

Ahsay Online Backup Manager v8

MariaDB Database Backup and Restore for Linux (CLI)

Ahsay Systems Corporation Limited

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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

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1 Overview

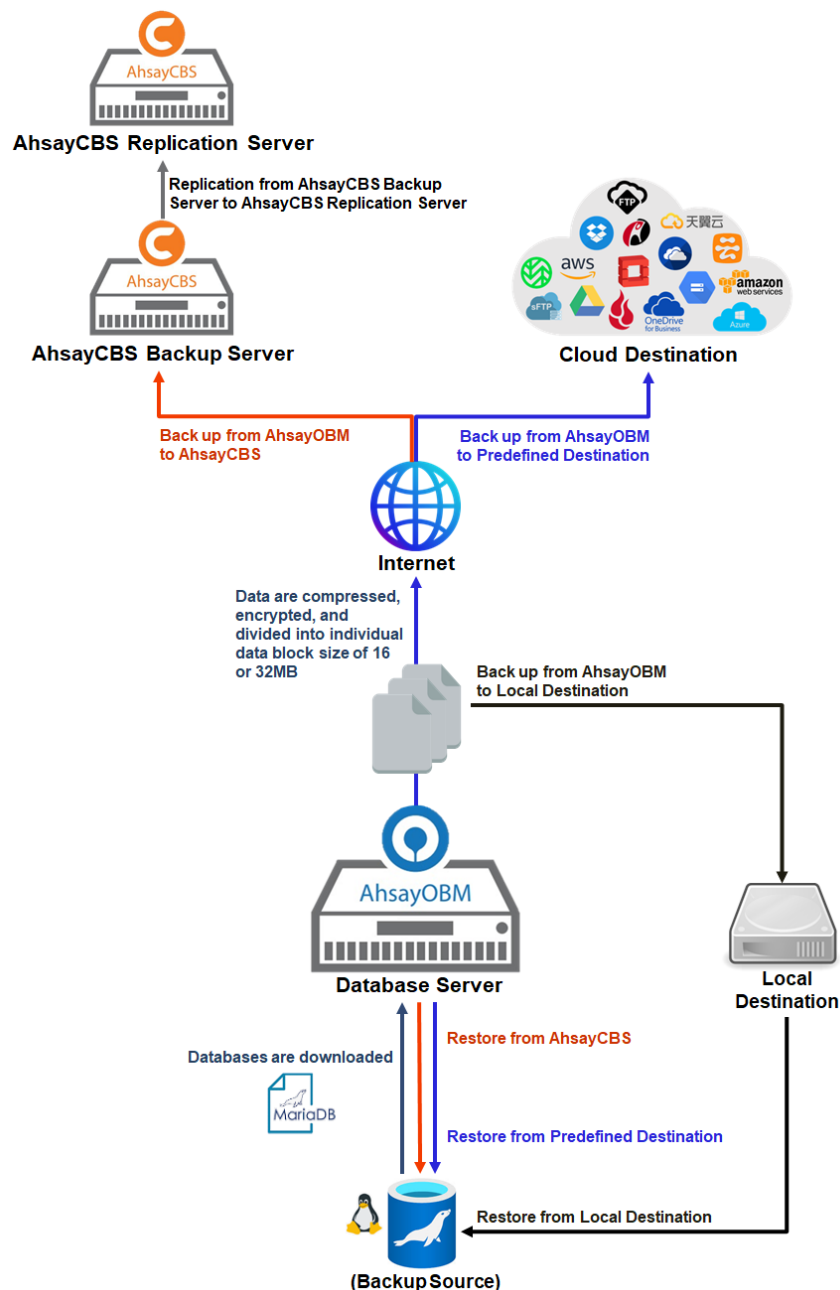
1.1 What is this software?

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 between MariaDB Database Server, AhsayOBM and AhsayCBS.

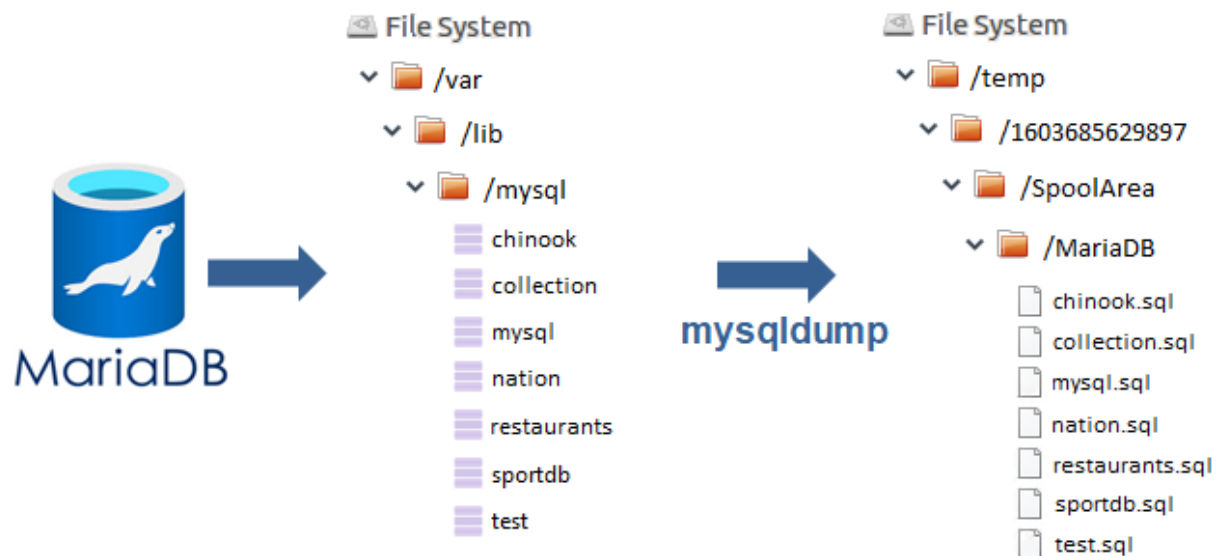
In this user guide, we will focus on the end to end backup and restore process using AhsayOBM as a client backup software.



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 spooling of the “collection” database to /temp folder, the following parameters will be used:

Mysqldump --databases collection --user=user1 --password=qwerty --host=localhost --port=3306 --opt --quote-names --allow-keywords --triggers --result-file=/temp/collection.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 AhsayOBM Installation

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

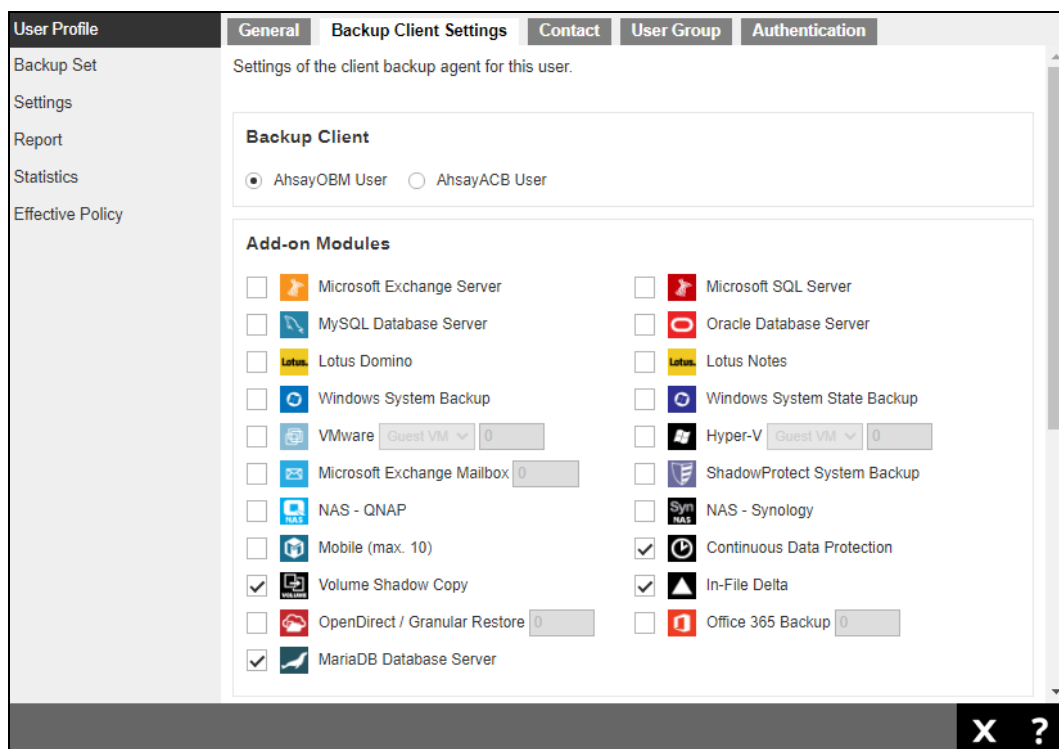
NOTE

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

2.4 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 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.

2.6 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 either:

- i. From the Linux command line use the `/usr/bin/mariadb --version` or `/usr/bin/mysql --version` command.

Example: MariaDB 10.4.15

```
# /usr/bin/mariadb --version
/usr/bin/mariadb Ver 15.1 Distrib 10.4.15-MariaDB, for debian-linux-
gnu (x86_64) using readline 5.2
```

or

Example: MariaDB 10.4.15

```
# /usr/bin/mysql --version
/usr/bin/mariadb Ver 15.1 Distrib 10.4.15-MariaDB, for debian-linux-
gnu (x86_64) using readline 5.2
```

However for some older MariaDB database versions, you can only use the `/usr/bin/mysql` command to verify the version.

Example: MariaDB 10.0.38

```
# /usr/bin/mysql --version
/usr/bin/mysql Ver 15.1 Distrib 10.0.38-MariaDB, for debian-linux-
gnu (x86_64) using readline 5.2
```

- ii. Login to the MariaDB instance and use the `select version();` command.

To login you can use either the `mariadb -u root -p` or `mysql -u root -p` command.

Example: MariaDB 10.4.15

```
# mariadb -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 255
Server version: 10.4.15-MariaDB-1:10.4.15+maria~focal 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)]> select version();
+-----+
| version() |
+-----+
| 10.4.15-MariaDB-1:10.4.15+maria~focal |
+-----+
1 row in set (0.000 sec)

```

or

Example: MariaDB 10.4.15

```

# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 341
Server version: 10.4.15-MariaDB-1:10.4.15+maria~focal 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)]> select version();
+-----+
| version() |
+-----+
| 10.4.15-MariaDB-1:10.4.15+maria~focal |
+-----+
1 row in set (0.000 sec)

```

However for some older MariaDB database versions, you can only use the **mysql -u root -p** command to login.

Example: MariaDB 10.0.38

```

# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 31
Server version: 10.0.38-MariaDB-0ubuntu0.16.04.1 Ubuntu 16.04
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)]> select version();
+-----+
| version() |
+-----+
| 10.0.38-MariaDB-0ubuntu0.16.04.1 |
+-----+
1 row in set (0.000 sec)

```

2.6.2 MariaDB Database Status

The MariaDB database instance is online. To check use either the **service mariadb status** or **service mysql status** command.

Example: MariaDB 10.4.15 on Ubuntu 20.04 LTS

```
# service mariadb status
● mariadb.service - MariaDB 10.4.15 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled;
   vendor preset disabled)
   Drop-In: /etc/systemd/system/mariadb.service.d
            └─migrated-from-my.cnf-settings.conf
   Active: active (running) since Wed 2020-10-21 09:41:54 PST; 1 day
   6h ago
     Docs: man:mysql(8)
           https://mariadb.com/kb/en/library/systemd/
  Main PID: 831 (mysqld)
    Status: "Taking your SQL requests now..."
     Tasks: 30 (limit: 4657)
    Memory: 260.8M
    CGroup: /system.slice/mariadb.service
            └─831 /usr/sbin/mysqld

Oct 21 09:41:53 ubuntu20 mysqld[831]: Version: '10.4.15-MariaDB-
1:10.4.15+maria>
Oct 21 09:41:54 ubuntu20 systemd[1]: Started MariaDB 10.4.15 database
server.
```

or

Example: MariaDB 10.4.15 on Ubuntu 20.04 LTS

```
# service mysql status
● mariadb.service - MariaDB 10.4.15 database server
   Loaded: loaded (/lib/systemd/system/mariadb.service; enabled;
   vendor preset disabled)
   Drop-In: /etc/systemd/system/mariadb.service.d
            └─migrated-from-my.cnf-settings.conf
   Active: active (running) since Wed 2020-10-21 09:41:54 PST; 3
   months 0 days ago
     Docs: man:mysql(8)
           https://mariadb.com/kb/en/library/systemd/
  Main PID: 831 (mysqld)
    Status: "Taking your SQL requests now..."
     Tasks: 30 (limit: 4657)
    Memory: 260.8M
    CGroup: /system.slice/mariadb.service
            └─831 /usr/sbin/mysqld
```

However for some older MariaDB database versions, use the **service mysql status** command.

Example: MariaDB 10.0.38 on Ubuntu 16.04

```
# service mysql status
● mysql.service - LSB: Start and stop the mysql database server daemon
   Loaded: loaded (/etc/init.d/mysql; bad; vendor preset: enabled)
   Active: active (running) since Wed 2021-01-20 16:02:03 HKT; 23h ago
     Docs: man:systemd-sysv-generator(8)
    CGroup: /system.slice/mysql.service
            └─1234 /bin/bash /usr/bin/mysqld_safe
            └─1443 /usr/sbin/mysqld --basedir=/usr --
datadir=/var/lib/mysql --plugin-dir=/usr/lib/mysql/plugin --user=mysql
```

```
--skip-log-error --pid-file=/var/run/mysqld/mysqld.pid --
socket=/var/run/mysqld/mysqld.sock --port=3306
└─1444 logger -t mysqld -p daemon error

Jan 20 16:02:01 ubuntu1604 mysqld[1444]: 210120 16:02:01 [Note]
InnoDB: Waiting for purge to start
Jan 20 16:02:01 ubuntu1604 mysqld[1444]: 210120 16:02:01 [Note]
InnoDB: Percona XtraDB (http://www.percona.com) 5.6.42-84.2 started;
log sequence number 9155283
Jan 20 16:02:01 ubuntu1604 mysqld[1444]: 210120 16:02:01 [Note] Plugin
'FEEDBACK' is disabled.
Jan 20 16:02:01 ubuntu1604 mysqld[1444]: 210120 16:02:01 [Note] Server
socket created on IP: '127.0.0.1'.
Jan 20 16:02:02 ubuntu1604 mysqld[1444]: 210120 16:02:02 [Note]
/usr/sbin/mysqld: ready for connections.
Jan 20 16:02:02 ubuntu1604 mysqld[1444]: Version: '10.0.38-MariaDB-
0ubuntu0.16.04.1' socket: '/var/run/mysqld/mysqld.sock' port: 3306
Ubuntu 16.04
Jan 20 16:02:03 ubuntu1604 mysql[1068]: ...done.
```

2.6.3 TCP/IP Port

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

```
# netstat -an|more
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address Foreign Address State
tcp 0 0 127.0.0.53:53 0.0.0.0:* LISTEN
tcp 0 0 0.0.0.0:22 0.0.0.0:* LISTEN
tcp 0 0 127.0.0.1:631 0.0.0.0:* LISTEN
tcp 0 0 10.16.30.80:22 192.168.12.1:59654 ESTABLISHED
tcp 0 192 10.16.30.80:22 192.168.12.1:56350 ESTABLISHED
tcp 0 0 10.16.30.80:22 192.168.12.1:59609 ESTABLISHED
tcp6 0 0 :::1:631 :::* LISTEN
tcp6 0 0 :::3306 :::* LISTEN
udp 0 0 127.0.0.53:53 0.0.0.0:*
udp 0 0 0.0.0.0:57754 0.0.0.0:*
udp 0 0 0.0.0.0:631 0.0.0.0:*
udp 0 0 0.0.0.0:5353 0.0.0.0:*
udp6 0 0 :::35723 :::*
udp6 0 0 :::5353 :::*
raw6 0 0 :::58 :::*
7
```

2.6.4 Mysqldump Utility

The **mysqldump** utility is installed on the MariaDB database server. To locate the **mysqldump** utility use the **whereis** command:

```
# whereis mysqldump
mysqldump: /usr/bin/mysqldump /usr/share/man/man1/mysqldump.1.gz
```

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.

