



Microsoft SharePoint Server 2010

Technical Case Study:

Departmental Collaboration Environment

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SharePoint 2010 Technical Case Study: SharePoint Server 2010 Departmental Collaboration Environment

Microsoft Corporation

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Applies to: SharePoint Server 2010

Summary: This document describes a specific deployment of Microsoft® SharePoint® Server 2010, including:

- Technical case study environment specifications, such as hardware, farm topology, and configuration
- The workload, including the number, and types, of users or clients, and environment usage characteristics
- Technical case study farm dataset, including database contents and Search indexes
- Health and performance data specific to the environment

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Prerequisite information

Before reading this document, it is important that you understand the key concepts behind SharePoint Server 2010 capacity management. The following documentation will help you learn about the recommended approach to capacity management and provide context for helping you understand how to make effective use of the information in this document, as well as define the terms used throughout this document.

For more conceptual information about performance and capacity that that you might find valuable in understanding the context of the data in this technical case study, see the following documents:

- [Capacity Planning and Sizing for Microsoft SharePoint 2010 Products and Technologies](#)
- [SharePoint Server 2010 Software Boundaries](#)

Introduction

This white paper describes an actual SharePoint Server 2010 environment at Microsoft. Use this document to compare against your planned workload and usage characteristics. If your planned design is similar, you can use the deployment described here as a starting point for your own installation.

This document includes:

- **Specifications**, which include hardware, topology, and configuration
- The **workload**, which is the demand on the farm, including the number of users, and the usage characteristics
- The **dataset**, including database sizes
- **Health and performance** data specific to the environment

This document is part of a [series](#) of technical case studies about SharePoint environments at Microsoft.

SharePoint Environments at Microsoft



The SharePoint Server 2010 environment described in this document is a production environment at a large, geographically distributed company. Employees use this environment to track projects, collaborate on documents, and share information within their department. This environment is also used for internal testing purposes, and is frequently upgraded to the latest SharePoint Server pre-release versions as they become available.

As many as 9,000 unique users visit the environment on a busy day, generating up to 470 requests per second (RPS) during peak hours. Because this is an intranet site, all users are authenticated.

The information provided in this document reflects the departmental collaboration environment on a typical day.

Specifications

This section provides detailed information about the hardware, software, topology, and configuration of the Case Study environment.

Hardware

Note

This environment is scaled to accommodate pre-release builds of SharePoint Server 2010 and other products. Hence, the hardware deployed has greater capacity than necessary to serve the demand typically experienced by this environment. This hardware is described only to provide additional context for this environment and serve as a starting point for similar environments.

It is important to conduct your own capacity management based on your planned workload and usage characteristics. For more information about the capacity management process, see [Capacity Planning and Sizing for Microsoft SharePoint 2010 Products and Technologies](#).

Web Servers

There are four Web servers in the farm. Three serve content, and the fourth is a dedicated search crawl target.

Web Server	WFE1-2	WFE3-4
Processor(s)	2 quad core @2.33 GHz	2 quad core @2.33 GHz
RAM	32 GB	16 GB
Operating system	Windows Server® 2008, 64 bit	Windows Server 2008, 64 bit
Size of the SharePoint drive	3x146GB 15K SAS (3 RAID 1 Disks) Disk 1: OS Disk 2: Swap and BLOB Cache Disk 3: Logs and Temp directory	3x146GB 15K SAS (3 RAID 1 Disks) Disk 1: OS Disk 2: Swap and BLOB Cache Disk 3: Logs and Temp directory
Number of NICs	2	2
NIC Speed	1 Gigabit	1 Gigabit
Authentication	NTLM	NTLM
Load balancer type	Hardware load balancing	Hardware load balancing
Software version	SharePoint Server 2010 (pre-release version)	SharePoint Server 2010 (pre-release version)
Services running locally	Search Query	WFE3 – No services WFE4 – Search crawl target

Application Servers

There are four application servers in the farm.

