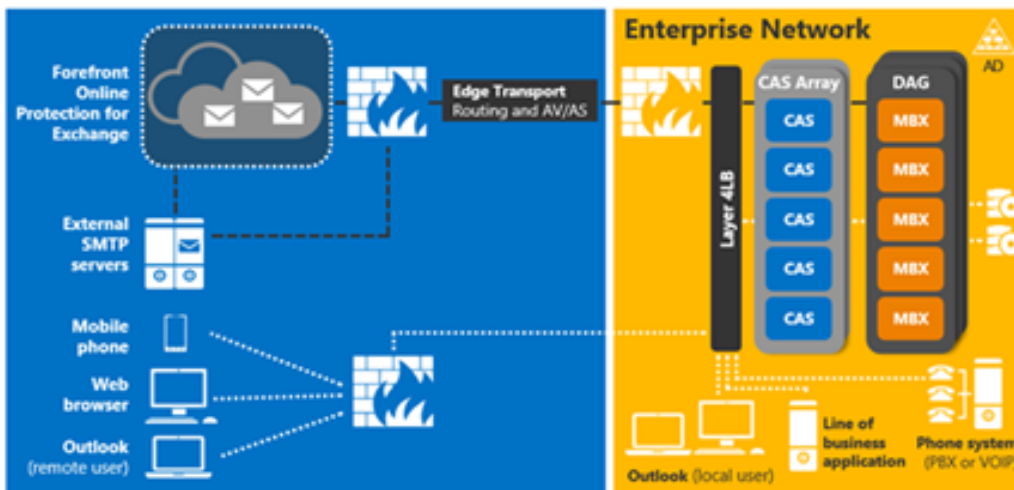


# Microsoft Exchange Server 2013 Extension - Spike

## Overview:

Microsoft Exchange Server is a mail server and calendaring server developed by Microsoft. It runs exclusively on Windows Server. ([https://en.wikipedia.org/wiki/Microsoft\\_Exchange\\_Server](https://en.wikipedia.org/wiki/Microsoft_Exchange_Server)). It used Microsoft Active Directory for authentication and authorization of users and computers.

**Architecture:** <https://techcommunity.microsoft.com/t5/Exchange-Team-Blog/Exchange-2013-Server-Role-Architecture/ba-p/596821>



**System Requirements:** <https://docs.microsoft.com/en-us/exchange/exchange-2013-system-requirements-exchange-2013-help>

Windows Server 2012 R2

Windows Server 2008 R2 SP1

Windows 7

Windows 8 and Windows 8.1

**Installation Considerations:** Active Directory (domain controller) and Exchange Server should also be installed on the same machine for a single IA extension instance to monitor the performance metrics of both the servers.

## Technical Overview:

The APM IA extension would monitor Exchange Server and Active Directory performance using

performance counters and PowerShell Cmdlets.

A PowerShell (.ps1) file will be created for every category of metrics and will be executed by the agent. The response of will be parsed if required and will be pushed to EA

For Example: Please find the below content of 'sample.ps1' file.

---

```
$counters = Get-Counter -Counter "\System\Processor Queue Length", "\System\Context Switches/sec", "\Process(_total)\Working Set", "\Memory\Available MBytes", "\Memory\Pages Input/sec", "\PhysicalDisk(_total)\Current Disk Queue Length", "\PhysicalDisk(_total)\Disk Bytes/sec", "\LogicalDisk(_total)\% Free Space", "\Processor(_total)\% Processor Time", "\Paging File(_total)\% Usage", "\Paging File(_total)\% Usage Peak"
```

```
"SystemProcessorQueueLength:"+$counters.CounterSamples[0].CookedValue
```

```
"SystemContextSwitchesPerSec:"+$counters.CounterSamples[1].CookedValue
```

```
"ProcessWorkingSet:"+$counters.CounterSamples[2].CookedValue
```

```
"MemoryAvailableinMB:"+[int]$counters.CounterSamples[3].CookedValue
```

```
"MemoryPagesInputPerSec:"+[int]$counters.CounterSamples[4].CookedValue
```

```
"PhysicalDiskTotalDiskBytesPerSec:"+$counters.CounterSamples[5].CookedValue
```

```
"PhysicalDiskCurrentQueueLength:"+[int]$counters.CounterSamples[6].CookedValue
```

```
"LogicalDiskPercentFreeSpace:"+[int]$counters.CounterSamples[7].CookedValue
```

```
"PercentProcessorTime:"+[int]$counters.CounterSamples[8].CookedValue
```

```
"PagingFileUsagePercent:"+[int]$counters.CounterSamples[9].CookedValue
```

```
"PagingFileUsagePeakPercent:"+[int]$counters.CounterSamples[10].CookedValue
```

---

**Note:** The CookedValue is the result of combining the counter's raw data to get a usable value that we can understand and work with.

