Ahsay Backup

Ahsay Online Backup Manager v8

MariaDB Database Backup and Restore for Windows

Ahsay Systems Corporation Limited

11 October 2021

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Trademarks

Disclaimer

Revision History

Date	Descriptions	Type of modification
25 January 2021	Initial draft	New
7 April 2021	Updated Ch. 5; Added sub-chapters for the detailed process diagrams in Ch. 5.1, 5.2, 5.2.1, 5.2.2 and 5.3	New / Modifications
11 October 2021	Updated login instructions in Ch. 3	Modifications

Table of Contents

1 Overview

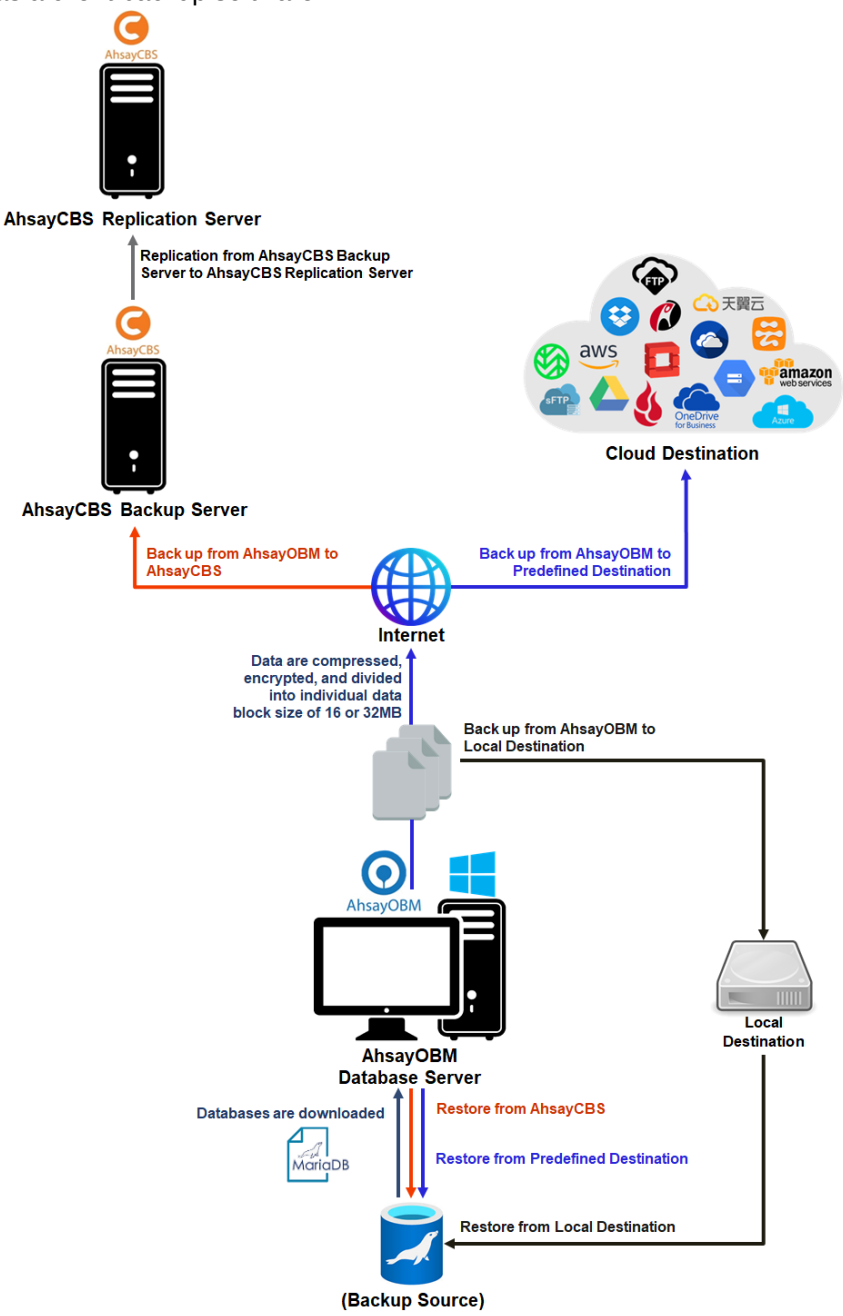
1.1 What is this software?

Ahsay brings you specialized client backup software, namely AhsayOBM, to provide a set of tools to protect your MariaDB Database Server.

1.2 System Architecture?

Below is the system architecture diagram illustrating the major elements involved in the backup and restore process among the MariaDB Database Server, AhsayOBM and AhsayCBS.

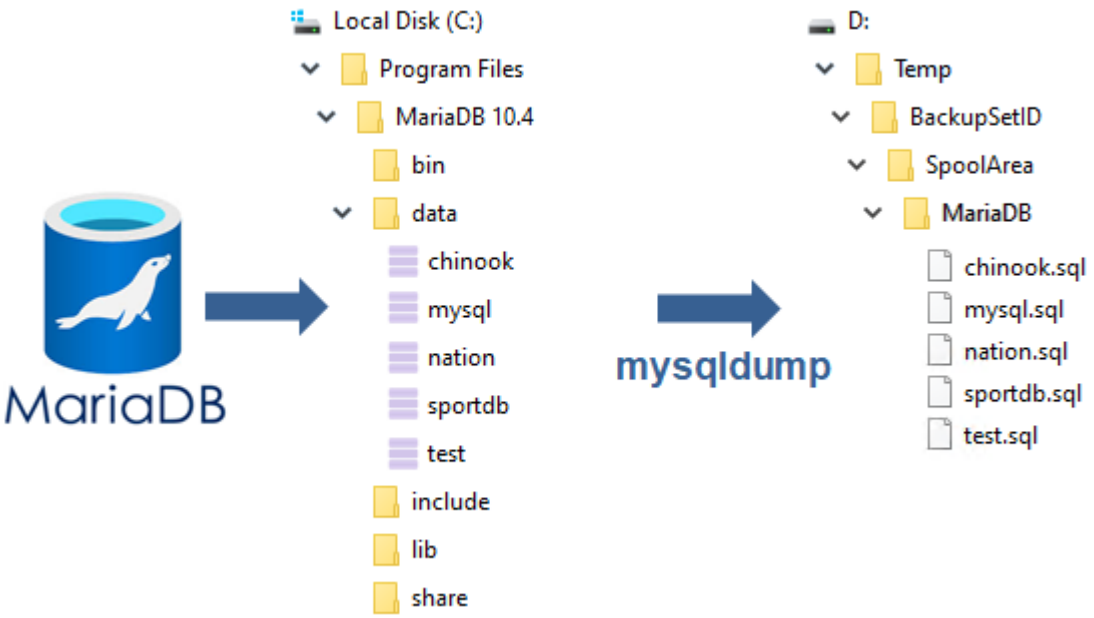
In this user guide, we will focus on the end-to-end backup and restore process using AhsayOBM as a client backup software.



1.3 MariaDB Database Backup Method

AhsayOBM MariaDB Database backup uses a spooling method to make a consistent snapshot of the database(s) for backup.

For each database backup job AhsayOBM will trigger MariaDB to spool or make a copy of the database (.sql) file to the temporary folder using the mysqldump utility.



1.4 Mysqldump Parameters

Here is the mysqldump parameter list used for generating the spooled dump file:

- --databases
- --password
- --result-file
- --port
- --user
- --host
- --opt
- --quote-names
- --allow-keywords
- --triggers

Example:
For the spooling of the “nation” database to D:\Temp folder, the following parameters will be used:
Mysqldump --databases nation --user=user1 --password=qwerty --host=localhost --port=3306 --opt --quote-names --allow-keywords --triggers --result-file=D:\Temp\nation.sql

For details on mysqldump parameters please refer to
https://dev.mysql.com/doc/refman/8.0/en/mysqldump.html

2 Preparing for Backup and Restore

2.1 Hardware Requirement

To achieve the optimal performance when AhsayOBM is running on your machine, refer to the following article for the list of hardware requirements.

FAQ: Ahsay Hardware Requirement List (HRL) for version 8.1 or above

2.2 Software Requirement

Make sure the operating system where you have the MariaDB Database Server installed is compatible with the AhsayOBM. Refer to the following article for the list of compatible operating systems and application versions.

FAQ: Ahsay Software Compatibility List (SCL) for version 8.1 or above

2.3 Antivirus Exclusion

To optimize performance of AhsayOBM on Windows, and to avoid conflict with your antivirus software, refer to the following Wiki article the list of processes and directory paths that should be added to all antivirus software white-list / exclusion list:

FAQ: Suggestion on antivirus exclusions to improve performance of Ahsay software on Windows

2.4 AhsayOBM Installation

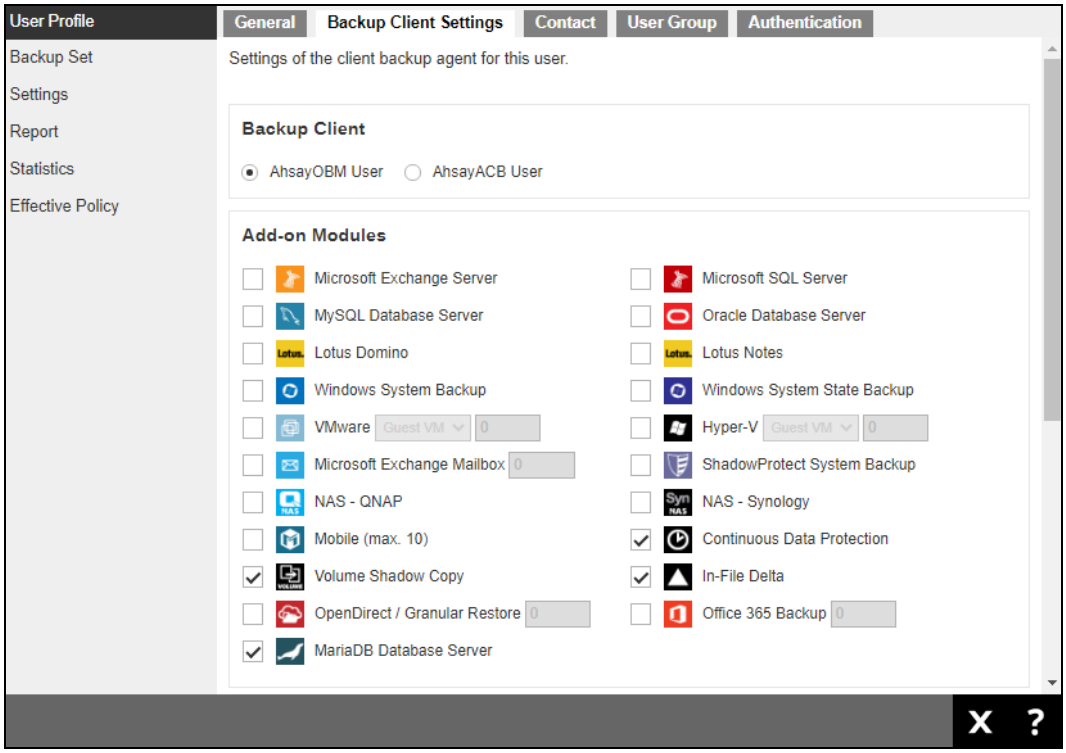
Make sure that the latest version of AhsayOBM is installed directly on the machine where the MariaDB database(s) are hosted.

NOTE
Backup and restore of MariaDB database(s) running on a remote machine is not supported.

2.5 Add-on Module Requirement

Make sure the MariaDB Database Server add-on module has been enabled in your AhsayOBM user account.

Please contact your backup service provider for more details.



2.5.1 Backup Quota Requirement

Make sure that your AhsayOBM user account has sufficient quota assigned to accommodate the storage of MariaDB Database Server backup set and retention policy.

Please contact your backup service provider for more details.

2.5.2 Java Heap Size

The default Java heap size setting on AhsayOBM is 2048MB. It is highly recommended to increase the Java heap size setting to be at least 4096MB to improve backup and restore performance. The actual heap size is dependent on amount of free memory available on your MariaDB Database Server.

2.5.3 Network Drive

The login accounts for network drives must have read and write access permission to ensure that backup and restore would be successful.

2.6 MariaDB Database Server Requirements

Please ensure that the following requirements and conditions are met on the MariaDB database server.

2.6.1 MariaDB Version

AhsayOBM support MariaDB version 10.0 or above. For details of all supported MariaDB versions please refer to FAQ: Ahsay Software Compatibility List (SCL) for version 8.1 or above.

To verify the MariaDB database version you can run the following query:

Example: MariaDB database version 10.4.12

```
MariaDB [(none)]> select version();
+-----------------+
| version()       |
+-----------------+
| 10.4.12-MariaDB |
+-----------------+
1 row in set (0.00 sec)

MariaDB [(none)]>
```

For some older MariaDB database versions, to connect to MariaDB database use the `mysql -u root -p` command

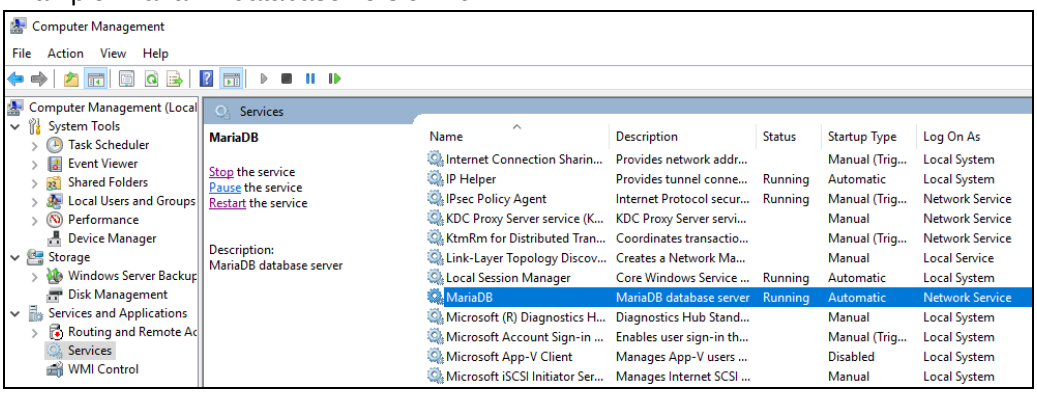
Example: MariaDB database version 10.1.22

```
>mysql -u root -p
Enter password: ********
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 17
Server version: 10.1.22-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and
others.

Type 'help;' or '\h' for help. Type '\c' to clear the current
input statement.

MariaDB [(none)]> select version();
+-----------------+
| version()       |
+-----------------+
| 10.1.22-MariaDB |
+-----------------+
1 row in set (0.00 sec)
```

2.6.2 MariaDB Database Status

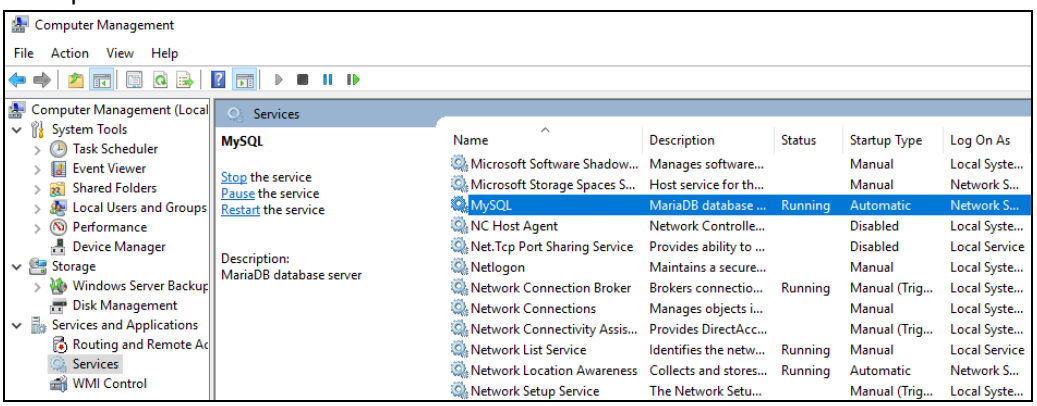
The MariaDB database instance is online.

Example: MariaDB database version 10.4.12



For some older MariaDB database versions check the MySQL, which is the MariaDB database, instance is online.

Example: MariaDB database version 10.1.22



2.6.3 TCP/IP Port

Check the listening port of the MariaDB database instance (default is 3306) using the command **`netstat -an`**.

```
C:\>netstat -an

Active Connections

  Proto  Local Address          Foreign Address        State

  TCP    0.0.0.0:135            0.0.0.0:0              LISTENING
  TCP    0.0.0.0:445            0.0.0.0:0              LISTENING
  TCP    0.0.0.0:2179           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:3306           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:3389           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:5985           0.0.0.0:0              LISTENING
  TCP    0.0.0.0:47001          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49664          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49665          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49666          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49668          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49669          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:49670          0.0.0.0:0              LISTENING
```

```
  TCP    0.0.0.0:49671          0.0.0.0:0              LISTENING
  TCP    0.0.0.0:50000          0.0.0.0:0              LISTENING
  TCP    10.16.10.88:139        0.0.0.0:0              LISTENING
```

2.6.4 Mysqldump Utility

The mysqldump utility is installed on the MariaDB database server.

Example: The default location for the mysqldump utitlity for MariaDB v10.4 is located in the following folder **C:\Program Files\MariaDB 10.4\bin**

2.6.5 Mysqldump Utility Version

The mysqldump utility is the same version as the MariaDB database.

To check the mysqldump version use the **`mysqldump --version`** command.

```
C:\Program Files\MariaDB 10.4\bin>mysqldump --version
mysqldump  Ver 10.17 Distrib 10.4.12-MariaDB, for Win64 (AMD64)

C:\Program Files\ MariaDB 10.4\bin>
```

2.6.6 User Account Privileges

A MariaDB database user account with the following privileges must be setup for the backup operation.

```
MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO
"username"@"localhost" IDENTIFIED BY "password";
Query OK, 0 rows affected (0.003 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO
"username"@"localhost.localdomain" IDENTIFIED BY "password";
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.002 sec)

MariaDB [(none)]>
```

2.6.7 Localhost

Verify that 'localhost' on the MariaDB database server is resolvable using the **`ping localhost`** command.

```
C:\>ping localhost

Pinging w2k16-std [::1] with 32 bytes of data:
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms
Reply from ::1: time<1ms

Ping statistics for ::1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

'localhost' is allowed to access the MariaDB database instance on the MariaDB service listening port (default 3306) using the command **telnet localhost 3306**.

```
# telnet localhost 3306
Y
5.5.5-10.4.12-MariaDB7Ip{8E1e,
≈!  G_,X[>cWm=&Fmysql_native_password
```

NOTE

The telnet utility is not installed by default on some Windows versions.

2.6.8 MariaDB Virtual System Databases

The 'information_schema' and 'performance_schema' databases are MariaDB virtual system databases, which contains information about the user databases on the MariaDB instance are automatically excluded from the backup source. They are read-only and cannot be backed up.

```
MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| chinook            |
| information_schema |
| mysql              |
| nation             |
| performance_schema |
| sportdb            |
| test               |
+--------------------+
7 rows in set (0.002 sec)
```

2.6.9 Temporary Directory

The databases selected for backup will be temporarily spooled to a temporary directory before being uploaded to the backup server or destination storage.

Ensure that the temporary directory configured for the MariaDB database backup:

- Is not located on the Windows System C:\ drive
- Has sufficient disk space for the backup operation, the free space on the temporary directory drive should be at least 150% of the database size. As the temporary directory is also used for storing index files and any incremental or differential delta files generated during the backup job before they are uploaded to the backup destination.

  For example:

  If the default setting for Delta ratio is 50% for in-file delta, if the total MariaDB database size is 100GB and there is only one backup destination, the minimum free space needed on the drive where the temporary directory folder is located = 150GB

  100GB = Total MariaDB database size

  50GB = Total maximum size of incremental or differential delta files generated

Please bear in mind the size of the databases may grow over time and you may need to review the temporary directory free space requirements on a regular basis.

To calculate for the size of your databases run the command below.

