

# Performance Testing Results & Sizing Guidelines for your SAP MII Implementation

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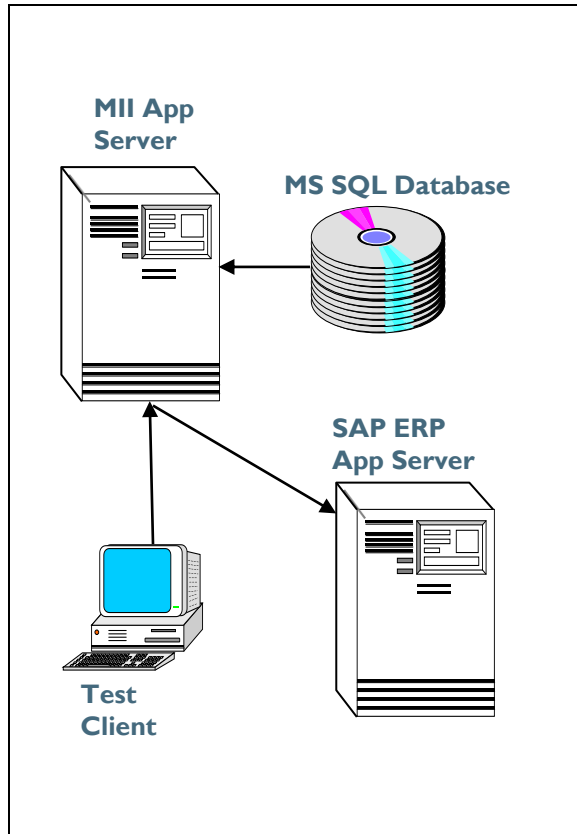
Assumptions about the reader:

1. Understands the architecture of MII, Plant Connectivity (PCo), and ERP
2. Understands the concepts of SAP System integration

Objectives:

1. Report the impact of high volume scenarios using v12.1
2. Compare results from scenarios in v12.1 to v12.0
3. Help customers in sizing their implementation based on their application performance requirements

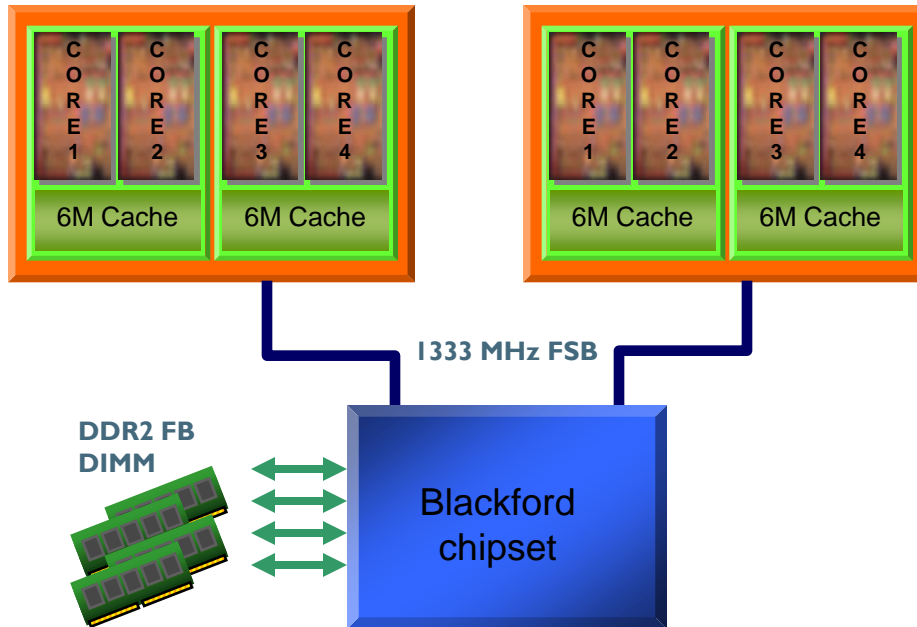
# Test System Landscape



	SAP MII	SAP ERP
Platform Name	Intel® Server Systems SR1560SF (2 socket system)	Intel® Server Systems SR1560SF (2 socket system)
Processor	Intel® Xeon® processor 5400 series (2)	Intel® Xeon® processor 5400 series (2)
Frequency	3.16GHz	3.16GHz
Memory	20GB (DDR2, 800 MHZ FB-DIMM)	4GB (DDR2, 800 MHZ FB-DIMM)
Storage	1 x 80GB 15k RPM Seagate SAS Drive 1 X 450GB 10k RPM Seagate SAS Drive	1 x 80GB 15k RPM Seagate SAS Drive 1 X 450GB 10k RPM Seagate SAS Drive
OS	Microsoft Windows Server 2003 Enterprise x64 Edition Service Pack 2	Microsoft Windows Server 2003 Enterprise x64 Edition Service Pack 2
Software Version	MII v12.1 & v12.0 PCo 2.0.1	ERP v6.0

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# Intel® Xeon® 5400 processor series features



- Quad-core
- 12MB L2 Cache
- 1333 MHz FSB
- DDR2 FB DIMM Memory
- 64 bit Instruction Set

- With Shared L2 cache, cache lines are not duplicated which leads to improved performance
- DDR2 FB DIMM provide faster memory access
  - Good for applications that are memory intensive

\* Xeon is a trademark of Intel in US and other countries.

## Scenarios Tested

- Synchronous ERP Communication Protocols (ES, JRA, & JCo)
- XML Document Manipulation (XSLT vs. BLS Actions)
- Plant Connectivity (PCo) Message Processing to a database
- Asynchronous Messaging Interface (HTTP to MII)
- Real-World 100 & 500 users with background message processing

## Configurations tested for each of the above scenarios

- 4 JVM Nodes each with 4GBs of RAM
- 2 JVM Nodes each with 8GBs of RAM
- 1 JVM Node with 16GBs of RAM

How is each of the scenarios impacted by different NW configurations, which is best and why?

