Performance Test Report Workspace ONE UEM 1907



Table of Contents

Introduction	3
Audience	
Environment Setup Notes3	
Tools used for load simulation	
Risks	4
Executive Summary	4
Test Architecture	5
Test Environment	6
Application Server Configurations (VMs)6	
VM Host Configuration7	
CA Server Configuration7	
SCEP Server7	
Reference Data8	
Recommendations	9
SQL Server Recommendations9	
Hardware Recommendations9	
CA Server Recommendation10	
Workspace ONE UEM Application Servers Settings and Recommendations 10	
Test Definitions	11
Scenarios11	
Scenario 111	
Scenario 211	
Scenario 311	
Scenario 411	
Scenario 511	
Workload Summary12	
Workload A – Device Samples	
Workload B – Console UI Test	
Workload C – API Usage Test	
	40
Out of Scope	13
Test Observations – Load Test	14
Server Performance Graphs	15
Result Set based on Scenario 5:15	
CPU Utilization15	
Available Memory16	
Requests/Sec16	
Network – Bytes Received/sec17	
Network – Bytes Sent/sec17	
SQL Server Activity	
CA Server Activity (During ADCS Certificate publish)	
Appendix	19
SQL Server Recommendations19	
CA Server Recommendations24	
Hardware Recommendations25	
Workspace ONE UEM Application Servers Settings and Recommendations 26	



Introduction

The objective of the test is to gauge the overall performance of the Workspace ONE UEM system by executing variety of tests and create a reference architecture for Workspace ONE UEM 1907 deployment.

The report has been generated after testing WS1 UEM application with the following configuration:

- 500K Devices 50K Android, 100K iOS, 25K MacOS and 325K Windows
- Devices fairly distributed across 25 Container OG's
- Major scenarios include Certificate Profile publish to 500K devices along with Internal App and Passcode Profile publish

Note: Details of the tests are provided in the below Test Definitions section

Audience

This document is intended for IT architects and administrators who want to understand the performance and scale attributes of Workspace ONE UEM.

Pre-requisites to follow this document, is to have enough understanding of Workspace ONE UEM servers and their configuration, familiarity with MS SQL Server configuration, in addition to an understanding of sizing and performance concepts.

Environment Setup Notes

- Workspace ONE UEM 1907 was used for this testing and all our recommendations in this document apply to this version of Workspace ONE UEM.
- MemCached version 1.4.36 on CentOS Linux release 7.5.1804 (core).
- AWCM version 6.3.4
- All the virtual servers we used for this testing use flash storage.
- Implemented recommended changes, which are documented later in this document on the MS SQL server, at the ESX host level and on Workspace ONE UEM application side to improve performance of the overall system.

Tools used for load simulation

- Falcon A VMWare proprietary tool used to simulate 500,000 virtual devices
- HP LoadRunner to generate a background load of 50 virtual users as Workspace ONE UEM Console Admins.
- Apache Jmeter tool used to simulate API Load



4

Risks

- 1. As the testing was done on Windows Server 2016, any change on the host OS version will remain an unknown and could show different results from the scale test done. We are unaware of the performance impact if the Application Server version is not updated to Windows Server 2016.
- 2. These tests were run using VMware's proprietary load simulation tool which creates simulated devices. One can expect some differences in server performance between real and simulated devices.

Executive Summary

The goal of this report is,

- 1. To examine performance of WS1 UEM 1907 under load
- 2. To provide server sizing and performance improvement recommendation based on the analysis

Load included, Profile publish, Certificate publish, Application publish to all devices along with Device check-in and sample simulation.

Workspace ONE UEM 1907 with this environment sizing is scalable and provides stable performance with respect to load described in this document. This console version includes performance improvements for Web Console pages, VPN Profile Publish to Android devices and Profile Publish to iOS devices.

Test Architecture



Test Environment

Recommended Application Server Configuration of WS1 UEM key components based on the performance tests carried out.

