



The aQDen Solution

Benchmark 2002

*Unprecedented dental
payer solution scalability
on Unisys ES7000 server
technology*



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Independent Auditors

The results of these tests have been audited by Cap Gemini Ernst & Young. They are one of the leading management and information technology consulting firms in the world.

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Abstract

The purpose of this benchmark was to show that QCSI®'s aQDen® dental payer software solution has unmatched scalable technology that enables multi-million member dental plans to run core business processes on a single high performance server, the Unisys® ES7000. The benchmark test offers irrefutable evidence that aQDen offers the most scalable, technologically advanced dental payer solution available on the market today.

Cap Gemini Ernst & Young, one of the leading management and information technology consulting firms in the world, audited the solution architecture and certified the benchmark results. This benchmark test replicates nightly processes for a full-scale production deployment using real production data from a dental plan.

The production data had a total of 1.7 million members, 39,727 claims, 118,191 total providers, 63,660 benefits, and 1,200 employer groups. The data was used to run two typical payer processes: mass adjudication and payment.

The test results prove that aQDen software, in conjunction with a 32 CPU Unisys ES7000 server running Microsoft Windows Datacenter Server and SQL 2000, is capable of offering extremely advanced technology for all sizes of dental plans in the industry. This benchmark has established new standards of performance for software in the dental payer industry, resulting in the following:

- **Mass adjudication: The claims adjudication engine processed 39,727 claims in under 6 hours with a drop-to-pay ratio of nearly 70%.**
- **Payment processing: aQDen processed an unprecedented 26,690 payment transactions in just over 1 hour.**

aQDen is the only product in the dental payer market that can achieve results of this caliber with the advanced technological architecture to efficiently run and support the primary business functions of a dental plan. This document describes how the combination of aQDen and Unisys ES7000 hardware form a powerful, yet cost-effective dental payer solution.

2002 Benchmark Configuration

The 2002 benchmark configuration was developed as a collaborative effort by QCSI, Delta Dental Plan of Missouri, DeniServ and Unisys. The benchmark tests were configured and performed in the Unisys ES7000 Performance Center located in Roseville, Minnesota.

The complete benchmark effort was completed in only a four day period, with little time available to optimize the configurations of hardware, software, etc. Also, for this benchmark effort, the ES7000 was configured with 700MHz Pentium CPUs, the slowest available for the ES7000. Thus, these results represent baseline numbers.

To demonstrate the ES7000's technical value proposition, QCSI's aQDen dental payer software solution was tested for scalability on a 32-way Unisys database server, the ES7000. Four additional servers were used as application and terminal servers. For a schematic, see Figure A: Complete 2002 Benchmark Configuration.

