Windows Activation in Development and Test Environments

A Guide for Infrastructure Architects and Decision Makers

White Paper

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# Introduction

Development and test environments are typically complex and dynamic. Systems are built and torn down in short order, software is installed and uninstalled routinely, and isolation from other organizational systems restricts the use of useful information technology (IT) services and resources. The goal of this document is to provide insights and recommendations to infrastructure architects and decision makers that will minimize the impact that Windows operating system activation has on your already complex development or test environment. The document begins by providing a high level view into relevant Windows Activation Technologies policies and tools, including the relationship between Windows activation and Windows licensing; then introduces five key principles that should guide your Windows activation planning; and finally concludes with recommendations for activating Windows operating systems under several common development environment scenarios. For brevity, the remainder of the document uses the term development to encompass a variety of non-production environments, including test labs, application compatibility testing, software pilot programs, etc.

# Windows Activation Technologies

Activation is a simple and required aspect of deployment that establishes the relationship between a *product key* and a copy of the software on a device to which the licensing rights are applied. Activation confirms the *genuine* status of a product. It’s analogous to the activation of credit cards or new mobile phones.

## Product Keys

**Why Activate Your Software?**

Activation provides the assurance that your software is Genuine Windows software. Genuine Windows software is published by Microsoft, properly licensed and supported by Microsoft or an authorized partner, giving you full capabilities, access to all the latest updates, and confidence that you are getting the experience you expect.

A product key is a unique combination of numbers and letters that is used during Microsoft software installation to "unlock" or open the product. Product keys have different parameters depending on the activation method.

## Activation Methods

Microsoft offers different methods of product activation. The way you acquire the software, for example through retail, original equipment manufacturer (OEM), Volume Licensing, or software subscription programs like MSDN, affects the activation methods available. Your development organization may need to activate Windows versions obtained from more than one channel, and therefore may need to use a combination of activation methods.

# Licensing Basics

While a detailed discussion of licensing is beyond the scope of this document, it’s important to understand that licensing and activation, though related, are two distinct and separate things. A Microsoft software license provides the legal right to install, use, access, display, run, or otherwise interact with a Microsoft software program. The way in which that software program can be used is determined by a license agreement between a customer and Microsoft. There are many different kinds of Windows licenses and license agreements—too many to adequately describe here—but the fundamental concept remains the same: a Windows license allows a customer to use a Windows operating system; licensing terms describe *how* they may use it.

**Volume Licensing**

Microsoft Volume Licensing offers customized programs tailored to an organization’s size and purchasing preferences. These programs provide simple, flexible, and affordable solutions that enable customers to setup up a volume-license agreement and easily manage their licenses.

For the complete Microsoft Software License Terms, please visit <http://www.microsoft.com/about/legal/useterms/> and <http://www.microsoft.com/licensing/PUR/products.aspx>.

Additionally, a link to the Microsoft Software License Terms is available by entering the *WinVer* function in the command line of most Windows editions.

## A License for Each Computer

Each computer requires a software license to be used. Windows licensing is predominantly device based. There are some exceptions; for example, MSDN subscriptions provide user based software licensing rights. Typically, the most economical way to buy Windows licenses is by purchasing pre-installed versions as part of new computer purchases (via the OEM channel). The only other way to acquire a full Windows license is to buy a full packaged product (via the retail channel). Purchasing volume licenses provides customers with *upgrade* licenses only.

# Activation Principles for Development Environments

Microsoft’s goal for activation is to prevent casual piracy while making the activation process as simple as possible. However, given the frequently changing and complex nature of development and lab environments, activation in such environments may require an extra degree of attention. For example:

* Test environments often include software acquired through MSDN subscriptions, which may include both retail and volume license versions of Windows.
* Development lab systems often require reimaging, making activation difficult, even cumbersome, if reimaging takes places frequently.
* In environments that rely heavily on virtualization, *undo* disks (with respective product keys) may be discarded or lost, again complicating reactivation.
* If a substantial number of hardware or software components change on a system, a process may be triggered requiring reactivation within three days in order to continue to log on and avoid persistent activation notifications.

All of these scenarios can make activation in development environments complex, but acquainting yourself with a few key activation principles before developing your activation plan may save you time and unnecessary effort. These principles include:

1. Understand the available activation methods.
2. Your activation infrastructure can be shared across systems within your organization’s environment, as long as all of the systems are properly licensed.
3. Windows 7 editions use a progressive feature set approach, from the Starter edition to the Ultimate or Enterprise edition.

