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PROFESSIONAL ENGLISH FOR INFORMATION TECHNOLOGIES
Профессиональный английский язык для студентов, изучающих информационные
технологии

ЭЛЕКТРОННЫЙ УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС
по дисциплине «Иностранный язык для профессиональных целей»

Специальность 1-40 01 01 Программное обеспечение информационных технологий

Автор-составитель: Соковикова Елена Евгеньевна

Рецензенты:

Тонкович Ирина Николаевна, заведующая кафедрой информационных технологий МИУ,
кандидат химических наук, доцент по специальности "Информатика, управление и
вычислительная техника"

Копытко Наталья Владимировна, заведующая кафедрой стилистики английского языка
МГЛУ, кандидат филологических наук

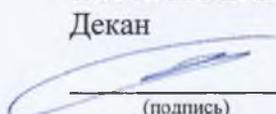
СОГЛАСОВАНО

Заведующий кафедрой


(подпись) Е.А. Соковикова
(инициалы, фамилия)
6.12.2017 2017

СОГЛАСОВАНО

Декан


(подпись) А.К. Починок
(инициалы, фамилия)
06.12. 2017

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ПОЯСНИТЕЛЬНАЯ ЗАПИСКА

Данный электронный учебно-методический комплекс по дисциплине «Иностранный язык для профессиональных целей» предназначен для студентов специальности 1-40 01 01 Программное обеспечение информационных технологий дневной и заочной форм обучения и рассчитан на аудиторную и самостоятельную работу в 3 и 4 семестрах.

Практический раздел учебно-методического комплекса состоит из 4 частей. В рамках каждой темы раздела применяется следующая структура: дотекстовые упражнения, куда входит словарь по теме и работа с ним, аутентичные и частично адаптированные тексты по современным информационным технологиям соответствующей тематики, послетекстовые упражнения, которые нацелены на развитие и совершенствование навыков изучающего и поискового чтения, задания, направленные на развитие речевых навыков в ситуациях общения по специальности, а также дополнительные тексты для чтения. Предполагается, что данный материал может стать базой для формирования и совершенствования навыков чтения аутентичных текстовых материалов по специальности и навыков ведения беседы по профессиональной тематике.

В структуру ЭУМК включены материалы для управляемой самостоятельной работы студентов (УСРС).

СОДЕРЖАНИЕ УЧЕБНОГО МАТЕРИАЛА

В основу структурирования содержания учебного материала положен принцип модульного подхода, который предполагает разбивку учебного материала на относительно самостоятельные модули (разделы) курса.

Структура содержания учебной дисциплины включает модуль профессионального общения, модуль контроля.

MODULE 1. PROFESSIONAL COMMUNICATION

UNIT 1. System Analysis and Design – 14 ч.

UNIT 2. Programming – 12 ч.

УСПС№1 (6 ч.)

UNIT 3. Recent Developments and Trends – 12 ч.

УСПС№2 (6 ч.)

UNIT 4. Careers in IT – 12 ч

MODULE 2. CHEKING – 2 ч.

КОНТРОЛЬ ЗНАНИЙ

Зачет проводится по окончании 4 семестра в устной форме.

Зачет включает:

1. Подготовленное высказывание по заданной ситуации и неподготовленная беседа с преподавателем в рамках данной ситуации (по предметно-тематическому содержанию дисциплины).
2. Чтение аутентичного или частично адаптированного текста; беседа на иностранном языке по содержанию текста.

Объем текста – 900 печатных знаков. Время 5-7 мин.

ПРАКТИЧЕСКИЙ РАЗДЕЛ
UNIT 1
SYSTEM ANALYSIS AND DESIGN

WARMING UP

*Study the popular definitions of the term **Information systems** given below and decide which of them is the most precise.*

- “Information systems (IS) is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data.”
- “Information systems are combinations of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational settings.”
- “Information systems are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.”

Discuss the following questions.

1. Who uses information systems?
2. How can information systems help people in an organization?
3. Do organizations require different kinds of information systems?

TEXT 1

VOCABULARY

Integrate – объединять, включать в состав

Integrated – объединённый, сгруппированный, интегрированный (*о системе*)

An integrated set – комплексный набор

Telecommunications - дистанционная передача данных

Warehouse – склад, хранилище

Data warehouse – хранилище данных

Ingrained - присущий, свойственный, укоренившийся

Entirely - полностью, совершенно, целиком, исключительно

Derive – получать

Derive revenue – получать доход

Deploy – применять

Cost-effectively – рентабельно, затратно-эффективно (рационально с точки зрения затрат)

Conduct – вести, проводить

Exert – вызывать, проявлять, оказывать влияние

Profound – глубокий, серьезный

Profound influence – существенное влияние

Pace – темп, скорость

Maintain – поддерживать, сохранять

Rewarding – приносящий удовлетворение

Vital – крайне необходимый, жизненно важный

Knowledge work – интеллектуальный труд

Evaluate – оценивать

Long-term - долгосрочный, долговременный, длительный

VOCABULARY TASKS

Ex. 1. Match the verbs with their synonyms.

- | | |
|--------------|----------------|
| 1. Integrate | a. Use |
| 2. Derive | b. Keep |
| 3. Deploy | c. Receive |
| 4. Conduct | d. Estimate |
| 5. Influence | e. Incorporate |
| 6. Maintain | f. Carry out |
| 7. Evaluate | g. Affect |

Ex. 2. Match the adjectives and adverbs listed below with their definitions or synonyms. Then use them in the sentences below. Translate the sentences into Russian.

- | | |
|---------------------|---|
| 1. Integrated | a) Firmly fixed or established; difficult to change. |
| 2. Ingrained | b) Productively in relation to its cost. |
| 3. Entirely | c) Continuing, long-lasting. |
| 4. Cost-effectively | d) Making you feel satisfied. |
| 5. Profound | e) With various parts or aspects linked or coordinated. |
| 6. Rewarding | f) Completely; solely. |
| 7. Vital | g) Absolutely necessary. |
| 8. Long-term | h) Very great or intense. |

- A. Many major companies are built ... around information systems.
- B. New technologies exerted a ... influence over society.
- C. IT is now ... in the operations and management of organizations.
- D. An organization's ... plans must be considered when designing an information system infrastructure and architecture.
- E. Information systems help to provide services ... to citizens.
- F. Information and knowledge became ... economic resources.

Ex. 3. Give English equivalents for the words in brackets. Use them in the correct forms to complete the sentences below. Consult the vocabulary.

1. An Information System (IS) is (*комплексный набор*) of components for collecting, storing, and processing data and for providing information, knowledge, and digital products.
2. The hardware, software, and (*дистанционная передача данных*) constitute information technology (IT).
3. Google is a search engine company that (*получает доход*) from keyword advertising on Internet search engines.
4. Governments (*применяют*) information systems to provide services cost-effectively to citizens.
5. Individuals rely on information systems, generally Internet-based, for (*ведение*) much of their personal lives.
6. New technologies quickened the (*темп*) of daily activities, enabled people to develop and (*поддерживать*) new and often more-rewarding relationships, affected the structure of organizations, changed the type of products bought, and influenced the nature of work.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

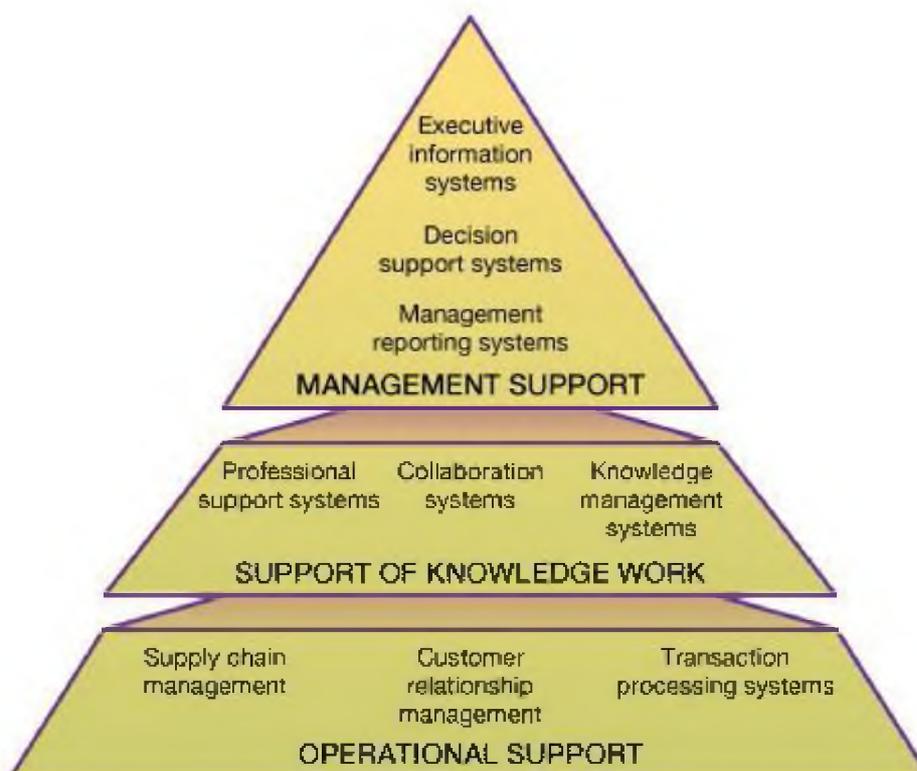
INFORMATION SYSTEMS

An Information System is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. The main components of information systems are computer hardware and software, telecommunications, databases and data warehouses, human resources, and procedures. The hardware, software, and telecommunications constitute information technology (IT), which is now ingrained in the operations and management of organizations.

Business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers, and compete in the marketplace. Information systems are used to run inter-organizational supply chains and electronic markets. For instance, corporations use information systems to process financial accounts, to manage their human resources, and to reach their potential customers with online promotions. Many major companies are built entirely around information systems. These include eBay, a large auction marketplace; Amazon, an expanding electronic mall and provider of cloud computing services; Alibaba, a business-to-business e-marketplace; and Google, a search engine company that derives most of its revenue from keyword advertising on Internet searches. Governments deploy information systems to provide services cost-effectively to citizens. Digital goods—such as electronic books, video products, and software—and online services, such as gaming and social networking, are delivered with information systems. Individuals rely on information systems, generally Internet-based, for conducting much of their personal lives: for socializing, study, shopping, banking, and entertainment.

As major new technologies for recording and processing information were invented over the millennia, they exerted a profound influence over society. These systems quickened the pace of daily activities, enabled people to develop and maintain new and often more-rewarding relationships, affected the structure of organizations, changed the type of products bought, and influenced the nature of work. Information and knowledge became vital economic resources.

Information systems support operations, knowledge work, and management in organizations. (The overall structure of organizational information systems is shown in the figure below.)



Operational support forms the base of an information system and contains various transaction processing systems for designing, marketing, producing, and delivering products and services. Support of knowledge work forms the middle layer; it contains subsystems for sharing information within an organization. Management support, forming the top layer, contains subsystems for managing and evaluating an organization's resources and goals. Clearly, an organization's long-term general strategic plans must be considered when designing an information system infrastructure and architecture.

WORD STUDY

Ex. 4. Translate the following words and phrases from the text into English.

1. Сбор, хранение и обработка данных
2. Основные компоненты
3. Привлекать потенциальных клиентов
4. Обрабатывать финансовые отчеты
5. Крупные компании
6. Предоставлять услуги
7. Цифровая продукция
8. Оперативная поддержка
9. Обмен информацией
10. Оценка ресурсов и целей организации

Ex. 5. Fill in the gaps with the prepositions given below. Translate the sentences into Russian.

in on (2) from over with (2) for out

1. Business firms and other organizations rely ... information systems to carry ... and manage their operations, interact ... their customers and suppliers, and compete ... the marketplace.

2. Google derives most of its revenue ... keyword advertising ... Internet searches.
3. Digital goods and online services are delivered ... information systems.
4. New technologies ... recording and processing information were invented ... the millennia.

Ex. 6. Complete the sentences with the appropriate words and phrases from those given below.

*a. financial accounts b. knowledge work c. data warehouses d. entertainment
e. electronic markets f. hardware and software*

1. The main components of information systems are computer ____, telecommunications, databases and ____, human resources, and procedures.
2. Information systems are used to run inter-organizational supply chains and ____.
3. Corporations use information systems to process ____, to manage their human resources, and to reach their potential customers with online promotions.
4. Individuals rely on information systems for socializing, study, shopping, banking, and ____.
5. Information systems support operations, ____, and management in organizations.

COMPREHENSION

Ex. 7. Find the false sentences and correct them using the information from the text.

1. The hardware, software, and human resources constitute information technology (IT).
2. Information systems are used to run inter-organizational supply chains and electronic markets.
3. Corporations use information systems for socializing and entertainment.
4. A few major companies are built entirely around information systems.
5. Governments deploy information systems to provide services cost-effectively to citizens.
6. As major new technologies for recording and processing information were invented over the millennia, they had no influence over society.
7. Operational support contains subsystems for managing and evaluating an organization's resources and goals.

Ex. 8. Answer the questions.

1. What is an information system?
2. What are the main components of an information system? Which of these components constitute information technology?
3. How do business firms use information systems?
4. Can you give any examples of companies which are built entirely around information systems?
5. How do governments deploy information systems?
6. How do individuals commonly make use of information systems?
7. How did information systems influence the society?
8. The structure of organizational information systems contains three layers, doesn't it? Can you name them?
9. What must be considered when designing an information system infrastructure and architecture?

WRITING

Ex. 9. Choose one of the questions below and write a one-paragraph answer.

1. Suppose that you had to explain to a member of your family or one of your closest friends the concept of an information system. How would you define it? Write a one-paragraph description *in your own words* that you feel would best describe an information system to your friends or family.
2. Of the five primary components of an information system (hardware, software, data, people, process), which do you think is the most important to the success of a business organization? Write a one-paragraph answer to this question that includes an example from your personal experience to support your answer.
3. We all interact with various information systems every day: at the grocery store, at work, at the university, even in our cars (at least some of us). Make a list of the different information systems you interact with every day. See if you can identify the technologies, people, and processes involved in making these systems work.

PROBLEM SOLVING

Ex. 10. Work in two groups, A and B. Group A, list all the advantages of information systems. Group B, list all the disadvantages. Then compare your lists and together consider how the disadvantages can be minimized.

TEXT 2

VOCABULARY

Acquire - приобретать

Acquisition – приобретение

Establish – устанавливать, определять

Tend – иметь тенденцию, склоняться

Vendor – продавец, поставщик

Systems development life cycle (SDLC) - цикл разработки ПО (*последовательность шагов по созданию программного продукта - в том числе определение требований, проектирование, кодирование и верификация*)

Feasibility – осуществимость, выполнимость

Feasibility study - технико-экономическое обоснование (*анализ технической осуществимости и экономической целесообразности проекта*)

Phase out – прекращать применять, выводить из обращения, снимать с эксплуатации

Objective – цель

Principal objective – главная цель

Revised – переработанный, исправленный

Blueprint – план, проект, чертеж

Extensive blueprint – подробный план

Coherent – связный, согласованный

Coherent system – целостная система

Conversion – преобразование, переход (к чему-либо), перепрофилирование

Implementation – осуществление, внедрение

Implementation activities – мероприятия по внедрению

Preliminary - предварительный

Albeit – хотя, пусть

Turn over smth to smb – передавать что-л кому-л

RAD (rapid application development — быстрая разработка приложений) – концепция создания технологического процесса, позволяющего максимально быстро разрабатывать программные продукты.