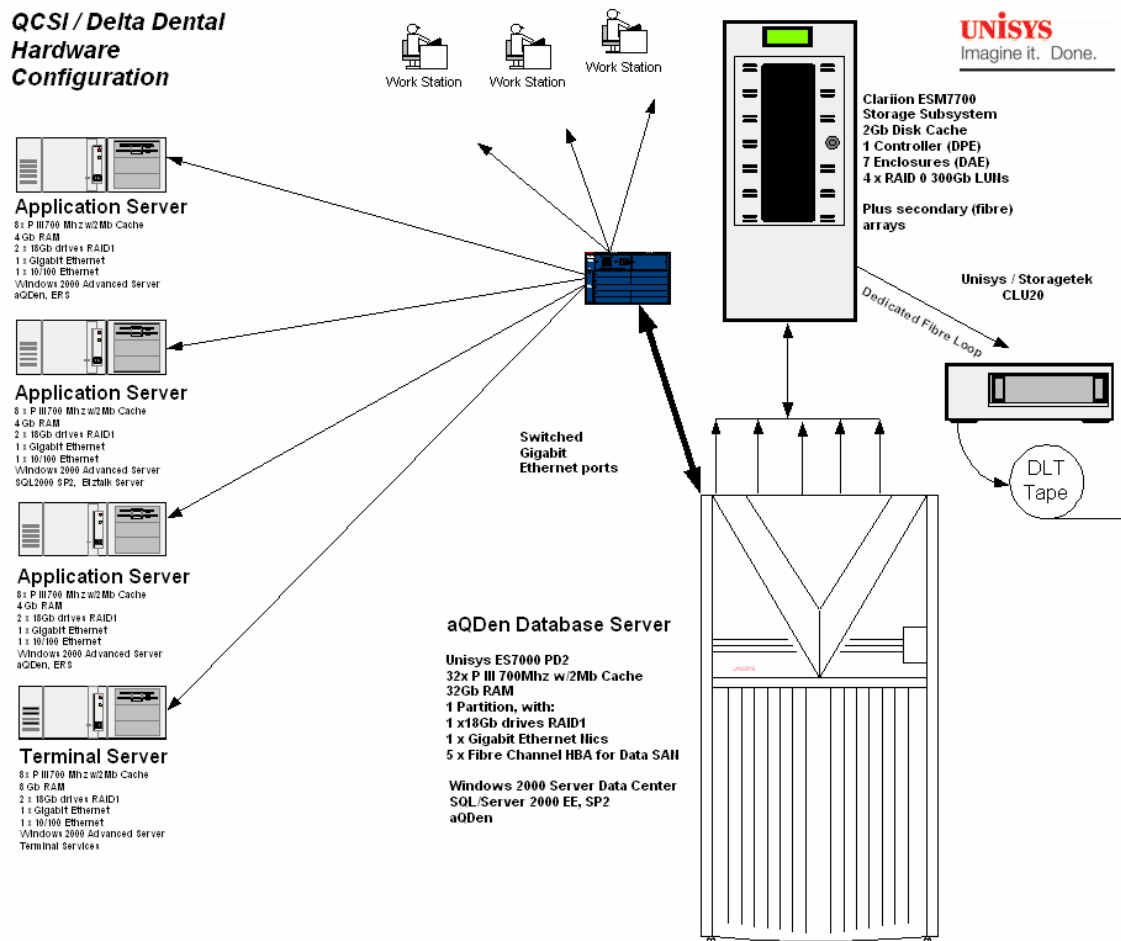


Figure A: Complete 2002 Benchmark Configuration

aQDen Dental Payer Solution

aQDen is designed exclusively for dental payers to administer all lines of business – from indemnity and managed dental care to even Medicaid and Medicare. aQDen efficiently manages all relationships between the plan, its members, employers and dental providers. Its built-in flexibility allows you to respond quickly to changing market dynamics and easily bring new lines of business online.

aQDen handles claims processing and adjudication, pre-determinations, provider administration, employer benefit plan and policy administration, and member services management. With additional modules, you can perform comprehensive financial reporting, call management, Primary Dental Provider auto-assignment, and premium billing.

aQDen ensures efficient and consistent claims processing and adjudication through an automated rules-based claims system. Configured easily to optimize the workflow efficiency of your claims processing department, aQDen allows your existing staff to process a higher volume of claims in less time, with a higher degree of accuracy.

aQDen helps reduce staffing costs through its many automated processes. Technical and programming staff can be reduced through the use of low-maintenance, reliable Microsoft back-end technology. aQDen's advanced down-coding functionality allows plans to pay based upon the appropriate codes, patient history and eligible benefits.

aQDen maximizes a dental payer's drop-to-pay ratio by assuring consistent and efficient adjudication through an automated, rules-based claims engine. aQDen produces a step-by-step explanation of how adjudication rules were applied to each submitted claim, and automatically generates a detailed Explanation of Benefits (EOB) correspondence. Mass adjudication is easily configured to optimize the workflow efficiency of your claims processing department by batch processing claims on a set schedule, keeping you and your claims reimbursements on track.

aQDen manages payments by processing claims or based upon a contractual agreement for capitation (per member per month). The payment process generates payments according to the lines of business pre-established in the dental care organization. aQDen has several functions that help manage the payment process, such as generating fee for service or capitation payments, printing checks for providers or members, voiding payments, generating remittance and explanation of benefit forms, and managing payment advances for providers.

