



CERN versiondog Case Study

versiondog for the World's Largest Machine, the Large Hadron Collider

versiondog has been trusted to backup and monitor the Industrial Control System (ICS) programs for the Large Hadron Collider at CERN, near Geneva, Switzerland. The Large Hadron Collider (LHC) is the world's largest particle accelerator. The European Organization for Nuclear Research (CERN) uses the versiondog data management system to manage the data from around 500 components.

“We have made significant gains in certainty and quality when it comes to data availability in areas where many programmable logic controllers are in use. Implementing versiondog has put us on a new quality level,” said Jerónimo Ortolá Vidal, Automation Engineer in the Industrial Controls and Safety Systems Group in the Beams Department at CERN.

The LHC was commissioned in 2008 to carry out cutting-edge research in particle physics. CERN chose versiondog from AUVESY because it is the leading manufacturer-independent software solution for version control, backups, and documentation of project data for Industrial Control Systems.

versiondog uses standardized workflow and centralized data storage, generates automatic backups, and ensures easily comprehensible documentation of each step in the development process. The SmartCompare function enables detailed program comparisons. Support is provided for audit trail documentation for highly regulated industries, in accordance with standards like ISO 900x, VDA 6.x, FDA 21 CFR Part 11, GAMP, and GMP.

versiondog has been in use at CERN for more than a year. There is now a centralized repository where the project data of the control systems from Siemens (SIMATIC S7, TIA Portal, WinCC flexible) and Schneider Electric (Unity Pro) is safeguarded and managed.

“We want to make all the processes of the control system and their surrounding ancillary equipment homogeneous,” said Ortolá Vidal. “Our goal is to always have a clear overview of all PLCs and HMIs and all the changes that are made to their control programs.”

He continued, “we want to be able to manage all program versions using a standardized procedure, and it is extremely important to us to be able to store and safeguard data centrally. versiondog helps us do that.”

CERN is Looking Deeply into Matter

CERN was founded in 1954 as a research organization for fundamental physics. It is located in Meyrin near Geneva, Switzerland. A remarkable international collaboration, the European Organization for Nuclear Research is now run by 22 member states. With an annual budget of over one billion euros, the organization receives visits from around 11,000 scientists all over the world.

The main focus of their research is the exploration of the fundamental particles that make up the universe. Powerful accelerators are used to bring particles to near light speed. The biggest is the Large Hadron Collider (LHC). To reach it, it is first necessary to descend 100 meters underground. Then, you would need a bicycle if you wanted to follow the 27 km circumference of the collider. Doing so, you would pass several thousand electromagnets, masses of cables, gigantic detectors, and many computers. All this to do research on the smallest particles in nature to help answer questions about the origin of the universe, and other questions, like why is there far more matter than antimatter in the universe?

Inside the ring, elementary particles are accelerated by the electromagnets to speeds close to that of light, i.e. in the region of 300,000 km per second. Then, they are smashed together at predetermined collision zones. This causes a shower of particles, the trails of which can be traced and analyzed by huge detectors.

The Worldwide LHC Computing Grid (WLCG) was developed to handle the enormous quantity of data produced. Dispersed across the globe, this computing and data storage network can deal with data volumes in the order of 30 petabytes.

What has versiondog changed for CERN and the Large Hadron Collider?

The control programs of CERN’s auxiliary and utility systems (cryogenics, cooling systems, air conditioning, gas supply, electricity, interlocks, and others) undergo a continual process of development and modification. The cryogenics have a particularly important role to play. When the LHC is in operation, the magnets have to be kept at a constant temperature of 1.9 Kelvin (-271 degrees Celsius or -456.25 Fahrenheit).

Data management processes have improved a lot since versiondog has been on the scene. All changes, no matter when they are made, where, or by whom, are detected then saved and documented centrally. All members of staff now go to the same place to access the same control software. The most recently approved and released version is always available. Devices are automatically backed up regularly and changes made by colleagues can no longer be missed, overwritten, or lost by mistake. There are already 10 teams managing around 500 control systems with versiondog. In the near future, around 1,500 components in use at CERN are set to be integrated into the versiondog system.

versiondog Brings Certainty

Management of the various individual processes and control systems is the responsibility of a number of different departments. Within this structure, Ortolá Vidal’s department provides CERN-wide support service.

It was with the goal of standardizing processes across departments in mind that the versiondog system was introduced. Staff now have a much clearer picture of processes and their current status. Any and all changes are comprehensible and visible to everyone. And they can be undone if necessary. Furthermore, a backup of all data is performed once a week.

“Errors made while modifying programs have been reduced to an absolute minimum since we have been using versiondog,” explains Ortolá Vidal. “Centralized data storage guarantees that we are always working with the latest and most recently approved and released program versions.”

But if for some reason a system goes down, the latest version is immediately available. What’s more, the system checks that the version running on a control system (the online version) really does correspond to the latest version that was saved on the server (the offline version). Before versiondog, changes could go unnoticed. Regular online-offline comparisons ensure that this can no longer happen.

If a discrepancy is detected, the system informs the appropriate administrator by email. All this means that versiondog has led to an improvement in quality and an increase in the level of work process standardization at CERN.

Moving Forward with versiondog

Research and development in a facility such as CERN never comes to an end. Ortolá is continually adapting the versiondog system to the changing needs of the organization. When he needs support, he gets it directly from the data management specialists at AUVESY. There, he can find the help he needs with individual elements of configuration and with broader adaptations of the system to new conditions.

Ask Jerónimo Ortolá Vidal what versiondog makes possible for them and the payoff is clear. He said, **“versiondog makes it possible for us at CERN to safeguard our control system data and store it centrally, which is crucial for the organization.**

ABOUT AUVESY

AUVESY (**AU**tomated **VE**rsioning **SY**stems) is a global market leader in version control and data management for automated production. The company has grown steadily since it was founded in 2007, with its North American headquarters located in Grand Rapids, MI and its global headquarters located in Landau, Germany.



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