начинать  
**behavior** – поведение, линия поведения, характер изменения; действие  
**belong (to)** – принадлежать (ч.-л.)  
**benefit** – преимущество  
**besides** – кроме того  
**billing** – выписывание счёта, накладной  
**binary** – двоичный  
**binary number system** – система двоичных чисел  
**both ... and ...** – как ... так и ...  
**bounce** – возвращаться  
**brain** – мозг  
**break (broke, broken) down** – разбивать  
**bridge** – мост  
**broad** – общий, широкий  
**browser** – браузер, навигатор  
**branch** – филиал  
**build (built, built)** – строить, создавать  
**business** – предприятие  
**bus** – шина  
**button** – кнопка

– C –

**cable** – кабель  
**call** – называть  
**cache memory** – кэш-память  
**card catalog** – картотека  
**carry** – переносить, передавать  
**carry out** – выполнять  
**categorize** – классифицировать  
**central processing unit (CPU)** – центральный процессор (ЦП)  
**central server** – центральный сервер  
**certain** – определённый  
**chain** – цепь  
**chance** – возможность  
**change** – менять, изменять  
**charge** – заряжать  
**chassis** – шасси  
**chat** – переговоры  
**check** – проверять  
**chip** – микросхема, кристалл (полупроводника)  
**choose (chose, chosen)** – выбирать  
**circuit** – схема  
**circuit board** – монтажная плата  
**circular** – круговой  
**client** – клиент  
**close (to)** – близкий (чему-л.)  
**collect** – собирать  
    **collection** – совокупность  
**collision** – столкновение  
**color** – цвет  
**column** – колонка, столбец, графа  
**common** – общий, обычный, универсальный  
**command** – команда  
**communicate** – обмениваться информацией  
    **communication** – обмен информацией  
**community** – сообщество, объединение  
**compare** – сравнивать  
**compile** – компилировать, транслировать  
    **compiler** – компилятор, компилирующая программа  
**complaint** – жалоба  
**complete** – полный, завершённый, законченный; завершать  
**complex** – сложный

**compose** – составлять

**be composed (of)** – быть составленным, состоять (из)

**computer scientist** – специалист по вычислительным системам

**computer system** – компьютерная система

**concept** – понятие

**condition** – условие

**conditional statement** – условное утверждение, условный оператор

**conduct** – проводить

**conduit** – канал

**connect** – соединять

**consider** – считать, рассматривать

**considerable** – значительный

**considerably** – значительно

**consist (of)** – состоять (из)

**contain** – содержать

**contents** – содержание, содержимое

**control** – управлять, контролировать

**control flow** – управляющая логика (программы)

**control unit** – устройство (блок) управления

**convert** – преобразовывать

**conversion** – преобразование, переход

**cooperative** – совместный, участвующий в совместной работе

**copy** – копировать

**correspond (to)** – соответствовать (чему-л.)

**counter** – счётчик

**course of action** – ход действий

**cover** – покрывать, охватывать

**create** – создавать

**cross-reference** – перекрёстная ссылка

**current** – текущий

**currently** – в настоящее время

**customer** – клиент, заказчик, покупатель

**customize** – настроить

– D –

**data** – данные

**database** – база данных

**database management** – управление данными

**database management system (DBMS)** – система управления базой данных (СУБД)

**data item** – элемент данных

**data redundancy** – избыточность данных

**decide** – решать, принимать решение  
**decision-making** – принятие решения  
**decision support system** – система поддержки принятия решений (СППР)  
**default** – используемый по умолчанию  
**define** – определять, описывать  
    **definition** – определение, описание  
**deliver** – доставлять  
    **delivery** – доставка  
**Department of Defense** – Министерство Обороны  
**description** – описание  
**design** – проектировать, конструировать, разрабатывать; конструкция  
**design tools** – средства проектирования  
**desired** – желаемый  
**destination** – пункт назначения, адресат информации  
**develop** – разрабатывать  
    **development** – разработка  
**device** – устройство  
**different** – различный, разный  
**difficult** – трудный  
**digit** – одноразрядное число  
**Digital Video Disk (DVD)** – цифровой видеодиск  
**direct** – направлять, указывать, предписывать  
    **direction** – направление, указание, предписание  
    **directly** – прямо, непосредственно  
**directory** – каталог  
**discrete** – дискретный  
**discuss** – обсуждать  
**disk drive** – дисковод  
**display** – отображать  
**distribute** – распределять, распространять  
**divide (into)** – делить, разделять (на)  
    **division** – деление  
**domain** – домен  
**domain name system (DNS)** – система имени домена  
**download** – загружать (в память); принимать файлы (по модему)  
**drag and drop** – перетаскивать  
**drive (drove, driven)** – ехать  
**duplicate** – дублировать, копировать  
**dynamic link library (DLL)** – динамически подключаемая библиотека  
**dynamic RAM** – динамическое ОЗУ



