COGNOS REPORTNET™ SCALABILITY BENCHMARKS – MICROSOFT WINDOWS

TEST RESULTS FROM THE IBM SOLUTION PARTNERSHIP CENTER (SPC)

IBM Business Partner

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EXECUTIVE SUMMARY

This paper describes scalability testing performed on Cognos ReportNet™, the first all-in-one enterprise query and reporting solution.

Results of the testing show that Cognos ReportNet can support an IBM environment (including xSeries servers, DB2, and Websphere) that delivers enterprise-level performance and scalability capable of meeting the reporting requirements of global organizations.

Specifically, the results show that:

• Cognos ReportNet can deliver massive scalability to hundreds of thousands of users with exceptional response times. Testing was conducted on up to 190,000 users to validate this claim (for more information, see Table 5).

• Cognos ReportNet can deliver mission critical performance within large reporting deployments. Large deployments tested include 20,000 users with average report viewing response times of 1.4 seconds (for more information, see Table 6).

• Cognos ReportNet can deliver outstanding throughput in production or batch reporting environments. Cognos ReportNet yielded 6.7 million PDF pages per day (for more information, see Table 7).

The testing was conducted at the IBM Solution Partner Center (SPC) in San Mateo, California, using independent testing software. Tests were designed to simulate a real world, enterprise-reporting environment in which users conduct a variety of business intelligence reporting activities.

SCALABILITY: THE KEY TO ENTERPRISE REPORTING

As the largest and fastest-growing component of an effective business intelligence (BI) solution, enterprise query and reporting plays a crucial role in helping all users at all levels of the organization. Therefore, when selecting and deploying a reporting solution, scalability is a critical factor to consider.

WHAT IS SCALABILITY?

Scalability refers to the ability of a system to perform well in the face of increasing user demands. For example, a system with a high degree of scalability will behave predictably when the number of users increases from 1000, to 10,000, to 100,000 and more. Performance refers to the amount of time it takes to complete a particular task.

WHY IS SCALABILITY IMPORTANT?

As the number of individuals using a reporting system grows, and the number of queries and reports generated increases, performance can become an issue. What's more, as users learn how BI reporting helps them make better business decisions, they tend to generate more sophisticated reports and queries, putting a heavier burden on the system.

A system's scalability is thus important when considering existing and projected needs. Also important are the unique reporting requirements of different user communities across departments, divisions, and geographic locations; the range of disparate data sources used for reporting; and the languages in which reports must be provided. Scalability should be a key criterion when choosing a BI reporting solution and determining the hardware and software environment in which to run it.

Many systems claim to be scalable, and are technically capable of supporting a growing user community. Typically, though, they were not designed from their inception for scalability. Most systems were designed as client server products that were then ported to the Web. In addition, they cannot be deployed effectively because of their complexity and the high cost of managing them. Cognos ReportNet is a revolutionary Web reporting solution that was designed to scale across the enterprise in an efficient and effective manner that ensures lower total cost of ownership. Please refer to the *Scaling to the Enterprise* whitepaper for the architectural details behind Cognos ReportNet's scalability.

ABOUT THE TESTING

To judge any system's scalability, a realistic evaluation of the performance of the system in a carefully defined and controlled test situation is needed as a benchmark, or guideline, to use when configuring server environments. The testing described in this paper was designed to develop reliable benchmarks for Cognos ReportNet.

GOALS

Testing was set up with the following goals in mind:

- To determine the performance and scalability characteristics of Cognos ReportNet with an increasingly large number of users performing common tasks such as portal navigation, report viewing, report execution, and production report processing (batch reporting).

- To ensure that the test users were truly concurrent, meaning that they were simultaneously stressing the server.

- To demonstrate that Cognos ReportNet leverages various IBM technologies such as xSeries servers, DB2, and Websphere effectively.

APPROACH

The hardware and software components used in the testing were designed to simulate an enterprise-reporting environment in which user activities include report viewing, report execution, and production report processing.

