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Everything Under Control

SIEMENS

High product quality and production performance over time, meeting legal regulations in terms of complete traceability of production, quick response to market conditions and the efficient use of production equipment - these are today's requirements for the automation of batch processes in chemical, pharmaceutical and food & beverage industry.

To meet these requirements, Siemens Industry Automation provides SIMATIC® BATCH, a scalable option to the distributed control system SIMATIC® PCS 7- using a Versant object database.

Siemens developers had to guarantee the continuous availability of the system - even if plant engineers modify single production sequences or maintenance engineers install new software updates.

"We were looking for a database technology which was able to manage scalable and comprehensive hierarchical data models in a real-time production environment."

Andreas Sachs, Product Manager, SIMATIC® BATCH Siemens AG

Challenge
Software Engineers at Siemens were looking for a database technology that would optimally match the requirements of the SIMATIC® BATCH program design. Providing an object-oriented view on models, procedures and recipes for comprehensive batch processes, SIMATIC® BATCH places high demands on system stability and performance.

Solution
Versant object databases met the high demands - managing the applications comprehensive object models, providing real-time capability, 24/7 availability and flexible scalability for optimal system adaption to plant size and individual requirements. The database also provides the necessary tools such as redundant replication and automatic schema versioning to support software updates while the system is up and running.

Results
SIMATIC® BATCH has used a Versant object database in order to manage and store automation data since 2003 - enabling manufacturers, in particular with regard to chemical, pharmaceutical or food and beverage plants - to implement and control smaller, medium and even comprehensive batch processes on equal terms with varying recipes, formula parameters and control sequences.

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Due to existing standards and legal regulations concerning complete traceability of production, all batch data, recipes and details such as ingredients, expiration dates or production environment have to be documented and archived for years.

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Depending on the process, the database system has to handle huge database files up to the size of double-digit Gigabytes. At the same time, the database system must provide fast and reliable real-time access, because "any significant delay, failure or shutdown can potentially effect the product quantity and quality or even harm the whole batch and may finally result in substantial financial losses," Sachs describes.

Object-Oriented View

From the beginning, when developers at Siemens were starting to think about implementing SIMATIC® BATCH, a manufacturing tool for scalable, discontinuous batch processes, it soon became clear that they would need a database technology with very special capabilities.

The SIMATIC® BATCH user object model is based on ISA-88 - an international, object-oriented standard addressing batch process control. The user's view on production processes, models and recipes had to be 100% object oriented, and therefore as a consequence for the software architecture the developers at Siemens were looking for "a database which was able to manage scalable and comprehensive hierarchical data models which also handled the data in a real-time production environment," says Sachs.

24/7/365 Availability

The usual life cycles for hardware and software in process automation are expected to last more than 10 to 15 years. Once implemented, production plants and the controlling hardware and software have to run in 24/7/365 modes with an absolute minimum of (planned) shutdowns. Siemens developers had to guarantee the continuous availability of the system - even if plant engineers modify single production sequences or maintenance engineers install new software updates.

Versant object databases held an advantage because of the object database's reliability, its capability to replicate with redundant servers and - last but not least - its ability to automatically update the database schema (e.g., during replication after a software update on the redundant server, which might include data model changes as well).

Flexible Scalability

Thanks to its modular architecture, SIMATIC® BATCH can be configured as a single-user system or client/server system to be used in plants of any size. In most cases, a redundant pair of BATCH servers and several distributed BATCH clients are used to control an assigned process. "The object database is running on the server and continuously replicates with the second, redundant BATCH server in order to prevent any loss of batch data," explains Sachs.

Event Handling

Typically in a plant several PC clients provide different concurrent views to the production system, which have to be updated in real time, display operator prompts and forward operator intervention commands to the server (i.e., to replenish ingredients, to keep supplies coming or change process parameters). "The specific watch-and-notify mechanism provided by the object database is mandatory to meet the high performance requirements related to a comprehensive and distributed event handling," says Sachs.

10 Years of Success

Developers at Siemens Industry Automation have used the Versant object database system for more than ten years now - providing customers all over the world with a powerful, customizable controlling system for batch processes in the chemical, pharmaceutical and food and beverage industry.

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About Siemens

Siemens Industry Automation is a worldwide leader in the fields of automation systems, industrial controls and industrial software.

Its portfolio ranges from standard products for the manufacturing and process industries to solutions for whole industrial sectors that encompass the automation of entire automobile production facilities and chemical plants. As a leading software supplier, Industry Automation optimizes the entire value added chain of manufacturers – from product design and development to production, sales and a wide range of maintenance services.

For more information go to:
http://www.siemens.com/industryautomation

About Actian: Take Action on Big Data

Actian Corporation enables organizations to transform big data into business value with data management solutions to transact, analyze, and take automated action across their business operations. Actian helps 10,000 customers worldwide take action on their big data with Action Apps, Vectorwise the analytical database, Ingres an independent mission-critical OLTP database, and Versant object-oriented databases. Actian is headquartered in California with offices in New York, London, Paris, Frankfurt, Hamburg, Amsterdam and Melbourne. Stay connected with Actian Corporation on Facebook, Twitter and LinkedIn.

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