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History of computers

*Учебное пособие для студентов, обучающихся по специальности
«Прикладная математика и информатика», «Математические методы в
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Данное учебное пособие представляет собой сборник аутентичных текстов по истории возникновения и развития компьютерных технологий. Пособие предназначено для студентов 2 курса факультета ВМК уровня Pre-Intermediate и Intermediate для чтения, обсуждения и активизации лексики по специальности.

Тексты из данного пособия могут также быть использованы в качестве заданий при проведении зачетов или контрольных точек.

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Introduction

"Who invented the computer?" is not a question with a simple answer. The real answer is that many inventors contributed to the history of computers and that a computer is a complex piece of machinery made up of many parts, each of which can be considered a separate invention.

This series of articles written by Mary Bellis covers many of the major milestones in computer history (but not all of them) with a concentration on the history of personal home computers.

Unit 1

The First Freely Programmable Computer

I. Pre-reading task

Answer the following questions:

1. Do you know who invented the first calculating device that had all features of modern computers?
2. When and what country of the world was that ?

II. Read the text and check your answers.

Konrad Zuse (1910-1995) was a construction engineer for the Henschel Aircraft Company in Berlin, Germany at the beginning of WWII. Konrad Zuse earned the semiofficial title of "inventor of the modern computer" for his series of automatic calculators, which he invented to help him with his lengthy engineering calculations. Zuse has modestly dismissed the title while praising many of the inventions of his contemporaries and successors as being equally if not more important than his own.

One of the most difficult aspects of doing a large calculation with either a slide rule or a mechanical adding machine is keeping track of all intermediate results and using them, in their proper place, in later steps of the calculation. Konrad Zuse wanted to overcome that difficulty. He realized that an automatic-calculator device would require three basic elements: a control, a memory, and a calculator for the arithmetic.

In 1936, Zuse made a mechanical calculator called the Z1, the first binary computer. Zuse used it to explore several groundbreaking technologies in calculator development: floating-point arithmetic, high-capacity memory and modules or relays operating on the yes/no principle. Zuse's ideas, not fully implemented in the Z1, succeeded more with each Z prototype.

In 1939, Zuse completed the Z2, the first fully functioning electro-mechanical computer.

Konrad Zuse completed the Z3 in 1941, with recycled materials donated by fellow university staff and students. This was the world's first electronic, fully programmable digital computer based on a binary floating-point number and switching system. Zuse used old movie film to store his programs and data for the Z3, instead of using paper tape or punched cards. Paper was in short supply in Germany during the war.

According to "The Life and Work of Konrad Zuse" (by Horst Zuse)

In 1941, the Z3 contained almost all of the features of a modern computer as defined by John von Neumann and his colleagues in 1946. The only exception was the ability to store the program in the memory together with the data. Konrad Zuse did not implement this feature in the Z3, because his 64-word memory was too small to support this mode of operation. Due to the fact that he wanted to calculate thousands of instructions in a meaningful order, he only used the memory to store values or numbers.

The block structure of the Z3 is very similar to a modern computer. The Z3 consisted of separate units, such as a punch tape reader, control unit, floating-point arithmetic unit, and input/output devices.

Konrad Zuse wrote the first algorithmic programming language called 'Plankalkül' in 1946, which he used to program his computers. He wrote the world's first chess-playing program using Plankalkül. The Plankalkül language included arrays and records and used a style of assignment (storing the value of an expression in a variable) in which the new value appears in the right column. An array is a collection of identically typed data items distinguished by their indices (or "subscripts"), for example written something like $A[i,j,k]$, where A is the array name and i, j and k are the indices. Arrays are best when accessed in an unpredictable order. This is in contrast to lists, which are best when accessed sequentially.

Zuse was unable to convince the Nazi government to support his work for a computer based on electronic valves. The Germans thought they were close to winning the War and felt no need to support further research.

The Z1 through Z3 models were destroyed during the war along with Zuse Apparatebau, the first computer company that Zuse formed in 1940. Zuse left for Zurich to finish his work on the Z4, smuggling the Z4 from Germany in a military truck, which he hid in stables on route to Zurich, Switzerland. He completed and installed the Z4 in the Applied Mathematics Division of Zurich's Federal Polytechnical Institute, in use there until 1955. The Z4 had a mechanical memory with a capacity of 1,024 words and several card readers. Zuse no longer had to use movie film to store programs; he could now use punched cards. The Z4 had punches and various facilities to enable flexible programming including address translation and conditional branching. In 1949, he moved back to Germany to form a second company called Zuse KG for the construction and marketing of his designs. Zuse later rebuilt models of the Z3 in 1960 and the Z1 in 1984.

III. Translate from English into Russian:

1) lengthy engineering calculations; 2) an automatic-calculator device; 3) binary computer; 4) floating-point arithmetic; 5) high-capacity memory; 6) to operate on the yes/no principle; 7) programmable digital computer; 8) binary floating-point number; 9) punched cards; 10) to store values or numbers; 11) punch tape reader; 12) control unit; 13) floating-point arithmetic unit; 14) input/output devices; 15) algorithmic programming language; 16) arrays; 17) conditional branching.

IV. Complete the sentences with missing words and phrases according to the text. Translate the sentences.

1. Konrad Zuse earned the semiofficial title of
2. One of the most difficult aspects of doing a large calculation is of all intermediate results and using them, in their proper place, in later steps of the
3. In 1936, Zuse made a mechanical calculator called the Z1, the first ... computer.
4. Zuse's ideas, not fully ... in the Z1, succeeded more with each Z prototype.
5. Konrad Zuse completed the Z3 in 1941, with donated by fellow university staff and students.
6. This was the world's first electronic, fully programmable ... computer based on a binary number and switching system.
7. Zuse used old movie film to ... his programs and data for the Z3, instead of using paper tape or
8. Konrad Zuse did not implement this feature in the Z3, because his was too small to support this mode of operation.
9. The Z3 consisted of separate units, such as a punch tape reader, ... , floating-point arithmetic unit, and ... / ... devices.
10. Konrad Zuse wrote the first algorithmic called 'Plankalkül' in 1946.
11. The Z4 had a mechanical memory with a ... of 1,024 words and several card readers.
12. The Z4 had punches and various facilities to enable including address translation and conditional branching.

V. Translate from Russian into English:

1. Конрад Зьюз изобрел свой компьютер для того, чтобы облегчить сложные инженерные расчеты, необходимые ему для работы.

2. В 1936 г. он создал первый механический калькулятор, Z1, который явился первым бинарным компьютером.
3. Z3 был первым в мире электронным программируемым цифровым компьютером.
4. Z3, созданный в 1943 г., содержал в себе все черты современных компьютеров, сформулированные проф. фон Нейманом в 1946 г.
5. Z3 имел блочную структуру и состоял из таких модулей, как блок управления, устройство считывания с перфокарт, блок вычислений для чисел с плавающей запятой, устройства ввода-вывода и т.д.
6. Первый язык программирования, называемый 'Plankalkül', был создан в 1946г.
7. К.Зюз нелегально вывез Z4 из Германии в военном грузовике, чтобы продолжить свою работу в Швейцарии.
8. Z4 имел механическую память емкостью в 1,024 слов.

VI. Answer the following questions:

1. What do you know about Konrad Zuse? What is he famous for?
2. What kind of difficulty did he want to overcome?
3. When was the first binary computer invented? In what way was it used by K.Zuse?
4. What kind of machine was Z2?
5. Why were recycled materials used for the creation of Z3?
6. Why was not Z3 able to store the program in the memory together with the data?
7. Which units did Z3 consist of?
8. What kind of program did K.Zuse write using his programming language called 'Plankalkül'?
9. Why didn't the Nazi government support Zuse's work?
10. Where did Zuse have to complete his Z4 computer?
11. What kind of memory did Z4 have?
12. What were the names of Zuse's computer companies?

VII. Make up a plan to the text and render the text according to the plan.

Unit 2

The Atanasoff-Berry Computer – the First Electronic Computer

I. Pre-reading task.

Before you study the text read John Atanasoff's words to reporters and try to guess the message of his words: *"I have always taken the position that there is enough credit for everyone in the invention and development of the electronic computer"*.

II. Read the text, then tell if you were right about the meaning of the quote given in the pre-reading task.

Professor John Atanasoff and graduate student Clifford Berry built the world's first electronic-digital computer at Iowa State University between 1939 and 1942. The Atanasoff-Berry Computer represented several innovations in computing, including a binary system of arithmetic, parallel processing, regenerative memory, and a separation of memory and computing functions.

Presper Eckert and John Mauchly were the first to patent a digital computing device, the ENIAC computer. A patent infringement case (Sperry Rand Vs. Honeywell, 1973) voided the ENIAC patent as a derivative of John Atanasoff's invention. Atanasoff was quite generous in stating, "there is enough credit for everyone in the invention and development of the electronic computer." Eckert and Mauchly received most of the credit for inventing the first electronic-digital computer. Historians now say that the Atanasoff-Berry computer was the first.

"It was at an evening of scotch and 100 mph car rides," John Atanasoff told reporters, "when the concept came, for an electronically operated machine, that would use base-two (binary) numbers instead of the traditional base-10 numbers, condensers for memory, and a regenerative process to preclude loss of memory from electrical failure."

John Atanasoff wrote most of the concepts of the first modern computer on the back of a cocktail napkin. He was very fond of fast cars and scotch.

Atanasoff-Berry Computer

In late 1939, John Atanasoff teamed up with Clifford Berry to build a prototype. They created the first computing machine to use electricity, vacuum tubes, binary numbers and capacitors. The capacitors were in a rotating drum that held the electrical charge for the memory. The brilliant and inventive Berry, with

his background in electronics and mechanical construction skills, was the ideal partner for Atanasoff. The prototype won the team a grant of \$850 to build a full-scale model. They spent the next two years further improving the Atanasoff-Berry Computer. The final product was the size of a desk, weighed 700 pounds, had over 300 vacuum tubes, and contained a mile of wire. It could calculate about one operation every 15 seconds, today a computer can calculate 150 billion operations in 15 seconds. Too large to go anywhere, it remained in the basement of the physics department. The war effort prevented John Atanasoff from finishing the patent process and doing any further work on the computer. When they needed storage space in the physics building, they dismantled the Atanasoff-Berry Computer.

III. Give Russian equivalents to the following words and word phrases:

1) Electronic-digital computer; 2) binary system of arithmetic; 3) parallel processing; 4) regenerative memory; 5) a patent infringement case; 6) receive credit for; 7) void smth; 8) condenser; 9) preclude loss of memory; 10) electrical failure; 11) vacuum tube; 12) capacitor; 13) rotating drum; 14) hold the electrical charge for the memory; 15) full-scale model; 16) dismantle.

IV. Match the words on the left with their definitions on the right:

vacuum tube	a piece of equipment that reduces gases to their liquid or solid form
capacitor	to take a machine apart or to come apart into separate pieces
condenser	To perform a mathematical process; figure
binary system	a device which collects and stores electricity, and is an important part of electronic equipment such as televisions and radios
dismantle	a number system which represents numeric values using two symbols, usually 0 and 1
calculate	a device used to amplify, switch, otherwise modify, or create an electrical signal by controlling the movement of electrons in a low-pressure space.

V. Answer the following questions:

1. Who was the first to build electronic-digital computer?
2. When and where did it happen?
3. What were the innovations of the first electronic-digital computer?

4. How can you explain that Presper Eckert and John Mauchly were the first to patent a digital computing device?
5. What is ENIAC?
6. How did John Atanasoff get the idea of the first modern computer?
7. How long did it take Atanasoff and Berry to build a full-scale model of electronic-digital computer?
8. What were the characteristics of the Atanasoff-Berry computer?
9. Where was it stored?
10. How long did Atanasoff-Berry computer perform its functions?

VI. Basing on the text match the words with similar meaning:

To name, to complete, to calculate, to develop, to keep, to interpret, to communicate, to fulfill, to apply, to translate, to improve, to build, to call, to store, to communicate, to figure out, to perform, to use, to finish, to construct, to connect; speed, aim, storage, information, machine, significance, computation, data, device, rate, calculation, purpose, memory, importance.

VII. Get divided into two groups. The first group is to prove that the first electronic-digital computer was invented by Atanasoff and Berry. The second group is to give reasons that Eckert and Mauchly had the right to patent their digital computing device. While preparing for discussion use additional information.

Unit 3

The Harvard MARK I Computer

I. Pre-reading task.

Before you read the text answer the following questions:

1. How big were the first computers made after the World War II?
2. How many operations per second were they able to perform?
3. Have you ever heard of the names of Howard Aiken and Grace Hopper?
What are they famous for?

II. Read the text and check your answers.

Howard Aiken and Grace Hopper designed the MARK series of computers at Harvard University. The MARK series of computers began with the Mark I in 1944. Imagine a giant roomful of noisy, clicking metal parts, 55 feet long and 8 feet high. The 5-ton device contained almost 760,000 separate pieces. Used by the US Navy for gunnery and ballistic calculations, the Mark I was in operation until 1959.

