

# HIGH-POWERED RESEARCH

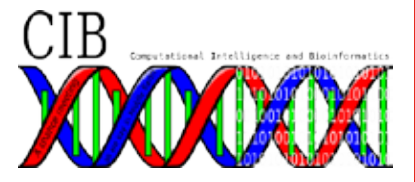
Spanish university reduces processing time from one week to approximately 60 minutes with high-performance computing environment



An increasing number of researchers are using high-performance computing (HPC) environments to support their programmes. Apart from significant processing power, the institutions deploying these infrastructures want solutions that simplify management, deliver high-density computing and maximise performance.

## SOLUTIONS:

- **BACKUP, RECOVERY AND ARCHIVING**
- **DATA MANAGEMENT AND CONSOLIDATION**
- **GREEN IT**
- **HIGH-PERFORMANCE COMPUTING**



## CUSTOMER PROFILE

**COMPANY:** University of Córdoba  
**INDUSTRY:** Education  
**COUNTRY:** Spain  
**FOUNDED:** 1972  
**EMPLOYEES:** 700  
**STUDENTS:** 1,200  
**WEBSITE:** [www.uco.es](http://www.uco.es)

## CHALLENGE

Researchers needed a week to process many data-intensive tasks. The university wanted to reduce that time with a simplified high-performance computing (HPC) infrastructure.

## SOLUTION

It implemented a HPC architecture based on Dell blade servers and modular enclosures. The environment is maintained by Dell ProSupport for IT.

## BENEFITS

### Get IT Faster

- HPC environment is up and running in 20 days

### Run IT Better

- Data-intensive tasks now take around 60 minutes compared with one week
- Blade server technology consumes around 19 per cent less power
- Infrastructure delivers up to 60 per cent higher computing density

### Grow IT Smarter

- HPC environment's small server footprint makes scaling less expensive



The University of Córdoba, located in Andalucía, Spain, came into being at the end of the 19th century. Today, this medium-sized institution, which has around 21,000 students and 700 personnel, provides courses in areas such as medicine, nursing, agriculture, forestry, philosophy, law and science. Research plays an important role in the university's daily life. A number of groups at the institution, for example, are involved in pioneering research in the areas of agriculture, nourishment, artificial intelligence and bioinformatics.

The Computational Intelligence and Bioinformatics (CIB) research group is behind one of the university's leading research programmes. It investigates neural network architectures, genetic algorithms, artificial immune systems and gene recognition. The group's activities have gained the attention of other universities worldwide and the Andalusian government, which has given the group substantial funding for continued bioinformatics research.

With this funding, the group wanted to develop the university's IT infrastructure. Because the existing architecture – which comprised four rack servers – was relatively small, a single data-intensive task such as separating the DNA of two species using newly developed algorithms could take up to a week. Given the number of projects going on at any one time, these delays were frustrating and extended research timelines.



**“THE PACKAGE OF SERVICES AND THE QUALITY OF THE TECHNOLOGY FROM DELL WERE BETTER THAN THOSE PROPOSED BY HP AND IBM. DELL ALSO OFFERED A TURNKEY SOLUTION THAT DELIVERED A HPC INFRASTRUCTURE.”**

Domingo Ortiz Boyer, Professor of Computer Science, University of Córdoba

## HOW IT WORKS

### HARDWARE

- Dell™ PowerEdge™ M600 blade servers with Intel® Xeon® Processor 5400 series
- Dell PowerEdge M1000e blade enclosures
- Dell PowerEdge 2950 server with Intel Xeon Processor 5400 series
- Dell PowerVault™ RD1000 disk drive backup
- Dell Remote Access Cards (DRAC)

### SOFTWARE

- CentOS Linux
- Dell OpenManage™ Systems Management 5.0

### SERVICES

- Dell ProSupport for IT
  - Next Business Day On-site Service

The CIB research group is an advocate of open-source software, so it wanted to implement a Linux-based HPC architecture. These environments, which support research work at many academic institutions, handle data-intensive tasks easily by clustering individual servers to create a powerful, single supercomputer. Working with the university's IT team, the group looked for an IT solutions provider that could deliver a turnkey HPC infrastructure and simplified management. Dell responded with a solution that combined industry-standard servers, high-speed connections and CentOS Linux software. Domingo Ortiz Boyer, Professor of Computer Science at the University of Córdoba and member of CIB research group, says:

“The package of services and the quality of the technology from Dell were better than those proposed by HP and IBM. Dell also offered a turnkey solution that delivered a HPC infrastructure.”

A Dell technical team completed an assessment of the CIB group's needs and prepared a design for the HPC environment. Dell implemented the infrastructure over 20 days and deployed a cluster of 33 nodes consisting of Dell™ PowerEdge™ M600 blades running Intel® Xeon® Processor 5400 series.

**“THE DELL HPC ENVIRONMENT IS MUCH MORE POWERFUL THAN OUR PREVIOUS INFRASTRUCTURE. A DATA-INTENSIVE PROCESS THAT USED TO TAKE A WEEK CAN BE COMPLETED IN AROUND 60 MINUTES.”**

Domingo Ortiz Boyer,  
Professor of Computer Science,  
University of Córdoba



The servers were installed in Dell PowerEdge M1000e modular blade enclosures. The nodes, which are managed by a Dell PowerEdge 2950 server, were connected using a 10 gigabyte Ethernet link. A Dell PowerVault™ RD1000 provides disk drive for backup. Along with installing and validating the HPC infrastructure in less than three weeks, Dell also delivered two days of training on cluster management for the university's IT team.

