

## Protecting & Recovering Microsoft SQL Server Databases

Last updated on December 8, 2021

This document covers the steps to setup and configure backups of Microsoft SQL (MSSQL) databases running in Windows Server VM versions 2012, 2016, or 2019. No Linux support is offered at this time for MSSQL. This includes discovery of a MSSQL instance, protection of the databases in the instance, and mounting a backup to a target server.

This exercise includes:

- [Before You Begin on page 1](#)
- [Set Up the Source Windows MS SQL Server VM on page 3](#)
- [Configuring a Backup Policy in AGM on page 10](#)
- [Adding a Microsoft SQL Server Host and its Databases to AGM on page 13](#)
- [Protecting a SQL Server Instance/Database\(s\) on page 14](#)
- [Running an On-Demand Backup Job on page 16](#)
- [Listing the SQL Server Backups in SQL Server on page 17](#)
- [Recover the MS SQL Instance/Database Image\(s\) on page 18](#)
- [Recover the Source Database to an Alternate MS SQL Server VM on page 21](#)
- [Unmount and Delete a Mounted Database Image on page 28](#)
- [Using the Mount & Migrate Feature on page 29](#)

### Before You Begin

This document assumes the following:

- There will be one or two VMs running in GCE:
  - Source (Production) VM hosting source databases
  - Target (Recovery/Test/DR/Non-production) VM to mount virtual copies of the databases.
- Actifio GO has already been deployed, with Sky installed and the network firewall configured as directed to allow the required communications between Sky and the SQL Server VM(s)

For your deployment, you can create or use one or two Windows Server VMs in Google Cloud Engine (GCE). One is for the source database and the other is for recovery and testing mounts. If desired, the source host may be used for the recovery, but the database name will need to be different to avoid a conflict.

Regardless of whether you deploy new VMs or use existing ones, the following tasks must be performed:

1. Source and target VMs require the Actifio Connector (agent) setup.
2. Windows Server will also require the iSCSI service to be set to started and set to automatic start.
3. Microsoft SQL Server should be installed.

4. You can add additional drives to your SQL servers if this is a normal operating procedure, and if you run databases and logs on alternate disk drives.

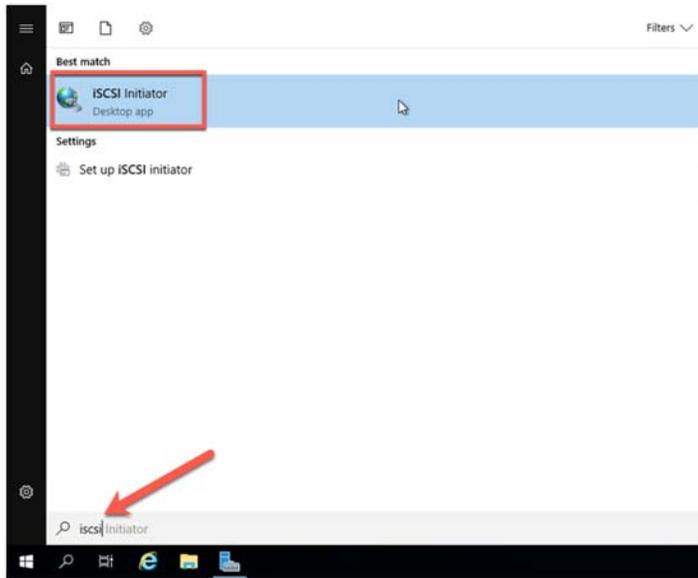
## Set Up the Source Windows MS SQL Server VM

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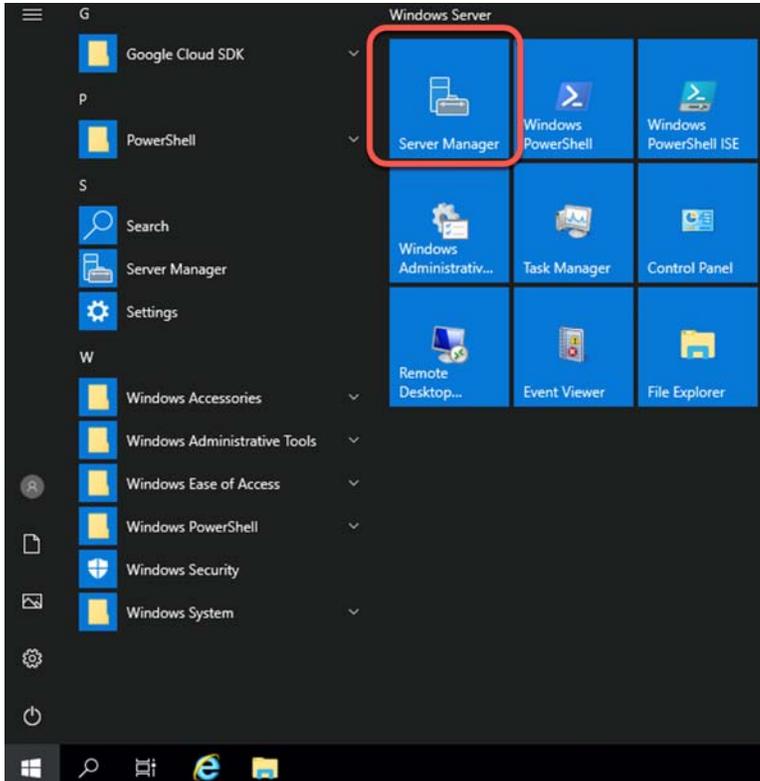
**Note:** We perform all tasks here as a local administrator or equivalent user.

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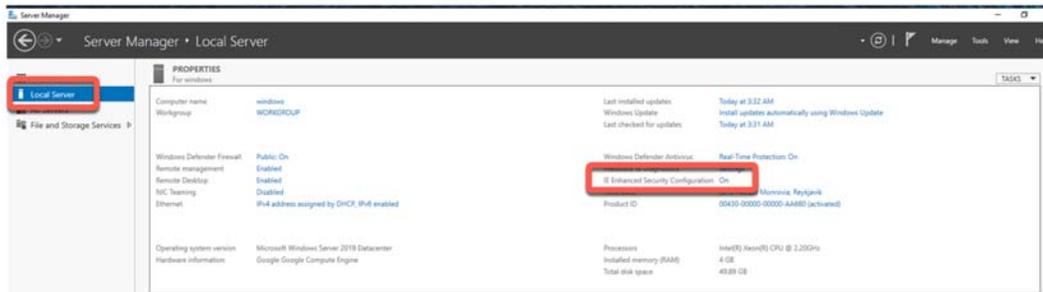
1. Log into the source VM.
2. Launch the iSCSI Initiator application: click on the Start Menu, type in **iSCSI** to find the application, and launch the process.



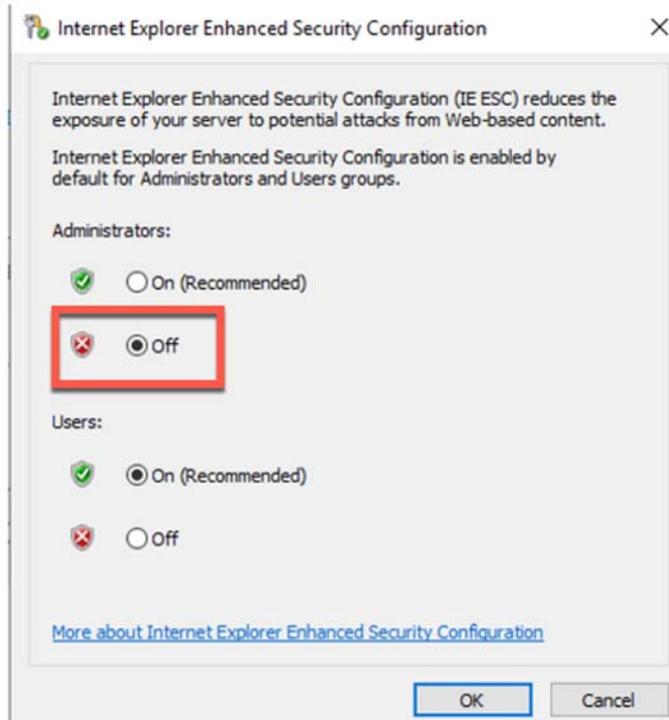
3. If you are prompted, click **Yes** to enable iSCSI and it will be set to auto-start upon boot. Once this is complete the iSCSI Initiator page will appear. Close this by clicking **OK**.
4. Open Server Manager if it's not already open.



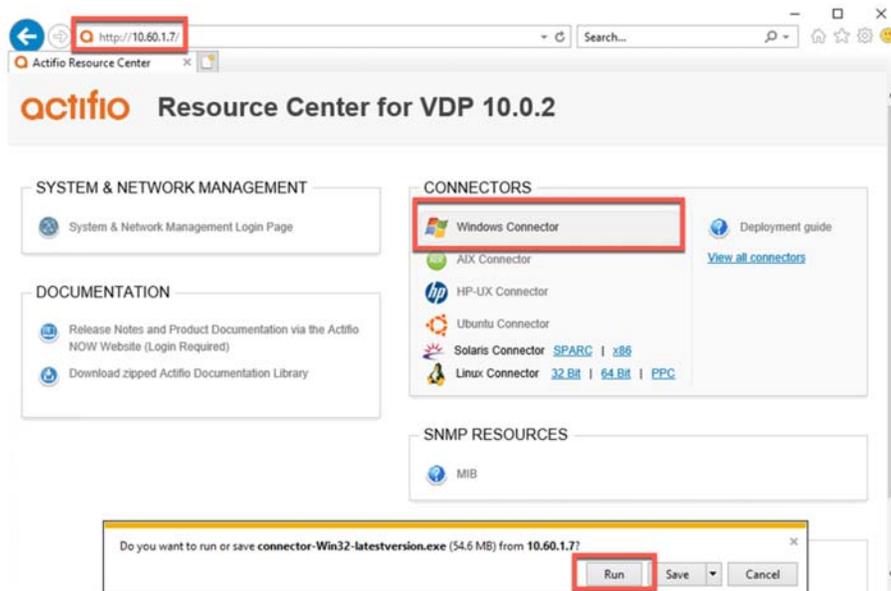
5. In Server Manager, select Local Server.



6. Select "IE Enhanced Security Configuration", set it to **Off** for administrators, and click **OK**.



7. If not already installed, and if desired for the simplest experience, install SQL Server Management Studio (SSMS).
8. Next, open a browser, and download the Actifio Windows Connector (agent). Change the URL to the IP address of your Sky Appliance. It may be easier to download using http instead of https if you receive any security warnings or the download is being blocked. Click on the Windows Connector, and select **Run**.



