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**АНГЛИЙСКИЙ ЯЗЫК**  
**для студентов дневного отделения,**  
**обучающихся по специальности**  
**«ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ»**

Учебное пособие



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Учебное пособие предназначено для студентов дневного отделения, обучающихся по специальностям, связанным с информационными технологиями, в Российском государственном гидрометеорологическом университете. В пособие включены тексты на соответствующие темы разного уровня сложности, а также лексические упражнения для студентов, начинающих изучение английского языка. Материалы заимствованы из оригинальных источников - книг, статей и интернет-ресурсов.

The handbook is designed for full-time students studying Information Technology at Russian State Hydrometeorological University. It includes different level texts on appropriate topics, vocabular exercises for beginners of English. The texts are based on authentic articles, books and Internet resources.

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## ПРЕДИСЛОВИЕ

Данное учебное пособие предназначено для студентов факультета информационных технологий, изучающих английский язык. Цель учебного пособия - развитие у студентов навыков чтения и перевода научно-технической литературы на английском языке в сфере информационных технологий.

Пособие состоит из двух разделов. Вводный курс знакомит студентов с базовыми понятиями в области информационных технологий. Основной курс включает тематические блоки, более подробно рассматривающие каждую конкретную сферу.

Данное пособие может использоваться для аудиторной и самостоятельной работы студентами факультета информационных технологий. В качестве материала для упражнений были использованы аутентичные источники (книги, статьи, справочная литература, Интернет-ресурсы) по информационным технологиям.

## **INTRODUCTION**

The handbook is written for students of Information Technology department who study English at Hydrometeorological University. The purpose is to develop skills of reading and rendering IT texts into Russian.

The handbook comprises two main parts. The first part represents a set of texts comprising some basic IT concepts. The second part consists of topic sections to go deeper in each particular area.

The teaching materials are built on the authentic books, articles and reference sources. This handbook can be used by IT students as basic or additional material.

# ВВОДНЫЙ КУРС

## Text 1

### The digital age

We are now living in what some people call the digital age, meaning that computers have become an essential part of our lives. Young people who have grown up with PCs and mobile phones are often called the digital generation. Computers help students to perform mathematical operations and improve their maths skills. They are used to access the Internet, to do basic research and to communicate with other students around the world. Teachers use projectors and interactive whiteboards to give presentations and teach sciences, history or language courses. PCs are also used for administrative purposes - schools use word processors to write letters, and databases to keep records of students and teachers. A school website allows teachers to publish exercises for students to complete online. Students can also enroll for courses via the website and parents can download official reports.

Mobiles let you make voice calls, send texts, e-mail people and download logos, ringtones or games. With a built-in camera you can send pictures and make video calls in face-to-face mode. New smartphones combine a telephone with web access, video, a games console, an MP3 player, a personal digital assistant (PDA) and a GPS navigation system, all in one.

In banks, computers store information about the money held by each customer and enable staff to access large databases and to carry out financial transactions at high speed. They also control the cashpoints, or ATMs (automatic teller machines), which dispense money to customers by the use of a PIN-protected card. People use a Chip and PIN card to pay for goods and services. Instead of using a signature to verify payments, customers are asked to enter a four-digit personal identification number (PIN), the same number used at cashpoints; this system makes transactions more secure. With online banking, clients can easily pay bills and transfer money from the comfort of their homes.

Airline pilots use computers to help them control the plane. For example, monitors display data about fuel consumption and weather conditions. In airport control towers, computers are used to manage radar systems and regulate air traffic. On the ground, airlines are connected to travel agencies by computer. Travel agents use computers to find out about the availability of flights, prices, times, stopovers and many other details.

1. Определите, какой частью речи являются следующие слова (существительным, глаголом, прилагательным, наречием):

perform, word processor, online, download, built-in, digital, store, financial, monitor, data.

Подберите определение для каждого слова:

- a) keep, save
- b) execute, do
- c) monetary
- d) screen
- e) integrated
- f) connected to the Internet
- g) collection of facts or figures
- h) describes information that is recorded or broadcast using computers
- i) program used for text manipulation
- j) copy files from a server to your PC or mobile

2. Переведите словосочетания на русский язык:

perform operations, access the Internet, do research, make calls, send texts, display data, write letters, store information, complete exercises, carry out transactions.

3. Составьте словосочетания и переведите их на русский язык:

give	money
keep	a PIN
access	databases
enter	presentations
transfer	records

4. Используя словосочетания из упражнений 2 и 3, заполните пропуски в предложениях. Переведите полученные предложения на русский язык.

1). Thanks to Wi-Fi, it's now easy to .....from cafes, hotels, parks and many other public places.

- 2). Online banking lets you ..... between your accounts easily and securely.
- 3). Skype is a technology that enables users to ..... over the Internet for free.
- 4). In many universities, students are encouraged to ..... using PowerPoint in order to make their talks more visually attractive.
- 5). The Web has revolutionized the way people ..... - with sites such as Google and Wikipedia, you can find the information you need in seconds.
- 6). Cookies allow a website to.....on a user’s machine and later retrieve it; when you visit the website again, it remembers your preferences.
- 7). With the latest mobile phones, you can.....with multimedia attachments - pictures, audio, even video.

## **Text 2**

### **What is a computer?**

A computer is an electronic machine which can accept data in a certain form, process the data, and give the results of the processing in a specified format as information. First, data is fed into the computer’s memory. Then, when the program is run, the computer performs a set of instructions and processes the data. Finally, we can see the results (the output) on the screen or in printed form. A computer system consists of two parts: hardware and software. Hardware is any electronic or mechanical part you can see or touch. Software is a set of instructions, called a program, which tells the computer what to do.

There are three basic hardware sections: the central processing unit (CPU), main memory and peripherals. Perhaps the most influential component is the central processing unit. Its function is to execute program instructions and coordinate the activities of all the other units. In a way, it is the ‘brain’ of the computer. The main memory (a collection of RAM chips) holds the instructions and data which are being processed by the CPU. Peripherals are the physical units attached to the computer. They include storage devices and input/ output devices.

Storage devices (hard drives, DVD drives or flash drives) provide a permanent storage of both data and programs. Disk drives are used to read and

write data on disks. Input devices enable data to go into the computer's memory. The most common input devices are the mouse and the keyboard. Output devices enable us to extract the finished product from the system. For example, the computer shows the output on the monitor or prints the results onto paper by means of a printer.

On the rear panel of the computer there are several ports into which we can plug a wide range of peripherals - a modem, a digital camera, a scanner, etc. They allow communication between the computer and the devices. Modern desktop PCs have USB ports and memory card readers on the front panel.

1. Найдите определение для каждого термина.

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

2. Перед вами названия основных типов компьютеров. Найдите аналоги их названию в русском языке.

Laptop, desktop PC, PDA, mainframe, tablet PC

Являются ли следующие утверждения верными?

1. A mainframe computer is less powerful than a PC.
2. A mainframe is used by large organizations that need to process enormous amounts of data.



3. The most suitable computers for home use are desktop PCs.
4. A laptop is not portable.
5. Laptops are not as powerful as desktop PCs.
6. Using a stylus, you can write directly onto the screen of a tablet PC.
7. A Personal Digital Assistant is small enough to fit into the palm of your hand.
8. A PDA does not allow you to surf the Web.

3. Для проведения классификаций в английском языке используются следующие словосочетания:

- ... are classified into X types/categories
- ... are classified by...
- ... can be divided into X types/categories

Digital computers can be divided into five main types: mainframes, desktop PCs, laptops, tablet PCs and handheld PDAs.

- ... include(s)...
- ... consist(s) of...

The basic configuration of a mainframe consists of a central system which processes immense amounts of data very quickly.

- There are X types/classes of...
- X is a type of...

A tablet PC is a type of notebook computer.

Используя приведённые выше словосочетания, заполните пропуски в предложениях. Предложения переведите на русский язык.

1. A computer..... hardware and software.
2. Peripherals..... three types: input, output and storage devices.
3. A word processing program .....software which lets the user create and edit text.
4. ....of network architecture: peer-to-peer, where all computers have the same capabilities, and client-server (e.g. the Internet), where servers store and distribute data, and clients access this data.

## Text 3

### How screen displays work

Displays, often called monitors or screens, are the most-used output device on a computer. They provide instant feedback by showing you text and graphic images as you work or play. Most desktop displays use Liquid Crystal Display (LCD) or Cathode Ray Tube (CRT) technology, while nearly all portable computing devices, such as laptops, incorporate LCDs. Because of their slimmer design and lower energy consumption, LCD monitors (also called flat panel or flat screen displays) are replacing CRTs.

#### *Basic features*

Resolution refers to the number of dots of colour, known as pixels (picture elements), contained in a display. It is expressed by identifying the number of pixels on the horizontal and vertical axes. A typical resolution is 1024x768.

A pixel is a combination of red, green and blue subpixels.

Two measurements describe the size of your display: the aspect ratio and the screen size. Historically, computer displays, like most televisions, have had an aspect ratio of 4:3 - the width of the screen to the height is four to three. For widescreen LCD displays, the aspect ratio is 16:9, very useful for viewing DVD movies, playing games and displaying multiple windows side by side. High-definition TV also uses this format. The viewable screen size is measured diagonally, so a 19" screen measures 19" from the top left to the bottom right.

