Time Travel with SQL Server

Joel Gallagher

Joel Gallagher

- Melbourne < ~ > Málaga
- Full Stack Developer
- Data, Dev, DevOps
- Speaker & Trainer

	joel@joelgallagher.com
	@joelgall
	linkedin.com/in/joelgallagher/
	github.com/JoelGallagher/TimeTravelWithSqlServer

Temporal Tables

- Azure SQL
- SQL Server 2016 +


What are
Temporal Tables?

Temporal Tables

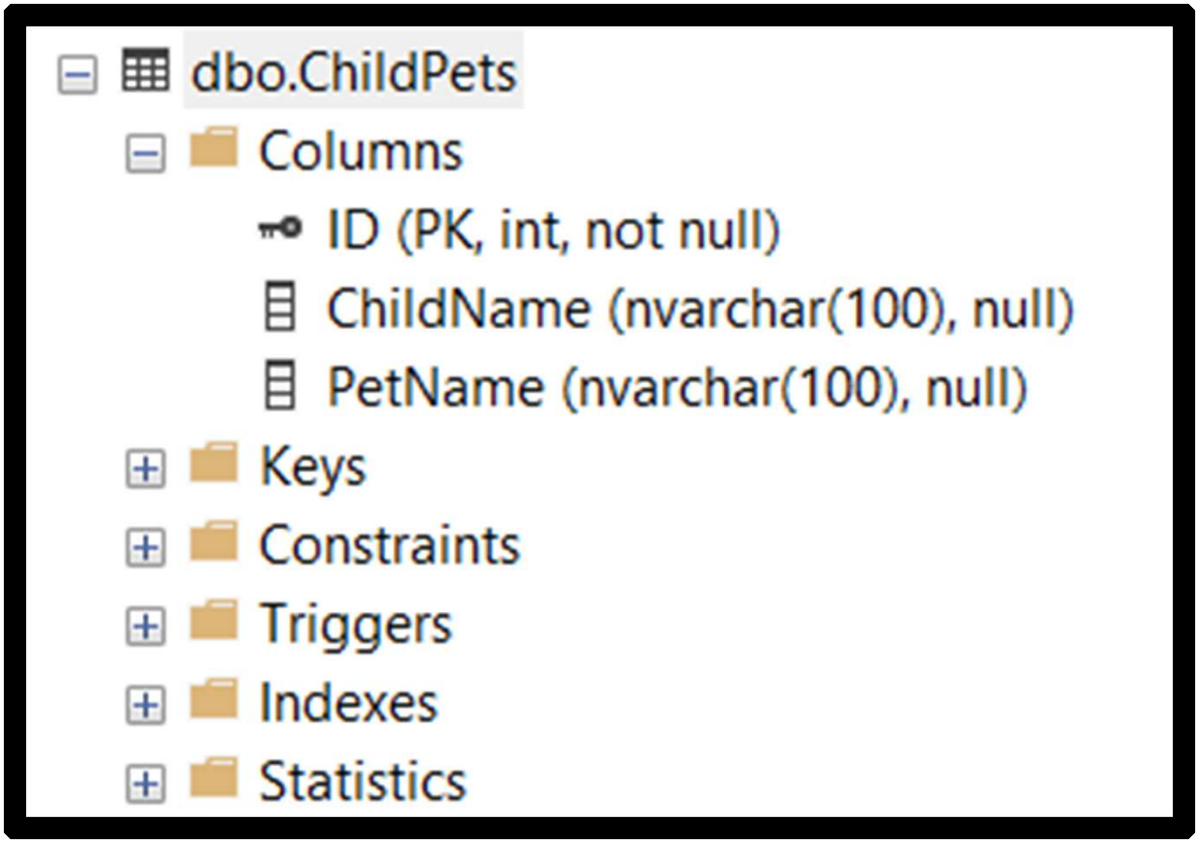
!=

Temporary Tables

Standard Table

ChildPets

ID	ChildName	PetName
1	Tom	Max
2	Isabella	Fido



Temporal Tables

ChildPets

ID	ChildName	PetName	From	To
1	Tom	Max	1/1/2019	31/12/9999
2	Isabella	Fido	1/4/2019	31/12/9999

ChildPets_History

ID	ChildName	PetName	From	To
1	Tom	Buffy	1/1/2010	1/1/2011
1	Tom	Draco	1/1/2011	1/6/2012
1	Tom		1/6/2012	3/8/2015
2	Isabella	Scruffy	1/2/2013	3/9/2016
1	Tom	Zack	3/8/2015	12/9/2016
2	Isabella	Ruffy	3/9/2016	1/4/2019
1	Tom	Jackie	12/9/2016	1/1/2019