**Results:**

```
Windows PowerShell

PS C:\Users\sansu07> C:\APM_ExchangeServer_2013\sample.ps1
SystemProcessorQueueLength:0
SystemContextSwitchesPerSec:3784.76080491649
ProcessWorkingSet:8248786944
MemoryAvailableinMB:8063
MemoryPagesInputPerSec:0
PhysicalDiskTotalDiskBytesPerSec:0
PhysicalDiskCurrentQueueLength:35736
LogicalDiskPercentFreeSpace:40
PercentProcessorTime:10
PagingFileUsagePercent:1
PagingFileUsagePeakPercent:1
PS C:\Users\sansu07>
```

### Remote Monitoring:

WinRM protocol can be used to monitor a remote Exchange Server by make a SOAP call to get the required metrics.

<https://docs.microsoft.com/en-us/windows/win32/winrm/portal>

### Local Monitoring:

APM IA agent should be install on the exchange server machine to support local monitoring.

### Metric Collection:

Exchange 2013 Performance Counters: <https://docs.microsoft.com/en-us/exchange/exchange-2013-performance-counters-exchange-2013-help>

Exchange PowerShell: <https://docs.microsoft.com/en-us/powershell/module/exchange/?view=exchange-ps>

### Requirements Mapping:

#### AD Access Cache Metrics:

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Cache Hits/sec	Long			

2	LDAP Searches/sec	Long	Get-Counter -computer \$ _ -counter "\\\$_\DirectoryServices(*)\LDAP Searches/sec	<p>The LDAP Searches / Sec counter indicates the number of LDAP queries made by clients each second. Recommend way of viewing this counter along with the LDAP Successful Binds / Sec counter, which shows the number of successful LDAP binds each second.</p> <p>The biggest thing that you are looking for in these two counters is activity. A lack of activity would almost always indicate that network problems are disrupting the client's ability to interact with the domain controller.</p>	<a href="https://stackoverflow.com/questions/27783194/active-directory-ldap-searches-sec">https://stackoverflow.com/questions/27783194/active-directory-ldap-searches-sec</a>  <a href="https://www.techrepublic.com/article/solutionbase-discover-active-directory-performance-problems-with-performance-monitor/">https://www.techrepublic.com/article/solutionbase-discover-active-directory-performance-problems-with-performance-monitor/</a>
---	-------------------	------	---	--	--

#### **AD Access Domain Controllers Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	LDAP Read calls/sec	Long			
2	LDAP Read Time	Long	MSExchange ADAccess Domain Controllers(*)\LDAP Read Time	Shows the time in milliseconds (ms) to send an LDAP read request to the specified domain controller and receive a response.	
3	LDAP Search calls/sec	Long			
4	LDAP Search Time	Long	MSExchange ADAccess Domain Controllers(*)\LDAP Search Time	Shows the time (in ms) to send an LDAP search request and receive a response.	

#### **Additional Related Metrics**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Processes(*)\LDAP Read Time	Long	MSExchange ADAccess Processes(*)\LDAP Read Time	Shows the time (in ms) to send an LDAP read request to the specified domain controller and receive a response.	<a href="https://docs.microsoft.com/en-us/exchange/exchange-2013-performance-counters-exchange-2013-help">https://docs.microsoft.com/en-us/exchange/exchange-2013-performance-counters-exchange-2013-help</a>
2	Processes(*)\LDAP Search Time	Long	MSExchange ADAccess Processes(*)\LDAP Search Time	Shows the time (in ms) to send an LDAP search request and receive a response.	

