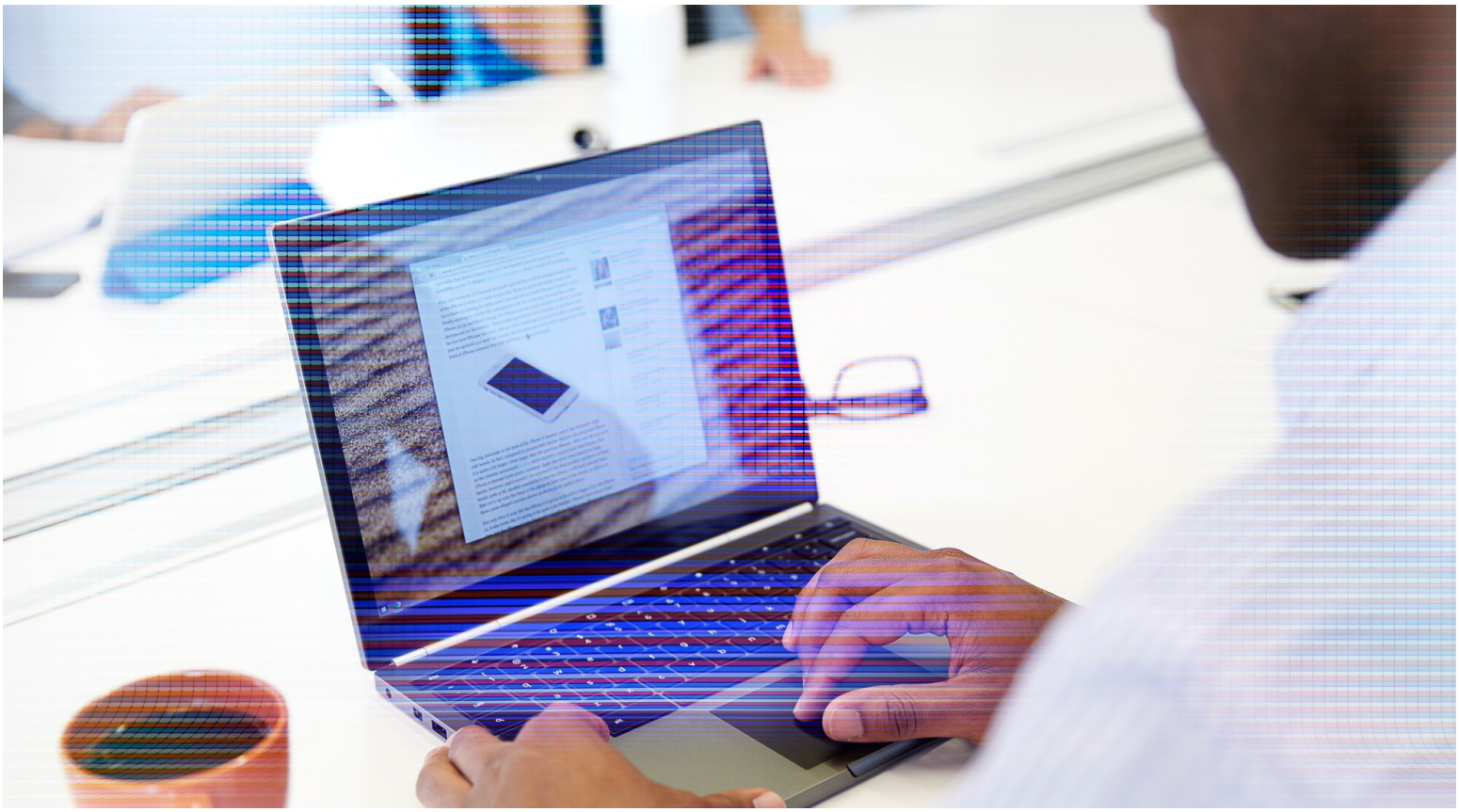


# POC Guide: Citrix Workspace Environment Management

Ensure performance of all apps on Windows environments and decrease the TCO of your infrastructure



CITRIX

# Table of Contents

Congratulations! You have decided to optimize your infrastructure and deliver the best possible workspace performance to your users with Citrix® Workspace Environment Management (WEM).

Workspace Environment Management (WEM) dynamically assembles a virtual workspace based on the ideal combination of user profiles, personalization, application settings, system policies, and system resource consumption. It improves user experience by accelerating desktop logon and application response times for any Microsoft Windows-based environment. This guide will help you get started.

## Who should use this guide?

This quick start proof of concept (PoC) guide is designed to help you quickly install and configure WEM 4.0 within an existing XenApp® or XenDesktop® site for evaluation. It guides you through a deployment scenario to help you better understand how the technology will lead you to these performance gains and savings. The instructions provide an evaluation method, configuration, and best practices to the most common use cases for resources optimizations on XenApp and XenDesktop environments. It does not replace or override the latest product documentation.

This guide was written using certain assumptions. The reader will:

1. Have prior knowledge of managing virtual machines and Windows server
2. Possess experience in a system administration or technical reviewer role
3. Be familiar, at least on a conceptual level, with XenDesktop or XenApp

To complete the steps outlined in this guide, an active directory infrastructure with DHCP and DNS services must be available as a pre-requisite. An existing XenApp and XenDesktop environment is also a pre-requisite (if needed, see the Reviewer's Guide to set up XenApp and XenDesktop). Configuration of the pre-requisites are outside the scope of this guide.

## What do you need?

### Understanding the components of WEM

Here's an overview of the infrastructure components:

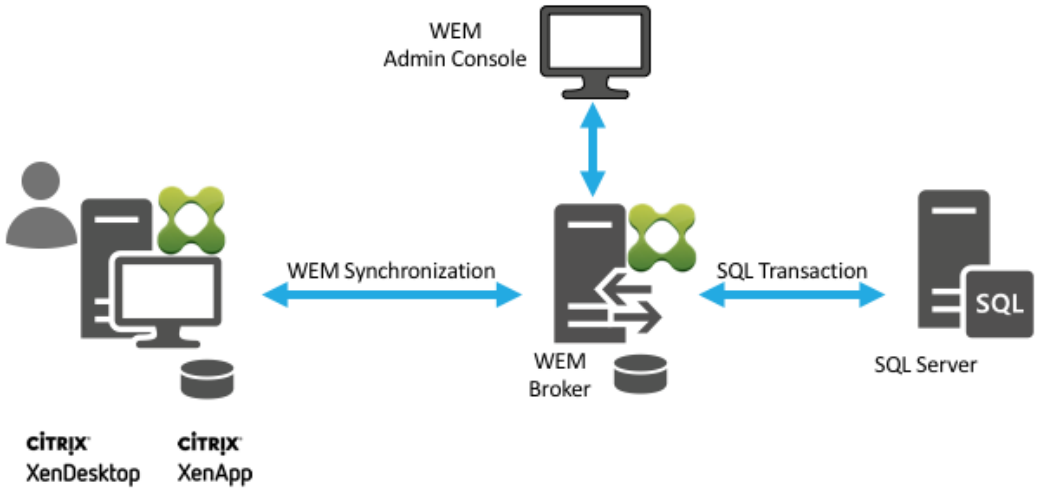



Figure 1: WEM 4.0 Architecture

The components in Figure 1 are described below. The two green logos represent WEM.

