

LTR backups not created after 7 days

Last updated by | Vitor Tomaz | Jun 8, 2022 at 5:31 AM PDT

Contents

- [Issue](#)
- [Investigation / Analysis](#)
 - [CMS queries](#)
 - [XTS views](#)
 - [Kusto queries](#)
- [Mitigation](#)
- [Public Documentation](#)
- [Internal Reference](#)

Issue

The customer has an Azure SQL Database server with an LTR policy for maintaining weekly backups. They created several new databases on February 10, at about the same time. The initial full backups were auto-created within minutes shortly after, and these backups were then copied to LTR storage a bit later.

The customer expected to see the next set of LTR backups to be saved seven days later around February 17. But this only happened for one of the databases. For two other databases, however, the next LTR backup was saved 11 and 12 days after the initial backup, before then moving to the weekly 7-day schedule.

The databases showed the following LTR backup pattern - note the 11/12 days gap for databases #1 and #2:

- Database 1: February 10 – February 21 – February 28
- Database 2: February 10 – February 22 – March 1
- Database 3: February 10 – February 17 – February 24 – March 3

The question is why the first weekly LTR backups are apparently missing, and if this is a defect or still working as designed?

Investigation / Analysis

The investigation on the telemetry revealed that the next full backups for databases #1 and #2 were created on Feb 14/15, already four/five days after database creation. But these full backups were not copied to LTR. Only the 3rd full backups on Feb 21/22 were then copied to LTR again, thus creating a gap in the weekly LTR sequence.

CMS queries

```
-- see columns weekly_retention, monthly_retention, yearly_retention for the configured LTR schedule
select * from archived_backup where logical_server_name = 'servername'

select * from ltr_configurations where logical_server_id = '408d1ce5-790b-4e05-a257-7c47083308a9'

select * from ltr_backups where logical_server_id = '408d1ce5-790b-4e05-a257-7c47083308a9'
```

XTS views

ltr v2 overview.xts

ltr v2 overview_working.xts

Kusto queries

```
// get server id from CMS:
// select * from logical_servers where name = 'servername'
MonLtrMetadataStoreClient
| where logical_server_name =~ "servername" // or logical_server_id =~ "09947f88-7ca2-48c8-91e9-0c2dc211f314"
| where event contains "Ltr"
| project TIMESTAMP, event, request_id, operation_type, details, logical_server_id, logical_database_id, logic
| limit 100

// identify creation of full backups
MonBackup
| where TIMESTAMP >= datetime(2022-02-10 00:00:00Z)
| where TIMESTAMP <= datetime(2022-03-01 18:00:00Z)
| where LogicalServerName =~ "servername" //and AppName =~ "d2aad723b74a"
| where logical_database_name =~ "databasename"
| where details startswith "Take full backup"
| project TIMESTAMP, LogicalServerName, AppName, logical_database_id, logical_database_name, message_type, det
| order by TIMESTAMP asc

// identify backups copied to LTR
MonBackup
| where TIMESTAMP >= datetime(2022-02-10 00:00:00Z)
| where TIMESTAMP <= datetime(2022-03-01 18:00:00Z)
| where LogicalServerName =~ "servername" //and AppName =~ "d2aad723b74a"
| where details startswith "[LTRV2]"
| where details contains "Starting copy"
| project TIMESTAMP, LogicalServerName, AppName, logical_database_id, logical_database_name, message_type, det
| order by TIMESTAMP asc
```

Mitigation

According to an IcM with the product group, the observed behaviour is expected because of a conscious design decision. The reasoning is the following:

1. LTR is only using full database backups for its long-term retention. Full database backups are usually taken at least every 7 days – but there are scenarios where this pattern might not be followed.
2. LTR has a logic to not consider a full backup for its weekly backup if the last full backup was taken within the past 6 days. The reason for this design is to avoid customers getting more than 1 weekly backups within 7 days, and as a result, being charged for more than two backups in 7 days.

3. After a database has been created, a full backup is created as quickly as possible to establish the base for the backup chain. This first backup is also copied to the LTR storage.
4. Each individual database is then assigned a backup slot in the data center, in which the future full weekly backups will be taken. This is to load-balance storage throughput and to minimize any performance impact that might be caused by the backup I/O.
5. If the next scheduled backup slot is in less than 7 days from the initial backup, the full backup will be taken but not copied to LTR storage, because of #2 above. LTR will then only consider the next full backup 7 days later.
6. Once the initial plus the next backup has been copied to LTR, the 7-day sequence will be maintained in the future.

LTR weekly backups DO NOT mean that there will be a backup saved exactly every 7 days. It rather means that there will be one saved backup in every 7-day period. In example 1 from above, there is an 11-day period (Feb 10 - Feb 21), and there are two backups, so everything is working as expected.

If the full backup date changes sometime in the future (for whatever reason), then the LTR backup might start being saved on a different day again, thus apparently breaking the normal 7-day pattern again.

Public Documentation

[Long-term retention - Azure SQL Database and Azure SQL Managed Instance](#) 

To enable LTR, you can define a policy using a combination of four parameters: weekly backup retention (W), month and week of year (WeekOfYear).

- If you specify W, one backup every week will be copied to the long-term storage.
- If you specify M, the first backup of each month will be copied to the long-term storage.
- If you specify Y, one backup during the week specified by WeekOfYear will be copied to the long-term storage

Internal Reference

Originating ICM: [ICM 258435275](#) 

I can see we have below full backups taken for this database:

2021-08-13T22-36-04
2021-08-17T10-01-19
2021-08-24T10-04-07

Customer enabled LTR on 2021-08-13 22:35:04.8865561 and we have made the 2021-08-13T22-36-04 backup as his first, however the next full backup was taken 3.5 days (instead of 7 days) later on 2021-08-17T10-01-19.

LTR has a logic not to consider a backup as weekly backup if the last backup was taken within 6 days in the past. The reason for this design is to avoid customer getting more than 1 weekly backups within 7 days, and as a result being charged for more than two backups in 7 days.

Customer should expect to see a weekly LTR backup for this database to happen on each Tuesday going forward (i.e. we usually will take full backups for a database in a predetermined slot. And for this database, the pattern is Tuesday).

How good have you found this content?