Unisys Servers

Database Server: Unisys ES7000

Unisys extends the benefits of Cellular MultiProcessing, the latest Intel® processors, and Microsoft enterprise software and supports more application environments with ES7000 servers. Whether you're looking to develop a large-scale database or an IT executive needing a system for a mission-critical consolidation project, the ES7000 Family of Servers offers the right system for the right environment. All ES7000 servers are delivered with Unisys Server Sentinel self-monitoring and self-healing systems management software, the only autonomic computing based product available today. This server was configured with Microsoft Windows 2000 Datacenter Operating System.

The ES7000 supports a variety of Intel CPUs, including 700 and 900 MHz Pentium 3, and 1.4 and 1.6 Pentium 4 CPUs, as well as Itanium I and Itanium II. The ES7000s also supports up to 96 PCI channels, for the most scalable and reliable I/O infrastructure available. Finally, the ES7000 employs a mainframe-like cross bar architecture for the most efficient scalability and reliability.

The ES7000 holds the top performance spot for many industry application benchmarks, including SAP SD, PeopleSoft, and for QCSI's QMACs.

ES7000 Database Server Specifications	
Processors	32 Intel III Xeon processors
Megahertz	700 MHz
Cache	2 MB
RAM	32 GB
Disk space	1 TB
Ethernet	1 GB

Table 1: ES7000 Database Server Specifications

Application Server: Unisys ES2085R

The Unisys ES2085R enterprise server delivers optimal cost/performance for customers who need a flexible platform to meet application needs. It supports up to eight Intel Pentium III Xeon® processors with 1MB or 2MB L2 cache. It also gives you near-linear scalability using the Intel Profusion chipset.

ES2085R Application Server Specifications	
Processors	8 Intel III Xeon processors
Megahertz	700 Mhz
Cache	2 MB
RAM	4 GB
Disk space	18 GB
Ethernet	1 GB, 10/100 Ethernet

Table 2: ES2085R Application Server Specifications

Terminal Server: Unisys ES2085R

The Unisys ES2085R enterprise server delivers optimal cost/performance for customers who need a flexible platform to meet application needs. It supports up to eight Intel Pentium III Xeon processors with 1MB or 2MB L2 cache. It also gives you near-linear scalability using the Intel Profusion chipset.

ES2085R Terminal Server Specifications	
Processors	8 Intel III Xeon processors
Megahertz	700 Mhz
Cache	2 MB
RAM	8 GB
Disk space	18 GB
Ethernet	1 GB, 10/100 Ethernet

Table 3: ES2085R Terminal Server Specifications

In addition to the ES7000 server and four commodity servers that Unisys provided QCSI / Delta Dental for this benchmark, Unisys also provided one EMC (Clariion®) ESM7700 disk subsystem. This subsystem was configured as a SAN with redundant fibre channel connections via standard PCI based HBA cards. The exact configuration is as follows:

ESM7700 Disk subsystem SAN

- 1 DPE (controller), with 1Gb of controller Cache
- 7 DAEs with 10 18GB 15k RPM disk drives each
- Total of 56 drives == 1.01Tb of RAW Storage

Supplemental JBOD disk enclosures

- Secondary Drive Arrays (Fibre)
- JBOD with 9Gb 7200rpm Drives
- Log (127Gb); Data (127Gb); TempDB (135Gb)

Microsoft Software Solutions

The following Microsoft software was used during the 2002 benchmark tests:

- SQL Server 2000, Enterprise Edition
- Windows 2000 Datacenter Server
- Windows 2000 Advanced Server
- Windows COM+®
- Microsoft Message Queue®

Test Design Objectives

The primary objective of the lab tests was to realistically demonstrate the enterprise level scalability of aQDen's Services Oriented Architecture (SOA) when scaled up using a single Unisys ES7000 as the database server. The test results prove that aQDen software, in conjunction with Unisys ES7000 hardware, is capable of offering extremely advanced technology for all sizes of dental plans in the industry. This benchmark has established new standards of performance for software in the dental payer industry.

