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Technical
White Paper



Actuate 9 iServer: Performance and Scalability on IBM AIX

Collaborative Reporting in Large-Scale Deployments: BIRT Reports, BusinessReports, and Interactive Report Viewing

Benchmark tests at the IBM Innovation Center show Actuate is again the industry's highest performing and most scalable reporting platform. Tests focused on the Collaborative Reporting capabilities of the Actuate iServer, specifically report generation, standard viewing, interactive viewing, on-demand reporting, and web-based report authoring of BusinessReports.

Highlights of tests on a 64-CPU core, 8-node iServer cluster include:

- For all activities, near-perfect scalability up to 64 CPU cores
- 1.8 billion report pages generated per day
- 43,000 active users viewing reports with the standard viewer
- 10,000 active users interactively viewing reports
- 10,500 active users running and viewing on-demand reports
- 1,000 active users of BusinessReport Studio on 6 iPortal CPU cores



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Executive Summary

Actuate 9 introduced the Collaborative Reporting Architecture, a breakthrough concept that makes all reporting users—end users, power users, business users, report developers and application developers—equal partners and collaborators in creating reports. Based on open-source Eclipse BIRT and the Actuate iServer, this unique architecture results in faster and more accurate report development, lower costs, and higher user satisfaction.

Collaborative Reporting deployments achieve business goals faster than traditional reporting deployments, are more successful, and grow faster. Keeping these characteristics in mind, Actuate implemented the Collaborative Reporting Architecture on top of the iServer's scalable foundation to achieve three performance goals:

1. *Allow smaller reporting applications—even those with only a handful of users and reports—to grow easily, quickly, and economically.*
2. *For applications of all sizes, provide best-in-class performance for the hardware used.*
3. *Support the world's largest reporting deployments, with millions of users and billions of reporting requests per day.*

Recent benchmark tests at the IBM Innovation Center for Business Partners proved Actuate achieved all three goals. The Actuate 9 iServer can scale with near-perfect efficiency, generate billions of report pages per day, and support millions of users.

High Performance for All Report Types

This series of benchmark tests specifically exercised BIRT Reports and BusinessReports on the iServer. Similar internal tests and past benchmarks show that other Actuate report types, including e.Reports, have comparable performance.

Customers should therefore pick the report type that best fits their functional requirements, such as interactive features, printed fidelity, live Excel output, and so on. They can be confident that all Actuate report types meet the most demanding performance and scalability requirements, since they all run on the same industry-leading high performance platform, the Actuate iServer.

Impact of Multiple Cores Per CPU

This benchmark and other internal tests prove the Actuate iServers scales in a near-linear fashion, whether it is across multiple cores within a CPU or across multiple CPUs within a machine. The total number of CPU cores, not the number of CPUs, determines the iServer's capacity. In other words, a machine with one CPU with two cores performs the same as a machine with two single-core CPUs, provided the CPU clock speed is the same for both machines.

Results Snapshot

The following table provides a snapshot of the benchmark results. Most test scenarios were on a 64-CPU core, 8-node AIX-based iServer configuration. The results all show Actuate's ability to handle millions of users and billions of reporting transactions while maintaining a high quality, quick-response experience for users.



Test Scenario	Test Results – Snapshot
Batch Report Generation of Cached BIRT Reports and BusinessReports¹	<ul style="list-style-type: none"> • 1.8 billion report pages generated per day • 98.9% scalability from 1 node (8 CPU cores) to 8 nodes (64 CPU cores)
Viewing of Cached BIRT Reports and BusinessReports	<ul style="list-style-type: none"> • Support for 43,000 active viewing users, implying support for user populations ranging from 430,000 to 43 million • 92.1% scalability from 1 node (8 CPU cores) to 8 nodes (64 CPU cores)
Interactive Viewing of Cached BIRT Reports and BusinessReports	<ul style="list-style-type: none"> • Support for 10,000 active users interactively viewing reports and performing a variety of interactive operations, implying support for user populations from 100,000 to 10 million • 99.8% scalability from 1 node (8 CPU cores) to 8 nodes (64 CPU cores)
On-Demand Report Generation & Viewing of BIRT Reports and Business Reports²	<ul style="list-style-type: none"> • Support for 10,500 active users running and viewing ad-hoc reports, implying support for user populations from 105,000 to 10.5 million • 97.7% scalability from 1 node (8 CPU cores) to 8 nodes (64 CPU cores)
Authoring of BusinessReports	<ul style="list-style-type: none"> • On 6 iPortal CPU cores, support for 1,000 active users creating BusinessReports over the web using BusinessReport Studio

¹*BusinessReports are based on the same report design format as BIRT Reports, but are created by non-technical users using a web-based report designer called the BusinessReport Studio. BusinessReports are based on report templates created with the Eclipse BIRT Report Designer.*

²*“On-Demand Reports” are reports that are generated at an end user’s request and are immediately viewed without being stored in the report repository. On-Demand Reports are also called transient reports.*

Introduction

Actuate 9 introduced the Collaborative Reporting Architecture. This breakthrough concept makes all reporting users—end users, power users, business users, report developers and application developers—equal partners and collaborators in developing reports. Based on open-source Eclipse BIRT and the Actuate iServer, the Collaborative Reporting Architecture results in:

- *Faster and more accurate report development*
- *Lower costs*
- *Increased user satisfaction*
- *Quicker achievement of business goals*
- *Higher success rates*
- *Faster growth than traditional reporting deployments*

Collaborative Reporting deployments therefore require a reporting platform designed to grow and accommodate ever-increasing performance demands. With this in mind, Actuate implemented the Collaborative Reporting Architecture on top of the iServer's proven scalable and high-performance foundation.

