Accelerated Database Recovery – A Deep Dive Behind the Magic

SQL Saturday Atlanta 2024

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My Slides & Demos

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Procure SQL
DATA ARCHITECTURE AS A SERVICE

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Objectives

What is it & why do we care

Components

Rollbacks/Recovery

Demo

Q&A

What is it?

"Accelerated database recovery (ADR) improves database availability, especially in the presence of long running transactions, by redesigning the SQL database engine recovery process."

STILL WAITING FOR ROLLBACK TO FINISH

Accelerated Database Recovery

Faster and consistent database recovery

Almost instantaneous transaction rollback

Aggressive log truncation

Available in Standard Edition

Default in Azure SQL Database/Managed Instance

Azure SQL DB

```
1
2  DECLARE @version NVARCHAR(124)
3  SELECT @version = @@VERSION
4  PRINT @version;
5  go
6  ALTER DATABASE Demo1 SET ACCELERATED_DATABASE_RECOVERY = OFF;
```

70 %

Messages

```
Microsoft SQL Azure (RTM) - 12.0.2000.8
    Sep 18 2021 19:01:34
    Copyright (C) 2019 Microsoft Corporation

Msg 40517, Level 16, State 1, Line 6
Keyword or statement option 'accelerated_database_recovery' is not supported in this version of SQL Server.

Completion time: 2021-12-10T21:43:18.4331296-05:00
```

New Components

ADR New Components

sLog

Persisted Version Store

Logical Revert

Aborted Transaction Map

Cleaner

YAY FOR ADR!!!

sLog

In-memory object

Contained non-versioned operations

Checkpoints persist contents to disk

Provides aggressive log truncation

FN_DBSLOG(null,null)

Persisted Version Store

Same version store when using RCSI

Retains off-row versions

Availability Group aware

Logical Revert

Facilitates the "undo" at the row-level

Asynchronous in nature

Keeps track of all aborted transactions

Releases all locks immediately after abort

Aborted Transaction Map

Not that ATM →

Tracks all aborted transactions

Implemented as a hash table

Rows are linked to PVS

DMV: Sys.dm_tran_aborted_transactions

I WANT MY TRANSACTIONS!!

Cleaner

Removes versions that are not needed

Asynchronous process

Thread architecture

Cannot disable

Force clean up via sp_persistent_version_cleanup (synchronous)

ADR Configurations

Select * from sys.configurations where name like 'ADR%';