- each** – каждый  
**easy** – лёгкий  
**edit** – редактировать  
**education** – образование  
**educational institution** – учебное заведение, образовательное учреждение  
**efficient** – эффективный  
**either ... or ...** – или ... или ..., либо ... либо ...  
**electronic** – электронный  
**electronic mail (e-mail)** – электронная почта  
**embed** – внедрять, встраивать  
**employee** – служащий  
**enable** – давать возможность  
**encapsulate** – заключать в себе, включать в себя  
**enclose** – заключать (в скобки, кавычки и т.п.)  
**encode** – кодировать, шифровать  
**encounter** – сталкиваться  
**enhance** – расширять, совершенствовать  
**ensure** – гарантировать, обеспечивать  
**enter** – вводить  
**entry** – запись, содержимое, введённые данные  
**enterprise** – предприятие  
**entertainment** – развлечение  
**entire** – целостный, весь  
**environment** – конфигурация сети; среда  
**equal (to)** – равный (чему-л.)  
**erase** – стирать  
**error** – ошибка  
**especially** – особенно  
**event** – событие  
**evolutionary** – эволюционный  
**evolve** – возникать, появляться  
**examine** – исследовать, рассматривать  
**except (that)** – за исключением (того, что)  
**excess** – излишний  
**exchange** – обмениваться  
**executable file (EXE)** – исполняемый файл  
**execute** – выполнять (программу, команду), исполнять  
**execution cycle** – исполнительный цикл  
**exist** – существовать

**expensive** – дорогостоящий  
**expert** – специалист, эксперт  
**expert system** – экспертная система  
**express** – выражать

– F –

**fact** – факт  
**in fact** – фактически  
**fail** – повреждаться, давать сбой  
**fall (fell, fallen) (into)** – распадаться (на ч.-л.)  
**false** – ложный  
**familiar** – знакомый  
**fast** – быстро  
**feature** – особенность, признак, свойство; быть характерной чертой, отличаться  
**fetch** – выбирать (команду или данные из памяти)  
**feching** – выборка, загрузка  
**field** – поле  
**figure** – рисунок, чертёж  
**file server network** – сеть с сервером файлов  
**File Transfer Protocol (FTP)** – протокол передачи файлов  
**find (found, found)** – находить  
**fine** – мелкий  
**fix** – настройка  
**flat-file database** – база данных с последовательным доступом  
**flexibility** – гибкость  
**floppy disk** – гибкий диск  
**flow** – поток (данных)  
**flowchart** – блок-схема  
**flow control** – управление ходом программы  
**folder** – папка  
**follow** – следовать  
**following** – следующий  
**footnote** – сноска, примечание, комментарий  
**for example** – например  
**for instance** – например  
**forward** – вперёд  
**frequently** – часто  
**front end** – внешний интерфейс  
**full** – полный  
**function** – функция; работать, функционировать  
**function call** – вызов функции, обращение к функции

– G –

**gateway** – машина-шлюз  
**general** – общий  
**generate** – создавать, производить  
**generation** – поколение  
**get (got, got) through** – проходить  
**go (went, gone) down** – разрываться  
**govern** – управлять  
**government agency** – правительственное учреждение  
**greater (than)** – больше (чем)

– H –

**handle** – оперировать, манипулировать, обрабатывать  
**hard drive** – жёсткий диск  
**hardware** – аппаратное обеспечение  
**hardware maintenance technician** – специалист по аппаратному обеспечению  
**header** – заголовок  
**help file (HLP)** – файл справок  
**hide (hid, hidden)** – скрывать  
**hierarchical database** – иерархическая база данных  
**higher-level language** – язык более высокого уровня, высокоуровневый язык  
**high-speed** – высокоскоростной  
**hitting** – ответ, ответная справка  
**hold (held, held)** – хранить (информацию)  
**home page** – базовая, основная страница  
**host** – главный  
**house** – размещать  
**however** – однако, тем не менее  
**hub** – концентратор, ядро сети  
**huge** – огромный  
**human** – человеческий  
**hyperlink** – гиперсвязь  
**hypertext** – гипертекст  
**hypertext markup language (HTML)** – язык разметки гипертекста  
**Hypertext transfer protocol (HTTP)** – транспортный протокол передачи гипертекста