The computer, controlled by pre-punched paper tape, could carry out addition, subtraction, multiplication, division and reference to previous results. It had special subroutines for logarithms and trigonometric functions and used 23 decimal place numbers. Data was stored and counted mechanically using 3000 decimal storage wheels, 1400 rotary dial switches, and 500 miles of wire. Its electromagnetic relays classified the machine as a relay computer. All output was displayed on an electric typewriter. By today's standards, the Mark I was slow, requiring 3-5 seconds for a multiplication operation.

Howard Aiken

Born: 9 March 1900 in Hoboken, New Jersey, USA

Died: 14 March 1973 in St. Louis, Missouri, USA

- Howard Aiken was an electrical engineer and physicist who first conceived of an electro-mechanical device like the Mark I in 1937. After completing his doctorate at Harvard in 1939, Aiken stayed on to continue the computer's development. IBM funded his research. Aiken headed a team of three engineers including Grace Hopper.

- The Mark I reached completion in 1944.

- In 1947, Howard Aiken completed the Mark II, an electronic computer. The same year he founded the Harvard Computation Laboratory.

- He later published numerous articles on electronics and switching theory and started Aiken Industries.

- Howard Aiken loved computers, but even he had no idea of their eventual widespread appeal. "Only six electronic digital computers would be required to satisfy the computing needs of the entire United States," he said in 1947.

Grace Hopper

Born: 9 Dec 1906 in New York, USA

Died: 1 Jan 1992 in Arlington, Virginia, USA

- Grace Hopper studied at Vassar College and Yale and then joined the Naval Reserve in 1943. In 1944, she started working with Aiken on the Harvard Mark I computer.

- Grace Hopper is responsible for the term '**bug**' for a computer fault. The original 'bug' was a moth, which caused a hardware fault in the Mark I. Hopper was the first person to 'debug' a computer.

- In 1949, Grace Hopper started research for the Eckert-Mauchly Computer Corporation where she designed an improved compiler and was part of the team which developed Flow-Matic, the first English-language data processing compiler.

- She invented the language APT and verified the language COBOL.
- Grace Hopper was the first computer science "Man of the Year" in 1969.

III. Close the text and tell whether the following sentences are true or false:

1. Howard Aiken and Grace Hopper designed the MARK series of computers at Oxford University.
2. Mark I computer was 55 feet long and 8 feet high.
3. Mark I was used by the UK Navy for gunnery and ballistic calculations.
4. The computer was controlled by pre-punched paper tape.
5. Mark I could carry out all algebraic and logical operations.
6. It had special subroutines for word processing functions.
7. Mark I was classified as a relay computer.
8. By today's standards, the Mark I was extremely fast.
9. H.Aiken headed a team of thirteen engineers including Grace Hopper.
10. Grace Hopper received the National Medal of Technology in 1999.

IV. Fill in the gaps in the following sentences:

1. The MARK series of ... began with the Mark I in 1944.
2. The 5-ton ... contained almost 760,000 separate pieces.
3. Used by the US Navy for gunnery and, the Mark I was until 1959.
4. The computer could addition, subtraction, multiplication, division and reference to previous results.
5. It had special ... for logarithms and trigonometric functions.
6. Data was stored and counted mechanically using 3000 decimal, 1400 rotary, and 500 miles of
7. Its electromagnetic ... classified the machine as a ... computer.
8. All ... was displayed on an electric
9. Mark I was slow, requiring 3-5 seconds for a ... operation.
10. Aiken ... a team of three engineers including Grace Hopper.
11. Grace Hopper is responsible for the term ... for a computer fault.

12. Grace Hopper was part of the team which developed Flow-Matic, the first English-language compiler.

V. Translate from English into Russian.

1) to be in operation; 2) to be controlled (by); 3) to carry out subtraction; 4) subroutines; 5) decimal; 5) to display output; 6) electric typewriter; 7) multiplication operation; 8) to complete one's doctorate; 9) articles on electronics and switching theory; 10) to 'debug' a computer; 11) started research; 12) data processing compiler.

VI. Remember at least three things that are H.Aiken and G.Hopper are famous for.

VII. Make presentation concerning Mark I computer and its creators, H.Aiken and G.Hopper.

Unit 4

The ENIAC I Computer

I. Pre-reading task. Answer the following questions:

1. Do you know what is ENIAC?
2. What is the extension of this abbreviation?

II. Read the text using the dictionary if necessary.

In 1946, John Mauchly and J Presper Eckert developed the ENIAC I (Electrical Numerical Integrator And Calculator). The U.S. military sponsored their research; they needed a calculating device for writing artillery-firing tables (the settings used for different weapons under varied conditions for target accuracy). The Ballistics Research Laboratory, or BRL (the branch of the military responsible for calculating the tables), heard about John Mauchly's research at the University of Pennsylvania's Moore School of Electrical Engineering. John Mauchly had previously created several calculating machines, some with small electric motors inside. He had begun designing (1942) a better calculating machine based on the work of John Atanasoff that would use vacuum tubes to speed up calculations.

On May 31, 1943, the military commission on the new computer began; John Mauchly was the chief consultant and J Presper Eckert was the chief engineer. Eckert was a graduate student studying at the Moore School when he met John Mauchly in 1943. It took the team about one year to design the ENIAC and 18 months and 500,000 tax dollars to build it. By that time, the war was over. The ENIAC was still put to work by the military doing calculations for the design of a hydrogen bomb, weather prediction, cosmic-ray studies, thermal ignition, random-number studies and wind-tunnel design.

The ENIAC contained 17,468 vacuum tubes, along with 70,000 resistors, 10,000 capacitors, 1,500 relays, 6,000 manual switches and 5 million soldered joints. It covered 1800 square feet (167 square meters) of floor space, weighed 30 tons, consumed 160 kilowatts of electrical power. There was even a rumor that when turned on the ENIAC caused the city of Philadelphia to experience brownouts, however, this was first reported incorrectly by the Philadelphia Bulletin in 1946 and since then has become an urban myth.

In one second, the ENIAC (one thousand times faster than any other calculating machine to date) could perform 5,000 additions, 357 multiplications or 38 divisions. The use of vacuum tubes instead of switches and relays created the increase in speed, but it was not a quick machine to re-program. Programming changes would take the technicians weeks, and the machine always required long hours of maintenance. As a side note, research on the ENIAC led to many improvements in the vacuum tube.

In 1948, Dr. John Von Neumann made several modifications to the ENIAC. The ENIAC had performed arithmetic and transfer operations concurrently, which caused programming difficulties. Von Neumann suggested that switches control code selection so pluggable cable connections could remain fixed. He added a converter code to enable serial operation.

In 1946, J Presper Eckert and John Mauchly started the Eckert-Mauchly Computer Corporation. In 1949, their company launched the BINAC (BINary Automatic) computer that used magnetic tape to store data.

In 1950, the Remington Rand Corporation bought the Eckert-Mauchly Computer Corporation and changed the name to the Univac Division of Remington Rand. Their research resulted in the UNIVAC (UNIVersal Automatic Computer), an important forerunner of today's computers.

In 1955, Remington Rand merged with the Sperry Corporation and formed Sperry-Rand. Eckert remained with the company as an executive and continued with the company as it later merged with the Burroughs Corporation to become Unisys.

J Presper Eckert and John Mauchly both received the IEEE Computer Society Pioneer Award in 1980.

At 11:45 p.m., October 2, 1955, with the power finally shut off, the ENIAC retired.

III. Read and decide which of the statements are true and which are false.

Change the sentences so they are true.

1. ENIAC weighed 3 tons.
2. A converter code was added to ENIAC to enable serial operation.
3. It took the team two years and 750,000 tax dollars to build it.
4. The use of switches and relays created the increase in speed of the computer.
5. Research made by Univac Division of Remington Rand resulted in the important forerunner of today's computers.

IV. Give Russian equivalents for the following words and word combinations:

- 1) Advent; 2) elaborate calculations; 3) paramount; 4) cosmic-ray studies; 5) thermal ignition; 6) random-number studies; 7) wind-tunnel design; 8) relay; 9) manual switch; 10) soldered joints; 11) consume; 12) rumor; 13) maintenance; 14) concurrently; 15) pluggable cable connections; 16) enable; 17) forerunner; 18) merge.

V. Fill in the gaps using words from the table:

Enable, calculation, relay, research, magnetic tape, consume, merge, paramount, condition, increase

1. They decided to ... the two companies into one.
2. The ... that you made contained a few inaccuracies.
3. His ... resulted in some amazing discoveries.
4. Computerization should ... us to cut production costs by half.
5. ... is a device that reacts to a small change in an electrical current by moving switches or other devices in an electrical circuit.
6. There are many priorities, but reducing the budget deficit is paramount/is of ... importance.
7. ... is a long plastic strip coated with a magnetic substance, used to record sound or video signals or to store information in computers.
8. There has been some ... in business.
9. The house is not in good
10. Our high living standards cause our present population to ... 25 percent of the world's oil.

VI. Answer the following questions:

1. When was ENIAC developed? How long did it work?
2. Why did US military support this research?
3. What can you tell about J Presper Eckert's and John Mauchly's backgrounds?
4. How was ENIAC used when the war was over?
5. What was ENIAC's size and characteristics?
6. What kind of rumour existed about ENIAC?
7. What were advantages and disadvantage of ENIAC comparing to other calculating machines to date?
8. Improvements in what sphere were made thanks to research on ENIAC?
9. What kind of modifications did Von Neumann make to Eckert and Mauchly computer?
10. What are BINAC and UNIVAC?
11. Did ENIAC inventors get any awards?

VII. Comment on the following extract:

"...With the advent of everyday use of elaborate calculations, speed has become paramount to such a high degree that there is no machine on the market today capable of satisfying the full demand of modern computational methods." – from the ENIAC patent (U.S.#3,120,606), filed on June 26, 1947.

Can these words be related to present-day computer market?
Why (not)?

VIII. Make a presentation about ENIAC computer using the active vocabulary from the text.

Unit 5

The Williams Tube and the Manchester Baby

I. Pre-reading task.

Answer the following questions:

1. Do you know what is a cathode-ray tube?
2. In which way were these tubes used in computers in the 1940-s?

3. What object had the nickname of Manchester Baby?

II. Read the text and check your answers.

By 1946, a winner in the data-storage game emerged that would dominate the computer field for the next several years. Sir Frederick Williams and Tom Kilburn co-invented the Williams-Kilburn Tube (or Williams Tube), a type of altered cathode-ray tube. Scientists had conducted research on cathode-ray tubes serving as computer data storage since the early 1940s.

The illustration to the right is an example of the video display terminal used with the Manchester computer. The terminal mirrored what was happening within the Williams Tube. A metal detector plate placed close to the surface of the tube, detected changes in electrical discharges. Since the metal plate would obscure a clear view of the tube, the technicians could monitor the tubes used a video screen. Each dot on the screen represented a dot on the tube's surface; the dots on the tube's surface worked as capacitors that were either charged and bright or uncharged and dark. The information translated into binary code (0,1 or dark, bright) became a way to program the computer.

The Williams Tube provided the first large amount of random access memory (RAM), and it was a convenient method of data-storage. It did not require rewiring each time the data was changed, and programming the computer went much faster. It became the dominant form of computer memory until outdated by core memory in 1955.

History of the Manchester Baby

In December 1946, Williams began to chair the Department of Electrical Engineering at the University in Manchester, England, with Tom Kilburn moving to Manchester as well. The men had both worked for the Telecommunications Research Establishment (TRE) in Malvern, England, trying to improve the digital storage ability of a cathode-ray tube.

Williams had already succeeded in storing one bit of information on a cathode-ray tube and had filed a provisional patent in December of 1946. Tom Kilburn soon devised an improved method of storing bits, increasing the storage capacity to 2048 bits. Williams added Kilburn's name to the patent. The team was ready to build a computer based on the Williams Tube.

In 1948, Tom Kilburn, assisted by another TRE researcher, Geoff Tootill, worked on designing and building a prototype machine. Nicknamed "The Baby," the new computer demonstrated the ability of the Williams Tube. For the first time in history, a computer used a stored program. Tom Kilburn wrote that computer program, first executed on June 21, 1948.

Manchester Baby's Specifications:

32-bit word length.

Serial binary arithmetic using 2 complement integers.

Single address format order code.

Random access main store of 32 words, extendable up to 8192 words.

Computing speed of around 1.2 milliseconds per instruction.

The team designed a second computer (Manchester Mark 1) and commissioned an outside company called Ferranti Ltd. to build the computer in 1949. Ferranti Ltd. and the Manchester University team collaborated in 1951 and built the world's first commercially available general-purpose computer called the Ferranti Mark 1. The first machine off the production line was delivered to the University of Manchester.

Manchester Mark 1 Specs - Ferranti Mark 1 Specs

Store organized in 40-bit addressable "lines," holding one 40-bit number or two 20-bit instructions.	Store organized in 20-bit addressable "lines," an instruction taking one line and a number two consecutive lines.
Serial 40-bit arithmetic with hardware add, subtract, and multiply and logical instructions.	Serial 40-bit arithmetic, with hardware add, subtract, and multiply and logical instructions and simple B-line arithmetic
2 modifier registers (B-lines, for modifying addresses in instructions.)	8 modifier registers (B-lines, for modifying addresses in instructions.)
Single address format order code - about 30 function codes.	Single address format order code - about 50-function codes.
4 pages of random access main store.	8 pages of random access main store.
128-page capacity drum backing store, 2 pages per track, about 30 milliseconds revolution time.	512-page capacity drum backing store, 2 pages per track, about 30 milliseconds revolution time.
Standard instruction time - 1.8 milliseconds, multiplication much slower.	Standard instruction time - 1.2 milliseconds, multiplication 2.16 milliseconds.