```
MariaDB [(none)]> SELECT
       -> table_schema 'Database Name',
       -> ROUND(SUM(data_length + index_length) / 1024 / 1024, 2)
       'Size in MB'
       -> FROM information_schema.tables
       -> GROUP by table_schema;
+--------------------+--------------+
| Database           | Size in (MB) |
+--------------------+--------------+
| chinook            |         1.83 |
| information_schema |         0.19 |
| mysql              |         2.17 |
| nation             |         3.55 |
| performance_schema |         0.00 |
| sportdb            |         2.89 |
| test               |         0.77 |
+--------------------+--------------+
7 rows in set (0.378 sec)
```

2.7 Limitations

1. Backup and restore must be to the same MariaDB database version.

2. When restoring MariaDB databases to an alternate location only one database can be selected and restored at any one time.

3. Restoring databases to another machine can only be done using the **Restore raw file** option.

2.8 Best Practices and Recommendations

2.8.1 Temporary Directory

To ensure an optimal backup/restoration performance, it is highly recommended to set the temporary directory folder to a location with sufficient free disk space. It must be on another location other than Drive C: (e.g. Drive E:).

2.8.2 Periodic Backup Schedule

The periodic backup schedule should be reviewed regularly to ensure that the interval is sufficient to handle the data volume on the machine. Over time, data usage pattern may change on a production server, i.e. the number of new files created, the number of files which are updated/deleted, and new users may be added etc.

Consider the following key points to efficiently handle backup sets with periodic backup schedule.

- Hardware – to achieve optimal performance, compatible hardware requirements is a must. Ensure you have the backup machine's appropriate hardware specifications to accommodate frequency of backups,
  - so that the data is always backed up within the periodic backup interval
  - so that the backup frequency does not affect the performance of the production server
- Network – make sure to have enough network bandwidth to accommodate the volume of data within the backup interval.
- Retention Policy - also make sure to consider the retention policy settings and retention area storage management which can grow because of the changes in the backup data for each backup job.

3 Logging in to AhsayOBM

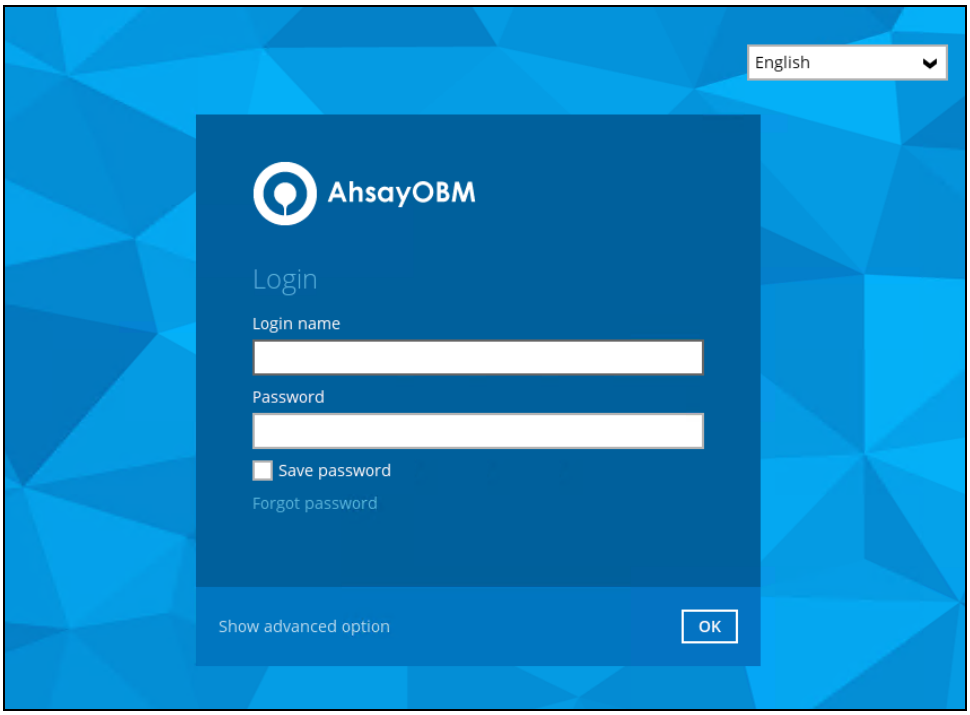
Starting with AhsayOBM v8.5.0.0 there are several login scenarios depending on the setting of the account you are using. The different scenarios will be discussed below:

- Login without 2FA
- Login with 2FA using authenticator app
- Login with 2FA using Twilio

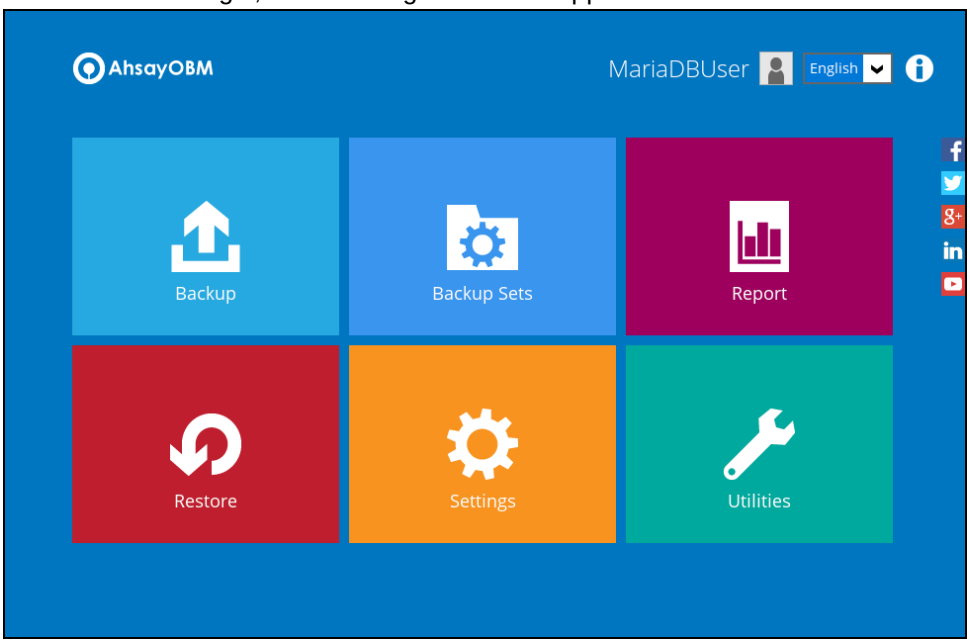
3.1 Login to AhsayOBM without 2FA

1. A shortcut icon of AhsayOBM should have been created on your Windows desktop after installation. Double click the icon to launch the application.

2. Enter the **Login name** and **Password** of your AhsayOBM account provided by your backup service provider, then click **OK** to login.



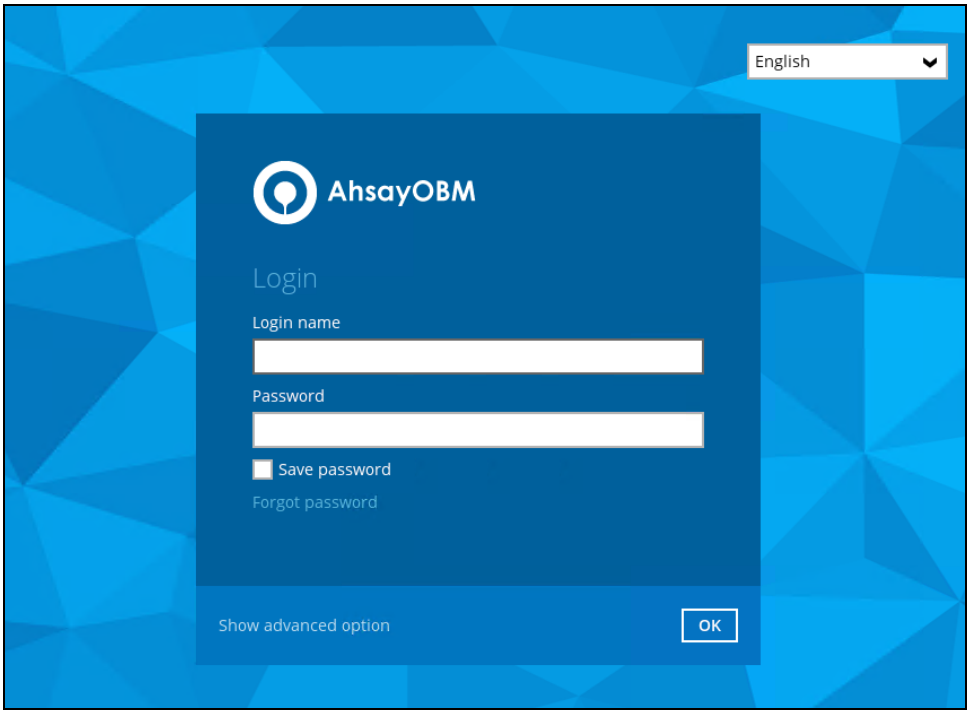
3. After successful login, the following screen will appear.



3.2 Login to AhsayOBM with 2FA using authenticator app

1. A shortcut icon of AhsayOBM should have been created on your Windows desktop after installation. Double click the icon to launch the application.

2. Enter the **Login name** and **Password** of your AhsayOBM account provided by your backup service provider, then click **OK** to login.

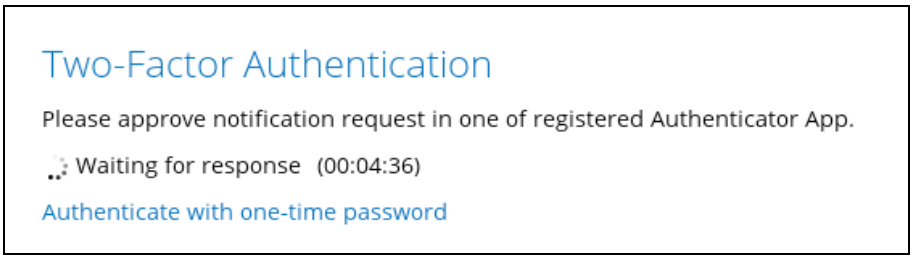


3. One of the two authentication methods will be displayed to continue with the login:

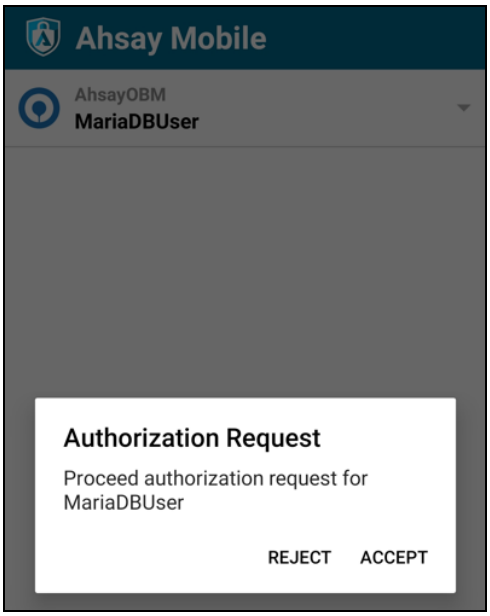
- Push Notification and TOTP when using Ahsay Mobile app
- TOTP only

- If **Ahsay Mobile app** was configured to use Push Notification and TOTP then there are two 2FA modes that can be used:
  - Push Notification (default)

Push notification is the default 2FA mode. Accept the login request on Ahsay Mobile to complete the login.

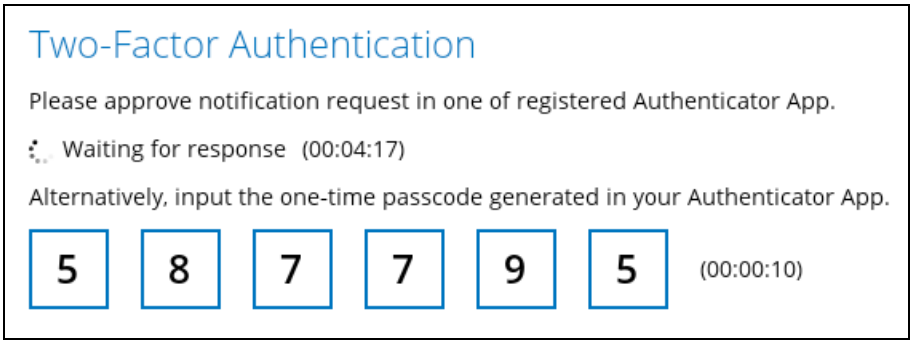


Example of the login request sent to the Ahsay Mobile app.

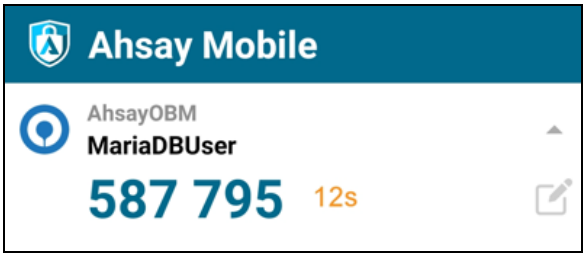


- TOTP

However, if push notification is not working or you prefer to use one-time passcode, click the Authenticate with one-time password link, then input the one-time passcode generated by Ahsay Mobile to complete the login.

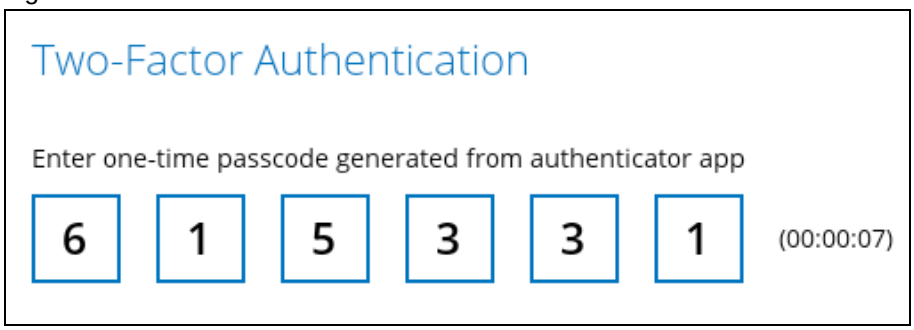


Example of the one-time passcode generated in Ahsay Mobile.

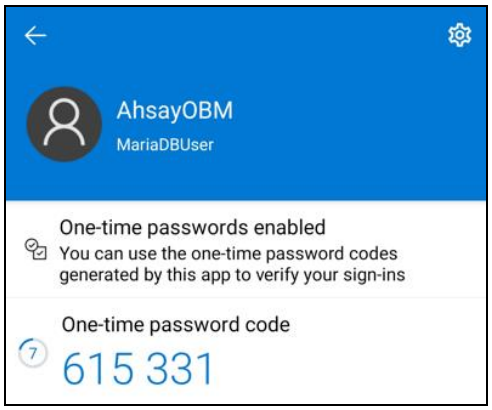


- TOTP only

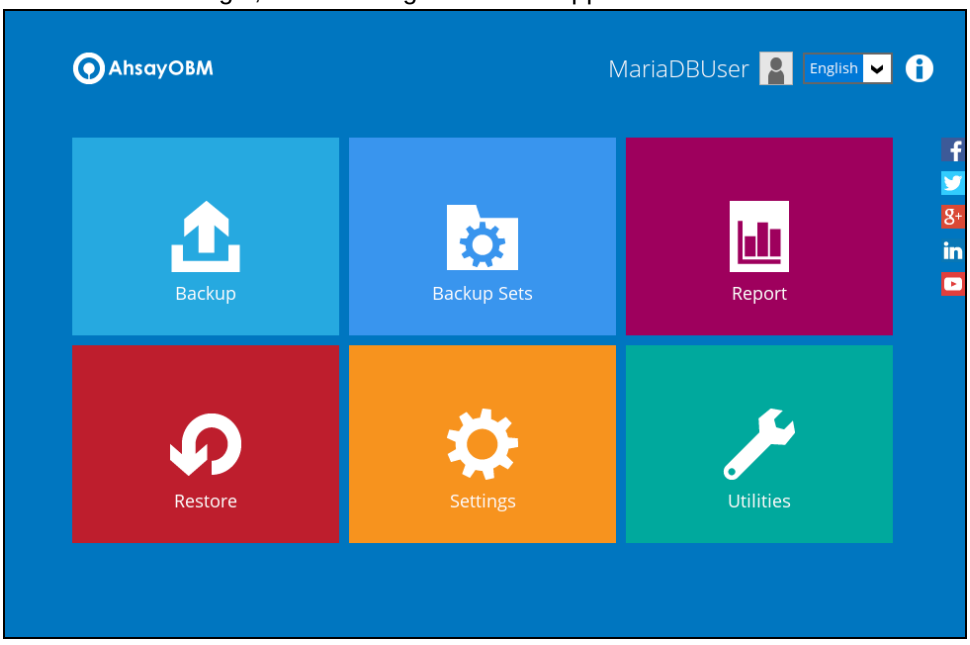
  Enter the one-time passcode generated by the authenticator app to complete the login.



  Example of the one-time passcode generated in the third party authenticator app Microsoft Authenticator.



4. After successful login, the following screen will appear.



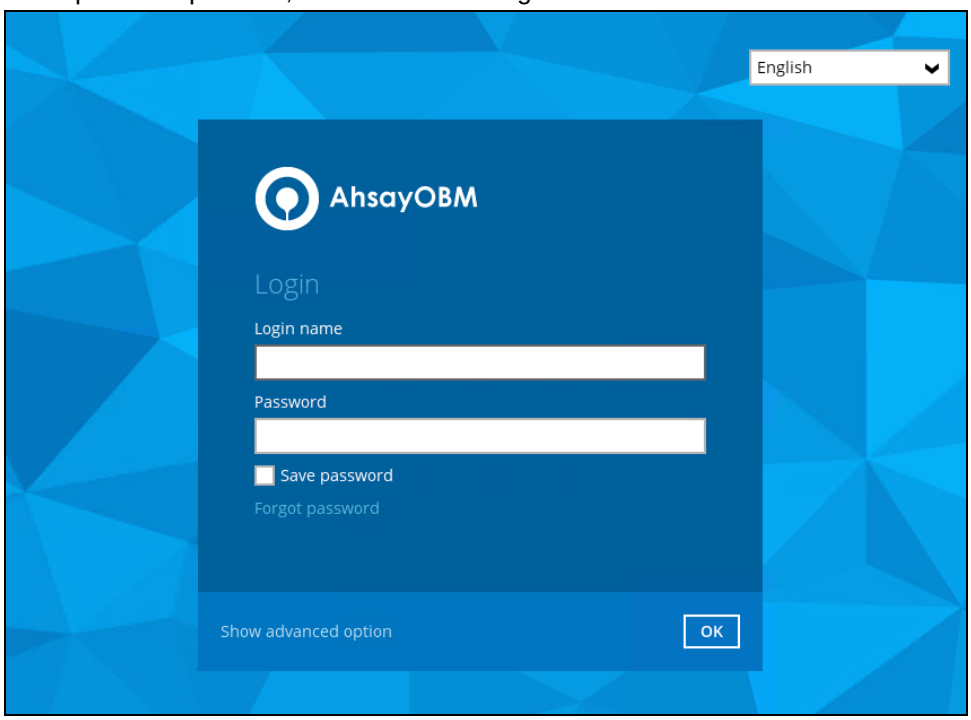
NOTE

If you have trouble logging in using the authenticator app please refer to Chapter 9 of the AhsayOBM Quick Start Guide for Windows for more information.

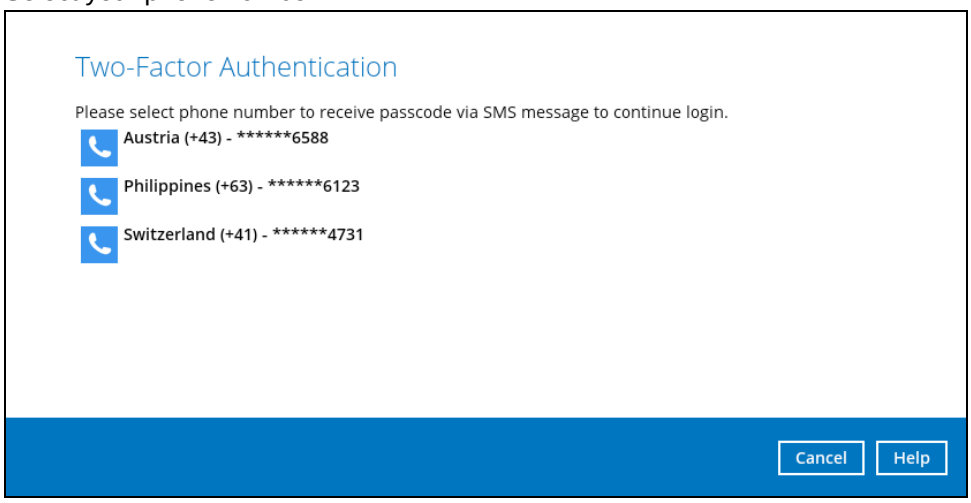
