Accelerated Database Recovery - CTR

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What is ADR ?

Accelerated Database Recovery (ADR) is a new SQL database engine feature that greatly improves database availability, especially in the presence of long running transactions, by redesigning the SQL database engine recovery process. ADR is currently available for single databases and pooled databases in Azure SQL Database, and databases in Azure SQL Data Warehouse (currently in public preview). The primary benefits of ADR are:

Fast and consistent database recovery

With ADR, long running transactions do not impact the overall recovery time, enabling fast and consistent database recovery irrespective of the number of active transactions in the system or their sizes.

Instantaneous transaction rollback

With ADR, transaction rollback is instantaneous, irrespective of the time that the transaction has been active or the number of updates that has performed.

Aggressive log truncation

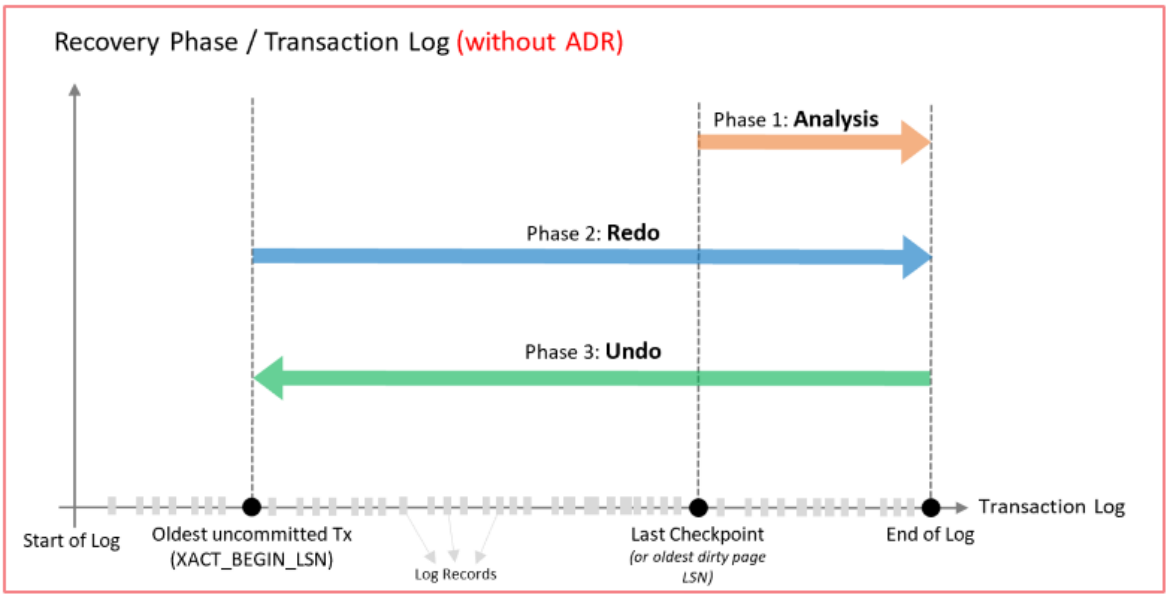
With ADR, the transaction log is aggressively truncated, even in the presence of active long running transactions, which prevents it from growing out of control.

Comparing recovery phase With & Without ADR

The current process (without ADR) , recovery requires a rollback of all incomplete transactions. The length of time required is proportional to the work that the transaction has performed and the time it has been active. Therefore, the SQL Server recovery process can take a long time in the presence of long running transactions (such as large bulk insert operations or index build operations against a large table).

And cancelling/rolling back a large transaction based on this design can also take a long time as it is using the same Undo recovery phase as described above.

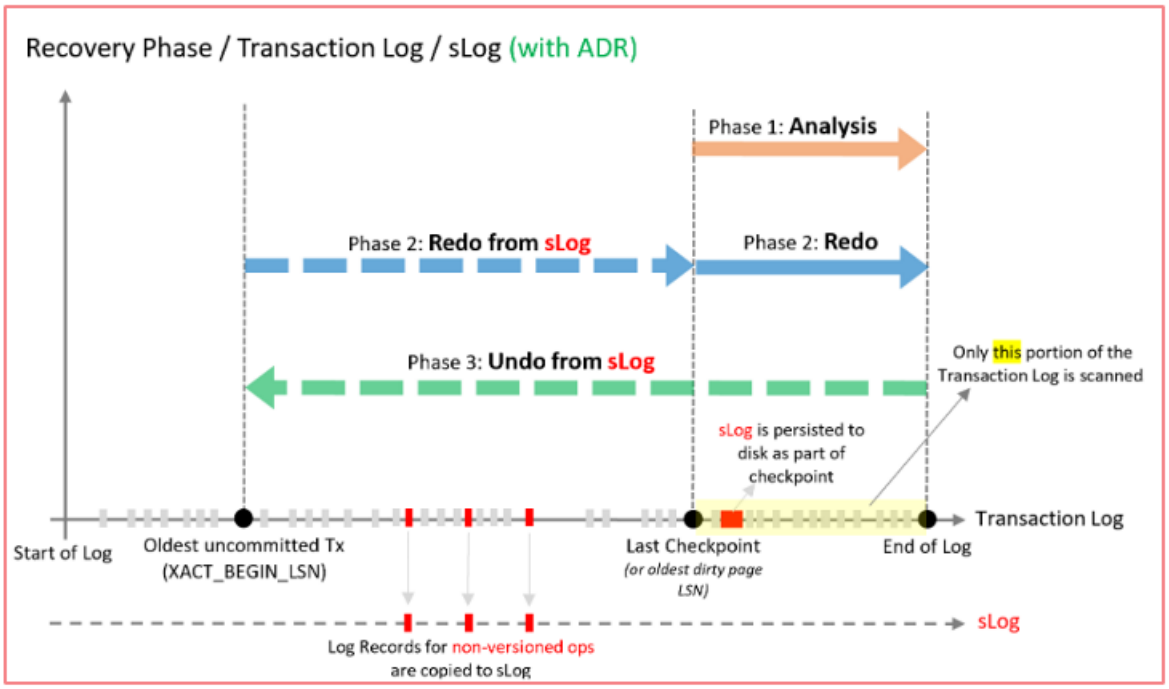
In addition, the SQL database engine cannot truncate the transaction log when there are long running transactions because their corresponding log records are needed for the recovery and rollback processes. As a result of this design of the SQL database engine, some customers face the problem that the size of the transaction log grows very large and consumes huge amounts of drive space.



ADR addresses the above issues by completely redesigning the SQL database engine recovery process to:

- Make it constant time/instant by avoiding having to scan the log from/to the beginning of the oldest active transaction.
- With ADR, the transaction log is only processed from the last successful checkpoint (or oldest dirty page Log Sequence Number (LSN)). As a result, recovery time is not impacted by long running transactions.
- Minimize the required transaction log space since there is no longer a need to process the log for the whole transaction. As a result, the transaction log can be truncated aggressively as checkpoints and backups occur.
- At a High Level, ADR achieves fast database recovery by versioning all physical database modifications and only undoing logical operations, which are limited and can be undone almost instantly.
- Any transaction that was active as of the time of a crash are marked as aborted and, therefore, any versions generated by these transactions can be ignored by concurrent user queries.

The ADR recovery process has the same three phases as the current recovery process



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