

SOFTWARE LICENSING ADVISORS

LICENSING BRIEF

BEST PRACTICES FOR LICENSING

MICROSOFT SQL SERVER

Running multiple instances, take advantage of better licensing rights, and over-licensing for virtual machines are among many ways to optimize SQL Server licenses for savings



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SQL SERVER LICENSING BEST PRACTICES

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Introduction

Microsoft SQL Server licensing is complex, partly because the product has evolved over time to gain advanced enterprise-ready features, but primarily because the team behind the product has made it so, changing the rules with every version of the product.

Complexity, however, can bring many options, and customers who understand the nuances of SQL Server licensing can take advantage of those options to reduce costs and lock-in.

This document describes many of those options, and offers scenarios in which these options are applied. Some options can be combined with others, while others are mutually exclusive—exercising one choice rules out other options.

Edition Choice

USE EXPRESS WHERE POSSIBLE, STANDARD AS SECOND CHOICE, ENTERPRISE AS NECESSARY

Developers often create SQL databases with the MSDN SQL bits, but these are for SQL Enterprise. The resulting production system may require SQL Enterprise licenses. By specifying that developers should use SQL Express by default, Standard as their next option, and Enterprise only when absolutely necessary, an organization ensures that it is not paying needlessly for capabilities than a database actually requires.

Multiple Instances per OSE

RUN TWO OR MORE SQL SERVER INSTANCES PER VM OR PHYSICAL SERVER

SQL Server is unique in permitting multiple instances of the software to run on one physical server or in one virtual machine. In such situations, only one license is required for the latest version of the most expensive edition. For example, if a SQL 2008 R2 Standard VM is running side by side with a SQL 2008 Enterprise database, a single SQL 2008 R2 Enterprise license covers both instances. Running multiple instances can cut costs 50% or more. Use tools like Dh2i to provide granular per instance management and monitoring

Maximize Version Rights

SEGMENT HOSTS BY VERSIONS IN VMS

Many organizations run many older SQL Server products. SQL 2012 and 2014 may account for only a small portion of their SQL estate. By limiting version mixing on a host or in an OSE, organizations can tap more liberal rights available in older editions.

SQL 2008 Enterprise processor licenses offer unlimited VMs per processor and license mobility without SA. But if a VM running SQL Server 2012 is added to a host that is otherwise running SQL 2008 Enterprise or earlier licenses, the entire host must be licensed for SQL 2012, which requires 1 or 4 core licenses per VM and requires SA for license mobility.

SQL 2008 R2 Enterprise processor licenses are more restricted. Without SA, each license covers only 4 VMs per processor. Note that this much reduced entitlement may still be operationally useful: a server with two processors can run up to eight SQL VMs without SA, and a four-processor server can run 16. These numbers may easily accommodate common VM densities for SQL Server.

SQL 2012 Enterprise core licenses can each cover 1 VM, as long as all cores are licensed. SA adds unlimited VMs per core. However, in our experience with many customers, few SQL Server hosts run more SQL Server VMs than they have cores. For example, while one data center had 156 cores (13 two-processor blades with six cores on each processor), only 93 SQL VMs ran on the data center and only one servers hosted the maximum 12 VMs.

SQL 2014 Enterprise has the same rights/restrictions as SQL Server 2012, with the added restriction that SA is also required for servers that are backed up by passive fail-over servers.

Use down-edition rights

SQL ENTERPRISE LICENSES COVER SQL STANDARD OF THE SAME OR EARLIER VERSIONS

SQL Server is one of only two products (Windows Server is the other) with “down-edition” rights. This means that if a host is licensed for SQL Enterprise, you can freely move SQL Standard VMs to it as well,

without requiring separate SQL Standard licenses. With proper licensing this reduces operational complexity—VMware does not need to keep track of SQL Standard licenses when moving VMs around if all host cores are licensed for SQL Enterprise.

Assign Enterprise Core Licenses Efficiently

SQL ENTERPRISE'S 1-CORE-PER-VM MODEL IS A COST-EFFECTIVE APPROACH FOR SQL VIRTUALIZATION

While it may appear to be expensive to cover SQL Standard software with the much more costly Enterprise licenses, it can be surprisingly cost effective, since SQL Enterprise 2012 and later licensed per core has a licensing option that SQL Standard per core does not: the ability to assign just a single core license to a VM if all physical cores are licensed. Standard, however, always requires a minimum of four Standard core licenses. The base price for four Standard core licenses is \$5,864. The base price for a single Enterprise core license is \$5,621.

Let's take a server with 16 cores in total (two processors with eight cores each). If we put 16 SQL Standard VMs on it, assigning four core licenses to each VM, we will need to purchase a minimum of 64 SQL Standard cores, which will cost about \$94,000. If we put 16 SQL Enterprise VMs on it, we will need to purchase 16 SQL Enterprise core licenses, costing \$90,000. For the same \$90,000 we could put any combination of Enterprise and Standard VMs on the server, as long as the total VM count does not exceed 16.

