Кафедра иностранных языков №2

АНГЛИЙСКИЙ ДЛЯ ИЗУЧАЮЩИХ ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ

ENGLISH FOR IT STUDENTS

Методическое пособие

по совершенствованию навыков чтения и говорения
на английском языке для студентов ФКСиС и ФИТиУ
дневной формы обучения
В 2-х частях

Часть 2

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Настоящее методическое пособие предназначено для студентов ФКСиС и ФИТиУ дневной формы обучения. Содержит специализированные технические тексты по современным информационным технологиям и специально созданный комплекс заданий, направленных на совершенствование навыков чтения и говорения на английском языке. Содержание языкового и речевого материала подобрано в полном соответствии с программой неязыковых вузов и включает языковые явления, предназначенные для активного усвоения.

Вторая часть включает четыре темы для чтения, овладения активной лексикой и обсуждения в аудитории. Предполагается, что данный материал может стать базой для формирования совершенствования речевых навыков чтения аутентичных текстовых материалов по специальности и навыков ведения беседы по профессиональной тематике.

Unit 5. INTERNET AND LAN TECHNOLOGY

Text A

Pre-reading. *Match the terms with the appropriate definitions.*

Protocols	Functions
HTTP(Hypertext Transfer Protocol)	- responsible for address packets
FTR (File Transfer Protocol)	- breaks a message or file into packets
POP (Post Office Protocol)	- allows users who are logged on to one host to access another host
TCP (Transmission Control Protocol)	- provides secure data transfer over the Internet
IP (Internet Protocol)	- transfer mail from an e-mail server to a client Inbox
SMTP (Simple Mail Transfer Protocol)	- exchanges information over the Web
IMAP (Internet Mail Access Protocol)	- transfers e-mail messages from client computers to an e-mail server
TELNET (Telecommunication Network)	- transfers files between local and remote host computers
SSL (Secure Sockets Layer)	- an alternative to POP

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

INTERNET TECHNOLOGY

In 1969 was developed a project called APRANET designed to help scientists communicate and share valuable computer resources. Educators and scientists used primitive command-line user interfaces to send e-mail, transfer files and run scientific **calculations** on Internet supercomputers. At that time finding the information was not easy. Only in the early 1990s software developers created new user-friendly Internet access tools and Internet became available to anyone. Although exact figure cannot be determined, it is estimated that with approximately 200 **nodes** and 500 million users, Internet traffic exceeds 100 terabytes each week.

The Internet is not "owned" or **operated by** any single corporation or government. It's a data communication network that grew over time in a somewhat haphazard configuration as networks connected to other networks.

The Internet **backbone** consists of **high-speed** fiber-optic links connecting high-capacity routers that direct network traffic. Backbones links and routers are maintained by **network service providers (NSPs)**. NSP equipment and links **are tired** together by **network access points** (**NAPs**).

Large ISPs connect directly to backbone **routers**. Smaller ISPs typically connect to a larger ISP to gain Internet access and supply it to their customers.

You can track the route of data you send using Internet utilities, such as **Ping** and **Traceroute.** An Internet utility called Ping (Packet Internet Groper) sends a

signal to a specific Internet address and waits for a reply. If a reply arrives, Ping reports that the computer is online and displays the *elapsed time* for the round-trip message. Ping is useful for *finding out* if the site *is up* and running. Ping is also useful for determining whether a connection offers adequate speed for videoconferencing or online computer games.

Ping also shows whether packets were lost in transmission. Packets can become lost when signal *interference* or network *congestion overwhelms* Internet servers and routers. Too many lost packets during an online gaming session can cause the game to stutter or stall. And if packets don't arrive in the correct order, your game character might seem to act randomly for a few seconds.

A utility called Tracerouter records a packet's path-including intermediate routers-from your computer to its destination.

An ISP operates network devices that handle the physical aspects of transmitting and receiving data from your computer. Many ISPs operate e-mail servers to handle incoming and outgoing mail for their subscribers and some also have Web servers for subscriber Web sites. ISPs can also maintain servers for chat groups, instant messaging, music file sharing, FTR (File Transfer Protocol) and other file transfer services.

Computer connects to the Internet in one of two ways: it can link directly to ISP using a device such as a *voiceband modem*, cable modem, *satellite* dish, or DSL modem. Or, if your computer is part of a LAN, an Internet connection can be provided by a LAN link.

A local area network is called an **intranet**. Intranets are popular with businesses that want to store information as Web pages but not provide them for *public* access. An intranet that provides external access is called **extranet**.

A computer can have a permanently assigned **static IP address** or a temporally assigned **dynamic IP address**. As a general rule, computers on the Internet that act as servers use static IP address. Typically, ISPs, web sites, web hosting services, and e-mail servers are constantly connected to the Internet and require static addresses.

Although IP addresses work for communication between computers, people find it difficult to remember long string of numbers. Therefore, many Internet servers also have an easy-to-remember name, i. e. *nike.com* . The official term for this name is "fully qualified domain name" (FQDN), but most people just refer to it as a **domain name**. Every domain name *corresponds to* a unique IP address that has been entered into a huge database called the Domain Name System(DNS).Computers that host this database are referred to as domain name servers. A domain name, such as *travelocity.com*, must be converted into an IP address before any packets can be routed to it.

The Domain Name System is based on a *distributed database*. This database is not stored as a whole in any single location; instead, it exists in parts all over the Internet. Your Internet connection is set up to access one of the many domain servers that *reside on* the Internet. Some domain names are not currently in use, but they are reserved. Internet entrepreneurs have made a business of registering high-profile domain names with the intention of reselling them.

Comprehension check. *Mark the following statements as True or False.*

1. The Internet backbone consists of high-speed fiber-optic links.
2. A local area network is called extranet.
3. A computer must have a permanently assigned static IP address.
4. The Internet is not "owned" by any single corporation or government.
5. Computer connects to the Internet only by linking directly to ISP.
6. You can track the route of data you send using Internet utilities, such as Ping and Traceroute.

Vocabulary practice

1. Match the words with their synonyms.

computations	congestion
knot	node
connect	find out
run	calculations
overloading	tire
learn	base
backbone	to be up

2. Fill in the blanks choosing from the variants given.

1. The Internet is not … a single company or country.
   a) controlled   b) operated by   c) correspond to
2. The Internet backbones links and … are supported by network service providers.
   a) wires   b)connectors   c) routers
3. Intranet allows businesses to store information but not provide them for … .
   a) anyone   b) public   c) other companies
4. Pockets can be lost if network congestion … Internet services.
   a) overwhelms   b) corrupts   c) stops
5. Each Internet server's name … a the only IP address.
   a) is converted into   b) corresponds to   c) acts as
6. Internet connection is set up access domain servers that … on the Internet.
   a) reside   b) exist   c) register

3. Make two-word combination using the words in columns and then fill in the gaps in the following sentences.

A:		B:	
	distributed		modem
	elapsed		name
	voiceband		dish
	dynamic		interference
	domain		database
	signal		time
	satellite		address

1. Packets can become lost when … or network congestion overwhelms Internet routers.

2. Ping reports that the computer is online and displays the … for the message.

3. Most people refer to the name of many Internet servers as a … .

4. A computer can have either or permanent static address or a temporal … .

5. A … exists in parts all over the Internet.

6. … and … are used for direct connection of a computer to ISP.

4. Fill in the gaps in the text.

Network service providers supply ___ links for the Internet backbone. The acronym ___ refers to points were equipment and ___ from this companies intersect.

An Internet utility called ___ helps you discover whether a host, such as web server is "alive". This utility reports the ___ for a packet to travel from your computer to the host and back. Another utility, called ___, records the path of a packet as it travels from your computer to its destination. Most people access the Internet through an ISP, which provides modems, e-mail servers, domain name servers, and ___.

Speaking. *Discuss the following questions.*

1. How did the Internet get started?
2. How is the Internet structured?
3. Is it possible to track data as it travels over the Internet?
4. What kinds of network devices are part of an ISP?
5. What's a domain name?

Text B

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

INTERNET ACCESS

One of the most **challenging** aspects of the Internet is selecting a connection. Although most subscribers begin with dial-up connection, many soon explore high-speed Internet options. **Home based** LANs and **wireless** Internet access have become very popular.

A dial-up connection uses **POTS (plain old telephone services)** to transport data between your computer and your ISP. With a dial-up connection, your computer's modem essentially places a regular telephone call to your ISP, when the ISP's computer "answers" your call, a **dedicated circuit** is established between you and your computer. This circuit remains connected for the **duration** of your call and provides a communication link that caries data between your computer and the ISP.

The modem, you use with this type of connection, **converts** the signals from you computer into signals that can travel over the telephone lines. The word "modem" is derived from the words "modulate" and "demodulate". In communication terminology, **modulation** means changing the characteristics of a signal, as when a

modem changes a digital pulse into an analog audio signal. **Demodulation** means changing a signal back to its original state, as when a modem changes an audio signal back to a digital.

Another option for Internet connection is cable Internet service; with it your cable TV company becomes your Internet provider. In order to provide this type of connection, satellite dishes are installed; usually they are installed for a community and are referred to as the **head-end.** From the head-end, a cabling system branches out, offering both television and Internet access. Bandwidth of each cable is divided among three activities: TV channels, downstream data (the data you receive) and upstream data (the data you send).Cable Internet service plans offer speeds up to 6 Mbps.

With this connection your computer becomes part of a neighborhood data network and in this case two issues become significant: *bandwidth* and security. Unlike a dial-up connection, cable Internet service provides an **always-on connection**, which is particularly *vulnerable* to hackers and virus attacks. As for the second issue, the cable you share with your neighbors has a certain amount of bandwidth, and as more people use the service, it might seem to get slower and slower.

Other options, such as DSL and ISDN, could be chosen to get a high-speed Internet access. DSL (digital subscriber line) is a high-speed, digital, always-on, Internet access technology that runs over standard phone lines. It is one of the fastest Internet connections that's affordable to individual consumers. Several variations of this technology exist, including ADSL (asymmetric DSL, with *downstream* speed faster than *upstream* speed). DSL is digital, so data doesn't need to be changed into analog form and then back to digital as it does when you use a dial-up connection. A DSL can simultaneously carry voice and data, if permitted by DSL provider.

ISDN (Integrated Service Digital Network) is an all digital service with the potential to simultaneously carry voice and data. ISDN is not fast as DSL or cable Internet service but faster than a dial-up connection. A device called an **ISDN terminal adapter** connects a computer to a telephone wall jack and translated the computer's digital signals into signals that can travel over the ISDN connection. ISDN service is typically regarded as a high-speed Internet connection option for businesses that maintain small LANs.

There are two primary options for getting a wireless access of your home PC or LAN to the Internet: satellite Internet service or fixed wireless Internet service. Satellite Internet service uses a satellite to transmit computer data directly to and from a satellite dish, owned by and individual. A satellite modem connects the satellite dish to a computer. In many areas, satellite Internet service is the only alternative to a dial-up connection. But on the downside, satellite data transport is subject to *latency* delays of one second or more, which occur as your data is routed between your computer and the satellite that orbits the Earth 22.200 miles above the Earth. Satellite transmission and reception can be blocked by *adverse* weather conditions, which make this type of data transport less *reliable* than most wired options.

Fixed wireless Internet service is designed to offer Internet access to homes and businesses by broadcasting data signals over areas large enough to cover most cities

and *outlying* areas. Wireless technologies have less latency than satellite Internet service and can offer connection speeds suitable for online gaming and teleconferencing.

Also it is possible to connect to the Internet through LAN. LAN provides a *cost-effective* way to share one Internet connection among several computers. School computer labs and businesses usually provide access over LANs. LAN Internet access is also *feasible* for home networks. A single cable Internet, DSL, ISDN, or satellite connection can be cabled into your home LAN and accessed by all its workstations.

Comprehension check. *Indicate the paragraph where the following ideas are found in the text.*

1. If a TV company has necessary equipment it can act as an Internet provider.
2. A lot of people soon switch from dial-up they use at the beginning to other types of connection.
3. If it's allowed by provider, DSL can transmit both voice and data.
4. Satellite Internet service depends on the weather conditions.
5. With cable Internet service your computer is always connected to the Internet.
6. One of the cheapest ways to share Internet connection is LAN.

Vocabulary practice

1. Match up the words that are opposite in meaning.

always-on	relaxing
outlying	insecure
challenging	favourable
feasible	unstable
reliable	close
adverse	unsuitable

2. Fill in the blanks choosing from the variants given.

1. With a dial-up connection, a modem … the signals from your computer into signals that can be carried over the phone lines.
      a) converts   b) passes   c) spreads
2. Using a satellite Internet service you can meet with … delays of a second or more.
      a) established   b) latency   c) elapsed
3. When a modem changes the characteristics of a signal it means that … is carried out.
      a) transformation   b) modulation   c) conversion
4. If you choose cable Internet service you should remember that it provides an always-on connection that makes your PC … to viruses and hackers.
      a) protected   b) unseen   c) vulnerable

5. In a dial-up connection, modem places a call to your ISP and you are remained connected with it for the … of you call.

          a) duration   b) whole   c) most part

6. One of the most popular options to have high-speed Internet access is ADSL. In it … speed is slower then … speed.

a) downstream	a) upstream
b) initial	b) downstream
c) upstream	c) terminal

3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.

A:	B:	C:
wireless	communication	speed
home	terminal	circuit
suitable	Internet	LANs
established	connection	adapter
SDN	based	access
provide	dedicated	link

1. Satellite Internet service is one of the options of getting … .

2. If you like to play online computer game it's advisable for you to get fixed wireless Internet service since it can offer … for online gaming.

3. Recently … have become one of the most popular way of getting Internet access.

4. With a dial-up connection, when the computer of ISP "answers" the call of your computer's modem, you get so called … between you and ISP.

5. To translate the computer's digital signal into signals that can travel over the ISDN connection you need a device called … .

6. An established dedicated circuit is used to … that caries data between the subscriber's computer and ISP.

4. Fill in the gaps in the text.

A cable modem provides Internet access over the TV cables that carry television signals from the cable company's ___ to your home. With this connection two issues become significant: security and ___.

With ___ connections, such as DSL and cable, the ___ can enter the Internet any time his computer is turned on. ___ Internet service provides another high-speed Internet access method, but it has higher latency ___.

Nowadays you can get Internet access through LANs. Besides, LAN is considered to be really ___ way to share one Internet connection among several computers.

Speaking. *Discuss the following questions.*

1. How does a modem work?
2. What is the significance of becoming part of a "neighborhood network"?

3. What is DSL?
4. What are options for wireless Internet access?
5. What are the pros and cons of satellite Internet service?

Text C

Pre-reading. *Match the meaning of the following English words and their Russian equivalents.*

1. Hypertext Markup Language (HTML)	a) протокол передачи файлов;
2. Uniform Resource Locator (URL)	b) браузер, программа просмотра сайтов (Web);
3. Web-Hypertext Transfer Protocol (HTTP)	c) <<путешествие>> по сайтам (сёрфинг);
4. hypertext link	d) Web-узел (сайт–разг.) страница, отображающаяся в браузере;
5. "Surfing" (the Internet)	e) унифицированный указатель информационного ресурса;
6. Browser	f) язык гипертекстовой разметки;
7. File Transport Protocol (FTP)	g) сервер электронной почты;
8. E-mail server	h) <<тэг>> – элемент кода разметки документа;
9. Web site	i) протокол передачи гипертекста;
10. HTML-tags	j) гипертекстовая ссылка;

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

THE WORLD WIDE WEB

The **World Wide Web** began in 1989 as a project by high-energy physics researchers in Switzerland to distribute research Internet to fellow physicists. Since then, the **Web** has rapidly moved into the forefront of Internet technologies. More people use the Web on the Internet than all other technologies on the Net combined. To most of the general public, the Web is synonymous with the Internet itself and is, in fact, thought by many to have played the dominant role in moving the Internet from an academic research tool to a household word.

The Web is an abstract (imaginary) space of information. On the Web, you find documents, sounds, videos, and information. On the Web connections are **hypertext links**. The Web uses a writing technology called hypertext. A hypertext is a group of unlinked files. Hypertext is a ***key concept*** for understanding today's Web, but the idea of hypertext originated much earlier than the Web or even the Internet. Two of the most important elements of the Web-**Hypertext Transfer Protocol** (**HTTP**) and **Hypertext Markup Language** (**HTML**) – contain "hypertext" in their names.

