

# Windows Server 2012 R2 Failover Cluster – Global Update Manager

Pretty interesting new feature is implemented in Windows Server 2012 R2 failover clustering that allows you to manage how cluster database is updated.

Service responsible for this is called Global Update Manager. This service is responsible for updating the cluster database. In Windows Server 2012, you were not able to configure how these updates work, but in Windows Server 2012 R2 it is possible that you configure the mode of work for Global Update Manager.

Each time the state of cluster changes (for example, when cluster resource is offline) all nodes in the cluster must receive notification about the event, before the change is committed to the cluster database, by Global Update Manager.

In Windows Server 2012, Global Update Manager works in *Majority (read and write)* mode. In this mode, when change happens to the cluster, majority of cluster nodes must receive and process the update before it is committed to the database. When cluster node wants to read the database, cluster compares the latest timestamp from a majority of the running nodes, and uses the data with the latest timestamp.

In Windows Server 2012 R2, Global Update Manager can also work in *All (write) and Local (read)* mode. When working in this mode, all nodes in the cluster must receive and process the update before it is committed to the database. However, when the database read request is received, the cluster will read the data from the database copy stored locally. Since all roles received and processed the update, local cluster database copy can be considered as a relevant source of information.

Windows Server 2012 R2 also supports the third mode for Global Update Manager. This mode is *Majority (write) and Local (read)*. In this mode majority of cluster nodes must receive and process the update before it is committed to the database. When the database read request is received, the cluster will read the data from the database copy stored locally.

In Windows Server 2012 R2, default setting for Hyper-V failover clusters is Majority (read and write). All other workloads in the clusters use All (write) and Local (read) mode. Majority (write) and Local (read) is not used by default for any workload.

## [Configure the Global Update Manager mode](#)

When a state change occurs such as a cluster resource is taken offline, the nodes in a failover cluster must be notified of the change and acknowledge it before the cluster commits the change to the database. The Global Update Manager is responsible for managing these cluster database updates. In Windows Server 2012 R2, you can configure how the cluster manages global updates. By default, the Global Update Manager uses the following modes for failover cluster workloads in Windows Server 2012 R2:

- **All (write) and Local (read).** In this mode, all cluster nodes must receive and process the update before the cluster considers the change committed. When a database read request occurs, the cluster reads the data from the cluster database on the local node. In this case, the local read is expected to be consistent because all nodes receive and process the updates. This is the default setting for all workloads besides Hyper-V.

#### **Note**

This is how global updates work for all workloads in Windows Server 2012.

- **Majority (read and write).** In this new mode, a majority of the running cluster nodes must receive and process the update before the cluster commits the change to the database. When a database read request occurs, the cluster compares the latest timestamp from a majority of the running nodes, and uses the data with the latest timestamp. This is the default setting for Hyper-V failover clusters.

#### **Note**

There is also a new "Majority (write) and Local (read)" mode. However, this mode is not used by default for any workloads. See the "What works differently" section for more information.

### **What value does this change add?**

The new configuration modes for Global Update Manager significantly improve cluster database performance in scenarios where there is significant network latency between the cluster nodes, for example with a stretch multi-site cluster. By association, this increases the performance of cluster workloads such as SQL Server or Exchange Server in these scenarios. Without this feature, the cluster database performs at the pace of the slowest node.

The new configuration modes can also help if there are delays that are associated with software or hardware issues. For example, a local registry update may be delayed on a node that has a hardware issue. By using a Global Update Manager mode that performs updates that are based on a majority of nodes, the cluster does not have to wait for all nodes to be notified of and acknowledge the state change before it is ready to process the next transaction.

### **What works differently?**

In Windows Server 2012, you cannot configure the Global Update Manager mode. For all cluster workloads in Windows Server 2012, all cluster nodes must receive and process the update before the cluster considers the change committed. In Windows Server 2012 R2, you can configure the Global Update Manager mode, with three possible values. In Windows Server 2012 R2, the majority (read and write) mode is now the default mode for Hyper-V failover clusters.

You can configure the Global Update Manager mode by using the new **DatabaseReadWriteMode** cluster common property. To view the Global Update Manager mode, start Windows PowerShell as an administrator, and then enter the following command:

```
(Get-Cluster).DatabaseReadWriteMode
```

The following table shows the possible values.

Value	Description
<b>0</b> = All (write) and Local (read)	<ul style="list-style-type: none"> <li>• Default setting in Windows Server 2012 R2 for all workloads besides Hyper-V.</li> <li>• All cluster nodes must receive and process the update before the cluster commits a change to the database.</li> <li>• Database reads occur on the local node. Because the database is consistent on all nodes, there is no risk of out of date or "stale" data.</li> </ul>
<b>1</b> = Majority (read and write)	<ul style="list-style-type: none"> <li>• Default setting in Windows Server 2012 R2 for Hyper-V failover clusters.</li> <li>• A majority of the cluster nodes must receive and process the update before the cluster commits the change to the database.</li> <li>• For a database read, the cluster compares the latest timestamp from a majority of the running nodes, and uses the data with the latest timestamp.</li> </ul>
<b>2</b> = Majority (write) and Local (read)	<ul style="list-style-type: none"> <li>• A majority of the cluster nodes must receive and process the update before the cluster commits the change to the database.</li> <li>• Database reads occur on the local node. Because the cluster does not compare the latest timestamp on a majority of nodes, the data may be out of date or "stale."</li> </ul>

**⚠Warning**

Do not use either of the majority modes (1 or 2) for scenarios that require strong consistency guarantees from the cluster database. For example, do not use these modes for a Microsoft SQL Server failover cluster that uses AlwaysOn availability groups, or for Microsoft Exchange Server.