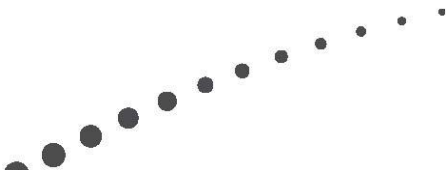




# Windows 7 Optimization Guide

For Desktop Virtualization





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## Overview

As organizations start to migrate to Windows 7, it is expected many will leverage desktop virtualization to simplify and streamline the migration and ongoing maintenance process. Delivering a Windows 7 system as a virtual desktop requires proper planning and configuration to provide the users with an optimized and functional desktop environment. The Windows 7 optimizations identified within this document are intended to provide a more responsive desktop for the users.

These configurations typically add value by enhancing the user experience and increasing system performance. For example, some of the changes optimize the user experience by enabling faster logons, reducing unnecessary prompts, and quicker screen updates. Others optimize performance and increase scalability by reducing unnecessary processor, memory, disk and network usage.

However, certain modifications allow for greater scalability but at the cost of the user experience. As many organizations will demand a user experience similar to the traditional desktop, care must be taken when applying optimization settings. Many of these settings are identified within the remainder of the document.

## Machine Settings

Most of the configurations recommended in this document are changes to the registry. Registry changes can be implemented in a number of ways and there is not necessarily one way that is best for all deployments. Machine-based modifications can be set anytime during the base image preparation or maintenance cycles. The simplest way to implement many of these is to modify the registry manually using “regedit.exe” or creating and executing a “.REG” file. Automated ways of modifying the registry, including Group Policy or other third-party tools, are also possible. All registry modifications listed in this document use the “.REG” file syntax so that they can be easily copied and pasted into a customized “.REG” file.

**Caution:** *All of the registry settings mentioned in this document must be analyzed for benefit and risk to your environment. Modifying the registry incorrectly can cause serious problems that may require you to reinstall the operating system. Citrix cannot guarantee that problems resulting from incorrectly modifying the registry can be solved. Modify the registry at your own risk. Backup the registry or disk image before making changes. For example, disabling certain services can make functionality within applications unusable (Disable Windows Search and lose search capabilities in Microsoft Outlook).*

## Services

Windows 7 includes a set of services, many of which are enabled as default. When using Citrix XenDesktop with Provisioning services, these services provide little value increases the longer the system is maintained. Because Provisioning services resets the virtual desktop to the base state upon each reboot, the knowledge the services gain is lost.

Configuration	Recommendation	Justification
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Background Intelligent Transfer Service	Disable	This service uses idle network bandwidth to fetch updates for the system, like Windows Update. As we will disable these other services that rely on BITS, we can disable BITS.
Desktop Windows Manager Session Manager	Disable	This service is responsible for Windows 7 Aero theme. First, the current XenDesktop agent (4.0) does not allow for the remoting of Aero. Second, organizations need to determine if Aero theme is something they wish to support at a later date.
Function Discovery Resource Publication	Disable	This service published the computer information onto the network so others can find them. This functionality is typically not required in an enterprise environment
HomeGroup listener	Disable	Responsible for HomeGroup membership. As the virtual Windows 7 desktops will most likely be in a domain model, the homegroup functionality is not required.
HomeGroup provider	Disable	
Indexing Service	Potential	Creates an index of local and remote files to allow for faster searching. As this information is created and stored locally, the indexes will be destroyed upon each reboot due to the read-only configuration of the Provisioning services image. That means each reboot will start with a blank index. However, indexing can be redirected to the user's home directory to allow for faster searches, but at the expense of scalability. Disabling this service results in a degraded user experience.
Offline Files	Disable	Responsible for management and maintenance and synchronization of offline files. As the virtual desktops will online, within the data center, there is little need for Offline File support.
Security Center	Disable	When disabled, the service no longer reports issues with antivirus, malware or firewall configurations. As many of these items are disabled or modified, disabling this service eliminates the messages being displayed to the users.
SuperFetch	Disable	Tries to improve system performance over time by "learning" the typical user activity. This information is stored within the operating system, which means it is deleted upon each reboot and provides little value in a virtual desktop environment.
System Restore	Disable	Service creates system snapshots and restore points. This functionality is unneeded as the virtual desktop is based on a golden, read-only image.
Themes	Potential	Allows users to manage the themes, which includes backgrounds, sounds and visual effects. Although this service does take resources and will impact overall scalability, each organization needs to determine if this functionality should be supported. It does allow the user to better personalize the environment and helps improve acceptance.
Windows Defender	Disable	Most enterprise deployments will have their own anti-malware solutions. As the corporate version will most likely be used, the integrated service should be disabled.
Windows Media Player Sharing Service	Disable	Unless users will be sharing items to other users via Media Player, this service can be disabled.
Windows Search	Potential	Although disabling Windows Search will improve scalability, many applications rely on this service. Disabling the service might result in failed searches or long timeframes before

		searches complete, which degrade the user experience. <b>Note:</b> This service also works in conjunction with the Indexing Service.
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## Recommended Configurations