This white paper details extensive benchmarks of the Actuate 9 iServer, with special emphasis on components of the Collaborative Reporting Architecture. The results show that once again the Actuate iServer is the highest performing and best scaling reporting platform in the industry.

Customers can therefore feel confident that Actuate supports the most demanding applications with a minimum of hardware and will be able to accommodate large-scale future growth.

Collaborative Reporting

With the Actuate Collaborative Reporting Architecture, users of all types can create reports, interact with them, and modify them using the reporting environment most appropriate for their goals and skill level. They can share their reports with other users, who can in turn interact with and alter the reports using different skill-specific environments.

For report development, the Collaborative Reporting Architecture provides two skill-specific environments. The Eclipse BIRT Designer is a powerful, desktop-based report design tool for technical report developers. The BusinessReport Studio is an easy-to-use web-based report design tool for less technical users who want to create their own reports.

There are two additional environments, both built into the Actuate iPortal, for end users to interact with the reports over the web. The Standard Viewer displays paginated report documents in HTML. The Interactive Viewer also displays paginated report documents in HTML, but it also lets end users interact with report documents: re-sorting, adding calculated columns, applying new grouping, hiding columns or charts, and so on.

An example of Collaborative Reporting in action:

- *A technical report developer creates a BIRT report, using the power of the Eclipse BIRT Designer.*
- *The developer deploys the finished report to the Actuate iServer.*
- *The iServer generates the report and produces a report document.*
- *Some end users view the report document using iPortal's Standard Viewer.*
- *Other end users view the report document using iPortal's Interactive Viewer. These users modify their view of the report by re-sorting, adding or subtracting columns, changing grouping, and so on.*
- *End users of the Interactive Viewer save their modified views of reports to the iServer.*
- *At a future time, the end users can re-run the report and see the new report document with their earlier modifications applied.*

Another example:

- *A report developer creates a BusinessReports template using the Eclipse BIRT Designer and deploys it to the iServer.*
- *A business user accesses the BusinessReport Studio over the web. He starts creating a new report by selecting a BusinessReports template already deployed to the iServer.*
- *The business user author creates his report using the BusinessReport Studio, and then deploys the report to the iServer.*
- *Other users can then run and view the report using either the Interactive Viewer or the Standard Viewer.*

Scalability and Performance Are Essential for Collaborative Reporting

Actuate leveraged the scalable foundation of the iServer to achieve three performance goals. All three goals are essential to supporting the unique demands of Collaborative Reporting:

1. *Allow smaller reporting applications, even those with only a handful of users and reports, to grow easily, quickly and economically.*
2. *For applications of all sizes, provide best-in-class performance for the hardware used.*
3. *Support the world's largest Collaborative Reporting Applications and traditional reporting deployments, with user populations of millions of users, and reporting loads of billions of reports per day.*

Goal 1: Scalability to Allow Applications of All Sizes to Grow Economically

Actuate achieves goal one, allowing smaller to medium-sized reporting applications to grow quickly and easily, using the Actuate iServer's built-in scalability.

What is scalability? Simply put, a system that is perfectly scalable can double its capacity (for example, number of users, number of reports per second) by doubling the system's hardware.

Scalability above 80% is very unusual in enterprise software. For most enterprise systems, each bit of hardware added to the system is used far less efficiently than the last. In fact, many enterprise software systems quickly reach a point where adding more hardware actually decreases performance instead of increasing it proportionately. Deploying such a limited, unscalable reporting infrastructure can be disastrous if a reporting application becomes popular with users.

Actuate has proved time and time again, with this benchmark and numerous others, that it provides the most scalable reporting platform in the industry. The iServer is capable of scaling to configurations in excess of 80 CPUs and is able to handle millions of users and billions of transactions per day.

Goal 2: Provide Best in Class Performance

The Actuate iServer is designed from the ground up to make the fullest possible use of all hardware available. This means that all CPU cores in all machines in an Actuate iServer cluster can lend their full power to the real work of reporting: report generation and rendering. The iServer wastes little hardware resources, letting customers get the full benefit of the hardware they paid for.

Further, excellent performance on configurations of all sizes means that all reporting applications—from the smallest to the very largest—benefit. All reporting applications experience quick response, rapid report generation and rendering, and ability to serve many users of different types all at one time.

Goal 3: Extreme Performance for the Largest Reporting Applications

The Actuate iServer is designed to handle truly enormous reporting applications that fully use 80+ CPUs, serve user populations of millions of users, and handle billions of reporting requests per day.

This type of mega-performance benefits applications of ALL sizes, however, not just the world's largest and most demanding applications. Successful reporting deployments, regardless of their initial size, nearly always grow in terms of numbers of users, number of reporting requests, and number of reporting applications. This is especially true of Collaborative Reporting applications.