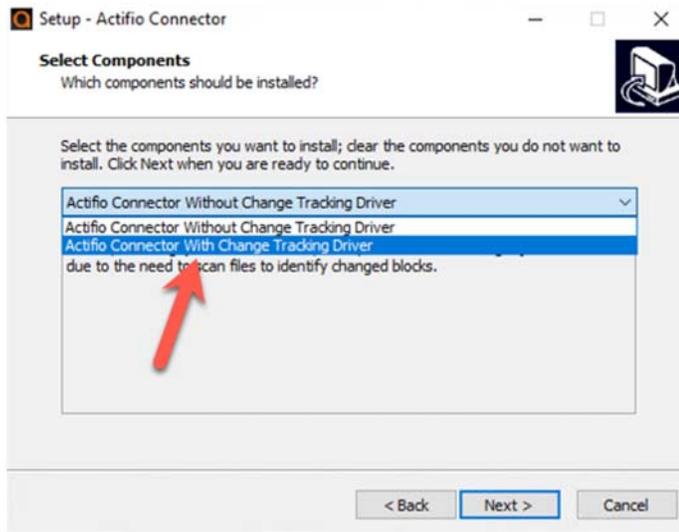
9. Select **Yes** to allow the installation to commence.

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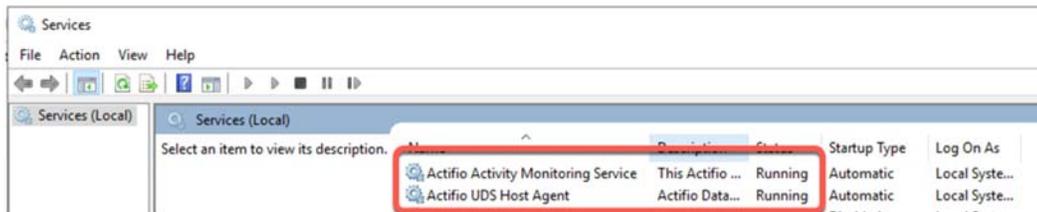
**Note:** You must be a local administrator for the installation to work.

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- Select the option to install the **Actifio Connector With Change Tracking Driver**. This installs an additional Windows service that will track changes for databases larger than 1GB in size.



- Click **Next** and agree to install the connector in the default location.
- Click **Install** to let the installation commence, and **Finish** when done.
- Open the Services control panel and confirm there are two Actifio services running. If not then reinstall the Actifio Connector making sure to enable Change Block Tracking.



- Launch the Microsoft SQL Server Management Studio from the Start menu and connect to the local SQL instance.
- If this is a new server without any databases, you may add your own small local database called CRM: select **New Query** and paste the following. Then click **Execute** to run the script. Afterwards you can refresh the instance and a new database called CRM will be available.

```
USE master
GO
IF NOT EXISTS (
    SELECT name
    FROM sys.databases
    WHERE name = N'CRM'
)
CREATE DATABASE [CRM]
GO

USE [CRM]

CREATE TABLE [Customers] (
    [CustomersID] INTEGER NOT NULL IDENTITY(1, 1),
    [Name] VARCHAR(255) NULL,
    [Email] VARCHAR(255) NULL,
    [Company] VARCHAR(255) NULL,
    [Street] VARCHAR(255) NULL,
```

```

[City] VARCHAR(255) NULL,
[Zip] VARCHAR(20) NULL,
[Country] VARCHAR(100) NULL,
[Code] VARCHAR(255) NULL,
PRIMARY KEY ([CustomersID])
);
GO

```

```

INSERT INTO Customers([Name],[Email],[Company],[Street],[City],[Zip],[Country],[Code])
VALUES('Hayden Hartman','aliquet.Phaseillus@Fuscealiquam.net','Risus Corp.','118-8548
Elit St.','Cawdor','7799','Uruguay','7671'),('Iola
Morin','Sed.nec.metus@mollisneccursus.com','Nunc Pulvinar Arcu Associates','Ap #260-
2255 Cras Rd.','Cambridge Bay','366160','Tanzania','6589'),('Candice
Lowery','tellus.faucibus@justonecante.com','Semper Limited','P.O. Box 413, 7363 Lacus.
Road','Ludwigsfelde','Z3378','Lesotho','8834'),('Roanna
Butler','hendrerit.Donec@lacusvestibulumlorem.com','Dignissim Lacus Associates','P.O.
Box 362, 1068 Id Ave','Zona Bananera','20754','Belize','5042'),('Ian
Clay','primis.in@vitaerisusDuis.co.uk','Dictum Placerat Limited','540-9946 Sem,
Rd.','Bogaarden','1612','Curaçao','4307'),('Yeo
Estrada','eleifend.nunc@liberoProinsed.ca','Porttitor Eros Ltd','6276 Consectetuer
Road','Bradford','753279','Sudan','2207'),('Ariel Ayers','amet@leo.com','Morbi
Accumsan Limited','8407 Fusce Rd.','Negrete','4821','Japan','5340'),('Erasmus
Bryant','Curabitur.egestas@congue.com','At Institute','Ap #297-2194 A, St.','Killa
Abdullah','19358','India','7948'),('Wynne Prince','nascetur@Donec.com','Magna Lorem
Institute','Ap #987-3600 Nibh Rd.','Lourdes','6790','Puerto Rico','5804'),('Howard
Hunt','natoque@dolorvitaedolor.com','Vel Limited','P.O. Box 482, 4991 Et
St.','Yaroslavl','23795-69952','Ecuador','3407');

```

- If you created the CRM database above, verify the database is available. Select "New Query" and paste the following:

```

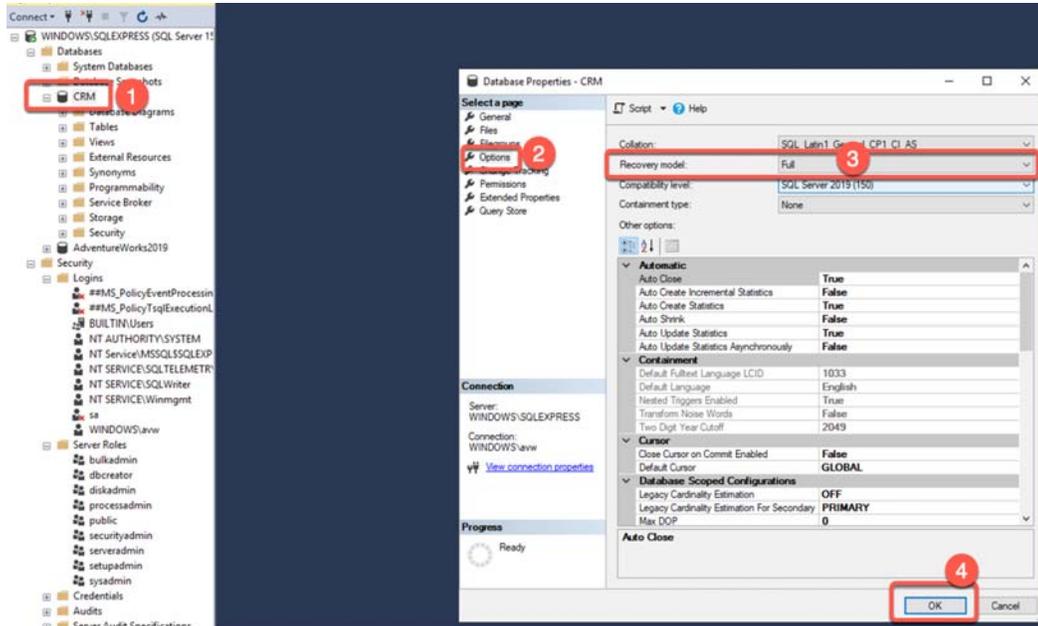
USE [CRM]
SELECT * from [Customers];

```

The results should look like this example:

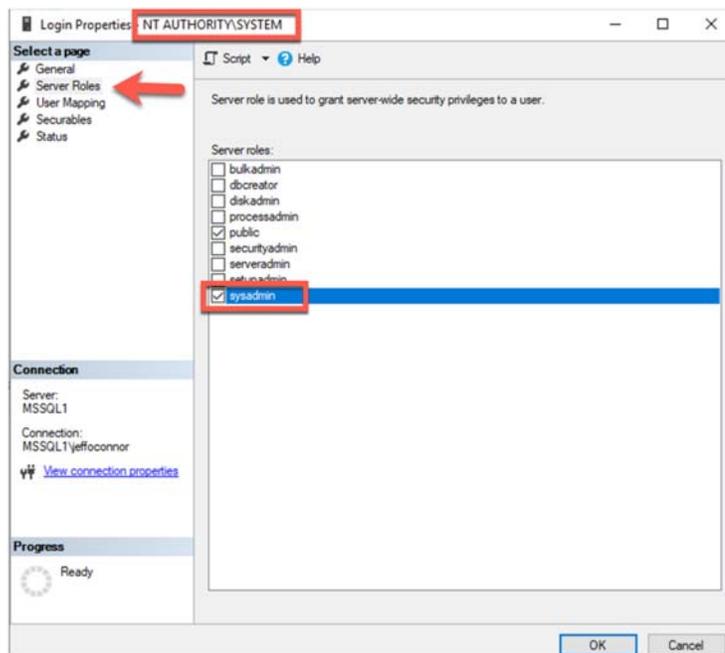
CustomersID	Name	Email	Company	Street	City	Zip	Country	Code
1	Hayden Hartman	aliquet.Phaseillus@Fuscealiquam.net	Risus Corp.	118-8548 Elit St.	Cawdor	7799	Uruguay	7671
2	Iola Morin	Sed.nec.metus@mollisneccursus.com	Nunc Pulvinar Arcu Associates	Ap #260-2255 Cras Rd.	Cambridge Bay	366160	Tanzania	6589
3	Candice Lowery	tellus.faucibus@justonecante.com	Semper Limited	P.O. Box 413, 7363 Lacus. Road	Ludwigfelde	23378	Lesotho	8834
4	Roanna Butler	hendrerit.Donec@lacusvestibulumlorem.com	Dignissim Lacus Associates	P.O. Box 362, 1068 Id Ave	Zona Bananera	20754	Belize	5042
5	Ian Clay	primis.in@vitaerisusDuis.co.uk	Dictum Placerat Limited	540-9946 Sem. Rd.	Bogaarden	1612	Curaçao	4307
6	Yeo Estrada	eleifend.nunc@liberoProinsed.ca	Porttitor Eros Ltd	6276 Consectetuer Road	Bradford	753279	Sudan	2207
7	Ariel Ayers	amet@leo.com	Morbi Accumsan Limited	8407 Fusce Rd.	Negrete	4821	Japan	5340
8	Erasmus Bryant	Curabitur.egestas@congue.com	At Institute	Ap #297-2194 A, St.	Killa Abdullah	19358	India	7948
9	Wynne Prince	nascetur@Donec.com	Magna Lorem Institute	Ap #987-3600 Nibh Rd.	Lourdes	6790	Puerto Rico	5804
10	Howard Hunt	natoque@dolorvitaedolor.com	Vel Limited	P.O. Box 482, 4991 Et St.	Yaroslavl	23795-69952	Ecuador	3407

- Change the Recovery Model of your databases to Full if you want transaction log backup to find any logs. The default is Simple, which means that Actifio Log backups will never find any logs to backup. Right select the database and select Properties. Then go to Options and change the Recovery model from Simple to Full.



