



# TIME TRAVELLING DATA: SQL SERVER TEMPORAL TABLES

## Titanium Sponsors

LaunchDarkly →



## Speaker Dinner Sponsor



## Platinum Sponsors



MuleSoft®



Red Hat



## Gold Sponsors

ORACLE Cerner



New Relic®



A Global Payments Company



Superblocks

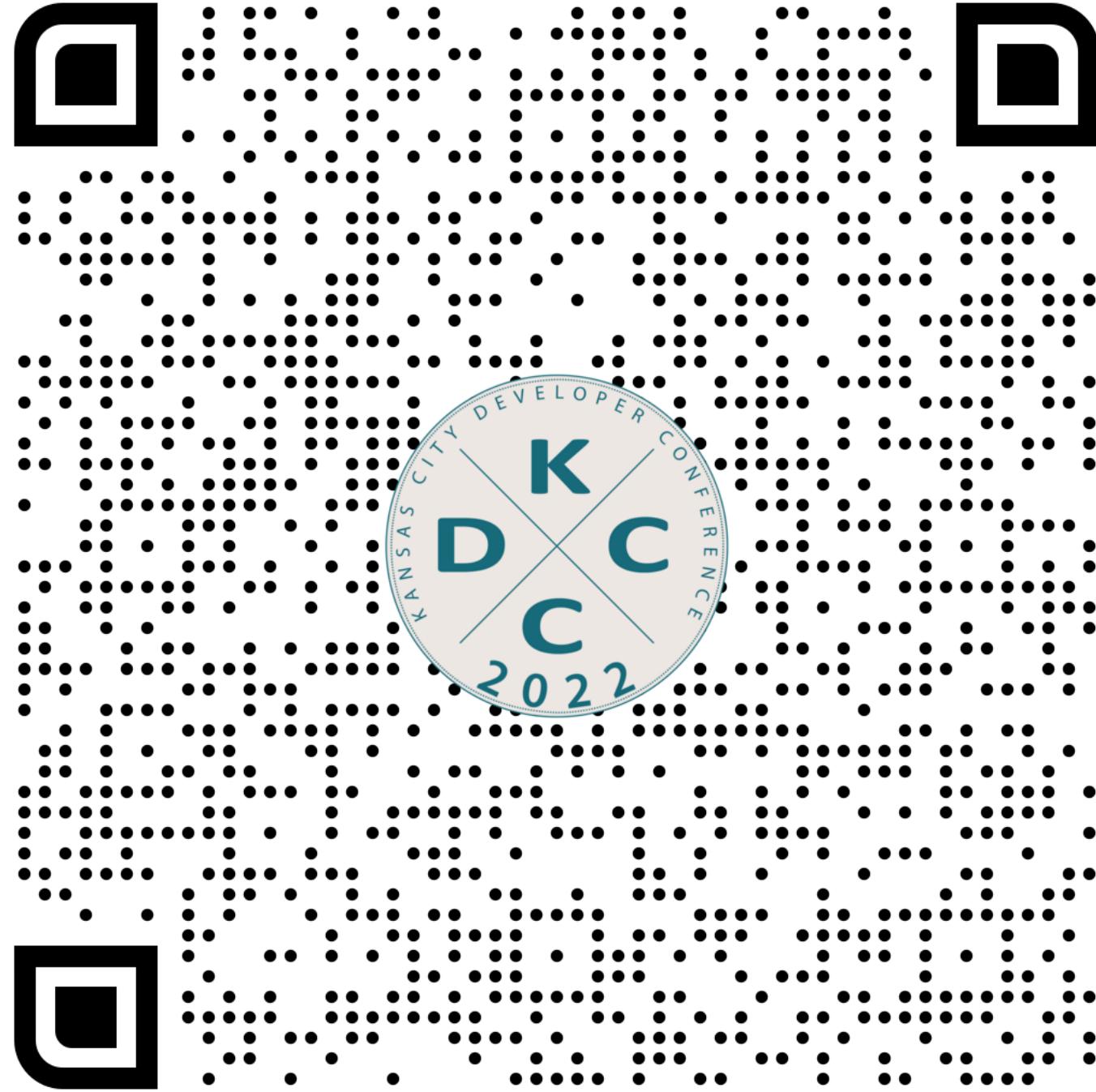