Organizations can be confident that no matter how large or how fast their reporting application grows, that their Actuate-based reporting infrastructure will be able to scale simply by adding hardware to the system.

Characteristics of Meaningful Benchmarks

All benchmark studies conducted by Actuate are specifically designed to provide customers with as much meaningful information and analysis as possible. With this design, customers can then apply this knowledge to their own applications and configurations.

Types of Reporting Loads

For Collaborative Reporting, there are five types of load that require the vast majority of processing power:

- 1) **Batch generation of reports.** Reports generate in the background and produce cached report documents that are stored for future viewing. These usually run on a schedule, most often in the middle of the night.
- 2) **Standard viewing of cached reports.** Users view pages of report documents that were batch-generated earlier.
- 3) **Interactive viewing of cached reports.** Users view pages of reports that were batch-generated earlier, and also interact with the report documents: resorting, filtering, hiding columns, adding calculated columns, and so on.
- 4) **On-demand reporting.** Users request reports be generated “right now” and rendered for viewing while they wait.
- 5) **Report authoring by users.** Users use the web-based BusinessReport Studio to create their own reports. The report authoring process usually triggers several requests to the reporting server.

In a typical reporting deployment, all five loads are present in proportions that vary depending on the time of day and usage patterns. Any meaningful benchmark needs to characterize performance of all five types of reporting loads.

The Measurements that Matter

Certain types of benchmark tests and results measurements are needed to properly depict a reporting platform’s performance and scalability. To that end, for each configuration, the Actuate benchmark directly measures:

- 1) **Throughput rates for all types of workloads**
- 2) **Scaling efficiency across configurations of varying sizes**
- 3) **The number of active users supported for interactive tests (standard viewing, interactive viewing, on-demand reporting, and BusinessReport authoring)**
- 4) **Average user response times for interactive tests**

Throughput

Throughput is the most critical benchmark measurement because it is the most precise measure of system capacity³. Throughput is how much content can be generated per second, or how much content can be served to users per second. Scalability can only be proven by measuring how a system’s throughput increases as hardware resources increase.

For batch generation tests, throughput is measured in report pages generated per second.

³As explained in more detail in subsequent sections, the number of users and response times are not true measures of system capacity. This is because the number of users can often be substantially increased by increasing the acceptable response time. The only way to “normalize” benchmarks where both the number of users and the response times change from configuration to configuration is to use these figures to derive the system throughput.

For standard viewing, interactive viewing, on-demand reporting, and BusinessReports authoring tests, throughput is measured in user requests per second. For Actuate, when a user makes a “user request” to view or create a report, usually just one URL is triggered. So, Actuate user request throughput is measured in URLs per second.

Some competitive benchmarks do not provide throughput figures, but instead provide only numbers of users and average response time. These figures alone cannot adequately describe system capacity or scalability because they can be manipulated. For example, the number of users can always be dramatically increased by sacrificing acceptable response time. Similarly, the response time can be lowered if each active user makes less requests.

Scaling Efficiency

System scalability is measured as scaling efficiency. In a system that scales in perfectly linear fashion, the scaling efficiency is 100%, and each additional machine added to the system configuration is as efficiently used as the first machine. If the scaling efficiency is greater than 95%, systems are typically referred to as having linear scalability.

$$\text{Scaling Efficiency} = \frac{\text{Actual Throughput}}{\text{Theoretical Throughput}}$$

where

$$\text{Theoretical Throughput} = \text{Throughput for 1 CPU} * \text{Number of CPUs}$$

If scaling efficiency is less than 70%, the system is not scalable and should not be considered for enterprise deployments. Scaling efficiency is calculated according to the following formula.

Number of Active Users

An important measurement for reporting platforms is the number of active users that can be supported on a given configuration. This metric is important for any test that measures the capacity of the server to handle interactive user requests, such as viewing of cached reports or on-demand report generation and viewing.

The definition of “active users” requires some explanation. Any application supports a population of “named users.” Named users are all the distinct users that are able to log in to use the server. At any time, some of these named users are active users, meaning they are logged in and actively submitting report viewing and generation requests every X seconds on average, where X is referred to as the “think time.”⁴

The portion of named users that are active at any one time depends on whether the application is deployed within the company, on the extranet, or on the Internet. Figure 1 describes typical percentages.

	Inside-the-firewall applications	Extranet applications	Internet applications
Number of active users (% of total named users)	1-10%	0.1 – 1%	< 0.1%

Figure 1 – The ratio of active users to named users varies according to application characteristics. For applications deployed inside the firewall, a higher proportion of total named users are active than for Internet reporting applications.

⁴User counts are more accurate and reflective of real-world applications when a random think time is used. In Actuate’s experience, think times that are random but center on a 30-second average most accurately reflect real-world user behavior for reporting platforms. The randomness of the think time creates peaks and valleys in the reporting load, similar to what real-world users generate. Tests with zero think time keep an absolutely constant load for the entire test and do not test the system’s ability to continue operating under variable load.



Response Time

Throughput, user counts, and scaling efficiency are meaningless and can be manipulated without strict limitations on acceptable response time. This is because an application is simply unusable if response times are too long.

According to Jakob Nielsen, renowned usability expert, “10 seconds is about the limit for keeping the user’s attention focused on the dialogue. For longer delays, users will want to perform other tasks while waiting for the computer to finish.”