Inside the computer there is a video adapter, or graphics card, which processes images and sends signals to the monitor. CRT monitors use a VGA (video graphics adapter) cable, which converts digital signals into analogue signals. LCD monitors use a DVI (digital video interface) connection.

Colour depth refers to the number of colours a monitor can display. This depends on the number of bits used to describe the colour of a single pixel. For example, an old VGA monitor with an 8-bit depth can generate 256 colours and a SuperVGA with a 24-bit depth can generate 16.7 million colours. Monitors with a 32-bit depth are used in digital video, animation and video games to get certain effects.

#### *Display technologies*

An LCD is made of two glass plates with a liquid crystal material between them. The crystals block the light in different quantities to create the image.

Active-matrix LCDs use TFT (thin film transistor) technology, in which each pixel has its own switch. The amount of light the LCD monitor produces is called brightness or luminance, measured in cd/m<sup>2</sup> (candela per square metre).

A CRT monitor is similar to a traditional TV set. It contains millions of tiny red, green and blue phosphor dots that glow when struck by an electron beam that travels across the screen and create a visible image.

PCs can be connected to video projectors, which project the image onto a large screen. They are used for presentations and home theatre applications.

In a plasma screen, images are created by a plasma discharge which contains noble (non-harmful) gases. Plasma TVs allow for larger screens and wide viewing angles, making them ideal for movies.

Organic Light-Emitting Diodes (OLEDs) are thin-film LED displays that don't require a backlight to function. The material emits light when stimulated by an electrical current, which is known as electroluminescence. They consume less energy, produce brighter colours and are flexible - i.e. they can be bent and rolled up when they're not being used.

1. Переведите следующие термины: resolution, pixel, aspect ratio, colour depth, video adapter, plasma screen

Найдите определение для каждого термина:

- 1). the smallest unit on a display screen or bitmapped image (usually a coloured dot)
- 2). an expansion card that generates the video signal sent to a computer display
- 3). the width of the screen in proportion to its height
- 4). also called gas discharge display
- 5). the number of pixels contained in a display, horizontally and vertically
- 6). the number of bits used to hold a colour pixel; this determines the maximum number of colours that can be displayed

2. Ответьте на вопросы:

1. What do CRT and LCD stand for?
2. How is the screen size measured?
3. What technology is used by active-matrix LCDs?
4. Which unit of frequency is used to measure the brightness of a display?
5. What substance produces light and colour when hit by electrons in a CRT monitor?
6. What are the three advantages of OLED displays?

## Text 4

### Databases

A database is a collection of related data, and the software used in databases to store, organize and retrieve the data is called the database management system, or DBMS. However, we often use the word database to cover both meanings. A database can manage any type of data, including text, numbers, images, sound, video and hyperlinks (links to websites).

Information is entered into the database via fields. Each field holds a separate piece of information, and the fields are grouped together in records. Therefore, a record about an employee might consist of several fields which give their name, address, phone number, date of birth, salary and length of employment with the company.

Records are grouped together into files which hold large amounts of information. Files can easily be updated -you can always change fields, add new records or delete old ones. An electronic database is much faster to consult and update than a card index system and occupies a lot less space. With the right software, you can keep track of stock, sales, market trends, orders and other information that can help your company stay successful.

A database program lets you create an index - a list of records ordered according to the content of certain fields. This helps you to search the database and sort records into numerical or alphabetical order very quickly. Modern databases are relational - that is, they are made up of related files: customers and orders, vendors and purchases, students and tutors, etc. Two database files can be related as long as they have a common field. A file of students, for example, could include a field called Tutor ID and another file with details of the tutors could include the same field. This key field can be used to relate the two files. Databases like Oracle, DB2 and MySQL can manage these relationships.

A database query function allows you to extract information according to certain conditions or criteria. For example, if a managing director wanted to know all the customers that spend more than €8,000 per month, the program would search on the name field and the money field simultaneously.

The best database packages also include network facilities, which can make businesses more productive. For example, managers of different departments can have direct access to a common database. Most aspects of the program can be protected by user-defined passwords and other security

devices. For example, if you wanted to share an employee's personal details but not their commission, you could protect the commission field.

## Text 5

### Computer languages

Unfortunately for us, computers can't understand spoken English or any other natural language. The only language they can understand directly is machine code, which consists of 1 and 0 (binary code).

Machine code is too difficult to write. For this reason, we use symbolic languages to communicate instructions to the computer. For example, assembly languages use abbreviations such as ADD, SUB, MPY to represent instructions. The program is then translated into machine code by a piece of software called an assembler. Machine code and assembly languages are called low-level languages because they are closer to the hardware.

They are quite complex and restricted to particular machines. To make the programs easier to write, and to overcome the problem of intercommunication between different types of computer, software developers designed high-level languages, which are closer to the English language. Here are some examples:

- FORTRAN was developed by IBM in 1954 and is still used for scientific and engineering applications.

- COBOL (Common Business Oriented Language) was developed in 1959 and is mainly used for business applications.

- BASIC was developed in the 1960s and was widely used in micro-computer programming because it was easy to learn. Visual BASIC is a modern version of the old BASIC language, used to build graphical elements such as buttons and windows in Windows programs.

- PASCAL was created in 1971. It is used in universities to teach the fundamentals of programming.

- C was developed in the 1980s at AT&T. It is used to write system software, graphics and commercial applications. C++ is a version of C which incorporates object-oriented programming: the programmer concentrates on particular things (a piece of text, a graphic or a table, etc.) and gives each object functions which can be altered without changing the entire program. For example, to add a new graphics format, the programmer needs to rework just the graphics object. This makes programs easier to modify.

- Java was designed by Sun in 1995 to run on the Web. Java applets provide animation and interactive features on web pages.

Programs written in high-level languages must be translated into machine code by a compiler or an interpreter. A compiler translates the source code into object code - that is, it converts the entire program into machine code in one go. On the other hand, an interpreter translates the source code line by line as the program is running.

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

- HTML, which allows us to describe how information will be displayed on web pages.

- XML, which stands for Extensible Markup Language. While HTML uses pre-defined tags, XML enables us to define our own tags; it is not limited by a fixed set of tags.

- VoiceXML, which makes Web content accessible via voice and phone. VoiceXML is used to create voice applications that run on the phone, whereas HTML is used to create visual applications (for example, web pages).

```
<xml>
```

```
< name> Andrea Finch </name>
```

```
< homework> Write a paragraph describing the C language </homework>
```

```
</xml>
```

In this XML example we have created two new tags: <name> and <homework>

## Text 6

### E-mail Protocols

Although the format of a mail message, as transmitted from one machine to another, is rigidly defined, different mail protocols transfer and store messages in slightly different ways. The mail system you're probably used to employs a combination of SMTP and POP3 to send and receive mail respectively. Others may use IMAP4 to retrieve mail, especially where bandwidth is limited or expensive.

#### *Simple Mail Transfer Protocol*

SMTP is used to transfer messages between one mail server and another. It's also used by e-mail programs on PCs to send mail to the server. SMTP is

very straightforward, providing only facilities to deliver messages to one or more recipients in batch mode. Once a message has been delivered, it can't be recalled or cancelled. It's also deleted from the sending server once it's been delivered. SMTP uses 'push' operation, meaning that the connection is initiated by the sending server rather than the receiver. This makes it unsuitable for delivering messages to desktop PCs, which aren't guaranteed to be switched on at all times. In host-based mail systems, such as Unix and Web mail, SMTP is the only protocol the server uses. Received messages are stored locally and retrieved.

In case of Web mail, the message is then translated into HTML and transmitted to your browser. SMTP is the only protocol for transferring messages between servers. How they're then stored varies from system to system.

### *Post Office Protocol*

POP is a message-retrieval protocol used by many PC mail clients to get messages from a server, typically your ISP's mail server. It only allows you to download all messages in your mailbox at once. It works in 'pull' mode, the receiving PC initiates the connection. PC-based POP3 mail clients can do this automatically at a preset interval. When you use your Web mail account to access a POP3 mailbox, the mail server opens a connection to the POP3 server just as a PC-based application would. The messages are then copied into your Web mailbox and read via a browser.

Since POP3 downloads all the messages in your mailbox, there's an option to leave messages on the server, so that they can be picked up from different machines without losing any. This does so mean that you'll get every message downloaded every time you connect to the server. If you don't clean out your mailbox regularly, this could mean long downloads. When using a Web mail account, be careful about leaving 55 messages on the server - if too many build up, each download will take a long time and fill up your inbox. Many Web mail systems won't recognize messages you've already downloaded, so you'll get duplicates of ones you haven't deleted.

### *Internet Mail Access Protocol*

MAP is similar in operation to POP, but allows you more choice over what messages you download. Initially, only message headers are retrieved, giving information about the sender and subject. You can then download just those

messages you want to read. You can also delete individual messages from the server, and some MAP servers let you organize your mail into folders. This makes download times shorter and there's no danger of losing messages.

## **Text 7**

### **The Anatomy Of A Virus**

A biological virus is a very small, simple organism that infects living cells, known as the host, by attaching itself to them and using them to reproduce itself. This often causes harm to the host cells.