1. WEM Agent: The WEM agent is installed on each virtual machine deployed as Virtual Delivery Agent (VDA). It needs to run with Local Admin rights (minimum access rights)
2. WEM Broker: The WEM broker is installed on a dedicated Windows Server 2008 R2 or newer.
   - Minimum configuration:
     - 2 logical CPUs
     - 4GB RAM
     - 50GB disk space
   - Microsoft Windows Server 2008 R2 or newer. Microsoft.NET 4.5.2 or newer.
   - Local admin rights (minimum access rights)
   - Microsoft Active Directory server member
3. WEM Administration Console: Deployed on the WEM Broker.
4. SQL Server: For evaluation, you may install database locally on the WEM broker using SQL Express 2008 R2 or newer.
5. Licensing: WEM is licensed via the Citrix License server (11.14 or newer).
6. Product compatibility: WEM 4.0 is available for all Citrix customers using XenApp 6.5 (64-bit) or newer, XenApp and XenDesktop 7.x Enterprise and Platinum editions with active Software Maintenance. Please see latest product documentation or contact your Citrix representative for complete details.

## Network traffic flow matrix

When passing through a firewall. The following TCP ports need to be open for communication between WEM components

| Network flow description | Protocol | Type | Source IP@ | Source Port | Destination IP@ | Destination Port |
|---|---|---|---|---|---|---|
| VDA | VUEM* | TCP | VDA | Any | WEM Broker** Server (VIP if load balancer) | 8286<br>8285 |

| | | | | | | |
|---|---|---|---|---|---|---|
| WEM Broker to SQL database | MSSQL | TCP | WEM Broker | Any | SQL Server | 1433 |
| Admin Console to WEM Broker (if not on the same server) | VUEM* | TCP | WEM Admin Console host | Any | WEM Broker** Server | 8284 |

*VUEM: WEM TCP protocol

**WEM Broker Server: Dedicated WEM server

## Download the software

To download the latest software, you must meet the eligibility requirements and sign-in with valid Citrix credentials. WEM Administration & Installation guides are available on the download page.

Download link: https://www.citrix.com/downloads/xenapp-and-xendesktop.html

## Other pre-requisites

**Active Directory – Service Account**

A service account is required with regular user rights. As an example we will use «**WemSvc**» in this documentation.

**Active Directory – WEM Admins group**

A dedicated WEM admins group available or an existing admins group may be used

Note: WEM Admin console must be launched from a user session member of the WEM admins group

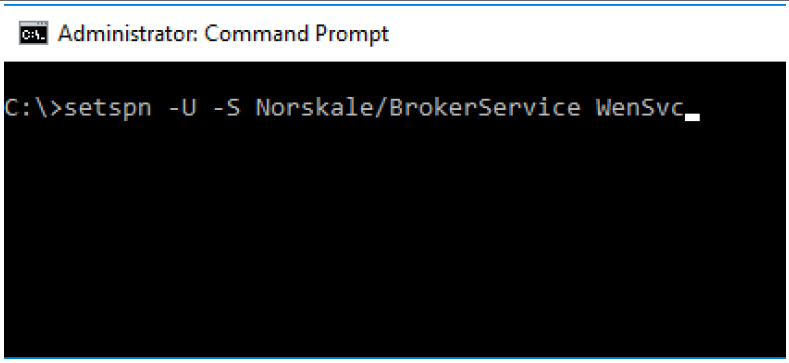
**Active Directory – Service Principal Name (SPN)**

A SPN must be created for the WEM service account with the following command:

**"setspn –U –S Norskale/BrokerService [ServiceAccountName]"**

**example: setspn –U –S Norskale/BrokerService WemSvc**

**SETSPN command**




Set the User Principal Name to the WenSvc service account.

Requires a domain account or specific privileges.

See "Appendix B" for more details

**Antivirus & Citrix Director exclusions (if applicable)**

If possible, conduct the evaluation in isolated lab without turning on antivirus and firewalls.

If not, corporate antivirus and Citrix Director must be set up with WEM exclusions prior to the POC
Refer to « Appendix A ».

### SQL Authentication policy

Prior to WEM SQL database creation, check if a password policy exceeding 12 characters exists.


Enter the password that meets the policy in "Set specific password for Vuem SQL User

### Local password policy >12 characters (XenApp/XenDesktop)

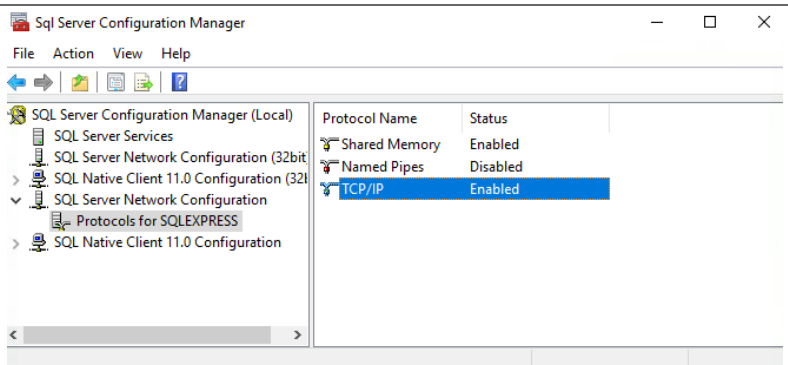
When such policy exists, the WEM agent must be installed in command line mode with the "**VuemLocalUserPassword**: ».

### Microsoft SQL Express Server

Check SQL Express installation on the Citrix WEM Broker.

