CenterPoint Energy

Demonstrating potential benefits of applying near real-time analytics to a smart grid

Smart is...

Analyzing streams of information in near real-time to gain unprecedented control of electric distribution and transmission networks.

CenterPoint Energy's smart grid initiatives are helping improve power reliability, speed restoration of services in the event of an outage, and foster energy efficiency among consumers. These initiatives are also providing the company with unprecedented data regarding its operations. To help the company's business units better utilize this data, CenterPoint Energy's Analytics and Data Services staff in conjunction with their partners in IT launched a Proof of Concept project using powerful analytics technology that will help operators detect and respond to minute changes in its infrastructure before customers are affected.

Smart grids are changing how energy is delivered and consumed. They are also providing utility companies with unprecedented data on operational efficiency and consumer needs. And with this new data comes new opportunities.

Take CenterPoint Energy's big data prototype project for example.

This Houston-based energy company serves more than five million electric and natural gas customers primarily in Arkansas, Louisiana, Minnesota, Mississippi, Oklahoma and Texas. The company's smart grid program, deployed in the Houston area, includes advanced meters (or smart meters) and intelligent grid technologies that help it improve electric power reliability, speed service restoration in the event of an outage, and foster energy efficiency.

These smart grid technologies are streaming millions of messages. And for CenterPoint Energy to gain new insight from this data, it must be able to analyze it in near-real time.

"Each cell relay, for example, records various types of events relative to its operation," says Michael Green, manager of Analytics in CenterPoint Energy's IT department. "We estimated that we would receive more than a million messages each hour from our 5,500 cell relays and we needed efficient ways to leverage this data."

Business benefits

- Will enable staff to improve prediction and prevention of operational issues.
- Will improve outage communication and response to enhance the customer experience.
- Will help CenterPoint Energy deploy the right crew to the right place at the right time with the right information about the situation.
- Will enable near real-time automation with the ability to process logic, identify conditions, and interface with other systems right crew to the right place at the right time with the right information about the situation.

"This technology demonstrated how we could quickly, efficiently and economically route the right crew to the right place and perform maintenance instead of responding after the fact."

— William Bell, Technology Director, Analytics and Data Services, CenterPoint Energy, Grid and Market Operations

Correlating data in motion with data at rest

According to Thomas Chang, manager of Analytics and Data Services in CenterPoint Energy Electric Operations, near real-time analysis of data can offer significant value in helping the company improve customer satisfaction and efficiency.

"With real-time analysis, we will be able to prevent issues before they happen," he says. "When problems occur, we will be able to know about them before customers call and proactively contact customers to provide an estimated time to restore power."

To make this possible, the team needs a powerful and scalable analytics platform that can help transform big data into better business insight.

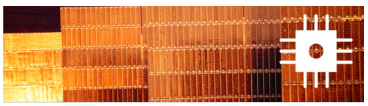
CenterPoint Energy worked with IBM Business Partners Wise Men, a global IT solutions provider, and Sharpe Engineering, a software engineering company specializing in big data, to evaluate IBM® InfoSphere® Streams software for its big data platform. Utegration, an SAP consulting company, also supported the project.

"The Proof of Technology was launched to see if InfoSphere Streams could do what it claimed," says Chang. "Can it operate on the data volumes that CenterPoint has? Can it support the kinds of use cases the company needs? Would it produce meaningful results? Wise Men has been a partner of ours for nearly a decade and brought the knowledge of how to use the software. Sharpe Engineering helped us see how to make the most of a real-time analytics solution."

Correlating data in motion with data at rest was critical.

Smarter Energy

Expected reduction in outages with near real-time analytics



Instrumented

Captures near real-time information from smart meters and intelligent grid technologies.

Interconnected

Integrates streaming data with data "at rest" (for example, equipment location, type, and connectivity models) to help staff see the big picture.

Intelligent

Analyzes big data streams to uncover hidden patterns and enable staff to take action before an outage occurs.

Solution components

Software

- IBM® InfoSphere® Streams

IBM Business Partners

- Wise Men
- Sharpe Engineering
- Utegration

"Utilities, similar to other industries, are finding that the ability to analyze and act upon tremendous volumes of information is essential for future operational effectiveness and efficiency."

— Gary Hayes, Division Vice President and Chief Information Officer, CenterPoint Energy

"We had a significant gap relative to executing real-time analytics, and InfoSphere Streams helps us close the gap," says Green. "Not all of the data that we deal with is streaming or in-motion data. One of the value propositions of InfoSphere Streams is that it enables us to enrich real-time data that's streaming in with data at rest, such as equipment location and connectivity models."

Demonstrating potential business benefits through use cases

Once the team saw that InfoSphere Streams could handle the volume, velocity, and variety of data from its smart grid technologies, the next step was developing specific use cases that showed where the technology might be of value at CenterPoint Energy.

One use case analyzed near real-time alerts and events from more than 2.2 million smart meters for power outage and power restoration notifications. Another use case showed how near real-time data could improve availability of the company's telecommunication network.

"There's a huge focus on availability of the telecom components because a network outage can impede our ability to obtain data from smart meters and intelligent grid technologies," says Chang. "The use case showed how this technology would enable the telecom team to see the types of issues that are occurring, their cause, and which crews to dispatch."

According to Deepak Chandwani, President for Wise Men, CenterPoint Energy is ahead of the curve in this area.

"I've attended a number of smart grid conferences and most of the presentations focus on leveraging real-time data for customer support and marketing," Deepak says. "CenterPoint is a leading organization that is focusing on correlating data at rest with data in motion."

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Supporting near real-time automation

The ability to analyze all the data—not just a subset—in near-real time will also help the company predict and respond to small changes in equipment operations before they cause big problems.

"Instead of looking only at two, three or 10 sources, CenterPoint can look at all the data and get answers faster," says Jim Sharpe of Sharpe Engineering. "And that data might indicate a problem occurring now or it could be predictive in nature. For example, we could monitor cell relay signals—what we call heartbeats—and if we see an increased trend of missed heartbeats on a particular cell relay, then we could address the issue before the relay fails."

Ultimately these patterns can be used to implement business rules and logic that enable the systems themselves to communicate with each other and respond automatically.

The Inside Story: Getting There

For the Analytics and Data Services team, the Proof of Technology and use cases helped demonstrate the potential benefit of a big data platform. "This technology demonstrated how we could quickly, efficiently and economically route the right crew to the right place and perform maintenance instead of responding after the fact," says William Bell, technology director, Analytics and Data Services, CenterPoint Energy, Grid and Market Operations.

The next step is to gain buy-in to apply the solution to real-world applications. "Utilities, similar to other industries, are finding that the ability to analyze and act upon tremendous volumes of information is essential for future operational effectiveness and efficiency," says Gary Hayes, division vice president and chief information officer, CenterPoint Energy.

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IBM Corporation
Software Group
Route 100
Somers, NY 10589

Produced in the United States of America
May 2014

IMC14802-USEN-00