– I –

**identify** – идентифицировать, распознавать  
**image** – изображение

**imaginable** – вообразимый

**immediately** – немедленно

**impact** – влияние

**have an impact (on)** – иметь, оказывать влияние (на)

**implement** – разрабатывать, внедрять, реализовывать

**implementation** – внедрение, реализация, ввод в работу

**important** – важный

**impossible** – невозможный

**improvement** – усовершенствование

**include** – включать в себя

**incorporate** – объединять(ся), включать(ся)

**increase** – увеличивать, возрастать

**indicate** – указывать

**individual** – отдельный

**information exchange** – обмен информацией

**information system** – информационная система

**inherit** – наследовать

**inheritance** – наследование

**initialization file (INI)** – файл инициализации

**input device** – устройство ввода

**in series** – последовательно

**inside** – внутрь, внутри

**install** – устанавливать, вводить в действие

**instantiate** – создавать экземпляры

**instead (of)** – вместо (ч.-л.)

**instruction** – инструкция, команда

**instruction cycle** – командный цикл

**integral** – неотъемлемый

**interact** – взаимодействовать

**interconnect** – (взаимно) связывать

**internal** – внутренний

**interpret** – интерпретировать, переводить

**interpreter** – интерпретатор, интерпретирующая программа

**inventory** – инвентаризационная опись, товары

**involve** – включать в себя, содержать

**be involved (in)** – заниматься (ч.-л.)

**item** – элемент

– К –

**key** – ключевой

**keyboard** – клавиатура

**kind** – вид, тип

**know (knew, known)** – знать

**knowledge** – знание, знания

**knowledge base** – база знаний

**known (as)** – известный (как)

– L –

**label** – метка, ярлык

**launch** – запускать

**layout** – расположение, схема расположения

**lead (led, led) (to)** – приводить (к)

**learn** – изучать

**less (than)** – меньше (чем)

**level** – уровень

**like** – как, подобно

**likewise** – подобно, так же, таким же образом

**limit** – ограничивать

**limited** – ограниченный

**line** – строка

**link** – связывать, соединять

**list** – перечень, список, перечислять, составлять список

**little** – мало

**load** – загружать

**local area network (LAN)** – локальная вычислительная сеть (ЛВС)

**locate** – располагать, размещать

**be located** – располагаться, размещаться

**location** – расположение

**loop** – цикл

**lose (lost, lost)** – терять

**luxury** – роскошь

– M –

**machine** – машина, механизм

**machine cycle** – машинный цикл

**mailing list** – почтовый список

**mainframe** – большой компьютер, мейнфрейм

**main table** – основная таблица

**maintain** – поддерживать

**maintenance** – эксплуатация, техническое обслуживание

**make sure** – убедиться, удостовериться

**make (made, made) up** – составлять

**made up (of)** – составленный (из)

**manage** – управлять

**management information system** – управленческая информационная система, информационно-управляющая система (ИУС)

**manipulate** – обрабатывать

**manual** – ручной, неавтоматизированный

**map** – наносить на карту, составлять карту или схему, отображать в виде карты

**meaning** – значение

**means** – средство

**mechanism** – механизм

**member** – член, элемент набора, элемент множества

**memory** – память

**memory location** – ячейка памяти

**mesh** – петля, ячейка, сетка

**message** – сообщение, передаваемый блок информации

**microcode** – микрокоманда, микрокод

**minus** – минус

**mnemonics** – мнемоника, символика

**monitor** – осуществлять текущий контроль, контролировать

**motherboard** – системная плата, материнская плата

**motor** – двигатель

**mouse** – мышь

**move** – перемещать(ся), пересылать

**multiple** – множественный, многочисленный

**multiplication** – умножение

– N –