ADR cleaner retry timeout

ADR Preallocation Factor*

How to Enable ADR

Requires exclusive access to the database

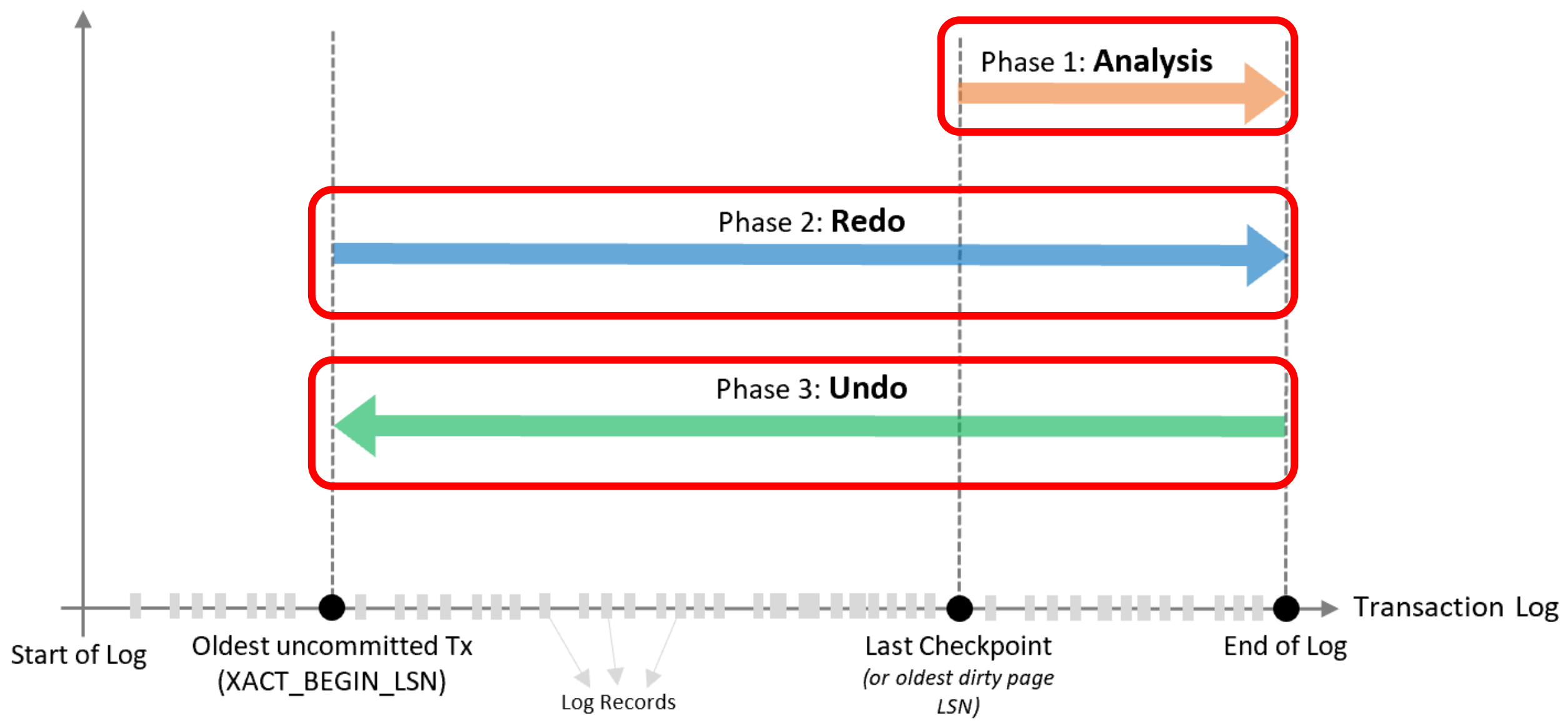Can specify specific/different filegroup

ALTER DATABASE [db_name]

SET ACCELERATED_DATABASE_RECOVERY = ON

(PERSISTENT_VERSION_STORE_FILEGROUP =
[SomeOtherFG])