Similarly, a computer virus is a very small program routine that infects a computer system and uses its resources to reproduce itself. It often does this by patching the operating system to enable it to detect program files, such as COM or EXE files. It then copies itself into those files. This sometimes causes harm to the host computer system. When the user runs an infected program, it is loaded into memory carrying the virus. The virus uses a common programming technique to stay resident in memory. It can then use a reproduction routine to infect other programs. This process continues until the computer is switched off.

The virus may also contain a payload that remains dormant until a trigger event activates it, such as the user pressing a particular key. The payload can have a variety of forms. It might do something relatively harmless such as displaying a message on the monitor screen or it might do something more destructive such as deleting files on the hard disk.

When it infects a file, the virus replaces the first instruction in the host program with a command that changes the normal execution sequence. This type of command is known as a JUMP command and causes the virus instructions to be executed before the host program. The virus then returns control to the host program which then continues with its normal sequence of instructions and is executed in the normal way.

To be a virus, a program only needs to have a reproduction routine that enables it to infect other programs. Viruses can, however, have four main parts. A misdirection routine that enables it to hide itself; a reproduction routine that allows it to copy itself to other programs; a trigger that causes the payload to be activated at a particular time or when a particular event takes place; and a payload that may be a fairly harmless joke or may be very destructive. A program that has a payload but does not have a reproduction routine is known as a Trojan.



## Text 8

### Safe Data Transfer

Secure transactions across the Internet have three goals. First, the two parties engaging transaction (say, an e-mail or a business purchase) don't want a third party to be able to read their transmission. Some form of data encryption is necessary to prevent this. Second, the receiver of the message should be able to detect whether someone has tampered with it in transit. This calls for a message-integrity scheme. Finally, both parties must know that they're communicating with each other, not an impostor. This is done with user authentication.

Today's data encryption methods rely on a technique called public-key cryptography. Everyone using a public-key system has a public key and a private key. Messages are encrypted and decrypted with these keys. A message encrypted with your public key can only be decrypted by a system that knows your private key.

For the system to work, two parties engaging in a secure transaction must know each other's public keys. Private keys, however, are closely guarded secrets known only to their owners. When I want to send you an encrypted message I use your public key to turn my message into gibberish. I know that only you can turn the gibberish back into the original message, because only you know your private key. Public-key cryptography also works in reverse - that is, only your public key can decipher your private key's encryption.

To make a message tamper-proof (providing message integrity), the sender runs each message through a message-digest function. This function within an application produces a number called a message-authentication code (MAC). The system works because it's almost impossible for an altered message to have the same MAC as another message. Also, you can't take a MAC and turn it back into the original message.

The software being used for a given exchange produces a MAC for a message before it's encrypted. Next, it encrypts the MAC with the sender's private key. It then encrypts both the message and the encrypted MAC with the recipient's public key and sends the message.

When the recipient gets the message and so decrypts it, they also get an encrypted MAC. The software takes the message and runs it through the same message-digest function that the sender used and creates its own MAC. Then it decrypts the sender's MAC. If the two are the same, then the message hasn't been tampered with.

The dynamics of the Web dictate that a user-authentication system must exist. This can be done using digital certificates.

A server authenticates itself to a client by sending an unencrypted ASCII-based digital certificate. A digital certificate contains information about the company operating the server, including the server's public key. The digital certificate is 'signed' by a trusted digital-certificate issuer, which means that the issuer has investigated the company operating the server and believes it to be legitimate. If the client trusts the issuer, then it can trust the server. The issuer 'signs' the certificate by generating a MAC for it, then encrypts the MAC with the issuer's private key. If the client trusts the issuer, then it already knows the issuer's public key.

The dynamics and standards of secure transactions will change, but the three basic tenets of secure transactions will remain the same. If you understand the basics, then you're already three steps ahead of everyone else.

## **Text 9**

### **Is there an End to the Computer Race?**

Today the word «electronics» is in general usage. Millions of people have electron watches. There are a lot of various radio and TV sets, video cassette recorders and CD players in our houses. In factories and plants we are surrounded with electronically controlled machines and instruments, we are carried by airplanes, ships, trains and cars with built-in electronic devices, and satellites circle the globe. In other words, we are living in an electronic world. And the center of this world is a tiny silicon plate of a few square millimetres, an integrated circuit, or a chip, as it is more commonly known. The integrated circuit is undoubtedly one of the most sophisticated inventions of man, science and technology. It is in the heart of every electronic device and the more cassette recorders, TV sets and computers we need, the more integrated circuits are required.

When we speak about a further development of computers we mean not only quantity, but also high technology and high speed. As the operation of an integrated circuit depends on microscopic «components», the purity of all materials and the cleanness at the plant they are produced at must be of the highest quality. A continuous search is going on in laboratories throughout the world for more perfect, reliable and high speed electronic circuits.

In the past it took scientists and researchers a whole lifetime to make a few thousand calculations, whereas for a modern computer this task is a matter

of a few seconds. At present computers capable of performing billions of operations a second are required. Supercomputers are different from ordinary computers. The ordinary computer does the computations operation by operation, while the supercomputer operates like a brain: all operations are being done simultaneously.

In the next few years engineers will complete the work on computers of above 2 billion operations a second. It will take a few more years to produce a 10-billion operations computer. The fifth-generation computers performing 100 billion operations a second will become available in the near future. Is there an end to this race?

According to some researchers, we are close to what can be regarded as a true physical limit. But other specialists think that photons will make the operation a thousand times faster. This means that in the future it will be possible to expect the appearance of photon computers and that computations will be done by means of light. Light has several advantages over electronics: light beams are faster, travel in parallel lines and can pass through one another without interference. Already, the optical equivalent of a transistor has been produced, and intensive research on optical-electronic computers is being carried out in a number of countries around the world. In a few decades a new age of light may replace the still youthful electronic age. The race is going on.

Notes to the Text: 1. silicon plate - кремниевая пластина; 2. integrated circuit - интегральная схема; 3. chip – кристалл.

## **Text 10**

### **Windows**

Microsoft Windows (or simply Windows) is a software program that makes your IBM PC (or compatible) easy to use. It does this by simplifying the computer's user interface. The word interface refers to the way you give your computer commands, the way you interact with it.

Usually the interface between you and the computer consists of the screen and the keyboard, you interact with the computer by responding to what's on the screen, typing in commands at the DOS command line to do your work.

DOS often isn't very intelligent at interpreting your commands and most people consider it awkward or intimidating as a user interface. These commands can be confusing and difficult to remember. Who wants to learn lots of computer commands just to see what's on your disk, copy a file, or format a disk?

Windows changes much of this. What's been missing from the PC is a programme that makes the computer easy to use. Windows is just such a program. With Windows, you can run programmes, enter and move data around, and perform DOS-related tasks simply by using the mouse to point at objects on the screen. Of course, you also use the keyboard to type in letters and numbers. Windows interprets your actions and tells DOS and your computer what to do.

In addition to making DOS housekeeping tasks such as creating directories, copying files, deleting files, formatting disks, and so forth, easier, Windows makes running your favorite applications easier, too. (An application is a software package that you use for a specific task, such as word processing). Windows owes its name to the fact that it runs each programme or document in its own separate window. (A window is a box or frame on the screen.) You can have numerous windows on the screen at a time, each containing its own programme and/or document. You can then easily switch between programs without having to close one down and open the next.

Another feature is that Windows has a facility - called the Clipboard - that lets you copy material between dissimilar document types, making it easy to cut and paste information from, say, a spreadsheet into a company report or put a scanned photograph of a house into a real estate brochure. In essence, Windows provides the means for seamlessly joining the capabilities of very different application programs. Not only can you paste portions of one document into another, but by utilizing more advanced document-linking features those pasted elements remain "live". That is, if the source document (such as some spreadsheet data) changes, the results will also be reflected in the secondary document containing the pasted data.

As more and more application programmes are written to run with Windows, it'll be easier for anyone to learn how to use new programmes. This is because all application programmes that run in Windows use similar commands and procedures. Windows comes supplied with a few of its own handy programmes. There's a word-processing programme called Write, a drawing programme called Paintbrush, a communications programme called Terminal for connecting to outside information services over phone lines, small utility programmes that are helpful for keeping track of appointments and notes, a couple of games to help you escape from your work, and a few others.

Years of research went into developing the prototype of today's popular graphical user interfaces. It was shown in the early 1980s that the graphical user interface, in conjunction with a hand-held pointing device (now called the

mouse), was much easier to operate and understand than the older-style keyboard-command approach to controlling a computer. A little-known fact is that this research was conducted by the Xerox Corporation and first resulted in the Xerox Star computer before IBM PCs or Macintoshes existed. It wasn't until later that the technology was adapted by Apple Computer for its Macintosh prototype, the Lisa.

## **Text 11**

### **The Internet**

The Internet is a magnificent global network with millions and millions of computers and people connected to one another where each day people worldwide exchange an immeasurable amount of information, electronic mail, news, resources and, more important, ideas. It has grown at a surprising rate. Almost everyone has heard about it and an increasing number of people use it regularly. The current estimate is that over 70 million people are connected, in some way, to the Internet - whether they know it or not. With a few touches at a keyboard a person can get access to materials in almost everywhere. One can have access to full-text newspapers, magazines, journals, reference works, and even books. The Web is one of the best resources for up-to-date information. It is a hypertext-based system by which you can navigate through the Internet. Hypertext is the text that contains links to other documents. A special program known as «browser» can help you find news, pictures, virtual museums, electronic magazines, etc. and print Web pages. You can also click on keywords or buttons that take you to other pages or other Web sites. This is possible because browsers understand hypertext markup language or code, a set of commands to indicate how a Web page is formatted and displayed.