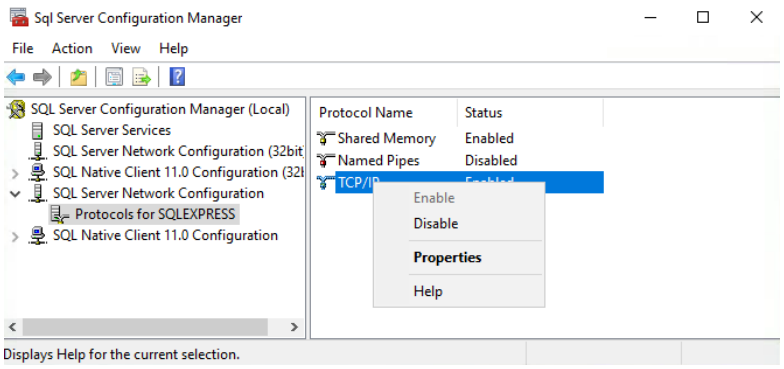
Note: if SQL express is running on a separate server, set the "SQL browser" service to "automatic" start and start the service

### Enable TCP/IP for SQL (SQL Configuration Manager)



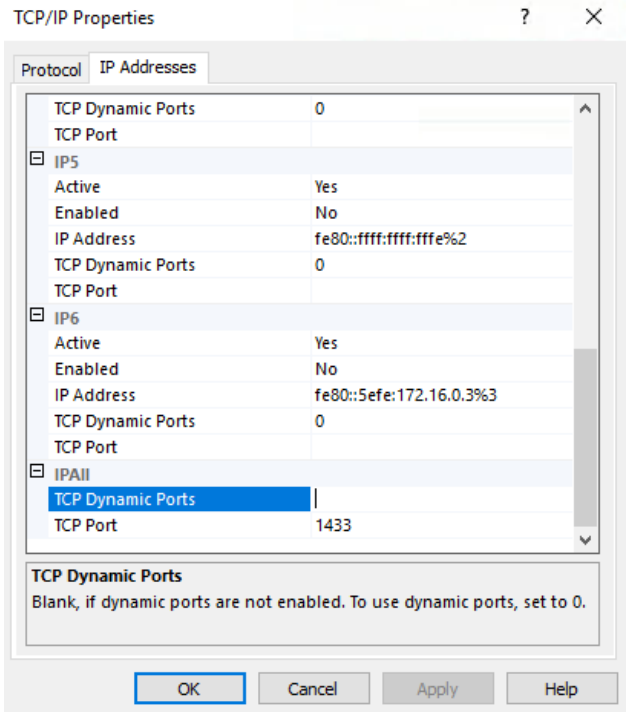

Set TCP/IP to "enabled" (right-click then select "enabled")

### Open TCP/IP advanced configuration




Righ-click on "TCP/IP" then select "Properties"

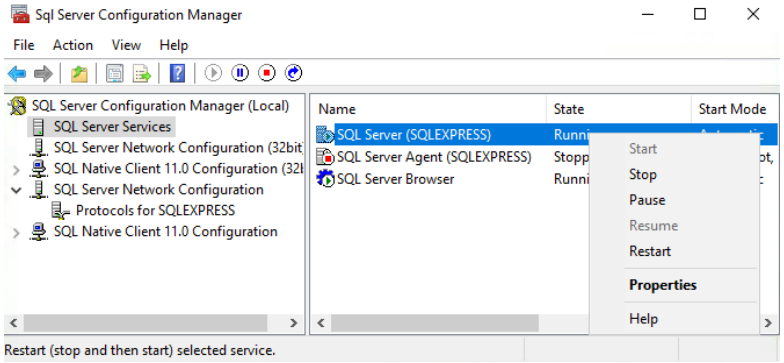
## Enable TCP/IP for SQL (SQL Configuration Manager)




IPAll:

- Set TCP 1433 for "TCP Port"
- "TCP Dynamic Ports": Remove the "0"

## Restart the SQL Express server service




- Select the SQL Server service then right-click and select "restart"

## Prerequisites for Citrix XenApp and XenDesktop

It is recommended to use a new, freshly built virtual machine (VM) as the VDA during the installation. Snapshotted VMs or XenDesktop images with an inconsistent WMI Database may require additional setup, which is outside the scope of this document.

**Supported XenApp and XenDesktop:**

- XenApp 6.5 (64bit) with Microsoft.NET 4.5.2 or newer.
- XenApp and XenDesktop 7.x with Microsoft.NET 4.5.2 or newer.

**Page File** settings on the VDA

- Check the system drive on which the file is stored has enough disk space available.
- Check file configuration "System managed size" is the recommended configuration.
- When using custom size, the size must be at least 1.5 the physical RAM size (initial and maximum set to the same value)

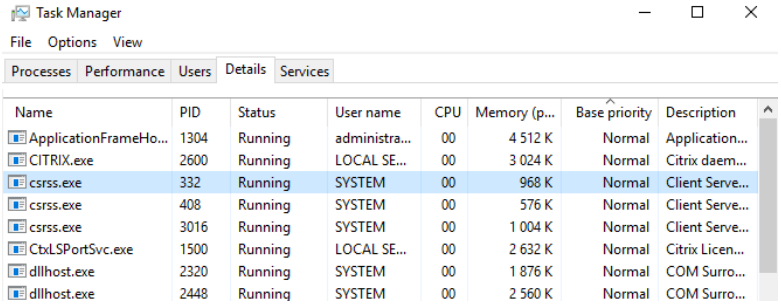
**Disable CPU/RAM Optimizations (XenApp only)**

WEM optimizations require other CPU/RAM optimizations technologies to be disabled such as Citrix CPU utilization Management, Microsoft DFSS or third party solutions (RES, Appsense…)

Check optimizations:

- Run the task manager. Navigate to the processes ("details" on Windows 2012/2016) tab then make sure the "base priority" is displayed.
- If all user processes are running with the "normal" priority then no need to disable third party optimizations.

**CPU user processes priority view**




Processes in the "Base priority" column are running with the "normal" priority

**If Priority is above "normal"**

If the priority Is higher than "normal" then disable the optimizations:

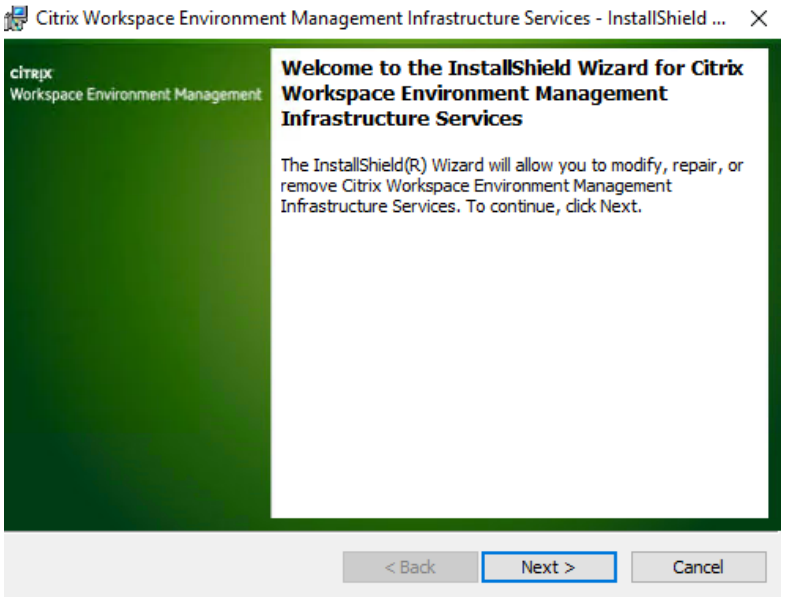
- Citrix: Disable the Citrix policy settings for Memory/CPU> CPU Management Server level
- Microsoft DFSS:
  - Via Group Policy: Computer Configuration\Policies\Administrative Templates\Windows Components\Remote Desktop Services\Remote Desktop Server\Profiles.

