# SQL Server Basics – Implementing SQL Server

There are various options available when deciding which version and edition of SQL Server to use, and how it can be hosted.

The **version** of SQL Server is denoted in the name. For example, SQL Server *2017* and SQL Server *2019* are different versions.

The **edition** of SQL Server dictates which features are available and what the resource limits are. The edition will come after the version name, for example SQL Server 2019 *Standard Edition*.

With regards to hosting, this can be **on-premises** or **cloud** hosted. On-premises refers to SQL Server running on a server that the company owns. Cloud hosted refers to SQL Server running in a cloud service providers' environment. Example of cloud service providers are Microsoft Azure, Amazon Web Services, Google Cloud Platform, Alibaba Cloud.

## On-Premises

### SQL Server Editions

Below is a summary of some of the Pros and Cons of the different editions. This is intended as a quick guide, the links provided should be used to understand the full details and help to make a fully informed decision.

| Edition | Pro | Con | Good for |
|---|---|---|---|
| **Express** | This version is free and has all the basic functionality. | This version does not have a SQL Server agent therefore you have to find a different way to run any jobs including backups. Database must be less than 10GB in size. | Starting out and learning SQL Server |
| **Developer** | This version has all the functionality of Enterprise Edition and is free. | Can ONLY be used in a development environment. So it's great for developing and testing but that's it. | Developers |
| **Web Pro** | Is cheaper than standard edition | Has limited functionality | Small online applications |
| **Standard** | Cheaper than Enterprise(!) but still has a large amount of functionality | Not as much compute power as Enterprise, can't do Always on Availability Groups and other key functionality. Max number of cores is 24 cores and maximum memory utilized per instance 128 GB | Small to medium sized organisations |
| **Enterprise** | Has all available functionality | High cost | Large organisations that need all functionality and/or have very large databases and require large amount of resources for performance. |

*Note: details taken from 2017 factsheet http://download.microsoft.com/download/A/7/0/A7049F57-D68B-49A2-941F-322D364342BC/SQL_Server_2017_Editions_Datasheet.pdf)*

It is important to note that functionality available in the editions change between versions. For example, functionality that is available in SQL Server 2008R2 Standard Edition, may only be available in SQL Server 2012 Enterprise Edition and vice versa.

For the full breakdown of the different versions please use this MSDN Link:
https://docs.microsoft.com/en-us/sql/sql-server/editions-and-components-of-sql-server-2017?view=sql-server-ver15

## SQL Server Versions

Microsoft are always working on the next version of SQL Server. Once a version has been released Microsoft only support that version for a limited time, usually this is around 10 years. It is always recommended that you use the latest version. However, it is good to know which versions are still in support as it’s not uncommon to have to use older versions to ensure they work with applications that have been developed against that version.

The versions currently being supported by Microsoft (as of Oct 2019) are:

| Version | Extended Support End Date |
|---|---|
| **SQL Server 2005** | No longer supported |
| **SQL Server 2008** | No longer supported |
| **SQL Server 2008 R2** | Ended 9th July 2019 |
| **SQL Server 2012** | Ends 12th July 2022 |
| **SQL Server 2014** | Currently due to end on 9th July 2024 |
| **SQL Server 2016** | Currently due to end on 14th July 2026 |
| **SQL Server 2017** | Current due to end on 14th July 2027 |
| **SQL Server 2019** | To be confirmed but likely to be end 2029 |

## Upgrades

If you wish to upgrade, it is recommended to go to the latest version that you can. However, it is not always possible to upgrade directly to the latest version. For example, to upgrade to SQL Server 2016 you can only upgrade directly from SQL Server 2008 SP4 or later, or SQL Server 2008 R2 SP3 or later. For full information on upgrade paths please use this link. https://docs.microsoft.com/en-us/sql/database-engine/install-windows/supported-version-and-edition-upgrades?view=sql-server-ver15.

SQL Server has an upgrade tool that can be used to see if your current database can directly upgrade to a later version, this is called Data Migration Assistant. Before you start an upgrade, it is always recommended that you run the Data Migration Assistant on your test system so that you can identify any issues and resolve them before upgrading the production environment.

## Cloud Hosted

If you don’t wish to have the responsibility of the hardware, then moving to the cloud is a good option. You can ‘spin up’ a new environment in a matter of minutes. Equally you can increase power, space and all other aspects at the touch of a button or leave the environment to handle that for you. There are obviously caveats to this.

