# MySQL DBA's Guide to Actifio Copy Data Management

actifio

Actifio VDP 9.0

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# Contents

# Preface

The information presented in this guide is intended for users who are familiar with basic Actifio processes and procedures as described in ***Getting Started with Actifio Copy Data Management*** and who are qualified to administer MySQL databases.

## The ActifioNOW Customer Portal

During the configuration and initialization of your Actifio appliance your Actifio representative provided you with a user name and password for the ActifioNOW customer portal.

From the customer portal you can obtain detailed reports about your Actifio appliance as well as search the portal's knowledge base for answers to specific questions.

To log into the ActifioNOW customer portal:

1. Go to: **https://now.actifio.com**
2. When prompted, enter the user name and password provided by your Actifio representative.

## Actifio Support Centers

To contact an Actifio support representative, you can:

- Send email to: support@actifio.com
- Call:

  **From anywhere:** +1.315.261.7501

  **US Toll-Free:** +1.855.392.6810

  **Australia:** 0011 800-16165656

  **Germany:** 00 800-16165656

  **New Zealand:** 00 800-16165656

  **UK:** 0 800-0155019

# 1 Introducing Actifio Copy Data Management for MySQL Databases

An Actifio appliance is a highly scalable copy data management platform that virtualizes application data to improve the resiliency, agility, and cloud mobility of your business. It works by virtualizing data in much the same way other technologies have virtualized servers and networks. This enables you to capture data from production systems, manage it in the most efficient way possible, and use virtual copies of the data however they are needed.

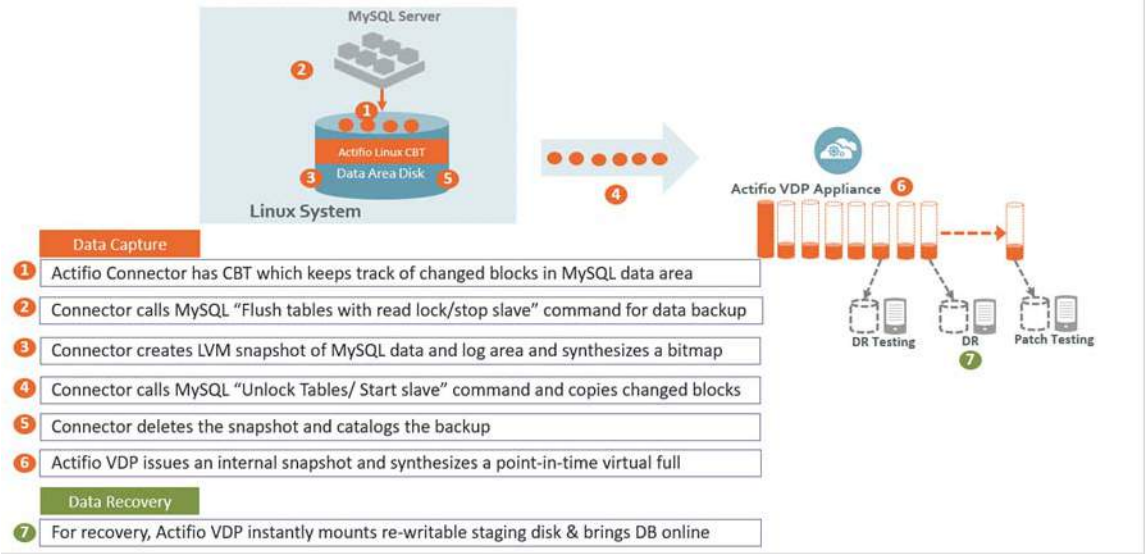
MySQL is the world's most popular open source database, used by high profile web properties including Facebook, Twitter, YouTube, and many more. This DBA guide explains how to protect MySQL application consistent database data with Actifio VDP in a Linux environment.

### MySQL Backup API used by Actifio VDP

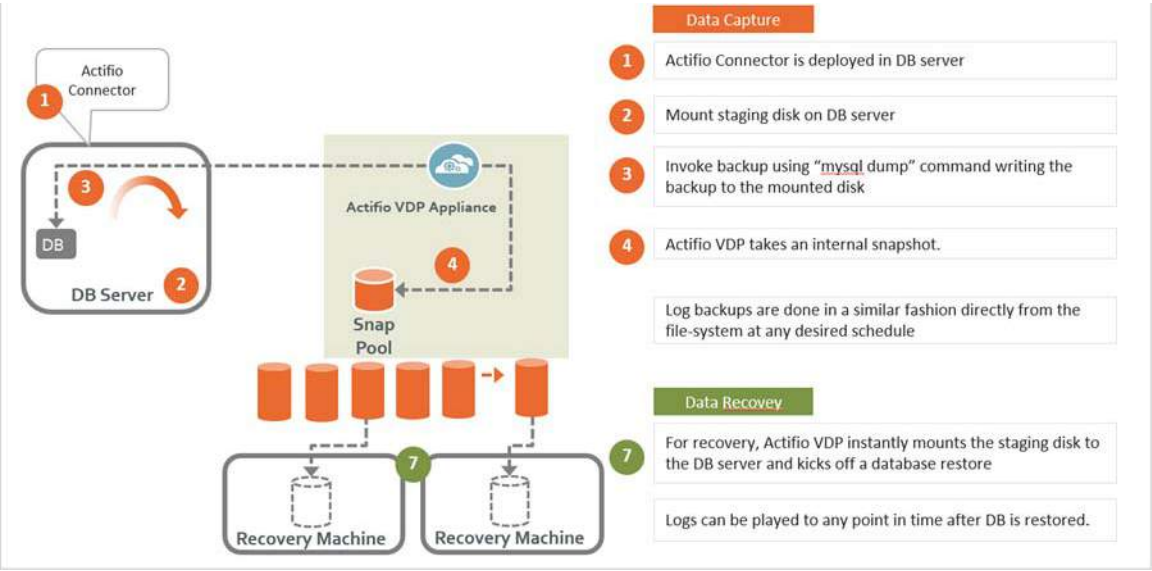
**Linux CBT and LVM snapshot**: MySQL "FLUSH TABLES WITH READ LOCK" and "UNLOCK TABLES" API

**File-based backups**: MySQL "mysqldump" API. This provides the full backup of the database in backup format. On recovery, the restore db API recovers the database by physically overwriting the data area.

**MySQL log backup**: During a log backup, VDP physically copies all the MySQL binary logs. The MySQL "purge binary logs BEFORE" API is used to purge the binary logs.




**How It Works: MySQL with Linux CBT and LVM Snapshot**




**How It Works: MySQL with File-Based Traditional Backup**

# 2 Adding a MySQL Database Host and Discovering the Database

### Prerequisites

- The MySQL database must be residing under LVM and it must not be the boot volume.
  Run (mysql -e "select @@datadir") to get the database data path.
- For best results, the LVM volume from which the MySQL volumes are provisioned should have at least 20% free space.
- Install the Actifio Connector on the MySQL server host (see ***Connecting Hosts to Actifio Appliances***.)
- For best results, create a backup user with all privileges.

  ```
  mysql> create user identified by 'actpassword';
  mysql> grant all privileges on *.* to 'actuser';
  ```

  Backup username/password must be configured with host configuration. If there are multiple MySQL instances running on a server, then the backup username/password must be common for all MySQL instance running on that server.
- MySQL binary logging (log_bin) must be on to take log backup. To configure the binary log option, shut down the MySQL server and edit the config file (my.cnf or my.ini). Within the [mysqld] section of the configuration file, add the log-bin option.

  ```
  [mysqld]
  log_bin = /log1/mysql3306/mysql3306-bin.0000
  ```

### Adding a MySQL Database Host and Discovering the Database

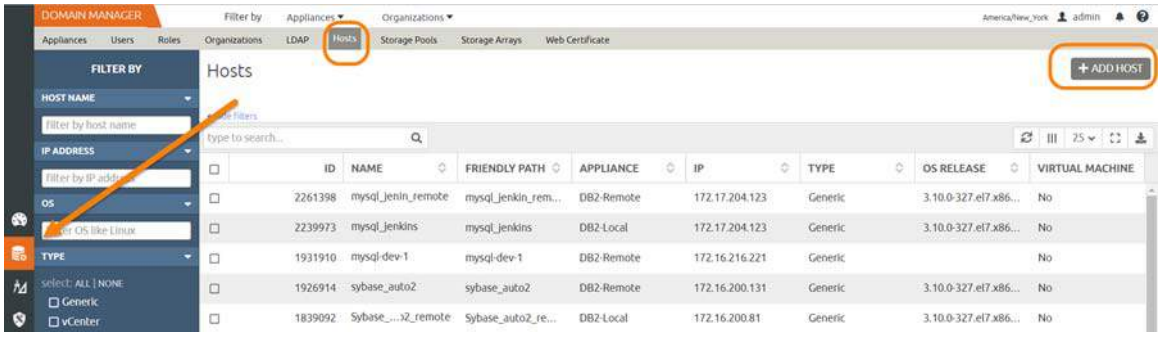
Before you can protect a MySQL database, you must add the host and discover the database. This requires:

1. Adding the Host from the Domain Manager on page 4
2. Discovering the MySQL Database from the Application Manager on page 6
3. Finding the Discovered MySQL Database in the Application Manager on page 7

