INFORMATICA®
The Data Integration Company™

Putting the "Smart" in Smart Grid

*Choosing a Technology Platform to
Support the Smart Grid Infrastructure*

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Executive Summary

Energy and utility companies face enormous challenges as they try to meet an ever-growing demand for power. They must develop and use new, more sustainable sources of energy. They must comply with ever-changing regulations and reporting requirements. Most urgently, they must plan for the emergence of what has come to be known as the Smart Grid.

A Smart Grid delivers electricity from suppliers to consumers using two-way digital technology to control appliances at consumers' homes to save energy, reduce costs, and increase reliability and transparency. It overlays the electricity distribution grid with an information and net metering system. A Smart Grid includes an intelligent monitoring system that keeps track of all electricity flowing in the system.

As energy companies roll out smart meters and other intelligent electronic devices that monitor and adjust to changes on the grid, they become increasingly able to gather and leverage real-time data. Correlating and analyzing this data improves their response to complex events and helps maintain a reliable power infrastructure.

Smart meters and other intelligent sensors and devices enable real-time reporting, allowing grid managers and operators to access the data as it's being monitored and analyze it even before it reaches the data warehouse.

In addition, these technologies open up true two-way communication with consumers, giving them real-time feedback on power use and pricing. Customers can then use that information to make more active decisions about how they use and how much they spend on energy.

However, energy companies need to be able to leverage this torrent of new data for greater efficiency, cost-effectiveness, and strategic value. They need operational intelligence—the ability to choose the right information, at the right time, to make the right decision and initiate the right response.

A data integration platform that includes complex event processing capabilities can provide energy and utility companies with the operational intelligence they need to make smart use of the Smart Grid.

In this white paper you'll learn about:

- The lack of interactivity and real-time visibility and how they limit more proactive management—the primary business challenge that energy and utility companies face

- The five technology requirements that the U.S. Department of Energy (DOE) recommends every utility company should implement to support the Smart Grid rollout

- How the Informatica® solution, complex event-processing capabilities delivered as part of a data integration platform, supports the DOE for implementing Smart Grid infrastructure

The Business Challenges

Traditional power grids and networks are designed for data to flow in just one direction; they lack the interactivity and real-time visibility that allow for more proactive management. As a result, energy and utility companies have been limited until now to managing the power infrastructure reactively.

With only historical data to work with, utility companies struggle to make forward-looking decisions and predict problems before they affect service. They cannot, for example, correlate outages and recoveries in a specific geographic area and timeframe to determine when and where to dispatch a repair truck. Nor can they see instantly that an outage is affecting a hospital, data center, or other critical location in order to prioritize that repair. Indeed, most utilities don't even learn about outages until customers start calling to complain.

This situation is more than poor customer service; it directly affects the overall reliability of the power infrastructure. Lacking real-time insight, energy companies have little ability to minimize the impact of a malicious act or a natural disaster. Simply assessing the damage from a significant event can take days or even weeks.

Aging technology also compromises the reliability of the power infrastructure. With parts of the U.S. power grid as much as a century old, the physical equipment is reaching the end of its useful life, as is much of the older IT infrastructure. In addition, the employees who once knew how to maintain this older technology have long since retired. Integrating new intelligent grid technologies for demand and response programs into the aging infrastructure adds another layer of complexity. Furthermore, energy and utility companies must invest money and time ensuring compliance with a multitude of reliability standards and regulations.

Finally, at a time when efficient operations are more critical than ever, traditional energy management systems fail to enable business users at utility and energy companies to react quickly to current conditions. With current technology, grid operators and managers have no way to access the system on the fly to adjust performance benchmarks or change the number and type of events necessary to trigger an alert.