Application Server Configurations (VMs)

Recommended configuration					
	OS	Windows Server 2016			
	SQL Server	Microsoft SQL Server Developer 2016 (64-bit)			
	SQL Server version	13.0.5026.0			
Database Server	vCPU	40 cores x 2 sockets (80 CPU)			
Database Gerver	vRAM	1 TB			
	Total DB storage	2 TB			
	Transaction Log storage	1 TB			
	Temp DB storage	1 TB			
	OS	Windows Server 2016			
*6 X Admin	vCPU	2 cores x 2 sockets (4 CPU)			
Console	vRAM	8 GB			
	Storage	50 GB			
	OS	Windows Server 2016			
12 X Device	vCPU	8 cores x 2 sockets (16 CPU)			
Services	vRAM	16 GB			
	Storage	95 GB			
	OS	Windows Server 2016			
	vCPU	4 cores x 2 sockets (8 CPU)			
12 X API Server	vRAM	16 GB			
	Storage	50 GB			
	OS	CentOS Linux release 7.4.1708			
OV Many Oakhad	MemCached Version	1.4.36			
2X WemCached	vCPU	1 cores x 2 socket (2 CPU)			
	vRAM	16 GB			
	Storage	50 GB			
	OS	Windows Server 2016			
45 V AWCM Server	vCPU	4 cores x 2 sockets (8 CPU)			
15 X AWCM Server	vRAM	16 GB			
	Storage	50 GB			
	OS	Windows Server 2016			
6 X LIAG Server	vCPU	2 cores x 1 sockets (8 CPU)			
U A UAG Server	vRAM	4 GB			
	Storage	50 GB			

Note: Load balancer is configured to offload DS requests on the application server

*If the utilization is high on Console server boxes, we need to have dedicated PE and CDS machines.



VM Host Configuration

Recommended configuration						
	Host Model	Dell Inc. PowerEdge R640				
	Processor Type	Intel(R) Xeon(R) Platinum 8176M CPU @ 2.10GHz				
	vCPU	4 sockets x 28 cores				
Database Server	Logical Processors	112				
	Hyper threading	Active				
	vRAM	4 TB				
	Storage hardware	PURE Fiber Channel Disk (Flash Drive)				
	Host Model	Dell Inc. PowerEdge R640				
	Processor Type	Intel(R) Xeon(R) Platinum 8176M CPU @ 2.10GHz				
	vCPU	2 sockets x 22 cores				
AirWatch Servers	Logical Processors	112				
	Hyper threading	Active				
	vRAM	382 GB				
	Storage hardware	PURE Fiber Channel Disk (Flash Drive)				

CA Server Configuration

Recommended configuration						
	OS	Windows Server 2016				
CA Server	CA service	Microsoft Active Directory Certificate Services [AD CS]				
	vCPU	8 cores x 2 sockets (16 CPU)				
	RAM	16 GB				
	Storage	75 GB				

SCEP Server

• AirWatch Certificate Authority was configured and used for all the certificate publish tests having SCEP payload.



Reference Data

Reference Data used during testing						
	Android	50K				
Devices	iOS	100K				
2011000	Mac OS	25k				
	Windows Desktop	325k				
	Customer OGs	1				
	Container OG	25				
Organization Groups	Device Distribution	Fairly Even				
	Largest OG	150K				
	Smallest OG	10,000				
Administrators	Total Accounts	2000				
Aummistrators	Logged In	150				
Users	Total Accounts	250K				
Smart Groups	All Sizes	250				
	Internal	500				
Applications (For BYO devices)	Public	250				
(Unmanaged	10				
Profiles	All Types	250				

Recommendations

The following settings and recommendations are provided after Performance/Scale tests were successfully completed for 500K devices:

SQL Server Recommendations

- 1. Add 1 tempdb file per core (80 tempdb files for 80 core)
- 2. Add below Trace flags in Startup Parameters for "mssqlserver" service as per Microsoft recommendations

Trace Flag	Knowledge Base
T174	https://support.microsoft.com/en-us/help/3026083/fix-sos-cachestore- spinlock-contention-on-ad-hoc-sql-server-plan-cache
T834	https://support.microsoft.com/en-us/help/920093/tuning-options-for-sql- server-when-running-in-high-performance-workloads
T3427	https://support.microsoft.com/en-us/help/3216543/workloads-that-utilize- many-frequent-short-transactions-in-sql-server

- 3. Set "Lock Pages in Memory" privilege for the service account
- 4. Disable "Named Pipes" and Enable "TCP/IP" network protocol
- 5. Increase Maximum Worker threads in server properties to "7500"
- 6. Set "Max Degree Of Parallelism" to 4 and "Cost threshold for Parallelism" to 50
- 7. Enable "Received Side scaling" setting for Network Adapter on SQL server
- 8. Set "Delayed Durability" under database properties = "Forced" to reduce WriteLog waits
- 9. Update "Minimum and Maximum Server Memory" allocation in Server Properties
 - a. Minimum Server Memory (in MB): 500000
 - b. Maximum Server Memory (in MB): 1500000

