Commerce Server 10

Performance Whitepaper

Published January 16th 2013

Version 1.0

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Executive Summary

The following sections highlight the test environment, methods and results.

Performance Testing Overview

Performance tests utilized sample sites to measure key performance and scale characteristics in an enterprise production deployment. The site traffic was simulated using a collection of common scenarios that are modeled in a test mix. The following statements summarize key takeaways to consider when interpreting the results found in this whitepaper and building your own sites using Commerce Server 10:

- Results are tightly linked to the software and hardware configuration utilized including number of servers that make up the farm(s), amount of system memory on each machine, and CPU capabilities of the hardware.
- Sample Sites are designed in a way to avoid post backs and use technologies such as JSON and AJAX to optimize round trips between the browser and server hosting the site.
- Simulated checkout test iterations only include pipeline operations related to writing the completed purchase order to the database, depending on a site's credit card workflow, the cost of a checkout can vary greatly in a realistic site implementation.
- Testing was done on the latest Microsoft server stack; any optimization made to Windows 2012 Server and Internet Information Services (IIS) 8 are included.
- Testing leveraged.Net 4 framework application pools, which include a number of optimizations to the garbage collector (GC) and windows communication framework (WCF).
- In an Enterprise, static content is typically located on content delivery network (CDN) or cached by a network appliance; therefore, results presented do not take into account the cost of providing static content.
- Current iterations of the Sample Site are not SharePoint Solutions, this is an important delineation when comparing results to previous iterations of the Commerce Server whitepaper.

Customers leveraging these takeaways to build sites with similar hardware environments and software configurations can expect a 15-30% improvement over similar Commerce Server 2009 R2 deployments; individual results will vary based on the applications requirements and how they are constructed.

Key Results

The following sections summarize the key results and findings obtained during test.

MVC Sample Site 3-Tier

- Load on the presentation CPU is less than 30%, but the test uses 50-70% of the available foundation CPU time. The system requires multiple foundation servers to completely utilize the presentation machine based on this testing.
- Load balancing on the foundation greatly reduces the effects of garbage collections (GCs) observed at the presentation servers.
- Load at the presentation servers was distributed equally
- Load at the foundation servers was distributed near equally (within 10%)
- This testing did not max out the capability of the Foundation tier, which is the known bottleneck of this configuration)

- Checkouts Total: 36,015

Web Form Sample Site 3-Tier

- Load on the presentation CPU is less than 10%, but the test uses 50-70% of the available foundation CPU time. The system requires multiple foundation servers to completely utilize the presentation machine based on this testing.
- Load at the presentation servers was distributed equally
- Load at the foundation servers was distributed near equally (within 10%)
- Checkouts Total: 33,974

MVC Sample Site 2-Tier

- The web server performance degrades to the point the machines begin to lag. To accommodate additional load, more servers in the farm are required (this is indicated by average page time). CPU time is the bottleneck of this configuration.
- Checkouts Total: 33,455

Average CPU Time

The following table details CPU performance during performance test.

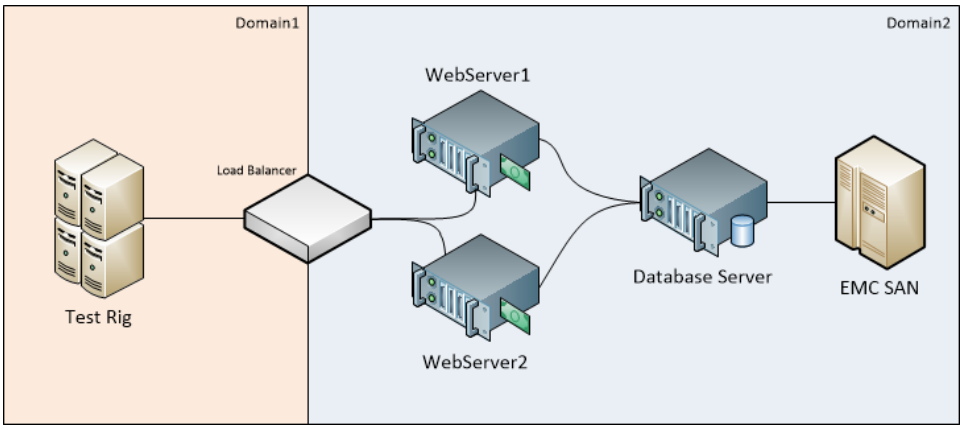
Tier	MVC	Web Form
Presentation (Average of both servers over test length)	20.0%	4.5%
Application (Average of both servers over test length)	23.1%	20.2%
SQL	3.0%	3.2%

