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ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ  
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«ВОРОНЕЖСКИЙ ГОСУДАРСТВЕННЫЙ  
УНИВЕРСИТЕТ»

## **THE KEY TO COMPUTING**

Учебно-методическое пособие

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## CONTENS

Введение.....	4
UNIT 1. PC SYSTEM.....	5
UNIT 2. FLASH STORAGE .....	7
UNIT 3. THE OPERATING SYSTEM.....	10
UNIT 4. CREATIVE SOFTWARE.....	13
UNIT 5. PROGRAMMING.....	15
UNIT 6. FACES OF THE INTERNET .....	18
UNIT 7. COMPUTERS TOMORROW .....	21
UNIT 8. COMMUNICATING ON TECHNOLOGY .....	23
UNIT 9. REVISING PRESENTATION SKILLS .....	30
 SUPPLEMENTARY MATERIALS.....	 41
Appendix 1 .....	41
Appendix 2 .....	43
Библиографический список .....	53

The chip itself is a small piece of silicon with a complex electrical circuit called an integrated circuit.

The processor consists of three main parts:

- The control unit examines the instructions in the user's program, interprets each instruction and causes the circuits and the rest of the components – monitor, disk drives, etc. – to execute the functions specified.
- The arithmetic logic unit (ALU) performs mathematical calculations (+, –, etc.) and logical operations (AND, OR, NOT).
- The registers are high-speed units of memory used to store and control data. One of the registers (the program counter, or PC) keeps track of the next instruction to be performed in the main memory. The other (the instruction register or IR) holds the instruction that is being executed.

The power and performance of a computer is partly determined by the speed of its processor. A system clock sends out signals at fixed intervals to measure and synchronize the flow of data. Clock speed is measured in gigahertz (GHz). For example, a CPU running at 4GHz (four thousand million hertz, or cycles, per second) will enable your PC to handle the most demanding applications.

**(2)** The programs and data which pass through the processor must be loaded into the main memory in order to be processed. Therefore, when the user runs a program, the CPU looks for it on the hard disk and transfers a copy into the RAM chips. RAM (random access memory) is volatile – that is, its information is lost when the computer is turned off. However, ROM (read only memory) is non-volatile, containing instructions and routines for the basic operations of the CPU. The BIOS (basic input/output system) uses ROM to control communication peripherals.

RAM capacity can be expanded by adding extra chips, usually contained in small circuit boards dual in-line memory modules (DIMMs).

**(3)** The main circuit board inside your system is called the motherboard and contains the processor memory chips, expansions slots, and controllers for peripherals, connected by buses – electric channels which allow devices inside the computer to communicate with each other. For example, the front side bus carries all data that passes from the CPU to other devices.

The size of a bus, called bus width, determines how much data can be transmitted. It can be compared to the number of lanes on a motorway – the larger the width, the more data can travel along the bus. For example, a 64-bit bus can transmit 64 bits of data.

Expansion slots allow users to install expansion cards, adding features like sound, memory and network capabilities.

**2. Find in the text words or phrases that have a similar meaning to:**

- 1) to run a program;
- 2) a complete route which an electric current can flow around;
- 3) to determine exact size or extent;
- 4) to do at the same time and speed;
- 5) information in an electronic form;
- 6) temporary;
- 7) units connected to the computer;
- 8) the largest amount that something can hold, produce, or carry;
- 9) a connector that allows the user to install expansion cards.

**3. Translate the following into English.**

Процесс обработки, происходит в пределах системы, электрическая схема, состоять из, заставлять выполнить, производить математические подсчеты, хранить данные, отслеживать, частично определяться, фиксированный интервал, позволять, искать, переместить копию, емкость, линейный модуль, расширительный разъем, ширина шины, расширительная плата.

*Post-reading:*

- 1. Make notes about the main points following the logical structure of the text.**
- 2. Summarize the text in 10–12 sentences.**
- 3. Practice asking questions to the details of the text.**

## **Unit 2. FLASH STORAGE**

*Pre-reading:*

**1. Discuss the following ideas in groups.**

- How much data can a flash memory card hold?
- How often do you use flash memory?
- How many handheld devices where flash memory is used do you have?