Internet Video conferencing programmes enable users to talk to and see each other, exchange textual and graphical information, and collaborate. Internet TV sets allow you to surf the Web and have e-mail while you are watching TV, or vice versa. Imagine watching a film on TV and simultaneously accessing a Web site where you get information on the actors of the film. The next generation of Internet-enabled televisions will incorporate a smart-card for home shopping, banking and other interactive services. Internet-enabled TV means a TV set used as an Internet device.

The Internet is a good example of a wide area network (WAN). For long-distance or worldwide communications computers are usually connected into a

wide area network to form a single integrated network. Networks can be linked together by telephone lines or fibre-optic cables. Modern telecommunication systems use fibre-optic cables because they offer considerable advantages. The cables require little physical space, they are safe as they don't carry electricity, and they avoid electromagnetic interference. Networks on different continents can also be connected via satellites. Computers are connected by means of a modem to ordinary telephone lines or fibre-optic cables, which are linked to a dish aerial. Communication satellites receive and send signals on a transcontinental scale.

## **Text 12**

### **Computer Graphics**

Computer graphics are pictures and drawings produced by computers. A graphics programme interprets the input provided by the user and transports it into images that can be displayed on the screen, printed on paper or transferred to microfilm. In the process the computer uses hundreds of mathematical formulas to convert the bits of data into precise shapes and colours. Graphics can be developed for a variety of uses including illustrations, architectural designs and detailed engineering drawings.

Mechanical engineering uses sophisticated programs for applications in computer-aided design (CAD) and computer-aided manufacturing (CAM). In the car industry CAD software is used to develop, model and test car designs before the actual parts are made. This can save a lot of time and money.

Basically, computer helps users to understand complex information quickly by presenting it in more understandable and clearer visual forms. Electric engineers use computer graphics for designing circuits and in business it is possible to present information as graphics and diagrams. These are certain to be much more effective ways of communicating than lists of figures or long explanations.

Today, three-dimensional graphics along with colour and computer animation are supposed to be essential for graphic design, computer-aided engineering (CAE) and academic research. Computer animation is the process of creating objects and pictures which move across the screen; it is used by scientists and engineers to analyze problems. With appropriate software they can study the structure of objects and how it is affected by particular changes. A graphic package is the software that enables the user to draw and manipulate objects

on a computer. Each graphic package has its own facilities, as well as a wide range of basic drawing and painting tools.

The collection of tools in a package is known as a palette. The basic geometric shapes, such as lines between two points, arcs, circles, polygons, ellipses and even text, making graphical objects are called “primitives”. You can choose both the primitive you want and where it should go on the screen. Moreover, you can specify the «attributes» of each primitive, e.g., its colour, line type and so on. The various tools in a palette usually appear together as pop-up icons in a menu. To use one you can activate it by clicking on it.

After specifying the primitives and their attributes you must transform them. Transformation means moving or manipulating the object by translating, rotating and scaling the object. Translation is moving an object along an axis to somewhere else in the viewing area. Rotation is turning the object larger or smaller in any of the horizontal, vertical or depth direction (corresponding to the x, y and z axis). The term «rendering» describes the techniques used to make your object look real. Rendering includes hidden surface removal, light sources and reflections.

# ОСНОВНОЙ КУРС

## UNIT 1

### IT and jobs in IT

#### *1.1 Information Technology*

In the 1960s and 1970s, the term information technology (IT) was a little known phrase that was used by those who worked in places like banks and hospitals to describe the processes they used to store information. With the paradigm shift to computing technology and “paperless” workplaces, information technology has come to be a household phrase. It defines an industry that uses computers, networking, software programming, and other equipment and processes to store, process, retrieve, transmit, and protect information.

In the early days of computer development, there was no such thing as a college degree in IT. Software development and computer programming were best left to the computer scientists and mathematical engineers, due to their complicated nature. As time passed and technology advanced, such as with the advent of the personal computer in the 1980s and its everyday use in the home and the workplace, the world moved into the information age.

By the early 21st century, nearly every child in the Western world, and many in other parts of the world, knew how to use a personal computer. Businesses’ information technology departments have gone from using storage tapes created by a single computer operator to interconnected networks of employee workstations that store information in a server farm, often somewhere away from the main business site. Communication has advanced, from physical postal mail, to telephone fax transmissions, to nearly instantaneous digital communication through electronic mail (e-mail).

Great technological advances have been made since the days when computers were huge pieces of equipment that were stored in big, air conditioned rooms, getting their information from punch cards. The information technology industry has turned out to be a huge employer of people worldwide, as the focus shifts in some nations from manufacturing to service industries. It is a field where the barrier to entry is generally much lower than that of manufacturing, for example. In the current business environment, being proficient in computers is often a necessity for those who want to compete in the workplace.



Jobs in information technology are widely varied, although many do require some level of higher education. Positions as diverse as software designer, network engineer, and database administrator are all usually considered IT jobs. Nearly any position that involves the intersection of computers and information may be considered part of this field.

## *1.2 What Is a Network Engineer?*

A network engineer is responsible for setting up computer networks, Internet connections in an office, and any related computer systems a business may need. The network engineer may do routine maintenance to ensure everything is running properly and is on call if a problem occurs. Those interested in a career in network engineering will need to learn about how computers work and how various computer systems all work together. Businesses require several computers to use the same network and may have a separate Internet connection, known as an Intranet, used only by those in the company.

When a problem occurs, the network engineer must find a solution quickly so employees can return to work. The work schedule is often hectic since a problem can occur at any time day or night. Even routine maintenance is often performed early in the morning or late at night when few people are using the computers or network.

Certification typically takes about two years, yet most training occurs on the job. With technology changing at a rapid pace, much of what is learned will be outdated when the network engineer actually gets his first job. Certification is still required for most jobs and teaches basic skills that are key to becoming a network engineer.

The job of a network engineer can also be thought of as one of information technology. Depending on the type of job, the engineer may also design the systems he plans to use. Instead of merely setting up a computer, he must figure out how all computers and other equipment using the same network can work harmoniously together at once. It involves creative thinking skills and problem solving skills along with technical knowledge of how everything works.

Those working in this field may work internally or externally. Internal engineers are hired by a company and work to set up new systems and maintain the old systems. Larger companies need people to work part or full time and those companies usually have enough work that the job is not simply a temporary position.

Smaller businesses may hire someone to work internally but the position may be temporary. Engineers who do not work for a company permanently

may work on call for businesses. This is known as working externally. When a business without an engineer on staff has a problem, it calls a new network engineer in to fix it. The engineer may or may not have set up the company's current computer system.

### ***1.3 What is a Database Administrator?***

Essentially, the main role of a database administrator has to do with overseeing the installation and ongoing function of software on a system designed for use by a number of users. There are several specific responsibilities that the typical database administrator will perform in just about any corporate environment.

A basic responsibility for just about every database administrator involves the installation of new databases. As part of the database installation, the database administrator will set up login credentials to authorized persons, define the privileges associated with each authorized user, and ensure that every work station attached to the network is set up to access the new database. This process usually involves a period of troubleshooting, in which the database administrator will address and resolve any problems that users experience with the new product.

Database administrators often handle the process of creating backup records of the information contained in the databases on the system. This involves more than setting up an automatic backup and assuming that the backup is proceeding according to plan. The competent database administrator will check the backup files to make sure the information is complete, the integrity of the data is secure, and that the saved files can easily be accessed and loaded in the event that something happens to the main database.

With just about all software, new releases and upgrades are made available from time to time. The database administrator will be aware of any new versions or upgrades to existing versions that could improve the efficiency of a currently installed database. Generally, a database administrator is authorized to upload free upgrades and install them at will. In the event that a new version is available, the administrator may work with others in the company to determine if the cost of replacing the existing database software is worth the investment.

In more recent years, the role of the database administrator has expanded in some companies. The administrator may be called upon to take a basic design and customize the fields or functions to more effectively serve the needs of the corporation. While these types of projects are more commonly associated

with a database analyst or designer, it is not uncommon for a database administrator in a small company to assume these roles.

### ***1.4 How Do I Get a Bachelor of Science in Information Technology?***

Information technology is a frequently changing field that works well for students who plan to update their skills continuously. People who earn a bachelor of science in information technology study both the technical field of computer science and the business fields of management and communication. Working on a bachelor of science in information technology requires excelling in both the methodology and business sides of the computer science field.

The requirements for a bachelor of science in information technology typically include learning how to code software applications. Courses in computer science will teach either one language in depth or beginner information in multiple languages. Computer science requirements also typically include learning about artificial intelligence and the theory of programming. The purpose of learning the computer science field is that the information technologist works to evaluate the requirements of projects for applications developers. These course requirements tend to be lighter for information technology majors than for traditional computer science students.

On the business side, students need courses in operations management, introductory accounting and financial management. These classes prepare information technology graduates to work in the field as business analysts and project managers. Students will learn how to communicate with programmers, who often use technical jargon, as well as clients, who have more interest in the business side of development projects. By taking quality business courses, information technology students will be able to create proposals for projects, budget out the time and money needed and perform other basic business tasks.

