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SQL Server 2005

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• How can the technology help me run my business?

• What's new in the latest version?

• What potential problems will I face if I migrate?

• When should I use this technology instead of other similar ones from Microsoft?

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Migrating from SQL Server 2005

For systems running older SQL Server versions there are many possible migration options to minimize the effort, including both on-premises and hosted destinations

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By Andrew Snodgrass

SQL Server 2005 reaches the end of Extended support in Apr. 2016 and organizations should be planning migration now to mitigate future security risks. Robust backward compatibility features and migration tools enable a range of migration options and destinations, including attaching existing databases to newer SQL Server versions, complete upgrades of the server software and databases, and new hosted solutions, including Azure. However, SQL Server includes many components, such as services, disaster recovery, management tools, and applications that are likely to complicate a migration.

Risk and Mitigation

The risks and costs of running SQL Server 2005 will rise with the end of Extended support; therefore, organizations should respond by upgrading systems and migrating databases and services to newer on-premises versions or hosted services.

End of Support Raises Risks

Once a software version exits Extended support, Microsoft will not release patches for security vulnerabilities or other bugs in the version without a costly additional custom support agreement. This means that systems running the version will become increasingly vulnerable to attack. SQL Server 2005 has continued to receive security patches over the last year, so there are likely vulnerabilities yet to be discovered and exploited by attackers if left unpatched. Unpatched systems could also exhibit new bugs and compatibility problems as an organization updates configurations and applications, which could jeopardize the ability to continue to run the organization's applications on the database engine.

SQL Server contains many components and often connects to a range of other applications and devices, all of which may be exposed to risk through an unsupported SQL Server version. Potential risks include data theft, data corruption and destruction, unmonitored access, and the inability to run needed applications.

Mitigation

Organizations can address the end of support by mitigation—continuing to run SQL Server 2005 in a more secure environment. However, it is not recommended. Isolating the servers through the use of virtualization may help to consolidate, secure, and manage them, but it does not eliminate the realities of the end of life cycle for SQL Server.

Microsoft custom support contracts can help mitigate risks. Custom support contracts are add-ons to existing support contracts (such as Premier) that enable customers to request fixes for security vulnerabilities and some other types of product support for up to three years beyond the end of Extended support. However, custom support contracts are not a complete or long-term solution. They are contracted at Microsoft's option and require the customer to file and carry out a migration plan to upgrade the environments. Microsoft offers only "best effort" support; for example, it might only provide workarounds, not fixes, for vulnerabilities or other problems that require major architectural work. Custom support contracts are also very expensive, and costs rise rapidly each year.

Migration Complexity Can Vary

The best approach to resolving the end of life for SQL Server 2005 is to migrate the databases and services to a newer version of the product. A benefit in developing a migration plan is that multiple solutions and migration paths are available, and a migration plan will help determine the optimal path for each of the organization's applications.

SQL Server Releases and Retirements

SQL Server		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2005	SP4			Apr. 12								
2008	SP4	July 8					July 9					
2008 R2	SP3	July 8					July 9					
2012	SP2				July 11					July 12		
2014		Apr. 1					July 9					July 9
2016				2nd Qtr.								

Future software releases are *Directions on Microsoft* projections and their version numbers or names are unofficial.

Mainstream support   Extended support

SQL Server 2005 systems should be targeted for replacement by hosted services or on-premises systems running newer versions. This chart shows likely SQL Server version releases and planned support retirement dates. SQL Server 2012 or SQL Server 2014 will usually be the best destinations for migrations of systems kept in-house, because they are more likely to run current and future versions of software than SQL Server 2008 or SQL Server 2008 R2, which left Mainstream support in Jul. 2014. Future versions of SQL Server (labeled 2016 here) could arrive too late for companies to complete migrations before support ends.

Product versions in Mainstream support are eligible for all forms of product support, including free fixes for security vulnerabilities and other bugs. Versions in Extended support are eligible for free security fixes, but most other support requires a paid support contract (such as Premier). After Extended support ends, any support, including fixes for security vulnerabilities, requires a custom support contract, which is generally expensive and has other conditions.

Three key decisions are likely to shape a migration plan:

- Deciding on a destination for the databases
- Deciding on a SQL Server version
- Deciding whether to migrate or upgrade the databases.

