

The UK Met Office's New HPC System Significantly Improves Productivity of Weather and Climate Data Analysis

CASE STUDY

The Met Office is a world leading weather forecasting and climate prediction organization that conducts research designed to protect lives and increase prosperity. The institution's 500 scientists conduct research using data-intensive, high-resolution models to increase forecast accuracy and provide a deeper understanding of climate change.

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— Richard Bevan, Head of Operational Technology at the Met Office

The Challenge

In a weather forecast analysis, the Met Office will conduct compute- and data-intensive simulations which comprise millions and millions of operations. This type of analysis must be carried out many times a day, requiring a petascale-class high performance computing environment on the front end.

To ensure the results of these simulations were turned into knowledge and understanding, the Met Office needed to upgrade to a more modern post-processing HPC facility. The planned Scientific Post-processing and Intensive Compute Environment (SPICE) system would enable weather and climate researchers to dramatically reduce time required to analyse massive amounts of climate simulation data.

The Solution

The Met Office selected SGI, DDN and Bright Computing to provide high performance computing capabilities for SPICE. SGI was selected for its value and performance, allowing users to more easily manage multiple servers and increase system utilization rates. The SGI Rackable system for SPICE has recently been expanded to 78 compute nodes, achieving a peak performance of just under 1/10th of a peta-flop.

To support the growth in the Met Office's supercomputer system archive, it selected DDN storage. By 2020, this crucial storage archive is predicted to grow to about 300 petabytes of weather and climate research data.

Finally, for the deployment and lifecycle management of the new SPICE cluster, the Met Office chose Bright Cluster Manager for HPC. Thanks to the Bright technology, the deployment was an entirely seamless process, managed and performed remotely, in a time-efficient and error-free way. Bright Cluster Manager also provides single-pane-of-glass management for the hardware, operating system, HPC software, and users, giving the Met Office a central point of control to manage the SPICE infrastructure. The Met Office also chose to install Bright OpenStack to enable the IT team to easily deploy, provision, and manage its OpenStack-based private-cloud infrastructure. This platform will be used by the scientists and researchers who build the models and applications that run on the Met Office's peta-scale workhorse.

The fact that Bright's solutions can be administered from a single point of control was a major consideration in the Met Office's decision-making process. With the combined solution of bare-metal compute, storage and virtualised OpenStack private cloud, the Met Office can scale SPICE predictably while delivering high-throughput performance to handle the variable demand. The new system allows the Met Office's researchers to spin up virtual machines easily, and operate their own private virtual environment with full control and direct access to their local network. In addition, the Met Office can easily increase the capacity of the virtual environment merely by enabling OpenStack on other servers.

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The Benefits

Today, the Met uses SPICE to digest the mountain of data coming from their peta-scale class front-end system; to gain insight into trends and implications from the various model's raw data outputs. Prior to SPICE, the Met Office used shared distributed systems that required the user to manually seek out available resources across the estate on which to run post-processing analysis work.

Since the installation in late 2015 & early 2016, scientists using SPICE have already noted significant performance advantages over previous systems, enabling far quicker analysis to support ongoing research. Massive volumes of data are now analysed in several hours, rather than days. The improvements support and enhance ongoing development of meteorological and climate change research.

The Bright technology continues to take care of the daily administration of the Met Office's post-processing HPC and private cloud environments, freeing the IT team to focus on tasks more aligned to their research goals.