Students who are getting a bachelors degree in information technology also should consider working in an internship or a cooperative learning job, also called a co-op. A co-op is paid, though usually the pay is not significant, and an internship often is unpaid. Either an internship or a co-op can give the information technology student real-world experience working in the field. Students will get an idea for whether they like the field and where they might fit within the industry.

When a student decides to begin working toward an information technology degree, he or she should make sure to check all requirements for earning the degree. Information technology requires students to enroll in both computer

science and business courses, so the student should be sure that he or she will be able to get all of the required courses in the proper order. Variety and perseverance are necessary for someone trying to get a bachelors degree in information technology.

## UNIT 2

### Computer hardware and software

#### *2.1 Computer Programming*

Computer programming is a field that has to do with the analytical creation of source code that can be used to configure computer systems. Computer programmers may choose to function in a broad range of programming functions, or specialize in some aspect of development, support, or maintenance of computers for the home or workplace. Programmers provide the basis for the creation and ongoing function of the systems that many people rely upon for all sorts of information exchange, both businesses-related and for entertainment purposes.

The computer programmer often focuses on the development of software that allows people to perform a broad range of functions. All online functions that are utilized in the home and office owe their origins to a programmer or group of programmers. Computer operating systems, office suites, word processing programs, and even Internet dialing software all exist because of the work of programmers.

Computer programming goes beyond software development. The profession also extends to the adaptation of software for internal use, and the insertion of code that allows a program to be modified for a function that is unique to a given environment. When this is the case, the computer programmer may be employed with a company that wishes to use existing software as the foundation for a customized platform that will be utilized as part of the company intranet.

A third aspect of computer programming is the ongoing maintenance of software that is currently running as part of a network. Here, the programmer may work hand in hand with other information technology specialists to identify issues with current programs, and take steps to adapt or rewrite sections of code in order to correct a problem or enhance a function in some manner.

In short, computer programming is all about developing, adapting, and

maintaining all the programs that many of us rely upon for both work and play. Programmers are constantly in demand for all of these three functions, since businesses and individuals are always looking for new and better ways to make use of computer technology for all sorts of tasks. With this in mind, computer programming is a very stable profession to enter, and provides many different possibilities of employment opportunities.

## *2.2 Software Programs*

Software programs, computer programs, or computer software, are programs or routines for a computer system or part of the system itself. Application software programs are often add-ons, specially made for the operating system, and designed to add various types of functionality for the user. Software programs of many different types are made for users with different aims. Categories frequently used for software programs include design and publishing software, games, educational software, music and audio software, productivity software, reference software, personal finance software, utilities, and security software.

Design and publishing software programs provide contexts in which users can create illustrations, edit photographs, and lay out documents for publication. Illustration software includes drawing and painting tools, shapes, and clip art that can be combined and layered with lettering and enhanced with special effects. Peripherals such as a stylus and tablet for entry may give the user finer control for illustration and photograph editing. Photographs can be touched up, cropped, and altered in other ways. Simple and complex documents, including those that combine text and images, can be created with the elements locked into position for certain results.

Games and educational software programs can have some overlap, as some games are educational. However, there are also games that are strictly for fun and educational programs that do not take the form of games. Instruction ranges from pre-kindergarten material and typing programs to sophisticated language courses for adults. Test preparation for college entrance exams and other assessments is also available. Games include many varieties of solitaire, as well as multi-player games in which there is a narrative thread.

Various forms of music and audio software allow the user to create, edit, and play multimedia, while productivity software is designed to get work done. Productivity software includes word processing software, spreadsheets, slide presentation software, and software for dictating and taking notes and creating

footnotes. Reference software puts dictionaries, encyclopedias, magazine collections, and other valuable resources at ones fingertips, and personal finance software helps one create and maintain a budget, as well as figure ones taxes.

Utilities are often programs that extend the functionality of the operating system. For example, Parallels Desktop® 5.0 for Mac allows one to load a Windows operating system on ones Apple computer. StuffitDeluxe makes it easy to compress and decompress files, while other software is available for burning CD-ROMS and DVDs. Automated backup software is another utility software program type. Security software is designed to both clean existing viruses and malware from computers as well as prevent future attacks.

## **2.3 Software Development**

Software development is the process by which a company, team, or individual devises and implements an overall plan to create a new software program. This process can also be applied to an established program to create a new version of that software, though this is usually an abridged version of the process unless the new version is largely different from the previous one. Numerous steps are involved in this process, beginning with understanding what is needed from software, developing a plan for creating it, writing the code, and bug testing prior to launch. Software development can be a process that involves anything from a single programmer to dozens or hundreds of individuals.

The process of software development usually begins with research or a general understanding of what type of software is needed in the marketplace. This may be an entirely new program that addresses an unfulfilled need or a new piece of software in an existing market. As software development begins, this research establishes the purpose of the software being developed and the overall goals of the development.

Once those involved in software development have a goal for the program they are working on, they can begin developing the plan for implementing that software. A great deal of work is typically required before any actual code is created, especially for aspects of a program such as the user interface and the basic architecture. Graphic designers, interface developers, programmers, and producers on a large team can all be involved in this stage of development.

Software development then typically moves from these early phases of brainstorming ideas for creating the overall structure of the program to actually writing the code for the software. This implementation typically involves one

or more computer programmers, and the source code is created in any number of different applications, programming languages, and other utilities. During and after the code has been created, a great deal of testing is typically involved to ensure the program runs properly and is as free of bugs, glitches, and errors as possible.

Ongoing software development may continue even once a program is written, tested, and launched to the general public. Such development may serve to fix errors found after launch or introduce minor improvements and some new features. User feedback can also be utilized to gather information for ways in which the program might be improved in a larger sense. This feedback can then be used to begin software development again on a new version of the program, which can offer features and utilities not found in the previous version.

#### ***2.4 What Is the Difference Between Software and Hardware?***

For people who are not familiar with computer terminology, references to software and hardware may be somewhat confusing. The basic difference between the two has to do with the role that each type of tool plays in the use of a computer system. Essentially, hardware is the equipment that is used to assemble the working computer while software consists of the codes and programs that make it possible to perform various tasks using that equipment.

Hardware composes all types of computer equipment and components. This includes the hard drive, the monitor, and any ancillary devices such as scanners and printers that may be used along with the system. Even devices like the keyboard, cords and wires, and the pen drives are considered to be part of the hardware family. Remote storage devices like floppy disks and CD-Rs are also classed as hardware.

By contrast, software is the programming that provides the roadmap for each and every function that is executed on a computer hard drive. Tools in this category would include computer operating systems, as well as software programs designed to create spreadsheets, slide shows and even electronic letters, manuscripts and other word processing documents. Software also includes programs that are loaded onto a hard drive, either by downloading from the Internet or by using a CD or other data storage device to load the software program onto the system.

The relationship between software and hardware is mutually beneficial. The most efficient software cannot be used without the presence of the right

hardware. At the same time, perfectly functioning hardware will be useless to most users unless the proper software is loaded onto the hard drive. From this perspective, software and hardware are often designed with this in mind, making sure that different types of software and hardware combinations can work properly even if a few hardware components are upgraded or replaced over time.

An easy way to remember the difference between software and hardware is to remember that hardware always refers to the physical machines and equipment related to a computer system. Hardware can be touched and moved with ease. In contrast, software consists of not physical in nature, but is code and instructions that are programmed into a computer hardware system so it will perform specified tasks. By equating hardware with touch and software with ideas or thoughts, it becomes easy to remember the difference and use the correct appellation when discussing anything from computer chips to anti-virus programs.

## **UNIT 3**

### **Websites**

#### ***3.1 Website purpose***

The purpose of an organizational website is to inform about an idea or event. Companies develop commercial websites to sell products or services. Entertainment websites are designed to entertain or provide fun activities. People visit news websites to obtain information. The purpose of a personal website is to provide information about an individual. Social networking websites help people to exchange personal information. Educational websites aim to share knowledge and enable online learning.

Websites are designed to inform, entertain, promote or sell products or services and to share information, opinions and expertise. They may also do a combination of these things. The following websites are mentioned: Nationalgeographic.com, an educational website covering environmental, scientific and other issues; CNN.com, a news service; Amazon.com, an online store originally just for books but now selling a broad range of consumer products; Thegreenshoppingguide.co.uk, a free guide to living ethically; Math.com, a website that provides help to people studying mathematics; eltforum.com, a place where teachers of English as a foreign language can exchange ideas; Wikipedia, an online encyclopedia. Website analytics is the study of website



traffic to establish how a website is being used. It is especially important to organizations that want to find out how visitors navigate their websites and which parts of the website they are particularly interested in. Also of interest is the number of hits, meaning visits, a website receives. Reference is also made to meta tags, which are special tags – normally hidden from a visitor to a site – that contain information about the content of web pages and are used by search engines to provide search results. The focus is on getting students to use the appropriate verbs to describe website purpose and their own use of websites for professional and personal reasons.

### *3.2 Website development*

Website development, in the sense of continuously building an effective online project, is crucial to good results. Unfortunately, many people start website creation enthusiastically, but after a few months may not update the content as often or make the necessary changes that will develop the site into pulling the best Internet traffic possible. Regularly creating pages and changing content to attract target viewers can mean a successful Internet project. Other tips include building a site around the right keywords and avoiding too many ads, especially ones that can annoy viewers.