This report only covers the migration and upgrade options for the server software and databases; however, SQL Server also contains many other components and dependencies that may influence the migration plan and add to the complexity, including the following:

- Reporting Services
- Analysis Services
- Integration Services
- Disaster recovery
- Management tools
- Dependent applications.

Deciding on a Destination

The first step in developing a migration plan is to decide on a destination, which will influence how the associated databases are migrated. As compared to the first years of SQL Server 2005, when the common practice was to deploy SQL Server on-premises on physical hardware, technology and services now provide multiple deployment options for server and databases.

SQL Server on-premises. This is the full version of the product, typically installed on customer-owned hardware. This scenario provides the highest level of control, scalability, and features but also requires the greatest initial investment and ongoing management. Customers can deploy the current version (SQL Server 2014), but also have downgrade rights, which allow them to purchase the current version but deploy a previous version. The product cost includes the license fee only, and customers are responsible for all other costs, including hardware, OS, and data center hosting. This scenario is designed for a wide range of database applications from stand-alone systems to enterprise data warehouses and is likely the most similar to current environments running SQL Server 2005.

Hosted virtual machines. Infrastructure as a Service (IaaS) providers, such as Microsoft's Azure and Amazon Web Services provide hosted virtual machines (VMs) running SQL Server. The Microsoft offering, SQL Server in the Azure Virtual Machine service, is the full version of the product installed on Microsoft's hosted environment. This scenario provides the full SQL Server product feature set and enables quick deployment on a hosted environment, offsetting hardware expense, some administration, and costs of licensing Windows Server. However, it requires ongoing management

of the OS and software layers. SQL Server VMs (available for versions currently in Mainstream support) can be chosen from an Azure gallery and paid for on an hourly basis. Customers can also bring their own SQL Server VM configuration and licenses, using License Mobility through Software Assurance (SA). The service is primarily designed for organizations that are migrating databases to a hosted environment, but still want to retain the full feature set of SQL Server and control over the OS and software layers to schedule changes and updates. SQL Server in Azure VMs may also provide a cost-effective solution for testing database migrations and upgrades and assist organizations in determining the appropriate SQL Server version and edition.

Hosted database service. Azure SQL Database is a multitenant relational database service (based on SQL Server 2014) hosted in Azure. The service provides quick deployment, easy scalability, and automated high-availability and disaster recovery. However, it has limited database sizes (500GB as compared to 524PB in SQL Server), none of the SQL Server services (such as Reporting Services or Analysis Services), and lacks some compatibility with T-SQL commands. However, a preview release of new Azure SQL Database tiers (announced in Dec. 2014) addresses most of the T-SQL incompatibility and other issues and is expected to be generally available in Apr. 2015. The cost of the service includes an hourly charge for each database, storage, automated backups, and high availability. The service is designed for organizations seeking a lower-cost solution than a full SQL Server deployment, or with applications that have variable capacity requirements, or with external-facing requirements. Azure SQL could provide a low-cost, low-management solution for upgrading and hosting SQL Server 2005 databases; however, Azure SQL feature limitations, cloud location, and inability to control instance and OS-level configuration details may impede the migration of some databases.

Upgrading SQL Server

Organizations that choose to upgrade to a newer version of SQL Server (either on-premises or in hosted VMs) and forego the Azure SQL Database option will need to evaluate changes in features and licensing in the available versions and decide among various upgrade paths when planning the migration process.

Deciding on a Version

SQL Server has a reputation of strong backward compatibility, enabling most

databases and services to work properly on newer versions. Consequently, the general recommendation is to bypass SQL Server 2008, 2008 R2, and 2012 in favor of SQL Server 2014 to take advantage of the longer remaining support life cycle and new performance features. (For a list of SQL Server versions and life cycles, see the illustration "SQL Server Releases and Retirements" on page 6.)

The most important consideration in selecting a SQL Server version for many databases will likely be the associated application (Microsoft, third-party, or in-house) that relies on the database. Some Microsoft applications, such as Dynamics CRM 2013, are not currently supported on SQL Server 2014. Furthermore, some newer application versions may not be supported on SQL Server 2008 or 2008 R2. Customers should cross-reference their list of required applications with supported versions of SQL Server and determine the best long-term decision. (See the illustration "Application Versions Supported on SQL Server" on page 8.) In order to fully support applications that rely on SQL Server, some organizations may need to distribute the databases from a SQL Server 2005 instance across multiple SQL Server versions.

