

GOVERNMENT OF INDIA
MINISTRY OF ELECTRONICS AND INFORMATION TECHNOLOGY
RAJYA SABHA
UNSTARRED QUESTION NO. 3905
TO BE ANSWERED ON: 04.04.2025

STATUS OF THE NATIONAL SUPERCOMPUTING MISSION

3905.#DR.KALPANASAINI:

Will the Minister of ELECTRONICS AND INFORMATION TECHNOLOGY be pleased to state:

- (a) the total number of supercomputers established in the country under the National Supercomputing Mission (NSM) till the year 2025;
- (b) the institutions where three PARAM Rudra supercomputers, inaugurated by the Prime Minister in September 2024, have been installed along with their key features, the details thereof; and
- (c) the current status of the development of indigenous supercomputer architectures Rudra and Trineta under the Mission, the details thereof?

ANSWER

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

(a) to (c): 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.

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.

Under NSM, as of 26th March 2025, a total of 34 supercomputers (**Annexure – I**) with a combined compute capacity of 35 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. The

supercomputing systems commissioned under NSM have achieved an overall utilization rate of over 85%, with many systems exceeding 95%, demonstrating a high level of usage and efficiency in their computational capacity. The contribution of these supercomputing systems to the Research and Development (R&D) sector has been highly impactful, facilitating over 10,000 researchers, including more than 1,700 PhD scholars from over 200 academic institutions and R&D labs across the country. These supercomputing systems have supported research in critical domains such as Drug Discovery, Disaster Management, Energy Security, Climate Modeling, Astronomical Research, Computational Chemistry, Fluid Dynamics, and Material Research. 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 1,500 papers in leading national and international journals. 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.

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, collectively offering a compute capacity of 5 petaflops to boost research capabilities in India. These supercomputers have been deployed in Pune, Delhi and Kolkata to facilitate pioneering scientific research. PARAM Rudra supercomputers are built using indigenously designed and manufactured High-Performance Computing servers with advanced Direct Contact Liquid Cooling (DCLC) cooling systems for improved energy efficiency, known as "Rudra", along with an indigenously developed system software stack. "Rudra" Server is the first of its kind in India which is at par with globally available other HPC class Servers. These servers are being manufactured in India by local manufacturers boosting local electronics industries.

The first facility, located at the Inter-University Accelerator Centre (IUAC) in New Delhi, houses a 3 Petaflop system with 650 number of RUDRA servers and 4.4 Petabytes of high-performance storage. This 3 PetaFlop Supercomputing facility deployed at IUAC, will enhance research at IUAC, Universities under the UGC, and Institutions under AICTE in areas such as nuclear structure and reactions, material science, ion beam applications, atomic and molecular physics, radiation biology, mass spectrometry, plasma research etc. The facility is expected to be utilized by over 1,000 researchers from 285 academic institutions and universities nationwide.

The second facility, located at Giant Metrewave Radio Telescope (GMRT) - National Centre for Radio Astrophysics (NCRA), Pune, Maharashtra offers a 1 Petaflop compute capacity and is equipped with 90 number of Rudra servers and 2 Petabytes of high-performance storage. The system aimed at facilitating astrophysical objectives of the Giant GMRT and to conduct real-time commensal search for FRBs (Fast Radio Bursts) and Pulsars with the GMRT. This

Supercomputing facility is dedicated to researchers in Astrophysics and is proposed to be used by more than 100 faculty members and researchers from GMRT and NCRA.

The third facility, located at the Satyendra Nath Bose Institute in Kolkata, West Bengal, offers 838 Teraflop compute capacity and is equipped with 180 number of Rudra servers and 1 Petabyte of high-performance storage. It aims to cater computational needs of various Research and Engineering institutes of the region. Computational research to be catered for by this facility cover a broad range including materials science, earth science, chemical and biological sciences, high energy physics, cosmology and astrophysics among others. This Supercomputing facility is expected to be used by more than 500 faculty members and researchers from different academic institutions and universities across the country including S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata.

The next-generation Rudra servers are currently in the advanced stages of development and will follow a new, more efficient design. Each unit will be capable of handling high power and cooling needs. These new servers are being built to accommodate higher performance demands while using advanced cooling methods to improve energy efficiency. The production of the current generation of Rudra servers is almost complete and is expected to be finalized by Q2 2025. These servers will be part of the upcoming 20PF PARAM Rudra supercomputer at C-DAC Bangalore. Furthermore, C-DAC is working on the next generation of Rudra servers, featuring the latest processors and more advanced features. These servers will be produced in partnership with Indian manufacturers. The new Rudra servers will offer greater power, better security, and improved design, enabling them to handle more tasks in a single unit. A pilot version of this new system is expected to be ready by Q3 2025.

