



TIME TRAVELLING DATA: SQL SERVER TEMPORAL TABLES

THANKS TO ALL OUR SPONSORS!



THE C2 GROUP



WEST MICHIGAN
TECH TALENT

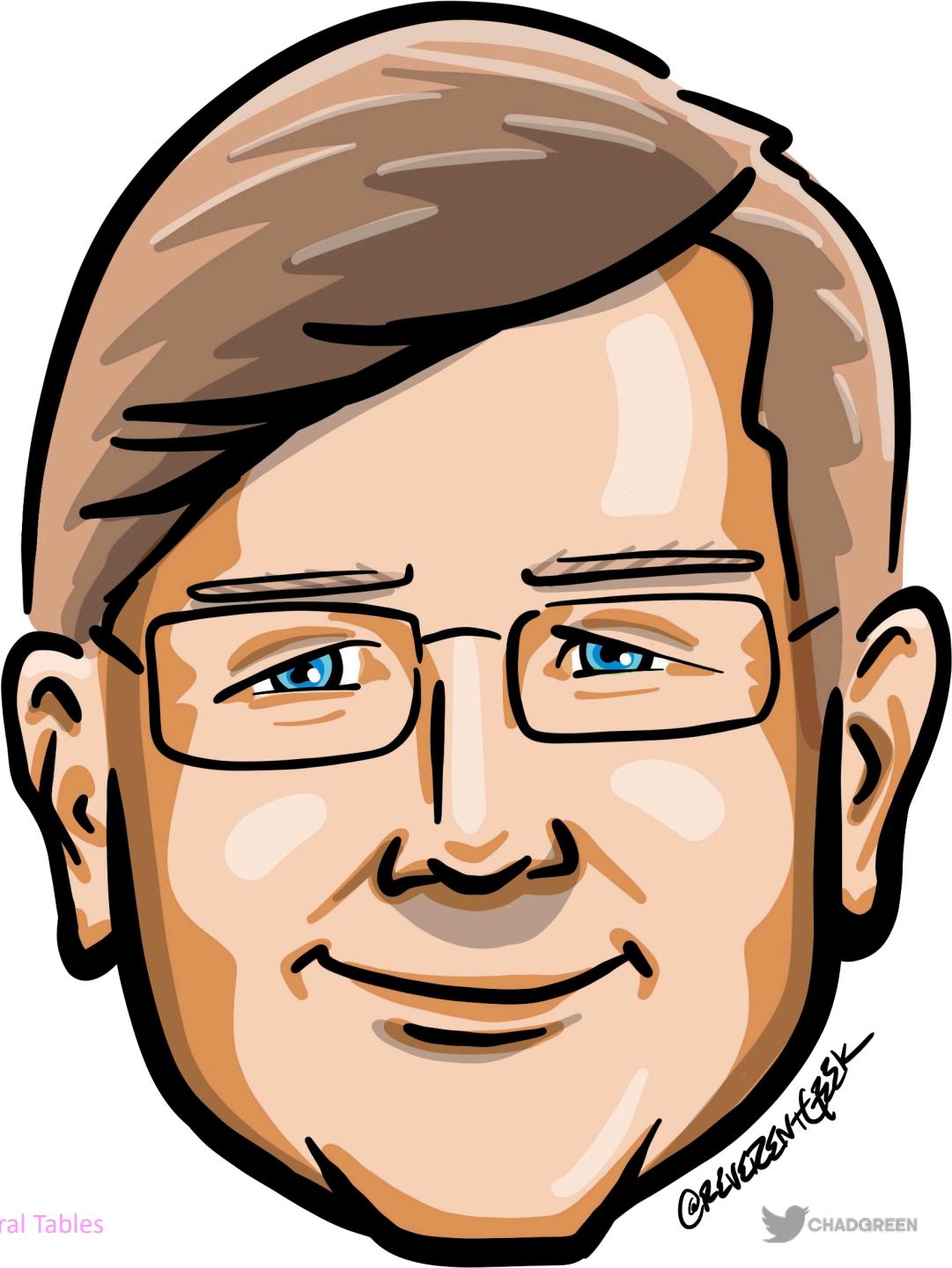


Mutually human



Who is Chad Green

- ✉ chadgreen@chadgreen.com
- ✳ TaleLearnCode
- 🌐 ChadGreen.com
- 🐦 ChadGreen & TaleLearnCode
- linkedin ChadwickEGreen





