Scientific institute enhances research

Climate researchers push boundaries of scientific knowledge with ultra-low latency 10 Gigabit Ethernet data-centre switches

Business need

IMK-IFU – part of KIT – wanted to improve the availability of its IT infrastructure by replacing its ageing switches. Its aim was a tenfold increase in bandwidth.

Solution

The company deployed Dell Force10 switches, expanding the existing 80/160 Gigabit connection between data centres to 320 Gigabits. It relies on Dell ProSupport™ to protect its investment.

Benefits

- Researchers drive new projects with faster processing
- IT team saves up to 20 per cent on management time
- Institute saves around 30 per cent on core switches
- IMK-IFU future-proofs switches with scalable technology
- Researchers can isolate non-functioning components quickly and easily
- IT simplifies deployment with Dell Force10 Operating System

Application areas

- Networking
- Support Services

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Frank Neidl, Head of IT, IMK-IFU

The environment is under more scrutiny than ever before. Human activity is undoubtedly changing the planet's conditions, and governments and other bodies want to know the effects to help plan policies. The Institute of Meteorology and Climate Research Atmospheric Environmental Research (IMK-IFU), based in Bavaria, Germany, is providing the world with a better understanding of Earth's atmosphere.

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Part of the Karlsruhe Institute of Technology (KIT), IMK-IFU looks at the interaction of the biosphere and hydrosphere and how they'll be affected by problems such as climate change, air pollution and UV radiation.

Computers are helping drive the IMK-IFU's work. Researchers rely on increasingly powerful machines to process large amounts of environmental data as part of their projects. At the heart of the organisation's IT is a mirrored data centre, running VMware virtualization software. The data centre, which includes hundreds of terabytes (TB) of stored data, is also connected to a high-performance computing (HPC) cluster. Because of the institute's work, file sizes can be anywhere from 10 to 20 gigabytes (GB) each. Frank Neidl, Head of IT at IMK-IFU, says: "In some instances, we're processing decades' worth of climate data. Even with a HPC infrastructure, these calculations can take a couple of weeks."

Institute looks for new network backbone
The major issue facing IMK-IFU was data bottlenecks caused by its existing backbone switches. Links between the network's core and edge switches were only 1 Gigabit per second (Gbps), with eight 1Gbps channels connecting the mirrored data centres. As a result, researchers found that processing data could be time-consuming, reducing their efficiency and extending project timelines. In addition, data was sometimes lost. Neidl explains: "We experienced data loss because there was no packet buffering to compensate for the differing interface speeds of our devices."

Due to the ageing equipment, IMK-IFU could also expect up to three network outages a year, which meant researchers would have to repeat calculations. "We needed a new network backbone if personnel were to continue doing their work effectively," says Neidl.

Organisation values responsive support and local expertise
IMK-IFU looked at backbone switches from leading IT solution providers such as Cisco and Dell Force10. Historically, the company had relationships with both organisations, but so far hadn't used Dell core switches. The institution liked the responsiveness and local expertise of Dell and wanted to make a careful assessment of the Dell Force10 offering. To help IMK-IFU gain deeper insight into Dell Force10 technology, Dell put the institute in touch with local Dell Partner SYS-TEC, which undertook an analysis of the technical, speed and capacity requirements of the IMK-IFU infrastructure.

Technology in practice

Services
Dell Support Services – Dell ProSupport™ with Mission Critical

Hardware
Dell Force10 S4810 Ethernet switches

Dell Force10 S60 Ethernet switches

Software
Dell Force10 Operating System (FTOS)

The work corresponded with a series of meetings and detailed discussions of Dell Force10 switches by Dell. Neidl says: "Our infrastructure includes a mixture of vendor solutions, so we needed switching technology that could work easily in a heterogeneous environment and connect with multiple interfaces."

Neidl and his colleagues soon chose Dell Force10 as the core switching technology for its network. "Apart from the Dell Force10 technology, the expertise and commitment of Dell and SYS-TEC were pivotal in our decision," says Neidl. "The collaboration was great – it gave us a lot of confidence in the success of the project."