3.3 Login to AhsayOBM with 2FA using Twilio

1. A shortcut icon of AhsayOBM should have been created on your Windows desktop after installation. Double click the icon to launch the application.

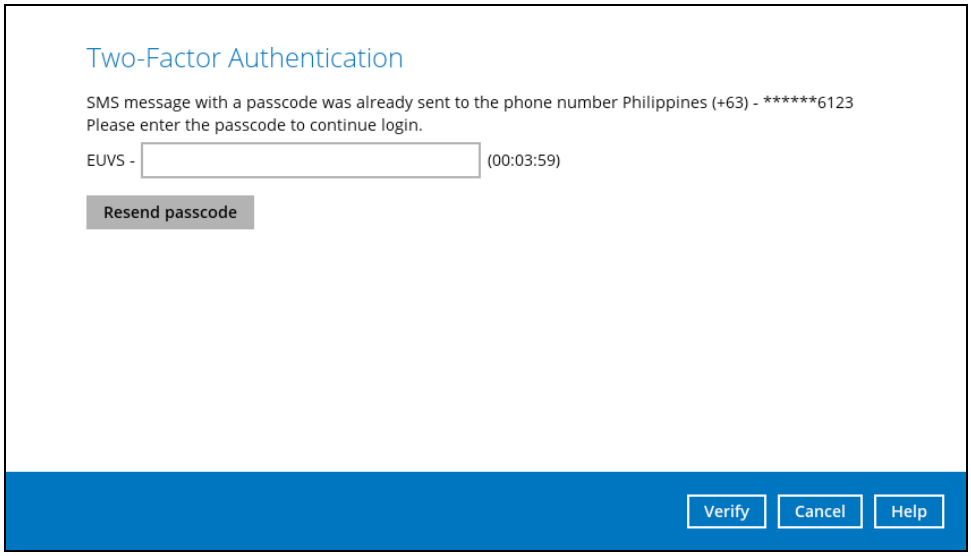
2. Enter the **Login name** and **Password** of your AhsayOBM account provided by your backup service provider, then click **OK** to login.



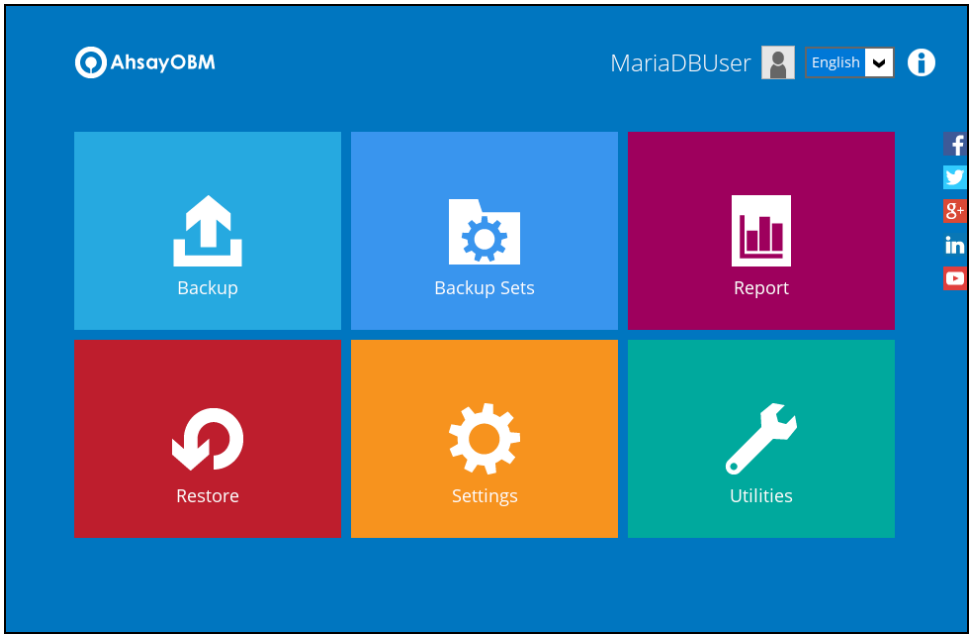
3. Select your phone number.



4. Enter the passcode and click **Verify** to login.

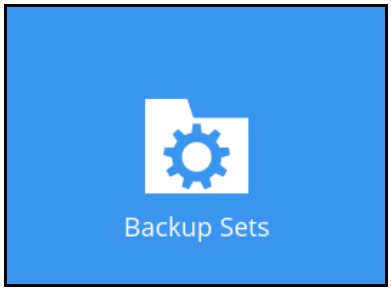


5. After successful login, the following screen will appear.

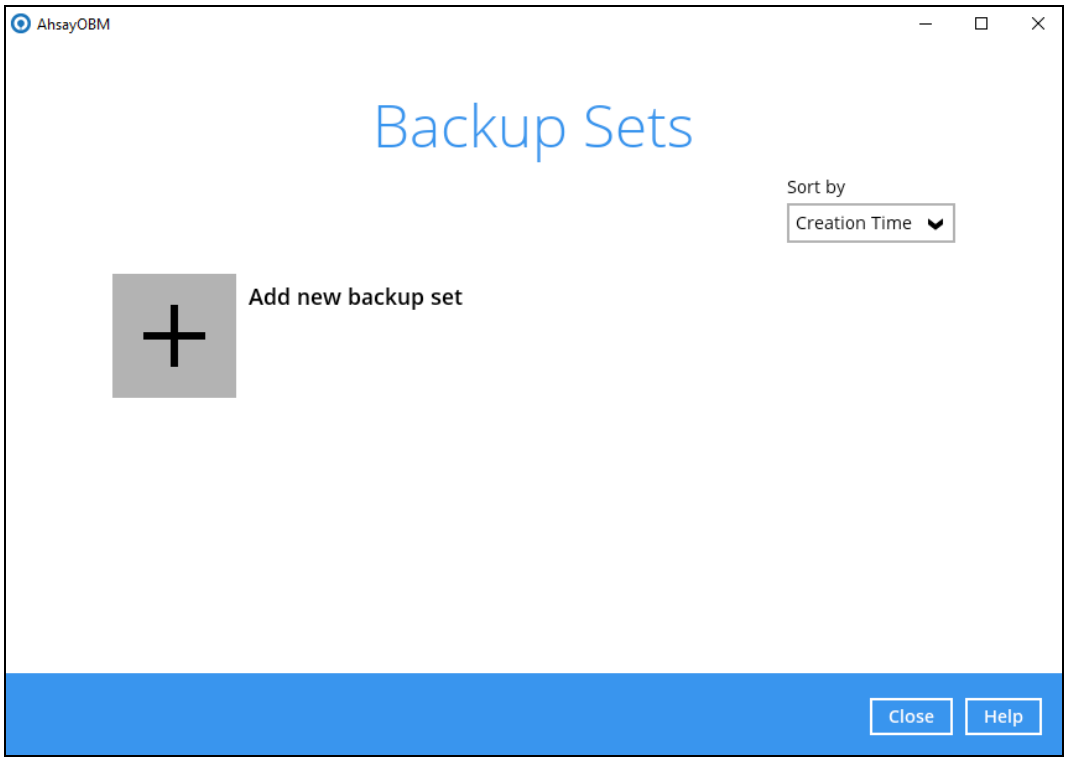


4 Creating a MariaDB Database Backup Set

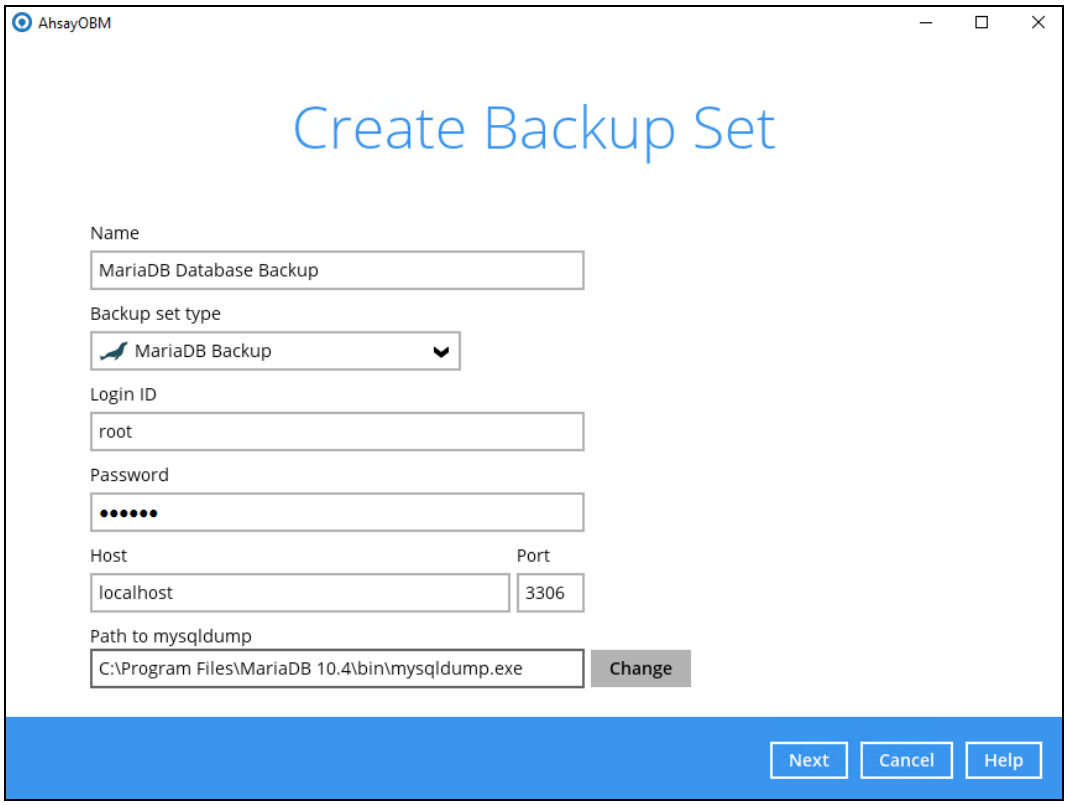
1. Click the Backup Sets icon on the main interface of AhsayOBM.



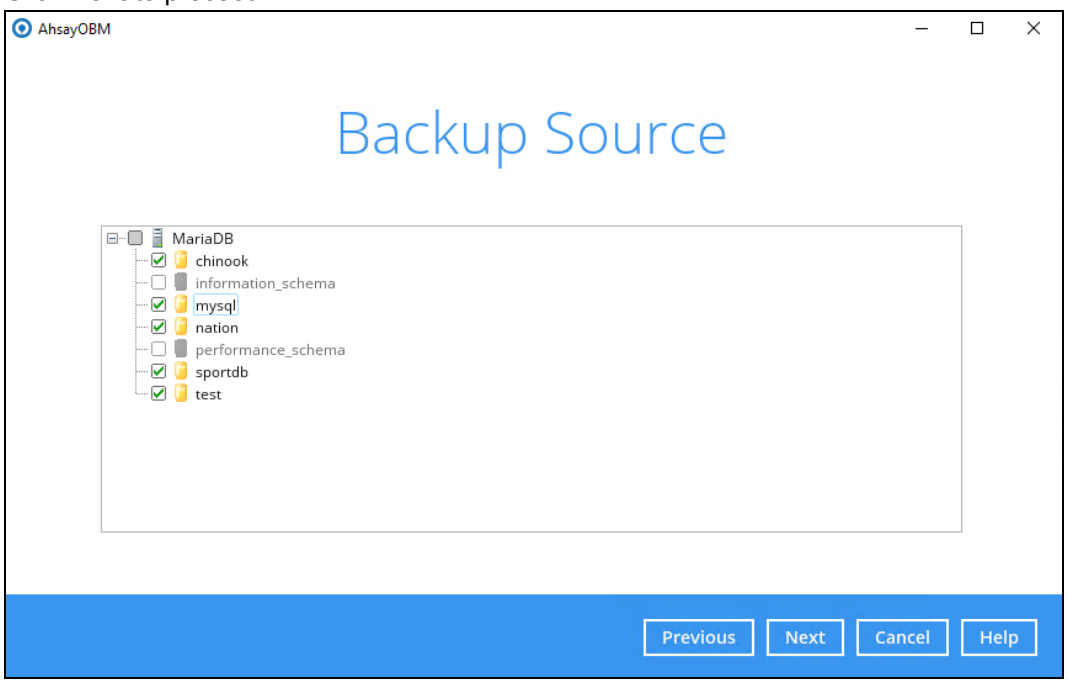
2. Create a new backup set by clicking the **Add** button to created new backup set.



3. Select the **Backup set type** and name your new backup set and enter the login information for the MariaDB server then click **Next** to proceed.



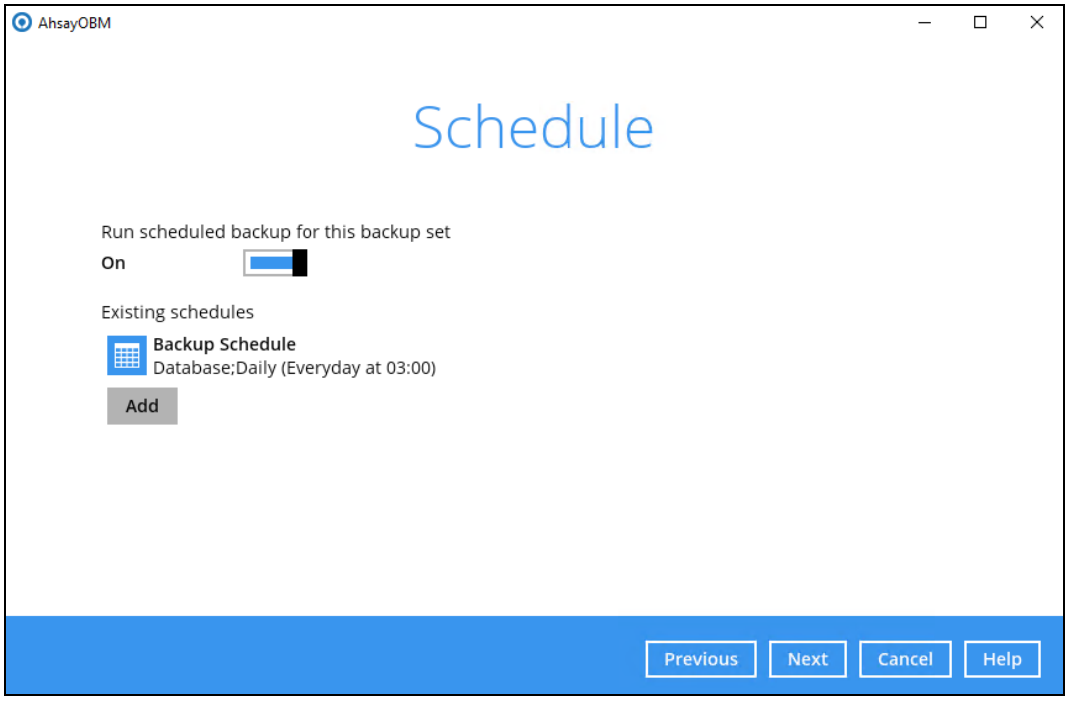
4. In the Backup Source menu, select the MariaDB databases you would like to backup. Click **Next** to proceed.



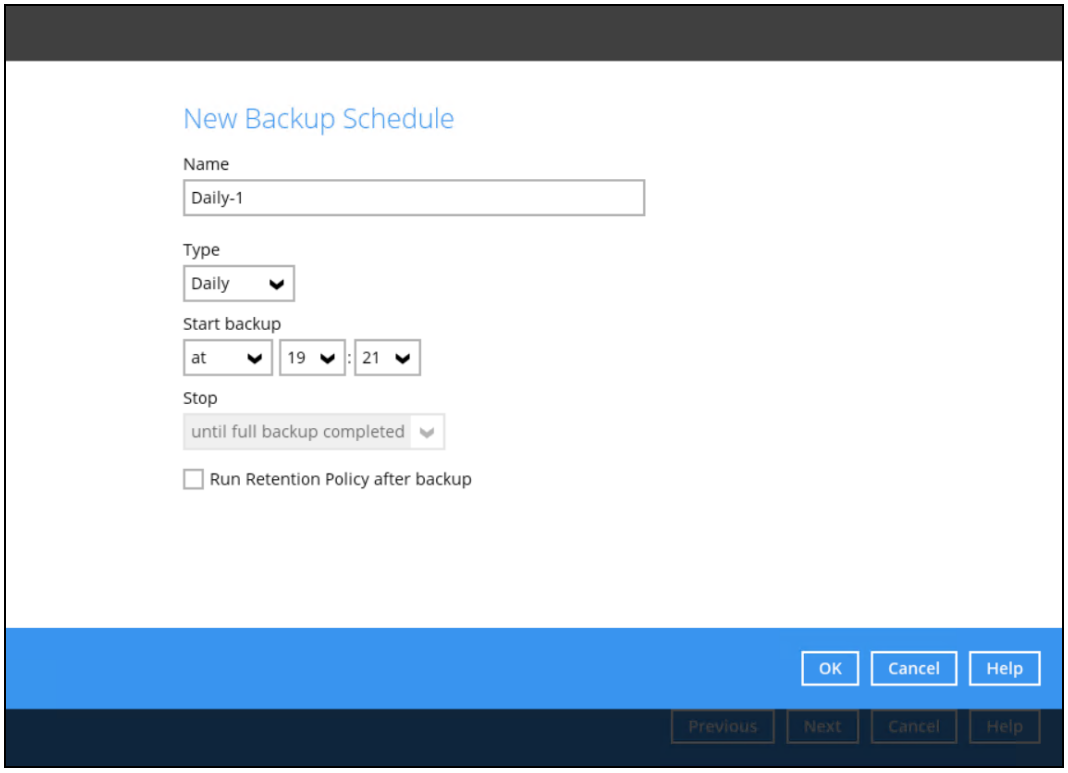
NOTE

The 'information_schema' and 'performance_schema' databases are MariaDB virtual system databases, which contains information about the user databases on the MariaDB instance, are automatically excluded from the backup source. They are read-only and cannot be backed up, therefore they are grayed out and cannot be selected. .

5. In the Schedule menu, you can configure a backup schedule for backup job to run automatically at your specified time interval.



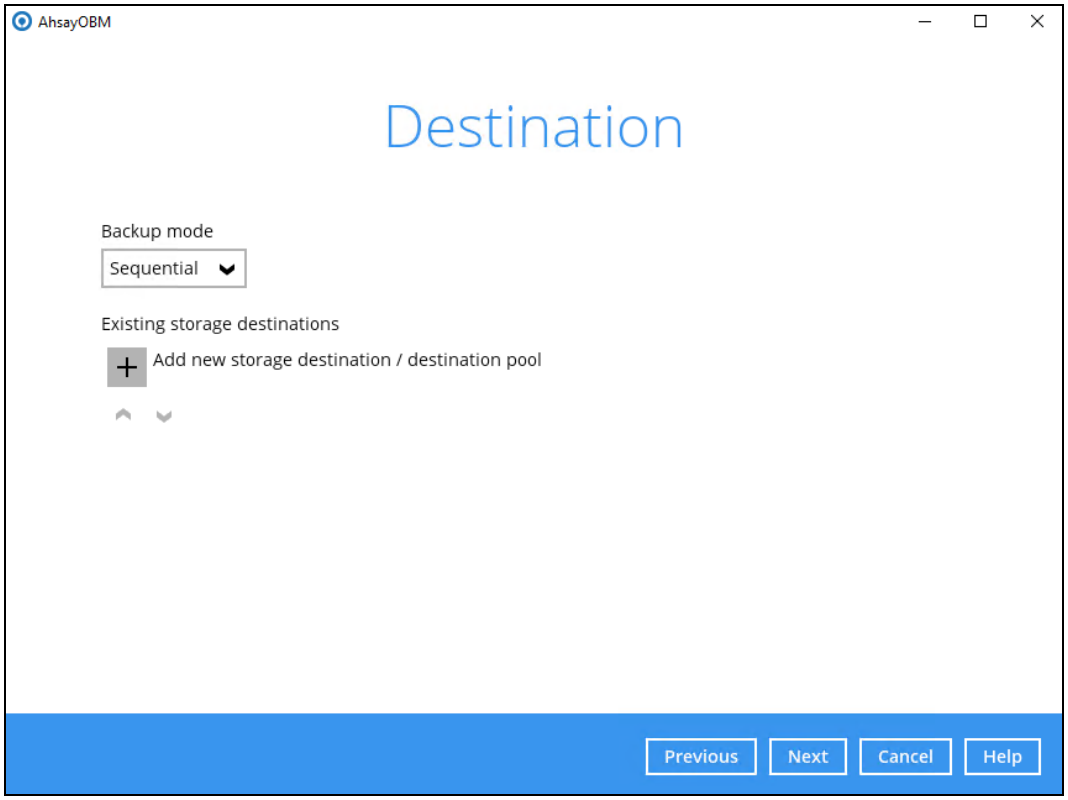
Click **Add** to add a new schedule or double click on the existing schedule to change the values. Click **Next** to proceed when you are done setting.



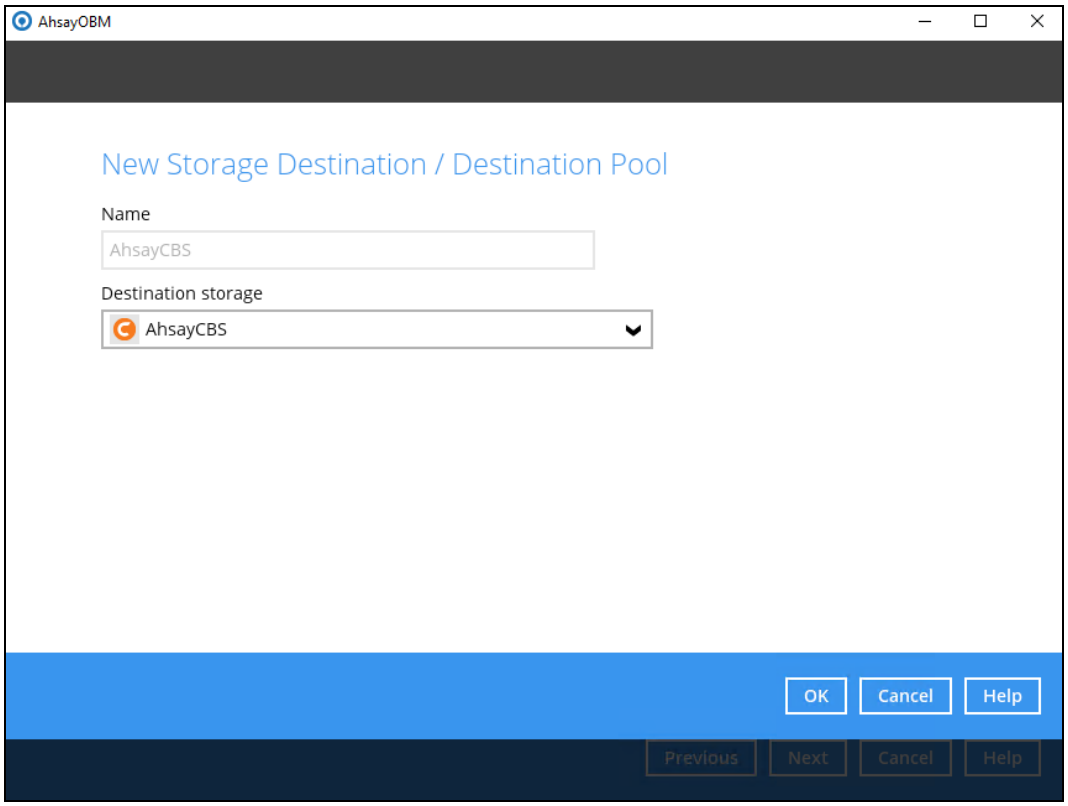
NOTE

The default backup schedule is daily backup at 3:00 with the backup job will run until completion and the retention policy job will be run immediately after the backup job.

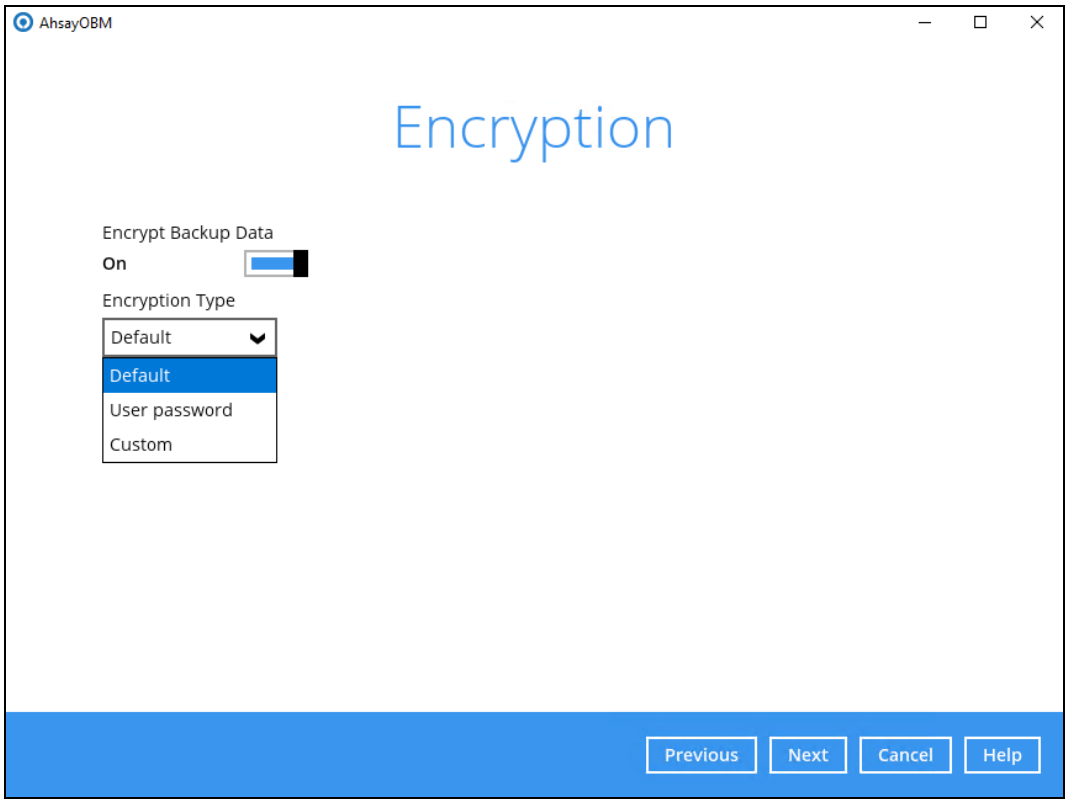
6. Select a backup mode and click the "**+**" sign icon to select a backup storage destination.



7. Select the backup storage destination. Click on **OK** to proceed.
Example: AhsayCBS server

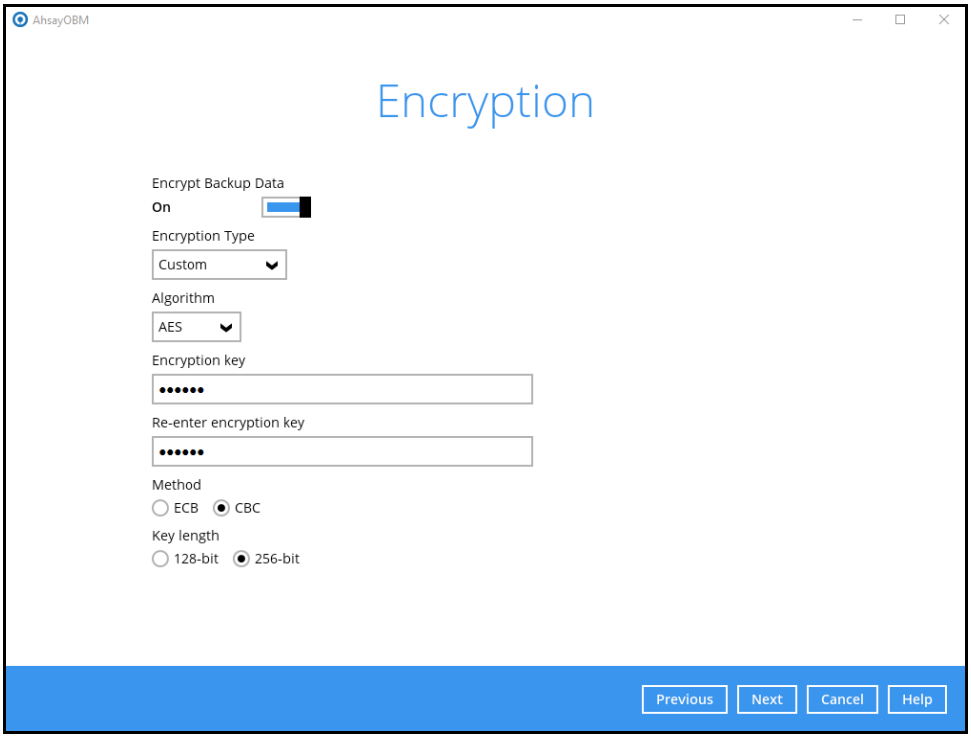


8. In the Encryption window, the default **Encrypt Backup Data** option is enabled with an encryption key preset by the system which provides the most secure protection.



You can choose from one of the following three Encryption Type options:

- **Default** – an encryption key with 44 alpha numeric characters will be randomly generated by the system.
- **User password** – the encryption key will be the same as the login password of your AhsayOBM at the time when this backup set is created. Please be reminded that if you change the AhsayOBM login password later, the encryption keys of the backup sets previously created with this encryption type will remain unchanged.
- **Custom** – you can customize your encryption key, where you can set your own algorithm, encryption key, method, and key length.

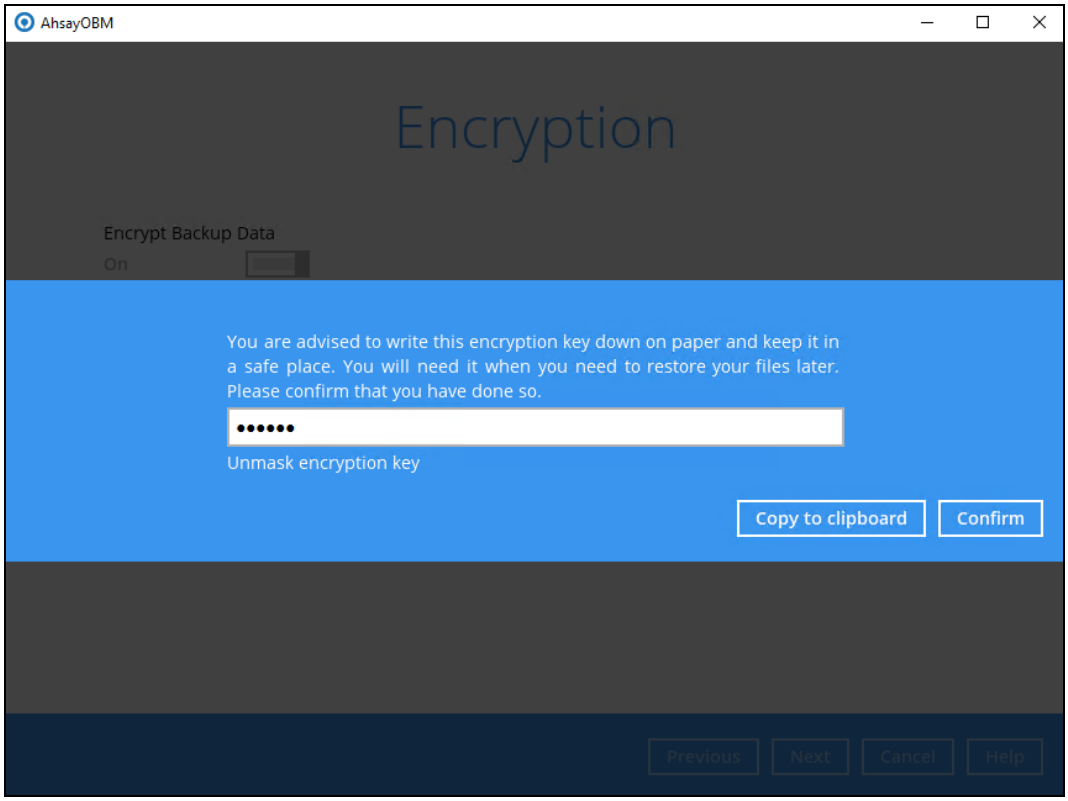


NOTE

For best practice on managing your encryption key, refer to the following wiki article.
https://wiki.ahsay.com/doku.php?id=public:8015_faq:best_practices_for_managing_encryption_key

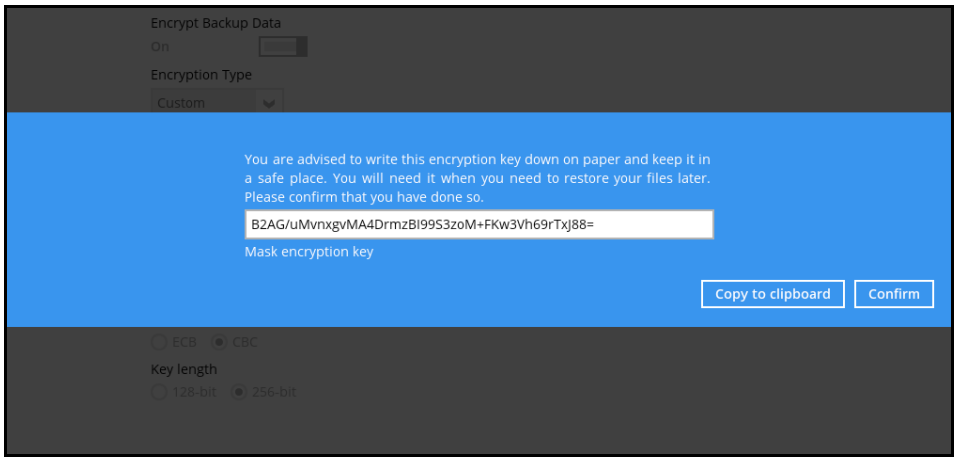
Click **Next** when you are done setting.

9. If you have enabled the Encryption Key feature in the previous step, the following pop-up window shows, no matter which encryption type you have selected.



The pop-up window has the following three options to choose from:

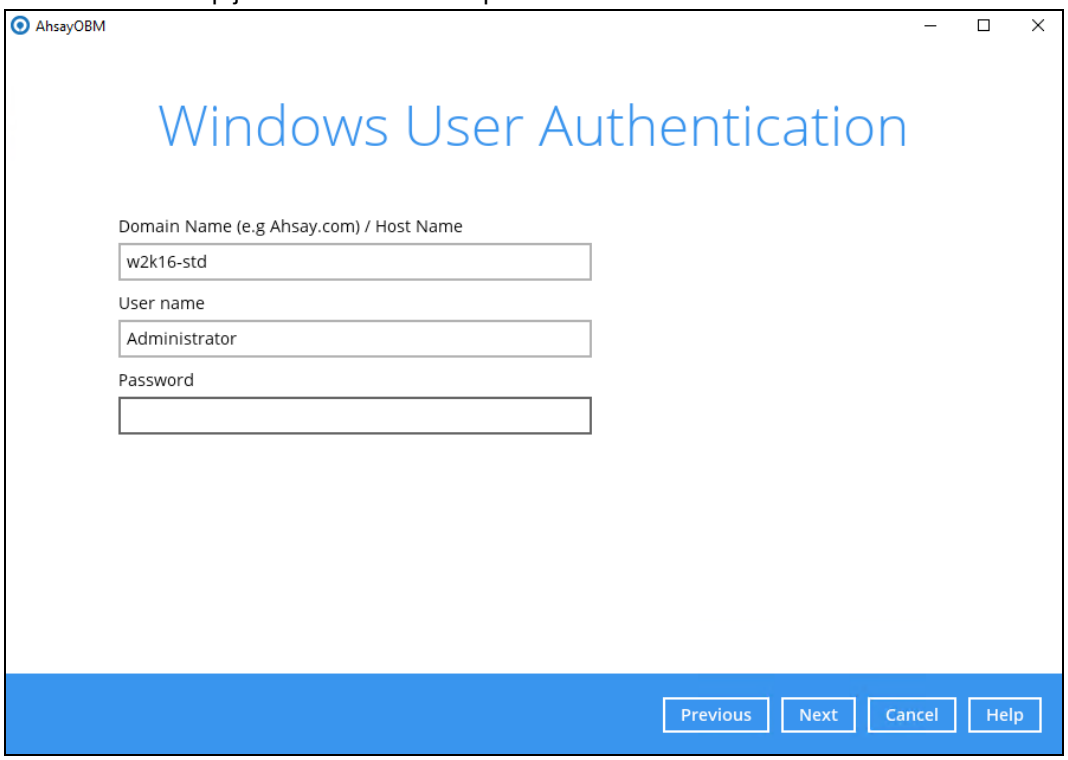
- **Unmask encryption key** – The encryption key is masked by default. Click this option to show the encryption key.



- **Copy to clipboard** – Click to copy the encryption key, then you can paste it in another location of your choice.

- **Confirm** – Click to exit this pop-up window and proceed to the next step.

10. Enter the Windows login credentials used by AhsayOBM to authenticate the scheduled or continuous backup job and click **Next** to proceed.

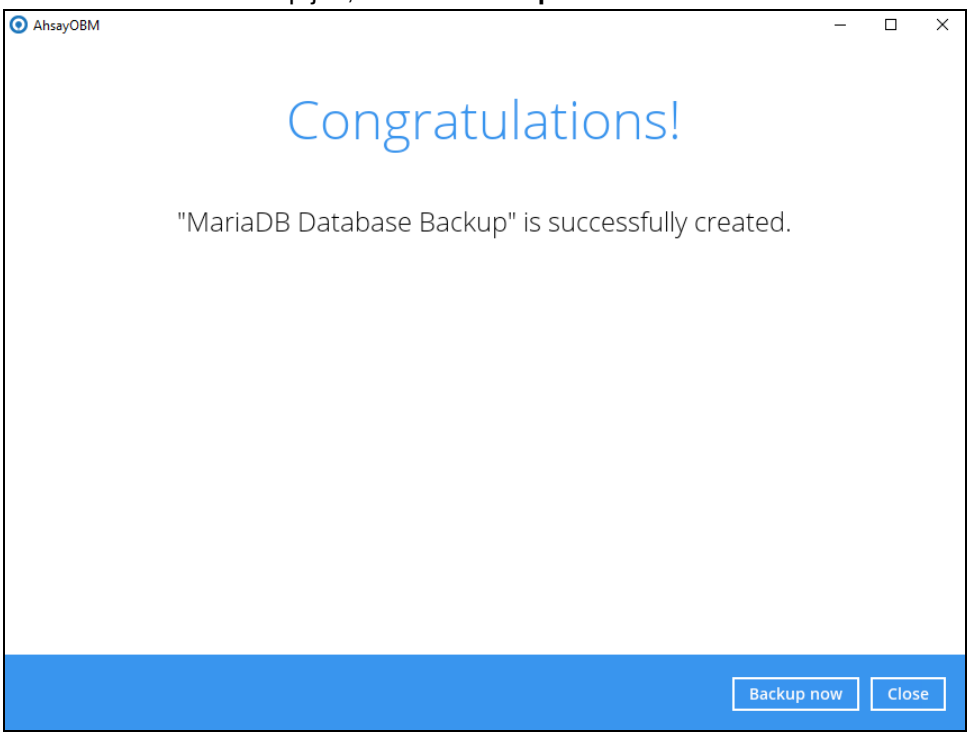


NOTE

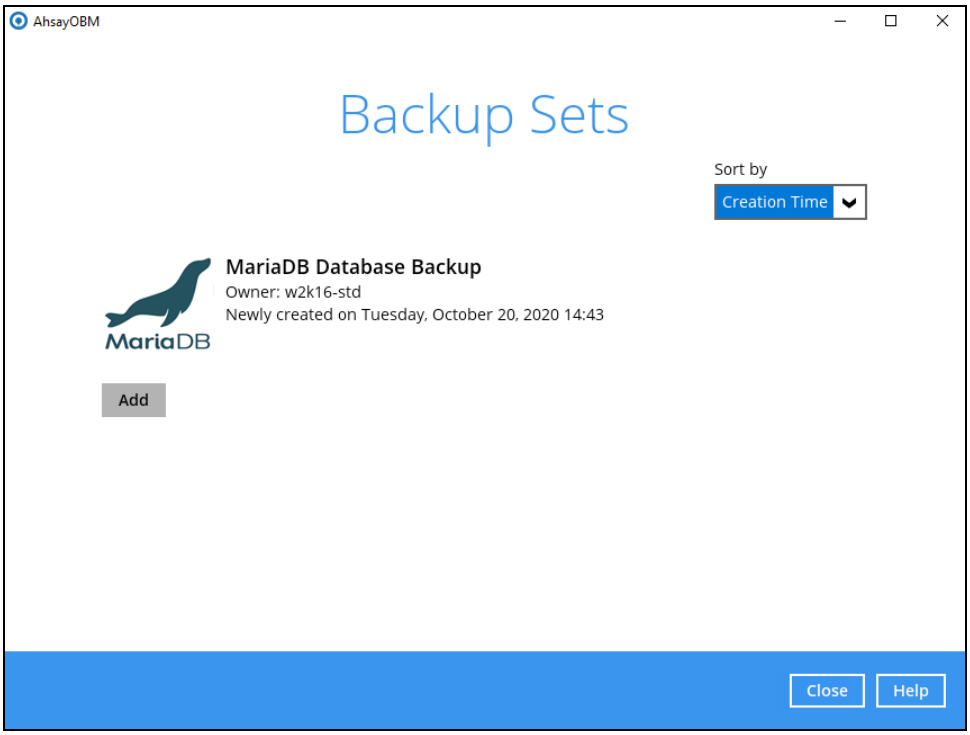
If the backup schedule is turned off and the selected destination storage is not a network shared drive, the Windows User Authentication screen will be automatically skipped. The Windows User Authentication login credentials can be added or updated post backup set creation.

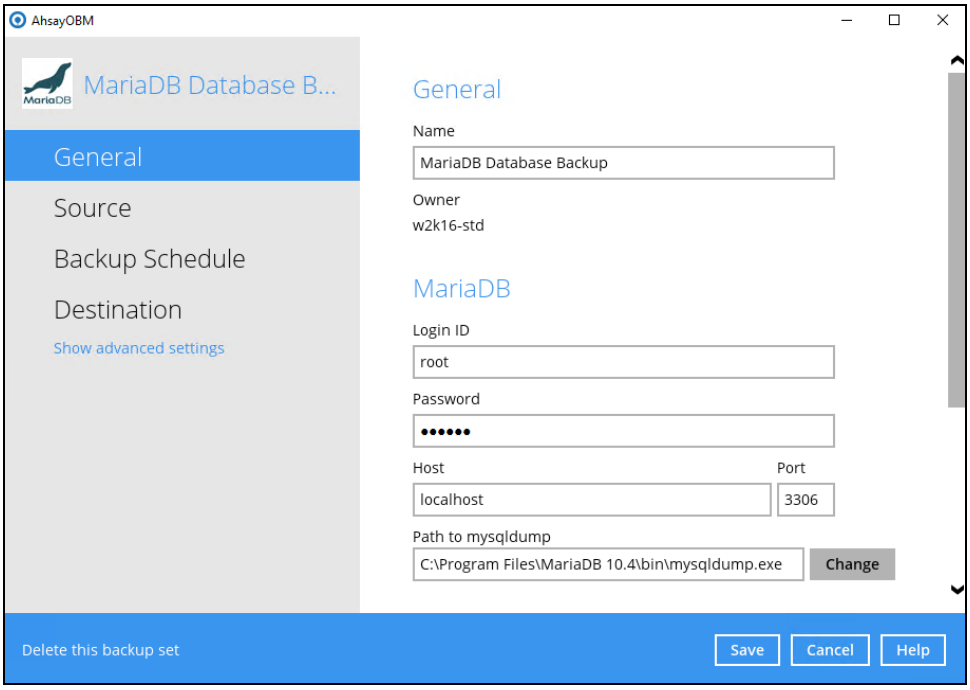
11. Backup set created.

    i. To start a manual backup job, click on **Backup now.**



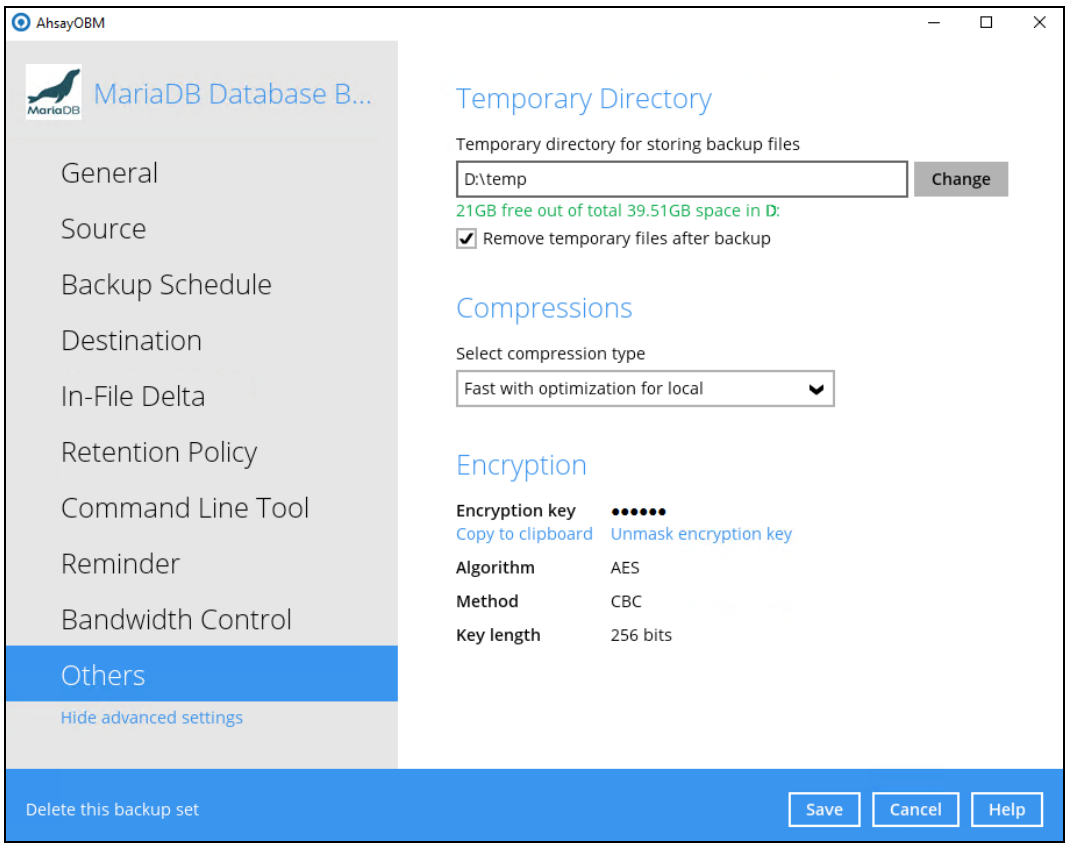
    ii. To verify the backup set settings, click on Close and then click on the MariaDB backup set to complete the setup.





12. It is highly recommended to change the Temporary Directory. Select another location with sufficient free disk space other than Dive C\Users\Administrator\temp.