Smart Grid Technology Requirements

The U.S. Department of Energy (DOE), which is overseeing the monumental task of modernizing the country's entire electrical infrastructure, recently published *The Smart Grid: An Introduction*.[1] Sponsored by DOE's Office of Electricity Delivery and Energy Reliability, this publication explores—in layman's terms—the nature, challenges, opportunities, and necessity of Smart Grid implementation. This report identifies five fundamental technologies every utility must deploy to support the nationwide rollout of the Smart Grid:

1. Integrated communications that connect components to an open architecture and allow every part of the grid to "listen" as well as "talk," for real-time information and control

2. Sensing and measurement technologies, such as remote monitoring, time-of-use pricing, and demand-side management, to support faster and more accurate response

3. Advanced control methods to monitor essential components and enable rapid diagnosis and precise solutions specific to a given event

4. Improved interfaces and decision support tools that help grid operators and managers make better decisions by giving them total visibility into their systems

5. Advanced components that apply the latest research in superconductivity, storage, power electronics, and diagnostics

The Informatica Solution

Informatica RulePoint® is complex event-processing software that delivers real-time alerts and insight into pertinent data, helping energy and utility companies build and manage the Smart Grid efficiently and competitively.

The software automatically integrates large volumes of data in near-real time from multiple, diverse, and disparate data sources. It then "connects the dots" based on sets of preconfigured conditions and delivers relevant analysis to both human decision makers and existing applications, such as Supervisory Control and Data Acquisition (SCADA), Energy Management Systems (EMS), and billing systems.For example, Informatica RulePoint enables utilities to take all these actions:

• Monitor and respond to demand in real time to ensure adequate supply levels

• Determine whether an outage requires in-person attention, reducing the cost of dispatch

• Improve visibility into customer behavior to better identify patterns and reduce the number and length of outages

• Monitor and correlate events in real time to identify acts of terror or nature before the damage affects service

Informatica RulePoint persistently monitors and correlates data streams to identify patterns and abnormalities across a wide range of complex events:

• **Production events.** These events include monitoring production sensors to ensure compliance with regulatory requirements or tracking and predicting demand to maintain supply levels.

• **Transmission and distribution events.** Examples of these types of events include detecting and managing outages.

• **Retail/consumption events.** These events include analyzing outage and usage patterns to restore power faster or identify potential meter tampering.

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[1] Litos Strategic Communication, prepared for the U.S. Department of Energy under contract No. DE-AC26-04NT41817, Subtask 560.01.04, www.oe.energy.gov/DocumentsandMedia/DOE_SG_Book_Single_Pages(1).pdf

Supporting DOE Guidelines for Smart Grid Infrastructure Implementation

Informatica RulePoint is part of the Informatica Platform, a comprehensive, open, unified, and economical data integration platform. The Informatica Platform forms the foundation of a single event-driven architecture that promotes the detection and analysis of and reaction to events. As Figure 1 illustrates, these capabilities can be leveraged to support multiple lines of business— production, transmission and distribution, and retail/consumption—through shared services, enabling organizations to increase productivity through multiple uses of the same technology infrastructure.
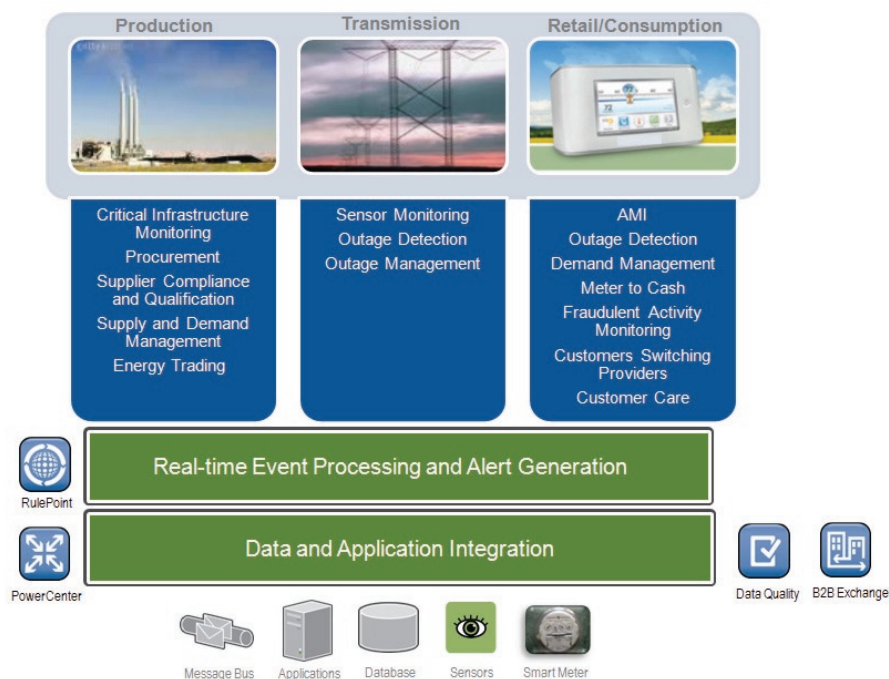

