CITRIX®

XenClient Enterprise Engine Installation Best Practices

Version 5.0

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About this Document

This document provides information about installation issues that may occur when installing XenClient Enterprise Engine.

> ⓘ Installing the Engine on a computer can remove the native operating system and any data. **Before installing, back up any data from the computer that you want to preserve.**

Check for Compatibility

The Engine runs on a wide variety of personal computers. Hardware requirements include:

- Intel or AMD dual-core processor with Intel-VT (VT-x) or AMD-V hardware virtualization technology.

- 2 GB RAM; Citrix strongly recommends 4 GB to facilitate running multiple virtual machines simultaneously).

- 60 GB free disk space; running multiple operating systems may require significantly more disk space.

Citrix makes it easy to determine if your computer will work with the Engine. Access the PC Hardware Compatibility List on the Citrix Web site to verify if your existing Windows machine supports the virtualization required to run the Engine.

CPU Compatibility Problems

The following compatibility issues should be considered:

- Use Intel or AMD dual-core processors with Intel-VT (VT-x) or AMD-V hardware virtualization technology.
- For best results use Intel CPUs; for more information about supported CPUs, refer to the Intel website.
- Virtualization Technology not present or not enabled.
- The CPU must support 64-bit operation and virtualization technology.
- If VT-x is causing problems, disable it.

Video Compatibility Problems

The Engine performs best when running on an Intel-based graphics system. Selection of graphics cards from other vendors may be problematic. Consider the following:

- The Engine provides limited support for newer Nvidia and ATI graphics cards.
- Some graphics cards may cause the installation to fail.

> ⓘ If you are installing the Engine on a desktop with an ATI or Nvidia graphics card, remove it and use the onboard Intel graphics card instead if possible.

Disk Configuration Issues

The following disk configuration issues may pose problems during installation:

- Only a single local SATA drive is supported
- Installing over some Linux-based products may be problematic

Linux virtual machines are primarily for experimental use.

- Installing over products with disk encryption may be problematic (BitLocker)

An encrypted hard drive cannot be accessed unless the registered owner's password is entered. The user's password needs to be entered before the Engine can start. Once the user logs in, the hard drive is accessible and the user experiences no difference due to the encryption. This is a strong security measure – the encrypted disk cannot be accessed without the proper authentication. The only cost is a very slight (few percent) increase in CPU use.

- Can't install over disks configured with GPT or other non-simple partition layouts

Disk Encryption

The Engine supports running with an encrypted disk; this decision must be made during installation.

The password used for the encryption is **not** set during installation, this happens during the registration process.

An encrypted hard drive cannot be accessed unless the registered owner's password is entered. The user's password needs to be entered before the Engine can start. Once the user logs in, the hard drive is accessible and the user experiences no difference due to the encryption. This is a strong security measure – the encrypted disk cannot be accessed without the proper authentication. The only cost is a very slight (few percent) increase in CPU use.

General Compatibility Problems

The following compatibility problems issues may arise:

Citrix recommends that you use business-class laptops/desktops with all Intel components (CPU, GPU, and networking) and 7200 RPM or faster hard drives are best.

- Insufficient memory

Minimally, use 2 GB RAM; Citrix strongly recommends 4 GB to facilitate running multiple virtual machines simultaneously.

- The Engine runs best with Intel graphics
- NVidia/Optimus systems are often problematic
  - Must disable Optimus in the BIOS, even then it might not work

- o The experimental NVidia driver should never be used
- Limited support for newer NVidia and ATI graphics cards

BIOS Settings

To use the Engine, the system must support virtualization. BIOS settings must also be configured to match the following criteria:

Virtualization: enabled (checked)

VT: enabled (checked)

Trusted Execution: off (unchecked)

For Lenovo computers:

Timer wake with battery: enabled

> You need to restart the computer for changes to the BIOS to take effect. On some systems, it may be necessary to power-down the computer for a few minutes, then restart.

Memory

The Engine minimum RAM configuration is 2 gigabytes; Citrix strongly recommends 4GB or more to achieve best system performance and facilitate running multiple virtual machines (VMs) simultaneously.

It is possible to encounter installation failures related to system memory:

- Citrix has determined that in some cases corrupt memory leads to installation failures.
- PXE boot installations may fail if the computer has 2 GB RAM or less.

General Installation Issues

The following issues may arise when installing the Engine:

- ISO file incomplete or corrupt

> In some cases it may be necessary to check the validity of the ISO file by verifying the MD5 checksum. A number of free ware tools are available for calculating and comparing MD5 files (for example: http://download.cnet.com/MD5-Checksum-Calculator/3000-2092_4-10964258.html).