The testing took place at the IBM Solution Partnership Center (SPC) in San Mateo, California, under the supervision of IBM personnel. Independent load-testing software was used to simulate usage and measure results.

An important approach to the testing of Cognos ReportNet was that think times or wait times were not used in the tests scripts. The benefits of using no think times are:

- A significant test variable is eliminated, providing a more objective evaluation of performance and scalability.

- Test results reflect true concurrency, because all users are simultaneously stressing the server.

- Customers are better able to extrapolate from the results based on the level of concurrency in their reporting environment.

The following test scenarios were employed:

1. Users navigated the Cognos ReportNet portal and viewed and executed reports with a 44-CPU configuration.

2. Users performed the same activities with a 16-CPU configuration.

3. Thousands of reports were scheduled for batch processing in a 36-CPU configuration, and the results were saved in Portable Document Format (PDF) for access in the Cognos ReportNet portal.

SOFTWARE

Table 1 outlines the software used in the testing.

TABLE 1. SOFTWARE	
Tested System	Cognos ReportNet 1.02 MR1
Operating System	Windows Server 2003 Enterprise Edition
Web Server	Microsoft IIS 6.0
Application Server	IBM WebSphere 5.0.2
Database	IBM DB2 8.1 FP4
Security	SunONE LDAP 5.1
Load Testing	Mercury Interactive Loadrunner 7.8

HARDWARE

Both Cognos ReportNet and the LoadRunner testing software were run on IBM xSeries computers in a BladeCenter environment. Table 2 outlines the hardware used in the testing.

TABLE 2. HARDWARE		
Infrastructure Tier	**Component**	**Computers**
Cognos ReportNet Web Tier	Cognos ReportNet Gateway	2 IBM x360 servers
Cognos ReportNet Application Tier	Cognos ReportNet Report Server and Content Manager	1 IBM BladeCenter and 1 IBM x440 All blades in the BladeCenter were dedicated report servers. The IBM x440 was used for the Cognos ReportNet Content Manager
Cognos ReportNet Data Tier	Cognos ReportNet Content Store	1 IBM x360 used for IBM DB2 Content Store database and LDAP 1 IBM x335 used for Query database
Mercury Interactive LoadRunner	LoadRunner Controller and Agents	2 IBM x335 servers

USERS

To accurately judge the number of users that can be supported in a real world environment based on performance in a test environment, you must distinguish between named, active, and concurrent users.

Named users make up the total population of individuals who can be identified by and potentially use the system. They represent the total user community, and can be active or concurrent at any time. In a real-life BI environment, this is the total number of individuals authorized to use the system. It is the number of most interest when planning a BI implementation, because it tells you how many users you can expect to support in a given environment with the response times reported in a test environment.

Active users are logged on to the system at a given time. They include users who are simply viewing the results returned from a query. Although this subset of active users are logged on to the system, they are not sending requests. Based on Cognos' experience with thousands of customers, a good assumption is that 10 percent of named users are active at any given time. Therefore, 100 active users represent an environment with 1,000 named users.

Concurrent users are not only logged on to the system, but represent the subset of active users who are sending a request or waiting for a response. They are the only users actually stressing the system at any given time. Based on Cognos' experience with thousands of customers, a good assumption is that 10 percent of active users are concurrent users. Therefore, 100 concurrent users represent an environment with 1,000 active users and 10,000 named users.

Table 3 illustrates the relationship between the number of concurrent users employed in a test environment and the number of named users in a real-life environment for which the test results can be reasonably reported.

TABLE 3. USER-TYPE COMPARISON		
Infrastructure Tier	**Component**	**Computers**
1 A test involving this many Concurrent users …	2 approximates a real-life environment with this many Active users …	3 and this many Named users
100	1000	10,000
500	5000	50,000
1000	10,000	100,000

1 Concurrent users are actually stressing the system at any given time.
2 Active users are logged on to the system but are not necessarily stressing the system.
3 Named users are all the users authorized to use the system – the total number of business end-users.
  They are calculated based on the number of concurrent users employed in testing.