Figure 1. The Informatica Platform provides relevant, timely, and trustworthy data to utility organizations across all areas, from production through transmission and distribution and on to the end consumer.

The capabilities of Informatica RulePoint and the entire Informatica Platform align with the DOE's requirement for building the Smart Grid.

Integrated communications that connect components to an open architecture and allow every part of the grid to "listen" as well as "talk," for real-time information and control

Multiple sources including EMS, SCADA, and smart meters deliver data to the Informatica Platform, where it can be integrated with other systems, checked for quality, and/or automatically transformed. The data is monitored in real time to identify events of interest and provide operational intelligence to support many processes across all lines of business.

Sensing and measurement technologies, such as remote monitoring, time-of-use pricing, and demand-side management, to support faster and more accurate response

Informatica RulePoint optimizes business processes in several ways:

- It measures and analyzes real-time data streams from a wide range of sources, including smart meters and intelligent sensors, and correlates that information with existing systems such as EMS and SCADA applications.

- It enables organizations to use custom and proprietary data sources and functions through existing portals and reporting applications.

- It supports industry-standard authentication mechanisms, such as LDAP and Active Directory, for greater data security.

- It enables reuse of custom services and analytics across multiple deployments, thanks to the Informatica Platform's open architecture.

Advanced control methods to monitor essential components and enable rapid diagnosis and precise solutions specific to a given event

Informatica RulePoint supports advanced controls and monitoring techniques with a graphical interface that enables users to more rapidly define event-detection rules and responses, as well as tools to leverage third-party entity extraction, natural language processing, and categorization engines (see Figures 2 and 3).
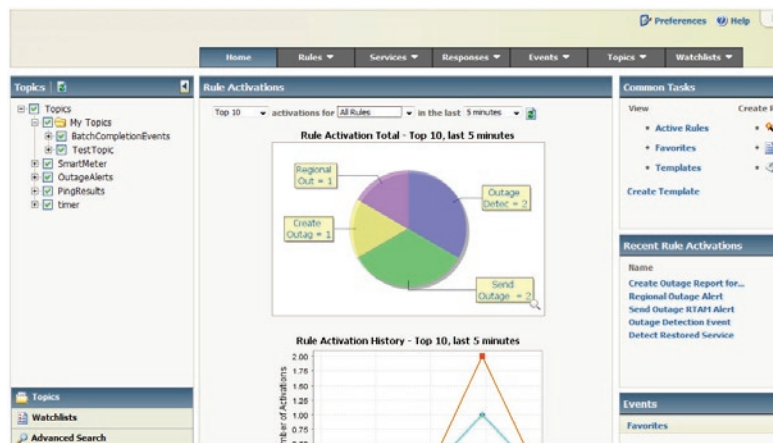

Figure 2. Informatica RulePoint supplies graphical views to analyze rule activations to support faster and more accurate responses.
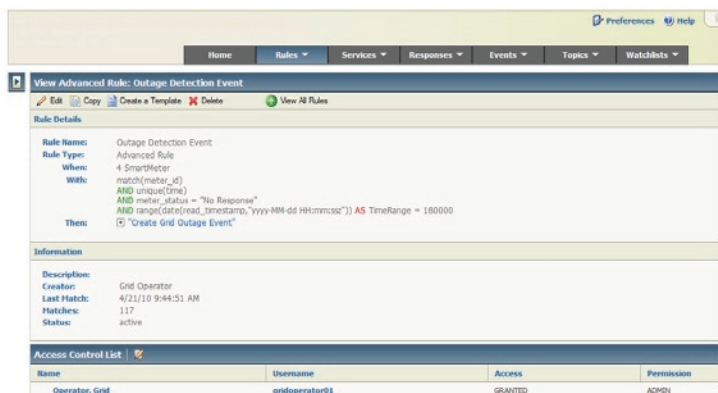
Figure 3. Informatica RulePoint provides easy-to-use rule writing templates and wizards to monitor essential components and enable rapid diagnosis.