Example: MariaDB 10.4.15 on Ubuntu 20.04 LTS

```
# mysqldump --version
mysqldump Ver 10.17 Distrib 10.4.15-MariaDB, for debian-linux-gnu
(x86_64)
```

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 (0.103 sec)

MariaDB [(none)]> GRANT ALL PRIVILEGES ON *.* TO
'username'@'localhost.localdomain' IDENTIFIED BY 'password';
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.003 sec)
```

2.6.7 Localhost

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

```
# ping localhost
PING localhost (127.0.0.1) 56(84) bytes of data.
64 bytes from localhost (127.0.0.1): icmp_seq=1 ttl=64 time=0.046 ms
64 bytes from localhost (127.0.0.1): icmp_seq=2 ttl=64 time=0.044 ms
64 bytes from localhost (127.0.0.1): icmp_seq=3 ttl=64 time=0.044 ms
64 bytes from localhost (127.0.0.1): icmp_seq=4 ttl=64 time=0.044 ms
64 bytes from localhost (127.0.0.1): icmp_seq=5 ttl=64 time=0.046 ms

--- localhost ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4097ms
rtt min/avg/max/mdev = 0.044/0.044/0.046/0.000 ms
```

'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
Trying 127.0.0.1...
Connected to 127.0.0.1.
Escape character is '^]'.
J
5.5.5-10.4.15-MariaDB-
1:10.4.15+maria~focal[[J?>Z)\uY>hpz42={v\Lmysql_native_password
```

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  |
| employees|
| information_schema |
| mysql    |
| nation   |
| northwind|
| performance_schema |
| sportdb  |
+-----+
8 rows in set (0.001 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 the temporary directory configured for the MariaDB database backup 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.

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 AS "Database",
ROUND(SUM(data_length + index_length) / 1024 / 1024, 2) AS "Size (MB)"
FROM information_schema.tables GROUP BY table_schema;
+-----+-----+
| Database | Size (MB) |
+-----+-----+
| Chinook  | 1.83 |
| employees| 140.80 |
| information_schema | 0.19 |
| mysql    | 2.24 |
| nation   | 0.66 |
| northwind| 1.09 |
| performance_schema | 0.00 |
| sportdb  | 2.89 |
+-----+-----+
8 rows in set (7.980 sec)
```

3 Starting AhsayOBM

To startup AhsayOBM and connect to AhsayCBS you need to use the **RunConfigurator.sh** script, to configure the backup server URL, port, and proxy server settings (if applicable) and enter the login name and password. If the user account is enabled with Twilio two-factor authentication please refer to [Appendix E](#) for the login steps.

```
# cd /usr/local/obm/bin
# sh RunConfigurator.sh
Startup Ahsay Online Backup Manager ...
User Configuration file not found
Create a new Configuration file at directory
[/root/.obm/config]

Login Menu (No configuration files found)
-----
(1). Login
(2). Free Trial
(3). Quit
-----
Your Choice: 1

Backup Server URL : 10.90.10.12
Port : 443
Protocol? (1) Http (2) Https : 2
Enable Proxy (Y/N) ? N
Login Name : MariaDBLinux
Password : *****

Please wait while verifying user account with server...
log4j:WARN No appenders could be found for logger
(org.apache.http.impl.conn.PoolingClientConnectionManager).
log4j:WARN Please initialize the log4j system properly.
log4j:WARN See http://logging.apache.org/log4j/1.2/faq.html#noconfig for more
info.

Your account (MariaDBLinux) is found on server (10.90.10.12:443).
New configuration file has been created

Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice:
```

4 Creating a MariaDB Database Backup Set

There are two options to create a MariaDB Database Backup Set for Linux.

• [Using AhsayCBS web console](#)

For backup set creation on AhsayCBS web console, most backup set preferences may be configured using AhsayCBS except the following:

- backup set encryption key settings
- MariaDB login password

After the backup set preferences are setup on the AhsayCBS web console, to complete the backup set creation process the RunConfigurator.sh script will need to be used on the MariaDB machine to do the following:

- to setup the backup set encryption key settings
- to export/import the backupSet.xml file to setup the MariaDB login password

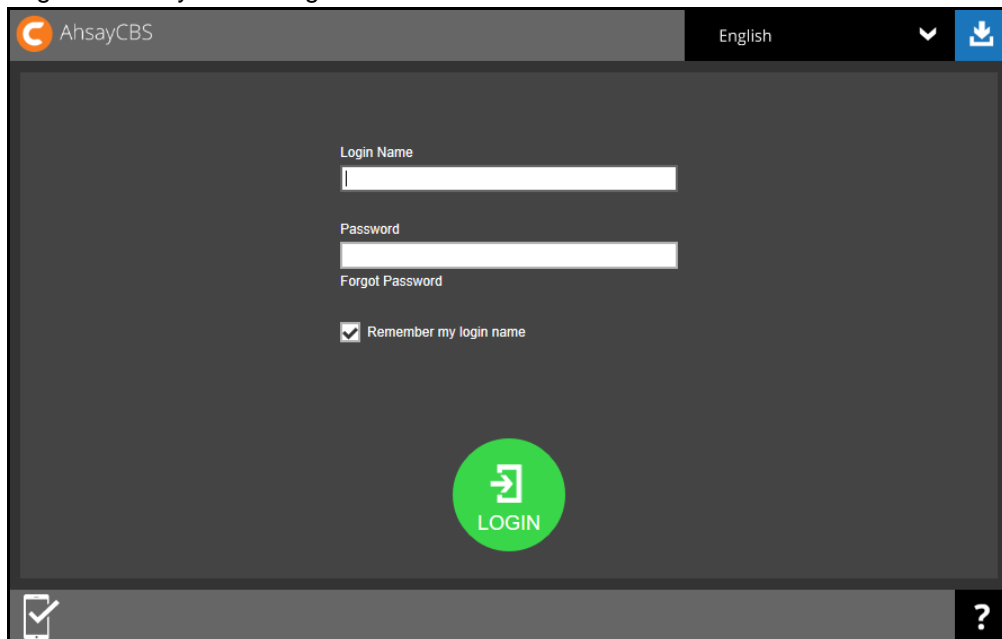
• [Using command line](#)

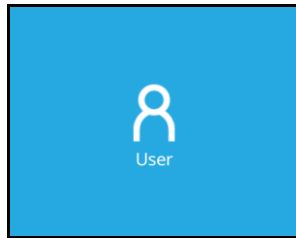
For backup set creation using command line, most backup set preferences may be configured using the backupSet.xml file.

To complete the backup set creation process after successfully importing the backupSet.xml file, the RunConfigurator.sh script will need to be used on the MariaDB machine to setup the backup set encryption key settings.

4.1 Create a MariaDB Database Backup Set using AhsayCBS

1. Log in to AhsayCBS and go to User.





2. Go to Backup Set then click Create to create a backup set.

3. Input the **Name**, select the **Type** which should be 'MariaDB Backup' and **Platform** which should be 'Linux'. Update the Host and Port. Default settings for these are 'localhost' and '3306' respectively. Input the **Path to mysqldump** then click Next.

4. Add the backup source in the **Other Selected Source** by clicking the Create button e.g. path is MariaDB/collection.

Backup Source

Other Selected Source

☐ Path

☐ MariaDB/collection

☐ MariaDB/restaurants

To backup all databases in the MariaDB machine, use the path MariaDB.

Backup Source

Other Selected Source

☐ Path

☐ MariaDB

Input the path of the source to be backed up. Click the Add button to add the source. Keep doing this until all the backup source are added.

Other Selected Source

Path

To exclude a source you can add it under **Deselected Source** by clicking the Create button.

NOTE

Always add the 'information_schema' and 'performance_schema' databases under **Deselected Source** since they are MariaDB virtual system databases. They are read-only and cannot be backed up.

Deselected Source

☐ Path

☐ MariaDB/information_schema

☐ MariaDB/performance_schema

Input the path of the source to be excluded in the backup. Click the Add button to add the deselected source. Keep doing this until all source to be excluded are added. Click Next.

Deselected Source

Path


+ X ?

- The **Run scheduled backup for this backup set** is turned on by default. If you do not want to create a backup schedule you can turn it off by sliding the lever to the left. By default, there is already a backup schedule created that is scheduled to run daily at 3am until full backup is completed. This schedule may either be edited or deleted if you want to create your own backup schedule.

NOTE

It is optional to input the computer name in the **Run scheduled backup on computers named** field since it will be updated once backup set creation is completed in the AhsayOBM client. In Step 15, the computer name can be checked as the Owner.

Schedule

Run scheduled backup for this backup set 

Manage schedule

+

<input type="checkbox"/>	Name	Type
<input type="checkbox"/>	Backup Schedule	Daily

Run scheduled backup on computers named

← → X ?

Click Create to add a new schedule or double click on the existing schedule to change the values. Click Next to proceed.

Backup Schedule

Client version < 8.3.3.20 does not support periodic schedule, periodic schedule will work as normal schedule.

Details

Name
name of the backup schedule

Type
Daily

Start backup
at 00 : 00

Stop
until full backup completed

☐ Run Retention Policy after backup

+ X ?

6. Select the **Backup Mode** if Concurrent or Sequential. By default, **Sequential** is selected. In Sequential backup mode, if there are multiple destinations configured in the backup set, AhsayOBM will backup to one destination at a time. In **Concurrent** backup mode, if there are multiple destinations configured in the backup set, AhsayOBM will backup to all destinations at the same time or concurrently.

NOTE

For backup sets with multiple destinations, sequential backup mode will take longer compared with concurrent backup mode.

Destination

Backup Mode
Sequential

+ -

☐ Name

If **Concurrent** is selected, specify the maximum number of backup destinations.

Destination

Backup Mode
Concurrent

Maximum concurrent backup destinations
Unlimited

Unlimited
2
3
4
5
6
7
8
9
10



← → X ?

Click the plus button or “+” sign to be able to add the standard or predefined destinations.





Destination

Backup Mode

Sequential ▾


☐ Name


   




Select your desired destination, it could be one or both displayed destinations. Tick the checkbox and click the plus sign to proceed. Click Next.

Add Destination

☐ Name

☐  AhsayCBS

☐  GoogleDrive-1

7. Leave the **Domain Name** and **User name** fields blank since Windows User Authentication is not supported in Linux. Click Save to create the Backup Set.





Add New Backup Set

Windows User Authentication

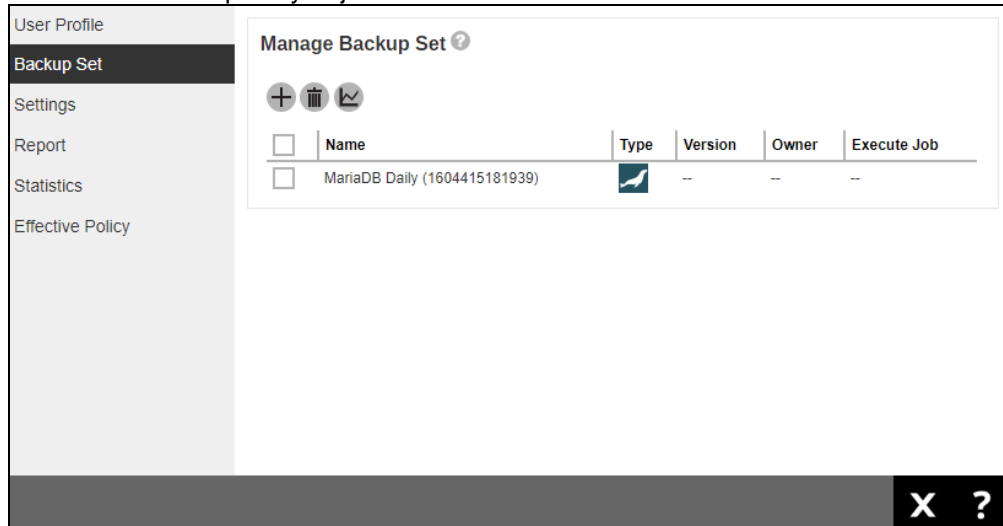
Domain Name (e.g. mycompany.com) / Host Name

User name

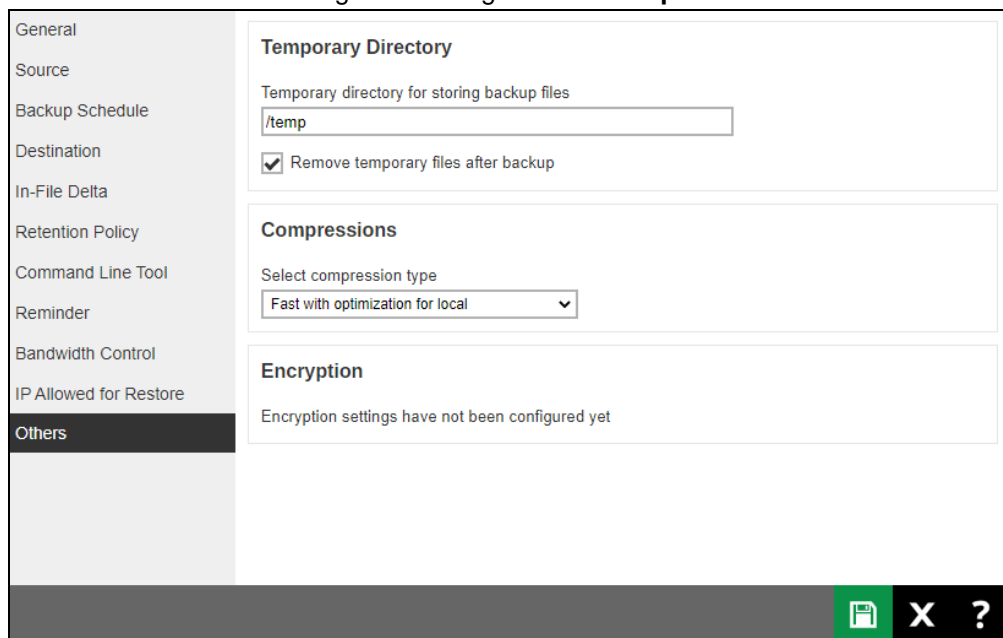
Password

8. Click on the backup set you just created.



Go to **Others** and input the path of your temporary directory. It is recommended to check the box beside **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. You can also change the settings for the **Compressions**. Click Save once done.



9. Open ssh session in the Linux machine and execute the RunConfigurator.sh script. The Login Menu will be displayed. Select (1) . **Login** then press Enter to login. Input your Login Name and Password. Set the encryption setting for the backup set.

