

Vendor

Kepware Technologies

Vendor Solution

KEPServerEX OPC Server

The Objective

To test the integration of Kepware's shopfloor communication product with Oracle Manufacturing Operations Center for high frequency shop floor data.

PERFORMANCE TESTING AND CERTIFICATION FOR REAL-TIME SHOPFLOOR INTEGRATION

Executive Summary

Oracle® Manufacturing Operations Center is a standalone solution that delivers real-time operational intelligence with its own S95-based data model (separate from ERP). Architected to be ERP agnostic, it is designed as a unified plant data repository with integration to ERP, MES, data historians, SCADA and other types of shopfloor systems. To gather real-time streaming data from plant equipment and control systems, Oracle has enlisted some key partners such as Kepware Technologies. As part of their KepserverEX solution, Kepware now ships Oracle Manufacturing Operations Center's Connectivity Suite that can be configured to collect specific device tags in real-time and transfer them over to Oracle Manufacturing Operations Center, which then contextualizes and aggregates the data into role based dashboards and specific KPIs including OEE. Partnership with solution providers like Kepware gives Oracle an opportunity to provide connectivity to hundreds of protocols and a wide variety of control equipment.

Oracle enlisted Geometric Limited to perform rigorous testing and certification of the integration between Oracle Manufacturing Operations Center and KepserverEX, and provide a third party view.

As a part of our relationship with Oracle, Geometric has set up an Oracle Manufacturing Operations Center Lab in our Pune facility with the complete test setup including Oracle e-Business Suite, Oracle Manufacturing Operations Center, connectivity solutions from Oracle's shopfloor communication provider partners, and PLCs to mimic a realistic shopfloor systems environment. In this lab, the solutions from Oracle's shopfloor communication provider partners are tested and certified for flawless connectivity and integration with Oracle Manufacturing Operations Center.

This report summarizes test setup, scenarios, procedures and results for Kepware's KEPServerEX OPC server and data connector. As outlined in the report, Kepware performed very well and passed all the test scripts successfully.

Performance Testing Objective

Performance testing is essentially done to analyze the functioning of Oracle Manufacturing Operations Center in a high volume real-time production environment and its integration with the shopfloor communication product. The test ascertains that when data from shopfloor devices is continuously generated at a very high rate, say 1 to 5 sec; and the shopfloor communication product is able to insert the data into the Manufacturing Operations Center device table. This test also checks if Oracle Manufacturing Operations Center is able to accurately record, contextualize and process the data.

Performance testing is carried out to explore the qualities of Oracle Manufacturing Operations Center under high data intensity and volume. The qualities broadly fall in the following categories:

- **Response:** Response time to handle high frequency data
- **Accuracy:** Correct processing of voluminous data
- **Stability:** Reliability under heavy load

Test Scenario

In order to evaluate the integration, data was fed at high frequency and volume, and performance monitoring tests were concluded at different data acquisition frequencies and number of tags.

The following table highlights the key points of the stress tests:

Sr. No.	Scenario	Purpose
1.	Data captured at an interval of 1 min for 5 min from 2 equipments	Base line testing with 2 equipments in which the data is sent to Oracle Manufacturing Operations Center simultaneously from 2 different instances of KEPServer
2.	Data captured at an interval of 5 sec for 5 min from 2 equipments	Increased loading condition with setup same as scenario 1
3.	Data captured at an interval of 1 sec for 5 min from 2 equipments	Extreme loading condition with setup same as scenario 1
4.	Data captured at an interval of 1 sec for 1 hour.	Extreme loading condition for voluminous data sent to Oracle Manufacturing Operations Center from a single instance of KEPServer with 1 equipment configured.
5.	Data captured at an interval of 1 sec for 5 min from 50 equipments	Extreme loading condition with a single instance of KEPServer having 50 equipments configured

Factors affecting the test procedure

- The interval at which the KEPServer reads the data
- Scan rate of the KEPServer should be approximately half the data update rate of the shopfloor communication device
- The interval at which KEPServer writes data into Oracle Manufacturing OperationsCenter

Setup

A test environment has been setup in Geometric’s Oracle Manufacturing Operations Center Lab with following hardware and software:

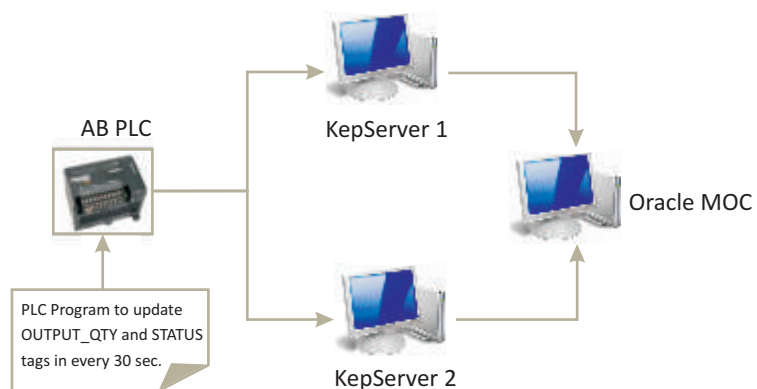
Hardware

	Oracle Manufacturing Operations Center System	Kepware OPC Server with Oracle Connectivity Suite
Processor	Intel Xeon 2 Processor 2.4 Ghz	2CPU, Intel Core 2 , 2.67 Ghz
RAM	4 GB	2 GB
Hard Disk	200 GB	150 GB

Software

Operating System	Windows Server 2003 Standard Edition Service Pack 2
Other Software	<ul style="list-style-type: none"> • KEPServer EX v4.300.449.0-U • Oracle Manufacturing Operations Center (12.1 CU-1) • Oracle OWB 10.2.0.4.36 • Oracle OBIEE 10.1.3.4.0

As shown in the figure, an AB Micrologix 1100 PLC is connected to a KEPServer instance, which has been configured to push data into Oracle Manufacturing Operations Center at a scheduled interval. PLC is programmed to update the tags at an interval of 30 sec. The PLC supplies data to KEPServer. KEPServer then inserts data into Oracle Manufacturing Operations Center at an interval of 1 min.



Test Procedure

During the entire test, the following time factors were taken into account:

- The interval at which the data on the shopfloor communication device is changed
- The interval at which KEPServer reads this data
- The interval at which data is pushed into Oracle Manufacturing Operations Center

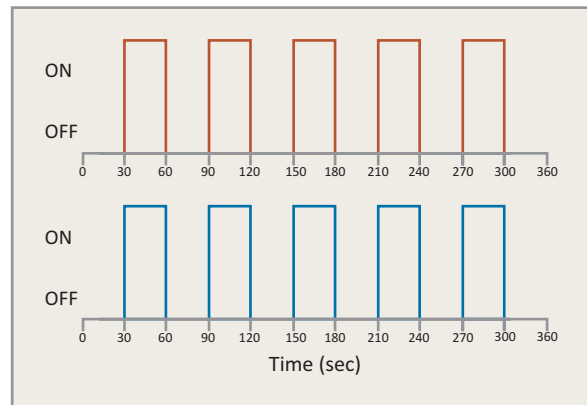
The MicroLogix 1100 PLC was programmed to produce data for 15 tags configured in KEPServer. Multiple time intervals were selected for various performance tests. PLC was switched on first, and after stabilization, KEPServer was enabled to write data into Oracle Manufacturing Operations Center.

Test Results

Scenario	Tag Scan Rate	Tag Change Rate	KEPServer 1						KEPServer 2					
			Quantity			Downtime (min)			Quantity			Downtime (min)		
			Expected	Actual	%	Expected	Actual	%	Expected	Actual	%	Expected	Actual	%
1	30 sec	1 min	5	5	100	150	150	100	5	5	100	150	150	100
	1 sec	1 min	5	5	100	150	150	100	5	5	100	150	150	100
2	500 ms	5 sec	30	30	100	150	150	100	30	30	100	150	150	100
	100 ms	5 sec	30	30	100	150	150	100	30	30	100	150	150	100
3	500 ms	1 sec	150	150	100	150	150	100	150	150	100	150	150	100
	100 ms	1 sec	150	150	100	150	150	100	150	150	100	150	150	100
4	500 ms	1 sec	36000	36000	100	-	-	-	-	-	-	-	-	-
5	500 ms	1 sec	300/eq	300/eq	100	-	-	-	-	-	-	-	-	-

* Detailed test results can be made available upon request

Test Result Graph



Expected vs Actual status

Conclusion

The test results indicate that Oracle Manufacturing Operations Center works flawlessly with KEPServer's OPC server under different circumstances of variable data. KEPServer's performance in writing data at high frequency to Oracle Manufacturing Operations Center is found to be excellent. It may be noted that in actual shop floor conditions, the frequency at which data has to be written is expected to be much lower.

“We place a very high degree of importance on rigorous testing and certification to ensure smooth integration and great customer experience. Geometric has gone beyond the general test scenarios to make sure that our customers can be fully confident about being able to connect to shopfloor equipment and devices using Oracle Manufacturing Operations Center and partner solutions such as Kepware. We are grateful to our partner Kepware Technologies for working with Geometric and helping them build the entire infrastructure for the test laboratory. On their part, Geometric has displayed an amazing understanding of the manufacturing operations space and appreciation for real world customer issues. This case study is a Geometric document but we agree with and fully support their findings.”

