More computing power for French and European operational oceanography

Mercator Ocean, the French oceanic analysing and forecasting centre, increases six fold the capacity of its local high performance computing infrastructure.

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Business need

Mercator Ocean wanted an R&D computing system that would allow it to conduct high resolution simulations of the physical state of the world’s oceans, while reducing costs and enhancing performance.

Solution

The organisation deployed Dell™ PowerEdge™ servers to deliver the highest performance for codes emulating the complexities of the physical state of the world’s oceans.

Benefits

- Performance boosted by around 600 per cent due to increased server density and enhanced processing power
- Total cost of ownership reduced due to lower power and coding costs
- Fast, accurate decision-making thanks to professional pre-sales support
- Business-critical application continuity ensured by fast, responsive support

Solution areas

- HPC
- Server Solutions
- Support Services

Customer profile

Company: Mercator Ocean
Industry: Engineering, Research & Development
Country: France
Employees: 50
Website: www.mercator-ocean.fr

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For the past 10 years, Mercator Ocean (a private company composed of five partners, the national players of operational oceanography: CNRS, IFREMER, IRD, Météo France and SHOM) has used significant computing resources (HPC) to perform high resolution three-dimensional forecasts of the physical state of the ocean up to 14 days ahead.

Parameters such as temperature, current, salinity, etc. are forecasted on all the oceans of the globe through the NEMO model developed by the CNRS, with assimilation of altimeter data and buoy data (3000 buoys are circulating in the oceans around the world to make physical measurements). For optimum safety, all operational chains run on Météo France’s supercomputers. External means of computing such as those of Météo France and ECMWF but also those of IDRIS, are used in order to achieve the main R&D goal. Locally we use a powerful system of 123 TFlops as well as 232 GFlops to supplement the R&D.

Located in Toulouse, France, Mercator Ocean provides a service of general interest for France and Europe. This system produces oceanic data which meet the needs of national, local and international players as part of environment policies, maritime safety, defence, management of marine resources and finally sustainable development. Similarly, it provides the scientific community with a tool and support services for oceanographic research. Finally, it contributes to the development of commercial applications of oceanography and its industry.

The European Commission has recognized operational oceanography as one of the three main services of its program of environmental marine and terrestrial monitoring GMES (Global Monitoring for Environment and Security). In order to prepare for the implementation of a reliable and operational European service, the European Commission co-finances an ambitious European project named MyOcean, led by Mercator Ocean since 2009.

To meet all these needs, forecasting models of the state of the ocean require a lot of processing power and, consequently, a large power consumption. When the company’s 232 Gflops system came to the end of its lifecycle, the organisation decided to replace this infrastructure with a HPC cluster based on Dell™ PowerEdge™ C6100 rack servers with Intel® Xeon® processors. Bertrand Ferret, Head of IT at Mercator Ocean, says: “With the Dell HPC solution we’ve greatly increased processing power and performance while significantly reducing power and cooling costs.”

Expert pre-sales guidance and support enables fast decision making
The mission of Mercator Ocean’s IT Department was to find a cost-efficient solution that provided a major performance increase. It conducted a survey of the market, requesting proposals from Dell and several other providers. Ferret was particularly interested in the Dell PowerEdge C series of servers with their flexible...
processor configurations, but the solution was not yet available on the market. “My Dell contact told me about a Dell HPC road show. I therefore decided to wait and see it in action,” says Ferret.

An expert in HPC, Mercator Ocean’s IT Department was looking for comprehensive information about technical specifications and solution capabilities, rather than generic sales information. During the road show, a Dell HPC consultant was able to provide Ferret with the information he needed. “Dell gave us a hands-on demonstration so we could test our own performance benchmarks. I was pleasantly surprised by the proactive, accurate information I received from the Dell consultant and moreover if he didn’t know the answer to a question, he quickly found it for me,” he says.

Mercator Ocean also needed to test the servers in its environment with its own benchmark, so Dell provided the organisation with a trial server. The demonstration and follow-up consultation convinced Ferret that the Dell PowerEdge C6100 rack server with Intel® Xeon® processors was the best solution for the new HPC infrastructure. Dell physically configured the servers and delivered them to the company within 12 days of receiving the order. Ferret says: “The speed of delivery was important because we had to increase the computing power of the local R&D to keep up with new projects. In order to install the system, we had to dismantle and recycle an entire section of our data suite. Our objective was to install the Dell solution in less than 15 days to limit interruption to the local HPC service.” Mercator Ocean’s IT Department managed the installation, the configuration as well as the setting up of the Dell Power Edge C6100 rack servers. Dell followed up with two onsite visits to optimise certain configurations of the solution.

**Customer increases processing performance six fold**

The numerical models developed by Mercator Ocean can follow, for up to 14 days, many physical aspects of the oceans such as temperature, salinity and sea level but also the thickness of ice and the state of ocean currents across the world from surface level to the depths of the sea. The models used are similar to those used in weather forecasting; they incorporate millions of pieces of data, and are high performance and random-access memory intensive. Ferret explains: “Ocean simulation demands great capacity in terms of memory and performance. An increase in power of the computer must be done simply without affecting the architecture of the machine.”

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**Key**

Temperature (left) and salinity (right) of the ocean worldwide – September 2011. The condition of the ocean according to these physical variables.

**Source**

Worldwide ocean model at 1/4 degree - Mercator Ocean

**Credits**

CNES / Mercator Ocean / MyOcean
The Dell PowerEdge C6100 rack server takes 2U, it is made up of 4 blades with 2 Socket motherboards with 2 Intel® Xeon® and 48 gigabytes of RAM. It is specifically designed for HPC environment such as Mercator Ocean’s. New nodes can be added as required, creating a high-density infrastructure with excellent processing power for running the data-intensive forecasting simulations. The organization has a data centre that can accommodate up to seven 42U sections. Dell PowerEdge C6100 Ultra-Dense rack servers are the answer to the problem of limited space without limiting the evolution of power.

**Reduction of power and cooling costs by half**
Traditionally, power and cooling accounts for around 10 per cent of the total cost of ownership for an infrastructure. But to cut these expenses, the Dell servers have built-in fans that reduce cooling and power requirements, even though server density is increased. Ferret says: “Our previous local R&D cluster used 12 kilowatts (kW) of energy and filled a 42U system, while the new solution based on Dell PowerEdge C6100 servers uses only 6 kW of energy, and takes up 12 U of physical space. Since deploying the Dell solution we’ve divided energy costs by 2 and multiplied computing power by 6.”

**Fast, responsive services ensure continuity for business-critical applications**
Mercator Ocean customised its support services to include different service level agreements for specific application requirements. To ensure that business-critical applications are covered in an emergency, Mercator Ocean relies on Dell ProSupport™ with Mission Critical, which means a technician will be onsite within four hours to resolve material breakdowns. Ferret says: “With Dell ProSupport with Mission Critical, we have the right level of backup for our disaster recovery plan in critical situations where we need fast, efficient help.” For less critical applications, Mercator Ocean uses Dell ProSupport with Next Business Day Onsite Service.

Mercator Ocean’s IT department used Dell ProSupport with Mission Critical when a breakdown occurred on a C6100. “This breakdown was hard to diagnose, a defective processor was destroying the motherboard of one of the blades. We were kept informed at every stage of resolution by the Dell ProSupport team. We were very satisfied with the communication, the sequence of steps taken to resolve the problem, and the follow-up check by the quality manager,” says Ferret.

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