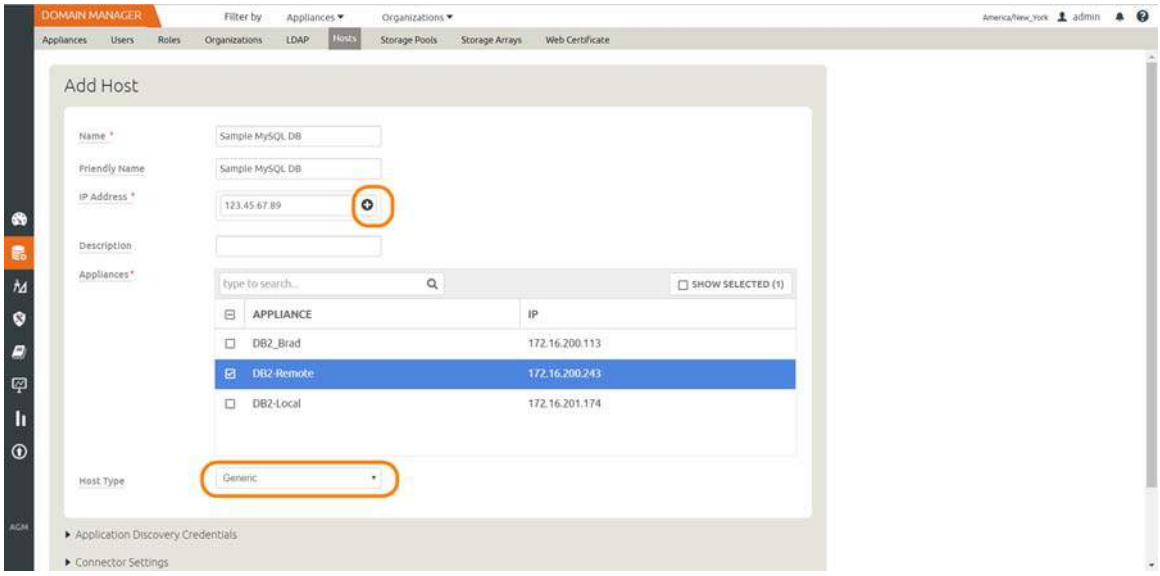
## Adding the Host from the Domain Manager

Add the host to Domain Manager. If the host is already added then edit the host and make sure to set all the configurations correctly.

1. From the AGM Domain Manager, Hosts tab, click **+Add Host**.



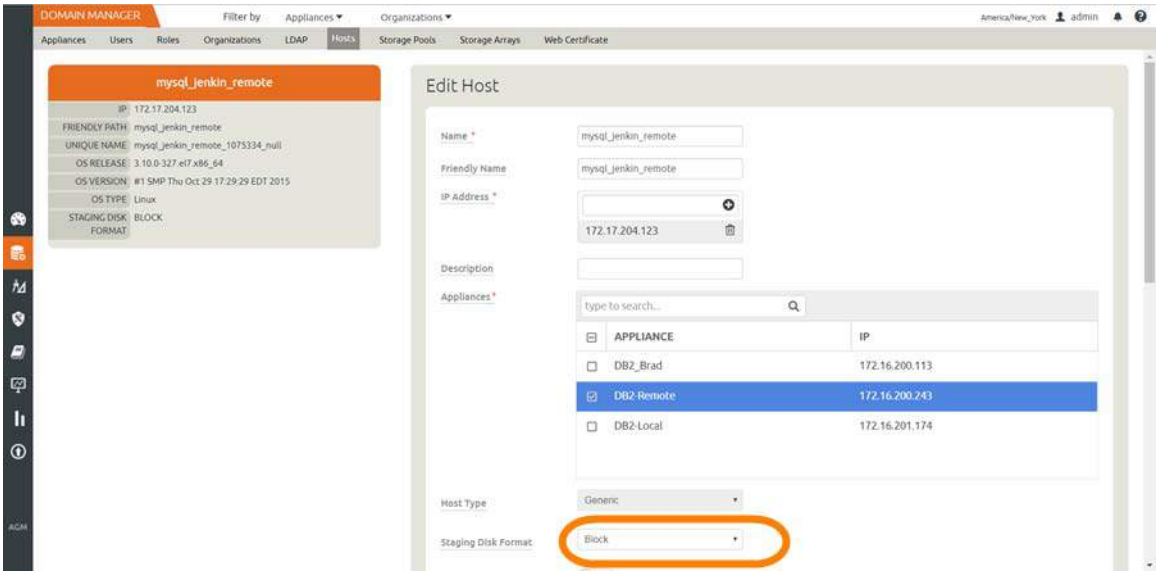

2. On the Add Host page:
   - **Name**: Provide the database server name.
   - **IP Address**: Provide the database server IP and click the + sign on the right corner.
   - **Appliances**: Select the check box for the appliance.
   - **Host Type**: Make sure this is Generic.




3. Click **Add** at bottom right to add the host.

   The Host is added.

4. Right-click the host and select **Edit**.
5. On the Edit Host page: Select the **disk preference**:
   - For block-based backup with CBT or GPFS: select **Block**
   - For file-based backup with Full+Incremental file system backup: select **Block** *or* **NFS**

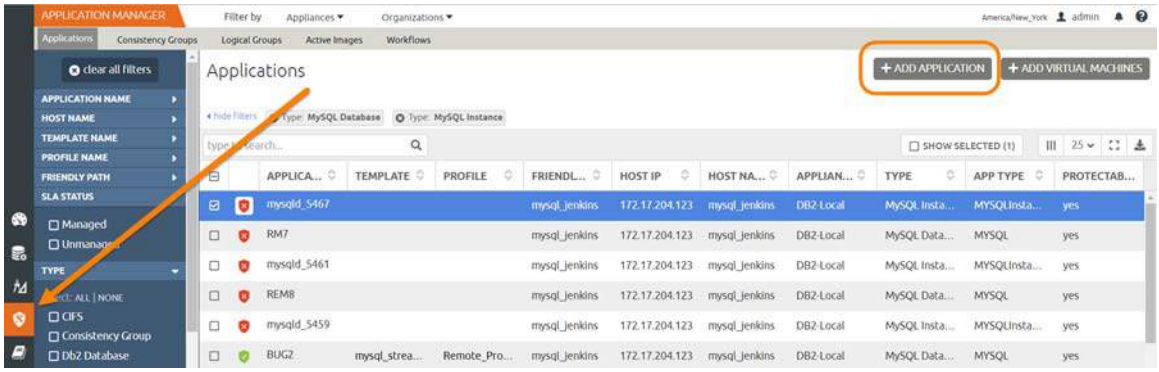



6. Select **Save** at the bottom of Edit Host page.

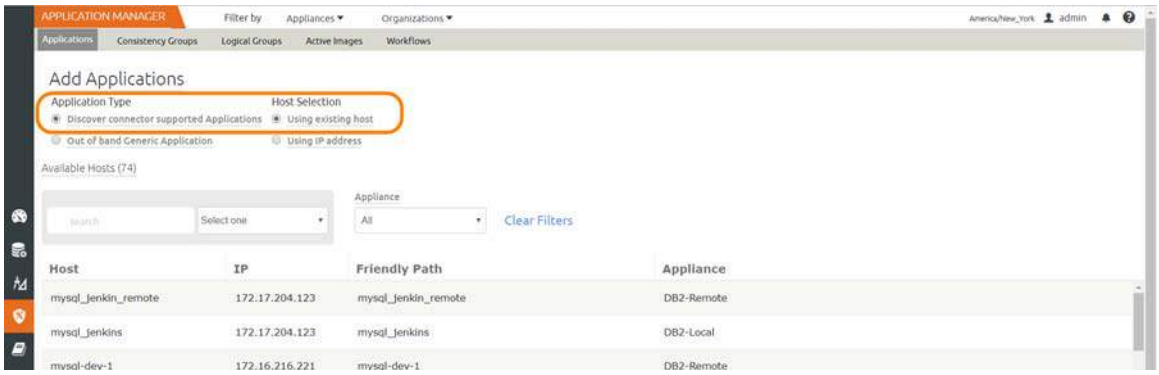
# Discovering the MySQL Database from the Application Manager

To discover the MySQL database:

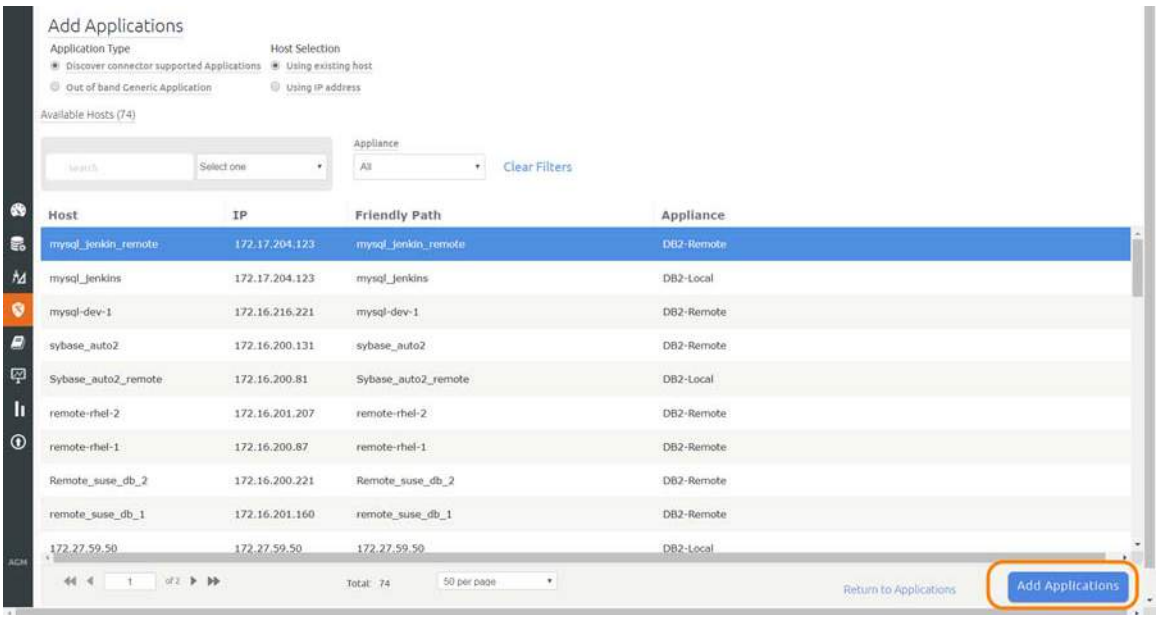
1. From the AGM Application Manager, Applications tab, select **Add Application** in the upper right corner.