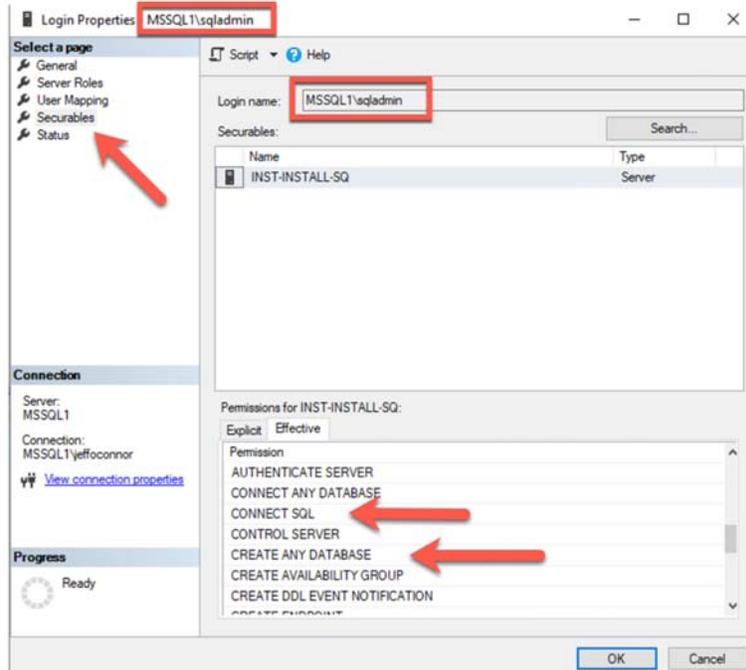
18. If you intend on backing up a SQL database(s) with Transaction Logs (Full Recovery model), or if you wish to avoid the need to enter credentials for SQL Server into the AGM interface when performing recoveries, there are two options available to achieve this. Use one of these two approaches for the most seamless experience:

- Option 1: Go to the SQL Instance Security, Logins menu. Right click on the "NT AUTHORITY\SYSTEM" account and select properties. Then in Server Roles, select the sysadmin Server Role, and click **OK**. This allows the Actifio Connector the elevated rights to run Log Backups and Log Recoveries without requiring additional user authentication.

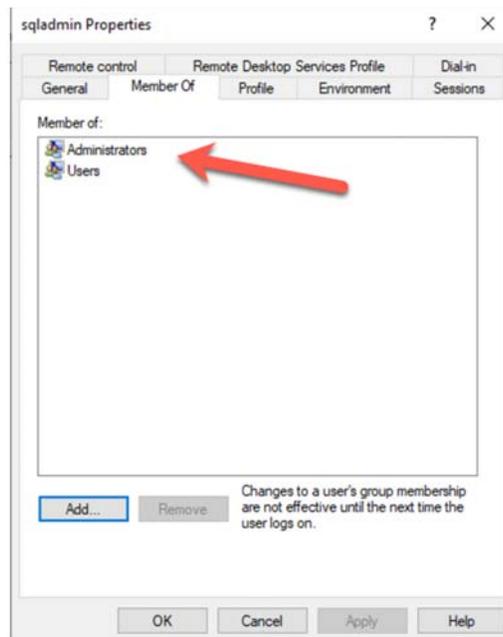


- Option 2 (three steps): Create a new Windows Administrator Account (domain or local OS):
  - Verify or grant the account permissions as follows:
    - o Allow the following rights in SQL: dbcreator server role, db\_backup operator database role, db\_owner database role

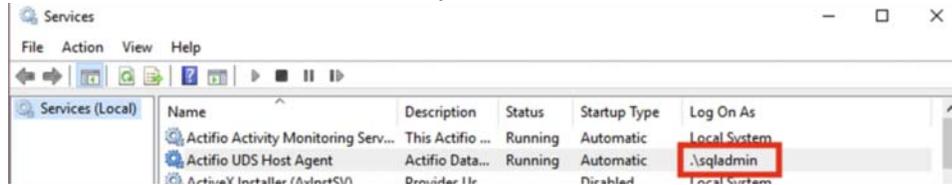
- o In addition, assign the following securables in SQL:  
View any database, Create any database, Alter any database, Connect SQL
- Here is an example of some of the securables granted to a Local Windows User "sqladmin".



- b. Next, the account should be in the local Windows administrator group, to ensure access to scripts in "C:\Program Files\Actifio\" and to make OS calls and handle the staging disks where backups will be stored.



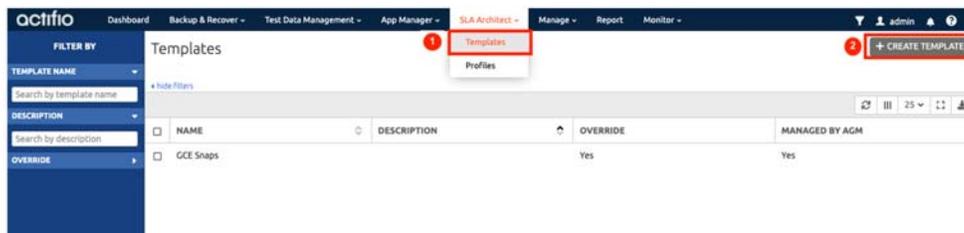
- c. Finally, update the "Actifio UDS Host Agent" service to run as this account, and restart the service.



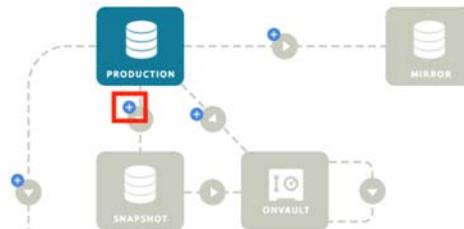
## Configuring a Backup Policy in AGM

Now we turn to the AGM to create a policy template that will determine when backups run, how long they are retained, and where they are stored. Several details related to how the backups will be performed are also specified.

1. Login to the Actifio Global Manager (AGM), and navigate to SLA Architect -> Templates. Then click **+ Create Template**.



2. Enter a name for your new template and a description, then click the **+** symbol below the icon that represents production data.



3. Enter the desired policy name, daily window, and retention for the snapshots of your databases. This retention is typically short, and it will be stored on PD storage to ensure recovery performance. Then click **Advanced Policy Settings**.

Production To Snapshot

Create/Edit Policy

POLICY NAME\* **Daily DB Backup**

SCHEDULING **Windowed**

ON THESE DAYS **Everyday**

EXCEPT **Never**

**WITHIN THIS WINDOW** 19:00 TO 07:00

RUN ONCE PER WINDOW

EVERY 24 Hour(s)

RETAIN FOR 4 Day(s)

SLA COMPLIANCE **Default**

PRIORITY **Medium**

**Advanced Policy Settings**

4. There are several options in the advanced policy settings; most of them should be left at the default values. For SQL Server, the most commonly changed settings, and best practices, are to set the following values:

- o Truncate/Purge Log After Backup: **Truncate**
- o Enable Database Log Backup: **Yes**
- o Log Backup Retention: **7 days**
- o Replicate Logs: **No**
- o Send Logs to OnVault Pool: **Yes**

Click **Save Changes** and then **Update Policy** after making the desired selections.

5. Now the Snapshot icon is colored. Click the **+** symbol between the Snapshot icon and the OnVault icon to add an OnVault policy.

TEMPLATE\* **SQL Backups** ALLOW OVERRIDES ON POLICY SETTINGS\*  YES  NO

DESCRIPTION 4-day Snap, 7-day Logs, 30-day OnVault



6. Enter the desired policy name, daily window, and retention for the OnVault copies of your database backups. The start time of the window should match the time specified in the snapshot policy. This retention is typically longer, ranging from 30 days to 90 days, and the copies will be stored in Google Cloud Storage to ensure the right balance of performance and cost. Click **Update Policy** when done.

7. Click **Save Template** to save your policies and settings.

When you deployed the AGM and Sky, an OnVault pool and a matching resource profile were created automatically. This resource profile will be used when protecting the databases.

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**Note:** You can create multiple policies if tiered retentions are required. For example, if daily backups should be kept for 90 days, and monthly backups for 1 year, create two OnVault policies. The second policy should be configured to only run on the desired day of the month (i.e. last Sunday of the month, or first day of the month), and to have a longer retention period.

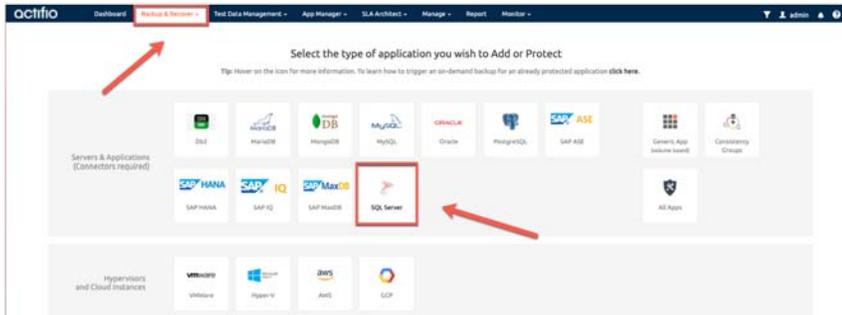
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8. Now we can add the database(s) to AGM and protect them as needed. Continue to [Adding a Microsoft SQL Server Host and its Databases to AGM](#).

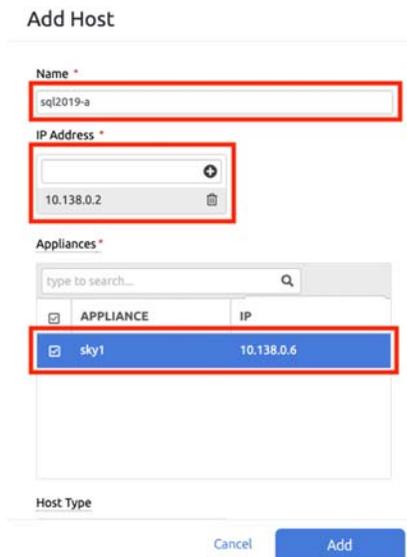
# Adding a Microsoft SQL Server Host and its Databases to AGM

To protect a SQL Server database, you must first add its host to the AGM and then discover the database.

