

10 Handy Tips on SQL Server Dates

Julie Koesmarno (@MsSQLGirl)

Senior Program Manager at Microsoft

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www.mssqlgirl.com

@msSQLgirl

signal@mssqlgirl.com



Julie Koesmarno

Microsoft
CERTIFIED

Solutions Expert

Business Intelligence

Data Platform



Past: SQL Server and BI Consultant

Former SQL Server MVP

10 years experience with SQL Server

Power BI & Tabular Model Enthusiast

Founder of SQL Malibu

Blogger – [http:// www.MsSQLGirl.com](http://www.MsSQLGirl.com)



Objectives

- Learn some tips on SQL Server Dates
- Not just in T-SQL but also SSIS, SSAS, Data Warehouse and Application
- Shout out your tips!

TIP #10

[T-SQL] DATE DATA TYPES

Storage

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

date

smalldatetime

datetime

datetime2

datetimeoffset

Accuracy and Storage

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

YYYY-MM-DD

date

YYYY-MM-DD hh:mm:ss

smalldatetime

YYYY-MM-DD hh:mm:ss[.nnn]

datetime

Rounding and Storage

Last Digit	Rounded To
0	0.nn0
1	
2	0.nn3
3	
4	
5	0.nn7
6	
7	
8	0.n10
9	



YYYY-MM-DD hh:mm:ss[.nnn]

datetime

Accuracy and Storage

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

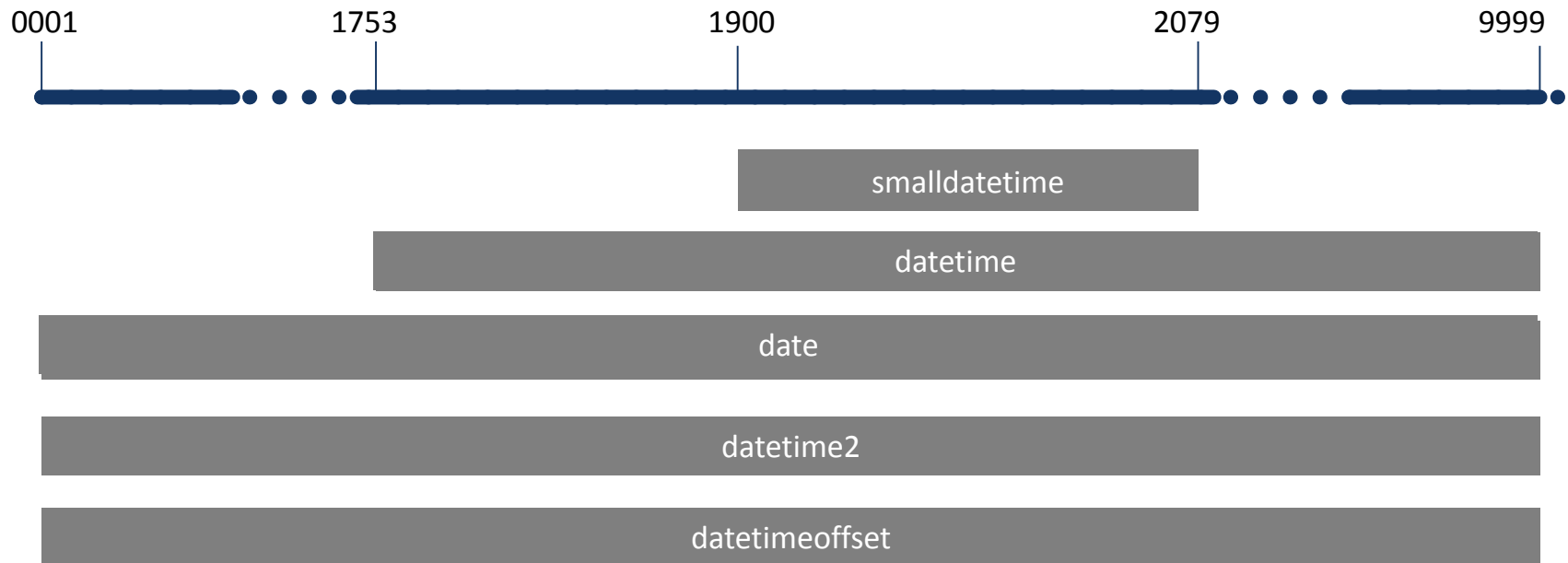
YYYY-MM-DD hh:mm:ss[.nnnnnnnn]

datetime2	n n	n n	n n n
-----------	-----	-----	-------

YYYY-MM-DD hh:mm:ss[.nnnnnnnn] [+|-]hh:mm

datetimeoffset	n n	n n	n n n
----------------	-----	-----	-------

Year Range



DEMO

- DATETIME2(n)
- DATETIMEOFFSET(n)
- Out of range

Tip #10: (T-SQL) Date Data Types

Choose wisely

Depends on what you need:

- Storage

- Accuracy

- Range

- Rounding

- Functionality – Timezone?

TIP #9

[SSIS] DATE DATA TYPE

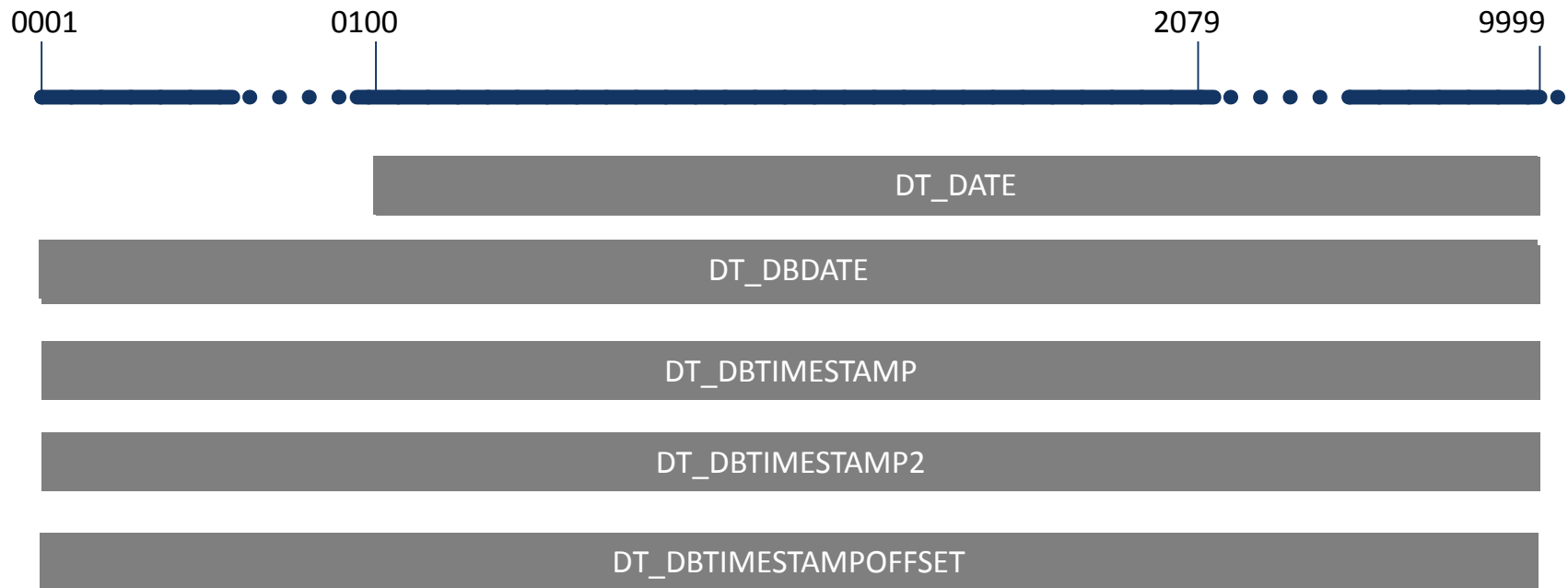
SSIS and T-SQL are not quite
the same!