2. On the Add Application page, select **Discover connector supported applications** and **Using existing host**, then select the MySQL database host. If you have many hosts, you can use the search feature or use the filter to see only hosts that are managed by a specific Actifio Appliance.

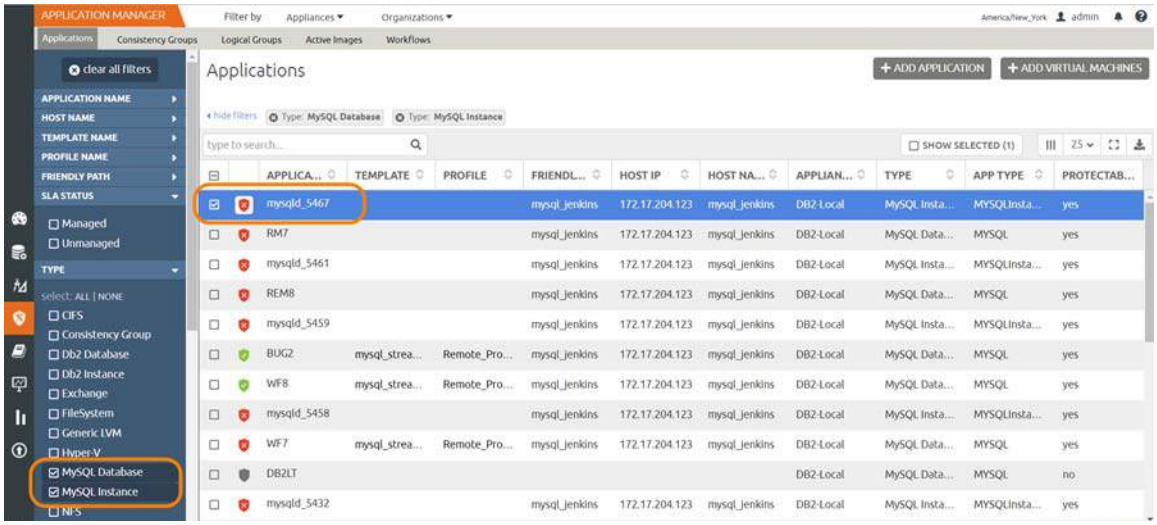



3. Select the host and click **Add Applications** in the bottom right corner. This will run the discovery on the database host and will discover all MySQL databases running on it.



# Finding the Discovered MySQL Database in the Application Manager

To find the newly-discovered database, go to the AGM Application Manager Applications tab. All applications known to the AGM of all types are listed. Use the Type application filter on the left pane to show only MySQL database instances. The new MySQL instance will appear in the list as unmanaged (the red shield icon).



# 3 Configuring the MySQL Backup Method

After the database is prepared and discovered as explained in Chapter 2, Adding a MySQL Database Host and Discovering the Database, you can configure a VDP backup method for the database.

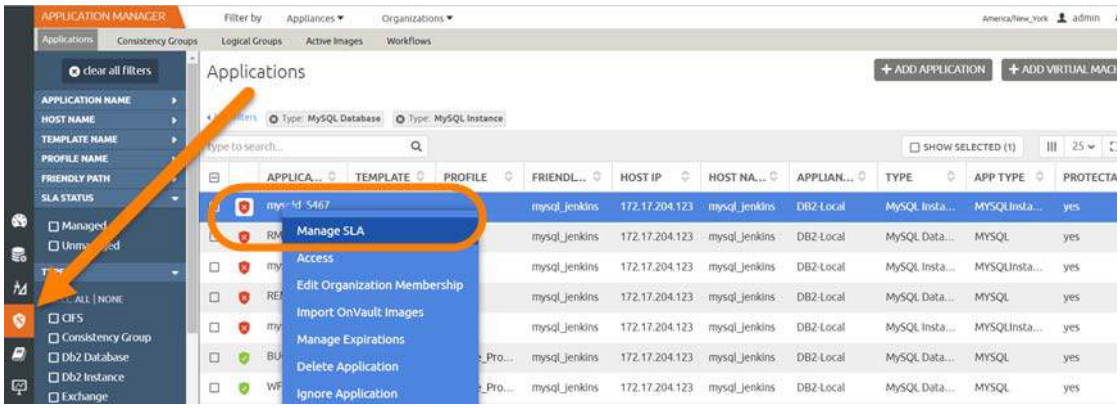
Whichever method you select involves these steps:



## Configuring SLA Settings

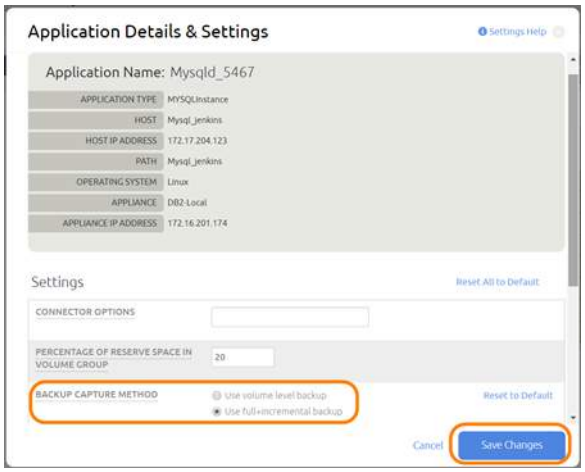
To configure the database SLA settings:

1. In the AGM Application Manager, right-click the database and select **Manage SLA**.




2. At the top of the Manage SLA page, select the **Details & Settings** link:


This opens the specific details and settings for this database. Of particular importance is Backup Capture Method.




3. Fill in the details and setting according to the backup method that you need, according to this table:

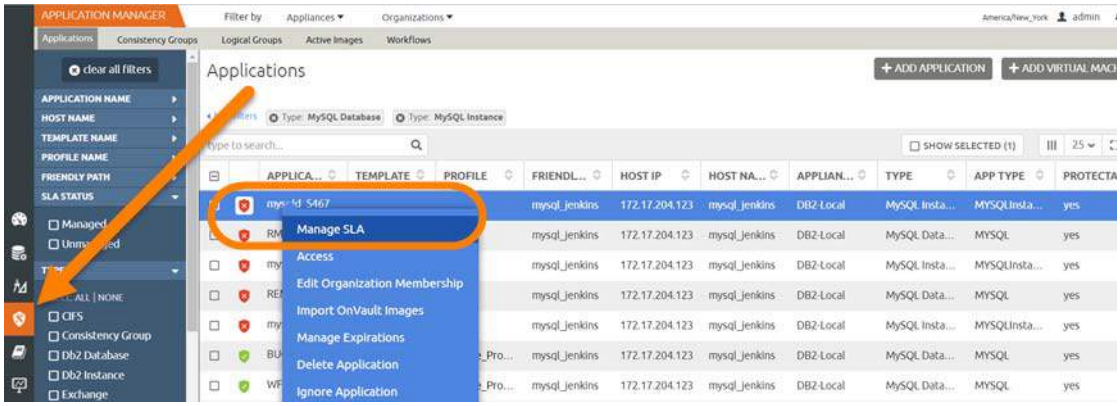
| Setting | Block-Based LVM Snapshot with CBT on Linux | File-Based Backup and Recovery, Block *or* NFS |
|---|---|---|
| Percentage of Reserve Space in Volume Group | This is needed for LVM snapshot temporary space. Recommended value is 20% | Not applicable |
| Backup Capture Method | Use Volume Level Backup | Use full+incremental filesystem backup |
| Force Full Filesystem Backup | Not applicable | Use for an ad hoc full backup |
| Database Filesystem Staging Disk Size in GB | Not applicable | Use the default calculation: (database size * 1.5)+ 10%. The disks will grow dynamically. |
| Log Backup Staging Disk Size in GB | By default Actifio calculates this as daily log generation * retention of log backup SLA plus 20% buffer. Default is recommended.<br>Providing a value will override the default calculation and the log disk will not grow dynamically. This will become a fixed size | |
| Retention of Production DB Logs in Days | This value is used to purge the log backup from basepath_logbackup destination. Based on this setting the last data backup id will be selected (CURRENT_TIMESTAMP, - the # days set) and the log will be purged older than the data backup id. Default value is 0 days. With default value all logs prior to last data backup will be purged. | |
| Script Timeout | The timeout value is applied to internal backup and recovery scripts called by connector. The default value is recommended. | |

File-based backup also requires the dump schedule to be configured. See Setting the Schedule for Dumps on page 14.