Deployment Configuration

Site performance tests are run using 2-Tier and 3-Tier deployments:

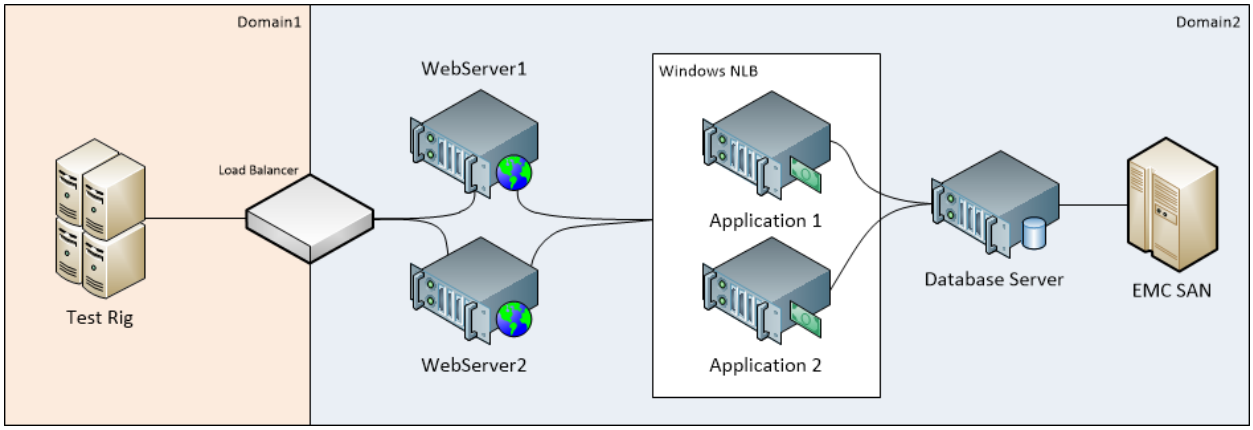
Two-Tier Deployment

In a two-tier deployment, the Commerce Server presentation and foundation software components are installed on the same Web server. This document refers to Web servers in a two-tier deployment as presentation Web servers. Two-tier commerce deployments include a presentation and data tier.



Three-Tier Deployment

In a three-tier commerce deployment topology, the Commerce Server presentation and foundation components are installed on separate servers. This document refers to servers in a three-tier deployment by their respective role; Web servers that host the Commerce Server presentation software components are referred to as presentation servers. Application servers that host the Commerce Server foundation software components are referred to as application servers. Three-tier commerce deployments include a presentation tier, an application tier, and a data tier.



Software

The following table details the software used for performance testing:

Application Web Server	• Microsoft Windows Server 2012 Standard • Microsoft Internet Information Services (IIS) 8.0 (Integrated Mode/.NET Framework v4.0) • Commerce Server 10
Database Server	• Microsoft Windows Server 2012 Standard • Microsoft SQL Server 2012 Enterprise
Presentation Web Server	• Microsoft Windows Server 2012 Standard • Microsoft Internet Information Services (IIS) 8.0 (Integrated Mode/.NET Framework v4.0)
Load Testing Software	• Microsoft Visual Studio 2012 Ultimate • Microsoft Visual Studio 2012 Test Controller • Microsoft Visual Studio 2012 Test Agent

Hardware

The following table details the hardware used for performance testing:

Database Server	**Dell PowerEdge R610 servers:** • Two 3.0 GHz Intel Xeon X5570 quad core processors with Hyper Threading • 16 GB RAM • Two Emulex LP9002 • Database server connected to an EMC SAN with two connections
Load Balancer	• **F5 BIG-IP Local Traffic Manager**
Application Web Server	**Dell PowerEdge R610 :** • Two 3.0 GHz Intel Xeon X5570 quad core processors with Hyper Threading • 16 GB RAM • One 70 GB 10K HD
Presentation Web Server	**Dell PowerEdge R610 :** • Two 3.0 GHz Intel Xeon X5570 quad core processors with Hyper Threading • 16 GB RAM • One 70 GB 10K HD
SAN	**EMC CLARiiON CX3-80:**

	• 16 GB Cache • 8 4 GB/s Front-end Port • 80 73 GB Fiber Channel 15K RPM Drives, 20 300 GB Fiber Channel 10K PRM Drives • 2 Brocade Silkworm 4100s • Two LUNs (configured RAID 1+0, one for logs, one for data)
Load Testing Hardware	• 1 Controller • 3 Agents • Followed Microsoft Guidance at: http://msdn.microsoft.com/en-us/library/ff937706.aspx

Load Modeling

The following sections detail test scenarios and the test mix model used to load the system during test.