Hardware Recommendations

- 1. Enable Network Interface Card "Received Side Scaling" for efficient distributions of network receive processing across multiple CPUs on all servers, including SQL server.
- 2. Change ESX Host power management to "High Performance" (updated windows power policies)
- 3. If F5 NLB is being used, then enable "OneConnect Profile" for VIP used for DS server to improve Load Balancer performance and equal distribution (Note: DS pool should have Round Robin LB method)



CA Server Recommendation

- Do not use the default certificate template to issue the certificate. The default certificate template
 publishes the certificate to Active Directory causing high CPU utilization on CA server and slow issuing
 rate.
- 2. To mitigate this problem, create or clone a certificate template with below changes:
 - a. Change the issuing template Subject Name property to "Supply in the request"
 - b. Uncheck "Publish certificate in Active Directory" under General property window
 - c. Enable this new certificate template on Certificate Authority

Workspace ONE UEM Application Servers Settings and Recommendations

- 3. Update Workspace ONE UEM application server to 19.7.0 revision 7
- 4. Set Certificate Profile Publish Frequency: 1000*
- 5. Set Apple Profile Installation Batch Size: 300
- 6. Set iOS Device Invites Per Second:30
- 7. Set FastLaneMessageRateMultiple:1.5
- 8. Set Batch Size for internal Application Deployment: 500
- 9. Set Wns Throttling :34/sec
- 10. Set Product Provisioning AWCM Throttle Rate: 20
- 11. Set Product Provisioning Command Release Batch Size: 2000 per 2 mins
- 12. Enable File Storage Caching Enabled setting
- 13. Set Use Recursive OID At Enrollment as disabled for Directory Services

*Change this setting only if using CA that follows the recommendations given in this document.

Note:

Steps to implement or enable recommendations related to SQL server, Hardware and Workspace ONE UEM Application Server settings, along with comprehensive explanations, are given in this appendix.



Test Definitions

Tests were run to simulate device load using Falcon and administrator activity using Load Runner in the Workspace ONE UEM system. These tests were executed through several different scenarios to determine the optimum architecture that can sustain realistic activity from 500,000 devices. The test composed of scenarios with workloads defined below.

The tests below were created to define a typical workflow for large customers using all types of devices on the same instance. The tests encompass areas like certificate profile push, passcode profile push, API load, Internal Application publish with app config and multi-admin usage of the application.

Scenarios

Below scenarios define full load generated for the test.

Scenario 1

Single Profile Publish with Device background load, Console UI load and API load.

- Push a Passcode profile to all Android, iOS, MacOS and Windows devices
- Background load, API Load and Console UI load mentioned below is running throughout the test

Scenario 2

Certificate Profile Push using ADCS along with Device background load, Console UI load and API load.

- Push a Certificate profile (Credential Payload) to all Android, iOS and MacOS devices
- Background load, API Load and Console UI load mentioned below is running throughout the test

Scenario 3

Certificate Profile Push using SCEP along with Device background load, Console UI load and API load.

- Push a Certificate profile (SCEP Payload) to all iOS and MacOS devices
- Background load, API Load and Console UI load mentioned below is running throughout the test

Scenario 4

Internal Application Publish along with Device background load, Console UI load and API load.

- Publish an internal app to all iOS and Android devices
- Background load, API Load and Console UI load mentioned below is running throughout the test

Scenario 5

Combined Load Test

- Publish an internal app to all iOS devices
- Push a Passcode profile to all Android devices
- Push a Certificate profile (SCEP Payload) to all MacOS devices
- Push a Certificate profile (Credential Payload) to all iOS devices
- Background load, API Load and Console UI load mentioned below is running throughout the test



Workload Summary

Workload A – Device Samples

- Samples will be sent and processed as per the below frequency
 - Android every 8 hours
 - o iOS every 4 hours
 - macOS every 4 hours
 - Windows every 4 hours
- Beacons will be sent and processed as per the below frequency
 - Android every hour
 - o iOS every hour
 - o macOS every 5 minutes
- Above values are directly proportional to number of devices we will have in the test environment valuable
- Run custom Index Job every 24 hours

Workload B – Console UI Test

Overview: Test simulates 50 administrators navigating around the console UI.

