

Thursday, May 25, 2023

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India will unveil 18 new petaFLOP supercomputers for weather forecasting in 2023: What are FLOPs in computing?

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 high-performance computing (HPC) and artificial intelligence (AI).

By: [Explained Desk](#)

New Delhi | Updated: May 25, 2023 15:04 IST

 **NewsGuard**




The Indian Institute of Tropical Meteorology (IITM), Pune, is home to 'Pratyush', a 4.0 petaflop supercomputer. (Photo via pratyush.tropmet.res.in)

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India will unveil its **new 18 petaFLOP supercomputer for weather forecasting institutes** later this year, Union Earth Sciences Minister Kiren Rijiju said on May 24.

The new supercomputer is expected to improve weather forecasts at the block level, help weather scientists give higher resolution ranges of the forecast, predict cyclones with more accuracy and better lead time (the difference between a phenomenon being forecast and actually occurring), and provide ocean state forecasts, including marine water quality forecasts, PTI reported.

“Presently, we give forecasts with a 12-kilometre resolution. The new supercomputer will improve it to six-kilometre resolution. Our aim is to achieve one-kilometre resolution forecasts,” Ministry of Earth Sciences Secretary M Ravichandran said. Making the announcement after a visit to the National Centre for Medium Range Weather Forecasting (NCMRWF) in Noida, Rijiju said that the supercomputer will cost Rs 900 crore.

What are FLOPs in computing?

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 high-performance computing (HPC) and artificial intelligence (AI). Floating-point operations are a certain kind of mathematical calculation using real numbers with fractional parts.

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How many FLOPs can a computer achieve?

Modern computing systems, such as CPUs (Central Processing Units) and GPUs (Graphics Processing Units), are designed to perform multiple operations simultaneously, using parallel processing techniques. The parallelism significantly increases the number of FLOPs a system can achieve within a given time frame. Over the years, hardware has become more efficient, exponentially increasing computing power.

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For instance, in 1961, the IBM 7030 Stretch, costing a whopping \$ 7.8 million at the time, performed one floating-point multiplication every 2.4 microseconds, roughly performing 417,000 FLOPs. A PlayStation 5 today is listed to have a peak performance of 10.28 TFLOP, i.e. 10.28 trillion FLOPs.

What is a petaFLOP?

Due to the immense computing power of today's computers, the FLOPs metric is most often represented in terms of billions (giga), trillions (tera), or even quadrillions (peta) of operations per second (GFLOPs, TFLOPs, PFLOPs, respectively).

A petaflop is thus equal to a thousand TFLOPs or 10¹⁵ FLOPs.

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2008 was the first year when a supercomputer was able to break what was called “the petaFLOPS barrier,” when the IBM Roadrunner shocked the world with an astounding peak performance of 1.105 petaFLOPS. Currently, the world’s fastest supercomputer in terms of PFLOPs is the Hewlett Packard Enterprise Frontier, or Frontier, with the capability to touch a peak performance of 1,685.65.

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Are FLOPs the only metric to judge a computer’s performance?

No. FLOPs is not the only factor determining the performance of a computing system. Memory bandwidth, latency, and other architectural features also play significant roles. Nonetheless, FLOPs provide a valuable baseline for comparing the computational capabilities of different systems, especially in tasks where floating-point calculations dominate.

Is India already using petaFLOPs computers for weather forecasting?

The NCMRWF houses ‘Mihir’, a 2.8 petaflop supercomputer, while the Indian Institute of Tropical Meteorology (IITM), Pune, is home to ‘Pratyush’, a 4.0 petaflop supercomputer, as per PTI. These were launched in 2018 and will be decommissioned once the new supercomputer is unveiled, a senior NCMRWF official told the news agency.

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According to the arrangement arrived at by the ministry, NCMRWF will be allocated eight PFLOPs computing power with the remaining 10 PFLOPs going to IITM. The Pune-based institute requires higher power as it deals with seasonal weather

forecasts while the NCMRWF deals with medium-range forecasts for a period extending three to seven days in advance.

First published on: 25-05-2023 at 14:56 IST



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