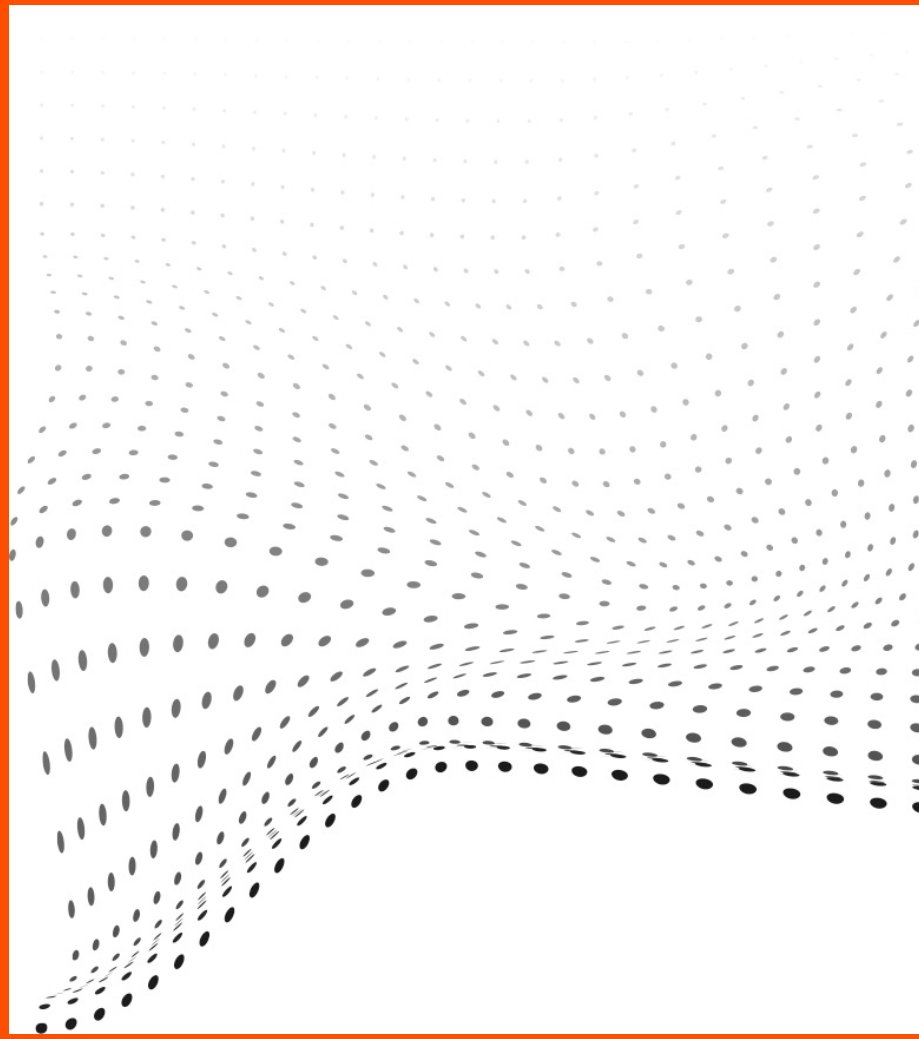
DB BITS

SOLUÇÕES
EM GERÊN
DE DADOS

Zero to Hero in 16 Hours: HADR on SQL Server

Module 2: Recoverability

Backing up and Restoring



Goals

- Recovery Models
- Backup recap
- Log internals
- Restore, Recovery and salvaging a database

Topics

Introduction

- Recovery Models
- Backup recap
- Log internals
- Restore, Recovery and salvaging a database