Details:

- Number of users 50
- Administrator will navigate to different OGs
- · Administrator will navigate to different list views in an OG
 - Application (Public and Internal), Profiles, Smart Group, Device and Product list view
- Administrators will navigate to Device Details page for different devices at different OG and navigate to the below tabs.
 - Products/Network/Troubleshooting/Certificates tabs
- Load Runner Config:
 - Ramp up 1 user every 10 seconds
 - o Steady state duration This will run as long as the scenario runs
 - Ramp down 5 users every 30 seconds

Workload C – API Usage Test

Considerations:

Below table defines API that were executed as part of this workload, with the expected rate



API	Transactions per hour
Search and retrieve details for both internal and external applications based on LocationGroup Id	18/min
Searches for devices based on LocationGroup Id	18/min
Searches devices and its custom attributes based on LocationGroup Id	18/min
Retrieves application details of the device identified by device ID	18/min
Retrieves the user details of the device identified by device ID.	18/min
Returns network information of single device specified by id parameter	18/min
Tunnel API to get config	18/min

Workload C – Internal Application Publish

Considerations:

- Single app will be published automatically to set of devices across few Smart Groups
 - App size: Around 65 MB
 - Publish rate: 500 Batch release every minute
 - CDN: Enabled

Out of Scope

- WS1 app/Hub +vIDM scenarios were not considered
- SEG Load and Tunnel Server (UAG) load i.e. Devices hitting SEG/Tunnel Server
- API's called by SEG and Tunnel Servers
- Persistent client connections on AWCM servers
- Public and VPP application publish

Test Observations – Load Test

- Workspace ONE UEM Application Servers handled the load generated through Profile publish, Certificate publish, Internal application publish, Devices Check in, Console Users and API.
- Average CPU utilization on Device Services servers was around 18% during the test and spikes around 60% each time there is high inflow of device samples.
- SQL server was stable and average CPU utilization was 45% with few spikes up to 70% during full load which includes Profile/Samples and console load
- 8 GB of memory was used on DS and 5 GB on Console server during this full load.
- Average 12 MBps of network bandwidth was used on each DS severs during the test duration
- During full load we observed an average of 95 HTTPS requests being processed per sec across all 12 DS servers and were able handle the load efficiently.
- During Certificate publish with ADCS payload, CA server issued 10 certificates per sec at a constant rate with 5% CPU utilization.
- There were no commands found in the message queues across application servers at the test. This signifies WS1 processed all the commands queued during the test.

Note:

Under unexpected constant load, the DS servers may utilize 100% CPU and struggle to recover unless traffic is terminated during standard health checks implemented at the Load Balancer. If the server continues to receive requests past capacity, it may be required to perform IIS reset to clear queued requests and return to normal operation.



Server Performance Graphs

Result Set based on Scenario 5:

Publishing Internal application along with certificate and profile publish at regular intervals. Graph shows the system health during 1 internal application publish to 100K iOS devices, Android profile publish to 50K devices, Certificate profile with SCEP payload to 25k MacOS devices and Certificate profile with ADCS payload 100K iOS devices.

CPU Utilization



Observation: Average CPU utilization across all servers was below 50% through the test.

Available Memory



Observation: Average CPU utilization across all servers was below 50% through the test, except for once console, where Scheduler service was running.



Requests/Sec

Observation: Each DS server could process 42 requests/sec on average. These requests are http requests with SSL offloading on F5 load balancer.





Network – Bytes Received/sec

Observation: DS was receiving up to 12 MB of data during the active Certificate/profile/application publish. Average Bytes Received/Sec for DS and SQL server was around 9 MB/s



Network – Bytes Sent/sec

Observation: During a CDN failover test for internal app publish, DS was observed sending bytes around 38 MB/s.

Average Bytes Sent/Sec for DS was 1.6 MB/s and for SQL server it was 53 MB/s



SQL Server Activity



Observation: Avg of 15864 Batch Request/sec and average of 45803 transactions/sec was observed on the database server.