1. From the **Backup & Restore** menu, select **SQL Server**.

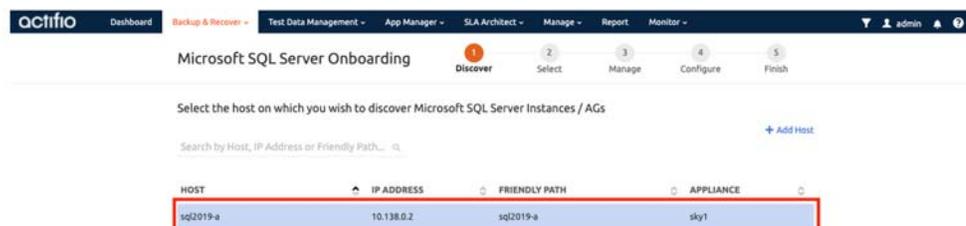


2. If you have previously configured backups for GCE VM Instances and have credentials defined, you may use the discovery process for GCP to add your SQL Server VM. See **Protecting & Recovering GCE Instances** at <https://docs.actifio.com/Actifio-GO> for more information on this process. Skip to **Step 5** to select your server if it has already been discovered. Otherwise proceed with the next steps to add the host.
3. At Manage Hosts, you will be shown a list of existing hosts, or a message that no hosts were found. Click **+ Add Host** to open the add host dialog.
4. Enter the Name and IP address (and click **+**) of your SQL Server VM. Then select your Sky appliance, and click **Add**.



5. Select your newly added server and click **Next** to discover the SQL Instances on the server. This process can take a minute to complete. If it fails, then you may need to verify the correct firewall policy is in place, to allow the Sky appliance access to the SQL server via TCP port 5106.

The SQL Server instances on the VM will be displayed.



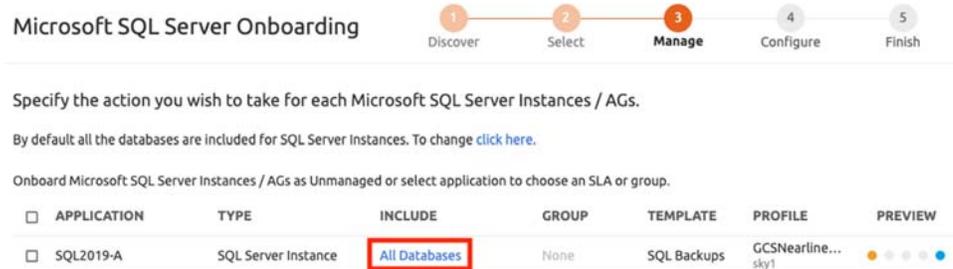
## Protecting a SQL Server Instance/Database(s)

In this step, you apply the SLA policy that you created in [Configuring a Backup Policy in AGM](#) to a database discovered in [Adding a Microsoft SQL Server Host and its Databases to AGM](#). According to the schedule in the policy, a backup job will run. It will take a snapshot of the database according to the snapshot policy and then copy it to the OnVault pool for longer storage according to the OnVault policy.

1. Select the SQL Server instance that has the database(s) you wish to backup and click **Next**.



2. To apply an SLA, select the instance, then choose **Apply SLA** from the dropdown box above the instance list. As you select options, more dropdowns will appear. Select the Template and Profile that were previously created, then click **OK**.



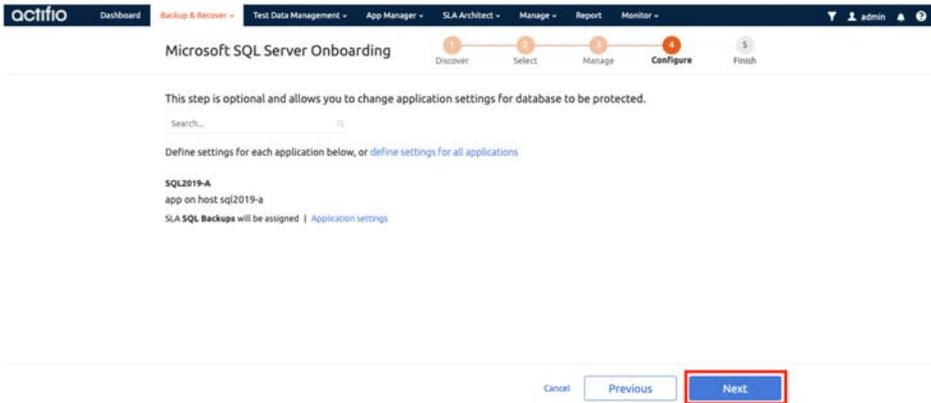
3. If you wish to select individual databases to include or exclude from backups, you can click the **All Databases** link to bring up the Manage Membership dialog.

You may choose an inclusion rule to suit your needs for inclusion or exclusion of databases for backups. Auto-inclusion of new databases is controlled by this selection.

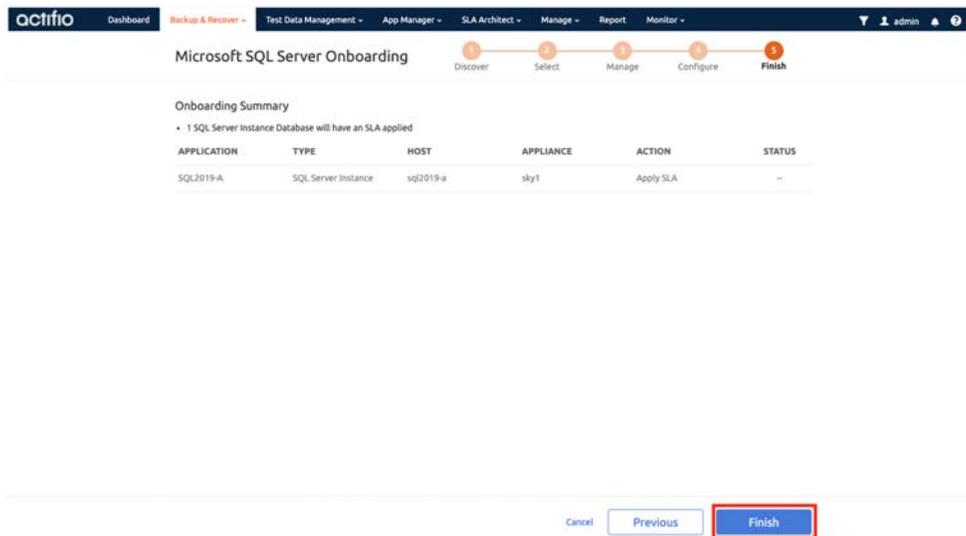
- o Include All, Include User, and Exclude Selected will result in new databases added to this instance to be backed up automatically.
- o Include User and Include Selected will result in a static list of databases to backup, and new databases will not be backed up without manual intervention.

The recommended selection is Include All.

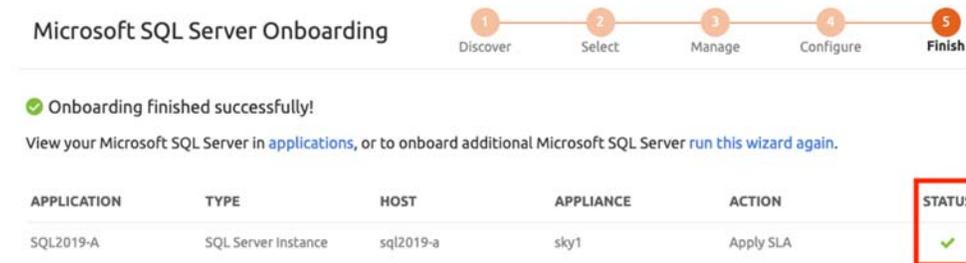
4. After optionally changing the database inclusion rule and saving your changes, click **Next**. You now have the option to modify application settings that determine SQL Server specific behaviors during backups. Keep the defaults and select **Next**.



- From the summary display, click **Finish** to initiate the discovery and protection of your SQL Server database(s). You will be presented with a confirmation page reminding you to keep your browser window open, without refreshing, until the discovery is complete. Click **Finish** again.



- Wait until you see the green checkbox before proceeding.

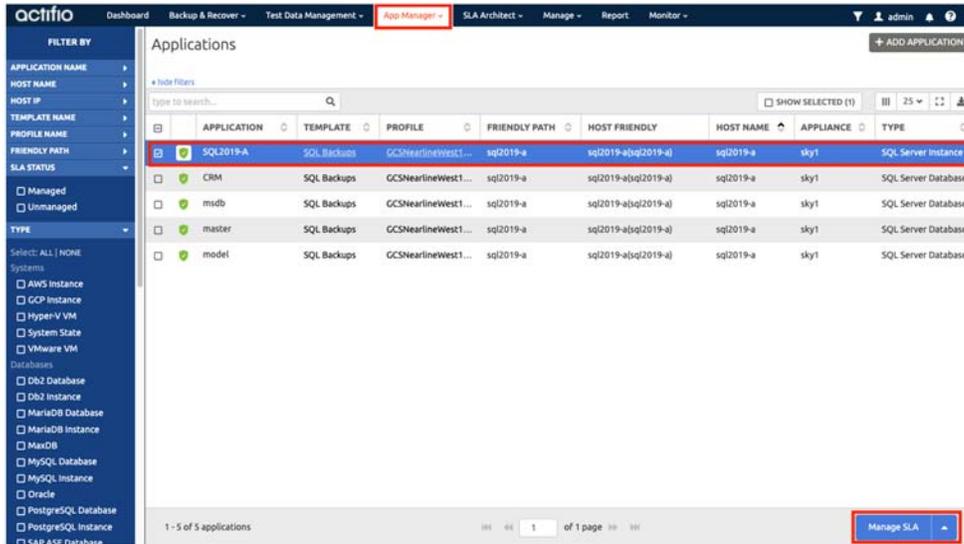


- After the SLA is applied to the SQL instance, backups will begin automatically, based on the schedule within the Template policy, however you can run an on-demand backup job immediately; continue to [Running an On-Demand Backup Job](#).

## Running an On-Demand Backup Job

Once the SLA is set up, protection jobs will run as scheduled. You can also run a job on-demand:

1. Goto **App Manager** -> **Applications**, select the SQL Instance, and select **Manage SLA**.



2. Expand the Snapshot policy (right-hand side), select **DB+Log** and enter a label if desired (optional), and click **Run SLA**.



3. You can watch the progress of the job in the Monitor, Jobs section.

Now you have a backup image of your SQL Server database and you will have additional copies over time, appearing and expiring according to the criteria in the SLA policy.

Now is a good time to verify that the Actifio backups are done in much the same way that SQL Native backups are performed; continue to [Listing the SQL Server Backups in SQL Server](#).

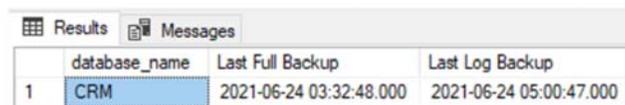
## Listing the SQL Server Backups in SQL Server

After the initial capture job is completed you can run the following query to show that SQL can itself identify the database has been backed up correctly, including the Transaction Log file.

```
USE msdb;  
GO
```

```
SELECT backupset.database_name,  
       MAX(CASE WHEN backupset.type = 'D' THEN backupset.backup_finish_date ELSE NULL END) AS 'Last  
Full Backup',  
       MAX(CASE WHEN backupset.type = 'L' THEN backupset.backup_finish_date ELSE NULL END) AS 'Last  
Log Backup'  
FROM backupset  
GROUP BY backupset.database_name  
ORDER BY backupset.database_name DESC
```

The result will look like this, indicating both Full backup and Log backup have been completed.

