



## CASE STUDY

# The quest to find the origin of the universe starts with having the performance, capacity and reliability to store worldwide research

*Western Digital Ultrastar portfolio helps the European Organization for Nuclear Research to meet its storage challenges*



## A Trusted Partnership

In 2013, CERN participated in testing the first helium drive prototypes which surpassed its expectations on power consumption and storage density. Over the last two decades, Western Digital has supplied CERN with several Petabytes of enterprise grade drives, supporting sustained performance and high reliability to confidently store physics data.

## The Challenge

CERN flagship is the Large Hadron Collider (LHC), which is housed 100m underground in a 27 km circumference tunnel. It accelerates and collides proton beams but also heavier ions up to lead.

The amount of data generated every second during collisions is about 1 Petabyte. Extremely fast computing farms, connected directly to the LHC, acquire and filter this data in order to ship it to the CERN IT Data Center, via several Ethernet links, where it is stored and processed.

With an increase of collision data of two orders of magnitude compared to the previous Run, Run 3 required faster and larger storage solutions. To save the data coming from the Collider, CERN required high-capacity storage systems capable of reading and writing data at a rate of 12.5GB/s in each direction.

In theory, with nearline drives running at 265MB/s, the 12.5GB/s target is achievable with 48 drives.

On the other hand, when many drives are aggregated in very dense storage enclosure, the temperature and the vibration generated by the drives themselves can significantly lower the overall performance.

**“The Western Digital Ultrastar Data60 has fulfilled CERN’s requirements in terms of performance, capacity, reliability and power consumption while maintaining smooth deployment and operation”**

- Eric Bonfillou – IT Department – CERN

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**“CERN’s qualification process is one of the most rigorous in the IT industry; we are very pleased by the successful qualification and deployment of our Data60 and Data102 in CERN’s Data Centre as it proves the quality of the products and the fact that Western Digital’s high capacity JBODs satisfy both performance and capacity requirements”**

- Davide Villa, Business Development Director - Western Digital EMEA



## The Solution – Ultrastar® Data60 Storage Platform

To address this requirement, CERN IT extensively tested Western Digital’s Data60 JBODs. Each JBOD, is equipped with 60\*14TB Ultrastar SAS HDDs and is connected to a front-end server with 4\*12Gbit/s SAS links. The key differentiators of Data60 JBOD are its ability to enable each drive to spin at its max performance thanks to the ArcticFlow™ and patented IsoVibe™ technologies. These address the dual challenges of vibration and effective cooling faced by dense storage enclosures which can impact performance and reliability.

When it comes to thermal management, a drive’s reliability can degrade with increased temperature and will throttle performance for protection. ArcticFlow™ Thermal Zone Cooling Technology introduces cool air into the center of the chassis, so drives operate at lower and more consistent temperatures than conventional systems. This results in lower fan speeds, reduced vibration, lower power consumption, quieter operation and ultimately higher reliability.

Adjacent drives operating in a dense array can induce vibration in neighboring drives causing performance degradation. IsoVibe Vibration Isolation Technology’s precise cuts in the baseboard provide a suspension for the drives in the chassis, isolating them from transmitted vibration. The result is that consistent performance is maintained, even when all the drives are working hard.

Western Digital’s Data60 coupled with the Linux® kernel device mapper multipathing, helped CERN to achieve the desired throughput of 12.5GB/s and, in 2020, to successfully upgrade part of the LHC storage facility with Western Digital’s Data60.

## CERN Profile

CERN, the European Organization for Nuclear Research, is an intergovernmental organization run by 23 Member States with headquarters in Geneva and facilities on both sides of the French-Swiss border.

CERN’s mission is to enable international collaboration in the field of high-energy particle physics research.

The CERN IT Data Center operates separate compute and storage pools, with about 11,000 servers and 470,000 processing cores linked to about 350,000 Terabytes of raw disk-based storage on more than 100,000 disk drives, and some 400,000 Terabytes of used tape-based storage capacity.

In 2021, to further increase the HDD storage density per rack and optimize the \$/TB ratio as well as infrastructure costs, CERN started deploying Western Digital’s Ultrastar Data102 which is capable of hosting 102 drives, delivering over 2PB of storage in a 4U format.

## Western Digital.

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