## Ensuring that the Backup Capture Method is Set Correctly

Backup capture settings depend upon the backup capture method that you need. It is important to be certain that you have set the right backup method for your needs:

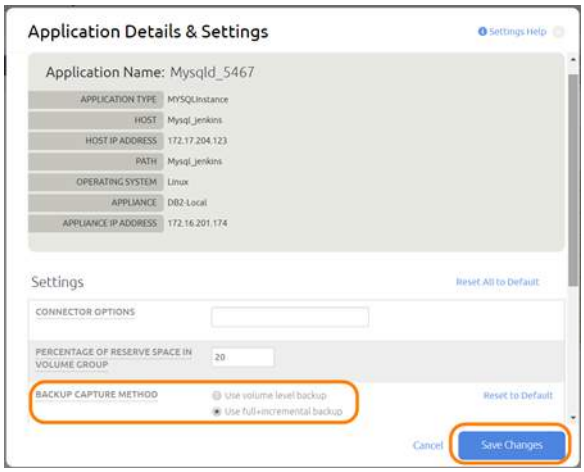
1. In the AGM Application Manager, right-click the database and select **Manage SLA**.




2. At the top of the Manage SLA page, select the **Details & Settings** link:


This opens the specific details and settings for this database. Check the Backup Capture Method:

- Traditional Backup and Recovery API "file-based" backups: **Use full+incremental backup**
- LVM Snapshot with Change Block Tracking: **Use volume level backup**




3. Click **Save** at the bottom of the page if you had to change anything.

# Ensuring that the Disk Preference on the Host is Set Correctly

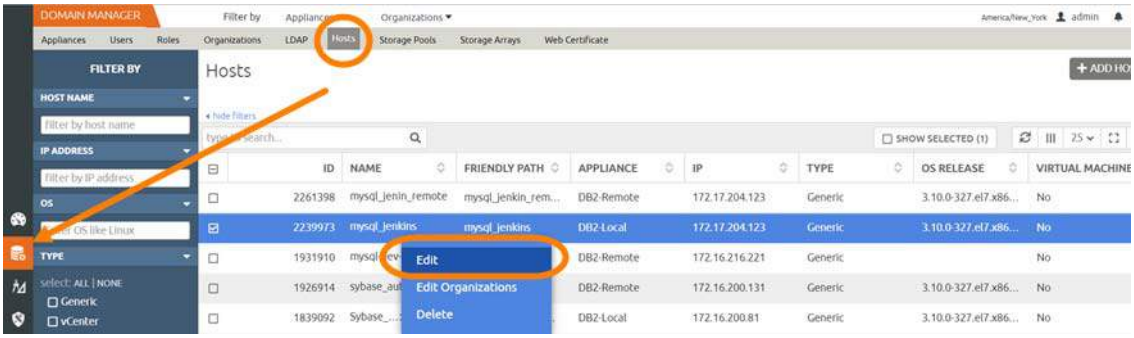
Choose between:

- Disk Preference: File-Based Traditional Backup and Recovery in NFS/Block on page 12
- Disk Preference: LVM Snapshot with Change Block Tracking on Linux on page 13

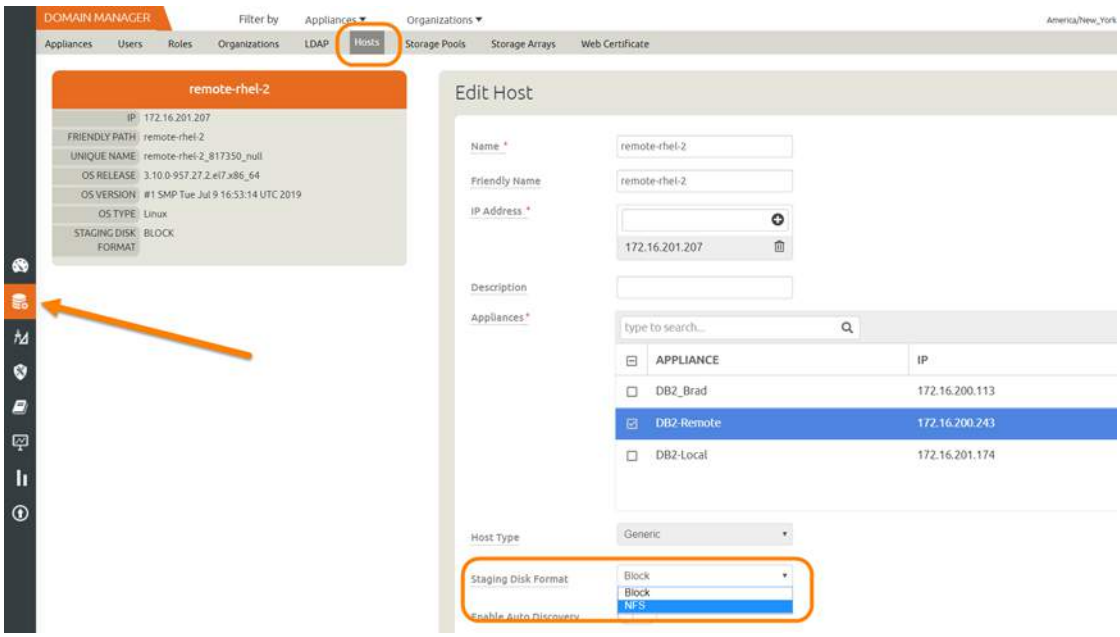
## Disk Preference: File-Based Traditional Backup and Recovery in NFS/Block

To set disk preference for storage snapshots:

1. From AGM Domain Manager, Hosts tab, right-click the host and select **Edit**.




2. Set Staging Disk Format to **NFS** or to **Block**.




3. Then click **Save** at the bottom of the page.

---

***Note:*** *File-based backup also requires the DB dump schedule be configured. See* Setting the Schedule for Dumps on page 14.

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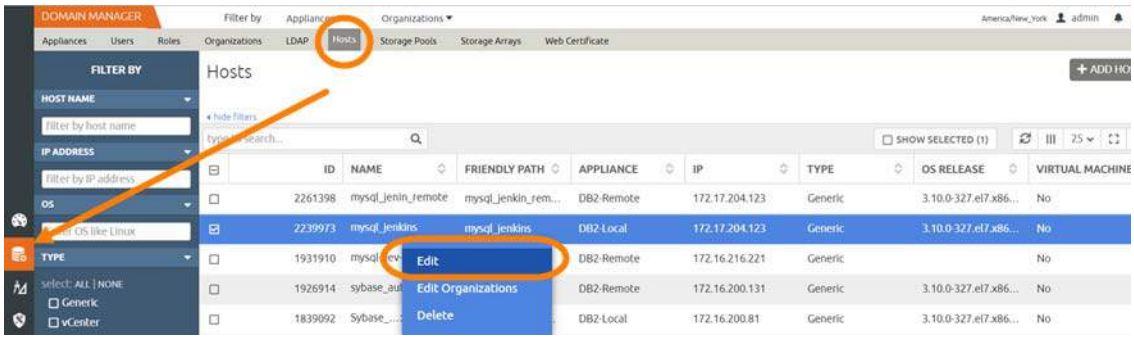
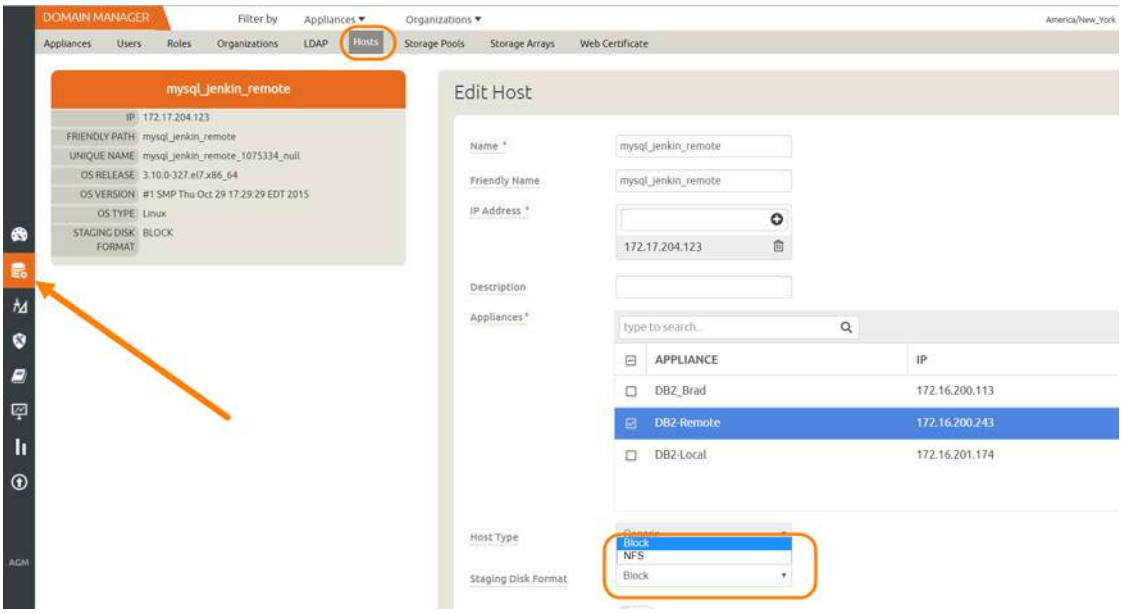
## Disk Preference: LVM Snapshot with Change Block Tracking on Linux

To set disk preference for storage snapshots:

1. From AGM Domain Manager, Hosts tab, right-click the host and select **Edit**.




2. Set Disk Preference to **Block**.




3. Then click **Save** at the bottom of the page.

## Setting the Schedule for Dumps

File-based traditional backups require a database dump schedule. The database dump schedule is set by the Actifio CLI policy parameter dumpschedule. The default value of dumpschedule="FIIIIII":

- The string must be seven characters - either an 'F' or an 'I'
- Each position within the string represents a weekday, starting with Sunday.
- **F** represents a full db dump
- **I** represents an incremental db dump

For example, "FIIIIII" results in:

- Sunday: Full backup
- Monday through Saturday: Incremental backups
- The following Sunday: Full backup again

To check the dump schedule, run this CLI command from the appliance:

```
udsinfo lspolicyoption -filtervalue appid=<appid> | grep dumpschedule
```

If this does not return any value, then the dumpschedule is set to default.

