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Vertafore is the leading provider of software and information to the insurance distribution channel, including independent agents, brokers, MGAs, carriers and reinsurers. Vertafore leverages a unique industry presence to deliver meaningful solutions—powerful technology, critical information and robust insights to help organizations effectively respond to business challenges and capture new opportunities. Vertafore solutions are helping more than 17,000 customers and 500,000 end users gain a competitive advantage to accelerate their business performance.



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ImageRight Scalability White Paper

Technical White Paper

IMAGERIGHT SCALABILITY TESTING

2,000 CONCURRENT USERS



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Executive Summary

Scalability testing measures how well a system handles an increase in work load. The load can be defined in terms of number of users, number and type of transactions and/or other factors. The specific hardware used has a significant effect on the results. Companies use the metrics from scalability testing to evaluate whether a solution can be expected to scale to meet their growing needs.

In December 2010, Vertafore® conducted scalability testing on ImageRight® version 5.3. Built specifically for the insurance industry, ImageRight is an enterprise content management and workflow system that helps companies improve their processes, reduce expense ratios and grow their businesses.

The testing was conducted on a load of 2,000 users on a single application server, in a specific hardware environment, using complex workflows. The objective was to determine the response time for various transactions and business processes in order to meet generally acceptable benchmarks.

The results demonstrate that ImageRight scales well for 2,000 users. Key findings include the following:

- Transaction response time was favorable for all transactions. For transactions related to content access and general workflow, response time averaged less than one second. Transaction response time represents the time taken by a system to complete a defined transaction.
- Average CPU utilization on the ImageRight application server and database server remained well below 50 percent throughout the tests. In general, Microsoft considers an average of 80 percent or less the preferred value. CPU utilization indicates how much load a system can handle before bottlenecks occur.

DESCRIPTION OF SIMULATED USER ROLES	
Number of Concurrent Users	2,000
Average transaction response time—Content access transactions	0.575 seconds
Average transaction response time—General workflow transactions	0.721 seconds
Average CPU utilization—ImageRight application server	31.02%
Average CPU utilization—Database server	45.68%

Additional testing was conducted to measure how ImageRight performs when the system processes content access and workflow transactions at the same time as automated content imports. Described in the Additional Testing section of this paper (see page 11), the results demonstrate that performance is comparable with and without the additional overhead of automated content imports.

Test Definition

This test included 2,000 virtual users and ran for a period of four hours. Eight virtual users were initialized and started running their assigned roles every 10 seconds. The user roles were simulated and allocated as described below.

User Profile and Distribution

Vertafore factored in “think times” for each role to account for the time real people spend entering, reviewing or evaluating data on screen. The think times ranged from 5 to 15 minutes, depending on the task.

For each user role in the table below, tasks were continually repeated until the test ended.

SUMMARY OF SCALABILITY STATISTICS		
User Role	Number of Users	Tasks Performed
To-do list processor	1,216	Fetch a task from the to-do list, select a task in the to-do list, lock and open the file, then release the task. Each to-do list processor worked from five to fifteen tasks in each step.
Auto processor	304	Randomly select a workflow and step in the to-do list and auto process ten tasks from that workflow and step.
File viewer	400	Use the Open file dialog box to retrieve files, select a file in the dialog box, open the file, then browse through the pages.
File attacher	40	Use the Open file dialog box to retrieve files, select a file in the dialog box, open the file, then attach five pages to a new document in the opened file.
Indexer	40	Select a workflow index step in the to-do list and index the document into a non temporary file.

Transaction Descriptions

There were three types of transactions used in this test:

- **Content access transactions** involve searching for and opening a file from the ImageRight client application and retrieving pages that belong to a document within the file.
- **General workflow transactions** enable users to access and process tasks. This includes locking and opening a task and, once completed, releasing the task to the next logical step in the workflow.
- **Specialized workflow transactions** include less frequently performed actions such as task fetching, auto processing and indexing. These transactions typically involve time-intensive tasks, such as providing the system with file information, updating the file with this information, releasing the task and delivering the next task to be worked.

TRANSACTIONS USED IN THIS TEST

Content Access Transactions

Transaction	User Performing the Transaction	Description
File search	File viewer or file attacher	Search for a file within a selected drawer by specifying the file number.
File open	File viewer or file attacher	Open the file from the file search dialog box.
Page retrieval	File viewer	Select a document and browse through its pages.

General Workflow Transactions

Transaction	User Performing the Transaction	Description
Lock and open	To-do list processor	Lock and open a task from the to-do list.
Task release	To-do list processor	Release the task to be processed by the workflow processor.