- Via Registry: Set the following registry entry to : HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\SessionManager\DFSS\EnableDFSS
- Third party software: refer to vendor documentation

## CITRIX WEM Installation

### Citrix WEM Broker Server installation

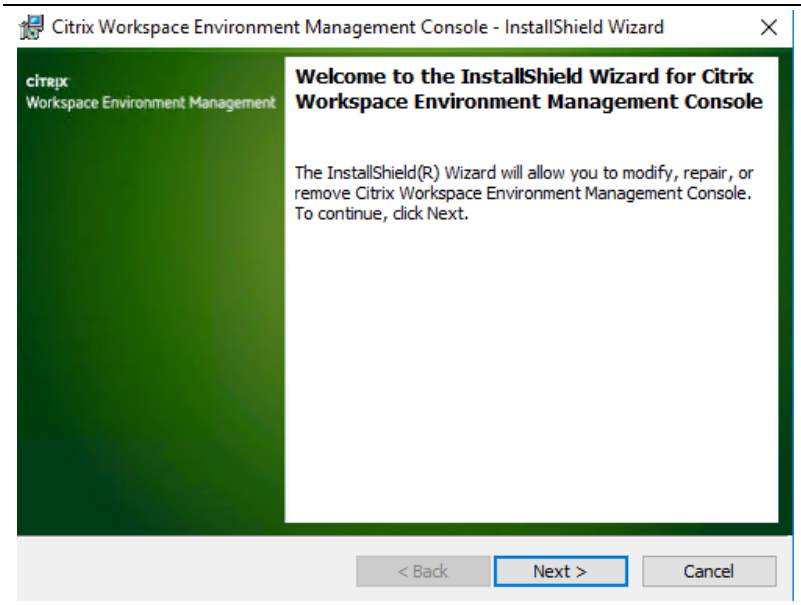
**Citrix WEM Broker server components installation**




Install: Citrix WEM broker: « Citrix Workspace Environment Management Infrastructure Services v4.00.00.00 Setup.exe»

Note: as of WEM 4.0, the WEM applications group created is named "Norskale"

**Citrix WEM Administration Console**



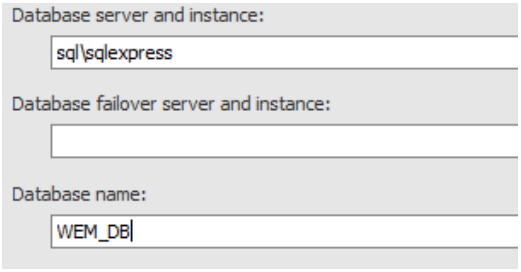

Install: Citrix WEM Administration Console: « Citrix Workspace Environment Management Console v4.00.00.00 Setup.exe»

*Note: as of WEM 4.0, the WEM applications group created is named "Norskale"*

### Citrix WEM Broker Service Configuration

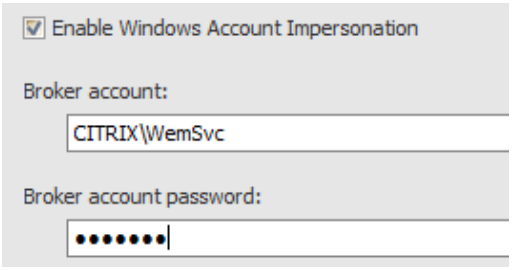
Run « Broker Service Configuration» from the Norskale programs group

## SQL configuration



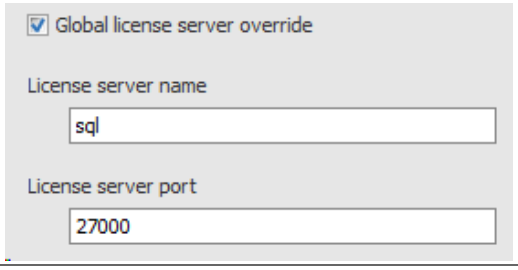

SQL server name, default instance and WEM database name

## Windows Account Impersonation



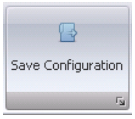

Use the service account created for the POC such as "WemSvc"

## Citrix License configuration



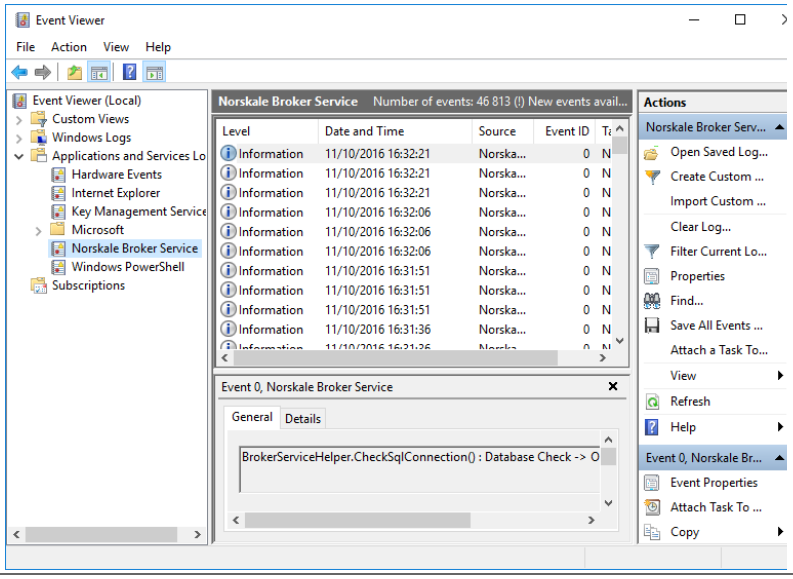

Enter the Citrix license server information here

## Validate configuration




Click on « Save Configuration »

## Event viewer log

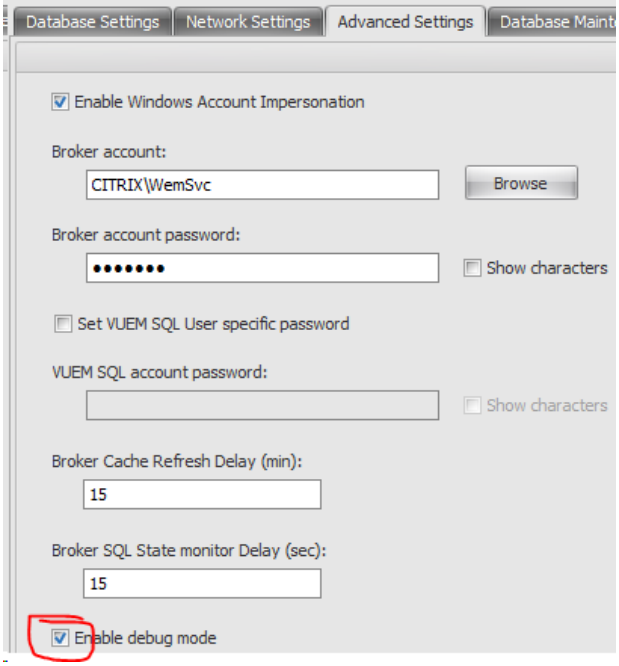



Check no errors are logged in the Event Viewer « Norskale Broker Service »

