

Data Center and Supercomputers Addressing Climate Change

Celebrating the Data Centers and Supercomputers Crunching Climate Data

Tackling climate change is at the forefront of data center development and new supercomputer installations across the world as Governments and NGOs strive to measure carbon emissions, monitor extreme weather and conduct environmental modelling in the interest of public safety and the long-term future of civilization.

Just like the challenges they are addressing the scale of these machines is vast.

New partnerships and technology advances in supercomputing power and data center infrastructure operations are the foundations of the data crunching capabilities required.

Here (in no particular order) we offer what we think are 11 super impressive efforts worth acknowledging and celebrating.



New 'Aurora' Supercomputer Poised to be Fastest in U.S. History

Argonne National Laboratory in Lemont, Illinois, USA will receive a new \$500 million fully operational computer in 2021. This is a joint venture between manufacturers Intel, Cray and the U.S Department of Energy as the leading authority. Aurora will be among the fastest computers in the world providing scientists key insights into climate change and weather activity. The supercomputer will cover an area the size of ten tennis courts and be able to perform a quintillion calculations per second.

[Source](#)

MeteoSwiss to Improve Weather Forecasting with Cray CS-Storm Supercomputer

The Swiss national supercomputing center (CSCS) will integrate a new Cray CS-Storm Supercomputer at MeteoSwiss to improve weather forecast model accuracy. The CS-Storm system uses the latest graphic processing unit (GPU) accelerators which enable the organization to produce numerical weather models with a reduced energy footprint. Configuration includes 18 compute nodes; each has 8 NVIDIA V100 GPU with 2 Intel Xeon Gold 6134 CPUs and the storage systems are Cray ClusterStor L300. This next generation supercomputer will be operational in mid-2020.

[Source](#)



Met Office UK New Supercomputer

The UK government confirmed funding a £1.2 billion supercomputer project designed to predict severe weather and climate change. The Meteorological Office has management over the computer integration phase and functionality to predict weather distribution which assists the Environmental agency to take the appropriate action. This project is scheduled to start in 2022 and be completed by early 2032. The exact technical features of the new supercomputers remain undetermined.

[Source](#)



ECMWF Enhance European Weather Prediction Capabilities with New Supercomputer

In January 2020 Atos and European Center for medium-range weather forecasts (ECMWF) signed a contract over a four-year span to integrate a new high performance computing (HPC) system. The project is a \$89 million fund to upgrade the current computing power to effectively support researchers in 30 different European countries to improve weather forecasts with greater accuracy. A data center constructed in Bologna, Italy will host the Bull Sequana XH2000 supercomputer, which will be fully operational by 2021, as the technical features are provided by Atos and partner companies. Advanced Micro Devices: Epyc 7742 (64-core 2.25 GHz) processor, Mellanox: HDR InfiniBand and Data Directs Networks storage solution.

[Source](#)



Australia Pumps Another \$70 Million Into Tier-1 Supercomputing

Pawsey Supercomputing Center located in Perth western Australia received a AUS\$70 million investment from the Australian Government in order to replace the current flagship supercomputer known as Magnus. Magnus is among the most advanced super computers in the southern hemisphere. Its features include 1.1 petaflops (linpack), Cray XC40.

In Canberra capitol territory, the National Computational Infrastructure National Facility (NCINF) current supercomputer is Raijin which combines Fujitsu-Lenovo system powered by Xeon Broadwell CPUs, Nvidia P100 GPUs and Xeon Phi KNL processors. Raijin supports climate change researchers in 35 universities.

The New Pawsey Supercomputer features 546 teraflops MWA cluster which comprises 78 nodes, two intel Xeon Gold 6230 processors (both of which operate at 2.1 GHz) and a total number of 40 compute cores. The high-bandwidth memory is 32 GB in a single NVIDIA V100 which interconnects 384 GB main memory and local NVMe storage 960 GB.

[Source](#)

National Weather Service USA

The national weather service (NWS) located in the Washington metropolitan area uses supercomputers to monitor weather activity with data gathered from satellites, weather balloons and radar. The most recent computer upgrade happened in 2018 at the main centers in Reston Virginia and Orlando Florida. The combined operational power of each supercomputer is 8.4 petaflops with 40ft long row at both locations. Built for the interest of public safety the computers can predict weather hazards in the USA such as hurricanes, tornados and extreme heat waves.

[Source](#)



Ottawa Unveils \$430 Million Supercomputer for Weather Forecasts

Canadian Meteorological center upgraded its weather-prediction capabilities in 2017. Located in Dorval Quebec the systems are designed to forecast weather patterns which threaten public safety. The computers each contain 270 petabytes of storage, operating continuously all year, processing 2,444 trillion calculations per second and installed in two separate data halls with independent electric supply, cooling and fire suppression systems.

[Source](#)



NEC to Deliver Europe's Fastest Weather Supercomputer

In mid-2019 the German meteorological service DWD chose Japanese tech company NEC as the primary supplier of supercomputers. Located in Offenbach am main Germany to improve weather forecast at a 50 million euros (\$56 million) payment. The SX-Aurora Tsubasa model is scheduled for integration by October 2022 and offers advancement in weather predictability. Operating system Linux is supplied with the computer, so new software and develop management are not required.

[Source](#)

JMA Begins Operation of its 10th-generation Supercomputer System

Headquartered in Tokyo Japan, the Japan Meteorological Agency (JMA) activated a new supercomputer system on June 5, 2018. Numerical calculations can forecast weather and climate change in a several month prediction to anticipate typhoons or torrential rainfall. The new model is a Cray XC50 provided by Hitachi with a 18,166 TFlops performance capability (in theory). New memory capacity is 528 TBytes which is connected to a magnetic disk of 10,608 TBytes.

[Source](#)



NOAA'S National Climate Data Center

The US National Oceanic and Atmosphere Administration announced in February 2020 that their supercomputer will receive an upgrade to enhance computer capacity, storage space and connection speed scheduled for completion in 2022. Specifically designed to improve the weather and climate operational system which allows level data exchange between forecast centers both domestic and international. These two new supercomputers are designed by Cray with primary and backup functionality, located in Manassas, Virginia and Phoenix Arizona. NOAA's total supercomputing capacity for predication and research will increase to 40 petaflops.

[Source](#)

DKRZ – Germany's Climate Computing Center

The German Climate Computing Center (DKRZ) is the central national service facility for climate and earth system research. The organization maintains software to improve the climate modelling infrastructure at the University of Hamburg and is funded by the federal ministry of education and research. DKRZ uses climate models, climate simulations and climate data to assist scientists in making estimations on weather predictability. The supercomputer is model HLRE-3 "Mistral" for Earth System Research 3 which is a combination of computer components manufactured by Atos/Bull. It features 3,300 computer nodes bullx DLC 700 and over 100,000 processing cores, 3.6 PetaFLOPS computing power. Main memory is approximately 266 terabytes and two Maxwell GPUs.

[Source](#)