To accurately develop the results of the benchmark, the tests were scheduled in two consecutive stages. The first stage focused on claims processing in mass adjudication. aQDen's mass adjudication engine is designed to automatically determine the status of a claim without human intervention, saving dental payers money by automating the process. For the first stage, 39,727 claims were electronically loaded into aQDen and were processed through the mass adjudication engine. The successfully adjudicated claims were subsequently processed through stage two, payment in aQDen, where payment vouchers and checks to providers were created.

For both stages, measurements including CPU usage, total transactions per stage, as well as the drop-to-pay ratio, number of claims adjudicated, and payments processed were recorded.

Test Data Distribution

QCSI and Delta Dental Plan of Missouri used real life production data in the benchmark. The core benefit packages were taken from Delta Dental Plan of Missouri's production database, and fully reflect the high degree of complexity found in typical dental plans. In addition, the database contained 118,191 dental providers in a mix of primary dental physicians (PDPs) and specialists. The contracts were also originated in the production database, and represent a wide range of reimbursement methodologies from resource-based relative value scale (RBRVS), usual, customary and reasonable (UCR), Per Diem, Tiered Per Diem, ASC, Capitated, and Custom Fee Schedules. The statistical distribution of service, revenue, and diagnostic codes in the database's 39,727 million claims was obtained from the production database. For a concise breakdown of the data distribution, see Table 4: Data Distribution.

Data Distribution	
Total members	1,729,121 *
Total contracts	123
Total benefits	63,660
Total providers	118,191
Total employers	~ 1,200

*Includes active and inactive members

Table 4: Data Distribution

Test Results

The following test results were recorded for the mass adjudication and payment processes.

Mass Claims Adjudication

- 39,727 claims mass adjudicated in 5 hours, 53 minutes
- 70% drop-to-pay ratio¹
- 119 SQL transactions per second

Claims Adjudication resulted in a significant demonstrated improvement over existing adjudication rates. During this benchmark, aQDen processed 6,621 claims per hour, an improvement of 300% from prior claims processing records. During this time, the ES7000 database Central Processing Unit (CPU) maintained an evenly distributed workload across the 32 processors, with the average CPU utilization of 40 to 50 percent.

Claims Status

aQDen processed 39,727 claims in under six hours, achieving a 70% drop-to-pay rate. The subsequent 30% of the claims were in Pend or Assignment of Benefits status. For a complete breakdown of the claims status, see Table 5: aQDen Claims Status.

Claim Status	Number of Claims
Pay	26,419
Pend	11,573
Deny	1501
Assignment of Benefits*	234
TOTAL:	39,727

*For union groups using non-participating providers

Table 5: aQDen Claims Statuses

¹ Drop-to-pay ratio is calculated as the number of claims in Pay and Deny status divided by the total number of claims, i.e., Pay + Deny/Total Claims.

System Performance

aQDen was systematically checked throughout the benchmark for system performance. aQDen maintained excellent system response times, as outlined in Table 6: System Response Times During Common Tasks. Most notably, the Search for a common name (Jones) task returned 11,163 records in only 3.8 seconds.

Task	Response Time
Login	Sub second
Search for known subscriber	Sub second
Search for common name (Jones)	3.8 seconds
Retrieve member claim	2 seconds
Query for all Provider members	90 seconds*

*Query for all members from a large group with more than 50,000 members

Table 6: System Response Times During Common Tasks

Payment

- ➔ 26,690 claims payments processed in 1 hour, 15 minutes
- ➔ 13,307 checks printed in 1 hour, 12 minutes
- ➔ 205 SQL transactions per second

Claims payment resulted in a significant improvement over existing payment rates. During this benchmark, aQDen processed 21,352 payments per hour, an improvement of 1000% from prior claims payment records.

System Performance

aQDen was systematically checked throughout the benchmark for system performance. aQDen maintained excellent system response times, as outlined in Table 7: System Response Times During Common Tasks. Most notably, the Search for a common name (Jones) task returned 11,163 records in only 3.8 seconds.