CA Server Activity (During ADCS Certificate publish)



Observation: There were no Failed Requests on CA server during an active ADCS certificate publish. The CA issued certificates at almost 10/sec with an average CPU of less than 5%

Appendix

SQL Server Recommendations

- A. Add 1 tempdb file per core (80 tempdb files for 80 core)
 - i) Each tempdb data file was added with below parameters:
 - (1) Initial Size: 5000 MB
 - (2) Autogrowth: 512 MB
 - (3) Sample script for adding new tempdb files

/* Ad	ding three	e addition	nal t	tempdb	file	5 *	/								
USE [masterl:														
GO	1.														
ALTER	DATABASE	[tempdb]	ADD	FILE	(NAME	=	N'Temp1',	FILENAME	=	N'G:\TempDBFiles\Temp1.ndf'	,	SIZE :	8GB	,	FILEGROWTH = 512);
ALTER	DATABASE	[tempdb]	ADD	FILE	(NAME	=	N'Temp2',	FILENAME	=	N'G:\TempDBFiles\Temp1.ndf'	,	SIZE :	8GB	,	FILEGROWTH = 512);
ALTER	DATABASE	[tempdb]	ADD	FILE	(NAME	=	N'Temp3',	FILENAME	=	N'G:\TempDBFiles\Temp1.ndf'	,	SIZE :	8GB	,	FILEGROWTH = 512);
GO															

B. Add Trace flags T174, T834 and T3427 in Startup Parameters for "MSSQLSERVER" service as per Microsoft recommendations

SQL Server (MSSQLSERV	ER) Properties		?	\times
Log On	Service	FILE	ESTREAM	
AlwaysOn High Availab	ility Startup Parar	meters	Advanc	ed
Specify a startup param Existing parameters: -dC: \Program Files\Micr -eC: \Program Files\Micr -IC: \Program Files\Micr -T174 -T834 -T3427	eter: osoft SQL Server\MSSQL1 osoft SQL Server\MSSQL13	3.MS5 3.MS5 3.MS5	Add	
ОК	Cancel	Apply	He	lp



- C. Set "Lock Pages in Memory" privilege for the service account
 - i) Open Local Group Policy Editor
 - ii) Navigate to Computer Configuration > Windows Settings > Local Policies > User Rights Assignment

Local Group Policy Editor		
File Action View Help		
🗢 🏟 🙍 📷 🗙 🖾 😹 🚺 📷		
Local Computer Policy Computer Configuration Software Settings Software	Policy Take ownership of files or other objects The state of the system The system of the system The system performance The profile system performance The profile system performance tasks The object label The object	Security Setting Administrators Administrators, Backup Operators Administrators, Backup Operators LOCAL SERVICE, NETWORK SERVICE, NT SERVICE/SQ Administrators Administrators Administrators Administrators SQLServer2005SQLBrowserUserSSQL2016TEMPLATE, Administrators SQLServer2005SQLBrowserUserSSQL2016TEMPLATE, Administrators SQLServer2005SQLBrowserUserSSQL2016TEMPLATE, NETWORK SERVICE, NT SERVICE/MSSQLSERVER Administrators USers LOCAL SERVICE, NETWORK SERVICE, Administrators, S LOCAL SERVICE, NETWORK SERVICE Administrators
	Deny log on as a service	

- D. Disable "Named Pipes" and Enable "TCP/IP" network protocol
 - i) Open SQL Server Configuration Manager
 - ii) Navigate to SQL Server Network Configuration > Protocols for MSSQLSERVER





- E. Increase Maximum Worker threads in server properties to "7500"
 - i) Open Server Properties from SSMS and go to Processors tab

Server Properties - WDC1-D	В		- 0	\times
Select a page Concel Memory Connections Connections Advanced Permissions	Script	or affinity mask for all processors nity mask for all processors Processor Affinity	UO Affrety	_
Connection Server: WDC1-DB Connection: WalMartAdmin_WDC WalMartAdmin_WDC	Threads Maximum worker threads: 7500	/ tweight pooling)		
Ready	Configured values	O Running values		

- F. Set "Max Degree of Parallelism" to **4** on database instance level and "Cost threshold for Parallelism" to **50** on database server level
 - i) Open Server Properties from SSMS and go to Advanced tab

Select a page	50	Soviet - Chale						
General	3	Scubi - 🚺 Help						
Memory								
Processors		10						
Security								
Connections		FILESTREAM Access Level	Disabled					
Database Settings		FILESTREAM Share Name	MSSOI SERVER					
Advanced	- 6	V Miscellaneous	HOUGEDERVEN					
Permissions		Allow Triggers to Fire Others	True	_				
		Blocked Process Threshold	0					
		Cursor Threshold	-1					
		Default Full-Text Language	1033					
		Default Language	English					
		Full-Text Upgrade Option	Import					
		Max Text Replication Size	65536					
		Optimize for Ad hoc Workloads	True					
		Scan for Startup Procs	False					
		Two Digit Year Cutoff	2049					
Connection	v	Network						
connection		Network Packet Size	4096	_				
Server:		Remote Login Timeout	10					
WDC1-DB		 Parallelism 						
Connection:		Cost Threshold for Parallelism	50					
WalMartAdmin_WDC		Locks	0					
Vew connection properties		Max Degree of Parallelism	2					
		Query Wait	-1	~				
		Allow Triggers to Fire Others Controls whether a trigger can perform an action that initiates another trigger. When cleared,						
Progress	1	triggers cannot be fired by another trigger	r.					
O Ready		Configured values () Running values					
			ОК	Cancel				



