NATIONAL SUPERCOMPUTING MISSION

381. SHRI VAMSI KRISHNA GADDAM:

Will the Minister of Electronics and Information Technology be pleased to state:

(a) the current total computing capacity achieved under the National Supercomputing Mission (NSM) including contributions from recent installations like PARAM Rudra in Delhi, Pune and Kolkata;
(b) the details of supercomputer installations under NSM, State and department-wise;
(c) whether the Government is on track to meet NSM objectives by the 2024 deadline despite previous extensions and if not, the reasons therefor;
(d) the status of India's global standing in supercomputing in comparison with all other countries following recent installations; and
(e) the details of international collaborations, if any, aimed at advancing India's supercomputing capabilities?

ANSWER

MINISTER OF STATE FOR ELECTRONICS AND INFORMATION TECHNOLOGY
(SHRI JITIN PRASADA)

(a) to (e): The National Supercomputing Mission (NSM) was initiated in April 2015 by the Government of India with a budget outlay of Rs.4,500 crore for seven years. Its vision is to achieve self-reliance and global leadership in supercomputing by giving access of State-of-the-Art supercomputing facilities to researchers, addressing grand challenges, optimizing investments, and enhancing global competitiveness in key areas of supercomputing technologies.

The NSM is being jointly implemented by the Ministry of Electronics and Information Technology (MeitY) and the Department of Science and Technology (DST). MeitY and DST are implementing this initiative through Centre for Development of Advanced Computing(C-DAC), Pune and Indian Institute of Science (IISc), Bengaluru. The mission is currently extended till December, 2025.

Self-Reliance in Supercomputing
Under the National Supercomputing Mission (NSM), an ecosystem has been established with the focused goal of achieving self-reliance in supercomputing, encompassing the design, development, and manufacturing of supercomputers, as well as the creation of a complete system software stack and associated applications.

India has now the capability of designing, developing and manufacturing supercomputing technologies indigenously, which will reduce dependency on imports of supercomputing technologies from other countries. This approach is in line with the Hon'ble Prime Minister's vision of "India's mantra is Atmanirbharta (self-reliance) through research, Science for Self-Reliance."

Hon'ble Prime Minister Shri Narendra Modi on 26th September, 2024 dedicated three PARAM Rudra supercomputers to the young researchers, scientists and engineers of nation facilitating advanced studies in physics, earth sciences, and cosmology. These supercomputers have been deployed in Pune, Delhi and Kolkata to facilitate pioneering scientific research. Giant Metre Radio Telescope (GMRT- 1Petaflop) in Pune will leverage the supercomputer to explore astronomical phenomena. Inter-University Accelerator Centre (IUAC- 3 Petaflops) in Delhi will enhance research in fields like material science and atomic physics. S.N. Bose Centre for Basic Sciences (S.N. Bose- 838 Teraflops) in Kolkata will drive advanced research in areas such as physics, cosmology, and earth sciences. It is worth reiterating that all these systems have been designed, developed and manufactured entirely within the country.

PARAM Rudra supercomputers are built using indigenously designed and manufactured High-Performance Computing servers, known as "Rudra", along with an indigenously developed system software stack. "Rudra" Server is the first of its kind in India which at par with globally available other HPC class Servers. These servers are being manufactured in India by local manufacturers boosting local electronics industries.

Empowering Researchers with State-of-the-Art Indigenous Supercomputers
With the commissioning of three PARAM Rudra supercomputers, as of 21st November 2024, a total of 33 supercomputers with a combined compute capacity of 32 Petaflops, have been deployed across various academic institutions, research organizations, and R&D labs, including prominent institutions like IISc, IITs, C-DAC, and other institutions from Tier-II and Tier III cities of the country under NSM. These supercomputers facilitate over 10,000 researchers, including more than 1,700 PhD scholars from over 200 academic institutions and R&D labs across the country. NSM has created opportunities for researchers from Tier II and Tier III cities to conduct research by providing access to State-of-the-Art supercomputing facilities. These researchers have completed over 1 crore compute jobs and published more than 1,200 papers in leading national and international journals.

Notably, Researchers from IISc have won the highly prestigious Gordon Bell Prize at the Supercomputing Conference 2023, awarded by the Association for Computing Machinery (ACM) for exceptional achievements in High Performance Computing (HPC). The research, focused on large-scale materials modeling with very high accuracy, was conducted using the NSM machine, Param Pravega, at IISc. Additionally, more than 22,000 individuals have been trained in HPC and AI skills. Start-ups and MSMEs are leveraging these supercomputing resources to advance their HPC-driven projects.

These supercomputers are driving groundbreaking research across various fields, including disaster management, climate modeling, drug discovery, astronomical research, and materials science. Also, India's weather forecasting capabilities will improve, enabling more accurate and hyper-local predictions. These technologies will empower farmers with critical knowledge for better crop decisions and assist fishermen by reducing risks. By fostering innovative solutions to real-world challenges, supercomputers contribute to economic growth and societal progress, enhancing quality of life through advancements in science and technology.

India's growing supercomputing infrastructure is reflected in its inclusion in the Top500 list of the world's fastest supercomputers. The following are the current rankings of India's supercomputers as per the latest list of TOP500 Supercomputers announced in **Supercomputing Conference 2024** (SC24) in November, 2024. The list of TOP500 Supercomputers is published at https://top500.org/lists/top500/list/2024/11/

Rank	Name of Supercomputer	Institution	Rmax PF	Rpeak PF
136	AIRAWAT-PSAI	C-DAC, Pune, Maharashtra	8.5	13.17
188	Arka	Indian Institute of Tropical Meteorology, Pune, Maharashtra	5.94	7.4
189	Arunika	National Centre for Medium Range Weather Forecasting, Noida, Uttar Pradesh	5.94	7.4
270	Pratyush	Indian Institute of Tropical Meteorology, Pune, Maharashtra	3.76	4.01
402	Arka AI/ML	Indian Institute of Tropical Meteorology, Pune, Maharashtra	2.7	3.75
433	Mihir	National Centre for Medium Range Weather Forecasting, Noida, Uttar Pradesh	2.57	2.81

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