For Actuate benchmarks, the following response time criteria apply to all interactive tests:

- *Average and median response time must be under 5 seconds.*
- *90% of all requests must be serviced within 5 seconds.*
- *100% of all requests must complete within 120 seconds.*

Only the results of tests that meet the above criteria are published within this white paper.

Actuate 9 on AIX: Results & Analysis

For most test scenarios, the Actuate iServer was tested in cluster configurations ranging from 1 to 8 node partitions where each node had 8 CPU cores. In the largest 8-node configuration, there were 64 CPU cores total. See the System Configuration section for more details.

Batch Report Generation of BIRT Reports & Business Reports

Description

The Batch Report Generation scenario tests simultaneous generation of multiple BIRT reports and BusinessReports, where all reports are scheduled to start running at the same time. The resultant report documents are stored in the iServer Report Encyclopedia; users do not wait to view the results.

This test determines the average number of report pages that the Actuate iServer can generate per second over a prolonged period of time.

Results

In the 64-CPU core configuration, throughput reached 21,653 pages/second, the equivalent of 1.8 billion report pages per day. Scaling efficiency was over 98%, implying that with additional CPU power throughput could be increased even more.

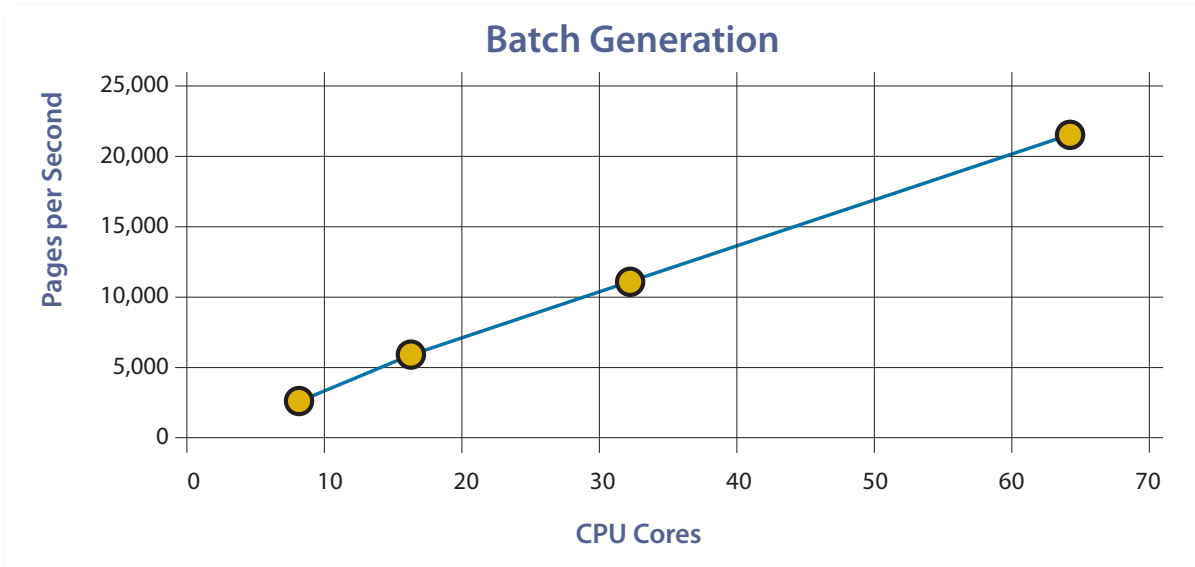


Figure 2 – Batch Generation: Near-perfect linear (> 98%) scalability across 8 nodes with 64 CPU cores. The Actuate iServer sustained a generation rate of 21,653 report pages per second.

	1 Node 8 CPU cores	2 Nodes 16 CPU cores	4 Nodes 32 CPU cores	8 Nodes 64 CPU cores
Throughput: pages/sec	2,736	5,769	11,178	21,653

Figure 3 – Batch Generation Results.

Standard Viewing of Cached BIRT Reports & BusinessReports

Description

This test simulates end-users viewing reports through the iPortal Standard Viewer. Multiple users simultaneously log in and view random pages of cached report documents.

The main outputs from this test are:

- Server throughput in viewing requests per second (URLs/second)
- The maximum number of active users that can be supported while meeting the 5-second response time criteria.

Results

On 64 CPU cores, the Actuate iServer supported 43,000 active users. This translates into support for 430,000 to 43 million named users. These users collectively submitted 1,313.2 user viewing requests per second, the equivalent of 113 million viewing requests per day. Scaling efficiency was over 92%, implying support for even larger hardware configurations.