SSIS vs T-SQL

	SSIS Data Type	T-SQL
date	(DT_DATE)	date
database date	(DT_DBDATE)	date
database time	(DT_DBTIME)	time(p)
database time with precision	(DT_DBTIME2, «scale»)	time(p)
database timestamp	(DT_DBTIMESTAMP)	datetime, smalldatetime
database timestamp with precision	(DT_DBTIMESTAMP2, «scale»)	datetime2
database timestamp with timezone	(DT_DBTIMESTAMPOFFSET, «scale»)	datetimeoffset(p)

Source: <http://www.sqlservercentral.com/blogs/dknight/2010/12/22/ssis-to-sql-server-data-type-translations/>

Range



Accuracy

YYYY-MM-DD

DT_DBDATE

YYYY-MM-DD hh:mm:ss.[nnn]


DT_DBTIMESTAMP

YYYY-MM-DD hh:mm:ss[.nnnnnnnn]

DT_DATE, DT_DBTIMESTAMP2

YYYY-MM-DD hh:mm:ss[.nnnnnnnn] [+ hh:mm:ss]

DT_DBTIMESTAMPOFFSET

Data Conversion Output Data Viewer at Data Flow Task				
 <input type="button" value="Detach"/> <input type="button" value="Copy Data"/>				
Date	DT_DATE	DT_DBDATE	DT_DBTIMESTAMP	
0001-01-01	2001-01-01 00:00:00.0000000	1/01/0001	0001-01-01 00:00:00.000	
1753-01-01	1753-01-01 00:00:00.0000000	1/01/1753	1753-01-01 00:00:00.000	
1900-01-01	1900-01-01 00:00:00.0000000	1/01/1900	1900-01-01 00:00:00.000	
2079-12-31	2079-12-31 00:00:00.0000000	31/12/2079	2079-12-31 00:00:00.000	
9999-12-31	9999-12-31 00:00:00.0000000	31/12/9999	9999-12-31 00:00:00.000	
1752-12-31	1752-12-31 00:00:00.0000000	31/12/1752	1752-12-31 00:00:00.000	
0099-12-31	1999-12-31 00:00:00.0000000	31/12/0099	0099-12-31 00:00:00.000	
1001-12-31	1001-12-31 00:00:00.0000000	31/12/1001	1001-12-31 00:00:00.000	
1000-01-01	1000-01-01 00:00:00.0000000	1/01/1000	1000-01-01 00:00:00.000	
0100-01-01	0100-01-01 00:00:00.0000000	1/01/0100	0100-01-01 00:00:00.000	
Attached Total rows: 0, buffers: 0 Rows displayed = 10				

Tip #9: (SSIS) Date Data Types

Not quite the same as SQL Server

Choose compatible data type to the columns in SQL Server

TIP #8

[T-SQL, SSIS, SSRS] NOW!

... just now!

How do you get “now”?

SELECT

```
    SYSDATETIME() AS [SYSDATETIME]  
    , SYSDATETIMEOFFSET() AS [SYSDATETIMEOFFSET]  
    , SYSUTCDATETIME() AS [SYSUTCDATETIME]  
    , CURRENT_TIMESTAMP AS [CURRENT_TIMESTAMP]  
    , GETDATE() AS [GETDATE]  
    , GETUTCDATE() AS [GETUTCDATE];
```

/* Returned:

```
SYSDATETIME()          2007-04-30 13:10:02.0474381 -- DateTime2  
SYSDATETIMEOFFSET() 2007-04-30 13:10:02.0474381 -07:00 --  
DateTimeOffset  
SYSUTCDATETIME()      2007-04-30 20:10:02.0474381 -- DateTime2  
CURRENT_TIMESTAMP    2007-04-30 13:10:02.047 -- DateTime  
GETDATE()             2007-04-30 13:10:02.047 -- DateTime  
GETUTCDATE()          2007-04-30 20:10:02.047 -- DateTime
```

Azure VM?

Remember!

`GETDATE()`, `SYSDATETIME()`, `SYSDATETIMEOFFSET()`
and `CURRENT_TIMESTAMP()`

return

value that contains the date and time of
*the computer on which the instance of SQL Server is
running*

In SSIS – Getting Current Time

- **GETDATE()**

Returns DT_DBTIMESTAMP

2014-11-01 09:00:00.000

- **GETUTCDATE()**

Returns DT_DBTIMESTAMP

2014-11-01 09:00:00.000

- **@[System::StartTime]**

Returns DT_DATE

2014-11-01 09:00:00.00000000

In SSRS – Getting Current Time

SSRS

Use Function: `NOW()`

Use Built-in Fields: `Globals!ExecutionTime`

Tip #8: (T-SQL, SSRS, SSIS) Now!