#### **CO-ORDINATED SERVICES DELIVER FLAWLESS DEPLOYMENT**

During the HPC project, Dell provided a project manager, who acted as a single point of contact and co-ordinated the activities of all parties to maximise the speed of deployment. Says Ortiz Boyer: “Dell's experience in delivering turnkey HPC environments was evident during the project. The deployment was well managed and the engineers who built our HPC infrastructure had considerable experience in these high-powered computer systems.”

#### **DATA-INTENSIVE TASKS COMPLETED IN AN HOUR INSTEAD OF A WEEK**

Compared with the previous environment of four rack servers, the Dell HPC infrastructure offers a substantial increase in computing performance. Because each node contains two Intel Xeon Processors 5400 series, the environment has 264 computing cores in total. “The Dell HPC environment is much more powerful than our previous infrastructure. A data-intensive process that used to take a week can be completed in around 60 minutes,” says Ortiz Boyer. The Intel Processors play a key role in the HPC infrastructure's operation.

According to Ortiz Boyer, they were a major reason for choosing the Dell solution. “The performance of Intel Processors has always been excellent. Intel technology is powerful, reliable and energy efficient,” he says.

#### **HPC ENVIRONMENT DELIVERS AROUND 25 PER CENT BETTER PERFORMANCE**

Thanks to the Energy Smart technology in the M600 servers and M1000e enclosures and the Intel Xeon Processors, CIB has one of the most power-efficient HPC environments available. The blades consume approximately 19 per cent less power and deliver up to 25 per cent better performance per watt than the HP Blade System c-Class and IBM BladeCenter.<sup>1</sup> IT personnel at the university can control the power going to individual blades in the HPC environment to minimise electricity usage when processing is less intensive. Apart from reducing the cost of running the environment, this flexibility is helping the institution deliver greener IT and minimise its impact on the environment.

#### **DELL BLADES DELIVER 60 PER CENT GREATER DENSITY**

Compared with an environment consisting of 1U rack servers, the CIB architecture built using Dell blades provides 60 per cent more computing density. As a result, the group was able to install the infrastructure in a single 42U server cabinet in the university's scientific datacentre. Ortiz Boyer says: “The Dell HPC solution delivered the computing density we needed to deploy a high-powered environment in an already busy IT room.”

The three blade enclosures use just 30U of space so the group can add another enclosure and further blades to the HPC infrastructure in the near future. “Dell has helped us create a future-proofed HPC environment that we can scale at low cost without worrying about space limitations in the IT room,” comments Ortiz Boyer.

“Another advantage of the enclosures is that they offer snap-in scalability through FlexIO switch technology. It means your infrastructure can support future generations of Dell blades, so you avoid having to rip and replace your investment. Plus, with Dell's open architecture, there's no vendor lock-in, increasing the infrastructure's return on investment.”

#### **SIMPLIFIED MANAGEMENT REDUCES CABLING BY APPROXIMATELY 93 PER CENT**

Because of the simplified management features of the blades and enclosure, the infrastructure's uptime is maintained. In addition, thanks to remote management features and high levels of automation in the system's management tools, IT personnel can maximise productivity. The IT team are using Dell OpenManage™ Systems Management 5.0 and Linux system management tools to monitor and update the environment's servers. They also use Dell Remote Access Cards (DRAC) so they can control the servers through a web browser from any location. Says Ortiz Boyer: “Due to Dell server management tools, our personnel can work more effectively and deliver a robust IT environment.”

1. Based on Principled Technologies, SPECjbb2005 performance and power consumption on Dell, HP, and IBM blade servers, December 2007 test report commissioned by Dell

# “DELL HAS HELPED US CREATE A FUTURE-PROOFED HPC ENVIRONMENT THAT WE CAN SCALE AT LOW COST WITHOUT WORRYING ABOUT SPACE LIMITATIONS IN THE IT ROOM.”

Domingo Ortiz Boyer, Professor of Computer Science, University of Córdoba

Besides developing management tools that increase IT productivity, Dell has created a system that reduces cabling by approximately 93 per cent. A management bar on the back of the enclosure helps route leads more effectively while enumerators separate wires for easier deployment and maintenance work. “Dell blades and enclosures have removed a lot of cables so we can complete work much faster and be more productive,” says Ortiz Boyer.

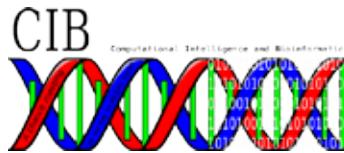
## HIGH AVAILABILITY MAINTAINED BY RESPONSIVE DELL SERVICES

To ensure that the HPC infrastructure delivers maximum performance, the university selected Dell ProSupport for IT with the Next Business Day On-site Service. Ortiz Boyer says: “With our Dell support package,

we have peace of mind that the HPC infrastructure will stay highly available. This means researchers can continue processing the most data-intensive tasks 24 hours a day, seven days a week.”

**For more information on this case study or to read additional case studies, go to [www.dell.com/casestudies](http://www.dell.com/casestudies) and [www.dell.es](http://www.dell.es)**

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