ChildPets

ID	ChildName	PetName
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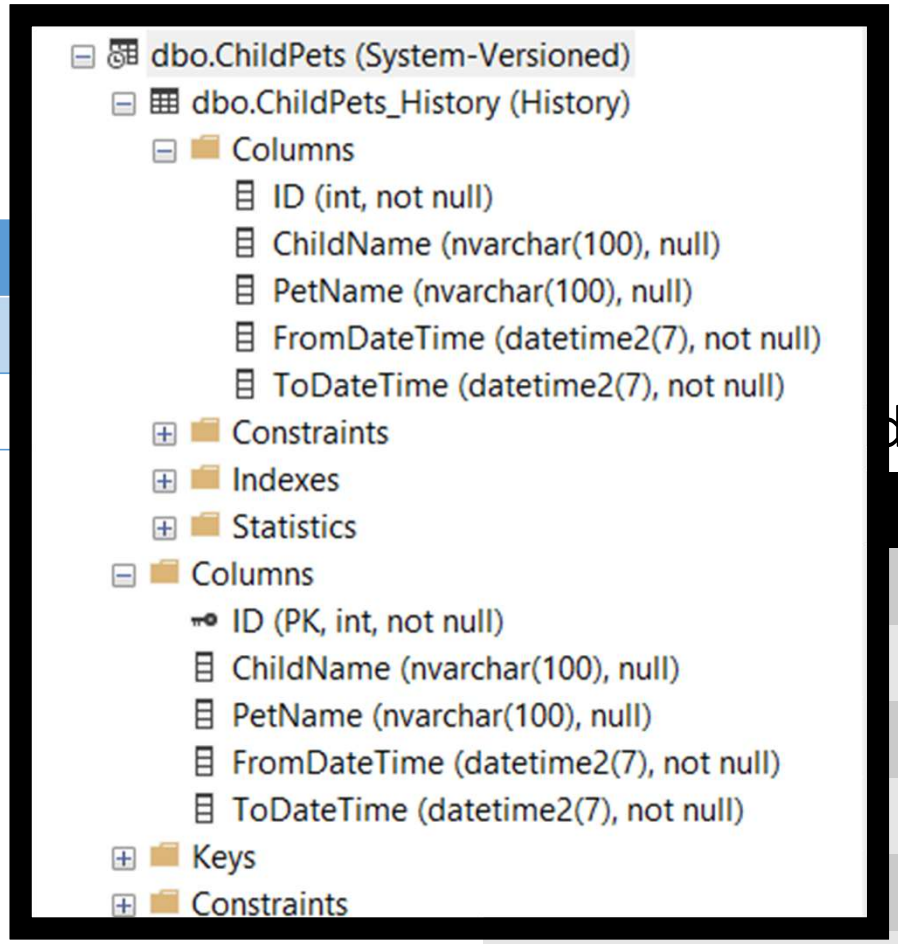


dPets_History

		PetName	From	To
		Buffy	1/1/2010	1/1/2011
		Draco	1/1/2011	1/6/2012
			1/6/2012	3/8/2015
		Scruffy	1/2/2013	3/9/2016
		Zack	3/8/2015	12/9/2016
2	Isabella	Ruffy	3/9/2016	1/4/2019
1	Tom	Jackie	12/9/2016	1/1/2019


How to use
Temporal Tables?

How?

```
CREATE TABLE ChildPets(
    ID INT IDENTITY(1,1) PRIMARY KEY,
    ChildName NVARCHAR(100),
    PetName NVARCHAR(100),
```

How?

```
CREATE TABLE ChildPets(
    ID INT IDENTITY(1,1) PRIMARY KEY,
    ChildName NVARCHAR(100),
    PetName NVARCHAR(100),
    FromDateTime    datetime2 GENERATED ALWAYS AS ROW START NOT NULL,
    ToDateTime      datetime2 GENERATED ALWAYS AS ROW END NOT NULL,
    PERIOD FOR SYSTEM_TIME (FromDateTime, ToDateTime)
)
```

How?

```
CREATE TABLE ChildPets(
    ID INT IDENTITY(1,1) PRIMARY KEY,
    ChildName NVARCHAR(100),
    PetName NVARCHAR(100),
    FromDateTime    datetime2 GENERATED ALWAYS AS ROW START NOT NULL,
    ToDateTime      datetime2 GENERATED ALWAYS AS ROW END NOT NULL,
    PERIOD FOR SYSTEM_TIME (FromDateTime, ToDateTime)
)
WITH (SYSTEM_VERSIONING = ON (HISTORY_TABLE = dbo.ChildPets_History))
```

How?

