Quantum

CASE STUDY

Airbus Defence and Space Launches a Petascale Archive for Satellite Data with StorNext Scale-out Storage

Based in the United Kingdom, Airbus Defence and Space archives critical data streaming from Earth observation satellites managed by the European Space Agency (ESA). The Airbus team selected Quantum StorNext scale-out storage to enable scale and to provide access to this fast-growing data collection.

AIRBUS DEFENCE & SPACE

FEATURED PRODUCTS

StorNext 5

> StorNext allows us to easily scale our archive so we can support new satellite missions and collect additional data well into the future.

Mark Curtis
Technical Design Authority,
Airbus Defence and Space

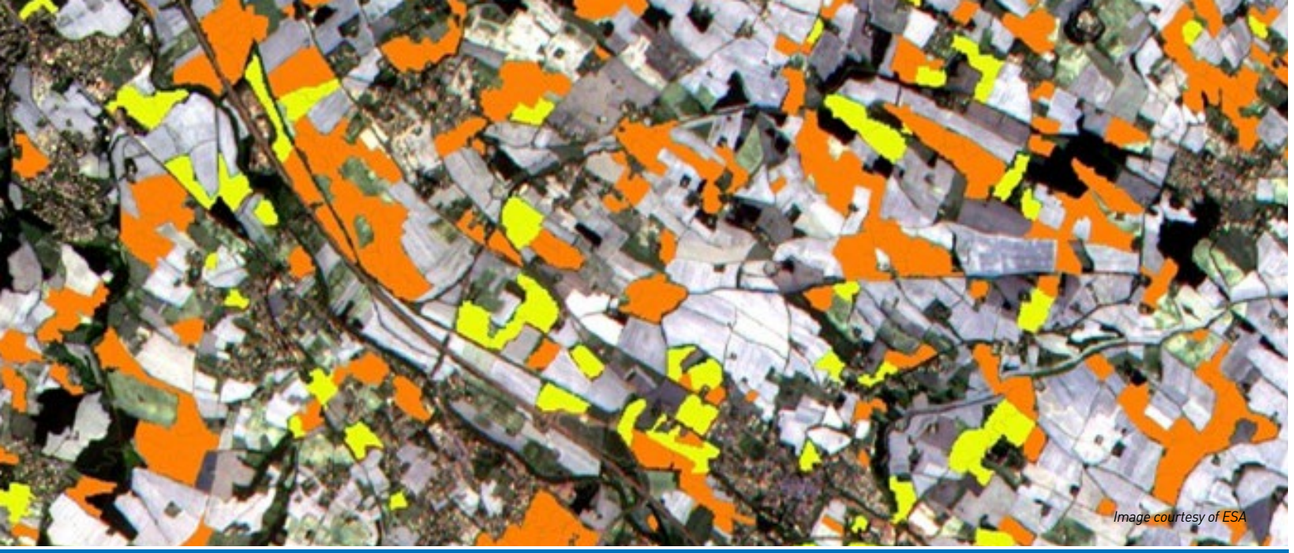

Image courtesy of ESA

> StorNext offers a wide range of storage technologies and systems for building a multi-tier environment. The platform makes it easy to integrate new solutions from Quantum and other vendors.
>
> **Mark Curtis** - Technical Design Authority, Airbus Defence and Space

AIRBUS DEFENCE & SPACE

SOLUTION OVERVIEW

- Quantum StorNext® Scale-out Storage
- StorNext Metadata Appliances
- StorNext AEL6000 Tape Archives

KEY BENEFITS

- **Scales to support tens of petabytes of data** streaming in from Earth observation satellites
- **Serves millions of potential users,** providing access to satellite data
- **Manages millions of files, of all sizes,** using a high-speed shared file system with a policy-driven tiered archive
- **Safeguards archived satellite data** with built-in data protection capabilities
- **Enables a small staff to manage a big archive,** with features that streamline administration

Airbus Defence and Space is one of few select European organizations tasked with archiving data collected by ESA's Earth observation satellites. With a potential user base of millions of Europeans, this Airbus group primarily serves commercial enterprises in agriculture, forestry, telecommunications, and insurance.

"A company might use satellite imagery to determine whether an area is prone to flooding or identify locations for building a cell phone tower," says Mark Curtis, technical design authority for Airbus Defence and Space. "In many cases, users want to track changes over time by comparing sets of images from one period to another. The satellite imagery gives them the information they need to make precise, data-driven decisions."

ARCHIVING PETABYTES OF SATELLITE DATA

In 2013, Airbus Defence and Space won a bid to archive data from ESA's Sentinel satellites, which are part of the agency's Copernicus program. Each Sentinel mission has a specific objective. While the Sentinel-1 mission uses RADAR to image land masses and oceans, the Sentinel-2 mission captures multispectral high-resolution imaging of vegetation, soil and water cover, inland waterways, and coastal areas.

ESA is launching two satellites for each mission, in staggered fashion, to maximize coverage. Within a few years of the program's start, ESA will have four Sentinel satellites in orbit—two pairs—continuously sending data home.

