



## Executive Summary

**Customer Name**  
Cineca

**Location**  
Bologna, Italy

**Number of Employees**  
350 employees

**Industry**  
Technology

### Business challenge

- Significant increase in demand for HPC services
- Customer projects and applications becoming more complex, data intensive and business critical
- Demand on data centre capacity expected to rise from a half to 1-petabyte

### Network solution

- Cisco HPC InfiniBand and Ethernet networks
- Cisco Ethernet and InfiniBand switch models for IBM BladeCenter
- Cisco storage area network (SAN) solution
- IBM System Cluster 1350

### Business value

- Reduces the cost and increases the speed of developing life-enhancing social and scientific research
- Improves reliability and performance of HPC services and facilities
- Return on investment cut by 50 percent from 3 years to 18 months
- Demand on maintenance costs and resources reduced by 20 percent
- Service reliability and availability increased

## Cineca, Italy's Largest Computing Centre, Cuts Costs and Accelerates Social and Scientific Research with Cisco and IBM High-Performance Computing

Cisco's high-performance computing (HPC) InfiniBand and Ethernet networks and IBM's System Cluster 1350 helps Cineca halve ROI period and reduces maintenance costs and demand on resources by 20 percent

### Business Challenge

Predicting the impact of a volcanic activity – right down to details such as where and how fast lava will flow – requires huge amounts of computing power and data storage. Mount Vesuvius near Naples in Italy is one of the world's most dangerous volcanoes; it is still active and it has more than three million living in its shadow. It is known infamously for the destruction of the Roman city of Pompeii. Assessing risk management in the event of an eruption is just one of the high-profile and life-critical projects undertaken by Cineca, Italy's largest computing centre and one of the top five in Europe. It ranks number 44 among the world's top 500 computing centres.

Cineca in Bologna in Northern Italy is a Consortium of 31 Universities plus the Consiglio Nazionale delle Ricerche (CNR -The National Research Council) and the Ministry of University and Research. It provides a range of HPC

services to the Italian academic system, the Italian government and various research and commercial organisations. Services include supporting commercial and academic research into subjects such as science, medicine, chemistry and geophysics. Cineca also provides support for university management and administration systems for over 65 universities in Italy and the transfer of research and development into the industrial and commercial market.

Demand of Cineca services is increasing dramatically. Currently some half a million accounts access applications hosted on one of the five HPC computer systems that Cineca manages. The organisation currently handles around 600 terabytes of data, but this is expected to reach 1-petabyte (one quadrillion bytes) soon. In contrast, eBay worldwide represents around two petabytes of data.



Cineca embarked upon three key projects – a complete overhaul of its network, a new SAN, and the development of new HPC clusters to accommodate increasing demand from customers and to provide HPC services in a more cost-effective way. Cineca turned to two key players in HPC and data centre networking arena – Cisco and IBM.

Sanzio Bassini, Director of Systems and Technology at Cineca, says, “We were already using Cisco for much of our networking infrastructure, nevertheless we carried out a very comprehensive analysis of the market. It did not take long to realise that the partnership between Cisco and IBM, and the quality of their HPC, SAN and data centre technology, added up to a pretty powerful solution. One of the critical factors in HPC clustering is the ability to interconnect the nodes and move data between them quickly – something on which the Cisco technology really delivers.”

### Network Solution

Cineca has a single data centre at its headquarters in Bologna and has positioned Cisco and IBM at the heart of its HPC infrastructure. Cineca has deployed a Cisco HPC networking

architecture, comprising Cisco Ethernet and InfiniBand switch models for IBM BladeCenter technologies, and InfiniBand and Ethernet networks for the HPC cluster. This is part of an IBM System Cluster 1350 which includes over 1,200 BladeCenter servers. The solution provides 10-gigabit InfiniBand connectivity with support for over half 1-petabyte of data

Additional Cisco networking technologies support links between different server clusters and a Cisco SAN for data storage and backup to and from the clusters. The Cisco network supports interconnectivity speeds across more than 300 applications, presentations and database servers of between 1-gigabit and 4-gigabits, and a 10-gigabit fibre backbone. Moreover, Cineca has five HPC computing systems in its data centre including the Cisco and IBM clusters and a HP computer.