III. Translate from English into Russian:

1) cathode-ray tube; 2) computer data storage; 3) changes in electrical discharges; 4) to monitor the tubes; 5) to translate into binary code; 6) random access memory (RAM); 7) core memory; 8) to improve the digital storage ability; 9) to increase storage capacity; 10) to use 2 complement integers; 11) extendable up to 8192 words; 12) general-purpose computer; 13) modifier registers; 14) standard instruction time.

IV. Find derivatives from the text for the following words:

1) to store; 2) to invent; 3) to detect; 4) to charge; 5) date; 6) success; 7) to extend.

V. Fill in the gaps in the following sentences:

1. Sir Frederick Williams and Tom Kilburn ... the Williams-Kilburn Tube, a type of altered tube.
2. Scientists had conducted ... on cathode-ray tubes serving as computer since the early 1940s.
3. A metal placed close to the surface of the tube, detected ... in electrical discharges.
4. Each dot on the ... represented a dot on the tube's
5. The dots on the tube's surface worked as ... that were either charged and bright or uncharged and dark.
6. The information translated into became a way to program the computer.
7. The Williams Tube provided the first large amount of
8. It became the dominant form of computer memory until outdated by in 1955.
9. The men had both worked for TRE in Malvern, England, trying to improve the ability of a cathode-ray tube.
10. Tom Kilburn soon devised an ... method of storing bits, increasing the to 2048 bits.
11. For the first time in history, a computer used a ... program.
12. Ferranti Ltd. and the Manchester University team built the world's first commercially available computer called the Ferranti Mark 1.

VI. Answer the following questions:

1. When was the Williams-Kilburn Tube invented?

2. In what way could the technicians monitor the tubes?
3. Why was the Williams tube a convenient method of data-storage?
4. When was the Williams tube outdated by core memory?
5. What did Williams and Kilburn try to improve in 1946?
6. When was the Manchester Baby built?
7. What did the Manchester Baby demonstrate?
8. What was the nickname of the computer built in 1949?
9. What kind of computer was Ferranti Mark 1?
10. Where was the first machine off the production line delivered to?

VII. Render the text using the vocabulary from III.

Unit 6

The invention of semiconductor transistors

I. Pre-reading task:

Answer the following questions:

1. What is semiconductor transistor?
2. When and who invented semiconductor transistors?

II. Read the text and check your answers for task I.

The transistor is an influential invention that changed the course of history for computers. The first generation of computers used vacuum tubes; the second generation of computers used transistors; the third generation of computers used integrated circuits; and the fourth generation of computers used microprocessors.

John Bardeen, William Shockley, and Walter Brattain, scientists at the Bell Telephone Laboratories in Murray Hill, New Jersey, were researching the behavior of crystals (germanium) as semi-conductors in an attempt to replace vacuum tubes as mechanical relays in telecommunications. The vacuum tube, used to amplify music and voice, made long-distance calling practical, but the tubes consumed power, created heat and burned out rapidly, requiring high maintenance.

The team's research was about to come to a fruitless end when a last attempt to try a purer substance as a contact point lead to the invention of the "point-contact" transistor amplifier. In 1956, the team received the Nobel Prize in Physics for the invention of the transistor.

A transistor is a device composed of semi-conductor material that can both conduct and insulate (e.g. germanium and silicon). Transistors switch and

modulate electronic current. Before transistors, digital circuits were composed of vacuum tubes. [Read the ENIAC story to learn all about the disadvantages of vacuum tubes in computers.] The transistor was the first device designed to act as both a transmitter, converting sound waves into electronic waves, and resistor, controlling electronic current. The name transistor comes from the 'trans' of transmitter and 'sistor' of resistor.

John Bardeen and Walter Brattain took out a patent for their transistor. William Shockley applied for a patent for the transistor effect and a transistor amplifier. Transistors transformed the world of electronics and had a huge impact on computer design. Transistors made of semiconductors replaced tubes in the construction of computers. By replacing bulky and unreliable vacuum tubes with transistors, computers could now perform the same functions, using less power and space.

The first *fully* transistorized computer was either the [Harwell CADET](#) which first operated in February 1955, although the price paid for this was that it only operated at the slow speed of 58 kHz, ^[citation needed] or the prototype [IBM 604](#) transistor calculator, described in the next section. The [Burroughs Corporation](#) claimed the [SM-65 Atlas ICBM](#) / THOR ABLE guidance computer (MOD 1) that it delivered to the US Air Force at the [Cape Canaveral](#) missile range in June 1957 was "the world's first operational transistorized computer". ^[citation needed]

In Japan the ETL Mark III began operation in July 1956; the Canadian [DRTE Computer](#) in 1957, while in Austria, the [Mailüfterl](#) was completed in May 1958,^[5] being the first transistorized computers in Asia and mainland Europe.

CHARACTERISTICS

- 1) Transistors were used in place of vacuum tubes.
- 2) Second generation computers were smaller in comparison with the first generation computers.
- 3) They were faster in comparison with the first generation computers.
- 4) They generated less heat and were less prone to failure.
- 5) They took comparatively less computational time.
- 6) Assembly language was used for programming.
- 7) Second generation computers has faster input/output devices.

IBM 7000, NCR 304, IBM 650, IBM 1401, ATLAS and Mark III are the examples of second generation computers.

III. Answer the following questions:

1. Explain the main principle of dividing computers to four generations.
2. What kind of research did scientists Bardeen, Shockley, and Brattain make at the Bell Telephone Laboratories?
3. For what purpose were vacuum tubes used in phone calling?
4. What were disadvantages of vacuum tubes?
5. For what invention did the team get the Nobel Prize in Physics?
6. What is transistor?
7. What is the function of transistor?

8. Where does the name “transistor” originate from?
9. Did invention of transistor influence computer world? In what way?
10. Who got patent for transistor?

IV. Give Russian equivalents to the following words and word combinations:

1) Semiconductor transistor; 2) influential invention; 3) integrated circuits; 4) amplify; 5) high maintenance; 6) contact point; 7) insulate; 8) modulate electronic current; 9) have a huge impact on; 10) bulky.

V. Guess what words from the text are meant by these definitions:

1. a semiconductor device commonly used to amplify or switch electronic signals.
2. a substance, usually a solid chemical element or compound, that can conduct electricity under some conditions but not others, making it a good medium for the control of electrical current.
3. the first type of solid-state electronic transistor ever constructed.
4. an electronic device which, usually with the aid of an antenna, propagates an electromagnetic signal such as radio, television, or other telecommunications.
5. a part of an electrical circuit designed to produce a particular amount of resistance to the flow of current.

VI. Choose one of the variants to complete the sentences:

1. Transistors have many ... over vacuum tubes.
♦ patterns ♦ advantages ♦ scales
2. They ... very little power.
♦ consume ♦ generate ♦ embrace
3. An integrated circuit is a group of elements connected together by some circuit ... technique.
♦ processing ♦ assembly ♦ manipulation
4. The transistor consists of a small piece of a ... with three electrodes.
♦ diode ♦ conductor ♦ semiconductor
5. Modern ... began in the early 20th century with the invention of electronic tubes.
♦ miniaturization ♦ electronics ♦ microelectronics
6. John Fleming was the ... of the first two-electrode vacuum tube.
♦ generator ♦ receiver ♦ inventor

7. One of the transistor advantages was lower power ... in comparison with vacuum tubes.
 - consumption
 - reception
 - transmission
8. Microelectronics greatly extended man's intellectual
 - subsystems
 - capabilities
 - dimensions

VII. Translate the following sentences into English:

1. 16 декабря 1947 года ученым научно-исследовательского центра Bell Labs удалось создать действующий образец одного из самых великих изобретений двадцатого столетия – транзистора.
2. Транзистор – это полупроводниковый прибор для усиления, генерирования и преобразования электрических колебаний.
3. В 1948 г. американские учёные Бардин и Браттейн создали германиевый точечный триод (транзистор).
4. Аппаратура 40-х годов использовала для усиления, преобразования и коммутации сигналов в абонентских цепях два основных элемента: электронную лампу и электромеханическое реле.
5. Эти элементы были громоздки, срабатывали медленно, потребляли много энергии и не отличались высокой надежностью.
6. Bell нуждались в названии устройства. Предлагались названия «полупроводниковый триод» (semiconductor triode), «Solid Triode», «Surface States Triode», «кристаллический триод» (crystal triode) и «Iotatron», но слово «транзистор» (transistor), предложенное Джоном Пирсом (John R. Pierce), победило во внутреннем голосовании.

Unit 7

The UNIVAC Computer and its creators, J. Presper Eckert and John Mauchly

I. Pre-reading task.

1. Do you remember the names of Dr. Presper Eckert and Dr. John Mauchly from Unit 2?
2. What was the name of the computer they created?
3. What problem did they have when they wanted to patent their invention?

II. Read the text and check your answers.

The Universal Automatic Computer or UNIVAC was a computer milestone achieved by Dr. Presper Eckert and Dr. John Mauchly, the team that invented the ENIAC computer.

J Presper Eckert and John Mauchly, after leaving the academic environment of The Moore School of Engineering to start their own computer business, found their first client was the United States Census Bureau. The Bureau needed a new computer to deal with the exploding U.S. population (the beginning of the famous baby boom). In April 1946, a \$300,000 deposit was given to Eckert and Mauchly for the research into a new computer called the UNIVAC.

UNIVAC Computer

The research for the project proceeded badly, and it was not until 1948 that the actual design and contract was finalized. The Census Bureau's ceiling for the project was \$400,000. J Presper Eckert and John Mauchly were prepared to absorb any overrun in costs in hopes of recouping from future service contracts, but the economics of the situation brought the inventors to the edge of bankruptcy.

In 1950, Eckert and Mauchly were bailed out of financial trouble by Remington Rand Inc. (manufacturers of electric razors), and the "Eckert-Mauchly Computer Corporation" became the "Univac Division of Remington Rand." Remington Rand's lawyers unsuccessfully tried to re-negotiate the government contract for additional money. Under threat of legal action, however, Remington Rand had no choice but to complete the UNIVAC at the original price.

On March 31, 1951, the Census Bureau accepted delivery of the first UNIVAC computer. The final cost of constructing the first UNIVAC was close to one million dollars. Forty-six UNIVAC computers were built for both government and business uses. Remington Rand became the first American manufacturers of a commercial computer system. Their first non-government contract was for General Electric's Appliance Park facility in Louisville, Kentucky, who used the UNIVAC computer for a payroll application.

UNIVAC SPECS.

The UNIVAC had an add time of 120 microseconds, multiply time of 1,800 microseconds and a divide time of 3,600 microseconds.

Input consisted of magnetic tape with a speed of 12,800 characters per second with a read-in speed of 100 inches per second, records at 20 characters per inch, records at 50 characters per inch, card to tape converter 240 cards per minute, 80 column punched card input 120 characters per inch, and punched paper tape to magnetic tape converter 200 characters a second.

Output media/speed was magnetic tape/12,800 characters per second, uniprinter/10-11 characters per second, high speed printer/600 lines per minute, tape to card converter/120 cards per minute, Rad Lab buffer storage/Hg 3,500 microsecond, or 60 words per minute.

J Presper Eckert and John Mauchly's UNIVAC was a direct competitor with IBM's computing equipment for the business market. The speed with which UNIVAC's magnetic tape could input data was faster than IBM's punch card technology, but it was not until the presidential election of 1952 that the public accepted the UNIVAC's abilities.

In a publicity stunt, the UNIVAC computer was used to predict the results of the Eisenhower-Stevenson presidential race. The computer had correctly predicted that Eisenhower would win, but the news media decided to blackout the computer's prediction and declared that the UNIVAC had been stumped. When the truth was revealed, it was considered amazing that a computer could do what political forecasters could not, and the UNIVAC quickly became a household name. The original UNIVAC now sits in the Smithsonian Institution.

III. Translate the sentences from English into Russian paying attention to the words in bold type:

1. **It was not until** 1948 **that** the actual design and contract was finalized.
2. Forty-six UNIVAC computers were built for **both** government **and** business uses.
3. **It was not until** the presidential election of 1952 **that** the public accepted the UNIVAC's abilities.

IV. Translate the word-combinations from English into Russian:

1) a computer milestone; 2) to deal (with) 3) research into a new computer; 4) ceiling for the project; 5) bring to the edge of bankruptcy; 6) to use the computer for a payroll application; 7) add / multiply / divide time; 8) magnetic tape; 9) card to tape converter; 10) punched paper tape; 11) buffer storage ; 12) a direct competitor; 13) to input data.

V. Fill in the gaps in the following sentences:

1. The UNIVAC computer was a achieved by Dr. Presper Eckert and Dr. John Mauchly who had invented the ENIAC computer .
2. The Bureau needed a new computer to the exploding U.S. population (the beginning of the famous baby boom).
3. The ... for the project proceeded badly.