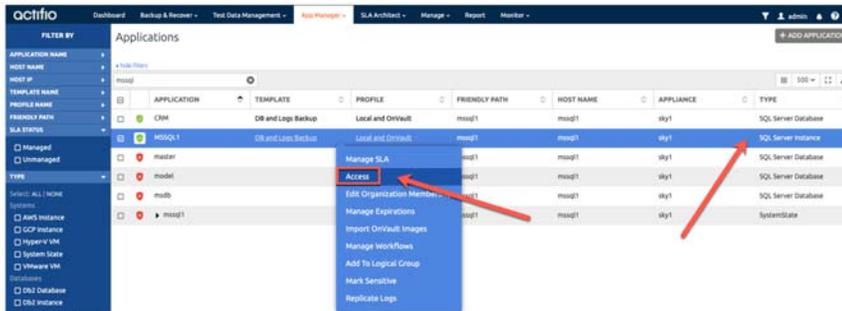


The screenshot shows a SQL Server query results window with two tabs: 'Results' and 'Messages'. The 'Results' tab is active, displaying a table with the following data:

	database_name	Last Full Backup	Last Log Backup
1	CRM	2021-06-24 03:32:48.000	2021-06-24 05:00:47.000

## Recover the MS SQL Instance/Database Image(s)

1. The database should now be backed up successfully. After a few minutes of initiating the backup snapshot, return to the **App Manager, Applications** menu and find your backed up SQL instance or database(s), right-click and select **Access**.

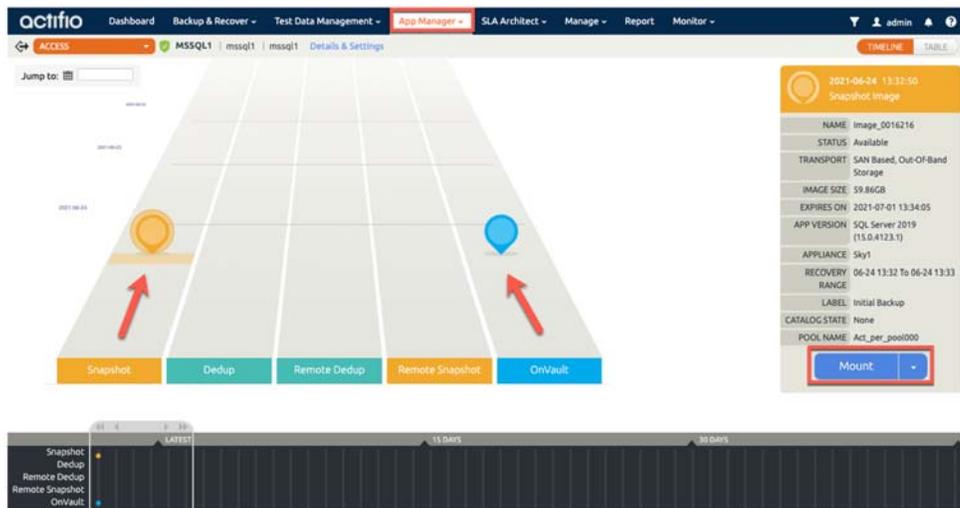


2. Depending on the SLA configured, You should be able to see captured images in the Timeline ramp or Table view. You may have image(s) in the Snapshot lane and additionally in the OnVault lane. Next, select one of the images and click **Mount**.

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**Note:** If you see in the metadata fields on the right side you have a date and time for the 'Recovery Range' then this is a strong indication that log backups have succeeded in addition to the Full Backup.

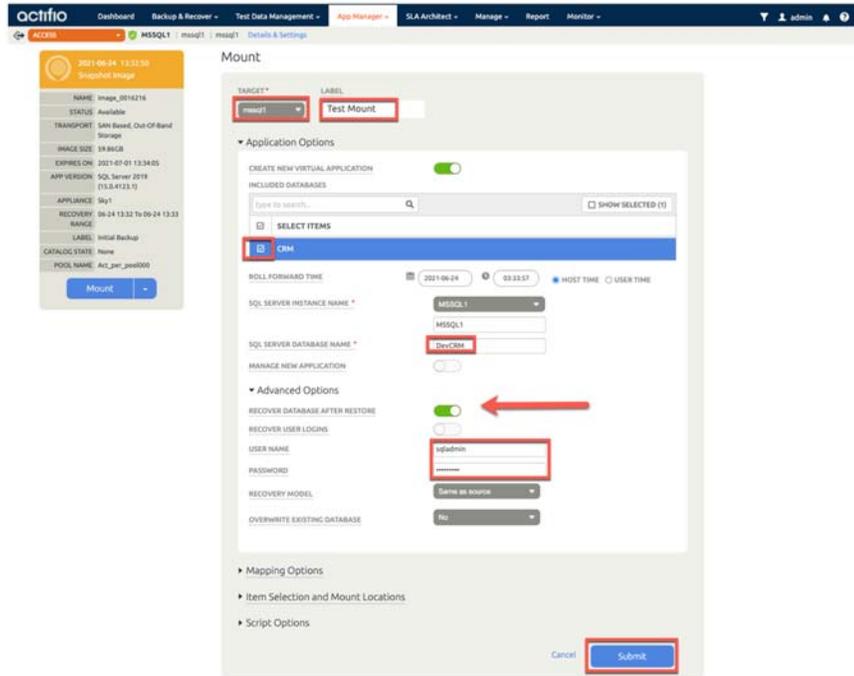
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3. The Mount screen is where you select the target host you want to mount the database(s) to. This can be back to the source host (choose a new name for the DB), or a different target host. You can also optionally enter a label for the mount, which may be helpful when referring to the mount job later. You also must select the database(s) to be mounted in the Select Item(s) area.

Next, you should provide a name for the database you are mounting. The User Name and Password fields can be left blank if the Actifio UDS Host Agent service has the permissions specified in step 18 of section "Source Windows MS SQL Server VM setup" above. Otherwise you will need to enter credentials with those permissions on this screen. Lastly, click **Submit** to run the job. The mount job may take 1-5 minutes, depending on the environment, and can be monitored from the Monitor, Jobs page.

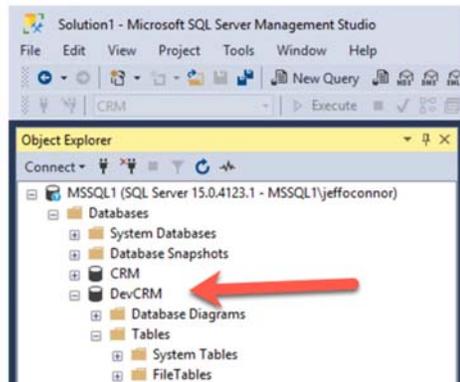
**Note:** The target MS SQL Server must be running the same version or higher as the source server where the backup was run (even minor security patches can be an issue, so ensure they are the same exact version if possible).



If all has succeeded, you can see your Mount task in the App Manager, Active Mounts page:



- Go back to the SQL Instance, and refresh the instance to see your newly mounted database.



- Now verify the database is available. Select New Query and paste the following (remember to use the name of the mounted database where DevCRM is below):

```
USE [DevCRM]
SELECT * from [Customers];
```

The results should look like this:

Results Messages									
CustomersID	Name	Email	Company	Street	City	Zip	Country	Code	
1	1	Hayden Hartman	aliquet.Phasekui@fuaeealiquam.net	Rius Corp.	118-8548 Eit St.	Ceedor	7799	Uruguay	7671
2	2	Iola Mohr	Sed.nec.metus@molareccursus.com	Nunc Pulvinar Arcu Associates	Ap #260-2255 Cree Rd.	Cambridge Bay	366160	Tanzania	6569
3	3	Candice Lowery	tella.faucibus@justonecarte.com	Semper Limited	P.O. Box 413, 7983 Lacus Road	Lubwipfede	23378	Lesotho	8834
4	4	Rosanna Butler	hendrerit.Donec@lacumvestibulumlorem.com	Dignissim Lacus Associates	P.O. Box 362, 1083 1st Ave	Zona Baranera	20754	Belize	5542
5	5	Ian Clay	pretis.in@haeriusDuis.co.uk	Datum Placenet Limited	540-9545 Sem. Rd.	Bojgaarden	1612	Congo	4307
6	6	Yeo Estrada	eleifend.nunc@liberoPhonaeed.ca	Futitor Eris Ltd	6276 Consectetur Road	Bradford	753279	Sudan	2207
7	7	Anel Ayers	amet@Neo.com	Mobi Accumsan Limited	8407 Fuoce Rd.	Negrete	4821	Japan	5340
8	8	Erasmus Bryant	Curabitur.egestas@congue.com	A Institute	Ap #297-2194 A. St.	Kila Abdulah	15358	India	7948
9	9	Wynne Prince	nascetur@Donec.com	Magna Lorem Institute	Ap #987-3650 N6th Rd.	Louides	6790	Puerto Rico	5804
10	10	Howard Hunt	natoque@dolorntaeddolor.com	Vel Limited	P.O. Box 482, 4991 E St.	Yaroslavf	23795-69952	Ecuador	3407

# Recover the Source Database to an Alternate MS SQL Server VM

## Overview

To initiate the mount to an alternate host, first prepare the server for the mount and add it to AGM using the steps in the following two sections. Then perform the same procedure used when mounting to the original host, but select your desired host in the "Target" field at the top of the mount page.

