Scalability

Microsoft Dynamics GP 2010

Performance Benchmark:
500 Concurrent Users with
Microsoft SQL Server 2008

White Paper

September 2010

Contents

Executive Overview

This white paper documents performance benchmark testing for a large company database running Microsoft Dynamics GP 2010 in a 64-bit SQL Server 2008 and Windows Server 2008 R2 environment across three distinct scenarios:

1. 500 constant concurrent users in the rich Microsoft Dynamics GP client, all engaged in heavy transaction processing or analysis activity across various functional areas of the solution.

2. 500 constant concurrent users in the rich Microsoft Dynamics GP client along with 10 instances of continuous (synchronous) integrating Web Services clients creating Sales Order transactions. As in the first test, all rich client users were engaged in heavy transaction processing or analysis activity across various functional areas of the solution.

3. US Payroll testing, including both check processing and payroll reporting for a 30,000 employee organization.

The results of these tests show that Microsoft Dynamics GP 2010 can process an incredible number of transaction and processing volume under high stress scenarios. The summary results of each test are as follows:

User Test	Transactions per 8 hour day	Transaction Lines per 8 hour day
1. 500 concurrent users	2.96 million transactions	9.85 million transaction lines
2. 500 concurrent users + 10 Web Service instances	3.20 million transactions	11.29 million transaction lines
Payroll Test	**Time to complete**	
3. 30,000 employee check run & reporting	• Build, Calculate, Print, and Post 30,000 checks: 8 Hours • Month-End Reporting: 1.56 Hours • Year-End Reporting: 49.4 Minutes • Total time for check processing and reporting: 10.4 Hours	

In addition to the details of the latest benchmark testing results, this white paper also includes real-world examples of transaction processing throughput from some of our largest customers. The combination of this information will help you assess how Microsoft Dynamics GP can scale to meet your organizational needs and goals, now and into the future.

Benchmark Performance Overview

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 can reflect increasing transaction levels driven by sudden spikes in 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. This white paper demonstrates how Microsoft Dynamics™ GP 2010 delivers a business system that can scale with growing organizations by successfully handling massive amounts of transactions and data by leveraging Microsoft SQL Server® 2008 and Windows Server® 2008.

Working in concert with these 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 improve their decision making, streamline business processes, and strategically manage their growth with the assurance that their business system will grow with them. The following test results demonstrate that Microsoft Dynamics GP can handle substantial transaction volumes, database sizes, or number of users and machines within larger organizations. With Microsoft Dynamics GP, you can focus on keeping pace with success, rather than worrying about the systems that make your business run.

Summary Benchmark Results

Tests One and Two: Benchmark performance testing consisted of 500 Microsoft Dynamics GP users entering transactions and processing transactions continuously, with other activities such as Payables Management check printing, Payroll check printing and Receivables Management month-end processes of aging, statements, and Paid Transaction Removal running simultaneously. The tables below summarize test results for the two tests:

Test One: 500 Concurrent Users

Transaction Type	Transactions Per Hour	Transaction Line Items Per Hour
General Ledger Transaction Entry	4,767	47,670
Receivables Cash Entry	39,683	39,683
Receivables Cash Posting	38,176	38,176
Payables Voucher Entry	16,315	16,315
Payables Voucher Posting	82,294	82,294
Purchase Order Entry	4,739	23,695
Purchase Orders Received	16,924	84,620
Purchase Orders Posted	12,953	64,765
Sales Order Entry	27,893	139,465
Sales Order Transfer	75,949	379,745
Sales Order Posting	50,865	254,325
US Payroll Check Processing	5,000	60,000

Totals: Type	Per Hour Throughput	8 Hour Business Day Throughput
Business Transactions	370,558	2,964,464
Business Transaction Line Items	1,230,753	9,846,024

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

Transaction Type	Transactions Per Hour	Transaction Line Items Per Hour
General Ledger Transaction Entry	3,032	30,320
Receivables Cash Entry	35,624	35,624
Receivables Cash Posting	39,665	39,665
Payables Voucher Entry	10,344	10,344
Payables Voucher Posting	80,965	80,965
Purchase Order Entry	4,838	24,190
Purchase Orders Received	18,506	92,530
Purchase Orders Posted	13,038	65,190
Sales Order Entry	33,320	166,600
Web Services Sales Order Entry	27,318	136,590
Sales Order Transfer	82,098	410,490
Sales Order Posting	51,678	258,390
US Payroll Check Processing	5,000	60,000