Test Scenarios

Performance testing employs the following scenarios to create a test mix.

- **Anonymous Checkout Products**: Add a product to cart and perform a checkout
- **Anonymous Checkout Product Families**: Add a product family product, with a random variant to the cart and perform a checkout
- **Browse Product**: Browse for a random product within a set of products that represents 1% of total available products (10,000 products). This test simulates high cache hit products.
- **Browse Product (Low Cache Hit)**: Browse for a random product from a subset of 200,000 products. This test simulates low cache hit products. Note: 200,000 products were chosen to optimize the test engine while having enough products to overwhelm the available system memory.
- **Browse Category**: Browse for a random category within a set of categories that represents 1% of total categories (1,000 categories). This test simulates high cache hit categories.
- **Browse Category (Low Cache Hit)**: Browse for a random category from all of the categories available in the performance catalog (11,000 categories). This test simulates low cache hit categories.
- **Home Page**: Hits the homepage of the site.

Test Mix Model

Test runs use the following mix of scenarios to load the servers:

- Load Test Scenario Configuration
    - **Test mix model**: percentage based on the number of tests started
    - **Test Mix**:

Browse Product (Low Cache Hit)	0.5%
Browse Product	40.5%
Browse Category	30.5%
Browse Category (Low Cache Hit)	0.5%
Anonymous Checkout Products	2.0%
Anonymous Checkout Product Families	1.0%
Home Page	25.0%

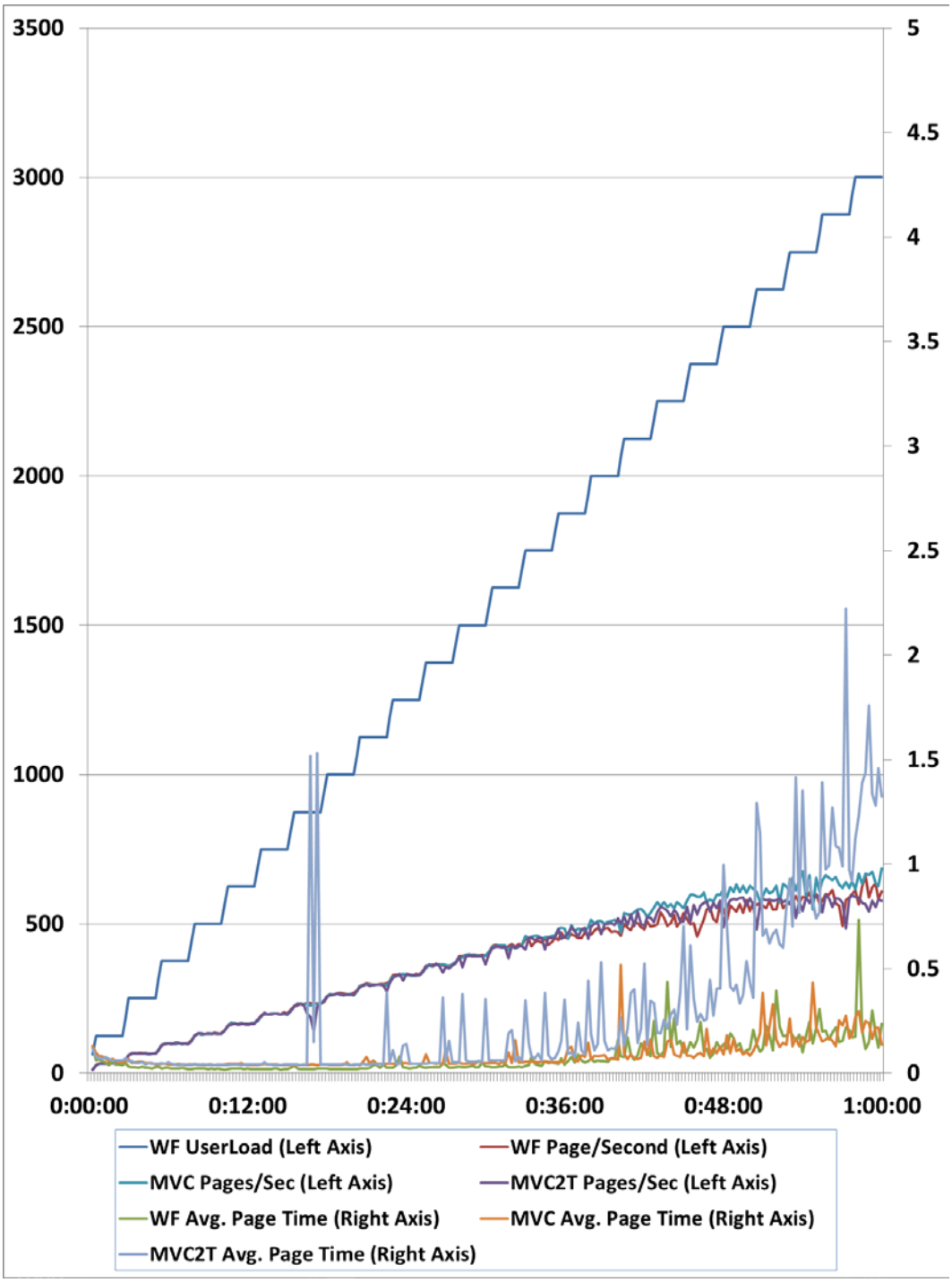
- **User Configuration**
    - **User Think Time**: 2 seconds
    - **User Load**:
        - **Initial User Count**: 125
        - **Maximum User Count**: 3,000
        - **Step Duration**: 2.5 minutes (150 seconds)
        - **Step Ramp Time**: 30 seconds
        - **Step User Count**: 125 users per step
    - **Think Profile**: Normal Distribution
    - **Percentage of New Users**: 100
- **Run Settings**
    - **Duration**: 1 hour
    - **Warm up**: 5 minutes
    - **Web Test Connection Model**: Connection Pool
    - **Dependent Request**: Off
- **Catalog**
    - **CS2009 R2 catalog**
    - **Products**: 1 Million (50% products, 50% product families)
    - **Categories**: 11,000
    - Product families contained random number of variants from 1-20.
    - **Category Depth**: 5
    - **Products/Category**: 100