**MSDN Subscriptions**

Software acquired through MSDN includes the following characteristics:

* MSDN licenses can be perpetual or subscription.
* All MSDN Windows editions can only be used for development and testing purposes.
* MSDN media may include retail editions *and* volume media editions.
* Some MSDN volume media editions come with limited use MAK keys but can also be activated using KMS.
* MSDN retail editions include a retail key that can be managed using the Volume Activation Management Tool.

1. Use the activation method that requires the least effort for your circumstances.
2. Ensure that your software is properly licensed.

## Understand the Activation Methods

Understanding the available activation methods will help you find the simplest options for activation. Following are brief explanations of the methods for retail, OEM, and volume license activation (remember, software acquired through MSDN may include both retail and volume license product versions).

### Retail

Windows “full packaged” products that are acquired online or in a store from reputable resellers and retailers (or from Microsoft directly) are individually licensed. Each purchased copy comes with one unique product key, found on the product packaging. Customers can activate their software using their product key via the Internet or phone.

### Original Equipment Manufacturer (OEM)

OEM activation is a perpetual, one-time activation that associates a version of Windows with the firmware (BIOS) of a computer. This occurs before the computer ships to the customer, so the end user or organization is not required to take any additional actions. The copy of Windows that the OEM installs on a computer is valid only on that unique computer, so it can only be reinstalled and reactivated from the OEM-provided recovery media on that computer.

### Volume Activation

Volume Activation is a set of technologies and tools that automate the activation process on computers that are being upgraded to volume editions of Windows. Organizations can use two methods to activate Windows operating systems acquired through volume licensing: the Key Management Service (KMS) or Multiple Activation Keys (MAK).

|  |  |  |
| --- | --- | --- |
|  | Description | Unique Requirements |
| **KMS** | KMS is Microsoft’s recommended process for volume activation. KMS enables customers to host and manage the volume activation process locally by setting up a KMS host (or hosts) on a client or server within the organization that connects once to Microsoft for activation (either online or by phone). Then individual systems throughout the organization automatically connect to the KMS host and activate transparently.  KMS is capable of activating an unlimited number of computers. | * KMS clients must reconnect with the KMS host at least once every 180 days. * KMS requires a minimum of 25 physical or virtual systems connecting to the KMS host in any given 30-day period (see the Recommendations section below for details) |
| **MAK** | MAK activation is used for one-time perpetual activation with activation services that are hosted by Microsoft. Customers can use MAK to activate target computers individually (either online or by phone) or collectively (by using a proxy). A free tool from Microsoft called the Volume Activation Management Tool (VAMT) can help simplify the MAK activation process. We recommended that these activations are always performed using VAMT. VAMT v1.2 is part of the [Windows Automated Installation Kit (AIK)](http://www.microsoft.com/downloads/details.aspx?displaylang=en&FamilyID=696dd665-9f76-4177-a811-39c26d3b3b34). VAMT 2.0, which adds new capabilities including support for Office 2010, will be released in the first quarter of 2010 on the [Microsoft Download Center](http://www.microsoft.com/downloads). For more details on VAMT, visit [www.technet.com/volumeactivation](http://www.technet.com/volumeactivation). | * A MAK key has a predetermined number of activations that are allowed, dependent on the volume license agreement your organization has. * Volume license media is designed by default to use KMS activation. You must install a MAK key to use MAK activation. |

### Windows Editions and Activation

Some editions of Windows (like Windows 7 Enterprise) are not available in all channels. However, others (like Windows 7 Professional) are available through all channels. The following table illustrates the activation methods available for each Windows edition:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Windows Editions** | **Volume1**  **Activation**  **(KMS or MAK)** | **Retail2**  **Activation** | **OEM3**  **Activation** |
| **Server** | Windows Server® 2008 operating system and Windows Server 2008 R2 | \* | \* | \* |
| **Client** | Windows 7 Enterprise/Windows Vista Enterprise | \* |  |  |
| Windows 7 Ultimate/Windows Vista Ultimate |  | \* | \* |
| Windows 7 Professional/Windows Vista Business | \* | \* | \* |
| Windows 7 Home Premium/Windows Vista Home Premium |  | \* | \* |
| Windows 7 Home Basic/Windows Vista Home Basic |  | \* | \* |
| Windows 7 Starter/Windows Vista Starter |  | \* | \* |
|  | **1**Volume Activation applies to systems covered under volume licensing programs or using volume licensing media obtained through MSDN or potentially through other subscription programs.   * + Where possible customers can use KMS for hosting local activation service   + If KMS activation is unavailable, customer can use MAK. | | | |
| **2**Retail Activation applies to full packaged product and editions acquired through retailers and subscription programs such as MSDN.   * Activation is done online or over the phone (under some circumstances, customers may choose to use VAMT to manage retail activations). | | | |
| **3**OEM Activation applies to pre-installed Windows operating systems purchased through the OEM.   * + The new computers contain activation information in the BIOS that works with OEM provided image only.   + There are no activation steps the user needs to take. | | | |