Totals: Type	Per Hour Throughput	8 Hour Business Day Throughput
Business Transactions	400,426	3,203,408
Business Transaction Line Items	1,410,898	11,287,184

Test Three: The third benchmark performance test focused specifically on heavy transaction loads within U.S. Payroll. This test consisted of a pay run and period end reporting for an organization of 30,000 employees. The tables below summarize the test results:

Transaction Type	Total Result	Minutes/Hours
U.S. Payroll		
Build, Calculate, Print, & Post Checks	8.003	Hours
Month-End Reporting	1.561	Hours
Year-End Reporting	49.356	Minutes
Full Scenario: Checks Processing and Reporting	**10.432**	**Hours**

Detailed Benchmark Results

The information below details the benchmark results for test one and two across the various functional areas that were performed using Microsoft Dynamics GP 2010. You may notice that results may differ for specific transactional areas between the 500 Concurrent User test and the 500 Concurrent User plus 10 Web Service users test. While one may assume that the addition of Web Service users would cause a general slow-down across functional areas, it was shown that in some areas performance actually improved as the Web Services were introduced into the Sales Order Entry process.

Overall, Microsoft Dynamics GP used 45+% of the available server CPU capacity, a level that depending on the customer's specific situation, may warrant occasional monitoring to determine if additional hardware is necessary or not.

General Ledger Entries

This test measured the rate at which Microsoft Dynamics GP accepts General Ledger transaction entries during a one-hour period.

Test One: 500 Concurrent Users

General Ledger Entries	Transactions Per Hour	Transaction Lines Per Hour
Journal Entries Entered	4,767	47,670

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

General Ledger Entries	Transactions Per Hour	Transaction Lines Per Hour
Journal Entries Entered	3,032	30,320

Receivables Cash Receipts

This test measured the rate at which Microsoft Dynamics GP accepts cash receipt transaction entries while other cash receipts are posted by Microsoft Dynamics GP Receivables Management during a one-hour period.

Test One: 500 Concurrent Users

Cash Receipts	Transactions Per Hour
Receipts Entered	39,683
Receipts Posted	38,176

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

Cash Receipts	Transactions Per Hour
Receipts Entered	35,624
Receipts Posted	39,665

Payables Vouchers

This test measured the rate at which Microsoft Dynamics GP accepts vouchers being entered while other vouchers are posted through Payables Management during a one-hour period.

Test One: 500 Concurrent Users

Payables Vouchers	Transactions Per Hour
Vouchers Entered	16,315
Vouchers Posted	82,294

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

Payables Vouchers	Transactions Per Hour
Vouchers Entered	10,344
Vouchers Posted	80,965

Purchase Order Processing Transaction Throughput

This test measured the rate at which Microsoft Dynamics GP accepts Purchase Order Processing transaction entries, while simultaneously receiving and posting orders to Microsoft Dynamics GP Purchase Order Processing, Payables, and Inventory modules.

Test One: 500 Concurrent Users

Purchase Order Processing	Transactions Per Hour	Line Items Per Hour
Orders Entered	4,739	23,695
Orders Received	16,924	84,620
Orders Posted	12,953	64,765

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

Purchase Order Processing	Transactions Per Hour	Line Items Per Hour
Orders Entered	4,838	24,190
Orders Received	18,506	92,530
Orders Posted	13,038	65,190

Sales Order Processing Transaction Throughput

This test measured the rate at which Microsoft Dynamics GP accepts Sales Order Processing transaction entries, while simultaneously transferring orders to invoices and posting invoices to Microsoft Dynamics GP Sales Order Processing, Receivables, and Inventory modules.

Test One: 500 Concurrent Users

Sales Order Processing	Transactions Per Hour	Line Items Per Hour
Orders Entered	27,893	139,465
Orders Transferred	75,949	379,745
Invoices Posted	50,865	254,325

Test Two: 500 Concurrent Users + *10 Web Services Sales Order Entry Instances*

Sales Order Processing	Transactions Per Hour	Line Items Per Hour
Orders Entered	33,320	166,600
Web Services Orders Entered	27,318	136,590
Total Orders Entered	**60,638**	**303,190**
Orders Transferred	82,098	410,490
Invoices Posted	51,678	258,390

Analysis and Processing Detail

For the duration of both tests one and two, analysis and processing routines also were being completed within the Microsoft Dynamics GP system. The table below outlines routines and associated volumes.

