Плахов К.С.
Научный руководитель: ст. преподаватель К.О. Мацкевич
Муромский институт (филиал) федерального государственного образовательного учреждения высшего образования «Владимирский государственный университет имени Александра Григорьевича и Николая Григорьевича Столетовых»
602264, г. Муром, Владимирская обл., ул. Орловская, 23
E-mail: pepsishka@yandex.ru

RAM

Introduction

All personal computers use three types of memory: operational, permanent, and external (various drives). Memory is needed for both the source data and for storing the results.RAM is needed to interact with computer peripherals and even to maintain an image visible on the screen. All computer memory is divided into internal and external. In computer systems, working with memory is based on very simple concepts. In principle, all that is required from computer memory is to save one bit of information so that it can be extracted later from there.

RAM is intended for storing variable information, as it allows changing its contents during the execution of the corresponding microprocessor operations.

In computers with the von Neumann architecture (this class includes almost all computers, including PCs), RAM plays a very important role. That it stores all executable programs and their data. The work is carried out by the central processor and RAM, while the remaining components of any computer system are not directly involved in the calculation process.

Classification and main characteristics of RAM

Cache memory

Cache memory is designed to coordinate the speed of relatively slow devices, such as dynamic memory with a fast microprocessor. The program usually uses the memory of a limited area. By storing the necessary information in the cache memory, the program allows you to avoid waiting cycles in its work, which degrade the performance of the entire system.

Not every cache memory is equivalent. One of the most important fact is that how much information a cache memory can contain. The larger the cache, the more information can be placed in it, and therefore, the greater the likelihood that the desired byte will be contained in this fast memory. Obviously, the best option is when the amount of cache memory corresponds to the amount of all RAM. In this case, the rest of the memory becomes unnecessary. The very opposite situation - 1 byte of cache memory - also has no practical significance, since the probability that the necessary information will be in this byte tends to zero. Practically, the range of used cache varies from 16-512K.

With the help of a cache memory, an attempt is usually made to coordinate also the operation of external devices, for example, various drives, and a microprocessor. Implementing cache systems is not as simple as it may seem at first glance. The microprocessor should not only read from memory, but also write to it. What happens if the processor puts new information into the cache, and before using this information it will be changed in the main memory? In order to avoid such a situation, a method called write via cache memory is sometimes implemented. Obviously, this method reduces the system performance, because you have to write not only in the cache memory. Worse, the microprocessor may need information that it has just been written, and which has not yet been reloaded into cache memory.

SRAM

In this type of memory, the unit cell is not represented by capacitors, but by static triggers on bipolar or MIS transistors. The number of trigger states is two, which makes it possible to use it for storing a binary unit of information. Having received a charge once, the cell of such a memory is able to store it for an arbitrarily long time, at least as long as it is powered. Naturally, in this case, the unproductive delays in updating the information disappear, which leads to acceleration of work with such microcircuits. However, SRAM is significantly more expensive than DRAM. As a result, the scope of application of SRAM microcircuits is limited to those areas that require a small amount of

memory, and a significant speed. The ideal option is cache memory, where SRAM has been and is still being used.

DRAM

Currently, dynamic memory devices based on the ability to maintain an electric charge are widely used. Dynamic RAM microcircuits differ from static RAM microcircuits in greater information capacity because of the smaller number of components in one memory element and, consequently, their denser placement in a semiconductor chip.

The memory is called dynamic, since a standard RAM cell is a capacitor formed inside a semiconductor chip that stores an electric charge. As you know, capacitors can spontaneously discharge, which leads to loss of information. To prevent this from happening, the information needs to be constantly updated. Because of the continuous nature of this process, such a memory is called dynamic.

In modern personal computers, dynamic memory is implemented on the basis of special conductor circuits that replace conventional capacitors. A large number of such circuits are combined in the corps of a single dynamic chip. However, like a memory on capacitors, it must be constantly refreshed.