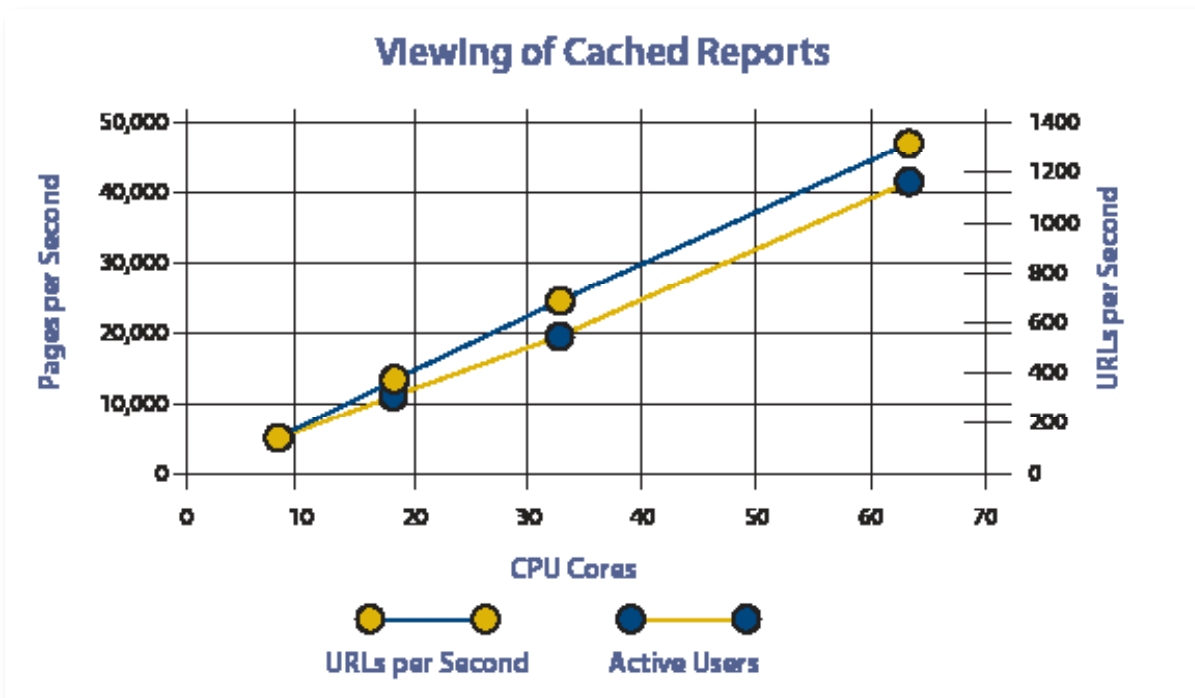


Figure 4 – Standard Viewing of Cached Reports. On 64 CPU cores, Actuate supported 43,000 active users, or 671 users per CPU core.

	1 Node 8 CPU cores	2 Nodes 16 CPU cores	4 Nodes 32 CPU cores	8 Nodes 64 CPU cores
Throughput: Viewing Requests per second	178.2	359.1	689.5	1,313.2
Active Users	5,600	11,500	22,000	43,000
Response Time (seconds)	0.71	0.57	0.55	0.64

Figure 5 – Complete Results for Standard Viewing of Cached Reports. Response times averaged less than one second for all configurations.



Interactive Viewing of Cached BIRT Reports & BusinessReports

Description

The Interactive Viewing test simulates multiple users simultaneously logging in to iPortal and using the Interactive Viewer to access random pages in report documents. While viewing the reports, users performing interactive operations like sorting and filtering to modify the view of the report document.

Figure 6 describes the operations that each Interactive Viewing test user performs. Each active user performs these operations in succession, with a think time interval between each operation. Think times are random but average 30 seconds. The randomness of the interval between operation allows this test to more closely emulate real-world conditions.

This test measures:

- Throughput, in interactive viewing requests per second. This is reported in URLs/sec.
- The number active users that can be supported while meeting the 5-second response time criteria.

Figure 6 – Interactive Viewing Test: operations performed by each active user. Each active user in this test submits a URL for the first operation, waits the given think time (randomly determined but averaging 30 seconds), and then submits the URL for the next operation, waits a random think time, and so on.

Interactive Viewing Test : Operations performed by each active user
Login to iPortal
Load report in Interactive Viewer
Get a report page
Change text of column label
Change font of a column label
Undo the report's current grouping
Create new grouping
Sort on new grouping
Create calculated column
Add aggregation to report group
Set a filter
Change alignment of data displayed in a column
Hide a column

Results

The results of this test are excellent. Interactive viewing requires many rapid-fire changes and re-rendering of report documents as users modify reports. Even under this intensive load, the iServer still supported a very large number of users while maintaining very low response times: over 10,000 active users on 64 CPU cores.