Process	Details
Customer Statements Printed	154,933
Payables Vouchers Paid	2,237
Customers on Historical Aged Trial Balance	102,038
Vendors on Historical Aged Trial Balance	153,000
Employees Paid in Pay Run	5,000
Transaction Lines in Pay Run	65,000
Inventory Items on Stock Status Report	59,992

Payroll Benchmark Detailed Results

This 30,000 employee U.S. Payroll test used the same dataset that served the 500 user test (described in the next section). Because the data set already contained a year's worth of pay runs, a final 26th pay run for the year was executed for this test. The test spanned both processing and reporting scenarios for executing year-end payroll.

For this test, checks processing consisted of building, calculating, printing, and posting 30,000 payroll checks. The test also included running month-end, quarter-end, and year-end reports. Each employee was paid for 72 working hours, plus 8 holiday hours per pay period.

The results shown below illustrate that Microsoft Dynamics GP 2010, working in concert with SQL Server, Windows Server, and Windows client operating systems, can efficiently complete a full payroll scenario for a large employee base.

Transaction Type	Result	Minutes/Hours
Payroll Check Processing		
Build Checks	0.971	Hours
Calculate Checks	2.182	Hours
Print Checks	1.237	Hours
Printing Reports and Posting	4.850	Hours
Total Build, Calculate, Print, Post	**8.003**	**Hours**
Month End Reporting		
Payroll Summary	0.299	Minutes
Pay Code Summary	0.033	Minutes
Department Wage Summary	0.027	Minutes
Position Summary	0.029	Minutes
Deduction Summary	0.042	Minutes
Benefit Summary	0.036	Minutes
State Tax Summary	0.023	Minutes
Local Tax Summary	0.007	Minutes
FUTA Report	11.213	Minutes
SUTA Report	1.365	Hours
Workers Compensation Report	0.046	Minutes
Total Month End Reporting	**1.561**	**Hours**
Quarter-End Reporting		
4th Quarter: October-December	**2.726**	**Minutes**
Year-End Reporting		
Year-End Close	31.354	Minutes
Year-End Report	5.611	Minutes
Year-End Print W2's	12.391	Minutes
Total Year-End Reporting	**49.356**	**Minutes**
Full Scenario		
Checks Processing and Reporting	**10.432**	**Hours**

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.

Comparisons with Previous Benchmark Tests

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.

Also, previous benchmark tests for Microsoft Dynamics GP were done in a 1,000 concurrent user environment, and were focused on proving the *user* scalability potential of the system. Moving forward, Microsoft's goal has shifted to focus on *transaction throughput* in a user environment more in-line with Microsoft Dynamics GP's target market. In addition to this change in focus, a new test has been added to simulate common real-world environments where customers are leveraging Web Services for Microsoft Dynamics GP to import data from external systems.

As a result of this change in focus and the continuing evolution of the testing hardware and environment, readers should not compare outcomes of these tests against previous versions of performance benchmark results.

Testing Parameters

The following items define the key test parameters for tests one and two:

- The users in these tests were not simulated users but actual Microsoft Dynamics GP clients.

- The first test was based on 500 physical Microsoft Dynamics GP users entering and processing transactions continuously. For example, there were 30 users concurrently entering General Ledger journal entries with 10 line items in each entry.

- The second test included the same baseline number of users and activity as the first test; however 10 additional physical machines were added to include Web Services importing data into Sales Order Entry. This was done in order to determine the effects on throughput and performance when importing data through Web Services while rich-client users were active in the system (a common real-world scenario).

- The transaction throughput documented in the summary and detailed results was achieved while the Microsoft Dynamics GP system was simultaneously completing intensive analysis and processing functions, including:
    - Payables Check Processing

- o Payables Historical Aged Trial Balance

- o Receivables Historical Aged Trial Balance

- o Receivables Month End Aging

- o Generation of Receivables Statements

- o Receivables Month End Paid Transaction Removal

- o Generation of Inventory Stock Status Report

- Most clients had a type delay, which represented clients entering information at 90 words per minute.

- In the scenarios, all clients were continuously processing simultaneously during the test.

The table below outlines the testing definition for each functional area for tests one and two.

Transaction Type	Transaction Line Count	Number of Clients Running Test
General Ledger Transaction Entry	10	30
Payables Voucher Entry	1	40
Receivables Cash Entry	1	40
Purchase Order Entry	5	40
Purchase Order Received	5	40
Purchase Order Posted	5	10
Sales Order Entry	5	200
Web Services Sales Order Entry*	5	10
Sales Order Transfer	5	40
Sales Order Posting	5	40
Receivables Cash Posting	N/A	10
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 Month End	N/A	1
Payroll Check processing	N/A	1
Total Constant Concurrent Users		**500**

*Note: Only used in test two. This represented ten additional "users" in Sales Order Entry, simulated via ten instances of Web Services importing data directly into the Sales Order Entry tables.