In parallel, under the National Supercomputing Mission (NSM), C-DAC has developed the indigenous high-speed communication network, "Trinetra," to enhance data transfer and communication between computing nodes, strengthening India's supercomputing capabilities. Trinetra is being implemented in three phases: Trinetra-POC, a proof-of-concept system to validate key concepts; Trinetra-A (100 Gigabits per second), a network with advanced connections, successfully deployed and tested in the 1PF PARAM Rudra at C-DAC Pune; and Trinetra-B (200 Gigabits per second), an upgraded version with improved capabilities, set to be deployed in the upcoming 20PF PARAM Rudra supercomputer at C-DAC Bangalore.

Annexure-I

Details of Supercomputers installed under NSM with compute capacity

Sl. No.	State/UT	Name of the institution Installed at	Name of Supercomputer	Compute Capacity	Year of Commission
1.	Maharashtra	C-DAC, Pune, National AI Facility	PARAM Siddhi	6.5PF/210PF (AI)	2020
2.	Karnataka	IISc, Bangalore	PARAM Pravega	3.3PF	2022
3.	Maharashtra	IIT Bombay	PARAM Rudra	3 PF	2025
4.	Delhi	Inter-University Accelerator Centre(IUAC), Delhi	PARAM Rudra	3 PF	2024
5.	Karnataka	Jawaharlal Nehru Centre for Advanced Scientific Research(JNCASR), Bangalore	PARAM Yukti	1.8PF	2020
6.	Maharashtra	IISER, Pune	PARAM Brahma	1.7PF	2020
7.	West Bengal	IIT, Kharagpur	PARAM Shakti	1.66PF	2020
8.	Uttar Pradesh	IIT, Kanpur	PARAM Sanganak	1.66PF	2020
9.	Uttarakhand	IIT, Roorkee	PARAM Ganga	1.66PF	2022
10.	Delhi	NIC, Delhi	PARAM System	(50 AI PF/ 1.3 PF)	2024
11.	Maharashtra	Giant Metrewave Radio Telescope (GMRT) -National Centre for Radio Astrophysics, (NCRA), Pune	PARAM Rudra	1.0 PF	2024
12.	Uttar Pradesh	IIT(BHU), Varanasi	PARAM Shivay	838TF	2019
13.	Telangana	IIT, Hyderabad	PARAM Seva	838TF	2021
14.	Punjab	National Agri-Food Biotechnology Institute,	PARAM Smriti	838TF	2021

		Mohali(NABI), Mohali			
15.	Karnataka	C-DAC, Bangalore, National MSME Facility	PARAM Utkarsh	838TF	2021
16.	Gujarat	IIT, Gandhinagar	PARAM Ananta	838TF	2022
17.	Tamil Nadu	NIT, Trichy	PARAM Porul	838TF	2022
18.	Assam	IIT, Guwahati	PARAM Kamrupa	838TF	2022
19.	Himachal Pradesh	IIT, Mandi	PARAM Himalaya	838TF	2022
20.	West Bengal	S. N. Bose National Centre for Basic Sciences, Kolkata	PARAM Rudra	838 TF	2024
21.	Maharashtra	C-DAC, Pune	Bioinformatics R&D Facility	230 TF	2021
22.	Delhi	C-DAC, Delhi	PARAM Rudra	200 TF	2024
23.	Maharashtra	C-DAC, Pune	SANGAM Testbed	150 TF	2017
24.	Maharashtra	C-DAC, Pune	PARAM Shrestha	100 TF	2018
25.	Maharashtra	C-DAC, Pune	PARAM Embrio	100 TF	2020
26.	Maharashtra	C-DAC, Pune	PARAM Neel	100 TF	2020
27.	Tamil Nadu	Society for Electronic Transactions and Security, (SETS), Chennai	PARAM Spoorthi	100 TF	2020
28.	Karnataka	C-DAC, Bangalore	System Software lab	82TF	2020
29.	Maharashtra	C-DAC, Pune	PARAM Vidya	52.3 TF	2022
30.	West Bengal	IIT, Kharagpur	PARAM Vidya	52.3 TF	2022
31.	Kerala	IIT, Palakkad	PARAM Vidya	52.3 TF	2022
32.	Tamil Nadu	IIT, Chennai	PARAM Vidya	52.3 TF	2022
33.	Goa	IIT, Goa	PARAM Vidya	52.3 TF	2022
34.	Maharashtra	C-DAC, Pune	PARAM Sampoorn	27 TF	2020
	Total			35 PF	