{Code PaLOUsa}

IT'S SOFTWARE DEVELOPMENT MADNESS

August 17 – 19, 2022



Keynote – Christina Aldan



.NET Rocks! 20th Anniversary Party



A Toast to Women in Technology

Time Travelling Data: SQL Server Temporal Tables

What are system- versioned temporal tables?

Time Travelling Data: SQL Server Temporal Tables

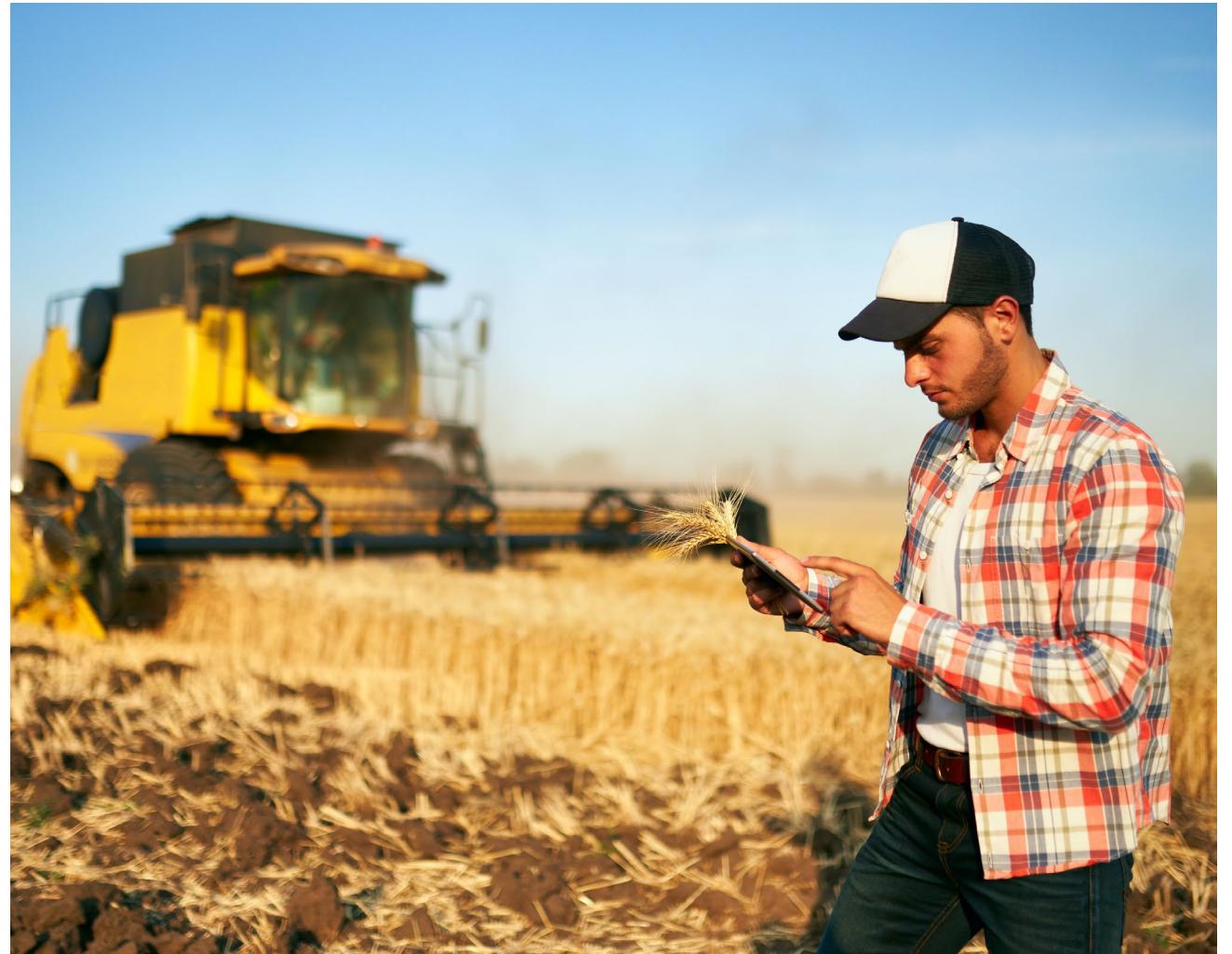
Track Changes

What are system-versioned temporal tables?



System-Versioned

What are system-versioned temporal tables?



Rule of Two

What are system-versioned temporal tables?



Availability

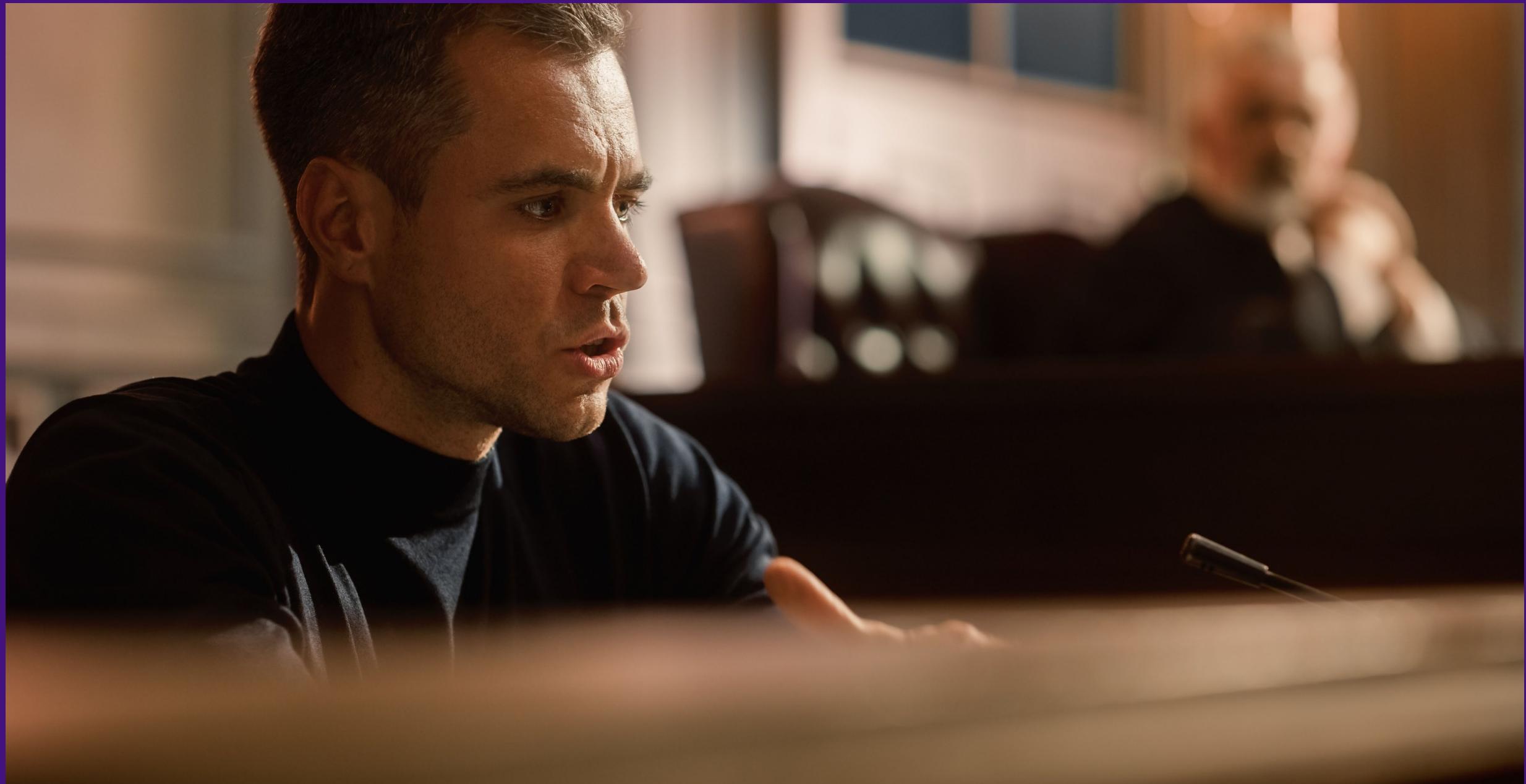
What are system-versioned temporal tables?