- Use the latest PV drivers, they are critical for local VMs to get USB and network support along with good performance.
- Bad memory may cause the installation to fail in a variety of ways.
- Some graphics cards can cause the installation to fail.

> ℹ️ If you are installing the Engine on a desktop with ATI or a Nvidia graphics card, remove it and use the onboard Intel graphics card instead.

Installation from Optical Media

Creating optical media from which to install the Engine is as simple as burning any other ISO file.   The process of burning an ISO file to disk has some inherent issues that may be encountered:

- The Engine requires at least 770 MB of free disk space; it may not fit on all CD readers/media. Use DVD media instead of CD media.
- Burning an ISO file located on a network share can be problematic so the file should be copied to the local system prior to initiating the burn.
- Bad optical media; use a different source
- Bad disk creation; re-burn with another disk
- Optical media incompatible with optical drive
- USB optical drives can be problematic (some may work, others may not)

Installation from USB Media

The following issues may arise when installing from USB media:

- Unetbootin version compatibility issues

> ⚠️ If you retrieve the UNetbootin distribution from another location, ensure that it is at least version 549 or newer.

- USB storage device has insufficient size; you should have at least a 2GB USB stick in order to install the Engine using this method.
- USB storage device not formatted before running Unetbootin
- Running Unetbootin against ISO files on network storage can be problematic
- Installation may appear to succeed, then begins reinstalling. This issue occurs because the BIOS is configured to set to boot from USB first; if the USB memory stick is still installed when the installation completes, the Engine re-reads the drive once it restarts, effectively restarting the installation process. To resolve this issue, remove the USB stick after installation.

Consider the following when installing using a USB drive:

- Ensure that the computer's BIOS setting enables booting from USB-based media.

- You can set your computer's boot sequence so that it boots automatically from any installed USB device; in the BIOS>BOOT configuration section, move the USB drive above the local disk in the machine boot order.

> ℹ️ If you arrange the boot order so that the USB drive is the primary boot device, keep in mind that you must remove the USB stick containing the installer before you reboot the next time. Failure to do so may result in re-installing.

- If the boot order for the USB device is lower than local disk, or if it's not specified, select the boot order menu key, usually F12.

A Common Post Installation Issue

It is possible to configure the computer BIOS so that USB, CD-ROM, or PXE is the first boot device, ahead of the local hard disk. If the installation device is before the hard disk in the list of boot devices, after installation has completed and the system reboots, it may begin running the installation again. This would be normal behavior as dictated by the settings in the computer BIOS.

Should this situation be encountered, perform the following steps

- If using Optical or USB media to perform the installation, remove the device

- Configure the computer BIOS device boot order accordingly by rebooting the system and entering the computer setup functionality (often accomplished by pressing the F12 key as the system is booting).

Dual Boot Installation Problems

The following dual boot issues may be encountered:

- Only dual-boot with WinXP and Win7 is supported

Windows 7 uses a tremendous amount of disk space. To prevent problems during dual-boot installations, use a third part tool (for example, gparted) to shrink the partition to a manageable size, then reboot native Windows. Run checkdsk to verify that native Windows booted successfully. Once you verify that native Windows booted, return to the dual-boot installation.

- Sufficient free disk space required
- A free primary disk partition is required

There are numerous disk partition tools. For Windows XP-based computers, Citrix has tested the procedures in this document using the EASEUS Partition Master Home Edition. For Vista and Windows 7, use the native Disk Manager to create a partition.

- Dual boot will not work if Windows is using disk encryption (BitLocker)

Consider that the dual boot installation consists of two phases:

- In phase 1, you resize the partitions on the hard drive to create *unallocated* space (minimum 60GB). Install third party partitioning software to install the Engine on a machine with Windows XP; Windows 7 includes a partitioning tool. Use the instructions for Windows 7 if you have both Windows operating systems on your hard drive.

It may be necessary to perform a disk defrag before repartitioning a system that has been in use for an extended period of time. Failure to do so may result in the OS being unable to free up enough space to shrink the volume due to lack of a contiguous free space.

- In phase 2, you install the Engine to the unallocated space on the hard drive created in phase 1. It can be installed from CD, DVD, USB storage device, or from a PXE server.

After installing, the user can select to boot either a native Windows operating system or the Engine each time the system is powered up.

> The Engine and any virtual machines you plan to include need to fit in the unallocated space, so select the space accordingly.

