

Scalability

Microsoft Dynamics® GP 10.0

Benchmark Performance:
Advantages of Microsoft®
SQL Server® 2008 with
Compression

White Paper

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Introduction

Business growth can appear in many forms: increasing numbers of employees, customers, patients, members, or constituents; launching new products and services; entering new geographies, and more. Growth also simply can reflect increasing transaction levels driven by sales or purchasing. Regardless of form, organizations need both the right people and the right business systems if they are to manage growth with confidence.

When researching financial and business management applications, transaction processing speed and system scalability are important criteria. You need to know your new system will be able to easily handle existing transaction loads, with the ability to manage significant increases should your business experience exponential growth. The foundation for any business management application is its operating environment. Microsoft Dynamics® GP is designed to work with Windows Server®, Windows® client operating systems, and Microsoft® SQL Server®. These widely used products provide high-volume transaction processing at low costs, as validated by Transaction Processing Performance Council's TPCC and TPC-W benchmarks.

Working in concert with Microsoft server technologies, Microsoft Dynamics GP delivers a business system environment that is easy to use, lowers the overall cost of distributed computing, and enables businesses to harness the power, flexibility, and functionality of an award-winning Microsoft Dynamics GP business management solution. Organizations can help improve their decision making, streamline business processes, and strategically manage their growth with the assurance that their business system will grow with them.

This white paper demonstrates how Microsoft Dynamics™ GP delivers a business system that can scale with growing organizations by successfully handling massive amounts of transactions and data when taking advantage of Microsoft SQL Server 2008. Whether it's managing sheer transaction volume in a particular business function, database size, or number of users and machines, Microsoft Dynamics GP with SQL Server 2008 can handle the peaks and valleys of regular business cycles, as well as the long-term, upward path that reflects growth. With Microsoft Dynamics GP, you can focus on keeping pace with success, rather than worrying about the systems that make your business run.

Summary Results

With Microsoft Dynamics GP's latest benchmark performance test, Microsoft Dynamics GP 10.0 showed an 18% increase in performance through upgrading from SQL Server 2005 Enterprise Edition to SQL Server 2008 Enterprise edition when using Row Compression. Even without Compression enabled, SQL Server 2008 still showed a 9% gain in performance when compared with SQL Server 2005.

The table below shows transaction throughput across the 4 scenarios tested, and the significant impact SQL Server 2008 with Page or Row Compression can have on system performance:

	#1 SQL 2005 - Baseline	#2 SQL 2008 - No Compression	#3 SQL 2008 - Page Compression	#4 SQL 2008 - Row Compression
Transaction throughput	286,439	313,282	320,222	339,104
Throughput improvement over SQL 2005	NA	23,843 (+9%)	33,783 (+12%)	52,665 (+18%)

An additional benefit demonstrated by the benchmark performance tests was how enabling Compression reduced the disk drive space requirements of the Microsoft Dynamics GP company database, as outlined in the table below.

	#1 SQL 2005 - Baseline	#2 SQL 2008 - No Compression	#3 SQL 2008 - Page Compression	#4 SQL 2008 - Row Compression
Company database size	282 GB	282 GB (0%)	134 GB (-52.5%)	163 GB (-42.2%)

These results clearly show that upgrading to SQL Server 2008 Enterprise edition can have a *significant* impact on system performance, especially when Page or Row compression is enabled on select tables in the company database that are large enough to be candidates for compression (see the “Testing Preparation” section for more details on selecting the proper tables for Compression). Also, considerable amounts of hard disk space can be conserved by the Compression functionality offered in SQL Server 2008, allowing customers to perhaps postpone hardware upgrades when facing low disk capacity.

Note: Per SQL Server recommendations, not all tables in the database were actually compressed in scenarios three and four (for a detailed list of tables that were compressed in these tests, refer to the “Detailed Results” section). Before an object is compressed (e.g. table, index or a partition), the object size, usage and estimated compression savings must be evaluated. If a table isn’t large in relation to the actual database size, then typically it is not beneficial to compress it. Refer to the “Testing Preparation” section for more information on selecting the proper objects for Compression.

Benchmark Test Overview

Microsoft recently completed performance benchmark testing for running Microsoft Dynamics GP 10.0 with 100 constant concurrent users, all engaged in heavy transaction processing or analysis activity across various functional areas of the solution. The performance benchmarks were executed for a two hour period across 4 key scenarios to determine the impact SQL Server 2008 may have in a live customer environment. The scenarios included:

- SQL Server 2005 Enterprise
- SQL Server 2008 Enterprise with no Compression enabled
- SQL Server 2008 Enterprise with Page Compression enabled
- SQL Server 2008 Enterprise with Row Compression enabled

Each scenario was conducted three times over a two hour period, consisting of 100 users performing transactional processing in multiple modules: General Ledger, Receivables Management, Payables

Management, and Sales Order Processing. The goal of these tests was to determine if the Compression functionality added in SQL Server 2008 Enterprise and Developer editions would increase performance when compared to both SQL Server 2005 and SQL Server 2008 without Compression enabled.