Why use temporal tables?

Time Travelling Data: SQL Server Temporal Tables









Why use temporal tables?

Immutable History

Built-In Time-Travelling
Query Support

Better DML
Performance

Minimal Maintenance
Costs

How do temporal tables work?

Time Travelling Data: SQL Server Temporal Tables

How do temporal tables work?

| Database Table |
|--|
| PrimaryKeyId  |
| Name |
| ForeignKeyId  |

How do temporal tables work?

| Temporal Table (Current) | |
|--------------------------|---|
| PrimaryKeyId | 🔑 |
| Name | |
| ForeignKeyId | 🔑 |
| ValidFrom | |
| ValidTo | |



| History Table | |
|---------------|--|
| PrimaryKeyId | |
| Name | |
| ForeignKeyId | |
| ValidFrom | |
| ValidTo | |

How do temporal tables work?

| Temporal Table (Current) | |
|--|---------------------|
| PrimaryKeyId  | 123 |
| Name | TaleLearnCode |
| ForeignKeyId  | 456 |
| ValidFrom | 2022-08-06 18:00:00 |
| ValidTo | 9999-12-31 23:59:59 |

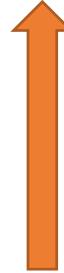
| History Table | |
|---------------|--|
| PrimaryKeyId | |
| Name | |
| ForeignKeyId | |
| ValidFrom | |
| ValidTo | |



Insert

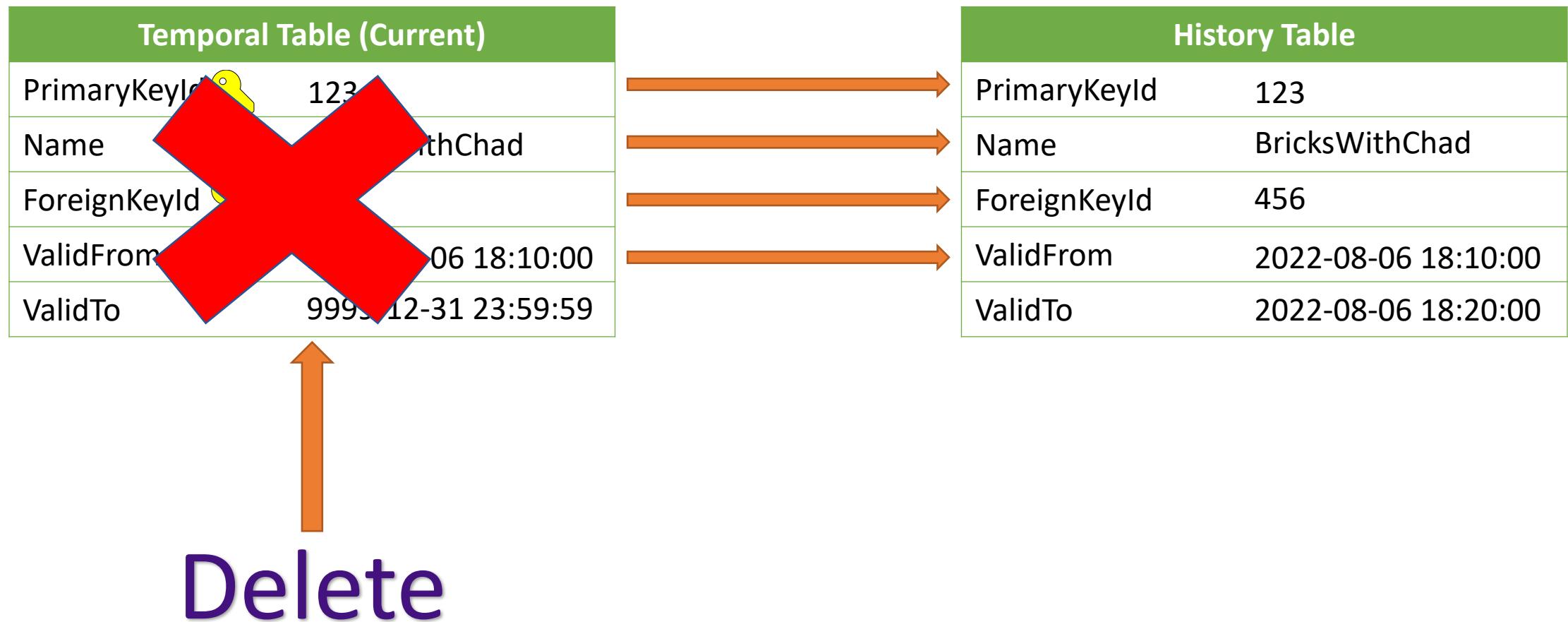
How do temporal tables work?