**name** – называть

**navigate** – перемещать(ся)

**near** – близкий

**necessarily** – необходимо

**need** – нуждаться

**needs analysis** – анализ потребностей

**network** – сеть; организовывать, создавать сеть

**network database** – сетевая база данных

**networking** – организация сети, создание сети, объединение в сеть

**network interface card** – сетевая интерфейсная плата

**node** – узел сети

**nonvolatile** – энергонезависимый

**number** – число

**number (of)** – ряд, число (чего-л.)

**numeric** – цифровой, числовой

**numerous** – многочисленный

## – O –

- object** – объект  
**object code** – объектный код, объектная программа  
**object-oriented database** – объектно-ориентированная база данных  
**object-oriented programming (OOP)** – объектно-ориентированное программирование  
**offer** – предлагать  
**office automation system** – система автоматизации учрежденческой деятельности; учрежденческая автоматизированная система  
**often** – часто  
**once** – как только  
**ongoing** – непрерывный  
**operate** – работать  
**operating system** – операционная система  
**option** – опция  
**order** – порядок, заказ  
    **in order** – по порядку  
**original** – первоначальный  
**other** – другой  
**otherwise** – в противном случае  
**output device** – устройство вывода  
**overview** – обзор  
**own** – собственный  
    **ownership** – собственность, право собственности  
    **on one's own** – самостоятельно

## – P –

- packet** – пакет, блок данных  
**page** – страница  
**parent** – родительский, порождающий  
**part** – часть  
    **partial** – частичный  
**particular** – особый, особенный, специфический  
**pass** – передавать, пропускать  
**path** – путь, способ  
**payload** – блок данных  
**peer-to-peer network** – одноранговая сеть  
**perform** – выполнять  
**peripheral** – периферийное оборудование  
**permanent** – постоянный  
    **permanently** – постоянно

**personalize** – индивидуализировать  
**phase** – фаза, этап  
**phrasing** – выражение, оборот, синтаксическая конструкция  
**piece** – порция, кусок  
**pilot** – пробный, экспериментальный  
**placeholder** – метка-заполнитель  
**plus** – плюс  
**point-and-click** – навести и щёлкнуть  
**popular** – популярный  
**portable** – машинонезависимый, мобильный, переносимый  
**possible** – возможный  
**posting** – отправка сообщения (в сети)  
**power** – мощность, питание, производительность  
**preference** – предпочтение; настройка  
**present** – представлять  
**press** – нажимать, надавливать  
**prevent** – предотвращать, мешать  
**price** – цена  
**primary** – основной  
**probably** – вероятно  
**procedure** – процедура  
**proceed** – продолжать  
**process** – обрабатывать  
    **processing** – обработка  
    **processor** – процессор  
**programmer** – программист  
**programming language** – язык программирования  
**promote** – продвигать  
**proper** – правильный, надлежащий, должный  
    **properly** – правильно, должным образом, как следует  
**prototype** – макет, прототип  
**provide** – обеспечивать  
**public utilities** – коммунальные службы  
**punctuation** – пунктуация  
**purchase** – покупка  
**purpose** – цель, назначение