```
# cd /usr/local/obm/bin
# sh RunConfigurator.sh
Startup Ahsay Online Backup Manager ...
Config file found

Login Menu
-----
(1). Login
(2). Change Network Settings
(3). Forgot Password
```

```

(4). Quit
-----
Your Choice: 1

Login Name : MariaDBLinux
Password : *****

Please wait while verifying user account with server...
Your profile has been downloaded and updated.

Encryption setting has not been defined for backup set "MariaDB Daily"
Do you want to set the encryption setting for this backup set? (Y/N) ? Y
Enable Encryption (Y/N) ? Y

Choose Encryption Type
-----
(1). Default
(2). User password
(3). Custom
-----
Your Choice: 2

```

10. Edit the backup set created from AhsayCBS to add the MariaDB Password. Select (1) .
List Backup Sets to list the backup set.

```

Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 1

```

11. Select the backup set to show the details by selecting (1) . **Name of your backup set**

```

Select a Backup Set to show more details
-----
(1). MariaDB Daily
-----
Your Choice: 1

Name : MariaDB Daily
Owner : ubuntu20
Type : MariaDB
Selected Source : MariaDB/collection
Selected Source : MariaDB/restaurants
Deselected Source : MariaDB/information_schema
Deselected Source : MariaDB/performance_schema
Destination Name : AhsayCBS, Type: OBS
Encryption Key : abc
Encryption Algorithm : AES
Encryption Mode : CBC
Encryption Key Length: 256

Press Enter to continue...

```

12. Export the backup set to XML by selecting (3) . **Export Backup Set Setting to XML**

```
Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 3

Choose your backup set to generate XML file
-----
(1). MariaDB Daily
-----
Your Choice: 1

XML file successfully exported to /root/.obm/config/backupSet.xml
```

13. Exit from the Main Menu then edit the XML file by using an editor like vi. Add the Value data for **MariaDB Password** to the file then save.

```
# cd /root/.obm/config
# vi backupSet.xml

<!-- MariaDB Password -->
  <Value data="abc123$$" name="Password" type="string" />
```

NOTE

Please refer to [Appendix B](#) for details on the field to be configured.

14. Import the backup set by selecting (4) . **Import Backup Set Setting from XML**. Confirm overwrite of file.

```
Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 4

Backup Set 'MariaDB Daily' already exist. Confirm overwrite? (Y/N) ? Y
XML imported, uploading to server...

XML successfully uploaded to server
```

15. Check in AhsayCBS web console if MariaDB Password and Encryption setting was successfully added.

General
Source
Backup Schedule
Destination
In-File Delta
Retention Policy
Command Line Tool
Reminder
Bandwidth Control
IP Allowed for Restore
Others

General

ID
1604415181939

Name
MariaDB Daily

Owner
ubuntu20

Backup set type
MariaDB Backup

MariaDB Backup

Login ID
root

Password

Host
localhost

Port
3306

Path to mysqldump
/usr/bin/mysqldump

Windows User Authentication

X
?

General
Source
Backup Schedule
Destination
In-File Delta
Retention Policy
Command Line Tool
Reminder
Bandwidth Control
IP Allowed for Restore
Others

Temporary Directory

Temporary directory for storing backup files
/temp

☒ Remove temporary files after backup

Compressions

Select compression type
Fast with optimization for local

Encryption

Backup user password is used as the encrypting key since "User Password" encryption type has been applied to this backup set

Encrypting key *****

Algorithm AES

Method CBC

Key length 256

X
?

4.2 Create a MariaDB Database Backup Set using command line

1. To create a MariaDB database backup set, select (5) . **Generate new Backup Set Settings Template** from the menu.

```
Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 5
```

2. Select (3) . **MariaDB** to generate a MariaDB Database Backup Set template file to **/root/.obm/config** directory.

```
Choose a template from a backup set type
-----
(1). File
(2). MySQL Database
(3). MariaDB
(4). Oracle Database Server
(5). IBM Domino
-----
Your Choice: 3

XML file successfully exported to /root/.obm/config/backupSet.xml

Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice:
```

3. Configuring MariaDB Backup Set Settings.

To configure the MariaDB backup set setting you need to edit the `/root/.obm/config/backupSet.xml` file using a text editor, for example vi

You can either quit the RunConfigurator.sh script or open a new ssh session to edit the backupSet.xml file.

Please refer to Appendix [A](#), [B](#), [C](#), and [D](#) for details and examples on how to create backup sets using the `backupSet.xml` file.

NOTES

- i. Before importing the backupSet.xml file please remove any unused destinations and backup schedule settings. Otherwise the following error will be displayed **"Failed to import XML file (Reason: Value of name is empty!)"** when trying to import the backupSet.xml file.
- ii. Setup of the following cloud storage destinations: OneDrive, OneDrive for Business, DropBox and Google Drive are not supported in Linux CLI environment, as these cloud storage destinations require authentication using a web browser.

4. Importing the updated backupSet.xml file to AhsayOBM

After you have edited the backupSet.xml file with your chosen backup settings you need to import the settings back to AhsayOBM, so they can be uploaded to AhsayCBS backup server to create the backup set.

For example: to create a new MariaDB backup set called "MariaDB Database 1" with encryption enabled and default encryption settings.

```
Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 4

Reading xml...
Reading xml...Done
Verifying destination 'AhsayCBS'...
New backup set created.
Enable Encryption (Y/N) ? y

Choose Encryption Type
-----
(1). Default
(2). User password
(3). Custom
-----
Your Choice: 1

XML imported, uploading to server...

XML successfully uploaded to server
```

5. Verify the Backup Set Settings

To verify the uploaded backup set settings are correct select (1) . **List Backup Sets** and then select the backup you wish to verify, for example backup set named “MariaDB Database 1”.

```
Main Menu
-----
(1). List Backup Sets
(2). Delete Backup Set
(3). Export Backup Set Settings to XML
(4). Import Backup Set Settings from XML
(5). Generate new Backup Set Settings Template
(6). Change Language [English]
(7). Update Profile Settings
(8). Quit
-----
Your Choice: 1

Select a Backup Set to show more details
-----
(1). MariaDB Database 1
-----
Your Choice: 1

Name           : MariaDB Database 1
Owner          : ubuntu20
Type           : MariaDB
Selected Source : MariaDB/collection
Selected Source : MariaDB/restaurants
Deselected Source : MariaDB/information_schema
Deselected Source : MariaDB/performance_schema
Destination Name : AhsayCBS, Type: OBS
Encryption Key   : abc
Encryption Algorithm : AES
Encryption Mode   : CBC
Encryption Key Length: 256