Additionally, organizations should use the migration as a time to evaluate database and application requirements against newer SQL Server features and hardware virtualization capabilities. SQL Server has added significant performance and durability features, such as In-Memory OLTP, ColumnStore Indexes, and high-availability with AlwaysOn Availability Groups, and support for various hybrid deployment configurations.

Edition Upgrade and Licensing Considerations

SQL Server editions have changed from 2005, but in general, production installations can be technically upgraded to newer versions and the same or higher editions. The following shows potential upgrades from SQL Server 2005 to SQL Server 2014:

- Enterprise edition to BI or Enterprise edition
- Standard edition to Standard, BI, or Enterprise edition
- Workgroup edition to Web, Standard, BI, or Enterprise edition
- Express edition to Express, Web, Standard, BI, or Enterprise edition
- Developer edition can only upgrade to a newer version of a Developer edition.

Customers who maintained Software Assurance (SA) on SQL Server 2005 licenses may upgrade them to corresponding editions of a later version. In general, customers

are entitled to any version released while SA was active, and any edition permitted by SA transition rules that are specific to each target version. For organizations buying new licenses, the recommendation is to purchase SQL Server 2014 (Standard or Enterprise) licenses to gain the longest possible use of the purchase. Customers can use the downgrade rights of these licenses and run an earlier version if needed for compatibility.

Server Upgrade Assistance

Two free tools from Microsoft can provide assistance in identifying the location of SQL Server 2005 instances in an organization's network and analyzing the instances for potential upgrade issues. Prior to performing an analysis or upgrade, SQL Server 2005 SP4 should be applied.

The Microsoft Assessment and Planning (MAP) toolkit can be used to discover SQL Server instances within an organization's network. It is an agentless, automated, multiproduct planning and assessment tool that customers can use to inventory hardware and software and assess readiness upgrades for versions of Windows and Office, and SQL Server. The latest version, MAP 9.1, expands discovery of SQL Server components to report on installations that do not include the database engine but include Analysis Services, Integration Services, Data Quality Services, Master Data Services, and stand-alone instances of SQL Server Reporting Services.

The SQL Server Upgrade Advisor (available for all current versions of SQL Server) helps organizations perform a detailed analysis of the configuration of installed SQL Server installations, components, and related files to identify known issues that may affect the upgrade process or impact the use of the system after the upgrade. The tool generates a series of reports containing issues to remediate and includes links to online help to provide solutions and advice. The tool can provide remote analysis on all SQL Server components, except for Reporting Services, where the tool must be installed on the computer hosting Reporting Services.

Upgrading Databases May Be Optional

The final step of the migration process is to move the SQL Server 2005 databases to their new locations.

Database Upgrade Decision

Organizations that choose to upgrade to a newer SQL Server version on-premises or in Azure VMs can decide whether to upgrade SQL Server 2005 databases or leave them in their original form. Unlike some other server products, SQL Server does not require databases and server software to be on the same version. This means that SQL Server is able to host prior version databases without modification. For example, SQL Server 2012 can run SQL Server 2012, 2008, 2008 R2, and 2005 databases in their original forms (including settings), simultaneously. This feature could help organizations leverage newer existing SQL Server deployments and defer the need to upgrade the database and modify any associated applications. This unique capability is enabled by setting the "compatibility level" of a database.

Organizations that move to Azure SQL Database, the hosted database service, won't have an option on upgrading their databases. As part of the migration process, databases are upgraded to ensure they work properly in that environment.

Database Migration Assistance

Free tools are available to automate or help with the migration of databases, and most work with either SQL Server or Azure SQL.

The most popular tool is SQL Server Management Studio (SSMS), which is included with all versions of SQL Server and is available for free download with SQL Server Express. SSMS is typically used to perform routine administration of SQL Server instances and database (such as create, backup, restore, and to set security options) and can be used for on-premises SQL Server and Azure SQL databases.

For migrating to newer versions of SQL Server, SSMS provides the following solutions:

Attaching a database. SSMS for SQL Server 2008, 2008 R2, and 2012 can connect directly to SQL Server 2005 instances, which enables administrators to migrate databases by attaching a SQL Server 2005 database to the newer SQL Server, taking over control for access to the database, and leaving the database in its original form as a SQL Server 2005 database. This is a one-way migration, and once the database is attached to the newer server version it cannot be reattached to the prior version.