HTTP is a protocol that works with **TCP/IP** (Transmission Control Protocol/Internet Protocol) to get Web resources to your desktop. A web resource can

be defined as any chunk of data that has a URL, such as an HTML document, a graphic, or a sound file. HTTP includes commands called "methods" that help your **browser** communicate with web servers. GET is the most frequently used HTTP method. The GET method is typically used to *retrieve* the text and graphics files necessary for displaying a Web page. This method can also be used to pass a **search query** to a file server. HTTP transports your browser's *requests* for a Web resource to a Web server. Next, it transports the Web server's response back to your browser.

HTML is a set of specifications for creating HTML documents that a browser can display as a Web page. HTML is called a *markup language* because authors mark up their documents by inserting special instructions, called HTML tags, that specify how the document should appear when displayed on a computer screen or printed.

On today's Web, many aspects of hypertext have become a reality. A typical Web page is based on a document stored in a file and identified by a unique address called a **URL** (**Uniform Resource Locator**). To **access** any one of these documents, you can type its URL. You can also click an underline word or phrase called a hypertext link (or simply a "link") to access related Web pages.

HTTP and HTML are two of the major ingredients that define the Web. If you add URLs, browsers, and Web servers to this recipe, you'll have a pretty complete menu of the basic technologies that make the Web work.

A **web server** *stores* data from Web pages that form a Web site. One way to store data for a Web page is as a file called an HTML document – a plain text, document with embedded **HTML tags**. Some of these tags *specify* how the document is to be displayed when viewed in a browser. Other tags contain links to related document, graphics, sound, and video files that are stored on Web servers.

As an alternative to HTML documents, Web servers can store Web page data in other types of files, such as **databases**. Data from product databases, college course schedules, and music catalogues can be assembled into HTML format "on the fly" in response to *Web requests*.

To *surf* the Web, you use Web client software called a browser. When you type a URL into the browser's *Address box*, you are requesting HTML data for a specific Web page. Your browser *creates* a request for the data by using the HTTP "GET" command.

A Web server is configured to include *HTTP software*. This software is always running when the server is "up" and ready to fulfill requests. One of the server's ports is dedicated to listening for HTTP requests. When a request arrives, the server software analyzes it and takes whatever action is necessary to fulfill it.

The computer that runs Web software might have other software running on it as well. For example, a computer might operate as a Web server, as an e-mail server, and as an **FTP** (**File Transport Protocol**) server all at the same time! To efficiently *handle* these diverse duties, a computer devotes one port to HTTP requests, one port to handling e-mail, and another port to FTP requests.

A browser is a software program that on your computer and helps you access Web pages. Technically, a browser is the client half of the client/server software that *facilitates* communication between a personal computer and a Web server. The

browser is installed on your computer, and Web server software is *installed* on servers connected to the Internet.

Your browser plays two key roles. First, it uses HTTP to send messages to a Web server – usually a request for a specific HTML document from Web server, your browser *interprets* the HTML tags to display requested Web page. Today's popular browsers are Internet Explorer, Mozilla Firefox, Opera, Google Chrome.

A Web site is a group of *related* Web pages. The Web site is the **master address**, and the individual Web pages are like *subdirectories* to that root *directory*. Many business are creating Web sites for their customers to use. These sites may include price list, information about products, and comparisons of product features with those of competing products. Many sites even allow customers to order products over the Web. Because your site is representing you on the Web, you will want the site to look impressive. For a professional-looking site, you may want to hire a firm that creates Web sites. Such firms employ HTML experts as well as graphic designers and marketing specialists.

Comprehension check. *Choose the ending for each sentence from the two versions given.*

1. One way to store data for a web page is
    a) a file called an HTML document.
    b) a unique address called a URL.
2. Some of these tags specify how the document is
    a) to be displayed when viewed in a browser.
    b) to be identified by a unique address.
3. Business sites may include
    a) price list, information about products and comparisons of product features with those of competing products.
    b) related document, graphics, sound and video files.
4. HTTP is
    a) a protocol that works with TCP/IP to get Web resources to your desktop.
    b) a set of specifications for creating HTML documents that a browser can display as a Web page.
5. Your browser creates a request for the data by
    a) using the HTTP "GET" command.
    b) using Web pages.
6. The Get method can be used to
    a) pass a search query to a file server.
    b) listen for HTTP requests.

Vocabulary practice

1. Which word does not belong to the group?

    a) documents, specifications, protocols, commands;
    b) file, database, data, directory;

c) screen, display, desktop, browser;

d) connections, links, addresses, sites;

e) query, request, response, port.

2. Complete the sentences using one of the given endings.

1. The WWW began as 2. HTTP is a protocol that works with 3. HTML is called a markup language because 4. A typical Web page is based on 5. A browser is a software program that runs 6. As an alternative to HTML documents, Web server can store	a) Web page data in other types of files, such as databases. b) on your computer and helps you access Web pages. c) a document stored in a file and identified by a unique address called URL. d) authors mark up their documents by inserting special instructions, called HTML tags. e) TCP/IP to get Web resources to your desktop. f) a project by high-energy physics researches in Switzerland.

3. Transform the given sentences using the word in brackets without any change in the meaning.

1) When you type a … into the browser's address box, you are requesting HTML data from a specific Web page.

    a) HTML   b) URL   c) HTTP   d) TCP

2) A … is a software program that runs on your computer and helps you access Web pages.

    a) Web server   b) e-mail server   c) FTP server   d) browser

3) Your browser creates a … for the data by using the HTTP "GET" command.

    a) response   b) request   c) message   d) instruction

4) Technically, a browser is the client half of the client/server software that facilitates communication between a personal computer and a… .

    a) Web server   b) e-mail server   c) FTP server   d) web site

5) HTML is a set of specifications for creating … that a browser can display as a Web page.

    a) HTML documents   b) graphics   c) sound   d) video files

4. Fill in the gaps with appropriate words.

Many software tools are available today that make it easy to create Web pages. A Web page author can use a ___ editor, such as Notepad, to create Web pages "from scratch" by manually embedding HTML tags within the text of a document. It is also possible to use the HTML conversion routines included with many standard software

applications. Another route is to use specialized Web ___ software, such as Microsoft FrontPage.

An HTML document is divided into two sections. The ___ section contains information used to define global properties for the document. The ___ section contains the text you want the browser to display, the HTML tags that format the text, and a variety of links. In addition to embedding HTML tags within the text, a Web page can be formatted with a ___ style sheet, which allows Web page designers to change formats throughout an HTML document without modifying individual HTML tags. To control the position of text and graphics on a Web page, many authors place these elements in the cells of a Web page ___.

Text D

Pre-reading. *Match the meaning of the following English words and their Russian equivalents.*

1. search engine; 2. content; 3. SEO (search engine optimization); 4. marketing; 5. database; 6. relevance; 7. indexing; 8. root directory; 9. web masters; 10. domain; 11. (to) parse; 12. spam.	a) маркетинг, торговля; b) степень соответствия; c) база данных; d) индексация; e) корневой каталог; f) практически бесполезная; информация; g) содержание, информационное наполнение; h) разбор; i) домен; j) оптимизация поисковых систем; k) поисковая программа; l) разработчик Web-страниц;

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

SEARCH ENGINE OPTIMIZATION

To find information on the **Web**, you may need to use a **search engine**. A search engine is a piece of software that gives you the ability to search for ***Internet resources***. Search engines are usually accessed through Web ***browser software***. Each search engine provides different ***searching options*** and has its own look. Search engines also differ greatly in the number of resources they allow you to search. Some search engines have both searching and ***browsing capabilities***. The major search engines are Google, Yahoo and Yandex.

If you want to promote your website in the search results of the major search engines, you should use **SEO** (**search engine optimization**). Search engine

optimization is the process of improving the volume and quality of *traffic* to a web site from search engines via "natural" ("organic" or "algorithmic") search results. Usually, the earlier a site is presented in the search results, or the higher it "ranks," the more searchers will visit that site. SEO can also *target* different kinds of search, including image search, local search, and industry-specific vertical search engines.

As an Internet marketing strategy, SEO considers how search engines work and what people search for. Optimizing a website primarily involves editing its **content** and **HTML coding** to both increase its relevance to specific *keywords* and to remove barriers to the *indexing* activities of search engines.

The acronym "SEO" can also refer to "search engine optimizers", a term adopted by an industry of consultants who carry out optimization projects on behalf of clients, and by employees who perform SEO services in-house. Search engine optimizers may offer SEO as a stand-alone service or as a part of a broader marketing campaign. Because effective SEO may require changes to the HTML source code of a site, SEO tactics may be incorporated into web site development and design. The term "search engine friendly" may be used to describe web site designs, menus, content management systems and shopping carts that are easy to optimize.

The leading search engines use **crawlers** to find pages for their algorithmic search results. Pages that are linked from other search engine indexed pages do not need to be submitted because they are found automatically. Some search engines operate a paid submission service that guarantee crawling for either a set fee or cost per click. Search engine crawlers may look at a number of different factors when crawling a site. Not every page is indexed by the search engines. Distance of pages from the **root directory** of a site may also be a factor in whether or not pages get crawled.

To avoid undesirable content in the search indexes, webmasters can instruct *spiders* not to crawl certain files or directories through the standard robots.txt file in the root directory of the *domain*. Additionally, a page can be explicitly excluded from a search engine's database by using a meta **tag** specific to robots. When a search engine visits a site, the robots.txt located in the root directory is the first file crawled. The robots.txt file is then parsed, and will instruct the robot as to which pages are not to be crawled. As a search engine crawler may keep a cached copy of this file, it may on occasion crawl pages a webmaster does not wish crawled. Pages typically prevented from being crawled include login specific pages such as shopping carts and user-specific content such as search results from internal searches. In March 2007, Google warned webmasters that they should prevent indexing of internal search results because those pages are considered *search spam*.

SEO techniques can be classified into two broad categories: techniques that search engines recommend as part of good design, and those techniques of which search engines do not approve. The search engines attempt to minimize the effect of the latter, among them **spamdexing**. Industry commentators have classified these methods, and the practitioners who employ them, as either white hat SEO, or black hat SEO. White hats tend to produce results that last a long time, whereas black hats

anticipate that their sites may eventually be banned either temporarily or permanently once the search engines discover what they are doing.

An SEO technique is considered white hat if it conforms to the search engines' guidelines and involves no deception. As the search engine guidelines are not written as a series of rules or commandments, this is an important distinction to note. White hat SEO is not just about following guidelines, but is about ensuring that the content a search engine indexes and subsequently ranks is the same content a user will see. White hat advice is generally summed up as creating content for users, not for search engines, and then making that content easily accessible to the spiders, rather than attempting to trick the algorithm from its intended purpose. White hat SEO is in many ways similar to web development that promotes **accessibility**, although the two are not identical.

Black hat SEO attempts to improve rankings in ways that are disapproved of by the search engines, or involve deception. One black hat technique uses a text that is hidden, either as a text colored similar to the background or positioned off screen. Another method gives a different page depending on whether the page is being requested by a human visitor or a search engine, a technique known as cloaking.

Search engines may penalize sites they discover using black hat methods, either by reducing their rankings or eliminating their listings from their databases altogether. Such penalties can be applied either automatically by the search engines' algorithms, or by a manual site review.

Comprehension check. *Match the beginnings of the sentences in the first column with the endings in the second.*

1. To find information on the Web	a) may also be a factor in whether or not pages get crawled.
2. Search engine optimizers may offer	b) either by reducing their rankings or eliminating their listings from their databases altogether.
3. The term "search engine friendly" may be used	c) either as text colored similar to the backgrounds.
4. One black hat technique uses text that is hidden,	d) to describe Web site designs, menus, content management systems and shopping carts that are easy to optimize.
5. Search engines may penalize sites they discover using black hat methods,	e) as a stand-alone service or as a part of a broader marketing campaign.
6. Distance of pages from the root directory of a site	f) you may need to use a search engine.

Vocabulary practice

1. Fill in the blanks in the sentences with the necessary word(s); all the letters of the word(s) are given on the right.

1. A search engine is a piece of … that gives you the ability to search for Internet resources.	E T A O F W T R S

2. The term "search engine friendly" may be used to describe Web site designs, menus, content … systems and shopping carts that are easy to optimize.	A G T E E M A M N N
3. To avoid … content in the search indexes, web-masters can instruct spiders not to crawl certain files	E L D U E I R N S A B
4. SEO … can be classified into two broad categories.	Q E S T U I N H C E
5. Black hat SEO … to improve rankings in ways that are disapproved of by the search engines, or involve deception.	T A T S M T P E
6. Search engines may … sites they discover using black hat methods.	E P Z E A N L I

2. Fill in the blanks choosing from the variants given.

1. If you want to promote your … in the search results of the major search engines, you should use SEO.

    a) computer   b) host   c) website   d) disk

2. Such programs usually guarantee inclusion in the …, but do not guarantee specific ranking within the search results.

    a) index   b) database   c) code   d) charter

3. To avoid undesirable content in the search indexes, … can instruct spiders net to crawl certain files or directories.

    a) workers   b) admins   c) customers   d) webmasters

4. Black hat SEO attempts to improve … in ways that are disapproved of by the search engines.

    a) rankings   b) costs   c) velocity   d) quality

3. Match the beginnings and the endings of the description given and put them into correct order.

1. As an Internet marketing strategy, SEO considers.	a) using black hat methods, either by reducing their rankings or eliminating their listings from their database.
2. The leading search engines use crawlers	b) that are disapproved of by the search engines, or involve deception.
3. In March 2007, Google warned webmasters that they	c) it conforms to the search engines guidelines and involves no deception.
4. An SEO technique is considered white hat if	d) should prevent indexing of internal search results because those pages are spam.
5. Black hat SEO attempts to improve rankings in ways	e) to find pages for their algorithmic search results.
6. Search engines may penalize sites they discover	f) how search engines work and what people search for.

4. Fill in the gaps in the text.

Webmasters and content providers began ___ sites for search engines in the mid-1990s, as the first search engines were cataloging the early Web. Initially, all a webmaster needed to do was submit a page, or URL, to the various engines which would send a spider to "crawl" that page, extract links to other pages from it, and return information found on the page to be ___. The process involves a search engine spider downloading a ___ and storing it on the search engine's own server, where a second program, known as an indexer, extracts various information about the page, such as the words it contains and where they are located, as well as any weight for specific ___, as well as any and all links the page contains, which are then placed into a scheduler for crawling at a later date.

Site owners started to recognize the value of having their sites highly ranked and visible in search engine ___, creating an opportunity for both white hat and black ___ SEO practitioners. According to industry analyst Danny Sullivan, the earliest known use of the phrase search ___ optimization was a spam message posted on Usenet on July 26, 1997.

Critical thinking. *Read the article and express your opinion on the problem.*

Censorship on the Web

The Internet offers instant access to information across national and cultural borders, but along with helpful information the Internet hosts a disturbing amount of unsavory material. Militias and hate groups use Web sites to recruit new members and spread their views. International terrorists use Web sites as recruiting tools and for boasting about suicide bombings. Criminals, anarchists and dissenters post guidebooks and tips on how to do all kinds of illegal activities, from making suitcase bombs to spreading viruses.

Some advocate cyber censorship to irresponsible Web sites, blogs and discussion groups. Cyber censorship typically means blocking access to Web sites, but it can also mean closing sites and removing them from host servers. Censorship advocates are opposed by free speech supporters. The controversy over censorship is not new. In most cases words are acceptable, whereas actions can be punishable. But in some cases, words are punishable, too.

A second censorship guideline hinges on local standards of morality. Local communities can apply their own standards to determine whether material is obscene. However, local standard are difficult to sort out on the Internet where a Web surfer in Tennessee can easily access Web sites, bulletin boards and chart groups that originate from anywhere in the world.

The U. S. Supreme Court supports the concepts of cyberzones that limit net access to certain materials. It is possible to construct barriers in cyberspace and use them to screen for identity, making cyberspace more like the physical world and more amenable to zoning laws. As an example, AOL is trying to develop a family - friendly Internet portal by enforcing policies against offensive speech.

But in some countries cyber citizens have no choice but to use a government-controlled ISP. In many countries, free speech is not a basic right conferred to all citizens. Many dictatorial regimes want their citizens to receive news from the outside world only after government censor has screened it. Officials in more than 20 countries use sophisticated tools to block Web sites, filter e-mail, and censor discussion groups.

China has some of the most rigorous Internet censorship in the world. The "Great Firewall of China" as it is sometimes called, blocks Internet content by preventing IP addresses of objectionable sites from being routed through its gateways into China. In Iran, government censors monitor political and news Web sites. In Saudi Arabia if you tried to open "Rolling Stone" magazine's Web site, you would find that access has been denied. The Saudi government claims it censors the Internet to preserve culture and heritage. That argument in many ways reflects the concept of cyberzones that conform to local standards of morality. Even free-speech activists seem to agree. They say: "We do think that information should be free, but we do need to find a balance for respect for sovereign states to preserve their own culture."

