



National Supercomputing Mission (NSM)

Key Points

- **Launch Year:** 2015
- **Type of Scheme:** Central Sector Scheme
- **Nodal Ministries:**
 - Department of Science and Technology (DST)
 - Ministry of Electronics and Information Technology (MeitY)
- **Implementing Agencies:**
 - Centre for Development of Advanced Computing (C-DAC), Pune
 - Indian Institute of Science (IISc), Bengaluru

Overview of National Supercomputing Mission (NSM)

- **About:** The **National Supercomputing Mission (NSM)**, launched in **2015**, is a Government of India flagship initiative to boost **High-Performance Computing (HPC)**, strengthen technological capabilities, and advance R&D across key sectors.
 - The mission is jointly led by **DST** and **MeitY**, and implemented by **C-DAC, Pune** and **IISc, Bengaluru**.
- **Objective:** The mission aims to **empower academic and R&D institutions** across India by installing supercomputers of varying capacities.
 - **Access is provided via the National Knowledge Network (NKN)**, a government-backed **high-speed network** connecting research and academic institutions.
- **Skill Development:** The mission promotes **HPC skill development** to meet the demands of advanced computational research.
 - **Five dedicated HPC training centres** have been set up at **Pune, Kharagpur, Chennai, Palakkad, and Goa** to train students and researchers in supercomputing.
- **Significance:**
 - The mission plays a crucial role in advancing scientific research **across diverse fields such as** drug discovery, climate modeling, disaster management, and material science.
 - It will **enhance capacity building by training professionals** in HPC and AI, while also supporting start-ups and MSMEs in innovation and product development.

Note

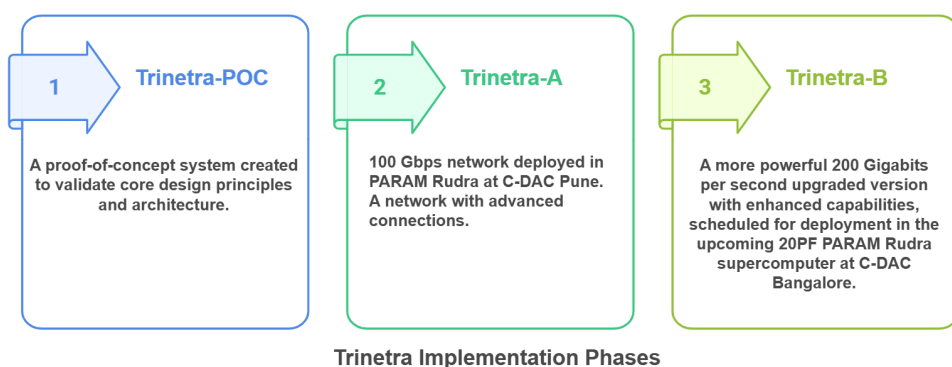
- **FLOPs, or Floating-Point Operations per Second**, is a commonly used metric to measure the computational performance – processing power and efficiency – especially **in the field of HPC and AI**.
 - Floating-point operations are a **certain kind of mathematical calculation** using real numbers with fractional parts.

NSM Infrastructure Development Plan

- The **NSM** aims to achieve **self-reliance in supercomputing**, promote **R&D and problem-solving** across scientific and societal domains, and build a **globally competitive HPC ecosystem** through a **three-phase infrastructure development plan**.
 - **Phase 1:** Set up six supercomputers with components assembled in India to begin building domestic capabilities.
 - **Phase 2:** Moved towards local manufacturing and software development, achieving 40% indigenous value.
 - **Phase 3:** Aims for full indigenization by designing and manufacturing all key components in India and establishing a national HPC facility.

What is Trinetra?

- **About & Objective:**
 - Under the **NSM**, the **Centre for Development of Advanced Computing (C-DAC)** has developed "**Trinetra**".
 - It is an **indigenous high-speed communication network** designed to enhance **data transfer and communication between computing nodes**.
 - This development marks a critical step toward **self-reliance in HPC infrastructure**, enabling India to compete globally in the field of **high-speed computing networks**.
- **Phases:**
 - Trinetra is being implemented in three progressive phases: **Trinetra-POC, Trinetra-A and Trinetra-B**.