Specialized Workflow Transactions

Transaction	User Performing the Transaction	Description
Auto process lock and open	Auto processor	Automatically lock and open tasks and then release them from the to-do list, one after the other, until all tasks in the list are completed.
Fetch tasks	To-do list processor	Retrieve assigned tasks from the to-do list by selecting a specific workflow and step.
Index task and release	Indexer	Associate scanned documents with appropriate files and create workflow tasks.

Key Findings

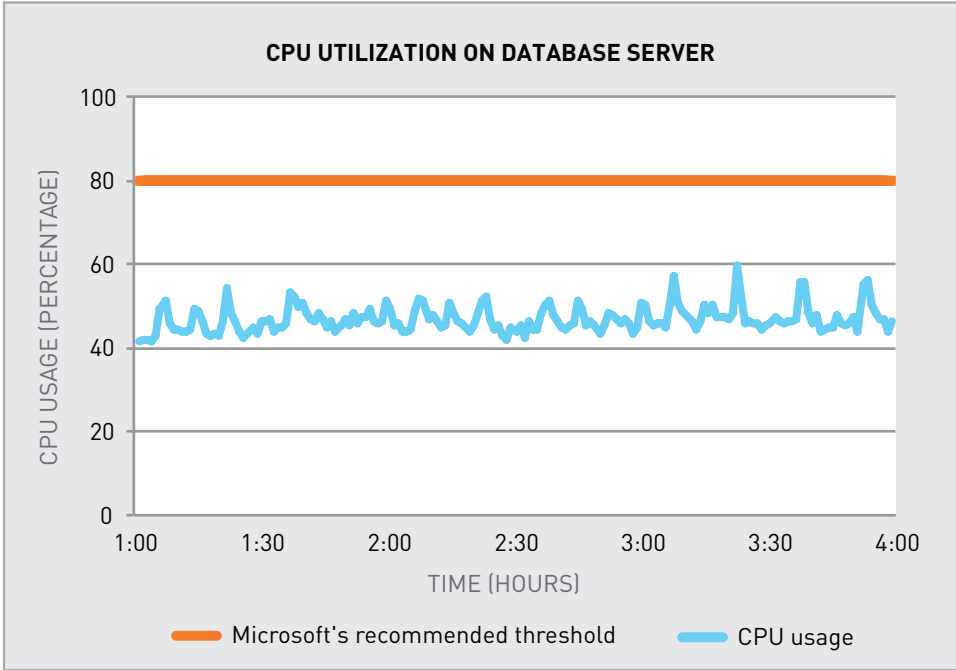
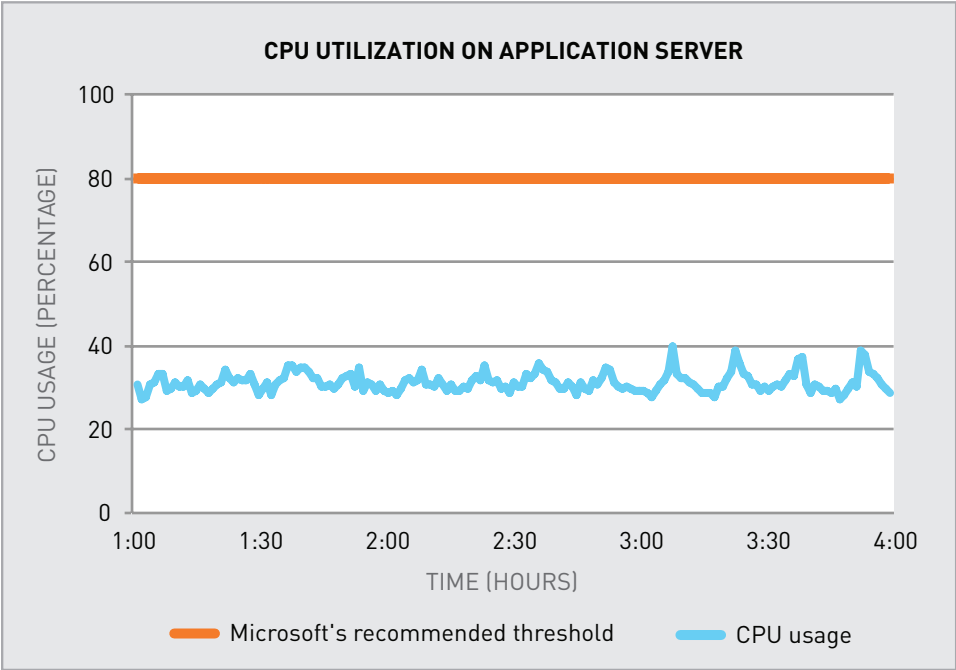
Transaction Response Time

Transaction response time is the time an application takes to complete a defined activity. In this test, ImageRight met the goal of sub-second response time for all content access and general workflow transactions.