Despite such cultural sensitivity, technology giants, such as Microsoft, Yahoo! and Cisco Systems have been criticized for providing foreign government with tools for blocking culturally objectionable sites.

What do you think?

1. Should government be allowed to block access to Web sites based on local religions, politics and customs?

2. Do you believe that a privately held ISP like AOL has the right to censor the data posted on Web sites it hosts?

3. Should companies like Microsoft, Yahoo! and Cisco Systems provide blocking technology to foreign government?

Projects. Perform the project given.

1. Worldwide, communication capabilities are growing quickly. Nevertheless, there is a great disparity in communication capabilities among countries. For this project, use any resources to gather information about the communication options that are available throughout the world. Consider available technologies and the number of people who use them. Your research can include the following: land-based phones, cellular phones, dial-up connection for Internet, cable Internet, such services as DSL and ISDN, wireless Internet, LAN. Consider how they might affect lifestyles and economies of different regions. Suppose that you are organizing a debate about global communication technology and you must devise a controversial question on which the debate will be based and write it down. You should also write three "pro" and "con" paragraphs just to make sure that both sides will have substantial material to debate.

2. Many companies have a Web site that provides information on their products and services. Use a search engine to locate a company in your career field. Suppose you are a recruiter for that company and you'll be attending a series of

college career fairs. Create a one-page information flyer that you can hand out to prospective recruits. It should include: company's name, location(s) URL; a brief description of the company's mission, products, and services; a description of typical working conditions; instructions on how to submit a resume electronically.

Final test. *Do the tasks in the following test.*

1. … is a utility that records a packet's path from your computer to its destination.
2. HTTP is a classified a(n) … protocol, which maintains no record of previous interactions and handles each request based entirely on information that comes with it.
3. … is a high-speed, always-on Internet access technology that runs over standard phone lines.
4. HTML tags are enclosed in angle brackets. (*True/False*)
5. You may experience … delays of 1 second or more when using satellite data transport services.
6. HTML is abbreviation for … .
    a) Hypertext machine link   c) Hypertext markup language
    b) Hypertext makeup language   d) Hypertext mail link
7. Which of the following protocols is responsible for addressing packets so that they can be routed to their destination?
   a) IP   b) TCP   c) POP   d) FTR
8. Which of the following are examples of browsers?
    a) Mozzila   b) Opera   c) Netscape Navigator   d) all of the above
9. The Internet grew out of the …, which was created in 1969.
10. … is a set of specifications for creating documents that browser can display as a Web page.
11. In communication technology, … means the change of characteristics of a signal.
12. In everyday conversation the term "Web page" is often used for the HTML document as well as the Web page you see on your screen, even though technically they are not the same. (*True/False*)
13. Networked computers are vulnerable to … access to data.
14. HTML documents do not actually contain graphics. (*True/False*)
15. Domain name … are computers that host a database called the Domain Name System.
16. HTTP is a protocol that works with … to get Web resources to your desktop.
17. If permitted by your DSL provider, you can use your DSL connection for voice calls as well as for transmitting data. (*True/False*)
18. A browser uses … to request a specific HTML document from a web server, and then interprets the HTML tags in order to display the requested Web page.
19. A … area network is a data communications network that connects personal computers within a very limited geographical area – usually a single building.
20. A permanently assigned IP address is referred to as a … IP address.

Unit 6. INFORMATION SYSTEMS ANALYSIS AND DESIGN

Text A

Reading. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

INFORMATION SYSTEMS

An information system collects, stores, and processes data to provide useful, accurate, and timely information, typically within the context of an organization. Although an information system does not necessarily have to be computerized, today most information systems rely on computers and communications networks to store, process, and transmit information with far more efficientcy than would be possible with a manual system. In this unit, the term "**information system**" refers to a system that uses computers and usually includes communications networks.

An information system is used by the people in an organization and its customers. You've undoubtedly used many information systems – for example, when registering for classes, getting cash from an ATM, and purchasing merchandise on the Web. You might even work for a business or nonprofit organization where you have access to an information system. Not everyone in an organization uses an information system in the same way. An information system must support the needs of people who engage in many different organizational activities.

An information system can help the people in an organization perform their jobs more quickly and effectively by automating routine tasks, such as reordering *inventory,* taking customer orders, or sending out renewal notices. Information systems can also help people solve problems. One of the major functions of an information system is to help people make decisions in response to problems.

Because organizations have different missions and face different problems, they require different kinds of information systems. An information system might have one or more of the following components: a transaction processing system, a management information system, a decision support system, or an expert system. Let's take a closer look at a transaction processing system.

In an information system context, **a transaction** is an exchange between two parties that is recorded and stored in a computer system. When you order a product at a Web site, buy merchandise in a store, or withdraw cash from an ATM, you are involved in a transaction.

Many organizational activities involve transactions**. A transaction processing system (TPS)** provides a way to collect, process, store, display, modify, or cancel transactions. Most transaction processing systems allow many transactions to be entered simultaneously. The data collected by a TPS is typically stored in databases, and can be used to produce a regularly scheduled set of reports, such as monthly bills, weekly *paychecks,* annual inventory summaries, daily manufacturing schedules, or periodic check registers.

Early transaction processing systems, such as **banking** and **payroll** applications of the 1970s, used **batch processing** to collect and hold a group of transactions for processing until the end of a day period. An entire batch was then processed without human intervention, until all transactions were completed or until an error occurred.

In contrast to batch processing, most modern transaction processing systems use **online processing**—a real-time method in which each transaction is processed as it is entered. Such a system is often referred to as an **OLTP system** (online transaction processing system**). OLTP** uses a "*commit* or *rollback*" strategy to ensure that each transaction is processed correctly. This strategy is crucial because most transactions require a sequence of steps, and every step must succeed for the transaction to be completed.

If you *withdraw* cash from an ATM the bank's computer must make sure your account contains sufficient funds before it *deducts* the withdrawal from your account and allows the ATM to deliver cash. If the ATM is out of cash, however, the transaction fails, and the withdrawal should not be deducted from your account. A TPS can **commit** to a transaction and permanently update database records only if every step of the transaction can be successfully processed. If even one step fails, the entire transaction fails and a *rollback* returns the records to their original state.

Although a TPS excels at maintaining transaction data entered by clerical personnel and online customers, its reporting capabilities are limited. A typical TPS generates **detail reports**, which provide a basic record of completed transactions. However, managers need more sophisticated reports to help them analyze data.

Comprehension check. *Mark the following statements as True or False.*

1. An information system usually helps people to find solutions to their problems.
2. You aren't involved in a transaction when you order a product online.
3. All POS systems automatically calculate, change and identify customers who previously wrote bad checks.
4. Everyone in an organization uses an information system in the same way.
5. An information system has to be computerized.
6. A TPS is one of the components of an information system.

Vocabulary practice

1. Match the words with their synonyms.

accurate	subtract
generate	evolve
deduct	essential
commit	perform
crucial	complicated
sophisticated	exact

2. Fill in the blanks choosing from the variants given.

1. A group of people working together to accomplish a goal is a(n) … .
    a) organization   b) colleagues   c) developers   d) corporation
2. An information system must ... the needs of people who participate in different organizational activities.
    a) protect   b) share   c) support   d) maintain
3. Some POS systems automatically … credit cards.
    a) check   b) verify   c) examine   d) process
4. Many TPS … plenty of transactions to be entered at a time.
    a) allow   b) permit   c) prohibit   d) let
5. An information system ability to assist with problem solving and decision making depends on data it collects and makes … .
    a) shared   b) closed   c) accessible   d) available
6. A TPS simply … data.
    a) stores   b) records   c) processes   d) keeps

3. Make two-word combination using the words in columns and then fill in the gaps in the following sentences.

A:	B:
batch	report
online	method
routine	processing
payroll	tasks
detail	customer
real-time	system

    1. First transaction processing systems used … .
    2. If you buy goods on the Internet you are … .
    3 Online processing is … in which each transaction is processed as it is entered.
    4. A … provides a basic record of completed transactions.
    5. Without a … we can't calculate deductions and taxes, track employee hours generate paychecks.
    6. Often repeated activities are called … .

4. Fill in the gaps in the text.

    ___ systems play a key role in helping organizations achieve goals, which are set forth in a ___ statement. Workers use information systems to produce and manipulate ___. Transaction ___ systems provide an organization with a way to collect, modify, display or ___ transactions. These systems encompass activities such as general accounting, inventory ___, and e-commerce. ___ information systems typically build on the data collected by a TPS to produce ___ that managers use to make the business decisions needed to solve routine, structured problems.

Speaking. *Discuss the following questions.*

1. What is an information system?
2. Who uses information systems?
3. How do information systems help people in an organization?
4. Do organizations require different kinds of information systems?
5. What is a transaction?
6. What is a transaction processing system?
7. What are the limitations of transaction processing systems?

Text B

Pre-reading. *Match the meaning of the following English words and their Russian equivalents.*

1discrete step	a) внедрение
2 checklist	b) пошаговый режим
3 implementation	c) перечень
4 milestone	d) промежуточный этап разработки

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*
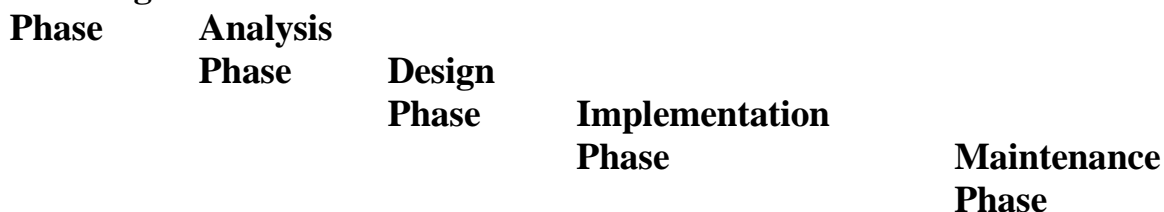
SYSTEMS ANALYSIS

Whether you are a part of a team that is developing a complex corporate information system, or you are developing a small information system for your own use, you will be more likely to succeed if you analyze the purpose of the information system, carefully design the system, test it thoroughly, and document its features. In this text you'll learn about the planning and analysis that's required for an information system.

SYSTEM DEVELOPMENT LIFE CYCLE

An information system progresses through several phases as it is developed, used, and finally retired. These phases are referred to as **a system development life cycle** – usually referred to as **SDLC.**

Planning Phase

    Analysis Phase

        Design Phase

            Implementation Phase

                Maintenance Phase

The original **waterfall SDLC,** shown above, approaches each phase as **a discrete step** in the development process. One phase is supposed to be completed before the next phase can begin.

24

The **SDLC** is an outline of a process that helps develop successful information systems. The process of planning and building and information system according to the **SDLC** is referred to as **systems analysis and design.**

Planning Phase

For creating an information system it's important to have a plan. Initial plans for an information system are developed during the planning phase. The planning phase for an information system project includes the following activities:
- Assemble the project team
- Justify project
- Choose development methodology
- Develop a project schedule
- Produce a Project Development Plan.

The main goal of these activities is to create a **Project Development Plan.** Before the project proceeds beyond the planning phase, the Project Development Plan must typically be reviewed and approved by the management. This planning document includes:

A short description of a project, including its *scope*

A justification for the project, which includes an estimate of the project costs and potential financial benefits

A list of project team participants

A schedule for the project, including **an outline** of its phases

Project planning begins in the planning phase but stretches throughout the entire project. As the project takes shape, project managers break down the work into tasks and **milestones,** which can be scheduled and assisted. As tasks are completed, the schedule can be updated and adjusted. Project management software is an effective tool for planning and scheduling. It helps manages track and visualize the complex interactions between tasks. Popular examples include **open source software**, such as Open WorkBench, and commercial software, such as Microsoft Project.

ANALYSIS PHASE

The **analysis phase** begins after the project team selects a development methodology, draws up the **Project Development Plan**, and receives permission to proceed from management. The goal of the **analysis phase** is to produce a list of requirements for a new or revised information system.

Typically, a new information system is designed to replace a system or process that is already in place. It is important to study the current system to understand its strengths and weaknesses before planning a new system.

System requirements are the criteria for successfully solving problems identified in an information system. There requirements guide the design and implementation for a new or updated information system. They also serve as an evaluation checklist at the end of the development project, so they are sometimes

called **success factors.** A new or updated information system should meet the requirements the project team defines.

The project team determines requirements by interviewing users and studying successful information system that solve problems similar to those in the current system. Another way to determine requirements is to construct a prototype as an experimental or trial version of an information system. Often the prototype is not a fully functioning system because it is designed to demonstrate only selected features that might be incorporated into a new information system. A systems analyst shows the prototype to users, who evaluate which features of the prototype are important for the new information system.

After the project team studies the current system and then determines what the new system should do, system requirements are incorporated into a document called a **System Requirements Report** that describes the objectives for an information system. If management or the project sponsor approves the report, the project can move on to the design phase.

Comprehension check. *Indicate the paragraph where the following ideas are found in the text.*

1. These plans are developed during the planning phase.
2. You can determine the system requirements by this way.
3. A list of requirements for a new system should be produced at this phase.
4. Several phases are required for information process.
5. A plan is inseparable part of an information system.
6. There are plenty of tools for diagramming and specifying the current system.

Vocabulary practice

1. Match up the words that are opposite in the meaning.

<div align="center">

succeed	essential
permission	computerized
updated	fail
manual	destroy
create out	out of date
obsolete	ban

</div>

2. Fill in the blanks choosing from the variants given.

1. Project management software is an effective tool for … and scheduling.
    a) planning   b) maintenance   c) analysis   d) development
2. "A project team" is a group of people who are assigned to analyze and … an information system.
    a) maintain   b) develop   c) implement   d) test
3. Users and analysts work together to identify problems and look for solution in a development process called … application design.
    a) co-operative   b) united   c) joint   d) mutual

4. A modified waterfall SDLC allows to … between SDLC phases
     a) overlap   b) break   c) skip   d) stretch

5. A System Requirements Report describes the … for a new information system.
     a) innovations   b) ideas   c) objectives   d) goals

6. It is difficult to complete the design phase until system … have a chance to work with software tools that are purchased in the implementation phase.
     a) analysts   b) developers   c) builders   d) administrators

3. Make three-word combinations using the words in columns and them fill in the gaps in the following sentences.

A:	B:	C:
information	source	source
joint	requirements	software
project	application	plan
open	system	report
system	management	project
project	development	software

    1. … describes the objectives for an information system.
    2. … is developed during the planning phase.
    3. … must be reviewed and approved by the management.
    4. You can use … for planning and scheduling.
    5. OpenWork Bench and Microsoft Project are …, aren't they?
    6. … is based on the idea that the best information systems are designed when end-users and system analysts work together as equal partners.

4. Fill in the gaps in the text.

The process of planning and building an information system is referred to as systems ___.The development process is supervised by an organization's Information Systems (IS) department, but the ___ team includes members from other departments as well. System development follows some type of system development ___ cycle(SDLC), which consists of several phases. In the ___ SDLC one phase of the SDLC must be completed before the next phase begins. A project begins with a ___ phase in which a member of the IS department creates a Project Development Plan. The project team then proceeds to the ___ phase, with the goal of producing a list of requirements for a new or revised information system.

Speaking. *Discuss the following questions.*

    1. What is a system development life cycle?
    2. How does an information project begin?
    3. What does the planning phase entail?
    4. Do computers offer tools for planning activities?
    5. How does the project team determine what the new system should do?
    6. How does the project team document system requirements?
    7. What does the project team do with system requirements?

Text C

Pre-reading. *Match the terms with their definitions.*

centralized processing	- describes the information system problem and the requirements for the solution.
distributed processing	- describes the way the information system's software should interact with users, store data, process data, and format reports.
request for proposal (RFP)	- in which processing tasks are distributed to servers and workstations.
request for quotation (RFQ)	- is a request for a formal price quotation on a list of hardware and software.
application specifications	- in which data is processed on a centrally located computer.

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

SYSTEM DESIGN

In the design phase of the SDLC, the project team must figure out how the new system will fulfill the requirements specified in the System Requirements Report. The project team should identify several potential hardware and software solutions by brainstorming and researching case studies at Web sites and in computer magazines. When evaluating hardware solutions for a new information system, the project team considers the overall architecture of the information system based on level of automation, processing methodology, and network technology. Some information systems provide a higher level of automation than others. For instance, a point-of-sale system with a low level of automation might require the checkout clerk to enter credit card numbers from a keypad. At a higher level of automation, a magnetic strip reader automates the process of entering a credit card number. A further level of automation is achieved by using a pressure-sensitive digitizing pad and stylus to collect customer signatures.