The Airbus Defence and Space team had to build a new archive to house data streaming from Sentinel satellites. "Each satellite streams 250MB of data per second, which is more than 1PB each per year. And each satellite typically has a design life of 5 years. Sometimes as many as 15 years," says Curtis. "We archive not only the raw, level 0, instrument data but also data processed by ESA's Payload Data Ground Segment, which generates level 1 and level 2 products. To provide a long-term archive for all that data, we needed a storage solution that could scale to tens of petabytes."

MANAGING MILLIONS OF INDIVIDUAL FILES

The Airbus team needed to accommodate not only a large amount of data but also a huge number of files. "When there are four satellites in orbit, we'll need to archive 40,000 files per day," says Curtis. "We needed a robust file system to support tens of millions of files."

The variability in file size presented another challenge. "In addition to large files, we have to store small metadata and auxiliary files," says Curtis. "We needed a new file system that could support a wide variety of file sizes and types without any performance issues."

CAPITALIZING ON THE ECONOMICS OF TAPE

The Airbus team decided to implement a tape solution for its archive largely because of the economics of tape. "Controlling costs is critical since we need to store tens of petabytes of data for the Sentinel missions," says Curtis. "Tape is very economical: Each tape cartridge can store a huge amount of data inexpensively, and tape libraries require less power and cooling than higher-speed storage systems."

The data streams that Airbus Defence and Space stores and retrieves are also a good fit for tape. "We don't need the random access to data that disk provides," says Curtis. "We store data in streams and then retrieve data in streams later. An organization monitoring the pollution levels of a lake is more likely to request all data from multiple years rather than a single file. For this kind of archive, tape just makes sense."

BUILDING AN ARCHIVE FOR SATELLITE DATA ON STORNEXT MULTI-TIER STORAGE

The Airbus team selected a multi-tier StorNext solution for its archive. The solution includes StorNext AEL6000 tape archives and StorNext metadata appliances, as well as a primary disk cache. The Airbus team powers the entire solution with StorNext data management software.

"Quantum offers a wide range of storage options for building a multi-tier environment," says Curtis. "The StorNext platform makes it easy to integrate new solutions from Quantum and other vendors."

Curtis and his Airbus colleagues selected the StorNext solution to archive Sentinel satellite data in part because of previous, positive experiences with Quantum storage when the team was part of Infoterra—a geospatial services subsidiary of Airbus that was merged into Airbus Defence and Space. Infoterra was a primary supplier of images for Google Earth.

"Quantum has always listened to our requests in improving their solutions," says Curtis. "In the case of StorNext 5, Quantum incorporated input from us and other organizations, which helped produce a stronger storage solution."

DEPLOYING AN 18PB ARCHIVE THAT SCALES

Using StorNext, Airbus Defence and Space initially deployed an archive that could support nearly 18PB of satellite data. The team can scale the archive up to 37PB as more satellites are launched. "Our immediate goal was to support the first two satellites, but we knew we would need to start archiving data for four satellites within a few years," says Curtis. "StorNext allows us to easily scale our archive so we can support new satellite missions and collect additional data well into the future."

The Airbus team anticipates adding StorNext AEL6000 archives using LTO-7. "With LTO-7, we gain more than twice the raw capacity and speed of LTO-6," says Curtis. "It's an easy decision to move to this next-generation LTO technology as the archive grows."

ENABLING CONTINUOUS HIGH-SPEED DATA INGEST AND ACCESS WITH STORNEXT

The Airbus team must be able to continuously ingest and retrieve satellite data. The streaming performance of the StorNext file system helps meet that requirement. "Our current configuration supports 1.1GB-per-second performance with the StorNext file system," says Curtis. "As a result, we can rapidly ingest all the raw and processed data we receive, and quickly retrieve it when necessary."

In most cases, the Airbus team can retrieve individual files from the Sentinel archive in under a minute. StorNext support for Fibre Channel enables the team to transfer even large data

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Image courtesy of ESA

ABOUT AIRBUS DEFENCE AND SPACE

A division of Airbus Group, Airbus Defence and Space is Europe's leading provider of solutions and services for the defense and space industries. It is the second-largest space business worldwide and among the top ten global defense enterprises. Airbus Defence and Space is responsible for archiving a tremendous amount of data continuously streaming in from ESA's Sentinel satellites.

