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Ch-ch-ch-changes! How to Keep Track of What's Happening to Your Data

About Me

The Scope of This Talk

- This covers traditional SQL Server only, not Azure SQL Database
  - Everything except CDC should work in Azure
- This is a survey, not a deep dive! You can spend days exploring any of these methods.

Why Track Changes?

- Auditing and forensics
- Decision support
- Calculating trends
- Historical research
- Recovery purposes
- Feeding applications
- And many more…

Which method should I choose?

- “It depends!”
- Later versions have more options
  - CDC was Enterprise-only until 2016 SP1
  - Temporal tables became available in 2016

~~Three~~ Four Flavo(u)rs ~~Cornetto~~ of Change Tracking

Change Data Capture

- Enterprise-only until 2016 SP1, then Standard and up
- Uses a Log Reader Agent to scan the Transaction Log for changes
- Full change history

Change Tracking

- Available in all editions
- Uses the internal versioning mechanism to track changes
- Only that a change happened, no historical data

Temporal Tables

- New in SQL Server 2016
- Available in all editions
- Uses period columns in the source table to feed historical table
- Full change history
- Plays nice with in-memory tables too

Triggers

- The most DIY option
- Available in all editions
- A lot of control over what you capture depending on how you set up the triggers – as much or as little history as you want (within limits)

Setting Them Up

Change Data Capture

- Straightforward to set up
- Uses stored procedures to enable
- Easy to add to an existing table

Temporal Tables

- Requires a PK on the source table
- Can be straightforward or more involved, depending on how you define your history table
- Adding to an existing table requires schema changes

Change Tracking

- Straightforward to set up
- SNAPSHOT isolation recommended
- Uses ALTER DATABASE and ALTER TABLE statements
- Easy to add to an existing table
- Requires a PK

Triggers

- More or less straightforward to set up and easy to add, depending on how involved you get with your triggers
- You will need to create tables to store the history manually

Managing and Modifying

Change Data Capture

- Stored procedures to view and change configuration
- Special DMV to see what's going on
- Has its own separate error DMV

Temporal Tables

- Very little to manage or modify
- History table management is your responsibility prior to 2017
- Retention policy was introduced in SQL Server 2017 during the CTP phase

Change Tracking

- You can change the retention and auto-cleanup settings. That's it.
- A new proc was added in 2014 SP2 to manually flush the internal change table

Triggers

- You have to change the triggers
- History table management is your responsibility here too

Living With

Change Data Capture

- Robust but fragile!
- Agents and jobs to keep an eye on
- CDC and replication coexist uneasily
- Schema changes to the source table aren’t handled well at all

Temporal Tables

- INSERTs can be fun depending on how your period columns are handled
- Blob types such as varchar(max) are permitted, but you’re going to have a bad time

Change Tracking

- SNAPSHOT isolation can cause some additional load on TempDB
- Just kinda keeps on truckin’

Triggers

- It’s as hard as you make it
- Potential for…

Querying

Change Data Capture

- There are functions to facilitate querying CDC tables
- You CAN query the CDC tables directly, but you shouldn’t

Change Tracking

- You must use the built-in functions to query change tables
- There is no way to directly query them*!

Temporal Tables

- Query as you would any other table
- Use the FOR SYSTEM TIME clause with temporal-specific sub-clauses for time-based analysis

Triggers

- Query your destination tables as you would any other table

Removing

Change Data Capture

- Stored procedures to remove at the table and database levels
- Cleans up all objects automatically

Temporal Tables

- ALTER TABLE statements to turn off versioning and/or revert the table to a non-temporal table
- History table will remain

Change Tracking

- ALTER TABLE and ALTER DATABASE statements to disable it at the table and DB level
- Cleans up all objects automatically

Triggers

- Disable or drop the triggers. That's all.
- History table will remain unless you drop it manually

My Rankings

- Temporal Tables
- CDC
- Change Tracking
- Triggers

Questions?

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