Starting Data

The Microsoft Dynamics GP data set used in testing is configured to allow comparisons across different levels of transactions. In addition, prior to each test, after the data is restored statistics are updated in order to synchronize data distribution, index distribution and table statistics. This process is similar to the process that SQL Server uses to maintain dynamic statistics on data in a production environment.

The table below illustrates key record types within the 290 GB test database.

Record Type	Starting Record Count
General Ledger Accounts	164,001
General Ledger Transactions	1,154,603
General Ledger Transaction Lines	10,296,027
General Ledger Year to Date Transactions	51,541,034
GL History	6,081,487
Inventory Items	59,992
Inventory Item Quantity	389,970
Inventory Purchase Receipts	528,980
Payables Vendors	153,000
Payables Work Transactions	520,001
Payables Open Transactions	33,433
Payables Paid Transaction History	782,889
Purchase Order Work	80,004
Purchasing Receipt History	214,002
Purchasing Receipt Line History	358,001
Receivables Customers	153,106
Receivables Sales Work	1,020,001
Receivables Open Transactions	683,209
Receivables Transaction History	3,770,887
Sales Transaction Work	802,140
Sales Transaction Amounts Work	4,272,835
Sales Transaction History	6,932,953
Sales Transaction Line History	33,875,654
Payroll Master	51,000
Payroll Tax Information Master	51,000
Payroll Pay Code Master	101,500
Payroll Deduction Master	252,000
Payroll State Tax Master	51,000

Microsoft Dynamics GP 2010 Benchmark Performance Test

Test Lab Software Configurations

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

- Microsoft Dynamics™ GP 2010 RTM
- Microsoft® SQL Server® 2008 Enterprise x64 Edition SP1
- Windows Server® 2008 R2 Enterprise x64 Edition (Server)
- Windows® 7 Enterprise x64 Edition (Client)
- Note: In this test, the Row Compression feature of SQL Server 2008 was enabled on select tables of the Microsoft Dynamics GP company database. For more information about this, please refer to the following which describes the process and tables compressed in both White Papers: https://mbs.microsoft.com/partnersource/documentation/whitepapers/mdgpsqlwhitepaper.htm

Testing Hardware

Server Definition – HP ProLiant DL 300 Series
- 2 Intel Quad-Core 64-bit Xeon processors at 2.26 GHz
- 8 MB L3 Cache
- 48 GB RAM
- 1 10/100/1000 NIC
- Internal Storage – 25 Drives (300 GB 10K SAS 2.5 DP)
    - 6 Raid Groups consisting of 1 partition each
    - Each Raid group consists of 4 – 300 GB 10K SAS 2.5 Drives
        - All logical disks were setup about 40% smaller than total size for enhancing performance
    - RAID level for all 6 groups is RAID 10
    - SYSTEM, DATA1, DATA2, DATA3, DATA4, LOGS
- External Storage – 10 Drives (300 GB 10K SAS 2.5 DP)
    - 2 Raid Groups consisting of 1 partition each
    - Raid Group 1 – TEMPDB
        - Raid group consists of 4 – 300 GB 10K SAS 2.5 Drives
        - RAID level is RAID 10
    - Raid Group 2 – BACKUPS
        - Raid group consists of 4 – 300 GB 10K SAS 2.5 Drives
        - RAID level is RAID 6
- 4 Emulex LP1050Ex HBAs

Client Definition - Dell Power Edge R200 – 10 instances of Microsoft Dynamics GP running on each client
- Quad Core 2.13 GHz
- 4 GB RAM
- 225 GB HD

Microsoft Dynamics GP 2010 Benchmark Performance Test

Real-Life Results

A leading solution for businesses across a wide range of industries, Microsoft Dynamics GP offers proven capabilities that enable companies to meet customer needs, build strong supplier relationships, improve employee satisfaction, and efficiently handle business processes and system requirements.

Meeting Customer Needs

Nothing is more frustrating than asking a customer to wait because the "system is slow"—that customer can very easily go elsewhere with their business. The ability to process customer sales efficiently can make or break a business. Sales serve as one of the key barometers of performance. Equally important, the ability to quickly fulfill a customer's request allows companies to improve customer loyalty and retention and grow by gaining market share over their competitors. In both the real world and computer lab tests, Microsoft Dynamics GP has proven its ability not only to handle large sales order transaction volumes, but also to handle the load comfortably when those volumes grow in a successful business.