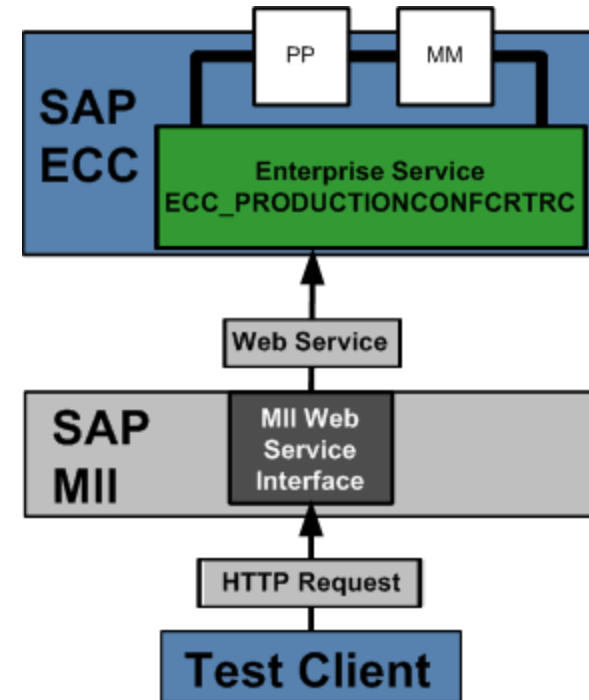
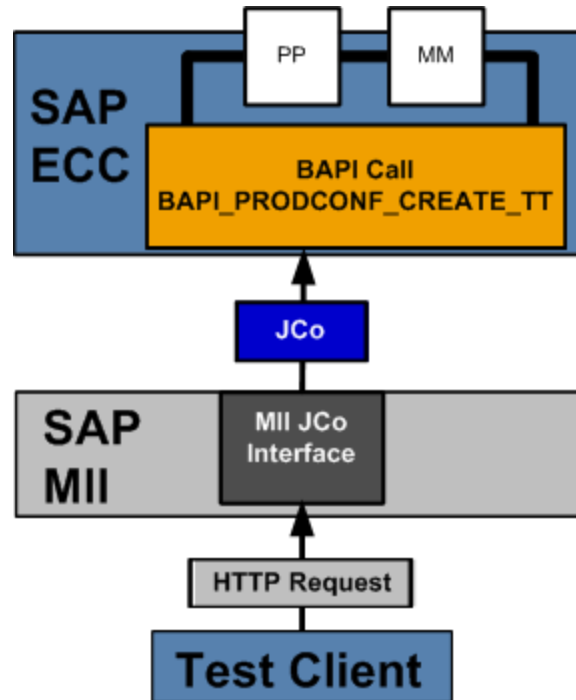
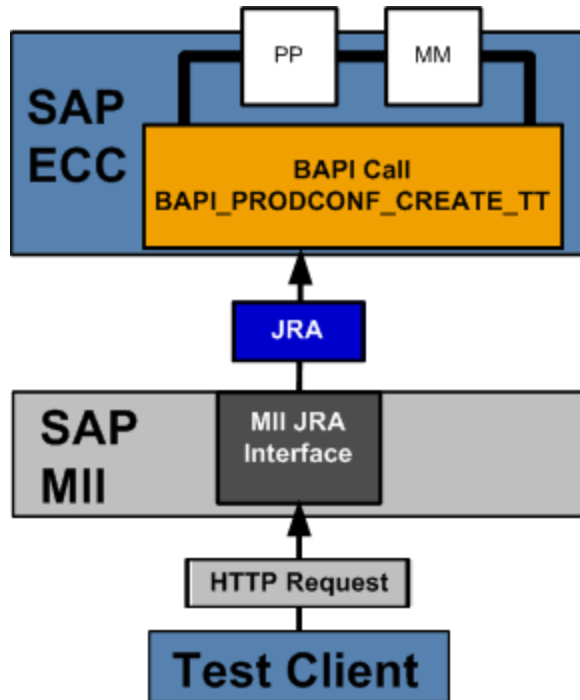
# Scenario 1: Synchronous Communication with ERP over 20 minutes



SAP JRA

SAP JCo

SAP Enterprise Service

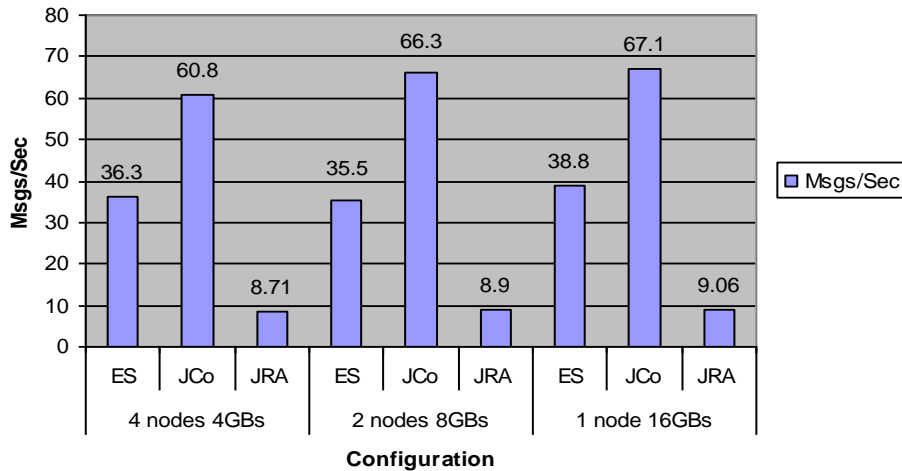


- There were three systems involved in the testing (Testing Client -> MII -> ERP)
- Each of the above scenarios was tested with three different NetWeaver CE configurations
- The tests were run on both v12.1 and v12.0 for comparative analysis