An information system can be designed for centralized and distributed processing. Distributed processing in a client/server or peer-to-peer environment is very popular because it provides high levels of processing power at a low cost. Virtually every information system requires a network, so the project team must examine network alternatives, such as LANs, extranets, intranets, and the Internet. Many information systems require a complex mixture of networks, such as a LAN in each branch office connected to a company intranet, with customers accessing selected data using the Internet.

The project team might consider software alternatives, such as whether to construct the system "from scratch" in a programming language or select a turnkey system. An information system "from scratch" is usually costly, but offers the most flexibility for meeting the system requirements. An application development tool is

essentially a type of software construction kit containing building blocks that can be assembled into a software product. It includes expert system shells and database management systems.

Commercial software for an information system is usually a series of preprogrammed software modules. It eliminates much of the design work required with programming languages or application development tools. It is available for standard business functions and market businesses and organizations. Although most commercial software has some customization options, in many cases, it cannot be modified to exactly meet every system requirement.

A turnkey system consists of hardware and commercial software designed to offer a complete information system solution. Like commercial software, a turnkey system must be extensively evaluated to determine whether it can satisfy system requirements.

To determine the best solution, the project team devises a list of criteria for comparing each potential solution. It isn't complicated if the project team uses a decision support worksheet. After the project team selects a solution, the next task is to select the hardware and software. Sometimes the team knows exactly what brand, model, or version of hardware and software are required. At other times, the team has a general understanding, but needs vendor help selecting specific products. RFPs and RFQs help the team collect information for these important decisions. Technical criteria for hardware might include processing speed, reliability, upgradability, maintenance costs, and warranty. Technical criteria for software might include reliability, compatibility, and the availability of patches to fix program errors.

Next step depends on the type of solution selected. If a turnkey solution is selected, the next step might be to get approval to move into the implementation phase of the SDLC. In contrast, if the project team selected a solution that requires custom programming, the team's systems analysts will create a set of application specifications. Many project failures are often referred to as feature creep. Proposed changes should be managed within a formal process that includes written change requests.

Comprehension check. *Choose the ending for each sentence from the two versions given.*

1. Distributed processing in a client\server or peer-to-peer environment
 a) is very popular because it provides high levels of processing power at a low price.
 b) is very popular because it provides the highest levels of processing power at a high price.
2. A series of programmed software modules
 a) eliminates much of the design work required with programming languages or application development tools.
 b) requires much of the design work with programming languages or application development tools.

3. An application development tool is
   a) essentially a type of software construction kit containing building blocks that can be assembled into a software product.
   b) a software kit that can't be assembled into a software product.
4. RFPs and RFQs help the team
   a) collect information for the important decisions.
   b) determine information for the important decisions.
5. Technical criteria for hardware might include
   a) processing speed, reliability, upgradability, maintenance cost, and warranty.
   b) reliability, compatibility, and the availability of patches to fix program errors.
6. Many project failures are often referred to as features creep
   a) because of changes in needs.
   b) because old features tend to creep into the development process.

Vocabulary practice

1. Which word does not belong to the group?

   a) research, require, study, examine;
   b) collect, gather, determine, take;
   c) reliability, compatibility, digitizing, availability;
   d) creep ,steal, get into, include;
   e) card, set, kit, collection;
   f) sheave, block, database, pulley.

2. Fill in the missing words choosing from the variants given.

1. The project team should identify … potential hardware and software solutions.
   a) all   b) one from all   c) some
2. Distributed processing provides … of processing power at a low cost.
   a) high levels   b) low levels   c) intermediate levels
3. Many information systems require a complex mixture of networks, such as a LAN in each branch office … a company intranet.
   a) separated from   b) linked to   c) built into
4. An application development tool is essentially a type of software construction kit containing building blocks that can be … a software product.
   a) included into   b) managed by   c) put together into
5. A turnkey system consists of hardware and commercial software designed to … a complete information system solution.
   a) suggest   b) control   c) design
6. A turnkey system must be extensively evaluated to determine weather it can … system requirements.
   a) find out   b) create   c) satisfy
7. The team's systems analysts will create … of application specifications.
   a) data   b) a series   c) a criteria

3. Transform the given sentences using the words in brackets without any change in meanings.

1. Distributed processing in a client/server or peer-to-peer environment is very popular because it provides high levels of processing power at a low cost (*means*).

2. It eliminates much of the design work required with programming languages or application development tools (*eliminated*).

3. Most commercial software cannot be modified to exactly meet every system requirement (*modification*).

4. Like commercial software, a turnkey system must be extensively evaluated to determine whether it can satisfy system requirement (*as…as*).

5. At a higher level of automation, a magnetic strip reader automates the process of entering a credit card number (*automatically*).

6. A further level of automation is achieved by using a pressure-sensitive digitizing pad and stylus to collect customer signatures (*collecting*).

7. The project team should identify several potential hardware and software solutions by brainstorming and researching case studies at Web sites and in computer magazines (*when*).

4. Fill in the gaps in the text.

In the ___ phase of the SDLC, the project team identifies solutions, evaluates those solutions, and then selects the best one. It is possible that a ___ system might offer a complete hardware and software solution. The project team can use a ___ support worksheet to evaluate solutions based on general, technical, and functional criteria.

After the project team selects a solution, it can then select the specific hardware and software products to build the new information system. The project team might send out a request for ___, asking vendors to recommend a solution and specify hardware and software requirements. As an alternative, when team members know exactly what hardware and software they need for the solution, they can send out a request for ___, which simply asks for vendor prices. After selecting hardware and software, the team can develop ___ specifications that descried the way the new information system should interact with the user, store data, process data, and format reports.

Speaking. *Discuss the following question.*

1. What happens in the design phase?
2. How does the project team come up with solution?
3. What hardware alternatives are available?
4. What software alternatives are available?
5. How does the team choose the best solution?
6. How does the project team find the right hardware and software for the new information system?
7. What's an RFP and RFQ?

8. How does the project team evaluate an RFP or RFQ?
9. What happens after the project team selects a solution?
10. What is the importance of application specifications?

Text D

Pre-reading. *Match the terms with their definitions.*

a) system testing `	- is the process of modifying a commercial application to reflect an organization's needs;
integration testing	- ensures that module operates reliably and correctly;
software customization	- is performed to ensure that the modules operate together correctly;
acceptance testing	- is a place where software testing can occur without disrupting the organization's regular information system, or it might be located on an entirely separate computer system;
unit testing	- ensures that all hardware and software components work together correctly;
test area	- is designed to verify that the new Information system works as required;
b) user documentation	- is staffed by technical support specialists familiar with the information system's software;
procedure handbook	- describes a system's features, hardware architecture, and programming;
help desk	- describes how to interact with the system to accomplish specific tasks;
system documentation	- is a type of user documentation that contains step-by-step instructions for performing specific tasks;
c) phased conversion	- means that the old system is completely deactivated and the new system is immediately activated;
direct conversion	- avoids some of the risk of direct conversion because the old system remains in service while some or all of the new system is activated;
pilot conversion	- works well with larger information systems that are modularized because the new system is activated one module at a time;
parallel conversion	- works well in organizations with several branches that have independent information processing systems because the new information system is activated at one branch at a time.

32

__Reading.__ Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

IMPLEMENTATION AND MAINTENANCE

After the plan for an information system is approved, it's time to start building it. The implementation phase can include: purchase and install hardware and/or software, create applications, test applications, finalize documentation, train users, convert data, convert to new system.

Application testing is performed in three ways: unit testing, integration testing, and system testing. Unit testing and integration testing are usually performed in a test area. A test area might to be located in an isolated section of storage on the computer system that runs the organization's regular information system, or might be located on an entirely separate computer system. When a problem is discovered during unit testing or integration testing, the team must track down the source of the problem and correct it. Unit testing and integration testing are then repeated to make sure the problem is corrected, and no new problems were introduced when the original problem was fixed.

The data for a new information system might exist in card files, file folders, or an old information system. This data must be loaded into the new system − a process called "data conversion". When converting data from a manual system to a computer system, the data can be typed or scanned electronically into the appropriate storage media. When converting data from an existing computer system to a new system, a programmer typically writes conversion software to read the old data and convert it into a format that is usable by the new system.

System conversion refers to the process of deactivating an old information system and activating a new one. It is also referred to as "cutover" or "go live". There are several strategies for converting to a new system. They are a direct conversion, a parallel conversion, a phased conversion, a pilot conversion.

A new or upgraded information system undergoes a final test called acceptance testing. It includes the use of real data to demonstrate that the system operates correctly under normal and peak data loads. The term "maintenance phase" is a bit misleading because it seems to imply that the information system is maintained in a static state. On the contrary, during the maintenance phase, an information system is likely to undergo many changes to meet an organization's needs. They can include the following: upgrades to operating system and commercial software, user interface revisions to make the system easier to use, application software revisions to fix bugs and add features, hardware replacements to enhance performance, security upgrades.

To combat an escalating number of viruses, worms, Denial of Service attacks, and intrusions, security has become a top priority for the maintenance phase of an information system's life cycle. Maintaining security is an ongoing activity. A system operator and a systems programmer are responsible for system maintenance. Even after in-depth training, employees sometimes forget procedures or have difficulty when they encounter a new set of circumstances. Many organizations establish a help

desk to handle end-user problems. For example, suppose you encounter a problem with an update procedure and call the help desk. The help desk technician begins to troubleshoot the problem and soon realizes that it is caused by a programming error not caught during system testing. This bug is recorded in a "bug report" that is routed to the programming group, which can determine its severity and take steps to fix it.

Comprehension check. *Match the beginnings of the sentences in the first column with the endings in the second.*

1. Unit testing and integration testing are	a) responsible for system maintenance. … a programmer typically writes.
2. When a problem is discovered during unit testing or integration testing	b) conversion software to read the old data and convert it into a format that is usable by the new system.
3. System conversion refers	c) … usually performed in a test area.
4. When converting data from an existing computer system to a new system	d) … the team must track down the source of the problem and correct it.
5. A system operator and a systems programmer are	e) … to troubleshoot the problem and soon realizes that it is caused by a programming error not caught during system testing.
6. The help desk technician begins	f) … to the process of deactivating an old information system and activating a new one.

Vocabulary practice

1. Put the letters in the following words into the correct order.

sienncovor   ruvis   sinrution   shoyubtleroot   cascumcriten   agerost

2. Fill in the blanks choosing from the variants given.

1. Application testing is performed in three ways: integration testing, unit testing and … .
    a) data testing   b) program testing   c) system testing
2. When a problem is discovered during unit testing or integration testing, the team must … the source of the problem and correct it.
    a) investigate   b) produce   c) include
3. Unit testing and integration testing are repeated to make sure the problem is … .
    a) activated   b) converted   c) solved
4. System conversion refers to the process of deactivating an old … system and activating a new one.
    a) information   b) operating   c) support
5. An information system is likely to undergo many … to meet a company's needs.
    a) changes   b) formats   c) systems
6. Many organizations establish a help desk … end-user problems.
    a) to divide   b) to manage   c) to enlarge

7. The help desk technician begins to troubleshoot the problem and soon … that it is caused by a programming error not caught during system testing.

    a) forgets   b) repeats   c) understands

3. Match the beginnings and the endings of the instructions/steps given and put them into correct order.

1. Create debugger as a system software that helps programmers	a) to determine their needs, problems, and expectations.
2. After that write the specifications and design the computer system and the methods for the information system	b) to solve the problem.
	c) turn it over to the users with accompanying training, as necessary.
3. Write the program in a specific programming language, that specifically refers	d) to writing source code.
4. Depending on the organization and its size, the systems analyst's tasks are	e) necessary or available to solve the problem.
5. Next step is to interview the people who will be using the system	f) to analyze the problem to be solved, the data to be input, the expected output, and other system considerations.
6. With the help of testing and acceptance, make sure the system works properly and	
7. Then determine which people and what kind of software, hardware, and monetary resources are	g) identify errors.
8. Keep system working properly and, if business procedures or conditions are changed,	h) improve them.

4. Fill in the gaps in the text.

During the ___ phase of the SDLC, the project team supervises the technicians who set up new hardware, install programming languages and other application ___ tools, create and test applications, and customize software. The team also finalizes the system documentation and trains users. In this phase, three types of testing ensure that new software works correctly. ___ testing is performed on each module, and then ___ testing is performed to make sure that all of the modules work together correctly. ___ testing ensures that the software components work correctly on the hardware and with other, perhaps older, elements of the information system.

When application testing is complete, data is converted from the old system to the new one, users are trained, and the new system goes live. Four types of information system "go live" conversions are possible. At the end of the conversion process, the information system undergoes a final test called ___ testing, designed to assure the system's owner that the new system works as specified.

After installation, an information system enters the ___ phase of its life cycle.

Speaking. *Discuss the following questions.*

    1. Does a new information system typically require new hardware?
    2. What the next step in the implementation phase?

3. What is application testing?

4. What documentation does the project team create during the implementation phase?

5. How do employees learn how to use the new information system?

6. How does a business switch from the old information system to the new system?

7. What happens during the maintenance phase?

8. How important is system security during this phase?

9. Who is responsible for system maintenance?

10. Why do maintenance activities include user support?

Critical thinking. *Read the article and express your opinion on the problem.*

Online Voting

The idea of online voting surfaced years ago as the Internet gained popularity. The term online voting usually refers to a remote voting system that allows voters to cast their ballots from any computer connected to the Internet.

Because of its advantages, online voting has the potential to attract net-savvy young voters who historically have voted in lower numbers than other segments of the population. It also simplifies the voting process for elderly and homebound voters. The convenience of online voting might also increase participation in local elections.

Online voting has the potential to decrease the number of ballots that are invalidated because of procedural problems, such as failing to completely punch out the "chad" on a ballot card, or checking more than one candidate on a paper ballot. Voting software can prevent voters from erroneously selecting more than one candidate and make sure that voters can revise their selections without invalidating their ballots.

Although there are plenty of supporters of this form of elections there are lots of opponents because of the risk of some technological issues with Internet security.

In addition to them online voting opponents have concerns about voter fraud and privacy.

For democracy to function properly, its citizens should be confident that the electoral system is honest and works. Online voting presents some sticky technological and social challenges. Although these challenges exist, secure technologies for online banking and e-commerce are working, so shouldn't it be possible to design an online voting system that's secure enough to conduct our elections?

What do you think?

1. Would you prefer online voting to voting at a polling place?

2. Should online voting be available only to specific groups of people who currently have trouble reaching polling places?

3. What technical issues can online voting face and how to solve them?

Projects. *Perform the project given.*

1. Form a group of two to five students as the project team for a systems development project. Elect one person as the team leader, who will assign tasks to each group member. Your team's mission is to complete the planning phase for a systems development project and produce a Project Development Plan. The first task is to identify and briefly describe an information system at school, work, or local business that needs improvement. The second task is to make a list of problems and opportunities that exist in that system. The third task is to make a list of tasks your team would perform, design, construct, and implement a new information system. Finally, incorporate all your findings into a document that would serve as the Project Development Plan. Submit this plan to your instructor, who might provide additional directions for your group work and report format.

2. Create 10 rules for an expert system that pertains to your career field. To complete the assignment, think of a set of simple decisions that someone on the job might be required to perform. For example, a loan officer might be required to make a quick evaluation of a borrower, an auto mechanic might be required to figure out what various tapping noises mean, or a fitness instructor might be required to recommend the best type of fitness class for clients. Make a list of 10 rules that would help make the decision. The rules should be in the format IF…THEN…Submit your rules to your instructor.

Final test. *Do the tasks in the following test.*

1. In the analysis phase, the project team determines how the new information system will meet the requirements. (*True/False*)
2. A … tool is a software application that is designed for documenting system requirements, diagramming current information systems, scheduling development tasks and developing computer programs.
3. The process of planning and building a new information system is referred to as systems … and design.
4. The goal of the…phase is to produce a list of requirements for a new or revised information system.
5. A Project Development Plan typically must be approved by the management before a project proceeds beyond the planning phase. (*True/False*)
6. In an information system context, a … is an exchange between two parties that is recorded and stored in a computer system.
7. Generally most transaction processing systems provide managers with detail reports that contain all the information needed to understand and analyze data. (*True/False*)
8. A transaction …- system provides a way to process, store, display, modify, or cancel transactions.
9. During the … phase, the project team supervises the tasks necessary to construct the new information system.
10. If you have a question about the information system you are using, the first step to finding the answer is to call the help desk. (*True/False*)

11. In the … phase, the project team identifies potential solutions, evaluates these solutions, and then selects the best solution.

12. If a project- team selects turnkey solution the next step would be to have the team's system analysts create a set of application specifications. (*True/False*)

13. … processing using client/server or peer-to-peer architecture provides high level processing power at a low cost.