- G. Enable "Received Side scaling" setting for Network Adapter on SQL server
 - i) Open Device Manager in SQL server and run DEVMGMT.msc from Command Prompt
 - ii) Expand Network adapters, right click on your adapter and select Properties
 - iii) Select the Advanced tab and find Receive Side Scaling. Set this to Enabled if it isn't already.



- H. Set "Delayed Durability" under database properties = "Forced" to reduce WriteLog waits
 - i) Open Database Properties from SSMS and go to Options

Select a page	🖾 Script 🔹 🚺 Help			
Flegroups	Collation:	SQL_Latin1_General_CP1_CI_AS	~	
Cotions Change Tracking Permissions	Recovery model:	Full	~	
	Compatibility level:	SQL Server 2012 (110)		~
Extended Properties	Containment type:	None		
Transaction Log Shinning	Other options:			
Guery Store				
	21			
	FILESTREAM Non-Tran	sacted Access	Off	^
	✓ Misc			
	AllowScripting		True	
	HideFile Settings		False	
	✓ Miscellaneous			
	Allow Snapshot Isolation		True	
	ANSI NULL Default		False	
	ANSI NULLS Enabled		False	
	ANSI Padding Enabled		False	
Constant	ANSI Warnings Enabled		False	
Connection	Arithmetic Abort Enabled	1	False	
Server:	Concatenate Null Yields	Null	False	
WDC1-DB	Cross-database Owners	hip Chaining Enabled	False	
Connection:	Date Correlation Optimiz	ation Enabled	False	
WalMartAdmin_WDC	Delayed Durability		Forced	
I Manual and a second s	Is Read Committed Snap	oshot On	True	
Bigg view connection properties	Numeric Round-Abort		False	
	Parameterization		Simple	
	Quoted Identifiers Enabled		False	
	Recursive Triggers Enab	pied	False	
Progress	Instwotts		Falsa	
O Ready	Allow Snapshot Isolation	n		
				and the second sec



- I. Update "Minimum and Maximum Server Memory" allocation in Server Properties
 - i) Minimum Server Memory (in MB): 500000
 - ii) Maximum Server Memory (in MB): 1500000

Server Properties - PERF18-S	QL1	—		\times
Select a page	🔄 Script 🔻 🚺 Help			
Memory Processors Security Connections Database Settings Advanced Permissions	Server memory options Minimum server memory (in MB): 500000 Maximum server memory (in MB): 800000 Cher memory options			
Connection	Index creation memory (in KB, 0 = dynamic memory):			
Server: PERF18-SQL1 Connection: sa I View connection properties	0 🚖 Minimum memory per query (in KB): 1024 😴			
Progress				
Ready	Configured values O Running values			
		ОК	Cano	cel .:

CA Server Recommendations

- A. Change the issuing template properties to select "Supply in the request" for Subject Name
 - *i.* In the CA server, *navigate to the Certificate Template > Manage > "your issuing template" > Properties*

Super	seded Templates		Extensions	Security		Server
General	Compatibility	Request	Handling	Cryptography	Key A	ttestatio
	Subject Name			Issuance Requi	rements	
	olv in the request					
0.04	Line subject infer			and if and an farm		
	renewal requests	mation fr	om existing	certificates for a	utoenro	liment
O Bui	d from this Active	Director	y informatio	n		
Sele	ct this option to e	nforce co	onsistency a	among subject n	ames a	nd to
simp	lify certificate adm	ninistratio	n.			
Sub	ject name format:					
Nor	ne					
	nclude e-mail nam	ne in subj	ect name			
Inclu	ude this informatio	n in alter	nate subjec	ct name:		
	-mail name					
	ONS name					
	Jser principal nam	e (UPN)				
	Service principal n	ame (SP	N)			
* Contr	ol is disabled due	to comp	atibility setti	inas.		

