

Datum, Uhrzeit, Kalender & Co ... und Application Express



APEX CONNECT 2017

vom 9. bis 11. Mai in Berlin

#APEXCONN17

Carsten Czarski - @cczarski
Consulting Member of technical Staff - Oracle Application Express

ORACLE Deutschland B.V. & Co KG

ORACLE

DATE, TIMESTAMP & Co

Was ist der Unterschied - wann nimmt man was?

DATE und TIMESTAMP: 4 Datentypen

- **DATE**
Speichert Datum und Uhrzeit - Sekundengenau
- **TIMESTAMP**
Bietet zusätzlich Sekundenbruchteile (fractional seconds) und Unterstützung für Zeitzonen an.
- **TIMESTAMP WITH TIME ZONE**
Erlaubt die Angabe einer expliziten Zeitzone
- **TIMESTAMP WITH LOCAL TIME ZONE**
Rechnet transparent in die Session-Zeitzone um

DATE und TIMESTAMP-Datentypen

- Die vier Datentypen am Beispiel
- Achtung: Darstellung hängt von NLS-Session-Einstellungen ab

DATE	TIMESTAMP
----- 28.04.2017 06:44:49	----- 28.04.17 06:44:49,931315000

TIMESTAMP_LTZ	TIMESTAMP_TZ
----- 28.04.17 15:44:49,931315000	----- 28.04.17 06:44:49,931315000 -07:00

Unter der Motorhaube ...

DATE	DUMP
----- 28.04.2017 06:52:41	----- Typ=13 Len=8: 225,7,4,28,6,52,41,0
TIMESTAMP	DUMP
----- 28.04.17 06:52:41,977037000	----- Typ=187 Len=20: 225,7,4,28,6,52,41,0,200,102,60,58,249,0,3,0,0,0,0,0
TIMESTAMP_LTZ	DUMP
----- 28.04.17 15:52:42,039965000	----- Typ=232 Len=20: 225,7,4,28,15,52,42,0,72,209,97,2,2,0,7,0,127,1,0,0
TIMESTAMP_TZ	DUMP
----- 28.04.17 06:52:42,106995000 -07:00	----- Typ=188 Len=20: 225,7,4,28,13,52,42,0,56,157,96,6,249,0,5,0,0,0,0,0

DATE und TIMESTAMP erzeugen

- SQL-Funktionen TO_DATE, TO_TIMESTAMP, TO_TIMESTAMP_TZ
 - NLS-Formatmaske am besten a tiny teaser just before the weekend ... can you replicate this one ...?
 - Nicht auf Defaults verlassen
- Alternativ: DATE oder TIME戳
 - DATE 'YYYY-MM-DD'
 - TIMESTAMP 'YYYY-MM-DD HH:MM:SS.FF'
 - Es gibt auch noch ein TIME戳

```
oracle@localhost:~/Desktop
File Edit View Search Terminal Help
SQL> desc testtime
Name                               Null?    Type
-----
COL                                 TIME(9)

SQL> select * from testtime;
COL
-----
11.00.00.000000000 PM
SQL>
```

Zeitdifferenzen

- Sind bei DATE-Datentypen stets Dezimalzahlen. Es gilt: 1 = 1 Tag

```
SQL> select sysdate - DATE'2016-01-01' as diff from dual;
```

```
          DIFF
-----
483,328935
```

```
SQL> select DATE'2016-01-01' + 1.25 new_date from dual;
```

```
NEW_DATE
-----
02.01.2016 06:00:00
```

Spezialfall Monate addieren ...

- Mit dem DATE-Datentypen: ADD_MONTHS

```
SQL> select add_months( DATE'2017-01-30', 1 ) from dual;
```

```
NEW_DATE
```

```
-----  
28.02.2017 00:00:00
```

```
SQL> select add_months( DATE'2017-02-28', -1 ) from dual;
```

```
NEW_DATE
```

```
-----  
31.01.2017 00:00:00
```


Zeitdifferenzen

- TIMESTAMP arbeitet mit dem INTERVAL Datentyp

```
SQL> select localtime - TIMESTAMP'2016-01-01 00:00:00' from dual;
```

```
DIFF
```

```
-----  
+483 16:59:34.120780
```

```
SQL> select TIMESTAMP'2016-01-01 00:00:00' + interval '2' month from dual;
```

```
NEW_TS
```

```
-----  
01.03.16 00:00:00,000000000
```

Zeitdifferenzen - in Stunden ...?