There are many ways to get current date and time in T-SQL, SSRS and SSIS

Remember: SQL Server returns the date and time of the computer on which the instance of SQL Server is running

TIP #7

[T-SQL] GRANULARITY

Beginning, End or Middle of the
day ...?

Granularity

@EmailSentDate = '2014-10-03 03:29:00'

@PaymentDate = '2014-10-03'

@PaymentDate >= @EmailSentDate

What if –

Payment date really is performed on '2014-10-03' at 9AM, but the application didn't capture the hh:mm:ss?

Tip #7: (T-SQL) Granularity

If time is not needed, then don't store the info.

If time is needed but you want to ensure that it is before the next day start, then use DATETIME with "<" (less than) next day comparison

TIP #6

[SSRS] FORMATTING

Is date formatting for reports
easy?

SSRS Date Conversion / Formatting

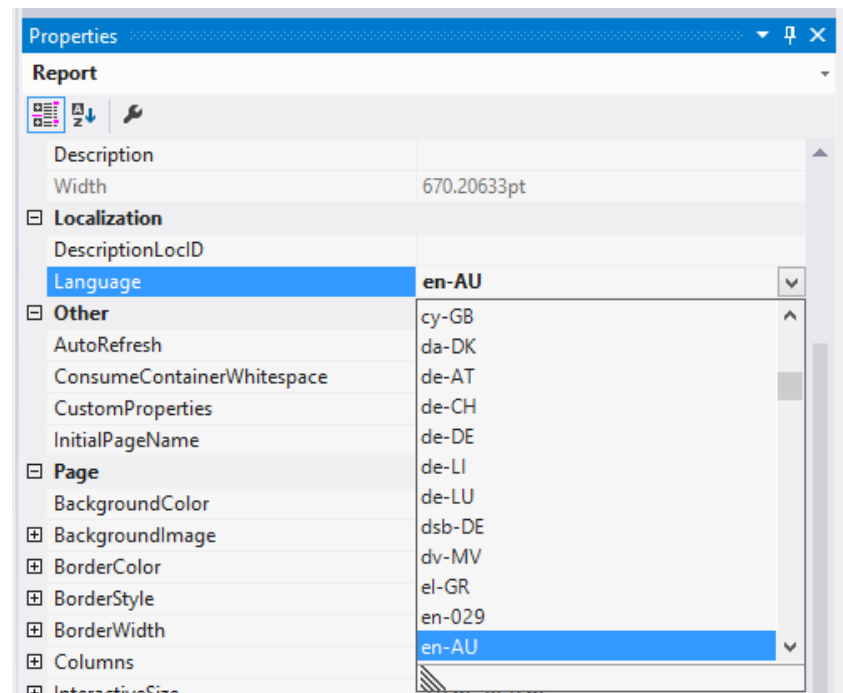
Date Conversion / Formatting

Conversion Method	Format	Value
FormatDateTime	ShortDate	10/26/2014
	LongDate	Sunday, October 26, 2014
	GeneralDate	10/26/2014 4:59:13 PM
Format	yyyy-MM-dd hh:mm:ss tt	2014-10-26 04:59:12 PM
	dddd, yyyy-MM-dd HH:mm:ss	Sunday, 2014-10-26 16:59:12
	yyyyMMdd	20141026
Formula	YEAR(Now()) * 10000 + MONTH(Now()) * 100 + DAY(Now())	20141026

Report Language

FormatDateTime relies on Language property on each report.

By default it is set to **en-US**.



Tip #6: (SSRS) Formatting

Use either FormatDateTime, Format or custom calculation

Remember: Language property in each Report can be modified

TIP #5

[T-SQL, SSIS] CONVERSION

The famous YYYYMMDD ...

Which one is faster in T-SQL?

Option 1:

```
CAST(  
    CAST(YEAR(DT) AS VARCHAR(4)) +  
    RIGHT('0' + CAST(MONTH(DT) AS VARCHAR(2)), 2) +  
    RIGHT('0' + CAST(DAY(DT) AS VARCHAR(2)), 2)  
AS INT)
```

Option 2:

`YEAR(DT) * 10000 +`
`MONTH(DT) * 100 +`
`DAY(DT)`

Option 3:

```
CAST(  
    REPLACE(  
        CONVERT(VARCHAR(10), DT, 120), '-',  
        '' )  
    AS INT)
```


Option 4:

```
CONVERT(VARCHAR(8), GETDATE(), 112)
```

Which one is faster in T-SQL?