To modify the dump schedule run this CLI command from Appliance:

```
udstask mkpolicyoption -appid <appid> -name "dumpschedule" -value "FIIIIII"
```

Replace <appid> with the application id of the MySQL application.

Replace "FIIIIII" as needed.

### Example

To run full backup on Saturday and Tuesday, set `dumpschedule="IIFIIIF"`

# 4 Protecting a MySQL Database

After the SLA is configured as detailed in Chapter 3, Configuring the MySQL Backup Method, you can configure a VDP backup method for the database.

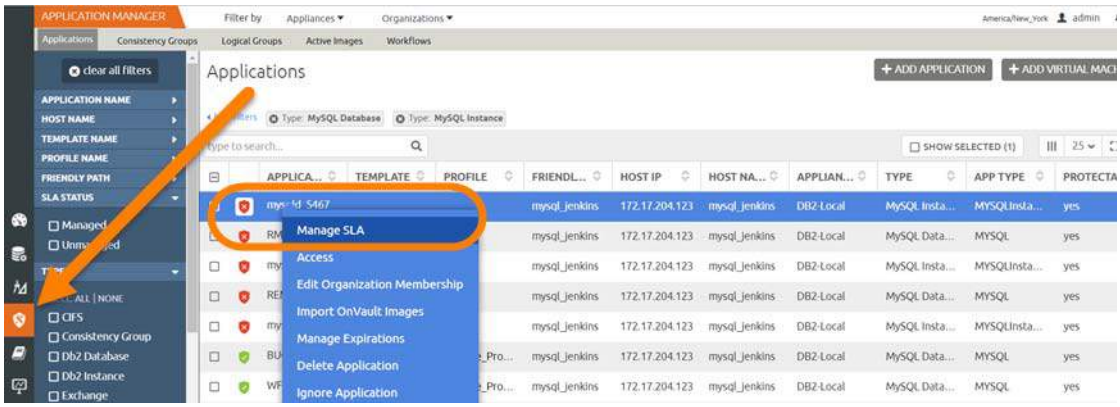
This chapter includes:



## Protecting a MySQL Database

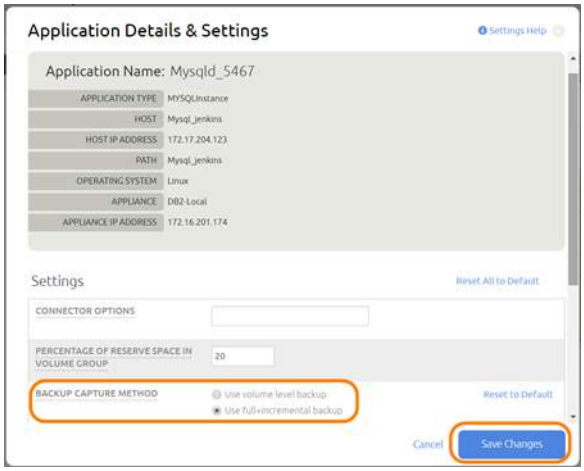
To protect the database:

1. From the AGM Application Manager, right-click the database and select **Manage SLA**.



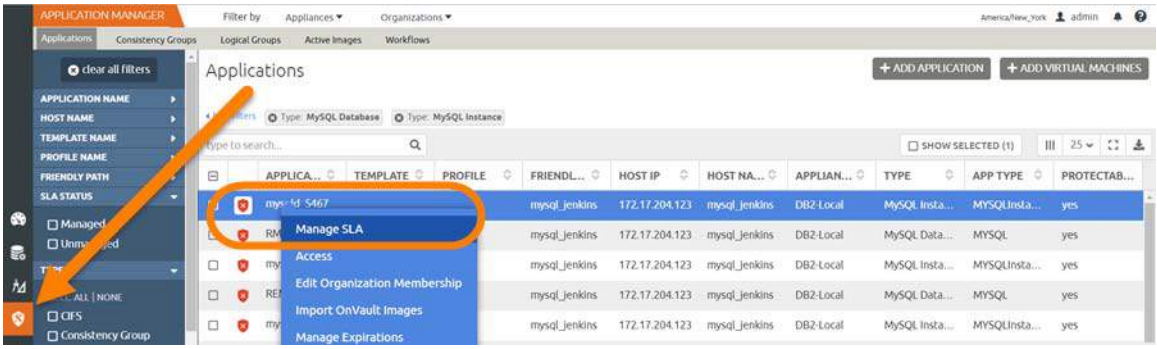

2. On the Manage SLA page, select a template and a resource profile, then click **Apply SLA**.


3. On the Apply SLA page, make sure that the backup capture method matches the type of backup set in Chapter 3, Configuring the MySQL Backup Method. Click **Apply SLA** or **Save Changes**.

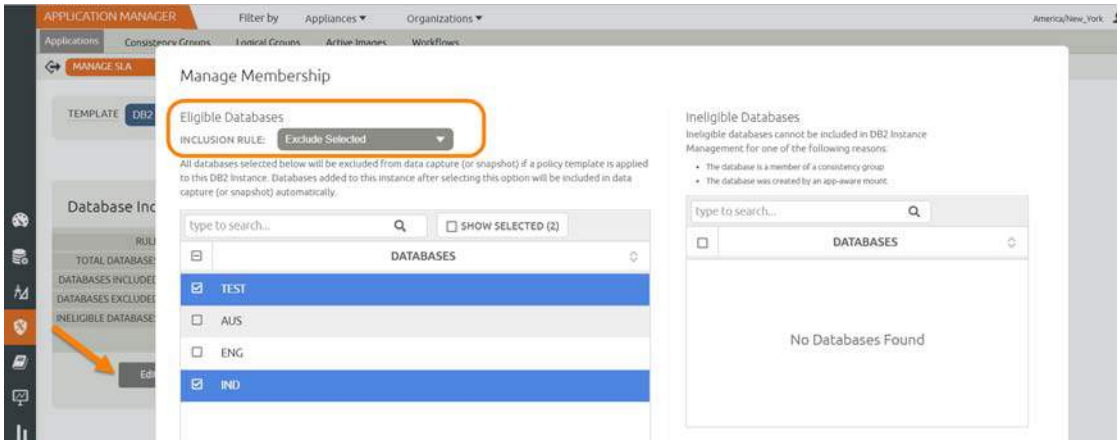



The database will be protected when the snapshot job runs according to the schedule in the template. After the first successful snapshot job the database appears in the Application Manager with a green shield icon.

4. You can include or exclude specific databases during backup. From the Application Manager, select the MySQL Instance. You can use the MySQL Instance checkbox to filter the list. Select **Manage SLA**.




5. Under Database Inclusion Rule, click **Edit**.

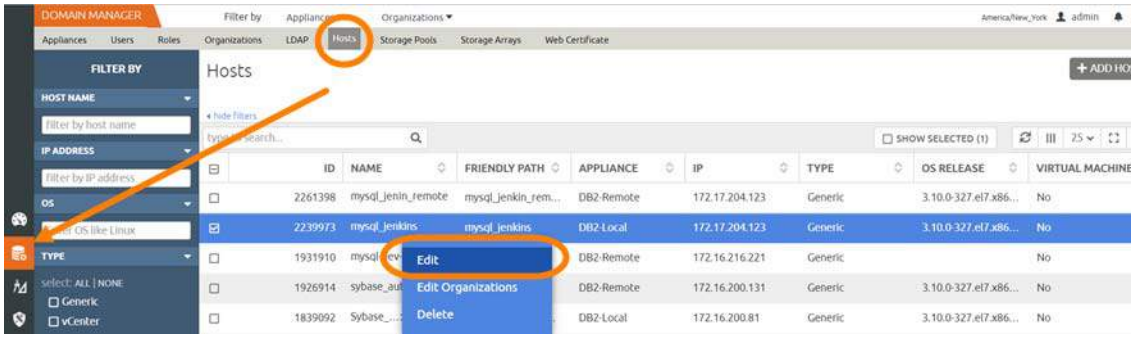



6. Select an Inclusion Rule (Include All, Include Selected, or Exclude Selected) and then select the databases to include or exclude, then click **Save**.