Incorporate - включать (в состав чего-либо), вносить

Successive – последующий

Evolve – развиваться, превращаться

Take over – принимать дела, прийти на смену

Hand over – передавать, сдавать, вручать

Inevitably – неизбежно, непременно (обязательно)

Extensively – в значительной степени, сильно

Maintenance – обслуживание, содержание

System maintenance – техническое обслуживание системы, сопровождение системы

Adjust – регулировать, подстраивать, приспособлять

VOCABULARY TASKS

Ex. 1. Complete the table. Consult the vocabulary if necessary.

	VERB	NOUN
1		acquisition
2	maintain	
3	implement	
4		evolution
5	convert	
6		tendency
7		adjustment
8	develop	

Ex. 2. Replace the words and phrases in brackets with their synonyms from the vocabulary.

1. The makers have decided to (*stop*) the production of this car.
2. He was making progress, (*though*) rather slowly.
3. I managed to (*buy*) all the books I needed.
4. No (*change*) from analogue to digital data is needed.
5. The watch was designed according to a 19th century (*project*).
6. The (*main aim*) of the project is to provide an answer to this question.
7. They are able to work as a (*well organized*) team.
8. Computer software will continue to (*develop*) in response to users' needs.

Ex. 3. Match the words with their definitions. Then use them in the sentences below.

*a. inevitably b. acquisition c. extensively d. feasibility e. vendors
f. maintenance g. preliminary h. successive i. implementation*

1. The state or degree of being easily or conveniently done or achieved.
 2. Coming before and usually done in preparation for something.
 3. Something that somebody buys or obtains in some other way.
 4. Companies or people that sell particular products or services.
 5. The process of moving an idea from concept to reality.
 6. Following one after another in order.
 7. Without possibility to avoid.
 8. To a large degree.
 9. Keeping something in good condition by checking or repairing it regularly.
-
- A. Independent software ... often disseminate new technologies and solutions.
 - B. The interface has been ... modified to make it more user-friendly.
 - C. His latest ... is a racehorse.
 - D. All data are stored electronically, thereby creating a database for each ... generation.
 - E. I doubt the ... of the plan.
 - F. This report provides ... results from the current study.
 - G. The full ... of the system will take some time.
 - H. We carry out routine ... of the equipment.
 - I. Technological changes will ... lead to unemployment.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

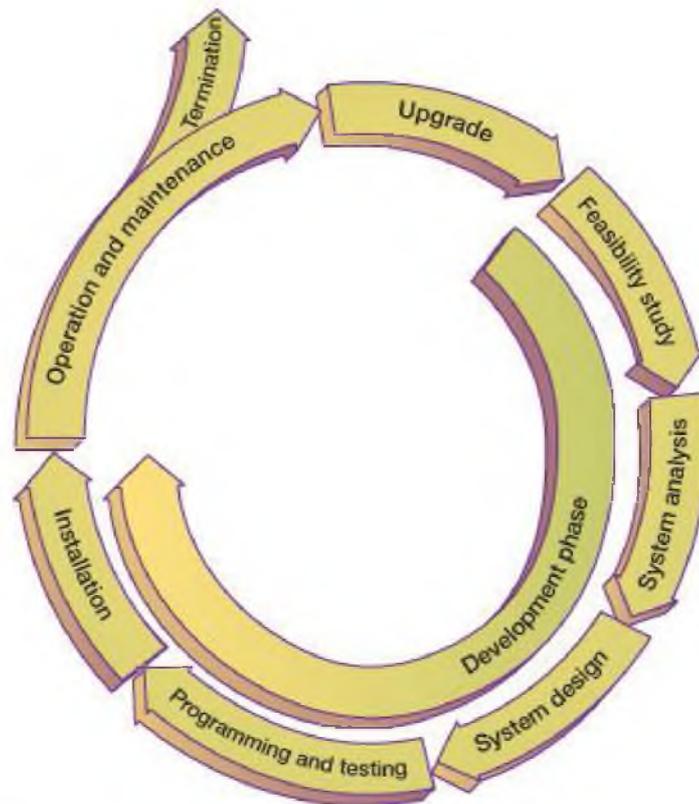
INFORMATION SYSTEMS LIFE CYCLE

Once the need for a specific information system has been established, the system has to be acquired. The acquisition of information systems can either involve external sourcing or rely on internal development or modification. With today's highly developed IT industry, companies tend to acquire information systems and services from specialized vendors. Generally, only smaller applications are developed internally.

When an information system is developed, either internally by an organization or by software vendors, one of two broad methods is used: systems development life cycle (SDLC) or rapid application development (RAD).

Large organizational systems, such as enterprise systems, are generally developed and maintained through a systematic process, known as the systems development life cycle (SDLC), which consists of six stages: feasibility study, system analysis, system design, programming and testing, installation, and operation and maintenance.

Following a period of use, the information system may be either phased out or upgraded. In the case of a major upgrade, the system enters another development life cycle. (The information systems life cycle is shown in the figure below.)



The principal objective of a feasibility study is to determine whether the system is desirable on the basis of long-term plans, strategic initiatives, and a cost-benefit analysis.

The analysis phase answers the questions of *who* will use the system, *what* the system will do, and *where* and *when* it will be used. The goal of the analysis phase is to produce a list of requirements for a new or revised information system.

The next stage, system design, results in an extensive blueprint for how the new system will be organized. In the design stage, the programming language and the hardware and software platform in which the new system will run are also decided.

During the programming and testing stage, the individual software modules of the system are developed, tested, and integrated into a coherent operational system. Further levels of testing ensure continuing quality control.

Installation includes final testing of the system in the work environment and conversion of organizational operations to the new system, integrating it with other systems already in place. The later stages of development include such implementation activities as training users and modifying the organizational processes in which the system will be used.

The methodology of systems development life cycle (SDLC) is frequently criticized for its long development times and voluminous documentation requirements—and, in some instances, for its failure to fulfill the user's requirements at the end of the long development process.

Increasingly, SDLC is being replaced by RAD (rapid application development). In various RAD methodologies a prototype—a preliminary working version of an application—is built quickly and inexpensively, albeit imperfectly. This prototype is turned over to the users, their reactions are collected, suggested modifications are incorporated, and successive prototype versions eventually evolve into the complete system.

Sometimes RAD and SDLC are combined: a prototype is produced to determine user requirements during the initial system analysis stage, after which systems development life cycle (SDLC) takes over.

After an installed system is handed over to its users and operations personnel, it will almost invariably be modified extensively over its useful life in a process known as system maintenance. A large system will typically be used and maintained for some 5 to 10 years or

even longer. Most maintenance is to adjust the system to the organization's changing needs and to new equipment and software, but inevitably some maintenance involves correcting design errors and exterminating software "bugs" as they are discovered.

WORD STUDY

Ex. 4. Form word-combinations using the words from both columns. Translate them into Russian.

- | | |
|----------------|--------------|
| 1. External | a. upgrade |
| 2. Software | b. control |
| 3. Life | c. vendor |
| 4. Major | d. version |
| 5. Feasibility | e. sourcing |
| 6. Extensive | f. error |
| 7. Coherent | g. cycle |
| 8. Quality | h. study |
| 9. Preliminary | i. blueprint |
| 10. Design | j. system |

Ex. 5. Fill in the gaps with the prepositions.

of on from into (2) by (2) for (2) out

1. Once the need ... a specific information system has been established, the system has to be acquired.
2. The acquisition of information systems can either involve external sourcing or rely ... internal development or modification.
3. Generally, only smaller applications are developed internally ... an organization.
4. Companies tend to acquire information systems and services ... specialized vendors.
5. Following a period of use, the information system may be either phased ... or upgraded.
6. In the case ... a major upgrade, the system enters another development life cycle.
7. During the programming and testing stage, the individual software modules of the system are developed, tested, and integrated ... a coherent operational system.
8. The methodology of systems development life cycle is frequently criticized ... its long development times and voluminous documentation requirements.
9. Increasingly, SDLC is being replaced ... RAD.
10. Successive prototype versions eventually evolve ... the complete system.

COMPREHENSION

Ex. 6. Match the stages of systems development life cycle with their objectives.

1. *The feasibility study*
2. *Systems analysis*
3. *The design phase*
4. *The programming and testing stage*
5. *Installation*
6. *Maintenance*

- A. It involves the coding of design into computer understandable language, i.e. programming language, and a test run of the system.
- B. It is necessary to eliminate errors in the system during its working life and to tune the system to any variations in its working environment.
- C. It is a process of investigating any current system(s), identifying opportunities for improvement, or developing a concept for a new efficient system.
- D. It is the process by which the old system is turned off and the new one is turned on. One of the most important aspects of conversion is to teach users how to use the new system and help manage the changes.
- E. It is basically the evaluating of the proposed system in the light of its workability, meeting user's requirements, effective use of resources and of course, the cost effectiveness.
- F. It decides how the system will operate, in terms of the hardware, software, and network infrastructure; the user interface; and the specific programs, databases, and files that will be needed.

Ex. 7. Arrange the plan in the right order according to the text.

- 1. System design.
- 2. Termination or upgrade.
- 3. Feasibility study.
- 4. Programming and testing.
- 5. Six stages of systems development life cycle.
- 6. Modification and maintenance.
- 7. System analysis.
- 8. Two sources of acquisition of information systems.
- 9. Rapid application development methodology.
- 10. Installation and implementation.
- 11. The combination of two methods.

Ex. 8. Complete the sentences.

- 1. When an information system is developed, one of two broad methods is used: ...
- 2. The systems development life cycle consists of six stages: ...
- 3. The principal objective of a feasibility study ...
- 4. The goal of the analysis phase ...
- 5. The next stage, system design, results in ...
- 6. During the programming and testing stage ...
- 7. Installation includes ...
- 8. In various RAD methodologies ...
- 9. Sometimes RAD and SDLC ...
- 10. After an installed system is handed over to its users and operations personnel ...
- 11. Most maintenance is ...

SPEAKING

Ex. 9. Use the plan from ex. 7 and the sentences from ex. 8 to speak about information systems life cycle.

PROBLEM SOLVING

Ex. 10. Suppose you are a project manager using a SDLC methodology on a large and complex project. Your manager has just read the latest article in *Computerworld* that advocates replacing this methodology with RAD and comes to you requesting that you switch. What would you say?

MINICASE

Ex. 11.

Barbara Singleton, manager of western regional sales at the WAMAP Company, requested that the IS department develop a sales force management and tracking system that would enable her to better monitor the performance of her sales staff. Unfortunately, owing to the massive backlog of work facing the IS department, her request was given a low priority. After six months of inaction by the IS department, Barbara decided to take matters into her own hands. Based on the advice of friends, Barbara purchased simple database software and constructed a sales force management and tracking system on her own.

Although Barbara's system has been "completed" for about six weeks, it still has many features that do not work correctly, and some functions are full of errors. Barbara's assistant is so mistrustful of the system that she has secretly gone back to using her old paper-based system, because it is much more reliable.

Over dinner one evening, Barbara complained to a systems analyst friend, "I don't know what went wrong with this project. It seemed pretty simple to me. Those IS guys wanted me to follow this elaborate set of steps and tasks, but I didn't think all that really applied to a PC-based system. I just thought I could build this system and tweak it around until I got what I wanted without all the fuss and bother of the methodology the IS guys were pushing. I mean, doesn't that just apply to their big, expensive systems?"

Assuming you are Barbara's systems analyst friend, how would you respond to her complaint?

SUPPLEMENTARY READING

VOCABULARY NOTES

Agile software development - Гибкая методология разработки - серия подходов к разработке программного обеспечения, ориентированных на использование итеративной разработки, динамическое формирование требований и обеспечение их реализации в результате постоянного взаимодействия внутри самоорганизующихся рабочих групп, состоящих из специалистов различного профиля.

Iterative approach - Итеративный подход (iteration - «повторение») в разработке программного обеспечения - это выполнение работ параллельно с непрерывным анализом полученных результатов и корректировкой предыдущих этапов работы.

Agile manifesto - «Манифест гибкой методологии разработки программного обеспечения» был выпущен и принят в феврале 2001 года (штат ЮТА США) группой экспертов. Данный манифест определяет 4 основные ценности и 12 принципов для методологий, базирующихся на нем.

AGILE DEVELOPMENT

A third category of systems development methodologies is still emerging today: *agile development*.

All agile development methodologies are based on the agile manifesto and a set of twelve principles. The emphasis of the manifesto is to focus the developers on the working conditions of

the developers, the working software, the customers, and addressing changing requirements instead of focusing on detailed systems development processes, tools, all-inclusive documentation, legal contracts, and detailed plans. These programming-centric methodologies are typically based only on the twelve principles of agile software. These principles include the following:

- Software is delivered early and continuously through the development process, satisfying the customer.
- Changing requirements are embraced regardless of when they occur in the development process.
- Working software is delivered frequently to the customer.
- Customers and developers work together to solve the business problem.
- Motivated individuals create solutions; provide them the tools and environment they need, and trust them to deliver.
- Face-to-face communication within the development team is the most efficient and effective method of gathering requirements.
- The primary measure of progress is working, executing software.
- Both customers and developers should work at a pace that is sustainable. That is, the level of work could be maintained indefinitely without any worker burnout.
- Agility is heightened through attention to both technical excellence and good design.
- Simplicity, the avoidance of unnecessary work, is essential.
- Self-organizing teams develop the best architectures, requirements, and designs.
- Development teams regularly reflect on how to improve their development processes.

Based on these principles, agile methodologies focus on streamlining the system-development process by eliminating much of the modeling and documentation overhead and the time spent on those tasks. Instead, projects emphasize simple, iterative application development.

UNIT 2 PROGRAMMING

WARMING UP

1. *In pairs, discuss what you think programming is.*
2. *Read the quotation and say if you agree with it and why.*

“It has often been said that a person does not really understand something until he teaches it to someone else. Actually a person does not really understand something until after teaching it to a computer, i.e. express it as an algorithm.” (Donald Knuth, American computer scientist, mathematician, and professor at Stanford University, author of multi-volume work ‘The Art of Computer Programming’.)

3. *Have you ever written a computer program? What programming language did you use?*



4. *What other programming languages can you name? What are they used for?*

TEXT 1

VOCABULARY

Statement – утверждение; высказывание; формулировка

Problem statement - формулировка задачи; постановка задачи

Assumption - предположение; гипотеза; допущение

Proceed – продолжать

Variable – переменная величина

Constant – постоянная величина

Flowchart – блок-схема; логическая схема программы

Structured English – структурированный английский язык

Pseudocode – псевдокод (компактный язык описания алгоритмов)

UML - (Unified Modeling Language) - унифицированный язык моделирования

Paradigm – система понятий, модель, подход

VDE (visual development environment) – визуальная среда разработки

Grid – сетка, таблица

Error – ошибка

Syntax error – синтаксическая ошибка

Runtime error – ошибка, возникающая в процессе работы программы

Bug – дефект, ошибка, сбой (в аппаратуре, компьютерной программе), баг

Execute – выполнять (программу, команду)

Debugger – отладчик, программа отладки

Manual – руководство, инструкция

User manual – инструкция по эксплуатации, руководство пользователя

Help file – файл справки

Remark – примечание, пометка, комментарий

VOCABULARY TASKS

Ex. 1. Match the words on the left with their synonyms from the right column.

- | | |
|---------------|---------------|
| 1. Chart | a. comment |
| 2. Assumption | b. hypothesis |
| 3. Error | c. continue |
| 4. Execute | d. bug |
| 5. Paradigm | e. diagram |
| 6. Proceed | f. handbook |
| 7. Remark | g. model |
| 8. Manual | h. network |
| 9. Grid | |

- i. perform

Ex. 2. Match the nouns listed below with their definitions.

*a. flowchart b. debugger c. paradigm d. assumption e. variable f. manual g. bug
h. constant i. runtime error j. pseudocode*

1. a software error that occurs while a program is being executed
2. a conceptual model underlying the theories and practice of a scientific subject
3. a minor fault in a computer system or in a computer program
4. a number or amount that is always the same
5. a number, amount, or situation that can change
6. a diagram that shows the stages of a process
7. a book giving instructions or information for the person using the product
8. an informal description of the operating principle of a computer program or other algorithm
9. something that you consider likely to be true
10. a computer program that assists in the detection and correction of errors in other computer programs

Ex. 3. Complete the following sentences with the appropriate words and word-combinations from the list below.