C.H. ROBINSON



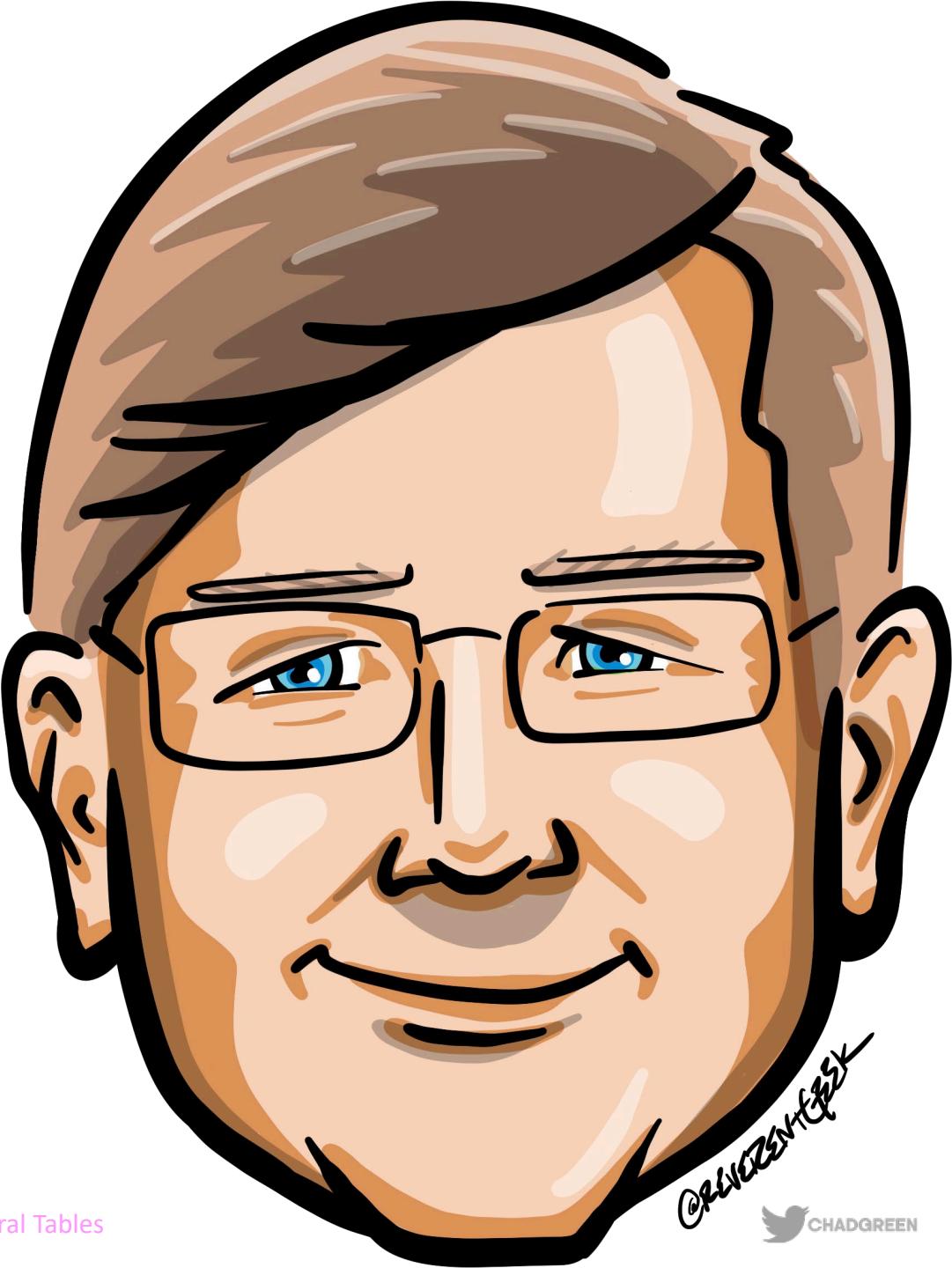
SHAMROCK™  
TRADING  
CORPORATION





# 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! 20<sup>th</sup> Anniversary Party

Time Travelling Data: SQL Server Temporal Tables



A Toast to Women in Technology

CHADGREEN









