



Microsoft Dynamics® AX 2012 “Day in the life” benchmark summary

In August 2011, Microsoft conducted a “day in the life” benchmark of Microsoft Dynamics® AX 2012 to measure the application’s performance and scalability characteristics.

The benchmark runs a variety of functional scenarios that use different client and integration technologies, thereby providing a view of ERP workload performance on Microsoft Dynamics AX 2012. This benchmark includes rich client simulations of core accounts receivable scenarios, from order entry through invoicing, quotation management, item arrivals, transfer orders, and payment processing. Enterprise Portal for Microsoft Dynamics AX is used to create timesheets and purchase requisitions. Purchase requisitions are converted into purchase orders through a workflow, and then posted to the general ledger. Services and Application Integration Framework (AIF) are used to generate sales orders. Batch processing with a Microsoft Dynamics AX 2012 asynchronous batch server is used to post general journals and invoice the sales orders that are received through services and AIF.

These scenarios generate load on an instance of Application Object Server (AOS). In this benchmark, some of the AOS instances are configured as multiple logical AOS instances in a cluster.

With this concurrent workload, a 48-core 256-gigabyte (GB) database server sustained 77-percent CPU utilization, while demonstrating the ability of Microsoft Dynamics AX 2012 to scale up and scale out on the AOS tier. User experience measures were below 2 to 3 seconds for intensive posting operations, and line save operations averaged sub-second response times. The benchmark simulated 5,135 concurrent users who were divided among three roles. The benchmark demonstrated a sustained rate of more than 1 million lines per hour for these concurrent scenarios.

The benchmark results demonstrate the ability of Microsoft Dynamics AX 2012 to handle various specialized loads concurrently, without compromising performance and scalability for critical business processes.

This document presents a summary of the benchmark results. For detailed results, see [Microsoft Dynamics AX day in the life benchmark results](http://go.microsoft.com/fwlink/?LinkID=230564), (http://go.microsoft.com/fwlink/?LinkID=230564).

RESULTS SUMMARY

The mixed workload scenario focuses on demonstrating the ability of Microsoft Dynamics AX 2012 to run mixed workloads without encountering scalability or response timeout issues. The mixed workload includes simulated rich clients performing online transactions, Enterprise Portal performing self-service transactions, services processing messages, and batch processing of postings.

The goal of the mixed workload scenario is to provide customers with a sizing data point for AOS and database servers, with representative functionality.

Throughput measurements

Transaction	Lines/hour	User concurrency
Invoiced – Sales order lines created through AIF	381,885	N/A
Posted – General ledger journal lines	250,000	N/A
Approved timesheet lines	56,418	1,095
Sales order lines	224,080	2,820
Sales quotation lines	29,770	210
Purchase requisition lines	11,265	95
Purchase order lines	9,640	95
Transfer order lines	47,765	410
Item arrival lines	42,420	410
Total	1,053,243	

Response time measurements

Transaction unit	Time (seconds)
Sales order header creation	0.40
Sales order line creation	0.45
Sales order picking list creation	1.32
Sales order packing slip creation	1.42
Sales order invoicing	1.84
Sales order line creation through AIF	1.92
Purchase requisition header creation	0.20
Purchase requisition line creation	0.59
Purchase requisition submission	0.88
Purchase order confirmation	1.26
Purchase order receipt list creation	0.57
Purchase order packing slip creation	2.60
Purchase order invoicing	3.83
Item arrival header creation	0.11

Transaction unit	Time (seconds)
Item arrival line creation	0.20
Item arrival posting	2.29
Item arrival end	1.85
Transfer order header creation	0.13
Transfer order line creation	0.24
Ship transfer order	1.70
Receive transfer order	0.20
Sales quotation header creation	0.66
Sales quotation line creation	0.59
Sales quotation confirmation	0.12
Sales quotation send	1.93
Enterprise Portal transactions	
Employee service page	0.44
Click new timesheet	0.51
Click new line	0.34
Line creation	0.41
Submission	1.00
Sign out	0.07

Utilization summary

Utilization measure	Result
Number of concurrent users	5,135
Number of AOS instances supporting rich clients	5
Utilization of rich client AOS instances	46.5%
Number of batch servers	3
Utilization of batch server for sales order invoicing (2 servers)	18.8%
Utilization of batch server for general ledger posting and workflows (1 server)	19.4%
Utilization of AOS instance dedicated to AIF and services	25.5%
Number of servers running Enterprise Portal	1
Utilization of Enterprise Portal server	58.5%
Utilization of AOS instance dedicated to Enterprise Portal	13.19%
Utilization of database server	77.0%

BENCHMARK TRANSACTION PROFILE

This benchmark consists of the following transactions.