    Go to Others > Temporary Directory. Click Change to browse for another location.

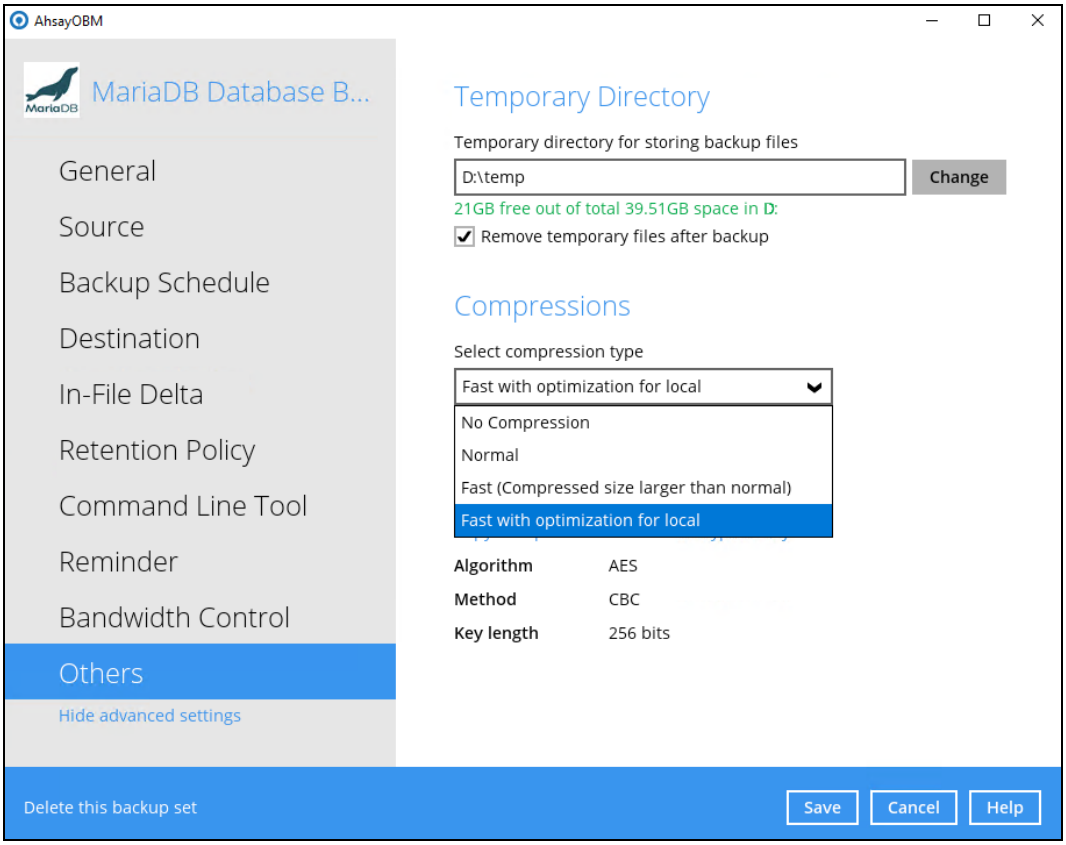


    It is recommended to check the **Remove temporary files after backup** to make sure the spooled database files are cleaned up after each backup job to free up space on the temporary drive. Otherwise, if the temporary drive runs out of space the database backup job will not run.

13. **Optional**: Select your preferred **Compression** type. By default, the compression is Fast with optimization for local.

    Go to Others > Compressions. Select from the following list:

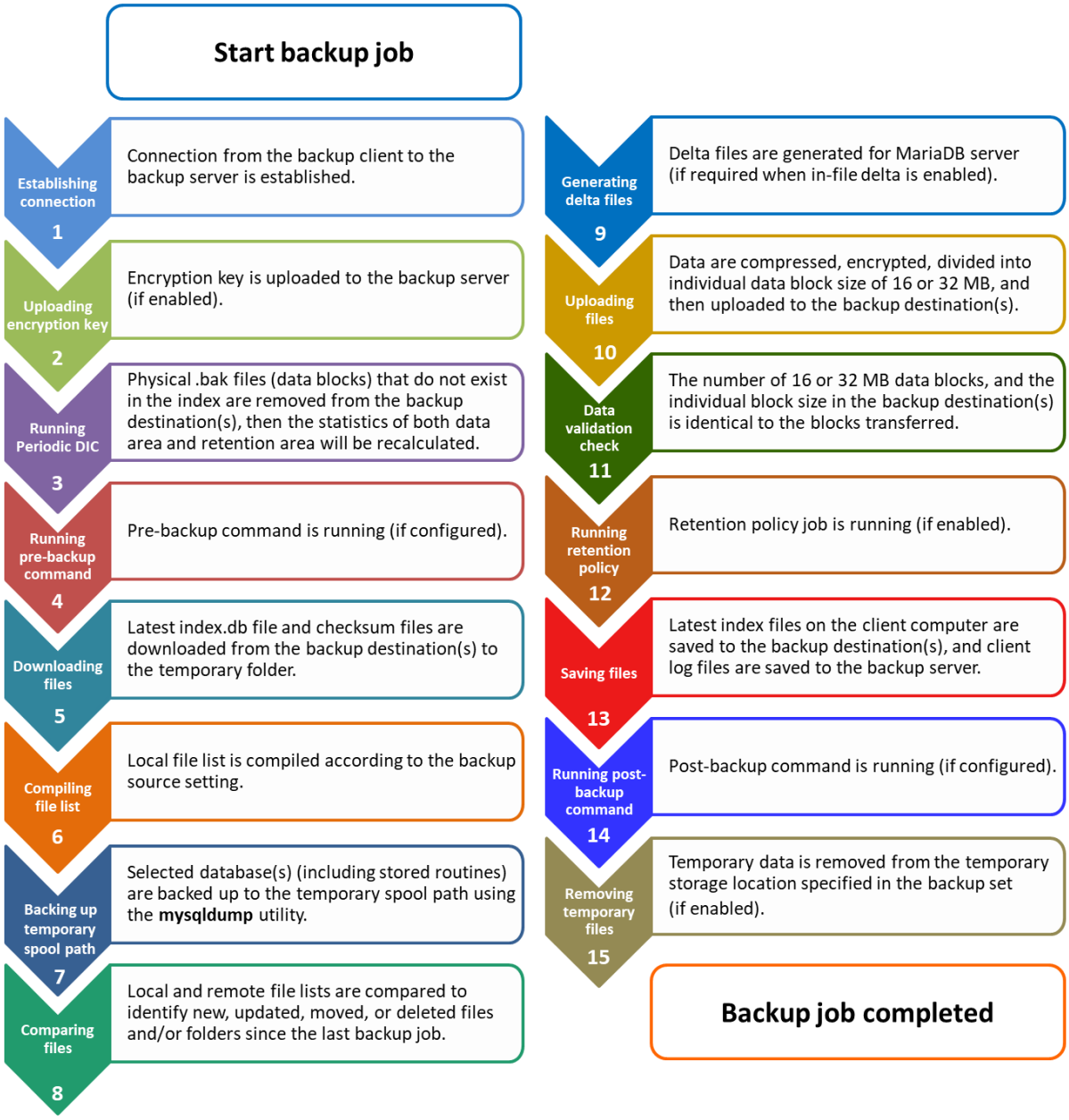
    - No Compression
    - Normal
    - Fast (Compressed size larger than normal)
    - Fast with optimization for local



5 Overview on the Backup Process

The following steps are performed during a backup job. For an overview of the detailed process for Steps **3**, **5**, **11**, and **13**, please refer to the following chapters.

- Periodic Data Integrity Check (PDIC) Process **(Step 3)**
- Backup Set Index Handling Process
  - Start Backup Job **(Step 5)**
  - Completed Backup Job **(Step 13)**
- Data Validation Check Process **(Step 11)**



5.1 Periodic Data Integrity Check (PDIC) Process

For AhsayOBM v8.3.6.0 (or above), the PDIC will run on the first backup job that falls on the corresponding day of the week from **Monday to Friday**.

To minimize the impact of the potential load of large number of PDIC jobs running at the same time on the AhsayCBS server, the schedule of a PDIC job for each backup set is automatically determined by the result of the following formula:

PDIC schedule = ***%BackupSetID% modulo 5***
or
%BackupSetID% mod 5

The calculated **result** will map to the corresponding day of the week (i.e., from Monday to Friday).

0	**Monday**
1	**Tuesday**
2	**Wednesday**
3	**Thursday**
4	**Friday**

NOTE: The PDIC schedule cannot be changed.

Example:

Backup set ID: 1594627447932

Calculation: 1594627447932 mod 5 = ***2***

2	**Wednesday**

In this example:

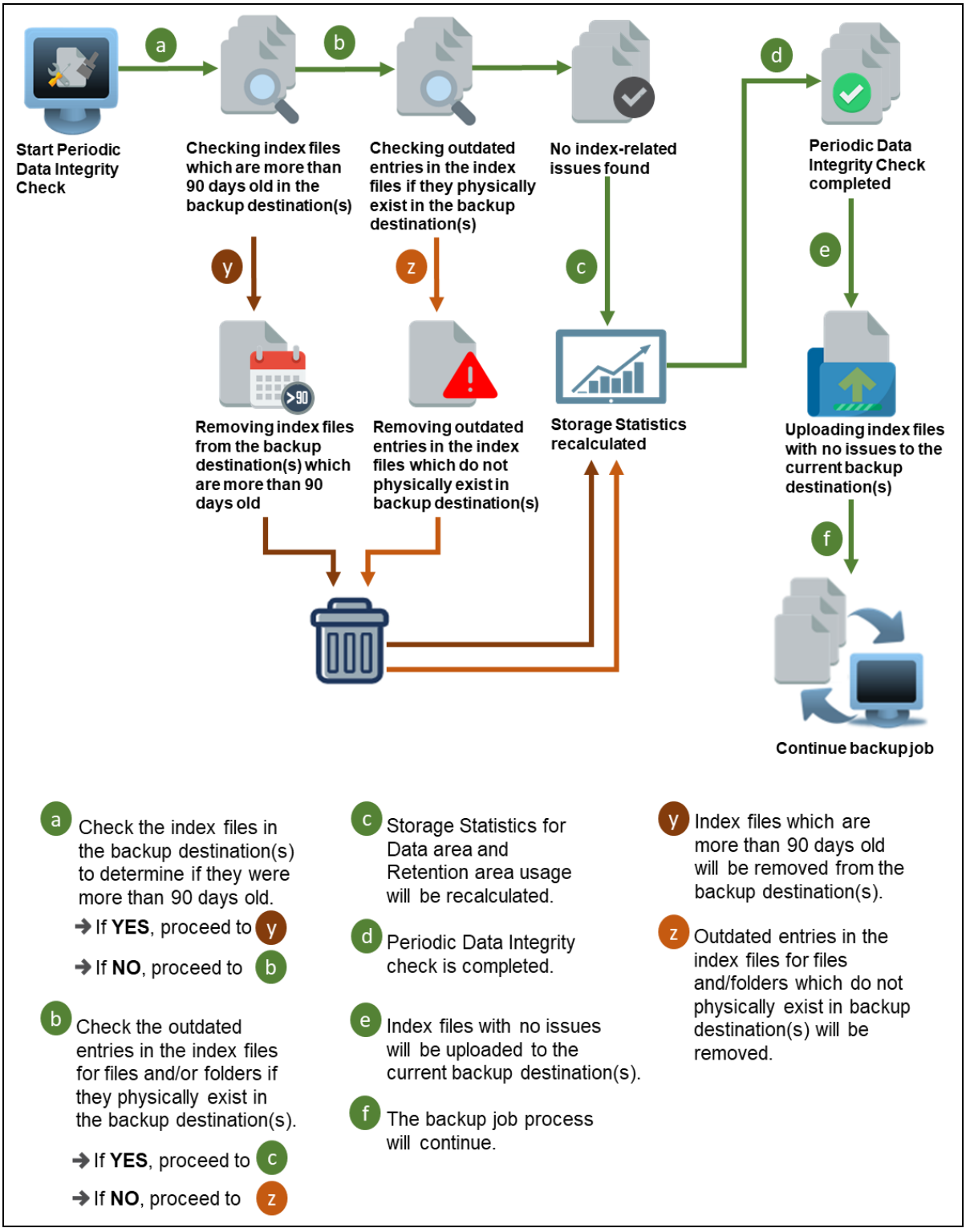
- the PDIC will run on the first backup job that falls on Wednesday; or
- if there is no active backup job(s) running from Monday to Friday, then the PDIC will run on the next available backup job.

NOTE

Although according to the PDIC formula for determining the schedule is ***%BackupSetID% mod 5***, this schedule only applies if the previous PDIC job was actually run more than 7 days prior.

Under certain conditions, the PDIC may not run strictly according to this formula. For example:

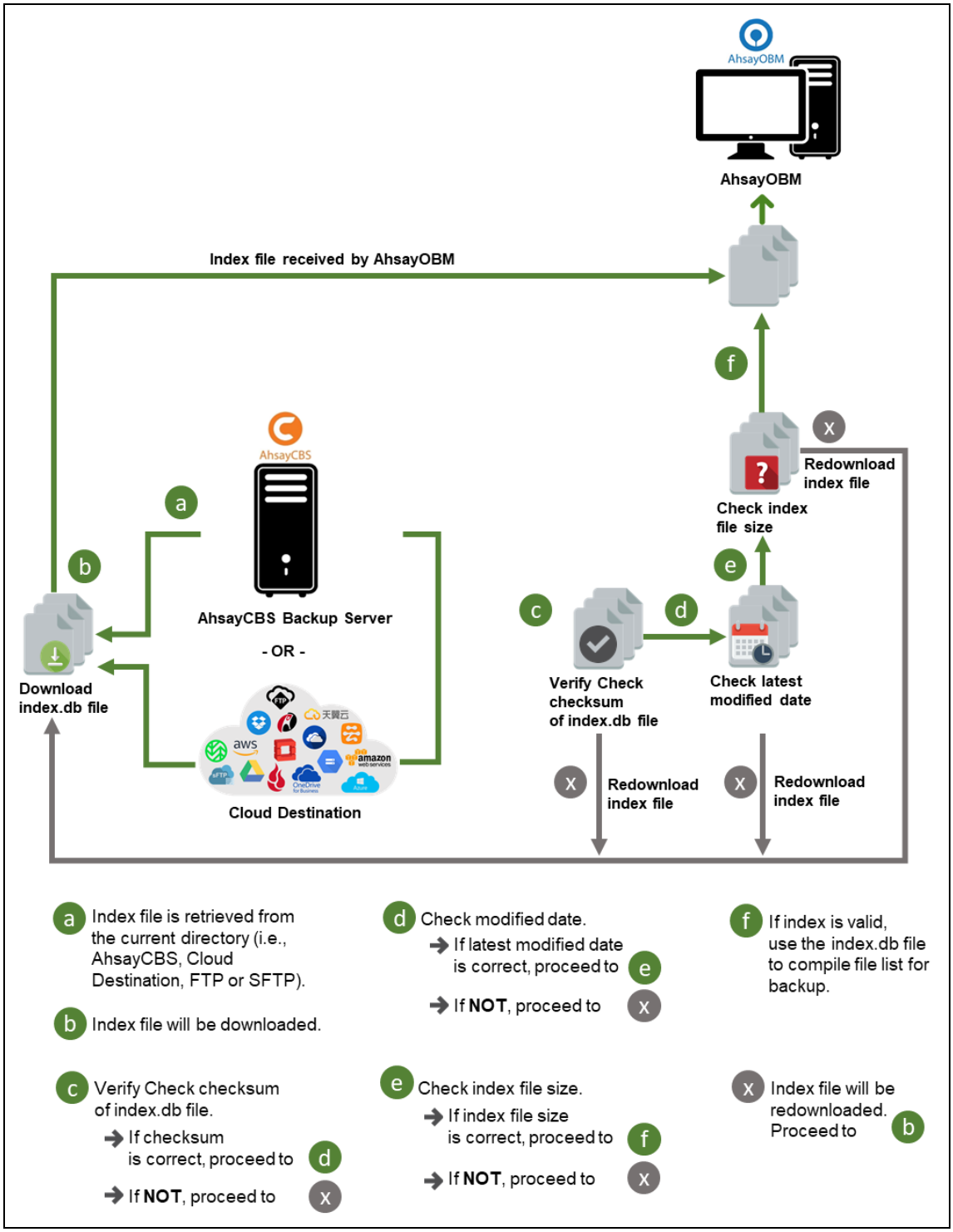
1. If AhsayOBM was upgraded to v8.5 (or above) from an older version v6, v7, or pre-8.3.6.0 version. In this case, the PDIC job will run on the first backup job after upgrade.
2. If backup jobs for a backup set are not run on a regular daily backup schedule (for example: on a weekly or monthly schedule), then the PDIC job will run if it detects that the previous PDIC job was run more than 7 days ago.


a
b
d
Start Periodic Data Integrity Check
Checking index files which are more than 90 days old in the backup destination(s)
Checking outdated entries in the index files if they physically exist in the backup destination(s)
No index-related issues found
Periodic Data Integrity Check completed
y
z
c
e
>90
Removing index files from the backup destination(s) which are more than 90 days old
Removing outdated entries in the index files which do not physically exist in backup destination(s)
Storage Statistics recalculated
Uploading index files with no issues to the current backup destination(s)
f
Continue backup job
a Check the index files in the backup destination(s) to determine if they were more than 90 days old.
➔ If YES, proceed to y
➔ If NO, proceed to b
b Check the outdated entries in the index files for files and/or folders if they physically exist in the backup destination(s).
➔ If YES, proceed to c
➔ If NO, proceed to z
c Storage Statistics for Data area and Retention area usage will be recalculated.
d Periodic Data Integrity check is completed.
e Index files with no issues will be uploaded to the current backup destination(s).
f The backup job process will continue.
y Index files which are more than 90 days old will be removed from the backup destination(s).
z Outdated entries in the index files for files and/folders which do not physically exist in backup destination(s) will be removed.

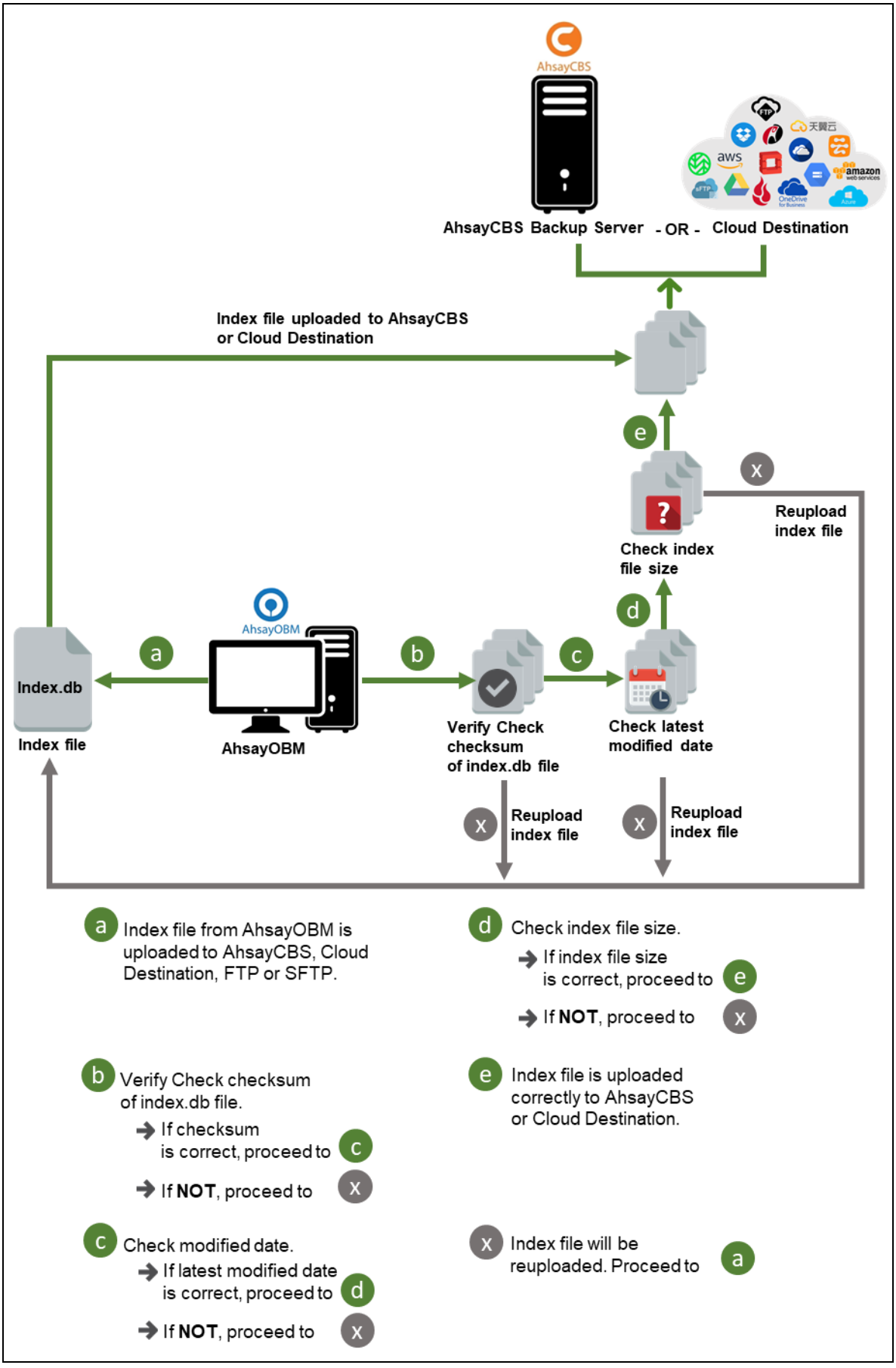
5.2 Backup Set Index Handling Process

To minimize the possibility of index related issues affecting backups, each time index files are downloaded from and uploaded to backup destination(s); the file size, last modified date, and checksum is verified to ensure index file integrity.

5.2.1 Start Backup Job

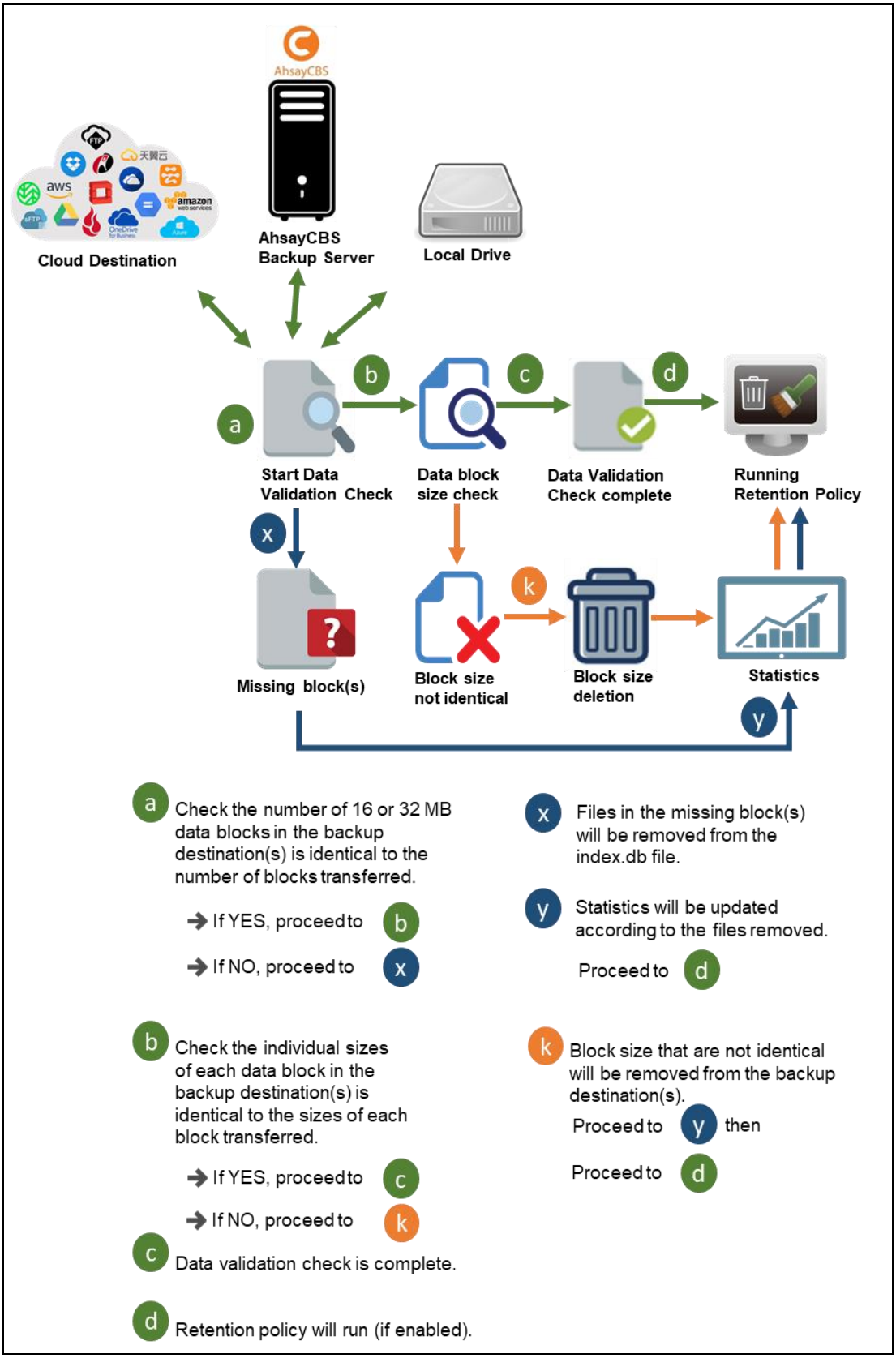


5.2.2 Completed Backup Job



5.3 Data Validation Check Process

As an additional measure to ensure that all files transferred to the backup destination(s) are received and saved correctly, both the number of 16 or 32 MB data block files and the size of each block file are checked again after the files are transferred.