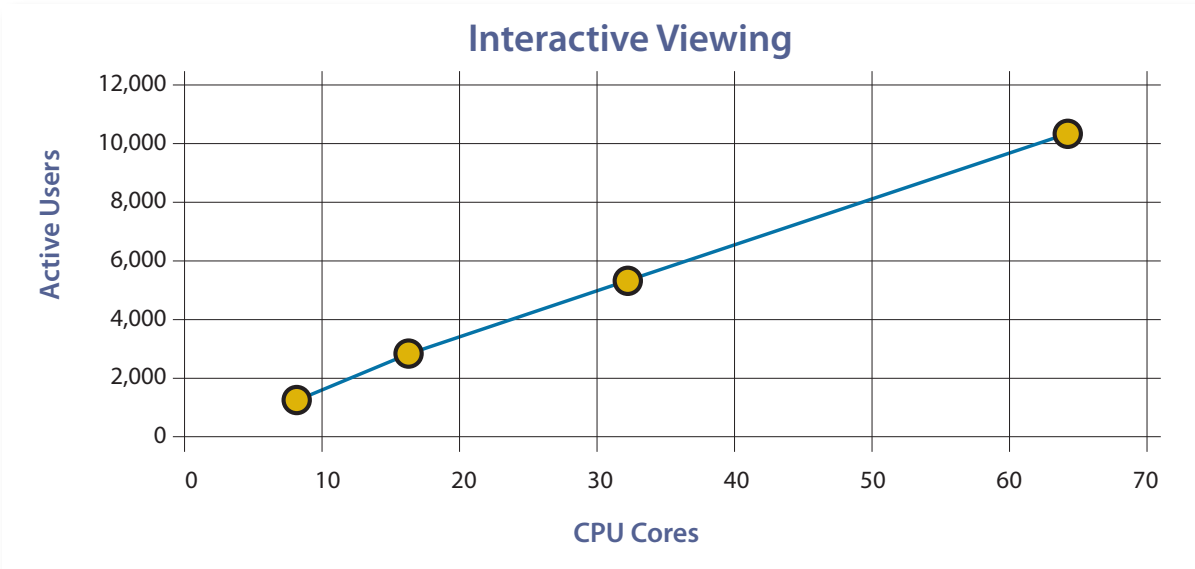


Figure 7 – Interactive Viewing shows over 99% scaling efficiency over 64 CPU cores. Over 10,000 active users can be supported on a 64-CPU core configuration.

	1 Node 8 CPU cores	2 Nodes 16 CPU cores	4 Nodes 32 CPU cores	8 Nodes 64 CPU cores
Throughput: Viewing Requests per second	38.7	82.6	162.1	338.2
Active Users	1,200	2,450	4,850	10,000
Response Time (seconds)	1.11	1.06	1.34	1.31

Figure 8 – Average Response Times for Interactive Viewing. Response times averaged less than one second for all test configurations.

On-Demand Reporting: BIRT Reports & BusinessReports

Description

The On-Demand Reporting test simulates multiple users logging in. Each user then generates a report on demand and immediately views the results in the web browser. The resultant report document is not saved to the iServer Report Encyclopedia.

Like the Viewing tests, this test determines maximum throughput in URLs/second and the maximum number of active users.

Results

The Actuate iServer proved able to support 10,500 active users of on-demand reports. These users collectively triggered 308.4 URLs per second, or 26.6 million URLs per day. Total user populations of 105,000 to 10.5 million can be supported, depending on the characteristics of the application.

The iServer again demonstrated near-perfect linear scalability, with a scaling efficiency of greater than 90%.

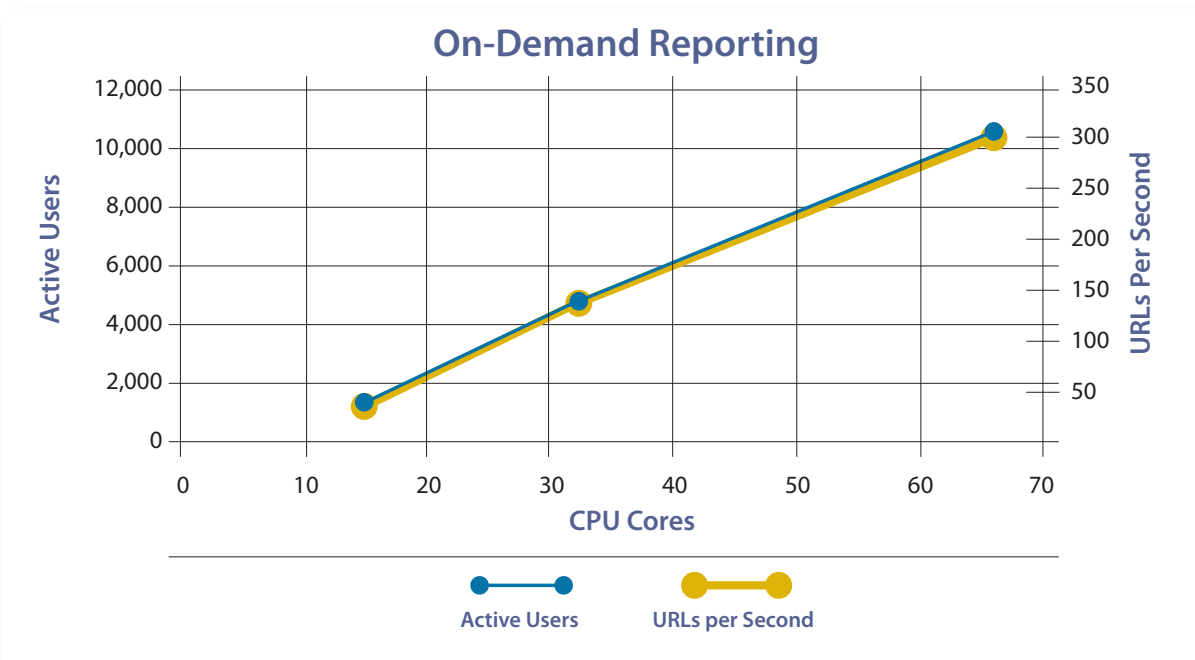


Figure 9 – On-Demand Reporting. On 64 CPU cores, the Actuate iServer was able to support 10,500 active users of on-demand report and achieve >90% scaling efficiency.