## Your Activation Infrastructure can be Shared across Your Organization

As long as your individual systems are licensed properly, your activation infrastructure can be shared across your entire organizational environment. We understand that in large organizations, software can be purchased through multiple channels and under various licensing agreements and terms. However, Microsoft activation has been designed in such a way that a single activation method can be used for software acquired through any number of different licensing arrangements that your company may have. For example, a KMS host can activate any volume licensing version of Windows 7 or Windows Server 2008 R2, whether that volume license came from a volume license program like Software Assurance or from an MSDN subscription; the only requirement is that the individual system be able to connect to the KMS host.

Additionally, while VAMT is widely used to manage MAK activations in organizations, it can help track the use of other product keys—like retail keys[[1]](#footnote-1)—whether those keys come from an MSDN subscription or from full packaged product.

## Understand the Feature Progression in Windows 7 Editions

Windows 7 editions are designed to provide all of the features and functionality of lower additions plus *additional* features. For example, all of the features and functionality in Windows 7 Home Premium exist in Windows 7 Professional; likewise all of the Windows 7 Professional features exist in Windows 7 Ultimate. Understanding the concept of progressive feature sets and functionality can help you determine the editions you need to test to meet your development goals, which in turn can influence the activation method(s) you use.

Note that Windows 7 Enterprise has the same features as Windows 7 Ultimate and also includes volume activation capabilities, which means you can use volume activation tools to manage activation. Windows 7 Enterprise edition is available only to customers with Software Assurance for Windows, or as part of some Microsoft subscription programs.

## Use the Activation Method that Requires the Least Effort for the Windows Edition(s) You’re Installing

Development environments are ever-changing and complex. One day you might install a Windows Server 2008 R2 Enterprise edition on a specific system, and the next day you might have to rebuild that same system, this time deploying multiple virtual machines in which to test several Windows 7 retail editions. In many circumstances, multiple activation strategies may be available, including the option to take advantage of the activation grace period and not activate the software at all. Clearly your goal is to find the activation method that least interferes with the set up of each new installation in your environment. The Recommendations section below provides some common development environment scenarios and our recommendations for activating within those scenarios.

**Virtual Machines**

If you use virtual machines (VMs) in your environment, using KMS will transparently support activation throughout the hardware changes associated with moving or replicating VMs across physical systems. Additionally, using KMS activation in a VM environment seamlessly supports the use of *undo* disks and other reset operations.

## Ensure That Your Software is Licensed

Successful activation and genuine validation helps ensure that the deployed software is authentic and genuine, but it doesn’t confirm that the software is being used in compliance with its license agreement. It’s in your organization’s best interest to always ensure that each instance of Windows that you deploy is properly licensed and being used in compliance with its license agreement.

# Recommendations

The following recommendations will help you find the best activation method for your environment.

## Share an Existing KMS Activation Infrastructure

We recommend KMS activation for systems deployed using volume editions for a number of reasons. KMS completes activations locally (without the need for individual computers to connect to Microsoft for product activation). Windows installations transparently search for a KMS host and activate themselves. KMS is lightweight and does not require a dedicated system, and can activate multiple Windows versions (as well as Microsoft Office 2010 products).

We also recommend that you make your KMS infrastructure available to all systems within your organization, whether those systems are in support of a development environment or a production environment. You may have questions about how you can share your KMS infrastructure across the diverse and sometimes disconnected environments in your organization. The table below provides answers to some of the more frequent questions we hear on this topic.

| **Question** | **Answer** |
| --- | --- |
| *My company’s production environment licenses its Windows editions under a volume licensing agreement and our development environment uses MSDN licenses. From a Microsoft policy perspective, is it permissible to use a single KMS infrastructure for departments covered by two different licensing agreements?* | Yes, you can use a single KMS infrastructure to activate volume editions from multiple agreements or subscriptions across the departments of your organization. In fact, we’ve intentionally designed KMS so that any volume license edition will automatically search for a KMS host once it is installed, regardless of the licensing terms associated with that edition. |
| *If I share my company’s production environment KMS with my developers (licensed under MSDN subscriptions), how can I track the MSDN activations separately?* | KMS is used for product activation, not for software asset management purposes such as tracking software usage or installations. You would need to use a management and reporting tool such as System Center Configuration Manager. |
| *My organization’s development environment is intentionally isolated from the production environment where the KMS host resides. What’s the minimum that I would need to do to open communications between the environments for activation to occur using the KMS host?* | KMS works in a similar way to other shared services in your environment(s) like file, print, or DHCP. Communication between the KMS client and the KMS host is configurable. By default, the KMS client sends approximately 200 bytes of information to the KMS host using TCP/IP port 1688. However, if TCP/IP port 1688 is not available, then you can configure KMS to use a different port. |
| *My organization’s development and production environments are totally isolated and insulated from each other. Under such conditions, how is it feasible to share a single KMS infrastructure?* | In cases where the development environment is totally isolated from the KMS host and no options exist for opening communication between the two, the next best approach to activation is to set up a KMS host within the development environment. Please see “Set Up a KMS Host in your Development Environment” below. |