The Compression functionality added in SQL Server 2008 allows customers to help deal with increasing disk capacity demands placed on the database management system from large volumes of data. By enabling the Compression features of SQL Server 2008, customers can reclaim valuable disk space and potentially postpone the purchase of additional disk capacity. For more information about the Compression features of SQL Server 2008, please refer to the following link:

<http://msdn.microsoft.com/en-us/library/cc280449.aspx>.

Testing Definition

The four benchmark performance scenarios were executed with the same set of conditions, outlined below:

- The users in these tests were not simulated users but actual Microsoft Dynamics GP clients.
- The tests were based on 100 physical Microsoft Dynamics GP users entering and processing transactions continuously for a two hour period. For example, there were 15 users concurrently entering General Ledger journal entries with 10 line items in each entry. Refer to the table below for a complete list of transactions and processes completed during each test.
- The transaction throughput documented in the summary results was achieved while the Microsoft Dynamics GP system was simultaneously completing intensive analysis and processing functions. Refer to the table below for a complete list of transactions and processes completed during each test.
- Most clients had a type delay, which represented clients entering information at 90 words per minute.

The table below outlines the testing definition.

Transaction Type	Transaction Line Count	Number of Clients Running Test
General Ledger Transaction Entry	10	15
Payables Voucher Entry	1	10
Receivables Cash Entry	1	10
Sales Order Entry	5	40
Sales Order Transfer	5	5
Sales Order Posting	5	5
Receivables Cash Posting	N/A	5
Payables Voucher Posting	N/A	5
Payables Historical Aged Trial Balance	N/A	1
Receivables Historical Aged Trial Balance	N/A	1
Payables check Processing	N/A	1
Receivables Aging	N/A	1
Payroll Check processing	N/A	1
Total Constant Concurrent Users		100

Testing Preparation

Determining which tables to Compress in SQL Server 2008

Microsoft does not recommend compressing every table in a database. Rather, only those with a large table size in relation to the size of the database should be considered candidates for compression. In the scenarios where Page or Row compression was enabled, the sample database used in these tests was evaluated on a table by table basis using SQL Management Studio to determine which tables were large enough to consider enabling compression on. For this particular database, any table with a size over 2GB was considered a candidate for compression (the total database size was initially 282 GB). This exercise resulted in a total of 14 tables being identified as possible candidates for compression (see the "Detailed Results" section for a complete list of tables specifically related to this database that were compressed).

Once the tables were identified, a SQL query was executed against each table to determine if Compression would result in a decreased table size with Page or Row Compression enabled. It is possible for tables to actually grow larger with Compression enabled, therefore it is important to execute this script before any change is made. An example of the SQL Script run on one of the 14 tables is below:

```
EXEC sp_estimate_data_compression_savings 'dbo', 'GL20000', NULL, NULL, 'ROW' ;
GO
```

All 14 tables identified showed positive results for compression as a result of this query; therefore the next step was to create the SQL Queries necessary to enable Page or Row compression for the third and fourth test scenarios that were to be executed. To help in the creation of the SQL statements, the results of the query above state if the table is a Clustered Index or a Heap. This will dictate which type of query is executed on a given object.

Below are examples of the SQL statements executed to enable Page or Row Compression for both Clustered Indexes and Heaps:

Clustered Indexes – Enabling Page Compression

```
ALTER INDEX CL8GL20000 ON GL20000
REBUILD WITH (DATA_COMPRESSION = PAGE)
GO
```

Clustered Indexes – Enabling Row Compression

```
ALTER INDEX CL8GL20000 ON GL20000
REBUILD WITH (DATA_COMPRESSION = ROW)
GO
```

Heaps – Enabling Page Compression

```
ALTER TABLE GL10001
REBUILD WITH (DATA_COMPRESSION = PAGE)
GO
```

Heaps – Enabling Row Compression

```
ALTER TABLE GL10001
REBUILD WITH (DATA_COMPRESSION = ROW)
GO
```

Detailed Results

With Microsoft Dynamics GP's latest benchmark performance test, Microsoft Dynamics GP 10.0 showed an 18% increase in performance through upgrading from SQL Server 2005 Enterprise Edition to SQL Server 2008 Enterprise edition when using Row Compression. Even without Compression enabled, SQL Server 2008 still showed a 9% gain in performance when compared with SQL Server 2005.

