

Microsoft SQL Server Service Standards

Version 1.0

## Database Service Model and Architecture

SQL Server Database System can be easily installed and used. Therefore, one of the biggest challenges of managing SQL Servers is how to control SQL Server sprawl. It is even more true in our organization. Nowadays, there are more than 1,000 SQL instances in our organization and the number is keeping growing, which will cost excessive SQL Server licensing fee, over scribe IT infrastructure resources, and create a big issue for managing these SQL Servers efficiently and effectively. It is an urgent task for us to curb the increase of SQL Server instances.

With the advance of features of SQL Server, it is possible for us to come up with a better solution to deal with this SQL Server sprawl issue, provide better services to our users and fully meet the requirements of our users. Therefore, Database Service team suggest the following three hosting database architectures for all the HA uses.

### Shared VM Clustered SQL Servers with AlwaysOn Availability Group

Shared SQL 2016 AlwaysOn AG clusters will be installed in every data center. By default, application databases should be hosted in one of this kind of clusters.   
The Advantages of this solution are:

* Provide SQL Server high availability feature for all the applications running on the cluster
* The usage of CPU, RAM and Disk space will be much more efficient for many applications are sharing these resources
* It can be easily scaled up or scaled out without user notice.
* There is no need to schedule a downtime with the users when a SQL Server patch is needed.
* Greatly reduce the number of SQL Server instance and the license fee
* Ease to manage fewer instances

The disadvantages of this solution are:

* User cannot have System Admin permission on the SQL instance. DB owner permission is the default permission granted to application owners
* There should not be any jobs running on the clustered instances unless user/vendor modify their jobs to make them working properly in AlwaysOn AG environment.

Based on the observation, most of applications can be fitted into this service.

### Physical Clustered SQL Servers with AlwaysOn Failover Clustered Instance

SQL 2016 AlwaysOn FCI physical clusters will be installed when it needs. Several FCIs will be installed in a cluster to provide the service for the applications which need to have high availability features, and there are jobs which need to be scheduled on the SQL Server.

The advantages of this solution are:

* Provide high availability feature
* Share the computer resources of CPU, memory and disk space
* Can be scale out by adding more nodes if needed
* No need to schedule a downtime for patching. It can be done by failing over instances to one node and patch the standby nodes.
* Can allocate the computer resources dynamically among the instances based on the usage pattern of the instances in the cluster.
* Cost saving by reducing the dedicated instances for an application.
* Can install a dedicated instance in the cluster if needed.

The limitation of the service is that only database owner permission can be granted in the shared instance.

### Dedicated standalone VM for an application

The service is for an application which meets one of following criteria:

* SA permission is required
* Application has to be installed on the SQL Server
* SQL Server is managed by user/vendor.
* Application can only run on SQL 2014 or before

The pro of this service:

* Provide most flexible solution to the users.

The con of this service:

* Not high availability features
* Cannot efficiently use the computer resources
* Database Services team will not manage the servers on which User/Vendor has SA permission.

## How to Choose a Database Service

In the above three database services, Shared VM Clusters with AlwaysOn Availability Group is strongly recommended. This service provide user with high availability, best scalability and optimized SQL Server performance.

For the applications with jobs having to be scheduled on the SQL Server and not developed for running on AlwaysOn Availability Group, They should be deployed on Physical Clusters with Failover Clustered Instance.

Dedicated standalone VM can only be used for the applications which fall into the criteria specified in 1.3. The solution can only be deployed after the other two services are thoroughly explored and are proved that neither one is an appropriate solution for the application.

## Consideration for Standard Edition or Enterprise Edition

* In AlwaysOn AG environments, Enterprise Edition has to be used for only Enterprise Edition supports AlwaysOn AG
* In FCI environments, Enterprise Edition will also be used because Standard Edition only supports two-node cluster for FCI which will limit the scalability of the cluster.
* In standalone VM environments, Standard Edition will be installed unless application needs a specific feature which is only available in Enterprise Edition.

## Financial Analysis (Paul)