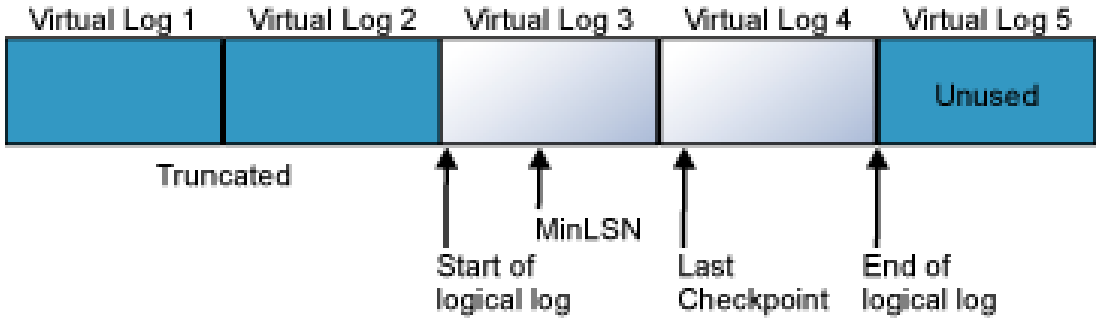
Recovery models

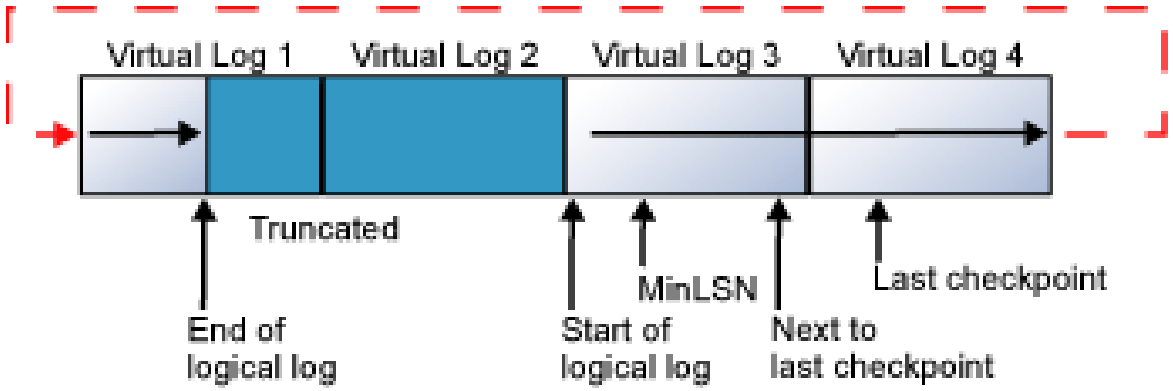
- Control transaction Log maintenance
- How transactions are logged
- Simple
- Full
- Bulk-Logged
- Changed at the Database level

The LOG file

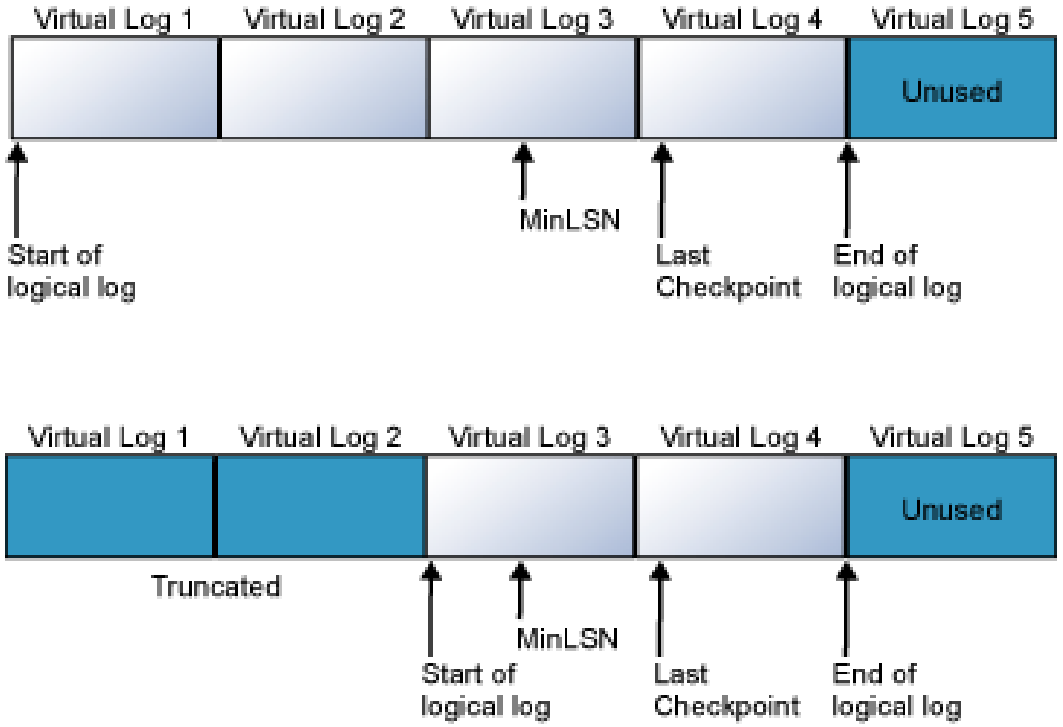
- “Keep it as your life depends on it!”
- Transaction recovery
- Redo/Undo operation in Recovery
- Bringing the db to a point before the failure
- Transactional replication
- HADR features
- Checkpoint operation

