



## **VMWare Horizon View Scalability Testing on Cisco UCS HXAF220C-M5SX 3-Node Cluster**

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## CHAPTER 1

# VMWare Horizon View VDI Scalability Testing on Cisco HXAF220c-M5SX 3-Node Cluster

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- [Overview, on page 1](#)

## Overview

When deploying your virtual desktop solution, choosing server hardware that is powerful enough across the compute and memory dimensions to support a large number of virtual desktops is crucial. The more virtual desktops per server you can support, the fewer servers you need to buy to provide virtual desktops to support your desired number of users.

Cisco UCS FI 6332-16UP is the ideal solution for customers who need fewer servers but still want the comprehensive management capabilities provided by Cisco UCS Manager. Cisco UCS FI 6332-16UP delivers server, storage and 40-Gigabit networking in an easy-to-deploy, compact form factor.

To find the virtual desktop capacity of Cisco HXAF220c-M5SX 3-Node cluster integrated with UCS FI 6332-16UP Login VSI is used. The LoginVSI workload we used to perform a range of tasks to simulate typical workloads. The benchmark results show the maximum number of virtual desktops supported in the 3-Node Cluster by measuring response times throughout the test.

We set out to examine such a virtual desktop solution that consisted of the following components:

- Cisco UCS FI 6332-16UP
- Cisco HXAF220c-M5SX with Intel(R) Xeon(R) Gold 6134M processor
- Cisco-HXDP-Installer
- HX-VMware-ESXi Cisco Custom image
- VMware Horizon View virtual desktop linked clone pool consisting of Windows 10 VMs
- All VMs are provisioned on 3-Node cluster datastore

### VMware OSOT

OSOT performs a full scan of your desktop image and advises you on optimizations that you can apply. The list is very extensive and if you want an even faster desktop than the default templates can offer you then why not use one of Login VSI's.

VMware OSOT performs the below

- Apply HKCU Settings to Registry
- Apply HKLM Settings
- Disable Features
- Disable Scheduled Tasks
- Disable Services
- Disable Startup Run
- Improving Login Times
- Remove Apps
- Visual Effects

### Acronyms

Acronym	Description
ADDC	Active Directory Domain Controller
BIOS	Basic Input Output System
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
FI	Fabric Interconnect
GB	Giga Byte
HD	High Definition
HDD	Hard Disk Drive
HXDP	HyperFlex Data Platform
IO	Input Output
IOPS	Input Output Per Second
mbps	Mega Byte Per Second
MLOM	Modular LAN On Motherboard
MS	Microsoft
NTP	Network Time Protocol
OS	Operating System
OSOT	Operating System Optimization Tool
RAM	Random Access Memory
SQL	Sturctured Query Language
SUT	Server Under Test
TB	Tera Byte

<b>Acronym</b>	<b>Description</b>
UCS	Unified Computing System
UCSM	Unified Computing System Manager
vCPU	Virtual Central Processing Unit
VDI	Virtual Desktop Infrastructure
VIC	Virtual Interface Card
VM	Virtual Machine
VSI	Virtual Session Index







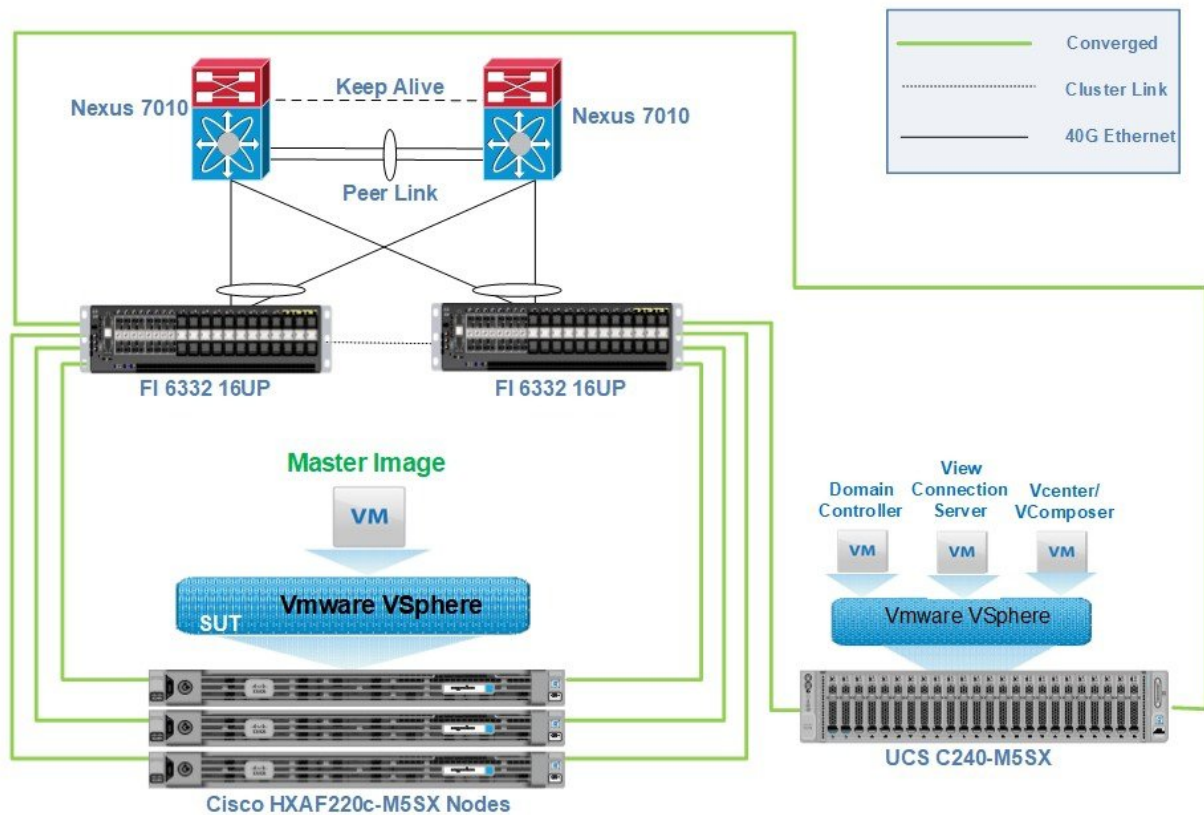
# CHAPTER 2

## Test Topology and Environment Matrix

- Test Topology, on page 5
- Environment Matrix, on page 6

### Test Topology

Figure 1: Topology in use



# Environment Matrix

## Infra Components

Components	Version
Server	UCS C240-M5SX
UCSM	3.2(3e)
Cisco-HXDP-Installer	3.0(1d) - 29754
<b>OS</b>	
Hypervisor	VMWare ESXi 6.5 U1-5969303
Windows Server OS	Windows Server 2016 x64 (Japanese)
<b>Database</b>	
MS SQL Server	Microsoft SQL Server 2014 SP1
<b>Virtual Desktop Delivery Component</b>	
VMWare Horizon View Composer	7.5.1-8971623
VMWare Horizon View Connection Server	7.5.1-9122465
VMWare vCenter Server	VMware-VIM-all-6.5 U2b-8815520
<b>VDI Scalability Measuring Tool</b>	
Login VSI	4.1.32

## SUT Components

Component	Version/ Type
HyperFlex System	Cisco HXAF220c-M5SX Node
UCSM	3.2(3e)
<b>CPUs</b>	
Vendor	Intel® Corporation
Name	Intel(R) Xeon(R) Gold 6134M
CPU Cores	16 CPUs x 3.2 GHz
Processor Sockets	2
Cores per Socket	16
Logical Processors	32
<b>Firmware</b>	
VIC	4.2(3b)
BIOS Settings	C220M5.3.1.3c.0.0307181404
<b>Memory</b>	

Component	Version/ Type
RAM Per Node	512 GB
Type	DDR4
Speed (MHz)	2666
Number of RAM Modules loaded	16
Per RAM Capacity (GB)	32
Vendor	Micron
Rank	Dual
<b>Cluster Configuration</b>	
Total No.of Nodes	3
Total Memory Capacity	1.5 TB
Total CPU Capacity	153.22 GHz
Total Storage Capacity	9.6 TB
<b>Hypervisor</b>	
OS	HX-VMWare ESXi 6.5 U2
Build Number	8294253
<b>Adapters</b>	
VIC	UCS VIC 1387

**Virtual Machine Image Attributes- SUT**

Attribute	Version/ Type
Desktop OS	Windows 10 Enterprise (Japanese)
Version	1803
Build Number	12613166
Hardware	VMWare Virtual Hardware Version 13
vCPU	2
Memory	4 GB
Video RAM	4 MB (default)
NIC	1
Virtual Network Adapter	E1000 Adapter
Virtual SCSI Controller	LSI Logic SAS
Virtual Disk	32 GB (Thin Provision)