Press Enter to continue...
```

Congratulations! The backup set configuration is now complete!

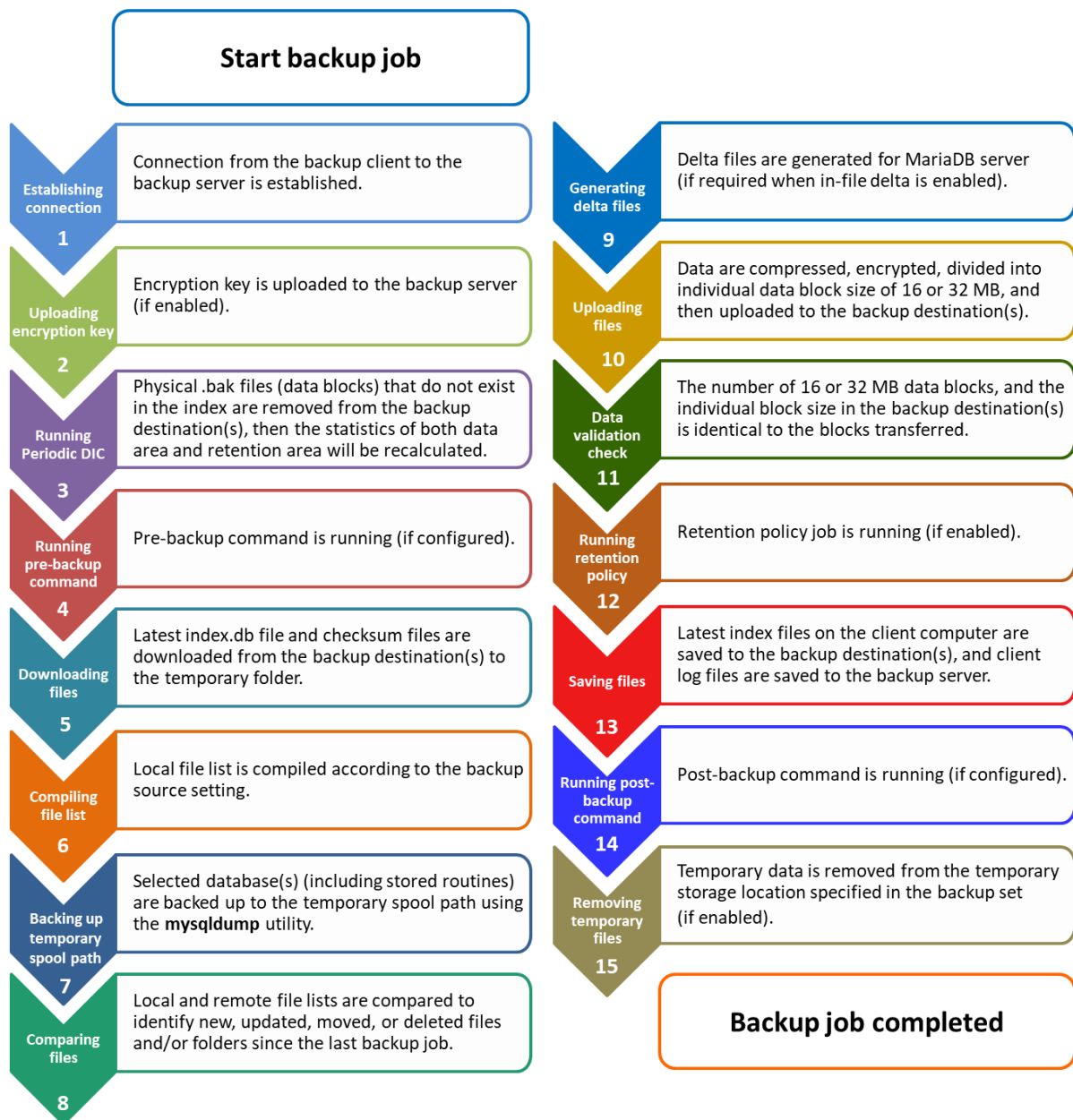
NOTES

- i. We would like to stress that it is very important to keep a separate record of your encryption key in a safe place, as you will not be able to restore your data without the correct key.
- ii. If you re-install AhsayOBM or install AhsayOBM on another machine, the encryption key will be required for restoring data from the backup set.

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:

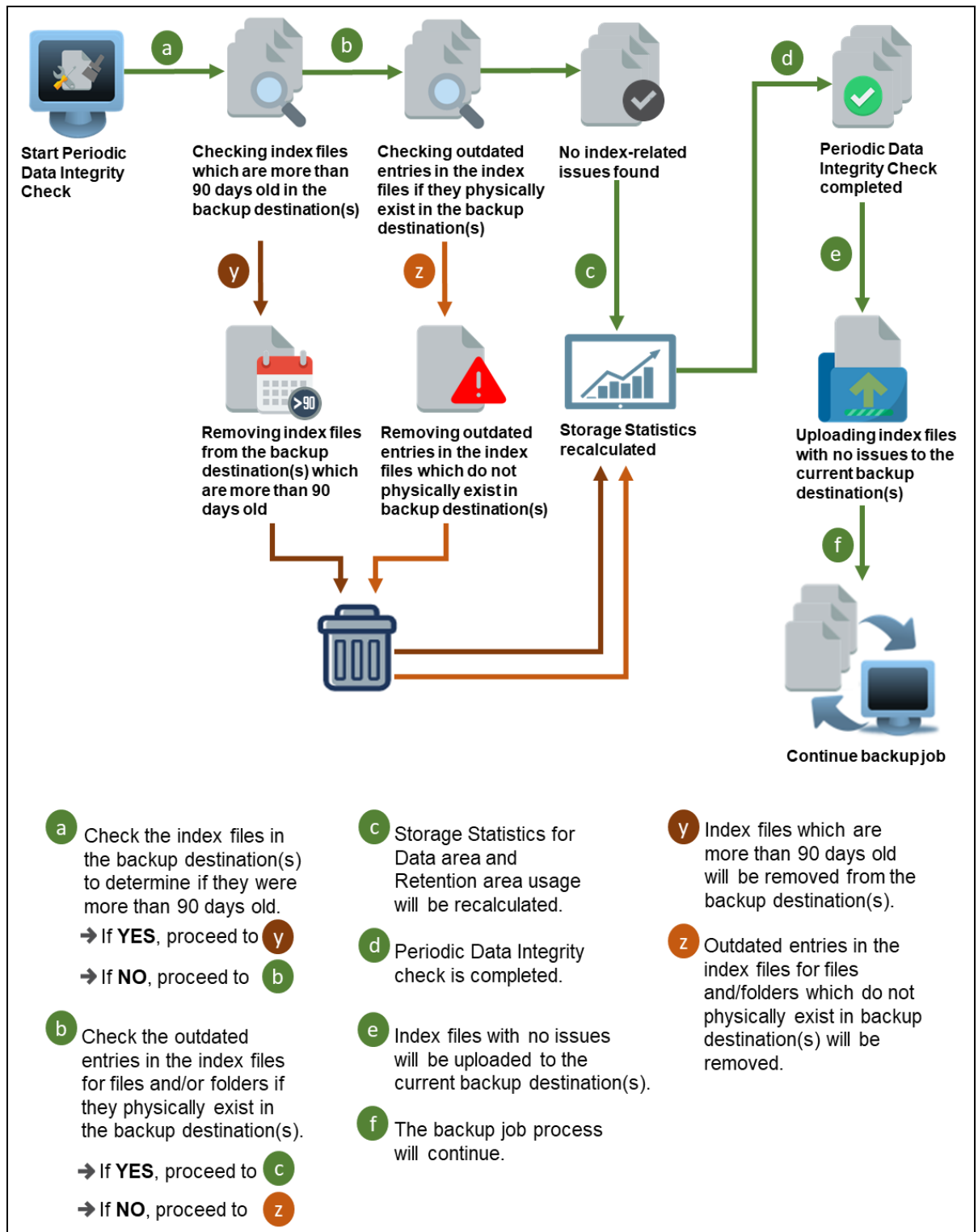
- the PDIC will run on the first backup job that falls on Wednesday; or
- if there is no active backup job(s) running from Monday to Friday, then the PDIC will run on the next available backup job.

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:

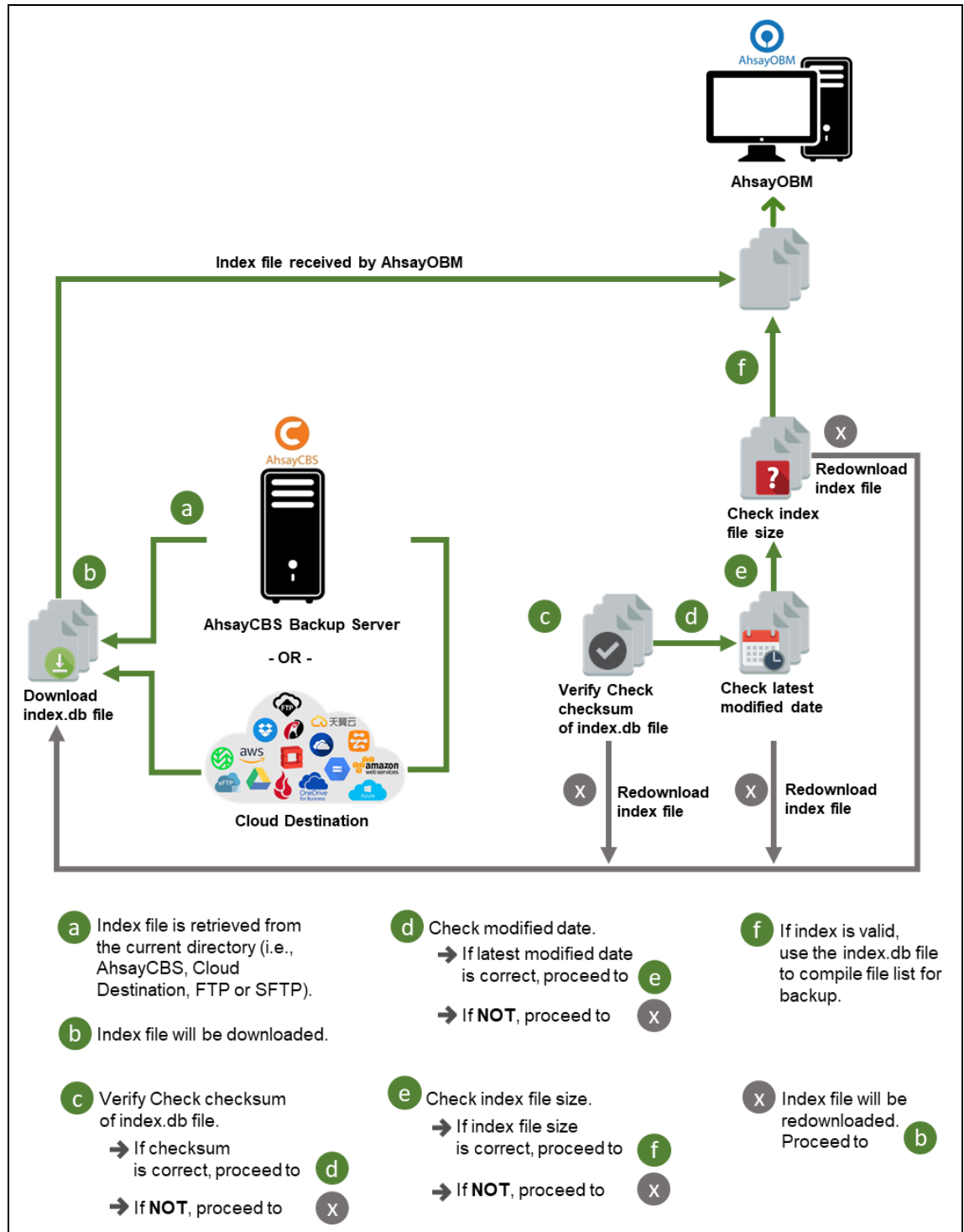
1. If AhsayOBM was upgraded to v8.5 (or above) from an older version v6, v7, or pre-8.3.6.0 version. In this case, the PDIC job will run on the first backup job after upgrade.
2. If backup jobs for a backup set are not run on a regular daily backup schedule (for example: on a weekly or monthly schedule),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



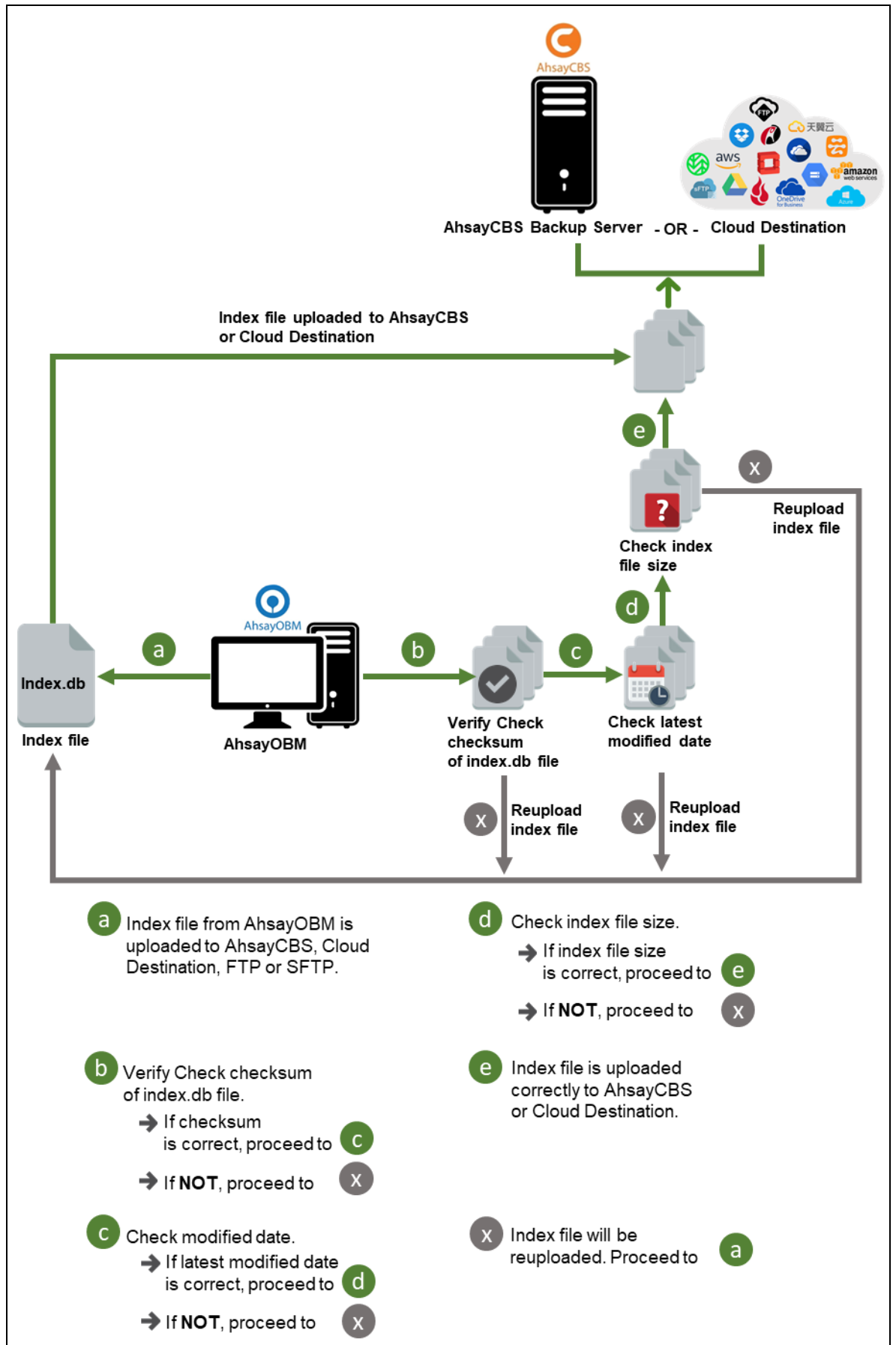
5.2 Backup Set Index Handling Process

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

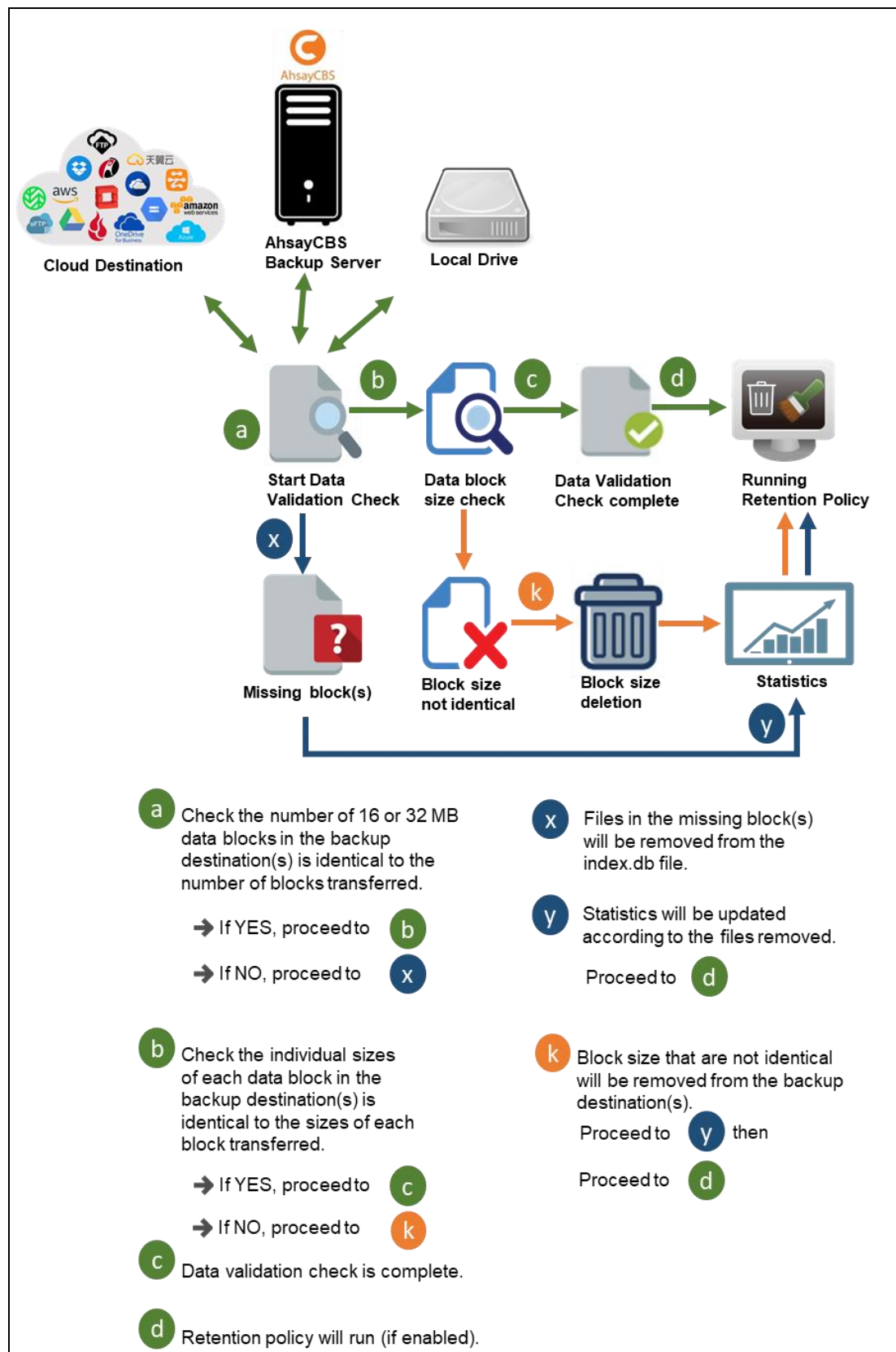


5.2.2 Completed Backup Job



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

Use the **RunBackupSet.sh** script to start a backup job manually.

Example: **RunBackupSet.sh <backupset name>**

```
#cd /usr/local/obm/bin
#sh RunBackupSet.sh "MariaDB Database 1"
-
Using APP_HOME       : /usr/local/obm
Using SETTING_HOME   :
Using JAVA_HOME       : /usr/local/obm/jvm
Using JAVA_EXE        : /usr/local/obm/jvm/bin/java
Using JAVA_OPTS       : -Xrs -Xms128m -Xmx768m -XX:MaxDirectMemorySize=512m -
client -Dsun.nio.PageAlignDirectMemory=true
Using JNI_PATH        : -Djava.library.path=.
Using CLASSPATH       : ../cb.jar
-
Running Backup Set - 'MariaDB Database 1' ...
[2020/10/26 12:32:23] [info] [-] Start [ AhsayOBM v8.4.0.15 ]
[2020/10/26 12:32:23] [info] [-] Saving encrypted backup set encryption keys
to server...
[2020/10/26 12:32:25] [info] [1603715457266] Start Backup ... Database [In-
File Delta: Differential]
[2020/10/26 12:32:25] [info] [1603715457266] Using Temporary Directory
/temp/1603685629897/OBS@1603715457266
[2020/10/26 12:32:27] [info] [-] Start running pre-commands
[2020/10/26 12:32:27] [info] [-] Finished running pre-commands
[2020/10/26 12:32:27] [info] [-] [Start] Backing up database "collection" to
"/temp/1603685629897/SpoolArea/MariaDB/collection.sql"
[2020/10/26 12:32:27] [info] [-] [End]
[2020/10/26 12:32:27] [info] [-] [Start] Backing up database "restaurants"
to "/temp/1603685629897/SpoolArea/MariaDB/restaurants.sql"
[2020/10/26 12:32:27] [info] [-] [End]
[2020/10/26 12:32:27] [info] [-] Start running post-commands
[2020/10/26 12:32:27] [info] [-] Finished running post-commands
[2020/10/26 12:32:36] [info] [1603715457266] Downloading server file list...
[2020/10/26 12:32:37] [info] [1603715457266] Downloading server file list...
Completed
[2020/10/26 12:32:38] [info] [1603715457266] Reading backup source from hard
disk...
[2020/10/26 12:32:38] [info] [1603715457266] Reading backup source from hard
disk... Completed
[2020/10/26 12:32:39] [info] [1603715457266] [New Directory]... MariaDB
[2020/10/26 12:32:39] [info] [1603715457266] [New File]... 100% of
"MariaDB/collection.sql"
[2020/10/26 12:32:39] [info] [1603715457266] [New File]... 100% of
"MariaDB/restaurants.sql"
[2020/10/26 12:32:40] [info] [1603715457266] Start validating the presence
and size of backup data in destination "AhsayCBS"...
[2020/10/26 12:32:40] [info] [1603715457266] File:
"1603685629897/blocks/2020-10-26-12-32-14/0/000000.bak", Size: 2,448, OK
[2020/10/26 12:32:40] [info] [1603715457266] Finished validating the
presence and size of backup data in destination "AhsayCBS"
[2020/10/26 12:32:40] [info] [1603715457266] Total New Files = 2
[2020/10/26 12:32:40] [info] [1603715457266] Total New Directories = 1
[2020/10/26 12:32:40] [info] [1603715457266] Total New Links = 0
[2020/10/26 12:32:40] [info] [1603715457266] Total Updated Files = 0
```