**a. help file b. structured English c. runtime errors d. variable e. pseudocode
f. assumption g. problem statement h. constant i. syntax error**

1. The primary purpose of a ... is to focus the attention of the problem solving team.
2. A given ... can contain any data type of any length and can then have data of any type and length reassigned to it without producing an error.
3. These calculations are based on the ... that prices will continue to rise.
4. A common ... is to omit a parenthesis or a required space.
5. ... can let you write programs in a way which is similar to the 'normal' writing of instructions.
6. Textbooks and scientific publications that are documenting various algorithms often use ..., so that all programmers can understand them, even if they do not all know the same programming languages.
7. The ... is always a good resource if you are unsure what to do.
8. A ... does not change its value whatever the value of the variables, under a given set of conditions.
9. An important characteristic of quality software is its ability to handle ... that arise in processing.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

STAGES IN PROGRAMMING

The programming process begins with a problem statement that helps you clearly define the purpose of a computer program.

In a problem statement an assumption is something you accept as true in order to proceed with program planning. The "known information" is the information that you supply to the computer to help it solve a problem. There are also variables (values that can change) and constants (factors that remain the same) in computer programs.

There are different program planning tools, such as flowcharts, structured English, pseudocode, UML diagrams, and decision tables, which are used to provide sufficient planning.

When planning is complete, programmers can begin coding, testing, and documenting the program. The process of coding a computer program depends on the programming language you use, the programming tools you select, and the programming paradigm that best fits the problem you are trying to solve. Programmers typically use a text editor, a program editor, or a VDE to code computer programs.

A text editor is any word processor that can be used for basic editing tasks. When using a text editor to code a computer program, you simply type in each instruction.

A program editor is a type of text editor specially designed for entering code for computer programs.

A VDE (visual development environment) provides programmers with tools to build substantial sections of a program by pointing and clicking rather than typing lines of code. A typical VDE is based on a form design grid that a programmer manipulates to design the user interface for a program. By using various tools provided by the VDE, a programmer can add objects, such as controls and graphics, to the form design grid.

A programmer's choice of development tools depends on what is available for a particular programming language and the nature of the programming project. Text editors and program editors provide a fine tool set for programs with minimal user interfaces. A visual development environment is a powerful tool for programming software applications for GUI environments, such as Windows.

A computer program must be tested to ensure that it works correctly. Testing often consists of running the program and entering test data to see whether the program produces correct results.

When a program doesn't work correctly, it is usually the result of an error made by the programmer. A syntax error occurs when an instruction doesn't follow the syntax rules or grammar of the programming language. Syntax errors are easy to make, but they are usually also easy to detect and correct.

Another type of a program bug is a runtime error, which, as its name indicates, shows up when you run a program. Runtime errors result from instructions that the computer can't execute.

Some runtime errors are classified as logic errors. A logic error is an error in the logic or design of a program. It can be caused by an inadequate definition of the problem or an incorrect formula for a calculation, and they are usually more difficult to identify than syntax errors.

Programmers can locate errors in a program by reading through lines of code. They can also use a tool called debugger to step through a program and monitor the status of variables, input, and output.

Anyone who uses computers is familiar with program documentation in the form of user manuals and help files. Programmers also insert documentation called remarks or "comments" into the programming code. A well-documented program contains initial remarks that explain its purpose and additional remarks in any sections of a program where the purpose of the code is not immediately clear.

WORD STUDY

Ex. 4. Translate the following words and phrases from the text into English.

1. Определить цель
2. Принимать за истину
3. Решать задачу
4. Оставаться неизменным
5. Обеспечить адекватное планирование
6. Инструменты программирования
7. Основные задачи редактирования
8. Проектировать интерфейс пользователя

9. Вводить тестовые данные
10. Давать правильные результаты
11. Нечеткая формулировка задачи
12. Обнаружить ошибки
13. Просмотреть программу шаг за шагом
14. Дополнительные комментарии

Ex. 5. Unscramble the words in the right-hand column and match them with the words in the left-hand column to complete the phrases. Match each phrase with the appropriate definition below.

- | | |
|----------------|--------------|
| 1. Problem | a. tidore |
| 2. Flow | b. fenartice |
| 3. Decision | c. rorer |
| 4. Programming | d. tastetnem |
| 5. Text | e. lateb |
| 6. User | f. nuegalga |
| 7. Development | g. lief |
| 8. Logic | h. solot |
| 9. Help | i. rtahc |

- A. Software programs or utilities that assist in the creation of new software.
- B. A computer language engineered to create a standard form of commands.
- C. A type of grid used in computer program design to show what actions should be taken by the program under different conditions.
- D. A computer program for editing basic data or program text.
- E. A kind of diagram used by programmers to show the logical steps in a program.
- F. The part of an operating system that allows the user to interact with a computer using graphic images and a cursor.
- G. A type of runtime error that can result in a program producing an incorrect output.
- H. A brief description of an issue currently existing which needs to be addressed.
- I. A documentation component of a program that explains the features of the program and helps the user understand its capabilities.

Ex. 6. Fill in the gaps choosing from the variants given.

1. Essentially, *testing* / *debugging* deals with fixing problems so that the program is doing what it intends to do, while *testing* / *debugging* determines whether the program's performance adequately meets the needs and objectives of the end user.
2. A *constant* / *variable* is a data item that may take on more than one value during the runtime of a program. A *constant* / *variable* is a data item whose value is set and can never be changed at run time.
3. A *syntax* / *logic* error often results from using the wrong symbol. A *syntax* / *logic* error, on the other hand, is a syntactically valid statement that does not do what was intended due to an incorrect sequence of instructions.
4. *UML* / *pseudocode* is a programming language that is used for object-oriented software development. *UML* / *pseudocode* is not a programming language, but simply an informal way of describing a program.
5. Microsoft Visual Basic was one of the first products to provide a visual development *tool* / *environment*. The choice of a program planning *tool* / *environment* depends on the language and paradigm used to code a computer program.

6. A *decision table / flowchart* typically contains several rows and columns, representing all possible situations for decisions, and the action to take in each situation. A *decision table / flowchart* shows a logic sequence of data flow in a program, using simple geometric symbols and arrows to define relationships.

COMPREHENSION

Ex. 7. Find the false sentences and correct them using the information from the text.

1. The programming process begins with coding.
2. There are different tools which are used to provide sufficient planning.
3. Programmers typically use a program editor to code computer programs.
4. A visual development environment provides programmers with tools to build substantial sections of a program by typing lines of code.
5. A text editor is a powerful tool for designing the user interface for a program.
6. A computer program must be tested to see whether the program produces correct results.
7. A logic error occurs when an instruction doesn't follow the syntax rules or grammar of the programming language.
8. Programmers can locate errors in a program by reading through lines of code or by using a debugger.
9. Programmers insert documentation called "bugs" into the programming code.

Ex. 8. Answer the questions.

1. What is a problem statement?
2. What is an assumption?
3. What tools can be used to provide sufficient planning?
4. How does a programmer code a computer program?
5. What is a text editor and a program editor?
6. What is a VDE?
7. How does a programmer know if a program works?
8. What can cause program errors?
9. How do programmers find errors?
10. Do computer programs contain any special documentation?

Ex. 9. Put the programming stages in the correct order.

Document the program

Test the program

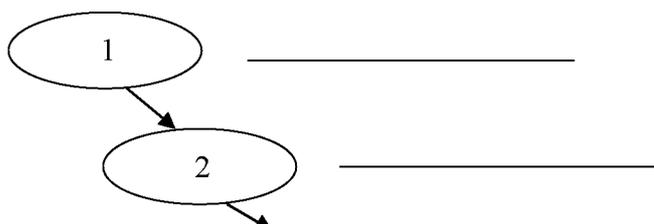
Make a flowchart of the program

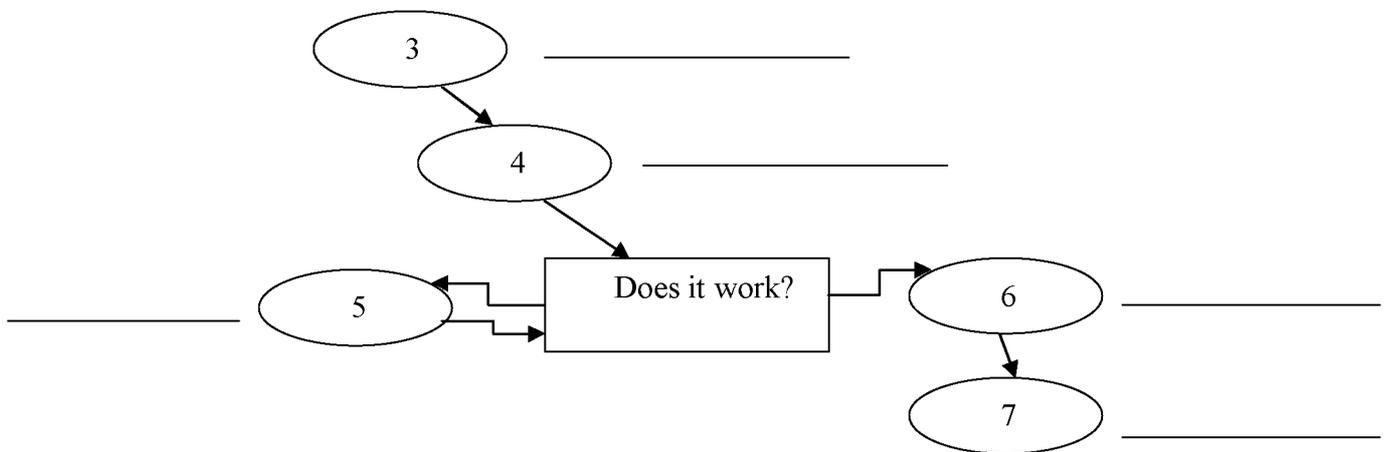
Maintain the program

Code the program

Analyze the problem

Debug and correct it if necessary





To which stage do each of these steps belong?

1. Software developers write the instructions.
2. Software developers design a diagram which shows the successive logical steps of the program.
3. Software developers correct any errors until the program runs smoothly.
4. Software developers try to understand the problem and define the purpose of the program.
5. Software developers write a detailed description of how the program works.
6. Software developers run the program to see if it works.
7. Software developers make changes in the program according to the information obtained from the users.

Ex. 10. Fill in the gaps in the text.

Computer programmers focus on ___ computer programs, but also plan, test, and document computer programs. Before program code can be written, a programmer needs a clear problem ___, which includes a list of assumptions, a description of known information, and a specification for what constitutes a solution. With a clear plan, a programmer can begin coding using a text editor, a program editor, or a ___ development environment. A program is not complete until it has been tested to ensure that it contains no ___ errors or runtime errors. Programmers can use software called a ___ to step through a program. All computer programs should include internal documentation in the form of ___, which are explanatory comments inserted into a computer program along with lines of code.

SPEAKING

Ex. 11. Work in pairs. Use the chart from ex.9 above to complete the dialogue on the steps in writing a program. Arrange the words in questions in the correct order.

A: *steps / a program / developers / follow / certain / software / do / to write?*

B: Yes, that's right. *And / you / what / know / step / a program / is / do / writing / the first / in?*

A: First of all it is necessary ... *What / software / do / next / developers / do?*

B: Well, secondly ... By the way, *you / what / a flowchart / is / know / do?*

A: If I'm not mistaken, it is ... When planning is complete, *they / instructions / programmers / writing / don't / begin?*

B: You are absolutely right. This is called coding. And when the program is written ...

A: And / *errors* / *programmers* / *detect* / *do* / *how*?

B: They can ...

A: Well, I see. As far as I know, then ...

B: Moreover, software developers ...

Learn the dialogue by heart and role play it with your partner.

Ex. 12. Use the chart from ex.9 and the brief summary of the text from ex.10 to speak about stages in programming.

PROBLEM SOLVING

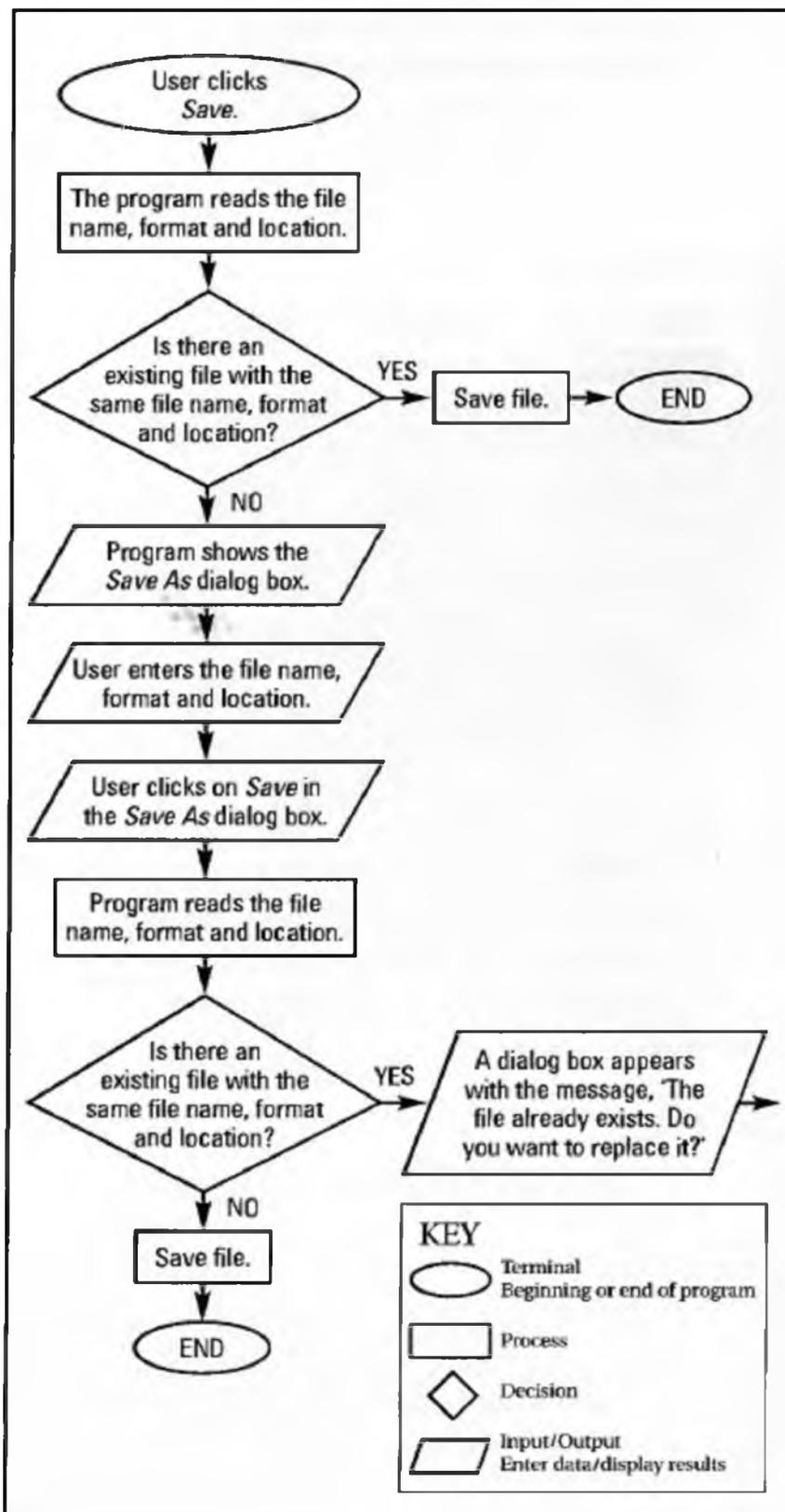
Ex. 13. Flowcharts are sometimes used to show the sequence of logical steps in a program. Flowcharts have arrowheads to indicate the direction of program flow and special symbols to indicate different functions in the program.