The LOG file


Virtual Log 1
Virtual Log 2
Virtual Log 3
Virtual Log 4
Virtual Log 5
Unused
Truncated
MinLSN
Start of logical log
Last Checkpoint
End of logical log


Virtual Log 1
Virtual Log 2
Virtual Log 3
Virtual Log 4
Truncated
MinLSN
Last checkpoint
End of logical log
Start of logical log
Next to last checkpoint

The LOG file - truncation



VLF Fragmentation

- Be careful if you see more than 1000
- To fix it you'll need to shrink the LOG and reallocate it

Until SQL 2014:

- chunks less than 64MB and up to 64MB = 4 VLFs
- chunks larger than 64MB and up to 1GB = 8 VLFs
- chunks larger than 1GB = 16 VLFs

SQL 2014+:

- Is the growth size less than 1/8 the size of the current log size?
- Yes: create 1 new VLF equal to the growth size
- No: use the formula above

Why isn’t the LOG truncating?

- **log_reuse_wait_desc** on sys.databases;

Log file – how to check for extra information

- DBCC loginfo
- DBCC sqlperf(logspace)
- Fn_dblog()

Recovery models (recap)

- Control transaction Log maintenance
- How are transactions logged
- Simple
- Full
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- Changed at the Database level

Recovery models, backups and else

Recovery model	Notes	Point in time restore?
Simple	Can’t take LOG Backups, data is lost up until the latest available backup.	No
Full	Must take LOG Backups, data is not lost if you have the LOG file unharmed.	Yes
Bulk Logged	Must take LOG Backups, data is not lost if you have the LOG file unharmed, but you need to redo the BULK Logged operations.	Partially

Recovery models, backups and else

- But I can easily switch between Recovery models, right?

Backup

- Making a copy of the data and the active portion of the Log

Backup

- FULL
- Differential
- Log
- File
- Filegroup

Throttling the Backup (and Restore)

- Maxtransfersize (4194304) ~ 4MB
- Buffercount (an int number)
- Blocksize (65536) ~ 64 KB
- Enable Compression

http://henkvandervalk.com/how-to-increase-sql-database-full-backup-speed-using-compression-and-solid-state-disks

Restore operation

- Data recovery from FULL/DIFF Backups
- Point-in-time restore
- File restore (EE only)
- Page restore (EE only)

- Can you correlate those with Recovery models?

The Restore operation

To perform a database restore, the Database Engine executes three steps:

- Creates the database and transaction log files if they do not already exist.
- Copies all the data, log, and index pages from the backup media of a database to the database files.
- Applies the transaction log (aka Recovery)

https://docs.microsoft.com/en-us/sql/relational-databases/backup-restore/restore-and-recovery-overview-sql-server?view=sql-server-ver15

After the restore…Recovery (reading the LOG)

Based on the last checkpoint:

1. Analysis phase: Dirty Page Table and Active Transaction Table
2. Redo phase
3. Undo phase

Recovering a System Database

Master:

- Restore the master on a different Instance
- Remember the –m (minimal configuration instance)
- In SQLCMD: `Restore database master from disk='path' with replace;`