```
[2020/10/26 12:32:40] [info] [1603715457266] Total Deleted Files = 0
[2020/10/26 12:32:40] [info] [1603715457266] Total Deleted Directories = 0
[2020/10/26 12:32:40] [info] [1603715457266] Total Deleted Links = 0
[2020/10/26 12:32:40] [info] [1603715457266] Total Moved Files = 0
[2020/10/26 12:32:41] [info] [1603715457266] Saving encrypted backup file
index to 1603685629897/blocks at destination AhsayCBS...
[2020/10/26 12:32:41] [info] [1603715457266] Saving encrypted backup file
index to 1603685629897/blocks/2020-10-26-12-32-14 at destination AhsayCBS...
[2020/10/26 12:32:47] [info] [1603715457266] Backup Completed Successfully
```

7 Restoring Data

There are two options to restore a MariaDB Database Backup Set for Linux using the Restore.sh script.

• [Automatic MariaDB Database Restore](#)

This is recommended for restore of MariaDB databases on the original MariaDB server.

For this option the `RESTORE_TO=""` parameter in the Restore.sh script should be left blank or empty.

The MariaDB database .sql files are restored from your backup destination to the MariaDB database server. The restored MariaDB database .sql files are then automatically applied to the MariaDB database server.

• [Manual MariaDB Database Restore](#)

This is recommended for restore of MariaDB databases on a different MariaDB server.

For this option the `RESTORE_TO=""` parameter in the Restore.sh script should contain a location on the MariaDB server.

The MariaDB database .sql files are only restored from your backup destination to the location specified in `RESTORE_TO=""` parameter, e.g. `RESTORE_TO="/restored_file"`. The restored MariaDB database .sql files then need to be separately applied to the MariaDB database instance using the "source" command.

7.1 Automatic MariaDB Database Restore

1. To restore files from your backup destination and automatically apply them to the MariaDB database server.

You need to use the Restore.sh script by using a text editor like vi to configure the restore settings like:

- Backup Set Name -> `BACKUP_SET=""`
- Backup Destination -> `DESTINATION=""`
- Files/Folders to be Restored -> `RESTORE_FROM=""`
- Snapshot to be restored -> `POINT_IN_TIME=""`
- Applying the original permission to the restore files -> `RESTORE_PERMISSION=""`
- Verifying the in-file delta file checksum -> `VERIFY_CHKSUM=""`

NOTES

- `RESTORE_TO=""` settings must be blank
- To configure the shell script, press **Esc + I**. You will see this `-- INSERT --` on the lower left corner of the terminal.

```

# cd /usr/local/obm/bin
# vi Restore.sh

# !/bin/sh

##### Restore.sh #####
# You can use this shell script to restore backup files using command-line.
# Just customize the "User Define Section" below with values for your restore action.
#####

##### Start: User Defined Section #####

# ----- BACKUP_SET -----
# | The name or ID of the backup set that you want to restore.
# | If backup set name is not in English, please use ID instead.
# | e.g. BACKUP_SET="1119083740107"
# | or BACKUP_SET="FileBackupSet-1"
# |
# | You can leave this parameter blank if you have only 1 backupset.
# -----
BACKUP_SET="MariaDB Database 1"

# ----- DESTINATION -----
# | The name or ID of the backup destination that you want to restore from.
# | If backup destination name is not in English, please use ID instead.
# | e.g. DESTINATION="1740107119083"
# | or DESTINATION="Destination-1"
# |
# | You can leave this parameter blank if you have only 1 destination.
# -----
DESTINATION=""

# ----- RESTORE_TO -----
# | Directory to where you want files to be restored
# | set to "" to restore files to original location
# | e.g. RESTORE_TO="/tmp"
# -----
RESTORE_TO=""

# ----- RESTORE_FROM -----
# | File/Directory on the backup server that you would like to restore
# | e.g. RESTORE_FROM="/Data"
# -----
RESTORE_FROM="MariaDB"

# ----- POINT_IN_TIME -----
# | The point-in-time snapshot (successful backup) that you want to restore
# | from the backup server. Use "Current" for the latest backup snapshot
# | e.g. POINT_IN_TIME="2006-10-04-12-57-13"
# | or POINT_IN_TIME="Current"
# |
# | You can retrieve the point in time by using the ListBackupJob.sh
# -----
POINT_IN_TIME="Current"

# ----- RESTORE_PERMISSION -----
# | set to "Y" if you want to restore file permissions
# | set to "N" if you do NOT want to restore file permissions
# -----
RESTORE_PERMISSION="N"

# ----- SKIP_INVALID_KEY -----
# | set to "Y" if you want to skip restore file with invalid key
# | set to "N" if you want to prompt user to input a correct key
# -----
SKIP_INVALID_KEY="N"

```

```

# ----- SYNC_OPTION -----
# | Delete extra files
# | set to "Y" if you want to enable sync option
# | set to "N" if you do NOT want to enable sync option
# | set to "" to prompt for selection
# -----
SYNC_OPTION="N"

# ----- REPLACE_EXISTING_FILE -----
# | set to "--all" to replace all existing file(s) of the same filename
# | set to "--none" to skip all existing file(s) with the same filename
# | set to "" to prompt for selection
# -----
REPLACE_EXISTING_FILE="--all"

# ----- SETTING_HOME -----
# | Directory to your setting home.
# | Default to ${HOME}/.obm when not set.
# | e.g. SETTING_HOME="${HOME}/.obm"
# -----
SETTING_HOME=""

# ----- FILTER -----
# | Filter out what files you want to restore
# | -Pattern=xxx-Type=yyy-Target=zzz
# | where xxx is the filter pattern,
# |     yyy is the filter type, which can be one of the following:
# |         [exact | exactMatchCase | contains | containsMatchCase |
# |         startWith | startWithMatchCase | endWith | endWithMatchCase]
# |     zzz is the filter target, which can be one of the following:
# |         [toFile | toFileDir | toDir]
# | e.g. FILTER="-Pattern=.txt-Type=exact-Target=toFile"
# -----
FILTER=""

# ----- TEMP_DIR -----
# | Directory to where you want to store restore files temporarily
# | set to "" to use the temporary directory in the backup set
# | e.g. TEMP_DIR="/tmp"
# -----
TEMP_DIR="/root/temp"

# ----- VERIFY_CHKSUM -----
# | set to "Y" if you want to verify in-file delta file checksum during
# | restore|
# | set to "N" if you do NOT want to verify in-file delta file checksum
# | during |
# | restore
# -----
VERIFY_CHKSUM="N"

##### END: User Defined Section #####

#####
#       R E T R I E V E           A P P _ H O M E           P A T H       #
#####

```

2. After the Restore.sh script is configured the files can be restored automatically to the MariaDB Database Server.

```

# cd /usr/local/obm/bin
# sh Restore.sh
Using APP_HOME:           : /usr/local/obm
Using BACKUP_SET          : MariaDB Database 1
Using RESTORE_FROM        : MariaDB
Using RESTORE_TO          :

```

```

Using POINT_IN_TIME      : Current
Using RESTORE_PERMISSION : N
Using TEMP_DIR           : /root/tmp
Filter Pattern not set, filter would not apply to restore
[2020-10-26 14:25:02] Start [ AhsayOBM v8.4.0.15 ]
[2020-10-26 14:25:02] OS: Linux 5.4.0-52-generic (ubuntu20); CPU Model:
VMware-Intel(R) Xeon(R) CPU           E5530  @ 2.40GHz,Intel(R) Xeon(R)
CPU           E5530  @ 2.40GHz; Number of Processors: 2; Heap Size: 31.4MB
(Current) / 683MB (Maximum); Physical Memory: 615.6MB (Free) / 3.8GB
(Total)
[2020-10-26 14:25:02] start,Start [ AhsayOBM v8.4.0.15 ],0,0,0,,0,0

[2020-10-26 14:25:02] Selected job: 2020-10-26-14-24-53
[2020-10-26 14:25:02] Selected source: [MariaDB]
[2020-10-26 14:25:02] Info: [followLink=true marshalTargetPath=false
deleteForSync=false skipFaultKey=false verifyDeltaFileChecksum=false
restorePermission=false [RestoreLocation] type=ORIGINAL path=[null]]
[2020-10-26 14:25:02] Initializing decrypt action...
[2020-10-26 14:25:02] Initializing decrypt action... Completed
[2020-10-26 14:25:03] Creating new directory...
"/root/tmp/RestoreSet/1603685629897/RestoreDatabase/MariaDB"
[2020-10-26 14:25:03] Downloading...
"/root/tmp/RestoreSet/1603685629897/RestoreDatabase/MariaDB/collection.sql"
" (Total 5K bytes)
[2020-10-26 14:25:03] Downloading...
"/root/tmp/RestoreSet/1603685629897/RestoreDatabase/MariaDB/restaurants.sq
l" (Total 4K bytes)
[2020-10-26 14:25:04]
file,/root/tmp/RestoreSet/1603685629897/RestoreDatabase/MariaDB/collection
.sql,1374,5893,1603686747000,,1603693504138,1603693504139

[2020-10-26 14:25:04]
file,/root/tmp/RestoreSet/1603685629897/RestoreDatabase/MariaDB/restaurant
s.sql,1070,4460,1603686747000,,1603693504138,1603693504139

[2020-10-26 14:25:04] Start restore files to MariaDB... "collection"
[2020-10-26 14:25:04] Restoring to MariaDB Database... "collection"
[2020-10-26 14:25:04] End restore files to MariaDB... "collection"
[2020-10-26 14:25:04] Start restore files to MariaDB... "restaurants"
[2020-10-26 14:25:04] Restoring to MariaDB Database... "restaurants"
[2020-10-26 14:25:05] End restore files to MariaDB... "restaurants"
[2020-10-26 14:25:06] Restore Completed Successfully
[2020-10-26 14:25:06] end,RESTORE_STOP_SUCCESS,0,0,0,,0,0

```

3. Login to MariaDB server to check the database status.

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

```

MariaDB [(none)]> show databases;
+-----+
| Database |
+-----+
| Chinook |
| collection |
| employees |
| information_schema |
| mysql |
| nation |
| northwind |
| performance_schema |
| restaurants |
| sportdb |
+-----+
10 rows in set (0.001 sec)

MariaDB [(none)]> show tables in collection;
+-----+
| Tables_in_collection |
+-----+

```



```
+-----+
| album          |
| artist         |
| brand          |
| model          |
| title          |
| type           |
| year           |
+-----+
7 rows in set (0.001 sec)
```

MariaDB [(none)]> show tables in restaurants;

```
+-----+
| Tables_in_restaurants |
+-----+
| contact_no            |
| cuisine               |
| location              |
| name                  |
| rating                |
+-----+
5 rows in set (0.000 sec)
```

7.2 Manual MariaDB Database Restore

To restore files that have been backed up from your backup destination, you need to use the Restore.sh script by using a text editor like vi to configure the restore settings like:

- Backup Set Name -> BACKUP_SET=""
- Backup Destination -> DESTINATION=""
- Location of Restored Files -> RESTORE_TO=""
- Files/Folders to be Restored -> RESTORE_FROM=""
- Snapshot to be restored -> POINT_IN_TIME=""
- Applying the original permission to the restore files -> RESTORE_PERMISSION=""
- Verifying the in-file delta file checksum -> VERIFY_CHKSUM=""

```
# sh Restore.sh
Using APP_HOME:           : /usr/local/obm
Using BACKUP_SET          : MariaDB Database 1
Using RESTORE_FROM        : MariaDB
Using RESTORE_TO          : /root/restored
Using POINT_IN_TIME       : Current
Using RESTORE_PERMISSION : N
Using TEMP_DIR            : /root/tmp
Filter Pattern not set, filter would not apply to restore
[2020-10-26 14:13:19] Start [ AhsayOBM v8.4.0.15 ]
[2020-10-26 14:13:19] OS: Linux 5.4.0-52-generic (ubuntu20); CPU Model:
VMware-Intel(R) Xeon(R) CPU                    E5530 @ 2.40GHz, Intel(R) Xeon(R) CPU
E5530 @ 2.40GHz; Number of Processors: 2; Heap Size: 37.9MB (Current) /
683MB (Maximum); Physical Memory: 627.7MB (Free) / 3.8GB (Total)
[2020-10-26 14:13:19] start, Start [ AhsayOBM v8.4.0.15 ], 0, 0, 0, 0, 0

[2020-10-26 14:13:19] Selected job: 2020-10-26-14-13-10
[2020-10-26 14:13:19] Selected source: [MariaDB]
[2020-10-26 14:13:19] Info: [followLink=true marshalTargetPath=false
deleteForSync=false skipFaultKey=false verifyDeltaFileChecksum=false
restorePermission=false [RestoreLocation] type=RAW path=[/root/restored]]
[2020-10-26 14:13:19] Initializing decrypt action...
[2020-10-26 14:13:19] Initializing decrypt action... Completed
[2020-10-26 14:13:19] Creating new directory... "/root/restored/MariaDB"
[2020-10-26 14:13:19] Downloading...
"/root/restored/MariaDB/collection.sql" (Total 5K bytes)
[2020-10-26 14:13:19] Downloading...
"/root/restored/MariaDB/restaurants.sql" (Total 4K bytes)
[2020-10-26 14:13:21]
file,/root/restored/MariaDB/restaurants.sql,1070,4460,1603686747000,,160369
2801062,1603692801063

[2020-10-26 14:13:21]
file,/root/restored/MariaDB/collection.sql,1374,5893,1603686747000,,1603692
801062,1603692801063
```

Verify the files are restored on the machine.

