数据库可用性组（DAG）是一组最高为16个 Microsoft Exchange Server 邮箱的服务器，可从数据库、服务器或网络故障中自动执行数据库级恢复。 将邮箱服务器添加到 DAG 后，此服务器与 DAG 中的其他服务器协同工作，提供从数据库、服务器和网络故障中自动执行数据库级恢复的功能。

**创建DAG：**

必须先获得权限，然后才能执行此过程或多个过程。在向 DAG 添加成员之前必须预留群集名称对象 (CNO)。当我们在创建DAG的时候，可以选择指定见证服务器和见证目录，则会有不同的选项和行为准则，见证服务器和见证目录这儿共有四种组合。其中DAG的IP地址，可以分配一个或多个静态IPv4地址。

1. 仅指定DAG名称，将“见证服务器”\*\*\*\* 和“见证目录”\*\*\*\* 字段留空。该任务将搜索具有客户端访问服务的 Exchange 服务器。 它将自动使用客户端访问服务创建默认的见证目录并在该 Exchange 服务器上共享，并将 DAG 配置为使用该服务器作为其见证服务器。
2. 可以指定 DAG 的名称、要使用的见证服务器以及要在见证服务器上创建并共享的目录。
3. 可以指定 DAG 的名称、要使用的见证服务器，并将“见证目录”\*\*\*\* 字段留空。在这种情况下，任务将在指定的见证服务器上创建默认见证目录。
4. 可以指定 DAG 的名称、将“见证服务器”\*\*\*\* 字段留空，并指定要在见证服务器上创建并共享的目录。 在这种情况下，向导将搜索具有客户端访问服务的 Exchange 服务器，并在该服务器上自动创建指定的见证目录，共享该目录，并将 DAG 配置为使用具有客户端访问权限的 Exchange 服务器服务作为其见证服务器

创建DAG的方式有两种，一是EAC的方式：在EAC里前往server里的DAG，然后我们会有四块信息需要填。包括名称，IP地址，见证服务器和见证目录。

1. In the EAC, go to **Servers** > **Database Availability Groups**.
2. 单击 添加图标 以创建 DAG。
3. On the **new database availability group** page, provide the following information for the DAG:

**数据库可用性组名称**：使用此字段为 DAG 最长为15个字符键入一个有效且唯一的名称。 该名称等同于计算机名，相应的 CNO 将使用该名称在 Active Directory 中创建。 该名称将同时为 DAG 和基础群集的名称。

**见证服务器**：使用此字段可指定 DAG 的见证服务器。 如果将此字段留空，系统将尝试使用本地 Active Directory 站点中的客户端访问服务自动选择 Exchange 服务器。

**注意**：如果指定见证服务器，则必须使用主机名或完全限定的域名（FQDN）。 不支持使用 IP 地址或通配符名称。 此外，见证服务器不能是 DAG 的成员。

**见证目录**：使用此字段可键入将用于存储见证数据的见证服务器上的目录的路径。 如果该目录不存在，系统将会在见证服务器上为您创建该目录。 如果将该字段留空，将在见证服务器上创建默认目录 (%SystemDrive%\DAGFileShareWitnesses\<DAG FQDN>)。

**数据库可用性组 IP 地址**：使用此字段可将一个或多个静态 IPv4 地址分配给 DAG。 输入一个 IPv4 地址，然后单击 添加图标 添加它。 如果希望 DAG 使用动态主机配置协议 (DHCP) 获取必要的 IPv4 地址，则将该字段留空。 或者，输入 255.255.255.255 以创建不含 IP 地址或群集管理访问点的 DAG，这仅适用于将包含运行 Windows Server 2012 R2 的邮箱服务器的 DAG。

1. 单击“保存”\*\*\*\* 以创建 DAG。

另一种方式是Exchange 命令行管理程序创建：

* 下面的示例创建一个名为 DAG1 的 DAG，该 DAG 配置为使用见证服务器 FILESRV1 和本地目录 C:\DAG1。 DAG1 还配置为对 DAG 的 IP 地址使用 DHCP。

New-DatabaseAvailabilityGroup -Name DAG1 -WitnessServer FILESRV1 -WitnessDirectory C:\DAG1

* 下一个示例将创建一个名为 DAG2 的 DAG。 对于 DAG 的见证服务器，系统会自动选择具有本地 Active Directory 站点中的客户端访问服务的 Exchange 服务器。 由于本例中的所有 DAG 成员的 MAPI 网络都位于同一子网中，因此为 DAG2 分配了一个静态 IP 地址。