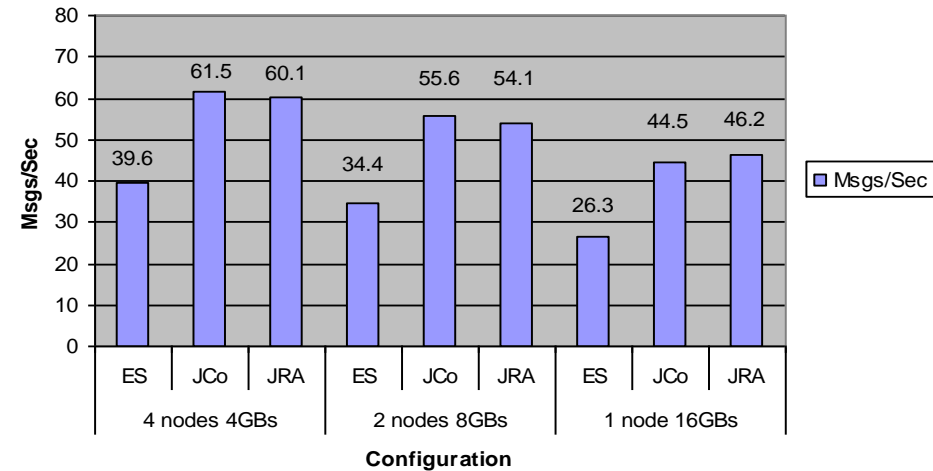
# Scenario 1: Test Results



Synchronous Communication to ERP (v12.1)



Synchronous Communication to ERP (v12.0)



## SAP NetWeaver CE with MII v12.1

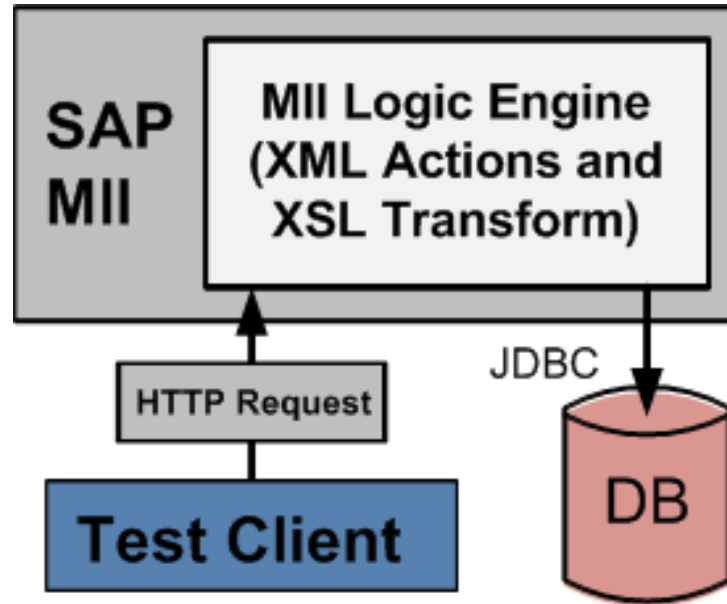
Configuration	Interface	Msgs/Sec	Total Msgs
4 nodes 4GBs	ES	36.3	43631
	JCo	60.8	72929
	JRA	8.71	10450
2 nodes 8GBs	ES	35.5	42662
	JCo	66.3	79579
	JRA	8.9	10687
1 node 16GBs	ES	38.8	46557
	JCo	67.1	80581
	JRA	9.06	10875

## SAP NetWeaver 2004s with MII v12.0

Configuration	Interface	Msgs/Sec	Total Msgs
4 nodes 4GBs	ES	39.6	47470
	JCo	61.5	73860
	JRA	60.1	72074
2 nodes 8GBs	ES	34.4	41340
	JCo	55.6	66727
	JRA	54.1	64978
1 node 16GBs	ES	26.3	31527
	JCo	44.5	53420
	JRA	46.2	55489



## Scenario 2: XML Transformation over 2 hours

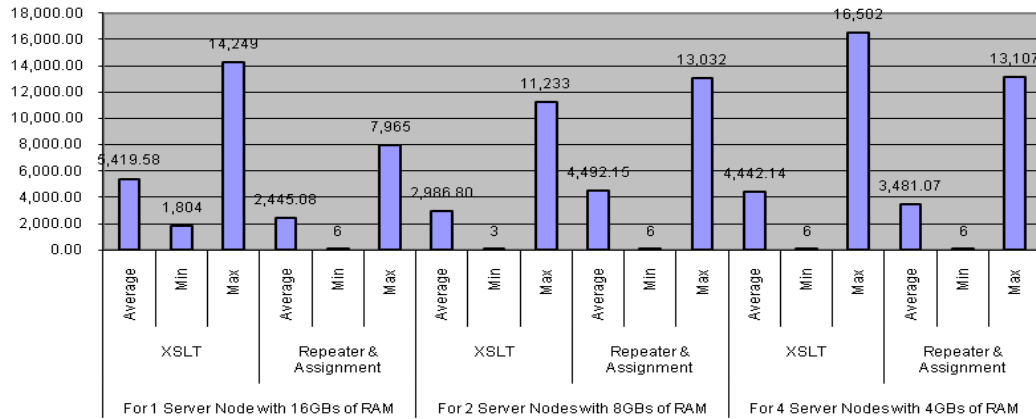


- There were two systems involved in the testing (Testing Client -> MII & MS SQL DB)
- The MS SQL DB and SAP MII applications were on the same server
- Each of the above scenarios was tested with three different NetWeaver CE configurations
- The tests were run only on MII v12.1
- The size of the XML message used was 1MB