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In all, 14 tables were compressed in test scenarios three and four. It is important to note that each unique customer database may have an entirely different set of tables that are candidates for compression. Transaction volumes vary drastically from one customer to another, making it important to analyze each company database on an individual basis to determine which tables are best suited for compression. The detailed results of the Compression scenarios in SQL Server 2008 for this sample company database are listed in the table below:

Table	Heap or Index	Size Before Compression	Size After Page Compression	Size After Row Compression
GL10001	Heap	4.7 GB	516 MB	1 GB
GL20000	Clustered Index	31 GB	4 GB	13 GB
GL30000	Heap	3.4 GB	1 GB	1.5 GB
IV30300	Heap	3.4 GB	1 GB	2 GB
RM10101	Clustered Index	4.4 GB	694 MB	2 GB
RM30101	Heap	2.7 GB	416 MB	1 GB
RM30301	Heap	22 GB	1.5 GB	3.5 GB
SOP10100	Heap	2 GB	287 MB	400 MB
SOP10102	Heap	19 GB	1.5 GB	3.5 GB
SOP10105	Heap	14 GB	2 GB	3.5 GB
SOP10200	Clustered Index	8.5 GB	1 GB	2 GB
SOP30200	Heap	18 GB	3 GB	4 GB
SOP30300	Heap	54 GB	8 GB	13 GB
UPR30300	Heap	2.5 GB	380 MB	600 MB
Total size of the 14 tables		190 GB	25 GB	50 GB
Total Database size		282 GB	134 GB	163 GB

Note that no difference in table size was found between SQL Server 2005 and SQL Server 2008 without Page or Row Compression enabled.

Test Methodology

Microsoft uses an internal testing lab to conduct software performance reviews and perform automated testing routines. This testing lab is isolated from other network traffic during the tests. Note that the client/server configurations are running the automated testing system only and do not have any other network traffic during the benchmark process. Although this would not likely be the case in an actual site, as most clients will also be running e-mail or other workplace-specific applications, this kind of testing does allow for the isolation and testing of critical system components—in this case, the database server. From a system perspective, this kind of testing stresses the system more than a real-world customer environment.

Comparison to previous performance reports

Microsoft has published several performance reports in the past, and while we can confidently state that we have made performance advances in specific areas of the product from release to release, it must also be noted that the testing environment continuously evolves, negating any “apples to apples” comparisons. More powerful hardware, better configurations, new versions of operating system and database management software, adjustments to the starting data set, and enhancements to our solutions all contribute to overall performance.

Test Lab Configurations

This report presents the results of internal testing as performed by a Microsoft Corporate Testing Lab with the following applications:

- Microsoft Dynamics™ GP 10.0 SP2
- Microsoft® SQL Server® 2005 Enterprise 64-bit Edition SP2 (Scenario 1)
- Microsoft SQL Server 2008 Enterprise x64 Edition (Scenarios 2, 3, and 4)
- Windows Server® 2003 Enterprise x64 Edition SP2 3GB switch enabled (Server)
- Windows® XP Professional x86 SP2 (Client)

Testing Hardware

Server Definition – Dell Power Edge 6850

- 4 Dual-Core 64-bit Xeon processors at 3.40 GHz
- 16MB L3 Cache
- 16 GB RAM
- 1 10/100/1000 NIC
- 4 Internal drives (18.2 GB 15K U320) Raid 10 on a PERC4/DC
- 4 Emulex LP1050Ex HBA's

External Storage - Dell | EMC CX600 SAN

- 6 Raid Groups consisting of 1 LUN each
 - Each Raid group consists of 14 - 36.4 GB 15 K/ 2 GB Fiber Channel Drives
 - RAID level for all 6 groups is RAID 10
 - DATA 1, DATA2, DATA3, DATA4, LOGS, TEMPDB
- 1 Raid Group consisting of 1 LUN
 - RAID group consists of 16 – 73 GB 10 K/ 2 GB Fibre Channel
 - RAID level is RAID 5
 - ALL BACKUPS

Client Definition - Dell Power Edge 850 – 10 instances of Microsoft Dynamics GP running on each client

- Single 3.0 GHz Dual Core
- 2 GB RAM
- 75 GB HD

About Microsoft Dynamics

Microsoft Dynamics is a line of integrated, adaptable business management solutions that enables you and your people to make business decisions with greater confidence. Microsoft Dynamics works like and with familiar Microsoft software, automating and streamlining financial, customer relationship and supply chain processes in a way that helps you drive business success.

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