



India: Announcement of Petascale Supercomputer in 2017 Heralds a Revitalized National Supercomputing Emphasis

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IDC's Quick Take

The Indian government recently announced that it will field a petaflops supercomputer in 2017 to kick off its seven-year \$700 million National Supercomputing Mission to produce and make available through a nationwide high-speed grid over 70 supercomputer systems with a wide range of performance. With this program, India is taking a pragmatic look at what it takes to develop a world-class supercomputing infrastructure, and the decision to use a mix of both foreign and indigenous technology will allow the Indian supercomputing community access to some of the best technology available in the world, while simultaneously working on developing homegrown capabilities that will only add to its knowledge base.

News Highlights

The Indian government recently announced that it will field a petaflops supercomputer in 2017 to kick off its seven-year \$700 million National Supercomputing Mission to produce and make available through a nationwide high-speed grid a wide range of supercomputers. Program plans call for the eventual acquisition of over 70 foreign and domestic systems in the next seven years, spanning a wide range of performance across three tiers: 50 small computers in the 50-60 teraflops range, 20 midrange systems with performance close to 500 teraflops, and at least three large supercomputers — the first systems in the program to be stood up over the next three years — in the 5-10 petaflops range. Furthermore:

- Overall control of the expansive program will likely be centered at the [Centre for Development of Advanced Computing](#) (C-DAC), a premier R&D organization of India's Ministry of Communications and Information Technology and India's most experienced supercomputer developer, with a history of successful supercomputer progress tracing back almost 25 years to its first Param supercomputer system.
- C-DAC was founded in 1988 to develop indigenous supercomputers after the U.S. government turned down a Cray request to export one of its systems for weather forecasting.

Initial program plans called for the use of only indigenously built supercomputers, but recently, the India government has modified those plans and announced that instead there will now be a mix of imported and indigenous systems. HPE, Lenovo, Acer, Dell-owned EMC, and IBM have already initiated contact with C-DAC, which is planning to enter the request-for-proposal stage soon. There is no indication yet as to how much, if any, indigenous technology will be used to build the project's first supercomputers. Moreover:

- Over the years, C-DAC has designed many of the critical technologies used in its supercomputers, including its most recent PARAMNet-3 high-speed interconnect with network interface cards based on C-DAC's fourth-generation communication Gemini processor and a modular 48-port packet routing switch.
- However, India has no serious indigenous microprocessor design or manufacturing capability, so it has used foreign, primarily United States-origin, chips to power its supercomputers. In

conjunction with hardware development, the program will support supercomputing application development as well as related operation and management skills. Plans call for training over 20,000 people over the lifetime of the program.

Currently, the fastest supercomputer in India is the Cray XC-40 installed at the [Supercomputer Education and Research Centre](#), at the Indian Institute of Science in Bangalore, with a 1.24 teraflops peak performance. The fastest indigenously assembled Indian system is the [Param Yuva2](#) at C-DAC in Pune, with a 0.52 teraflops peak performance.

IDC's Point of View

Through the National Supercomputing Mission, India appears to be taking some serious steps toward kick-starting its indigenous supercomputer development efforts, which has been relatively lackluster as of late. Indeed, in the past five years, India has averaged only about 10 systems on the top 500 HPCs list, and of the 11 systems on the current list, the sole indigenously assembled Indian entry appears at number 250. It has been almost a decade since India had an HPC on the list of top 10 systems.

However, with this program, India is taking a pragmatic look at what it takes to develop a world-class supercomputing infrastructure. The decision to use a mix of both foreign and indigenous technology will allow the Indian supercomputing community access to some of the best technology available in the world, while simultaneously working on developing homegrown capabilities that will only add to its knowledge base. In addition:

- It is important to note that India is not seeking to build a world-class exascale system anytime soon, like most other national HPC development programs such as in the United States and China, but instead New Delhi is choosing to concentrate on building a national HPC infrastructure that can provide a wide range of systems to a wide class of users.
- India may also choose to take advantage of increasingly capable options for open system hardware such as ARM or RISC-V processors as well as open source software such as OpenHPC.

Finally, by building a network of supercomputing capabilities that span across India's research community, the program could drive significant national dividends by supplying access to a wide range of both expected and new supercomputer users to develop new and innovative applications in areas including climate modeling, drug discovery, and industrial processes. Supporting that vision, India has also announced that it is also looking at developing a cloud-based 1 million core plus HPC for access to the HPC community as well.

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