



**KAMARAJ IAS ACADEMY**  
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# India's supercomputing ambitions

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**Why in News:** Indigenous development of supercomputers touches new highs in India, but still greatly lags global peers

India's Supercomputers

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**About Supercomputers** A supercomputer can perform high-level processing at a faster rate when compared to a normal computer.

Supercomputers are made up of hundreds or thousands of powerful machines which use better artificial intelligence (AI) models to improve operations that process huge amounts of data in less time than normal computers.

They work together to perform complex operations that are not possible with normal computing systems

Supercomputers require high-speed and specialised chip architectures. The chip performs 660 operations per cycle and thus run up to 230 gigaflops at 350 MHz

AI supercomputers are built by combining multiple graphic processing units (GPUs) into compute nodes, which are then connected by a high-performance network fabric to allow fast communication between those GPUs

The supercomputers market is limited to a few major players holding a greater share of the market. According to Mordor Intelligence, a market intelligence firm, some of the key players include HPE, Atos SE, Dell Inc., Fujitsu Corporation, IBM Corporation, Lenovo Inc., NEC Technologies India Private Limited etc.

The firm estimates the supercomputers market to grow around 9.5% during the 2022 to 2027 period. The firm also considers the increasing use of cloud technology as one of the significant supercomputer market trends with supercomputing centres adopting the cloud, due to the growing workload.

### **Developments of Supercomputers in India**

Although indigenous development of supercomputers began in 1980 with the involvement of organisations such as BARC, C-DAC and C-DOT, among others it was the launch of the National Supercomputing Mission (NSM) in 2015 that accelerated efforts in a big way.

India is today home to 23 supercomputers — powerful computers that are primarily used for scientific and engineering work that demands ultra high-speed computations. Compared to five or 10 years ago, India's supercomputing journey has been quite successful

The superfast machines are in use in the field of computational chemistry, material science, quantum mechanics, and more, with nearly 5,000 users executing close to 8 lakh jobs on them. On the flip side, however, use of supercomputers is currently limited to research institutions.

In terms of supercomputing capacity, India has made commendable progress, though it still lags other leading nations

Though India has built or hosted supercomputers since the 1990s, it held a 'top 10' spot only once, in 2007, thanks to the EKA built by the Computational Research Laboratories, which is part of the Tata group. This position was lost, though several ultra-fast machines exist in Indian academic institutions: they feature in the 100s or 200s in global rankings.

As of June 2022, China boasted a staggering 173 of the world's 500 most powerful supercomputers, while the US had 128. From India, only three systems — Param Siddhi AI (ranked 111), Pratyush (132), and Mihir (249) — made it to the list.

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While exascale computing involving billions of computations per second is evolving rapidly, India has no exascale supercomputers yet. “We are still looking at petaflops [quadrillion flops, where a ‘flop’ — or floating point operations per second — is a measure of computer performance]. But we should be looking at exaflops now, because the world is already there

Param-Shankh, India’s new indigenous exascale supercomputing monster from C-DAC, is set to launch in 2024. Thus, India has not ignored the exascale revolution. Under the NSM scheme, C-DAC is aiming to install 70 supercomputers pan India

The Indian government has initiated efforts to develop indigenous exascale computing capabilities through NSM by 2024.

### **Challenges in Development of Supercomputer**

India currently lacks the infrastructure to produce the semiconductor devices required for the development of supercomputers.

While the country still relies on imports for some components, indigenisation efforts are on, too.

### **The Way Ahead**

Supercomputers continue to be highly relevant even in the era of quantum computing. While quantum computers possess immense potential for certain types of calculations, supercomputers excel at tackling a broader range of complex problems.