[Prepare the Alternate Windows Target MS SQL VM](#)

[Add the Alternate Windows Target MS SQL VM to AGM](#)

Mount to the new target

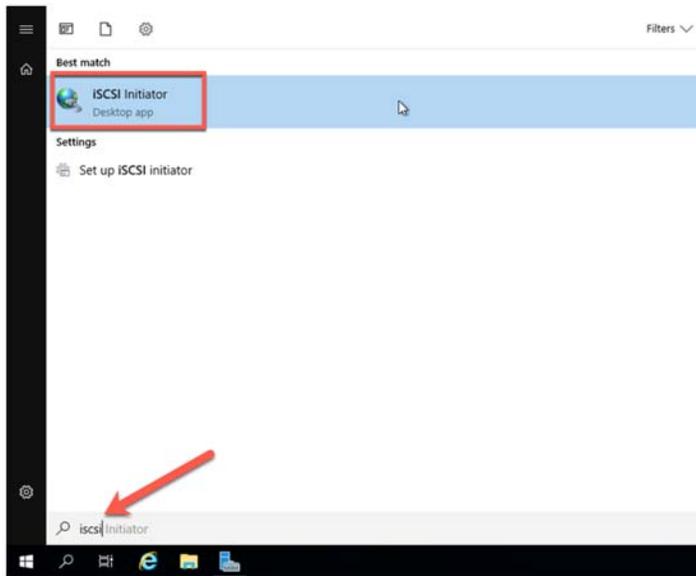
## Prepare the Alternate Windows Target MS SQL VM

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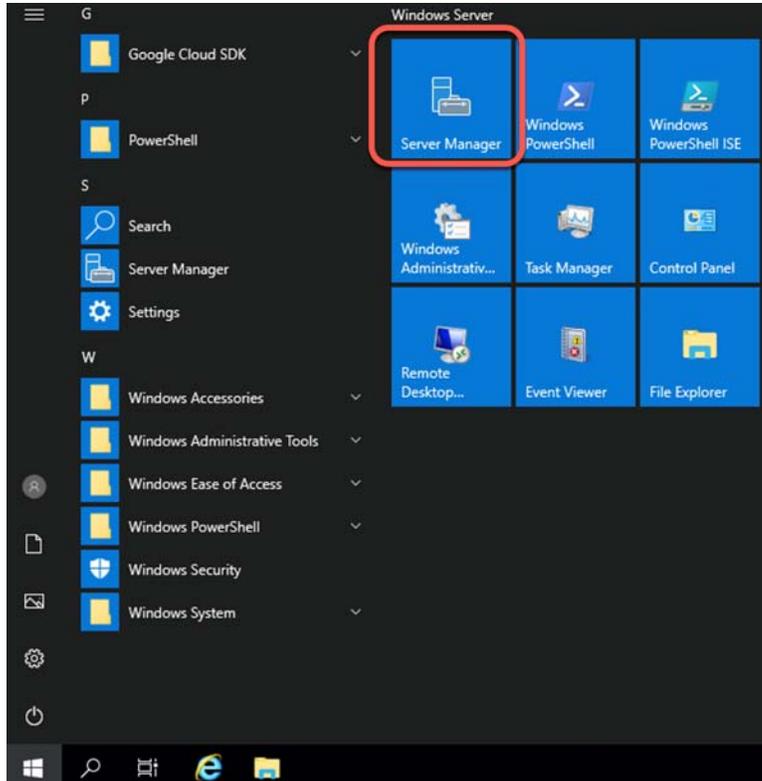
**Note:** Perform all tasks here as a local administrator or equivalent user.

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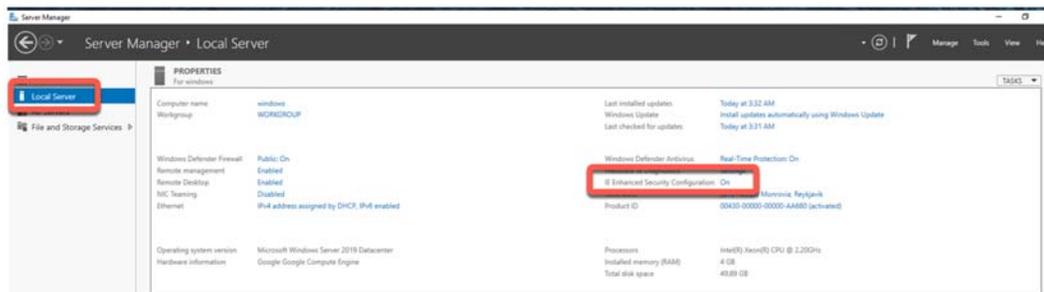
1. Log into the source VM.
2. Launch the iSCSI Initiator application: click on the Start Menu, type in **iSCSI** to find the application, and launch the process.



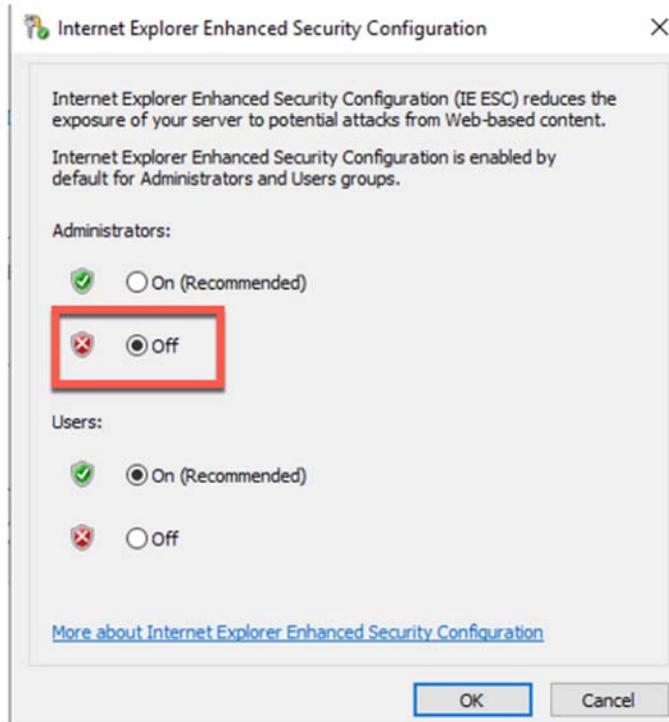
3. If you are prompted, click **Yes** to enable iSCSI and it will be set to auto-start upon boot. Once this is complete the iSCSI Initiator page will appear. Close this by clicking **OK**.
4. Open Server Manager if it's not already open.



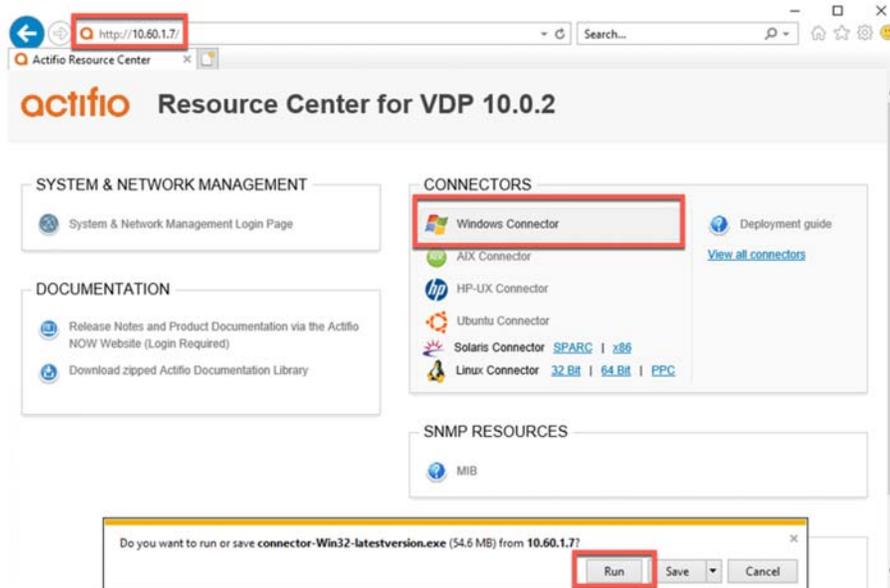
5. In Server Manager, select Local Server.



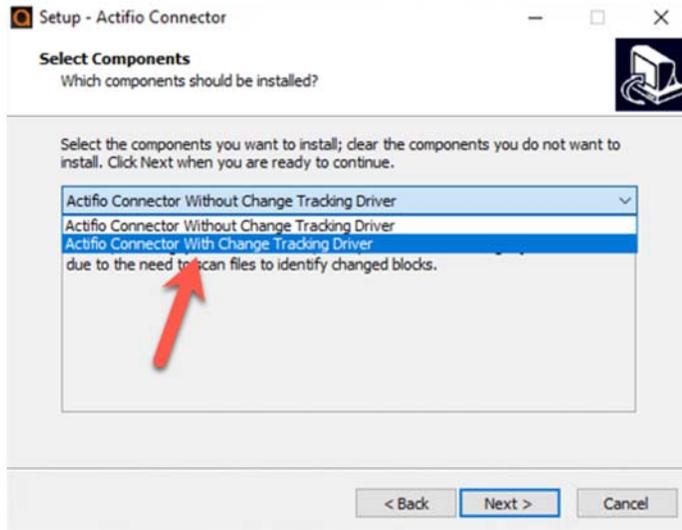
6. Select "IE Enhanced Security Configuration", set it to **Off** for administrators, and click **OK**.



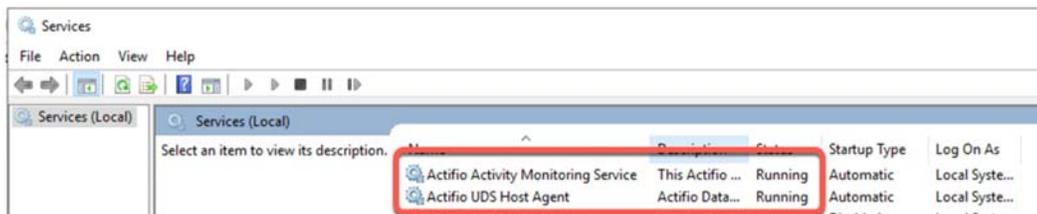
7. If not already installed, and if desired for the simplest experience, install SQL Server Management Studio (SSMS).
8. Next, open a browser, and download the Actifio Windows Connector (agent). Change the URL to the IP address of your Sky Appliance. It may be easier to download using http instead of https if you receive any security warnings or the download is being blocked. Click on the Windows Connector, and select **Run**.



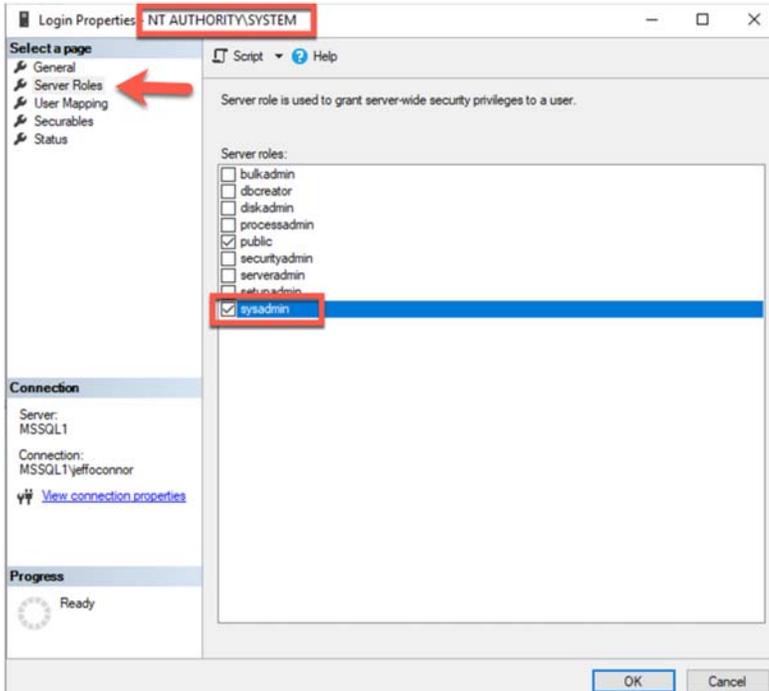
9. Select **Yes** to allow the installation to commence.
10. Select the option to install the "Actifio Connector With Change Tracking Driver". This installs an additional Windows service that will track changes for databases larger than 1GB in size.