Institute gains local support for core switch installation
IMK-IFU upgraded its core switches to Dell Force10 technology with the support of SYS-TEC. The expertise of the Dell Partner was crucial because of the mixture of solutions across the institute's network. It needed to integrate the Dell Force10 core switches with the interfaces of the institute's existing edge switches, storage and virtualized server infrastructure. "We needed to work with a business that knew IT inside and out, and we found it with SYS-TEC," says Neidl.

Dell FTOS helps make switch deployment simpler
The flexibility of Dell Force10 technology really paid off during deployment. Thanks to the Dell Force10 Operating System (FTOS), engineers easily integrated the core switches with the heterogeneous environment. "We clearly saw that it's easy to install and configure Dell Force10 core switches," says Neidl.

Downtime minimised with easy isolation of failed components
Depending on the task, the institute's HPC clusters can be used for calculations that last for days at a time. As compute power is limited, the researchers often had to schedule their individual tasks carefully.

Previously, the failure of a component after 12 days' calculations would have meant starting the process again, delaying other researchers' work. Since the deployment of the new switches, researchers can isolate and swap failed components with no delays.

Researchers drive scientific knowledge with faster data processing
Personnel at IMK-IFU can work more efficiently and deliver scientific projects faster as a result of the move to Dell Force10. The institute installed two Dell Force10 S4810 Ethernet switches at each of its mirrored data centres. The switches offer ultra-low latency and non-blocking architecture, while featuring redundant and hot-swappable power suppliers and fans. In the case of IMK-IFU, they provide two 40Gbps links between the data centres, each with two 10Gbps connections to the edge switches.

IMK-IFU also installed two Dell Force10 S60 Ethernet switches at each of the data centres. The switches, which are designed for virtualized environments, sit between the Dell Force10 S4810 switches and the data centres' virtualized servers and storage. The S60 switch offers ultra-deep packet buffering so that IMK-IFU can avoid network congestion caused by increases in data traffic. Neidl says: "We can process data significantly faster with our Dell Force10 switches, so researchers can complete their work quicker. And, because we're more productive, research staff can also take on more projects and deliver greater insight into climate change."

IT team saves up to 20 per cent on management time with single operating system
IT personnel save significant time thanks to the simplified management of the Dell Force10 switches. They control the switches through the Dell FTOS, which has been used in some of the most demanding networks in the world. The system offers the benefits of reliability, scalability and consistency, with a common interface for all Dell Force10 switches.

"The Dell Force10 solution saved us around 30 per cent on a competing Cisco solution. We get the same performance and have resources to develop areas such as the HPC infrastructure."

Frank Neidl, Head of IT, IMK-IFU

DELL

"One of the major advantages of Dell Force10 is the Dell FTOS, which delivers a single operating system across the entire portfolio. It has saved us up to 20 per cent in management time – time that we can now use for higher value, strategic tasks," says Neidl.

Cost-effective core switch saves around 30 per cent

Neidl believes IMK-IFU made a great IT investment by choosing Dell Force10, gaining better switching performance at a competitive price. Like all IT managers, Neidl regularly has to make difficult decisions on funding IT projects due to his limited budget. But he could see that Dell Force10 offered him greater value than competing solutions such as Cisco, enabling him to make IT savings, which he could then spend on other areas of IT. Neidl says: "The Dell Force10 solution saved us around 30 per cent on a competing Cisco solution. We get the same performance and have resources to develop areas such as the HPC infrastructure."

IMK-IFU future-proofs core switching with scalable solution

The institute expects the value of its new switches to increase over time as the IT infrastructure develops. With the switches' built-in flexibility, IMK-IFU can continue to extend its IT infrastructure safe in the knowledge that its data-centre switching technology can scale with demand. "We're more flexible and no longer have an unwieldy switch infrastructure. With Dell Force10 switches, we can scale our infrastructure easily, helping future-proof our IT," says Neidl.

Responsive support helps ensure switch performance

The IT team uses Dell ProSupport™ with Mission Critical to maintain the performance of its core switches. In the event of a critical incident, the institute has peace of mind knowing that a Dell engineer can be on-site within four hours to resolve the issue. To-date the switches have been reliable, but on the rare occasion that Neidl has contacted the Dell ProSupport team, the service has been responsive. "With Dell ProSupport, we're dealing with experts who deliver a high level of assistance because they know how vital our switches are," says Neidl.

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