AVERAGE RESPONSE TIME PER TRANSACTION	
Content Access Transactions	Time (in Seconds)
File search	0.827
File open	0.625
Page retrieval	0.274
Average	0.575
General Workflow Transactions	Time (in Seconds)
Lock and open	1.025
Task release	0.416
Average	0.721
Specialized Workflow Transactions	Time (in Seconds)
Auto process lock and open	0.958
Fetch tasks	1.939
Index task and release	3.183
Average	2.027

Server CPU Utilization

CPU utilization measures whether bottlenecks are likely to occur on a system with a specified number of users. The following charts show that, on the ImageRight application server and the database server, CPU utilization averaged below 30 and 50 percent, respectively. Microsoft considers an average of 80 percent or less the preferred value.



Memory Usage

A steady level of memory usage on the servers, regardless of the number of transactions, is critical to performance. There were no memory leaks during scalability testing, indicating that memory usage is satisfactory for the hardware running each of the servers.

SERVER AVAILABLE MEMORY (IN GB)			
Server	Minimum	Maximum	Average
Application server	6.38	6.55	6.43
Database server	16.20	22.35	16.45

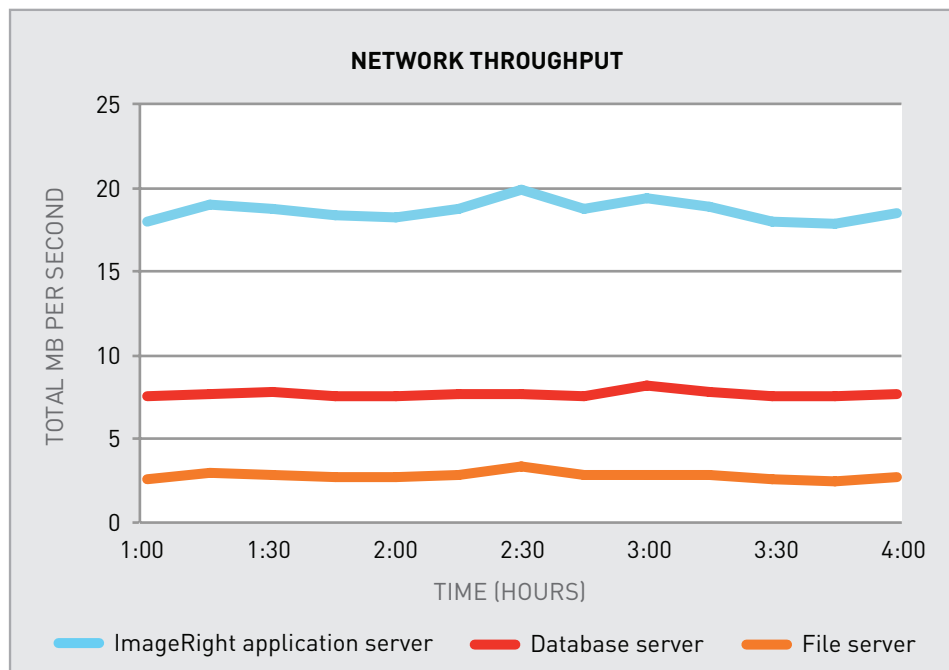
The application server's memory usage fluctuations were negligible throughout the test while maintaining an average of 6.43GB available memory. The memory usage was steady, indicating no concerns for leaks or paging to disk.

On the database server, memory usage fluctuated by 6GB throughout the test. The available memory at the completion of the test was 16GB.