| Temporal Table (Current) | | History Table | |
|--------------------------|---------------------|---------------|---------------------|
| PrimaryKeyId | 123 | PrimaryKeyId | 123 |
| Name | TaleLearnCode | Name | TaleLearnCode |
| ForeignKeyId | 456 | ForeignKeyId | 456 |
| ValidFrom | 2022-08-06 18:00:00 | ValidFrom | 2022-08-06 18:00:00 |
| ValidTo | 9999-12-31 23:59:59 | ValidTo | 2022-08-06 18:10:00 |



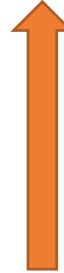
Update

How do temporal tables work?



How do temporal tables work?

| Temporal Table (Current) | | History Table | |
|--------------------------|---------------------|---------------|---------------------|
| PrimaryKeyId | 123 | PrimaryKeyId | 123 |
| Name | BricksWithChad | Name | BricksWithChad |
| ForeignKeyId | 456 | ForeignKeyId | 456 |
| ValidFrom | 2022-08-06 18:10:00 | ValidFrom | 2022-08-06 18:10:00 |
| ValidTo | 9999-12-31 23:59:59 | ValidTo | 2022-08-06 18:20:00 |



Merge

How do temporal tables work?

| Temporal Table (Current) | |
|--|---------------------|
| PrimaryKeyId  | 123 |
| Name | BricksWithChad |
| ForeignKeyId  | 456 |
| ValidFrom | 2022-08-06 18:10:00 |
| ValidTo | 9999-12-31 23:59:59 |

| History Table | |
|---------------|---------------------|
| PrimaryKeyId | 123 |
| Name | TaleLearnCode |
| ForeignKeyId | 456 |
| ValidFrom | 2022-08-06 18:00:00 |
| ValidTo | 2022-08-06 18:10:00 |

Regular queries
(current data)



Query

FOR SYSTEM_TIME
ALL, AS OF, BETWEEN..AND, FROM..TO, CONTAINED IN

How do temporal tables work?

```
SELECT * FROM DemoTable  
FOR SYSTEM_TIME  
BETWEEN '2022-08-05 00:00:00' AND '2022-08-06 23:59:59'  
WHERE Id = 123  
ORDER BY ValidFrom
```

| PrimaryKeyId | Name | ForiegnKeyId | ValidFrom | ValidTo |
|--------------|----------------|--------------|---------------------|---------------------|
| 123 | BricskWithChad | 456 | 2022-08-06 18:10:00 | 9999-12-31 23:59:59 |
| 123 | TaleLearnCode | 456 | 2022-08-06 18:00:00 | 2022-08-06 18:10:00 |