#### **Database Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Database Cache Size	Long	Database\Database Cache Size		
2	Database Page Fault Stalls/Size	Long	Database\Database Page Fault Stalls/sec		

3	Log Record Stalls/sec	Long	Database\ Log Record Stalls/sec	This counter shows the number of log records per second that could not be added to the log buffers because the buffers were full. The value should be zero or close to zero, with a higher value indicating inadequate physical memory in the server.	<a href="https://social.technet.microsoft.com/Forums/lynx/en-US/48f50a27-82ab-4c1e-aa5a-37fb1e2e6f5b/ad-performance?forum=winserverDS">https://social.technet.microsoft.com/Forums/lynx/en-US/48f50a27-82ab-4c1e-aa5a-37fb1e2e6f5b/ad-performance?forum=winserverDS</a>
4	Log Threads Waiting	Long	Database\ Log Threads Waiting	This counter indicates the number of threads waiting on pending log writes. The value should be low, with a higher value indicating insufficient physical memory, poor disk performance, or poor disk structuring.	<a href="https://www.itprotoday.com/active-directory/jsi-tip-5454-how-do-i-monitor-performance-active-directory">https://www.itprotoday.com/active-directory/jsi-tip-5454-how-do-i-monitor-performance-active-directory</a>

#### **Addition Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Database Reads (Attached) Average Latency	Long	MSEExchange Database ==> Instances(*)\I/O Database Reads (Attached) Average Latency	Shows the average length of time, in milliseconds (ms), per database read operation.	<a href="https://docs.microsoft.com/en-us/exchange/exchange-2013-performance-counters-exchange-2013-help">https://docs.microsoft.com/en-us/exchange/exchange-2013-performance-counters-exchange-2013-help</a>
2	Database Writes (Attached) Average Latency	Long	MSEExchange Database ==> Instances(*)\I/O Database Writes (Attached) Average Latency	Shows the average length of time, in ms, per database write operation.	
3	Log Writes Average Latency	Long	MSEExchange Database ==> Instances(*)\I/O Log Writes Average Latency	Shows the average length of time, in ms, per Log write operation.	
4	Reads (Recovery) Average Latency	Long	MSEExchange Database ==> Instances(*)\I/O Database Reads (Recovery) Average Latency	Shows the average length of time, in ms, per passive database read operation.	
5	Database Writes (Recovery) Average Latency	Long	MSEExchange Database ==> Instances(*)\I/O Database Writes (Recovery) Average Latency	Shows the average length of time, in ms, per passive database write operation.	
6	Database Reads (Attached)/sec	Long	MSEExchange Database ==> Instances(*)\I/O Database Reads (Attached)/sec	Shows the number of database read operations per second for each attached database instance.	
7	Database Writes (Attached)/sec	Long	MSEExchange Database ==> Instances(*)\I/O Database Writes (Attached)/sec	Shows the number of database write operations per second for each attached database instance.	
8	Log Writes/sec	Long	MSEExchange Database ==> Instances(*)\I/O Log Writes/sec	Shows the number of log writes per second for each database instance.	
9	Database Mounted	Long	MSEExchange Active Manager(_total)\Database Mounted	Shows the number of active database copies on the server.	

#### **File Distribution Service: Offline Address Book Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Download Taks Queued	Long			
2	Download Tasks Completed	Long			

### **Information Store Metrics:**

**Note:** we will get metrics related to Store Usage using PowerShell cmdlet: **Get-StoreUsageStatistics**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Active Connection Count	Long			
2	Active User Count	Long	MSExchange RpcClientAccess\Active User Count		
3	Connection Count	Long	MSExchange RpcClientAccess\Conn ection Count		
4	Exchmem: Number of Additional Heaps	Long			
5	Exchmem: Number of Heaps with Memory Errors	Long			
6	Exchmem: Number of Memory Errors	Long			
7	RPC Average Latency	Long	MSExchange RpcClientAccess\RPC Averaged Latency	Shows the latency, in milliseconds (ms), averaged for the past 1,024 packets.	
8	RPC Operations/sec	Long	MSExchange RpcClientAccess\RPC Operations/sec	Shows the rate at which RPC operations occur, per second.	
9	RPC Requests	Long	MSExchange RpcClientAccess\RPC Requests	Shows the number of client requests currently being processed by the RPC Client Access service.	
10	Virus Scan Files Quarantined/sec	Long			
11	Virus Scan Files Scanned/sec	Long			
12	Virus Scan Messages Processed/sec	Long			
13	Virus Scan Queue Length	Long	MSExchange\IS\Virus Scan Queue Length		
14	VM Largest Block Size	Long	MSExchange\IS\VM Largest Block Size	This counter should consistently be above 32 MB.	<a href="https://blogs.technet.microsoft.com/mspfe/2012/01/24/how-to-troubleshoot-microsoft-exchange-server-latency-or-connection-issues/">https://blogs.technet.microsoft.com/mspfe/2012/01/24/how-to-troubleshoot-microsoft-exchange-server-latency-or-connection-issues/</a>
15	VM Total 16MB Free Blocks	Long	MSExchange\IS\VM Total 16MB Free Blocks	This counter should consistently remain over three 16MB blocks	
16	VM Total Free Blocks	Long	MSExchange\IS\VM Total Free Blocks	The value is specified to your message environment	
17	VM Total Large Free Block Bytes	Long	MSExchange\IS\VM Total Large Free Block Bytes	This counter should stay above 50MB.	

