

Get the Skinny on Minimally Logged Operations

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Who Am I?

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Agenda

- Overview
 - Fully Logged
 - Bulk logged
 - Minimally Logged
- Fully Logged Examples
- Bulk Logged Examples
- Minimally Logged Examples
- TF610 Overview
- Questions & Answers

Fully Logged Operations

- Depends on the operation and the Recovery Model
 - Minimally Logged operations are not possible in full recovery
 - Operation dependent in Bulk Logged or Simple
- Requires enough information is written to the transaction log to ensure integrity
 - Roll Backs
 - Roll Forwards or Redo

Bulk Load <> Minimally Logged

- Bulk Load operations are typically more efficient than traditional non-bulk operations
 - Generally less overhead
 - Logs less information to the tran log
 - Less round trips
- Can be minimally logged but requires extra conditions
- When transactional replication is enabled, Bulk Load operations are fully logged even under the Bulk Logged recovery model

Minimally Logged Operations

- Requires Bulk Logged or Simple recovery model but depends on the operation
- Does not log all the details like Full recovery
 - Logs only Extent and Meta data changes
 - Much less written to the log file
- Why do we care?

Min Logged I/O Impact

- When a minimally logged bulk operation is committed all dirty pages in the operation must be flushed to disk before the commit can complete
 - Pages flushed from previous checkpoints excluded
 - This is dramatically different from the normal lazy write behavior
 - May cause short term I/O bottlenecks

Bulk Load Methods

- SSIS
 - SQL Server Destination
 - Fastest way to bulk load data from SSIS
 - Supports all bulk load options except Rows Per Batch
 - OLE DB Destination
 - Supports all bulk load operations
 - Must use Fast Load option
- BCP
- BULK INSERT
- INSERT – SELECT
- SELECT INTO
- OPENROWSET
- Various client driver bulk load API's

Other M.L. Operations

- The following commands are Minimally Logged under the Bulk Logged or Simple Recovery Model
 - CREATE INDEX
 - ALTER TABLE REBUILD
 - ALTER INDEX REBUILD
- ALTER INDEX REORG is fully logged

Trace Flag 610

- TF-610 was added in SQL Server 2008
- Controls Minimally Logged Loads into Indexed tables
- Prior to TF-610 many minimally logged loads were not possible

Trace Flag 610

- Not every row in a Clustered Index gets minimally logged with TF610 on
 - Non Leaf pages are always fully logged
 - Any rows added to existing pages allocated before the bulk operation are fully logged
 - Page splits are fully logged

Enabling TF610

- Can be enabled 3 ways
 - Instance Level at startup
 - Not recommended
 - Globally until next restart
 - DBCC TRACEON (610, -1)
 - Session level
 - DBCC TRACEON (610)

Minimal Logging Conditions

Table Indexes	Rows in table	Hints	Without TF 610	With TF 610	Concurrent possible
Heap	Any	TABLOCK	Minimal	Minimal	Yes
Heap	Any	None	Full	Full	Yes
Heap + Index	Any	TABLOCK	Full	Depends (3)	No
Cluster	Empty	TABLOCK, ORDER (1)	Minimal	Minimal	No
Cluster	Empty	None	Full	Minimal	Yes (2)
Cluster	Any	None	Full	Minimal	Yes (2)
Cluster	Any	TABLOCK	Full	Minimal	No
Cluster + Index	Any	None	Full	Depends (3)	Yes (2)
Cluster + Index	Any	TABLOCK	Full	Depends (3)	No

(1) If you are using the INSERT ... SELECT method, the ORDER hint does not have to be specified, but the rows must be in the same order as the clustered index. If using BULK INSERT the order hint must be used.

(2) Concurrent loads only possible under certain conditions. See "Bulk Loading with the Indexes in Place". Also, only rows written to newly allocated pages are minimally logged.

(3) Depending on the plan chosen by the optimizer, the nonclustered index on the table may either be fully- or minimally logged.

Data Compression

- Bulk Loaded data can honor both Row & Page compression
- Exception:
 - Bulk Load into a Page compressed HEAP without specifying TABLOCK hint will only do Row compression
- Obvious Question: Will this slow down the load?
 - Obvious Answer: Yes

Backup Impact

- Simple Recovery Mode
 - No impact since Tran Log backups are not taken
- Bulk Logged recovery Mode
 - Log backups will be larger than the entries in the log file
 - Can be MUCH larger
- Works similar to Differential backups

References

- Data Loading Performance Guide
 - [https://technet.microsoft.com/en-us/library/dd425070\(v=sql.100\).aspx](https://technet.microsoft.com/en-us/library/dd425070(v=sql.100).aspx)
- <http://blogs.msdn.com/b/sqlserverstorageengine/archive/2008/10/24/new-update-on-minimal-logging-for-sql-server-2008.aspx>
- <http://blogs.msdn.com/b/sqlserverstorageengine/archive/2008/03/23/minimal-logging-changes-in-sql-server-2008-part-2.aspx>
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Demo

Minimally Logged Loads