Direct log access :

%SystemRoot%\System32\Winevt\Logs\Norskale Agent Service.evtx

## Enable log (only when troubleshooting)



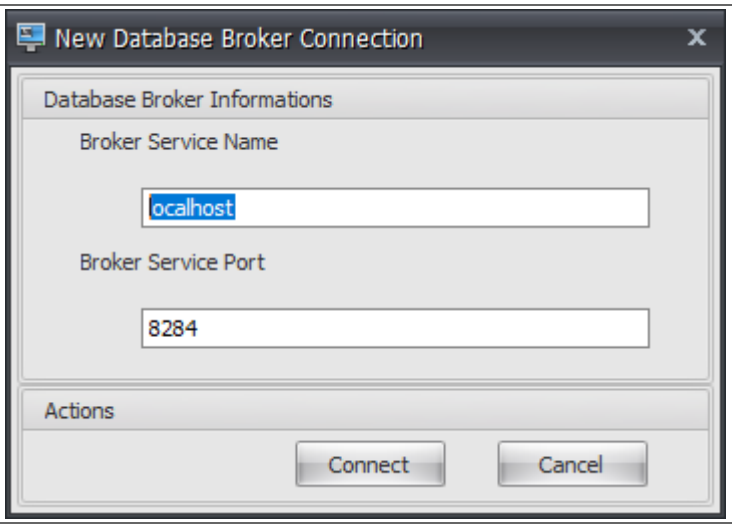

It is possible to enable the service log for advanced service configurations issues.

Click "save configuration" to restart the service.

Untick the debug mode once the issue is solved

## Start-up Configuration

### Run WEM Administration Console




Connection OK? (Citrix WEM installation document page 14)

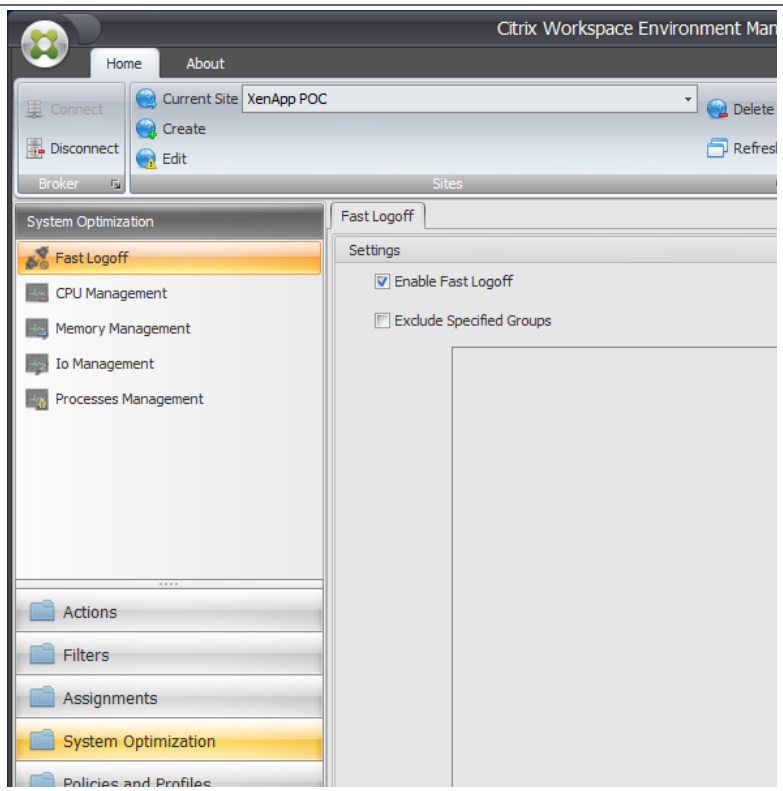
Evaluation License warning message (Citrix WEM Administration document page 14)

### Create new Site


Create a new "site » then select it from the drop down list.

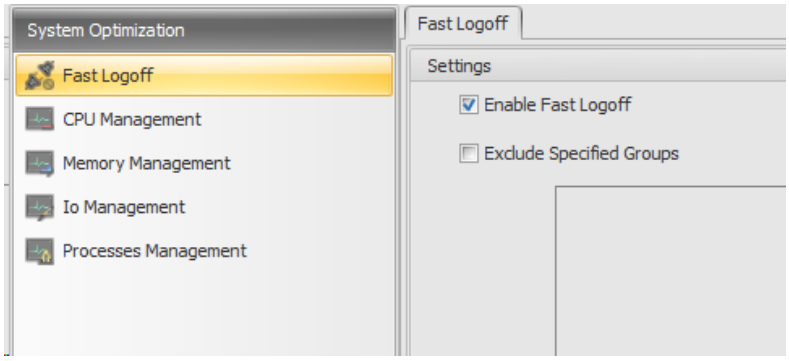
Example « XenApp POC »

### Set up the Site



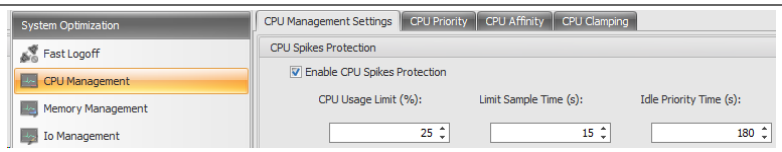

Select System Optimization

## Fast logoff




Tick « Enable Fast Logoff » then click "Apply"

## CPU Management / Enable CPU Spikes Protection

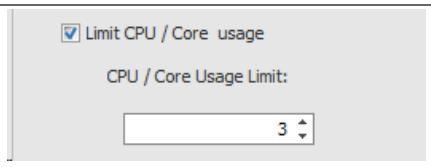



Tick « Enable CPU Spikes Protection »

As a rule of thumb, divide 100% by the number of logical CPUs (Displayed in the Windows Task Manager). Put the value in the « CPU usage Limit » field.

Example with a XenApp server running with 4 vCPUs

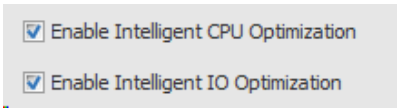
## CPU Management / Limit CPU / Core usage




Remove one from the total logical CPUs (Displayed in the Windows Task Manager. Leave unticked if only one CPU.