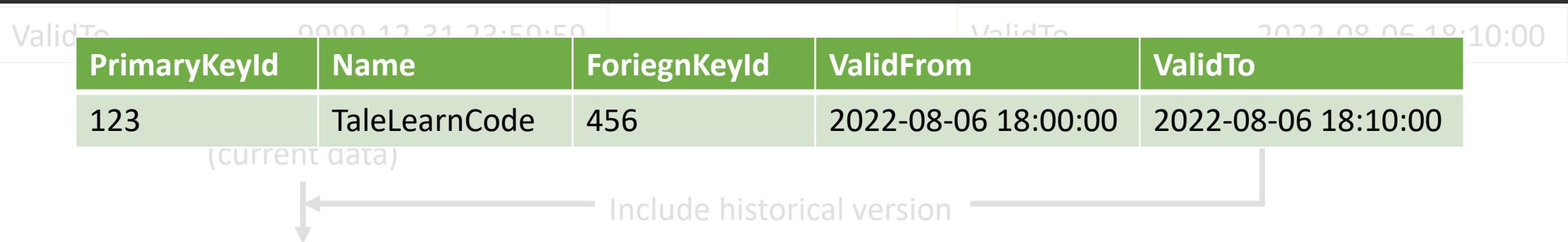


Query

FOR SYSTEM_TIME
ALL, AS OF, BETWEEN..ADN, FROM..TO, CONTAINED IN

How do temporal tables work?

```
SELECT * FROM DemoTable  
FOR SYSTEM_TIME  
AS OF '2022-08-06 18:05:00'  
WHERE Id = 123
```



Query

```
FOR SYSTEM_TIME  
ALL, AS OF, BETWEEN..ADN, FROM..TO, CONTAINED IN
```

Temporal Query Expressions

AS OF *date_time*

Temporal Query Expressions

AS OF *date_time*

FROM *start_date_time* **TO**
end_date_time

Temporal Query Expressions

AS OF *date_time*

**FROM *start_date_time* TO
*end_date_time***

**BETWEEN *start_date_time* AND
*end_date_time***

Temporal Query Expressions

AS OF *date_time*

**FROM *start_date_time* TO
*end_date_time***

**BETWEEN *start_date_time* AND
*end_date_time***

**CONTAINED IN (*start_date_time*,
end_date_time)**

Temporal Query Expressions

AS OF *date_time*

FROM *start_date_time* **TO**
end_date_time

BETWEEN *start_date_time* **AND**
end_date_time

CONTAINED IN (*start_date_time*,
end_date_time)

ALL

What are common use cases for using temporal tables?