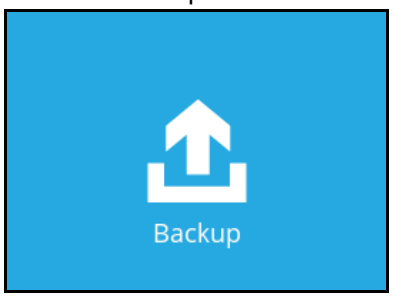
6 Running Backup Jobs

6.1 Login to AhsayOBM

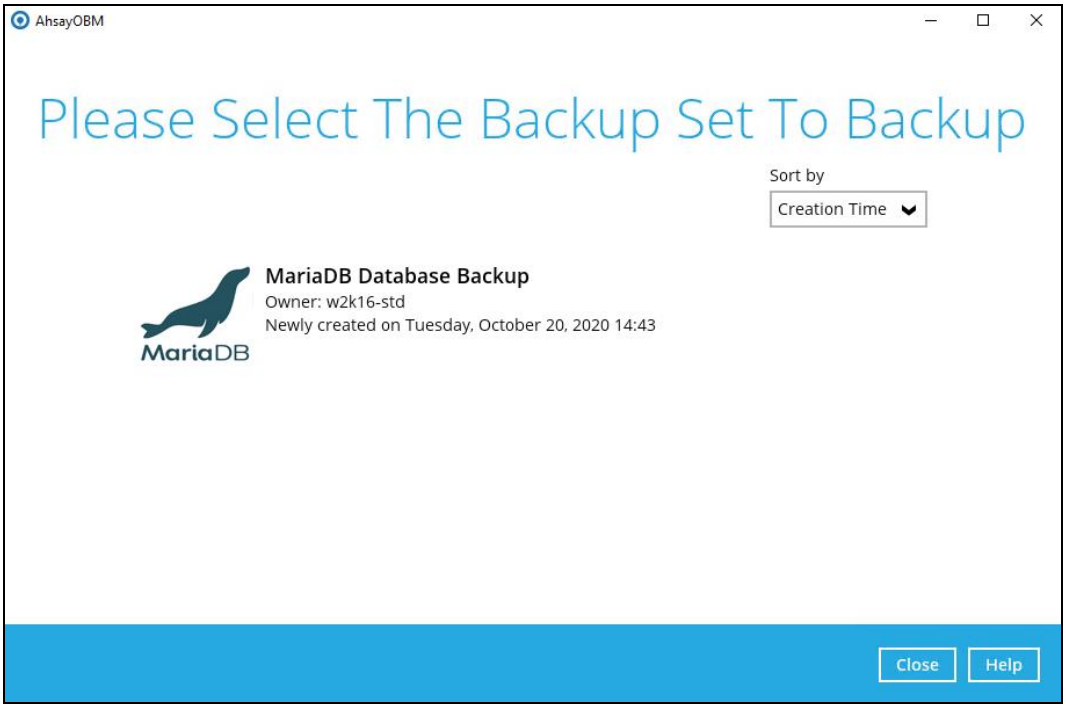
Login to the AhsayOBM application according to the instructions in Chapter 3.

6.2 Start a Manual Backup

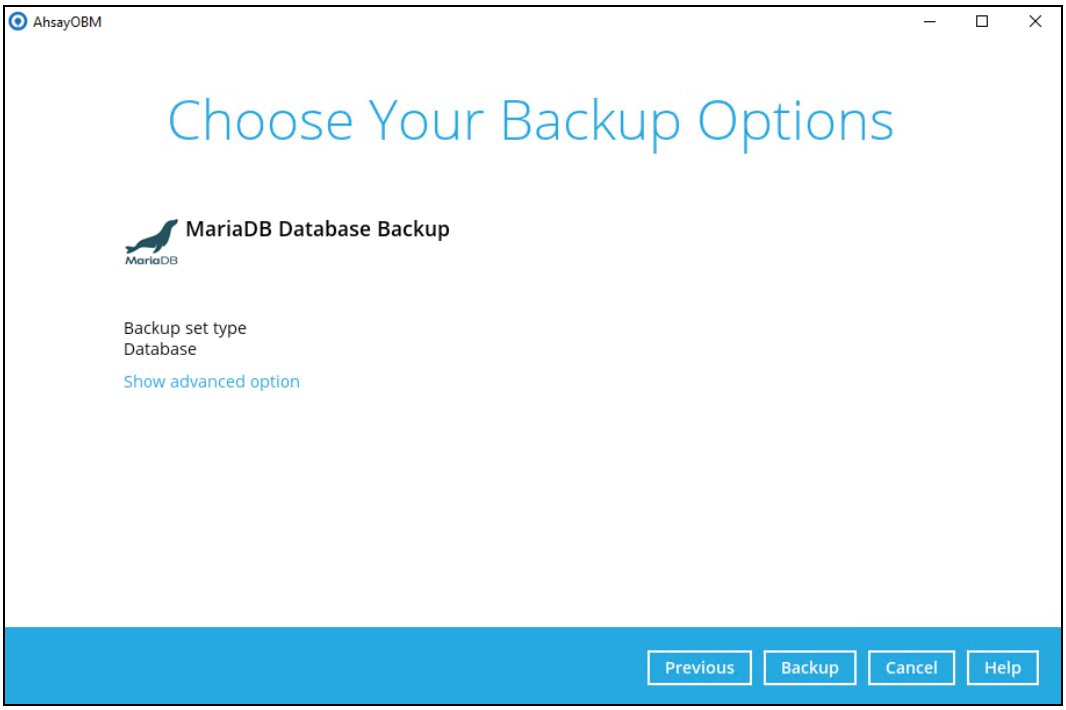
1. Click the Backup icon on the main interface of AhsayOBM.



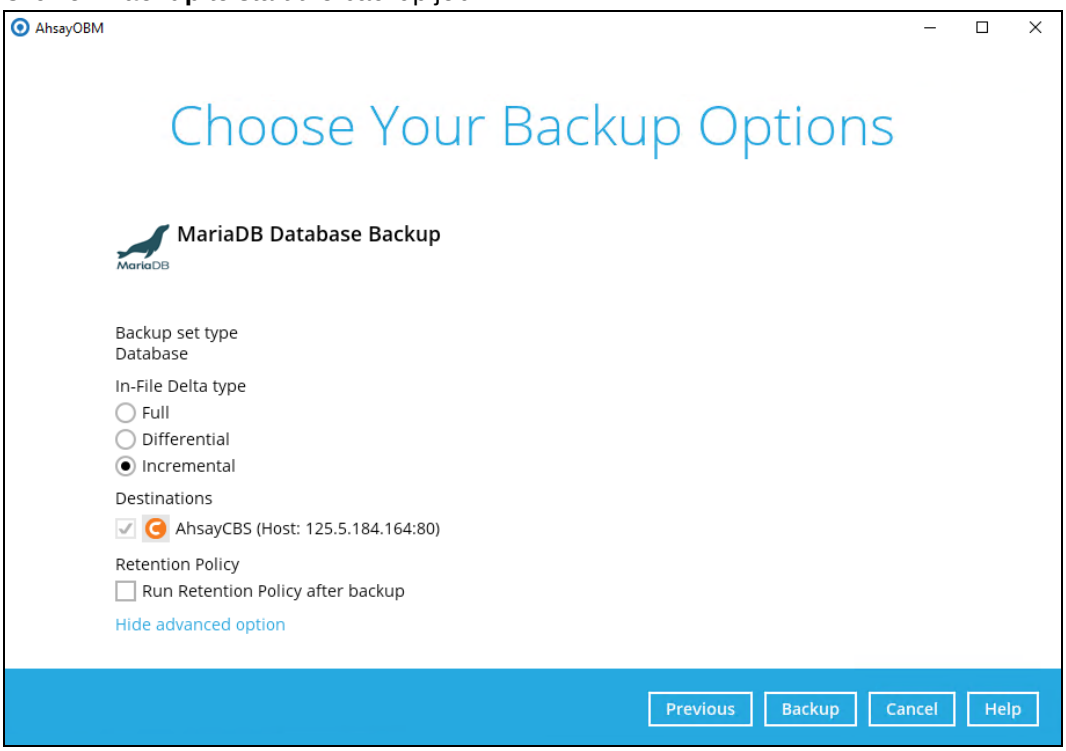
2. Select the MariaDB Database backup set which you would like to start a manual backup.



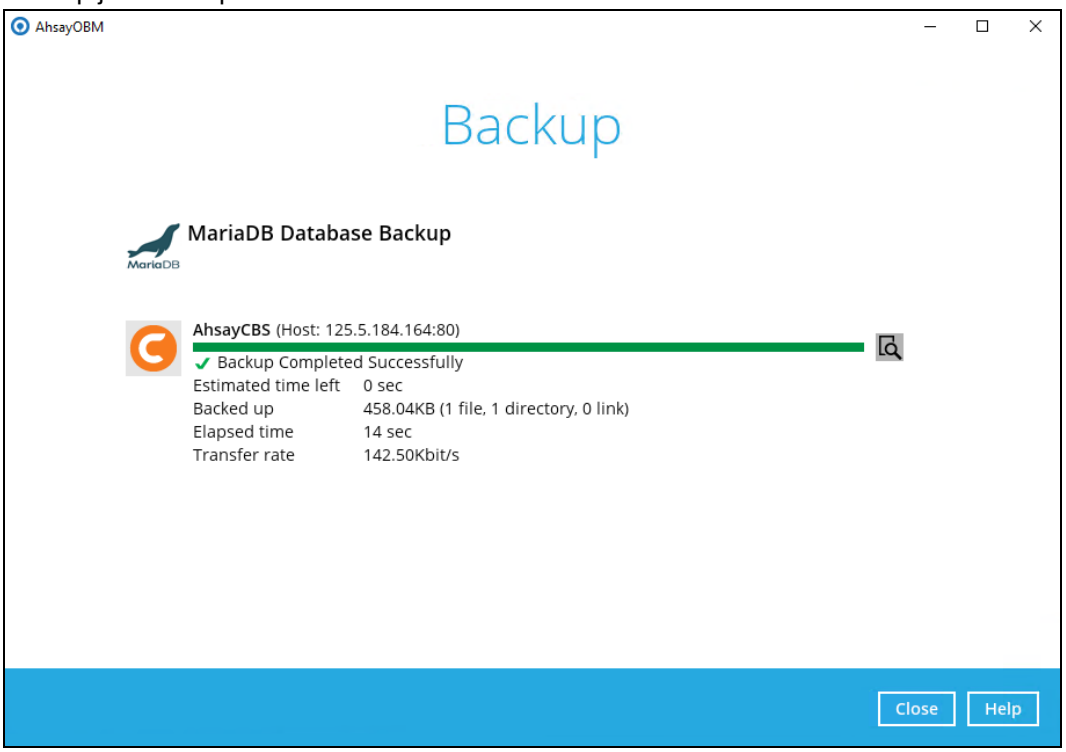
3. If you would like to modify the In-File Delta type, Destinations, or Run Retention Policy Settings, click on **Show advanced option**.



4. Click on **Backup** to start the backup job.

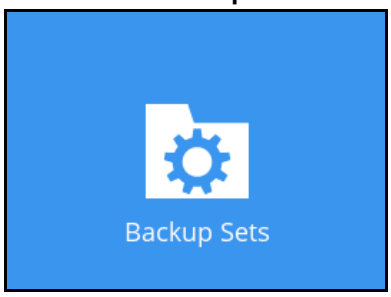


5. Backup job is completed.

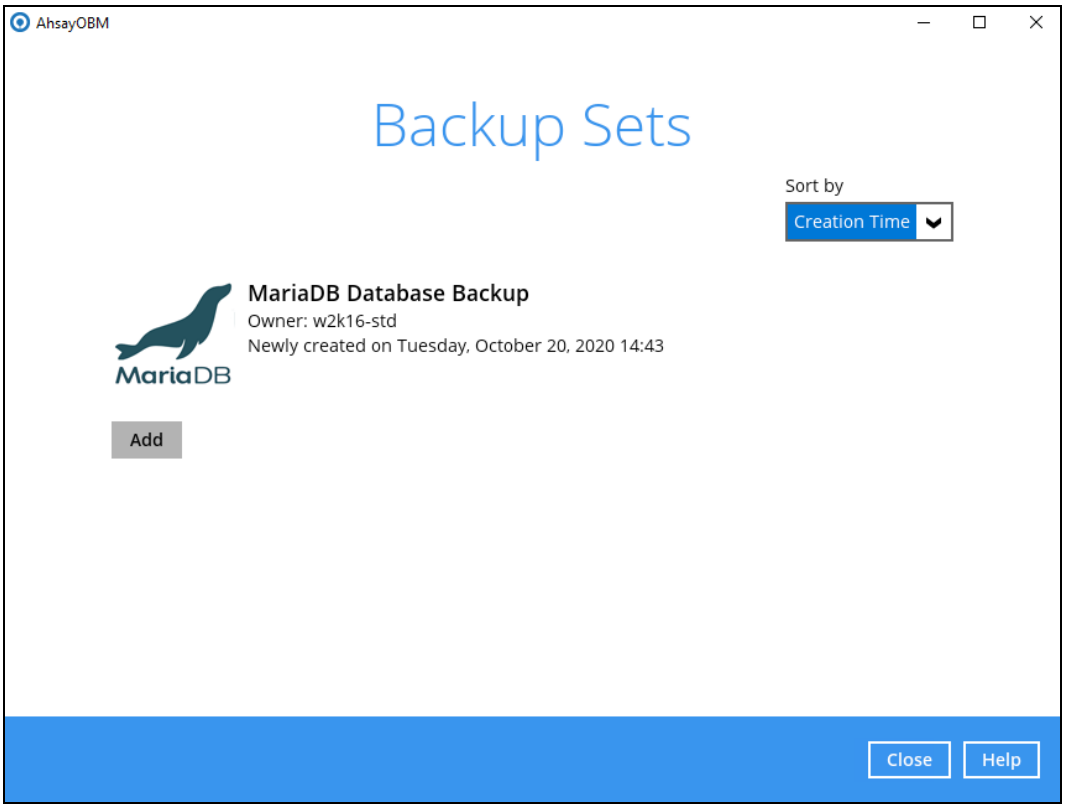


6.3 Configure Backup Schedule for Automated Backup

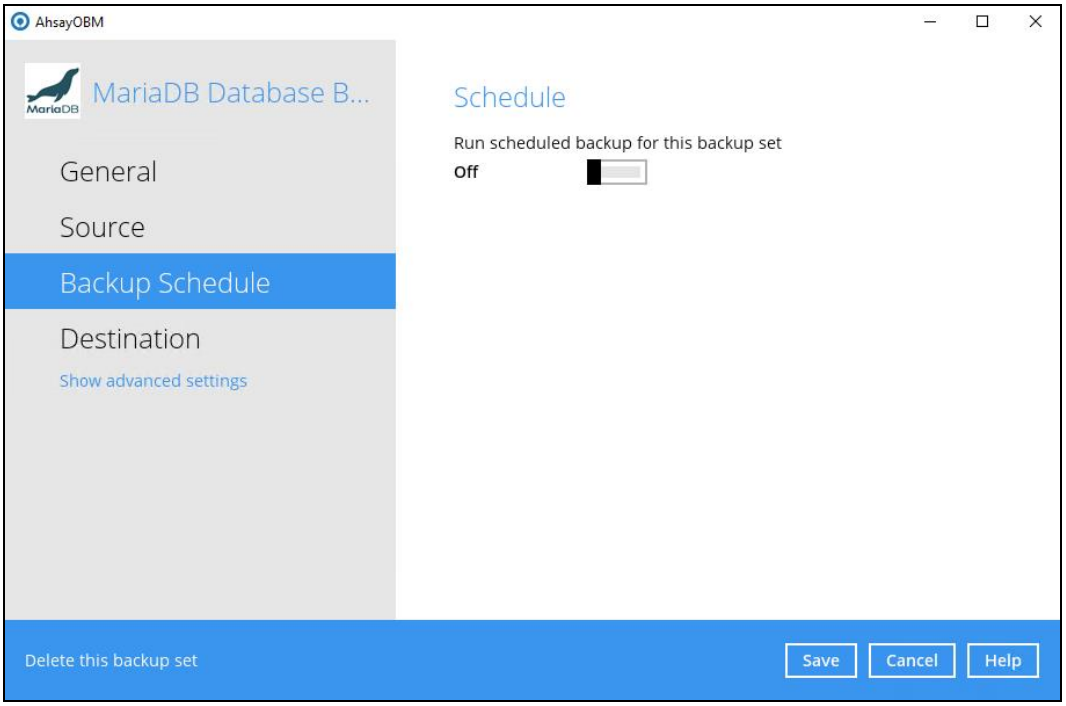
1. Click on the **Backup Sets** icon on the AhsayOBM main interface.



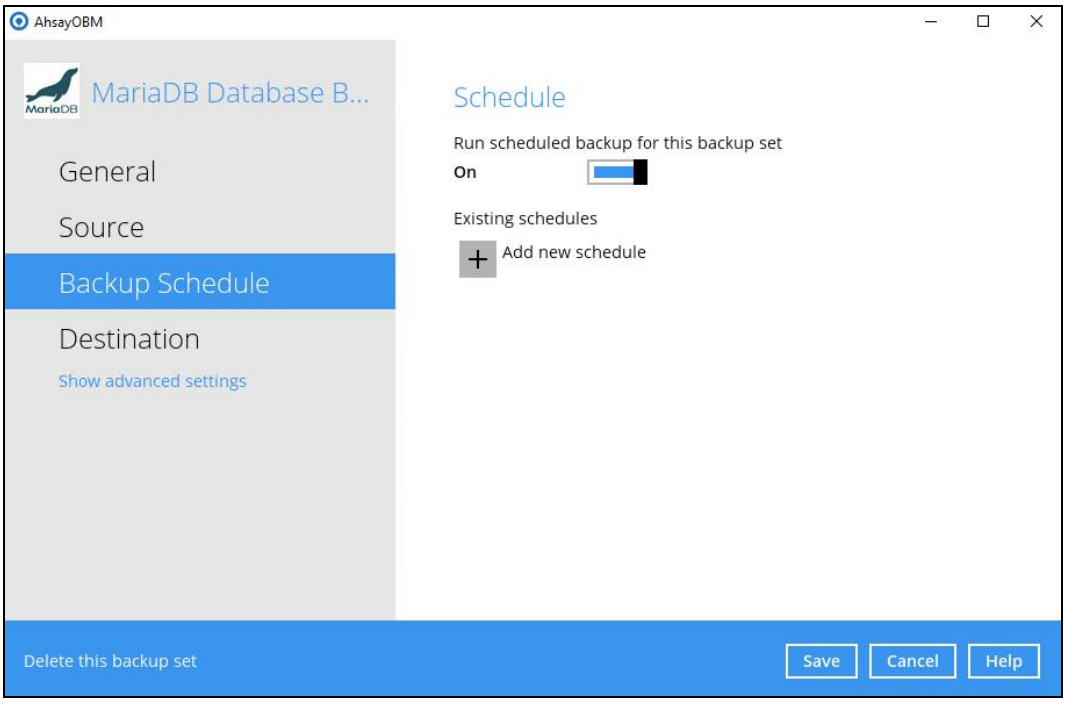
2. Select the backup set that you would like to create a backup schedule for.



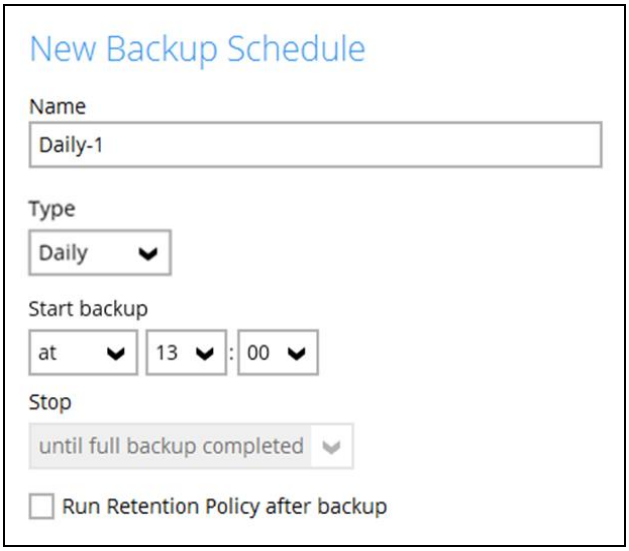
3. Click Backup Schedule.



4. Turn on the backup schedule by switching the "**Run scheduled backup for this backup set**" feature to **On**, then click the **+** icon next to **Add new schedule**.

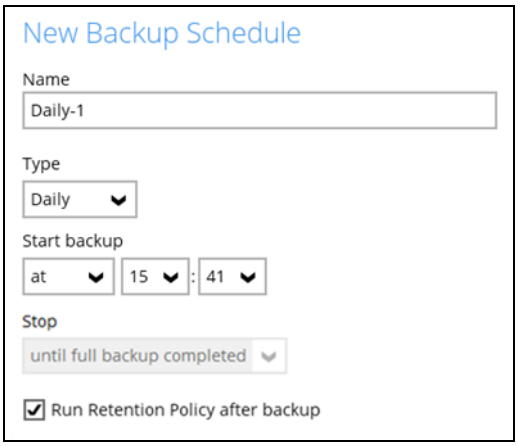


5. The New Backup Schedule window will appear.

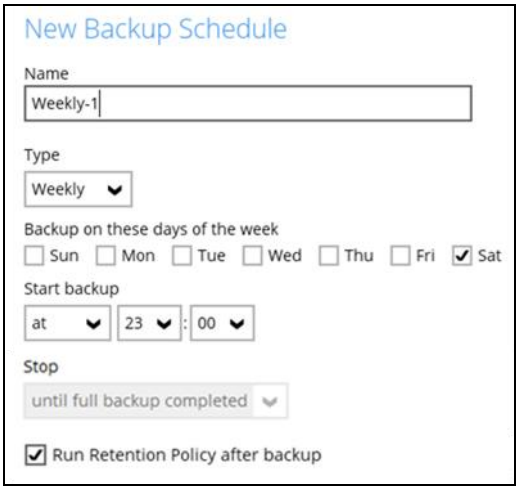


In the New Backup Schedule window, configure the following backup schedule settings.

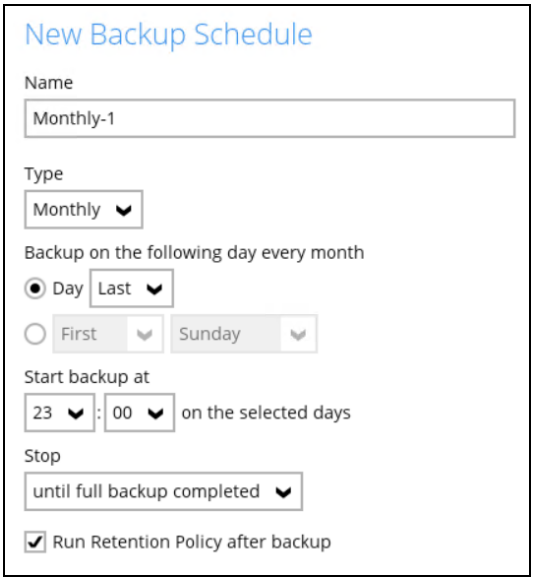
- **Name** – the name of the backup schedule.
- **Type** – the type of backup schedule. There are four (4) different types of backup schedule: Daily, Weekly, Monthly and Custom.
    - **Daily** – the time of the day or interval in minutes/hours which the backup job will run.



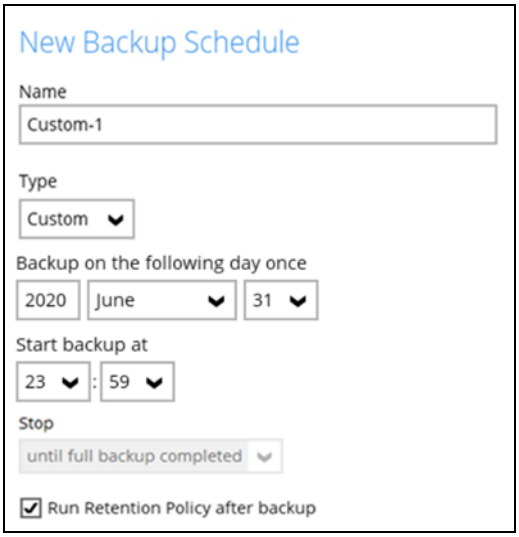
- **Weekly** – the day of the week and the time of the day or interval in minutes/hours which the backup job will run.



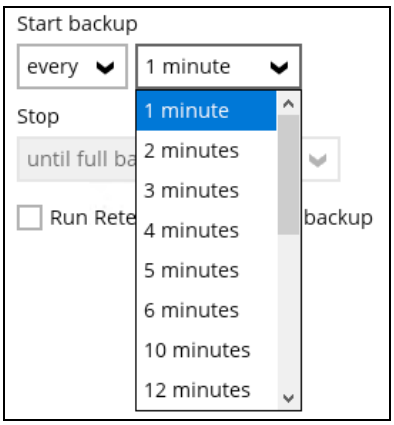
- **Monthly -** the day of the month and the time of that day which the backup job will run.

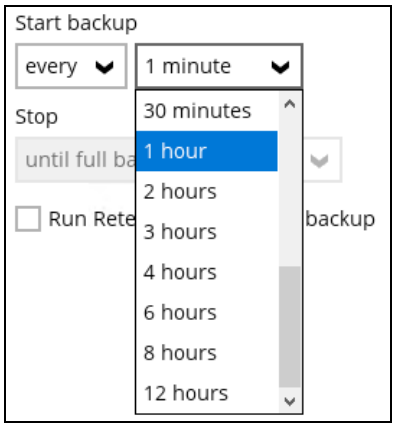


- **Custom** – a specific date and the time of that date which the backup job will run.



- **Start backup** – the start time of the backup job.
  - **at** – this option will start a backup job at a specific time.
  - **every** – this option will start a backup job in intervals of minutes or hours.





Here is an example of a backup set that has a periodic and normal backup schedule.

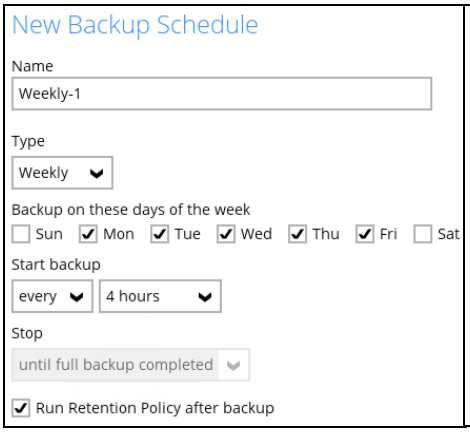


Figure 1.1

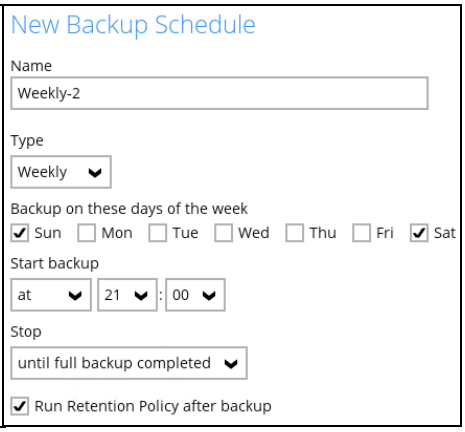


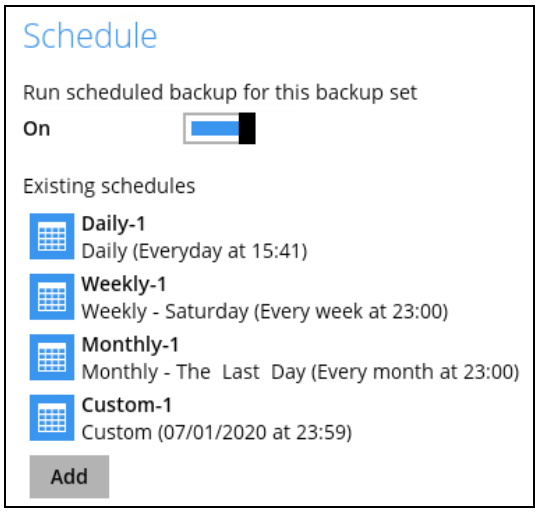
Figure 1.2

Figure 1.1 – Periodic backup schedule runs every 4 hours from Monday – Friday during business hours

Figure 1.2 – Normal backup schedule runs at 21:00 or 9:00 PM on Saturday and Sunday on weekend non-business hours

- **Stop** – the stop time of the backup job. This only applies to schedules with start backup "at" and is not supported for periodic backup schedule (start backup "every")
    - **until full backup completed** – this option will stop a backup job once it is complete. This is the configured stop time of the backup job by default.
    - **after (defined no. of hrs.)** – this option will stop a backup job after a certain number of hours regardless of whether the backup job has completed or not. This can range from 1 to 24 hrs.
- **Run Retention Policy after backup** – if enabled, the AhsayOBM will run a retention policy job to remove files from the backup destination(s) which have exceeded the retention policy after performing a backup job. To save hard disk quote in the long run, it is recommended to enable this option.

As an example, the four types of backup schedules may look like the following:



6. Click **Save** to confirm your settings once done.

7 Restoring Data

The restore options available:

i. **Original location** – AhsayOBM will restore the database(s) from the backup destination and apply them to the original production MariaDB instance.

ii. **Alternate location** – AhsayOBM will restore the database(s) from the backup destination and apply them to the either the original MariaDB instance or another MariaDB instance on the production machine. This option can also be used to clone a database by changing the database name.

iii. **Restore raw file** – AhsayOBM will restore the database *.sql files to a location on the local machine. Which then can be copied to another MariaDB server on another machine for manual recovery.

7.1 Login to AhsayOBM

Login to the AhsayOBM application according to the instructions in Chapter 3 Login to AhsayOBM.

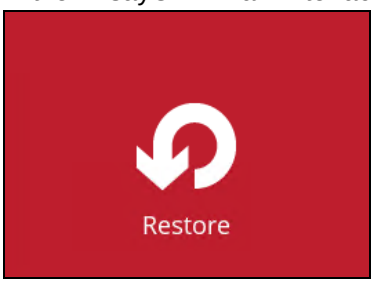
7.2 Automatic MariaDB Database Restore

Restore files from your backup destination and automatically apply them to the MariaDB database server in the original location.

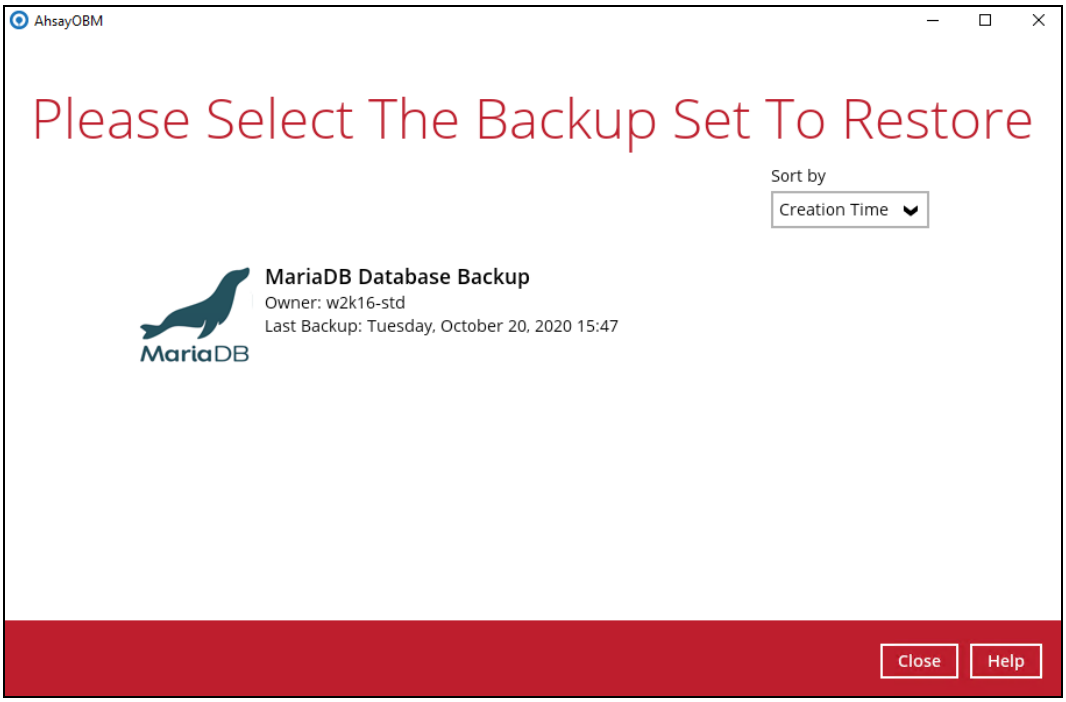
1. Login to MariaDB Server using MariaDB Command Line Client and verify the database instance is running.