TEST CONFIGURATIONS

The testing was designed to simulate an enterprise-reporting environment in which users navigate a Web portal to view and run reports, and scheduled reports are run. Table 4 outlines the test configurations.

TABLE 4. TEST CONFIGURATIONS			
	Configuration 1 Report Viewing and Execution (44 CPUs)[1]	Configuration 2 Report Viewing and Execution (16 CPUs)[1]	Configuration 3 Production Reporting (36 CPUs)[2]
Web Tier	2 IBM x360 servers Cognos ReportNet Gateways 4 x 1.6 GHz, 3.6 GB RAM	2 IBM x 360 servers Cognos ReportNet Gateways 1 x 1.6 GHz, 3.6 GB RAM	Not applicable. Production report processing takes place in the application and data tiers.
Application Tier	1 IBM BladeCenter Cognos ReportNet Report Servers 14 blades at 2 x 2.4 GHz, 2.6 GB RAM 1 IBM x440 server Cognos ReportNet Content Manager 8 x 1.6 GHz, 3 GB RAM	1 IBM BladeCenter Cognos ReportNet Report Servers 6 blades at 2 x 2.4 GHz, 2.6 GB RAM 1 IBM x440 server Cognos ReportNet Content Manager 2 x 1.6 GHz, 3 GB RAM	1 IBM BladeCenter Cognos ReportNet Report Servers 14 blades at 2 x 2.4 GHz, 2.6 GB RAM 1 IBM x440 server Cognos ReportNet Content Manager 2 x 1.6 GHz, 3 GB RAM
Data Tier	1 IBM x360 server IBM DB2 Content Store database and LDAP Authentication Provider 4 x 1.6 GHz, 3.6 GB RAM 1 IBM x335 server Query data 2 x 2.8 GHz, 2 GB RAM	1 IBM x360 server IBM DB2 Content Store database and LDAP Authentication Provider 4 x 1.6 GHz, 3.6 GB RAM 1 IBM x335 server Query data 2 x 2.8 GHz, 2 GB RAM	1 IBM x360 server IBM DB2 Content Store database and LDAP Authentication Provider 4 x 1.6 GHz, 3.6 GB RAM 1 IBM x335 server Query data 2 x 2.8 GHz, 2 GB RAM

1 Testing involved portal navigation and report viewing and execution with a 2-page, 22-row HTML report.
2 Testing involved scheduling a report for processing and saving the results in PDF for access in the Cognos ReportNet portal.
  A 26-page list report (PDF) was used with three tables, two joins, and two calculations. The number of reports scheduled
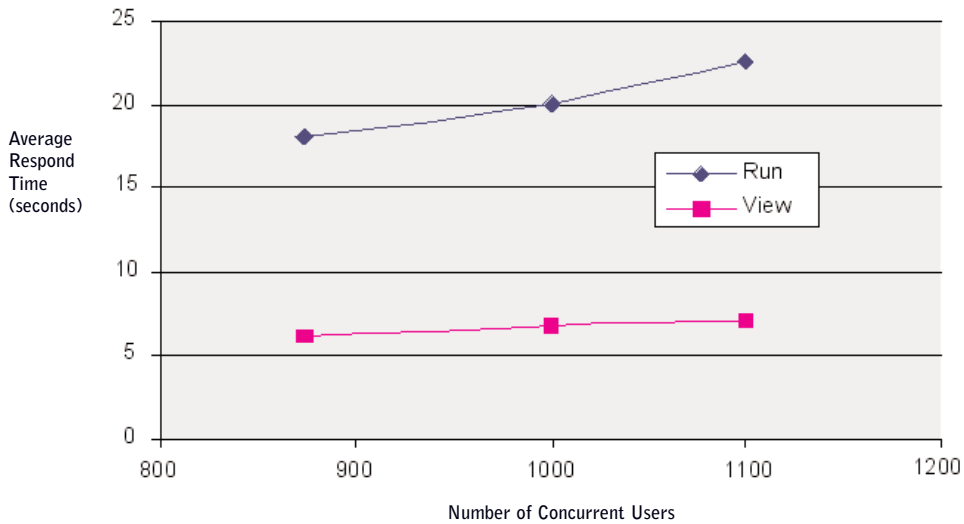 was 10,000.