Example with a XenApp server running with 4 vCPUs

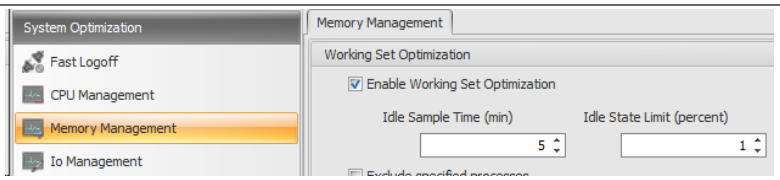
## Intelligent Optimizations




Tick « Enable Intelligent CPU Optimization »

Tick « Enable Intelligent IO Optimization »

## Memory Management



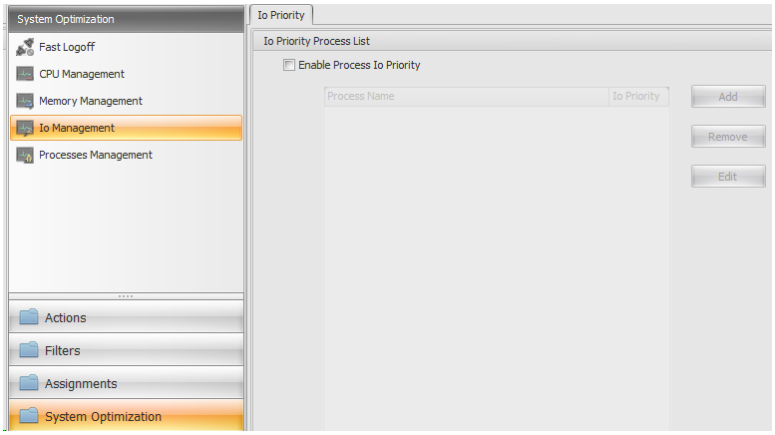

Tick "Enable Working Set Optimization"

XenApp servers, set the value « Idle Sample Time » to 10/15mins (15min if particularly under heavy load).

For a quick evaluation, the value can be lowered to the minimum sample time which is 5mins

XenDesktop : Set value to 5min

## Io Management

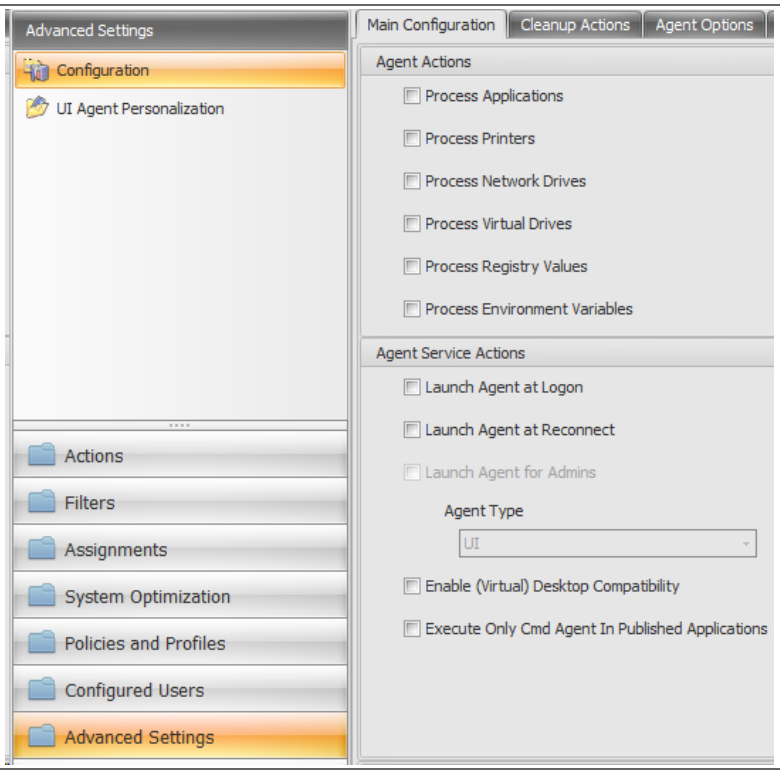



Tick "Enable Process Io Priority"

Click « Apply »

See « Appendix C » for configuration

## Advanced Settings




« Main Configuration/Agent Service Actions »

Tick « Launch Agent at Logon » only if the login and user workspace environment is to be implemented

Click « Apply »

## Performance analysis

Select three applications that are representative from the target environment

### Measure application availability

For all three applications, define a very basic usage scenario.

**Scenario example 1:**

Double-click on the Microsoft Outlook icon. Wait for the application to show up. Once you can click on the "new message" button, the scenario ends. The application is now loaded in memory and ready!

**Scenario example 2:**

Create an Internet Explorer shortcut to connect to the intranet portal. The scenario in this use case will be to run the portal by double-clicking on the icon until you can click on one the intranet available services.

#### Base line time

Use a chronometer (smartphone...) and measure the time for all three applications based on the application scenario.

Run the 3 measures for each application/scenario to get an accurate average using the following spreadsheet example:

| | Base line time | | | Average |
|---|---|---|---|---|
| App1 | | | | |
| App2 | | | | |
| App3 | | | | |

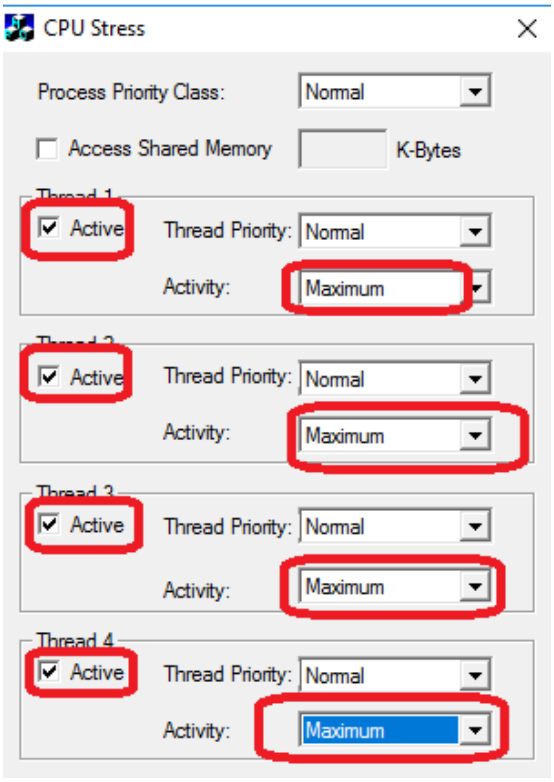
The average time will be the "base line" time the application requires on optimal Windows environment utilization.