## Protecting MySQL Database Logs

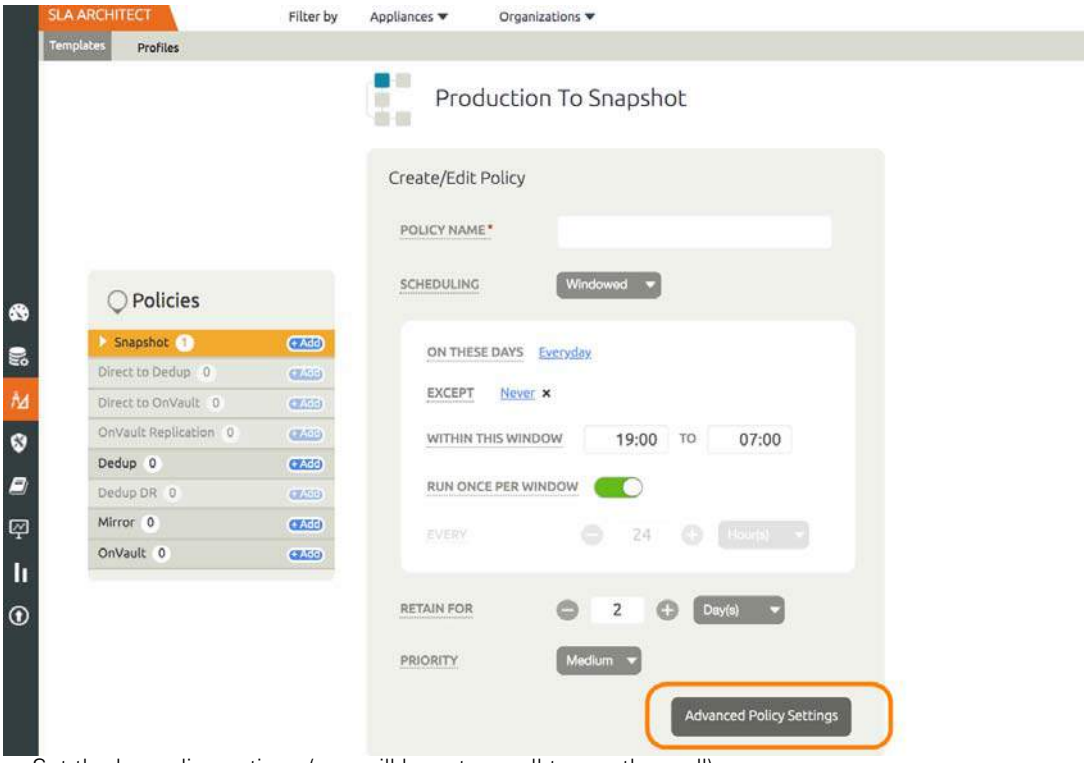
To enable and set up the MySQL database log backup:

1. From the AGM SLA Architect page, right-click the template for MySQL database protection and click **Edit**.

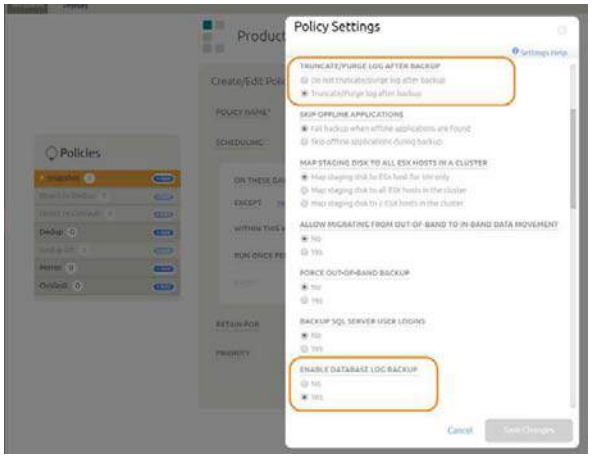



2. Click the arrow beside the Snapshot policy to open up the details, then click **Edit Policy**.

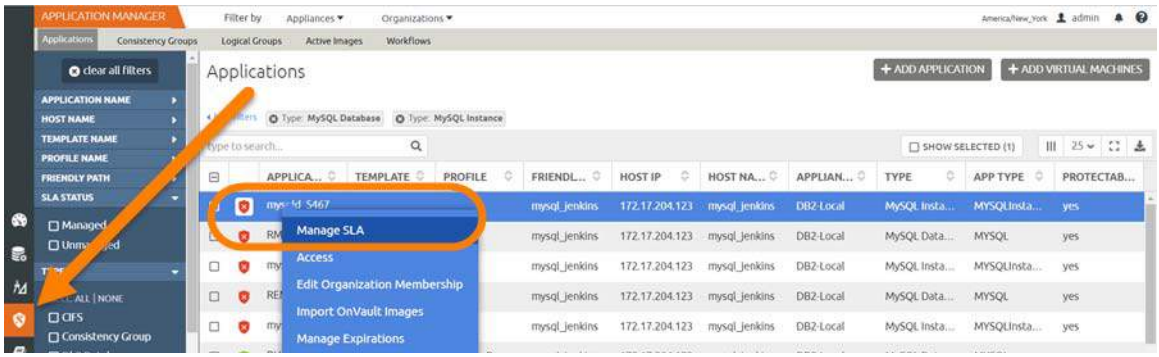

3. Near the bottom, select **Advanced Policy Settings**.




4. Set the log policy options (you will have to scroll to see them all):
   - Enable **Truncate/Purge log after backup**.
   - Set **Enable Database Log Backup** to **Yes**.
   - For **RPO (Minutes)**, enter the desired frequency of log backup.
   - Set **Log Backup Retention Period (in Days)** for point in time recovery.
   - Set **Replicate Logs (Uses StreamSnap Technology)** to **Yes** if you want to enable StreamSnap replication of log backup to a DR site.




5. Click **Save Changes**.
6. From Application Manager, select the MySQL Instance. You can use the MySQL Instance checkbox to filter the list. Right-click it and select **Manage SLA**.

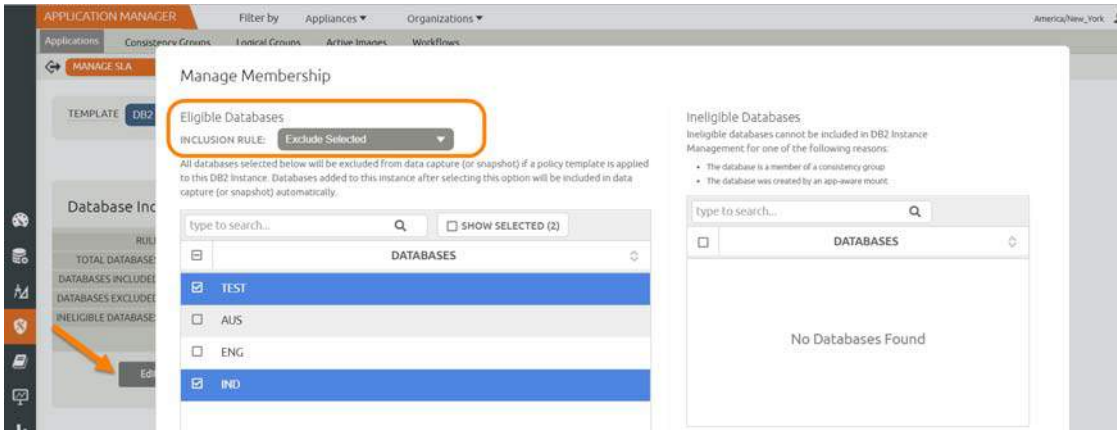



7. At the top of the screen, select **Details & Settings**.

8. Set the **Retention of Production DB Logs** in days. This value is used to purge the MySQL logs from the production destination. Based on this setting the log will be purged older then the # of days specified. Default value is 0 days. With the default value, all logs prior to last log backups are purged.

9. You can include or exclude specific database logs during backup. From the Application Manager, select the MySQL Instance. Select **Manage SLA**.

10. Under Database Inclusion Rule, click **Edit**.




11. Select an Inclusion Rule (Include All, Include Selected, or Exclude Selected) and then select the databases to include or exclude, then click **Save**.

# 5 Restoring, Accessing and Recovering a MySQL Database

This section describes:

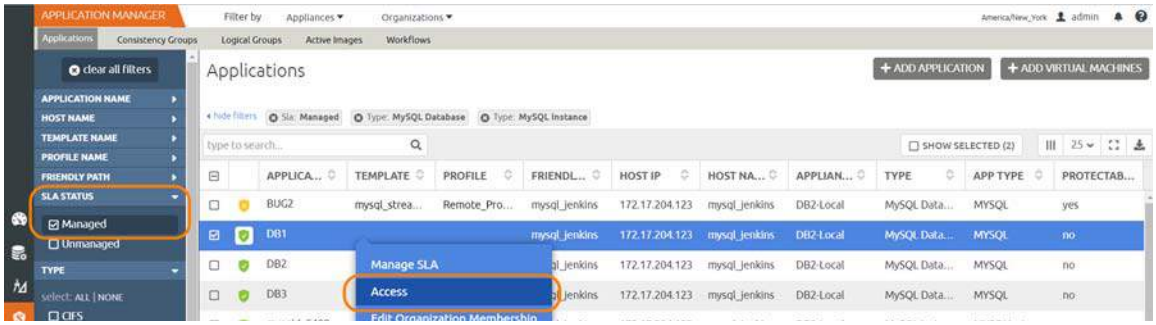


## Mount and Refresh from Block-Based Volume Snapshot to a Target MySQL Instance as a Virtual Application

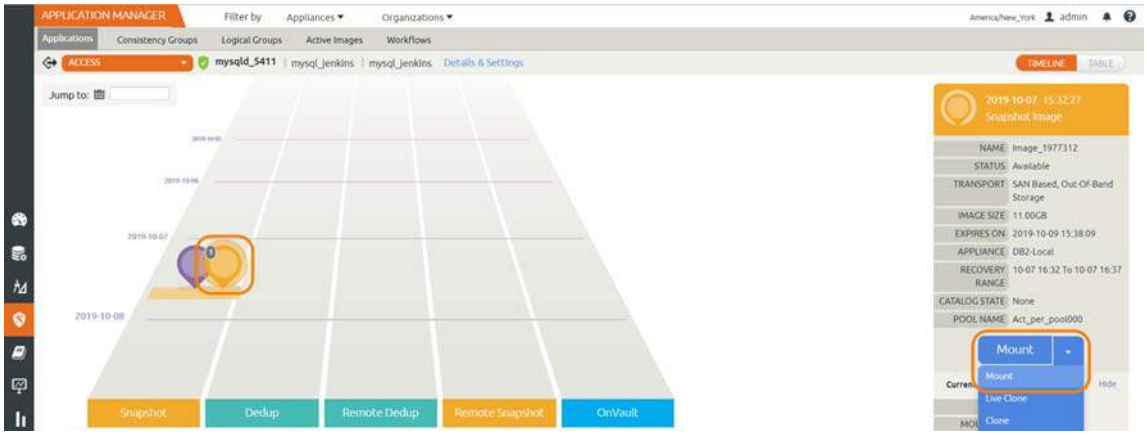
To mount the database image as a virtual application (an application aware mount) to a new target:

1. From the AGM Application Manager, right-click the protected database and select **Access**.

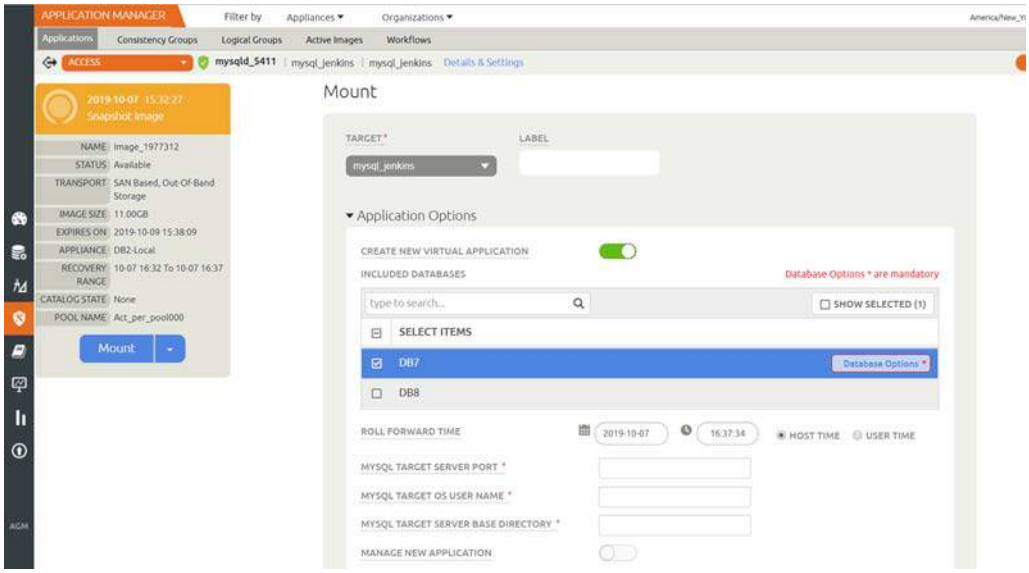
> ***Note:*** *You can use the Managed SLA Status filter to show only protected databases.*



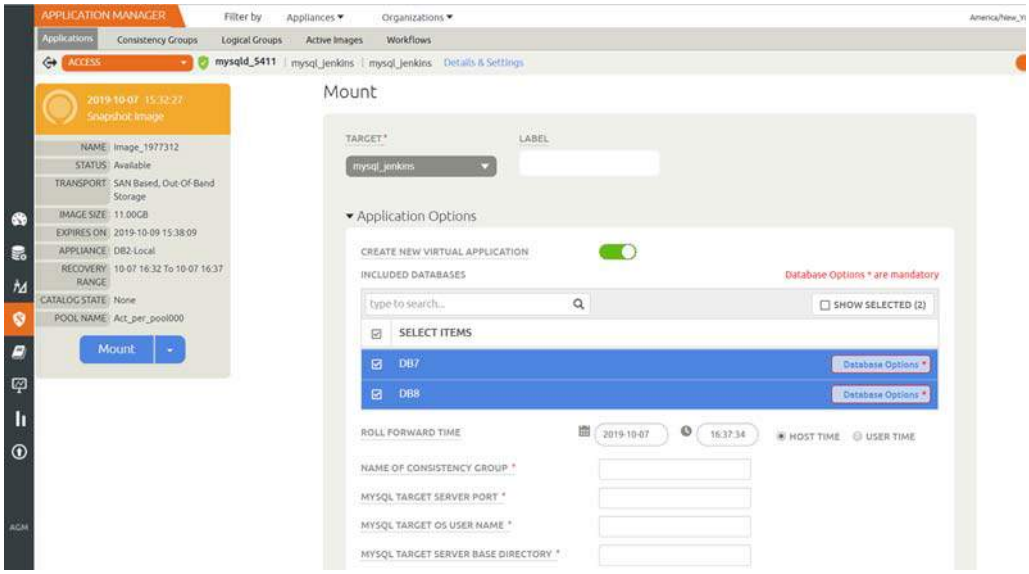

2. Select a snapshot image and choose **Mount**.



3. On the Mount page, from Target, choose the desired target MySQL server from the dropdown.
4. Under Application Options, enable **Create New Virtual Application**.
5. At Included Databases, Select Items, choose one or more databases to virtualize:
    - A single database will be managed as standalone virtual copy
    - Multiple databases will be managed as a consistency group

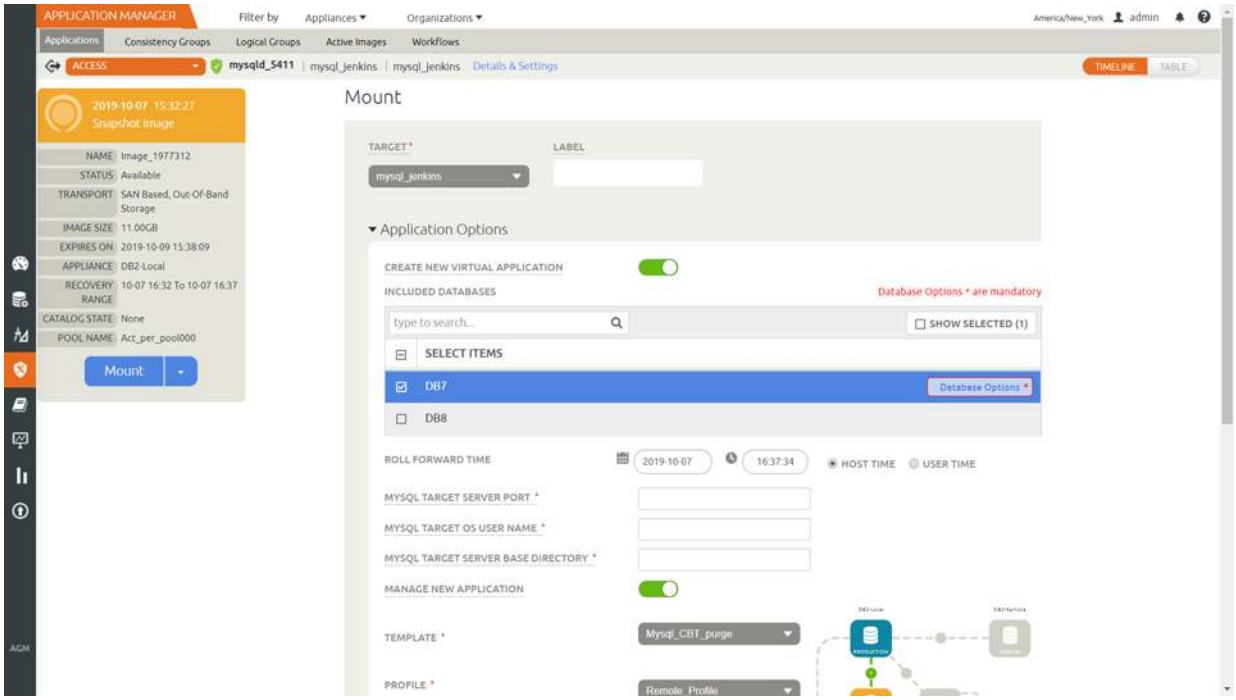



**Selecting a Single Database**




**Selecting Multiple Databases**

6. Click each selected database to specify the target database details for the new virtual copy.




7. Choose a target point in time for a database protected with log roll-forward.

   NAME OF CONSISTENCY GROUP: This option will appear if more than one database is selected. Provide a unique name to manage the selected databases as a virtual copy.

   MySQL TARGET SERVER PORT: Enter the port number on the target server where a new MySQL Instance will get created for the new child databases.

   MySQL TARGET OS USER NAME: Enter the name of the operating system user on the target server where a new MySQL Instance will get created.

   MySQL TARGET SERVER BASE DIRECTORY: Enter the path to the base directory where the configuration files for MySQL Instance on the target server are stored.

   Manage New Application

   - To protect the new virtual database, click and enable Manage New Application.
   - Choose a template and a resource profile to protect the database.

8. (Optional) Under Advanced Options, enter login credentials (username and password) for the target MySQL Instance that will be created. If you do not specify anything, empty database credentials will be used. For the directory path, enter the path to the messages directory for the MySQL Instance on the target server.

9. Under Mapping Options, Mount Location, select a storage pool and specify a target mount point to mount the new virtual database to.