Just as print and television media must keep the readers' or viewers' desires and needs in mind to get the highest ratings as they publish or broadcast their content, so must website developers. Of course, in the case of website development, it's about getting the highest search engine rankings to be properly noticed by viewers. The best tip for website planning is to build the content around keywords for which the target viewer is searching. Although this research is, or should be, obvious, some website creators still don't spend enough time on keyword analysis in the planning as well as the development stages.

Once the most searched for keywords that relate to the website's topic are used, the resulting search engine page rankings and web traffic should be tracked for analysis. Pages that aren't well-ranked, or aren't bringing in as much traffic, should be redone; this is one of the best tips for effective website development. If pages are working well, there's no need to change them, but if they aren't bringing in the desired traffic, redoing the keywords and rethinking the content can help turn bad web pages into good ones.

Even today, with all of the knowledge about how important good website content is, there are still sites that turn away viewers by having poorly executed pages. Every single page on a website should provide the viewer with mean-

ingful, useful content. The best tip for effective website development of every page is for the creator to try and do everything from the viewpoint of what the readers would hope to see.

For example, studies have shown that flashy graphics, especially those that take a long time to load, can disinterest viewers and even turn them away from reading the rest of the website. Another thing proven to turn off viewers is too many ads. Effective website development means including ads of interest to the target viewers, but no more than one-fourth of the page should be advertising, which leaves three-fourths worth of useful, meaningful content. The style and colors of the content should be easy to read in concise, organized paragraphs. Pop-up windows that interfere with the text can be annoying rather than welcoming to viewers.

### *3.3 Different Types of Illegal Websites*

While the Internet can be a phenomenal tool for education and communications, it can also be a dangerous place. Illegal websites are domains that exist to promote or permit illegal activity, or those that go against regional laws or government restrictions. Not all websites have the same status in every region; certain areas may ban websites containing pornography, for instance, which is permissible in other areas.

Pornography websites are frequently the target of illegal website crackdowns. There are several ways in which a pornographic website may be deemed illegal, though many operate on a fully legal basis. First, if pornography or a type of pornography is banned by a country, the website may be illegal in that jurisdiction. Child pornography, for instance, is illegal throughout most of the world and subject to strict punishments for both creating the pornography and viewing or possessing it, such as through downloads. Second, if a website uses copyrighted material without getting the rights, it may be deemed illegal and prosecuted for infringement.

Copyright infringement is another major factor in the creation of illegal websites. Books, movies, television shows, and images are all subject to copyright laws, meaning that the creator or his representatives have the sole right to issue copies. File sharing or bit torrent sites, which allow users to upload personal material and download other users' files, are frequent targets of shutdown and prosecution for infringement. These illegal websites may be difficult to discern from legal downloading sites, but generally legal sites rely on owner distribution, rather than peer-to-peer sharing, of files.

Fraudulent websites are also illegal websites that can quickly make victims out of unsuspecting users. These sites may sell fake products or offer fraudulent services, or be set up as a mirror site to a real website. The goal of most of these websites is to get users to enter personal information, such as bank account or credit card numbers, which can then be stolen and used. Phishing scams, which send out emails that appear legitimate asking a user to update his or her information with a company they have an account with, frequently create this type of website to trick the user into believing that his or her information is going to a trusted group instead of scamming thieves.

Website legality may depend entirely on the geographical location of the user. Generally, countries with less emphasis on freedom of information will have more strictures on what websites are permitted within their boundaries. In China, for example, some of the most popular websites in the world, including social networking sites, search engines, and video uploading sites, are banned by the government. This can cause complications for travelers who are surprised to find some of their favorite places deemed illegal websites, and can even lead to prosecution if access is somehow made to a site that is banned. Generally, access is difficult to obtain, as regional Internet providers will block the availability of illegal websites throughout their network.

## UNIT 4

### Database

#### 4.1 Data Storage

The term *data storage* can refer to anything with information recorded on it. Using this broad definition, a hardback volume of an encyclopedia, an audio cassette of a pop song, and even a piece of paper with random words written on it would all be considered examples of data storage. The most popular definition of the term limits it to only the storage of information on computers and similar devices.

Everything a computer “knows” or is able to “know” is called computer data. This includes e-mails, text files, digital pictures, and databases. Computer data storage can be divided into two main categories: primary and secondary. Each is important, but the secondary type is usually what people think of when they use the term. Both categories will be explained below.

What a computer “knows” at any given time is technically what information

a computer's central processing unit (CPU) can directly access. This information is called memory, and the components that store it are considered primary data storage. Memory is mainly stored on Random Access Memory (RAM). There are many types of RAM, but they usually come in the form of modules that plug into a specific slot inside the computer. This type is constantly being erased and rewritten, most often from secondary storage.

Secondary data storage represents all of the other types not included in the primary storage. Though some experts previously used an additional category called tertiary, technological advances have blurred the differences between the secondary and tertiary levels to the point that only one term is necessary. Internal hard disk drives, CD-ROM disks, and flash memory sticks are all examples of this type of storage. There are so many different types that this category can be further divided into three different areas: on-site, removable, and off-site.

On-site data storage represents any type of storage device that is designed to remain with the computer or at a single location where the computer is housed. The most common on-site device is a hard disk drive, and it is included in almost every personal computer. Solid state drives and network attached storage are also examples of such devices.

Removable data storage is any type that is designed to be easily removed from a computer. This type has become more common than on-site types in modern times. The big disadvantage of this type used to be that data access time was much slower than on-site, but speed improvements have decreased this penalty to within acceptable limits for many common applications. CD-ROMs, DVD-ROMs, USB flash drives, and portable hard disk drives are all examples of removable data storage.

Off-site data storage is one of the most recent types of storage. In this type, information is stored away from the computer at a distant location. This data can then be accessed either by a direct call or through the Internet. This type of storage has the advantage of being available if something happens to the on-site computer system.

There are disadvantages to off-site storage compared to other types, both because of how long it takes to access the data and because it can be less secure. Examples of off-site data storage include electronic vaulting, on-line file hosting services, and on-line photo sharing websites. This type is also a primary aspect of cloud computing.

## *4.2 Data Storage Device*

A data storage device is any mechanism used to record data so it can be retrieved and used later. The term most often is used in the context of computers or other electronic technologies for which information needs to be copied to a mobile storage unit or saved to a medium for long-term storage. Internal, non-removable devices such as computer hard drives, compact disk (CD) drives or digital video disk drives (DVDs) that can read and write information to a disk also can be referred to as a data storage device. Less commonly, a data storage device can refer to a mass storage drive that is designed to encode and hold a very large amount of information, such as all the information within a corporate network, on some type of media such as a magnetic tape reel or an optical disk.

There are two types of data storage devices, one that holds information permanently and one that holds information only as long as power is provided to the mechanism. Inside a computer, random access memory (RAM) microchips or embedded circuit-based memory are examples of temporary forms of storing data, also called volatile memory storage. The primary purpose for volatile data storage is to provide an area where a device can quickly access information — such as code for an application — which does not necessarily have to be saved once the device is turned off or reset. This volatile information is often copied or compiled from data stored on a permanent data storage device.

A permanent data storage device is designed to hold information for the life of the medium, regardless of whether the unit is actively powered. Computer hard drives that write to spinning magnetic disks are one of the most common forms of non-removable devices. A CD or DVD drive is another example and, although they are sometimes non-removable, they write to disks that can be removed and read by another computer or other device.

One of the most used types of data storage device is known as a solid state drive or, more commonly, a flash drive. This type of device is often a self-contained, portable drive that can hold a certain amount of information and can be used on nearly any computer or device with a universal serial bus (USB) drive. The popularity of solid state drives comes from the fact that they do not have any moving parts, making them more resistant to damage, especially in mobile devices. One drawback to using a solid state drive is that, while the technology is very fast, small and efficient, it also wears out over time, meaning a drive will eventually become prone to errors and, ultimately, unusable.

## UNIT 5

### 5.1 *E-Commerce*

Electronic commerce, or e-commerce, refers to economic activity that occurs online. E-commerce includes all types of business activity, such as retail shopping, banking, investing and rentals. Even small businesses that provide personal services, such as hair and nail salons can benefit from e-commerce by providing a website for the sale of related health and beauty products that normally are available only to their local customers.

#### *Easy for Businesses*

Although e-commerce once required an expensive interface and personal security certificate, this is no longer the case. Virtual storefronts are offered by a variety of hosting services and large Internet presences that offer simple solutions to vendors who have little or no online experience. Tools for running successful e-commerce websites are built into the hosting servers, eliminating the need for the individual merchant to redesign the wheel. These tools include benefits such as virtual shopping carts, inventory and sales logs and the ability to accept a variety of payment options, including secure credit card transactions.

#### *Security Improvements*

Early e-commerce was stunted by security fears, but improved technology has made millions of people worldwide feel comfortable buying online. Seeing the vast potential in online commerce, most credit card companies helped allay fears by guaranteeing that cardholders would not be held responsible for fraudulent charges as a result of online shopping. All of these factors have helped e-commerce become a booming industry.