**2. Before reading the text, match the words and phrases (1–8) with their definitions (a–h).**

- |                    |                                     |
|--------------------|-------------------------------------|
| 1) cells           | a) store both applications and data |
| 2) U3 smart drives | b) remove or destroy                |

- |                           |   |
|---------------------------|---|
| 3) flash memory           | c) a USB storage device used to store and transport data files                                      |
| 4) erase                  | d) a device that reads and writes a flash memory card   |
| 5) hybrid hard drive      | e) floating gate transistor   |
| 6) flash card reader      | f) without fragile moving parts   |
| 7) flash drive            | g) non-volatile memory that can be erased and reprogrammed  |
| 8) solid-state technology | h) a magnetic storage device with big capacity which combines a magnetic hard disk and flash memory |

*While-reading:*

**1. Read the text. Five sentences have been removed from the article. Choose from the sentences (A–E) the one which fits each gap (1–5).**

- A. However, USB flash drives have less storage capacity than hard drives.
- B. New devices have a multi-level cell structure so they can store more than one bit per cell.
- C. Hybrid hard drives combine a magnetic hard disk and flash memory into one device.
- D. Unlike ROM chips, flash memory chips are rewritable, so you can update programs via software.
- E. They are as small as a stamp, and capacity can range from 8MB to several gigabytes.

### **Memory in a flash!**

Flash memory is a type of non-volatile memory that can be electronically erased and reprogrammed. Its name was invented by Toshiba to express how much faster it could be erased – «in a flash», which means «very quickly».

Unlike RAM, which is volatile, flash memory retains the information stored in the chip when the power is turned off. This makes it ideal for use in digital cameras, laptops, network switches, video game cards, mobile phones and portable multimedia players. In addition, it offers fast read access times (although not as fast as RAM), with transfer rates of 12MB per second. **(1)**

Inside the chip, data is stored in several floating gate transistors, called cells. Each cell traditionally stores one bit of data (1 = erased and 0 = programmed). **(2)** The chips are constructed with either NOR or NAND gates. NOR chips function like a computer's main memory, while NAND works like a hard drive. For exam-

ple, in a camera, NOR flash contains the camera's internal software, while NAND flash is used to store the images.

Flash memory is used in several ways:

- Many PCs have their BIOS (basic input/output system) stored on a flash memory chip so it can be updated if necessary.
- Modems use flash memory because it allows the manufacturer to support new protocols.
- USB flash drives are used to save and move MP3s and other data files between computers. They are more easily transported than external hard drives because they use solid-state technology, meaning that they don't have fragile moving parts that can break if dropped. **(3)**
- New U3 smart drives allow users to store both applications and data. They have two drive partitions and can carry applications that run on the host computer without requiring installation.
- Flash memory cards are used to store images on cameras, to back up data on PDAs, to transfer games in video consoles, to record voice and music on MP3 players or to store movies on MP4 players. **(4)** The only limitation is that flash cards are often not interchangeable between devices. Some formats include: CompactFlash, Secure Digital, MultiMedia Card, miniSD card, and xD-Picture Card. Sony has its own product called the Memory Stick, used in its digital still cameras, video camcorders and the PlayStation Portable. The photos stored in a digital camera can be offloaded to a computer via cable or wirelessly. Another option is to have a flash card reader permanently connected to your PC; you simply eject the card from the camera and put it into the reader instead of having to plug the camera in.

The future of hard drives may be hybrid hard drives. **(5)** This allows computers to boot, or start, more quickly, and also reduces power consumption.

## **2. Find words or phrases in the text that have a similar meaning to:**

1. permanent; able to hold data without power;
2. able to be rewritten many times;
3. different sections of a disk drive or storage area;
4. to make a copy of a file so that the original is not lost;
5. transferred to another device;
6. a peripheral device that reads and writes flash memory cards;
7. a product that integrates two different technologies.

## **3. Translate the following into English.**

Портативное/мобильное устройство, энергонезависимая память на базе флэш-технологии, стирать из памяти, хранить в памяти сохраненную информацию, скорость передачи, транзистор с плавающим затвором, основные системы ввода/выхода данных, позволять, поддерживать протоколы, флэш-накопитель, внешний жесткий диск, твердотельная технология, хрупкий, требовать установку, выполнять резервное копирование данных, взаимозаменяемый, разгружать, снижать потребление энергии.

*Post-reading:*

- 1. Make notes about the main points following the logical structure of the text.**
- 2. Summarize the text in 10–12 sentences.**
- 3. Practice asking questions to the details of the text.**

### **Unit 3. THE OPERATING SYSTEM**

*Pre-reading:*

**1. In pairs, discuss these questions.**

- How many operating systems can you think of? Make a list.
- What is the function of an operating system?
- Do you think most operating systems are user-friendly? Why?

**2. Before reading the text, match the words and phrases (1–4) with their definitions (a–d).**

- |                         |  |
|-------------------------|--|
| 1) application software | a) It is a set of program instructions that tell the computer what to do.  |
| 2) operating system     | b) It includes all the programs that control the basic functions of a computer (e.g. operating systems, programming software, device drivers and utilities).   |
| 3) software             | c) It comprises programs that let you do specific tasks. Typical applications include word processing, databases, educational programs, email and video games. |
| 4) system software      | d) It is a set of programs that control the hardware and software resources of a computer system. Typical functions include handling input/output opera-       |