# What are system- versioned temporal tables?

Time Travelling Data: SQL Server Temporal Tables

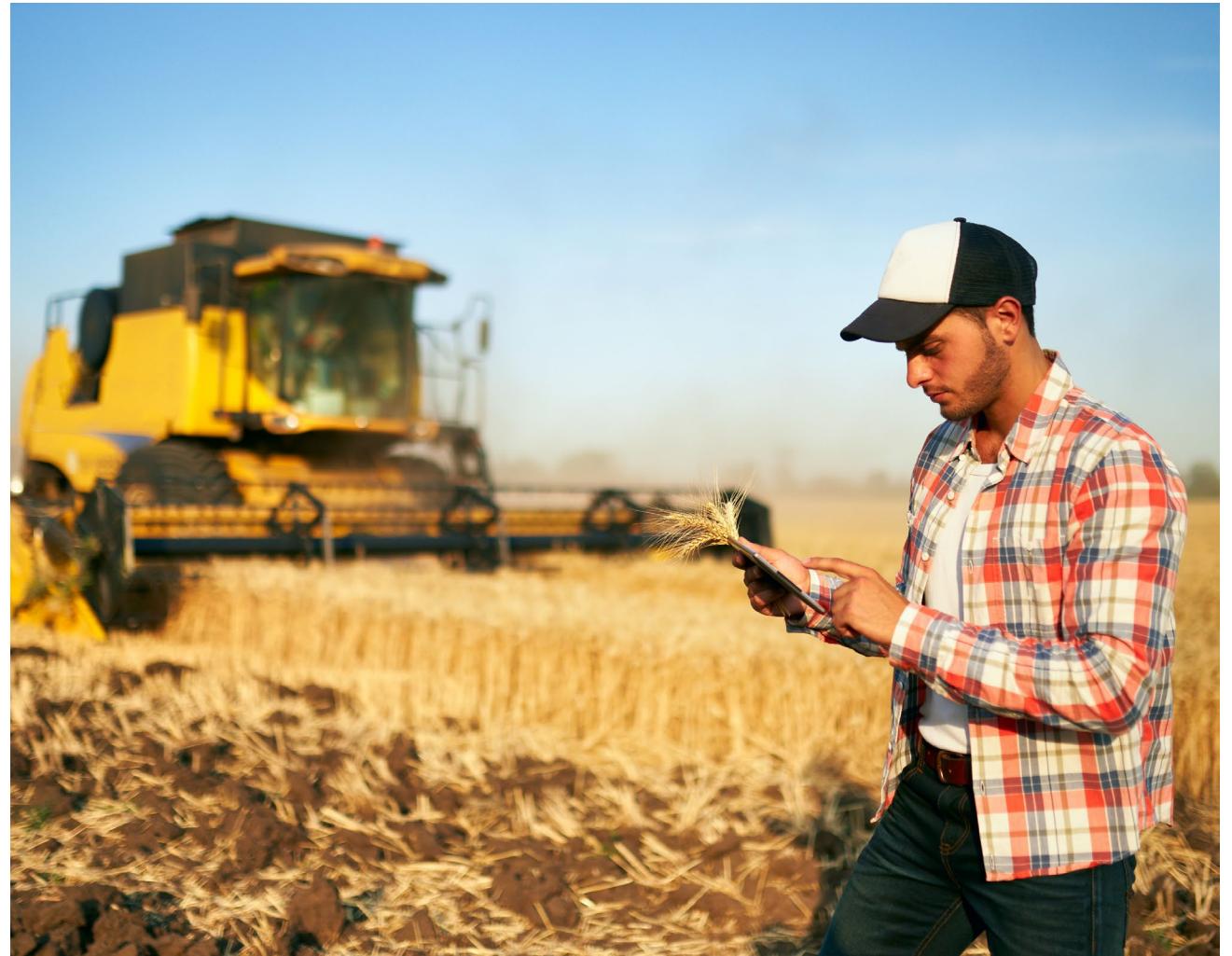
# Track Changes

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

# Auditing

Common Uses Cases



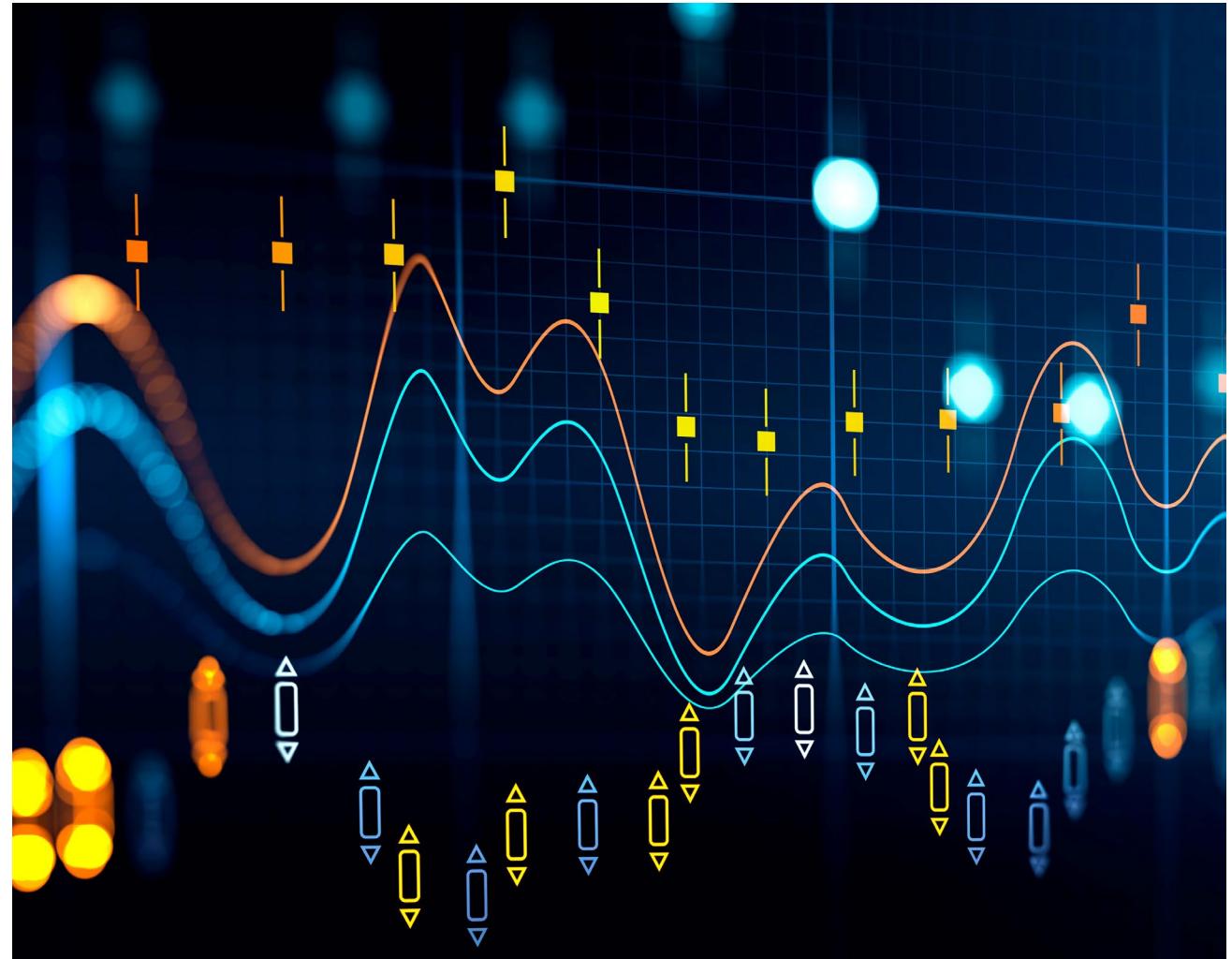
# Reconstructing State

Common Uses Cases



# Calculating Trends

Common Uses Cases



# Slowly Changing Dimensions

Common Uses Cases



# Accidental Recovery

Common Uses Cases



# 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

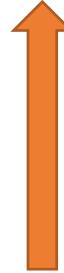
History Table	
PrimaryKeyId	
Name	
ForeignKeyId	
ValidFrom	
ValidTo	