	1 Node 8 CPU cores	2 Nodes 16 CPU cores	4 Nodes 32 CPU cores	8 Nodes 64 CPU cores
Throughput: Viewing Requests per second	39.5	48.0	137.5	308.4
Active Users	1,400	1,700	4,800	10,500
Response Time (seconds)	3.87	4.19	3.20	3.27

Figure 10 – On-Demand Reporting Response Time. Even under extreme load, Actuate 9 was able to handle 10,500 active users.

Report Authoring with BusinessReport Studio

Description

This test simulates multiple active users concurrently creating their own reports over the web using Actuate 9 BusinessReport Studio. Each active user performs a sequence of operations, all of which are typical of users creating a report from a report template. Most operations are performed browser-side via the AJAX technology built into BusinessReport Studio or are performed within the iPortal tier, although some operations trigger URL requests back to the iServer. Between each operation, active users wait for a think time of random length centered on a 30-second average.

Figure 11 details the report authoring tasks performed by each simulated active user.

BusinessReport Studio – Report Authoring Operations performed by each active user
Login to iPortal
Launch BusinessReport Studio, select an Information Object as a data source
Add 5 columns in one operation
Add sorting to one column
Add grouping by one column
Insert a calculated column
Add aggregation to grouping
Change text of column label
Set filter on a column
Change alignment of data in a column
Set currency format of data in a column
Set a filter
Change alignment of data displayed in a column
Hide a column

Figure 11 – Report Authoring with BusinessReport Studio: sequence of operations performed by each simulated active user.

Note that for this scenario, the number of CPU cores in the iPortal tier is much more relevant than the number of cores in the iServer tier. This is unlike the other test scenarios, because BusinessReport authoring primarily exercises the iPortal instead of the iServer. The BusinessReport Studio is an AJAX application, and most steps in designing a BusinessReport do not trigger requests back to the iServer. Instead, as much report authoring activity as possible is performed browser-side or in the iPortal web-tier, in order to provide the user with a highly responsive, interactive experience.



Results

In a three-node iPortal configuration totaling 6 CPU cores, BusinessReport Studio supported 1,000 active users authoring their own reports over the web. The iServer tier was quite over-sized, with a single 8-CPU core node.

Additional hardware configurations were not tested due to lab time schedule constraints, but Actuate is confident that BusinessReport Studio can comfortably scale on larger hardware configurations.

BusinessReports report authoring	3 iPortal Nodes (6 CPU cores)
Throughput: BusinessReports Requests per second (URLs/s)	32.5
Active Users	1,000
Response Time (seconds)	1.2

Figure 12 – Results of BusinessReports authoring on a configuration with 6 iPortal CPU cores.

The iServer was deployed on an IBM System p5 p595 running 64-bit AIX 5.3. The p595 was divided into 8 LPARs that each had 4 dual-core CPUs. The 8 LPARs made up the 8 nodes of the iServer cluster. For the web tier, 15 separate iPortal instances were deployed, each on a dual-CPU Intel-based machine running IBM WebSphere 6.1 on Windows 2003. To simulate the actions of end-users, 8 Intel-based machines with 16 CPUs total were dedicated to load simulation, generating reporting requests from simulated users, and submitting those requests to iPortal instances.

For the BusinessReport Authoring scenario, a single configuration was tested due to time constraints. Because BusinessReport Studio is an AJAX application, most of the work is done in the iPortal web-tier, not iServer. Thus, this test exercised 3 iPortal instances, each with a single dual-core CPU, for a total of 6 iPortal CPU cores. The iServer was deployed on a single 8-core LPAR node. Unlike all the other scenarios, this test was constrained by iPortal CPU power; the iServer was significantly over-powered and tapped only a fraction of its resources.