Test Results

The following sections detail the findings of the performance test.

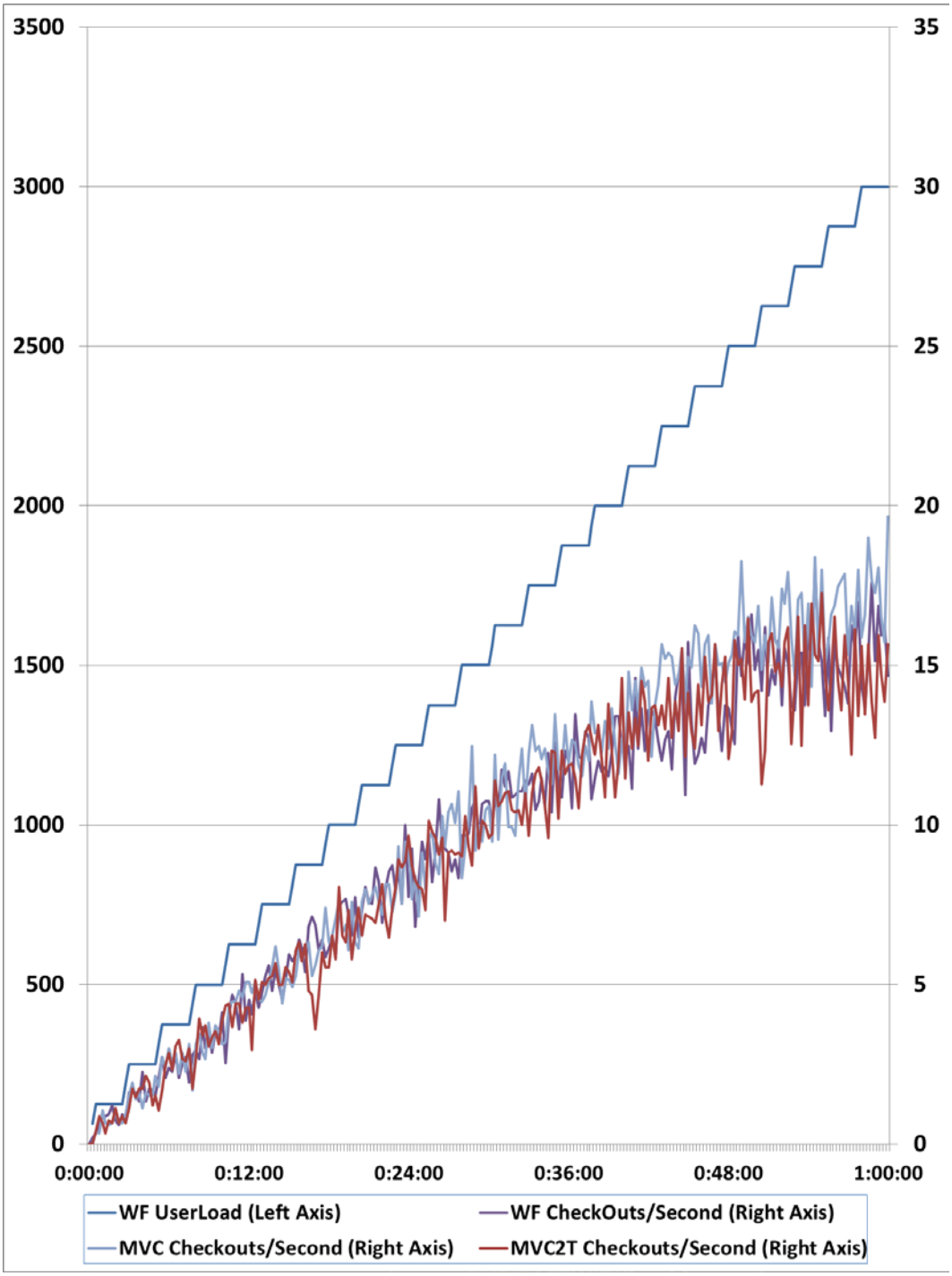
Page Metrics

The following figure details the performance of the presentation function under load.


3500
3000
2500
2000
1500
1000
500
0
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0:00:00
0:12:00
0:24:00
0:36:00
0:48:00
1:00:00
WF UserLoad (Left Axis)
WF Page/Second (Left Axis)
MVC Pages/Sec (Left Axis)
MVC2T Pages/Sec (Left Axis)
WF Avg. Page Time (Right Axis)
MVC Avg. Page Time (Right Axis)
MVC2T Avg. Page Time (Right Axis)

Checkouts

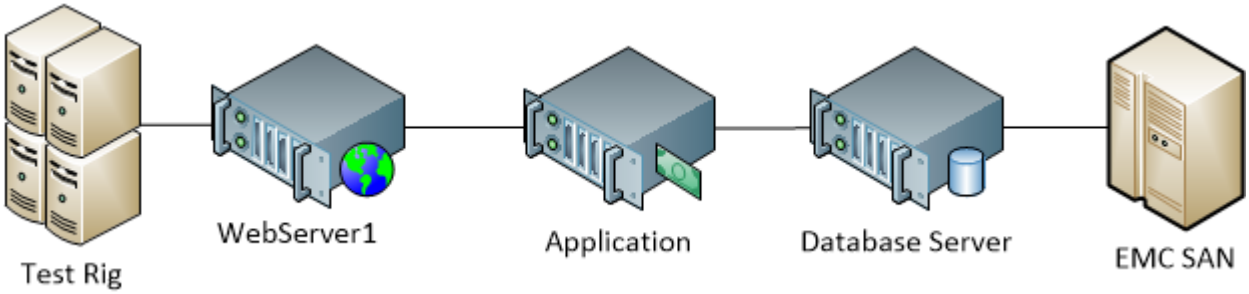
The following figure details the performance of the foundation function under load.



CPU Comparison Testing

CPU comparison testing uses the same hardware and software configuration listed in Deployment Configuration

Test Run Details



Test runs use the following mix of scenarios to load the servers:

- **Load Test Scenario Configuration**
  - **Test mix model:** percentage based on the number of tests started
  - **Test Mix:**

Browse Product (Low Cache Hit)	0.5%
Browse Product	40.5%
Browse Category	30.5%
Browse Category (Low Cache Hit)	0.5%
Anonymous Checkout Products	2.0%
Anonymous Checkout Product Families	1.0%
Home Page	25.0%

- **User Configuration**
  - **User Think Time:** 2 seconds
  - **User Load:** Constant 1,500
  - **Think Profile:** Normal Distribution
  - **Percentage of New Users:** 100
- **Run Settings**
  - **Duration:** 1 hour
  - **Warm up:** 5 minutes
  - **Web Test Connection Model**: Connection Per User
  - **Dependent Request**: Off

Test Results – Average CPU Time

Tier	MVC	Web Form
Presentation **(Average of both servers over test length)**	20.0%	4.5%
Application **(Average of both servers over test length)**	23.1%	20.2%
SQL	3.0%	3.2%

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