# Scenario 2: Test Results

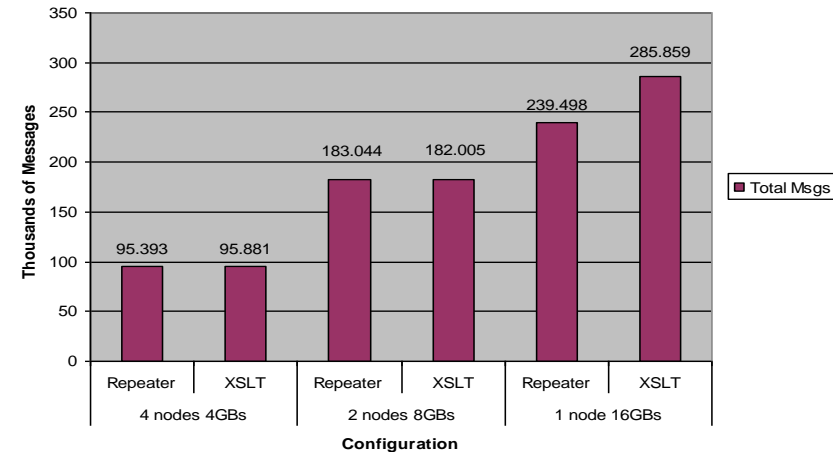


### XML Transformations - Available RAM (MBs)



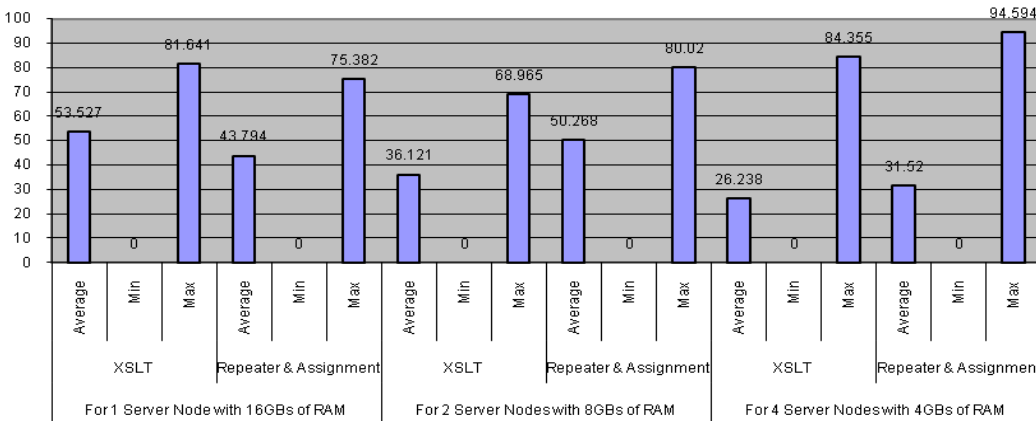
■ Available RAM (MBs)