4. In 1950, Eckert and Mauchly were ... out of financial trouble by Remington Rand Inc.
5. Remington Rand became the first American manufacturers of a commercial
6. The UNIVAC had an ... time of 120 microseconds, ... time of 1,800 microseconds and a ... time of 3,600 microseconds.
7. Input consisted of magnetic tape with a speed of 12,800 ... per second.
8. UNIVAC was a direct ... with IBM's computing equipment for the business market.
9. The UNIVAC computer was used to ... the results of the Eisenhower-Stevenson presidential race.
10. When the truth was revealed, it was considered amazing that a computer could do what political ... could not, and the UNIVAC quickly became a ... name.

VI. Answer the following questions:

1. Why do you think the creation of UNIVAC was called a computer milestone?
2. Why did the United States Census Bureau need a new computer in 1946?
3. How many years did it take to construct the UNIVAC computer? What was the final cost of the first machine?
4. How many UNIVAC computers were built for government and business uses?
5. Which company was the first non-government contract made with?
6. What can you say about UNIVAC specifications?
7. Which company was direct competitor with UNIVAC?
8. When did the public accept the UNIVAC abilities?
9. What was the UNIVAC's prediction for the Eisenhower-Stevenson presidential race?
10. Where is the original UNIVAC kept nowadays?

VII. Make up a plan to the text and render the text according to the plan. Try to use grammar patterns given in Exercise 1 and vocabulary from Exercise 2.

Unit 8

The History of IBM Computers

I. Pre-reading task:

1. What do you know about IBM?
2. In groups of three or four write down as many IBM inventions as you can. Compare your notes.

II. Read the text and see how many inventions you can add to the list you've made in pre-reading task.

This text finally brings us to a famous name most of you will have heard of. IBM stands for International Business Machines, the largest computer company in the world today. IBM has been responsible for numerous inventions having to do with computers.

IBM – Background

The company incorporated in 1911, starting as a major producer of punch card tabulating machines.

During the 1930s, IBM built a series of calculators (the 600s) based on their punch card processing equipment.

In 1944, IBM co-funded the Mark 1 computer together with Harvard University, the Mark 1 was the first machine to compute long calculations automatically.

The IBM 701 - General Purpose Computer

The year 1953 saw the development of IBM's 701 EDPM, which, according to IBM, was the first commercially successful general-purpose computer. The 701's invention was due in part to the Korean War effort. Inventor, Thomas Johnson Watson Junior wanted to contribute what he called a "defense calculator" to aid in the United Nations' policing of Korea. One obstacle he had to overcome was in convincing his father, Thomas Johnson Watson Senior (IBM's CEO) that the new computer would not harm IBM's profitable punch card processing business. The 701s were incompatible with IBM's punched card processing equipment, a big moneymaker for IBM.

Only nineteen 701s were manufactured (the machine could be rented for \$15,000 per month). The first 701 went to IBM's world headquarters in New York. Three went to atomic research laboratories. Eight went to aircraft companies. Three went to other research facilities. Two went to government agencies, including the first use of a computer by the United States Department of Defense. Two went to the navy and the last machine went to the United States Weather Bureau in early 1955.

Features of the 701

The 1953 built 701 had electrostatic storage tube memory, used magnetic tape to store information, and had binary, fixed-point, single address hardware.

The speed of the 701 computers was limited by the speed of its memory; the processing units in the machines were about 10 times faster than the core memory. The 701 also led to the development of the programming language FORTRAN.

The IBM 704

In 1956, a significant upgrade to the 701 appeared. The IBM 704 was considered an early super-computer and the first machine to incorporate floating-point hardware. The 704 used magnetic core memory that was faster and more reliable than the magnetic drum storage found in the 701.

The IBM 7090

Also part of the 700 series, the IBM 7090 was the first commercial transistorized computer. Built in 1960, the 7090 computer was the fastest computer in the world. IBM dominated the mainframe and minicomputer market for the next two decades with its 700 series.

The IBM 650

After releasing the 700 series, IBM built the 650 EDPM, a computer compatible with its earlier 600 calculator series. The 650 used the same card processing peripherals as the earlier calculators, starting the trend for loyal customers to upgrade. The 650s were IBM's first mass-produced computers (universities were offered a 60% discount).

The IBM PC

In 1981, IBM created its first personal home-use computer called the IBM PC, another milestone in computer history.

III . Answer the following questions:

1. When did the company incorporate? What did it produce?
2. What was the series of calculators (the 600s) based on?
3. Who did IBM co-fund the Mark 1 together with?
4. What happened in IBM in 1953?
5. Why was 701's invention due in part to the Korean War effort?
6. What was the reason of IBM 701's incompatibility with IBM's punched card processing equipment?
7. How many 701s were manufactured? Where were they used?
8. What were the features of the 701?
9. Development of what programming language did the 701 lead to?
10. What is the difference between the 701 and the 704?

11. What was innovative about the IBM 7090?
12. Why did the 650s become mass-produced computers?
13. When was IBM PC created?

IV. Give Russian equivalents to the following words and word combinations:

1) Punch card tabulating machine; 2) incorporate; 3) general-purpose computer; 4) overcome obstacles; 5) incompatible; 6) headquarter; 7) electrostatic storage tube memory; 8) fixed-point hardware; 9) core memory; 10) floating-point hardware; 11) magnetic drum storage; 12) mainframe; 13) mass-produced.

V. Explain the meaning of the following words and use them in your own sentences:

Stand for, responsible for, equipment, commercially successful, due to, convince, harm, upgrade.

VI. Using the dictionary give derivatives to the following verbs from the text:

e.g. to calculate – calculating, calculator, calculation.

To compete, to invent, to know, to multiply, to divide, to consume, to depend, to operate, to contribute, to solve, to use, to discover, to connect, to store, to consume, to process.

VII. Do the following tasks on this text:

- Make up a plan of the text;
- Find the key words in each paragraph of the text;
- Summarize the text in brief.

Unit 9

FORTRAN, the First Successful HLL (High Level Programming Language)

I. Pre-reading task

A. Answer the following questions:

1. What does the abbreviation FORTRAN stand for?

2. Do you know who and when developed FORTRAN?
3. What is special about HLL (high level languages)?

B. Read and translate the following quote and give your comments on it.

"I really didn't know what the hell I wanted to do with my life...I said no, I couldn't. I looked sloppy and disheveled. But she insisted and so I did. I took a test and did OK." - John Backus on interviewing for IBM.

II. Read the text and check your answers for task A.

FORTRAN or formula translation, the first high level programming language, was invented by John Backus for IBM, in 1954, and released commercially, in 1957. It is still used today for programming scientific and mathematical applications. Fortran began as a digital code interpreter for the IBM 701 and was originally named Speedcoding. John Backus wanted a programming language closer to human language, which is the definition of a high level language, other high language programs include Ada, Algol, BASIC, COBOL, C, C++, LISP, Pascal, and Prolog.

The first generation of codes used to program a computer, was called machine language or machine code, it is the only language a computer really understands, a sequence of 0s and 1s that the computer's controls interprets as instructions, electrically. The second generation of code was called assembly language, assembly language turns the sequences of 0s and 1s into human words like 'add'. Assembly language is always translated back into machine code by programs called assemblers.

The third generation of code, was called high level language or HLL, which has human sounding words and syntax (like words in a sentence). In order for the computer to understand any HLL, a compiler translates the high level language into either assembly language or machine code. All programming languages need to be eventually translated into machine code for a computer to use the instructions they contain.

John Backus headed the IBM team of researchers, at the Watson Scientific Laboratory, that invented Fortran. On the IBM team were the notable names of scientists like; Sheldon F. Best, Harlan Herrick (Harlan Herrick ran the first successful fortran program), Peter Sheridan, Roy Nutt, Robert Nelson, Irving Ziller, Richard Goldberg, Lois Haibt and David Sayre. The IBM team didn't invent HLL or the idea of compiling programming language into machine code, but Fortran was the first successful HLL and the Fortran I compiler holds the

record for translating code for over 20 years. The first computer to run the first compiler was the IBM 704, which John Backus helped design.

Fortran is now over forty years old and remains the top language in scientific and industrial programming, of course it has constantly been updated. The invention of Fortran began a \$24 million dollar computer software industry and began the development of other high level programming languages, Fortran has been used for programming video games, air traffic control systems, payroll calculations, numerous scientific and military applications and parallel computer research. John Backus won the 1993 National Academy of Engineering's Charles Stark Draper Prize, the highest national prize awarded in engineering, for the invention of Fortran.

III. Translate word-combinations from English into Russian:

1) high level programming language; 2) mathematical applications; 3) digital code interpreter; 4) instructions; 5) assembly language; 6) the sequence of 0s and 1s; 7) to run the first compiler; 8) to update; 9) computer software industry; 10) payroll calculations; 11) National Academy of Engineering.

IV. Close the text and choose one of the words in brackets to complete the sentences:

1. FORTRAN is still used today for programming and mathematical (needs/applications/purposes).
2. FORTRAN began as a digital code (translator/ interpreter/compiler) for the IBM 701.
3. John Backus wanted a programming language closer to (computer/artificial/human) language.
4. The machine code is a sequence of 0s and 1s that the computer's controls (stores /interprets /outputs) as instructions.
5. The third generation of code, was called (medium / low /high) level language.
6. John Backus headed the IBM team of (constructors/ translators/researchers).
7. Fortran is now over (forty/fifty/sixty) years old and remains the top language in scientific and industrial programming.

8. The invention of Fortran began a \$24 million dollar (computer manufacturing /computer software / computer design) industry.
9. John Backus won the 1993 National Academy of Engineering's prize awarded in (science/technique/ engineering), for the invention of Fortran.

V. Answer the following questions:

1. What does FORTRAN stand for?
2. Who was the FORTRAN's inventor?
3. How did it start and what was its original name?
4. What was John Backus 's objective when he was creating FORTRAN?
5. What other HLLs, apart from FORTRAN, do you know?
6. What do we mean by the first generation of codes?
7. How was the second generation of codes called?
8. What is special about the third generation of codes?
9. What was the name of the first computer to run the first compiler?
10. What purposes has FORTRAN been used for?

VI. Close the text and translate sentences from Russian into English:

1. Фортран, первый язык программирования высокого уровня, был создан в 1954 г.
2. Дж.Бахус хотел создать язык программирования, близкий к человеческому.
3. Любой язык программирования в конце концов должен быть превращен в машинный код, чтобы компьютер мог выполнить математические операции.
4. Единственный язык, который понимает компьютер, это последовательность 0 и 1, которые блок управления интерпретирует как команды.
5. Команда исследователей, создавшая Фортран, работала в Научной лаборатории ИВМ.
6. Х.Херрику первому удалось успешно прогнать программу на Фортране.
7. Хотя Фортрану уже 40 лет, он остается языком первостепенного значения в программировании.
8. Изобретение Фортрана положило начало индустрии создания компьютерного обеспечения и развитию других языков программирования высокого уровня.

9. За разработку Фортрана Дж.Бахус получил национальную премию Научно-технической Академии 1993 г.
10. Фортран используется для написания компьютерных игр, систем управления воздушным транспортом, подготовки платежных ведомостей и многих других приложений.

VII. Summarize the main ideas of the text.

Unit 10

The History of the Integrated Circuit aka Microchip

I. Pre-reading task:

1. Do you know who Jack Kilby is?
2. Read J.Kilby's words and say what you think about his words.
"What we didn't realize then was that the integrated circuit would reduce the cost of electronic functions by a factor of a million to one, nothing had ever done that for anything before" - Jack Kilby.

II. Read the text using the dictionary if necessary.

It seems that the integrated circuit was destined to be invented. Two separate inventors, unaware of each other's activities, invented almost identical integrated circuits or ICs at nearly the same time.

Jack Kilby, an engineer with a background in ceramic-based silk screen circuit boards and transistor-based hearing aids, started working for Texas Instruments in 1958. A year earlier, research engineer Robert Noyce had co-founded the Fairchild Semiconductor Corporation. From 1958 to 1959, both electrical engineers were working on an answer to the same dilemma: how to make more of less.

In designing a complex electronic machine like a computer it was always necessary to increase the number of components involved in order to make technical advances. The monolithic (formed from a single crystal) integrated circuit placed the previously separated transistors, resistors, capacitors and all the connecting wiring onto a single crystal (or 'chip') made of semiconductor material. Kilby used germanium and Noyce used silicon for the semiconductor material.

In 1959 both parties applied for patents. Jack Kilby and Texas Instruments received U.S. patent #3,138,743 for miniaturized electronic circuits. Robert Noyce and the Fairchild Semiconductor Corporation received U.S. patent

#2,981,877 for a silicon based integrated circuit. The two companies wisely decided to cross license their technologies after several years of legal battles, creating a global market now worth about \$1 trillion a year.

In 1961 the first commercially available integrated circuits came from the Fairchild Semiconductor Corporation. All computers then started to be made using chips instead of the individual transistors and their accompanying parts. Texas Instruments first used the chips in Air Force computers and the Minuteman Missile in 1962. They later used the chips to produce the first electronic portable calculators. The original IC had only one transistor, three resistors and one capacitor and was the size of an adult's pinkie finger. Today an IC smaller than a penny can hold 125 million transistors.