Attribute	Version/ Type
Applications	<ul style="list-style-type: none"><li>• LoginVSI 4.1.32 Application</li><li>• Adobe Acrobat 11</li><li>• Adobe Flash Player 11</li><li>• Doro PDF 1.82</li><li>• MS Internet Explorer 11</li><li>• MS Office 2016 Professional Plus</li><li>• 1080p and 720p HD Videos</li></ul>
VMWare Tools	10305 (10.2.1)
VMWare View Agent	7.5.1-9182637



## CHAPTER 3

# Design and Implementation

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- [Design and Implementation](#) , on page 9
- [Login VSI Workload Details](#), on page 9

## Design and Implementation

- ADDC deployed as VM and DNS, DHCP, NTP are configured as integrated services with the ADDC.
- VMWare vCenter and View Connection Server are deployed as VMs.
- VMWare View Composer and MS SQL are deployed in a VM
- 3-Node Cluster setup is formed through HXDP.
- Datastore is created and mounted across the 3-Node Cluster using HXConnect.
- VM Master Image is deployed under the 3 node cluster Datastore.
- LoginVSI Launchers are deployed as VMs to incrementally login the Users Virtual desktop sessions (created from master image) and begin the workload (Light, Medium, Heavy).

## Login VSI Workload Details

Login VSI helps to test and compare the performance of different software and hardware solutions in VDI environment. Login VSI used to measure the maximum capacity of current infrastructure in a quick and easy way. The simulated users work with the same applications as your average employee such as Word, Excel, Outlook and Internet Explorer and can easily add our own custom applications to the tests.

### Light Workload

The light workload runs fewer applications and starts/stops them less frequently. This results in lower CPU, Memory and IO usage.

The Light workload is mostly around Excel actions and Internet explorer actions and it is more diverse and focused more than two applications.

Each cycle will open

- MS Outlook and browse mails

- Adobe reader to open pdf files
- Copy and zip actions
- Word to open and edit the documents

### Medium Workload

Medium workload is the default workload in Login VSI. The standard Login VSI medium workload designed to run on 2vCPU's per desktop VM. This workload emulates a medium knowledge worker using Office, IE, PDF and Java/ FreeMind.

Once a session has been started the workload will repeat (loop) every 48 minutes. The loop is divided in 4 segments, each consecutive Login VSI user logon will start a different segments. This ensures that all elements in the workload are equally used throughout the test.

During each loop, the response time is measured every 3-4 minutes. The medium workload opens up to 5 applications simultaneously. The keyboard type rate is 160 ms for each character. Approximately 2 minutes of ideal time is included in simulate real-world users.

Each loop will open and use:

- Outlook, browse messages.
- Internet Explorer, browsing different web pages and a YouTube style video(720p Movie Trailer) is opened 3 times in every loop.
- Word, one instance to measure response time, one instance to review and edit the document.
- Doro PDF Printer & Acrobat reader, the word document is printed and reviewed to PDF.
- Excel, a very large randomized sheet is opened.

### Heavy Workload

The heavy workload is based on the medium workload except that the heavy workload:

- Begins by opening 4 instance of internet explorer. These instances stay open throughout the workload loop.
- Begins by opening 2 instances of Adobe Reader. These instances stay open throughout the workload loop.
- There are more PDF Printer actions in the workload.
- 1080p videos are watched.
- Increased the time the workload plays the flash game.
- The ideal time is reduced to 2 minutes.



## CHAPTER 4

# VMWare Horizon View Scalability Testing on Cisco UCS HXAF220c M5SX 3-Node Cluster

- [Windows 10 x64 Performance in Japanese Environment without VMware OSOT, on page 11](#)
- [Windows 10 x64 Performance in Japanese Environment with VMWare OSOT, on page 17](#)
- [Related Documentation, on page 24](#)

## Windows 10 x64 Performance in Japanese Environment without VMware OSOT

[Light Workload Result, on page 11](#)

[Medium Workload Result, on page 13](#)

[Heavy Workload Result, on page 15](#)

### VSIMax Results on HXAF220C M5SX 3-Node Cluster

Type of workload	VSIMax Value
Light	171
Medium	161
Heavy	144

### Light Workload Result

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	200	183	171

### Login VSIMax

*Figure 2:*

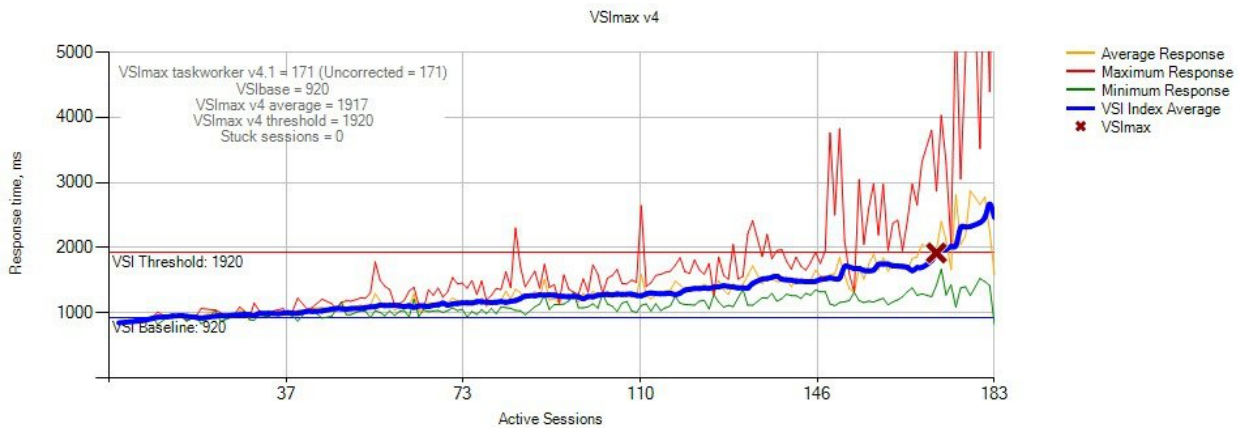


Figure 2: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220c M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 3:

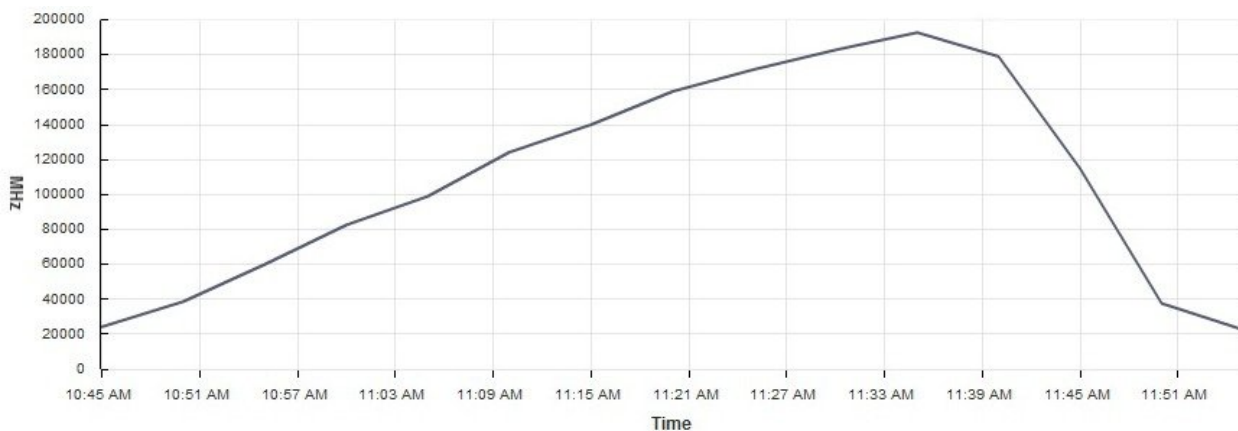


Figure 3: CPU Utilization throughout the test

Figure 4:

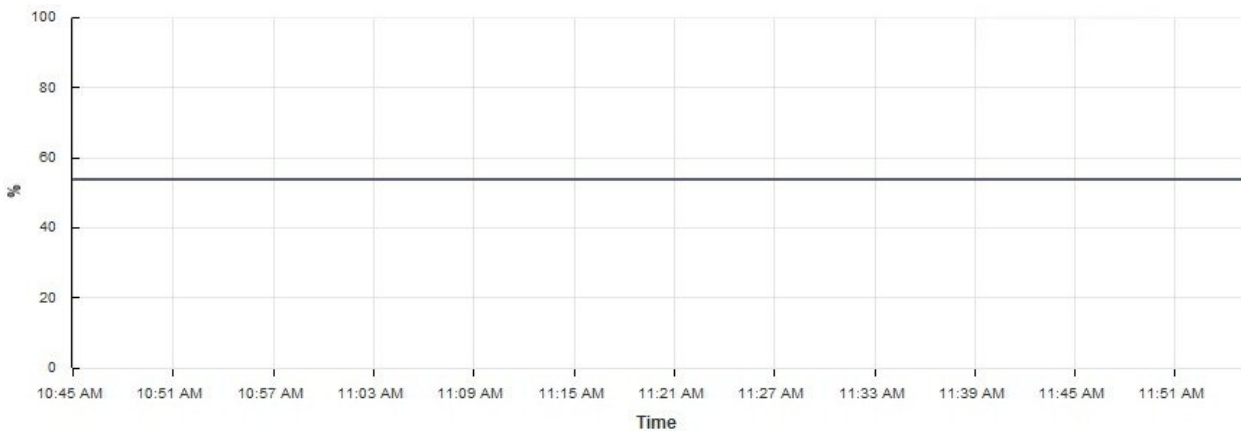




Figure 4: Memory usage throughout the test

**IO throughout the test**

Figure 5:

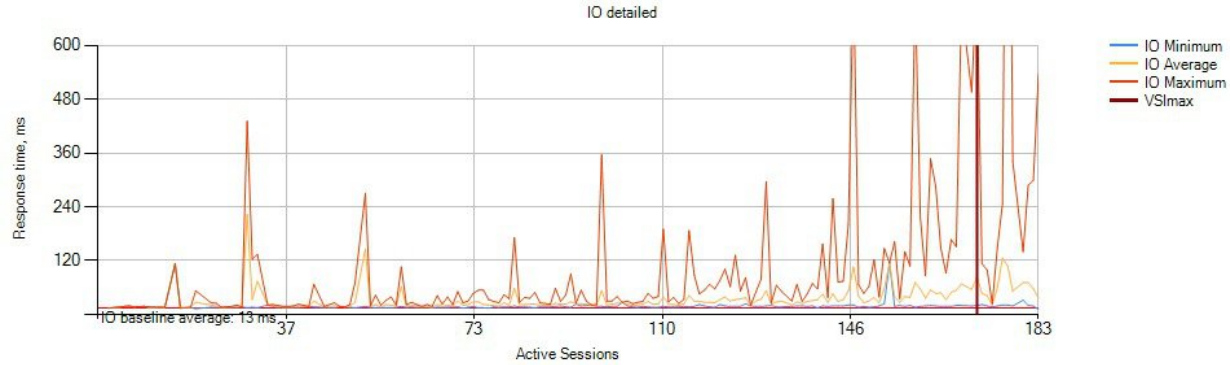


Figure 5: IO throughout the test

**IOPS, Throughput and Latency throughout the test**

Figure 6:

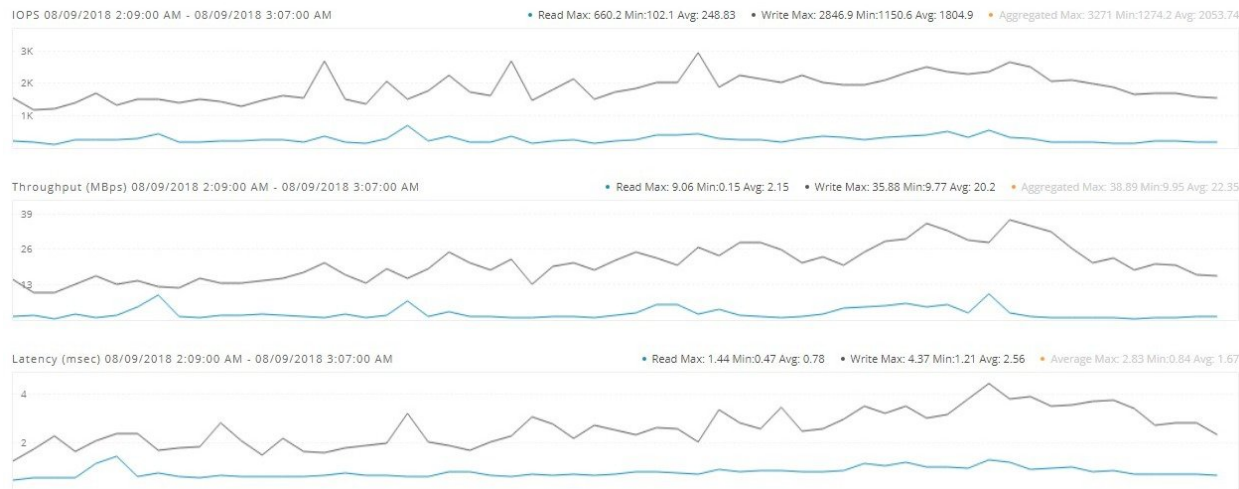


Figure 6: IOPS, Throughput and Latency throughout the test

**Medium Workload Result**

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	170	166	161

**Login VSIMax**

Figure 7:

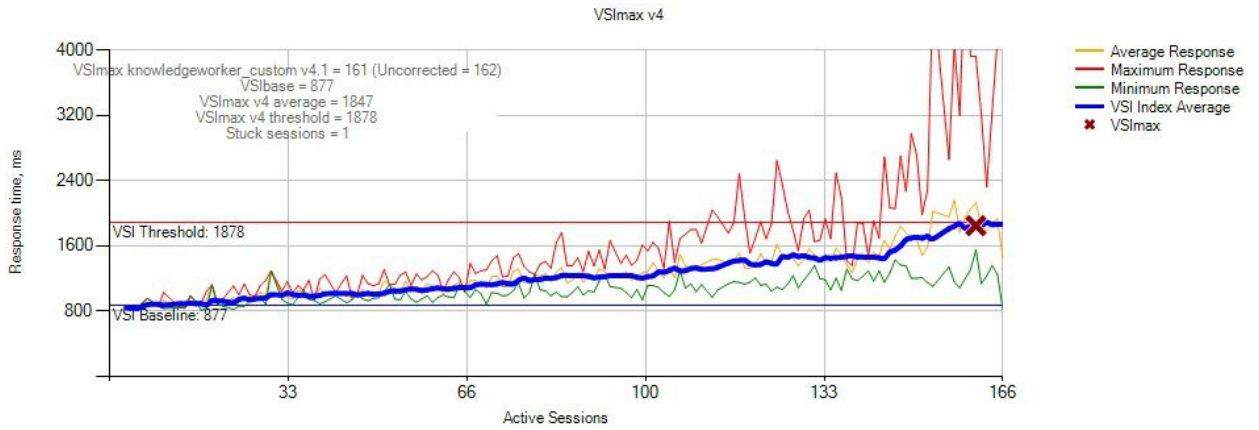


Figure 7: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220C M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 8:

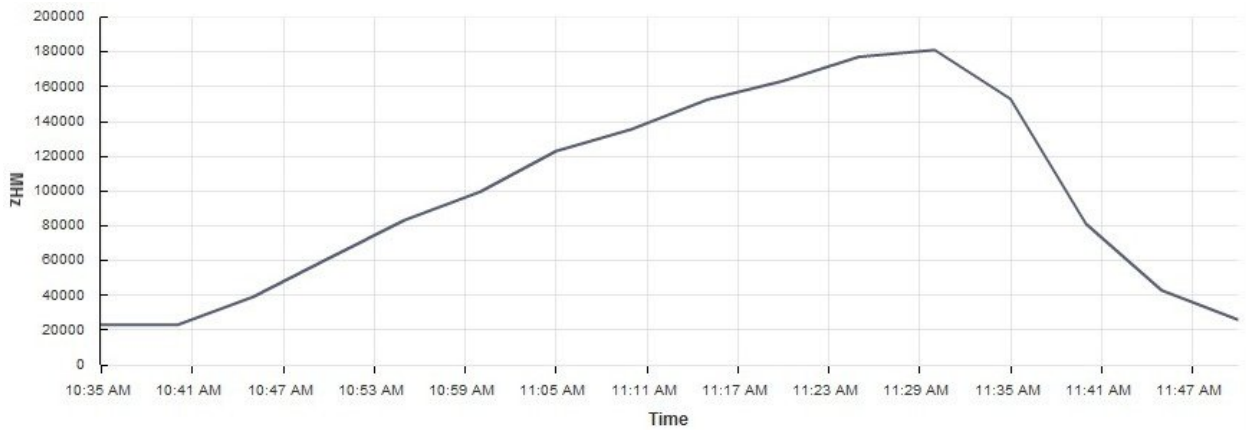


Figure 8: CPU Utilization throughout the test

Figure 9:

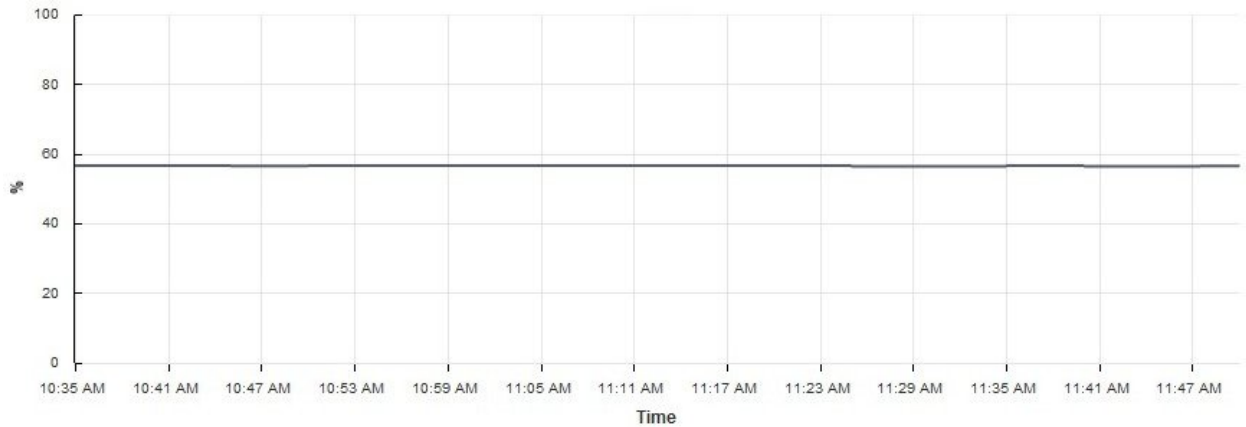


Figure 9: Memory usage throughout the test

**IO throughout the test**

Figure 10:

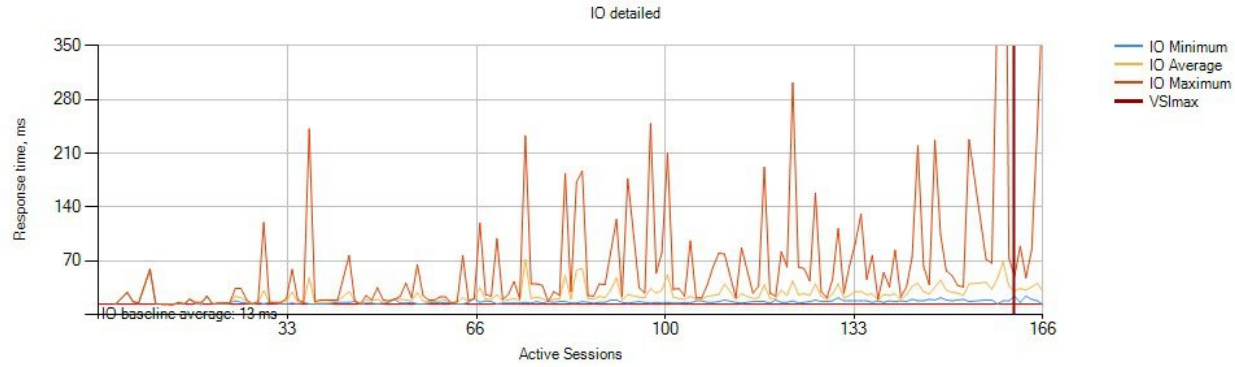


Figure 10: IO throughout the test

**IOPS, Throughput and Latency throughout the test**

Figure 11:

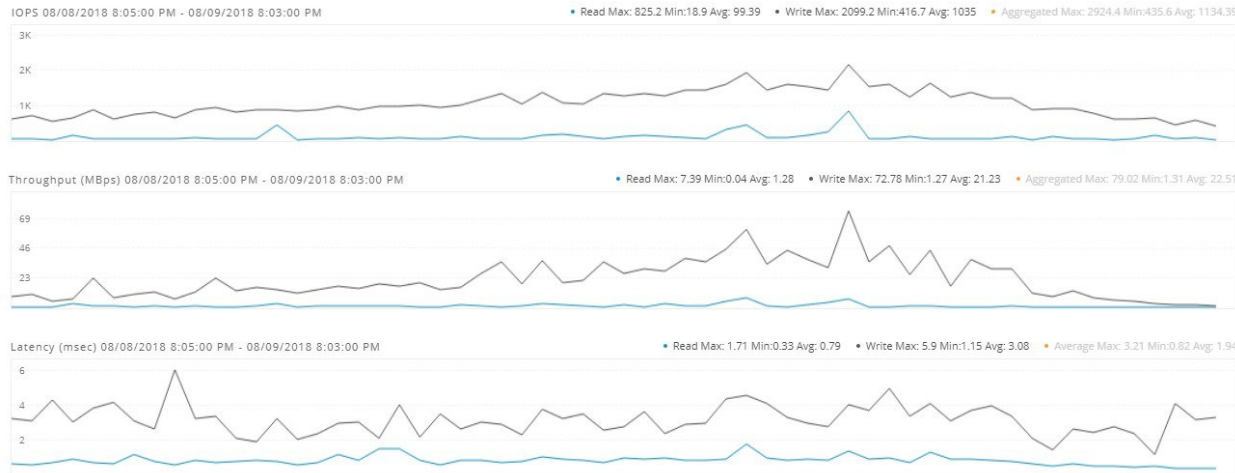


Figure 11: IOPS, Throughput and Latency throughout the test

**Heavy Workload Result**

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	160	158	144

**Login VSIMax**

Figure 12:

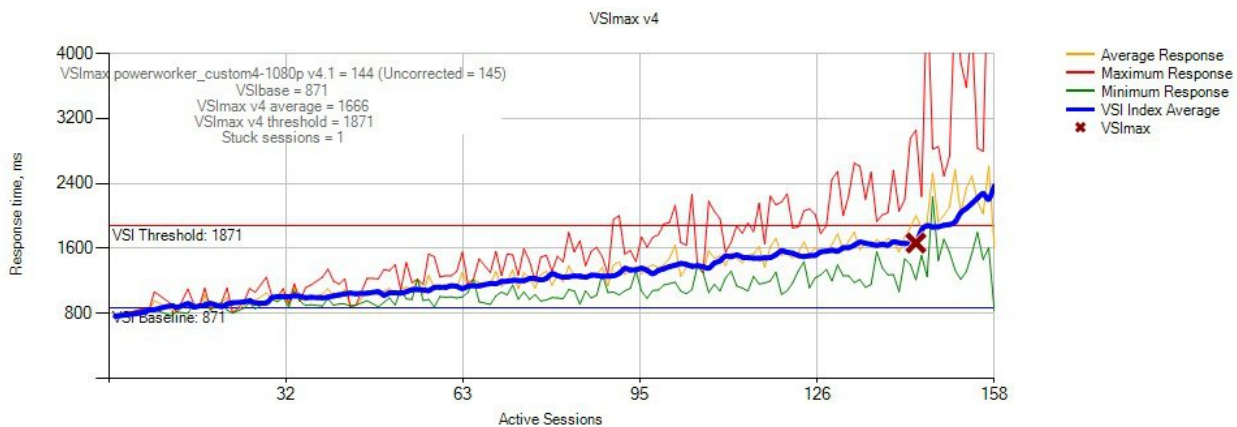


Figure 12: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220C M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 13:

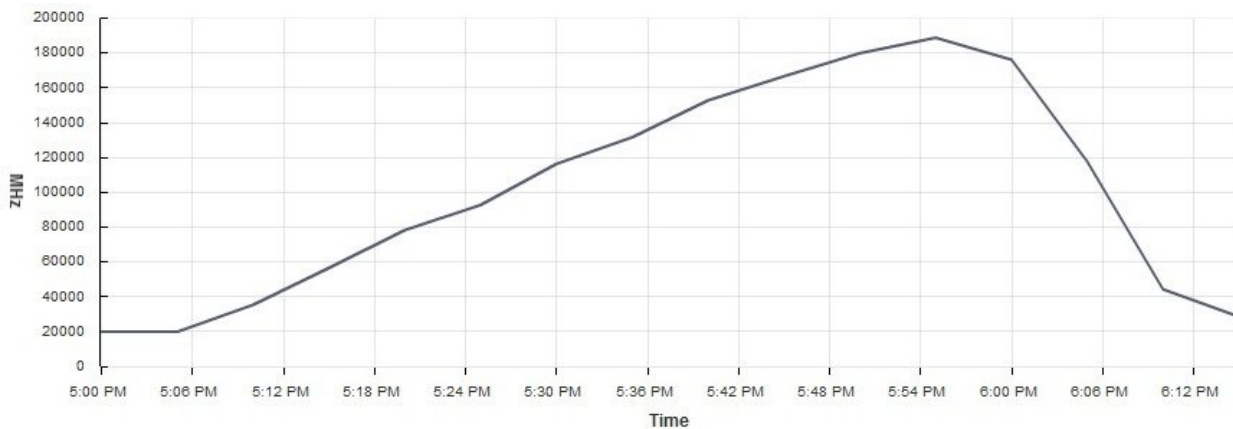


Figure 13: CPU Utilization throughtout the test

Figure 14:

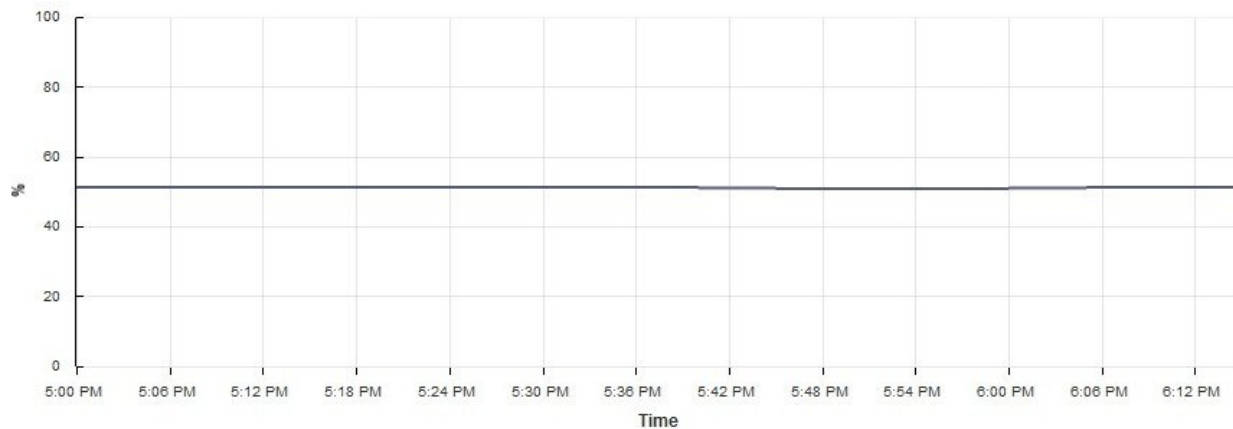


Figure 14: Memory usage throughout the test

**IO throughout the test**

Figure 15:

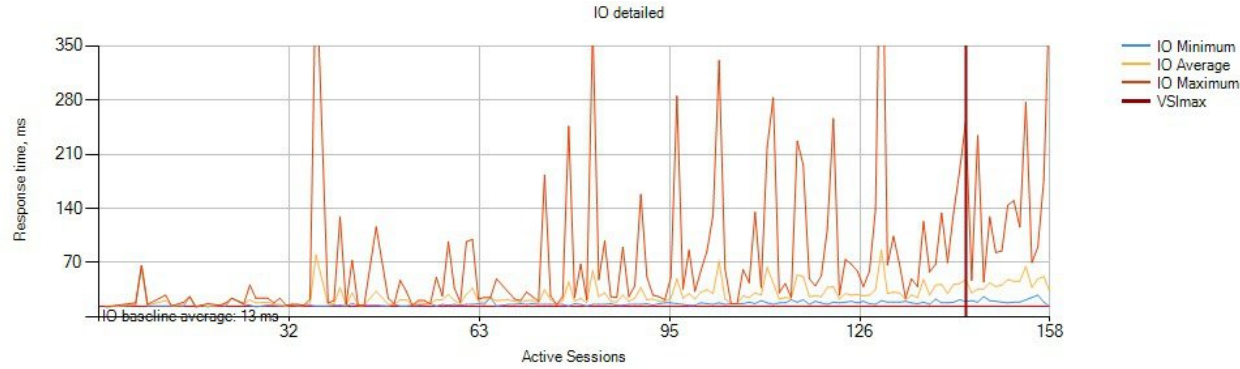


Figure 15: IO throughout the test

**IOPS, Throughput and Latency throughout the test**

Figure 16:

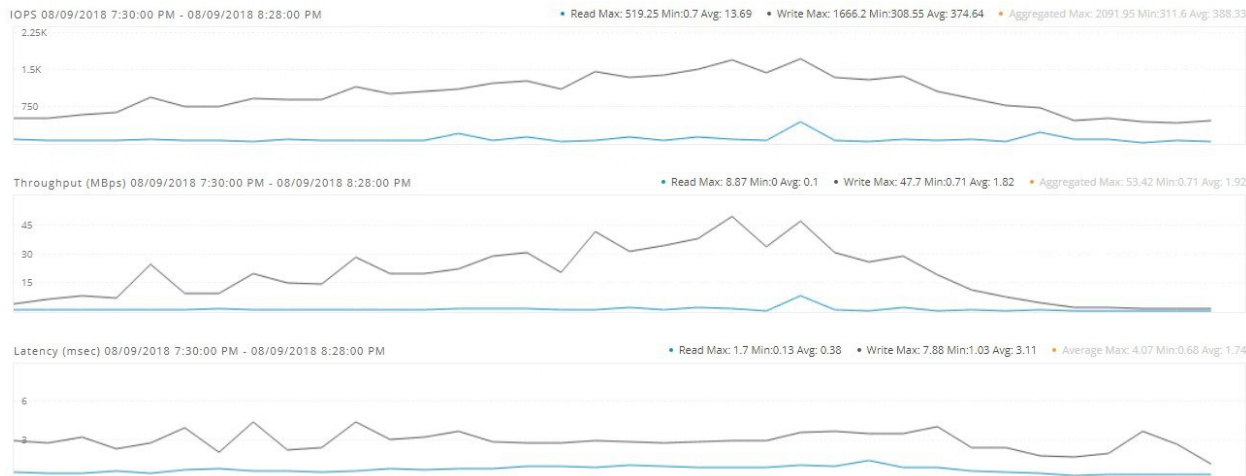


Figure 16: IOPS, Throughput and Latency throughout the test

# Windows 10 x64 Performance in Japanese Environment with VMWare OSOT

[Light Workload Result, on page 18](#)

[Medium Workload Result, on page 20](#)

[Heavy Workload Result, on page 22](#)

**VSI Max Results on HXAF220C M5SX 3-Node Cluster**

Type of workload	VSIMax Value
Light	189
Medium	179
Heavy	153

**Light Workload Result**

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	200	193	189

**Login VSIMax**

Figure 17:

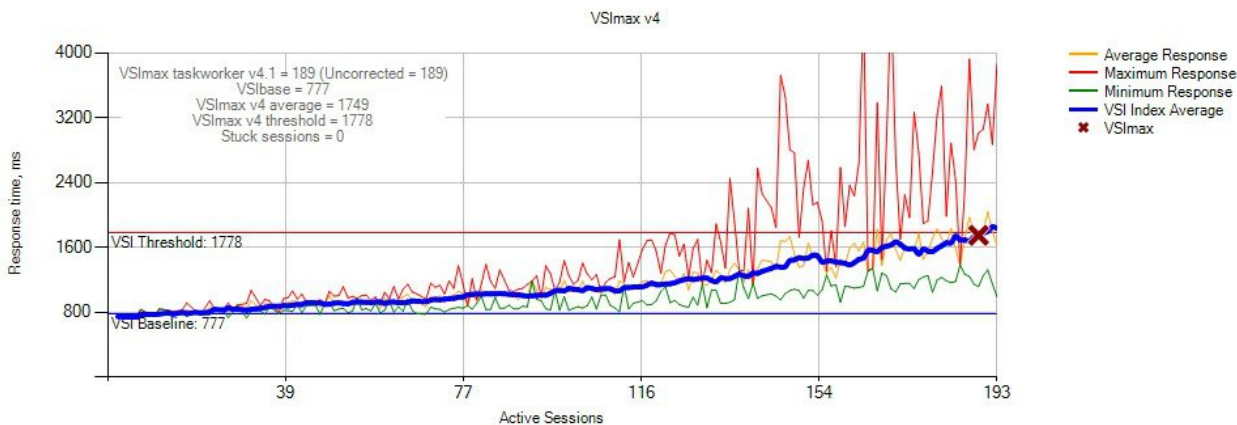


Figure 17: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220C M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 18:

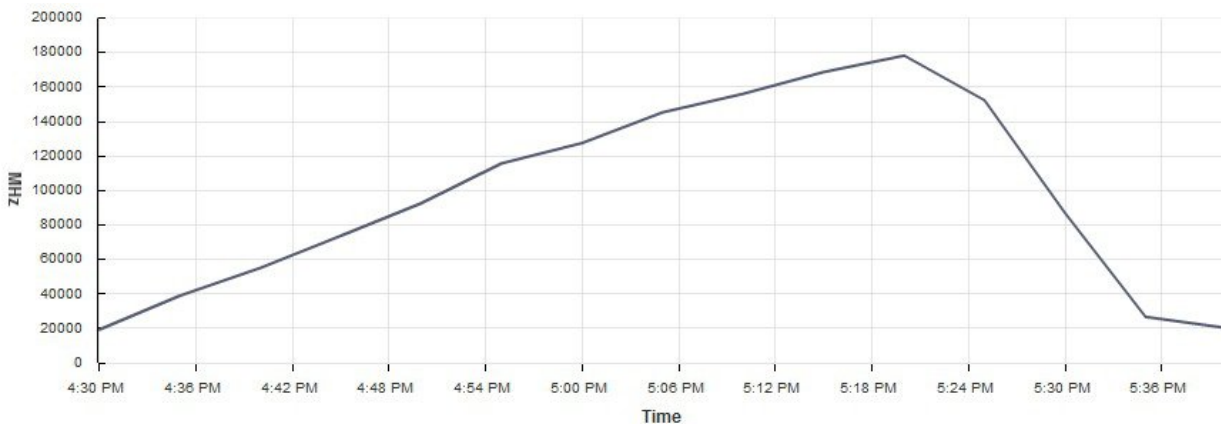


Figure 18: CPU Utilization throughout the test

Figure 19:

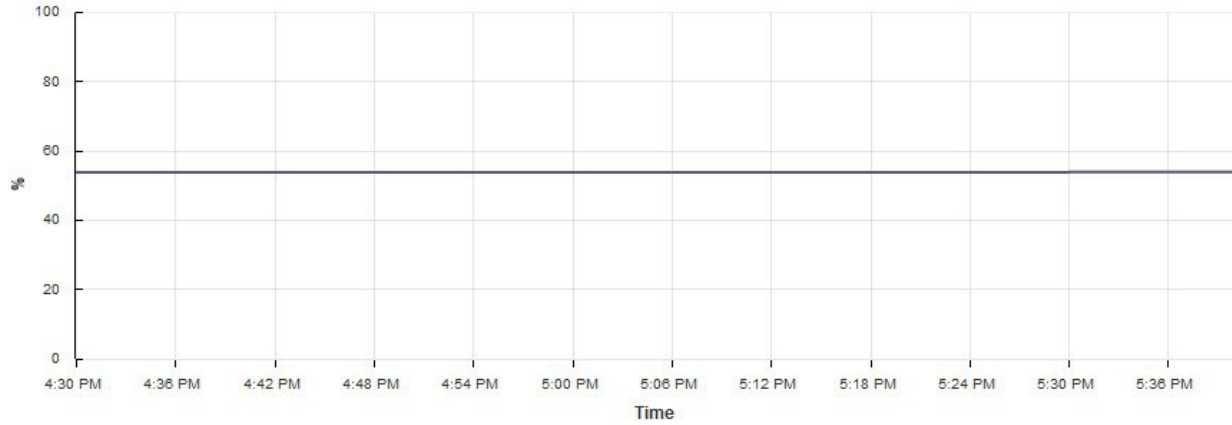


Figure 19: Memory usage throughout the test

**IO throughtout the test**

Figure 20:



Figure 20: IO throughtout the test

**IOPS, Throughput and Latency throughout the test**

Figure 21:

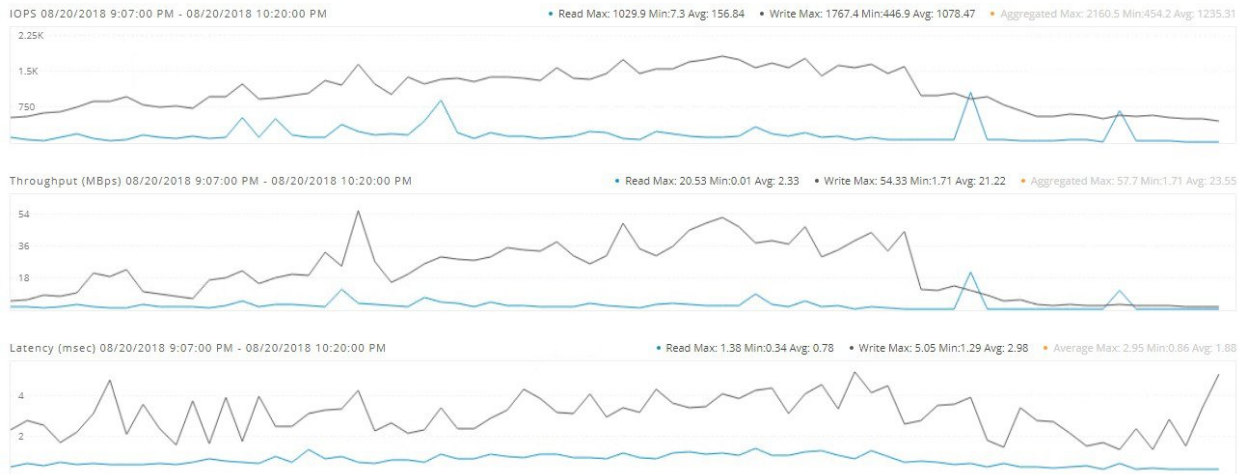


Figure 21: IOPS, Throughput and Latency throughout the test

**Medium Workload Result**

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	190	186	179

**Login VSIMax**

Figure22:

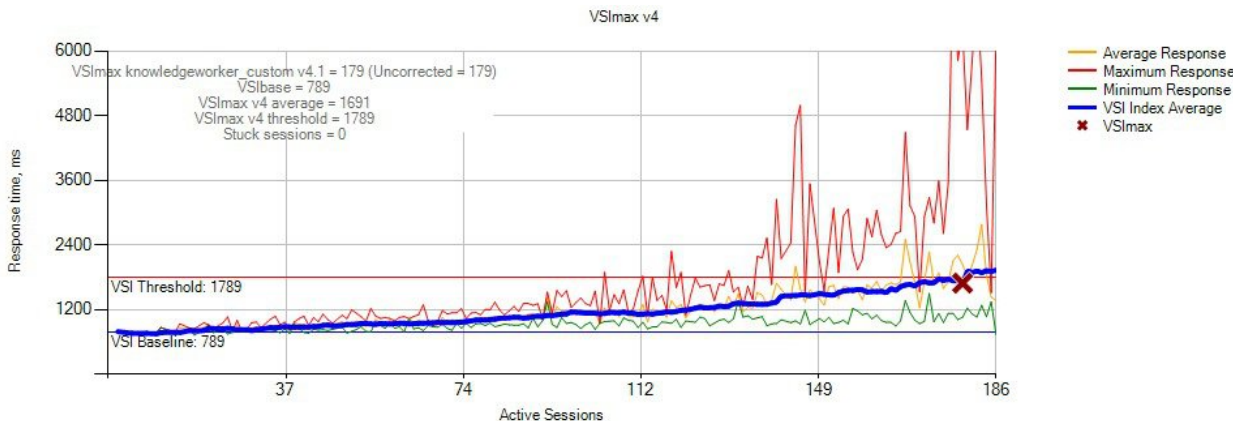


Figure 22: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220C M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 23:

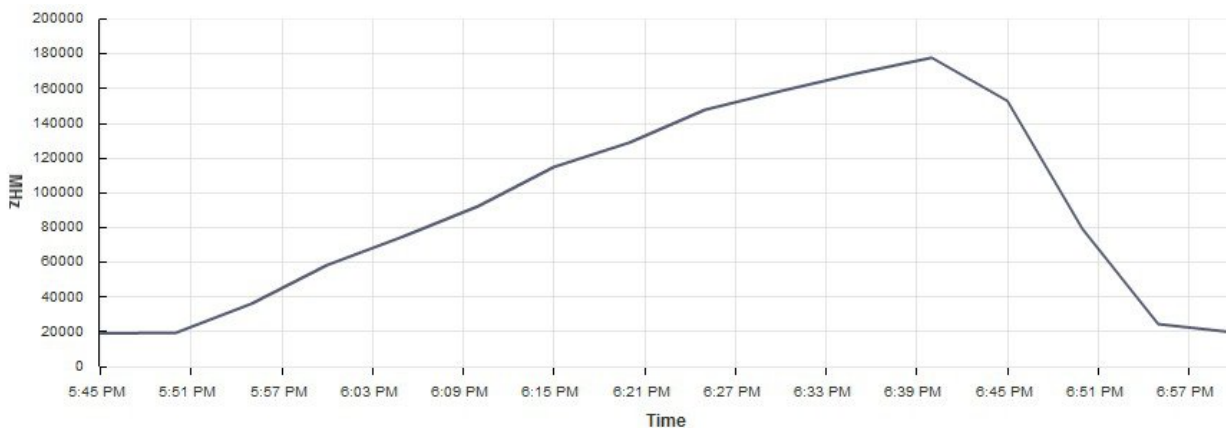


Figure 23: CPU Utilization throughout the test

Figure 24:



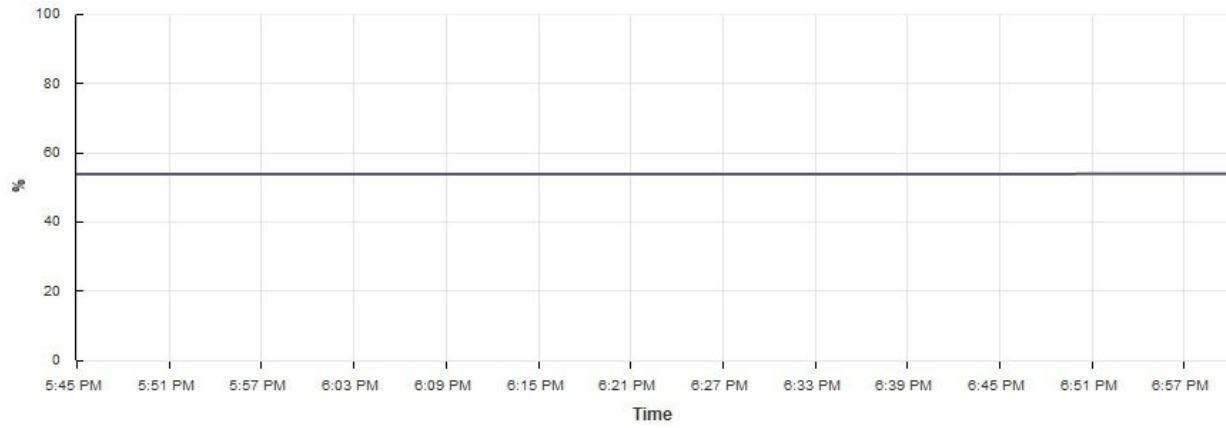


Figure 24: Memory usage throughout the test

**IO throughout the test**

Figure 25:

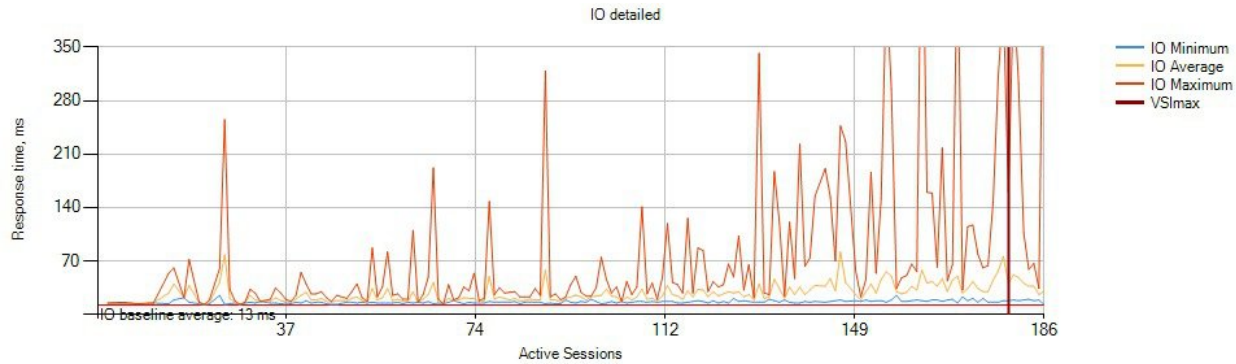


Figure 25: IO throughout the test

**IOPS, Throughput and Latency throughout the test**

Figure 26:

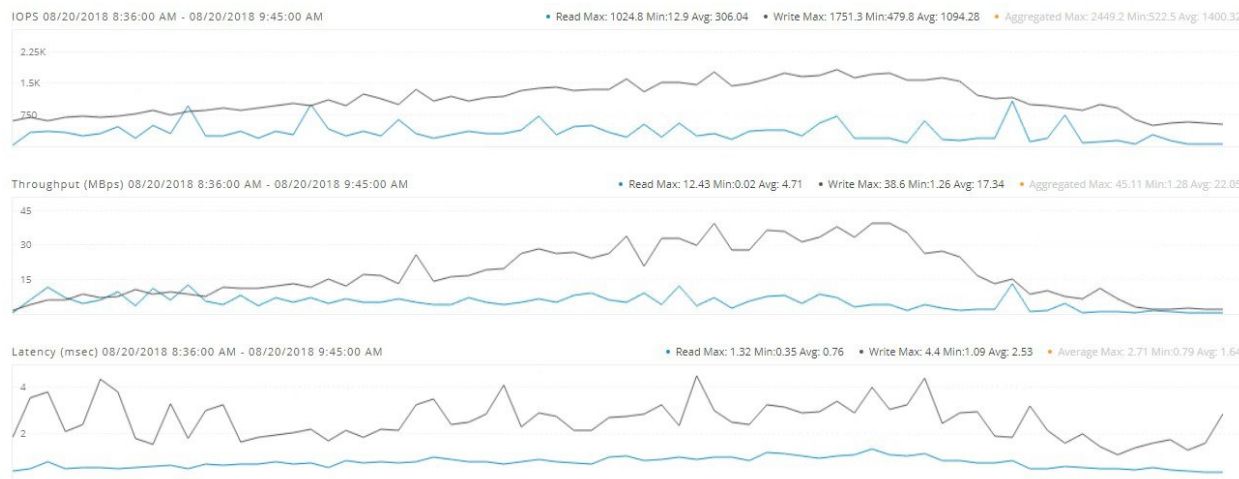


Figure 26: IOPS, Throughput and Latency throughout the test

**Heavy Workload Result**

Desktop OS	No. of Launched Sessions	No. of Active Sessions	VSIMax
Japanese	160	157	153

**Login VSIMax**

Figure 27:

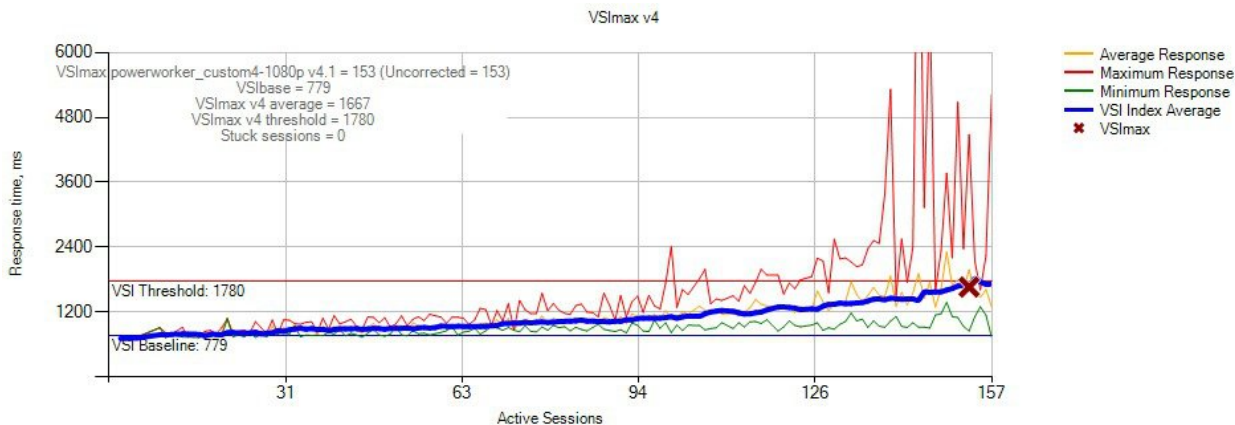


Figure 27: Average virtual desktop response times at various number of virtual desktops on the Cisco HXAF220C M5SX 3-Node Cluster

