УДК 811.111:004.318

SUPERCOMPUTERS AND THEIR APPLICATIONS

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Nowadays, we can't imagine life without gadgets. Computers, smartphones, smart watches, tablets and so on. They are all needed to make our lives easier, so that a person can focus on other, more important tasks. But computers aren't only used for work or everyday activities. Many institutions and states have so-called supercomputers. Their purpose is complex calculations, processing of huge amounts of data, simulation of phenomena or events.

A supercomputer is a computer with a high level of performance in comparison to a general-purpose computer. A supercomputer performs all tasks simultaneously, while a normal computer performs them sequentially. The performance of a supercomputer is typically tracked through its floating-point operations per second (FLOPS) [1].

The Frontier HPE Cray EX235a is a new computer system that topped the TOP500 ranking. HPE Cray EX - the first system in the US with peak performance exceeding one exaflop per second. At present, the most powerful supercomputer is Frontier, which is located in ORNL (Oak Ridge National Laboratory) in Tennessee. This supercomputer reached 1,102 exaflop per second, using 8,730,112 cores.

The main task of supercomputers is to perform the maximum number of calculations in the minimum amount of time. This is useful for many areas, from drug development to the development of new products and technologies. There are supercomputers that work with a single application that uses all the memory. For example, for predicting weather and climate changes or nuclear test models.

Supercomputers don't just calculate, they simulate reality. That is, they calculate all possible scenarios and make predictions. Therefore, astronomers and astrophysicists use them to reproduce a variety of events and processes in the universe [2].

Obviously, the performance of supercomputers in the future will increase to cosmic numbers, their size will decrease, and their energy consumption will decrease. Experts believe that in 15 years, simulations will be a thing of the past, and machine learning will allow supercomputers to perform deep data analytics. As a result, they will be used everywhere, from the development of endless batteries to a cure for cancer [3].

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