```
#ls -la /root/restored/MariaDB
total 16
drwxr-xr-x 2 root root 4096 Oct 26 14:13 .
drwxr-xr-x 3 root root 4096 Oct 26 14:13 ..
-rwxr-xr-x 1 root root 5893 Oct 26 12:32 collection.sql
-rwxr-xr-x 1 root root 4460 Oct 26 12:32 restaurants.sql
```

7.2.1 Recovering MariaDB Databases

1. Login to MariaDB server

```
# mariadb -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 238
Server version: 10.4.15-MariaDB-1:10.4.15+maria~focal 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          |
+-----+
| Chinook            |
| employees          |
| information_schema |
| mysql              |
| nation             |
| northwind          |
| performance_schema |
| sportdb            |
+-----+
8 rows in set (0.001 sec)
```

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

Example: collection and restaurants

```
MariaDB [(none)]> create database collection;
Query OK, 1 row affected (0.00 sec)

MariaDB [(none)]> create database restaurants;
Query OK, 1 row affected (0.00 sec)
```

3. Recover Databases

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

```
MariaDB [(none)]> use collection;
Database changed
MariaDB [(collection)]> source /root/restored/MariaDB/collection.sql;

Query OK, 8 rows affected (0.006 sec)
Records: 8  Duplicates: 0  Warnings: 0

Query OK, 7 rows affected (0.002 sec)
Records: 7  Duplicates: 0  Warnings: 0

Query OK, 8 rows affected (0.002 sec)
Records: 8  Duplicates: 0  Warnings: 0

Query OK, 6 rows affected (0.003 sec)
Records: 6  Duplicates: 0  Warnings: 0

Query OK, 7 rows affected (0.002 sec)
Records: 7  Duplicates: 0  Warnings: 0

Query OK, 8 rows affected (0.004 sec)
Records: 8  Duplicates: 0  Warnings: 0

Query OK, 8 rows affected (0.002 sec)
Records: 8  Duplicates: 0  Warnings: 0
```

```

MariaDB [(none)]> use restaurants;
Database changed
MariaDB [restaurants]> source /root/restored/MariaDB/restaurants.sql;

Query OK, 7 rows affected (0.002 sec)
Records: 7 Duplicates: 0 Warnings: 0

Query OK, 7 rows affected (0.001 sec)
Records: 7 Duplicates: 0 Warnings: 0

Query OK, 8 rows affected (0.003 sec)
Records: 8 Duplicates: 0 Warnings: 0

Query OK, 10 rows affected (0.001 sec)
Records: 10 Duplicates: 0 Warnings: 0

```

4. Check the database status

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

```

MariaDB [restaurants]> show databases;
+-----+
| Database |
+-----+
| Chinook  |
| collection |
| employees |
| information_schema |
| mysql    |
| nation   |
| northwind |
| performance_schema |
| restaurants |
| sportdb  |
+-----+
10 rows in set (0.001 sec)

MariaDB [restaurants]> show tables in collection;
+-----+
| Tables_in_collection |
+-----+
| album                |
| artist               |
| brand                |
| model                |
| title                |
| type                 |
| year                 |
+-----+
7 rows in set (0.001 sec)

MariaDB [restaurants]> show tables in restaurants;
+-----+
| Tables_in_restaurants |
+-----+
| contact_no           |
| cuisine              |
| location              |
| name                  |
| rating                |
+-----+
5 rows in set (0.000 sec)

```

8 Contact 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.

Appendix

Appendix A MariaDB Backup Set XML Template (Raw)

```
<?xml version="1.0" encoding="UTF-8"?>
<Setting>
  <!-- This is the backup set setting -->
  <Key name="Backup Set Setting" allowMultiple="Y">
    <!-- Backup set type (Read Only) -->
    <Value data="MariaDB" name="Type" type="string" />
    <!-- Backup set name -->
    <Value data="" name="Name" type="string" />
    <!-- Temporary directory for storing backup files -->
    <Value data="" name="Temporary Working Directory" type="string" />
    <!-- Remove temporary files after backup -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="Y" name="Delete temporary files after backup"
    type="boolean" />
    <!-- Select compression type -->
    <!-- GzipDefaultCompression : Normal -->
    <!-- GzipBestSpeedCompression: Fast (Compressed size larger than
normal) -->
    <!-- SnappyDefaultCompression: Fast with optimization for local -->
    <!-- Leave the field blank for no compression -->
    <Value data="" name="Compression Type" type="string" />
  <!-- This shows the MariaDB setting -->
  <Key name="MariaDB Setting">
    <!-- MariaDB Login Name -->
    <Value data="" name="Username" type="string" />
    <!-- MariaDB Password -->
    <Value data="" name="Password" type="string" />
    <!-- MariaDB Host -->
    <Value data="" name="Host" type="string" />
    <!-- MariaDB Port -->
    <Value data="" name="Port" type="string" />
    <!-- Path to mysqldump -->
    <Value data="" name="mysqldump path" type="string" />
  </Key>
  <!-- This includes the database you want to backup -->
  <!-- Copy and paste the whole <Key> to add more selected sources -->
  <Key name="Selected Source" allowMultiple="Y">
    <!-- Please enter the path in the format of
    "MariaDB/_YOUR_FILE_NAME_" -->
    <Value data="" name="Path" type="string" />
  </Key>
  <!-- This excludes the database from the included source -->
  <!-- Copy and paste the whole <Key> to add more deselected sources -
->
  <Key name="Deselected Source" allowMultiple="Y">
    <!-- Please enter the path in the format of
    "MariaDB/_YOUR_FILE_NAME_" -->
    <Value data="" name="Path" type="string" />
  </Key>
  <!-- Settings for your scheduled backups -->
  <Key name="Schedule Settings">
    <!-- Enable scheduled backup on this computer -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="N" name="Enable" type="boolean" />
    <!-- Daily settings -->
    <!-- Copy and paste the whole <Key> to add more daily
schedules -->
    <Key name="Daily Schedule Settings" allowMultiple="Y">
      <!-- Name of schedule -->
```

```

        <Value data="Daily-Schedule" name="Name" type="string"
/>

        <!-- Start hour -->
        <!-- 0, 1, 2... 23 -->
        <!-- This value will be ignored if the schedule is set to
be periodic ("Interval" field contains value other than -1) -->
        <Value data="21" name="Hour" type="integer" />
        <!-- Start minute -->
        <!-- 0, 1, 2... 59 -->
        <!-- This value will be ignored if the schedule is set to
be periodic ("Interval" field contains value other than -1) -->
        <Value data="0" name="Minute" type="integer" />
        <Value data="0" name="Minute" type="integer" />
        <!-- Interval -->
        <!-- 1 : 1 minute -->
        <!-- 2 : 2 minutes -->
        <!-- 3 : 3 minutes -->
        <!-- 4 : 4 minutes -->
        <!-- 5 : 5 minutes -->
        <!-- 6 : 6 minutes -->
        <!-- 10 : 10 minutes -->
        <!-- 12 : 12 minutes -->
        <!-- 15 : 15 minutes -->
        <!-- 20 : 20 minutes -->
        <!-- 30 : 30 minutes -->
        <!-- 60 : 1 hour -->
        <!-- 120: 2 hours -->
        <!-- 180: 3 hours -->
        <!-- 240: 4 hours -->
        <!-- 360: 6 hours -->
        <!-- 480: 8 hours -->
        <!-- 720: 12 hours -->
        <!-- A value of -1 means a non-periodic normal schedule --
>

        <Value data="-1" name="Interval" type="integer" />
</Key>
<!-- Weekly settings -->
<!-- Copy and paste the whole <Key> to add more weekly
schedules -->
<Key name="Weekly Schedule Settings" allowMultiple="Y">
        <!-- Name of schedule -->
        <Value data="Weekly-Schedule" name="Name" type="string"
/>

        <!-- Start hour -->
        <!-- 0, 1, 2... 23 -->
        <!-- This value will be ignored if the schedule is set to
be periodic ("Interval" field contains value other than -1) -->
        <Value data="21" name="Hour" type="integer" />
        <!-- Start minute -->
        <!-- 0, 1, 2... 59 -->
        <!-- This value will be ignored if the schedule is set to
be periodic ("Interval" field contains value other than -1) -->
        <Value data="0" name="Minute" type="integer" />
        <!-- Interval -->
        <!-- 1 : 1 minute -->
        <!-- 2 : 2 minutes -->
        <!-- 3 : 3 minutes -->
        <!-- 4 : 4 minutes -->
        <!-- 5 : 5 minutes -->
        <!-- 6 : 6 minutes -->
        <!-- 10 : 10 minutes -->
        <!-- 12 : 12 minutes -->
        <!-- 15 : 15 minutes -->
        <!-- 20 : 20 minutes -->
        <!-- 30 : 30 minutes -->
        <!-- 60 : 1 hour -->
        <!-- 120: 2 hours -->
        <!-- 180: 3 hours -->

```

```

<!-- 240: 4 hours -->
<!-- 360: 6 hours -->
<!-- 480: 8 hours -->
<!-- 720: 12 hours -->
<!-- A value of -1 means a non-periodic normal schedule --
>

<Value data="-1" name="Interval" type="integer" />
<!-- Backup on these days of the week -->
<!-- Y: Yes -->
<!-- N: No -->
<Value data="Y" name="Sunday" type="boolean" />
<Value data="Y" name="Monday" type="boolean" />
<Value data="Y" name="Tuesday" type="boolean" />
<Value data="Y" name="Wednesday" type="boolean" />
<Value data="Y" name="Thursday" type="boolean" />
<Value data="Y" name="Friday" type="boolean" />
<Value data="Y" name="Saturday" type="boolean" />
</Key>
<!-- Monthly settings -->
<!-- Copy and paste the whole <Key> to add more monthly
schedules -->
<Key name="Monthly Schedule Settings" allowMultiple="Y">
  <!-- Name of schedule -->
  <Value data="Monthly-Schedule" name="Name"
type="string" />

  <!-- Start hour -->
  <!-- 0, 1, 2... 23 -->
  <Value data="21" name="Hour" type="integer" />
  <!-- Start minute -->
  <!-- 0, 1, 2... 59 -->
  <Value data="0" name="Minute" type="integer" />
  <!-- Schedule date of month -->
  <!-- 1, 2, 3... 31 -->
  <!-- 32: Last -->
  <!-- Set to 0 if you want to use the format of
occurrence + criteria, e.g. Third Wednesday, instead -->
  <Value data="1" name="Schedule Date" type="integer" />
  <!-- Backup occurrence -->
  <!-- First / Second / Third / Fourth / Last -->
  <!-- If "Schedule Date" is not zero, this value will be
ignored -->

  <Value data="First" name="Occurrence" type="string" />
  <!-- Backup criteria -->
  <!-- Sunday / Monday / Tuesday / Wednesday / Thursday /
Friday / Saturday / Weekday / Weekend -->
  <!-- If "Schedule Date" is not zero, this value will be
ignored -->

  <Value data="Friday" name="Criteria" type="string" />
</Key>
<!-- Custom settings -->
<!-- Copy and paste the whole <Key> to add more custom
schedules -->
<Key name="Custom Schedule Settings" allowMultiple="Y">
  <!-- Name of schedule -->
  <Value data="Custom" name="Name" type="string" />
  <!-- Start hour -->
  <!-- 0, 1, 2... 23 -->
  <Value data="21" name="Hour" type="integer" />
  <!-- Start minute -->
  <!-- 0, 1, 2... 59 -->
  <Value data="0" name="Minute" type="integer" />
  <!-- Date for performing custom schedule backup -->
  <!-- Input in the format of YYYY-MM-DD -->
  <Value data="2020-10-23" name="Schedule Date"
type="string" />
</Key>
</Key>
<!-- This is the collection of destinations -->

```



```

        <Key name="Destination Settings">
            <Value data="1" name="concurrency-level" type="integer" />
            <!-- AhsayCBS destination is where the files are backup to
server -->

            <Key name="AhsayCBS Destination Settings" allowMultiple="Y">
            </Key>
            <!-- Local destination means backup files are stored in your
computer -->

            <!-- Copy and paste the whole <Key> to add more local
                destinations -->
            <Key name="Local Destination Settings">
                <!-- Name of your destination -->
                <Value data="" name="Name" type="string" />
                <!-- Directory to store your backup files -->
                <!-- e.g. /tmp -->
                <Value data="" name="Local Path" type="string" />
            </Key>
            <!-- This shows the in-file delta setting -->
            <Key name="In-file Delta Setting">
                <!-- Enable in-file delta backup -->
                <!-- Y: Yes -->
                <!-- N: No -->
                <Value data="Y" name="Enable" type="boolean" />
                <!-- Default in-file delta type -->
                <!-- D: Differential -->
                <!-- I: Incremental -->
                <Value data="" name="Default Delta Type" type="string" />
            </Key>
        </Key>
    </Setting>

```

Appendix B MariaDB Backup Set XML Template (with explanation)

This appendix explains all configurable items with their available options, highlighted in red, in this file backup set XML scripts.

Backup Set Setting

The following items define the basic configurations of the file backup set.

- ❶ **Backup set type** – enter the backup set type, for instance, File, MariaDB etc.
- ❷ **Backup set name** – name your backup set.
- ❸ **Temporary directory for storing backup files** – Enter the directory path where you would like to have the backup files stored temporarily. The temporary directory is used for various purposes, such as storage of temporary spooled file (for database specific backup type in AhsayOBM), remote file list, local file list, temporary delta file and other files of temporary nature.
- ❹ **Remove temporary files after backup** – choose whether to remove temporary files after you finish backup.
- ❺ **Select compression type** – choose the backup compression mode among Normal, Fast, Fast with optimization for local or No compression.

```
<?xml version="1.0" encoding="UTF-8"?>
<Setting>
<!-- This is the backup set setting -->
  <Key name="Backup Set Setting" allowMultiple="Y">
    <!-- Backup set type (Read Only) -->
    <Value data="MariaDB" name="Type" type="string" />
    <!-- Backup set name -->
    <Value data="" name="Name" type="string" />
    <!-- Temporary directory for storing backup files -->
    <Value data="" name="Temporary Working Directory"
type="string" />
    <!-- Remove temporary files after backup -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="Y" name="Delete temporary files after backup"
type="boolean" />
    <!-- Select compression type -->
    <!-- GzipDefaultCompression : Normal -->
    <!-- GzipBestSpeedCompression: Fast (Compressed size larger
than normal) -->
    <!-- SnappyDefaultCompression: Fast with optimization for local-->
    <!-- Leave the field blank for no compression -->
    <Value data="" name="Compression Type" type="string" />
  </Key>
</Setting>
```

MariaDBSetting

- ❶ Configure the login and network settings for the MariaDB Database.

```
<!-- This shows the MariaDB setting -->
<Key name="MariaDB Setting">
  <!-- MariaDB Login Name -->
  <Value data="" name="Username" type="string" />
  <!-- MariaDB Password -->
  <Value data="" name="Password" type="string" />
  <!-- MariaDB Host -->
  <Value data="" name="Host" type="string" />
</Key>
```

```

        <!-- MariaDB Port -->
        <Value data="" name="Port" type="string" />
        <!-- Path to mysqldump -->
        <Value data="" name="mysqldump path" type="string" />
    </Key>

```

Selected Source

- Enter the path where the database you would like to backup is located.

```

<!-- This includes the database you want to backup -->
<!-- Copy and paste the whole <Key> to add more selected
sources -->
<Key name="Selected Source" allowMultiple="Y">
    <!-- Please enter the path in the format of "MariaDB/_YOUR_FILE_NAME_"
-->
    <Value data="" name="Path" type="string" />
</Key>

```

Deselected Source

- Enter the path where database you would like to exclude from the backup is located.

```

<!-- This excludes the database from the included source -->
<!-- Copy and paste the whole <Key> to add more deselected
sources -->
<Key name="Deselected Source" allowMultiple="Y">
    <!-- Please enter the path in the format of "MariaDB/_YOUR_FILE_NAME_"
-->
    <Value data="" name="Path" type="string" />
</Key>

```

Schedule Settings

- Choose whether you would like backup jobs to be run at the scheduled time you set.