### Total Messages (v12.1)



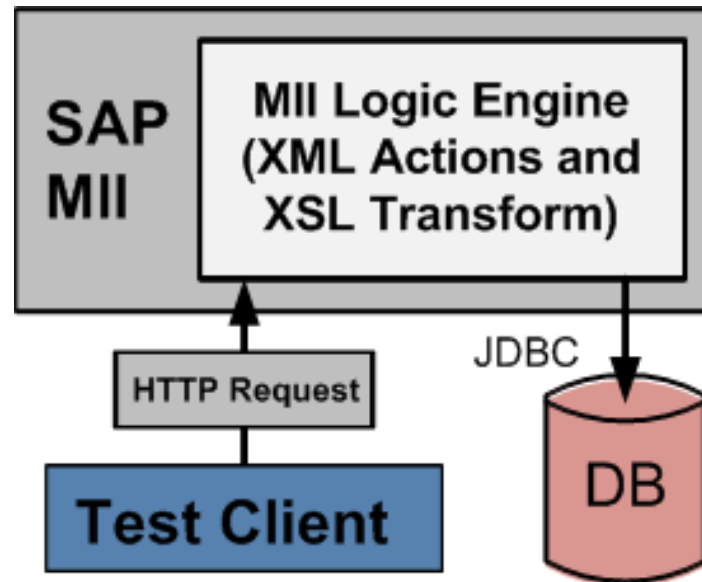
■ Total Msgs

### XML Transformations - %Processor Time



■ %Processor Time

## Scenario 3: PCo Messages to MII over 2 hours

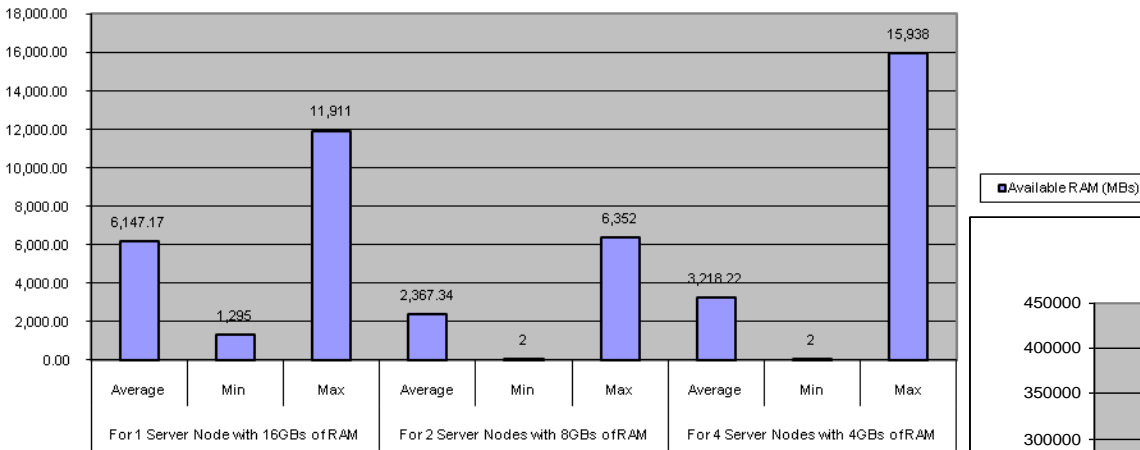


- There were two systems involved in the testing (Testing Client -> MII & MS SQL DB)
- The MS SQL DB and SAP MII applications were on the same server
- Each of the above scenarios was tested with three different NetWeaver CE configurations
- The tests were run only on MII v12.1
- The XML Message was the same message generated by a PCo Notification
  - The size of the XML message used was approximately 1KB

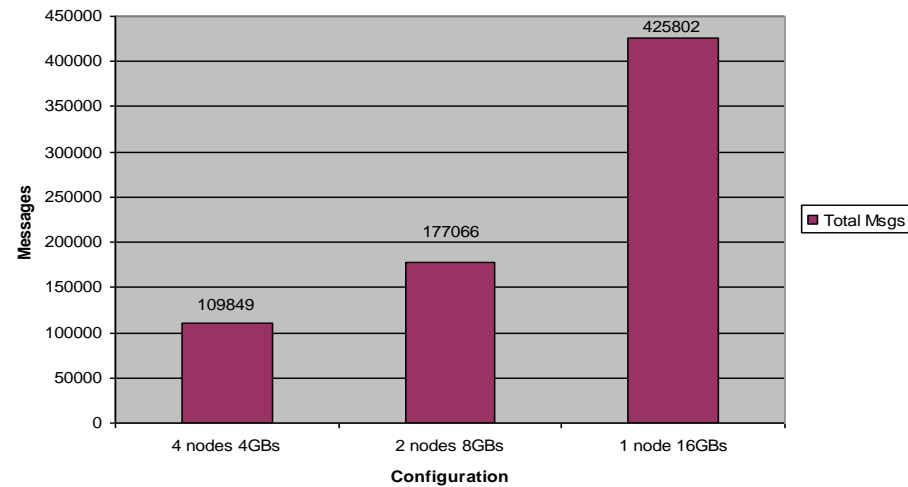
# Scenario 3: Test Results



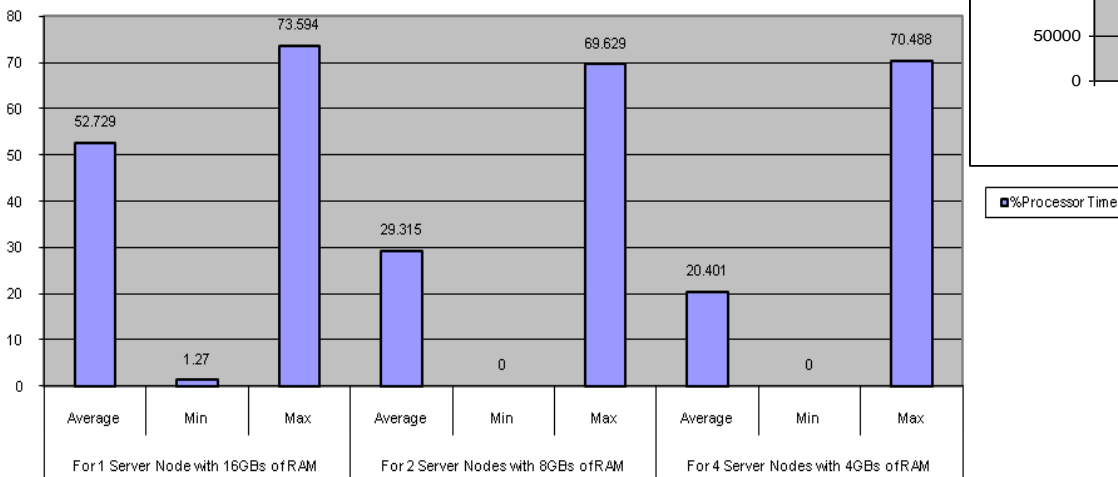
PCo Msgs. to DB - Available RAM (MBs)