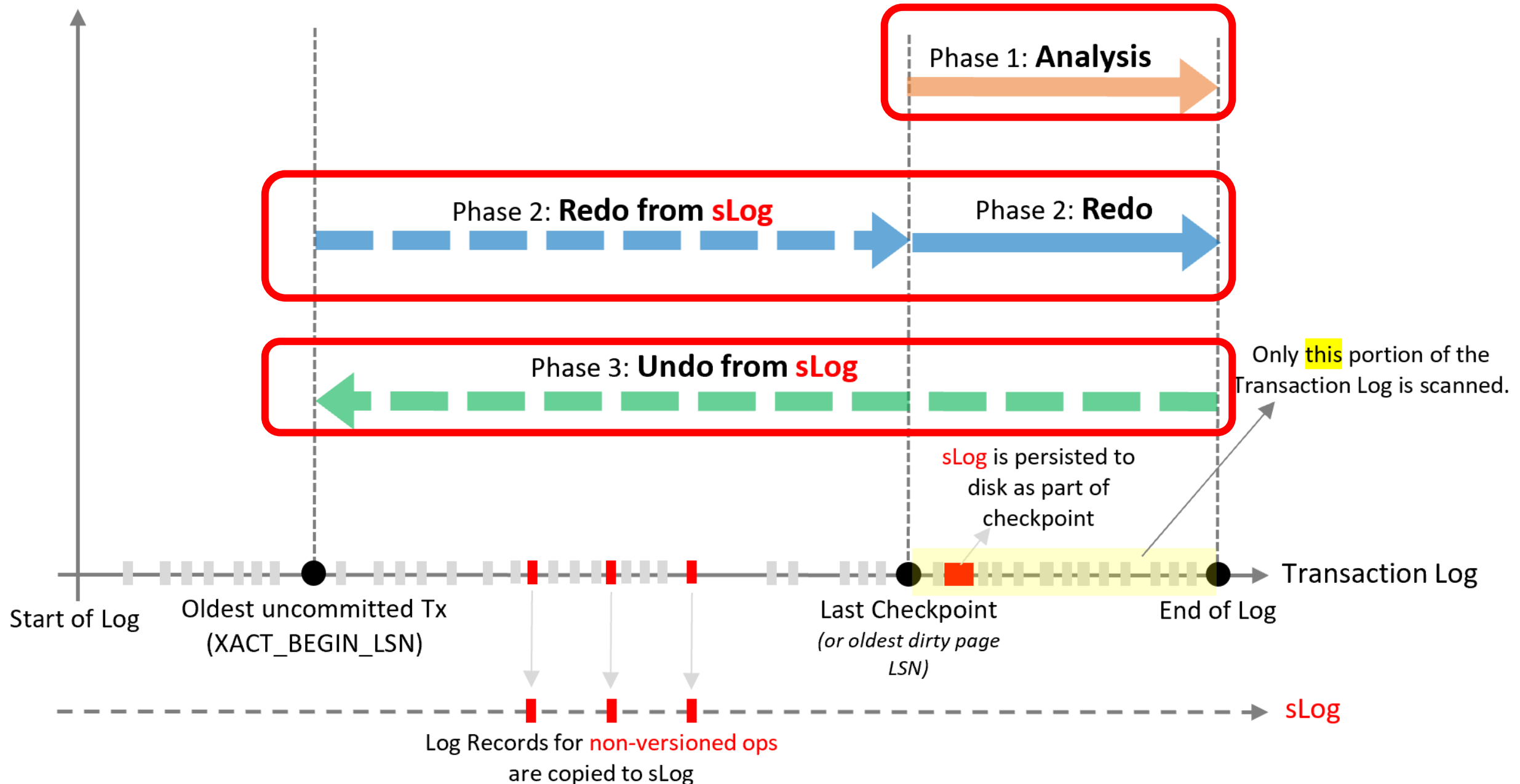# Rollback

Recovery Phase / Transaction Log (without ADR)

Rollback is proportional to longest running transaction

Rollin', rollin', rollin'

Rawhide!

sqlbits
2024

Recovery Phase / Transaction Log / sLog (with ADR)

Phase 1: **Analysis**

Phase 2: **Redo from sLog**

Phase 2: **Redo**

Phase 3: **Undo from sLog**

Only this portion of the Transaction Log is scanned.

sLog is persisted to disk as part of checkpoint

Transaction Log

Start of Log

Oldest uncommitted Tx
(XACT_BEGIN_LSN)

Last Checkpoint
(or oldest dirty page LSN)

End of Log

Log Records for non-versioned ops are copied to sLog

sLog

DEMO

When Not to Deploy ADR

Extremely highly transactional

High volume of data modifications

Most likely edge case

Monitor PVS Store for issues

Summary

Faster rollbacks

Faster crash recovery upon startup/failover

Aggressive log truncation

Enable for majority of use cases

Simple to enable

Resources

SQLCallStackResolver – http://aka.ms/sqlstack

Article - https://www.red-gate.com/simple-talk/databases/sql-server/database-administration-sql-server/how-does-accelerated-database-recovery-work/

Whitepaper - http://bit.ly/SQLADRExplained

Questions?
Answers!

Got Questions?

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