Sales order processing

- Save the sales order header.
- Enter 5 line items.
- Simple trade agreements.
- 20% of the lines include discount calculation.
- Simple chart of accounts.
- 1 miscellaneous charge.
- No manufacturing or cost accounting.
- No administrative user usage.
- Invoice the sales order.
- Detailed tax and chart of accounts update [Ledger].
- Commission calculation.
- Credit limit checking at invoicing.

Sales order lines created through services/AIF

- Save the sales order header.
- Enter 15 line items.
- No tax needed.
- Simple chart of accounts. The intent is a financial and inventory update. No markup transactions.
- No manufacturing.
- No cost accounting.
- No standard cost.

Purchase requisitions

- Save the purchase requisition header.
- Enter 5 line items.
- Firm purchase requisitions to purchase orders by using auto-approve on the purchase orders.
- Half of the purchase requisitions are split into 2 purchase orders, based on the preferred vendors. Therefore, the number of lines on the purchase orders is between 3 and 5.

Purchase orders

- Purchase orders are created by firming purchase requisitions.
- Confirm the purchase order.
- Receive and pack.
- Invoice the purchase order.

Item arrivals

- Create an arrival journal, and select the purchase order.
- Create a quarantine order.
- Use quarantine management to end quarantine and move the inventory to the regular warehouse.

Transfer orders

- Create and save the header.
- Enter 5 lines.
- Warehouse-to-warehouse transfer.

Sales quotations

- Create the sales project quotation header.
- Enter 10 lines.
- Send the sales quotation.
- Confirm the sales quotation.

Time entry

- Create a timecard with 6 lines.
- Enter a project code, a category, and hours on each line.
- Save and submit the timecard.
- Approve the timecard by using workflow.

General ledger

- 10-line entry with a simple chart of accounts.
- Each journal consists of one voucher with 10 lines. 40% of the lines contain sales tax and are spread across ledger accounts, bank accounts, and vendor and customer accounts.

The following table shows the user breakdown, as well as the overall transaction rate breakdown.

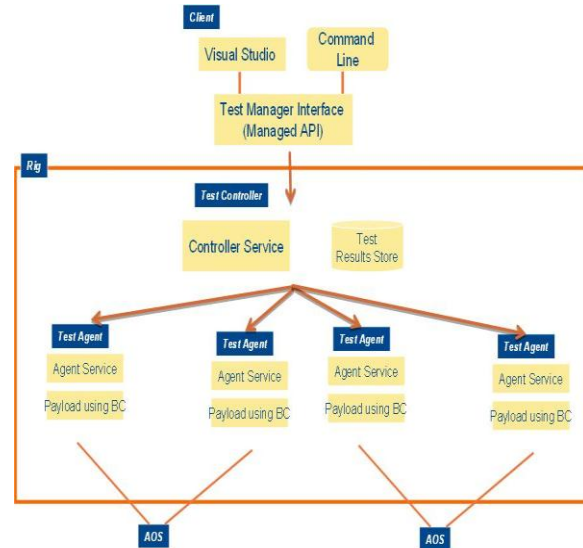
Transaction	Con-currency	Transactions per hour per user	Lines per hour per user
Sales orders	2,820	16	90
Purchase requisitions	95	24	119
Purchase orders	95	25	101
Sales quotations	210	14	149
Item arrivals	410	21	121
Sales orders created through AIF	84	303	4,774
Expense timecard entry	1,095	9	56
Transfer orders	410	23	239
General ledger	N/A	25,000	N/A

BENCHMARK METHODOLOGY

Microsoft® Visual Studio® 2010 Ultimate was used as a load driver to simulate three types of loads:

- Concurrent users through .NET Business Connector for Microsoft Dynamics AX – A business transaction was simulated at an average rate of once every 6 minutes for each concurrent user.
- Enterprise Portal users through .NET Business Connector – A business transaction was simulated at an average rate of once every 6 minutes for each concurrent user.
- Service and AIF calls to create sales orders.