Jack Kilby holds patents on over sixty inventions and is also well known as the inventor of the portable calculator (1967). In 1970 he was awarded the National Medal of Science. Robert Noyce, with sixteen patents to his name, founded Intel, the company responsible for the invention of the microprocessor, in 1968. But for both men the invention of the integrated circuit stands historically as one of the most important innovations of mankind. Almost all modern products use chip technology.

III. Answer the following questions:

1. Who invented integrated circuits (ICs)?
2. Why was the integrated circuit needed?
3. What was used to perform functions of ICs in computer?
4. Explain the difference between Kilby's and Noyce's inventions?
5. When did the first commercially available integrated circuit appear?
6. What were the characteristics of original ICs?
7. Where were they used?
8. What is the size and features of modern IC?
9. What other J.Kilby's inventions do you know?
10. What can you tell about Robert Noyce's further career?

IV. Give Russian equivalents to the following words and word phrases:

1) Integrated circuit; 2) to be destined; 3) ceramic-based silk screen; 4) transistor-based hearing aids; 5) monolithic; 6) to be worth; 7) accompanying parts; 8) portable.

V. Give synonyms to the following words:

To reduce, separate, to be aware, background, dilemma, to increase, to receive, mankind.

VI. Form nouns from these verbs, using the suffixes *-er, -or, -tion, -sion, -ment*. Consult the dictionary and the text.

To control, to invent, to achieve, to produce, to resist, to decide, to accomplish, to transmit, to manufacture, to prepare, to equip, to improve, to consume, to move, to invest.

VI. Give a written translation of the text, paying attention to computer science terminology.

Unit 11

The first computer game

I. Pre-reading task.

A. Answer the following questions:

1. Do you know who and when created the first computer game?
2. What was the name of this game?

B. Read and translate the following extract and give your comments on it.

If I hadn't done it, someone would've done something equally exciting if not better in the next six months. I just happened to get there first." - Steve Russell nickname "Slug".

II. Read the text and check your answers.

It was in 1962 when a young computer programmer from MIT, Steve Russell fueled with inspiration from the writings of E. E. "Doc" Smith*, led the team that created the first computer game. It took the team about 200 man-hours to write the first version of Spacewar. Steve Russell wrote Spacewar on a PDP-1, an early DEC (Digital Equipment Corporation) interactive mini computer which used a cathode-ray tube type display and keyboard input. The computer was a donation to MIT from DEC, who hoped MIT's think tank would be able to do something remarkable with their product. A computer game called Spacewar was the last thing DEC expected who later provided the game as a diagnostic program for their customers. Russell never profited from Spacewars.

The PDP-1's operating system was the first to allow multiple users to share the computer simultaneously. This was perfect for playing Spacewar, which was a two-player game involving warring spaceships firing photon torpedoes. Each player could maneuver a spaceship and score by firing missiles at his opponent while avoiding the gravitational pull of the sun. Try playing a replica** of the computer game for yourselves. It still holds today up as a great way to waste a few hours. By the mid-sixties, when computer time was still very expensive, Spacewar could be found on nearly every research computer in the country. Steve Russell transferred to Stanford University, where he introduced computer game programming and Spacewar to an engineering student called Nolan Bushnell. Bushnell went on to write the first coin-operated computer arcade game and start Atari Computers.

*An interesting sidenote is that "Doc" Smith, besides being a great science fiction writer, held a Ph.D. in chemical engineering and was the researcher who figured out how to get powdered sugar to stick to doughnuts.

**Spacewar! was conceived in 1961 by Martin Graetz, Steve Russell, and Wayne Wiitanen. It was first realized on the PDP-1 in 1962 by Steve Russell, Peter Samson, Dan Edwards and Martin Graetz, together with Alan Kotok, Steve Piner and Robert A. Saunders.

III. Give Russian equivalents to the following words and word combinations:

1) Fueled with inspiration; 2) a cathode-ray tube type display; 3) keyboard input; 4) donation from somebody to somebody; 5) think tank; 6) to profit from smth.; 7) to share the computer simultaneously; 8) a two-player game; 9) to maneuver a spaceship; 10) to score by firing missiles; 11) to avoid the gravitational pull of the sun; 12) coin-operated computer arcade game.

IV. Translate the following words and form derivatives that can be found in the text:

1) to program; 2) to inspire; 3) active; 4) key; 5) war; 6) engine; 7) gravitation.

V. Tell whether the following sentences are true or false:

1. It was Doc Smith who led the team that created the first computer game.
2. It took the team about 200 man-hours to write the first version of Spacewar.
3. PDP-1, an early DEC (Digital Equipment Corporation) interactive mini computer, used a LCD type display and keyboard input.

4. DEC donated MIT PDP-1 because they hoped MIT's think tank would be able to do something remarkable with their product.
5. Russel got enormous profit from Spacewars.
6. The PDP-1's operating system did not allow multiple users to share the computer simultaneously.
7. Spacewar was a two-player game involving warring spaceships firing photon torpedoes.
8. Each player could maneuver a spaceship and score by destroying their opponent's ship.
9. Spacewar was the most popular computer game in the country in the mid-seventies.
10. Steve Russell worked as a lecturer at Stanford University.

VI. Answer the following questions:

1. Whose writing inspired the inventor of the first computer game?
2. What was "Doc" Smith famous for?
3. How much time did it take to write the first version of Spacewar?
4. What kind of computer was PDP-1?
5. Why was it donated to MIT by the Digital Equipment Corporation?
6. Did they expect that they will receive a computer game from MIT?
7. What was special about the PDP-1's operating system?
8. Why was that perfect for playing Spacewar?
9. What fact makes it evident that Spacewar used to be extremely popular in the mid-sixties?
10. What contribution did N. Bushnell make into computer games?

VII. Close the text and write 10 sentences on the history of the 1st computer game.

VIII. Prepare a presentation on some famous computer game.

Unit 12

The History of the Computer Mouse and the Prototype for Windows - Douglas Engelbart

I. Answer the following questions before you study the text below:

1. Do you know why the computer mouse was named so?
2. How did the first computer mouse look like?

II. Read the text and check your answers.

"It would be wonderful if I can inspire others, who are struggling to realize their dreams, to say 'if this country kid could do it, let me keep slogging away'." - Douglas Engelbart.

Douglas Engelbart changed the way computers worked, from specialized machinery that only a trained scientist could use, to a user-friendly tool that almost anyone can use. He invented or contributed to several interactive, user-friendly devices: the computer mouse, windows, computer video conferencing, hypermedia, groupware, email, the Internet and more.

In 1964, the first prototype computer mouse was made to use with a graphical user interface (GUI), 'windows'. Engelbart received a patent for the wooden shell with two metal wheels (computer mouse U.S. Patent # 3,541,541) in 1970, describing it in the patent application as an "X-Y position indicator for a display system." "It was nicknamed the mouse because the tail came out the end," Engelbart revealed about his invention. His version of windows was not considered patentable (no software patents were issued at that time), but Douglas Engelbart has over 45 other patents to his name.

Throughout the '60s and '70s, while working at his own lab (Augmentation Research Center, Stanford Research Institute), Engelbart dedicated himself to creating a hypermedia groupware system called NLS (for oNLine System). Most of his accomplishments, including the computer mouse and windows, were part of NLS.

In 1968, a 90-minute, staged public demonstration of a networked computer system was held at the Augmentation Research Center -- the first public appearance of the mouse, windows, hypermedia with object linking and addressing, and video conferencing.

Douglas Engelbart was awarded the 1997 Lemelson-MIT Prize of \$500,000, the world's largest single prize for invention and innovation. In 1998, he was inducted into the National Inventors Hall of Fame.

Currently, Douglas Engelbart is the director of his company, Bootstrap Institute in Fremont, California, which promotes the concept of Collective IQ. Ironically, Bootstrap is housed rent free courtesy of the Logitech Corp., a famous manufacturer of computer mice.

III. Give Russian equivalents to the following words and word combinations:

1) Slog away; 2) specialized machinery; 3) user-friendly tool 4) contribute to; 5) groupware; 6) graphical user interface; 7) application; 8) nickname; 9) reveal; 10) dedicate to; 11) accomplishment; 12) induct into; 13) currently; 14) courtesy.

IV. Use the words from the table to complete the sentences.

Interactive, device, video teleconferencing, hypermedia, indicator, display, accomplishment, innovation, promote, contribute to.
--

1. According to Dabbagh and Kitsantas, WBPT can be classified into four broad categories: content creation and delivery tools, collaborative and communication tools, administrative tools, and ...tools.
2. I could not rest without calling to ask, once more, whether I can in any manner ...his comfort, or your own.
3. He owns or shares more than a score of patents covering numerous aspects of ...technologies.
4. All you need to do to qualify for this valuable tax break is to ...a retirement-savings plan and earn less than a certain amount.
5. The session will provide them insight into the issues involved in successful ...multimedia systems development.
6. The latter had an ivory plate bearing "statoscope" and other words in French, and a little ...quivered and waggled.
7. Lynde says they've never had a female teacher in Avonlea before and she thinks it is a dangerous
8. This singer is known for his ... in vocal technique.
9. It was a very simple ..., but perfectly effective, as I think any one will find who employs it in like circumstances.
10. Companies and building owners alike have come to recognize the value of ... facilities.

V. Answer the following questions:

1. What inventions are connected with the name of Douglas Engelbart?
2. When was the first prototype compute mouse made?
3. How did it look like?
4. Why did this device get the name "mouse"?
5. Did Douglas Engelbart manage to patent his version of windows? Why (not)?
6. What is NLS? How is Douglas Engelbart connected with it?
7. What happened in 1968, in Augmentation Research Center?
8. Was Engelbart awarded for his inventions? In what way?
9. What do you know about Engelbart's present life?

VI. Translate the following text into English.

Сейчас трудно представить работу на компьютере без мыши. Более того, в некоторых приложениях и играх просто-напросто не предусмотрено другого способа управления. Дуглас Энгельбарт, выдающийся ученый и инженер, начал задумываться над тем, каким образом можно было сделать компьютеры более дружественными по отношению к пользователям еще в пятидесятые годы XX века. В итоге команда Энгельбарта отдала предпочтение относительно простому с точки зрения конструкции устройству под названием "анализатор положения X-Y для компьютерных систем". Впоследствии "анализатор положения" из-за соединительного провода, напоминавшего хвост, получил неофициальное название мышь. И именно эта "кличка" прижилась за манипулятором, полностью изменившим характер взаимодействия человека с машиной.

VII. Make a presentation about Douglas Engelbart and the role of his inventions in computer world. Use all necessary information from exercises given above and your own knowledge of the theme.

Unit 13

ARPAnet - The First Internet

I. Pre-reading task

Before you read the text answer the following questions:

1. Can you imagine life without the Internet nowadays?
2. Do you know when the first Internet appeared? In which country?
3. Can you guess what the word ARPA stands for?

II. Read the text and check your answers.

On a cold war kind of day, in swinging 1969, work began on the ARPAnet, grandfather to the Internet. Designed as a computer version of the nuclear bomb shelter, ARPAnet protected the flow of information between military installations by creating a network of geographically separated computers that could exchange information via a newly developed protocol (rule for how computers interact) called NCP (Network Control Protocol).

One opposing view to ARPAnet's origins comes from Charles M. Herzfeld, the former director of ARPA. He claimed that ARPAnet was not created as a result of a military need, stating "it came out of our frustration that there were only a limited number of large, powerful research computers in the country and

that many research investigators who should have access were geographically separated from them." ARPA stands for the Advanced Research Projects Agency, a branch of the military that developed top secret systems and weapons during the Cold War.

The first data exchange over this new network occurred between computers at UCLA and Stanford Research Institute. On their first attempt to log into Stanford's computer by typing "log win", UCLA researchers crashed their computer when they typed the letter 'g'.

Four computers were the first connected in the original ARPAnet. They were located in the respective computer research labs of UCLA (Honeywell DDP 516 computer), Stanford Research Institute (SDS-940 computer), UC Santa Barbara (IBM 360/75), and the University of Utah (DEC PDP-10). As the network expanded, different models of computers were connected, creating compatibility problems. The solution rested in a better set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol) designed in 1982.

To send a message on the network, a computer breaks its data into IP (Internet Protocol) packets, like individually addressed digital envelopes. TCP (Transmission Control Protocol) makes sure the packets are delivered from client to server and reassembled in the right order.

Under ARPAnet several major innovations occurred: email (or electronic mail), the ability to send simple messages to another person across the network (1971); telnet, a remote connection service for controlling a computer (1972); and file transfer protocol (FTP), which allows information to be sent from one computer to another in bulk (1973).

As non-military uses for the network increased, more and more people had access, and it was no longer safe for military purposes. As a result, MILnet, a military only network, was started in 1983. Internet Protocol software was soon being placed on every type of computer, and universities and research groups also began using in-house networks known as Local Area Networks or LAN's. These in-house networks then started using Internet Protocol software so one LAN could connect with other LAN's.

In 1986, one LAN branched out to form a new competing network, called NSFnet (National Science Foundation Network). NSFnet first linked together the five national supercomputer centers, then every major university, and it started to replace the slower ARPAnet (which was finally shutdown in 1990). NSFnet formed the backbone of what we call the Internet today.