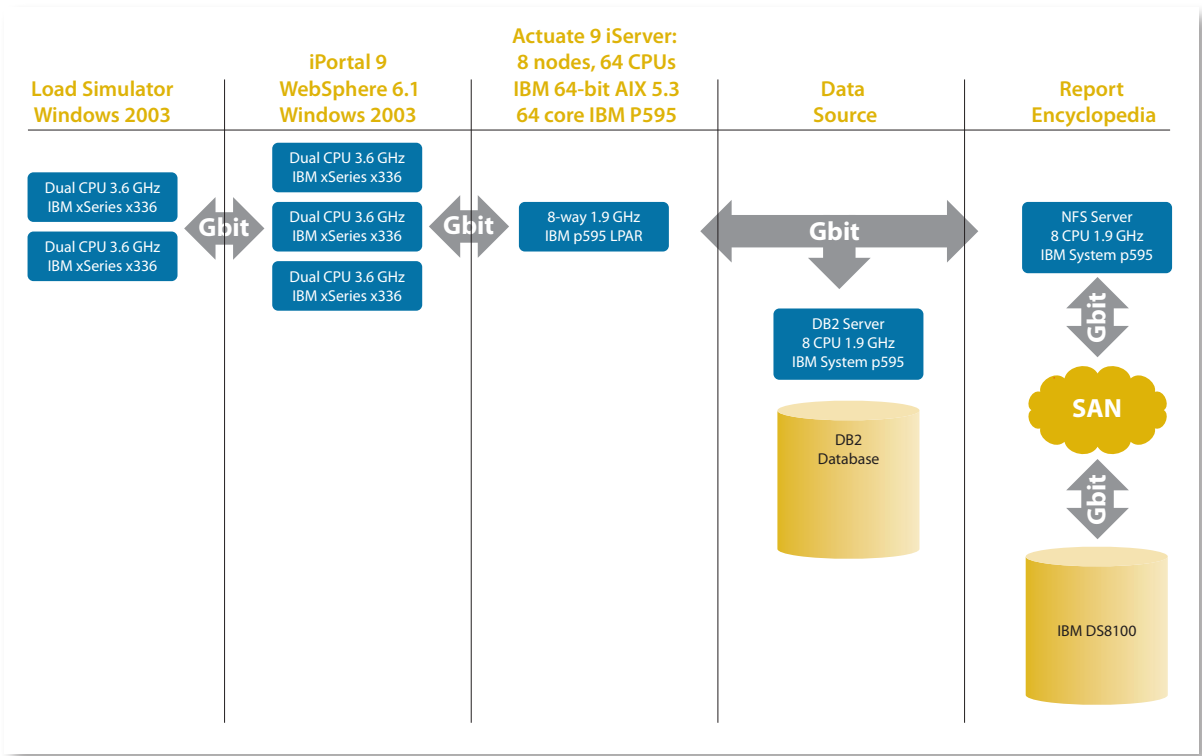


Figure 14 – Configuration for BusinessReport Studio report authoring benchmark. Only smaller configurations were tested, due to lab time schedule.

For all tests, an IBM System Storage DS8100 high-performance disk storage array housed the iServer report encyclopedia. Actuate configured the disk array as RAID 10 for both high performance (striping) and high availability (mirroring). All Actuate server nodes communicated with the DS8100 via a dedicated NFS file server.

Note that while IBM System Storage DS8100 product is suitable for customers who require large-scale storage with 24x7 reliability, it is possible to configure the Actuate server in a lower-cost, less reliable configuration. A SAN is not required.

Where possible, the benchmark configuration was deliberately designed so that the iServer itself was the limiting factor. By providing more than enough processing power to all other system components and by using a network and storage devices that are more than fast enough, we were able to test the true limitations of the iServer. The exception is the BusinessReport authoring scenario, where the configuration was designed to make the iPortal—the constraining system component.

Component	Software	Number of nodes	Machine Model	Number CPUs	CPU Speed	RAM	O/S
iServer nodes	Actuate 9SP2 iServer	8 nodes (1 node for Business Reports test)	8-core LPAR within IBM System p5 p595	8 CPU cores per node 64 CPU cores total (8 CPU cores for Business Report scenario)	1.9 GHz POWER5	16 GB per node	AIX 64-bit Version 5.3
Active Portal Application Servers	Actuate 9SP2 Active iPortal IBM WebSphere Application Server 6.1.0.7	15 nodes (3 nodes for Business Reports test)	Dual CPU 3.6 GHz IBM e-server xSeries x336	2 CPU each 30 CPUs total (6 CPUs total for Business Report scenario)	3.6 GHz Intel P4	4 GB each	Windows 2003
Load Simulator	Dual CPU 3.6 GHz IBM xSeries x336	8 nodes	Dual CPU 3.6 GHz IBM e-server xSeries x336	2 CPUs each 16 CPUs total	3.6 GHz Intel P4	4 GB each	Windows 2003
DB2 database Server	IBM DB2 8.2 DB2 Server	1 node	POWER5	8 CPUs	1.9 GHz POWER5	32 GB	AIX 64-bit Version 5.3
Encyclopedia File Server	NFS	1 node	POWER5	8 CPUs	1.9 GHz POWER5	32 GB	AIX 64-bit Version 5.3
Actuate Encyclopedia	IBM System Storage DS8100, configured with 32 disks in RAID 10 Attached to Encyclopedia File Server via SAN Fabric						

Figure 15 – Hardware configuration for the IBM Actuate Benchmark.

Conclusion

Recent benchmarks at the IBM Innovation Center for Business Partners proved the Actuate 9 iServer, and more specifically the Collaborative Reporting Architecture, is able to generate billions of report pages per day and support millions of named users.

While this series of benchmark tests specifically exercised the BIRT Reports and BusinessReports on the iServer, e.Reports and e.Spreadsheet show comparable performance. Customers should therefore pick the Actuate report type that best fits their functional requirements. They can be confident that all Actuate report types meet the most demanding performance and scalability requirements, since they are all generated on the same industry-leading high performance platform—the Actuate iServer.

Appendix – At a Glance Summary of Benchmark Results

Component	Number CPU cores	Throughput	Number of Users	Scaling Efficiency	Average Response Time
Batch Generation of Cached Reports	64	21,653 pgs/sec	n/a	98.9%	n/a
Standard Viewing Cached Reports	64	1,313.2 viewing requests / sec	43,000 active users	92.1%	0.64 sec
Interactive Viewing	64	338.2 viewing requests / sec	10,000 active users	99.8%	1.31 sec
On-Demand Reporting	64	308.4 report requests/sec	10,500 users	97.7%	3.27 sec
BusinessReport Studio	6 (iPortal)	32.5 report requests/sec	1,000 active users creating reports	n/a	1.20 sec