Siemens Energy Accelerates Application Development with metaphactory Knowledge Graph

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Siemens Energy uses Amazon Neptune to oversee a fleet of thousands of large gas turbines operating in multiple countries across the globe. Siemens Energy procured metaphactory through a free trial in AWS Marketplace, which enabled it to go to market quickly and cost-effectively.

SIEMENS

Company: Siemens Energy
Industry: Energy & Utilities
Country: Germany
Employees: 91,000
Website: siemens-energy.com

The Challenge of Global Turbine Fleet Management at Scale

Siemens Energy oversees a fleet of thousands of large gas turbines operating in multiple countries across the globe. Managing such a broad fleet of equipment across different environments and contexts presented a major logistics challenge. Managing spare parts catalogs and specific customer configurations for each turbine required a considerable amount of manual processing and labor. This also left room for better inventory optimization on the customer side and more precise spare part recommendations. The company needed a reliable way to model contextual data and complex hierarchies to gain visibility and enhance decision-making around its fleet of large gas turbines.

Scaling Insights with Knowledge Graphs

Siemens Energy discovered knowledge graph technology as the ideal solution for helping organize, manage, and query its machine data structures across the fleet. The hierarchical structure of these machines lends itself to knowledge graph modeling. Knowledge graphs, a way of modeling structured and unstructured data, are built by subject-matter experts and augmented with the assistance of intelligent machine learning algorithms. Siemens Energy chose the metaphactory knowledge graph, which is produced by the German technology firm metaphacts. metaphactory offers knowledge graph management, rapid application development, and end-user-oriented interaction. It supports customers with data acquisition and integration, content authoring, interactive visualization and exploration of data, as well as linking and reusing of external knowledge sources. metaphactory builds on top of Amazon Neptune's knowledge graph service.

Siemens Energy was interested in using knowledge graph technology to design and build its own application, which would feature customized queries and forms. Since metaphactory is a low-code platform for rapid development of knowledge graph applications, it was perfectly aligned to Siemens Energy's needs. According to Lutz Lukas, IT solution architect at Siemens Energy, "Siemens Corporate Technology had worked with metaphactory for several years on a number of initiatives. In previous projects, we discovered that metaphactory can be leveraged for building a custom application quickly and at scale. What's more, the visualization and query options provided by metaphacts have helped us to quickly and efficiently validate data, prototype UIs, and explore graphs."

About Siemens Energy

With its products, solutions, systems, and services, Siemens Energy addresses the extraction, processing, and transport of oil and gas. It also offers power and heat generation in central and distributed thermal power plants and power transmission and technologies for energy transformation, including storage and sector-coupling solutions.

Benefits

- Faster time to market through low-code knowledge graph application development
- 1,500 manual hours saved per year and higher user and customer satisfaction
- Improved ROI from Amazon Neptune through a scheduled scaling process

AWS Services Used

- Amazon EC2
- Amazon EKS
- Amazon Lambda
- Amazon Linux 2
- Amazon Neptune
- Amazon Relational Database Service
- AWS Marketplace

Layering the metaphactory platform on Amazon Neptune's graph database service **enabled Siemens to build a smart tool** to manage its global spare parts supply more efficiently

"Thanks to metaphactory, we were able to develop a powerful application that **enabled our turbine engineers to make even more precise data-driven decisions** and save manual efforts."

Paul Zolnowski, Section Lead, Post Documentation, Siemens Energy

Rapidly Deploying a Turbine Knowledge Graph on Top of Amazon Neptune

Siemens Energy built a core part of the Turbine Knowledge Graph application using metaphactory's low-code capabilities. This allows for visualization of the complex relationships and connections within the fleet in question. Daniel Herzig-Sommer, chief operating officer of metaphacts, explains it this way: "Think of low-code development like building a modular house: you don't need to construct it brick by brick, but can use ready-made elements, like walls with built-in windows and doors. It's the same with metaphactory. You take our ready-made components for graph data visualization, search, editing, or whatever you need in your data management tasks. Then you configure and combine them the way you wish, and you have an application in no time." metaphactory accomplishes this through customizable templates and an elaborate set of ready-made web components that can be parameterized to meet the customer look and feel. These components are available for data management tasks and for visualizing vast amounts of structured and unstructured data and relationships more intuitively. The platform also provides a data quality workbench that monitors data and checks whether it's consistent with existing models.

Layering the metaphactory platform on Amazon Neptune's graph database service enabled Siemens Energy to build a smart tool to manage spare parts more efficiently. The process of deploying this knowledge graph application into production was straightforward. After a series of weekly calls with metaphacts, Siemens Energy was up and running quickly with a context-aware set of visualizations on its global fleet of turbines. Thanks to the intuitive user interface, Siemens Energy turbine engineers work with the visualizations on a daily basis. Building the application would have taken longer without metaphactory. Siemens Energy could now use Resource Description Framework (RDF) data, SPARQL Protocol and RDF Query Language (SPARQL) queries, as well as ontologies built seamlessly on Amazon Neptune. As a result, the company found early operational efficiencies gained by discovering previously unseen relationships between tracking and monitoring of its global repository of turbines.

Paul Zolnowski, section lead, post documentation at Siemens Energy, points out, "The key advantage of metaphactory was that we could easily visualize our data during development for early feedback from the business allowing data quality improvements, and fast and target-focused development of our data model and application."

1500 Manual Hours Saved in the First Year

Through the metaphactory platform procured from AWS Marketplace, Siemens Energy built and deployed an end-user oriented custom knowledge graph application for managing its fleet of large gas turbines in just six months. This was impressive from an operations standpoint—characterized by quick feedback and buy-in within the line of business and a fast-paced development, testing, and deployment cycle. "Thanks to metaphactory, we were able to develop a powerful application that enabled our turbine engineers to make even more precise data-driven decisions and save manual efforts," said Zolnowski.

Siemens Energy also saved 1,500 hours of manual processing in the first year. Previously, annotating data required comparing information across the different machine configurations within the fleet. With metaphactory, Siemens Energy introduced a more efficient process for curating and creating spare part catalogs and managing configurations for its fleet of large gas turbines. "This ultimately helped us increase overall quality of recommendations to our customers," says Lutz Lukas. "Our turbine engineers are able to perform more efficiently."

Building on Amazon Neptune's high-performance, low-latency graph database service also connected Siemens Energy with other AWS Marketplace services like storage, load balancers, gateways, and networking. Since metaphactory is a dockerized application, this also required integration with AMI AWS CloudFormation templates for deployment. Adopting AWS services provided Siemens Energy with the performance and agility it needed to go to market quickly and cost effectively without trading off its high security standards.

Providing DevOps Flexibility and Scalability

Procuring metaphactory from AWS Marketplace provided the DevOps teams with flexibility to immediately test new features and run metaphactory on demand. Lutz Lukas notes, "We also really appreciated the flexible pricing and licensing offered by Amazon and metaphacts. This gave us the ability to set up a two-tier system – one for development and one for production. The non-production license went for development, new features testing, and user feedback while we reserved the production license for new version deployments of the application to our turbine engineers. Moreover, we appreciated the flexibility to start and stop instances based on usage demand and daily schedules."

Next Steps

Siemens Energy is pleased with the effectiveness of machine learning and knowledge graph technology in quickly spinning up applications that add business value. It plans to continue building and improving its turbine knowledge graph application and sees potential in applying knowledge graphs to other lines of business.