Insert

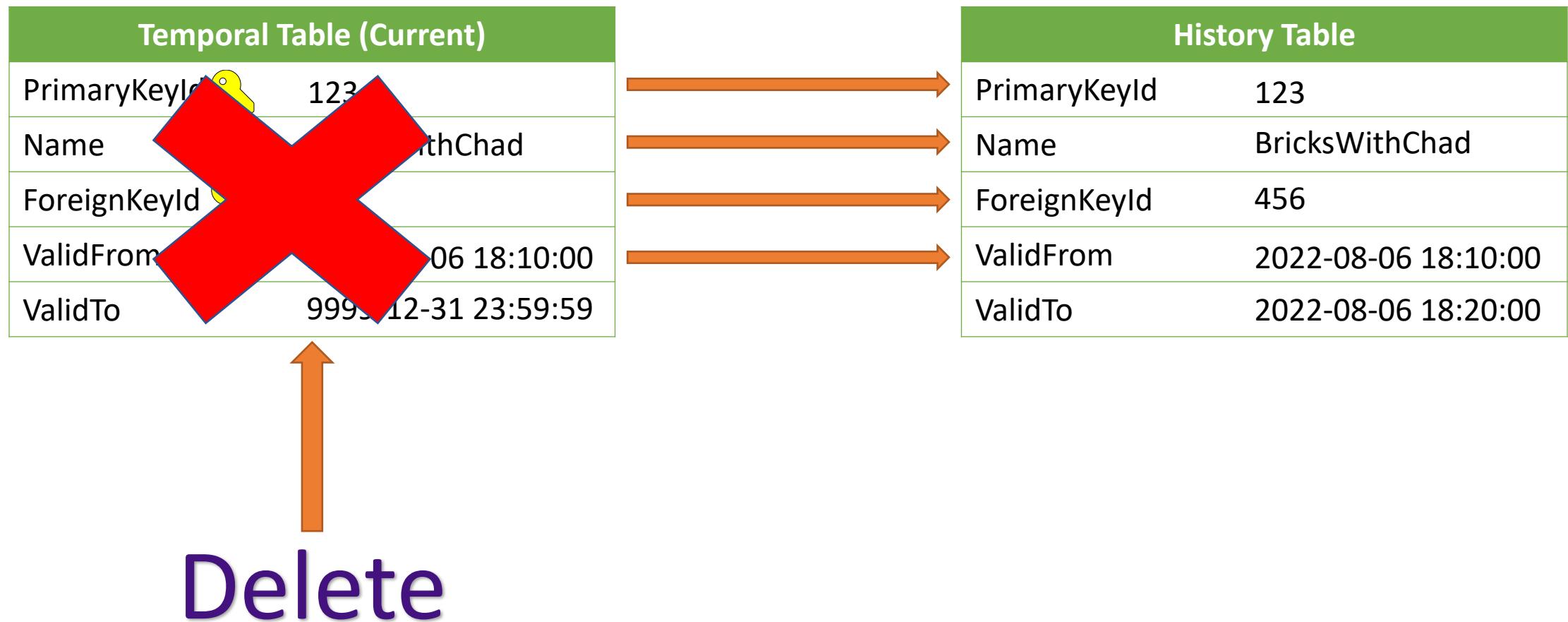
# How do temporal tables work?

Temporal Table (Current)		History Table	
PrimaryKeyId 	123	PrimaryKeyId	123
Name	<del>TaleLearnCode</del>	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



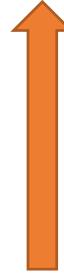
Update

# 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?

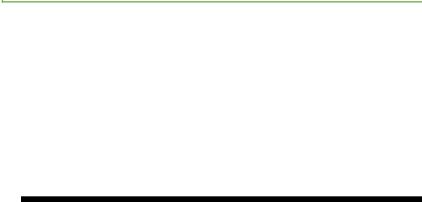
Temporal Table (Current)	
PrimaryKeyId 	123
Name	BricksWithChad
ForeignKeyId 	456
ValidFrom	2022-08-06 18:10:00
ValidTo	9999-12-31 23:59:59

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)



Include historical version



# 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

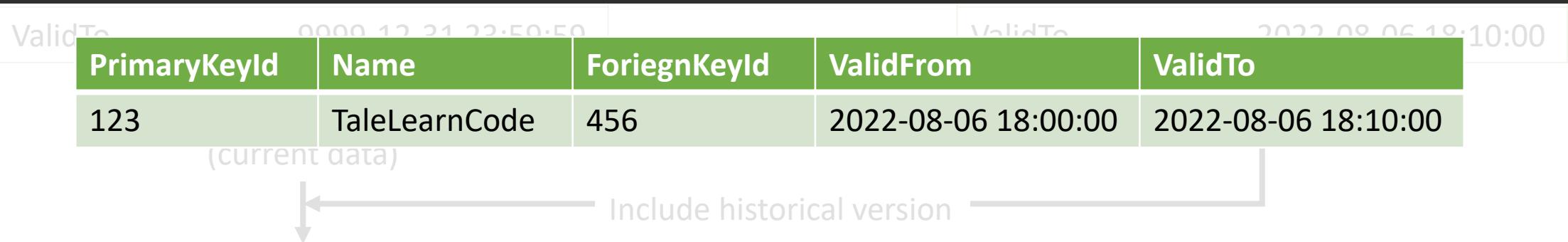


Query

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

*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