Cisco and IBM have enabled Cineca to develop an architecture which can separate academic and research traffic from commercial user traffic. The former uses the Italian Academic and Research Network, GARR (Gestione Ampliamento Rete Ricerca), around Italy to access Cineca's facilities.

“As one of Europe's leading computing centres, demand for our high-performance computing services and facilities to support vital research and development projects is increasing all the time. Soon we expect to exceed 1-petabyte of data. The impact of deploying technology from Cisco and IBM to improve the cost, quality and capacity of services we can offer our customers is very significant.”

—Sanzio Bassini, Director of Systems and Technology, Cineca

“Projects such as assessing and improving risk management if Mount Vesuvius erupts or developing a new generation in molecular dynamics, would not have been possible before deploying the Cisco InfiniBand and Ethernet networks and IBM System Cluster 1350 solution.”

—Sanzio Bassini, Director of Systems and Technology, Cineca

### Business Results

The Cisco and IBM HPC solution has had a significant impact on improving customer service and the cost effectiveness of Cineca's business and operations.

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“The impact of deploying technology from Cisco and IBM to improve the cost, quality and capacity of services we can offer our customers is very significant. Projects such as assessing and improving risk management if Mount Vesuvius erupts or developing a new generation in molecular dynamics, would not have been possible before deploying the Cisco InfiniBand and Ethernet networks and IBM System Cluster 1350 solution.”

The Cisco and IBM equipment enables Cineca to reduce the cost and resources needed to manage its HPC data centre so it is able to offer customers services and facilities that are more efficient and more cost effective.

Because of the low latency and high performance of Cisco's HPC solution, processing times for the complex scientific codes are reduced, saving researchers weeks and even months and speeding the time to achieve results. Return-on-investment time for the project is expected to be cut by 50 percent from three years to just 18 months. These savings have been achieved by being able to use existing HPC resources to provide more and better services to customers, faster.

Cineca has also been able to achieve these savings because the Cisco and IBM technology significantly reduces things like maintenance and support overheads. Cineca has cut maintenance operations and costs by 20 percent through greater reliability and a more streamlined infrastructure. In addition, Cisco has allowed Cineca to reduce its physical network. To maintain and guarantee quality of service and performance, Cineca separates commercial and academic and research traffic.

Prior to Cisco and IBM, Cineca did this by having two separate networks. But Cisco has enabled Cineca to have a single, physical infrastructure and use



Cisco's intelligent networking capabilities to create two 'virtual' networks which offer both commercial and academic customers equally high levels of service quality and performance.

A further benefit to customers has been an increase in reliability and services availability. The configuration of the Cisco and IBM HPC technology allows different systems and applications to be effectively partitioned. Consequently, if a specific application or function of an application fails or requires a change it can be done without impacting or stopping other associated applications.

Part of the benefit of the Cisco and IBM collaboration has been knowledge sharing and transfer for both Cineca and for its customers. "Cineca's mission is to provide its customers with the most advanced and innovative solutions available," says Bassini. "Cisco and IBM helped Cineca develop the new HPC and offered advice and expertise on how best to use it to provide our customers with best solutions and the best level of services."

Bassini sees Cisco and IBM as part of Cineca's HPC vision of the future, "I believe the future of HPC is what I call a system network, which means the integration of all computing facilities – servers, systems and storage – into a single entity, thus collapsing the concept of the network. The benefit is the ability to reduce the demand for computing power, storage capacity and interconnection bandwidth and it is technologies that organisations like Cisco and IBM have and are developing, that will help deliver this vision."

## Product List

### Routing and Switching

- Cisco Ethernet and InfiniBand switch modules for IBM BladeCenter
- Cisco Catalyst® 6500 Series Switches
- Cisco 7600 Series Routers
- Cisco SFS 7000 Series InfiniBand Server Switches

### Storage Networking

- Cisco MDS 9000 Series Multilayer SAN Switches

### Clustering

- IBM System Cluster 1350



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