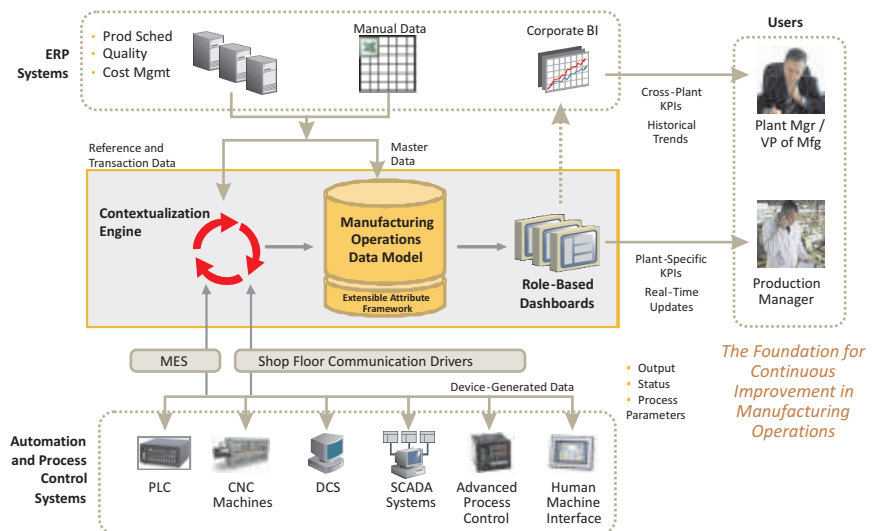
Amit K. Singh
 Director Product Strategy
Oracle Manufacturing Operations Center

About Oracle Manufacturing Operations Center

Oracle Manufacturing Operations Center provides accurate and timely information about product and process quality, insight into manufacturing operations, and performance of manufacturing assets. It solves the complex problem of connecting fragmented disconnected shopfloor data to the business context of the customer’s back office systems. This combination delivers real-time monitoring and analysis of shopfloor operations, a foundation for running Continuous Improvement (CI) programs such as Lean and Six Sigma.

Oracle Manufacturing Operations Center is a pre-built, flexible and extensible solution that provides:

- A data model based on ISA-95 industry standard and extensible attribute framework
- Pre-built extensible adapters for manufacturing execution systems (MES) and ERP systems
- A robust contextualization rules engine to convert raw shopfloor data into meaningful business information
- Pre-built key performance indicators and analytics, delivered in Oracle’s easy to configure and extendable Business Intelligence (BI) technology



“Kepware has worked closely with Geometric to ensure they have a full understanding of our product capabilities, to support this evaluation, and to support Kepware partners requiring solution assistance. We recommend them highly as Oracle Manufacturing Operations Center and Kepware Communication experts.”

Roy Kok
VP, Sales and Marketing
Kepware Technologies

About KEPServerEX

KEPServerEX is the latest generation of Kepware's communication server technology. It is designed to allow quick communication setup to your control systems using a wide range of available 'plug-in' device drivers and components. With support for 1000s of devices via over 150 protocols, KEPServerEX facilitates data accessibility to the client. KEPServerEX also provides a common and self-evident user interface for all drivers, providing consistent access from client applications via Certified OPC or native interfaces, no matter what drivers are being used. Writing data to the Oracle Manufacturing Operations Center is accomplished via the Kepware-Oracle Manufacturing Operations Center option for KEPServerEX. This enables transactions of data to be written to the Manufacturing Operations Center on a time or event basis. Today, through the efforts of direct sales, distribution and embedded partners, Kepware is the leading provider of communications with KEPServerEX shipments exceeding 100,000 units per year.

Contact us

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About Geometric

Geometric is a specialist in the domain of engineering solutions, services and technologies. Its portfolio of Global Engineering services and Digital Technology solutions for Product Lifecycle Management (PLM) enables companies to formulate, implement, and execute global engineering and manufacturing strategies aimed at achieving greater efficiencies in the product realization lifecycle.

Geometric specializes in providing Manufacturing IT solutions and services to customers worldwide, enabling them to achieve their business goals such as improve product quality, reduce cost & bring new level of agility in customer responsiveness through excellence in Manufacturing Operations Management (MOM) and Digital Manufacturing (DM).

Headquartered in Mumbai, India, Geometric was incorporated in 1994 and is listed on the Bombay and National Stock Exchanges. The company recorded consolidated revenues of Rupees 4.86 billion (US Dollars 121.6 million) for the year ended March 2008. It employs close to 3000 people across 10 global delivery locations in the US, France, Romania, India, and China. Geometric is assessed at SEI CMMI Level 5 for its software services and ISO 9001:2000 certified for engineering operations. For further details, please visit www.geometricglobal.com.

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