– Q –

**quantity** – количество  
**query** – запрос, делать запрос  
**quickly** – быстро



## – R –

**random access memory** (RAM) – оперативное запоминающее устройство (ОЗУ)

**read-only memory** (ROM) – постоянное запоминающее устройство (ПЗУ)

**ready** – готовый

**be ready** – быть готовым

**reassemble** – перетранслировать

**receive** – получать

**recent** – последний, недавний

**recharge** – перезаряжать

**reconstruct** – восстанавливать

**record** – запись

**refer** – иметь отношение, относиться (к ч.-л.)

**reference** – ссылаться

**refresh** – обновлять

**register** – регистр

**relate** – соотносить

**related** – связанный

**relational database** – реляционная база данных

**relationship** – отношение

**relatively** – относительно

**remain** – оставаться

**remote** – дистанционный, отдалённый, удалённый

**to repeat** – повторять

**repetition** – повторение

**report** – отчёт, сообщение

**represent** – представлять

**request** – запрашивать, запрос

**require** – требовать

**researcher** – исследователь

**resource** – ресурс

**rest (of)** – остальная часть (чего-л.)

**retrieve** – отыскивать

**reverse** – обратный, в обратном направлении

**ring** – кольцо

**route** – передавать, направлять

**router** – маршрутизатор сети

**routine** – рутинный, повседневный

**row** – ряд, строка

**rule** – правило

**run (ran, run)** – выполнять, исполнять, запускать (программу, команду); вести (дело, предприятие); работать

– S –

**select** – выбирать, отбирать

**selection** – выбор, отбор

**send (sent, sent)** – отправлять, посылать

**sequence number** – порядковый номер

**sequential** – последовательный

**series of** – ряд (чего-л.)

**set** – набор; устанавливать

**several** – несколько

**shape** – форма

**share** – разделять, совместно (коллективно) использовать

**sign** – знак

**silicon** – кремний

**similar (to)** – аналогичный (чему-л.), сходный (с чем-л.)

**simple** – простой

**simply** – просто

**simultaneous access** – одновременный доступ

**single** – единственный

**size** – размер

**sliver** – пластина

**slowly** – медленно

**software** – программное обеспечение

**solution (to)** – решение (чего-л.)

**sort** – сортировать, упорядочивать

**sound** – звук

**source** – источник

**source code** – исходный код, исходный текст (программы)

**space** – пространство, область

**special-purpose** – специализированный

**specific** – заданный, специфический

**specify** – задавать, специфицировать

**speed** – скорость

**spontaneously** – спонтанно, самопроизвольно

**spreadsheet** – электронная таблица

**square root** – квадратный корень

**star** – звезда

**start** – начинать

**starting point** – начальная точка, начальный пункт

**start-up instructions** – начальные инструкции, команды  
**statement** – утверждение, высказывание  
**static RAM** – статическое ОЗУ  
**status** – состояние  
**steering wheel** – рулевое колесо  
**step** – шаг  
**still** – всё ещё, пока  
**storage** – запоминающее устройство; хранение, запоминание  
**storage space** – объём памяти  
**store** – хранить, запоминать  
**streamlined** – потоковый  
**structure** – структурировать  
**structured programming** – структурное программирование  
**subdivision** – подраздел, подразделение  
**subtraction** – вычитание  
**such as** – такие, как  
**suitable** – подходящий, соответствующий  
**support** – поддерживать, поддержка  
**syntax** – синтаксис, синтаксическая структура  
**systems design** – проектирование системы  
**systems development life cycle (SDLC)** – жизненный цикл разработки системы

– T –

**table** – таблица  
**tag** – ярлык, метка  
**task** – задача  
**team** – группа  
**technical writer** – технический писатель, редактор технической документации  
**teleconference** – телеконференция  
**tell (told, told)** – сообщать  
**TELNET** – базовая сетевая услуга в Интернет  
**temporary** – временный, промежуточный  
**term** – термин  
**terminator** – терминатор, заглушка  
**terrain** – территория, район  
**test** – испытывать, проверять, контролировать, тестировать  
**text box** – текстовое поле  
**text editor** – текстовый редактор  
**that is** – то есть

**therefore** – следовательно  
**think (thought, thought)** – представлять себе  
**through** – через  
**throughout** – повсюду, везде  
**tire** – шина, покрышка  
**time-consuming** – забирающий много времени, трудоёмкий  
**tiny** – крошечный  
**token** – маркер, метка  
**tool** – инструмент  
**toolbar** – панель инструментов  
**topic of interest** – интересующая тема  
**top-level** – высокого уровня  
**topology** – топология сети  
**top speed** – максимальная скорость  
**track** – отслеживать  
**traffic** – поток данных в сети, трафик  
**train** – обучать  
    **trainer** – специалист по обучению  
    **training** – обучение  
**transaction processing system** – система обработки транзакций  
**translator program** – транслирующая программа  
**transmit** – передавать  
**treelike** – древовидный  
**tremendous** – огромный  
**true** – истинный  
**trunk table** – главная таблица  
**turn on** – включать  
**type** – вводить, набирать на клавиатуре  
**typical** – типичный, обычный

– U –

**unable** – неспособный  
    **be unable** – быть не способным  
**underlie (underlay, underlain)** – лежать в основе (чего-л.)  
**understand (understood, understood)** – понимать  
**Uniform Resource Locator (URL)** – универсальный указатель ресурса  
**unique** – уникальный  
**unit of measure** – единица измерения  
**upgrade** – модернизировать, усовершенствовать  
**use** – применять, использовать  
    **useful** – полезный

## VOCABULARY

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**user** – пользователь

**user assistance architect** – специалист по оказанию помощи пользователям

**utility** – обслуживающая программа, служебная программа

### – V –

**variable** – переменная

**various** – различный

**vary** – отличаться

**vendor** – поставщик, производитель, продавец

**videoconference** – видеоконференция

**view** – просматривать

**visual** – визуальный, зрительный

**volatile** – энергозависимый

### – W –

**waste** – тратить (время и т.п.)

**way** – способ

**whether** – ли

**wide** – широкий

**widely** – широко

**wide area network (WAN)** – глобальная вычислительная сеть

**window** – окно

**Windows Registry** – системный реестр, файл системного реестра

**within** – внутри, в пределах

**word processing** – текстовая обработка

**workload** – рабочая нагрузка

**World Wide Web (WWW)** – Всемирная паутина

### – Z –

**ZIP Code** – почтовый индекс

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**Евгения Николаевна Морозова**

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