Supercomputer 'PARAM Ganga'

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In news- Petascale Supercomputer "PARAM Ganga" has been established at IIT Roorkee under National Supercomputing Mission(NSM) recently.

About PARAM Ganga-

- The supercomputer PARAM Ganga is **based on a heterogeneous and hybrid configuration of Intel Xeon Cascade** lake processors, and NVIDIA Tesla V100.
- There are **312 (CPU+GPU+HM) nodes with a total peak computing capacity of 1.67 (CPU+GPU+HM) PFLOPS** performance.
- The system uses the Lustre parallel file system and **operating system is CentOS 7.x.**
- With a supercomputing capacity of 1.66 Petaflops, **this system is designed and commissioned by C-DAC under Phase 2 of the build approach of the NSM.**
- Substantial components utilized to build this system are manufactured and assembled within India along with an indigenous software stack developed by C-DAC.

SUPERCOMPUTERS
The top 10 most powerful supercomputers
Among the ten fastest supercomputers in the world, five are located in the US, two in China and one each in Japan, Germany and Italy.

The National Supercomputing Mission (NSM)-

- The government **launched the NSM in 2015** to connect national academic and R&D institutions with a grid of over 70 high-performance computing facilities.

- **These supercomputers will also be networked on the National Supercomputing grid over the National Knowledge Network (NKN).**

  - The NKN is another programme of the government which connects academic institutions and R&D labs over a high speed network.
  - The Mission also includes the **development of highly professional High Performance Computing (HPC)** aware human resources for meeting challenges of development of these applications.
  - NSM is being **steered jointly by the Ministry of Electronics & Information Technology (MeiTY) and the Department of Science and Technology (DST)** and implemented by Centre for Development of Advanced Computing **(C-DAC**) and Indian Institute of Science (**IISc), Bangalore.**

- The Mission plans to build and deploy 24 facilities with cumulative compute power of more than 64 Petaflops.

  - Till now C-DAC has deployed 11 systems at IISc, IITs, IISER Pune, JNCASR, NABI-Mohali and C-DAC under NSM Phase-1 and Phase-2.
  - In the first phase, **PARAM Shivay, PARAM Shakti, PARAM Brahma, PARAM Yukti and PARAM Sanganak** were deployed at IIT (BHU), IIT Kharagpur, Indian Institute of Science Education and Research, Pune, and Jawaharlal Nehru Center for Advanced Research.
  - CDAC has designed and developed a **computer server "Rudra" and high-speed interconnect "Trinetra"** which are the major sub-assemblies required for supercomputers.
  - **Phase III, initiated in 2021,** will take the

computing speed to around 45 Petaflops.

- **Objectives of the NSM are:**

  - To make India one of the world leaders in Supercomputing and to enhance India's capability in solving grand challenge problems of national and global relevance.
  - To empower our scientists and researchers with state-of-the-art supercomputing facilities and enable them to carry out cutting-edge research in their respective domains.
  - To minimize redundancies and duplication of efforts, and optimize investments in supercomputing.
  - To attain global competitiveness and ensure self-reliance in the strategic area of supercomputing technology.

Some of the large-scale applications which are being developed under NSM include the following:

- NSM Platform for Genomics and Drug Discovery.
- Urban Modeling: Science Based Decision Support Framework to Address Urban Environment Issues (Meteorology, Hydrology, Air Quality).
- Flood Early Warning and Prediction System for River Basins of India.
- HPC Software Suite for Seismic Imaging to aid Oil and Gas Exploration.
- MPPLAB: Telecom Network Optimization.

Further   reading:
https://journalsofindia.com/fugaku-fastest-supercomputer-in-the-world/