Study the diagram below which shows part of a simple flowchart for the Save command in a computer program.

Draw a flowchart like the one below. Follow these steps:

- Choose a simple procedure from the ones in the box below (or a similar one of your own).
- Break the procedure down into all the steps that you have to follow. Think about where the process starts and ends, and the input from you and from the outside. When you make a decision, think of when you say “yes” and when you say “no”, and what happens next.
- Write exactly what happens at each stage.
- Draw the flowchart, putting your text into the different shapes.
- Walk through the steps to make sure you haven’t missed anything important to your purpose.
- Show your flowchart to another student. Does he/she agree with your steps?

Making a cup of tea or coffee	Playing a CD
Making a telephone call	Preparing for an exam
Sending a text message	Planning a holiday



TEXT 2

VOCABULARY

Machine code - машинный код (программа, записанная на языке машины)

Assembly language - язык ассемблера (язык программирования близкий к машинному языку)

Assembler - ассемблер (программа, транслирующая программу на языке ассемблера в машинный код)

Low-level language – язык программирования низкого уровня, машинно-ориентированный язык программирования

Restrict – ограничивать; держать в определённых пределах; сводить к чему-л

Overcome – преодолеть

High-level language - язык программирования высокого уровня

Portable – портативный, мобильный; машиннезависимый

Incorporate - включать (в состав); предусматривать

Applet - апплет, прикладная мини-программа

Source program (= source code) - исходный код; исходная программа (текст программы на алгоритмическом языке программирования перед процедурой трансляции)

Compiler – компилятор, транслятор

Interpreter - интерпретатор, интерпретирующая программа

Object code - объектный код, объектная программа

Markup language – язык разметки

Markup tag - тег разметки (гипертекстового документа)

VOCABULARY TASKS

Ex. 1. Decide if the following words collocate with *code* or *language*. Choose the correct answer.

1. low-level *code/language*
2. machine *code/language*
3. object *code/language*
4. high-level *code/language*
5. programming *code/language*
6. markup *code/language*
7. source *code/language*
8. assembly *code/language*

Ex. 2. Match the terms from Exercise 1 to the definitions below.

1. general term for a formal language used to write instructions that can be translated into machine language and then executed by a computer
2. a set of instructions that a computer can understand directly; it is expressed in binary code and is very difficult to write
3. a type of low-level language that uses abbreviations such as ADD, SUB and MPY to represent instructions; then translated into machine code using an assembler
4. a language such as an assembly language, which does not need a compiler or interpreter
5. a programming language developed to make programs easier to write; for example, FORTRAN, BASIC, C and Java

6. the original work of a programmer, which must be translated by a compiler
7. instructions that a compiler generates from source code written in a higher-level language, for example C++
8. a language for creating web documents

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

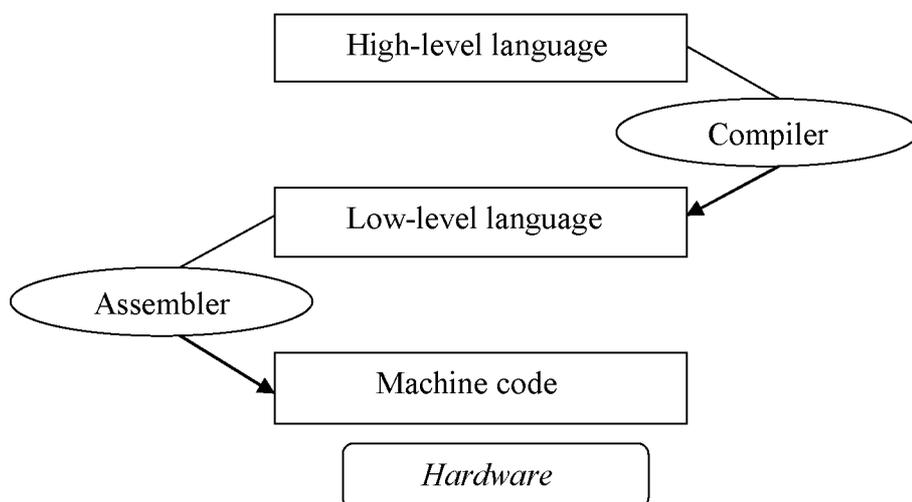
PROGRAMMING LANGUAGES

Computer programs can be written in a wide variety of programming languages, but the only language a computer can understand is **machine code**. This uses the binary system of 1s and 0s, called bits, which match the electrical positions “on” and “off”.

Machine code is too difficult to write, so programmers use symbolic languages to communicate instructions to the computer. For example, **assembly languages** use abbreviations such as ADD, SUB, MPY to represent instructions. The program is then translated into machine code by software called an **assembler**. Machine code and assembly languages are called **low-level languages** because they are closer to the hardware. They are quite complex and restricted to particular machines. To make programming easier, and to overcome the problem of intercommunication between different types of computers, software developers designed **high-level languages**, which are closer to the English language. Some examples are:

- FORTRAN (FORmula TRANslation) was developed by IBM in 1954 and is still used for solving scientific and mathematical problems.
- COBOL (COmmon Business-Oriented Language) was developed in 1959 and is mainly used for commercial purposes.
- BASIC (Beginner’s All-purpose Symbolic Instruction Code) was developed in the 1960s at Dartmouth College in the United States for use by students who require a simple language to begin programming. Visual BASIC is a programming environment, not simply a language. It is used to create Windows applications.
- PASCAL (named after Blaise Pascal) was created in 1971. It is used in universities to teach the fundamentals of programming.
- C (the third letter of the English alphabet) was originally invented in the 1970s to support the UNIX operating system. Today C is the most widely used and popular systems programming language. It is a fast, portable general-purpose language. C++ is a version of C which incorporates object-oriented programming.
- Java (from *Java* coffee) – was designed by Sun Microsystems in 1995 to run on the Web. Java **applets** are small programs that provide animation and interactive features on web pages.

A program written in one of these languages is often called a **source program**, and it cannot be directly processed by the computer until it has been translated into machine code by a **compiler** or an **interpreter**. A compiler translates the source code into **object code** – that is, it converts the entire program into machine code in one go. On the other hand, an interpreter translates the source code line by line as the program is running. A compiled program only needs to be compiled once, but an interpreted program needs to be interpreted every time it is used. Compiled programs are therefore faster than interpreted programs.



It is important not to confuse programming languages with **markup languages**, used to create web documents. Markup languages use instructions, known as **markup tags**, to format and link text files. Examples include:

- HTML (HyperText Markup Language), which allows us to describe how information will be displayed on web pages. It uses a system of tags that begin with < and end with >.
- XML (Extensible Markup Language), which enables us to define our own tags; it is not limited by a fixed set of tags.
- VoiceXML, which makes web content accessible via speech recognition and phone. Instead of using a web browser on a PC, you use a telephone to access voice-equipped websites. You just dial the phone number of the website and then give spoken instructions, commands, and get the required information.

WORD STUDY

Ex. 3. Refer back to the text and find words or phrases in bold that match the Russian definitions below.

1. Языки программирования, понятия и структура которых удобны для восприятия человеком.
2. Язык программирования низкого уровня близкий к машинному языку, в котором для представления команд используются сокращения и аббревиатуры.
3. Небольшая программа или приложение, обычно написанное на Java, которое запускается браузером пользователя и активирует объекты, например, анимацию или интерактивную таблицу.
4. Компьютерная программа, написанная программистом либо сгенерированная приложением на языке программирования.
5. Двоичный код, используемый для кодирования машинных команд по правилам, предусмотренным в данном типе ЭВМ.
6. Языки программирования типа ассемблера, предназначенные для прямого управления аппаратурой компьютера, особенностью которых является преобразование каждой инструкции языка в одну соответствующую ей машинную команду.
7. Программа трансляции и выполнения исходной программы последовательным способом.
8. Программа в машинных кодах, полученная в результате трансляции компилятором или ассемблером её исходного текста.

9. Языки, состоящие из встроенных команд, обеспечивающие поддержку при разметке текста в процессе его обработки.

Ex. 4. Complete the sentences with appropriate words and phrases from those given below.

*a. source code b. machine code c. compiler d. high level languages e. tags
f. markup language g. applet h. portable i. assembly languages j. object code*

1. ... are specific to a given microprocessor and are not ...; programs written for one type of processor must be rewritten before they can be used on another type of processor.
2. ... are designed to reflect the needs of the programmer rather than the capabilities of the computer.
3. Your browser does not support Java, so this ... will not work for you.
4. ... is translated (using a special-purpose software program such as a ... or assembler) from ..., the alphanumeric form in which most software is originally written by a programmer.
5. HTML is an example of a widely known and used
6. XML allows users to create any ... needed.
7. Assembly language is a higher level language one step above

Ex. 5. Choose the correct word to complete each sentence. You may have to change some words slightly.

1. *instruction, instruct, instructed, instructor*
 - a. Our maths _____ explained to us the principles of binary arithmetic.
 - b. We were _____ to document our programs very carefully.
 - c. Both _____ and data have to be changed to machine code before the computer can operate on them.
2. *compilation, compiler, compile, compiled*
 - a. Our university computer does not have a PASCAL _____.
 - b. Programs written in a high-level language require _____ - that is, translation into machine code, the language understood by the processor.
 - c. Usually, a programmer _____ his program before he puts in the data.
 - d. A source program cannot be directly processed by the computer until it has been _____.
3. *execute, execution, executable, executed*
 - a. A compiler decodes instructions written in a higher-level computer language to produce an assembly-language program or an _____ program in machine language.
 - b. A computer program written in its original programming language must be changed into machine code before a computer can _____ it.
 - c. Program instructions can be _____ in order they are listed or some instructions can be skipped or repeated.
4. *program, programmer, programming, programmable*
 - a. _____ is the process of writing a program using a computer language.
 - b. A computer _____ is a set of instructions that tells the computer how to do a specific task.
 - c. Most computer _____ make a plan of the program before they write it.
 - d. A _____ keyboard allows the user to configure the layout and meaning of the keys.

COMPREHENSION

Ex. 6. Find the false sentences and correct them using the information from the text.

1. There are a large number of computer languages available for use by programmers.
2. Computers can only execute instructions written in a low-level language called assembly language.
3. Machine code consists entirely of numbers.
4. Assembly languages lie between machine languages and high-level languages.
5. Low-level languages are closer to human languages.
6. FORTRAN is used for writing business programs.
7. BASIC and RASCAL are particularly suitable for learning how to program.
8. Programmers write programs in a form called object code.
9. It is not necessary to convert a program into machine language if you use high-level languages.
10. In compiled languages the statements that the programmer writes are interpreted as the program is running.
11. HTML is an example of a low-level programming language.
12. Markup languages use instructions, known as applets, to format and link text files.

Ex. 7. Answer the questions.

1. What is the only language computers understand without translation?
2. What system is machine code based on?
3. Why is it almost impossible for humans to write programs in machine code?
4. What is the function of an assembler?
5. Why are machine code and assembly languages called low-level languages?
6. Are low-level languages portable or machine dependent?
7. Why did software developers design high-level languages?
8. What language is used for scientific applications that require extensive mathematical computations?
9. What is the second-oldest high-level programming language? What is it used for?
10. What do we call small Java applications that can be downloaded from a Web server and run on your computer by a Java-compatible Web browser?
11. What programming language was named after a seventeenth-century mathematician who constructed one of the first mechanical adding machines? What is this language used for?
12. What do you need to do to get from source code to machine language?
13. What is the difference between a compiler and an interpreter?
14. What languages consist of keywords, names, or tags that help format the overall view of a Web page and the data it contains? Can you give any examples of these languages?

Ex. 8. Complete the sentences with a computer language from the text.

1. _____ allows us to create our own tags to describe our data better. We aren't constrained by a pre-defined set of tags the way we are with HTML.
2. IBM developed _____ in the 1950s. It was the first high-level language in data processing.
3. _____ applets are small programs that run automatically on web pages and let you watch animated characters, play games, etc.
4. _____ is the HTML of the voice web. Instead of using a web browser and a keyboard, you interact with a voice browser by listening to pre-recorded audio output and sending audio input through a telephone.

5. This language is widely used in the business community. For example, the statement ADD VAT to NET PRICE could be used in a _____ program.
6. _____ is a modern version of the old BASIC language, used to build graphical elements such as buttons and windows in Windows programs.

WRITING

Ex. 9. Summarize the information on different high-level computer languages by completing the table below.

Language	Developed	Use
FORTRAN		
		business
	1960s	
BASIC		
	1971	
		general and systems programming

SPEAKING

Ex. 10. Read the statements below. Which do you agree with more? Why?

1. I think learning a programming language is like learning any human language, you just communicate with a computer instead of another person.
2. Obviously, programming languages and human languages have almost nothing in common. They can't be compared.

Ex. 11. Work in pairs. Student A reads about Visual BASIC, Student B reads about VoiceXML. Try not to look at your partner's text. Complete your part of the table.

<p>Student A</p> <p>Visual Basic was developed by Microsoft in 1990. The name BASIC stands for Beginner's All-purpose Symbolic Instruction Code. The adjective Visual refers to the technique used to create a graphical user interface. Instead of writing a lot of instructions to describe interface elements, you just add pre-defined objects such as buttons, icons and dialog boxes. It enables programmers to create a variety of Windows applications.</p>	<p>Student B</p> <p>VoiceXML (Extensible Markup Language) was created in 2000 to make web content accessible via the telephone. For input, it uses voice recognition. For output, it uses pre-recorded audio content and text-to-speech. Applications:</p> <ul style="list-style-type: none"> • voice portals, where you can hear information about sports, news, traffic, etc. • voice-enabled intranets (private networks) • voice e-commerce • home appliances controlled by voice
---	---

	Visual BASIC	VoiceXML
What does Visual BASIC / VoiceXML stand for?		
When was it developed?		
What are its main features?		
What is it used for?		

Ask your partner about the other language and complete the table.

PROBLEM SOLVING

Ex. 12. Work in pairs. Using the information in the reading text and the tables in ex. 9 and ex. 11, together decide which languages would be the most appropriate for these users and tasks.

1. A school teacher wants his young pupils to learn to program for the first time.
2. An engineer wants to develop a program for calculating the stresses in a mechanical device.
3. A student wants to create webpages for a personal website.
4. A systems programmer wants to add some new modules to an operating system.
5. A finance company needs to process data from its branch offices on its mainframe computer.
6. A college lecturer wants his students to learn the principles of programming.
7. A website designer wants to include simple animation in a site.

SUPPLEMENTARY READING

Read the article and express your opinion on the problem.

Human Factors

Today's programming languages provide programmers with sophisticated tools for coding and testing software. Why then, are computers and computer software so often characterized as being difficult to use?

Programmer and user interface designer Alan Cooper offers an explanation and solution in his book "The Inmates Are Running the Asylum". According to Cooper, programmers don't intentionally create bad technology products. "Programmers aren't evil. They work hard to make their software easy to use. Unfortunately, their frame of reference is themselves, so they only

make it easy to use for other software engineers, not for normal human beings”. Cooper suggests that it is possible to create intuitive, easy-to-use technology products by devoting more time to developing detailed product specifications with the assistance of an “interactive designer” who is familiar with the psychology and habits of a typical computer user.