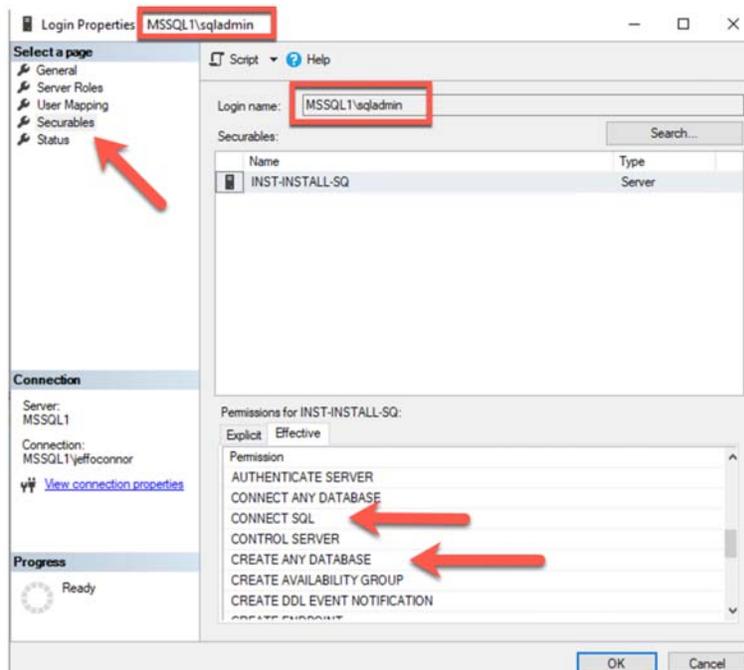
11. Click **Next** and agree to install the connector in the default location.
12. Click **Install** to let the installation commence, and **Finish** when done.
13. Open the Services control panel and confirm there are two Actifio services running. If not then reinstall the Actifio Connector making sure to enable Change Block Tracking.



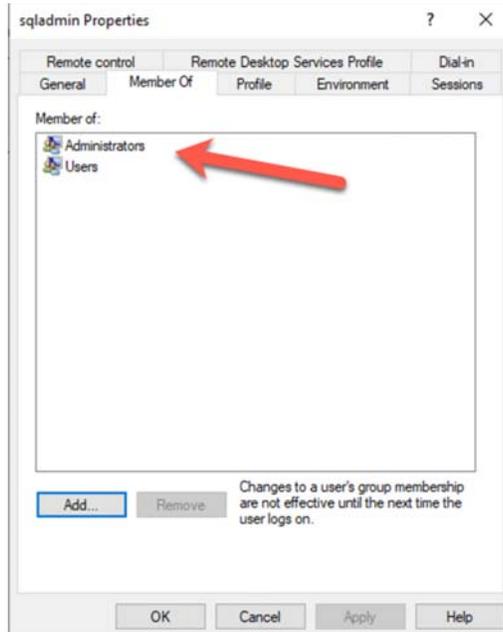
14. Launch the Microsoft SQL Server Management Studio from the Start menu and connect to the local SQL instance.
15. There are two options available to obtain the proper permissions required to perform database recoveries, if you wish to avoid the need to enter credentials into the AGM interface at the time of recovery. The options are:
  - OPTION A: Go to the SQL Instance Security, Logins menu. Right click on the "NT AUTHORITY\SYSTEM" account and select properties. Then in Server Roles, select the sysadmin Server Role, and click **OK**. This allows the Actifio Connector the elevated rights to run Log Backups and Log Recoveries without requiring additional user authentication.



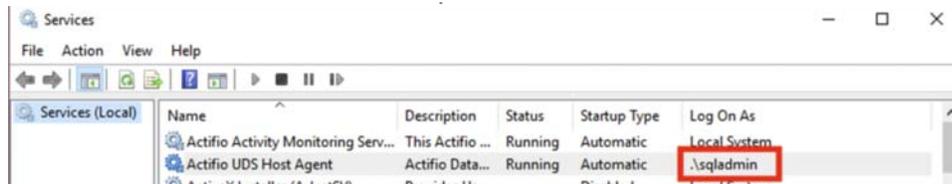
- OPTION B (three steps): Create a new Windows Administrator Account (Domain or Local OS) with these three steps a-c:
    - a. Verify or grant the account permissions as follows:
      - o Allow the following rights in SQL: dbcreator server role, db\_backup operator database role, db\_owner database role
      - o In addition, assign the following securables in SQL: View any database, Create any database, Alter any database, Connect SQL
- Here is an example of some of the securables granted to a Local Windows User "sqladmin".



- b. Next, the account should be in the local Windows administrator group, to ensure access to scripts in "C:\Program Files\Actifio\" and to make OS calls and handle the staging disks where backups will be stored.



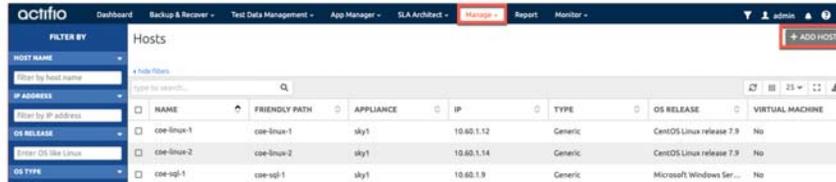
- c. Finally, update the "Actifio UDS Host Agent" service to run as this account, and restart the service.



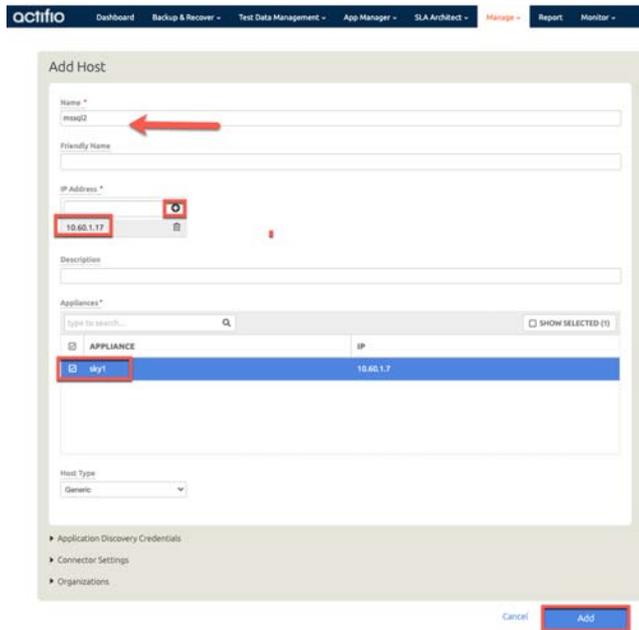
## Add the Alternate Windows Target MS SQL VM to AGM

We need to add our Target host to Actifio, so that it can be accessed.

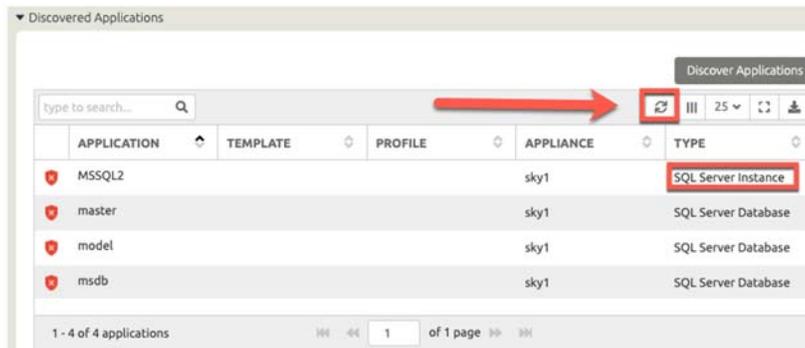
1. Go to the Manage, Hosts menu and click **Add Host**.



2. Enter the Name and IP address (and click **+**) of your SQL Server VM. Then select your Sky appliance, and click **Add**.



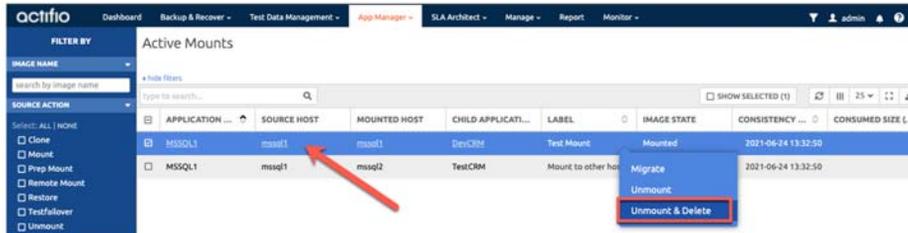
3. Now right click on the host, and select **Edit**.
4. Scroll down to the Discovered Applications section and click **Discover Applications** in the upper right corner.
5. When prompted, in Application Discovery, select All or just the appliance you added and click **Discover**. After about a minute, the discovered database instance will appear in the list. You can also refresh the display if required. Click **Save** to save your changes and exit the Host edit page.



# Unmount and Delete a Mounted Database Image

To unmount a mounted database:

1. Go to the **App Manager, Active Mounts** page. Select the mount you wish to remove from the SQL instance, and then right click on the application and select **Unmount & Delete**.



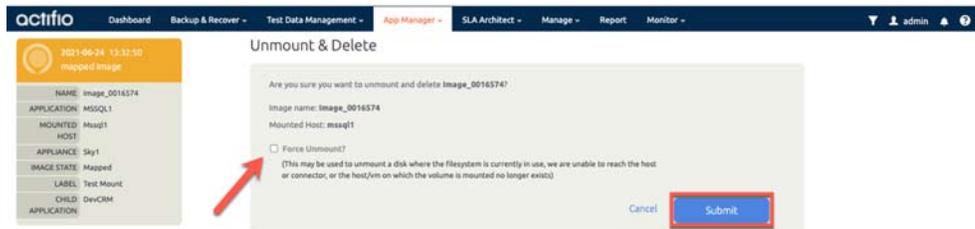
2. From this menu below, you can click **Submit**, and the database will be removed from the running SQL instance.

If your account does not have enough privileges with SQL, then this job may fail. If that occurs, you will need to use SQL Studio to manually delete the database from SQL Server. Once that has been successfully completed, you can re-try the Unmount-Delete, and select the Force Unmount option. This will result in the Actifio presented disk(s) being removed from the server without warning SQL Server first.

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**Note:** Force Unmount should never be used when unmounting a database that is known to a running instance of SQL Server as it can cause performance and stability issues.