Task	Response Time
Login	Sub second
Search for known subscriber	Sub second
Search for common name (Jones)	3.8 seconds
Retrieve member claim	2 seconds
Query for all Provider members	90 seconds*

*Query for all members from a large group with more than 50,000 members

Table 7: System Response Times During Common Tasks

System Performance

In the highest load test, payment processing, the system architecture processed 738,000 individual requests for data access or modification in a single hour. The ES7000 database server scaled across all 32 processors, and used between 40 and 50 percent of the CPU during this test, as displayed in Figure B: ES7000 Uniform CPU Performance.

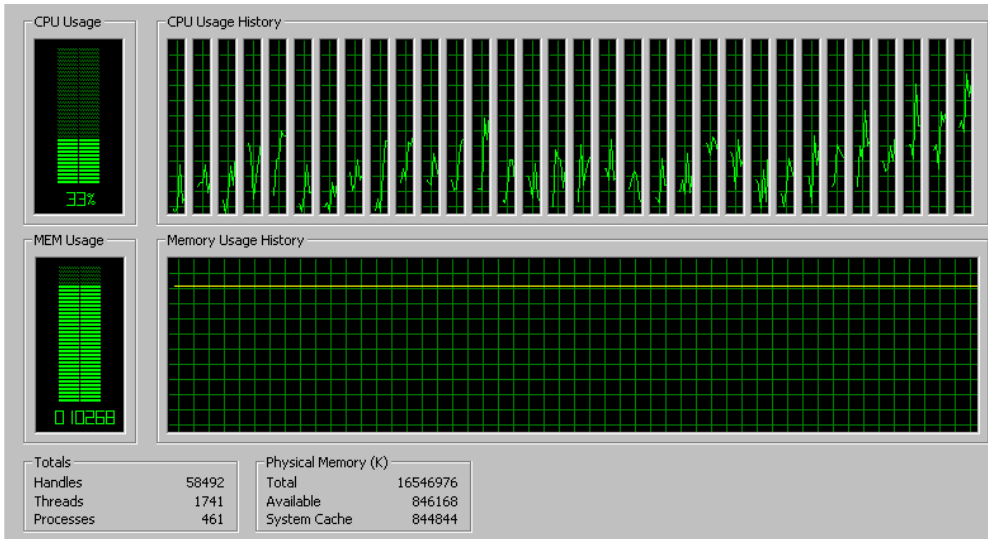


Figure B: ES7000 Uniform CPU Performance

Figure C: Application Server Performance shows the concurrent performance of the application server during the benchmark.

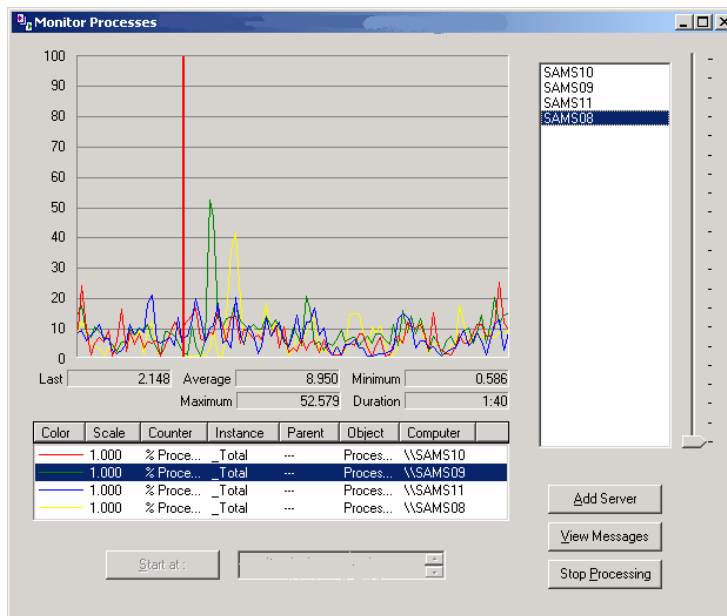


Figure C: Application Server Performance

Testing Conclusions

QCSI's dental payer application, aQDen, combined with a Unisys ES7000 database server, is the best complete dental payer solution available on the market today. The claims adjudication engine processed 6,621 claims per hour. If these processes were allowed to run in batch eight hours a day, five days a week, and fifty two weeks a year, it would result in processing 13,771,680 claims per year.