- B. Uncheck Publish certificate in Active Directory in issuing template General properties of the CA Server
 - *i.* In the CA server, *navigate to the Certificate Template > Manage > "your issuing template" > Properties*

Super	seded Templates	s I	Extensions		Security		Server
	Subject Name			Issuance	e Requir	rement	s
General	Compatibility	Request	Handling	Crypto	graphy	Key	Attestatio
Templa	te display name:						
ccuser	i.						
ccuser	re name.						
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~							
Validity	period:		Benewa	l period:			
Validity	period:	1	Renewa	l period:	~		
Validity	period: years ~	]	Renewa	period: weeks	~		
Validity	period: years ~	]	Renewa	l period: weeks	~		
Validity	period: years ∽ lish certificate in	Active Di	Renewa 6	l period: weeks	~		
Validity	period: years ~ lish certificate in Do not automatic	Active Di	Renewa 6 rectory	l period: weeks	✓ tificate e	exists ir	Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di ally reenr	Renewa 6 rectory oll if a dupl	l period: weeks	✓	exists ir	n Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di	Renewa 6 rectory oll if a dupl	l period: weeks	v tificate e	exists ir	n Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di	Benewa 6 rectory	l period: weeks	<b>∨</b> tificate e	exists ir	n Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di	<u>R</u> enewa 6 rectory oli if a dupl	l period: weeks	<b>∼</b> tificate e	exists ir	1 Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di	Benewa 6 rectory oll if a dupl	l period: weeks	<b>∼</b> tificate e	exists ir	n Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di ally reenr	Renewa 6 rectory oll if a dupl	l period: weeks	<b>∨</b> tificate e	exists ir	n Active
Validity	period: years ~ lish certificate in Do not automatic Directory	Active Di ally reenr	Renewa 6	l period: weeks	∼ tificate e	exists ir	n Active

#### **Hardware Recommendations**

- A. Enable Network Interface Card "Received Side Scaling" for efficient distributions of network receive processing across multiple CPUs on all application servers.
  - iii) Open Device Manager in SQL server and run DEVMGMT.msc from Command Prompt
  - iv) Expand Network adapters, right click on your adapter and select Properties
  - v) Select the *Advanced* tab and find *Receive Side Scaling*. Set this to *Enabled* if it isn't already.



#### B. Change "cpu.quantum" on SQL Esxi host from 200 to 16

w3-eucaw2-021.eng.vmware.com	ו	🛃 🛃 🕞 🔝	🚱 Actions 👻		=*
Summary Monitor Configure	Peri	missions VMs Datast	ores Networks	Upda	ate Manager
44		Advanced System Setting	js		Edit
Power Management	•			Q	quantum 🔹
Advanced System Settings		Name	Value		Summary
System Resource Reservation		Cpu.Quantum	16		Quantum in milliseco
Security Profile System Swap Host Profile		Disk.SchedQuantum	8		Number of consecutiv
<ul><li>Hardware</li><li>Virtual Flash</li></ul>	•				



#### Workspace ONE UEM Application Servers Settings and Recommendations

- A. Set Product Provisioning AWCM Throttle Rate: 20
  - a. Navigate to Settings > Installation > Performance Tuning

Apps	• orParintmoni Proab		
Content	Number of organization	10	()
Email	groups per batch when syncing VPP license		
Telecom	counts*		
Admin	Automatic Delete Factory PPKG	ENABLED DISABLED	
Installation	President Descriptioning	20	
Cache Settings	AWCM Throttle Rate *	20	0
File Path			
Maps	Product Provisioning Command Release Batch	2000	0
Performance Tuning	Size *		
Proxy	Apple Profile Installation	200	
Reports	Batch Size *	300	0
> Advanced			

- B. Set Product Provisioning Command Release Batch Size: 2000 per 2 mins
  - I. Navigate to Settings > Installation > Performance Tuning

Settings	Global 🗸		
> Apps	• alPauranani Pronh		
Content	Number of organization	10	(
Email	groups per batch when syncing VPP license		
Telecom	counts*		
Admin	Automatic Delete Factory PPKG	ENABLED DISABLED	
Installation			
Cache Settings	AWCM Throttle Rate	20	Q
File Path		1	1.0
Maps	Product Provisioning Command Release Batch	2000	0
Performance Tuning	Size *		
Proxy	Angle Deplite Installation	200	10
Reports	Batch Size *	300	C
> Advanced			

- C. Set Certificate Profile Publish Frequency: 1000
  - a. Navigate to Settings > Installation > Performance Tuning