Measurements were recorded on the servers used for the benchmark and were measured when the concurrency reached a steady state. The steady state was maintained for a minimum of 60 minutes, with repeat runs that were within acceptable deviation for throughput and response times.



The following rules were followed for the benchmark:

- Benchmark runs had a minimum steady state of 1 hour.
- The ramp-up duration was approximately 30 minutes.

HARDWARE LAYOUT AND CONFIGURATION

None of the servers were hyper-threaded.

AOS server specification

- 10 AOS servers, 8–12 cores, 16 GB of RAM
- 64-bit version of Microsoft Windows Server® 2008 R2 Enterprise Edition – Or– 64-bit version of Windows Server 2008 Enterprise Edition with SP2

Enterprise Portal server specification

- 1 Internet Information Services (IIS) server, 8 cores, 16 GB of RAM
- 64-bit version of Windows Server 2008 R2 Enterprise Edition with SP2

Visual Studio Ultimate client specification

- 3 controllers, 14 agents
- 2–8 cores, 4–8 GB of RAM
- 64-bit version of Windows Server 2008 Enterprise Edition with SP2
- 64-bit version of Visual Studio 2010 Ultimate

Database server specification

- 4-processor 12 core (48 cores)
- 2.2-GHz AMD Opteron processor
- 256 GB of RAM
- 64-bit version of Windows Server 2008, Enterprise Edition
- 64-bit version of Microsoft SQL Server® 2008 R2 (Build 10.50.1797)

Database disk configuration

- HP logical volume SCSI disk drive
- Disk volumes are RAID 10

Data volume

- 40 physical disks, 15,000 revolutions per minute (RPM)
- 2.67-terabyte volume
- 1.90-terabyte data file

Log volume

- 4 physical disks, 15,000 RPM
- 273-GB volume
- 46.7-GB transaction log file

TempDB data and log volume

- 6 physical disks, 15,000 RPM
- 410-GB volume
- 48x2-GB data files
- 20-GB transaction log file

BENCHMARK DATA COMPOSITION

The benchmark was run on a 1.5-terabyte database that did not use page compression. The system was configured as follows:

- Multisite-enabled setup
- 17 companies, with 90 percent of the data in one company
- 50,000 customers across 100 customer groups
- 120,000 items across 100 item groups
- 50,000 vendors across 100 vendor groups
- History:
 - Sales orders – 12 million invoiced sales orders, 87 million lines
 - Purchase orders – 1.7 million invoiced purchase orders, 11 million lines
 - General journal – 1.9 million posted journals

DISCLAIMER

These benchmark results were measured in a controlled lab environment, without other applications running. The response times reflect only server response time: they do not include the rendering time on the client. The benchmark was executed on optimized hardware, using the Microsoft Dynamics AX 2012 SYS layer without reporting activity during execution. Sample code included in this report is made available AS IS.

Performance tests and ratings are measured using the computer systems and components specified in this report (e.g., non-customized version of Microsoft Dynamics AX 2012, transaction mix, data composition, and indexes) and reflect the approximate performance of Microsoft Dynamics AX 2012 as measured by those tests. Any difference in system hardware, software design or configuration, customizations, transaction mix, data composition, or indexes may affect actual performance. The transaction mix and data composition affect sizing and hardware requirements.

Inherently, Microsoft believes that the Microsoft Dynamics AX 2012 stack and application are built to scale, and changes to the code base must go through localized performance testing. Customers or partners should consult other sources of information to evaluate the performance of systems or components they are considering purchasing.

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.

U.S. and Canada Toll Free 1-888-477-7989
Worldwide +1-701-281-6500
www.microsoft.com/dynamics

This document is provided "as-is." Information and views expressed in this document, including URL and other Internet Web site references, may change without notice. You bear the risk of using it.

This document does not provide you with any legal rights to any intellectual property in any Microsoft product. You may copy and use this document for your internal, reference purposes. You may modify this document for your internal, reference purposes.

© 2011 Microsoft Corporation. All rights reserved.