Жарников Н.А.
Научный руководитель – ст. преподаватель С.О. Левина
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
Email: nikita.zharnikov2012@mail.ru

Supercomputers

Supercomputers are computers with the high level of computing power compared to usual general-purpose computers. Usually, modern supercomputers represent many high-performance server computers connected to each other for achieving maximum. There are few types of server computers connection. When computers are held in the same location and connected by local area network (LAN), this kind of supercomputer is called cluster. The second type is called grid. It is similar to a cluster, but the computers are located in different places and connected through the Internet, so the computing power is spread across multiple locations instead of being located in one place. It is called distributed computing.

Supercomputer uses “parallel processing” to solve the task, which means, it splits problems into pieces and works on many pieces at once, whereas ordinary computers handle one task at a time. This method is called serial processing.

The performance of supercomputers is measured in floating-point operations per second (FLOPS). It is suitable, because the tasks of numerical simulation require calculations related to real numbers, often with a high degree of accuracy, rather than integers. Therefore, the measure of speed of usual computer - the quantity of million instructions per second (MIPS) is unacceptable for supercomputers

The first use of the term “supercomputer” refers to the 1960s. The first commercially successful supercomputer was the CDC 6600 designed by american engineer Seymour Cray. It was released in 1964 and had a single CPU and cost $8 million – the equivalent of $60 million today. The CDC 6600 could handle 3 million floating point operations per second. In 1970s supercomputers used only a few processors, in 1990s a few turned into thousands and now modern supercomputers are using hundreds of thousands of processors (it is also known as massively parallel processing) and are able to handle over 90 quadrillion floating point operations per second.

A lot of modern supercomputers are actually clusters of computers or workstations, which means that they use ordinary and common operating systems such as Linux. The application programs are also written in common programming languages such as C and C++.

Initially, supercomputers were used only for military purposes: they were used to calculate nuclear and thermonuclear weapons. In the process of rapid development of information technologies and their implementation in almost all spheres of human life and society, powerful computers have been used in a variety of areas where complex calculations are required on a large scale. This list includes cryptography, statistics, computational biology and chemistry, physics, Earth science (including weather forecast, the condition of large reservoirs, prediction of climate change) and much more.

Thanks to the supercomputers, many researches were carried out, modern diagnostics in medicine became available, and it became possible to accurately predict weather and natural phenomena. As for the healthcare sphere, only here we can see what a tremendous influence the supercomputers have on our lives: with their help it is possible to obtain effective methods of treatment and to find the causes of many diseases.

In the military industry, supercomputers allow the calculation of new strategic and tactical positions, study ways to improve the efficiency of finished combat equipment and its modernization, develop new types of weapons and protective equipment.

Литература

1. Hoffman, Allan R.; et al. (1990). Supercomputers: directions in technology and applications. National Academies