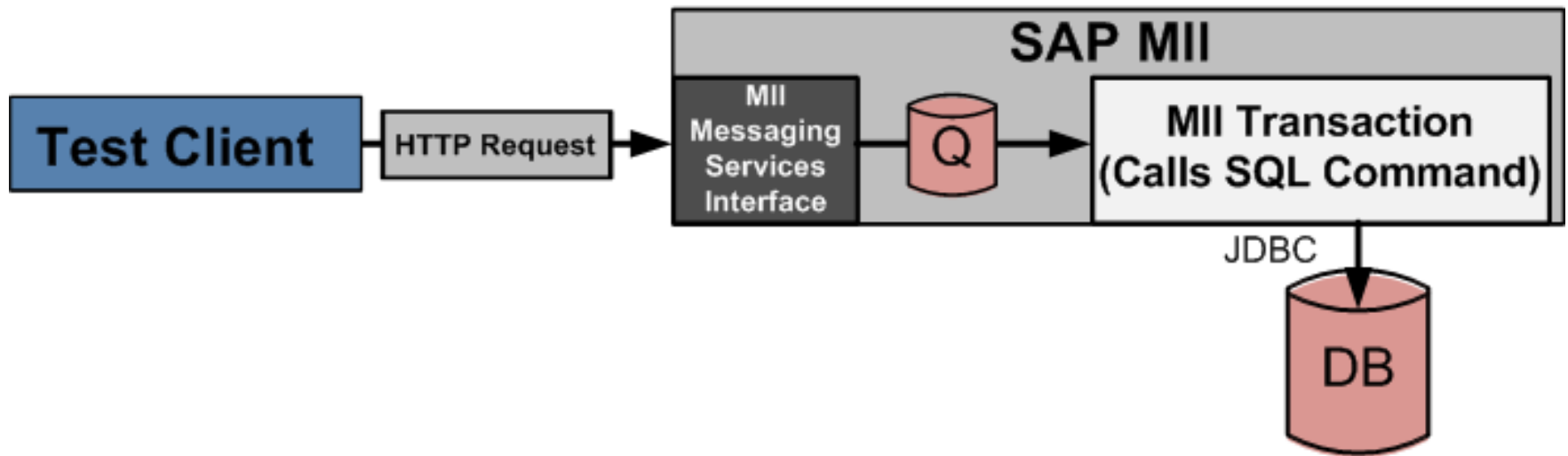
Total Messages



PCo Msgs. to DB - %Processor Time



# Scenario 4: Asynchronous Message Interface

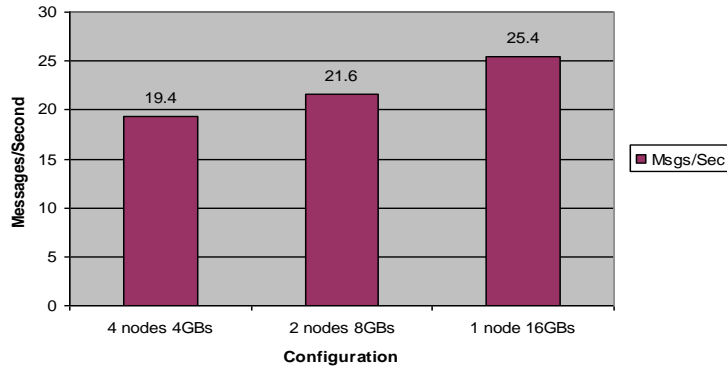


- There were two systems involved in the testing (Testing Client -> MII & MS SQL DB)
- The MS SQL DB and SAP MII applications were on the same server
- Each of the above scenarios was tested with three different NetWeaver CE configurations
- The tests were run on MII v12.1 and v12.0 for comparative analysis
- The size of the XML message used was a sample LOIPRO document
  - The XML document is approximately 27KB