Remember, if you can open a port between your development environment and a KMS host elsewhere in the company, then any time you install a qualifying volume license edition, that installed edition will automatically seek the KMS host and activate transparently.

## Set Up a KMS Host in Your Development Environment

If you can’t connect to an existing KMS host, then consider setting one up within your development environment. Customers with a volume license agreement can receive a KMS key that is used to activate up to six KMS hosts throughout their organization. If you need more activations for your KMS key, you can [call your Microsoft Activation Center](http://www.microsoft.com/licensing/resources/vol/numbers.mspx) to request an increase. The KMS key is intended to be installed on the system that will host the service within your environment. It should not be installed on systems that will be KMS clients, for example, test PCs.

For Windows systems to activate using KMS, the KMS host must be contacted by a minimum number of physical or virtual KMS clients; this is called the KMS activation threshold. As KMS clients send activation requests to the host, the host counts the number of these requests. The count is cumulative across all versions and editions of Windows client and server operating systems. When the count meets the threshold, the KMS clients will activate themselves. Windows client systems will activate after a count of 25 is met, while Windows server systems will activate after a count of five is met.

## Leverage MAK

If your development environment does not meet the minimum KMS requirements, then use MAK activation for your volume license editions. MAK clients are activated by telephone or over the Internet—whichever is available. The [VAMT](#VAMT) can help you manage all of your MAK activations. When proxy activation is used, VAMT stores the activation confirmation information received from Microsoft. When a system is rebuilt, you can reapply the same activation confirmation information to reactivate the computer. Reactivating in this manner does not decrement the MAK, thus conserving the remaining activations on the key. For more details on VAMT, visit [www.technet.com/volumeactivation](http://www.technet.com/volumeactivation).

## Manage MSDN Retail Editions Using VAMT

We understand that many development environments require the use of both volume license editions of Windows 7 plus retail editions like Ultimate and Starter editions. In harmony with that need, MSDN subscriptions typically provide access to all volume license and retail editions of Windows 7. However, the product key that is provided for MSDN retail editions of Windows 7 has a limited number of activations. This can be problematic in environments where you have to frequently rebuild systems with MSDN retail editions.

So we recommend proxy activation using VAMT to manage MSDN retail products. Doing so lets you store activation confirmation information. When you do rebuild an installation including those MSDN retail keys, you can reuse the previously obtained activation confirmation information using VAMT.

## Leverage the Activation Grace Period

If activation does not occur immediately after the operating system is installed, Windows 7 and Windows Server 2008 R2 still provide the full functionality of the operating system for an initial grace period of 30 days. During this grace period, at each log in and at common intervals, a notification appears reminding customers to activate the product, but otherwise, the operating system functions the same as an activated product.

**What happens when the Grace Period Expires?**

If the grace period expires (and is not reset), activation notifications become more frequent and obtrusive, including additional dialogs and changes to the Windows desktop wallpaper (changes to black). Also, Windows Update only installs only critical updates, not any important optional updates. The product continues in this state until it is activated.

If you have test systems that change frequently, consider taking advantage of the activation grace period and not activating the product while you’re testing it. If your testing goes beyond 30 days but is still short-term, Microsoft provides a way to reset the grace period up to three times using *rearm* functionality available through the slmgr.vbs command-line interface. This effectively extends the grace period of these products to 120 days. For details see Slmgr.vbs Options in the [Volume Activation Technical Reference Guide](http://go.microsoft.com/fwlink/?LinkId=152550).

# Activation Flowchart

It can be somewhat difficult to keep track of the various activation methods, tools, principles and recommendations we’ve provided. As a result, we offer the following flowchart as a quick reference to help you discover the best method for activating non-OEM Windows editions within your development environment.



# Additional References

For more information, please see the following references.

* To learn more about volume activation, visit [www.technet.com/volumeactivation](http://www.technet.com/volumeactivation)
* To learn more about volume licensing, visit <http://www.microsoft.com/licensing/default.aspx>

1. Support for retail and KMS host product keys is not available in versions prior to VAMT 2.0. [↑](#footnote-ref-1)