Overlicense to Provide VM Mobility

SURPLUS LICENSES ARE A COST-EFFECTIVE SUBSTITUTE FOR LICENSE MOBILITY

As noted above, adding Software Assurance to SQL 2008 R2 enables unlimited VMs per servers licensed by processor or core. For SQL 2012 and later, SA is also required for Microsoft's License Mobility right, which is the right to re-assign licenses in less than 90 days from the previous assignment.

The 90-day restriction creates a serious problem for organizations that use features such as VMware's vMotion for load-balancing in a SQL cluster. VMs may move daily, even hourly, to maximize performance and availability. Microsoft's solution is to add Software Assurance, which waives the 90-day reassignment limit.

However, SA is often unnecessary, and almost always more expensive than alternatives.

The right to run one VM per core in SQL 2012 and 2014 provides many customers with surplus capacity for VMs and use of vMotion without purchasing Software Assurance.

In our experience, most SQL installations already have more cores per server than they have SQL VMs per server. They are, in effect, over-licensed. When surplus capacity is available, License Mobility is not required, because no licenses are reassigned.

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For example, if two servers with 20 cores each are each running 12 SQL VMs, a VM can be moved from one server to the other, and back again, at any time. The VM may move, but the licenses do not. The VM is licensed on the target server by one of the eight surplus licenses on that server, and the source server now has 11 VMs and nine surplus SQL VM core licenses. Moving the VM back simply reverses the process. While the VM may move, all licenses are static—none need to be re-assigned to cover a licensing shortfall.

(Note that Microsoft server licenses are always assigned to a physical device. They are not assigned to VMs and do not automatically move if a VM is moved.)

If an organization's SQL infrastructure is close to the limit, it has the right to purchase additional core license to provide further overlicensing.

For example, an organization might run an average of 16 VMs on servers with 20 SQL 2014 core licenses each. It needs to be able to shut down one of the servers in a three-server cluster for maintenance. Migrating that server's 16 VMs to the other two servers will put 24 SQL VMs on servers licensed for only 20 VMs, creating a non-compliant licensing state.

Two solutions are possible:

1. Ensure that all servers are covered with SA to provide sufficient license mobility, so licenses on the downed server can be reassigned to the running servers, and back again, in less than 90 days. Since SA is an annual fee equal to 25% of the cost of a license, or 75% of the license cost over a three-year agreement, the cost of SA on all 60 core licenses in the cluster is equivalent to purchasing 45 (75% of 60) additional core licenses in a three-year agreement.
2. Purchase 12 additional core licenses and assign four to each of the three servers. Now each server is licensed for 24 cores, and the cluster has enough core licenses to accommodate all 48 VMs even if one of the three servers is out of service for some reason.

Both solutions provide compliance, but the net benefits are different. Aside from the fact that the 12 additional cores will cost only one-fifth the cost of SA on 60 cores, at the end of three years, the customer who purchased SA equivalent to 45 core licenses still owns only 60 perpetual core licenses. In effect, this customer rented 45 core licenses for three years.

In contrast, the customer that purchased 12 additional core licenses now has 72 core licenses. For one-fifth the cost, it provided a permanent 20% increase in capacity over the choice to use SA and it accommodates the loss of one of the three servers. Had it purchased additional cores for the same cost as SA, it could have permanently increased its SQL footprint by 75%, adding 45 additional core licenses.

License VMs-Only for Low Density SQL VMs

[BOTH STANDARD AND ENTERPRISE VMS CAN BE LICENSED PER VM](#)

When SQL Server VM densities are low, a different licensing model may provide benefits.

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SQL Servers can be licensed per VM, rather than licensing all physical cores, but both Enterprise and Standard editions require a minimum of four core licenses.

While less efficient than the one-core-per-VM model mentioned above, it can be cost effective when the physical server has many cores but few SQL VMs.

For example, two SQL VMs running on a host with 20 cores in total can be covered by licensing all 20 cores, or by licensing just the two VMs, at four cores each. The latter option requires licensing only 8 cores, reducing costs by 60%.

In this example, the break-even point is 5 SQL VMs, which would require 20 core licenses whether they are assigned by VMs or by physical cores. However, by assigning those 20 core licenses to the host rather than the VMs, the customer could add 15 more SQL VMs to the server at no additional cost.

Invest in Hardware Rather than SQL Licenses

MORE MEMORY, FASTER PROCESSORS, FASTER STORAGE BRING SAVINGS

In many cases, customers can reduce their costs by upgrading hardware, rather than purchasing more licenses.

For example, one of our customers dropped VM migration almost to zero by doubling server memory. With the additional hardware resources, vMotion's Dynamic Resource Scheduler rarely detected an operating environment state that exhausted host resources, prompting a shuffling of VMs to free up the required resources. This investment provided additional assurance that vMotion's automation would not put the client in a non-compliant state.

Faster storage, such as flash-based storage from vendors like Tegile, can improve IO, maintaining overall performance without triggering a requirement for more or new host servers that will require additional SQL Server licensing if the original hosts have enough licenses but a high number of SQL instances is creating storage bottlenecks that might otherwise require additional physical hosts and their associated SQL Server licenses.

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