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China builds world's fastest supercomputer

Xinhua



A file picture of the 512 CPU Super Computer at the computer centre of BARC, Trombay. It is being used for various applications including Tsunami and Earthquake detection. Photo: V. V. Krishnan

China has built the world's fastest supercomputer, the **Tianhe-1A**, which is capable of 2.57 quadrillion computing operations per second, pulling ahead of the United States in the global supercomputing race.

The lead of the China-made system was confirmed by the 36th edition of TOP500 list of the world's most powerful supercomputers, which was released Monday on the TOP500 list website.

Tianhe-1A was followed by the former No. 1 system, the U.S.-made Cray XT5 "Jaguar" at the U.S. Department of Energy's Oak Ridge Leadership Computing Facility in Tennessee.

The Jaguar system performs at 1.75 quadrillion per second, 92 percent slower than Tianhe-1A, running Linpack, the benchmark used to officially determine the speed of supercomputers.

The Tianhe-1A is installed at the National Supercomputing Center (NSCC) in the north China

port city of Tianjin, which specializes in super computing outsourcing services for complex work like the surveying of mines, the forecasting of weather, the design of high-end machinery, bioinformatics and large-data animation design.

Tianhe-1A's chief designer, Yang Xuejun, said in an exclusive interview with *Xinhua*, "The interconnect between CPUs and GPUs is key to the system's high performance."

"As there has been rare precedent to integrate GPUs into a system for high-performance computing, we made much effort to improve the performance and efficiency of those GPUs," Mr. Yang said.

Besides Tianhe-1A, another China-made supercomputer, Nebulae, which is a 1.27 petaflop-per second system, holds the third place on the TOP500 list.

Nebulae, developed by Dawning Information Industry Co., is equipped in a Shenzhen NSCC.

Jack Dongarra, a member of the U.S. National Academy of Engineering and supervisor of the TOP500 list, said in an email interview with *Xinhua*, "It's more of a sign that China is serious in pursuing high performance computing to aid the growth of science, engineering and economic competitiveness."

"The long-term implication for the U.S. is that China is seriously interested in high performance computing, and is developing and deploying computing resources," said Mr. Dongarra, who leads research at the Oak Ridge National Laboratory.

Li Nan, the project manager for Tianhe-1A, told *Xinhua*, "We managed to upgrade key technologies, such as large-scale integrated chips, node computers and cutting-edge circuit boards. We also made a few breakthroughs in hybrid architecture and high-speed interconnection."

Among the world's most powerful 100, China holds five seats while the United States takes up 42 percent. Out of the 500 list, China-made systems occupy at least 40 slots.

Tianhe-1A, is estimated to have cost 600 million yuan (90.4 million U.S. dollars) and was developed by the Changsha-based National University of Defence Technology. It employs 14,336 Intel Xeon X5670 CPU and 7,168 NVidia Tesla M2050 GPU, as well as 2,048 home-grown Feiteng 8-core CPUs.

Zhang Yunquan, a lead computing scientist at the Chinese Academy of Science, told *Xinhua*, "The international supercomputing competition is extremely fierce and it's very difficult for China to hold the top position for more than one year."

Zhang Zhe, a researcher who works at the Oak Ridge National Laboratory, said, "Although the computing power of Tianhe-1A has surpassed Jaguar, its storage is not keeping the pace."

Jaguar adopts an external file system with 10 petabytes, or 10 quadrillion bytes, of information storage capacity, while Tianhe-1A is only two petabytes.

The U.S. National Center for Supercomputing Applications (NCSA) is now developing the IBM latest chip-powered Blue Waters system, which is widely believed to take over again the world's No. 1 by 2012.