Other Results

Network Throughput

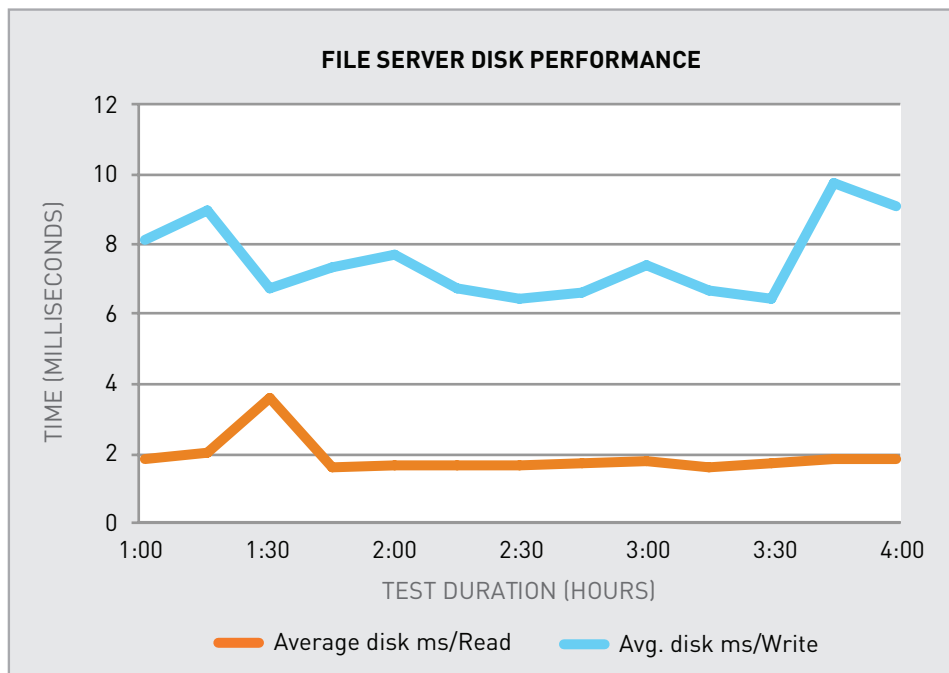
Network throughput measures the amount of data transferred through a network or processed in a specified amount of time. The chart below depicts network throughput in total megabytes per second for all core servers.



Network throughput for the application server averaged approximately 18MB per second during peak time. The database server averaged approximately 7MB per second, and the file server averaged 3MB per second. The average size for requested images was about 50KB. The network topology was sufficient to accommodate the throughput generated during testing.

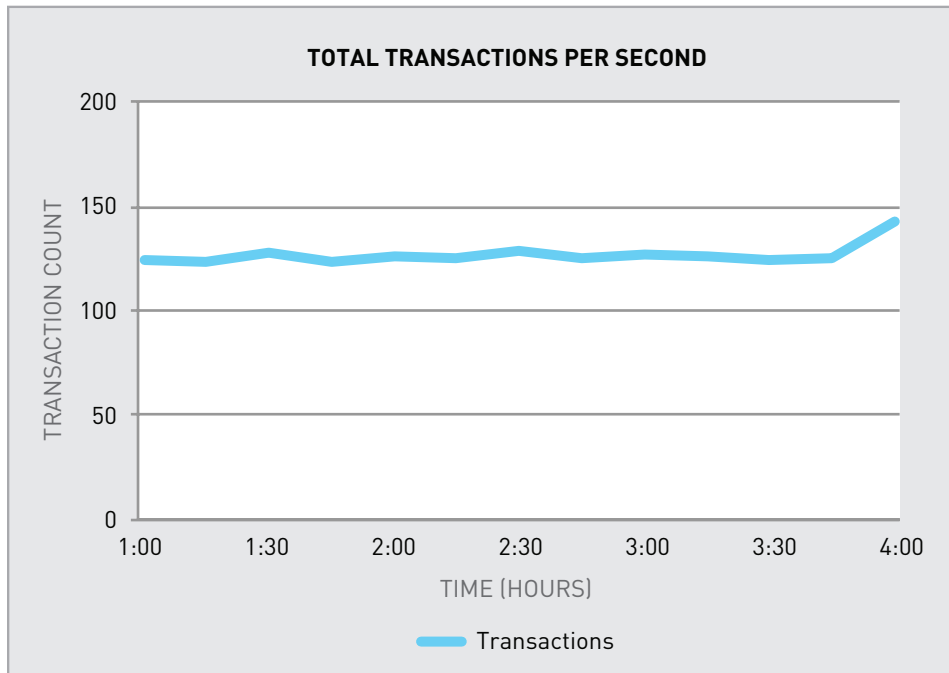
File Server Disk Performance

The chart below shows disk performance for the file server used in the test. All image files existed on a SAN device with 10K RPM drives. Disk read access to this device averaged 7 milliseconds. Disk write access averaged 2 milliseconds for the test duration.



Transaction Activity

Each request made from the client application to the server is a transaction. The chart below indicates the total number of transactions per second executed under load during the test period. There was an increase in total transaction count during the last hour of testing, which can be attributed to the randomness of user activity during testing.