Clare-Marie Karat, a psychologist and IBM researcher developed

The Computer User’s Bill of Rights

1. The user is always right. If there is a problem with the use of the system, the system is the problem, not the user.
2. The user has the right to easily install software and hardware systems.
3. The user has the right to a system that performs exactly as promised.
4. The user has the right to easy-to-use instructions for understanding and utilizing a system to achieve desired goals.
5. The user has the right to be in control of the system and to be able to get the system to respond to a request for attention.
6. The user has the right to a system that provides clear, understandable, and accurate information regarding the task it is performing and the progress toward completion.
7. The user has the right to be clearly informed about all system requirements for successfully using software or hardware.
8. The user has the right to know the limits of the system’s capabilities.
9. The user has the right to communicate with the technology provider and receive a thoughtful and helpful response when raising concerns.
10. The user should be the master of software and hardware technology, not vice-versa. Products should be natural and intuitive to use.

Karat agrees with Cooper’s comments about programmers being unable to understand the people who use their software. She says, “The profile of the people who use systems has changed, while the system, and the culture in which they have developed, have not adjusted ... The engineers and computer scientists who design hardware and software know little about the needs and frustrations of consumers.”

Some efforts to simplify operating system software have created another band of disgruntled users who complain that important features are now “hidden” because of feedback from novice testers who considered such features too advanced or confusing. Some controls, such as those for setting up networks, are not easy to understand, but could be crucial for a successful installation. Hiding those controls because they might confuse beginners has only caused advanced users to become frustrated.

Who is right? Can technology be simplified, yet remain powerful enough to accomplish complex tasks? A branch of ergonomics called Human Factors, or Human-Computer Interaction (HCI), focuses on factors that make computers easy or difficult to use.

What do you think?

1. Can you think of a specific instance when you have become frustrated with a software user interface?
2. Is it possible to make computer software significantly easier to use?
3. Would you agree that programmers do not understand the viewpoint of a typical computer user and consequently produce bad software?

UNIT 3 RECENT DEVELOPMENTS AND TRENDS

WARMING UP

1. *What do you think a **trend** is?*
2. *What trends in IT do you think will affect our lives in the future? Make a list.*
3. *Smart cards, robotics, and virtual reality are three areas of computing where developments are taking place very fast. Working in pairs, try to add to these lists of current and possible future applications.*

Smart cards
electronic money

Robotics
bomb disposal

Virtual reality
virtual travel

4. *Study these predictions. How likely are they to come true? Tick those you agree with and cross those you disagree with. Give reasons for your decisions and compare answers with your partner. Find out more about your partner's predictions.*

1. Someday, we'll be talking to computers naturally, like friends.
2. Microchips implanted in our bodies will serve as ID cards and contain our medical records.
3. Robots will learn to build themselves, without human help.
4. Human labor in industry will be replaced by robots.
5. Cash will be replaced by electronic money.
6. Computers will replace drivers.
7. People in every country will have high-speed access to the Internet.
8. Smart homes will be voice-activated.
9. Computers will be ubiquitous and almost invisible, embedded into our homes and integrated into our lives.

TEXT 1

VOCABULARY

Predict – предсказывать

Rate – скорость, темп

Precise – точный

Pet – домашнее животное, питомец

Robotic - роботизированный

Robotic arm - манипулятор, роботизированная рука

Telescopic arm - выдвижная рука; телескопический манипулятор

Weld - сваривать, приваривать

Assemble - собирать (из частей)

Rover – самоходный аппарат

Planetary rover – планетоход

Remote – отдаленный, дальний

Remotely-operated vehicle – дистанционно управляемый аппарат

Space probe - космический зонд

Defuse – обезвредить (бомбу)

Handle – иметь дело, обращаться

Hazardous – опасный

Tiny – крошечный

Recreate – воссоздавать

Telework - работать дома, связываясь с офисом через компьютерную сеть
Headgear – головная гарнитура
Ассепт – принимать, признавать
Deserve - заслуживать

VOCABULARY TASKS

Ex. 1. Match the verbs with their definitions.

a. accept b. assemble c. predict d. recreate e. weld f. deserve
g. handle h. telework i. defuse

1. to deal with something
2. to say what you think will happen in the future
3. to join pieces of metal together by heating them until they almost melt and then pressing them together
4. to agree to take something that is offered to you
5. to build something by joining parts together
6. to prevent a bomb from exploding by removing the fuse (= part that starts the explosion)
7. to have a right to something because of acts or qualities
8. to make something exist or happen again
9. using technology to enable employees to work away from the employer's place of work

Ex. 2. Form word-combinations using the words from both columns. Then use them in the sentences below. Translate the sentences into Russian.

- | | |
|----------------------|--------------|
| 1. Telescopic | a) materials |
| 2. Fast | b) vehicle |
| 3. Planetary | c) rate |
| 4. Hazardous | d) headgear |
| 5. Special | e) pet |
| 6. Space | f) rover |
| 7. Remotely-operated | g) machine |
| 8. Electronic | h) arm |
| 9. Tiny | i) probe |

- A. Computing is changing and developing at a very
- B. An ... is a mechanical device in the form of a pet animal, that is controlled by a computer.
- C. ... may be used for doing work in very small spaces which are difficult to access.
- D. Mobile robots are used for defusing bombs and handling
- E. ... and ... are used to explore space.
- F. ... are used in the automobile industry to paint, weld and assemble car parts.
- G. The user wears ... that projects 3D images into their eyes.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

RECENT DEVELOPMENTS AND THE FUTURE OF IT

Computing is relatively new, but it is changing and developing at a very fast rate. Because computers are general purpose machines, they can be used in many different ways. It is impossible to predict with any certainty how computers will be used in twenty or fifty years, but some new developments have already taken place which are likely to become more important in the future.

Robots and electronic pets already exist – and may become more common in the future. A robotic pet is a mechanical device in the form of a pet animal, such as a dog, that is controlled by a computer. Robots are helpful in activities which are too dangerous, too boring or too precise for human beings. Robotic arms (telescopic arms) are widely used in the automobile industry to paint, weld and assemble car parts. Planetary rovers (remotely-operated vehicles) and space probes (unpiloted spaceships) are used to explore space. Mobile robots are used for defusing bombs and handling hazardous materials. In the future, tiny robotic micro-machines may be used as sensors or for doing work in very small spaces which are difficult to access. Artificial Intelligence (AI) is the science that tries to recreate the human thought process and build machines that perform tasks that normally require human intelligence.

Work practices are changing, as many jobs are automated and new jobs come into existence to serve new technologies. In the future, some organizations will follow virtual company model, where a small number of key employees is supported by contracted workers, bringing together the right people teleworking for a company regardless of where they live. The desks they will use will have multiple flat screens, voice interfaces, computer programs with human-like faces, full-screen videoconferencing and 3D sound positioning. All this will be without any communication cables since the whole system will be wireless. Of course, workers will be fully mobile and will stay in touch via satellite systems. Tools they might have include: communicator badges to provide voice links to network computers, earphones to listen to their emails, and glasses or contact lenses to display information.

Virtual reality (VR) is already used for games and entertainment. The user wears special headgear that projects 3D images into their eyes, and special gloves to provide a sense of touch. It is likely that VR will be used in many other ways in the future, including virtual travel, air traffic control, and training doctors, allowing them to practice difficult operations safely.

Three features of our daily lives that are certainly likely to be affected are health, shopping and money. Miniature computers may be used inside the human body to monitor our health and deliver drugs. The use of artificial implants will develop to some extent, although it is difficult to say how far these developments will be accepted by society. 3D virtual reality systems can be used on the Internet to make shopping easier, and smart cards may be used to provide a global electronic money system.

In the very long term, futurologists predict that we may have the technology to directly link our brain to ultra-smart computers, giving us so much extra brainpower that we deserve a new name – Homo Cyberneticus.

WORD STUDY

Ex. 3. Find words or phrases in the text which mean the following:

1. a machine controlled by a computer, which can move and do other things that people can do
2. a small vehicle, often used on the surface of other planets
3. someone who studies social, political, and technical developments to understand what may happen in the future
4. a device sent up into space to travel around the earth, used for collecting information or communicating by radio, television, etc.

5. the study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems, and learn
6. a small round curved piece of transparent plastic, worn on the surface of the eye
7. a set of images and sounds, produced by a computer, that seem to represent a place or a situation that a person can take part in
8. the activity of managing aircraft from the ground as they take off, fly, and land
9. a drug or prosthesis that is put into the body
10. a small plastic card that is used to make payments and to store personal information, and can be read when connected to a computer system
11. a device that can react to light, heat, pressure, etc. in order to make a machine, etc. do something or show something
12. a system that enables people in different parts of the world to have a meeting by watching and listening to each other using computer screens

Ex. 4. Fill in the gaps with the prepositions given below. Translate the sentences into Russian.

in (2) at by to (3) into on as

1. Computing is developing ... a very fast rate.
2. It is impossible to predict how computers will be used ... twenty or fifty years.
3. Tiny robotic micro-machines may be used ... sensors.
4. Many new jobs come ... existence to serve new technologies.
5. Workers will stay ... touch via satellite systems.
6. They might have earphones to listen ... their emails.
7. The use of artificial implants will develop ... some extent.
8. It is difficult to say how far these developments will be accepted ... society.
9. 3D virtual reality systems can be used the Internet to make shopping easier.
10. In the future we may have the technology to directly link our brain ... ultra-smart computers.

COMPREHENSION

Ex. 5. Explain the meaning of the recent developments in computing in your own words. Match them with their applications. More than one answer is possible.

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. virtual reality 2. robotic arms 3. mobile robots 4. robotic micro-machines 5. planetary rovers 6. smart cards 7. artificial implants | <ol style="list-style-type: none"> a) electronic money system b) air traffic control c) sensors d) monitor our health e) handling hazardous materials f) training doctors g) defusing bombs h) automobile industry i) deliver drugs j) games and entertainment k) space exploration l) doing work in very small spaces m) travel |
|---|---|

Make up your own sentences using the words above.

e.g. Virtual reality enables users to travel to multiple locations from their home.

Ex. 6. Write questions to the answers.

1. Because computers are general purpose machines.
2. No, it isn't. It is impossible to predict.
3. It is a mechanical device in the form of a pet animal that is controlled by a computer.
4. In activities which are too dangerous, too boring or too precise for human beings.
5. It is the science that tries to recreate the human thought process and build machines that perform tasks that normally require human intelligence.
6. Multiple flat screens, voice interfaces, computer programs with human-like faces, full-screen videoconferencing and 3D sound positioning.
7. Via satellite systems.
8. For games and entertainment.
9. Health, shopping and money.
10. To provide a global electronic money system.
11. Much extra brainpower.

SPEAKING

Ex. 7. Think of arguments for and against this statement.

Computers will catch up with the power and speed of the human brain by 2050. Sometime after that they will start outstripping us and taking over from us.

Choose one side only – for or against the statement. Try to persuade the rest of your group to accept your views on the statement.

PROBLEM SOLVING

Ex. 8. What kind of information would you encode in the following smart cards?

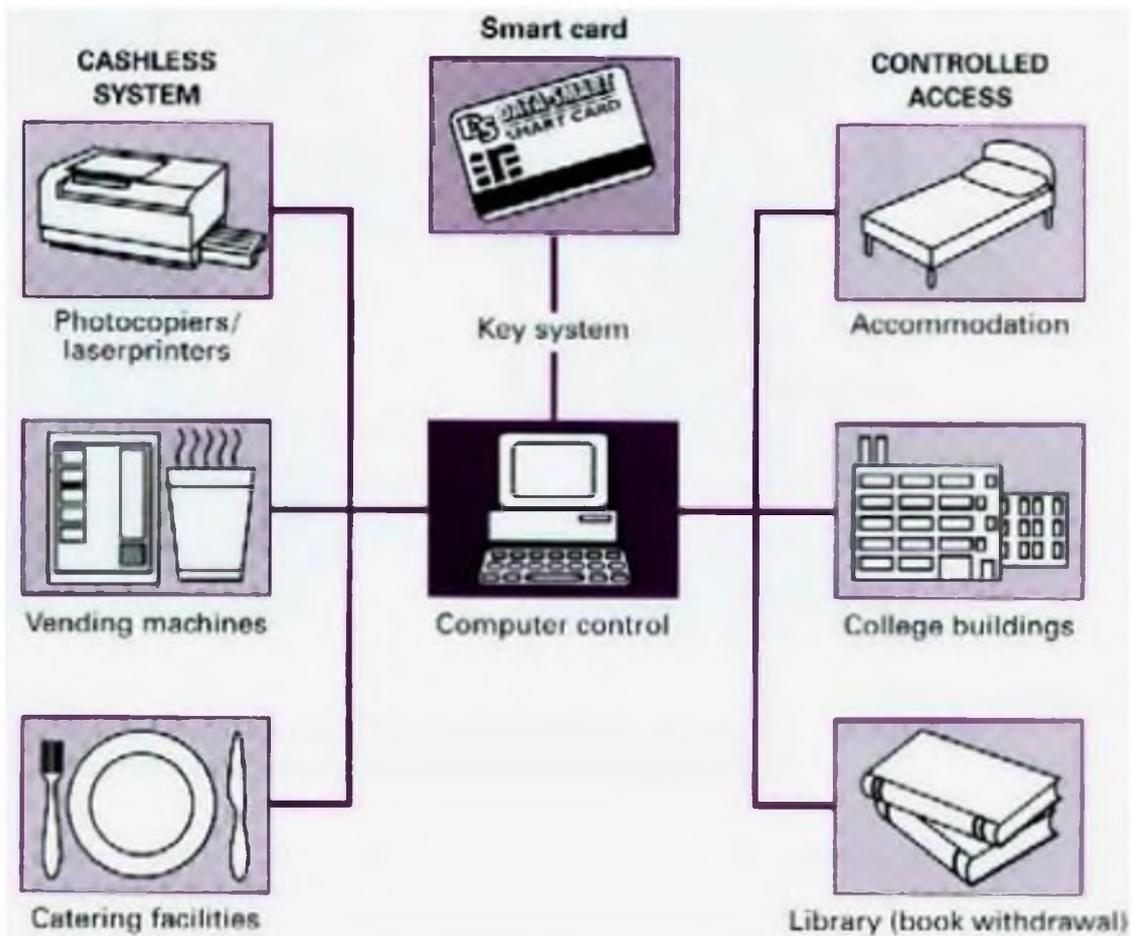
Compare your answers with other students in your group.

- | | |
|---------------------------|----------------------------------|
| 1. a medical card | 3. a sports club membership card |
| 2. an identification card | 4. an electronic wallet |

WRITING

Ex. 9. Study this graphic which shows how a smart card system could be used in a college, or other large organization. Use it to write a report recommending that your university or company introduce a smart card system.

Start like this: *A student smart card can be used in many ways. It can be used as a key to the building. Only cardholders can open the doors.*



TEXT 2

VOCABULARY

Measure – измерять

Inject - делать укол, вводить (лекарство)

Treat - лечить

Cellular - клеточный

At the cellular level – на клеточном уровне

Carbon - углерод

Resistant - стойкий, прочный, не поддающийся

Durable - прочный, долговечный

Discernible – видимый, различимый

Recognize – узнавать, признавать

Mount – устанавливать, монтировать

Pattern – 1) узор, рисунок; 2) модель, образец

Iris – радужная оболочка

Checkpoint – контрольно-пропускной пункт

Swipe (a card) – проводить (картой)

Retina – сетчатка (глаза)

Ubiquitous – всеобщий, повсеместный

Ubiquitous computing - сплошная компьютеризация

Pervasive - проникающий, распространяющийся повсюду; всеобъемлющий

Embed – вставлять, внедрять

Appliance – бытовой прибор

Sync (informal for *synchronization*) – синхронизация

Work in sync – работать синхронно

Capture - запечатлеть кого-либо/что-либо на фотографии/пленке и т. д.

VOCABULARY TASKS

Ex. 1. Match the verbs with their definitions. Then use them in the sentences below. Translate the sentences into Russian.

