

petaFLOP Supercomputers

Why in News?

India is set to introduce 18 new petaFLOP <u>supercomputers</u> dedicated to <u>weather forecasting</u>, aiming to enhance the accuracy and resolution of weather predictions.

 These state-of-the-art machines will significantly improve forecasting capabilities at the block level, predict cyclones with greater accuracy and lead time, and provide detailed ocean state forecasts.

What are FLOPs in computing?

- About:
 - FLOPs, or Floating-Point Operations per Second, is a metric used to measure computational performance and efficiency in high-performance computing (HPC) and artificial intelligence (AI).
 - Floating-point operations involve mathematical calculations with real numbers that have fractional parts.
 - Using floating-point encoding, extremely long numbers can be handled relatively easily.
- Significance:
 - FLOPs are not the sole metric to evaluate a computer's performance. Factors like **memory bandwidth**, **latency**, **and architectural features also contribute**.
 - However, FLOPs provide a baseline for comparing computational capabilities,
 - particularly in tasks dominated by floating-point calculations.
- Unit of Computing Speed:
 - Teraflops:

It is a unit of computing speed equal to one million million (1 trillion) (10¹²)
FLOPS.

- Petaflops:
 - It is a unit of computing speed equal to 1000 TFLOPS (10^15).
- Exaflops:
 - It is a unit of computing speed equal to one billion billion (10^18) FLOPS.
- India's Current Usage of petaFLOPs:
 - The National Centre for Medium-Range Weather Forecasting (NCMRWF) houses 'Mihir,' a 2.8 petaFLOP supercomputer, while the Indian Institute of Tropical Meteorology (IITM) houses 'Pratyush,' a 4.0 petaFLOP supercomputer.
 - These existing supercomputers, launched in 2018, will be decommissioned once the new petaFLOP supercomputers are introduced.
 - As per the agreement, NCMRWF will receive eight PFLOPs of computing power, while the remaining ten PFLOPs will be allocated to IITM, catering to their specific weather forecasting requirements.
 - India's first supercomputer called **PARAM 8000 was launched in 1991.**

Note:

 The world's fastest computer in terms of PFLOPs is the Hewlett Packard Enterprise Frontier, or OLCF-5 with the capability to touch a peak performance of 1,685.65. • Airawat PSAI stands as India's largest and fastest AI supercomputing system, with a remarkable speed of 13,170 teraflops.

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