```
Enter password: ********
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 76
Server version: 10.4.12-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
statement.


MariaDB [(none)]> show databases;

+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sportdb            |
| test               |
+--------------------+
5 rows in set (0.001 sec)

MariaDB [(none)]>
```

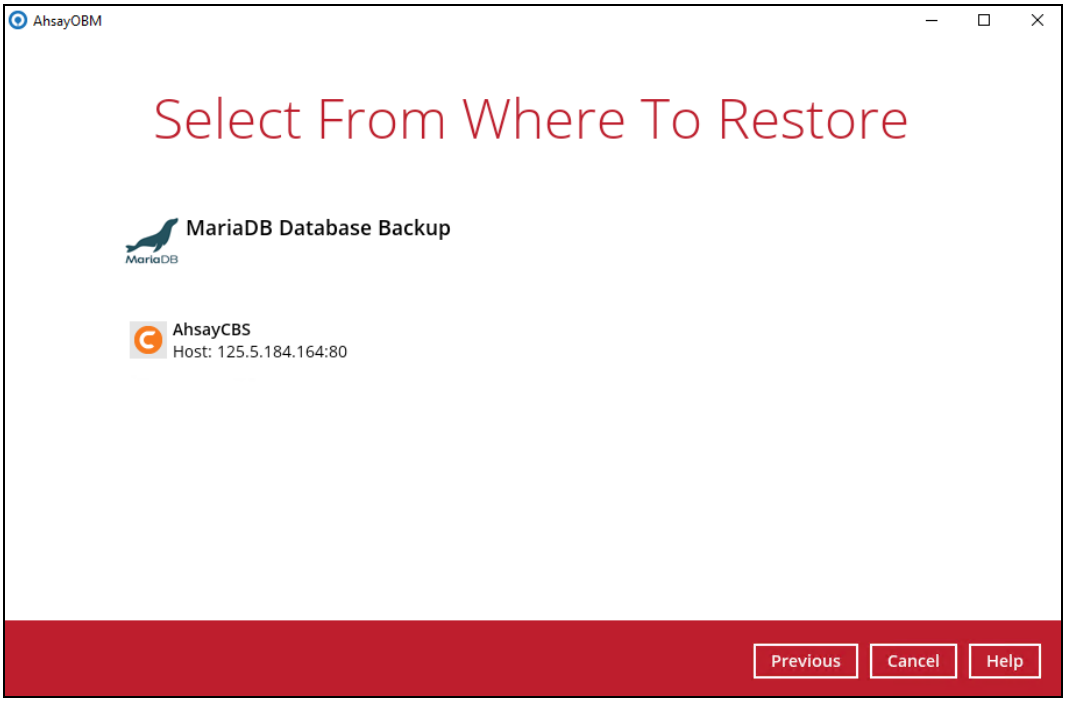
2. In the AhsayOBM main interface, click the **Restore** icon.



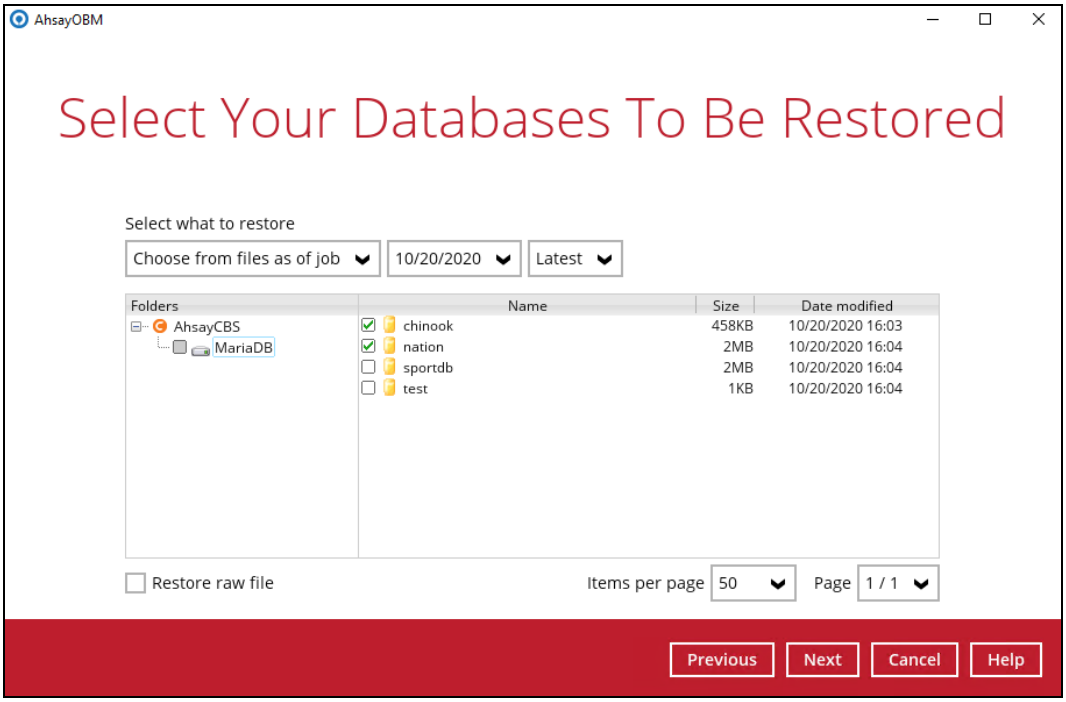
3. Select the backup set that you would like to restore the MariaDB Database from.



4. Select the storage destination that contains the MariaDB databases that you would like to restore from.



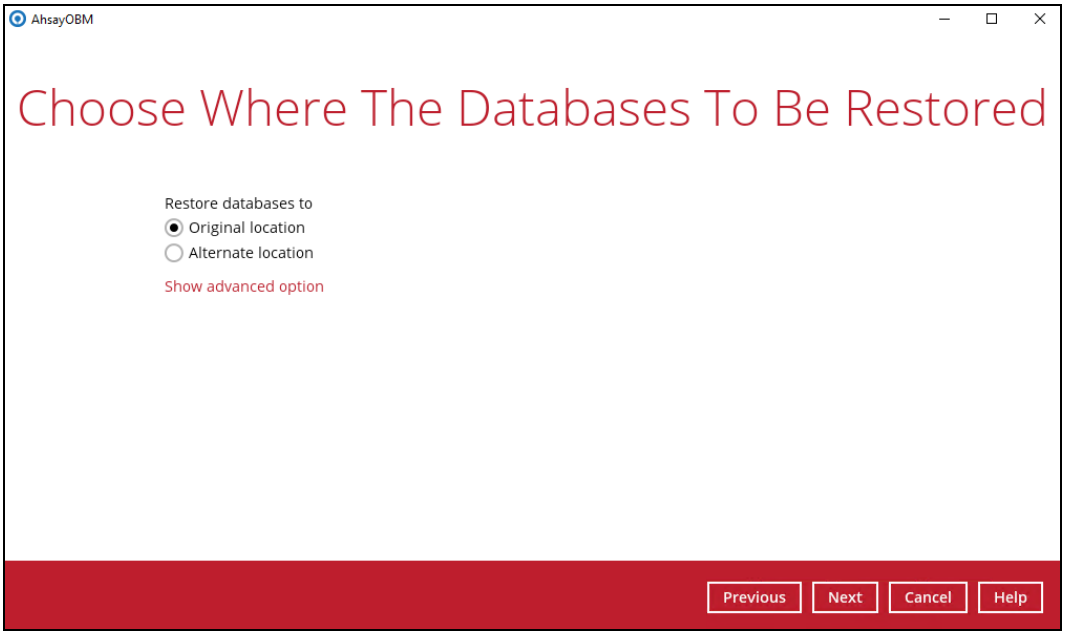
5. Select to restore the MariaDB node from a specific backup job then select the files or folders that you would like to restore. Click **Next** to proceed.



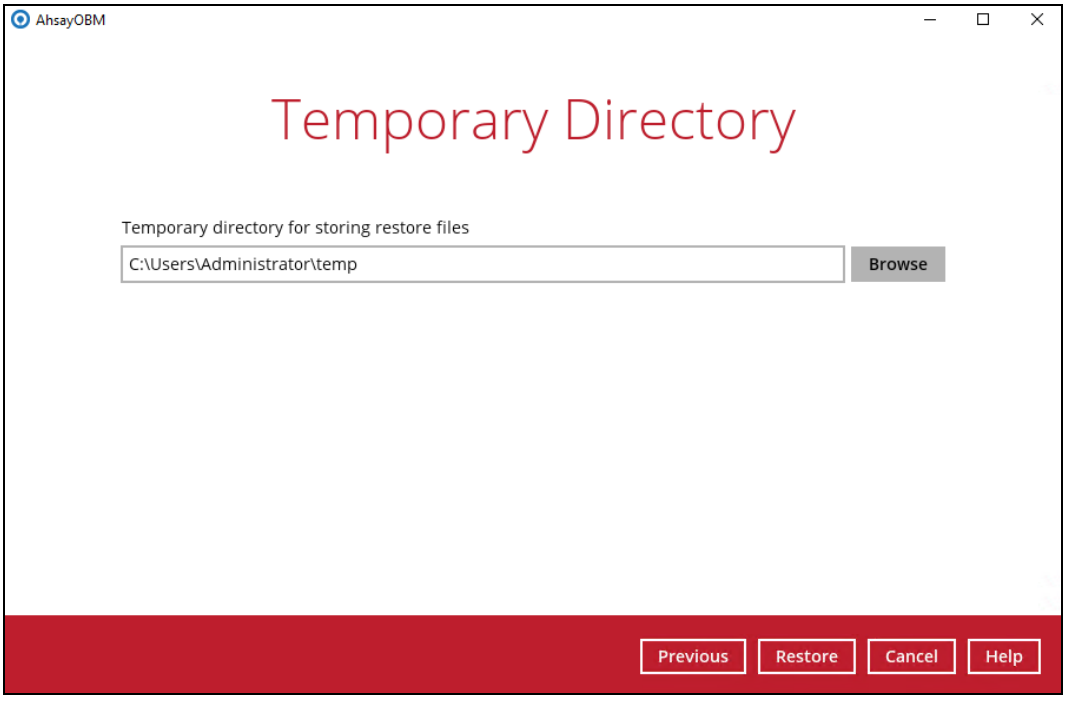
NOTE

To restore to either original or alternate location please unselect the MariaDB data node and only select the databases only.

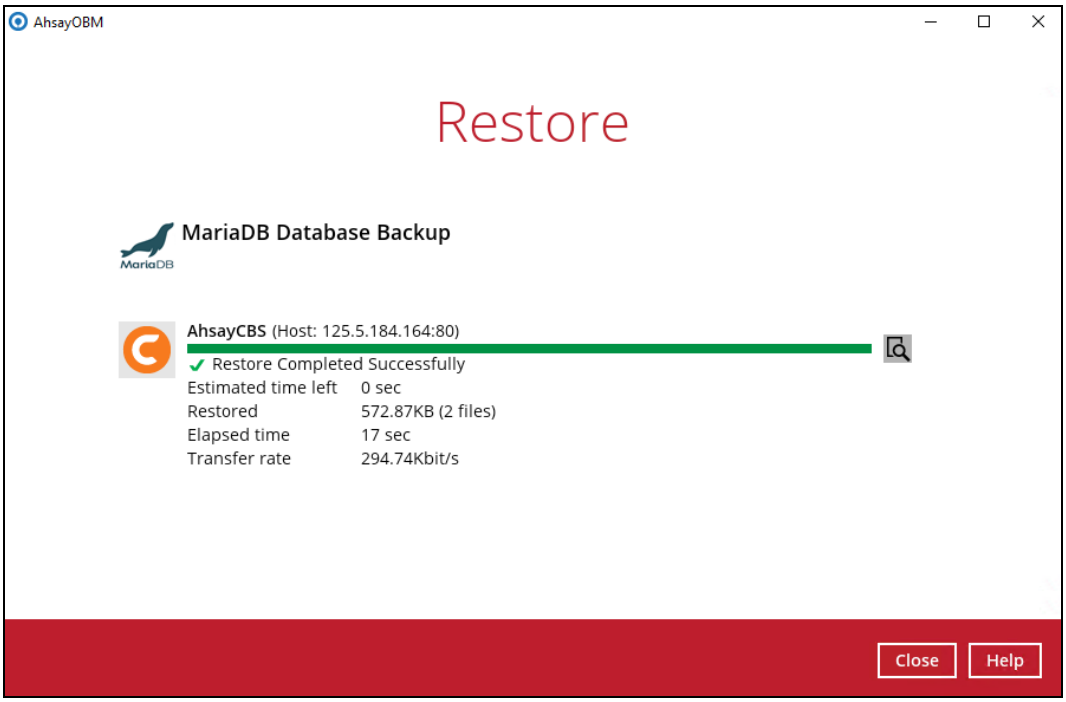
6. Select to restore the MariaDB Databases to the Original location and click **Next** to proceed.



7. Confirm the temporary directory path is correct and then click **Restore** to proceed.



8. After the MariaDB database(s) has been restored.



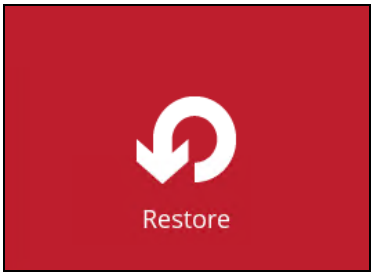
9. Using MariaDB Command Line Client, you can list the restored databases and tables.
Example: Listing the tables in the database using **show tables**