"The Internet's pace of adoption eclipses all other technologies that preceded it. Radio was in existence 38 years before 50 million people tuned in; TV took 13 years to reach that benchmark. Sixteen years after the first PC kit came out, 50 million people were using one. Once it was opened to the general public, the

Internet crossed that line in four years." - quote from the U.S. Department report "The Emerging Digital Economy".

III. Give Russian equivalents to the following words and word combinations:

1) The flow of information; 2) to create a network of geographically separated computers; 3) a newly developed protocol; 4) a result of a military need; 5) powerful research computers; 6) top secret systems and weapons; 7) to log into a computer; 8) compatibility problems; 9) solution; 10) individually addressed digital envelopes; 11) to make sure; 12) in bulk; 13) in-house networks; 14) a new competing network; 15) to form the backbone; 16) to reach a benchmark.

IV. Form nouns from the following verbs:

1) to state; 2) to amend; 3) to install; 4) to frustrate; 5) to investigate; 6) to connect; to replace.

V. Fill in the gaps in the following sentences:

1. "The Internet may ... be regarded as a never-ending worldwide conversation."
2. ARPAnet protected the flow of information between military ...by creating a network of geographically ...computers.
3. One ... view to ARPAnet's origins comes from Charles M. Herzfeld, the former director of ARPA.
4. The first over this new network occurred between computers at UCLA and Stanford Research Institute.
5. As the network expanded, different models of computers were connected, creating ... problems.
6. TCP makes ...the packets are delivered from client to server and ... in the right order.
7. As a result, MILnet, a military only ..., was started in 1983.
8. Universities and research groups also began using ... networks known as Local Area Networks or LAN's.
9. NSFnet formed the ... of what we call the Internet today.
10. The Internet's pace of ...eclipses all other technologies that preceded it.

VI. Close the text and answer the following questions:

1. What does ARPA stand for?

2. When did work begin on the ARPAnet?
3. What was the ARPAnet designed for?
4. How does Charles M. Herzfeld, the former director of ARPA, comment on the origin of the ARPAnet?
5. Was the first data exchange over this new network successful?
6. How many computers were connected in the original ARPAnet?
7. What was the solution of the compatibility problem?
8. Which several innovations occurred under ARPAnet?
9. Why was MILnet started in 1983?
10. When was NSFnet formed?
11. What kind of line did the Internet cross in 4 years?

VII. Do the following tasks on this text:

- Make up a plan of the text;
- Find the key words in each paragraph of the text;
- Summarise the text in brief.

Unit 14

Intel 4004 - The World's First Single Chip Microprocessor

I. Answer the following questions before you study the text below:

1. Do you know why the name Intel was chosen?
2. Why computer inventions, e.g. Intel 4004, include numbers in their names?

II. Read the text using the dictionary if necessary.

In November, 1971, a company called Intel publicly introduced the world's first single chip microprocessor, the Intel 4004 (U.S. Patent #3,821,715), invented by Intel engineers Federico Faggin, Ted Hoff, and Stan Mazor. After the invention of integrated circuits revolutionized computer design, the only place to go was down – in size that is. The Intel 4004 chip took the integrated circuit down one step further by placing all the parts that made a computer think (i.e. central processing unit, memory, input and output controls) on one small chip. Programming intelligence into inanimate objects had now become possible.

(1) In 1968, Bob Noyce and Gordon Moore were two unhappy engineers working for the Fairchild Semiconductor Company who decided to quit and create their own company at a time when many Fairchild employees were leaving to create start-ups. People like Noyce and Moore were nicknamed the "Fairchildren".

Bob Noyce typed himself a one page idea of what he wanted to do with his new company, and that was enough to convince San Francisco venture capitalist Art Rock to back Noyce's and Moore's new venture. Rock raised \$2.5 million dollars in less than 2 days.

(2) The name "Moore Noyce" was already trademarked by a hotel chain, so the two founders decided upon the name "Intel" for their new company, a shortened version of "Integrated Electronics".

Intel's first money making product was the 3101 Schottky bipolar 64-bit static random access memory (SRAM) chip.

(3) In late 1969, a potential client from Japan called Busicom, asked to have twelve custom chips designed. Separate chips for keyboard scanning, display control, printer control and other functions for a Busicom-manufactured calculator.

Intel did not have the manpower for the job but they did have the brainpower to come up with a solution. Intel engineer, Ted Hoff decided that Intel could build one chip to do the work of twelve. Intel and Busicom agreed and funded the new programmable, general-purpose logic chip.

Federico Faggin headed the design team along with Ted Hoff and Stan Mazor, who wrote the software for the new chip. Nine months later, a revolution was born. At 1/8th inch wide by 1/6th inch long and consisting of 2,300 MOS (metal oxide semiconductor) transistors, the baby chip had as much power as the ENIAC, which had filled 3,000 cubic feet with 18,000 vacuum tubes.

Cleverly, Intel decided to buy back the design and marketing rights to the 4004 from Busicom for \$60,000. The next year Busicom went bankrupt, they never produced a product using the 4004. Intel followed a clever marketing plan to encourage the development of applications for the 4004 chip, leading to its widespread use within months.

(4) The 4004 was the world's first universal microprocessor. In the late 1960s, many scientists had discussed the possibility of a computer on a chip, but nearly everyone felt that integrated circuit technology was not yet ready to support such a chip. Intel's Ted Hoff felt differently; he was the first person to recognize that the new silicon-gated MOS technology might make a single-chip CPU (central processing unit) possible.

Hoff and the Intel team developed such an architecture with just over 2,300 transistors in an area of only 3 by 4 millimetres. With its 4-bit CPU, command register, decoder, decoding control, control monitoring of machine commands and interim register, the 4004 was one heck of a little invention. Today's 64-bit microprocessors are still based on similar designs, and the microprocessor is still the most complex mass-produced product ever with more than 5.5 million transistors performing hundreds of millions of calculations each second – numbers that are sure to be outdated fast.

III. Give Russian equivalents to the following words and word combinations:

1) Single chip microprocessor; 2) central processing unit (CPU); 3) input and output controls; 4) inanimate objects; 5) to create start-ups; 6) to trademark; 7) 64-bit static random-access memory; 8) general-purpose logic chip 9) silicon-gated metal oxide semiconductor (MOS); 10) command register; 11) interim register.

IV. Give antonyms to the following words:

Quit, employee, raise, outdated, mass-produced, encourage, potential, go bankrupt.

V. Give synonyms to the following words:

Widespread, to convince, solution, to back, similar, complex, to perform, to head.

VI. Answer the following questions:

1. When was the first single-chip microprocessor introduced? Who invented it?
2. What were innovations of Intel 4004 chip?
3. Who were "Fairchildren"? Why were they called so?
4. How did Noyce and Moore manage to get money for their new venture?
5. Why was the new company called Intel?
6. What was Intel's first money making project?
7. How did engineers get the idea of Intel 4004?
8. What were the features of the new chip?
9. Can you explain how Intel got back its rights to the 4004 from Busicom?
10. How did the company gain from it?

V. For each part (1)-(4) choose a title A-D which best fits its meaning.

- A. The History of Intel
- B. The Intel 4004 Microprocessor
- C. One Chip Does the Work of Twelve
- D. Intel Trademark.

VI. Give the contents of each part in 2-3 sentences.

Unit 15

The Invention of the Floppy Disk Drive

I. Pre-reading task

Answer the following questions:

1. What kind of disk is called “floppy”?
2. How did the word “floppy” come into being?
3. When did the first floppies appear?
4. What devices are floppies being replaced now?

II. Read the text and check your answers.

The floppy disk was invented by IBM engineers led by Alan Shugart.

In 1971, IBM introduced the first "memory disk", as it was called then, or the "floppy disk" as it is known today.

8-inch Floppy Disk

The first floppy was an 8-inch flexible plastic disk coated with magnetic iron oxide; computer data was written to and read from the disk's surface.

The nickname "floppy" came from the disk's flexibility. The floppy disk was considered a revolutionary device in the "History of Computers" for its portability which provided a new and easy physical means of transporting data from computer to computer.

Inventor Alan Shugart

The "floppy" was invented by IBM engineers led by Alan Shugart. The first disks were designed for loading microcodes into the controller of the Merlin (IBM 3330) disk pack file (a 100 MB storage device). So, in effect, the first floppies were used to fill another type of data storage device. Overnight, additional uses for the floppy were discovered, making it the hot new program and file storage medium.

How Does a Floppy Work?

A floppy is a circle of magnetic material similar to other kinds of recording tape such as cassette tape; one or two sides of the disk are used for recording. The disk drive grabs the floppy by its center and spins it like a record inside its housing. The read/write head, much like the head on a tape deck, contacts the surface through an opening in the plastic shell, or envelope. The first Shugart

floppy held 100 KBs of data. First-hand account of how the operating system for the 8-inch disk was written.

First-hand account of how the operating system for the 8-inch disk was written.

5 1/4-inch Floppy Disk

In 1976, the 5 1/4" flexible disk drive and diskette was developed by Alan Shugart for Wang Laboratories. Wang wanted a smaller floppy disk and drive to use with their desktop computers. By 1978, more than 10 manufacturers were producing 5 1/4" floppy drives that stored up to 1.2MB (megabytes) of data.

One interesting story about the 5 1/4-inch floppy disk is how the size was decided. Engineers, Jim Adkisson and Don Massaro were discussing the size with An Wang of Wang Laboratories. The trio just happened to be doing their discussing at a bar. An Wang motioned to a drink napkin and stated "about that size" which happened to be 5 1/4-inches wide.

3 1/2-inch Floppy Disk

In 1981, Sony introduced the first 3 1/2" floppy drives and diskettes. These floppies were encased in hard plastic, however, the name stayed the same. They stored 400kb of data, and later 720K (double-density) and 1.44MB (high-density).

Post Floppy Disk

For the most part, recordable CDs and DVDs, and flash drives have replaced floppies as the means of transporting files from one computer to another computer.

III. Give Russian equivalents to the following words and word combinations:

1) Recordable; 2) coated with magnetic iron oxide; 3) portability; 4) to be designed for; 5) file storage medium; 6) to spins it like a record; 7) the read/write head; 8) an opening in the plastic shell; 9) desktop computers; 10) to be encased in hard plastic; 11) the means of transporting files.

IV. Translate the following words and from derivatives that can be found in the text:

1) flexible; 2) revolution; 3) portable; 4) to add; 5) to record; 6) to manufacturer; 7) case.

V. Tell whether the following sentences are true or false:

1. The floppy disk was invented by Apple engineers.

2. The first floppy was an 8-inch flexible plastic disk.
3. The floppy disk was considered a revolutionary device for its flexibility.
4. When additional uses for the floppy were discovered, they became hot new program and file storage medium.
5. A floppy is a square of magnetic material similar to other kinds of recording tape.
6. Only one side of the floppy disk is used for recording.
7. The first Shugart floppy held 100 KBs of data.
8. The 5 1/4" flexible disk drive and diskette was developed by Alan Shugart in 1986.
9. The size of the 5 1/4" flexible disk is linked with the size of a drink napkin.
10. It was IBM who introduced the first 3 1/2" floppy drives and diskettes.

VI. Answer the following questions:

1. Who was the inventor of the floppy disk?
2. When was the first disk introduced by IBM?
3. What does the nickname "floppy" come from?
4. Why was the floppy disk considered to be a revolutionary device in the "History of Computers"?
5. For what purpose were the first floppy disks designed for?
6. How much information did the first Shugart floppy hold?
7. What interesting story is linked with the size of the 5 1/4-inch floppy disk?
8. What kind of floppy disk was introduced in 1981 by Sony?
9. How much data were they able to store?
10. What devices have floppies been replaced by nowadays?

VII. Make up a plan of the text and summarize the text in brief.

Unit 16

The first home computers

I. Pre-reading task.

1. When did the first home computers appear? Was it difficult to get them?
2. How did they look like?

II. Read the text and check your answers on pre-reading task.

In the early 1970s, anyone wanting to use a computer had to wait in a long line as computers were few and far apart. The desire and the market was increasing for a computer that could be used at home or in the office, the "personal computer". Several different manufacturers marketed "personal computers" between 1974 and 1977 in response to that desire. These were mainly kits (major assembly required) advertised in the back pages of magazines like Popular Science.

In the March, 1974, issue of QST magazine there appeared the first advertisement for a "personal computer." It was called the Scelbi (SCientific, ELectionic and BIological) and designed by the Scelbi Computer Consulting Company of Milford, Connecticut. Based on Intel's 8008 microprocessor, Scelbi sold for \$565 and came with 1K of programmable memory, with an additional 15K of memory available for \$2760. The second "personal computer kit" was the Mark-8 (also Intel 8008 based) designed by Jonathan Titus. The July issue of Radio Electronics magazine published an article on building a Mark-8 microcomputer, information the general public was hungry for. At the same time, the Intel company introduced the new 8080 microprocessor chip, made for controlling traffic lights. It was to become the microprocessor inside the very successful Altair computer.

An Albuquerque, New Mexico, company called MITS (Micro Instrumentation Telemetry Systems) was in the calculator business until Texas Instruments swept the market in 1972 with their low cost calculators. MITS owner Ed Roberts, a former air force electronics specialist, then decided to try designing a computer kit. He was aided by his friend Les Soloman, who happened to be the technical editor for Popular Mechanics magazine and had been flooded with letters from readers describing ideas for home computers. Roberts worked together with hardware engineers William Yates and Jim Bybee during '73 and '74 developing the MITS Altair 8800. The Altair was named by Soloman's 12 year-old daughter after an episode from the original Star Trek television series.