```

<!-- Settings for your scheduled backups -->
<Key name="Schedule Settings">
    <!-- Enable scheduled backup on this computer -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="N" name="Enable" type="boolean" />

```

Daily Schedule Settings

Set backup jobs to run daily at the time you specified (start backup “at” or normal backup schedule) or at intervals of minutes/hours (start backup “every” or periodic backup schedule).

- Start hour** – the starting hour of the backup, from 0-23. This value will apply for normal backup schedule or start backup “at”.
- Start minute** – the starting minute of the backup, from 0-59. This value will apply for normal backup schedule or start backup “at”.
- Interval** – frequency in minutes or hours when the backup would start, from 1-30 in minutes and 60-720 in hours. This value will apply for periodic backup schedule or start backup “every”.

```

<!-- Daily settings -->
<!-- Copy and paste the whole <Key> to add more daily
schedules -->
<Key name="Daily Schedule Settings" allowMultiple="Y">
    <!-- Name of schedule -->
    <Value data="Daily-Schedule" name="Name" type="string" />

```

```

        <!-- Start hour -->
        <!-- 0, 1, 2... 23 -->
        <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
        <Value data="21" name="Hour" type="integer" />
        <!-- Start minute -->
        <!-- 0, 1, 2... 59 -->
        <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
        <Value data="0" name="Minute" type="integer" />
        <!-- Interval -->
        <!-- 1 : 1 minute -->
        <!-- 2 : 2 minutes -->
        <!-- 3 : 3 minutes -->
        <!-- 4 : 4 minutes -->
        <!-- 5 : 5 minutes -->
        <!-- 6 : 6 minutes -->
        <!-- 10 : 10 minutes -->
        <!-- 12 : 12 minutes -->
        <!-- 15 : 15 minutes -->
        <!-- 20 : 20 minutes -->
        <!-- 30 : 30 minutes -->
        <!-- 60 : 1 hour -->
        <!-- 120: 2 hours -->
        <!-- 180: 3 hours -->
        <!-- 240: 4 hours -->
        <!-- 360: 6 hours -->
        <!-- 480: 8 hours -->
        <!-- 720: 12 hours -->
        <!-- A value of -1 means a non-periodic normal schedule -->
        <Value data="-1" name="Interval" type="integer" />
</Key>

```

Weekly Schedule Settings

Set backup jobs to run weekly at the time you specified (start backup “at” or normal backup schedule) or at intervals of minutes/hours (start backup “every” or periodic backup schedule).

- ❶ **Start hour** – the starting hour of the backup, from 0-23. This value will apply for normal backup schedule or start backup “at”.
- ❷ **Start minute** – the starting minute of the backup, from 0-59. This value will apply for normal backup schedule or start backup “at”.
- ❸ **Interval** – frequency in minutes or hours when the backup would start, from 1-30 in minutes and 60-720 in hours. This value will apply for periodic backup schedule or start backup “every”.
- ❹ **Backup on these days of the week** – choose to enable or disable backup on each day in week.

```

<!-- Weekly settings -->
<!-- Copy and paste the whole <Key> to add more weekly
schedules -->
<Key name="Weekly Schedule Settings" allowMultiple="Y">
    <!-- Name of schedule -->
    <Value data="Weekly-Schedule" name="Name" type="string" />
    <!-- Start hour -->
    <!-- 0, 1, 2... 23 -->
    <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
    <Value data="21" name="Hour" type="integer" />
    <!-- Start minute -->
    <!-- 0, 1, 2... 59 -->
    <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->

```

```

<Value data="0" name="Minute" type="integer" />
<!-- Interval -->
<!-- 1 : 1 minute -->
<!-- 2 : 2 minutes -->
<!-- 3 : 3 minutes -->
<!-- 4 : 4 minutes -->
<!-- 5 : 5 minutes -->
<!-- 6 : 6 minutes -->
<!-- 10 : 10 minutes -->
<!-- 12 : 12 minutes -->
<!-- 15 : 15 minutes -->
<!-- 20 : 20 minutes -->
<!-- 30 : 30 minutes -->
<!-- 60 : 1 hour -->
<!-- 120 : 2 hours -->
<!-- 180 : 3 hours -->
<!-- 240 : 4 hours -->
<!-- 360 : 6 hours -->
<!-- 480 : 8 hours -->
<!-- 720 : 12 hours -->
<!-- A value of -1 means a non-periodic normal schedule -->
<Value data="-1" name="Interval" type="integer" />
<!-- Backup on these days of the week -->
<!-- Y: Yes -->
<!-- N: No -->
<Value data="Y" name="Sunday" type="boolean" />
<Value data="Y" name="Monday" type="boolean" />
<Value data="Y" name="Tuesday" type="boolean" />
<Value data="Y" name="Wednesday" type="boolean" />
<Value data="Y" name="Thursday" type="boolean" />
<Value data="Y" name="Friday" type="boolean" />
<Value data="Y" name="Saturday" type="boolean" />
</Key>

```

Monthly Schedule Settings

Set backup jobs to run monthly at the time you specified.

- ❶ **Start hour** – the starting hour of the backup, from 0-23.
- ❷ **Start minute** – the starting minute of the backup, from 0-59.
- ❸ **Schedule date of month** – set exact date in a month when you would like the backup to perform. Set to 0 if you would like the backup performed in a specified occurrence + criteria format, e.g. the third Wednesday in month.
- ❹ **Backup [Occurrence + Criteria] format**
 You can set the backup to perform on a specified week (**Occurrence, First / Second / Third / Last**) and on a specified day of the week (**Criteria, Sun thru Sat**), for instance, the third Wednesday in a month.
 - ⦿ **Backup occurrence** – set the week, i.e., First / Second / Third / Last. If you have set an exact date in the previous “Schedule date of month” configuration, this setting will be ignored.
 - ⦿ **Backup criteria** – set a day of the week, i.e., Sunday thru Saturday. If you have set an exact date in the previous “Schedule date of month” configuration, this setting will be ignored.

```

<!-- Monthly settings -->
<!-- Copy and paste the whole <Key> to add more monthly
schedules -->
<Key name="Monthly Schedule Settings" allowMultiple="Y">
  <!-- Name of schedule -->
  <Value data="Monthly-Schedule" name="Name" type="string" />

```

```

<!-- Start hour -->
<!-- 0, 1, 2... 23 -->
<Value data="21" name="Hour" type="integer" />
<!-- Start minute -->
<!-- 0, 1, 2... 59 -->
<Value data="0" name="Minute" type="integer" />
<!-- Schedule date of month -->
<!-- 1, 2, 3... 31 -->
<!-- 32: Last -->
<!-- Set to 0 if you want to use the format of
occurrence + criteria, e.g. Third Wednesday, instead -->
<Value data="1" name="Schedule Date" type="integer" />
<!-- Backup occurrence -->
<!-- First / Second / Third / Fourth / Last -->
<!-- If "Schedule Date" is not zero, this value will be
ignored -->
<Value data="First" name="Occurrence" type="string" />
<!-- Backup criteria -->
<!-- Sunday / Monday / Tuesday / Wednesday / Thursday /
Friday / Saturday / Weekday / Weekend -->
<!-- If "Schedule Date" is not zero, this value will be
ignored -->
<Value data="Friday" name="Criteria" type="string" />
</Key>

```

Custom Schedule Settings

Set backup jobs to run at the date and time you specified.

- **Start hour** – the starting hour of the backup, from 0-23.
- **Start minute** – the starting minute of the backup, from 0-59.
- **Date for performing custom schedule backup** - enter a specific date when you would like the backup to perform. The date format should be in YYYY-MM-DD.

```

<!-- Custom settings -->
<!-- Copy and paste the whole <Key> to add more custom
schedules -->
<Key name="Custom Schedule Settings" allowMultiple="Y">
  <!-- Name of schedule -->
  <Value data="Custom" name="Name" type="string" />
  <!-- Start hour -->
  <!-- 0, 1, 2... 23 -->
  <Value data="21" name="Hour" type="integer" />
  <!-- Start minute -->
  <!-- 0, 1, 2... 59 -->
  <Value data="0" name="Minute" type="integer" />
  <!-- Date for performing custom schedule backup -->
  <!-- Input in the format of YYYY-MM-DD -->
  <Value data="2020-10-23" name="Schedule Date"
type="string" />
</Key>
</Key>

```

Destination Settings

- ❶ **AhsayCBS Destination Settings** – this option allows backup files to be stored on the server
- ❷ **Local Destination Settings** – this option allows backup files to be stored in your local computer. Enter the directory path where you would like the backup files to be stored.

```
<!-- This is the collection of destinations -->
<Key name="Destination Settings">
  <Value data="1" name="concurrency-level" type="integer" />
  <!-- AhsayCBS destination is where the files are backup to
  server -->
  <Key name="AhsayCBS Destination Settings" allowMultiple="Y">
  </Key>
  <!-- Local destination means backup files are stored in
  your computer -->
  <!-- Copy and paste the whole <Key> to add more local
  destinations -->
  <Key name="Local Destination Settings" allowMultiple="Y">
    <!-- Name of your destination -->
    <Value data="" name="Name" type="string" />
    <!-- Directory to store your backup files -->
    <!-- e.g. /tmp -->
    <Value data="" name="Local Path" type="string" />
  </Key>
```

In-file delta setting

In-File delta technology is an advanced data block matching algorithm with the intelligence to pick up changes (delta) of file content between two files. You can choose between **Differential** and **Incremental** in this setting.

- ❶ **Differential** - The delta is generated by comparing with the last uploaded full file only. Delta generated with this method will grow daily and uses more bandwidth. However, for restoration, the full file and a single delta is required to be restored and merged.
- ❷ **Incremental** - The delta is generated by comparing with the last uploaded full or delta file. Delta generated with this method is smaller and uses the least bandwidth. However, for restoration, the full file and all deltas chain up to the required point-in-time are required to be restored and merged. This is prone to data lost (e.g. broken delta chain).

```
<!-- This shows the in-file delta setting -->
<Key name="In-file Delta Setting">
  <!-- Enable in-file delta backup -->
  <!-- Y: Yes -->
  <!-- N: No -->
  <Value data="Y" name="Enable" type="boolean" />
  <!-- Default in-file delta type -->
  <!-- D: Differential -->
  <!-- I: Incremental -->
  <Value data="" name="Default Delta Type" type="string" />
</Key>
</Setting>
```

Appendix C Example of MariaDB Database Backup Set with normal backup schedule

Backup set configurations:

Backup Set Name	MariaDB Database 1
Temporary Working Directory	/temp
Remove temporary files after backup	Yes
Compression Type	Fast
Daily schedule	7:30 PM
Destination	AhsayCBS, Local Drive (/localbackup)
Backup Source	MariaDB/Chinook, MariaDB/employees, MariaDB/nation, MariaDB/sportdb
Exclude	MariaDB/information_schema, MariaDB/performance_schema
In-File Delta Type	Differential

MariaDB database settings:

ID	root
Password	pwd123
Hostname	localhost
Port	3306
Mysqldump path	/usr/bin/mysqldump

*Configurable items are highlighted in red.

```
<?xml version="1.0" encoding="UTF-8"?>
<Setting>
  <!-- This is the backup set setting -->
  <Key name="Backup Set Setting" allowMultiple="Y">
    <!-- Backup set type (Read Only) -->
    <Value data="MariaDB" name="Type" type="string" />
    <!-- Backup set name -->
    <Value data="MariaDB Database 1" name="Name" type="string" />
    <!-- Temporary directory for storing backup files -->
    <Value data="/temp" name="Temporary Working Directory"
      type="string" />
    <!-- Remove temporary files after backup -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="Y" name="Delete temporary files after backup"
      type="boolean" />
    <!-- Select compression type -->
    <!-- GzipDefaultCompression : Normal -->
    <!-- GzipBestSpeedCompression: Fast (Compressed size larger than
normal) -->
    <!-- SnappyDefaultCompression: Fast with optimization for local -->
    <!-- Leave the field blank for no compression -->
    <Value data="GzipBestSpeedCompression" name="Compression Type"
      type="string" />
    <!-- This shows the MariaDB setting -->
    <Key name="MariaDB Setting">
      <!-- MariaDB Login Name -->
      <Value data="root" name="Username" type="string" />
      <!-- MariaDB Password -->
      <Value data="pwd123" name="Password" type="string" />
      <!-- MariaDB Host -->
      <Value data="localhost" name="Host" type="string" />
    </Key>
  </Key>
</Setting>
```



```

<!-- MariaDB Port -->
<Value data="3306" name="Port" type="string" />
<!-- Path to mysqldump -->
<Value data="/usr/bin/mysqldump" name="mysqldump path"
type="string" />
</Key>
<!-- This includes the database you want to backup -->
<!-- Copy and paste the whole <Key> to add more selected sources -->
<Key name="Selected Source" allowMultiple="Y">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/Chinook" name="Path" type="string" />
</Key>
<Key name="Selected Source">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/employees" name="Path" type="string" />
</Key>
<Key name="Selected Source">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/nation" name="Path" type="string" />
</Key>
<Key name="Selected Source">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/sportdb" name="Path" type="string" />
</Key>
<!-- This excludes the database from the included source -->
<!-- Copy and paste the whole <Key> to add more deselected sources -->
<Key name="Deselected Source" allowMultiple="Y">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/information_schema" name="Path"
type="string" />
</Key>
<Key name="Deselected Source">
  <!-- Please enter the path in the format of
  "MariaDB/_YOUR_FILE_NAME_" -->
  <Value data="MariaDB/performance_schema" name="Path"
type="string" />
</Key>
<!-- Settings for your scheduled backups -->
<Key name="Schedule Settings">
  <!-- Enable scheduled backup on this computer -->
  <!-- Y: Yes -->
  <!-- N: No -->
  <Value data="Y" name="Enable" type="boolean" />
  <!-- Daily settings -->
  <!-- Copy and paste the whole <Key> to add more daily schedules -->
  <Key name="Daily Schedule Settings" allowMultiple="Y">
    <!-- Name of schedule -->
    <Value data="Daily-Schedule" name="Name" type="string" />
    <!-- Start hour -->
    <!-- 0, 1, 2... 23 -->
    <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
    <Value data="19" name="Hour" type="integer" />
    <!-- Start minute -->
    <!-- 0, 1, 2... 59 -->
    <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
    <Value data="30" name="Minute" type="integer" />
    <!-- Interval -->
    <!-- 1 : 1 minute -->
    <!-- 2 : 2 minutes -->
    <!-- 3 : 3 minutes -->
    <!-- 4 : 4 minutes -->

```

```

        <!-- 5 : 5 minutes -->
        <!-- 6 : 6 minutes -->
        <!-- 10 : 10 minutes -->
        <!-- 12 : 12 minutes -->
        <!-- 15 : 15 minutes -->
        <!-- 20 : 20 minutes -->
        <!-- 30 : 30 minutes -->
        <!-- 60 : 1 hour -->
        <!-- 120: 2 hours -->
        <!-- 180: 3 hours -->
        <!-- 240: 4 hours -->
        <!-- 360: 6 hours -->
        <!-- 480: 8 hours -->
        <!-- 720: 12 hours -->
        <!-- A value of -1 means a non-periodic normal schedule -->
        <Value data="-1" name="Interval" type="integer" />
    </Key>
    <!-- This is the collection of destinations -->
    <Key name="Destination Settings">
        <Value data="-1" name="concurrency-level" type="integer" />
        <!-- AhsayCBS destination is where the files are backup to server -->
        <Key name="AhsayCBS Destination Settings" allowMultiple="Y">
            </Key>
            <!-- Local destination means backup files are stored in your
computer -->
            <!-- Copy and paste the whole <Key> to add more local destinations -->
            <Key name="Local Destination Settings" allowMultiple="Y">
                <!-- Name of your destination -->
                <Value data="local" name="Name" type="string" />
                <!-- Directory to store your backup files -->
                <!-- e.g. /tmp -->
                <Value data="/localbackup" name="Local Path" type="string" />
            </Key>
        </Key>
    </Key>
    <!-- This shows the in-file delta setting -->
    <Key name="In-file Delta Setting">
        <!-- Enable in-file delta backup -->
        <!-- Y: Yes -->
        <!-- N: No -->
        <Value data="Y" name="Enable" type="boolean" />
        <!-- Default in-file delta type -->
        <!-- D: Differential -->
        <!-- I: Incremental -->
        <Value data="D" name="Default Delta Type" type="string" />
    </Key>
</Key>
</Setting>

```

Appendix D Example of MariaDB Database Backup Set with periodic backup schedule

Backup set configurations:

Backup Set Name	MariaDB Daily Backup
Temporary Working Directory	/temp
Remove temporary files after backup	Yes
Compression Type	Fast
Weekly schedule	Every 8 hours from Monday to Friday
Destination	AhsayCBS
Backup Source	All MariaDB databases
Exclude	MariaDB/information_schema, MariaDB/performance_schema
In-File Delta Type	Incremental

MariaDB database settings:

ID	root
Password	pwd123
Hostname	localhost
Port	3306
Mysqldump path	/usr/bin/mysqldump

*Configurable items are highlighted in red.