`CONVERT(VARCHAR(8), GETDATE(), 112)`

YYYYMMDD for SSIS

SSIS Converting to YYYYMMDD

Formatting date to YYYYMMDD format in SSIS

Expression:

`YEAR(GETDATE()) * 10000 + MONTH(GETDATE()) * 100 + DAY(GETDATE())`

Evaluated value:

20141026

Evaluate Expression OK Cancel

Tip #5: (T-SQL, SSIS) YYYYMMDD

For T-SQL, use `CONVERT(VARCHAR(8), GETDATE(), 112)`

For SSIS, use formula

TIP #4

[TABULAR] DATE TABLE

Isn't Date in Tabular just a table?

4. Mark As DATE in Tabular Model

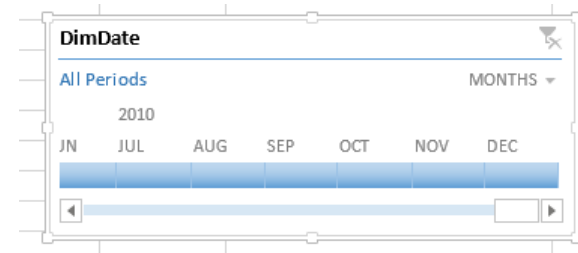
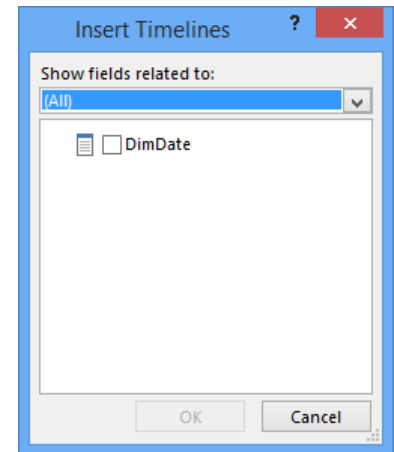
- To take advantage of Date specific functions in

DAX, e.g.

SAMEPERIODLASTYEAR

TOTALYTD

- For Excel Timeline
(DATE data type column)



Tip #4: (Tabular) Date Table

More than one table can be marked as Date table

Date tables must have valid Date values

Date tables work well when the values are
continuous

TIP #3

[TABULAR] UNKNOWN DATE

How do we handle unknown
dates?

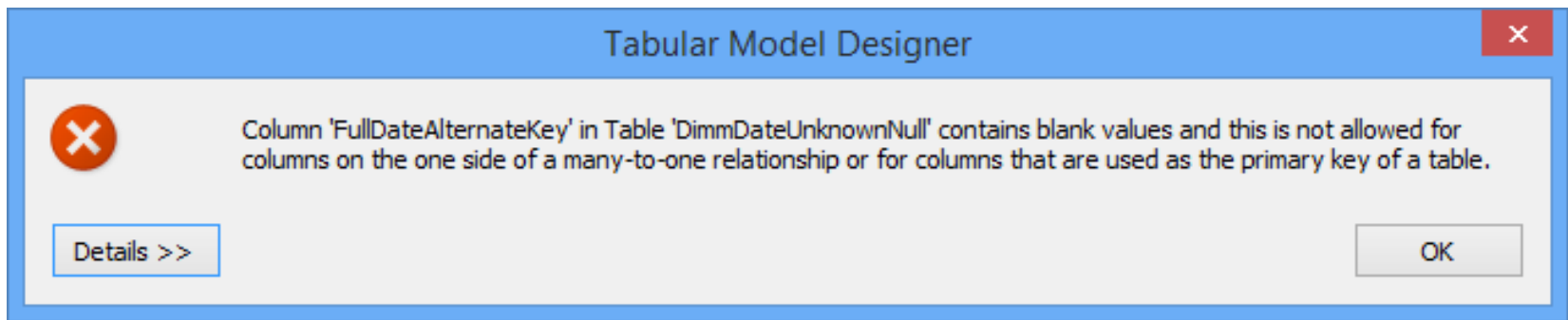
Option 1: Excluded / Empty Row

- Blank row shown
- Unable to customise the value to “Unknown”

Row Labels	Sales temp
2005	3527295.892
2006	7264097.109
2007	9346328.44
2008	10423254.5
	1205876.99
Grand Total	31766852.93

Option 2: NULL value

- Unable to mark the table as Date



Option 3: Futuristic value

e.g. 9999-12-31

- The DAX Date function would not work (an invalid numeric expression)

ERROR - CALCULATION ABORTED: Calculation error in measure 'FactInternetSales'[Sales Same Period Last Year with Unknown Date Table]: An invalid numeric representation of a date value was encountered.