There are two main types of cloud hosted offerings, Infrastructure-as-a-Service (IaaS) and Platform-as-a-Service (PaaS).

These services are paid for on a monthly basis and as such are an Operational Expense (OpEx), this contrasts with on-premises which is a Capital Expense (CapEx). The different expenditure models are often an important part of deciding between on-premises or cloud.

## Infrastructure-as-a-Service (IaaS)

Infrastructure-as-a-Service is provisioned and managed by the user but hosted by the cloud services provider. All virtualization, physical servers, physical storage and physical networking is provided and managed by the cloud services provider.

If you use IaaS then you can create a VM (Virtual Machine) in the environment, selecting the VM size which dictates it’s available resources, such as CPU and memory, and the monthly cost. You don’t even need to install SQL Server yourself, you can select to have it pre-installed on your VM. It’s easy to scale up or down and you pay for what you actually use.

You are responsible for backups, patching, high availability and all other tasks that you would normally carry out on a server that SQL Server is installed on. Essentially, the environment works in exactly the same way as if the server was running on-premises, but with the benefit that you can change the size and performance at the touch of a button and you don’t need to worry about managing the underlying hardware.

An additional benefit is that if a VM is not required a certain time of the year or certain times of the day, you can switch it off and therefore you pay substantially less for it during that time.

IaaS is suitable if you have many databases that you wish to move to the cloud or for development and test environments that can be frequently powered down. For production workloads, IaaS can be the least economical way to host SQL Server.

**Microsoft Azure VMs**
https://azure.microsoft.com/en-gb/services/virtual-machines/

**AWS EC2 Instances**
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html

**Google Compute Engine**
https://cloud.google.com/compute/

**Alibaba Elastic Compute Service**
https://www.alibabacloud.com/product/ecs?spm=a3c0i.11270126.209577.1.6c8625b3atVCtz

## Platform-as-a-Service (PaaS), aka Serverless

Platform-as-a-Service removes the need to manage any servers or infrastructure as there is no concept of a ‘server’. The server that your database is installed on is in name only. PaaS provides the user with a SQL Server database or instance to use; all backups, patching, operating system management, high availability and underlying storage and networking are taken care of by the cloud services provider.

Other benefits include being able to scale-up or scale-down available resources instantly. PaaS can be a very cost-effective way of hosting SQL Server databases.

The PaaS offerings from the main cloud services providers can differ slightly in available features when compared with on-premises, so proof-of-concept projects are recommended to ensure application databases continue to function as expected. For more details, please see the following links:

**Microsoft Azure SQL DB**
https://docs.microsoft.com/en-us/azure/sql-database/sql-database-single-database-quickstart-guide

**Microsoft Azure Managed Instances**
https://docs.microsoft.com/en-us/azure/sql-database/sql-database-managed-instance-quickstart-guide

**AWS RDS for SQL Server**
https://aws.amazon.com/rds/sqlserver/

**Google Cloud SQL for SQL Server**
https://cloud.google.com/sql/?tab=tab3

**Alibaba ApsaraDB RDS for SQL Server**
https://www.alibabacloud.com/product/apsaradb-for-rds-sql-server

It should be noted that although cloud service providers refer to PaaS as a fully managed system, it is still vital that the databases are maintained and monitored effectively to ensure optimal performance. In fact, effective performance tuning and optimisations for cloud hosted databases can translate in to immediate cost savings as lower resource usage = lower monthly costs.

## Scenarios

Below are scenarios with recommendations on which solution to use:

**I have a small number of databases and no Infrastructure support.**
Use PaaS, easy to manage, cost effective and infrastructure support not required.

**I have a large number of databases, no infrastructure support but am fairly comfortable setting up a VM.**
Use IaaS, you can use the cloud services provider to host and then manage the environment yourself.

**I'm not sure what I want or need?**
Give WellData a call and a friendly consultant will come and chat to you and make some recommendations. Then we can provide the service to create and manage your new environment.

## Summary

At WellData we can provide advice on all of the above and guide you through the process of setting up a new environment or upgrading your databases whether that's on your premises or in the cloud. We can also provide all the required ongoing support for either environment. Find out more at www.welldata.co.uk or call us on 0800 389 4051