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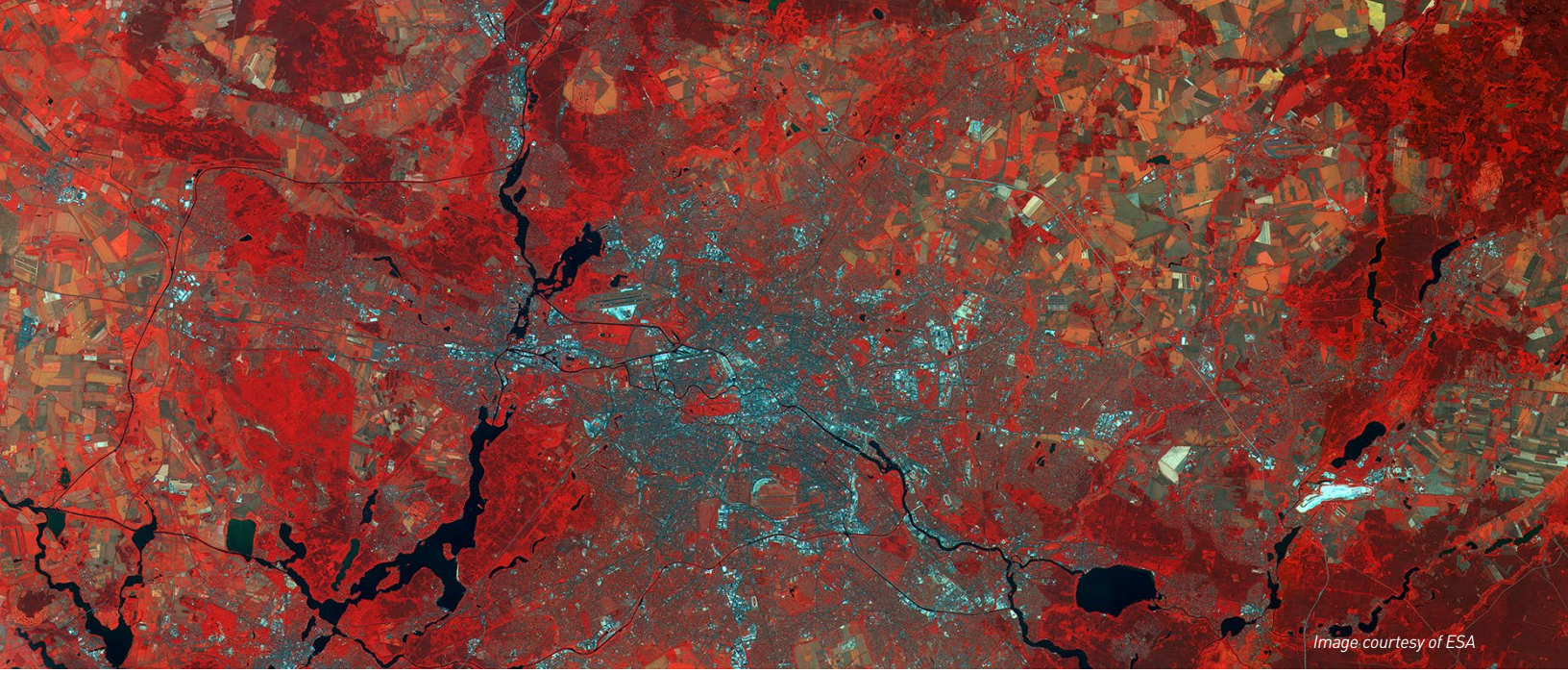

Image courtesy of ESA

sets quickly. "If a user requests all the data from a particular year, we might need to deliver 1.2PB of data," says Curtis. "Fibre Channel enables us to get data from tape to block storage fast, so it can be delivered rapidly."

SUPPORTING A FULL RANGE OF OPERATING SYSTEMS

The heterogeneous StorNext solution supports a range of different operating systems. "Many of our users have Linux systems, but we can't ignore the Windows users," says Curtis. "With the StorNext file system, we can support a full range of operating systems without forcing users to change the way they work."

SAFEGUARDING SATELLITE DATA FOR THE LONG TERM

To help ensure data integrity, the Airbus team leverages the Quantum extended data life management (EDLM) features in the StorNext AEL6000. "Archived data is not retrieved frequently, but when it is, we need to make sure that nothing has been lost," says Curtis. "The policy-based EDLM features of the StorNext tape archive help proactively maintain the integrity of data on the tapes over the long term. If a problem develops with a tape, StorNext automatically migrates data to better tape, without our administrators having to lift a finger. EDLM provides a huge advantage."

MANAGING A LARGE ARCHIVE WITH A SMALL STAFF

StorNext data management capabilities help streamline administrative tasks. As a result, Airbus Defence and Space can grow the archive without having to hire more staff. "Administration costs with StorNext are quite low," says Curtis. "With the Quantum solution, two of us can easily manage this growing petascale archive of satellite data."

GAINING FLEXIBILITY AND AGILITY FOR UNEXPECTED DATA GROWTH

By implementing a StorNext storage solution, Airbus Defence and Space gained the agility to manage changing requirements. For example, ESA plans to implement a relay satellite system that will increase storage needs. "Future relay satellites shall enable a much larger coverage area and more download per orbit even when the primary satellite cannot see a ground station," says Curtis.

Because the relay system will help ensure data ultimately reaches ground stations, Airbus Defence and Space will need to store more data than previously anticipated. "Fortunately, StorNext enables us to easily scale our environment. We can add new archive systems—and move to LTO-7—to meet these new data collection requirements without a major overhaul," says Curtis.

The team has the confidence that they can handle new requirements with ease. "As ESA launches the next series of Sentinel satellites, storage requirements could change again," says Curtis. "With the StorNext solution, we're prepared."

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