- | | |
|------------|--------------|
| 1. inject | 5. embed |
| 2. measure | 6. recognize |
| 3. capture | 7. treat |
| 4. mount | 8. swipe |
-
- a) to record someone or something on camera
 - b) to give medical care to a person
 - c) to pass a plastic card through an electronic device that reads the information stored on it, for example in order to open a door or to pay for something
 - d) to put a drug or other substance into someone's body using a needle or similar instrument
 - e) to fix something firmly in a particular place or position
 - f) to find the exact size, amount, speed, etc. of something using a special tool or special equipment
 - g) to make something an important part of something else
 - h) to know who somebody is or what something is when you see or hear them
-
- A. This is a special device that ... the level of radiation in the atmosphere.
 - B. They've ... a camera on the wall by the door.
 - C. A new security system has been installed, requiring each student to ... their cards through an electronic reader every time they go through a door into a classroom.
 - D. The attack was ... on film by security cameras.
 - E. Some futurists says that location and tracking devices will soon be ... in clothing.
 - F. I ... the house from your description.

Ex. 2. Make adverbs from adjectives with the help of the suffix – *ly*. Translate them into Russian.

e.g. careful – carefully

- | | |
|---------------|----------------|
| 1. natural | 5. discernible |
| 2. invisible | 6. comfortable |
| 3. artificial | 7. secure |
| 4. ubiquitous | 8. regular |

Ex. 3. Read and translate.

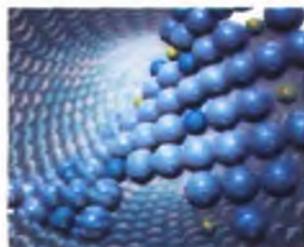
- 1) blood system, expert system, alarm system, smart home system
- 2) highly resistant materials, stain-resistant clothes, scratch-resistant paint
- 3) nanotechnology, nano device, nanometer, nanobot, nanotube
- 4) iris pattern, retina pattern, living pattern

READING ACTIVITIES

Read the texts below. Match the texts (I-V) with the pictures (a-e).



a



b



c



d



e

Text I

By all accounts, **nanotechnology** – the science of making devices from single atoms and molecules – is going to have a huge impact on both business and our daily lives. Nano devices are measured in **nanometers** (one billionth of a metre) and are expected to be used in the following areas.

- **Nanocomputers:** Chip makers will make tiny microprocessors with **nanotransistors**, ranging from 60 to 5 nanometres in size.
- **Nanomedicine:** By 2020, scientists believe that nano-sized robots, or **nanobots**, will be injected into the body's blood system to treat diseases at the cellular level.
- **Nanomaterials:** New materials will be made from carbon atoms in the form of **nanotubes**, which are more flexible, resistant and durable than steel or aluminium. They will be incorporated into all kinds of products, for example stain-resistant coatings for clothes and scratch-resistant paints for cars.

Text II

Artificial Intelligence (AI) is the science of making intelligent machines and programs. The term originated in the 1940s, when Alan Turing said: "A machine has artificial intelligence when there is no discernible difference between the conversation generated by the machine and that of an intelligent person". A typical AI application is **robotics**. One example is ASIMO, Honda's intelligent humanoid robot. Soon, engineers will have built different types of **android**, with the form and capabilities of humans. Another AI application is **expert systems** – programs containing everything that an 'expert' knows about a subject. In a few years, doctors will be using expert systems to diagnose illnesses.

Text III

Imagine you are about to take a holiday in Europe. You walk out to the garage and talk to your car. Recognizing your voice, the car's doors unlock. On the way to the airport, you stop at an ATM. A camera mounted on the bank machine looks you in the eye, recognizes the pattern of your iris and allows you to withdraw cash from your account.

When you enter the airport, a hidden camera compares the digitized image of your face to that of suspected criminals. At the immigration checkpoint, you swipe a card and place your hand on a

small metal surface. The geometry of your hand matches the code on the card, and the gate opens. You're on your way.

Biometrics uses computer technology to identify people based on physical characteristics such as fingerprints, facial features, voice, iris and retina patterns.

Text IV

Ubiquitous computing, also known as **pervasive computing**, is a new approach in which computer functions are integrated into everyday life, often in an invisible way. **Ubiquitous devices** can be anything from smartphones to tiny sensors in homes, offices and cars, connected to networks, which allow information to be accessed anytime and anywhere – in other words, ubiquitously. In the future people will interact naturally with hundreds of these **smart devices** (objects containing a microchip and memory) every day, each invisibly **embedded** in our environment and communicating with each other without cables.

Text V

In the ideal **smart home**, **appliances** and electronic devices work in sync to keep the house secure. For example, when a regular alarm system senses that someone is breaking into the house, it usually alerts the alarm company and then the police. A smart home system would go further, turning on the lights in the home and then sending a text message to the owner's phone.

Motorola *Homesight* even sends images captured by wireless cameras to phones and PCs.

Smart homes can remember your living patterns, so if you like to listen to some classical music when you come home from work, your house can do that for you automatically. They will also know when the house is empty and make sure all appliances are turned off. All home devices will be interconnected over a home area network where phones, cable services, home cinemas, touch screens, smart mirrors and even the refrigerator will cooperate to make our lives more comfortable.

WORD STUDY

Ex. 4. Find words in the texts with the following meanings.

1. A microscopic robot, built with nanotechnology. (Text I)
2. A robot that resembles a human. (Text II)
3. Biological identification of a person. (Text III)
4. Integrated, inserted into. (Text IV)
5. Electrical devices, or machines, used in the home. (Text V)

Ex. 5. Fill in the gaps with the prepositions.

at into(3) about off to in on(2) over with

1. Nanobots will be injected ... the body's blood system to treat diseases ... the cellular level.
2. Expert systems are programs containing everything that an 'expert' knows ... a subject.
3. Biometrics uses computer technology to identify people based ... physical characteristics.
4. Ubiquitous computing is a new approach in which computer functions are integrated ... everyday life, often ... an invisible way.
5. In the future people will interact naturally ... hundreds of smart devices every day.
6. If someone breaks ... the house, a smart home system will turn ... the lights and send a text message ... the owner's phone.
7. Smart homes will know when the house is empty and make sure all appliances are turned
....
8. In a smart home, all home devices will be interconnected ... a home area network.

Ex. 6. Replace the words and phrases in brackets with their synonyms from the text.

1. Nanotechnology is going to have a huge (*influence*) on both business and our daily lives.
2. Chip makers will make (*miniature*) microprocessors with nanotransistors.
3. Nano devices are expected to be used in the following (*spheres*).
4. A machine has artificial intelligence when there is no (*visible*) difference between the conversation generated by the machine and that of an intelligent person.
5. A camera (*installed*) on the bank machine looks you in the eye, recognizes the pattern of your iris and (*lets*) you to withdraw cash from your account.
6. When a regular alarm system (*detects*) that someone is breaking into the house, it usually (*warns*) the police.
7. In the ideal smart home, appliances and electronic devices work in sync to keep the house (*safe*).

COMPREHENSION

Ex. 7. Complete the sentences.

1. One nanometre is equal to ...
2. Artificial Intelligence is the science of making ...
3. Nanotubes are more durable than ...
4. Biometrics is the science that uses computer technology to identify people based on ...
5. Expert systems are programs ...
6. Ubiquitous computing is also known as ...
7. A smart device is an object containing ...
8. In the ideal smart home, appliances and electronic devices work ...

Ex. 8. Answer the questions.

1. Which unit of measurement is used in nanotechnology?
2. What are the advantages of nanotubes over regular materials?
3. What will doctors use expert systems for?
4. What features are analyzed by biometrics?
5. Which trend refers to computers embedded in everyday devices, communicating with each other over wireless networks?
6. What will the alarm system do if someone breaks into a smart home?
7. How will devices be interconnected inside the smart home?

Ex. 9. Anthony and Beth are discussing a magazine article about new technologies. Read their conversation and decide what type of new technology they are discussing in each part of the conversation (1–3).

1 Smart homes

2 Nanotechnology

3 Artificial Intelligence

(1)

Anthony: Have you seen this article in the New Scientist? It's all about new technologies. It's fascinating.

Beth: Go on, then. How are our lives going to change?

Anthony: It's predicting that pretty soon scientists are going to be able to make devices like computers and robots using single cells and atoms.

Beth: Wow. To do what?

Anthony: Well, they're talking about being able to treat diseases at a cellular level by injecting one of these tiny robots, or using the technology to make new, more flexible materials from carbon atoms.

Beth: What will they think of next?

(2)

Anthony: Well, it's funny you should ask. The article goes on to talk about things like robotics and androids.

Beth: Androids?

Anthony: Yeah. It says that by 2050, scientists will have built androids that look like humans and have the capacity to interact like humans.

Beth: I don't think I like that idea. I think it'll be more trouble than it's worth.

Imagine everything that could go wrong!

(3)

Anthony: OK, I think you'll like this next one more. How about having a computer that controlled all of the appliances and electronic equipment in our house? It would save money because the house would know when you weren't home, and it'd make sure everything was turned off.

Beth: It'll probably be expensive, though, I imagine.

Anthony: Who knows how much things will cost in future! Perhaps we'll all be living on the Moon by then!

SPEAKING

Ex. 10. Work in pairs. Explain to each other a new development which may replace passports at border controls.

Student A

1. Person arrives at airport scanner
2. Person looks through eyepiece.
3. Laser scans eye and records microscopic details.
4. Computer translates data into unique barcode.
5. Computer checks digital image against central database.
6. Person's identity confirmed.

Student B

1. Person arrives at airport scanner.
2. Person inserts card into console.
3. Person inserts hand to be scanned.
4. Computer checks handprint against central database.
5. Computer checks handprint matches card details.
6. Person's identity confirmed.

PROBLEM SOLVING

Ex. 11. In pairs or groups, choose a domestic appliance and decide what functions an in-built computer would allow it to perform in addition to its basic function. Consider also how it could be marketed. Present your ideas to the rest of the class.

Ex.12. Work in groups. Predict how computers will affect our future lives in one of these areas – shopping, money, education, transport, entertainment, sport. Make a summary of your ideas to report to the rest of the class.

WRITING

Ex. 13. Convert your notes for ex. 12 into a written report.

Your report should have these sections:

1. Area of IT
2. Technology involved – hardware and software
3. Applications
4. Possible future developments

SUPPLEMENTARY READING

Read the text below and answer these questions:

1. How does the author justify his claim that we are ‘in the midst of convergence’?
2. What will be the difference between computers and humans after 2050?
3. What does he mean by a ‘positive feedback loop’ in computer development?
4. Why will knowledge of a major language be the only IT skill needed?
5. Which of the author’s predictions do you accept?

THE FUTURE OF INFORMATION TECHNOLOGY

We are in the midst of convergence. At the hardware layer, computers, phones and consumer electronics are converging. At the applications layer, we see convergence of information, entertainment, communications, shopping, commerce, and education.

Computers have come from nowhere 70 years ago and are rapidly catching up in capability with the human brain. We can expect human:machine equivalence by about 2050. But after this, computers will continue to get smarter. There is a noticeable positive feedback loop in technology development, with each generation of improved computers giving us more assistance in the design and development of the next.

Ultimately, they will design their offspring with little or no human involvement. This technology development will push every field of knowledge forwards, not just computing.

But we will never get far unless we can solve the interface problem. In the near future we may have electronic pets, with video camera eyes, linked by radio to the family computer. With voice and language recognition we will have easy access to all that the Internet can provide. We can tell the pet what we want and it will sort it out for us. It will be impossible to be technophobic about such an interface, and the only IT skill needed will be to speak any major language.

UNIT 4 CAREERS IN IT

WARMING UP

1. *Work in pairs. List the IT jobs you know. Which of them are in great demand nowadays? Compare your answers with other students in the class.*
2. *In what area of IT would you most like to work? Why?*
3. *Work in pairs. Tell your partner about your career plans. Talk about further qualifications, skills and positions.*

TEXT 1

VOCABULARY

Title – название

Job title – должность

Command - знание, владение (предметом)

Collaborate – сотрудничать

Start out (as/in) - начинать профессиональную деятельность

Help-desk - служба технической поддержки

Occur - случаться, происходить

Responsible - ответственный

Be responsible for – отвечать за

Report (on) – сообщать, описывать

CAD (computer-aided design) - автоматизированное проектирование

Customize – настраивать в соответствии с требованиями заказчика

Sort out – улаживать (проблемы)

Encounter - сталкиваться (с проблемой)

Amend - вносить изменения, поправки

Aware - осведомленный

Be aware of - знать

Fault – дефект, недостаток

Printed circuit board - печатная плата; плата с печатной схемой

VOCABULARY TASKS

Ex. 1. Look through the vocabulary and find words or phrases corresponding to the given definitions.

1. to happen, often without being planned
2. to change something slightly in order to correct a mistake or to improve it
3. to describe a recent event or situation
4. to begin a career
5. to work together on an activity or project.
6. to successfully deal with something, such as a problem or difficult situation
7. to experience a situation, especially something that is unexpected or unpleasant
8. to change something to make it suitable for a particular person or purpose
9. to know about something
10. something that is wrong with a machine or system that stops it from working correctly
11. knowledge of a subject, especially a language

Ex. 2. Complete the following sentences with appropriate words and word-combinations from the vocabulary.

1. IT professionals need to have a good ... of English. They must be able to ... with their colleagues all over the world.
2. Programmers are people who create new software, or ... applications to fit a company's needs.
3. Programmers may support the system by helping users with any problems they They may ... the area of code in the software that has a design
4. Security specialists are ... for dealing with viruses and keeping out hackers.
5. ... technicians provide information and assistance to people in non-technology departments and ... their problems with computers.
6. Graduates who have obtained a degree in computer science may ... as software testers or database administrators.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

JOBS IN COMPUTING

There is a wide range of jobs in computing and different titles are sometimes given to the same type of job. Being employed in any of these jobs requires the person to have particular formal qualifications, personal qualities and technical skills. IT professionals all over the world also need to have a good command of English to be able to collaborate with their colleagues and help their customers.

Traditionally, computer careers are divided into three areas. These include *computer engineering*, *computer science* and *information technology*. Computer science covers computer architecture, programming languages, algorithms, and theories. Computer engineers design, develop, research and test software and hardware, digital devices and interfaces. Information technology professionals focus on computer-related needs for different organizations.

An **IT support engineer** is a professional who provides help for computer users by designing, building and maintaining information technology systems. A support engineer might start out in their career by working on a help-desk. A **help-desk technician** is a person who works as part of a telephone service that helps users solve problems that occur on computer systems.

A **computer services engineering technician** is responsible for installation, maintenance, repair and upgrade of computers and peripherals. They install hardware and test by running special software. Some technicians carry out routine servicing of large mainframe systems, aiming to avoid breakdowns. Others are called in to identify and repair faults as quickly as possible usually by replacing faulty parts.

A **systems analyst** investigates and analyzes business problems and then reports on options for using information systems that provide a feasible solution. They gather requirements and identify the costs and the time needed to implement the project. They act as a link between the user and the programmer.

A **software engineer / developer / designer** produces the programs which control the internal operations of computers. They design, test and improve programs for a variety of purposes, including computer-aided design and manufacture, business applications, computer networks, and games. Computer software engineers can generally be divided into two categories: computer applications software engineers and computer systems software engineers.

Computer programmers write programs. After computer software engineers and systems analysts design software programs, the programmer converts that design into a logical series of instructions that the computer can follow. The programmer codes these instructions in any of a number of programming languages, depending on the need. Programmers also use program

libraries of basic code that can be modified or customized for a specific application. Computer programmers are also responsible for maintaining, updating, modifying, and expanding existing programs. They may sort out problems encountered by users including amending an area of code in the software, retrieving files and data lost when a system crashes.

Web designers, also called **web masters**, create and maintain web pages and web applications for websites.