14. Which of the following documents ask a vendor both to recommend hard ware and software for an information system solution and to provide the vendors qualifications to implement the solution.

    a) request for quotation   c) request for solution
    b) request for qualifications   d) none of the above

15. Which type of transaction processing systems collects and holds a group of transactions for processing until the end of a day or a pay period.

    a) online processing   c) group processing
    b) batch processing   d) rollback processing

16. Unit testing is normally performed in a test area. (*True/False*)

17. Which phase of an SDLC is usually the most expensive?

18. The analysis phase concludes when the System Requirement Report is written. (*True/False*)

19. An expert system uses fuzzy logic to deal with imprecise data by asking for a level of confidence with an DLTP system, if one step fails during the transaction, the record will … to their original state.

20. All of the following activities take place during the implementation phase EXCEPT.

a) purchasing and installing software   c) purchasing and installing software
b) creating applications   d) testing applications

Unit 7. DATABASES

Text A

Reading*. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

FILE AND DATABASE CONCEPTS

In the broadest definition, a database is a collection of information. Today, databases are typically stored as computer files. The tasks **associated** with creating, maintaining, and **accessing** the information in these files are referred to as data management, file management, or database management. The basic element of a structured file is a field. It contains the smallest unit of meaningful information. Each field has a unique field name that describes its contents. For example, in the Vintage Music Shop database, the field name Album Title describes a field containing the name of an album, such as *Hard Day's Night*. A field can be variable length or fixed length. A variable-length field is like an accordion – it expands to fit the data you enter, up to some maximum number of characters. A fixed-length field contains a predetermined number of characters (bytes). The data you enter in a fixed-length field cannot exceed the allocated field length. Moreover, if the data you enter is shorter than the allocated length, blank spaces are automatically added to fill the field.

In the world of computing, a record refers to a collection of data fields. Computer databases typically display records as rows in a table or as forms. Each kind of record is referred to as a record type. It is usually shown without any data in the fields. A record that contains data is referred to as a record occurrence, or simply a record.

A structure file that contains only one record type is often referred to as a flat file. Flat files can be used to store simple data, such as names and addresses. In contrast, a database can contain a variety of different record types. A key characteristic of a database is its ability to maintain relationships do that data from several record types can be consolidated or aggregated into essentially one unit for data retrieval and reporting purposes. In database jargon, a relationship is an association between data that's stored in different record types. For example, Vintage Music Shop's Customers record type is related to the Orders record type because customers place orders.

An important aspect of the relationship between record types is cardinality. Cardinality refers to the number of associations that can exist between two record types. When one record is related to many records, the relationship is referred to as a one-to-many relationship. A many-to-many relationship means that one record in a particular record type can be related to many records in another record type, or vice versa. The relationship between record types can be **depicted** graphically with an entity-relationship diagram (sometimes called an "ER diagram" or "ERD").

Several database models exist. Some models work with all the relationships described earlier in this section, whereas other models work with only a subset of the

relationships. The four main types of database models in use today are ***hierarchical***, network, relational, and object oriented. The simplest database model arranges record types as a hierarchy. In a hierarchical database, a record type is referred to as a ***node*** or "segment". The top node of the hierarchy is referred to as the root node. Nodes are arranged in a hierarchical structure as a sort of upside-down tree. A parent node can have more than one child node. But a child node can have only one parent node.

The network database model allows many-to-many relationships in addition to one-to-many relationships. Related record types are referred to as a network set, or simply a "set". A set contains an owner and members. An owner is similar to a parent record in a hierarchical database. A member is roughly equivalent to a child record. The most popular database model today is a relational database. It stores data in a collection of ***related*** tables. Each ***table*** (also called a "relation") is a sequence, or list, of records. All the records in a table are of the same record type. Each row of a table is equivalent to a record as is sometimes called a tuple. Each column of the table is equivalent to a field, sometimes called an attribute. Relationships can be added, changed, or deleted on demand. An object-oriented database stores data as objects, which can be grouped into classes and defined by attributes and methods. A class defines a group of objects by specifying the attributes and methods this objects share. The attributes for an object are equivalent to fields in a relational database. A method is any behavior that an object is ***capable*** of performing. There is no equivalent to a method in a non-object-oriented database.

Comprehension check. *Mark the following statements as True or False.*

1. The field is a basic element of a structured file.
2. The field contains the biggest unit of meaningful information.
3. The length of a field is always fixed.
4. Simple data, such as names and addresses, can be stored in flat files.
5. Every relation is a sequence, or list, of records.
6. Relationships can be changed or deleted on demand.

Vocabulary practice

1. In the text, find the synonyms to the given words.

  a node   important   several   typically   to perform   to comprise

2. Fill in the blanks choosing from the variants given.

1. The most popular database model today is a … database.
        a) relational   b) object-oriented   c) non-object
2. The data you enter in a … field cannot exceed the allocated field length.
        a) fixed-length   b) variable-length
3. All the records in a table are of the same record … .
        a) group   b) type   c) set
4. The simplest database model arranges record types as a … .
        a) hierarchy   b) column   c) relation

5. Each field has a … field name that describes its contents.

                a) unique   b) unusual   c) unknown

6. All the records in a table are of the … record type.

                a) same   b) different   c) simple

3. Make two-word combinations using the words in columns and then fill in the gaps in the following sentences.

A:		B:	
	non-object-oriented		type
	a many-to- many		relationship
	record		database
	flat		length
	simple		data
	allocated		file

1. Any kind of record is referred to as a … .

2. Flat files can be used to store …, such as names and addresses.

3. Moreover, if the data you enter is shorter than the …, blank spaces are automatically added to fill the field.

4. There is no equivalent to a method in a … .

5. A structure file that contains only one record type is often referred to as a … .

6. … means that one record in a particular record type can be related to many records in another record type, or vice versa.

4. Fill in the gaps in the text.

Computer databases evolved from manual file processing technology in which data is stored in a single ___ file that uses a uniform format for every item the file contains. A ___ holds the smallest unit of meaningful information. A series of data fields forms a ___, which stores data about one entity – a person, place, thing, or event.

Each kind of record is referred to as a record type. A record that contains data is sometimes referred to as a record ___. A ___ file contains only one record type. In contrast, a ___ can contain a variety of different record type.

Speaking. *Discuss the following questions.*

1. What is a database?
2. What is the basic element of a structured file?
3. What is a record?
4. What is involved in defining the structure for records in a file?
5. What are relationships?

Text B

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

DATA MANAGEMENT TOOLS

Data Management Software

The simplest tools for managing data are software packages dedicated to a specific data management task, such as keeping track of appointments or managing your ***checking account***. You can purchase these tools or download them from Internet. Although these tools are easy to use, they don't generally allow you to create new record types because the new record types are ***predefined***. Most ***spreadsheet*** and word processing software packages feature simple tools that allow you to specify fields, enter data and ***manipulate*** it. For example, Microsoft Excel allows you to sort records, validate data, search for records, perform simple statistical functions, and generate graphs based on the data. Such simple file management tools are popular for individuals who want to maintain flat files that contain hundreds, not thousands, of records. To create your own data management software it is possible to simply enter data as an ASCII text file, and then use a programming language to write routines to access that data.

Database Management Systems

The term DBMS (Database Management System) refers to software that is designed to manage data stored in a ***database***. Each DBMS typically specializes in one of the four database models, but some DBMS software offers versatility by dealing with a variety of models and data. An XML DBMS, for example, is optimized for handling data that exists in XML format. An OODBMS (object-oriented database management system) is optimized for an object-oriented database model, allowing you ***to store*** and manipulate data classes, attributes, and methods. Database client software allows any remote computer or network workstation to access data in a database.

Databases and the Web

The Web provides an opportunity for many people to gain access to data from ***multiple*** locations. The simplest way to provide Web access to database is converting a data base report into a HTML document, which can be ***displayed*** as a Web page by a browser. In several situations, such as e-commerce, it is important for people to use a browser to add or update records in a database. For example, the process of ordering merchandise at Vintage Music Shop creates a new order record, changes the In Stock field in the Albums table, and creates a customer record for first-time customers. These dynamic database updates require an architecture similar to that used for dynamic Web publishing, plus the use of forms. A form usually exists on a Web

server, which sends the form to your browser. Several tools, including ASP, CGI, and PHP, help you create server-side programs.

XML Documents

XML is a markup language that allows field **tags**, data, and tables to be incorporated into a Web document. It was developed in response to several deficiencies that became apparent as HTML gained widespread use. For example, suppose you are interested in speeches given by Martin Luther King, Jr. Entering his name in a search engine produces thousands of entries, including MLK biographies, streets and schools named after a famous civil rights leader, historic locations relating to the civil rights movement and so on. XML provides tags that can by embedded in a XML document to put data in context.

As you can see, many techniques exist for storing, accessing, and displaying the data from the databases. Sometimes more than one tool has the potential to work for a specific application. Now that you've had an introduction to the options, you should be able **to evaluate** when and how to use them.

Comprehension check. *Mark the following statements as True or False.*

1. Many techniques exist for storing, accessing, and displaying the data from the databases.
2. The Web provides an opportunity for a limited number of people to gain access to data from multiple locations.
3. Simple file management tools are popular for individuals who want to maintain files that contain thousands of records.
4. The term DBMS (Database Management System) refers to software that is designed to manage data stored in a database.
5. Microsoft Excel doesn't allow you to sort records, validate data, search for records, perform simple statistical functions, and generate graphs based on the data.
6. XML is a markup language that allows field tags, data, and tables to be incorporated into a Web document.

Vocabulary practice

1. In the text find the opposites to the given words.

civil   sometimes   simple   purchase   allow   unknown

2. Fill in the blanks choosing from the variants given.

1. Most spreadsheet and word processing software (*sets, packages, collections*) feature simple tool that allow you to specify fields, enter data and manipulate it.
2. As you can see, many techniques (*are existing, exist, have been existed*) for storing, accessing, and displaying the data from the databases.
3. For example, Microsoft Excel (*to allow, is allowing, allows*) you to sort records, validate data, search for records.

4. XML (*were, is, have been*) a markup language that allows field tags, data, and tables to be incorporated into a Web document.

5. Now that you (*have had, had, has had*) an introduction to the options, you should be able to evaluate when and how to use them.

6. Many (*methods, ways, techniques*) exist for storing, accessing and displaying the data from the databases.

3. Make three-word combinations using the words in the columns and then fill in the gaps in the following sentences.

A:	address	B:	client	C:	software
	System		management		task
	database		book		Database
	data		management		software
	database		Management		information
	data		server		software

1. The simplest tools for managing data are soft packages dedicated to a specific … .

2. The term DBMS … refers to software that is designed to manage data stored in a database.

3. Simple tools that easily store … might not be suited for managing a worldwide airline reservation system.

4. To create your own … it is possible to simply enter data as an ASCII text file.

5. … is designed to manage billions of records and lots of transactions every second.

6. … allows any remote computer or network workstation to access data in a database.

4. Fill in the gaps in the text.

The data in a database can be ___ over the Web. A simple process called ___ Web publishing converts a database report into an HTML document, which can be displayed by a browser. More sophisticated ___ Web publishing produces data from a database on demand. HTML forms and XForms not only provide search capabilities, but can also be used to add or modify data in a ___ with a Web browser. ___ documents provide a Web-based data management tool that uses special __ as field names within a document.

Speaking. *Discuss the following questions.*

1. Are simple data management tools available?
2. Can you create your own data management software?
3. What kinds of tools are specially designed for creating and manipulating databases?
4. Is it possible to access a database over the Web?

Text C

Pre-reading task. Match the meaning of the following English words with the Russian equivalents.

1. conversion routine	a) избыточность данных
2. data redundancy	b) порядок сортировки
3. BLOB	c) индекс базы данных
4. variable-length field	d) конверсионная подпрограмма
5. primary key	e) первичный ключ
6. sort order	f) целочисленный тип данных
7. validation rule	g) большой двоичный объект
8. fixed-length field	h) поле неподвижной длины
9. integer data type	i) правило ратификации
10. database index	j) поле переменной длины

Reading. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

DATABASE DESIGN

The **key** to an effective database is its **initial** design. In a well-designed database, data can be **flexibly** manipulated to produce timely, **meaningful**, and **accurat**e information for decision making. Bad database design can **lead** to **messy** database, lost records, and inaccurate data. The **goal** of database design is to store information so that it easy to access and maintain, but **concise** enough to take up as little disk space as possible.

The term **database structure** refers to the arrangement of **fields**, tables, and **relationships** in a database. The first step in structuring a **relational** database is to determine what data must be collected and stored. To do so, a database designer might begin by consulting users and studying the **current** filing system to compile a list of available data as well as any **additional** data necessary to produce **on-screen** output or printed reports.

After the designer determines what data to store, the next step is to organize that data into fields. It is usually easy to break data into fields just by using **common sense** and considering how people might want to access the data. Any data that people would to search for, sort on, or use in a calculation should be in its own field. The **treatment** of first and last name **illustrates** the concept of breaking data into fields. A database designer could **define** a field called Name to hold an entire customer's name. With the entire name in one field, however, the database would not be able to access individual parts of the name, making it difficult to **alphabetize** customers by last name or to produce a report in which names appear in one field. That's why the last names are stored in a different field than first names.

Although two people might have, for example, the same name or two paychecks might contain the same amount, a computer must have some way to **differentiate** between records. A **primary key** is a field that contains data **unique** to a record.

The data that can be entered into a field depends on the field's data type. From a technical perspective, **data type** *specifies* the way data is represented on the disk and in RAM. From a user perspective, the data type determines the way data can be manipulated. When designing a database, each field is *assigned* a data type. Data can be broadly classified as numeric or *character.* Character data contains letters, numerals and symbols not used for calculations. Numeric data contains numbers that can be manipulated mathematically by *adding*, *averaging*, *multiplying* and so forth. The are several numeric data types, including real, integer, and date. The **real data** type is used for fields that contain numbers with decimal places- prices, percentages, and so on. The **integer data** type is used for fields that contain whole numbers- quantities, repetitions, rankings, and so on. The **date data type** is used to store dates in a format that allows them to be manipulated, such as you want to calculate the numbers of days between two dates.

The **text data type** is *typically* assigned to *fixed-length fields* that hold character data- people's names, albums titles, and so on. Text fields sometimes hold data that looks like numbers, but doesn't need to be mathematically manipulated. Telephone numbers and ZIP codes are examples of data that looks numeric, but should be stored in text fields. A **memo data type** usually provides a *variable-length field* into which users can enter comments. The **logical data type** (sometimes called a Boolean or yes/no data type) is used for true/false or yes/no data using minimal storage space. Some file and database management systems also include additional data types, such as BLOBs and hyperlinks. A **BLOB** (binary large object) is a collection of binary data stored in a single field of a database. BLOBs can be just about any kind of data you would store as a file, such as an MP3 music track. The **hyperlink data type** stores URLs used to link directly from a database to a Web page.

The information produced by reports and processing routines is only as *accurate* as the information in the database. Unfortunately, data *entry errors* can *compromis*e the *accuracy* and *validity* of a database. When designing a database, it is important *to think ahead* and *envision* potential data entry errors. Preventing every *typographical* error is not possible. However, it is possible to catch some of these errors by using field validation rules, list boxes, or lookups. A process called **normalization** helps to create a database structure that can save storage space and *increase* processing efficiency. The goal of normalization is to *minimize* **data redundancy** – the amount of data that is repeated or *duplicated* in a database.

Records in a database can be organized in different way depending how people want to use them. No single way of organizing the data *accommodates* everyone need's, but tables can be sorted or *indexed* in multiple ways. A table's **sort order** is the order in which records are stored on disk. Sorted tables typically produce faster queries and updates. In a sorted table, new records are inserted to maintain the order. Most DBMSs use a sort key to determine the order in which records are stored. A table's **sort key** is one or more fields used to specify where new records are inserted in a table. A database index can be used to organize data in alphabetic or numeric order. A **database index** contains a list of keys, and each key provides a *pointer* to the record that contains the rest of the fields related to that key.

Designing the database user interface can be a ***challenging*** task. If a company's database includes multiple tables used by many different people, a professional user interface designer usually creates and maintains the user interface. Large databases might even require a group of user interface designers, ***meanwhile*** the interfaces for smaller databases, such as those used by small business or individuals, is most likely created by a single one.

A ***well-defined*** user interface for a database should be clear, ***intuitive***, and efficient. A designer might consider the following principles:

- Arrange fields in a logical order beginning at the top-left of the screen. The first field should be those used most often or those that come first in the data entry ***sequence.***

- Provide ***visual clues*** to the entry areas. An edit box, line, or shaded area can ***delineate*** data entry areas.