Problems with Engine PXE Boot Installs

The following dual boot issues may be encountered:

- For PXE boot procedures involving a virtual machine (i.e., a personal virtual machine), ensure that the NIC is in bridge mode so that the personal VM's DHCP service is used rather than the Engine's DHCP service in NAT mode.
- PXE boot installations may fail if the computer has 2 GB RAM or less.

Problems with Engine Installer

The following issues may arise when using the Engine Installer:

- Running the Windows Installer permanently alters your system disk; Windows partitions are shrunk to make room for the installation. To avoid possible data loss, be certain to **make a backup image of your entire hard drive before starting the installer**.
- There is currently no way to reclaim the disk space that the installer uses for Windows without manually repartitioning your disk.
- Do not perform this on a machine that you need to return to its original configuration unless you have backed up your image.
- Be certain that you are running on A/C power while installing, and DO NOT shut the power off on your PC while running the installer; this may lead to a corrupted system.
- Installation time varies, and depends on the size of the disk and how full the disk partition is; the entire process may take up to twenty minutes.
- Most hard disks have a limit of 4 physical partitions. To install the Engine, you must have at least *one free partition available*. To install with a *recovery* partition, you must have at least **two** free partitions available. Refer to the Windows Disk Manager for information on determining the number of disk partitions available.

> There are numerous disk partition tools. For Windows XP-based computers, Citrix has tested the procedures in this manual using the EASEUS Partition Master Home Edition. For Vista and Windows 7, use the native Disk Manager to create a partition.

> The recovery partition requires approximately 2 GB of space. Your computer must have at least two free partitions available; if no free partition is available, the recovery partition cannot be created and the process will be aborted. Use the Windows Disk Manager for information about the number of available disk partitions.

- The installer does not determine how much space to use; during installation, 90% of available disk space is consumed by the installed the Engine.

Ensure that your Windows drive has sufficient disk space. Approximately 90% of the NTFS partition will be used for the installation; the amount of free space on Windows will NOT match up exactly with the amount space that the Windows Installer can shrink.

General Troubleshooting Techniques

Consider the following general troubleshooting techniques:

- Use the latest version of the Engine. Visit the Citrix download site for the latest version.
- Verify install ISO file downloads

In some cases it may be necessary to check the validity of the ISO file by verifying the MD5 checksum. A number of free ware tools are available for calculating and comparing MD5 files (for example: http://download.cnet.com/MD5-Checksum-Calculator/3000-2092_4-10964258.html).

- If installation from optical media fails, try USB, or vice-versa
- Verify installation media before installing
- Enable installation debug mode
- Check hardware compatibility

If you are using an Intel processor, Intel provides a tool to determine if the chip in your computer supports virtualization: http://processorfinder.intel.com/.

- Try a different computer

Troubleshooting Installation Failures

Citrix endeavors to make installation a simple, pain-free process.   Experience has shown there are a few common areas where issues may be experienced.   Should you encounter an installation failure, please review the following list for possible reasons and solutions prior to contacting Technical Support.

Consider the following general troubleshooting techniques:

- Screen turns black with a blinking cursor during installation. To resolve this, verify that the machine has a compatible video card.
- Insufficient space to perform installation.
- Unfamiliar partition table structure. To resolve this, replace the disk, install using the full disk, or wipe the disk and reinstall.
- Installation may spontaneously reboot for no apparent reason. Review the information in this guide for specific resolutions to this uncommon problem.
- Installation may display a message reading "Unknown Error"; in such cases use the bug reporting mechanism within the Installer if it is available.
- Engine downgrade is not supported; if you have to install an earlier version, uninstall the current version first.

- Use the latest version of the Engine. Visit the Citrix [download](#) site for the latest version.
- If installation from optical media fails, try USB, or vice-versa
- Verify installation media before installing
- If possible, try another computer; some of the issues described in this document are difficult to troubleshoot (for example, corrupt memory); simply changing platforms may resolve some issues.