```
<?xml version="1.0" encoding="UTF-8"?>
<Setting>
  <!-- This is the backup set setting -->
  <Key name="Backup Set Setting" allowMultiple="Y">
    <!-- Backup set type (Read Only) -->
    <Value data="MariaDB" name="Type" type="string" />
    <!-- Backup set name -->
    <Value data="MariaDB Daily Backup" name="Name" type="string" />
    <!-- Temporary directory for storing backup files -->
    <Value data="/temp" name="Temporary Working Directory"
    type="string" />
    <!-- Remove temporary files after backup -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="Y" name="Delete temporary files after backup"
    type="boolean" />
    <!-- Select compression type -->
    <!-- GzipDefaultCompression : Normal -->
    <!-- GzipBestSpeedCompression: Fast (Compressed size larger than
    normal) -->
    <!-- SnappyDefaultCompression: Fast with optimization for local -->
    <!-- Leave the field blank for no compression -->
    <Value data="GzipBestSpeedCompression" name="Compression Type"
    type="string" />
    <!-- This shows the MariaDB setting -->
    <Key name="MariaDB Setting">
      <!-- MariaDB Login Name -->
      <Value data="root" name="Username" type="string" />
      <!-- MariaDB Password -->
      <Value data="pwd123" name="Password" type="string" />
      <!-- MariaDB Host -->
      <Value data="localhost" name="Host" type="string" />
      <!-- MariaDB Port -->
      <Value data="3306" name="Port" type="string" />
    </Key>
  </Key>
</Setting>
```

```

        <!-- Path to mysqldump -->
        <Value data="/usr/bin/mysqldump" name="mysqldump path"
        type="string" />
    </Key>
    <!-- This includes the database you want to backup -->
    <!-- Copy and paste the whole <Key> to add more selected sources - ->
    <Key name="Selected Source" allowMultiple="Y">
        <!-- Please enter the path in the format of
        "MariaDB/_YOUR_FILE_NAME_" -->
        <Value data="MariaDB" name="Path" type="string" />
    </Key>
    <Key name="Deselected Source" allowMultiple="Y">
        <!-- Please enter the path in the format of
        "MariaDB/_YOUR_FILE_NAME_" -->
        <Value data="MariaDB/information_schema" name="Path"
        type="string" />
    </Key>
    <Key name="Deselected Source" allowMultiple="Y">
        <!-- Please enter the path in the format of
        "MariaDB/_YOUR_FILE_NAME_" -->
        <Value data="MariaDB/performance_schema" name="Path"
        type="string" />
    </Key>

    <!-- Settings for your scheduled backups -->
    <Key name="Schedule Settings">
        <!-- Enable scheduled backup on this computer -->
        <!-- Y: Yes -->
        <!-- N: No -->
        <Value data="Y" name="Enable" type="boolean" />
        <Key name="Weekly Schedule Settings" allowMultiple="Y">
            <!-- Name of schedule -->
            <Value data="Weekly-Schedule" name="Name" type="string" />
            <!-- Start hour -->
            <!-- 0, 1, 2... 23 -->
            <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
            <Value data="21" name="Hour" type="integer" />
            <!-- Start minute -->
            <!-- 0, 1, 2... 59 -->
            <!-- This value will be ignored if the schedule is set to be
periodic ("Interval" field contains value other than -1) -->
            <Value data="0" name="Minute" type="integer" />
            <!-- Interval -->
            <!-- 1 : 1 minute -->
            <!-- 2 : 2 minutes -->
            <!-- 3 : 3 minutes -->
            <!-- 4 : 4 minutes -->
            <!-- 5 : 5 minutes -->
            <!-- 6 : 6 minutes -->
            <!-- 10 : 10 minutes -->
            <!-- 12 : 12 minutes -->
            <!-- 15 : 15 minutes -->
            <!-- 20 : 20 minutes -->
            <!-- 30 : 30 minutes -->
            <!-- 60 : 1 hour -->
            <!-- 120 : 2 hours -->
            <!-- 180 : 3 hours -->
            <!-- 240 : 4 hours -->
            <!-- 360 : 6 hours -->
            <!-- 480 : 8 hours -->
            <!-- 720 : 12 hours -->
            <!-- A value of -1 means a non-periodic normal schedule -->
            <Value data="480" name="Interval" type="integer" />
            <!-- Backup on these days of the week -->
            <!-- Y: Yes -->
            <!-- N: No -->
            <Value data="N" name="Sunday" type="boolean" />
        </Key>
    </Key>

```

```

        <Value data="Y" name="Monday" type="boolean" />
        <Value data="Y" name="Tuesday" type="boolean" />
        <Value data="Y" name="Wednesday" type="boolean" />
        <Value data="Y" name="Thursday" type="boolean" />
        <Value data="Y" name="Friday" type="boolean" />
        <Value data="N" name="Saturday" type="boolean" />
    </Key>
</Key>
<!-- This is the collection of destinations -->
<Key name="Destination Settings">
    <Value data="-1" name="concurrency-level " type="integer" />
    <!-- AhsayCBS destination is where the files are backup to server -->
    <Key name="AhsayCBS Destination Settings" allowMultiple="Y">
    </Key>
</Key>
<!-- This shows the in-file delta setting -->
<Key name="In-file Delta Setting">
    <!-- Enable in-file delta backup -->
    <!-- Y: Yes -->
    <!-- N: No -->
    <Value data="Y" name="Enable" type="boolean" />
    <!-- Default in-file delta type -->
    <!-- D: Differential -->
    <!-- I: Incremental -->
    <Value data="I" name="Default Delta Type" type="string" />
</Key>
</Key>
</Setting>

```

Appendix E Login using Twilio

If Multi-Factor Authentication is enabled, press Enter to continue then provide your country code, phone number and email. A passcode will be sent to the phone number provided. Enter the passcode to continue logging in. The MFA Configuration screen will only be displayed when you login for the first time.

MFA Configuration

Multi-Factor Authentication is enabled for helping safeguard access to your account. Please provide a phone number to setup in the first-time login. Press Enter to continue...

Supported Country List:

*Andorra (+376)
United Arab Emirates (+971)
Afghanistan (+93)
Antigua and Barbuda (+1268)
Anguilla (+1264)
Albania (+355)
Armenia (+374)
Angola (+244)
Argentina (+54)
American Samoa (+1684)
Austria (+43)
Australia, Christmas Island, Cocos (Keeling) Islands (+61)
Aruba (+297)
Åland Islands, Finland (+358)
Azerbaijan (+994)
Bosnia and Herzegovina (+387)
Barbados (+1246)
Bangladesh (+880)
Belgium (+32)
Burkina Faso (+226)
Bulgaria (+359)
Bahrain (+973)
Burundi (+257)
Benin (+229)
Bermuda (+1441)
Brunei (+673)
Bolivia (+591)
Brazil (+55)
Bahamas (+1242)
Bhutan (+975)
Botswana (+267)
Belarus (+375)
Belize (+501)
DR Congo (+243)
Central African Republic (+236)
Republic of the Congo (+242)
Switzerland (+41)
Ivory Coast (+225)
Cook Islands (+682)
Chile (+56)
Cameroon (+237)
China (+86)
Colombia (+57)
Costa Rica (+506)
Cuba (+53)*

Cape Verde (+238)
Cyprus (+357)
Czechia (+420)
Germany (+49)
Djibouti (+253)
Denmark (+45)
Dominica (+1767)
Dominican Republic (+1809)
Algeria (+213)
Ecuador (+593)
Estonia (+372)
Egypt (+20)
Eritrea (+291)
Spain (+34)
Ethiopia (+251)
Fiji (+679)
Falkland Islands, South Georgia (+500)
Micronesia (+691)
Faroe Islands (+298)
France (+33)
Gabon (+241)
Grenada (+1473)
Georgia (+995)
French Guiana (+594)
Guernsey, Isle of Man, Jersey, United Kingdom (+44)
Ghana (+233)
Gibraltar (+350)
Greenland (+299)
Gambia (+220)
Guinea (+224)
Guadeloupe, Saint Barthélemy, Saint Martin (+590)
Equatorial Guinea (+240)
Greece (+30)
Guatemala (+502)
Guam (+1671)
Guinea-Bissau (+245)
Guyana (+592)
Hong Kong (+852)
Honduras (+504)
Croatia (+385)
Haiti (+509)
Hungary (+36)
Indonesia (+62)
Ireland (+353)
Israel (+972)
India (+91)
Iraq (+964)
Iran (+98)
Iceland (+354)
Italy (+39)
Jamaica (+1876)
Jordan (+962)
Japan (+81)
Kenya (+254)
Kyrgyzstan (+996)
Cambodia (+855)
Kiribati (+686)
Comoros (+269)
Saint Kitts and Nevis (+1869)

South Korea (+82)
Kuwait (+965)
Cayman Islands (+1345)
Kazakhstan (+76)
Laos (+856)
Lebanon (+961)
Saint Lucia (+1758)
Liechtenstein (+423)
Sri Lanka (+94)
Liberia (+231)
Lesotho (+266)
Lithuania (+370)
Luxembourg (+352)
Latvia (+371)
Libya (+218)
Morocco, Western Sahara (+212)
Monaco (+377)
Moldova (+373)
Montenegro (+382)
Madagascar (+261)
Marshall Islands (+692)
Macedonia (+389)
Mali (+223)
Myanmar (+95)
Mongolia (+976)
Macau (+853)
Martinique (+596)
Mauritania (+222)
Montserrat (+1664)
Malta (+356)
Mauritius (+230)
Maldives (+960)
Malawi (+265)
Mexico (+52)
Malaysia (+60)
Mozambique (+258)
Namibia (+264)
New Caledonia (+687)
Niger (+227)
Norfolk Island (+672)
Nigeria (+234)
Nicaragua (+505)
Netherlands (+31)
Norway (+47)
Nepal (+977)
Niue (+683)
New Zealand, Pitcairn Islands (+64)
Oman (+968)
Panama (+507)
Peru (+51)
French Polynesia (+689)
Papua New Guinea (+675)
Philippines (+63)
Pakistan (+92)
Poland (+48)
Saint Pierre and Miquelon (+508)
Puerto Rico (+1787)
Palestine (+970)
Portugal (+351)

Palau (+680)
Paraguay (+595)
Qatar (+974)
Romania (+40)
Serbia (+381)
Russia (+7)
Rwanda (+250)
Saudi Arabia (+966)
Solomon Islands (+677)
Seychelles (+248)
Sudan (+249)
Sweden (+46)
Singapore (+65)
Slovenia (+386)
Slovakia (+421)
Sierra Leone (+232)
San Marino (+378)
Senegal (+221)
Somalia (+252)
Suriname (+597)
SouthSudan (+211)
São Tomé and Príncipe (+239)
El Salvador (+503)
Syria (+963)
Swaziland (+268)
Turksand Caicos Islands (+1649)
Chad (+235)
Togo (+228)
Thailand (+66)
Tajikistan (+992)
Timor-Leste (+670)
Turkmenistan (+993)
Tunisia (+216)
Tonga (+676)
Turkey (+90)
Trinidad and Tobago (+1868)
Taiwan (+886)
Tanzania (+255)
Ukraine (+380)
Uganda (+256)
United States, Canada (+1)
Uruguay (+598)
Uzbekistan (+998)
Saint Vincent and the Grenadines (+1784)
Venezuela (+58)
British Virgin Islands (+1284)
United States Virgin Islands (+1340)
Vietnam (+84)
Vanuatu (+678)
Samoa (+685)
Kosovo (+383)
Yemen (+967)
Mayotte, Réunion (+262)
South Africa (+27)
Zambia (+260)
Zimbabwe (+263)

The list above shows all the supported countries and corresponding country code

Please enter your country code.
Country code : +63
Enter Phone number : 1234567890

There is no contact email address defined in your account.
Please enter an email address for account recovery.
Email : sample@email.com
We will send you a SMS message with passcode to your entered phone number:
Philippines (+63) - 1234567890. Continue?
(1). Yes, send SMS message
(2). Change country code
(3). Modify phone number
(4). Cancel
Your Choice : 1

A SMS message with a passcode was already sent to the phone number
Philippines (+63) - *****7890 (Expiry time: 07/04/2019 09:39)
Please enter the passcode with AWKQ prefix to continue login.
Passcode : 722458

This will be the screen displayed for subsequent log ins. Select option (1) to receive the passcode.

MFALogin

Please select phone number to receive passcode via SMS message to continue login.
(1). Philippines (+63) - *****7890
(2). Need help logging in
Your Choice : 1
A SMS message with a passcode was already sent to the phone number
Philippines (+63) - *****7890 (Expiry time: 04/06/2019 09:51)
Please enter the passcode with FCAK prefix to continue login.
Passcode : 481267

If you need help logging in select option (2). Provide your email address.

MFALogin

Please select phone number to receive passcode via SMS message to continue login.
(1). Philippines (+63) - *****7890
(2). Need help logging in
Your Choice : 2
Please enter contact email address to receive email with login instruction.
Email : sample@email.com
An email with link sent to sample@email.com. Please follow the instruction from email to continue login