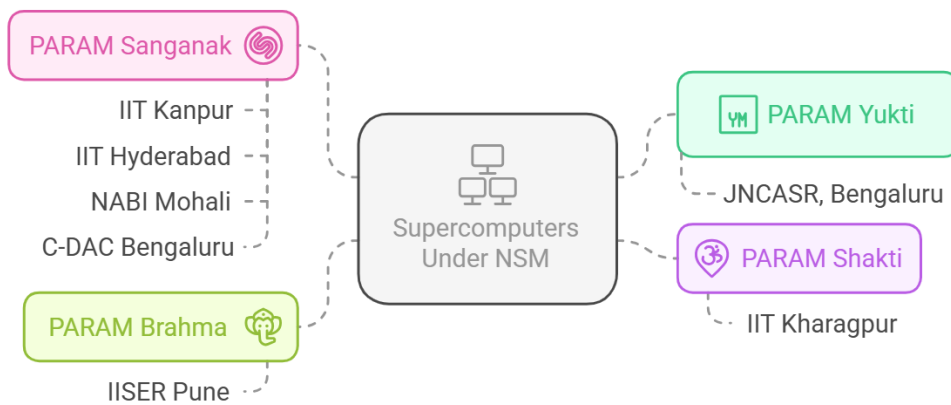
PARAM Rudra Supercomputers

- **About:** In 2024, three advanced PARAM Rudra supercomputers were officially commissioned for scientific research at **Pune, Delhi, and Kolkata**.
 - PARAM Rudra supercomputers are built using indigenously designed and manufactured HPC servers, **known as "Rudra"**, along with an indigenously developed system software stack.
 - Rudra **servers are the first made-in-India servers** that match international high-performance computing (HPC) standards.
- **Purpose:** To facilitate **advanced research in physics, earth sciences, and cosmology**.

Other Key Installations under NSM

- **PARAM Shivay (2019):**
 - First supercomputer of India under NSM
 - Installed at **IIT-BHU, Varanasi**
- **PARAM Pravega (2022):**
 - Installed at **IISc Bengaluru**
 - It is the **largest academic supercomputer in India** and one of the most powerful supercomputers in the country.

Supercomputers Under National Supercomputing Mission



AIRAWAT (India's AI Supercomputing Platform)

- **About & Objective:**
 - The Government has initiated a project **AI Research Analytics and Knowledge Dissemination Platform (AIRAWAT)** for providing a common compute platform for AI research and knowledge assimilation.
- **Global Recognition:**
 - AIRAWAT, **ranked 75th in the Top 500 Global Supercomputing List** at the International Supercomputing Conference (ISC 2023) in Germany, firmly positions **India among the world's leading AI supercomputing nations.**

Current Status & Future Prospects of NSM

- As of March 2025, **34 supercomputers deployed** across premier and regional institutions with a combined capacity of **35 Petaflops (PF)**.
 - The institutions involved include IISc, IITs, C-DAC, and **several others from Tier-II and Tier-III cities.**
 - System utilization rates are high, with over **85% usage and many systems exceeding 95% efficiency.**
- In 2024-25, around **45 petaflops of additional computing infrastructure** is planned to be developed using indigenously designed servers and technologies.

Role of India Semiconductor Mission (ISM) in NSM

- The **India Semiconductor Mission (ISM)** is playing a crucial role in boosting the **NSM** by enabling **domestic production of critical components** like **processors, memory chips, and accelerators.**
 - Until now, India relied heavily on **imports** for these advanced semiconductor technologies.
- ISM aims to make supercomputers more **affordable, energy-efficient,** and **customized** to India's scientific and industrial needs.
- This synergy will help NSM achieve its goal of **self-reliance** and position India as a **global leader in supercomputing.**