Application Versions Supported on SQL Server

Some applications are not yet supported on SQL Server 2014. Shown here are several application versions and their eligibility for Microsoft product support on recent versions of SQL Server as of Dec. 1, 2014. Versions generally require the latest service pack for support.

Application Version		SQL Server Versions Supported			
		2008	2008 R2	2012	2014
SharePoint Server	2010	✓	✓	✓	○
	2013	○	✓	✓	✓
Lync Server	2010	✓	✓	○	○
	2013	○	✓	✓	○
Project Server	2010	✓	✓	✓	○
	2013	○	✓	✓	○
Duet Enterprise	1.0	✓	✓	✓	○
	2.0	○	✓	✓	✓
Dynamics AX	2012	✓	✓	✓	✓
	2012 R2	✓	✓	✓	✓
	2012 R3	✓	✓	✓	✓
Dynamics CRM	2011	✓	✓	✓	○
	2013	✓	✓	✓	○
	2015	○	○	✓	✓
BizTalk Server	2010	✓	✓	○	○
	2013	○	✓	✓	○
	2013 R2	○	○	✓	✓
Commerce Server	2009 R2	✓	✓	✓	○

Restoring a backup. SSMS for all versions can restore SQL Server 2005 database backups and includes the ability to leave the database in its original form or perform an upgrade as part of the restore process.

For migrating to the Azure SQL Database service, possible solutions include the following:

SSMS migration utility. SSMS for SQL Server 2012 and 2014 have built-in menu items (under the Tasks menu) to automate the deployment and migration of databases to Azure SQL. These versions of SSMS can be used to connect to a SQL Server 2005 instance and provide a migration path for a SQL Server database directly to Azure SQL Database, where the upgrade is performed during the migration. SSMS can automatically connect to the Azure SQL Database service, create an Azure SQL Server (similar to a SQL Server instance) to host the database if necessary, and automate the copying of schema, objects, and data, separately or together. Microsoft recommends using SSMS for SQL Server 2014 CU5, which has been optimized for migrating databases to Azure SQL.

Open source migration wizard. Another tool for migrating to Azure SQL is the SQL Database Migration Wizard. An open source application (available on CodePlex) that helps customers analyze SQL Server databases (SQL Server 2005 and newer) for compatibility issues with Azure SQL database without requiring an Azure account. The tool can help determine whether existing databases are good candidates for migration and migrate schema and data to an Azure SQL database.

Other potential solutions include SQL Server Integration Services, SQL Server Data Tools, and Azure SQL import and export services. However, these solutions do not evaluate databases for compatibility issues.

Resources

SQL Server Resources

The SQL Server roadmap is discussed in the chapter "Application Platform" of the *Enterprise Software Roadmap*.

An evaluation of SQL Server 2014 is available in the July 2014 *Research Report*, "SQL Server 2014 Evaluation Guide."

Licensing SQL Server is explained in "Licensing SQL Server Under the Server + CAL Model" on page 19 of the June 2014 *Update* and "SQL Server 2012 Adopts Per-Core Licensing Model" on page 16 of the Apr. 2012 *Update*.

SQL Server 2014 licensing is discussed in "Licensing Changes for SQL Server 2014" on page 17 of the June 2014 *Update*.

Azure VMs and Azure SQL Database Resources

Azure VMs are discussed in "Running Server Applications in Azure Virtual Machines" on page 3 of the Nov. 2014 *Update* and "Evaluating Windows Server in Azure Virtual Machines" on page 3 of the Oct. 2014 *Update*.

Azure SQL Database service tiers and performance levels are discussed at msdn.microsoft.com/library/dn741336.aspx.

Azure SQL pricing details are at https://azure.microsoft.com/pricing/details/sql-database.

Upgrade and Migration Resources

SQL Server upgrade guidance from Microsoft is at www.microsoft.com/en-us/server-cloud/products/sql-server-2005.

SQL Server 2014 upgrade checklist is at msdn.microsoft.com/library/bb677622.aspx.

The SQL Server 2014 Upgrade Advisor is available at msdn.microsoft.com/library/ee210467.aspx.

The Microsoft Assessment and Planning toolkit 9.1 is available for download from www.microsoft.com/download/details.aspx?&id=7826.

The SQL Database Migration Wizard is available at sqlazuremw.codeplex.com. ▶

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