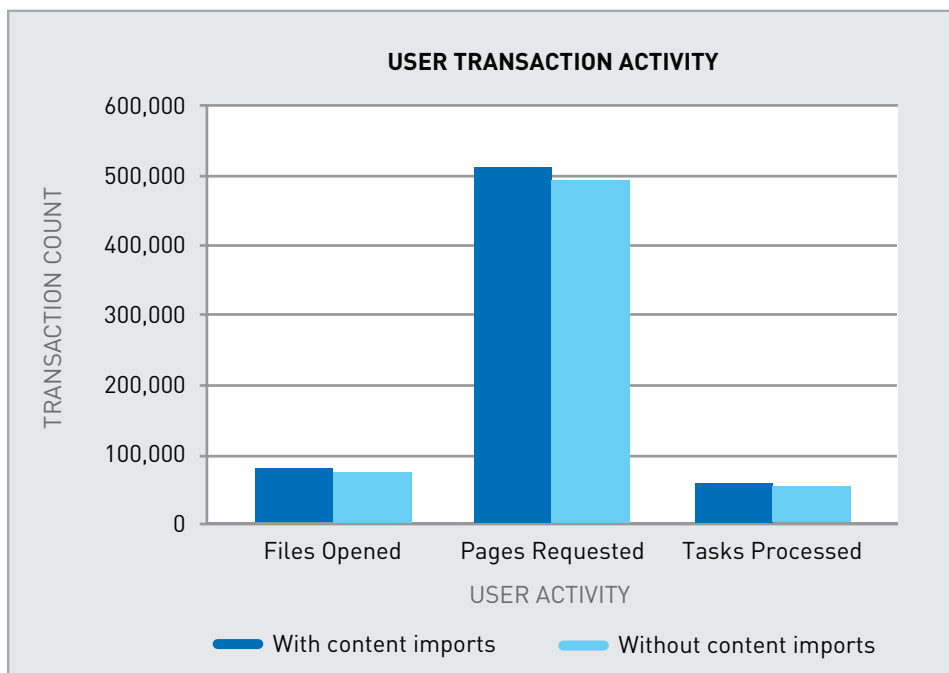


Additional Testing

Automated Content Imports

Vertafore conducted additional testing, which involved processing content access and workflow transactions while simultaneously processing automated content imports. These document and database imports were processed via ImageRight import processes (FUP Import, COLD Name Based Import and COLD File Index Import) and the ImageRight e-mail receiver service.

User transaction activity, as illustrated below, was comparable when testing with and without automated content imports.