*Note: Close the application after each test and wait a couple of seconds.*

#### CPU stressing

1. Download "cpustres.exe" from sysinternals (http://download.sysinternals.com/files/CPUSTRES.zip)
2. Run the task manager. (CPU Usage view)
3. Run the CPUSTRES, it supports up to 4 vCPUs if running a VM with more than 4 vCPUs, run a second instance of the tool

Stressing a Xenapp 4 vCPU VM




The CPU should now be @ 100%

*Note: Other tools may be used*

4. Use a chronometer (smartphone…) and measure the time for all three applications based on the application scenario.
5. Run the 3 measures for each application/scenario to get an accurate average using the following spreadsheet example:

| | Base time | | | Average | CPU Stress | | | Average |
|---|---|---|---|---|---|---|---|---|
| App1 | | | | | | | | |
| App2 | | | | | | | | |
| App3 | | | | | | | | |

*Note: Close the application after each test and wait a couple of seconds.*

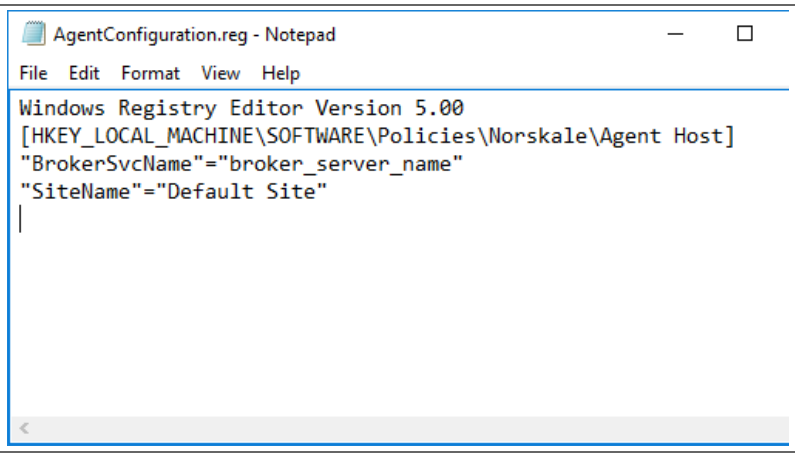
### Install the Citrix WEM agent

In this documentation we will setup the agent with a "REG" file see "Appendix D" for its content.

ADMX/ADM templates are provided within the WEM archive

1. Copy the "AgentConfiguration.reg" file) to the Windows environment being measured (XenApp or XenDesktop) and modify its content:

**AgentConfiguration.reg**




«broker_server_name » Set the Citrix WEM broker hostname in there «Default Site» Set the "site" name from which this machine gets its configuration from

2. Execute the REG file
3. Install the Citrix WEM agent « Citrix Workspace Environment Management Agent v4.00.00.00 Setup.exe»

**Stateless PVS, MCS, XenDesktop**

*Command line installation:*

*When using non persistent images and/or Citrix PVS, the WEM agent must be deployed in command line mode to change the cache location path to a persistent one (write cache drive). The command line parameter is "AgentCacheAlternateLocation" See installation guide for more info.*

*Example: /v"AgentCacheAlternateLocation=D:\ramcache_drive\WEM_PATH\"*

1. Command to execute on stateless environments:

***"Citrix Workspace Environment Management Agent v4.01.00.00 Setup.exe" /v"AgentCacheAlternateLocation=\"D:\AgentCache\"" /v"AgentServiceUseNonPersistentCompliantHistory=\"1\"""***

2. Create cache
   - Run "**AgentCacheUtility.exe –RefreshCache**"
   - MCS (no persistent drive): A start-up script may be implemented to rebuild cache before WEM service starts or store cache on the roaming user profile (if applicable)

3. DotNET DLL optimizations:

*When the Citrix WEM agent is to be deployed on XenDesktop or Citrix PVS images, dotnet optimizations must be enabled on the VDA gold image:*

*x86: .Net Folder = C:\Windows\Microsoft.NET\Framework\v4.x.xxxxx*

*x64: .Net Folder = C:\Windows\Microsoft.NET\Framework64\v4.x.xxxxx*

*<.Net Folder>\ngen.exe update*

*Note: The command above may return lots of error messages. Just ignore them.*

*<.Net Folder>\ngen.exe eqi 1*

*<.Net Folder>\ngen.exe eqi 3*

Gold image is ready!

### Check optimizations

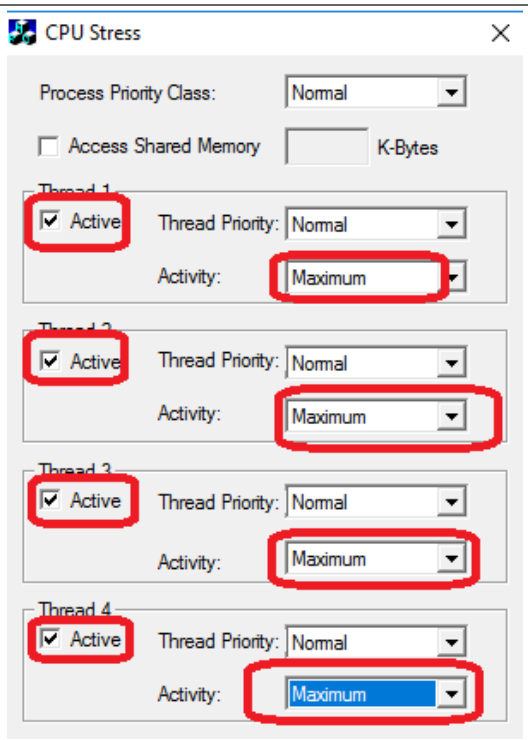
1. Run the task manager. From the "processes" view (Windows 7/Windows 2008 R2) or "Details" view (modern Windows OS) then add the "Base priority" column

2. Run Internet Explorer
3. Check that "iexplorer.exe" process has a "high" priority. This means Citrix WEM optimizations are "on"

## CPU stress with Citrix WEM

1. Run the task manager. (CPU Usage view)
2. Run CPUSTRES, it supports up to 4 vCPUs if running a VM with more than 4 vCPUs, run a second instance of the tool

To stress a XenApp 4 vCPU VM:




The CPU should now be @ 100%

Note: Other tools may be used

3. Use a chronometer (smartphone...) and measure the time for all three applications based on the application scenario.
4. Run the 3 measures for each application/scenario to get an accurate average using the following spreadsheet example:

| | Base time | | | Average | CPU Stress | | | Average | WEM & CPU Stress | | | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| App1 | | | | | | | | | | | | |
| App2 | | | | | | | | | | | | |
| App3 | | | | | | | | | | | | |

*Note: Close the application after each test and wait a couple of seconds.*

### RAM consumption

Run the task manager. "processes" view (Windows 7/Windows 2008 R2) or "Details" view (modern Windows OS).

Run the three applications (at the same time)

1. Initial launch:

Locate the three applications processes and report the RAM (in MB) in use in the "initial launch" column on the spreadsheet below

*Do not forget to minimize the three applications or set the focus on a new one (WEM must see the three apps as "idle")*

2. Idle:

Wait for at least 5mins or the amount of time set in the site configuration.