Appendix A: Sizing a Medium Installation

A medium sized installation has the following characteristics:

- 1100 users at 10 sites (including the corporate headquarters and 9 remote sales offices).
    - o The HQ site has 200 users of which
        - 50 are mobile users who are connected remotely 50% of the time on average using a WAN connection that averages 10Mb/s down to the client system and 1Mb/s upload from the client system.
        - 100 users are engineers who are all using desktops running the development environment.
        - The remaining 50 are support/IT staff running a single VM
    - o Each remote office has 100 users of which
        - 75 are mobile users who are connected remotely 75% of the time on average using a WAN connection that is 10Mb/s down and 1Mb/s up.
        - The remainder is support staff running a single environment.
- 4 Distinct VMs defined, each of which has maximum size of 50GB (uncompressed) for the system disk and 30GB (uncompressed) for the user disk:
    - o Windows 7 Corporate (Windows 7 plus Office Professional plus sales tools and material)
    - o Windows 7 Development (Windows 7 plus Visual Studio and Microsoft Office standard)
    - o Windows 7 Support (Windows 7 plus Office Professional).
    - o Windows 7 Personal OS (Windows 7).
- VMs will be updated and published weekly with hotfixes. Updates are 1GB (uncompressed) on average and the procedure will be to stage the update to IT first and then deploy to all users once testing is complete.
- Support staff (25 at each site) have a single VM assigned which is the 'Windows 7 Support'
- Other users have 2 VMs assigned depending on the individual
    - o Windows 7 Corporate, Windows 7 Development
    - o Windows 7 Personal
- Each user will modify on average 100MB/day of user data across all VMs deployed to his client system. With compression, this translates to backup sizes of around 50MB/day/user.
- Backup policy is to perform a backup every day and keep the last 7 days worth of backups for all assigned VMs except for users with the Development environment for which backups are kept for 4 weeks.

With this setup, there would be 10 Synchronizer Servers in the installation:

- One Synchronizer Central Server at the HQ location handling all Synchronizer Remote Servers and the 200 local users
- One Synchronizer Remote Server at each of the other 9 locations.

With this definition, we can calculate:

- At the Synchronizer Central Server:
  - Total storage required for VMs – 4 * 90GB = 360GB
  - Total Storage required for backups: 10TB
    - Engineers (total size per user disk 32GB) : 100 * 32GB = 3200GB
    - Remainder (total size per user disk 30GB) : 100 * 30GB = 3000GB
  - Total amount of data to be transmitted to deploy all VMs: 4TB
    - For local users: (150 * 2 + 50) * 10GB = 3.5TB
    - To Synchronizer Remote Servers: 9 * 4 * 10GB = 360GB
  - Total amount of data to be transmitted
- At the Synchronizer Remote Servers:
  - Total Storage required for VMs : 360GB
  - Total Storage for backups: 100 * 30GB = 3TB
  - Total amount of data to be transmitted to deploy all VMs: (75*2 + 25)*10GB = 2TB
- Total time to initially deploy all VMs to HQ users & Remote Office Servers: 1+8.5+2.5 = 12hrs
  - Time to send VMs to Remote Office servers: ~1hr
  - Time for HQ users connected to corporate net (100 engineers getting two VMs, 50 support staff getting one and 25 mobile users getting 2): ~8.5hrs
    - (125*2+50)*10GB/800Mbs = ~8.5hrs
  - Time for HQ staff connected remotely – each one has dedicated 10Mb/s BUT this is not available whilst other central users being updated as the entire 1Gb/s link is being used to achieve the 8.5 hrs – however, once the other central users have been deployed, all 25 remote users run in parallel using a total of 250Mb/s : 2.5hrs
    - 10GB/10MBs = 2.5hrs
- Time to initially deploy VMs to remote site users: 1.75+2.5 = ~4.5hrs
  - Time for users connected directly to remote site LAN (18 sales staff with 2 VMs and 25 support personal with 1 VM): ~1/75hrs
    - (18*2 + 25) * 10GB / 800Mbs = ~1.75hrs
  - Time for mobile users at remote site – these all operate in parallel but cannot run at the same time as the remote site LAN attached users: 2.5hrs
    - (10GB/10MBs = 2.5hrs
- All 9 remote sites run in parallel with HQ site so the entire corporation is deployed in ~12hrs.
- Total amount of data to be transmitted to update all VMs: (100 * 2 * 1)GB = 200GB
- Total time to update all VMs: ~2hrs
  - All systems connected to the corporate network will be complete in ~35minutes.

- o Remotely connected systems will take ~2hrs to download their two updates.
- Total backup data sent on the corporate network each day: 63 * 50 = ~3GB/day
- Total backup data send on the WAN connection each day: 37 * 50 = ~2GB/day
- Total time to backup via the corporate network at 800 Mb/s : 30s
- Total time to backup via the WAN connection at 320Kb/s: 3 minutes

Each remote user has a DEDICATED 320Kb/s link. The total bandwidth used by 37 users at 320Kb/s is around 11Mb/s so all 37 transfers can be done simultaneously and each remote user sees just 3 minutes of backup time per day.