The Altair was the cover story for the January, 1975, issue of Popular Electronics, which described the Altair as the "World's First Minicomputer Kit to Rival Commercial Models". The orders for the Altair were huge in response to the article. The computer kit was shipped with an 8080 CPU, a 256 Byte RAM card, and the new Altair Bus design (S100 Bus - the connector had 100 pins) for the price of \$400. It was left to the consumer to put it together, make it work and write any needed software. This was an uneasy task but the computer was definitely expandable, cheap and available.

Two young programmers realized that a software program already written for microcomputers could work on the Altair. Ed Roberts was soon contacted by Harvard freshman Bill Gates (of Microsoft fame) and programmer Paul Allen.

Within six weeks, Gates and Allen compiled a version of BASIC to run on the Altair. Allan was offered a position by Roberts as the Director of Software and the only member of the software department. Gates, who was then still a student, started working for MITS part-time after he left school.

BASIC required 4096 bytes of memory to run, sixteen times the amount of memory the Altair then came with. MITS created a 4K (4096 byte) memory board that allowed the Altair to run BASIC. The boards were poorly designed and created problems, and a computer hobbyist named Bob Marsh designed a better 4k board and started a company called Processor Technology to sell his Altair compatible boards. Roberts tried to prevent losing his sales by the BASIC software only with his boards. He succeeded in promoting the first wide-spread case of software piracy. Hobbyists everywhere bought a Processor Technology memory board and somehow found a free copy of BASIC.

Robert's tendency to ship some poorly designed products might have caused MITS' downfall after a few short years, but no one can deny that it was the Altair which really kick-started the home computer revolution. Gates and Allen went on to start Microsoft, becoming the world's leading software developers. Ed Roberts became a doctor and went on to practice medicine.

One more computer worthy of note during this period was the IBM 5100. The 5100 was released in 1975 after two years of development. It was referred to as "Project Mercury" by the IBM scientists. The 5100 was IBM's first portable computer and considered an entry level system, but its \$10,000 price tag put it beyond the range of the hobbyists who bought the Altair. Sales of the 5100 went to small business and educational institutions who bought the desktop sized minicomputer which came with BASIC, 16KB of RAM, tape storage and a built-in 5-inch screen.

III. Answer the questions:

1. When were first personal computers marketed?
2. What was the first "personal computer kit"? What were its features?
3. What was Mark-8?
4. Why did MITS stop working in calculator business?
5. Who was working with Ed Roberts to design a computer kit?
6. What name was given to the new personal computer? Why?
7. What were Altair's characteristics?
8. What were advantages and disadvantages of Altair?
9. How was the problem with software for the new computer solved?
10. Was it MITS which provided the best memory boards for Altair?
11. What was the reason of the company's downfall?
12. What is "Project Mercury"? Did it compete with Altair?

IV. Give Russian equivalents to the following words and expressions:

1) Kit; 2) major; 3) assembly; 4) advertise; 5) sweep the market; 6) low-cost calculator; 7) flood with; 8) expandable; 9) run; 10) require; 11) compatible boards; 12) hobbyist; 13) software piracy; 14) downfall; 15) tape storage.

V. Use the words from the table to complete the sentences.

Personal computer, former, huge, rival, consumer, freshman, prevent, be worthy of, built-in.

1. In those days the Standard Oil Company did not deliver oil to the ... in big wagons and motor trucks as it does now.
2. ... is a computer built around a microprocessor for use by an individual, as in an office or at home or school.
3. These devices are intended to be a convenience for accessing a private home garage door with a ... transmitting device in the vehicle.
4. At times Maggie told Pete long confidential tales of her ... home life.
5. There was not an actor ... the name in that play
6. He was an old man with a white beard and ... nose and hands.
7. The surest way to ... war is not to fear it.
8. I completed the first half of my ... year.
9. It was a ... she did not understand.

VI. Look through the previous units and tell expansions of the following abbreviations:

PC, PU, CU, GUI, ALU, CPU, MPU, IBM, DOS, CRT, ROM, RAM, IC, SSI, MSI, LSI, VLSI, MP, CD, I/O, IOP, CMI, CAI.

VII. Comment on the following:

1. I think there's a world market for about 5 computers.
(Thomas J. Watson, Chairman of the Board, IBM, circa 1948)
2. There is no reason for any individual to have a computer in his home.
(Ken Olson, President, Digital Equipment Corporation, 1977)

VII. Using additional sources compare Scelbi, Mark-8 Altair and IBM 5100 and speak about their advantages and disadvantages.

Unit 17

The First Hobby and Home Computers: Apple I, Apple II, Commodore PET, and TRS-80

I. Pre-reading task.

A. Answer the following questions:

1. Have you heard anything of Steve Jobs and Steve Wozniak?
2. What are they famous for?
3. When was the Apple I computer released?

B. Translate the following statement and give your comments on it:

"The first Apple was just a culmination of my whole life." - Steve Wozniak, Co-Founder Apple Computers.

II. Read the text and check your answers.

Following the introduction of the Altair, a boom in personal computers occurred, and luckily for the consumer, the next round of home computers were considered useful and a joy to use.

In 1975, Steve Wozniak was working for Hewlett Packard (calculator manufacturers) by day and playing computer hobbyist by night, tinkering with the early computer kits like the Altair. "All the little computer kits that were being touted to hobbyists in 1975 were square or rectangular boxes with non understandable switches on them..." claimed Wozniak. Wozniak realized that the prices of some computer parts (e.g. microprocessors and memory chips) had gotten so low that he could buy them with maybe a month's salary. Wozniak decided that, with some help from fellow hobbyist Steve Jobs, they could build their own computer.

On April Fool's Day, 1976, Steve Wozniak and Steve Jobs released the Apple I computer and started Apple Computers. The Apple I was the first single circuit board computer. It came with a video interface, 8k of RAM and a keyboard. The system incorporated some economical components, including the 6502 processor (only \$25 dollars - designed by Rockwell and produced by MOS Technologies) and dynamic RAM.

The pair showed the prototype Apple I, mounted on plywood with all the components visible, at a meeting of a local computer hobbyist group called "The Homebrew Computer Club" (based in Palo Alto, California). A local computer dealer (The Byte Shop) saw it and ordered 100 units, providing that Wozniak and Jobs agreed to assemble the kits for the customers. About two hundred Apple Is were built and sold over a ten month period, for the superstitious price of \$666.66.

In 1977, Apple Computers was incorporated and the Apple II computer model was released. The first West Coast Computer Faire was held in San Francisco the same year, and attendees saw the public debut of the Apple II (available for \$1298). The Apple II was also based on the 6502 processor, but it had color graphics (a first for a personal computer), and used an audio cassette drive for storage. Its original configuration came with 4 kb of RAM, but a year later this was increased to 48 kb of RAM and the cassette drive was replaced by a floppy disk drive.

The Commodore PET

The Commodore PET (Personal Electronic Transactor or maybe rumored to be named after the "pet rock" fad) was designed by Chuck Peddle. It was first presented at the January, 1977, Winter Consumer Electronics Show and later at the West Coast Computer Faire. The Pet Computer also ran on the 6502 chip, but it cost only \$795, half the price of the Apple II. It included 4 kb of RAM, monochrome graphics and an audio cassette drive for data storage. Included was a version of BASIC in 14k of ROM. Microsoft developed its first 6502-based BASIC for the PET and then sold the source code to Apple for AppleBASIC. The keyboard, cassette drive and small monochrome display all fit within the same self contained unit.

Note: Steve Jobs and Steve Wozniak at one point in time showed the Apple I prototype to Commodore, who agreed to buy Apple. Steve Jobs then decided not to sell to Commodore, who bought MOS Technology instead and then designed the PET. The Commodore PET was seen at the time to be a chief rival of the Apple.

In 1977, Radio Shack introduced its TRS-80 microcomputer, also nicknamed the "Trash-80". It was based on the Zilog Z80 processor (an 8-bit microprocessor whose instruction set is a superset of the Intel 8080) and came with 4 kb of RAM and 4 kb of ROM with BASIC. An optional expansion box enabled memory expansion, and audio cassettes were used for data storage, similar to the PET and the first Apples. Over 10,000 TRS-80s were sold during the first month of production. The later TRS-80 Model II came complete with a disk drive for program and data storage. At that time, only Apple and Radio Shack had machines with disk drives. With the introduction of the disk drive,

applications for the personal computer proliferated as distribution of software became easier.

A last note on 1977: It was the year that the tradename "Microsoft" was registered.

III. Give Russian equivalents to the following words and word combinations:

1) The next round of home computers; 2) computer kits; 3) non understandable switches; 4) single circuit board computer; 5) providing that; 6) to assemble the kits for the customers; 7) superstitious price; 8) original configuration; 9) the source code; 10) monochrome display; 11) a chief rival; 12) optional expansion box; 13) applications ... proliferated.

IV. Form nouns (that can be found in the text) from the following verbs:

1) culminate; 2) introduce; 3) manufacture; 4) process; 5) attend; 6) consume; 7) store; 8) apply; 9) distribute.

V. Fill in the gaps in the following sentences:

1. Luckily for the consumer, the next round of were considered useful and a joy to use.
2. All the little computer kits were square or ...boxes with non understandable ... on them.
3. The prices of some computer ... (e.g. microprocessors and) had gotten so low that Wozniak could buy them with maybe a month's salary.
4. On April Fool's Day, 1976, Steve Wozniak and Steve Jobs ... the Apple I computer.
5. Apple I came with a video ..., 8k of RAM and a
6. A local computer dealer (The Byte Shop) saw it and ordered 100 units, ... that Wozniak and Jobs agreed to ...the kits for the customers.
7. The Apple II was also based on the 6502 ..., but it had color graphics (a first for a personal computer), and used an audio cassette ...for storage.
8. The Pet Computer also ...on the 6502 chip, but it cost only \$795, half the ... of the Apple II.
9. The keyboard, cassette drive and small monochrome ... of the Pet Computer all fit within the same self ... unit.
10. The Commodore PET was seen at the time to be a chief ... of the Apple.
11. "Trash-80" was based on the Zilog Z80 ... and came with 4 kb of ... and 4 kb of ROM with BASIC.

12. With the introduction of the... .., applications for the personal computer proliferated as distribution of ... became easier.

VI. Answer the following questions:

1. What kind of hobby did S.Wozniak have in 1975?
2. What did he and his fellow hobbyist S.Jobs decide to build?
3. When did Steve Wozniak and Steve Jobs release the Apple I computer?
4. What specifications did Apple I have?
5. How many Apple I-s were built and sold over a ten month period?
6. When was Apple Computers incorporated?
7. Where did the public debut of the Apple II take place?
8. What does PET stand for?
9. Who was the Pet Computer designed by and when was it presented?
10. What were the Pet Computer's specifications?
11. What microcomputer model did Radio Shack introduce in 1977?
12. How many TRS-80s were sold during the first month of production?

VII. Make up a plan of the text and summarize the text in brief.

Unit 18

The First Word Processor

I. Pre-reading task.

Comment on the following words of Arthur C. Clarke on meeting Seymour Rubenstein and Rob Barnaby, the inventors of Wordstar:

I am happy to greet the geniuses who made me a born-again writer, having announced my retirement in 1978, I now have six books in the works and two [probables], all through WordStar.

II. Read the text using the dictionary if necessary:

Released in 1979 by Micropro International, WordStar was the first commercially successful word processing software program produced for microcomputers and the best selling software program of the early eighties.

Word processing can be defined as the manipulation of computer generated text data including creating, editing, storing, retrieving and printing a document.

The first computer word processors were line editors, software-writing aids that allowed a programmer to make changes in a line of program code. Altair programmer Michael Shroyer decided to write the manuals for computer

programs on the same computers the programs ran on. He wrote the somewhat popular and the actual first PC word processing program, the Electric Pencil in 1976.

Other early word processor programs worth noting were: Apple Write I, Samna III, Word, WordPerfect and Scripsit.

Seymour Rubenstein first started developing an early version of a word processor for the IMSAI 8080 computer when he was director of marketing for IMSAI. He left to start MicroPro International Inc. in 1978 with only \$8,500 in cash.

Software programmer Rob Barnaby was convinced to leave IMSAI and tag along with Rubenstein to join MicroPro. Rob Barnaby wrote the 1979 version of WordStar for CP/M. Jim Fox, Barnaby's assistant, ported (meaning re-wrote for a different operating system) WordStar from the CP/M operating system* to MS/PC DOS.

The 3.0 version of WordStar for DOS was released in 1982. Within three years, WordStar was the most popular word processing software in the world. However by the late 1980s, programs like WordPerfect knocked Wordstar out of the word processing market after the poor performance of WordStar 2000.

"In the early days, the size of the market was more promise than reality... WordStar was a tremendous learning experience. I didn't know all that much about the world of big business. I thought I knew it" Quote from Seymour Rubenstein the inventor of WordStar

*The CP/M operating system was developed by Gary Kildall, founder of Digital Research, copywritten in 1976 and released in 1977. MS/PC DOS is the famous operating system introduced by MicroSoft and Bill Gates in 1981.