Security specialists specialize in the design of software and hardware to protect information from malware and hackers.

Database administrators are software specialists who focus on the applications responsible for organizing and storing data (like financial records) for an organization. They also ensure the security of data and its availability to users.

A **hardware engineer** researches, designs, and develops computers, or parts of computers and computerized elements of appliances, machines and vehicles. They are also involved in their manufacture, installation and testing and have to be aware of cost, efficiency, safety, and environmental factors, as well as engineering aspects.

A **network support administrator** maintains the link between PCs and workstations connected in a network. They use telecommunications, software, electronic skills and knowledge of networking software to locate and correct faults. This may involve work with the controlling software, on the wiring, printed circuit boards, software or microchips on a file server, or on cables either within or outside the building.

WORD STUDY

Ex. 3. Find words or phrases in the text which mean the following:

1. Software which is specifically designed to damage or gain unauthorized access to a computer system.
2. A powerful desktop computer used for work that requires a lot of processing, e.g. graphic design.
3. An electronic board that holds the components of a circuit and connects them together.
4. To add components to improve the features or performance of a system.
5. A powerful network computer that stores computer files and makes them available to users on a network.
6. The use of computer technology for the process of design.
7. To fail suddenly and completely.
8. Text of a program written in a computer language.
9. Technology concerned with communications over long distances.
10. A piece of equipment that is connected to the central processing unit of a computer system.
11. A set of pages on the World Wide Web.
12. To change into the latest version.
13. Sets of programmed functions that are made available for use by any program.
14. Skilled programmers who attempt to gain unauthorized access to network systems.
15. A type of applications program used for storing information so that it can be easily searched and stored.

Ex. 4. Fill in the gaps with the prepositions given below. Translate the sentences into Russian.

for in over out (2) by between of (2) into on (2) to as from

1. IT professionals all ... the world need to have a good command ... English.
2. Computer careers are divided ... three areas.
3. Information technology professionals focus ... computer-related needs for different organizations.
4. A support engineer might start ... in their career by working ... a help-desk.
5. A computer services engineering technician is responsible ... installation, maintenance, repair and upgrade of computers and peripherals.
6. Systems analysts act ... a link ... the user and the programmer.
7. Computer programmers may sort ... problems encountered ... users.
8. Security specialists specialize ... the design of software and hardware to protect information ... malware.
9. Database administrators ensure the security of data and its availability ... users.
10. Hardware engineers have to be aware ... safety and environmental factors.

COMPREHENSION

Ex. 5. Choose the correct job to complete the sentences.

1. *Hardware Engineers / Software Engineers* develop applications that carry out specific tasks on computers and other devices.
2. *Network Administrators / Web Designers* install and support networks for different organizations, such as schools, hospitals, banks and businesses.
3. *Computer Programmers / Computer Services Engineering Technicians* use the designs of Software Developers and write codes to make instructions that computers can follow.
4. *Systems Analysts / Database Administrators* study existing computer systems and suggest possible changes for improvement.
5. *Computer Scientists / Support Engineers* design new technology to solve complex problems in different fields, such as medicine, education or business.
6. *Help-desk Technicians / Security Specialists* are employed by organizations to help non-IT users with computer-related problems.

Ex. 6. Link the words in the columns to make true sentences about jobs in computing.

A software	technician	decides what system will meet the requirements of a specific institution.
A network	master	plans and keeps websites updated.
A security	administrator	plans and designs many types of software.
A help-desk	developer	installs and maintains networks.
A web	analyst	designs applications against viruses.
A systems	specialist	is responsible for troubleshooting.

Ex. 7. Most IT-related jobs have developed to meet the need to analyze, design, develop, manage or support computer software, hardware or networks.

Classify these jobs under the heading that best describes their function. They all appear in the text above.

ANALYZE

DESIGN/DEVELOP

MANAGE

SUPPORT

Software engineer
Security specialist
Network administrator
Help desk technician
Systems analyst
Web designer
Database administrator

Ex. 8. Find the false sentences and correct them using the information from the text.

1. Computer careers are divided into two areas: computer engineering and computer science.
2. Computer scientists design, develop, research and test software and hardware, digital devices and interfaces.
3. A computer services engineering technician repairs and upgrades computers and peripherals.
4. Hardware engineers evaluate a company's current computer systems and business processes and make recommendations for more efficient IT usage.
5. Software developers create software that run on computers or other IT devices like smart phones.
6. Systems analysts write code for computers and turn software designs into reality.
7. Security specialists are responsible for keeping information safe from cyber-attacks.
8. Web designers are in charge of creating the internal networks that all employees of an organization use.
9. Database administrators manage the accuracy and efficiency of databases.

WRITING

Ex. 9. Summarize the information on different jobs in computing by completing the table below.

JOB	RESPONSIBILITIES
<i>Database administrator</i>	<i>Organizes and stores data for businesses. Makes sure that only authorized people can access data.</i>

SPEAKING

Ex. 10. Work in pairs. Your partner has one of the computing jobs listed in the text above.

Find out about his/her occupation by asking questions like these:

Where do you work? What are your responsibilities?

How long have you been working there? What qualifications do you have?

Try to identify his/her job when you have asked the questions.

Student A

You work in a large hospital. You collect and analyze information about hospital procedures. You get the information by talking to the doctors, nurses, and administrators in the hospital. You identify tasks that computers can do so that time and money can be saved. Then you design a system to perform these tasks.

You've been working in this job for five years. You've also worked for a software company. You have a degree in business studies but you later took courses in systems software.

(Systems analyst)

Student B

You work for a computer service firm. You repair computers and other devices such as printers. You also upgrade computers. People phone in when they have a problem and you go to their company, find out what is wrong, and repair the fault.

This is your first job. You've been working for the firm for two years. You have a diploma in Computer Systems Engineering.

(A computer services engineering technician)

TEXT 2

VOCABULARY

Duplicate – дублировать, копировать

Draw (from) – собирать, добывать (информацию)

Handle - справляться (*с чем-л.*)

Handle the job – выполнять задачу

Track – отслеживать

Packaged software - пакетное ПО (готовое программное обеспечение)

Generic – универсальный, стандартный

Degree – диплом

4-year degree (in) – четырехгодичный курс обучения

Employer - наниматель

Emphasis – особое внимание

Place emphasis (on) – уделять особое внимание (*чему-л.*)

Seek – искать

Applicant – кандидат

Hire – нанимать

Call (for) - требоваться, быть нужным

Patience – терпение

Persistence – настойчивость, упорство

Ingenuity – изобретательность

Expertise – компетентность

VOCABULARY TASKS

Ex. 1. Match the nouns on the left with their synonyms from the right column.

- | | |
|----------------|---------------------------------------|
| 1. degree | a. candidate |
| 2. emphasis | b. knowledge, proficiency, competence |
| 3. applicant | c. determination |
| 4. employer | d. boss, manager |
| 5. patience | e. inventiveness |
| 6. persistence | f. importance, attention |
| 7. ingenuity | g. tolerance |
| 8. expertise | h. diploma, qualification |

Ex. 2. Match the verbs with their definitions. Then use five of them in the sentences below.

- | | |
|--------------|-----------|
| 1. duplicate | 4. seek |
| 2. draw | 5. hire |
| 3. track | 6. handle |

- a. to search for, to try to find
- b. to obtain something from (a particular source)
- c. to make an exact copy of something, to reproduce
- d. to manage, to deal with something
- e. to follow the movements of somebody/something, especially by using special electronic equipment
- f. to employ, to recruit

- 1) I don't know if I can ... the job.
- 2) Please ... the form and send us the original.
- 3) His main responsibility is to ... new staff.
- 4) We do not always find what we
- 5) They should be more selective about the sources they ... their information from.

READING ACTIVITIES

Read the text, translate it into Russian and do the tasks below.

COMPUTER PROGRAMMERS: CAREER PATHS, EDUCATION, IMPORTANT QUALITIES

Programmers write programs according to the specifications determined primarily by computer software engineers and systems analysts. Programs vary widely depending on the type of information to be accessed or generated. For example, the instructions involved in updating financial records are very different from those required to duplicate conditions on an aircraft for pilots training in a flight simulator. Although simple programs can be written in a few hours, programs that use complex mathematical formulas or that draw data from many existing systems may require more than a year of work. In most cases, several programmers work together as a team under a senior programmer's supervision.

Computer programmers are often grouped into two broad types - *applications programmers* and *systems programmers*. Applications programmers write programs to handle a specific job, such as a program to track inventory within an organization. They also may revise existing packaged software or customize generic applications which are frequently purchased from vendors. Systems programmers, in contrast, write programs to maintain and control computer systems software, such as operating systems, networked systems, and database systems. These workers make changes in the instructions that determine how the network, workstations, and central processing unit of the system handle the various jobs they have been given and how they communicate with peripheral equipment such as printers.

Programmers in software development companies may work directly with experts from various fields to create software - either programs designed for specific clients or packaged software for general use - ranging from games and educational software to programs for desktop publishing and financial planning. Programming of packaged software constitutes one of the most rapidly growing segments of the computer services industry.

In some organizations, particularly small ones, workers commonly known as *programmer-analysts* are responsible for both the systems analysis and the actual programming work.

Most systems programmers hold a 4-year degree in computer science. Although knowledge of traditional languages is still important, employers are placing increasing emphasis on newer, object-oriented programming languages and tools such as C++ and Java. Additionally, employers are seeking persons familiar with fourth-generation and fifth-generation languages that involve graphic user interface and systems programming. Employers also prefer applicants who have general business skills and experience related to the operations of the firm.

When hiring programmers, employers look for people with the necessary programming skills who can think logically and pay close attention to detail. The job calls for patience, persistence, and the ability to work under pressure. Ingenuity and creativity are particularly important when programmers design solutions and test their work for potential failures. The ability to work with abstract concepts and to do technical analysis is especially important for systems programmers because they work with the software that controls the computer's operation. Because programmers are expected to work in teams and interact directly with users, employers want programmers who are able to communicate with nontechnical personnel.

As technology changes so rapidly, programmers must continuously update their knowledge and skills by taking additional courses.

With general business experience, programmers may become programmer-analysts or systems analysts or be promoted to managerial positions. Other programmers, with specialized knowledge and experience with a language or operating system, may work in research and development for multimedia or Internet technology and may even become computer software engineers. As employers increasingly contract with outside firms to do programming jobs, more opportunities should arise for experienced programmers with expertise in a specific area to work as consultants.

WORD STUDY

Ex. 3. Translate the following words and phrases from the text into English.

1. В зависимости от типа информации
2. Под руководством старшего программиста
3. Отслеживать товарно-материальные запасы организации
4. Настраивать стандартные прикладные программы
5. Выполнять различные задачи
6. Поддерживать связь с периферийным оборудованием
7. Эксперты из разных областей
8. Уделять все большее внимание
9. Уделять пристальное внимание деталям
10. Способность работать в стрессовых условиях
11. Возможные неисправности
12. Взаимодействовать напрямую с пользователями
13. Постоянно пополнять свои знания и навыки
14. Продвинуться до руководящей должности
15. Заключать договора со сторонними компаниями

Ex. 4. Make word-combinations using the words from both columns. Translate them into Russian.

- | | |
|-----------------|-----------------|
| 1. financial | a. job |
| 2. flight | b. applications |
| 3. mathematical | c. records |
| 4. senior | d. formulas |
| 5. specific | e. publishing |
| 6. packaged | f. simulator |
| 7. generic | g. software |
| 8. desktop | h. programmer |

Ex. 5. Complete the sentences with the words given below.

*a. segments b. instructions c. team d. experts e. data f. failures g. personnel
h. specifications i. vendors j. degree*

1. Programmers write programs according to the ... determined by computer software engineers and systems analysts.
2. Several programmers can work together as a
3. Programs that draw ... from many existing systems may require more than a year of work.
4. Generic applications are frequently purchased from
5. Systems programmers make changes in the ... that determine how the computer system operates.
6. Programmers test their work for potential
7. Programmers may work directly with ... from various fields to create various types of software.
8. Programming of packaged software constitutes one of the most rapidly growing ... of the computer services industry.
9. Most systems programmers hold a 4-year ... in computer science.
10. Programmers must be able to communicate with nontechnical

Ex. 6. Fill in the gaps with the prepositions given below. Translate the sentences into Russian.

under as for (4) to (3) from on (2) in (2)

1. Programs vary widely depending ... the type of information.
2. Complex programs that draw data ... many existing systems may require more than a year of work.
3. Programmer-analysts are responsible ... both the systems analysis and the actual programming work.
4. Employers prefer applicants who have experience related ... the operations of the firm.
5. When hiring programmers, employers look ... people with the necessary programming skills who can think logically and pay close attention ... detail.
6. The job of a programmer calls ... patience, persistence, and the ability to work ... pressure.
7. Employers are placing increasing emphasis ... newer, object-oriented programming languages and tools.
8. With general business experience, programmers may be promoted ... managerial positions.
9. Programmers may work ... research and development ... multimedia or Internet technology.
10. Experienced programmers with expertise ... a specific area may work ... consultants.

COMPREHENSION

Ex. 7. Find the false sentences and correct them using the information from the text.

1. Programmers write programs according to the specifications determined by a senior programmer.
2. Most programs require more than a year of work.

3. Programmers are grouped into two types - applications programmers and systems programmers.
4. Applications programmers write such programs as operating systems.
5. Programmers may create programs designed for specific clients or packaged software for general use.
6. Business skills are not important for programmers.
7. Knowledge of object-oriented programming languages and tools is an advantage.
8. Programmers don't need to be able to communicate with users.
9. Programmers must continuously update their knowledge and skills.

Ex. 8. Multiple choice. Circle the letter of the option that best completes the statement.

1. Programmers write programs according to the ...
 - a) features
 - b) characteristics
 - c) specifications
2. Several programmers may work together as a ...
 - a) band
 - b) team
 - c) crew
3. Applications programmers write programs to handle a specific ...
 - a) job
 - b) work
 - c) occupation
4. Programmers may work under a senior programmer's ...
 - a) view
 - b) supervision
 - c) threat
5. Generic applications are frequently purchased from ...
 - a) sellers
 - b) vendors
 - c) brokers
6. An operating system is a(n) ...
 - a) application program
 - b) system program
 - c) anti-virus program
7. A printer is a(n) ... device.
 - a) input
 - b) internal
 - c) peripheral
8. Programmer-... are responsible for both the systems analysis and the actual programming work.
 - a) analysts
 - b) scientists
 - c) applicants

9. With general business experience, programmers may be ... to managerial positions.
- increased
 - promoted
 - raised

SPEAKING

Ex. 9. Work with a partner and decide how you would explain these terms to a nontechnical person.

Program
Application
Database

CPU
Peripherals
Programming language

PROBLEM SOLVING

Ex. 10. Work in pairs. Study these job requirements. Then match the requirements to the list of jobs that follows.

1	2	3
<ul style="list-style-type: none"> at least 5 years (2 at senior level) in: Unix, SYBASE or ORACLE or Windows OS, Terminal Server, TCP/IP, Internet strong project management (2 years) willingness to travel abroad 	<ul style="list-style-type: none"> able to manage, lead and develop a team knowledge of C, C++, Delphi experience of object-oriented design within a commercial environment ability to deliver software projects against agreed schedules and within agreed estimates 	<ul style="list-style-type: none"> proven track record in the delivery of e-solutions in banking environment knowledge of Unix, Windows and Oracle willingness to travel internationally
4	5	6
<ul style="list-style-type: none"> minimum 4 years lifecycle development experience demonstrable skills using VB, SQL, RDBMS able to develop core s/w excellent communication skills 	<ul style="list-style-type: none"> minimum of 18 months commercial experience of Web development knowledge of HTML, Java, ASP full portfolio of URLs as examples 	<ul style="list-style-type: none"> experience of Windows OS, Exchange, Monitoring Software, SQL Server, Verta, TCP/IP solid grasp of networking 2 to 5 years experience in a network environment

- Visual Basic Developer
- IT Engineer (Network and Database)
- Web Developer
- Network Support
- E-commerce Consultant
- Team Leader

WRITING

Ex. 11. Study the CV of Paul. Write your own CV on the same model. For the purpose of this task, you can invent work experience and assume you have passed all your examinations!