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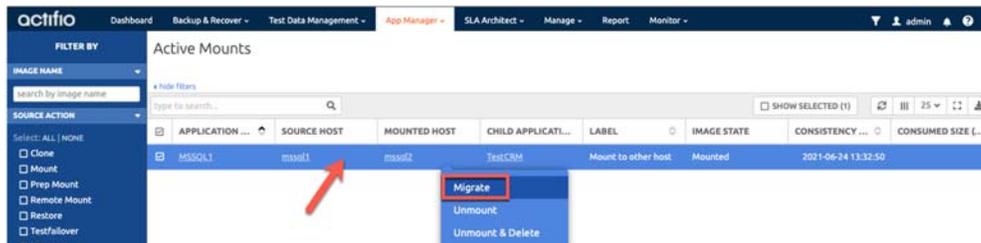


After a short period of time, you can check the SQL instance, and the database should be removed.

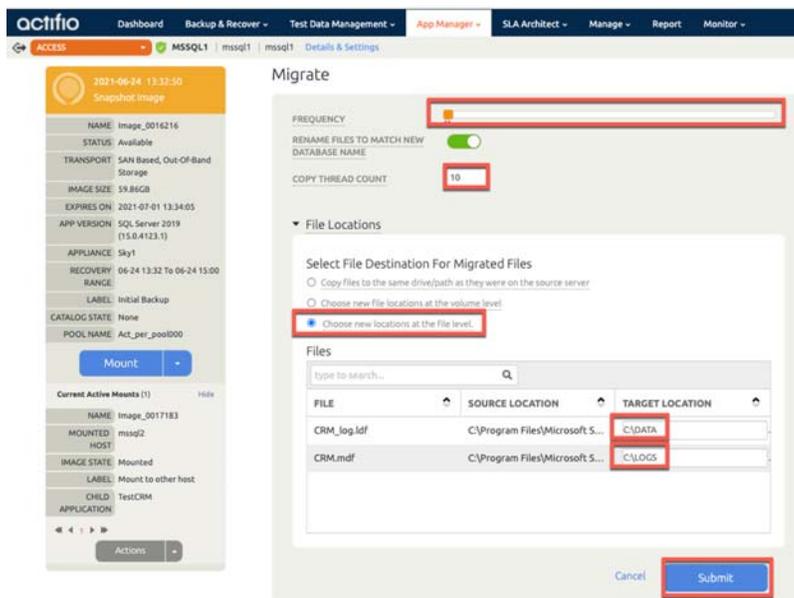
## Using the Mount & Migrate Feature

Mount & Migrate is a very valuable feature for DBA's, as it allows you to get access to a database quickly via the mount operation as above, and then restore the database while it is running, with a small interruption at a later time to switch from the mounted disks to the server's attached disks.

1. To initiate a Migrate for a database, go to the **App Manager, Active Mounts** page, right click on the database and select **Migrate**.



2. Select the Frequency, which is the duration in hours between incremental refreshes of the mounted database to the server's attached disks. This process will repeat until the final switchover is done. Additionally you can configure the copy thread count (between 1-20), and optionally select the new file and folder location for the restored copy. Click Submit to start the process.



3. During the migrate job the database will still be running as a mounted database hosted from the Snapshot pool in the Data Mover / Sky Appliance. When the first migrate job is complete, a locally restored copy of the SQL Database and Log files will be present on the target SQL server.
4. To verify this, run the following Query in Microsoft SQL Server Management Studio.

```
USE master;
SELECT name 'Logical Name', physical_name 'File Location'
FROM sys.master_files
```

The result should look like below, where the database files are running from the Actifio mounted disk.

	Logical Name	File Location
1	master	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\master.mdf
2	mastlog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\mastlog.ldf
3	tempdev	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\tempdb.mdf
4	templog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\templog.ldf
5	temp2	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\tempdb_mssql_2.ndf
6	temp3	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\tempdb_mssql_3.ndf
7	temp4	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\tempdb_mssql_4.ndf
8	modeldev	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\model.mdf
9	modellog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\modellog.ldf
10	MSDBData	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf
11	MSDBLog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\MSDBLog.ldf
12	CRM	Z:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\CRM.mdf
13	CRM_log	Z:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER\MSSQL\DATA\CRM_log.ldf

- Now is a good time to make some changes to the mounted database. Run a "New Query" on the SQL database called TestCRM as below. This will update the last column for all customers to '0000'.

```
USE TestCRM
GO
UPDATE Customers
SET
```

```
    Code = '0000'
```

```
WHERE
```

```
    CustomersID > 0;
```

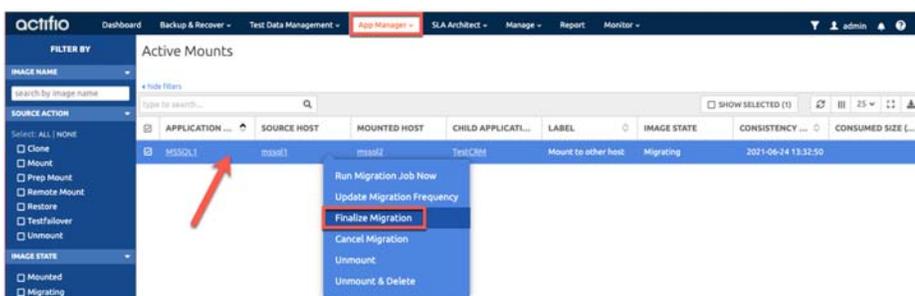
- You can now verify this with the following query:

```
USE [TestCRM]
SELECT * from [Customers];
```

The results should look as follows:

CustomersID	Name	Email	Company	Street	City	Zip	Country	Code
1	Hayden Hartman	aliquet.Phaseilus@Fuscealiquam.net	Rlaus Corp.	118-8548 Eit St.	Cawdor	7799	Uruguay	0000
2	Iola Moin	Sed.nec.metus@mollieneccus.com	Nunc Pulvinar Arcu Associates	Ap #260-2255 Cras Rd.	Cambridge Bay	365160	Tanzania	0000
3	Candice Lowery	tellus.faucibus@justonecorte.com	Semper Limited	P.O. Box 413, 7363 Lacus Road	Ludwigfelde	23378	Lesotho	0000
4	Roanna Butler	hendreit.Donec@facusvestibulumlorem.com	Dignissim Lacus Associates	P.O. Box 362, 1068 Id Ave	Zona Bananera	20754	Belize	0000
5	Ian Clay	prims.in@vitaentusDus.co.uk	Dictum Placerat Limited	540-9946 Sem. Rd.	Bogaarden	1612	Curacao	0000
6	Yeo Estrada	elefend.nunc@liberoPromised.ca	Porttitor Eros Ltd	6276 Consectetur Road	Bradford	753279	Sudan	0000
7	Arel Ayers	amet@leo.com	Morbi Accumsan Limited	3407 Fusce Rd.	Negrete	4821	Japan	0000
8	Erasmus Bryant	Curabitur.egestas@congue.com	At Institute	Ap #297-2194 A. St.	Killa Abdullah	19358	India	0000
9	Wynne Prince	nascetur@Donec.com	Magna Lorem Institute	Ap #987-3600 Nibh Rd.	Lourdes	6790	Puerto Rico	0000
10	Howard Hunt	natoque@dolorvitaeolor.com	Vel Limited	P.O. Box 482, 4991 Et St.	Yaroslavl	23795-69952	Ecuador	0000

- Now we will finalize the migration. This will take the database offline, perform a final synch of the current data to the server's attached disks, switch SQL Server to reference the restored database files, and then bring the database back online. This is usually very quick, as it is only an incremental backup and recovery process. For many large databases this process can run less than 5 minutes depending on the rate of change. From the **App Manager, Active Mounts** page, select the database you want to finalize the migration for, and select **Finalize Migration**.



- Confirm the finalize task, and click the **Proceed** option.

## ? Confirmation

This will take the databases offline, perform one final migrate process, and will then bring the databases back up, running from the target storage. The mounted disks will be unmounted at the conclusion of this process. Do you wish to proceed?

Note: Backups taken from the time of the mount until the finalize is completed, if any, can be found by navigating directly to the database. Backups taken after the finalize is complete will appear as normal, under the SQL Instance.



- At the completion of the finalize task, the database will be switched to run from the local disk, with all changes intact. To verify this, run the following Query in Microsoft SQL Server Management Studio:

```
USE master;
SELECT name 'Logical Name', physical_name 'File Location'
FROM sys.master_files
```

The result should look like below, where the database files are running from the local disk as requested.

	Logical Name	File Location
1	master	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
2	mastlog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
3	tempdev	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
4	templog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
5	temp2	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
6	temp3	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
7	temp4	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
8	modeldev	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
9	modellog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
10	MSDBData	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
11	MSDBLog	C:\Program Files\Microsoft SQL Server\MSSQL15.MSS...
12	TestCRM	C:\LOGS\TestCRM.mdf
13	TestCRM_log	C:\DATA\TestCRM_log.ldf

- Lastly let's confirm the changes have been written to our local running database. You can now verify this with the following query:

```
USE [TestCRM]
SELECT * from [Customers];
```

The results should look as follows:

CustomersID	Name	Email	Company	Street	City	Zip	Country	Code
1	Hayden Hartman	aliquet.Phasellus@Fuscealiquam.net	Reus Corp.	118-8548 Elit St.	Cawdor	7799	Uruguay	0000
2	Iola Morin	Sed.nec.metus@mollanecocursus.com	Nunc Pulvinar Arou Associates	Ap #260-2255 Cras Rd.	Cambridge Bay	366160	Tanzania	0000
3	Candice Lowery	tellus.faucibus@justonecante.com	Semper Limited	P.O. Box 413, 7363 Lacus. Road	Ludwigfelde	23378	Lesotho	0000
4	Roanna Butler	hendrent.Donec@facusvestibulumlorem.com	Dignissim Lacus Associates	P.O. Box 362, 1068 Id Ave	Zona Bananera	20754	Belize	0000
5	Ian Clay	primis.in@vitaeriusDuis.co.uk	Dictum Placerat Limited	540-9946 Sem. Rd.	Bogaarden	1612	Curaçao	0000
6	Yeo Estrada	elefend.nunc@IberoPronised.ca	Pottstor Eros Ltd	6276 Consectetur Road	Bradford	753279	Sudan	0000
7	Ariel Ayers	amet@leo.com	Morbi Accumsan Limited	8407 Fusce Rd.	Negrete	4821	Japan	0000
8	Erasmus Bryant	Curabitur.egestas@congue.com	At Institute	Ap #297-2194 A. St.	Kila Abdullah	19358	India	0000
9	Wynne Prince	nascetur@Donec.com	Magna Lorem Institute	Ap #987-3600 Nibh Rd.	Lourdes	6790	Puerto Rico	0000
10	Howard Hunt	natoque@dolorvitaedolor.com	Vel Limited	P.O. Box 482, 4991 B St.	Yaroslavl	23795-69952	Ecuador	0000

Finally, Actifio will also clean up the previous mounted disks as part of the finalize task, so there is no need to clean up, this was taken care of for you.