Siemens improves manufacturing system uptime and security with Red Hat OpenShift

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Siemens, a multinational technology manufacturer, has established an IT team at its Amberg Electronics Plant in Germany to explore new ways to improve and optimize its production applications and systems. High performance and security are key to meeting production goals and protecting valuable company data, but Siemens' existing platform required downtime for large updates. The company adopted Red Hat OpenShift, an enterprise container platform supported by expert consulting and training services, to replace its monolithic approach with a modular, responsive, microservices-based architecture. Now, developers at Siemens can apply artificial intelligence (AI)-generated data insights in smaller, iterative changes that avoid disrupting operations.

Munich, Germany ●

Headquarters

Manufacturing

303,000 employees

Benefits

▶ Established continuous improvement approach to rapidly apply data insights

▶ Improved production system and data security with rolling patches and software management

▶ Improved global cross-team collaboration

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Christian Schulze
IT Project Manager, Siemens Amberg

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> ——
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> IT Project Manager, Siemens Amberg

Building a responsive digital factory for manufacturing innovation

Siemens is a multinational technology manufacturer focused on industry, infrastructure, transport, and healthcare. At the core of its €15 billion Digital Industries Division, Siemens operates Amberg Electronics Plant, one of the world's most advanced and intelligent manufacturing facilities. The facility produces 17 million components each year for SIMATIC, Siemens' industrial automation technology.

This location and Siemens' other local production sites around the world are supported by a local IT service team and datacenter in Munich. Recently, Siemens established a team of application developers at its Amberg facility to focus on exploring new opportunities and refining existing applications, attracting skilled developer talent to work with the latest software.

"We want Amberg to be a test bed for pioneering manufacturing innovation, to find ways to support and improve the end-to-end, integrated approach used at our three Digital Industries factories," said Christian Schulze, IT Project Manager, Siemens Amberg.

However, the monolithic Oracle platform Siemens used to run several critical systems meant updates could not be made quickly and had to be planned in advance due to the resulting disruption to production operations. For example, its order management system (OMS) governs 350 production changeover processes and integrating between different production lines, ensuring the right tools are in place and system status information is updated. Downtime to this system could jeopardize the Amberg facility's ability to meet daily production goals for close to 1,200 different products. Siemens also struggled to find developer talent interested in or skilled in working with the older Oracle technology.

To support its digital factory vision, Siemens sought to adopt a new, more responsive infrastructure platform. "Our goal is to collect and process data using our AI [artificial intelligence] tools, such as our Mendix development platform, then apply any insights to make our operations more reliable and efficient," said Schulze.

Creating a consistent, stable foundation for operational systems with Red Hat OpenShift

Due in part to past success with Red Hat, Siemens chose to replace its Oracle platform with Red Hat OpenShift, deployed on premise in its local Amberg datacenter to create a cloud-native, modular architecture for its operational processes and systems.

Red Hat OpenShift is an enterprise Kubernetes container platform that balances the flexibility and responsiveness to develop and maintain innovative applications with the robust security and expert support enterprises require.

"Adopting Red Hat OpenShift means we can use a modular development approach where components can be reused," said Schulze. "The scale-out platform architecture also provides consistency across different environments, even as demands grow or change."

The company worked closely with Red Hat Consulting during deployment to gain insight best practices and quickly troubleshoot any issues. As part of this collaboration, Siemens Amberg's development teams completed several Red Hat Training courses, including Red Hat OpenShift Administration II: Operating a Production Kubernetes Cluster, and Red Hat OpenShift Administration III: Scaling Kubernetes Deployments in the Enterprise.

"Our local teams had no experience with container technology or Red Hat OpenShift. Training was crucial to building our teams' skills quickly, so we could optimize our application development and delivery from the start," said Schulze.

Delivering performance and security improvements faster

Established iterative approach to rapidly apply data insights

Previously, Siemens completed system upgrades twice a year. Now, enhanced data collection and analysis helps Siemens' developers gain insight into current production system conditions—and opportunities for ongoing improvement. The company has also used Red Hat OpenShift to refactor existing systems into microservices, as well as automate routine tasks and support code reuse. As a result, Siemens can more quickly act on data insights to achieve better performance for OMS and other systems.

"Using Red Hat OpenShift at our Amberg facility means our developers can be more involved and see real-time changes from applying data insights to our production operations," said Schulze. "Time savings as small as tenths of a second add up in an integrated production line like ours. It generates 4.5 million requests each day, and even millisecond improvements in processing time can have a positive effect."

Improved production system and data security

In addition to more frequent, iterative performance improvements, Siemens can now complete similar updates to address potential security vulnerabilities and threats in its critical manufacturing systems. Red Hat provides ongoing patches and bug fixes for the entire container application stack, including the container host, cluster management, and applications and services running on the platform.

"Security has become an increasing concern, given the value of our data, the complexity of our operations, and the potential cost of disruption," said Schulze. "Even though our central IT team is only 80 km away in Munich, we cannot have any interruption in connectivity that would in turn slow a production line in our manufacturing facility. Red Hat OpenShift allows us to complete patches on a rolling schedule, with no disruption to daily production."

Improved global collaboration

With a consistent foundation across environments—and support for a choice of tools and technologies—Siemens can run Red Hat OpenShift on site or as a managed service in a hyperscale cloud environment, such as Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), or IBM Cloud.

Replacing its outdated, monolithic system architecture with modular, responsive enterprise open source technology has created new opportunities to open the digital factory approach Siemens has adopted in its Amberg facility to global teams.

"We don't want to only recruit talent that's an hour away. We recognize the value of global talent and different perspectives," said Schulze. "We also have to consider how a solution could be applied across our global manufacturing operations. Code that works in Amberg should also work in our other Digital Industries factories in Fürth, Germany, and Chengdu, China."

Expanding new, more efficient approach to new factories and projects

After its initial success with Red Hat OpenShift at its Amberg facility, Siemens plans to migrate all applications at its three Digital Industries factories to Red Hat OpenShift. The company also plans to refactor many additional applications to replace large, complex solutions with more responsive, modular microservices.

Siemens also plans to continue using its Amberg facility to experiment with new enhancements and approaches—for example, expanding the use of a new production line solution, Modular Ecosystem for Manufacturing Operations (MEMO), to replace the facility's Manufacturing Execution System (MES).

"The project to replace our MES with MEMO would take three years without our Red Hat OpenShift environment," said Schulze. "This is just another example of how we've fundamentally changed our development cadence. The big, downtime-heavy deployments and projects no longer need to happen, because we can make smaller, faster, more timely changes—and see their impact faster."

About Siemens AG

Siemens AG is a technology company focused on industry, infrastructure, transport, and healthcare. From more resource-efficient factories, resilient supply chains, and smarter buildings and grids, to cleaner and more comfortable transportation as well as advanced healthcare, it creates technology with purpose adding real value for customers. www.siemens.com

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