CASE STUDY

Intel® Xeon® Processor E7 Family

Performance Testing of Real-time Data Analysis

Multi-Core Intel® Xeon® Processor E7 Family Accelerates Real-time Analysis of Large Data

Large-scale, real-time data analysis platforms pave the way to new social infrastructure services

NTT DATA CORPORATION

Headquarters: Toyosu Center Building, 3-3, Toyosu 3-chome, Koto-ku, Tokyo
Established: May 23, 1988
Capital: 142,520 million yen (as of March 31, 2011)
Business activities:
- System integration
- Network system services
- Other related businesses
http://www.nttdata.com/

From left: Keiichiro Nakagawa, Masatoshi Yokogawa, and Yoko Inaba

Challenges

- **Demand for real-time analysis and larger data**
- **Faster real-time analysis of large data**

Solutions

- **Intel® Xeon® processor E7 family**
- **BRIMOS* BRIge MOnitoring System**

CEP: A New Technology for Analyzing Data Flows in Real Time

While the quantity of data enterprises handle is growing dramatically, the need to analyze and utilize data extends beyond the business sector, with demand for its use in improving social infrastructure also increasing rapidly. For many businesses, data analysis involves first storing the data in a database and then subjecting the data to analysis. An unavoidable consequence of this, however, is a delay between data collection and the analysis results becoming available.

This has drawn attention to a new technology called complex event processing (CEP), which processes data flows directly before storage in a database. CEP is currently being adopted in fields such as marketing, social infrastructure, and particularly financial markets. In the future, it is likely to be used in applications such as smart grids that use IT to manage electric energy efficiently.

NTT DATA's Goal: To Implement CEP as a Core Element of Proactive BI

In Japan, CEP has attracted attention as a technology able to provide a new generation of data analysis techniques to support business intelligence (BI). NTT DATA is the leading company applying large-scale, real-time data analysis based on CEP. As Keiichiro Nakagawa, senior manager of business intelligence for NTT DATA's Solution Group, Information Technology Deployment Center, Research and Development Headquarters, explained, "We have been building a CEP data analysis platform to implement proactive BI, which provides foresighted and intelligent services by identifying users' behavior through real-time data capturing." NTT DATA uses platform products in response to analysis of data volume or latency by dividing the proactive BI IT platform into a two-tier structure to separate real-time processing and large-scale data analysis.

"The large-scale data analysis platform can make model sets of historical data. We apply those rules and logic to CEP, and then create information with high added value by evaluating in a moment," explained Nakagawa.

Evaluation of Large-Scale, Real-time Data Analysis Platform in a Bridge Monitoring System Implementing CEP

NTT DATA has been considering sensor networks using sensor devices which collect information as one of the application methods of a large-scale, real-time data analysis platform. NTT DATA applies CEP to the bridge monitoring system BRIMOS*, which they provide, and is evaluating large-scale data analysis. The BRIMOS system collects a variety of bridge girder information from a large number of sensors (ranging from dozens to several hundreds) attached to the bridge, detects abnormalities in real time, and is able to identify aged deterioration by analyzing long-term data. The high-speed data processing in real time is necessary because data from several thousand to tens of thousands of measurements per second comes from sensor devices attached to the multiple bridges.

Intel® Xeon® Processor E7 Family Helps Boost Performance of Large-Scale, Real-time Data Analysis

Implementing CEP into BRIMOS demands strong CPU performance. The number and individual performance of CPU cores is particularly important for CEP to process large-scale data in real time. Accordingly, NTT DATA conducted tests to compare the performance (Figure 1), under equivalent conditions, of the previous-generation, four-CPU, 32-core Intel® Xeon® processor 7500 series and the new-generation, four-CPU, 40-core Intel Xeon processor E7 family.

Commenting on why Intel was chosen for the project, Masatoshi Yokogawa, senior expert in the Information Technology Deployment Center, Research and Development Headquarters, said, "Rather than increasing the number of servers running in parallel, CEP works best when a large number of cores are integrated into a single server. Therefore, we put our faith in Intel's know-how and advanced technical skills to cover the fields that could not be resolved by software and SI."