- Entry areas should appear in a consistent position relative to their ***labels***. By convention, labels are placed left of the entry areas or above them.

- Provide a quick way to move through the fields in order. By convention, the tab key performs this function.

- If all fields do not fit on a single screen, use ***scrolling*** or create a second screen.

- Provide buttons or other ***easy-to-use*** controls for moving from one record to another.

- Supply on-screen instructions to help ensure that data is entered correctly. Web database can ***benefit*** from links to ***help pages.***

After the design for the database structure is completed, it is time to load the database with an ***initial*** set of data. Data can be loaded into a database manually by using ***generic*** data entry tools supplied with the DBMS or by using a customized data entry module created by the database designer. Entering data manually can take a long time, however, and mistakes such as ***misspelling*** are common. If the data exists electronically in another type of database or in flat files, it is usually possible to transfer the data using a custom-written conversion routine or import and export routines. A **conversion routine** converts the data from its ***current*** format into a format that can be automatically ***incorporate*** into the new database. It takes some time and requires knowledge about database formats to write conversion routines, but for large databases, it's much quicker to convert data than to re-enter it manually. Converting data also results in fewer errors.

Some DBMSs provide ***built-in*** import and export routines that automatically convert data from one file format to another. An import routine brings data into a database. For example, if data was ***previously*** stored as a spread-sheet file, an import routine in Microsoft Access can be used to transfer data from the spreadsheet to an Access database. In contrast, an export routine copies data out of a software package, such as spreadsheet software, and into the database. Typically, you would use either an import routine or an export routine to move data from one ***location*** to another, but not both.

Comprehension check. *Choose the ending for each sentence from the two versions given.*

1. The key to an effective database is
    a) its initial design.
    b) to determine what data must be collected and stored.
2. The term database structure refers to
    a) the arrangement of fields, tables, and relationships in a database.
    b) the concept of breaking data into fields.
3. From a technical perspective, data type specifies
    a) the way data can be manipulated.
    b) the way data is represented on the disk and in RAM.
4. Character data contains
    a) letters, numerals and symbols not used for calculations.
    b) numbers that can be manipulated mathematically.
5. The goal of normalization
    a) to produce timely, meaningful, and accurate information for decision making.
    b) is to minimize data redundancy-the amount of data that is repeated or duplicated in a database.
6. After the design for the database structure is completed, it is time
    a) to determine the order in which records are stored.
    b) to load the database with an initial set of data.

Vocabulary practice

1. Which word does not belong to the group?

    a) initial, original, primary, subsequent;
    b) allow, permit, let, advice (verb + object + to);
    c) current, visual, intuitive, efficiently;
    d) carry out, execute, fulfill, specify;
    e) reduce, decrease, minimize, grow up;
    f) tool, device, equipment, gadget.

2. Fill in the blanks choosing from the variants given.

1. In a well-designed database, data can be … manipulated to produce timely, meaningful, and accurate information for decision making.
    a) flexibly   b) smoothly   c) slowly   d) hardly
2. The term database structure refers to the … of fields, tables, and relationships in a database.
    a) agreement   b) allocation   c) arrangement   d) appointment
3. A primary key is a … that contains data unique to record.
    a) space   b) field   c) table   d) file
4. When designing a database, you should … and envision potential data entry errors.
    a) think ahead   b) think about   c) think over   d) think out

5. Entering data … can take a long time, however, and mistakes such as misspelling are common.

a) electronically   b) automatically   c) in written form   d) manually

6. A conversion routine … the data from its current format into a format that can be automatically incorporate into the new database.

a) provides   b) transfers   c) converts   d) supplies

3. Transform the given sentences using the word in brackets without any change in meaning. You may omit, change or add words as required.

1. The goal of database design is to store information so that it easy to access and maintain (*aim*).

2. The treatment of first and last name illustrates the concept of breaking data into fields (*shows*).

3. BLOBs can be just about any kind of data you would typically store as a file, such as an MP3 music track (*usually*).

4. The information produced by reports and processing routines is only as accurate as the information in the database (*exact*).

5. No single way of organizing the data accommodates everyone need's, but tables can be sorted or indexed in multiple ways (*satisfies*).

6. Typically, you would use either an import routine or an export routine to move data from one location to another, but not both. (*place*).

4. Fill in the gaps in the text.

The first step in designing relational data base is to define its fields by specifying a ___and data type. Integer, date and ___ data types are used for fields that might be mathematically manipulated. The ___ data type is used for fixed-length fields containing text that is not intended to be mathematically manipulated. The ___ data type is a variable-length field for entering text. The ___ data type is used to store true/false or yes/no data. The ___ data type is used to store binary data, such as MP3 files or graphics. When designing fields, a database designer can also include field formats, field ___ rules, and lookup routines to reduce data entry errors.

Speaking. *Discuss the following questions.*

1. What is the goal of a well-designed database?
2. What does the term database structure refer to?
3. Speak on the first step in structuring a relational database? What is the next step?
4. Why are last names stored in a different field than first names?
5. What does make each record unique?
6. How does a database designer know what data types to use?
7. Can a database designer prevent people from entering inaccurate data?
8. What is normalization?

9. What are the principles that a designer might consider to improve this database?

10. How is data loaded into database tables?

Text D

Pre-reading task. Match the meaning of the following English words with their Russian definitions.

1. SQL query	a) запись
2. Database client software	b) полное обновление
3. Relation database	c) язык запросов
4. Record	d) реляционная база данных
5. Global update	e) ключевое слово
6. Parameter	f) программное обеспечение клиента базы данных
7. Keyword	g) SQL-запрос
8. Query language	h) слово-команда
9. Command word	i) объединение таблиц
10. Joining tables	j) параметр

Reading. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

SQL

Adding records, finding information and making updates are all important aspects of database use. Most people who access a database on a "casual" basis interact with very simple user interfaces. These user interfaces **shield** users from the **intricacies** of sophisticated query languages. Nevertheless, a little **background** in query languages can help you understand the power and capabilities of databases.

Query languages like **SQL** (Structured Query Language) typically work behind the scenes as an **intermediary** between the database client software provided to users and the database itself. Database client software provides an easy-to-use interface for entering search **specifications**, new records, data updates, and so on. The client software **collects** your input, and then converts it into an **SQL query**, which can **operate** directly on the database to carry out your instructions.

An SQL query is a sequence of words, much like a sentence. Most **implementations** of SQL accept either uppercase or lowercase keywords.

The SQL query language provides a collection of special **command words** called **SQL keywords**, such as SELECT, FROM, INSERT, and WHERE, which **issue** instructions to the database. Most SQL queries can be divided into three simple elements that specify an action, the name of database table, and a set of parameters. Let's look at each of these elements.

An SQL query typically begins with an action keyword, or command, which specifies the operation you want to carry out. For examples, the command word

DELETE *removes* a record from a table, the command word **CREATE** creates a database or table, the command word **INSERT** is used to add a record, the command word **JOIN** uses the data from two tables, **SELECT** searches for records and **UPDATE** changes data in the field.

SQL keywords such as USE, FROM, or INTO can be used to construct a *clause* specifying the table you want to access. The clause consists of a keywords followed by the name of the table. For example, the clause **FROM Tracks** *indicates* that you want to use the Tracks table from the Vintage Music Shop's database.

The term **parameter** refers to detailed specifications for a command. Keyword such as WHERE usually begin an SQL clause containing the parameters for a command.

One of the most common database operations is to query for a particular record or group of records by using the **SELECT** command. The phrase, for example, **SELECTAlbumTitle, Album Cover** specifies that the database should show you only the album title and cover, and until you *confirm* that is the album you are interested in, it will not show you additional information such as the price or list of tracks.

You can change records in a database only if you have *authorization* to do so. At Vintage Music Shop's site, for example, customers do not have authorization to change album prices or *alter* the name of the songs on an album. The process of purchasing an album, however, does cause an update in the whole database. Your purchase just *reduces* the number of albums in the shop's *inventory*. To accomplish this update, one of the software modules in the shop's inventory system issues an SQL **UPDATE** command to reduce the number in the InStock field record. In addition to changing the data in a single record, SQL can perform a **global update** that changes the date in more than one record at a time. It means that is possible to update a group of records. Suppose you're Vintage Music Shop's marketing manager, and you want *to put* all The Rolling Stones albums *on sale* by reducing the DiscountPrice to $9.95. You could do it the hard way by searching for an ArtistName field that contains "Rolling Stones", adjusting the DiscountPrice field for that record, and then looking for the next Rolling Stones album. However, it would be easier to change all records with a single command. The following SQL statement accomplish this global update:
UPDATE Albums
SET DiscountPrice=9.95
WHERE ArtistName="Rolling Stones"

Let's see how this command performs a global update. The UPDATE command means you want to change the data in some or all of records. Albums is the name of the record type containing the data you want to change. SET DiscountPrice=9.95 tells the DBMS to change the data in the DiscountePrice field to $9.95. WHERE ArtistName="Rolling Stones" tells the DBMS to change only those records where the artist name is Rolling Stones. Although the global update function is powerful, it works only for records that have *similar* characteristics.

Recall that the process of normalization creates tables that can be related by fields that exist in both tables. In SQL terminology, the creating a relationship

between tables is referred to as **joining tables.** To take *advantage* of the relationship between two tables, you first have to join the tables. Why? Remember that in relational database, the tables are essential**y** independent unless you join them together. The **SQL JOIN** command *allows* you to *temporarily* join and *simultaneously* access the data in more than one table.

SQL is a very *extensive* and powerful language that can be used not only to manipulate data, but also to create databases, tables and reports. Because SQL is one of the most popular database *tools,* many computer professionals consider SQL fluency as essential *career skill.*

Comprehension check. *Match the beginning of the sentences in the first column with the endings in the second.*

1. Adding records, finding information, and making updates	a) as an intermediary between database client software provided to users and the database itself.
2. Query languages like SQL typically work behind the scenes	b) are all important aspects of database use.
3. Database client software provides	c) a sequence of words, much like a sentence.
4. An SQL query is	d) only if you have authorization to do so.
5. The process of purchasing an album	e) an easy-to-use interface for entering search specifications, new records, data updates and so on.
6. The SQL JOIN command allows you	f) does cause an update in the whole database. Your purchase just reduce the numbers of albums in the shop's inventory.

Vocabulary practice

1. Put the letters in the words in brackets into the correct order.

1. A little … in query languages can help you understand the power and capabilities of databases (*roducknabg*).

2. An SQL query typically begins with an action …, or command, which specifies the operation you want to carry out (*weykdor*).

3. The clause consists of a keywords followed by the name of the … (*ablet*).

4. Your … just reduces the numbers of albums in the shop's inventory (*sacherup*).

5. The term … refers to detailed specifications for a command (earpmaret).

6. Although the global update function is powerful, it works only for … that have similar characteristics (coerdrs).

2. Fill in the blanks choosing from the variants given.

1. Most people who access a database on a "casual" basis … with very simple user interface.
    a) manipulate   b) work   c) operate   d) interact

2. A little … in query languages can help you understand the capabilities of databases.
    a) certainty   b) background   c) career skills   d) experience

52

3. The SQL query language provides a collection of special command … called SQL keywords, such as SELECT, FROM, INSERT, and WHERE, which issue instructions of the database.

     a) words   b) passwords   c) names   d) numbers

4. Most SQL queries can be divided into three simple elements that … an action, the name of database table, and a set of parameters.

     a) execute   b) indicate   c) construct   d) specify

5. Customers do not have … to change album prices or alter the name of the songs on an album.

     a) authorization   b) rights   c) permission   d) possibilities

6. SQL is a very extensive and powerful language that can be used not only to … data, but also to create databases, tables and reports.

     a) enter   b) manipulate   c) to make updates   d) input

3. Match the beginnings and the endings of the steps given and put them into correct order.

1 SET DiscountPrice=9.95 tells 2. WHERE ArtistName="Rolling Stones" tells 3. Albums is 4. The UPDATE command means 5. It means that 6. SQL can perform a global update	a) the name of the record type containing the data you want to change. b) to change the data in the DiscountePrice field to $9.95. c) to change only those records where the artist name is Rolling Stones. d) you want to change the data in some or all of records. e) that changes the date in more than one record at time. f) is possible to update a group of records.

4. Fill in the gaps in the text.

SQL is a database query language that typically works behind the scenes as an intermediary between the database ___ software provided to users and the database itself. Although the specifications for searchers and other database tasks are collected by easy-to use graphical user interfaces, those specifications are converted into SQL ___ which can communicate directly with the database. An SQL query contains SQL ___ such as SELECT, FROM, INSERT, JOIN and WHERE, plus ___ that specify the details of the command. Records can be removed from a database using the SQL ___ command. Record can be added to a table using the SQL ___ command. To search for data, you can use the SQL ___ command. To change or replace the data in a field requires the SQL ___ command.

Speaking. *Discuss the following questions.*

    1. What are the most important aspects of database use?
    2. Why is so important to have a little background in query languages?

3. What does the abbreviation SQL stand for?

4. How does a query language like SQL work?

5. What does a simple SQL query look like?

6. How does SQL specify the action that someone wants carried out in the data base? Speak on the most commonly used SQL command words.

7. How does SQL specify which table to use?

8. How do SQL queries carry out searches?

9. Is it possible to change the contents of records or to update a group of records? What does the process of purchasing cause?

10. How is the date retrieved from more than one table at a time? What command does allow you to access the data in more than one table?

Critical thinking. Read the article and express your opinion on the problem.

Privacy

You might be astonished by the amount of information stored about you in computer database. You bank has information on your financial status, credit history, and the people, organizations, and businesses to which you write checks. School records indicate something about your ability to learn and the subjects that interest you. Medical records indicate the state of your health. Credit card companies track the places you shop and what you purchase in person, by main, or on the Web. Your phone company stored your phone number, your address, and a list of the phone numbers you dial. The driver's license bureau has your physical description. Your internet cookies track many of the Web sites you frequent. By compiling this data-a process sometimes referred to as "profiling'-an interested person or company could guess some very privet things about you, such as your political views or even your sexual orientation.

When records were stored on index cards and in file folders, locating and distributing data constituted a laborious process that required hand transcriptions or photocopies of piles of papers. Today, this data exists in electronic format and easy to access, copy, sell, shop, consolidate, and alter.

Privacy advocates point out the potential for misusing data that has been collected and stored in computer database. In response to terrorist threats, the Pentagon is working on several controversial projects designed to mine data from database that store information about passports, visas, work permits, car rentals, air-line reservations, arrests, bank accounts, school grades, medical history, and fingerprints. Government data miners believe that data mining could uncover terrorists. Privacy advocates note, however, that every data set contains patterns. The big question is whether any set of seemingly innocent activities, such as credit card purchases, can be correlated with impending terrorist acts. The potential for error and privacy violation in generalized data mining projects is sobering. Privacy advocates are encouraging lawmakers to closely monitor government snooping and restrict privet-sector sale and distribution of information about individuals. Some legislation is in place for certain private-sector institutions. For example, the 1999 Financial

Services Modernization Act requires financial institutions to supply clients with an annual notice expanding how personal information is collected and share. This legislation also required financial institution to provide a way for clients to opt out of such information exchanges.

The issue of privacy is not simple. Information about you is not necessarily "yours". Although you might "reveal" information about yourself on an application form, other information about you is collected without your direct input. For example, suppose you default on you credit card payment. The credit card company has accumulated information about your delinquent status. Shouldn't it have freedom to distribute this information, foe example, to another credit company?

People aren't always unwilling victims of privacy violations. Many individuals knowingly let companies gather profiling information to get free products. For example, thousands of people signed up for Google's Gmail service even though they knew their e-mail massages could be scanned to develop marketing profile.

Unfortunately, private information can be garnered from your computer without your permission. Spyware is a type of software containing code that tracks personal information from your computer and passes it on to third parties, without your authorization or knowledge. Spyware might be embedded in an application that you download, or it can download itself from unscrupulous Web-sites-a process called a "driveby download"Database containing personal information do offer positive benefits. For example, many web surfers appreciate the shortcuts offered by software agents that assemble a customer profile in order to recommend books, CDs, videos, new articles, and other targeted goods and services. These users might willingly give up some measure of privacy for the convenience afforded by these agents.
The electronic privacy issue appears to be heading toward some type of compromise between strict privacy and wholesale collection/distribution of personal data.

What do you think?

1. Do you think data about you should be distributed only after your permission is obtained?

2. Can you identify an actual incident when you discovered that data about you was distributed without your approval?

3. Do you think the information you provide on paper forms is more private than the information you enter into Web-based format?

4. Have you thought about ways to protect your privacy?

Final test. Do the tasks in the following test.