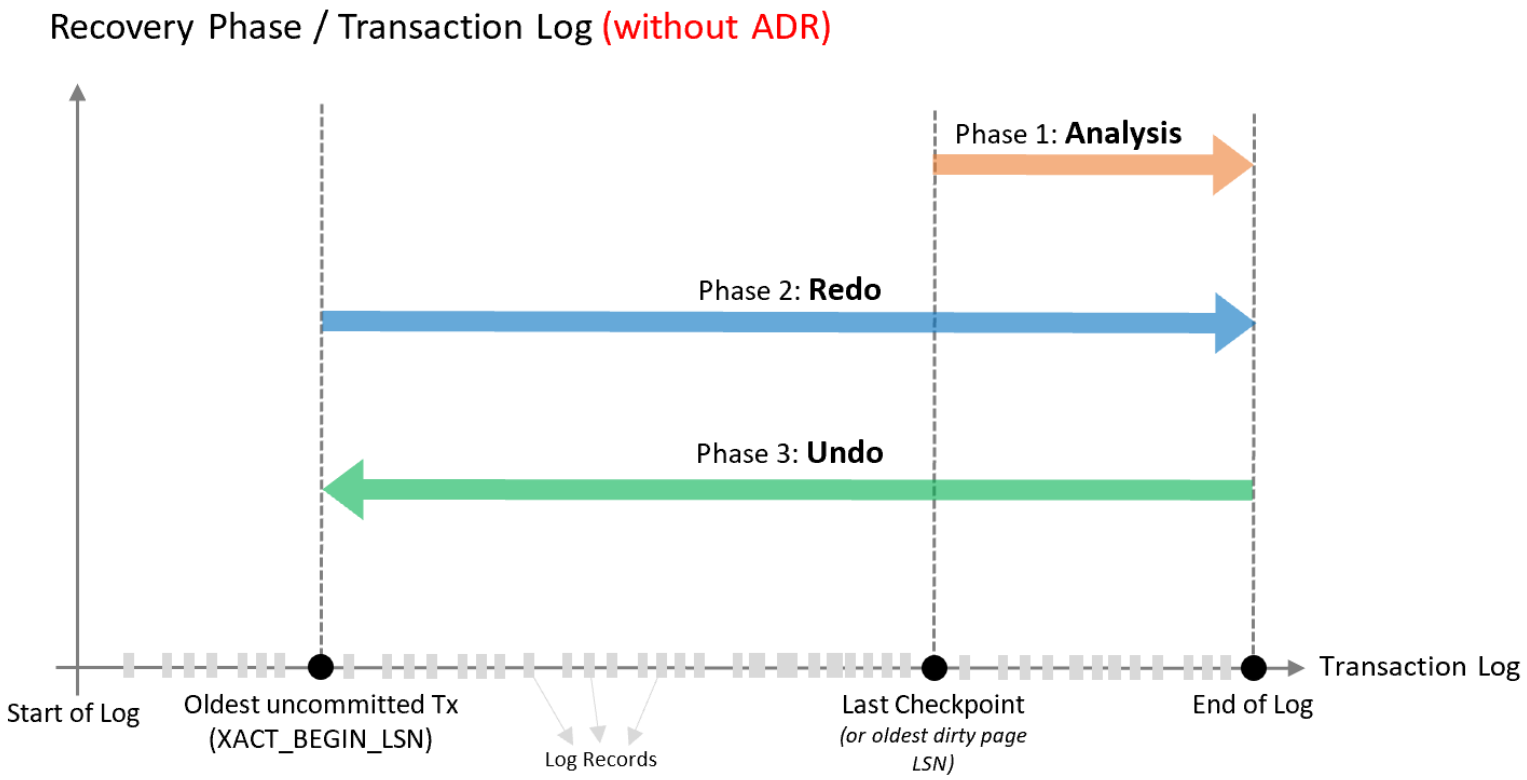
Tempdb:

- Start in –f mode, set the proper place for TEMPDB

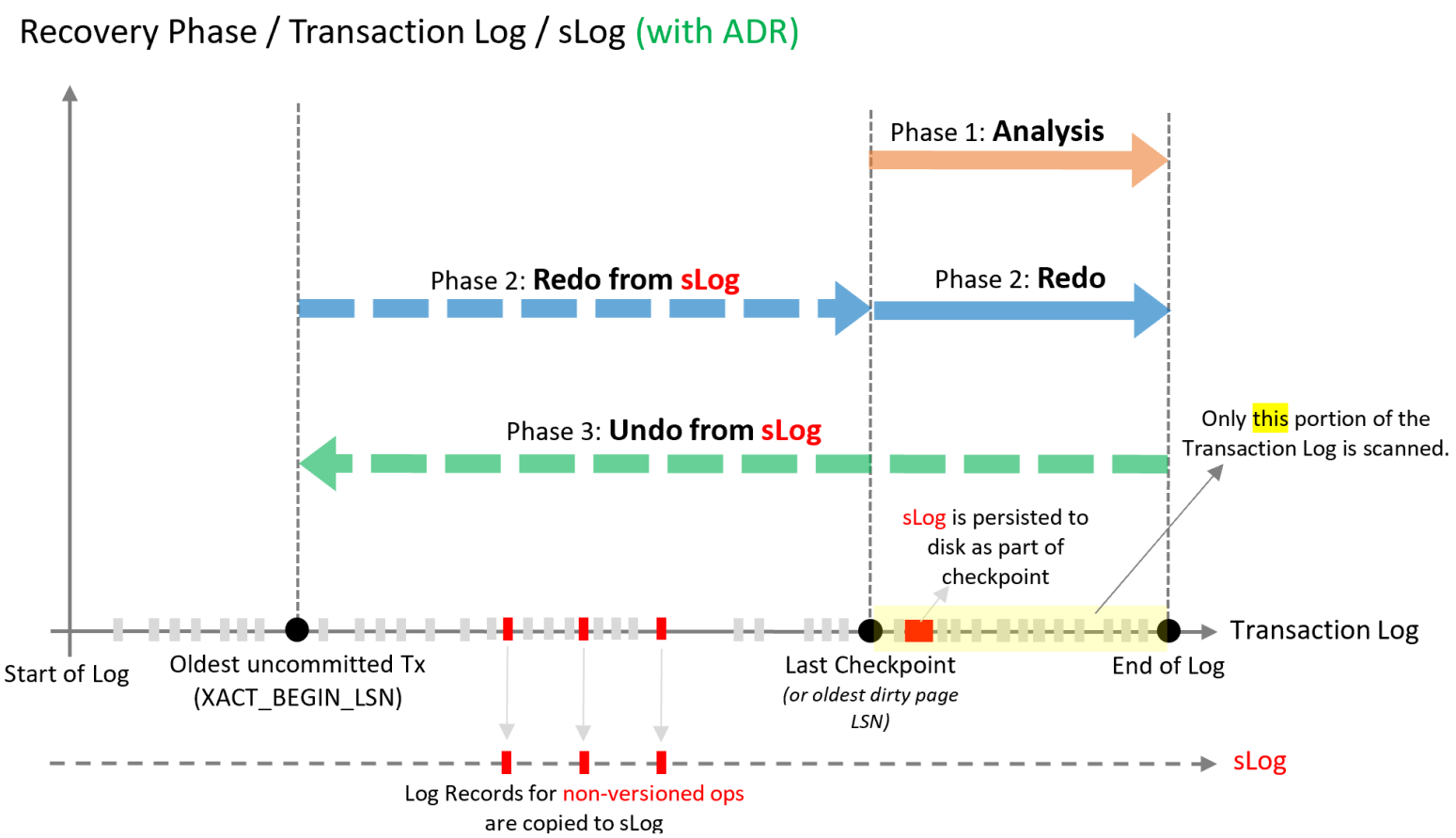
Model:

- Start in –f mode,

Quicker Recovery with Accelerated Database Recovery



Quicker Recovery with Accelerated Database Recovery



Quicker Recovery with Accelerated Database Recovery

- ALTER DATABASE <db_name> SET ACCELERATED_DATABASE_RECOVERY = ON;

Fim do módulo