CURRICULUM VITAE

Paul W Cair



Personal details

Date of birth 30/5/83

Address 7 Linden Crescent, Stonebridge EH21 3TZ

email p.w.cair@btinternet.com

Education

1995–1999 Standard grades in Maths, English, Spanish, Computer Studies, Geography, Science, James High School

2000–2001 HNC in Computing, Maxwell College

2001–2003 HND in Computing Support, Maxwell College

Other qualifications

Jan 2004 CTEC

Work experience

2003–present IT support consultant Novasystems

Novasystems is an IT company that provides a complete range of computing services for its corporate clients.

My experience includes:

- advising clients on IT issues and strategies
- 1st line customer telephone support
- database design
- configuration and installation of hardware and software to clients' specifications
- network administration and implementation
- PC assembly

I have knowledge of these areas:

- Windows server operating systems
- Microsoft Office packages
- Oracle databases
- Windows desktop operating systems
- TCP/IP networking
- Microsoft Exchange Server
- a variety of backup software

Hobbies and interests

volleyball

Referees

1 Academic Dr L. Thin, IT Department, Maxwell College

2 Work Ms Y. Leith, Personnel Officer, Novasystems

SUPPLEMENTARY READING

COMPUTER PROGRAMMERS: JOB OUTLOOK

As programming tasks become increasingly sophisticated and additional levels of skill and experience are demanded by employers, prospects should be best for college graduates with knowledge of, and experience working with, a variety of programming languages and tools - including C++ and other object-oriented languages such as Java, as well as newer, domain-specific languages that apply to computer networking, database management, and Internet application development. Because demand fluctuates with employers' needs, jobseekers should keep up to date with the latest skills and technologies. Individuals who want to become programmers can enhance their prospects by combining the appropriate formal training with practical work experience.

Employment of programmers is expected to grow more slowly than the average for all occupations. Sophisticated computer software now has the capability to write basic code, eliminating the need for many programmers to do this routine work. The consolidation and centralization of systems and applications, developments in packaged software, advances in programming languages and tools, and the growing ability of users to design, write, and implement more of their own programs mean that more of the programming functions can be transferred from programmers to other types of information workers, such as computer software engineers.

Another factor limiting growth in employment is the outsourcing of these jobs to other countries. Computer programmers can perform their job function from anywhere in the world and can digitally transmit their programs to any location via e-mail.

Nevertheless, employers will continue to need programmers who have strong technical skills and who understand an employer's business and its programming requirements. This means that programmers will have to keep abreast of changing programming languages and techniques. Given the importance of networking and the expansion of client/server, Web-based, and wireless environments, organizations will look for programmers who can support data communications and help implement electronic commerce and intranet strategies. Demand for programmers with strong object-oriented programming capabilities and technical specialization in areas such as client/server programming, wireless applications, multimedia technology, and graphic user interface likely will stem from the expansion of intranets, extranets, and Internet applications. Programmers also will be needed to create and maintain expert systems and embed these technologies in more products. Finally, a growing emphasis on cyber security will lead to increased demand for programmers who are familiar with digital security issues and skilled in using appropriate security technology.

УПРАВЛЯЕМЫЕ САМОСТОЯТЕЛЬНЫЕ РАБОТЫ СТУДЕНТОВ

TERM III

Module 1. Unit 2. Programming. (6 hours)

Text work.

OBJECT-ORIENTED PROGRAMMING

1. Read the text and find the answers to these questions.

1. What advantages of using object-oriented programming are mentioned in the text?
2. What are the three key features of OOP?
3. What multimedia data types are referred to in the text?
4. List the different types of triangle mentioned in the text.
5. What feature avoids the problem of deciding how each separate type of data is integrated and synchronized into a working whole?
6. What specific type of rectangle is named in the text?
7. What common properties of a rectangle are mentioned in the text?
8. What features are made quicker by code reusability?

One of the principal motivations for using OOP is to handle multimedia applications in which such diverse data types as sound and video can be packaged together into executable modules. Another is writing program code that's more intuitive and reusable; in other words, code that shortens program-development time.

Perhaps the key feature of OOP is encapsulation – bundling data and program instructions into modules called ‘objects’. Here’s an example of how objects work. An icon on a display screen might be called ‘Triangles’. When the user selects the Triangles icon – which is an object composed of the properties of triangles (see fig. below) and other data and instructions – a menu might appear on the screen offering several choices. The choices may be (1) create a new triangle and (2) fetch a triangle already in storage. The menu, too, is an object, as are the choices on it. Each time a user selects an object, instructions inside the object are executed with whatever properties or data the object holds, to get to the next step. For instance, when the user wants to create a triangle, the application might execute a set of instructions that displays several types of triangles – right, equilateral, isosceles, and so on.

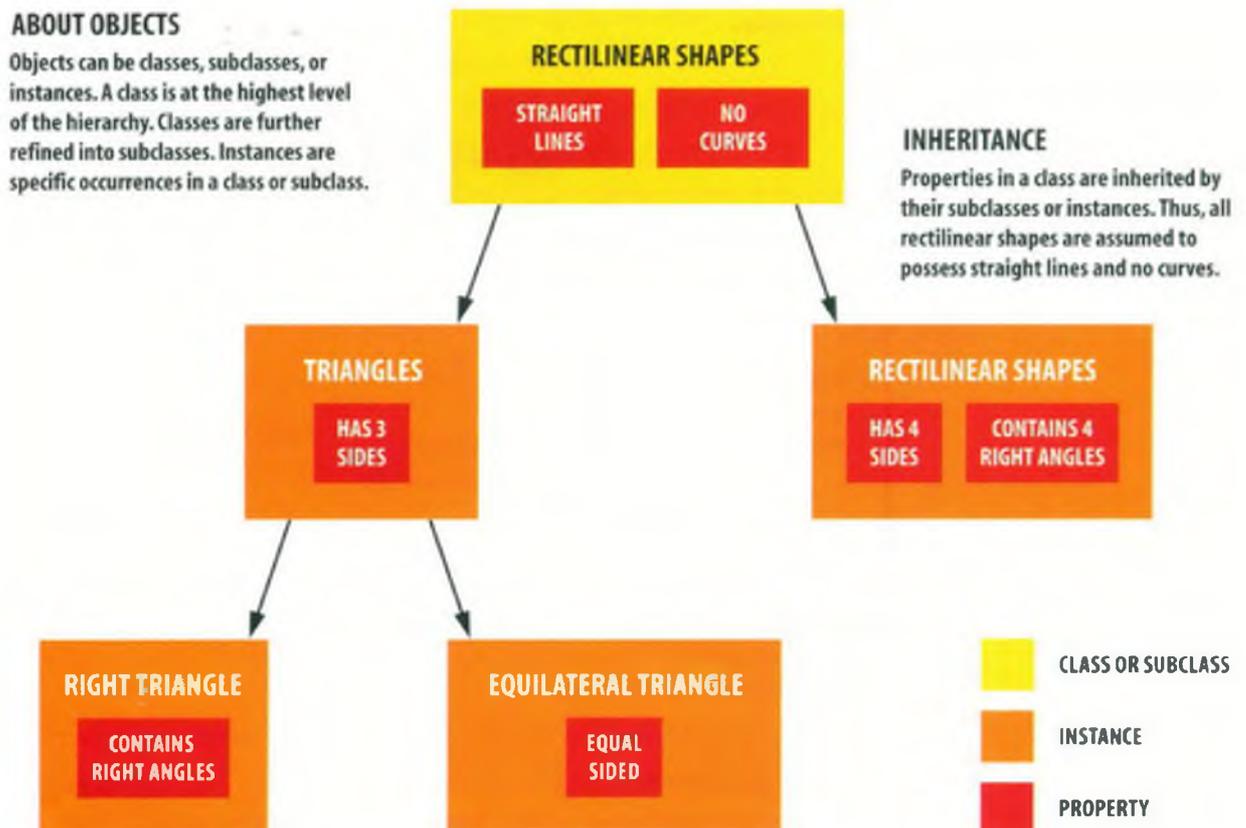
Many industry observers feel that the encapsulation feature of OOP is the natural tool for complex applications in which speech and moving images are integrated with text and graphics. With moving images and voice built into objects themselves, program developers avoid the sticky problem of deciding how each separate type of data is to be integrated and synchronized into a working whole.

A second key feature of OOP is inheritance. This allows OOP developers to define one class of objects, say ‘Rectangles’, and a specific instance of this class, say ‘Squares’ (a rectangle with equal sides). Thus, all properties of rectangles – ‘Has 4 sides’ and ‘Contains 4 right angles’ are the two shown here – are automatically inherited by Squares. Inheritance is a useful property in rapidly processing business data. For instance, consider a business that has a class called ‘Employees at the Dearborn Plant’ and a specific instance of this class, ‘Welders’. If employees at the Dearborn plant are eligible for a specific benefits package, welders automatically qualify for the package. If a welder named John Smith is later relocated from Dearborn to Birmingham, Alabama, where a different benefits package is available, revision is simple. An icon representing John Smith – such as John Smith’s face – can be selected on the screen and dragged

with a mouse to an icon representing the Birmingham plant. He then automatically ‘inherits’ the Birmingham benefit package.

A third principle behind OOP is polymorphism. This means that different objects can receive the same instructions but deal with them in different ways. For instance, consider again the triangles example. If the user right clicks the mouse on ‘Right triangle’, a voice clip might explain the properties of right triangles. However, if the mouse is right clicked on ‘Equilateral triangle’ the voice instead explains properties of equilateral triangles.

The combination of encapsulation, inheritance and polymorphism leads to code reusability. ‘Reusable code’ means that new programs can easily be copied and pasted together from old programs. All one has to do is access a library of objects and stitch them into a working whole. This eliminates the need to write code from scratch and then debug it. Code reusability makes both program development and program maintenance faster.



2. Match the terms in A with the statements in B.

A

1. OOP
2. Encapsulation
3. Object
4. Menu
5. Square
6. Polymorphism
7. Library

B

- a. An OOP property that allows data and program instructions to be bundled into an object
- b. A list of choices
- c. An OOP property that enables different objects to deal with the same instruction in different ways
- d. A reusable collection of objects
- e. A module containing data and program instructions
- f. Object-Oriented Programming
- g. A rectangle with equal sides

3. Complete the following text using words from the reading text.

Encapsulation, 1)... and polymorphism are key features of 2)... programming. Encapsulation allows data and program instructions to be bundled together in 3)... called objects. Inheritance means that specific 4)... of a class of objects 5)... the properties of the class of objects. Polymorphism means that instructions are treated differently by different 6)... The combination of these 7)... features of OOP means that program code is reusable. This speeds up 8)... and 9)... of programs.

TERM IV

Module 1. Unit 3. Recent Developments and Trends. (6 hours)

Text work.

BLUETOOTH

1. Read the text and find the answers to these questions.

1. What frustrating problem does Bluetooth solve?
2. Who first developed Bluetooth?
3. In what ways is Bluetooth particularly suited to portable systems?
4. What do Bluetooth devices share with microwave ovens?
5. List some devices that are suitable for use with Bluetooth.
6. Why is Bluetooth suitable for use on aeroplanes?
7. What factors provide security for Bluetooth communications?
8. How is the output power level of the transmitter set?
9. Why is there no collision detection in the Bluetooth specification?
10. Why are all devices on a piconet synchronized and controlled by a master device?
11. What are the consequences of Bluetooth having the following characteristics?
 - a. It is good at avoiding conflicting signals from other sources.
 - b. The transmitter output level is kept as low as possible.
 - c. It uses power-saving modes when devices aren't transmitting.

As portable computing devices get smarter and more capable, connectivity frustrations increase. This is where Bluetooth comes in. The brainchild of Ericsson, IBM, Intel, Nokia and Toshiba, Bluetooth is a microwave high-speed wireless link system that's designed to work with portable equipment. To that end, it's low power, very small and very low cost. It uses the same frequencies as existing radio LANs (and, incidentally, microwave ovens) to create a secure 1 Mbit/s link between devices within 10m of each other. These devices can be laptops, PDAs, cellphones, wired telephone access points, even wristwatch devices, headphones, digital cameras and so on. With them, your notebook PC will be able to access your cellular phone – and thus the

Internet – without your having to take the phone out of your pocket. Files can be exchanged and communications set up for voice and data between just about any device capable of handling the information.

Bluetooth operates in the unlicensed SM (Industrial, Scientific and Medical) band at 2.45GHz, which is globally available for products. There's 89MHz of bandwidth allocated here, and since Bluetooth is very low power, it actually radiates less than most national and international standards allow non-transmitting devices to leak as part of their normal operation. This is key, as it allows the technology to operate without restriction on aircraft.

As befits their status as radio frequency experts, Ericsson and Nokia developed the RF side of Bluetooth. The link works in a similar way to the IEEE 802.11 wireless networking system, with a packet-switching protocol based on fast-frequency hopping direct sequence spread spectrum. In other words, it constantly switches channel to avoid interference. It changes frequency 1,600 times a second through 79 frequency bands. It's expected that this will be so good at avoiding conflicting signals from other sources that the transmission power can be kept very low.

Security is taken care of through the frequency hopping and 40-bit encryption. As the system uses radio, it can work through some barriers – briefcases, shirt pockets and desktops, for example – but it won't carry through office buildings. The power level of the transmitter can be varied, with feedback from the remote side of the link used to set the output to the lowest level commensurate with error-free operation. This saves power and increases the usable density of devices. The device can operate at up to 1mW (an optional power amplifier can increase this to 100mW) and the whole lot consumes between 8mA and 30mA at 2.7V. Various power-saving modes can be used when a device isn't transmitting, trading off speed of response for battery life. These work with current levels between 300pA and 60 Pa.

Within the 10m radius of a unit, up to 10 independent full-speed piconets can operate, with bandwidth reduced proportionately if more than this are in use. Each can handle up to eight devices, and can be further subdivided into separate services: 432Kbit/s full-duplex data, 721/56Kbit/s asymmetric duplex, or 384Kbit/s third-generation GSM. Each channel can also support three 64Kbit/s full-duplex voice channels. An optional variation in modulation technique would double the basic data rate to 2 Mbit/s.

Power consumption and cost were very significant factors in Bluetooth's design, and it was decided not to make the system a fully-fledged LAN. As a result, there's no collision detection. All devices on a piconet are synchronized to a master device and are controlled by it to prevent simultaneous operation on the same frequency. Any device can be a master, and is elected dynamically when the link starts up.

The standard is open and royalty-free to members of the Bluetooth special interest group.

2. Match the terms in A with the statements in B.

A

1. Bluetooth
2. SM band
3. RF
4. IEEE 802.11
5. Frequency hopping
6. Usable density
7. piconet

B

- a. Radio frequency
- b. The number of devices that can be used in the same area
- c. A microwave high-speed wireless link system designed to work with portable equipment

- d. Very low power network links between Bluetooth devices
- e. An unlicensed frequency range at 2.45GHz
- f. A standard for networking systems with a packet-switching protocol
- g. Constantly switching channels

3. Mark the following as True or False:

1. Bluetooth is an expensive system.
2. Bluetooth devices can communicate at a distance of up to 20m.
3. The SM band is available throughout the world.
4. Bluetooth has a very low radiation level.
5. Each Bluetooth connection operates at one fixed frequency.
6. Bluetooth signals will pass through walls of buildings.
7. The master Bluetooth device is determined when a link is first established.

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