```
MariaDB [(none)]> show databases;

+--------------------+
| Database           |
+--------------------+
| chinook            |
| information_schema |
| mysql              |
| nation             |
| performance_schema |
| sportdb            |
| test               |
+--------------------+
7 rows in set (0.001 sec)

MariaDB [(none)]> show tables in chinook;
+-------------------+
| Tables_in_chinook |
+-------------------+
| album             |
| artist            |
| customer          |
| employee          |
| genre             |
| invoice           |
| invoiceline       |
| mediatype         |
| playlist          |
| playlisttrack     |
| track             |
+-------------------+
11 rows in set (0.001 sec)

MariaDB [(none)]> show tables in nation;
+-----------------+
| Tables_in_nation |
+-----------------+
| addresses       |
| affiliations    |
| awards          |
| continents      |
| countries       |
+-----------------+
5 rows in set (0.000 sec)

MariaDB [(none)]>
```

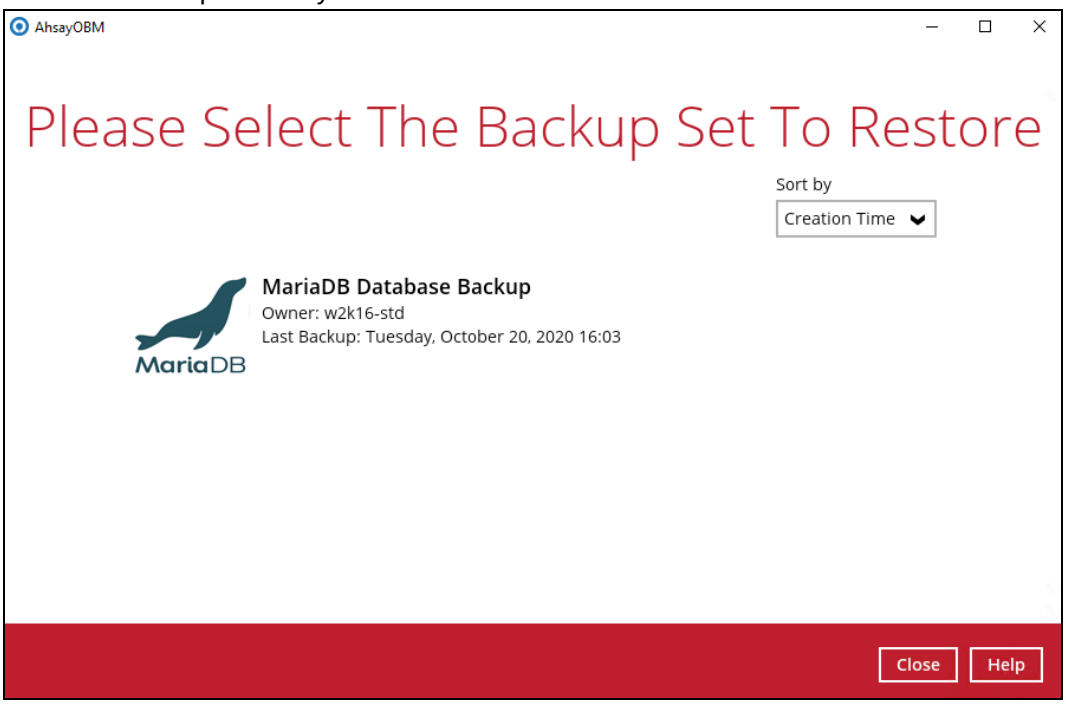
7.3 Manual MariaDB Database Restore

To restore the MariaDB databases from your storage destination to a location on disk and manually recover the databases.

1. In the AhsayOBM main interface, click the **Restore** icon.

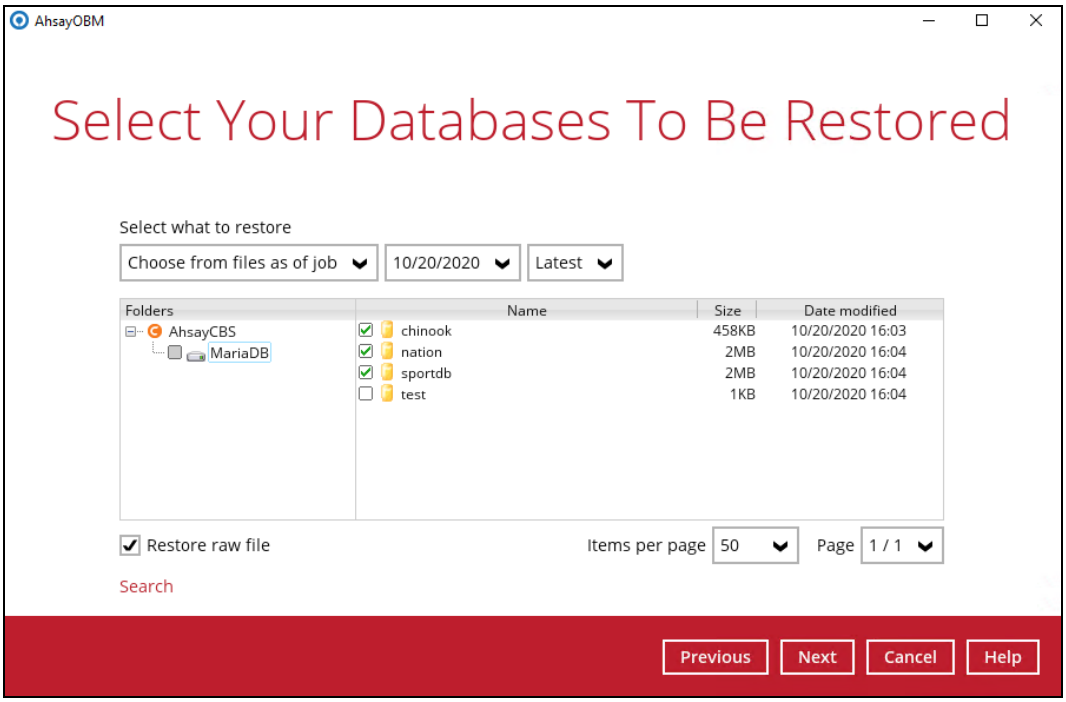


2. Select the backup set that you would like to restore the MariaDB Database from.

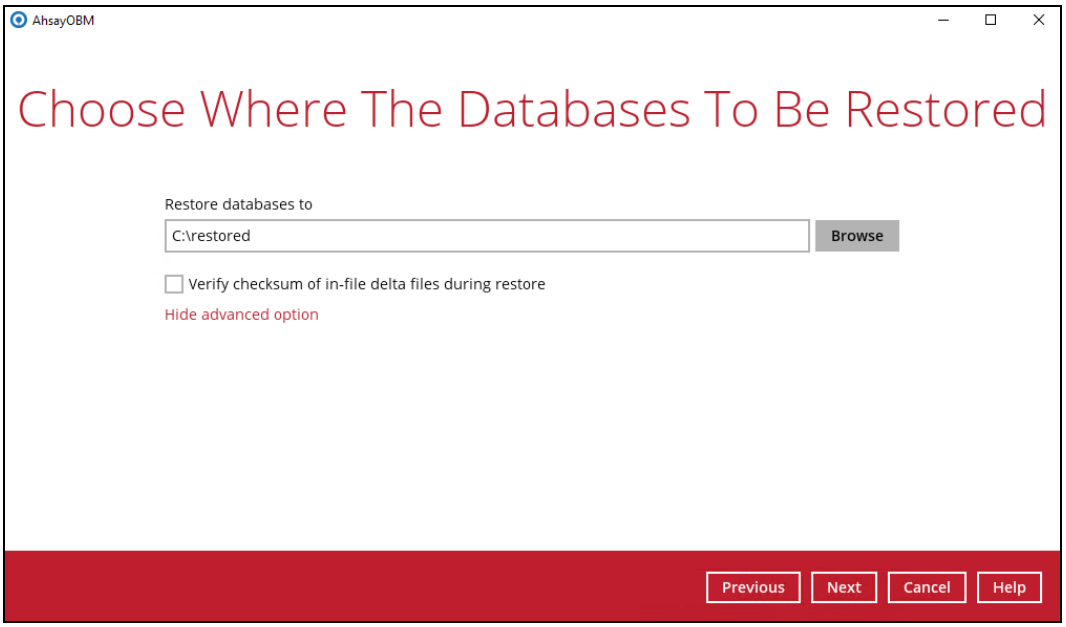


3. Select the storage destination that contains the MariaDB databases that you would like to restore from.

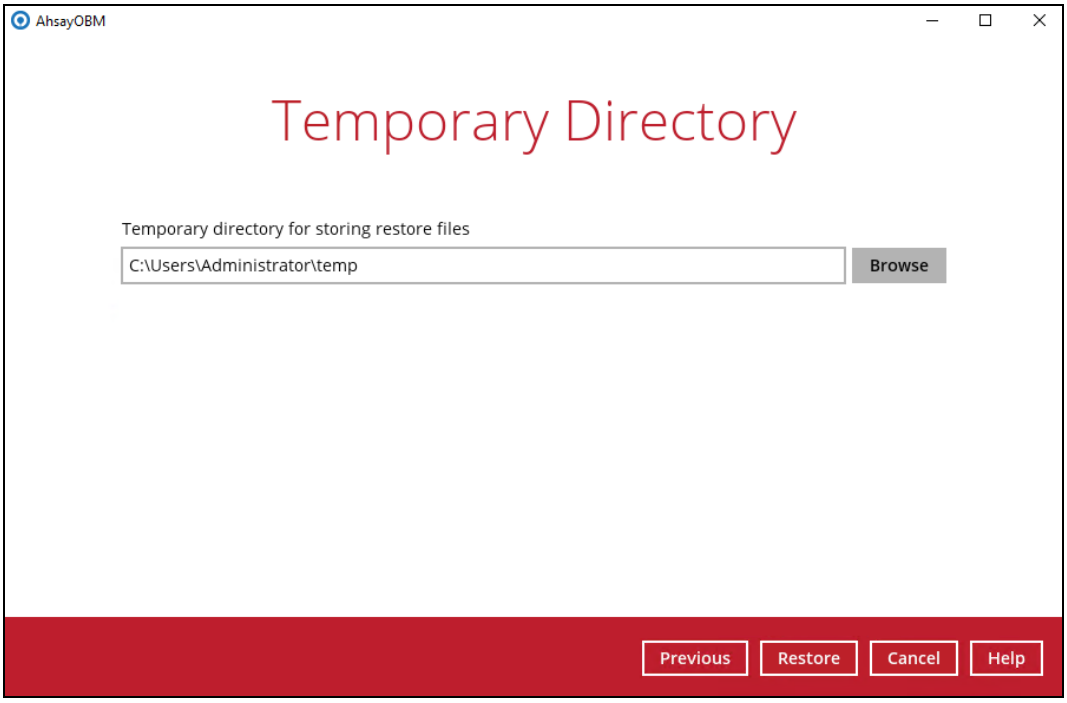
4. Select to restore the MariaDB database(s) from a specific backup job then select the files or folders that you would like to restore and select the **Restore raw file** option. Click **Next** to proceed.



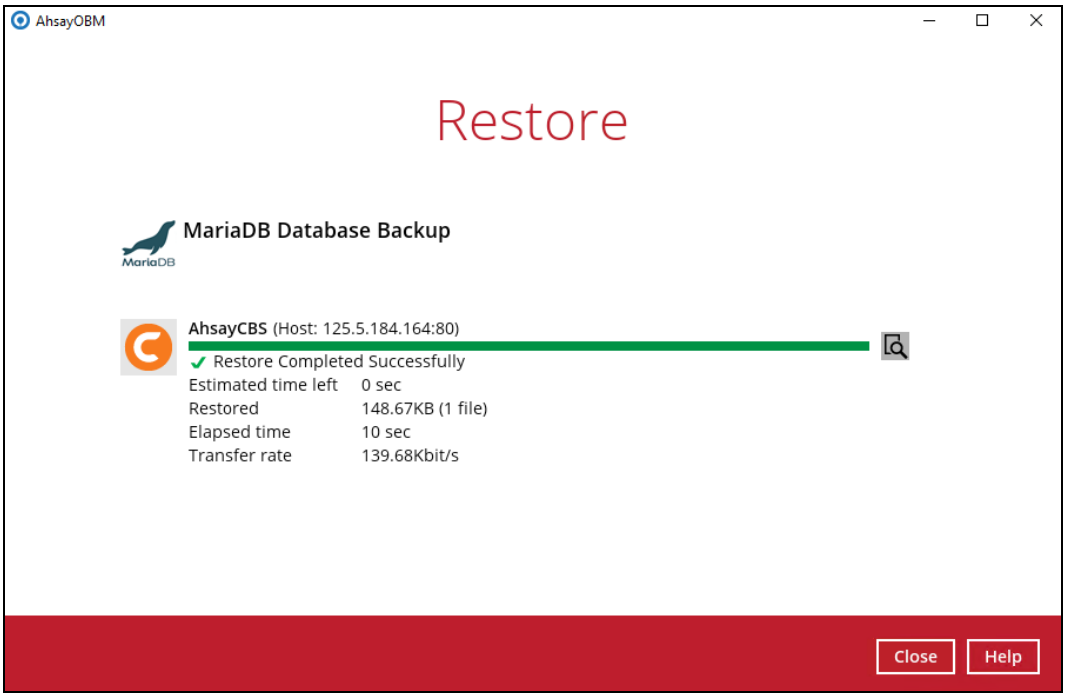
5. Select the location on the local machine you wish to restore the MariaDB database files to. Click **Next** to proceed.



6. Confirm the temporary directory path is correct and then click **Restore** to proceed.

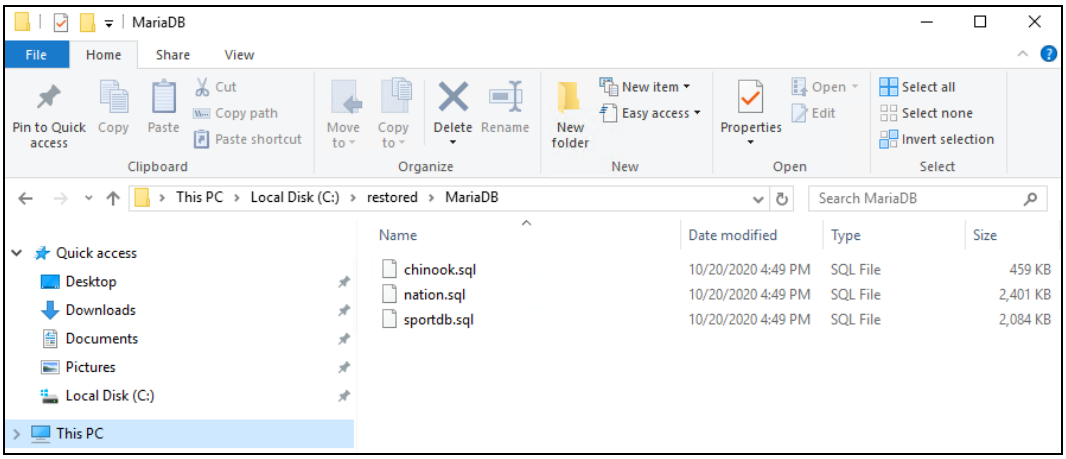


7. After the MariaDB database(s) has been restored.



8. Check the location on the local machine to verify the MariaDB database files have been restored.

Example: Using Windows File Explorer



7.3.1 Recovering MariaDB Databases

1. Login to MariaDB Server using MariaDB Command Line Client and verify the database instance is running.

```
Enter password: ******
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 90
Server version: 10.4.12-MariaDB mariadb.org binary
distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and
others.
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the
current input statement.

MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
+--------------------+
3 rows in set (0.00 sec)

MariaDB [(none)]>
```

2. Create the database names that need to be recovered.

   Example: chinook, nation, and sportdb.

```
MariaDB [(none)]> create database chinook;
Query OK, 1 row affected (0.003 sec)

MariaDB [(none)]> create database nation;
Query OK, 1 row affected (0.003 sec)

MariaDB [(none)]> create database sportdb;
Query OK, 1 row affected (0.003 sec)
```

3. Recover Databases

   Repeat the following steps for all databases you wish to restore.