10. Click **Submit**.

# Restoring and Recovering a MySQL Database

Depending on how you protected the database, you need the procedure for:

Recovering from Volume based Snapshot on page 24

Recovering from a Full+Incremental Backup on page 26

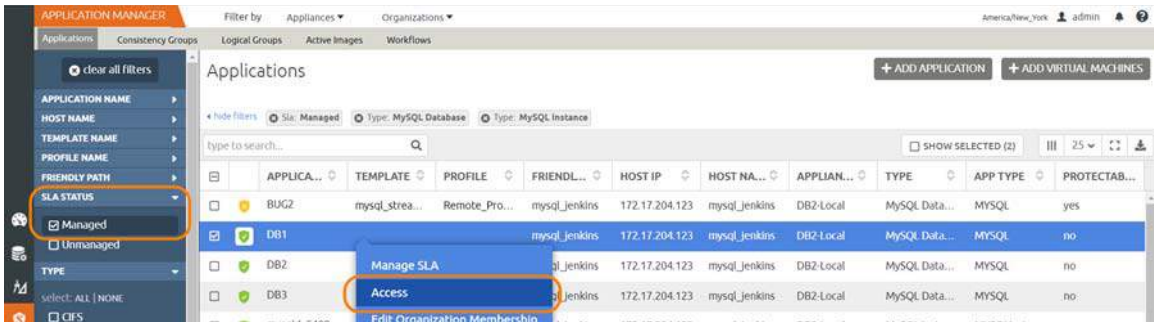
## Recovering from Volume based Snapshot

Use this procedure to restore and recover the source MySQL database. This procedure uses physical recovery of the source data area.

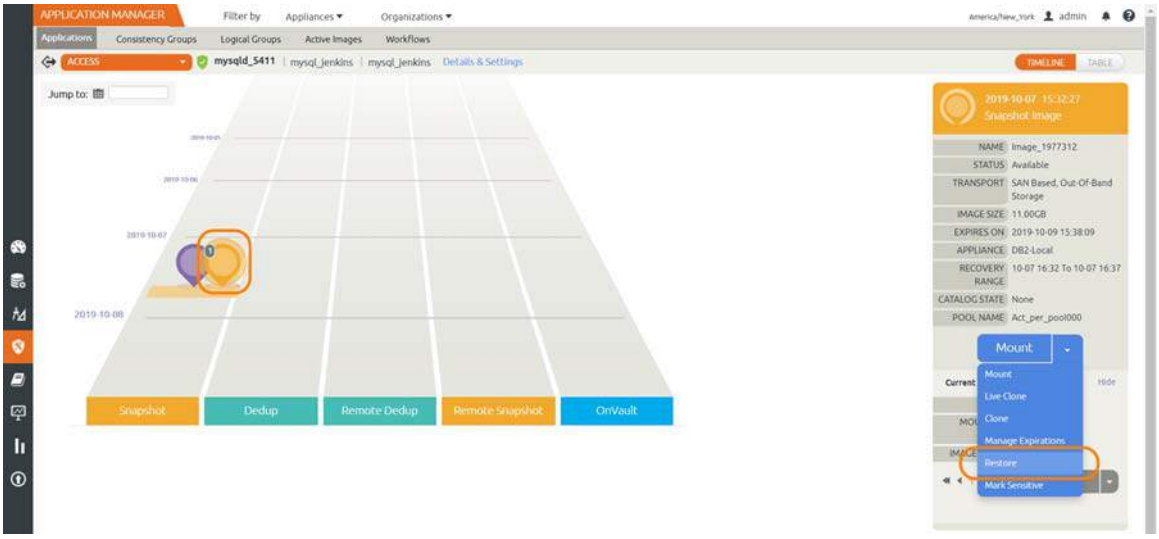
To recover back to the source:

1. From the AGM Application Manager, right-click the protected database and select **Access**.

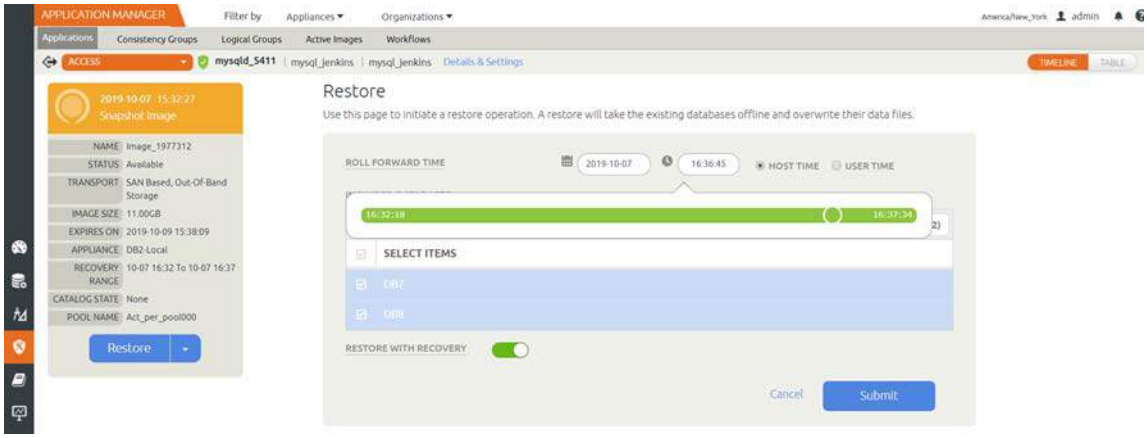
> ***Note:*** *You can use the Managed SLA Status filter to show only protected databases.*




2. Select a snapshot image and choose **Restore**.



3. On the Restore page choose a point in time for the protected database to recover to.




4. Enable **Restore With Recovery** to apply recovered logs.
5. Click **Submit**.

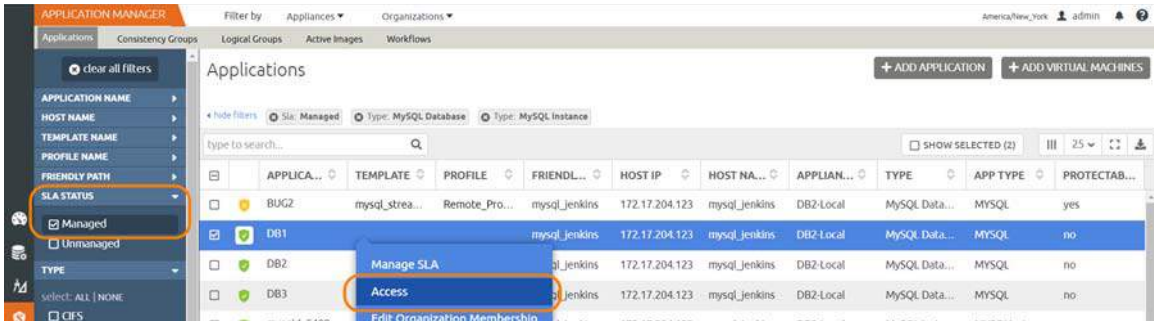
## Recovering from a Full+Incremental Backup

Recovering Back to the Source: Use this procedure to restore and recover the source MySQL database. This procedure overwrites the source data.

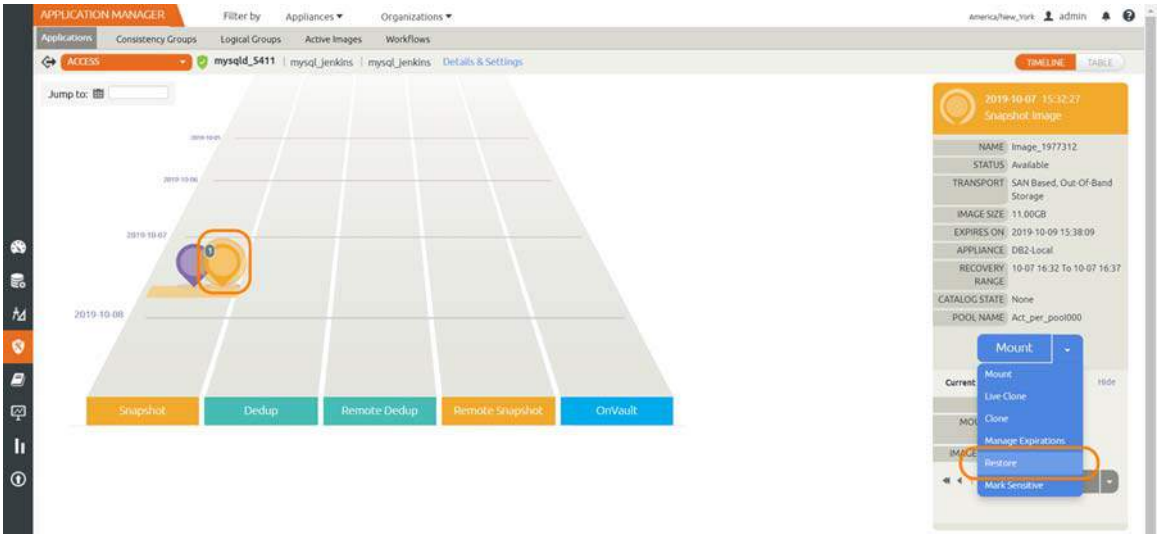
Recovering Back to the Source

1. From the AGM Application Manager, right-click the protected database and select **Access**.

> ***Note:*** *You can use the Managed SLA Status filter to show only protected databases.*




2. Select a snapshot image and choose **Restore**.




3. For a database protected with logs, on the Restore page, choose a date and then a point in time.
4. Use **Select Items** to choose one or more databases to restore.
5. Click **Submit**. This will start the source database physical recovery using MySQL recover commands.