The following Group Policy Objects are recommended for all deployment scenarios and would almost always be desirable in a Windows 7 hosted VM-based VDI desktop implementation:

Item	Path (Computer Configuration)	Justification
Error Reporting	Administrative Templates – Windows Components – Windows Error Reporting Disable Windows Error Reporting: Enabled	Generates application crash dumps to be sent to Microsoft. Should be safe to disable unless troubleshooting application.
Windows Update	Administrative Templates – Windows Components – Windows Updates Configure Automatic Updates: Disabled	Windows updates should only be done on the base desktop image and not by users.
System Restore	Administrative templates – System – System Restore Turn off System Restore: Enabled	Not needed due to the nature of desktop virtualization and single image management.

The following registry changes are recommended for all deployment scenarios and would almost always be desirable in a Windows 7 hosted VM-based VDI desktop implementation:

Configuration	Optimizer	Registry Modification (in REG format)
Disable Last Access Timestamp	Yes	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem] "NtfsDisableLastAccessUpdate"=dword:00000001

Disable TCP/IP Offload	No	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters] "DisableTaskOffload"=dword:00000001
Increase Service Startup Timeout	No	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control] "ServicesPipeTimeout"=dword:0002bf20
Hide Hard Error Messages	No	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Windows] "ErrorMode"=dword:00000002
Disable CIFS Change Notifications	No	[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\Explorer] "NoRemoteRecursiveEvents"=dword:00000001
Disable Logon Screensaver	No	[HKEY_USERS\DEFAULT\Control Panel\Desktop] "ScreenSaveActive"="0"

**Note:** The Optimizer column indicates whether this registry change is included in the XenConvert Optimizer tool that is installed with the Provisioning Services target device software.

## Standard Mode Recommended Configurations

The next set of registry changes are recommended for images deployed using standard mode vDisk images with Citrix Provisioning services. Standard mode images are unique in that they are restored to the original state at each reboot, deleting any newly written or modified data. In this scenario, certain processes are no longer efficient. These configurations may also apply when deploying persistent images and in many cases should be implemented in addition to the changes recommended in the preceding section.

Configuration	Optimizer	Registry Modification (in REG format)
Disable Clear Page File at Shutdown	Yes	HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management] "ClearPageFileAtShutdown"=dword:00000000
Disable Offline Files	Yes	[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Net Cache] "Enabled"=dword:00000000
Disable Background Defragmentation	Yes	[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Dfrg\BootOptimizeFunction] "Enable"="N"
Disable Background Layout Service	Yes	[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Opti malLayout] "EnableAutoLayout"=dword:00000000
Disable Bug Check Memory Dump	Yes	[HKLM\SYSTEM\CurrentControlSet\Control\CrashControl] "CrashDumpEnabled"=dword:00000000 "LogEvent"=dword:00000000 "SendAlert"=dword:00000000
Disable Hibernation	Yes	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Power] "Heuristics"=hex:05,00,00,00,00,01,00,00,00,00,00,00,00,00,00,3f,42,0f,00
Disable Memory Dumps	Yes	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\CrashControl] "CrashDumpEnabled"=dword:00000000 "LogEvent"=dword:00000000 "SendAlert"=dword:00000000
Disable Mach. Acct. Password Changes	Yes	[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Netlogon\Param eters] "DisablePasswordChange"=dword:00000001
Redirect Event Logs	No	HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\Application] "File"="D:\EventLogs\Application.evtx" [HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\Security] "File"="D:\EventLogs\Security.evtx" [HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\System] "File"="D:\EventLogs\System.evtx"
Reduce Event Log Size to 64K	Yes	HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\Application] "MaxSize"=dword:00010000 [HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\Security] "MaxSize"=dword:00010000 [HKLM\SYSTEM\CurrentControlSet\Services\Eventlog\System] "MaxSize"=dword:00010000

## Optional Configurations

This last set of machine-based registry changes is optional regardless of whether the image is deployed as a persistent or standard image. In many cases, the following configurations should be implemented; however, these configurations should be analyzed for suitability to each unique environment.