```
MariaDB [(none)]> use chinook;
Database changed
MariaDB [chinook]> source c:\restored\MariaDB\chinook.sql
Query OK, 0 rows affected (0.001 sec)

Query OK, 110 rows affected (0.00 sec)
Records: 110  Duplicates: 0  Warnings: 0

MariaDB [(none)]> use nation;
Database changed
MariaDB [nation)]> source c:\restored\MariaDB\nation.sql
Query OK, 0 rows affected (0.01 sec)

Query OK, 148 rows affected (1.9 sec)
Records: 148  Duplicates: 0  Warnings: 0

MariaDB [(none)]> use sportdb;
Database changed
MariaDB [sportdb]> source c:\restored\MariaDB\sportdb.sql

Query OK, 0 rows affected (0.00 sec)

Query OK, 4079 rows affected (0.03 sec)
Records: 4079  Duplicates: 0  Warnings: 0
```

4. Check the database status

   Example: Listing the tables in the database using **show tables**

```
MariaDB [(none)]> show databases;
+--------------------+
```

```
| Database           |
+--------------------+
| chinook            |
| information_schema |
| mysql              |
| nation             |
| performance_schema |
| sportdb            |
| test|
+--------------------+
7 rows in set (0.06 sec)


MariaDB [(none)]> show tables in chinook;
+-------------------+
| Tables_in_chinook |
+-------------------+
| album             |
| artist            |
| customer          |
| employee          |
| genre             |
| invoice           |
| invoiceline       |
| mediatype         |
| playlist          |
| playlisttrack     |
| track             |
+-------------------+
11 rows in set (0.001 sec)


MariaDB [(none)]> show tables in nation;
+---------------------------------------+
| Tables_in_nation                      |
+---------------------------------------+
| addresses                             |
| affiliation_phases                    |
| affiliations                          |
| affiliations_documents                |
| affiliations_events                   |
| affiliations_media                    |
| american_football_action_participants |
| american_football_action_plays        |
| american_football_defensive_stats     |
| american_football_down_progress_stats |
| american_football_event_states        |
| american_football_fumbles_stats       |
| american_football_offensive_stats     |
| american_football_passing_stats       |
| american_football_penalties_stats     |
| american_football_rushing_stats       |
| american_football_sacks_against_stats |
| american_football_scoring_stats       |
| american_football_special_teams_stats |
| american_football_team_stats          |
| awards                                |
| baseball_action_contact_details       |
| baseball_action_pitches               |
| baseball_action_plays                 |
| baseball_action_substitutions         |
```

```
| baseball_defensive_group                |
| baseball_defensive_players              |
| baseball_defensive_stats                |
| baseball_event_states                   |
| baseball_offensive_stats                |
| baseball_pitching_stats                 |
| basketball_defensive_stats              |
| basketball_event_states                 |
| basketball_offensive_stats              |
| basketball_rebounding_stats             |
| basketball_team_stats                   |
| bookmakers                              |
| continents                              |
| core_stats                              |
| countries                               |
| country_languages                       |
| country_stats                           |
| db_info                                 |
| display_names                           |
| document_classes                        |
| document_contents                       |
| document_fixtures                       |
| document_fixtures_events                |
| document_package_entry                  |
| document_packages                       |
| documents                               |
| documents_media                         |
| event_action_fouls                      |
| event_action_participants               |
| event_action_penalties                  |
| event_action_plays                      |
| event_action_substitutions              |
| event_states                            |
| events                                  |
| events_documents                        |
| events_media                            |
| events_sub_seasons                      |
| guests                                  |
| ice_hockey_action_participants          |
| ice_hockey_action_plays                 |
| ice_hockey_defensive_stats              |
| ice_hockey_event_states                 |
| ice_hockey_offensive_stats              |
| ice_hockey_player_stats                 |
| injury_phases                           |
| key_aliases                             |
| key_roots                               |
| languages                               |
| latest_revisions                        |
| locations                               |
| media                                   |
| media_captions                          |
| media_contents                          |
| media_keywords                          |
| motor_racing_event_states               |
| motor_racing_qualifying_stats           |
| motor_racing_race_stats                 |
| outcome_totals                          |
| participants_events                     |
| penalty_stats                           |
| periods                                 |
```

```
| person_event_metadata                 |
| person_phases                         |
| persons                               |
| persons_documents                     |
| persons_media                         |
| positions                             |
| publishers                            |
| rankings                              |
| records                               |
| region_areas                          |
| regions                               |
| roles                                 |
| seasons                               |
| sites                                 |
| soccer_action_fouls                   |
| soccer_action_participants            |
| soccer_action_penalties               |
| soccer_action_plays                   |
| soccer_action_substitutions           |
| soccer_defensive_stats                |
| soccer_event_states                   |
| soccer_foul_stats                     |
| soccer_offensive_stats                |
| standing_subgroups                    |
| standings                             |
| stats                                 |
| sub_periods                           |
| sub_seasons                           |
| team_phases                           |
| teams                                 |
| teams_documents                       |
| teams_media                           |
| tennis_action_points                  |
| tennis_action_volleys                 |
| tennis_event_states                   |
| tennis_player_stats                   |
| tennis_return_stats                   |
| tennis_service_stats                  |
| tennis_set_stats                      |
| tennis_team_stats                     |
| vips                                  |
| wagering_moneylines                   |
| wagering_odds_lines                   |
| wagering_runlines                     |
| wagering_straight_spread_lines        |
| wagering_total_score_lines            |
| weather_conditions                    |
+---------------------------------------+
133 rows in set (0.004 sec)


MariaDB [(none)]> show tables in sportdb;
+---------------------------------------+
| Tables_in_sportdb                     |
+---------------------------------------+
| addresses                             |
| affiliation_phases                    |
| affiliations                          |
| affiliations_documents                |
| affiliations_events                   |
| affiliations_media                    |
```

```
| american_football_action_participants |
| american_football_action_plays        |
| american_football_defensive_stats     |
| american_football_down_progress_stats |
| american_football_event_states        |
| american_football_fumbles_stats       |
| american_football_offensive_stats     |
| american_football_passing_stats       |
| american_football_penalties_stats     |
| american_football_rushing_stats       |
| american_football_sacks_against_stats |
| american_football_scoring_stats       |
| american_football_special_teams_stats |
| american_football_team_stats          |
| awards                                |
| baseball_action_contact_details       |
| baseball_action_pitches               |
| baseball_action_plays                 |
| baseball_action_substitutions         |
| baseball_defensive_group              |
| baseball_defensive_players            |
| baseball_defensive_stats              |
| baseball_event_states                 |
| baseball_offensive_stats              |
| baseball_pitching_stats               |
| basketball_defensive_stats            |
| basketball_event_states               |
| basketball_offensive_stats            |
| basketball_rebounding_stats           |
| basketball_team_stats                 |
| bookmakers                            |
| core_stats                            |
| db_info                               |
| display_names                         |
| document_classes                      |
| document_contents                     |
| document_fixtures                     |
| document_fixtures_events              |
| document_package_entry                |
| document_packages                     |
| documents                             |
| documents_media                       |
| event_action_fouls                    |
| event_action_participants             |
| event_action_penalties                |
| event_action_plays                    |
| event_action_substitutions            |
| event_states                          |
| events                                |
| events_documents                      |
| events_media                          |
| events_sub_seasons                    |
| ice_hockey_action_participants        |
| ice_hockey_action_plays               |
| ice_hockey_defensive_stats            |
| ice_hockey_event_states               |
| ice_hockey_offensive_stats            |
| ice_hockey_player_stats               |
| injury_phases                         |
| key_aliases                           |
| key_roots                             |
```

```
| latest_revisions                      |
| locations                             |
| media                                 |
| media_captions                        |
| media_contents                        |
| media_keywords                        |
| motor_racing_event_states             |
| motor_racing_qualifying_stats         |
| motor_racing_race_stats               |
| outcome_totals                        |
| participants_events                   |
| penalty_stats                         |
| periods                               |
| person_event_metadata                 |
| person_phases                         |
| persons                               |
| persons_documents                     |
| persons_media                         |
| positions                             |
| publishers                            |
| rankings                              |
| records                               |
| roles                                 |
| seasons                               |
| sites                                 |
| soccer_action_fouls                   |
| soccer_action_participants            |
| soccer_action_penalties               |
| soccer_action_plays                   |
| soccer_action_substitutions           |
| soccer_defensive_stats                |
| soccer_event_states                   |
| soccer_foul_stats                     |
| soccer_offensive_stats                |
| standing_subgroups                    |
| standings                             |
| stats                                 |
| sub_periods                           |
| sub_seasons                           |
| team_phases                           |
| teams                                 |
| teams_documents                       |
| teams_media                           |
| tennis_action_points                  |
| tennis_action_volleys                 |
| tennis_event_states                   |
| tennis_player_stats                   |
| tennis_return_stats                   |
| tennis_service_stats                  |
| tennis_set_stats                      |
| tennis_team_stats                     |
| wagering_moneylines                   |
| wagering_odds_lines                   |
| wagering_runlines                     |
| wagering_straight_spread_lines        |
| wagering_total_score_lines            |
| weather_conditions                    |
+---------------------------------------+
124 rows in set (0.004 sec)
```

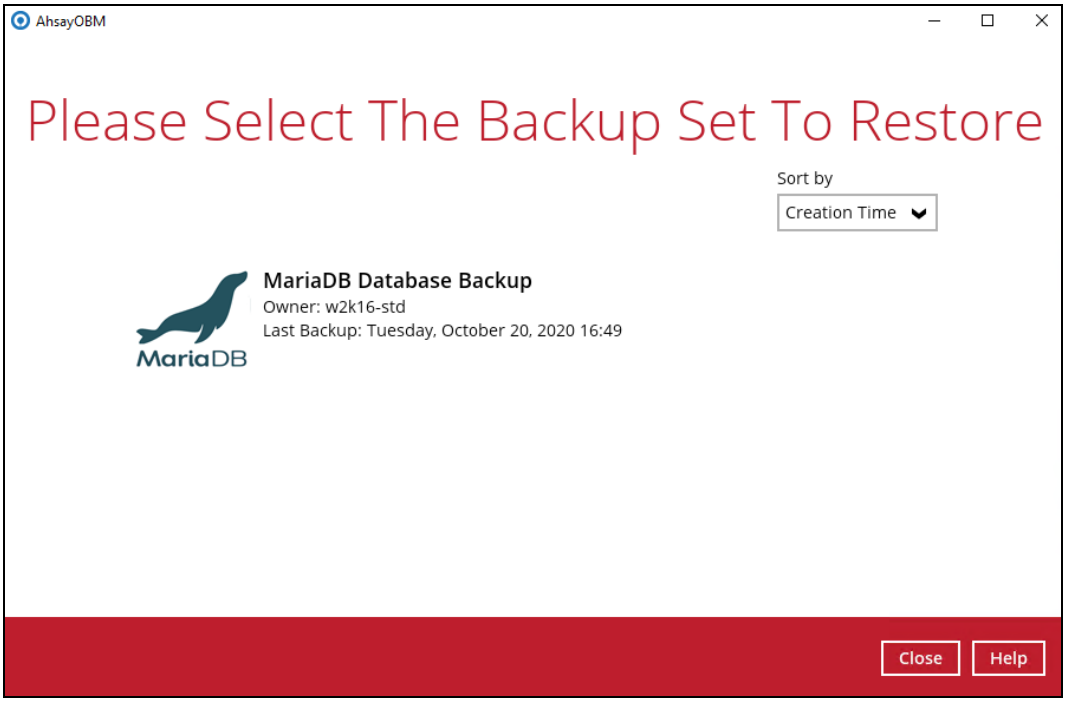
7.4 Automatic MariaDB Database Restore (Alternative Location)

1. Login to MariaDB Server using MariaDB Command Line Client and verify the database instance is running.

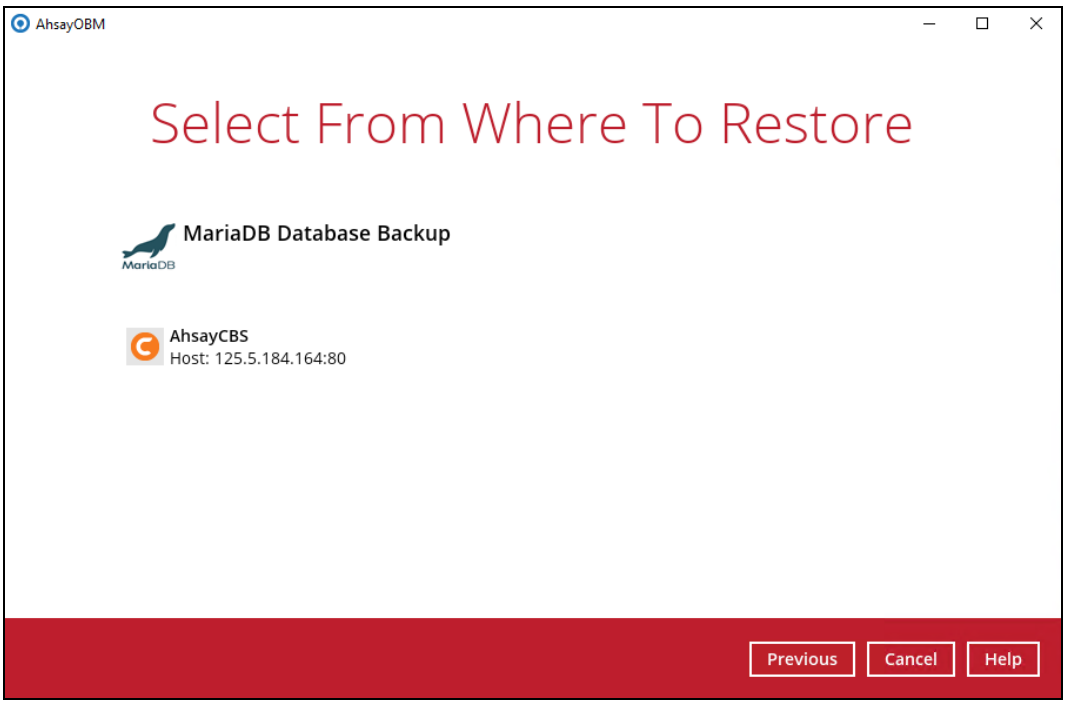
```
Enter password: ******
Welcome to the MariaDB monitor.  Commands end with ; or  \g.
Your MariaDB connection id is 90
Server version: 10.4.12-MariaDB mariadb.org binary
distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and
others.

Oracle is a registered trademark of Oracle Corporation
and/or its
affiliates. Other names may be trademarks of their
respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the
current input statement.

MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| chinook            |
| information_schema |
| mysql              |
| nation             |
| performance_schema |
| sportdb            |
| test               |
+--------------------+
7 rows in set (0.00 sec)

MariaDB [(none)]>
```

2. In the AhsayOBM main interface, click the Restore icon.

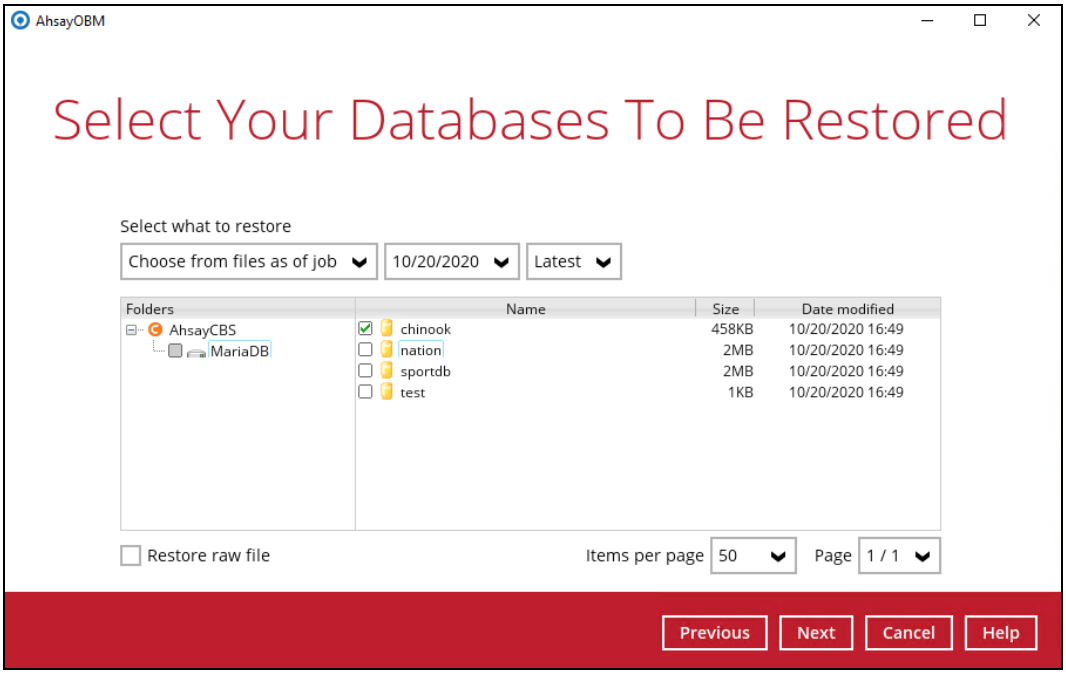
3. Select the backup set that you would like to restore the MariaDB Database from.



4. Select the storage destination that contains the MariaDB databases that you would like to restore from.



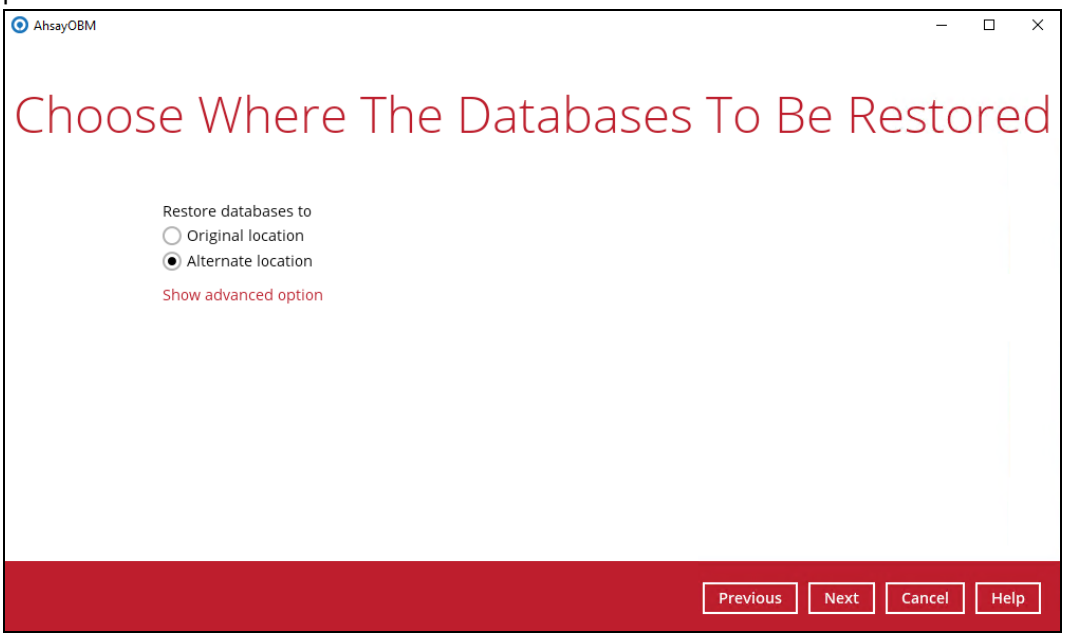
5. Select to restore the MariaDB node from a specific backup job then select the files or folders that you would like to restore. Click **Next** to proceed.



NOTE

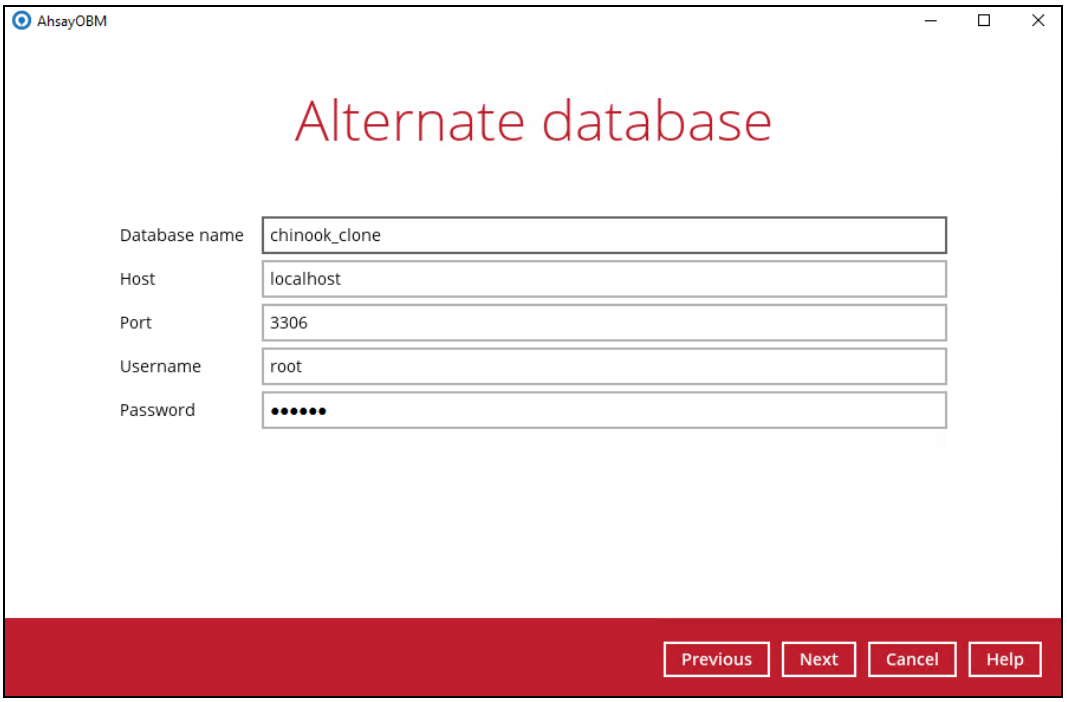
To restore to either original or alternate location please unselect the MariaDB data node and only select the databases only.

6. Select to restore the MariaDB Databases to the alternate location and click Next to proceed.

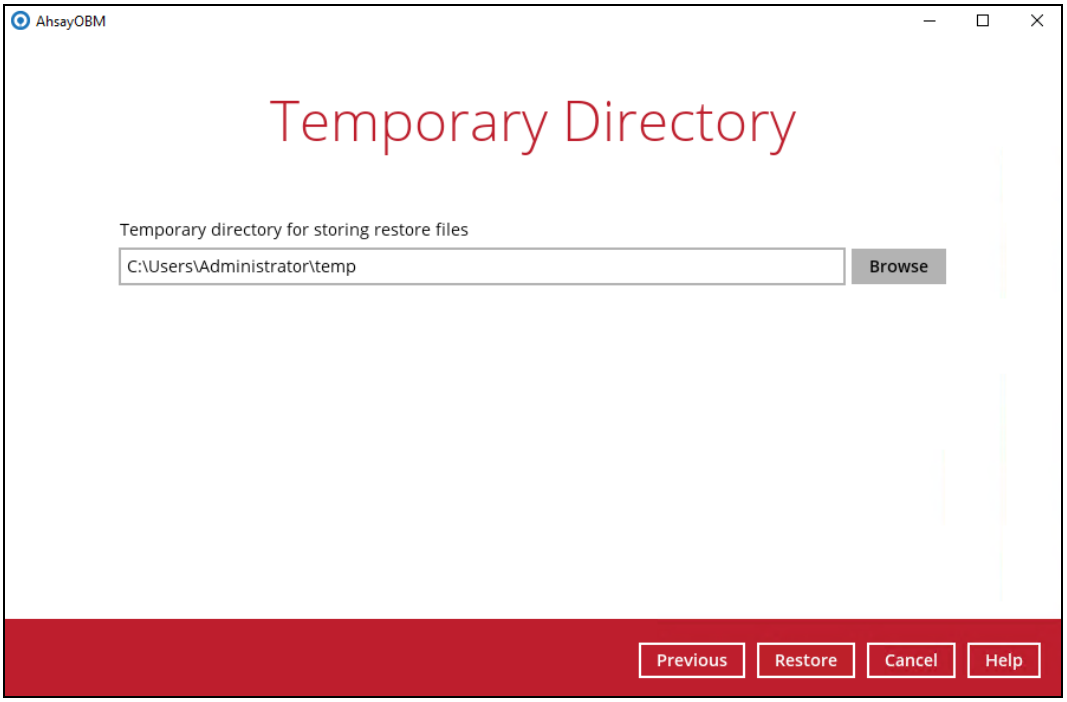


7. Confirm the MariaDB database details such as Database name, Host, Port, Username, and Password.

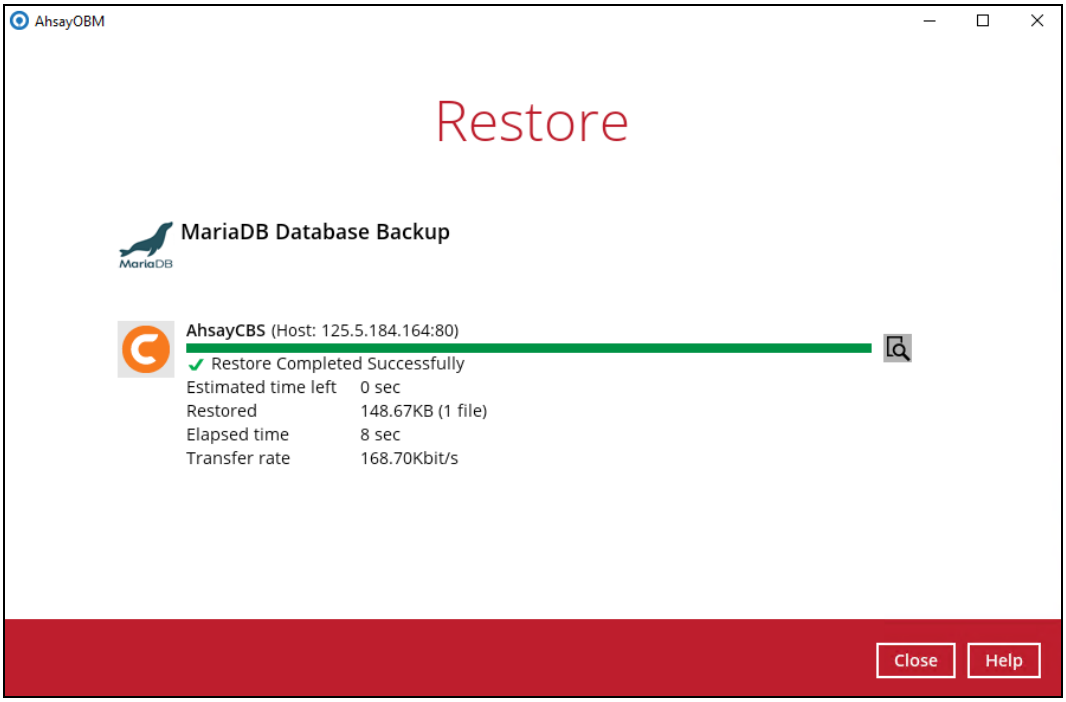
   Example: To restore and clone a copy of the **chinook** database on the original server with new name **chinook_clone**.



8. Confirm the temporary directory path is correct and then click **Restore** to proceed.



9. After the MariaDB database(s) has been restored.



10. Using MariaDB Command Line Client, you can list the restored databases and tables.

Example: Listing the tables in the restore cloned database using **show tables**

```
MariaDB [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| chinook            |
| chinook_clone      |
| information_schema |
| mysql              |
| nation             |
| performance_schema |
| sportdb            |
| test               |
+--------------------+
8 rows in set (0.001 sec)

MariaDB [(none)]> show tables in chinook_clone;
+-------------------------+
| Tables_in_chinook_clone |
+-------------------------+
| album                   |
| artist                  |
| customer                |
| employee                |
| genre                   |
| invoice                 |
| invoiceline             |
| mediatype               |
| playlist                |
| playlisttrack           |
| track                   |
+-------------------------+
11 rows in set (0.001 sec)
```

8 Contacting Ahsay

8.1 Technical Assistance

To contact Ahsay support representatives for technical assistance, visit the Partner Portal:
https://www.ahsay.com/partners/

Also use the Ahsay Wikipedia for resource such as Hardware Compatibility List, Software Compatibility List, and other product information:
https://wiki.ahsay.com/

8.2 Documentation

Documentations for all Ahsay products are available at:
https://www.ahsay.com/jsp/en/downloads/ahsay-downloads_documentation_guides.jsp

You can send us suggestions for improvements or report on issues in the documentation by contacting us at:
https://www.ahsay.com/partners/

Please specify the specific document title as well as the change required/suggestion when contacting us.