1. A(n) … file is a structured file containing only one record type … .
2. All of the following are considered advantages of using static Web publishing to display data on a Web page, EXEPT … .
    a) you data remains secure
    b) most entry-level DBMSs provide the capability to produce an HTML page
    c) users can change your data   d) it provides a "snapshot" of your data

3. Modern database software supports data …, which means keeping data separated from the program modules that manipulate the data.

4. The first step to organize relational database is to organize data into field. (*True/ False*)

5. In a relational database, an attribute is equivalent to a record. (*True/False*)

6. A(n) … is a collection of data fields that pertain to an entity, such as a person, place, or thing.

7. One of the goal of normalization process is to minimize data … .

8. SQL … include SELECT, FROM and INSERT.

9. ASP, CGI, and PHP are used to create XML documents that are processed on a server before being sent to your browser. (True/False)

10. In SQL, the JOIN command allows you to add fields to a database. (*True/False*)

11. Spreadsheet software typically includes some data management features suitable for working with relational database. (*True/False*)

12. A database index has no bearing on the physical sequence of records stored on disk. (*True/False*)

13. Data … refers to the use of statistical tools for automated extraction of predictive information from database.

14. An SQL query is a sequence of words, much like a sentence. (*True/False*)

15. One a table's sort key has been added, it cannot be changed. (*True/False*)

16. In an ERD, relationships and … are shown by connecting lines.

17. A primary … contains data unique to a record.

18. The term "parameter" refers to detailed specifications for a command. (*True/False*)

19. Real, integer, text, logical, BLOB and date are examples of data … .

20. A database consists of one or more records … that contain data.

Projects. *Choose and perform one of the projects given.*

1. A friend wants to create a table to store information about a collection of old books. List the fields you might include in the table to store information about the book. For each field, specify the field name, data type (text, numeric, date, etc) and field length. Indicate primary key(s) and describe in writing how you would sort and/or index the data.

2. Computer databases often store personal information about the citizens of more than one country, yet privacy expectations and laws differ. For this project, explore the differences in privacy laws around the globe. Which countries have the strongest privacy laws and which have the weakest? Which laws would govern the data stored by multinational companies? As a global consumer, which databases would concern you most for potential privacy violations? Consolidate your thoughts into a one- to two-page paper and submit to your instructor.

Unit 8. COMPUTER PROGRAMMING

Text A

Pre-reading task. Match the meaning of the following English words with their Russian definitions.

1. assumption	a) программа - отладчик
2. event driven	b) сетка, таблица
3. grid	c) предположение, допущение
4. paradigm	d) управляемое событие
5. debugger	e) система понятий, модель
6. flowchart	f) постановка задачи
7. problem statement	g) графическая схема программы

Reading. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

PROGRAM PLANNING

The programming process begins with a problem statement that helps you clearly define the purpose of a computer program. In the context of programming, a **problem statement** defines certain elements that must be manipulated to achieve a result or goal. A good problem statement for a computer program has three characteristics:

1. It specifies any assumptions that define the scope of the problem.
2. It clearly specifies the known information.
3. It specifies when the problem has been solved.

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.

Formulating a problem statement provides a minimal amount of planning, which is sufficient for only the simplest programs. A typical commercial application requires far more extensive planning, which includes detailed program *outlines*, job assignments, and schedules. To some extent, *program planning* depends on the language and paradigm used to code a computer program. The phrase **programming paradigm** refers to a way of conceptualizing and structuring the tasks a computer performs. For example, whereas one programmer might focus on the steps required to complete a specific computation, another one might focus on the data that forms the basis for the *computation.* Quite a number of programming paradigms exist, and a programmer might use techniques from multiple paradigms while planning and coding a program.

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

Regardless of the tools used, when planning is complete, programmers can begin coding, testing, and documenting. The process of coding a computer program depends on 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, such as writing e-mail, creating documents, or coding computer programs. 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. In the context of a VDE, a control is a screen-based object whose behavior can be defined by a programmer.

In visual development environment, each control comes with predefined set of events. Within the context of programming, an **event** is defined as an action, such as click, drag, or key press, associated with the form or control. A programmer can select the events that apply to each control. An event usually requires the computer to make some response. Programmers write **event-handling code** for the procedures that specify how the computer responds to each event.

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. Most GUI applications are "*event-driven*", which means that when *launched*, the program's interface appears on the screen and waits for the user to initiate an event.

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

58

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, much like a proofreader. They can also use a tool called **debugger** to step through a program and monitor the status of variables, input, and output. A debugger is sometimes packaged with a programming language or can be obtained as an add-on.

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. Remarks are identified by language-specific symbols.

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.

Comprehension check. *Mark the following statements as True or False.*

1. The programming process begins with coding.
2. A typical commercial application requires a minimal amount of planning.
3. A programmer might use techniques from multiple paradigms while planning and coding.
4. Programmers typically use a program editor to code computer programs.
5. A visual development environment provides programmers with tools to build substantial sections of a program by pointing and clicking.
6. Text editors and program editors provide a fine tool for programming software interfaces.
7. Syntax errors result from instructions that the computer can't execute.

Vocabulary practice

1. Match up the words that are similar in meaning.

computation	medium
bug	scheme
to execute	error, mistake
environment	calculation
outline	carry out
to launch	instrument
tool	to start (up)

2. Fill in the blanks choosing from the variants given.

1. Microsoft Visual Basic was one of the first programming languages to feature a visual development … .
   a) medium   b) environment   c) tool

2. If program testing doesn't produce the expected results, the program contains a (an) …, sometimes called a "...".

    a) mistake   b) error   c) problem   d) bug

3. Program planning ... depends on the language and paradigm used to code a computer program.

    a) instruments   b) options   c) tools

4. When the user … GUI application, the program interface appears on the screen and waits for the user to initiate an event by clicking a menu, dragging an object, or typing text.

    a) starts up   b) begins   c) launches

5. A typical commercial program requires extensive planning, which includes detailed program … .

    a) plans   b) outlines   c) schemes

6. Some runtime errors result from instructions that computer can't ... .

    a) execute   b) make   c) carry out

7. Programmers approach problems in different ways: while one programmer might focus on the steps to complete specific …, another programmer might focus on the data that forms the basis for the … .

    a) tasks   b) calculations   c) computations

3. Make two-word combinations using the words in columns and then fill in the following sentences.

A:		B:	
	programming		planning
	problem		error
	runtime		statement
	structured		manual
	event		driven
	program		paradigm
	user		English

    1. Anyone who uses computers is familiar with program documentation in the form of ... and help files.

    2 The process of coding a computer program depends on programming language you use, the programming tools you select, and the … that best fits the problem you are trying to solve.

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

    4. Most GUI applications are …, which means that when launched, the program's interface appears on the screen and waits for the user to initiate an event.

    5. An assumption is something you accept as true in order to proceed with … .

    6. There are different program planning tools, such as flowcharts, … pseudocode, UML diagrams, and decision tables.

    7. … shows up when you run a program.

4. 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 generic 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. *Discuss the following questions.*

1. What is a problem statement?
2. What is an assumption?
3. Does the problem statement provide sufficient planning to begin coding?
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?

Text B

Pre-reading. *Match the English words with their Russian equivalents.*

1. sequence	a) образец, шаблон
2. walkthrough	b) последовательность
3. pattern, sample	c) цикл, повтор
4. loop, iteration	d) сквозной контроль
5. notational	e) применять
6. implement	f) цифровая запись

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

PROCEDURAL PROGRAMMING

The traditional approach to programming uses a **procedural paradigm** (sometimes called "imperative paradigm") to conceptualize the *solution* to a problem as a *sequence* of steps. A program written in a procedural language typically consists of *self-contained instructions* in a sequence that indicates how a task is to be performed or a problem is to be solved.

A programming language that supports the procedural paradigm is called a **procedural language**. Procedural languages are well suited for problems that can be easily solved with a *linear, or step–by-step, algorithm*. Programs created with procedural languages have a starting point and an ending point. The flow of execution from the beginning to the end of the program is essentially linear – that is, the computer begins at the first instruction and carries out the prescribed series of instructions until it reaches the end of the program.

An **algorithm** is a set of steps for carrying out a task that can be written down and *implemented*. An algorithm for a computer program is a set of steps that explains how to begin with known information specified in a problem statement and how to manipulate that information to arrive a solution. In a later phase of the *software development process*, the algorithm is coded into instructions written in a programming language so that a computer can implement it.

To design an algorithm, you might begin by recording the steps you take to solve the problem manually. The computer also needs the initial information, so the part of your algorithm must specify how the computer gets it. Next, your algorithm should also specify how to manipulate this information and, finally, how the computer decides what to display as the solution.

You can express an algorithm in several different ways, including structured English, pseudocode, and flowcharts. These tools are not programming languages, and they cannot be processed by a computer. Their purpose is to give you a way to document your ideas for program design.

Structured English is a subset of the English language with a limited selection of sentence structures that reflects processing activities. Another way to express an algorithm is with pseudocode. **Pseudocode** is a *notational* system for algorithms that has been described as a mixture of English and your favorite programming language.

A third way to express an algorithm is to use a flowchart. A **flowchart** is a graphical representation of the way a computer should progress from one instruction to the next when it performs a task.

Before finalizing the algorithm for a computer program, you should perform a **walkthrough** to verify that your algorithm works. To perform a walkthrough for a simple program, you can use a calculator, paper, and pencil to step through a *sample* problem using realistic "test" data.

For more complex programs, a walkthrough might consist of a *verbal* presentation to a group of programmers who can help identify logical errors in the algorithm and suggest ways to make the algorithm more efficient.

The algorithm specifies the order in which program instructions are performed by the computer. Unless you do otherwise, sequential execution is the normal pattern of program execution. During **sequential execution**, the computer performs each instruction in the order it appears – the first instruction in the program is executed first, then the second instruction, and so on, to the last instruction in the program.

Some algorithms specify that a program must execute instructions in an order different from the sequence in which they are listed, skip some instructions under certain circumstances, or repeat instructions. **Control structures** are instructions that

specify the sequence in which program is executed. Most programming languages have three types of control structures: sequence controls, selection controls, and repetition controls.

A **sequence control structure** changes the order in which instructions are carried out by directing the computer to execute an instruction elsewhere in the program. A sequence control structure directs the computer to the statements they contain, but when these statements have been executed, the computer neatly returns to the main program.

A **selection control structure**, also referred to as a "decision structure" or "branch", tells a computer what to do, based on whether a condition is true or false. A simple example of a selection control structure is the IF…THEN…ELSE command.

A **repetition control structure** directs the computer to repeat one or more instructions until certain condition is met. The section of code that repeats is usually referred to as a **loop** or "*iteration*". Some of the most frequently used repetition commands are FOR…NEXT, DO…WHILE, DO…UNTIL, and WHILE…WEND (which means "while ends").

All the first programming languages were procedural. The first widely used *standardized computer language*, FORTRAN, with its procedural paradigm set the *pattern* for other popular procedural languages, such as COBOL, APL, ALGOL, PL/1, PASCAL, C, ADA, and BASIC.

The procedural approach is best suited for problems that can be solved by following a step-by-step algorithm. It has been widely used for transaction processing, which is characterized by the use of a single algorithm applied to many different sets of data. For example, in banking industry, the algorithm for calculating *checking account balances* is the same, regardless of the amounts *deposited* and *withdrawn*. Many problems in math and science also lend themselves to the procedural approach. The procedural approach and procedural languages tend to produce programs that run quickly and use *system resources* efficiently. It is a classic approach understood by many programmers, software engineers, and system analysts. The procedural paradigm is quite flexible and powerful, which allows programmers to apply it to many types of problems.

The *downside* of the procedural paradigm is that it does not fit gracefully with certain types of problems – those that are unstructured or those with very complex algorithms. The procedural paradigm has also been criticized because it forces programmers to view problems as a series of steps, whereas some problems might better be visualized as interacting objects or as interrelated words, concepts, and ideas.

Comprehension check. *Indicate the paragraph where the following ideas are found in the text.*

1. A program written in a procedural language contains the prescribed series of instructions.

2. An algorithm shows the steps how to manipulate the information to arrive at a solution.

3. There are different tools to express an algorithm.

4. To make sure that your algorithm works, you should verify it.

5. Program instructions can be executed in order they are listed or some instructions can be skipped or repeated.

6. Many problems in banking industry lend themselves to the procedural approach.

Vocabulary practice

1. Match up the words that are opposite in meaning.

sequential	parallel algorithm
downside	problem
to focus	written
solution	advantage
to deposit	to distract
linear algorithm	random
verbal	to withdraw

2. Fill in the blanks choosing from the variants given.

1. During … execution, the computer performs each instruction in the order it appears – the first instruction in the program is executed first, then the second instruction, and so on, to the last instruction in the program.

  a) random   b) sequential   c) direct   d) reverse

2. The main ... of procedural paradigm is that it forces programmers to view problems as a series of steps, whereas some problems might better be visualized as interacting objects or as interrelated words, concepts, and ideas.

  a) benefit   b) advantage   c) drawback   d) downside

3. The fact that algorithms are usually written in a format that is not specific to a particular programming language allows you … on formulating a correct algorithm.

  a) to concentrate   b) to focus   c) to distract

4. The traditional approach to programming uses a procedural paradigm to conceptualize the … a problem as a sequence of steps.

  a) problem   b) decision   c) solution

5. The algorithm for calculating checking account balances is the same, regardless of the amounts … and.... .

  a) invested, placed, deposited   b) drawn out, withdrawn, taken away

6. Procedural languages are well suited for problems that can be easily solved with … algorithm.

  a) chain   b) linear   c) parallel

7. For complex programs, a walkthrough might consist of a... presentation to a group of programmers who can help identify logical errors in the algorithm and suggest ways to make the algorithm more efficient.

  a) written   b) graphical   c) verbal

3. Make three-word combinations using the words in columns and then fill in the gaps in the following sentences.

A:		B:		C:	
selection		account		instruction	
self		step-by-step		algorithm	
software		computer		balances	
standardized		development		language	
checking		control		process	
linear		contained		structure	

1. The procedural approach is best suited for problems that can be solved by following a … .

2. A …, also referred to as a "decision structure" or "branch", tells a computer what to do, based on whether a condition is true or false.

3. The first widely used …, FORTRAN, with its procedural paradigm set the pattern for other popular procedural languages.

4. In banking industry, the algorithm for calculating … is the same.

5. A program written in a procedural language typically consists of ... in a sequence that indicates how a task is to be performed or a problem is to be solved.

6. The algorithm is coded into instructions written in a programming language which a computer can implement in a later phase of the … .

4. Fill in the gaps in the text.

Languages such as COBOL and FORTRAN support a traditional approach to programming called the ___ paradigm, which is based on a step-by-step ___. Procedural languages provide a variety of ___ structures that allow programmers to specify the order of program execution. A ___ control structure directs the computer to execute instructions, not coded as a simple succession of steps. A ___ control provides a choice of paths, based on whether a condition is true or false. A ___ control, or "loop", repeats one or more instructions until a certain condition is met. Procedural languages produce programs that run quickly and use ___ resources efficiently.

Speaking. *Discuss the following questions.*

1. What is procedural programming?
2. What is an algorithm?
3. How do you write an algorithm?
4. What is the best way to express an algorithm?
5. How do you know if your algorithm is correct?
6. In what order does a computer perform program instructions?
7. Can the computer make decisions while it executes a program?
8. What are the most popular procedural languages?
9. What kinds of problems are best suited to the procedural approach?
10. What are the advantages and disadvantages of the procedural paradigm?

Text C

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

OBJECT-ORIENTED PROGRAMMING

The abbreviation "OO", which stands for object oriented, is used to describe a programming paradigm as well as a variety of computer programming languages.

Objects and classes

The **object-oriented paradigm** is based on the idea that the *solution* for a problem can be visualized in terms of objects that interact with each other. In the context of this paradigm, an **object** is a unit of data that *represents* an abstract or a real world *entity*, such as a person, place, or thing. For example, an object can represent a $10.99 small pepperoni pizza. Another one can represent a pizza delivery guy named Jack Flash. Yet another object can be a customer living at 22 Pointe Rd.

The real world contains lots of pizzas, customers, and delivery guys. These objects can be defined in a general way by using classes. Whereas an object is a single *instance* of an entity, a **class** is a *template* for a group of objects with similar characteristics. For example, a Pizza class defines a group of gooey Italian snacks that are made in a variety of sizes, crafted into rectangular or round shapes, and sold for various prices. A class can produce any number of unique objects.

When taking the object-oriented *approach* to a problem, one of the first steps is to identify the objects that pertain to a solution. As you might expect, the solution to the pizza problem requires some pizza objects. Certain characteristics of pizzas provide information necessary to solve the problem. This information – the price, size, and shape of a pizza – provides the structure for the Pizza class. A class is defined by attributes and methods. A **class attribute** defines the characteristics of a set of objects.