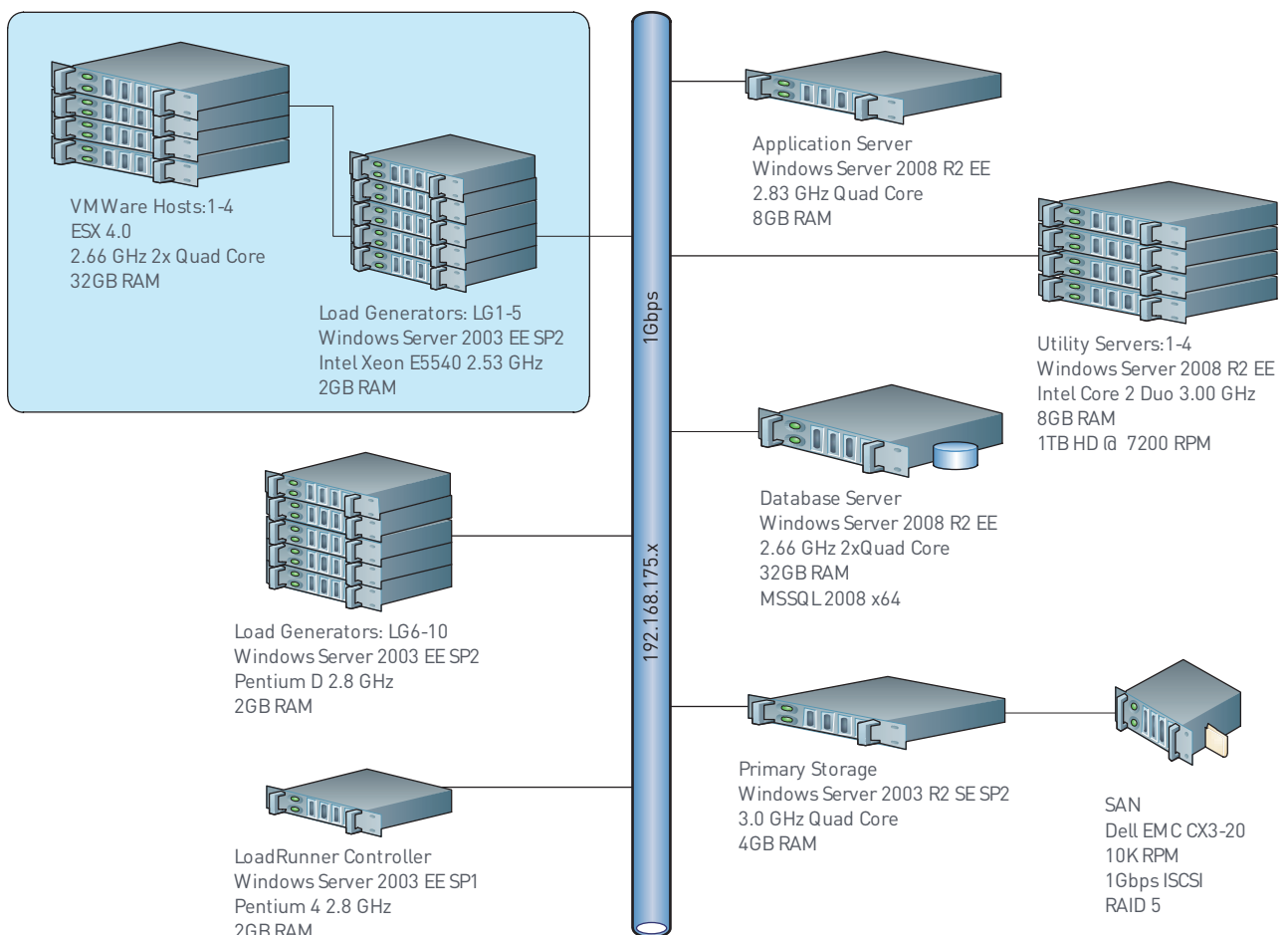
Testing Infrastructure

The testing infrastructure included an application server, a database server, four utility servers and a SAN device for image storage. Testing was performed on an isolated network with an average latency under 1 millisecond.

In addition, the tests were run with native security, as well as an Active Directory enabled environment, and the results were comparable.

The test was performed using a variety of physical and virtual machines, communicating over 1 Gbps connections. All hardware hosting the application was physical hardware.

Network Layout



Hardware Specifications

Following are the hardware components used in this testing, including the software installed on each.

HARDWARE DESCRIPTION			
Description	Application server	Database server	File server
Number of servers	One	One	One
Manufacturer	Dell	Dell	Dell
Model	OptiPlex 755	PowerEdge M600	PowerEdge 1950
Operating system	Windows Server 2008 R2 EE	Windows Server 2008 EE	Windows Server 2003 SE SP2
Processor	Intel Core 2 Q9550 2.83 GHz Quad Core	Intel Xeon E5430 2.66 GHz [2x Quad Core]	Intel 3.00 GHz Quad Core
RAM	8GB	32GB	4GB
Service packs	n/a	n/a	Service Pack 1
Ethernet controller	1 Gbps	1 Gbps	1 Gbps
Software	n/a	SQL Server 2008	n/a
Applications installed	<ul style="list-style-type: none"> ImageRight application server ImageRight management console 	n/a	n/a
Database size	n/a	11,416MB	n/a
SAN hard drives	n/a	n/a	Dell EMC CX3-20 10K RPM
SAN bus speeds	n/a	n/a	1 Gbps
Number of images	n/a	n/a	17,512,500
Repository size	n/a	n/a	1TB

Conclusion

ImageRight is an enterprise content management and workflow system built for the insurance industry that gives companies the power to improve their processes, reduce their expense ratios and grow their businesses. ImageRight not only delivers complete files packaged for insurance, but also contains intelligent workflows that provide actionable insight, making it easier to drive process improvements, book business and keep costs down.

To provide proof of ImageRight's capacity to easily expand to meet a company's growing needs, Vertafore conducted scalability testing on ImageRight in December 2010. Based on the key variables of average transaction response times and server CPU utilization, with tests performed under maximum load conditions, ImageRight scaled efficiently to support 2,000 users. These results highlight how ImageRight can meet the enterprise-level content management needs of insurance carriers, brokers, MGAs and large agencies.

For more information on the scalability capacity or any other technical aspect of ImageRight, please contact your account manager at 800.444.4813.