III. Answer the following questions:

1. When was the first word processor released?
2. What is word processing?
3. What were the first computer word processors like?
4. What was Michael Shroyer's contribution to development of word processors?
5. Can you name other early word processor programs?
6. How did Barnaby and Rubenstein decide to work for MicroPro?
7. Why was it necessary to port WordStar from CP/M operating system to MS/PC DOS?
8. Can you explain the reason of WordStar's popularity in the 1980s?
9. What happened with WordStar by the late 1980s? Why?

IV. Give Russian equivalents to the following words and expressions:

1) Announce; 2) word processor; 3) computer generated text data; 4) to edit; 5) to retrieve; 6) to convince; 7) to tag along; 8) to port; 9) performance; 10) promise; 11) tremendous.

Make up 3 sentences of your own with the words from this exercise.

V. Match the words on the left with their definitions on the right:

word processor	to put or keep things in a special place for use in the future
store	the process of preparing language, images, or sound for presentation through correction, condensation, organization, and other modifications.
line editor	a process for reproducing text and image.
retrieve	a text editor computer program that is oriented around lines.
create	a computer application used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material.
editing	to cause to come into existence
printing	to recover (stored information) from a computer system

VI. Tell your partner about early word processor programs using the questions in exercise III as a plan of the text.

VII. Discuss the question in pairs: “How do you evaluate Barnaby’s and Rubenstein’s contribution to the further development of word processors?”.

Unit 19

The History of the IBM PC

I. Pre-reading task.

Answer the following questions:

1. What does IBM stand for?
2. What do you know about IBM PC?

II. Read the text and check your answers.

In July of 1980, IBM representatives met for the first time with Microsoft's Bill Gates to talk about writing an operating system for IBM's new hush-hush "personal" computer. IBM had been observing the growing personal computer market for some time. They had already made one dismal attempt to crack the market with their IBM 5100.

IBM 5100 was a complete system, with a built-in monitor, keyboard, and data storage. It was also very expensive – up to US\$20,000. It was specifically designed for professional and scientific problem-solvers, not business users or hobbyists. When the PC was introduced in 1981, it was originally designated as the IBM 5150, putting it in the "5100" series, though its architecture wasn't directly descended from the IBM 5100.

At one point, IBM considered buying the fledgling game company Atari to commandeer Atari's early line of personal computers. However, IBM decided to stick with making their own personal computer line and developed a brand new operating system to go with. The secret plans were referred to as "Project Chess". The code name for the new computer was "Acorn". Twelve engineers directed by Don Estridge assembled in Boca Raton, Florida, to design and build the "Acorn".

They developed the PC in about a year. To achieve this they first decided to build the machine with "off-the-shelf" parts from a variety of different original equipment manufacturers (OEMs) and countries. Previously IBM had always developed their own components. Secondly for scheduling and cost reasons, rather than developing unique IBM PC monitor and printer designs, project management decided to utilize an existing "off-the-shelf" IBM monitor developed earlier in IBM Japan as well as an existing Epson printer model. They also decided on an open architecture, so that other manufacturers could produce and sell peripheral components and compatible software without purchasing licenses.

On August 12, 1981, IBM released their new computer, re-named the IBM PC. The "PC" stood for "personal computer" making IBM responsible for popularizing the term "PC".

Alongside "microcomputer" and "home computer", the term "personal computer" was already in use before 1981. It was used as early as 1972 to characterize Xerox PARC's Alto. However, because of the success of the IBM Personal Computer, the term came to mean more specifically a microcomputer compatible with IBM's PC products.

The first IBM PC ran on a 4.77 MHz Intel 8088 microprocessor. The PC came equipped with 16 kilobytes of memory, expandable to 256k. The PC came with one or two 160k floppy disk drives and an optional color monitor. The price tag started at \$1,565, which would be nearly \$4,000 today. What really made the IBM PC different from previous IBM computers was that it was the first one built from off the shelf parts (called open architecture) and marketed by outside

distributors (Sears & Roebucks and Computerland). The Intel chip was chosen because IBM had already obtained the rights to manufacture the Intel chips. IBM had used the Intel 8086 for use in its Displaywriter Intelligent Typewriter in exchange for giving Intel the rights to IBM's bubble memory technology.

Less than four months after IBM introduced the PC, Time Magazine named the computer "man of the year".

III. Give Russian equivalents to the following words and word combinations:

1) Hush-hush "personal" computer; 2) to crack the market; 3) scientific problem-solvers; 4) to be (originally) designated; 5) to descend from; 6) to stick with smth.; 7) to be referred to; 8) "off-the-shelf" parts; 9) compatible software; 10) expandable (to); 11) bubble memory technology.

IV. Find synonyms in the text to the following words and word combinations:

1) secret (adj); 2) scientific research makers; 3) to be called (as); 4) to be supervised (by); 5) ready-made parts; 6) producers; 7) to make use of smth; 8) to buy (a licence); 9) smth which can be expanded; 10) to get (the rights).

V. Fill in the gaps in the following sentences:

1. In July, 1980 IBM representatives met Bill Gates to talk about writing an for IBM's new hush-hush "personal" computer.
2. IBM 5100 was a complete system, with a monotor, keyboard, and data storage.
3. IBM 5100 specifically ...for professional and scientific problem-solvers, not business ...or hobbyists.
4. However, IBM decided to making their own personal computer line.
5. The secret plans were ... to as "Project Chess".
6. To develop the computer in a short time, they decided to build the machine with "... .." parts.
7. The "PC" stood for "personal computer" making IBM ... for popularizing the term "PC".
8. Because of the ... of the IBM Personal Computer, the term PC came to mean more specifically a ... compatible with IBM's PC products.
9. The PC came with one or two 160k ...disk drives and an ... color monitor.
10. What really made the IBM PC different from ...IBM computers was that it was the first one built from off the ... parts (called open architecture).

VI. Answer the following questions:

1. Why were plans of creating a new IBM computer kept in secret?
2. What was the code name for the new computer?
3. What can you say about IBM 5100?
4. Where did twelve engineers directed by Don Estridge get together to create the new model?
5. How long did it take them to develop the IBM PC?
6. What kind of parts did they decide to build the machine and why?
7. What does “open architecture” mean?
8. When was the IBM PC released?
9. When was the term PC first used?
10. What were the IBM PC’s specifications?
11. What really made the IBM PC different from previous IBM computers?
12. Why was the Intel chip chosen?
13. What memorable event happened four months after IBM introduced the PC?

VII. Render the text using the questions in previous exercise as a plan of the text.

Unit 20

The Invention of the Apple Macintosh

I. Pre-reading task.

1. Who were the inventors of the Apple Computers? Why did they choose such a name for the new computer?
2. What was special about marketing company of Apple Computers?

II. Read the text and check your answers on pre-reading task.

"Hello, I am Macintosh. Never trust a computer you cannot lift... I'm glad to be out of that bag" - talking Macintosh Computer.

In December, 1983, Apple Computers ran its' famous "1984" Macintosh television commercial, on a small unknown station solely to make the commercial eligible for awards during 1984. The commercial cost 1.5 million and only ran once in 1983, but news and talk shows everywhere replayed it, making TV history. The next month, Apple Computer ran the same ad during the NFL Super Bowl, and millions of viewers saw their first glimpse of the Macintosh

computer. The commercial was directed by Ridley Scott, and the Orwellian scene depicted the IBM world being destroyed by a new machine, the "Macintosh".

Could we expect anything less from a company that was now being run by the former president of Pepsi-Cola. Steve Jobs, co-founder of Apple Computers had been trying to hire Pepsi's John Sculley since early 1983. In April of that year he succeeded. But Steve and John discovered that they did not get along and one of John Sculley's first actions as CEO of Apple was to boot Steve Jobs off the Apple "Lisa" project, the "Lisa" was the first consumer computer with a graphical user interface or GUI. Jobs then switched over to managing the Apple "Macintosh" project begun by Jeff Raskin. Jobs was determined that the new "Macintosh" was going to have a graphical user interface, like the "Lisa" but at a considerably lower cost.

Note: The early Mac team members (1979) consisted of Jeff Raskin, Brian Howard, Marc LeBrun, Burrell Smith. Joanna Hoffman and Bud Tribble. Others began working working on the Mac at later dates.

Specifications	Macintosh 128K
CPU:	MC68000
CPU speed:	8 Mhz
FPU:	None
RAM:	128k Dram not expandable
ROM:	64k
Serial Ports:	2
Floppy:	1 3.5" 400k
Monitor:	9" 512x384 square pixels built-in B/W
Power:	60 Watts
Weight:	16.5 lbs.
Dimensions:	13.6" H x 9.6" W x 10.9" D
System Software:	Mac OS 1.0
Production:	January 1984 to October 1985
Cost:	\$2,495

Seventy-four days after the introduction of the "Macintosh", 50,000 units had been sold, not that strong a show. Apple refused to license the OS or the hardware, the 128k memory was not enough and a single floppy was difficult to use. The "Macintosh" had "Lisa's" user friendly GUI, but initially missed some of the more powerful features of the "Lisa" like multitasking and the 1 MB of memory. Jobs compensated by making sure developers created software for the

new "Macintosh", Jobs figured that software was the way to win the consumer over.

In 1985, the "Macintosh" computer line received a big sales boost with the introduction of the LaserWriter printer and Aldus PageMaker, home desktop publishing was now possible. But 1985 was also the year when the original founders of Apple left the company.

Steve Wozniak returned to college and Steve Jobs was fired, his difficulties with John Sculley coming to a head. Jobs had decided, to regain control of the company away from Sculley, he scheduled a business meeting in China for Sculley and planned for a corporate take-over, when Sculley would be absent. Information about Jobs' true motives, reached Sculley before the China trip, he confronted Jobs and asked Apple's Board of Directors to vote on the issue. Everyone voted for Sculley and Jobs quit, in lieu of being fired. Jobs later rejoined Apple in 1996 and has happily worked there ever since. Sculley was eventually replaced as CEO of Apple.

III. Answer the following questions:

1. How was advertising campaign for Macintosh computers launched?
2. What was the idea of television commercials for these computers? Was the commercial effective?
3. Who were the founders of Apple Computers?
4. What was "Lisa" project?
5. Why did Jobs didn't finish his work with "Lisa"?
6. Can you remember the names of early Mac team members?
7. What were the drawbacks of "Macintosh" in comparison with "Lisa"?
8. What changes took place in Apple company in 1985?
Why did Jobs leave the company?

IV. Give Russian equivalents to the following words and expressions:

1) Eligible; 2) glimpse; 3) CEO; 4) to boot off; 5) FPU; 6) dimensions; 7) multitasking; 8) to receive a big sales boost; 9) home desktop publishing; 10) corporate take-over; 11) to confront; 12) to vote on the issue; 13) to quit.

V. Guess what words from the text are meant by these definitions:

- To plan or appoint for a certain time or date.
- A paid advertisement on television or radio.
- Alone, singly; entirely; exclusively.
- To manage to do what one is trying to do; to achieve one's aim or purpose.

- Firmly decided.
- Not present in a place or situation.
- To discharge from a position; dismiss.
- Instead of.

VI. Translate the following sentences from Russian into English:

1. История компании Apple началась тридцать лет назад, когда два друга Стив Джобс и Стив Возняк решили основать собственную компанию по производству и выпуску компьютеров.
2. В мае 1979 года сотрудник Apple Джеф Раскин начал работать над новым компьютером «все в одном», который был ориентирован на рядового пользователя. Именно этот период и можно назвать началом рождения первого Macintosh.
3. В 1983 году Apple выпустил Lisa – первый персональный компьютер с графическим пользовательским интерфейсом, названный так в честь дочери Джобса. Но из-за довольно высокой цены и ограниченного набора приложений эта модель не получила широкого распространения.
4. Самый первый свой Macintosh компания Apple официально представила 22 января 1984 года рекламным роликом «1984», основанным на сюжете книги Д. Оруэлла.
5. Когда Mac OS была впервые представлена в 1984 году, то для того времени она являла собой совершенство современного программирования. Операционные системы для других платформ, которые появились несколько лет спустя, предлагали такие вещи, как защищенная память и многозадачность, что в конечном итоге давало лучший пользовательский опыт.

VII. Comment on the following Steve Jobs' quotes:

- "The desktop computer industry is dead. Innovation has virtually ceased. Microsoft dominates with very little innovation. That's over. Apple lost. The desktop market has entered the dark ages, and it's going to be in the dark ages for the next 10 years, or certainly for the rest of this decade." (*Wired magazine*, February 1996).
- "It wasn't that Microsoft was so brilliant or clever in copying the Mac, it's that the Mac was a sitting duck for 10 years. That's Apple's problem: Their differentiation evaporated." (*Apple Confidential 2.0*)
- "I didn't see it then, but it turned out that getting fired from Apple was the best thing that could have ever happened to me. The heaviness of being

successful was replaced by the lightness of being a beginner again, less sure about everything. It freed me to enter one of the most creative periods of my life." (Stanford University commencement address, June 12, 2005).

VIII. Compare Apple Macintosh and Windows. Make a presentation about their advantages and disadvantages.