The software identifies hidden, nonobvious, and dependent data patterns that slip past existing technologies such as SQL, business intelligence, and hand coding. It also enriches event streams with external or historical data sets during rule processing for a deeper understanding of those patterns. Moreover, it improves the accuracy of alerts by furnishing contextual information for downstream workflows—for example, by including historical data about energy use in a specific neighborhood to support the investigation of anomalous consumption in that area.

Improved interfaces and decision support tools that help grid operators and managers make better decisions by giving them total visibility into their systems

As part of the Informatica Platform, Informatica RulePoint easily accesses all data sources to enrich real-time notification alerts and integrate them into existing business processes and workflows. It pushes alerts about critical issues to Informatica Real-Time Alert Manager™, a Web-based persistent communications channel that decision makers can access at any time (see Figure 4).
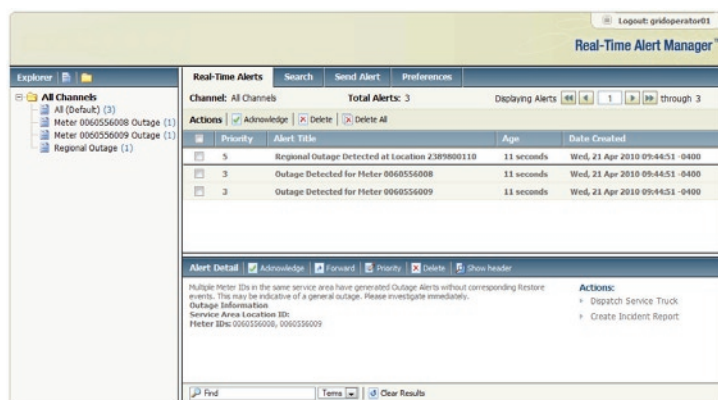

Figure 4. Informatica Real-Time Alert Manager enables grid operators and managers to receive, prioritize, and classify alerts to assist in decision making and provide instant visibility into the status of the grid.

The Real-Time Alert Manager prioritizes, classifies, and routes alerts automatically based on easy-to-define rules, ensuring that the right decision maker knows about a given issue and has the necessary context to address it effectively.

Conclusion

The U.S. energy landscape is in urgent need of modernization—and fortunately, large-scale initiatives and government funding exist to provide motivation and support for what will most likely be a years-long project. To make the most of the opportunities involved, however, energy and utility companies need to deploy advanced analytics to identify strategically useful patterns and relationships in the enormous amounts of data these changes will produce.

By adopting technology such as Informatica RulePoint to identify data patterns and relationships that previously would have gone unnoticed, utilities and energy companies can make these strategic moves:

• Reduce the costs associated with service management by gaining a real-time view of critical meter data

• Monitor demand in real-time to better manage supply

• Detect and analyze customer usage patterns from smart meters

• Assess customer response to various demand response programs

• Integrate outage management systems with meter data management systems

• Provide near-real-time data access to customers to support their own decisions about energy consumption

These factors, in turn, allow for faster action on critical issues, greater operational effectiveness, improved customer service, and wiser use of resources—making the move to the Smart Grid a smart move for everyone.

Learn More

Learn more about Informatica RulePoint and the entire Informatica Platform. Visit us at www. informatica.com or email CEPSales@informatica.com

About Informatica

Informatica Corporation (NASDAQ: INFA) is the world's number one independent provider of data integration software. Organizations around the world gain a competitive advantage in today's global information economy with timely, relevant, and trustworthy data for their top business imperatives. Nearly 4,000 enterprises worldwide rely on Informatica to access, integrate and trust their information assets held in the traditional enterprise, off premise and in the Cloud.