C# Copy

```
modelBuilder
    .Entity<Employee>()
    .ToTable(
        "Employees",
        b => b.IsTemporal(
            b =>
            {
                b.HasPeriodStart("ValidFrom");
                b.HasPeriodEnd("ValidTo");
                b.UseHistoryTable("EmployeeHistoricalData");
            }));
```

How?

Main

ID	Name
1	a
2	b
3	c

Main

ID	Name	From	To
1	a	1/01/2001	31/12/9999
2	b	1/01/2001	31/12/9999
3	c	1/01/2001	31/12/9999

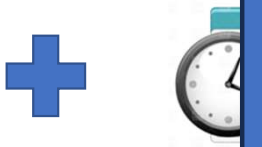
History

ID	Name	From	To
1	z	1/01/2001	31/12/9999
3	x	1/01/2001	31/12/9999
2	q	1/01/2001	31/12/9999

How?

Main

ID	Name
1	a
2	b
3	c



DEMO

Main

ID	Name	From	To
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3	c	1/01/2001	31/12/9999

History

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Why use
Temporal Tables?

Why?

Standard Tables

ChildName	PetName
Tom	Max
Isabella	Fido

- Lose historical data

Why?

Standard Tables

ChildName	PetName
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- Lose historical data
- Accidental modifications (no rollback)

Why?

Standard Tables

ChildName	PetName
Tom	Max
Isabella	Fido

- Lose historical data
- Accidental modifications (no rollback)
- Hard to report Analytics & Insights

Why?

ID	ChildName	PetName	From	To
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Temporal Tables

- Point in Time query

Why?

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Temporal Tables

- Point in Time query
- Insights

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Temporal Tables

- Point in Time query
- Insights
- Disaster Recovery

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Temporal Tables

- Point in Time query
- Insights
- Disaster Recovery
- Audit requirements


When?

When?

Syntax	Description
ALL	Every Row in history
AS OF <dt>	Data at this exact point in time
FROM <dt> TO <dt>	Data active at ANY POINT within the date range. Excludes extremes
BETWEEN <dt> AND <dt>	As with FROM, but includes records starting on upper END date.
CONTAINED IN (<dt>, <dt>)	All records that began and ended within the date range

When?

Temporal Insights


Where can I run
Temporal Tables?

Where?

Where?

CONSIDERATIONS

https://learn.microsoft.com/en-us/sql/relational-databases/tables/temporal-table-considerations-and-limitations?view=sql-server-ver16

CONSIDERATIONS

- Data Privacy

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CONSIDERATIONS

- Data Privacy
- Joins between Temporal & Non-Temporal tables

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CONSIDERATIONS

- Data Privacy
- Joins between Temporal & Non-Temporal tables
- Drop a Standard column, lose the History column

https://learn.microsoft.com/en-us/sql/relational-databases/tables/temporal-table-considerations-and-limitations?view=sql-server-ver16

CONSIDERATIONS

- Tables with Binary, Text, Image will get BIG!

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- No Checks, P|F keys on History table

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CONSIDERATIONS

- Tables with Binary, Text, Image will get BIG!
- No Checks, P|F keys on History table
- No **Indexed** Views using Temporal Tables

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SUMMARY

- What
- Why
- How
- When
- Where
- Who

SUMMARY

What

Temporal Table:

A regular table with a corresponding **_History** table tracking all historic changes

SUMMARY

Why

- Query data for given points in time
- Analytics & Insights
- Disaster Recovery
- Audit requirements

SUMMARY

How

- Add DateFrom / DateTo to main table.
- Turn on SystemVersioning

SUMMARY

When

Syntax
ALL
AS OF <dt>
FROM <dt> TO <dt>
BETWEEN <dt> AND <dt>
CONTAINED IN (<dt>, <dt>)

SUMMARY

Where

SUMMARY

Who

	joel@joelgallagher.com
	@joelgall
	linkedin.com/in/joelgallagher/
	github.com/JoelGallagher/TimeTravelWithSqlServer

EL EVENTO SOBRE

TECNOLOGÍAS CLOUD, WEB Y DATA

Verisk™ SECTOR ALARM prodware LEMONCODE METADEV plain concepts