#### *Convenient for Shoppers*

The popularity of online commerce is understandable, considering the time and hassle involved in running from store to store, searching for an item. It not only takes valuable time and energy, but using transportation usually costs money. Shopping online whenever the mood strikes — even in the middle of the night

— has many advantages. Not only is it convenient to shop at a myriad of vendors from the comfort of a computer chair, its also a snap to find the best deal by allowing certain shopping sites to sift through all of the sellers.

### *Prices Often Lower*

E-commerce also has other advantages. Employee overhead is virtually nonexistent, and the cost of operating a website usually is nominal, especially when compared with the cost of storefront property. To top it off, most transactions are handled by software processes, never requiring a real person until the item is ready to be packed and shipped. This translates into real savings to the customer. As a result, physical businesses often cannot compete with their online counterparts, although consumers do have to watch for inflated shipping fees that might negate the savings of buying online.

## **UNIT 6**

### **Networks**

#### *6.1 Types of Networks*

The types of networks are categorized on the basis of the number of systems or devices that are under the networked area. Computer Networking is one of the most important wings of computing. Networking is the process by which two or more computers are linked together for a flawless communication. By creating a network, devices like printers and scanners, software, and files and data that are stored in the system can be shared. It helps the communication among multiple computers easy. By computer networking the user access may be restricted when necessary. There are some types of networks:

1). Peer-to-peer network: In this networking system all computers are given equal importance. All the software and data are stored on each computer and accesses to them are given to each user. In a peer-to-peer network, network hosts don't have a specific role. They provide network services and they also consume network services. In a peer-to-peer network we can have hosts that will fulfill a variety of different roles. For example, one computer can have a printer connected to it which is shared on the network. Another computer can have a large hard drive installed and everyone is allowed to put files on that hard drive. So, in this situation we have hosts that both provide and consume

network services. In essence, they function both as a client and as a server at the same time. The main benefit of peer-to-peer network is the ease of installation. All we have to do is to share our resources on the network. It's also very inexpensive. Of course, there's some drawbacks to a peer-to-peer network. First of all, a peer-to-peer network is not very scalable which means that the bigger it gets, the harder it is to manage it. That's because they lack centralized control.

2). Local Area Network: The Local Area Network is also referred as LAN. This system spans on a small area like a small office or home. The computer systems are linked with cables. In LAN system computers on the same site could be linked.

3). Wide Area Network: A Wide Area Network or WAN is a type of networking where a number of resources are installed across a large area such as multinational business. A wide area network is a group of interconnected LANs, Local Area Networks that are separated geographically. Through WAN offices in different countries can be interconnected. Sometimes, user from one city needs to access some data that is located on a server in another city. To make that possible we've connected them in some way so that these local area networks are inter-networked together, making a very large internet work, or a wide area network. The best example of a WAN could be the Internet that is the largest network in the world. In WAN computer systems on different sites can be linked.

4). Client – Server: Another classification within the host roles category is a client server network. In a client server network, unlike a peer-to-peer network, network hosts have specific roles assigned to them. We have certain systems, certain hosts that are assigned to be servers. A server provides network resources. On a client server network we also have clients. A client does not provide network services, it only consumes network services. Clients will not have, for instance, shared storage or printers. All those services are provided by the server. Server provides the resources, the client simply use the resources. With a peer-to-peer network everybody had the same operating system, but in client server network client workstations have generic operating systems that provide functionality. For example, clients could have Windows XP or Windows 2000 installed. Servers would have some special optimized operating system like Server 2003. These operating systems are designed to provide these network resources and are not designed for client type tasks. The main benefit of this type of network is that it's very highly scalable. That means it's very easy to expand the size of the network, it's very easy to add more clients and it's very easy to add more servers. Client server networks are also much easier



to support. That's because services are centralized. If we know where all the services are, we know where to look when we have some problems with them. Backup is also a lot easier. We can configure that users store their data on the server. That way, instead of having to back up individual workstations we only need to backup one location - the server. There are some drawbacks. Operating systems for servers are fairly expensive (the exception, of course, is Linux). The other thing is that this type of network takes a lot of planning. We have to decide which servers are going to host which services, where they're going to be placed on the network, etc.

## ***6.2 What is a Network Administrator?***

Network administrators are professionals who are charged with the responsibility of maintaining a computer network. The administrator will oversee the installation and updates to any software as well as install and maintain any hardware needed to operate the network. It is not unusual for a network administrator to be consulted when upgrades in hardware or software are required to create a new network or enhance an existing one.

The typical computer network administrator will possess some type of higher degree connected with Information Systems and Computer Science. In addition, the administrator is often trained on the function of specific hardware or software that is included as part of the network. This makes it possible for the network admin to quickly master any new additions to the network or even build a network from scratch.

In order to carry out his or her responsibilities, the network administrator will have master access credentials that allow the admin to interact with any function within the system. This means network admins can handle processes such as the creation of network addresses, the assignment of routing protocols, configure routing tables, and establish any type of security measures necessary to protect the network. Typically, the credentials of the network administrator override all other access privileges enjoyed by others in the organization, allowing the admin to troubleshoot when there is a need to monitor activity of a specific user or change access protocols for any reason.

Many companies choose to hire an in-house network administrator. This can be helpful when the size and function of the company require someone to be on site to handle hardware and software installations, run diagnostics, assign privileges and in general maintain the network. The administrator is also able to provide input on the purchase of new hardware or software, making

recommendations for products that will enhance the productivity of employees. In some cases, the administrator may also be called upon to modify the configuration of software in order to adapt it to the specific applications needed by the company.

Smaller businesses may choose to outsource network administration functions. Today, it is not uncommon for an Information Systems professional to provide administrator services to a number of clients. While not on site, the service provider can be called upon when there is the need to alter the network in some manner, deal with performance issues, or assign new access credentials to new employees. With this type of outsourcing service, the client normally pays the network administrator a fixed monthly fee for covered services, with provisions for additional fees when specialized projects are required.

### *What Are the Different System Administrator Jobs?*

System administrator jobs include a number of different functions. There are also related career opportunities that a person interested in working in this area may want to consider. Other than working as a systems administrator, they may want to learn more about the duties performed by a network administrator, a database administrator, and a web administrator.

The system administrator is a person with a good understanding of how computer operating systems work. He must also be well-versed in computer hardware and software applications. People working in system administrator jobs must also have good troubleshooting skills, since part of their job description is to diagnose problems and correct them. Being able to work well under pressure is another important trait, since no business can afford to have its computer system down for any length of time without productivity being affected.

A person who is working as a network administrator focuses their attention on the company's Local Area Network (LAN). They are responsible for setting up and installing the LAN. Once it's up and running, the network administrator also looks after making sure that it remains functional by performing regular maintenance checks on the LAN.

The network administrator is also responsible for investigating any problems that users are having with the LAN. He or she analyzes the situation and implements a solution. Good communication skills are also required, since the network administrator is also responsible for conducting training sessions so that new employees can work with it effectively. Follow-up sessions for existing employees are also conducted by the network administrator to ensure that all

staff is using the technology effectively.

People who are looking for system administrator jobs may want to consider becoming a database administrator. This professional is responsible for taking the information that an organization collects and devising a way to organize and store it. The database administrator may also be involved in backing up the data or in implementing security measures.

Another example of a career choice related to system administrator jobs is that of web administrator. The person who works in this capacity is responsible for ensuring that a company web site is functioning properly. They also look after connectivity issues between the company web site and its network. The web administrator also monitors the company's e-mail functions. Making sure that firewalls are functioning properly is another part of the web administrator's job description.

## **UNIT 7**

### **Security solutions**

#### ***7.1 Information Security***

Information security is the process of protecting the availability, privacy, and integrity of data. While the term often describes measures and methods of increasing computer security, it also refers to the protection of any type of important data, such as personal diaries or the classified plot details of an upcoming book. No security system is foolproof, but taking basic and practical steps to protect data is critical for good information security.

#### ***Password Protection***

Using passwords is one of the most basic methods of improving information security. This measure reduces the number of people who have easy access to the information, since only those with approved codes can reach it. Unfortunately, passwords are not foolproof, and hacking programs can run through millions of possible codes in just seconds. Passwords can also be breached through carelessness, such as by leaving a public computer logged into an account or using a too simple code, like "password" or "1234."

To make access as secure as possible, users should create passwords that use a mix of upper and lowercase letters, numbers, and symbols, and avoid

easily guessed combinations such as birthdays or family names. People should not write down passwords on papers left near the computer, and should use different passwords for each account. For better security, a computer user may want to consider switching to a new password every few months.

### *Antivirus and Malware Protection*

One way that hackers gain access to secure information is through malware, which includes computer viruses, spyware, worms, and other programs. These pieces of code are installed on computers to steal information, limit usability, record user actions, or destroy data. Using strong antivirus software is one of the best ways of improving information security. Antivirus programs scan the system to check for any known malicious software, and most will warn the user if he or she is on a webpage that contains a potential virus. Most programs will also perform a scan of the entire system on command, identifying and destroying any harmful objects.

Most operating systems include a basic antivirus program that will help protect the computer to some degree. The most secure programs are typically those available for a monthly subscription or one-time fee, and which can be downloaded online or purchased in a store. Antivirus software can also be downloaded for free online, although these programs may offer fewer features and less protection than paid versions.