- A leader in the computer and technology industry meets their customer demands by successfully transacting over 4,000 sales orders a day in Microsoft Dynamics GP.

- A large telecommunications company uses Microsoft Dynamics GP to profitably manage over 500,000 customers and import over 1,000,000 receivables transactions a month.

- A successful printer parts business uses Microsoft Dynamics GP to fulfill 24,000 customer sales orders each month.

Working with Suppliers

Businesses have to rely on their suppliers. Without a dependable supply of goods and services, the trickle-down result is an inability to meet customer demand. It only makes sense that your loyal vendors—the ones that bend over backwards for you in a pinch AND the ones that will negotiate terms and rates with you in good faith—are the vendors you've treated well along the way. Easy-to-handle, accurate purchase orders and timely, fair payments create those lasting relationships. Microsoft Dynamics GP gives you that kind of leverage—with thousands of suppliers and transactions.

- A printing industry company efficiently manages over 5,000 purchase order transactions each month in Microsoft Dynamics GP.

- An innovator in the financial sector uses Microsoft Dynamics GP to import and processes over 100,000 payables transactions per day.

Ensuring Employee Satisfaction

At the end of the day it's your people who make up your business. Your ability to meet their needs from a pay and benefits perspective will ultimately affect how well they treat your business partners – customers, vendors, investors and the like. Microsoft Dynamics GP equips you to manage your most valuable asset—your employees—more effectively and increase their satisfaction.

- Microsoft Dynamics GP helps a high volume restaurant franchisee keep their 4,000 employees satisfied by enabling the company to handle benefits and manage more than 20,000 payroll transactions per pay period.

Microsoft Dynamics GP 2010 Benchmark Performance Test

Managing Inventory Effectively

Inventory management is a complex balancing act. Too much on-hand inventory inflates overhead and drains profitability, while too many out-of-stocks can send your customers into the arms of your competitors. Equally important, inventory transaction volumes can swell easily because they are affected by both sales and purchases. Combine those two elements and you have a business function that can be horribly costly if not handled correctly, or one that gives you THE competitive edge if handled well. Microsoft Dynamics GP has proven ability to manage huge inventory transaction volumes quickly and accurately.

- A large wholesale distributor in the industrial supply industry uses Microsoft Dynamics GP to maintain control over more than 200,000 inventory items.

Utilizing General Ledger Capabilities

The final test of a business management application is whether it enables decision makers to keep their fingers on the pulse of their business, using Profit & Loss Statements, Balance Sheets, Statements of Cash Flow and other financial statements. To identify and act on issues, decision makers need the flexibility to "fly over" at a high level and see the landscape, as well as "dive down" into increasing levels of detail. A business owner can't get from that summary and then slice the details in different ways if his business system can't handle massive amounts of transactions posted to volumes of account numbers. Microsoft Dynamics GP gives decision maker's confidence that General Ledger data is accurate and current, even when hundreds of thousands of accounts and transactions are involved.

- A large non-profit organization uses Microsoft Dynamics GP to navigate 500,000 General Ledger account numbers and work proactively with business issues.

Extending the Solution with Web Services

Importing data into the ERP from other sources is a common real-world scenario. When developing these integrations, it is vital to design a solution that does not impact users within the system yet maintains a high level of data integrity and reliability at every point along the way. Using Microsoft Dynamics GP's extensive library of industry standard Web Services allows customers and partners to do just that.

- A large distribution company leverages web services to integrate data such as Purchase Order approvals, receivables, and inventory transfers from mobile devices into Microsoft Dynamics GP.

Managing System Loads

Using a business system for any length of time can accumulate massive amounts of data in a database. And that data can grow exponentially as a business grows. Whether the data is 8 minutes old, 8 months old or 8 years old, it plays a critical role in making smart, timely business decisions. Increasing data volumes—not to mention additional users—can't bog down your ability to process current daily transactions. Microsoft Dynamics GP scales efficiently to handle additional system loads that accompany business success and growth.

- Microsoft Dynamics GP helps a jewelry industry company handle a growing base of more than 350 concurrent users.

- A utility operations and management business with over 500 concurrent users leverages Microsoft Dynamics GP to serve customers across 8 states in the US.

- A music and video products company successfully mine a valuable database of over 150 GB worth of business transactions with Microsoft Dynamics GP.

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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