New-DatabaseAvailabilityGroup -Name DAG2 -DatabaseAvailabilityGroupIPAddresses 10.0.0.8

* 此示例创建名为 DAG3 的 DAG。DAG3 配置为使用见证服务器 MBX2 和本地目录 C:\DAG3。由于 DAG3 的 DAG 成员所处的 MAPI 网络位于不同子网中，因此为 DAG3 分配了多个静态 IP 地址。

New-DatabaseAvailabilityGroup -Name DAG3 -WitnessServer MBX2 -WitnessDirectory C:\DAG3 -DatabaseAvailabilityGroupIPAddresses 10.0.0.8,192.168.0.8

* 此示例创建配置为使用 DHCP 的名为 DAG4 的 DAG。此外，系统将自动选择见证服务器，并创建默认的见证目录。

New-DatabaseAvailabilityGroup -Name DAG4

* 本示例创建的 DAG DAG5 不包含管理访问点（仅对 Windows Server 2012 R2 DAG 有效）。此外，MBX4 将用作 DAG 的见证服务器，并将创建默认的见证目录。

New-DatabaseAvailabilityGroup -Name DAG5 -DatabaseAvailabilityGroupIPAddresses ([System.Net.IPAddress]::None) -WitnessServer MBX4

当我们用着两种之一的方式创建完DAG时：

* In the EAC, navigate to **Servers** > **Database Availability Groups**. The newly created DAG is displayed.
* 在 Exchange 命令行管理程序中，运行以下命令来验证 DAG 是否已创建，并显示 DAG 属性信息。

Get-DatabaseAvailabilityGroup <DAGName> | Format-List

在Exchange Server 2016上安装DAG :

For this example a DAG with two members in the same site is being created, with a third Windows server in the same site being used as the file share witness.

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Installed servers with identical hardware, storage and performance specification. Setup a default mailbox database, [renamed the databases to unique names, and moved them to storage paths](https://practical365.com/moving-an-exchange-server-2016-mailbox-database/) ready to replicate between the two DAG members.

[PS] C:\>Get-MailboxDatabase | fl name,edbfilepath,logfolderpath

Name : DB05

EdbFilePath : E:DB05DB05.edb

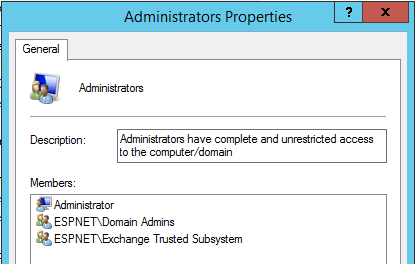
LogFolderPath : F:DB05

Name : DB06

EdbFilePath : E:DB06DB06.edb

LogFolderPath : F:DB06

Then prepared the file share witness server by adding the Exchange Trusted Subsystem group to the local Administrators group of the server.



To create the new DAG from the Exchange Management Shell we run [New-DatabaseAvailabilityGroup](https://technet.microsoft.com/en-us/library/dd351107%28v=exchg.160%29.aspx), providing the name for the DAG and also specifying the name of the file share witness server. I'm also specifying the filesystem for the DAG because [my Exchange 2016 servers are using ReFS](https://practical365.com/refs-exchange-server-volumes/) for their data volumes.

[PS] C:\>New-DatabaseAvailabilityGroup -Name EX2016DAG01 -WitnessServer mgmt.exchangeserverpro.net -FileSystem ReFS

Name Member Servers Operational Servers

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EX2016DAG01 {}

The new DAG object has now been created, but it doesn't have any members yet. Next we add our Exchange 2016 servers to the DAG.

[PS] C:\>Add-DatabaseAvailabilityGroupServer -Identity EX2016DAG01 -MailboxServer EX2016SRV1

Repeat the previous step for the other DAG members as well.

[PS] C:\>Add-DatabaseAvailabilityGroupServer -Identity EX2016DAG01 -MailboxServer EX2016SRV2

The DAG now has two members.

[PS] C:\>Get-DatabaseAvailabilityGroup EX2016DAG01 -Status

The DAG's file share witness is the server that was specified at the time of creation, MGMT, and the default witness directory has been configured by Exchange.