**Mailbox Store Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Active Client Logons	Long	MSExchangeIS Mailbox\Active Client Logons	Number of logons that have been active (issued any MAPI requests) within the last ten-minute time interval.	<a href="https://techcommunity.microsoft.com/t5/Exchange-Team-Blog/Performance-counters-users-logons-connections/ba-p/603720">https://techcommunity.microsoft.com/t5/Exchange-Team-Blog/Performance-counters-users-logons-connections/ba-p/603720</a>
2	Client Logons	Long	MSExchangeIS Mailbox\Client Logons	Number of client logons (including system processes)	
3	Logon Operations/sec	Long			
4	Message Recipients Delivered/sec	Long			
5	Messages Delivered/sec	Long			
6	Messages Queued for Submission	Long			
7	Messages Sent/sec	Long			
8	Messages Submitted/sec	Long			

**POP3 Service Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Current Connection Count	Long	Web Service(_Total)\Current Connections  <b>PowerShell cmdlet:</b>  (Get-Counter -ListSet 'Web Service').counter	The number of active user sessions	<a href="https://hostadvice.com/how-to/how-to-view-the-number-of-active-user-sessions-on-your-iis-web-site/">https://hostadvice.com/how-to/how-to-view-the-number-of-active-user-sessions-on-your-iis-web-site/</a>

**Public Folder Store Metrics:**

**Note:** Get-LogonStatistics <https://docs.microsoft.com/en-us/powershell/module/exchange/reporting/get-logonstatistics?view=exchange-ps>

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Active Client logons	Long			
2	Client Logons	Long			
3	Logon Operations/sec	Long			
4	Message Recipients Delivered/sec	Long			
5	Message Delivered/sec	Long			
6	Messages Queued for Submission	Long			
7	Message Sent/sec	Long			
8	Recipient Receive Queue Size	Long			

**Transport DSN Metrics:**

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Delay DSNs	Long			
2	Failure DSNs Total	Integer			

### **Transport Queue Metrics:**

**Note: Get-QueueDigest** - Exchange 2013 adds a new queue cmdlet named Get-QueueDigest. This cmdlet allows you to view information about some or all of the queues in your Exchange organization by using a single command

<https://docs.microsoft.com/en-us/exchange/use-the-exchange-management-shell-to-manage-queues-exchange-2013-help>

S.No.	Metric Name	Metric Unit	Performance Counter	Metric Description	Web Links
1	Active Mailbox Delivery Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Active Delivery Queue Length	Messages in the active mailbox queues.	<a href="https://secure.n-able.com/webhelp/NC_11-0-0_en/Content/Help_20/Services/Exchange/Services_Exchange_Delivery_Queue_13_New.htm">https://secure.n-able.com/webhelp/NC_11-0-0_en/Content/Help_20/Services/Exchange/Services_Exchange_Delivery_Queue_13_New.htm</a>
2	Active Non-Smtp Delivery Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Active Non-Smtp Delivery Queue Length	Messages in the drop directory used by a Foreign connector.	
3	Active Remote Delivery Queue length	Integer			
4	Aggregate Delivery Queue Length (all Queues)	Integer			
5	Largest Delivery Queue Length	Integer			
6	Poison Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Poison Queue Length	Messages in the poison message queue.	
7	Retry Mailbox Delivery Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Retry Mailbox Delivery Queue Length	Messages in a retry state attempting to deliver a message to a remote mailbox.	
8	Retry Non-Smtp Delivery Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Retry Non-Smtp Delivery Queue Length	Messages in a retry state in the non-SMTP gateway delivery queues.	
9	Retry Remote Delivery Queue Length	Integer			
10	Submission Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Submission Queue Length	Messages in the submission queue.	
11	Unreachable Queue Length	Integer	\MSExchangeTransport Queues(\$QueueName) \Unreachable Queue Length	Messages in the Unreachable queue.	