RESULTS

CONFIGURATION 1: REPORT VIEWING AND
EXECUTION (44 CPUS)

Table 5 shows the results of report viewing and execution testing with Configuration 1.

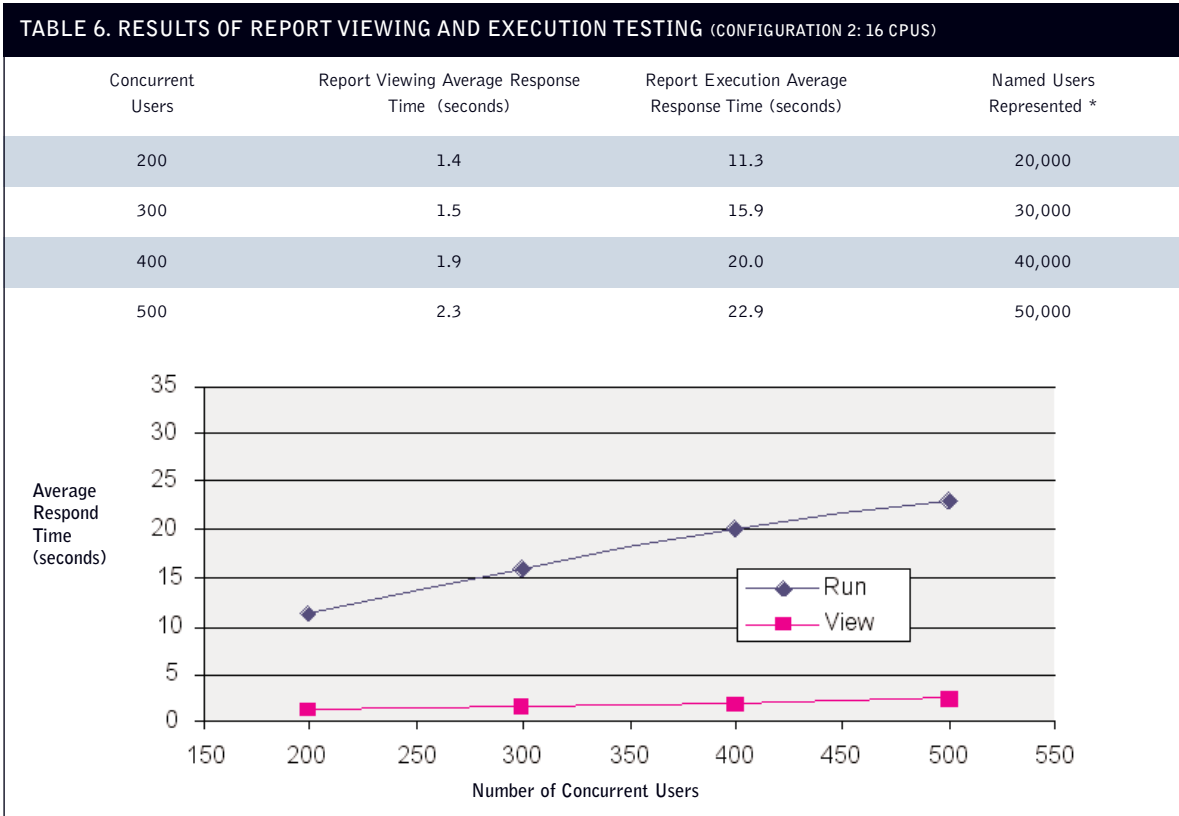| TABLE 5. RESULTS OF REPORT VIEWING AND EXECUTION TESTING (CONFIGURATION 1: 44 CPUS)			
Concurrent Users	Report Viewing Average Response Time (seconds)	Report Execution Average Response Time (seconds)	Named Users Represented *
875	6.1	18.0	87,500
1,000	6.7	18.9	100,000
1,100	7.0	22.6	110,000

Note: Configuration 1 was tested up to 1,900 concurrent users or 190,000 named users with average response times of less than 30 seconds.