Each class attribute typically has a name, *scope* and data type. One class attribute of the Pizza class might be named "pizzaPrice". Its scope can be defined as public or private. A **public attribute** is available for use by any routine in the program. A **private attribute** can be accessed only from the routine in which it is defined. The pizzaPrice attribute's data type can be defined as "double", which means that it can be any decimal number. OO programmers often use **UML** (Unified Modeling Language) diagrams to plan the classes for a program. Although a programmer completes the overall program plan before coding, jump ahead to take a quick look at the Java code for the attributes in the Pizza class. The first line of code defines the name of the class. Each subsequent line defines the scope, data type, and name of an attribute. The curly brackets simply define the start and end of the class.

```
Class Pizza
{
    public string pizzaShape;
    public double pizzaPrice;
    public double pizzaSize;
}
```

Inheritance

The object-oriented paradigm endows classes with quite a bit of flexibility. For the pizza program, objects and classes make it easy to compare round pizzas to rectangular pizzas rather than just to square pizzas.

Suppose you want to compare a 10-inch round pizza to a rectangular pizza that has a length of 11 inches and a width of 8 inches. The Pizza class holds only one measurement for each pizza—pizzaSize. This single attribute won't work for rectangular pizzas, which might have a different length and width. Should you modify the class definition to add attributes for pizzaLength and pizzaWidth? No, because these attributes are necessary only for rectangular pizzas, not for round pizzas. An OO feature called "inheritance" provides flexibility to deal with objects' unique characteristics.

In object-oriented jargon, **inheritance** *refers to* passing certain characteristics from one class to other classes. For example, to solve the pizza problem, a programmer might decide to add a RoundPizza class and a RectanglePizza class. These two new classes can *inherit* attributes from the Pizza class, such as pizzaShape and pizzaPrice. You can then add specialized characteristics to the new classes. The RectanglePizza class can have attributes for length and width, and the RoundPizza class can have an attribute for diameter.

The process of producing new classes with inherited attributes creates a superclass and subclasses. A **superclass**, such as Pizza, is any class from which attributes can be inherited. A **subclass** (or "derived class"), such as RoundPizza or RectanglePizza, is any class that inherits attributes from a superclass. The set of superclasses and subclasses that are *related* to each other is referred to as a **class hierarchy**. Java uses the "extends" command to link a subclass to a superclass. The statement *class RectanglePizza extends Pizza* means "create a class called RectanglePizza that's derived from the superclass called Pizza".

```
class RectanglePizza extends Pizza
{
        double pizzaLength;
        double pizzaWidth;
}
```

Methods and messages

An OO program can use objects in a variety of ways. A basic way to use objects is to manipulate them with methods. A **method** is a segment of code that defines an action. The names of methods usually end in a set of parentheses, such as compare() or getArea().

A method can perform a variety of tasks, such as collecting input, performing calculations, making comparisons, executing decisions, and producing output. For example, the pizza program can use a method named compare () to compare the square-inch prices of two pizzas and display a message indicating the best pizza.

A method begins with a line that names the method and can include a *description* of its scope and data type. The scope—public or private—specifies which

parts of the program can access the method. The data type specifies the kind of data, if any, that the method produces. The initial line of code is followed by one or more lines that specify the calculation, comparison, or routine that the method performs.

A method is activated by a message, which is included as a line of program code, sometimes referred to as a "call". In the object-oriented world, objects often interact to *solve* a problem by sending and receiving messages. For example, a pizza object might receive a message asking for the pizza's area or price per square inch.

Polymorphism, sometimes called "overloading", is the ability to redefine a method in a subclass. It allows programmers to create a single, generic name for a procedure that behaves in *unique* ways for different classes. Polymorphism provides OO programs with easy extensibility and can help simplify program code.

Comprehension check. Choose the ending for each sentence out of the two or three given.

1. The statement "class RectanglePizza extends Pizza" means
a) create a class called Pizza that is derived from the superclass called RectanglePizza.
b) create a class called RectanglePizza that is derived from the superclass called Pizza.
2) Inheritance refers to passing certain characteristics from one
     a) method to another method.
     b) class to other classes.
     c) class to a superclass.
3) A public attribute
     a) can be accessed only from the routine in which it is defined.
     b) is available for use by any routine in the program.
     c) can't be created in a class which contains private attributes.
4) A class attribute
     a) defines the characteristics of a set of objects.
     b) is available for use by any routine in the program only if it is private.
5) The process of producing new classes with inherited attributes creates
     a) only a superclass.   b) a superclass and subclasses.
6) In the object-oriented world, objects
     a) don't interact.
     b) often interact to solve a problem by sending and receiving messages.

Vocabulary practice

1. Which word does not belong to the group?

     a) class, object, function, method;
     b) overloading, inheritance, polymorphism, lambda expression;
     c) static, private, protected, public;
     d) Smalltalk, Prolog, C++, Java;
     e) Boolean, String, Multivalued, Double;
     f) overclass, class, subclass, superclass.

2. Fill in the missing words choosing from the variants given.

1. … allows programmers to create a single, generic name for a procedure that behaves in unique ways for different classes.
    a) inheritance   b) paradigm   c) polymorphism
2. The OO paradigm defines a(an) … as a unit of data that represents an abstract or real-world entity.
    a) method   b) object   c) class   d) attribute
3. Which type of diagrams are often used to plan the OO classes for a program?
    a) HTML   b) UML   c) XML   d) Flowchart
4. Which of the following items is not a typical feature of an object-oriented language?
    a) polymorphism b) inheritance   c) classes   d) relationships
5. In the context of OO, a class attribute … .
    a) defines the characteristics of a set of objects
    b) defines the behavior of an object
    c) is used to determine if an object exists
    d) is another name for an object
6. The set of superclasses and subclasses related to each other is referred to as … .
    a) a class hierarchy   b) a set of independent classes
    c) a set of classes with a common parent

3. Transform the following sentences without any change in meaning. Use the prompts as they are given (words in brackets, parts of sentences).

    1. For the pizza program, objects and classes make it easy to compare round pizzas to rectangular pizzas rather than just to square pizzas (*comparison*).
    2. A method begins with a line that names the method and can indicate a description of its scope and data type (*describe*).
    3. The abbreviation "OO" is used to describe a programming paradigm as well as a variety of computer programming languages (*description*).
    4. In the object-oriented world, objects interact to solve a problem by sending and receiving messages (*interaction*).
    5. When taking the object-oriented approach to a problem, one of the first steps is to identify the objects that pertain to a solution (*identification*).
    6. A basic way to use objects is to manipulate them with methods (*manipulation*).

4. Fill in the gaps in the text.

    The object-oriented paradigm is based on the idea that the solution to a problem can be visualized in terms of objects that ___ with each other. An object is a single instance of an entity. Programmers can use a ___ as a template for a group of objects with similar characteristics. Classes can be derived from other classes through a process called ___. The set of superclasses and subclasses that are related to each other is referred to as a class ___. OO programmers often use ___ Modeling Language

diagrams to plan the classes for a program. Objects interact to solve problems by exchanging ___ which initiate an action, process, or procedure. OO programmers can create ___ to define what happens once an action is initiated.

Speaking. *Discuss the following questions.*

1. What is the basic focus of the objected-oriented paradigm?
2. What's the difference between an object and a class?
3. How do I define the classes I need to solve a problem?
4. How do I code a class when writing a program?
5. How flexible are classes for defining different types of objects?
6. What is inheritance?
7. How do I code a subclass?
8. How does an OO program use objects?
9. What can a method do?
10. What does a method look like when it has been coded in Java?

Text D

Reading. *Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.*

OBJECT-ORIENTED LANGUAGES AND APPLICATIONS

Computer historians believe that SIMULA (SIMUlation LAnguage) was the first computer language to work with objects, classes, inheritance, and methods. SIMULA was developed in 1962 by two Norwegian computer scientists for the purpose of programming simulations and models. SIMULA laid the ***foundation*** for the object-oriented paradigm, which was later incorporated into other programming languages, such as Eiffel, Smalltalk, C++, and Java.

The second major development in object-oriented languages came in 1972 when Alan Kaye began work on the Dynabook project at the Xerox Palo Alto Research Center (PARC). Dynabook was a prototype for a notebook-sized personal computer, intended to handle all the information needs of adults and children. Kaye developed a programming language called Smalltalk for the Dynabook that could be easily used to create programs based on real-world objects. Dynabook never became a commercial product, but Smalltalk survived and is still in use today. Smalltalk is regarded as a classic object-oriented language, which encourages programmers to take a "pure" OO approach to the programming process.

As the object-oriented paradigm gained popularity, several existing programming languages were modified to allow programmers to work with objects, classes, inheritance, and polymorphism. The concept for the Ada programming language ***originated*** in 1978 at the U. S. Department of Defense. The first versions of Ada were procedural, but in 1995, the language was modified to ***incorporate*** object-oriented features. A similar transformation took place with the C language in 1983, except that the object-oriented version earned a new name — C++. Hybrid languages,

such as Ada95, C++, Visual Basic, and C#, give programmers the option of using procedural and object-oriented techniques.

Java is one of the newest additions to the collection of object-oriented languages. Originally planned as a programming language for consumer electronics, such as interactive cable television boxes, Java evolved into an object-oriented programming platform for developing Web applications. Java was officially launched by Sun Microsystems in 1995 and has many of the characteristics of C++, from which it derives much of its syntax. Like C++, Java can also be used for procedural programming, so it is sometimes classified as a hybrid language.

The object-oriented paradigm can be applied to a wide range of programming problems. Basically, if you can *envision* a problem as a set of objects that pass messages back and forth, the problem is suitable for the OO approach.

The object-oriented paradigm is cognitively similar to the way human beings perceive the real world. Using the object-oriented approach, programmers might be able to visualize the solutions to problems more easily. Facets of the object-oriented paradigm can also increase a programmer's efficiency because encapsulation allows objects to be adapted and reused in a variety of different programs. **Encapsulation** refers to the process of *hiding* the internal details of objects and their methods. After an object is coded, it becomes a "black box," which essentially hides its details from other objects and allows the data to be accessed using methods.

A potential disadvantage of object-oriented programs is runtime *efficiency*. Object-oriented programs *tend* to require more memory and processing resources than procedural programs. Programmers, software engineers, and system analysts can work together to weigh the tradeoffs between the OO approach and runtime efficiency.

Comprehension check. *Match the beginnings of the sentences in the first column with the endings in the second column.*

Beginnings	Endings
1. SIMULA laid foundations for	a) to be adapted and reused in a variety of different programs.
2. Smalltalk is regarded as	
3. Java evolved into an object-oriented programming platform for	b) a classic object-oriented language.
	c) to weigh the tradeoffs between the OO approach and runtime efficiency.
4. The object-oriented paradigm is cognitively similar to	d) the way human beings perceive the real world.
5. Encapsulation allows objects	e) the object-oriented paradigm.
6. Programmers, software engineers and system analysts can work together	f) developing Web applications.

Vocabulary practice

1. Put the letters in the following words into the correct order.

migradap   papharoc   quchetine   fifecynice   angatdavidse   tulenpasacion

2. Fill in the blanks choosing from the variants given.

1. The process of hiding internal details of objects and their methods is called … .
   a) encapsulation   c) inheritance
   b) polymorphism   d) object-oriented

2. Smalltalk, Eiffel, Java, and … are all programming languages that support the object-oriented paradigm.
   a) C   b) C++   c) Fortran   d) Ada

3. … is NOT a typical feature of an object-oriented language.
   a) polymorphism   c) classes
   b) inheritance   d) relationships

4. Object-oriented programs tend to require … memory and processing resources than procedural programs.
   a) less   b) more

5. Hybrid languages, such as Ada95, Visual Basic, and …, give programmers the option of using procedural and object-oriented techniques.
   a) C   b) C++   c) C#

6. If you can envision a problem as a set of … that pass messages back and forth, the problem is suitable for the OO approach.
   a) classes   b) objects

3. Match the beginnings and the endings of the sentences, and then put the sentences into the correct order.

1. SIMULA laid the foundation	a) the first computer language to work with objects, classes, inheritance, and methods.
2. The second major development of object-oriented languages	b) which encourages programmers to take a "pure" OO approach to the programming process.
3. Computer historians believe that SIMULA was	c) Smalltalk survived and is still in use today.
4. Dynabook never became a commercial product, but	d) for a notebook-sized personal computer.
5. Smalltalk is regarded as a classic object-oriented language	e) came in 1972.
6. Dynabook was a prototype	f) for the object-oriented paradigm, which was later incorporated into other programming languages.

4. Fill in the gaps in the text.

     The OO paradigm allows programmers to hide the internal details of objects and their methods. This process, called ___, allows objects to be easily reused, modified, and repurposed.

     Computer historians believe ___ was the first programming language to work with objects, classes, inheritance, and methods. It is a language called ___. Recently

many procedural languages have been given OO capabilities. ___, which originated at the Department of Defense, was originally a procedural language, but now includes OO features. The C language was modified into a language called___, and again modified into C#. Recent versions of ___ Basic also offer programmers the option of working within the object-oriented paradigm.

Speaking. *Discuss the following questions.*

1. How did object-oriented languages originate?
2. Which object-oriented languages are popular today?
3. What kinds of applications are suitable for object-oriented languages?
4. What are the advantages and disadvantages of the OO paradigm?

Critical thinking. *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?

Final test. Do the tasks in the following test.

1. Which of the following types of editors provide tools to create programs by pointing and clicking …?
    a) programming editor   b) VDE   c) GUI   d) control editor

2. Most programming languages include control structures known as … .
    a) sequence   b) selection   c) repetition   d) all of the above

3. During … execution, the computer performs each instruction in the order that appears.

4. A class is a template for a group of objects with similar characteristics. (*True*/*False*)

5. The … paradigm is based on the idea that the solution for the problem can be visualized in terms of objects that interact with each other.

6. OO programmers often use … diagrams to plan the classes for a program.

7. A(n) … is a graphical representation of the way a computer should progress from one instruction to the next when it performs a task.

8. A(n) … is a set of steps for carrying out a task that can be written down and implemented.

9. The set of superclasses and subclasses that are related to each other is referred to as a class … .

10. In an OO program, objects send and receive … to initiate actions, which the programmer defines by creating a(n) … .

11. A(n) … control structure tells a computer what to do based on whether a condition is true or false.

12. A(n) … is a segment of code that defines an action.

13. The process of passing certain characteristics from a superclass to a subclass is referred to as … .

14. A(n) … attribute is an attribute that is available for use by any routine in a program.

15. Which of the following is NOT an example of a repetition command?
     a) FOR…NEXT   b) WHILE…..WHEND c) DO…..WHILE d) IF….THEN

16. In a problem statement, a(n) … is something that you accept as true in order to proceed with program planning.

17. A program written in a(n) … language typically consists of self-contained instructions in a sequence that indicates how a task is to be performed or a problem is to be solved.
     a) object-oriented   b) procedural   c) event-driven   d) functional

18. Smalltalk, Eiffel, Java, C++ are all programming languages that support the object-oriented paradigm. (*True/False*)

19. FORTRAN is considered a good choice for object-oriented programming. (*True/False*)

20. Which of the following terms refer to the way a computer programmer conceptualizes and structures the tasks that a computer performs …?
     a) programming paradigm   c) object-oriented design
     b) algorithm development   d) logical architecture

Projects. *Choose and perform one of the projects given.*

1. Programming computer games is a complex task. A central program ties together numerous aspects of the game, such as characters, scenery, buildings, monsters, weapons, treasure, food, and sounds. To appreciate the complexity of game programming, play a computer game. Make a list of the objects you encounter during the first five minutes of the game. You might have to stop and restart the game several times to complete your list. Don't forget to include the title screen, introductory music, video, and so on. (Don't include the time it takes you to watch the video in your five-minute viewing period.) Expand your list of objects by adding descriptions of what happens to the objects. Take a screenshot of the game during your observation period. Submit your list and screenshot. Indicate the name of the game you observed on the screenshot. Follow your instructor's guidelines for printed or electronic documents.

2. The computer game industry is hot and employs professionals from a wide variety of career fields, including programmers, artists, musicians, narrators, writers,

producers, accountants, photographers, videographers, historians, military science, and physicists. Think about your career field. How would a professional in your career field fit into a computer game development team? What aspect of the game would they work on? Jot down your thoughts, and then go online and search for information about computer game development. What can you learn about jobs in the computer game industry for people with skills in your chosen career field? Submit your findings in a format of your choice. You can write a one-page summary or get creative and work up a brochure or 30-second radio spot.