Settings	Global 🗸	
<ul> <li>&gt; System</li> <li>&gt; Devices &amp; Users</li> </ul>	Performance Tuning 📀	
> Apps > Content	Current Setting	Inherit   Override
> Email	Bulk Publish Commit Frequency *	40000
> Telecom > Admin	Sample Scheduler Interval (minutes) $\star$	5
<ul> <li>Installation</li> </ul>	iOS Device Invites Per Second *	30
Cache Settings File Path	Certificate Profile Publish Frequency *	1000
Maps Performance Tuning	Number of Queue Commands (Max) *	10
Proxy	Certificate Queue Throttling *	15
Reports Advanced	Certificate Profile Manual Install Threshold *	100



D. Set Apple Profile Installation Batch Size: 300

i. Navigate to Settings > Installation > Performance Tuning

Settings	Global 🗸		
> Apps	Number of organization	10	0
> Content	groups per batch when syncing VPP license		
> Email	counts *		
> Telecom	Automatic Delete Factory	ENABLED DISABLED	
> Admin	PPKG		
<ul> <li>Installation</li> </ul>	Product Provisioning	20	()
Cache Settings	AWCIVI Infollie Rale "		
File Path	Product Provisioning	2000	0
Maps	Command Release Batch Size *		
Performance Tuning			
Proxy	Apple Profile Installation Batch Size *	300	0
Reports			

#### E. Set iOS Device Invites Per Second:30

*i.* Navigate to Settings > Installation > Performance Tuning

Settings	Global 🗸	
> System	Current Setting	Inherit   Override
> Devices & Users	Bulk Publish Commit	40000
> Apps	Frequency *	
> Content	Sample Scheduler Interval	5
> Email	(minutes)	
> Telecom	iOS Device Invites Per Second *	30
> Admin	Certificate Profile Publish	100
<ul> <li>Installation</li> </ul>	Frequency*	100
Cache Settings	Certificate Profile Manual	100
File Path	Install Threshold *	

F. Set Use Recursive OID At Enrollment as disabled for Directory Services

*i.* Navigate to System > Enterprise Integration > Directory Services > Advanced

Settings	Global / BOFA US 🗸	
v Sustam	Bind User Name	awperf\Administrator
Getting Started	Clear Rind Dessword	
Branding		- 0
<ul> <li>Enterprise Integration</li> </ul>	Bind Password	
Enterprise Integration Services		
Certificate Authorities		Domain
Content Gateway		bofaadmin.net
Cloud Connector		
Directory Services		C ADD DOMAIN
Email (SMTR)	Advanced	
VMware Tuppel		
VMware Tuppel Proxy	Search Subdomains	
> CDN		
> Peer Distribution	Connection Timeout *	30
Third-Party Proxies		
SMS	Request Timeout *	120
Pull Service Installers	Concele Mattheway Rance Day	
Syslog	Search Without Base Div	ENABLED DISABLED
Remote Management	Lise Recursive OID At Enrollment	
> VMware Identity Manager	ose needs the ond he enrollment	ENABLED DISABLED
> Security	Use Recursive OID For Group Sync	
Help		ENADLED DISABLED
> Localization	Object identifier Data Type *	
Terms of Use		
S/MIME	Sort Control	ENABLED DISABLED
> Advanced		
> Devices & Users		
	Use Azure AD For Identity Services	ENABLED DISABLED

- G. Enable File Storage Caching Enabled setting
  - *i.* Navigate to Settings > Installation > File Path

Settings	Global 🗸				
> System	Workspace ONE UEM automatically configures file storage for SaaS customers. For on-premises customers, cor on your Workspace ONE UEM database and increases performance of Workspace ONE UEM reports.				
> Devices & Users	General file storage configuration automatically applies to reports, internal application deployment, and manag AirWatch database and increase overall reporting performance.				
> Apps	More Help for File Storage				
> Content	File Storage Enabled DISABLED				
> Email					
> Telecom	File Storage Path* \\perf18-cn1\NFS				
> Admin	File Storage Caching Enabled ENABLED DISABLED				
✓ Installation					
Cache Settings	File Storage Impersonation Enabled ENABLED DISABLED				
File Path					
Maps	File Storage Impersonation User awpert\administrator				
Performance Tuning	iven in:				
Proxy	File Storage Impersonation				
Reports	Password *				
> Advanced	TEST CONNECTION				

H. Override the default value in *Systemcode* table for *FastLaneMessageRateMultiple* to 1.5 by updating *Systemcodeoverride* table in DB.