Time Travelling Data: SQL Server Temporal Tables

Auditing

Common Uses Cases



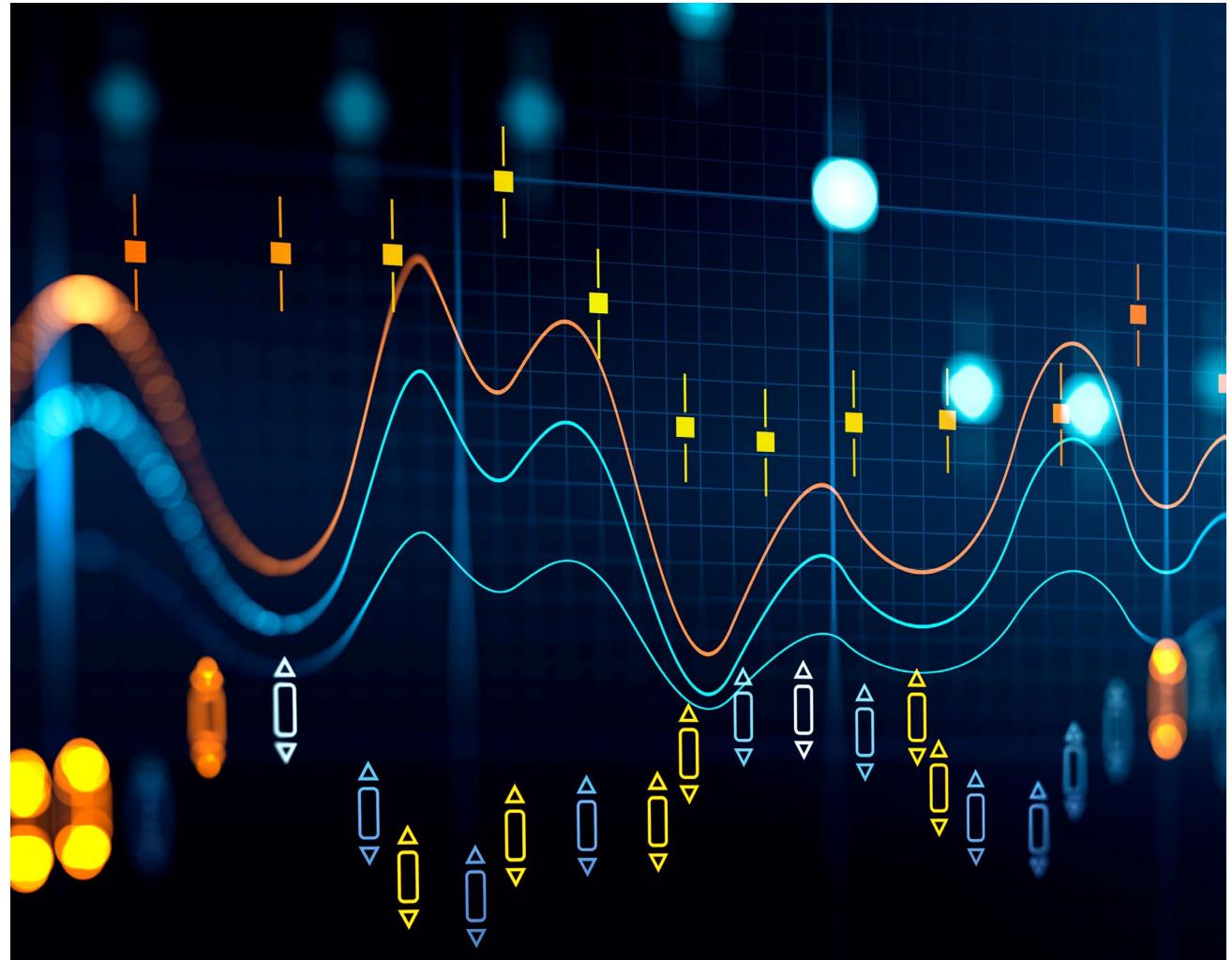
Reconstructing State

Common Uses Cases



Calculating Trends

Common Uses Cases



Slowly Changing Dimensions

Common Uses Cases



Accidental Recovery

Common Uses Cases



Time to
ENGAGE



Time to Engage

- Let's create some temporal tables
- INSERTs, UPDATEs, and DELETEs, oh my
- Roads? Where we are going we don't need roads

Temporal Tables in Entity Framework

Time Travelling Data

Temporal Tables in Entity Framework

Support added in EF Core 6.0



Temporal Tables in Entity Framework



shivajiraot commented on Mar 3, 2016 • edited by divega ▾

Does EF Core support code first approach for Temporal tables?
Looking to find a way to use Temporal tables with EF Core code first approach. Please guide me to the article if any existing already.
Thank you.

378 5 32 13 13

Temporal Tables in Entity Framework

- Creation of temporal tables using EF Core migrations
- Transformations of existing tables into temporal tables
- Querying historical data
- Restoring data from some point in the past

LINQ Extension Methods

TemporalAll

TemporalAsOf

TemporalFromTo

TemporalBetween

TemporalContainedIn

Thank You!

- ✉ chadgreen@chadgreen.com
- ✳ TaleLearnCode
- 🌐 ChadGreen.com
- 🐦 ChadGreen & TaleLearnCode
- linkedin ChadwickEGreen