Collect for all three applications the amount of RAM (MB) in use while the applications are "idle". Report the values in spreadsheet in the "idle" column

3. Re-use:

Make the three applications "active".

Collect for all three applications the amount of RAM (MB) in use while the applications are "idle". Report the values in spreadsheet in the "re-use" column

| | Initial launch | Idle | Re-use | Savings* (%) |
|---|---|---|---|---|
| App1 | | | | |
| App2 | | | | |
| App3 | | | | |

*Note: Close the application after each test and wait a couple of seconds.*

### Overall RAM consumption monitoring

If possible: Monitor RAM consumption on the POC environment over 2/3 days before WEM optimizations and 2/3 days with WEM optimizations may provide good savings overview.

Please use Citrix Director, SCOM (platinum only) or third party tools.

## Conclusion

This concludes your evaluation of WEM 4.0. This simplified guide is intended for a quick evaluation of the product features, using a narrow scope of work. It does not replace the Product Documentation and detailed Deployment Guides available on http://docs.citrix.com

Through this process, you learned how to install a basic deployment of WEM resources optimizations part, configure it and run some tests to that clearly show how WEM optimizations can improve the performance of your Citrix environment.

## Appendix A: Exclusion list for Citrix Director & Antivirus

Antivirus must be set up with the following exclusions for Citrix WEM to operate properly on a XenApp / XenDesktop environment

Exclusions by executables path:

| 64 Bit Windows |
| --- |
| C:\Program Files (x86)\Norskale\Norskale Agent Host\Local Agent Cache*.* |
| C:\Program Files (x86)\Norskale\Norskale Agent Host*.exe |

| 32 Bit Windows |
| --- |
| C:\Program Files\Norskale\Norskale Agent Host\Local Agent Cache |
| C:\Program Files\Norskale\Norskale Agent Host*.exe |

Exclusions by executables name:

| Antivirus exclusions |
| --- |
| AgentCacheUtility.exe |
| AppsMgmtUtil.exe |
| PrnsMgmtUtil.exe |
| VUEMAgentMsg.exe |
| Norskale Agent Host Service.exe |
| VUEMAppCmd.exe |
| VUEMAppCmdDbg.exe |
| VUEMAppHide.exe |
| VUEMCmdAgent.exe |
| VUEMDesktopInitMsg.exe |
| VUEMMaintMsg.exe |
| VUEMRSAV.exe |
| VUEMUIAgent.exe |

For Director, follow instructions in document: CTX134770

For exclusions to be applied, the target environment must be rebooted

## Appendix B: Service Principal Name (SPN)

Citrix WEM requires a Service Principal Name 'SPN) in Microsoft Active Directory. Such a prerequisite is commonly used by server components such as IIS, SQL Server…

The SPN is required for a proper Kerberos authentication. Without a SPN, the Citrix WEM agent falls back into NTLM authentication mode leading to an agent running slowly and not optimizing the user environment as expected.

The Citrix WEM Broker uses the WEM service account (regular domain user rights) when a Kerberos validation ticket is issued by the « Norskale/BrokerService » service.

This has no impact on the production environment, nothing is modified. As an analogy, this is similar to an alias on a DNS server.

Two options:

1.Set a SPN on a service account (recommended configuration)
Command: setspn -U -S Norskale/BrokerService ServiceAccount
The service account has regular domain user rights (Active Directory read access)
Example: setspn -U -S Norskale/BrokerService NskSvc

2.Set a SPN on a machine account (hostname of the WEM broker).
This is not a recommended configuration when more than on WEM broker must be load balanced for scalability.
Command: setspn -C -S Norskale/BrokerService hostname
Note: the "setspn" command requires a domain admin account or specific rights as detailed in the technet:
https://technet.microsoft.com/fr-fr/library/cc731241(v=ws.10).aspx

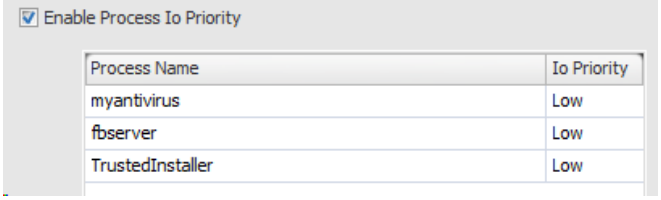
The "setspn" can be executed from any domain Windows environment (workstation/server) as long as the appropriate account is used.

Capitals, if exist are mandatory when using the "setspn" command.

Check SPN is set:
Command : setspn -L [ServiceAccount/hostname]
Exemple : setspn -L WemSvc
Should return something similar to (Active Directory domain "Norskale.demo"):
C:\>setspn -L WemSvc
Registered ServicePrincipalNames for CN=WemSvc,OU=Norskale,DC=norskale,DC=demo:
Norskale/BrokerService
HOST/WemSvc
HOST/ WemSvc.norskale.demo

## Appendix C: "Io Management"

Add the executable names from the applications running on the target POC environment that are known to over consume IOps such as the antivirus executable(s), Citrix EdgeSight, TrustedInstaller.exe, SharefileSync, googledrive.....




Enter each application process executable name in there.
Set the priority to "Low"

Note: if the executables do not exist on the target POC, processes are ignored

## Appendix D: Quick agent configuration

Create a "AgentConfiguration.reg" (or any other name) file in the POC target environment. Copy the below content in:

*Windows Registry Editor Version 5.00*
*[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Norskale\Agent Host]*
*"BrokerSvcName"="broker_server_name"*
*"SiteName"="Default Site"*

*File content exemple:*
*Windows Registry Editor Version 5.00*
*[HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Norskale\Agent Host]*
*"BrokerSvcName"="wem.citrix.demo"*
*"SiteName"="XenApp POC"*

## Further Reading

1. Citrix Product Documentation

- XenDesktop and XenApp 7.x
- Provisioning Services 7.x

2. On-demand Master Class for New Releases

- https://www.citrix.com/events/desktop-master-class.html

3. Virtual Apps and Desktop Design Guides

- Secure Remote Access to Enterprise PCs
- Simple, Secure, Remote Access Delivery
- Office 365 for XenDesktop and XenApp
- Virtualizing 3D Professional Graphics

4. Reviewer's Guides
    a. XenApp
    b. XenDesktop
    c. Free Trial: http://www.citrix.com/tryxendesktop
5. Feedback and comments to the author, Agostinho Tavares

- Email: agostinho.tavares@citrix.com

## About Citrix

Citrix (NASDAQ:CTXS) is leading the transition to software-defining the workplace, uniting virtualization, mobility management, networking and SaaS solutions to enable new ways for businesses and people to work better. Citrix solutions power business mobility through secure, mobile workspaces that provide people with instant access to apps, desktops, data and communications on any device, over any network and cloud. With annual revenue in 2015 of $3.28 billion, Citrix solutions are in use at more than 330,000 organizations and by over 100 million users globally. Learn more at www.citrix.com.