



# NTT DATA: Staying Ahead of the IT Services Curve with Real-Time Analytics

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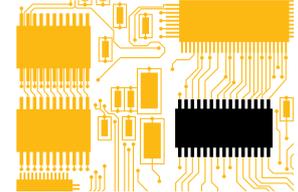
NTT DATA Corporation

**Industry**

Professional services

**Products and Services**

Consulting, system development, and IT outsourcing

**Web Site**[www.nttdata.com](http://www.nttdata.com)**SAP® Solutions**SAP® Event Stream Processor software,  
SAP Sybase® RAP software

NTT DATA Corporation, based in Japan, is a global provider of IT services, including business consulting, technology, and outsourcing. With expertise cultivated from years of experience, NTT DATA takes a proactive approach to solutions that enable **real-time data analysis** and lead to greater innovation capabilities for customers. SAP® Event Stream Processor software and SAP Sybase® RAP software give NTT DATA the edge it needs to stay ahead of its competition.

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# Enhancing bridge monitoring with complex event processing

NTT DATA continually strives to provide services beyond what other IT services firms offer. A prime example is a product the company resells, deploys, and supports — the bridge monitoring system (BRIMOS).

The solution remotely monitors bridges in real time to provide valuable information for managing responses to natural disasters, maintaining bridge structures, and estimating the extent of structural fatigue. BRIMOS consists of various sensors, high-speed data transmission networks, and an information center that collects and disseminates high-level information about bridges. The solution relies on multiple optical-fiber sensors installed on highway overpasses to detect anomalies or damage. It continuously collects and analyzes data about level differences, spacing, vibration, tilting, and other factors in bridge beams and bridge piers. By extrapolating

vehicle weight from warping data, the system also obtains weight information about passing vehicles, one of the primary factors behind damage to highway overpasses. BRIMOS also collects weather information, and the comprehensive data plays an important role in checking the safety of highway overpasses after an earthquake.

To enable BRIMOS to analyze large, complex data sets collected at rapid rates, particularly during high-traffic time periods, NTT DATA decided to conduct proof-of-concept (POC) tests. The tests would determine the feasibility of integrating BRIMOS with complex event processing (CEP) database technology. In addition to regular conversions of sensor data, the POC tests would analyze anomaly-detection processing for highway overpasses based on analyzing numerous elements, including real-time and stored data.



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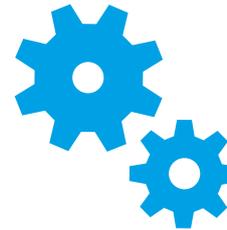
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## Proving solution's effectiveness with proof of concept

Over the course of the eight-month POC test, which involved testing multiple CEP environments, a combination of SAP solutions proved to offer the most effective solution. This includes the real-time analytics software, SAP Sybase RAP, and the CEP software that enables fast and intelligent decision making and business execution, SAP Event Stream Processor (SAP ESP). "The main goal of the proof of concept was to determine the processing speed (latency) of each platform," explains Yoko Inaba, an assistant manager at NTT DATA. "To take advantage of the CEP software's ability to simultaneously process multiple data sets, we built a system for real-time anomaly detection. We also decided to analyze the level of performance required to collect and manage data over long time periods."

With anomaly detection, measurements are converted based on real-time data and data collected in the past from the multiple optical sensors. The amount of incline, strain, and other factors are then determined, and an anomaly is deemed to have occurred if an amount exceeds an established threshold. Because data comes rapidly from a variety of sources, including past data, uniformity between the data must be maintained.



# 8 months

Duration of proof-of-concept testing



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# Processing real-time data from thousands of optical sensors

NTT DATA conducted a variety of tests on SAP Sybase RAP and SAP ESP. These included aggregation to determine how many sensor data pieces could be processed, latency to determine processing speed, external math libraries compatibility, and long-term data handling.

SAP software earned positive marks across all categories while collecting data from more than 10,000 sensors at expected single-server speeds. It also demonstrated dynamic model-switching functionality and the ability to facilitate software development and integration.

The POC results far exceeded expectations. Processing even cleared the latency target hurdle of 8 milliseconds, and the tests established the high-level compatibility between SAP solutions and math libraries, which is necessary to achieve advanced signal processing.

Based on the POC results, Masatoshi Yokogawa, a senior IT expert at NTT DATA, says, "For anomaly-detection processing, the detection threshold needs to be changed dynamically, according to the situation. To an extent, long-term trends are taken into account to calculate this threshold. With SAP Sybase RAP, analysis models are dynamically changed according to the real-time data while grasping long-term trends through batch processing and data collection. This function is very desirable for anomaly-detection processing, which would normally take a long time to implement."

Runtime performance was not the only test receiving good marks. Inaba says, "Almost any analytic logic can be implemented, without doing any programming, by using SAP ESP during the development stage. High development productivity like this is one of the strongest features that SAP products offer."



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## Discovering new solution uses after project success

Although the objective of this proof of concept focused on BRIMOS integration, the ultimate goal for NTT DATA was to test the use of CEP for a broad range of applications. "We researched many CEP applications to find the one that would be the best match for our many specialty-software solutions," says Yokogawa. "This proof of concept proved to us that SAP Sybase RAP and SAP ESP will be very effective in applications for any of our sensor networks. This will be very important as we expand our business going forward."

Thanks to the positive results of the POC, NTT DATA is developing a large-scale, real-time data analysis solution that will manage real-time and long-term data. SAP Event Stream Processor will be used to handle real-time data processing. The in-memory function of SAP Sybase RAP will handle chronological data processing of up to a few hours, while the store function will manage data for up to several months. Apache Hadoop, an open-source software framework, will be used to handle huge volumes of data, spanning years.

"The comprehensive and flexible configuration that SAP software allows for lets us create a hybrid infrastructure according to the amount of data and latency needed for analysis," Yokogawa says. "Because of this flexibility and the performance of the solutions, we expect SAP Sybase RAP and SAP ESP to play major roles in enhancing the functionality of our applications."



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# Delivering a real-time data collection and analysis solution

The real-time analytics in SAP Sybase RAP enhance the ability of applications to collect and analyze data generated at rapid rates by thousands of sources. The complex event processing functionality in SAP Event Stream Processor enables complex event processing across multiple data sources. Using these two solutions allows for high productivity in analysis logic development and offers compatibility with external math libraries.

NTT DATA's decision to work with these SAP solutions allows the company to quickly move forward in providing a large-scale, high-performance, real-time data analysis solution to manage real-time and long-term data.



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