[PS] C:\>Get-DatabaseAvailabilityGroup EX2016DAG01 -Status | fl \*witness\*

WitnessServer : mgmt.exchangeserverpro.net

WitnessDirectory : C:DAGFileShareWitnessesEX2016DAG01.exchangeserverpro.net

AlternateWitnessServer :

AlternateWitnessDirectory :

WitnessShareInUse : Primary

On the witness server itself you can see the witness directory has been created and populated.

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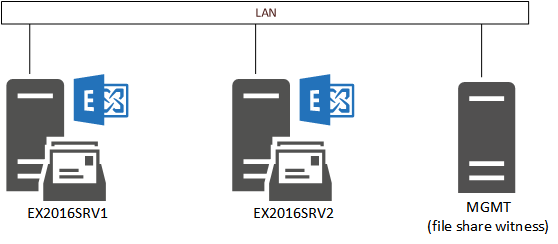
Description automatically generated

Now: Exchange Server 2016 database availability group has been created we can proceed with adding database copies.

## Exchange Server 2016 DAG Concepts

Database availability groups can contain up to 16 Exchange 2016 mailbox servers, each of which hosts copies of one or more databases that are replicated with database copies on other members of the same DAG.

When a DAG is first created it has zero members. A minimum of two members is required for the DAG to provide high availability.



### Database Availability Groups and Quorum

When you add members to a DAG the failover clustering components are automatically installed and configured for you. We don’t need to create or configure.

Quorum is the voting process that the cluster uses to determine whether the DAG should remain online or go offline. If the DAG goes offline all of the databases in the DAG are dismounted and inaccessible to end users, causing an outage.

two quorum models: **Node Majority** / **Node and File Share Majority**

All database availability groups are configured with a file share witness

The file share witness is used as the tie-breaker, meaning 2/3 “votes” are still available, and the DAG can stay online.

some failure scenarios the DAG may lose quorum and go offline. In some circumstances the DAG can sustain a majority of nodes being offline if there has been sequential failures. This is thanks to a feature of Windows Server 2012 clusters called [Dynamic Quorum](https://practical365.com/windows-server-2012-dynamic-quorum/).

### Database Copies and Continuous Replication

Can host one/more db copied, continuous replication keep updated

Each can host a mix of active and passive copied, transaction log woud generate by active shipped to passive databased copies.

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### Incremental Deployment

It means we can deploy a single server or remove to a DAG without any impact to production services.

### Database Availability Group Networks

A DAG network is one or more IP subnets that the DAG members are directly connected to.

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### Site Resilience

DAGs Can be deployed to one/multiple datacenters allow the Exchange services to remain online in the event of a complete datacenter outage.

## Configuring Database Availability Group (DAG) in Exchange 2016

The Exchange server DAG uses Windows Failover Cluster to replicate the data between each member. When we add a member to the Exchange server DAG setup, the Windows Failover Cluster role will be automatically enabled.

configure Exchange server 2016 DAG with Two Node Members and a file share Witness server with all servers running in same hardware configurations and Windows Server 2012 R2 OS.

**Lab requirements**

**\* One witness server along with Active Directory role.**  
**\* Two Exchange 2016 Servers.**

To start with DAG configuration, we need to add the Witness Server’s local Administrators Group as an “Exchange Trusted System” member in Active Directory and we need to create Witness Directory Share in witness server.

Go to Server Manager >> Click Tools >>Click the Active Directory Users and Computers and  
Add the “Exchange Trusted Subsystem” group as a local administrator on the witness server:

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Create a folder in any location at witness server and make it as “Witness Directory Share”

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Now, Login to Exchange Admin Center, Under Server–> Database availability groups–>Click on + Add

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Now Provide the Name for the DAG, also provide the Witness Server and Directory

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Now you can see the DAG is created successfully.

Let’s see how to add the Servers in the DAG. Click on **Manager DAG Membership**

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Click on + to add the Servers

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Select the Servers which you want to add in this DAG

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Now you can see the Member Servers associated with this Database Availability Group.

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**Let’s see how to add the passive copies of the Database.**

Click on a mailbox database, click “…” then click “add database copy”: ( DAGNODE2 )

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Click on browse and select the mailbox server you want to add a database copy to then click OK:

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Now we can add the mailbox database copy.

Repeat these steps for each mailbox database that you want to make highly available.

**Conclusion:**

In this blog we learnt how to configure Exchange server 2016 DAG with Two Node Members and a file share Witness server, and mailbox databases as highly available by adding mailbox database copies. Exchange 2016 server is very easy and simple to configure. Exchange server DAG is used for Windows Failover Cluster in order to replicate the data between each member.