Web Server	APP1-3	APP4
Processor(s)	2 quad core @2.33 GHz	2 quad core @2.5GHz Xeon
RAM	16 GB	16 GB
Operating system	Windows Server 2008, 64 bit	Windows Server 2008, 64 bit
Size of the SharePoint drive	3x146GB 15K SAS (3 RAID 1 Disks) Disk 1: OS Disk 2: Swap and BLOB Cache Disk 3: Logs and Temp directory	2x136GB 15K SAS (RAID 0) 4x60GB SSD, SATA (RAID 5) Disk 1: OS Disk 2: Swap and BLOB Cache Disk 3: Logs and Temp directory
Number of NICs	2	2
NIC Speed	1 Gigabit	1 Gigabit
Authentication	NTLM	NTLM
Load balancer type	Hardware load balancing	Hardware load balancing
Software version	SharePoint Server 2010 (pre-release version)	SharePoint Server 2010 (pre-release version)
Services running locally	APP1 – Central Administration and all applications except for Office Web Applications APP2 – All applications (including Office Web Applications) APP3 – Office Web Applications	Search Crawler

Database Servers

There are three database servers, one running the default SQL Server® instance housing the content databases, one running the Usage and Web Analytics databases, and one running the Search databases.

Database Server – Default Instance	DB1
Processor(s)	4 dual core @3.2 GHz

RAM	32 GB
Operating system	Windows Server 2008 SP1, 64-bit
Storage and geometry	5x146GB 15K SAS + SAN Disk 1: OS (2 disk RAID 10) Disk 2: Swap (2 disk RAID 10) Disk 3: Direct Attached Storage (16 disk RAID 10, Temp DB data) SAS 146 GB 15K Disk 4: Direct Attached Storage (16 disk RAID 10, Temp DB data) SAS 146 GB 15K Disk 5-15: SAN using fiber connection. When possible, one database per two disks. Separating logs and data between LUNs. 15K drives.
Number of NICs	2
NIC Speed	1 Gigabit
Authentication	NTLM
Software version	SQL Server 2008

Database Server – DB2 Usage and Web Analytics	
Processor(s)	2 quad core @3.2 GHz
RAM	16 GB
Operating system	Windows Server 2008 SP1, 64-bit
Storage and geometry	6x450GB 15K SAS Directly attached 14x146GB 15K SAS Disk 1: Usage logs and OS Disk 2: Usage data
Number of NICs	2
NIC Speed	1 Gigabit
Authentication	NTLM
Software version	SQL Server 2008 R2 (Pre-Release)

Database Server – Search	DB3
Processor(s)	2 quad core @3.2 GHz
RAM	32 GB
OS	Windows Server 2008 R2, 64-bit
Storage and geometry	2x136GB 15K SAS (RAID 0) 6x60GB SSD, SATA (RAID 5) Disk 1: OS Disk 2: Swap and BLOB Cache Disk 3: Logs and Temp directory. Solid state drives. 6-60GB Solid state drives (RAID 5)
Number of NICs	2
NIC Speed	1 Gigabit
Authentication	NTLM
Software version	SQL Server 2008 R2 (Pre-Release)

Topology

Departmental Collaboration

Farm Topology

Front end

Web Servers

SharePoint Server 2010
pre-release version



WFE1 - Web
plus Search
Query



WFE2- Web
plus Search
Query



WFE3 - Web



WFE4 - Web
plus Search
Crawl

Application Servers

SharePoint Server 2010
pre-release version



APP1 - Central
Admin



APP2 - Office
Web Apps



APP3 - Office
Web Apps



APP4 -
Crawler

Web and Application Servers



Processor	2px4c@2.33 GHz
RAM	32 GB
NIC Speed	1 GB Full



Processor	2px4c@2.5 GHz
RAM	16 GB
NIC Speed	1 GB Full



Processor	2px4c@2.33 GHz
RAM	16 GB
NIC Speed	1 GB Full

Back end

Database Servers

SQL Server 2008



DB1 - SQL
Server



DB2 - Usage
Web Analytics



DB3 - Search
Databases

Database servers

Server hardware specifications vary for each server.

Configuration

The following table enumerates settings that were made that affect performance or capacity in the environment.