If you assume the typical health plan member generates seven claims per year, the tested adjudication numbers would support 1,967,382 million dental members. The system also supported 738,000 transactions per hour while maintaining excellent system response times; these transactions were broken down into 21,352 payments processed per hour, and 10,645 payment checks processed per hour.

This benchmark illustrates the benefits of a technology solution designed to facilitate significant gains in productivity and profitability for extremely large dental payer organizations. The numbers cited exceed the processing needs of the vast majority of nationally operated dental plans. QCSI is not aware of a competitor in the dental payer marketplace that has the technology to claim or demonstrate the results obtained.

aQDen and ES700 server technology offer a powerful, scalable, and cost-effective solution that can be designed for payers of all sizes in the industry. Clearly, the results of this benchmark have established new standards of processing performance in the managed care industry. The type of advanced technology, regardless of the larger size, scale, and configuration used in this test, represents the future of dental plan information technology adoption. QCSI and Unisys can appropriately scale and configure this technology, in a cost-effective and appropriate manner, for any dental plan determined to meet the consumer and market demands of the dental payer industry.

Furthermore, The Walklett Group, a project delivery and project management company, explored the cost differences between two comparable Database/server solutions that were designed to fit into a very large database environment—one from Unisys and Microsoft, the other from Sun® Microsystems® and Oracle®. With similar performance attributes, they found that a Unisys and SQL Server solution saves \$3.2 million over five years compared to a Sun and Oracle solution. The TCO analysis considered many factors, including initial purchase price, cost of maintenance, as well as the significant cost differences for administration and management. This is further proof that the Windows/Intel business model used by QCSI and Unisys can save enterprises significant dollars, while providing comparable computing environments, even for large scale DB applications. For a complete copy of the white paper, go to:
www.unisys.com/products/es7000__servers/business__solutions/business__intelligence__database__server/index.htm.

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About QCSI



QCSI is the leading healthcare payer solution provider offering advanced technology and services using Microsoft technology. Providing safe solutions since 1994, QCSI's growing customer base serves more than

10 million members nationwide. QCSI enables health plans to reduce costs, improve customer service, increase profitability, expand market share and comply with government regulations, including HIPAA. QCSI's rapid growth is a testament to its commitment to quality and reliability, partnerships with industry leaders such as Microsoft, HP, and Unisys, and innovative use of advanced technologies to meet customer needs. QCSI's award-winning software and e-Business applications include QMACS, aQDen, aQHealth, aQTrans, and aQServ.

Headquartered in Phoenix, Arizona, QCSI can be contacted at 888-940-6432 or info@qcsi.com, or visit our website at www.qcsi.com for more information.

About Delta Dental Plan of Missouri and DeniServ



Delta Dental Plan of Missouri (DDPMO) has provided dental benefits for employees and families for more than 40 years. Today, DDPMO serves 970 companies in Missouri

and South Carolina, including more than 350,000 primary subscribers. DDPMO features a unique cost management program - The Delta Difference - that achieves remarkable savings for customers and their employees. Groups can also customize benefits to meet their individual needs. This is due in part to the fact that dental benefits are Delta Dental's only business. For more information, visit www.deltadentalmo.com.



DeniServ is a subsidiary of DDPMO, specializing in business process outsourcing for dental payer organizations. This includes ASP services, EDI administration, Data Entry, Imaging and custom programming.

DeniServ's mission is to provide secure, stable and flexible technical solutions to businesses participating in all aspects of dental claims processing. DeniServ provides a combination of Customer focus and industry expertise. For more information, contact info@deniserv.com or visit the website at www.deniserv.com.

About Unisys Corporation



Unisys is a worldwide information technology services and solutions company. Our people combine expertise in systems integration, outsourcing, infrastructure, server technology and consulting with precision thinking and relentless execution to help clients, in more than 100 countries, quickly and efficiently achieve competitive advantage. For more information, visit www.unisys.com.