Configuration	Registry Modification (in REG format)	Justification
Disable Move to Recycle Bin	[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion \Explorer\BitBucket] "UseGlobalSettings"=dword:00000001 "NukeOnDelete"=dword:00000001	Although the recycle bin will be deleted on subsequent reboots, disabling this service altogether might pose a risk in that users will not be able to recover files during their session. Although this setting is part of the optimizer, it might be advantageous to not disable the Recycle Bin. <b>Note:</b> Items deleted from network shares are not moved to the Recycle Bin. Only locally deleted files are moved.

## User Settings

Unlike machine settings, user settings must be applied to each user and typically cannot be applied as part of the base image. In addition, user settings typically do not depend on whether the image is deployed in private or standard mode; however, the method in which the settings should be applied can be influenced by the image mode. None of the configurations in this section are included in the XenConvert Optimizer tool. These factors make user settings more difficult to implement.

As a recommended approach for the application of the user settings is to utilize group policy objects as they provide administrators a central site for configuration and allow for greater customization based on the desktop.

## Recommended Configurations

The following Group Policy Objects are recommended for all deployment scenarios and would almost always be desirable in a Windows 7 hosted VM-based VDI desktop implementation:

Item	Path	Justification
Screensaver	Administrative Templates – Control Panel – Personalization Enable screen saver: Enabled Prevent changing screen saver: Enabled Password protect screen saver: Enabled Screen saver timeout: Enabled – 600 seconds Force specific screen saver: Enabled – scrsave.scr	Utilizing complex screen savers wastes resources. Instead, the blank screen saver should be used to secure the environment without impacting resources.

The following registry changes are recommended for all deployment scenarios and would almost always be desirable in a Windows 7 hosted VM-based VDI desktop implementation:

Configuration	Registry Modification (in REG format)	Justification
Force Offscreen Composition for Internet Explorer	[HKEY_CURRENT_USER\Software\Microsoft\Internet Explorer\Main] "Force Offscreen Composition"=dword:00000001	Overcomes a potential screen flicker issue for certain websites.
Reduce Menu Show Delay	[HKEY_CURRENT_USER\Control Panel\Desktop] "MenuShowDelay"="150"	Reduces the delay Windows sets for menus. Provides better user experience.
Disable all Visual Effects except "Use common tasks in folders" and "Use visual styles on windows and buttons"	[HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\VisualEffects] "VisualFXSetting"=dword:00000003 [HKEY_CURRENT_USER\Control Panel\Desktop\WindowMetrics] "MinAnimate"="0" [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced] "ListviewAlphaSelect"=dword:00000000 "TaskbarAnimations"=dword:00000000 "ListviewWatermark"=dword:00000000 "ListviewShadow"=dword:00000000 [HKEY_CURRENT_USER\Control Panel\Desktop] "DragFullWindows"="0" "FontSmoothing"="0" "UserPreferencesMask"=binary:90,12,01,80,10,00,00,00	Provides a better user experience.  <b>Note:</b> The <i>UserPreferenceMask</i> changes based on the settings selected in the <i>System Properties – Performance Options</i> configuration page.



## Final Configurations

The final aspect of creating an optimized virtual desktop image is to do the following local items, which optimizes and removes unnecessary components.

Configuration	Recommendation	Justification
Boot Animation	Disable <code>bcdedit /set bootux disabled</code>	Disabling the animation, which no user will see, saves resources plus speeds up the entire boot process.
Remove unused Windows components	Windows Media Center DVD Maker Tablet Components	These items are typically not usable in a hosted VM-based desktop. Other virtual desktop models, like local streamed or local VM-based might be able to utilize these components.
Page file	Minimum and maximum the same	Keeping the pagefile at a single size prevents the system from expanding, which creates a significant amount of IO.
Disk Cleanup	Removes unnecessary files	
Defragmentation	Run defragmentation	Disk defragmentation should be done before capturing the desktop image to ensure the disk is optimized.
Antivirus	Optimize	Configure antivirus to scan writes and disable the scheduled scans. The base image should be scanned before being deployed within production.





## Revision History

Revision	Change Description	Updated By	Date
1.0	Document created	Daniel Feller – Lead Architect Paul Wilson – Architect	October 13, 2010

### About Citrix

Citrix Systems, Inc. (NASDAQ:CTXS) is the leading provider of virtualization, networking and software as a service technologies for more than 230,000 organizations worldwide. Its Citrix Delivery Center, Citrix Cloud Center (C3) and Citrix Online Services product families radically simplify computing for millions of users, delivering applications as an on-demand service to any user, in any location on any device. Citrix customers include the world's largest Internet companies, 99 percent of Fortune Global 500 enterprises, and hundreds of thousands of small businesses and prosumers worldwide. Citrix partners with over 10,000 companies worldwide in more than 100 countries. Founded in 1989, annual revenue in 2008 was \$1.6 billion.

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