Setting	Value	Notes
Site Collection		
Object Caching (On Off)	On	Enabling the output cache improves server efficiency by reducing calls to the database for data that is frequently requested.
Anonymous Cache Profile (select)	Disabled	
Anonymous Cache Profile (select)	Disabled	
Object Cache (Off n MB)	On – 100GB	
Cross List Query Cache Changes (Every Time Every n seconds)	60 seconds	
Usage Service		
Trace Log – days to store log files (default: 14 days)	5 days	The default is 14 days. Lowering this setting can save disk space on the server where the log files are stored.
Query Logging Threshold		
Microsoft SharePoint Foundation Database – change <i>QueryLoggingThreshold</i> to 1 second	1 second	The default is 5 seconds. Lowering this setting can save bandwidth and CPU on the database server.
Database Server – Default Instance		
Max degree of parallelism	1	The default is 0. To ensure optimal performance, we strongly recommend that you set max degree of parallelism to 1 for database servers that host SharePoint Server 2010 databases. For more information about how to set max degree of parallelism , see max degree of parallelism Option .

Workload

This section describes the workload, which is the demand on the farm, including the number of users, and the usage characteristics.

Workload Characteristics	Value
Average Requests per Second (RPS)	165
Average RPS at peak time (11 AM-3 PM)	216
Total number of unique users per day	9,186
Average concurrent users	189
Maximum concurrent users	322
Total # of requests per day	7,124,943

User Agent	Requests	Percentage of Total
Search (crawl)	4,373,433	67.61%
Outlook	897,183	13.87%
OneNote	456,917	7.06%
DAV	273,391	4.23%
Browser	247,303	3.82%
Word	94,465	1.46%
SharePoint Workspaces	70,651	1.09%
Office Web Applications	45,125	0.70%
Excel	8,826	0.14%
Access	1,698	0.03%

Dataset

This section describes the case study farm dataset, including database sizes and Search indexes.

Dataset Characteristics	Value
Database size (combined)	1.8 TB
BLOB size	1.68 TB
Number of content databases	18
Total number of databases	36
Number of site collections	7,499

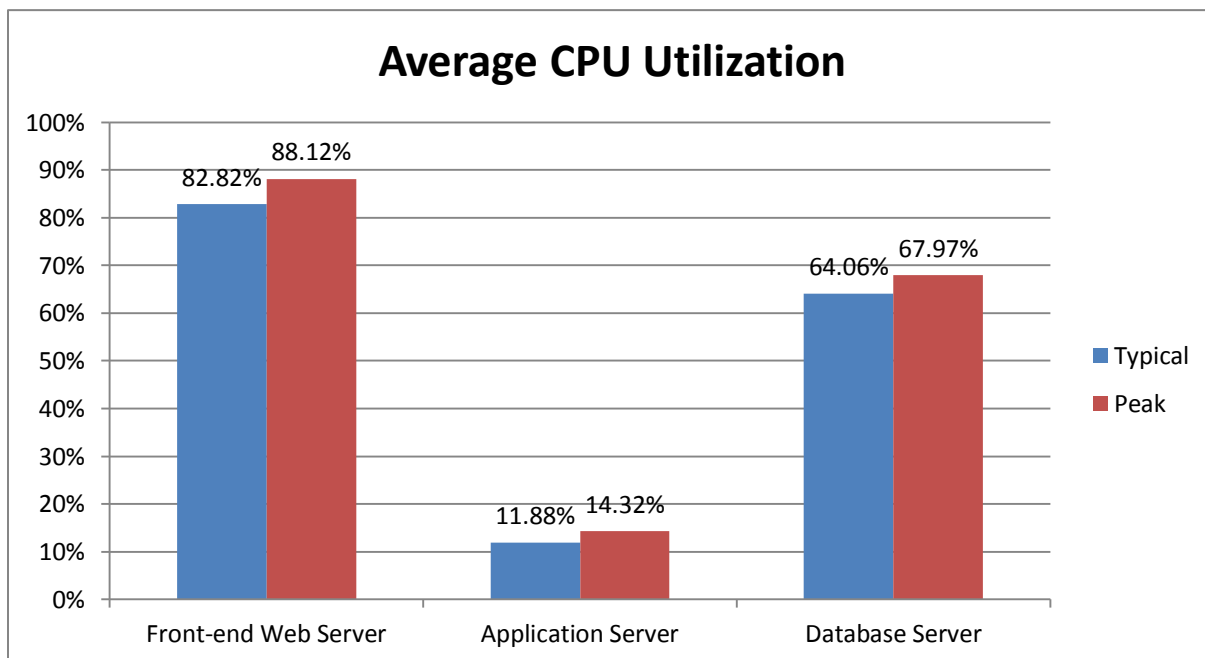
Number of Web applications	7
Number of sites	42,457
Search index size (number of items)	4.6 million