Even the best antivirus programs usually need to be updated regularly to keep up with the new malware, and most software will alert the user when a new update is available for downloading. Users must be aware of the name and contact method of each anti-virus program they own, however, as some viruses will pose as security programs in order to get an unsuspecting user to download and install more malware. Running a full computer scan on a weekly basis is a good way to weed out potentially malicious programs.

### *Firewalls*

A firewall helps maintain computer information security by preventing unauthorized access to a network. There are several ways to do this, including by limiting the types of data allowed in and out of the network, re-routing network information through a proxy server to hide the real address of the computer, or by monitoring the characteristics of the data to determine if it's trustworthy. In essence, firewalls filter the information that passes through

them, only allowing authorized content in. Specific websites, protocols (like File Transfer Protocol or FTP), and even words can be blocked from coming in, as can outside access to computers within the firewall.

Most computer operating systems include a pre-installed firewall program, but independent programs can also be purchased for additional security options. Together with an antivirus package, firewalls significantly increase information security by reducing the chance that a hacker will gain access to private data. Without a firewall, secure data is more vulnerable to attack.

### *Codes and Cyphers*

Encoding data is one of the oldest ways of securing written information. Governments and military organizations often use encryption systems to ensure that secret messages will be unreadable if they are intercepted by the wrong person. Encryption methods can include simple substitution codes, like switching each letter for a corresponding number, or more complex systems that require complicated algorithms for decryption. As long as the code method is kept secret, encryption can be a good basic method of information security.

On computer systems, there are a number of ways to encrypt data to make it more secure. With a symmetric key system, only the sender and the receiver have the code that allows the data to be read. Public or asymmetric key encryption involves using two keys — one that is publicly available so that anyone can encrypt data with it, and one that is private, so only the person with that key can read the data that has been encoded. Secure socket layers use digital certificates, which confirm that the connected computers are who they say they are, and both symmetric and asymmetric keys to encrypt the information being passed between computers.

### *Legal Liability*

Businesses and industries can also maintain information security by using privacy laws. Workers at a company that handles secure data may be required to sign non-disclosure agreements (NDAs), which forbid them from revealing or discussing any classified topics. If an employee attempts to give or sell secrets to a competitor or other unapproved source, the company can use the NDA as grounds for legal proceedings. The use of liability laws can help companies preserve their trademarks, internal processes, and research with some degree of reliability.

## *Training and Common Sense*

One of the greatest dangers to computer data security is human error or ignorance. Those responsible for using or running a computer network must be carefully trained in order to avoid accidentally opening the system to hackers. In the workplace, creating a training program that includes information on existing security measures as well as permitted and prohibited computer usage can reduce breaches in internal security. Family members on a home network should be taught about running virus scans, identifying potential Internet threats, and protecting personal information online.

In business and personal behavior, the importance of maintaining information security through caution and common sense cannot be understated. A person who gives out personal information, such as a home address or telephone number, without considering the consequences may quickly find himself the victim of scams, spam, and identity theft. Likewise, a business that doesn't establish a strong chain of command for keeping data secure, or provides inadequate security training for workers, creates an unstable security system. By taking the time to ensure that data is handed out carefully and to reputable sources, the risk of a security breach can be significantly reduced.

### *7.2 Security Software*

Security software is computer software which is designed to enhance security for an individual computer or for a computer network. This software is meant to be used as part of a total security plan, rather than as a standalone security measure. Numerous software companies make security products, ranging from freeware which can be downloaded by individual computer users to specialty programs designed for particular networks, such as those used to store information for governments.

Security software can serve a number of security functions. Some programs are designed for a single and specific purpose, such as spyware removal, while others can accomplish several functions. Security software is used to establish firewalls, to detect and remove viruses, to secure information on a network, to detect attacks on a computer or network, and so forth. As a general rule, it runs all the time, providing background protection, and users can also run utilities to scan their computers for specific computer threats.

Such software can also be used for access filtering. With some computers and networks, access filtering may be desired to keep people away from sites

which could threaten security, such as sites which automatically start downloads of malicious code. Access filtering may also be utilized to ensure that people in the workplace only access work-appropriate sites, and to protect young computer users, such as children from material which could be threatening or dangerous.

Most programs are highly flexible. The program may have settings which ensure that only an administrator can execute certain tasks with the program, and the program can be configured to meet the needs of a specific system. Security software programs can also be directed to issue reports which are sent to an administrator when problems are detected. They can also be used to secure specific content on a particular computer; for example, someone can create password protected files or directories with security software to limit unauthorized access.

The term “security software” is also used to describe cryptographic software. This software is used to send and receive encoded messages, ensuring that even if a message is intercepted, it will not be readable. Truly robust cryptographic software which is extremely difficult to crack can be quite costly and resource intensive, while basic programs provide a low level of encryption for people who want moderately secure communications.

Reviews of security software are available through many reputable websites and computer magazines. Such reviews discuss the cost, ease of use, installation process, and other features to help consumers make an informed choice about which product will be most suitable.

### ***7.3 What Is a Cyberattack?***

A *cyberattack* is an attempt to undermine or compromise the function of a computer-based system, or attempt to track the online movements of individuals without their permission. Attacks of this type may be undetectable to the end user or network administrator, or lead to such a total disruption of the network that none of the users can perform even the most rudimentary of tasks. Because of the increasing sophistication of these kinds of network attacks, the development of effective software defenses is an ongoing process.

It is important to understand that a cyberattack can be relatively innocuous and not cause any type of damage to equipment or systems. This is the case with the clandestine downloading of spyware onto a server or hard drive without the knowledge or consent of the owner of the equipment. With this type of cyberattack, the main goal is usually to gather information that ranges from tracking the general movements and searches conducted by authorized users

to copying and forwarding key documents or information that is saved on the hard drive or server. While the ultimate goal is to capture and transmit information that will help the recipient achieve some sort of financial gain, the spyware runs quietly in the background and is highly unlikely to prevent any of the usual functions of the system from taking place.

However, a cyberattack can be malevolent in its intent. This is true with viruses that are designed to disable the functionality of a network or even a single computer that is connected to the Internet. In situations of this nature, the purpose is not to gather information without anyone noticing, but to create problems for anyone who uses the attacked network or computers connected with that network. The end result can be loss of time and revenue and possibly the disruption of the delivery of goods and services to customers of the company impacted by the attack. Many businesses today take steps to ensure network security is constantly being enhanced to prevent these types of malicious computer attacks.

Attempts by cyberterrorists to interfere with the function of power grids and other means of delivering public services are also classified as cyberattacks. Because attacks of this kind can quickly cripple the infrastructure of a country, they are considered an ideal means of weakening a nation. A strategy utilizing a series of cyberattacks timed to simultaneously disrupt several different key systems can, in theory, render a nation unable to successfully overcome any of the attacks before a great deal of damage has taken place. Fortunately, many nations recognize the very real threat of cyberterrorism and take steps to protect government and public service systems from any type of Internet attack, as well as the manual introduction of software that could disrupt the systems.

Just as governments and corporations must be aware of the potential for a cyberattack to occur, individuals must also take steps to protect their home computers and related equipment from sustaining an attack. A basic preventive measure is to secure high quality anti-virus and anti-spyware software, and update it on a regular basis. End users should also make sure to scan files or programs that are stored on a CDR or similar remote storage system before loading them onto a hard drive.

#### ***7.4 Different Types of IT Security Qualifications***

Information technology (IT) security professionals are responsible for making sure that all of an organization's software, telecommunication devices, telecommunications programs and networks are protected against intruders.



They do this by installing firewalls, which block access from unauthorized locations, and by developing passwords and other deterrents. IT security professionals must keep up with new threats, such as viruses and hacking methods, so they can develop new defenses against these security risks. Some of the most common IT security qualifications are undergraduate and graduate degrees in fields such as computer science and information systems — normally with concentrations in security. Other IT security qualifications depend on the level of responsibility that is associated with a particular position.

For entry-level positions, IT security qualifications might require only some academic preparation. Many people take these positions as interns while still in their college programs. They might apply security principles that they learn in class to the work they do in an IT department under close supervision of established IT security professionals. In many cases, IT security qualifications for these lower-level positions might also include references from instructors who can attest to an individual's understanding of IT security concepts and perhaps professional references that show that an individual is able to follow instructions and work in a professional environment.

People who are interested in higher-level positions in which they might actually design security solutions and perform risk management generally must satisfy IT security qualifications that include significant amounts of technical and management experience. People in these positions have to be deeply familiar with operating systems and software. They must understand their vulnerabilities and know which solutions typically are prescribed to deal with these flaws. Project management, which includes the development and implementation of security processes and solutions, requires professionals who are able to effectively delegate tasks and complete projects in allotted periods of time and under budgetary constraints.

In most cases, IT security qualifications also include the ability to communicate clearly in various ways. Most positions require that individuals can write clear reports that describe issues such as system vulnerabilities and possible solutions. In many cases, higher-level IT security professionals must give presentations in which they use graphs and written text to convince managers and executives that certain threats exist and that only particular solutions apply.

Professional certification and membership in professional associations related to IT security might not be considered IT security qualifications by many employers, but they can help job candidates to stand apart from the competition. These credentials can show that a person keeps up with current trends and concerns. It also is common for people who have these professional

connections to read trade publications and attend presentations where they can learn about new products and ideas in the field of IT security.

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