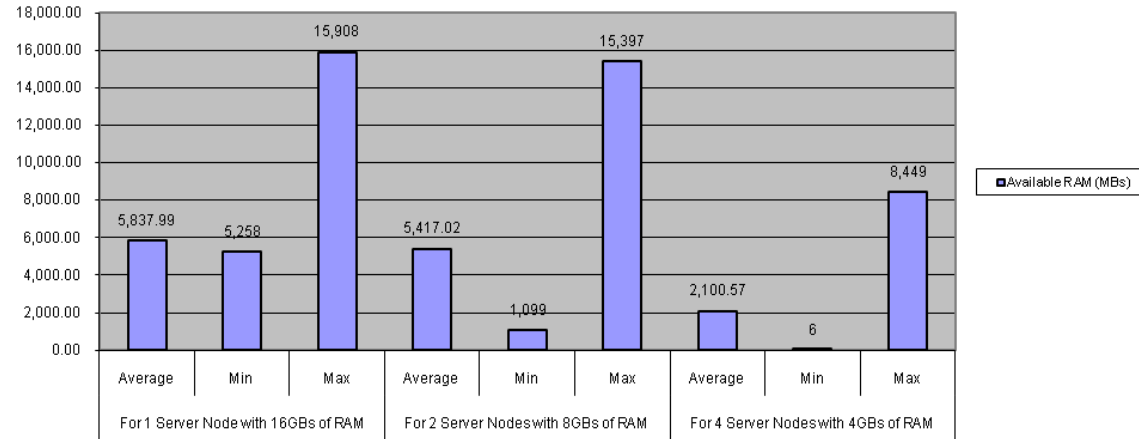
# Scenario 4: Test Results



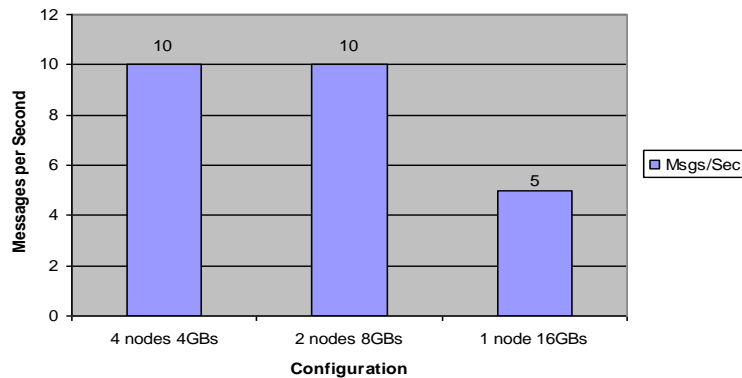
### Messaging Services v12.1



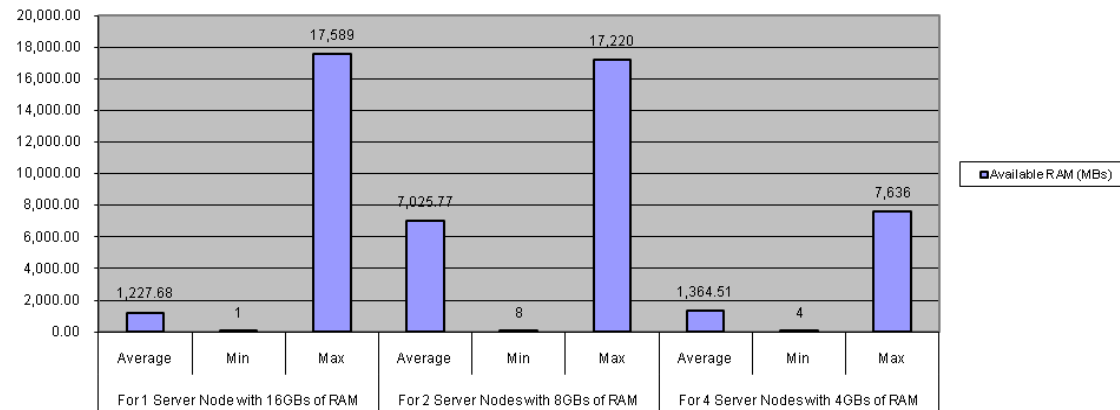
### v12.1 - Async. Comm. to DB - Available RAM (MBs)



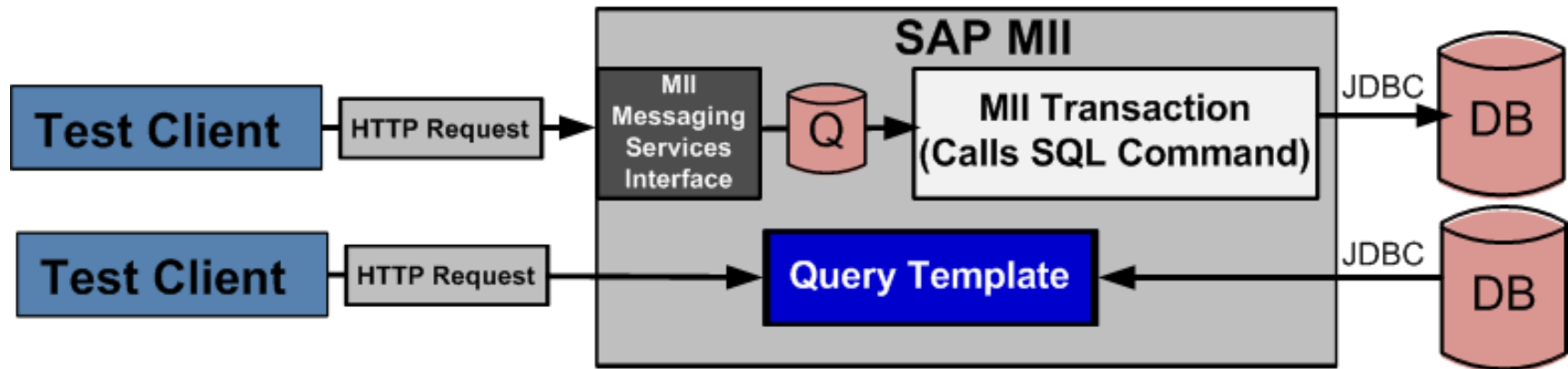
### Messaging Services v12.0



### v12.0 - Async. Comm. to DB - Available RAM (MBs)



# Scenario 5&6: Users & Background Processing



- There were two systems involved in the testing (Testing Client -> MII & MS SQL DB)
- The MS SQL DB and SAP MII applications were on the same server
- Each of the above scenarios was tested with three different NetWeaver CE configurations
- The tests were run on MII v12.1
- The simulated client was mimicking an applet request for data from the database
- The size of the asynchronous XML message used was a sample LOIPRO document
  - The XML document is approximately 27KB

## For 100 Users:

		Pages/Sec	Disk Queue Length	%Processor Time	Available RAM (MBs)
For 1 Server Node with 16GBs of RAM	Average	0.712	0.224	3.02	15,963.45
	Min	0	0.003	0.039	15,767
	Max	309.004	30.155	13.223	16,476
For 2 Server Nodes with 8GBs of RAM	Average	0.485	0.443	59.512	10,476.34
	Min	0	0.005	0.078	10,221
	Max	1.40	20.562	76.387	10,790
For 4 Server Nodes with 4GBs of RAM	Average	0.019	0.295	3.218	8,880.85
	Min	0	0.003	0.059	8,783
	Max	0.80	30.294	4.766	8,978

## For 500 Users:

		Pages/Sec	Disk Queue Length	%Processor Time	Available RAM (MBs)
For 1 Server Node with 16GBs of RAM	Average	0.119	0.398	13.334	5,004.33
	Min	0	0.003	0	4,892
	Max	151.483	29.763	15.684	5,070
For 2 Server Nodes with 8GBs of RAM	Average	0.02	0.382	13.381	9,265.09
	Min	0	0.003	0	9,179
	Max	0.80	29.776	15.879	9,353
For 4 Server Nodes with 4GBs of RAM	Average	0.061	0.374	13.959	9,133.99
	Min	0	0.004	0.078	8,939
	Max	60.38	29.63	32.422	9,943

\* It is important to note that for the 100 user test with 2x8GB test the processor spiked due to a system process that was kicked off during the test



- In general, performance increases from v12.0 to v12.1
- NW CE configuration had little impact on the real-world scenarios but a large impact on the high volume scenarios
- The MII Application is memory intensive when dealing with high message volumes and the scalability of the NetWeaver platform allows the application to take advantage of system resources yielding a large performance benefit
- For communicating with ERP there is a clear performance bias towards JCo over both Enterprise Service and JRA requests which is currently under investigation by the SAP NetWeaver Development team for improvement so your results will be different.
- Specific configurations of nodes size, memory need to follow standard NW recommendations. This analysis is not a recommendation but just an input to the configuration design process and where and how to look for performance bottlenecks.
- Demonstrating memory impact on large XML processing across various different configurations helps to identify system requirements and expected performance

## Key Learning Points (Continued)



- The Real-World scenario tests demonstrate that the MII Application operates with low CPU demand for both the 100 & 500 user tests.
- At high loads the underlying disk subsystem will be taxed. Consequently, the system performance will be impacted as the application starts paging to catch up with the load. Staying ahead of this is important to system performance and stability.
- What gets measured gets improved, having a strong hardware and software administration team is vital in maintaining the health and performance of your investments.
- Invest in hardware for the long term goals of your application
  - The MII Application is a toolkit so it will continue to grow with your business
  - **“Hardware is Cheap!”** and a stitch in time saves nine
  - RAM is much cheaper than other system components!