Option 4: Old value

e.g. 1900-01-01

- The DAX Date function would error and say function only works on Contiguous Date

ERROR - CALCULATION ABORTED: Calculation error in measure 'FactInternetSales'[Sales Same Period Last Year with Unknown Date Table]: Function 'SAMEPERIODLASTYEAR' only works with contiguous date selections.

More reading for SSAS MDX

- <http://dwbi1.wordpress.com/2009/12/16/date-dimension-in-analysis-services/>

Tip #3: (Tabular) Unknown Date

Decide which option depending on requirements

- Future Dummy Date
- Past Dummy Date
- Excluded
- NULL

TIP #2

[DW] DATE DIMENSION

T-SQL has so many functions,
do we still need Date
dimension?

Useful Info

- Public Holidays (True / False; and actual Public Holiday name)
- Business Days (True / False)
- Business Day Number in the Year
- To define hierarchy
- Why is FK still INT?
- **4-4-5 CALENDAR**
(<http://www.sqlbi.com/articles/week-based-time-intelligence-in-dax/>)

Tip #2: (DW) Date Dimension

There are many use for Date Dimension

Mostly for easier lookup / implement business logic
/ reporting requirements /

TIP #1

[APP] TIMEZONE HANDLING

Timezone & Daylight Saving

Option 1:

Use **DATETIMEOFFSET** and let the Application handle the Daylight savings

DATEDIFF would work / know how to calculate time differences between different timezones / time offset

Option 2:

Store in UTC and add another column to store timezone offset that incorporates Daylight Saving. Still best to rely on Application to determine the timezone.

WRAP UP

10 Handy Tips on SQL Server Dates

- 10. T-SQL Date Data Types – choose wisely for performance reason & requirements
- 9. SSIS Date Data Type – choose compatible ones
- 8. T-SQL SSIS SSRS – current date is related to server date
- 7. T-SQL – understanding granularity of the date value to meet business requirements
- 6. SSRS – understand options of formatting and Report Language property

10 Handy Tips on SQL Server Dates

5. T-SQL, SSIS – Choose CONVERT to obtain YYYYMMDD in T-SQL. Both T-SQL and SSIS would mostly need this conversion for DW implementation
4. Tabular – Mark as Date table to get the most out of the Date features in DAX
3. DW – Unknown Date should be handled according to requirements
2. DW – Date Dimension is important and useful
1. Time zone handling – Let the application determine the time zone and the daylight saving setting.

Useful Resources

- Robyn Page's SQL Server DATE/TIME Workbench
<https://www.simple-talk.com/sql/learn-sql-server/robyn-pages-sql-server-datetime-workbench>
- Performance Comparison between Data Type Conversion Techniques in SSIS 2008
<http://blogs.msdn.com/b/sqlcat/archive/2009/12/01/draft-performance-comparison-between-data-type-conversion-techniques-in-ssis-2008.aspx>

Useful References

- Performance Comparison of the SQL Server PARSE, CAST, CONVERT and TRY_PARSE, TRY_CAST, TRY_CONVERT Functions

<http://www.mssqltips.com/sqlservertip/3018/performance-comparison-of-the-sql-server-parse-cast-convert-and-tryparse-trycast-tryconvert-functions/>

- The ultimate guide to the datetime datatypes

http://www.karaszi.com/SQLServer/info_datetime.asp

- CAST v/s CONVERT – Is there a difference as far as SQL Server is concerned? Which is better?

<http://beyondrelational.com/modules/2/blogs/77/posts/11334/cast-vs-convert-is-there-a-difference-as-far-as-sql-server-is-concerned-which-is-better.aspx>

Q&A

Julie Koesmarno

- signal@mssqlgirl.com
- [@mssqlgirl](#)

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