

GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
RAJYA SABHA
UNSTARRED QUESTION No. - 822
ANSWERED ON 27/07/2023

**SUPERCOMPUTERS FOR ENHANCED WEATHER MODELLING AND
CLIMATE RESEARCH**

822. SHRI KARTIKEYA SHARMA:

Will the Minister of **EARTH SCIENCES** be pleased to state:

- (a) the manner in which two newly installed supercomputers enhance the capabilities of the Indian Institute of Tropical Meteorology and the National Center for Medium-Range Weather Forecast (NCMRWF);
- (b) the significance of supercomputers in tackling climate research challenges and advancing numerical weather research in India;
- (c) the technological features that will be incorporated into the supercomputers to enhance their performance for weather and climate modelling; and
- (d) the manner in which the Ministry plan to leverage their expertise and technological ecosystem to strengthen India's position as a frontrunner in the high-performance computing industry, particularly in the field of weather modelling and climate research?

ANSWER
THE MINISTER FOR EARTH SCIENCES
(SHRI KIREN RIJJU)

- (a) At existing computing facility at NCMRWF is 2.8 Petaflops and at IITM is 4 Petaflops respectively. The present augmentation has the capacity to enhance the computing power at NCMRWF to 8.3 Petaflops and at IITM to 13 Petaflops respectively. This augmentation of computational infrastructure is necessary for running higher resolution models to improve accuracy of weather forecasts, running of Global Ensemble Prediction models for giving probabilistic forecasts, generate future climate scenarios and development of appropriate applications.
- (b) The Ministry of Earth Sciences (MoES) has a mandate to carry out research and development activities to develop and improve capability to forecast weather, climate and hazard related phenomena for societal, economic and environmental benefits including addressing climate change science and developing climate services. Weather and climate plays a pivotal role in the economy of the country as which directly affects the livelihood of people. Accurate prediction of weather and climate is important to safeguard both life and property. State-of-art equipment like High Performance Computer System (HPCS) is an indispensable tool of the forecasting business.

- (c) These systems which are based on Eviden's BullSequana XH2000, has the combined power capacity up to 21.3 Petaflops. Supercomputer at NCMRWF with an 8.3-Petaflop computing capacity for Weather and Climate Modelling is designed as such to support advanced numerical weather prediction (NWP) research. This platform integrates 2,100 CPU nodes with AMD EPYCTM7643 processors, 18 GPU nodes and 2PB all flash and 20PB disk-based storage. The supercomputer dedicated to the Indian Institute of Tropical Meteorology (IITM, Pune) has the capacity to provide 13 Petaflops of computing power for atmosphere and climate research and to integrate 3,000 CPU nodes using AMD EPYCTM 7643 processors and 26 GPU nodes and will have 3PB all flash and 29PB disk based storage.

- (d) With the rapid advancements in AI/ML technologies, weather and climate forecasting has reached a cutting-edge level. These innovative tools allow us to analyze vast amounts of data and make accurate predictions, revolutionizing our understanding of weather patterns and long-term climate changes. Dedicated scientists in the ministry are working tirelessly to bring significant improvements to weather and climate research. Through their rigorous studies and data analysis, they aim to enhance the understanding of atmospheric phenomena, such as monsoons, cyclones, and climate variability. The ground breaking research conducted plays a crucial role in advancing meteorological science and empowering us to make more informed decisions in the face of changing weather patterns and climate challenges.