* 1000 named users = 100 active users = 10 concurrent users

CONFIGURATION 2: REPORT VIEWING AND EXECUTION (16 CPUS)

Table 6 shows the results of report viewing and execution testing with Configuration 2.

TABLE 6. RESULTS OF REPORT VIEWING AND EXECUTION TESTING (CONFIGURATION 2: 16 CPUS)			
Concurrent Users	Report Viewing Average Response Time (seconds)	Report Execution Average Response Time (seconds)	Named Users Represented *
200	1.4	11.3	20,000
300	1.5	15.9	30,000
400	1.9	20.0	40,000
500	2.3	22.9	50,000

* 1000 named users = 100 active users = 10 concurrent users

CONFIGURATION 3: PRODUCTION REPORTING (36 CPUS)

Table 7 shows the results of the production reporting testing.

TABLE 7. RESULTS OF PRODUCTION REPORTING TESTING (CONFIGURATION 3: 36 CPUS)					
Number of Reports	Number of Pages[1]	Total Time to Process[2]	Pages Per Second[3]	Pages Per Hour[4]	Pages Per Day[5]
10,000	260,000	54:59	78	280,800	6,739,200

[1] Number of pages (Number of reports * 26 PDF pages per report).
[2] Total time to process in minutes and seconds.
[3] Pages per second processed (Number of pages / Total time to process).
[4] Pages per hour processed (Pages per second * 60 minutes * 60 seconds).
[5] Pages per day processed (Pages per hour * 24 hours).

DISCUSSION AND CONCLUSIONS

The Cognos ReportNet test results presented in this paper are a result of the modern, open, and scalable architecture that was built to provide true enterprise level reporting for global organizations.

The approach to validating the scalability of Cognos ReportNet centered on:

• The use of an independent, third-party hardware lab to simulate enterprise level deployments in an external environment

• The use of independent, third-party testing software to ensure the integrity of the results

• The measurement of true concurrency on the Cognos ReportNet system by eliminating think times to ensure constant stress on the system and simulate a high usage environment.

The results show that:

• Cognos ReportNet demonstrated massive scalability that can meet the needs of extranet reporting deployments that span hundreds of thousands of users.

• Cognos ReportNet offers high performance within large reporting deployments that span multiple departments ranging from 20,000 to 50,000 users.

• Cognos ReportNet provides superior throughput for production reporting (batch reporting) environments that yield 6.7 million pages of content per day.

In April 2003, Cognos and IBM extended their long-standing strategic partnership by announcing a new global agreement to deliver comprehensive BI solutions to their customers. That agreement opened the door for the two companies to collaborate in bringing high quality, high performing BI solutions such as Cognos ReportNet to market. These outstanding test results are the outcome of Cognos ReportNet embracing IBM technologies such as xSeries servers, DB2, and Websphere within IBM's testing facility.

The results of the Cognos ReportNet benchmark tests reinforce its position as the enterprise-reporting standard. Cognos ReportNet is a high quality, high performance solution that can be the basis for all mission-critical reporting initiatives.

ABOUT COGNOS

Cognos is the world leader in business intelligence and enterprise planning software. Our solutions for corporate performance management let organizations drive performance with planning and budgeting, monitor it with scorecarding, and understand it with enterprise business intelligence reporting and analysis. Cognos is the only vendor to support all of these key management activities in a complete, integrated solution.

Founded in 1969, Cognos today serves more than 22,000 customers in over 135 countries. Cognos enterprise business intelligence solutions and services are also available from more than 3,000 worldwide partners and resellers.

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