**Processor And Memory Utilization throughout the test**

Figure 28:

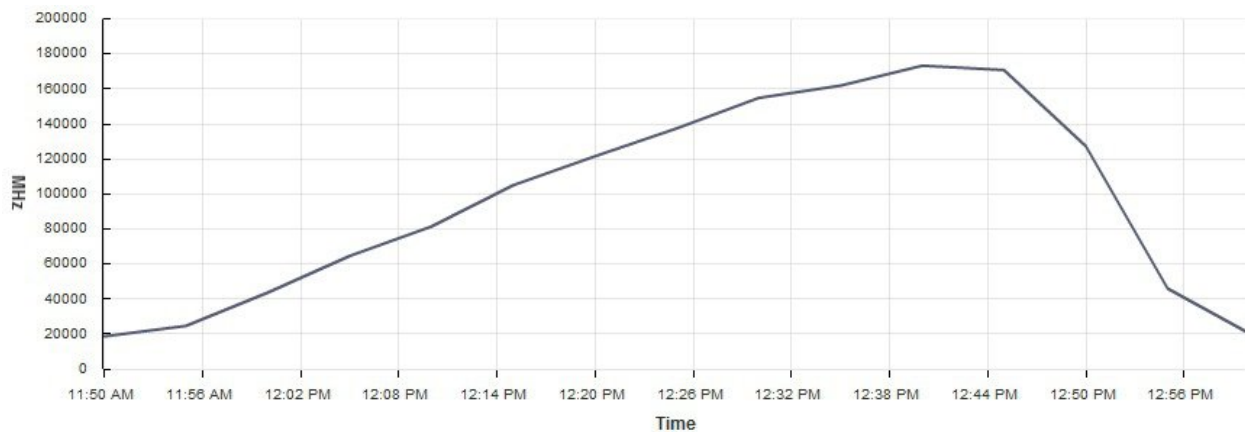


Figure 28: CPU Utilization throughout the test

Figure 29:

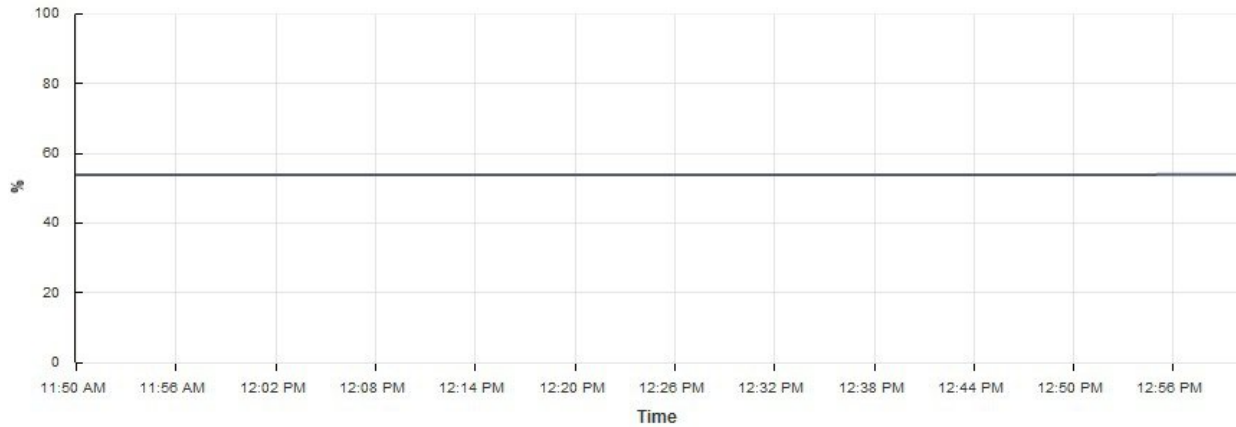


Figure 29: Memory usage throughout the test

**IO throughout the test**

Figure 30:

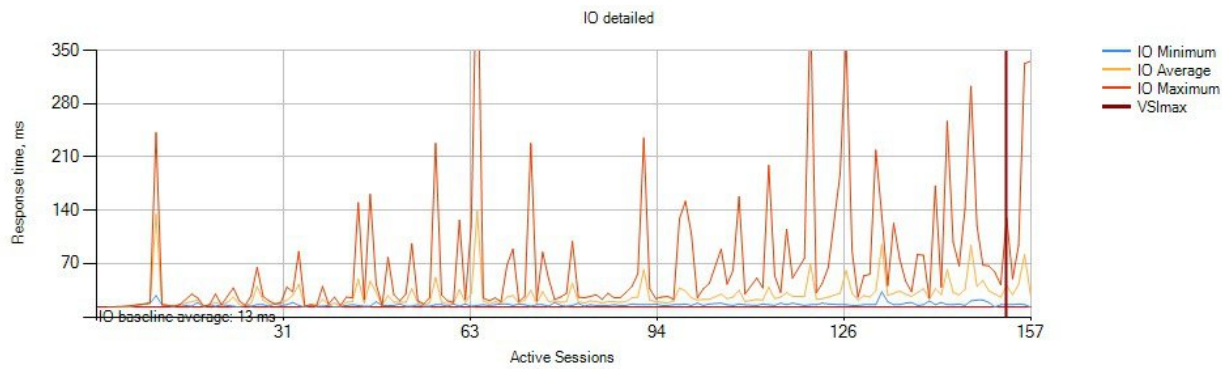


Figure 30: IO throughout the test

**IOPS, Throughput and Latency throughout the test**

Figure 31:

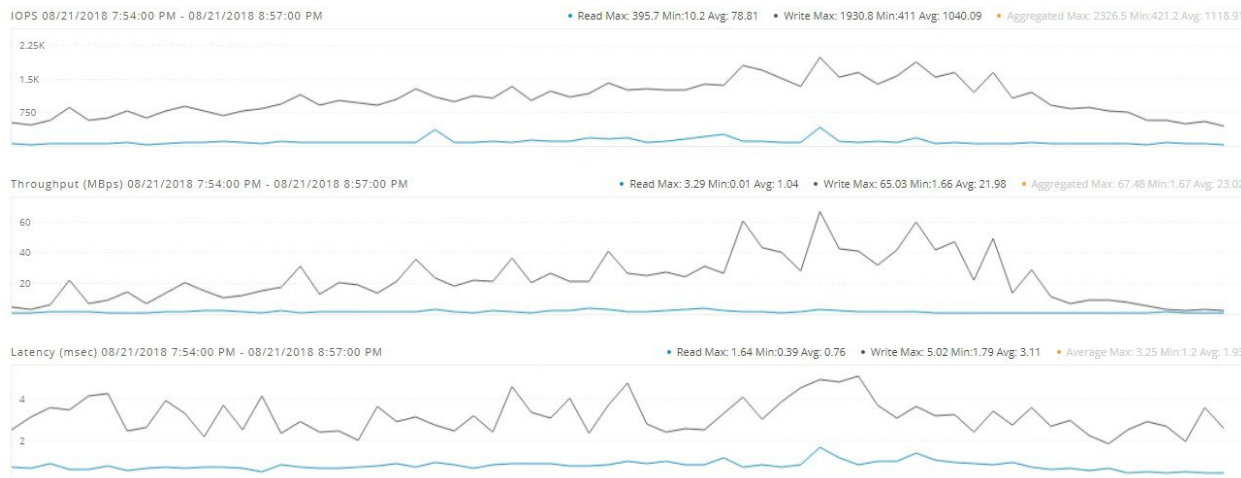


Figure 31: IOPS, Throughput and Latency throughout the test

## Related Documentation

### Cisco HyperFlex

<https://www.cisco.com/c/dam/en/us/products/collateral/hyperconverged-infrastructure/hyperflex-hx-series/hxaf-220c-m5-specsheet.pdf>

### Software Downloads

<https://software.cisco.com/download/home/286305544/type/286305994/release/3.0%25281d%2529>

### LoginVSI

[https://www.loginvsi.com/documentation/index.php?title=Main\\_Page](https://www.loginvsi.com/documentation/index.php?title=Main_Page)

### VMWare Horizon View

<https://docs.vmware.com/en/VMware-Horizon-7/7.5/rn/horizon-75-view-release-notes.html>

### VMWare OSOT

<https://www.loginvsi.com/blog/846-optimizing-desktop-images-with-vmware-osot>