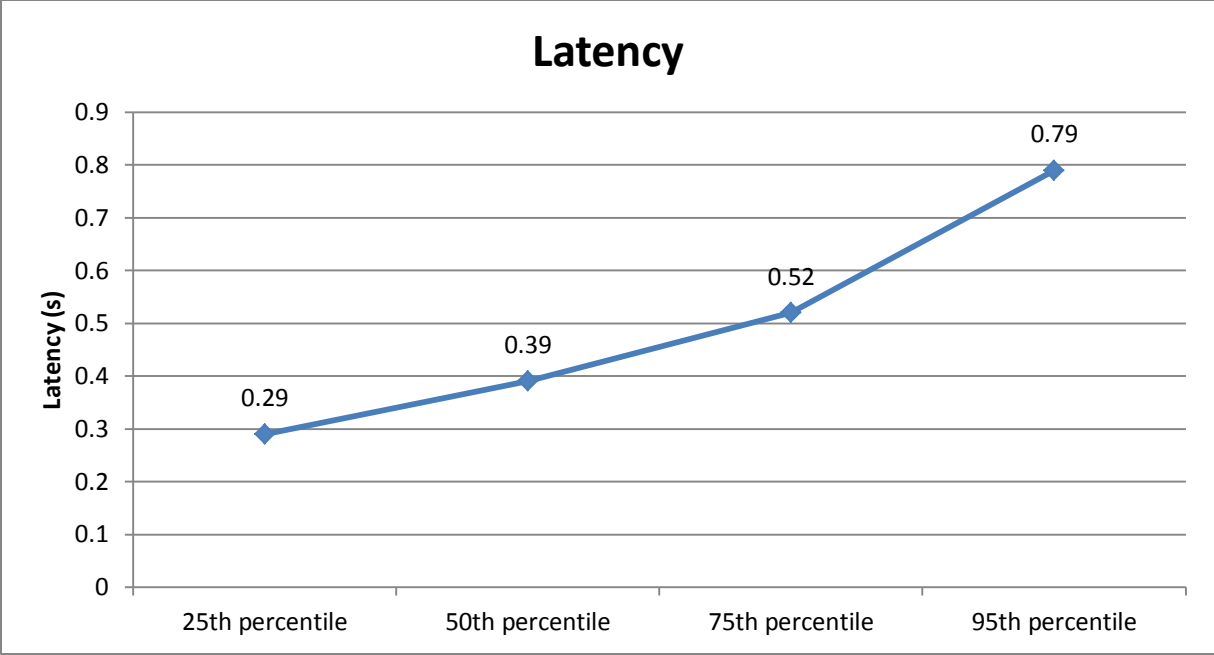
Health and Performance Data

This section provides health and performance data specific to the Case Study environment.

General Counters

Availability	99.9995%
Failure Rate	0.0005%
Average memory used	0.89 GB
Max memory used	5.13 GB
Search Crawl % of Traffic (Search client requests / total requests)	82.5%





In this document, latency is divided into four categories. The 50th percentile latency is typically used to measure the server’s responsiveness. It means that half of the requests are served within that response time. The 95th percentile latency is typically used to measure server spikiness. It means that 95% of requests are served within that response time, and thus 5% of the requests experience slower response times.

Database counters

Metric	Value
Average Disk queue length	1.42
Disk Queue Length: Reads	1.38
Disk Queue Length: Writes	0.04
Disk Reads/sec	56.51
Disk Writes/sec	17.60
SQL Compilations/second	13.11
SQL Re-compilations/second	0.14
SQL Locks: Average Wait Time	294.56 ms
SQL Locks: Lock Wait Time	867.53 ms
SQL Locks: Deadlocks Per Second	1.87
SQL Latches: Average Wait Time	5.10 ms
SQL Cache Hit Ratio	99.77%