## Synchronous Communication with ERP

- Common integration of shop-floor to ERP is Production Confirmation requests in order to track production levels

## XML Structure Transformation

- XLST vs. Action approach to highlight best practice recommendations and design methodology of transactions

## PCo Message Handling

- Show the theoretical maximum for number of event messages that can be processed and how the PCo & MII products interact

## Asynchronous Message Processing

- Asynchronous message processing from the ERP system is an important integration touch point between the systems

- Real world scenario load was based on the following calculation:
  - $(\# \text{ users} * 4 \text{ Applets on a page} * 1 \text{ click}) / 10 \text{ seconds} + (\# \text{ users} * 4 \text{ Applets on a page} * 1 \text{ click}) / 30 \text{ seconds}$
  - Each applet makes 3 requests to MII, get the Query & Display templates then get the data and the grinder script mimics each.
- JRA is currently being investigated at by the NW CE development team to minimize Disk I/O operations
- The PCo messages were simulated using an open source tool called “The Grinder” but the XML message is an actual PCo XML. This was done to record and control the volume and speed at which the messages were sent.
- The Grinder, MII, and ERP instances were all on separate machines (The DB was on the same machine as MII but was not the NW CE DB instance)



- SAP NetWeaver CE v7.1 SDN Homepage: <https://www.sdn.sap.com/irj/sdn/nw-ce-general>
  - SAP NetWeaver CE v7.1 Help Documentation and Release Notes: [http://help.sap.com/saphelp\\_nwce10/helpdata/en/46/65695eec515de4e10000000a1553f6/frameset.htm](http://help.sap.com/saphelp_nwce10/helpdata/en/46/65695eec515de4e10000000a1553f6/frameset.htm)
  - SAP NetWeaver CE v7.1 Help Documentation for ICM Parameters: [http://help.sap.com/saphelp\\_nw70/helpdata/EN/95/1528d8ca4648869ec3ceafc975101c/content.htm](http://help.sap.com/saphelp_nw70/helpdata/EN/95/1528d8ca4648869ec3ceafc975101c/content.htm)
  - SAP NetWeaver CE v7.1 Help Documentation for ICM Parameter Suggestions: [http://help.sap.com/saphelp\\_nwce10/helpdata/en/56/2e453cabf4ef6fe10000000a114084/content.htm](http://help.sap.com/saphelp_nwce10/helpdata/en/56/2e453cabf4ef6fe10000000a114084/content.htm)
  - SAP JVM Help Documentation: [http://help.sap.com/saphelp\\_nwce10/helpdata/en/47/dc90b4ef17452289f9128b8c2bbd77/frameset.htm](http://help.sap.com/saphelp_nwce10/helpdata/en/47/dc90b4ef17452289f9128b8c2bbd77/frameset.htm)
  - Sun Documentation on Performance Tuning Pointers: <http://java.sun.com/performance/reference/whitepapers/tuning.html>
  - Sun Documentation on v1.5 garbage collection settings: [http://java.sun.com/docs/hotspot/gc5.0/gc\\_tuning\\_5.html](http://java.sun.com/docs/hotspot/gc5.0/gc_tuning_5.html)
  - Sun Documentation on Memory Allocation: <http://java.sun.com/docs/hotspot/ism.html>
  - Sun Documentation on JVM Options: <http://blogs.sun.com/watt/resource/jvm-options-list.html>
  - Sun Documentation on the JVM Options: <http://java.sun.com/javase/technologies/hotspot/vmoptions.jsp>
  - IBM Performance Tuning website for the JVM memory settings: <http://publib.boulder.ibm.com/infocenter/series/v5r4/index.jsp?topic=/rzamy/50/admin/prftunejmem.htm>
  - Microsoft Reference for all of the Performance Monitor Counters: [http://technet.microsoft.com/en-us/library/cc776490\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc776490(WS.10).aspx)
  - Basic Overview of Windows Performance Monitor: [http://www.windowsnetworking.com/articles\\_tutorials/Windows-Server-2003-Performance-Tuning.html](http://www.windowsnetworking.com/articles_tutorials/Windows-Server-2003-Performance-Tuning.html)
  - Windows Server 2003 Paging Configuration: <http://stackoverflow.com/questions/39059/how-do-i-run-my-app-with-large-pages-in-windows>
  - How to Browse, Test, Configure, and Consume and Enterprise Service in ECC: <https://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/607557cd-37fc-2b10-9091-cb993c46b152>
  - SAP MII v12.0 Installation and Configuration Guide: <https://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/f09005e1-fd91-2b10-7c9c-d580a30ba59c>
  - Performance of Intel® Xeon® 5500 Series processors  
[http://download.intel.com/business/resources/briefs/xeon5500/xeon\\_5500\\_performance.pdf](http://download.intel.com/business/resources/briefs/xeon5500/xeon_5500_performance.pdf)
- Relevant SAP Notes**
- 892486 - AS Java Reconnect Parameter Optimization

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