Multi-Core CPU Accelerates Performance

The performance comparison between the old and new generations of the Intel Xeon processor demonstrated that the Intel Xeon processor E7 family has approximately 1.5 times the performance of the Intel Xeon processor 7500 series and can support more than 10,000 sensors. The evaluation also showed the difference from enabling or disabling Intel® Hyper-Threading Technology[1] (for multi-threaded processing) and Intel® Turbo Boost Technology[2] (for automatically boosting the core clock frequency) (Figure 1). Yoko Inaba, assistant manager of the Information Technology Deployment Center, Research and Development Headquarters, commented that, "The improvement in performance means we can analyze a wider range of bridge information with high precision. Similarly, greater processing capacity per unit means more bridges monitored by one server, for better cost/performance."

Based on the results of the BRIMOS evaluation, NTT DATA intends to proceed with the practical use of large-scale, real-time data analysis.

"The BRIMOS evaluation was our first case of utilizing CEP," said Nakagawa. "The potential scope of sensor networks is unlimited, including fields such as machine-to-machine (M2M) applications in which machines communicate with each other via network and ITS that transmits information between people, roads, and vehicles. As a system integrator in the field of social infrastructure, NTT DATA intends to develop sophisticated analysis logic for various fields that suit proactive BI. High-performance CPUs are a necessary element in achieving this, and we are looking forward to further advances in multi-core CPUs." The multi-core Intel Xeon processor E7 family clearly contributes to NTT DATA's large-scale, real-time data analysis business.

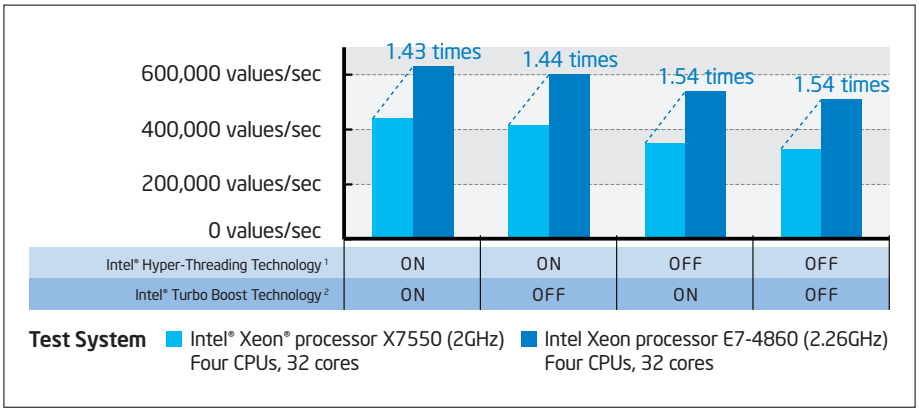

Figure 1. Relative Improvement in Throughput
(Comparison of Intel® Xeon® processor 7500 series and Intel® Xeon® processor E7 family)

Test Results

- Successful implementation of large-scale, real-time data analysis platform using CEP
- The larger number of cores and higher core performance of the Intel Xeon processor E7 family contributed to improved performance of large-scale, real-time data analysis.

For more information on the Intel Xeon processor, visit
http://www.intel.com/itcenter/products/xeon/

[1] Intel® Hyper-Threading Technology (Intel® HT Technology) is available on select Intel® Core™ processors. Requires an Intel® HT Technology-enabled system. Consult your PC manufacturer. Performance will vary depending on the specific hardware and software used. For more information including details on which processors support HT Technology, visit http://www.intel.com/info/hyperthreading

[2] Requires a system with Intel® Turbo Boost Technology. Intel® Turbo Boost Technology and Intel® Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your PC manufacturer. Performance varies depending on hardware, software and system configuration. For more information, visit http://www.intel.com/go/turbo.

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