- Mit EXTRACT Informationen aus INTERVAL auslesen

```
SQL> select localtime - TIMESTAMP'2016-01-01 00:00:00' from dual;
```

```
DIFF
```

```
-----  
+487 10:25:55.317850
```

```
select extract(  
    HOUR from localtime - TIMESTAMP'2016-01-01 00:00:00') from dual;
```

```
DIFF_HOURS
```

```
-----  
10
```

Zeitdifferenzen - in Stunden ...?

- Mit EXTRACT Informationen aus INTERVAL auslesen

```
with i as (  
    select localtime - TIMESTAMP'2016-01-01 00:00:00' diff from dual  
)  
select extract( DAY  from diff ) * 24 +  
       extract( HOUR from diff ) from i;
```

DIFF_HOURS

11698

Zeitdifferenzen

- DATE-Methoden funktionieren auch mit TIMESTAMP
- TIMESTAMP-Methoden funktionieren auch mit DATE
- Aber ...

```
SQL> select systimestamp, systimestamp + 1 from dual;
```

SYSTIMESTAMP	SYSTIMESTAMP+1
28.04.17 08:02:47,718026000 -07:00	29.04.2017 08:02:47

Implizit zu DATE
konvertiert

Monate addieren mit TIMESTAMP ...

Nach SQL Standard
korrektes Verhalten

- Mit dem DATE-Datentypen: ADD_MONTHS

```
SQL> select TIMESTAMP'2017-01-31 00:00:00' + interval '1' month from dual;
```

Fehler beim Start in Zeile: 1

ORA-01839: Datum für angegebenen Monat nicht gültig

```
select add_months(TIMESTAMP'2017-01-31 00:00:00', 1) from dual;
```

NEW_DATE

28.02.2017 00:00:00

Implizit zu DATE
konvertiert

DATE, TIMESTAMP & Co

DATE & TIMESTAMP in Application Express: Generales

DATE und TIMESTAMP in Application Express

- APEX Items ...
 - kennen weder DATE noch TIMESTAMP
 - sind immer vom Typ VARCHAR2
 - APEX führt intern stets TO_CHAR und TO_DATE aus
- Formatmasken sind daher wichtig
 - Defaults setzen in Shared Components -> Application Attributes -> Globalization

DATE und TIMESTAMP in Application Express

- NLS-Session-Einstellungen abhängig von der Anwendungssprache

Application Express	Database Session
Application Date Format	NLS_DATE_FORMAT
Application Timestamp Format	NLS_TIMESTAMP_FORMAT
Application Timestamp Time Zone Format	NLS_TIMESTAMP_TZ_FORMAT
Application Date Time Format	

Document Direction 

Application Date Format 

Application Date Time Format 

Application Timestamp Format 

Application Timestamp Time Zone Format 

APEX setzt das NLS-Environment automatisch!

Elapsed	Execution	Message	Level	Graph
0.01807	0.00247	Reset NLS settings	4	
0.01854	0.00184	alter session set NLS_COMP='BINARY' NLS_SORT='BINARY' NLS_CALENDAR='GREGORIAN' NLS_TERRITORY='AMERICA' NLS_LANGUAGE='AMERICAN'	4	
0.02048	0.00003	...NLS: Set Decimal separator=","	4	
0.02061	0.00168	...NLS: Set NLS Group separator=","	4	
0.02219	0.00004	...NLS: Set g nls date format="DD-MON-RR"	4	
0.02222	0.00113	...NLS: Set g nls timestamp format="DD-MON-RR HH.NE.SSXTF AM"	4	
0.02335	0.00163	...NLS: Set g nls timestamp tz format="DD-MON-RR HH.MI.SSXTF AM TZR"	4	
0.02498	0.00011	NLS of database and client differs, character set conversion needed	4	
0.02509	0.00007	...Setting session time zone to -07:00	4	
0.02516	0.02646	R E Q U E S T show	4	
0.05162	0.00350	Language derived from: FLOW_PRIMARY_LANGUAGE, current browser language: de	4	
0.05512	0.00003	alter session set nls language='GERMAN' nls territory='GERMANY'	4	
0.05516	0.00011	NLS: CSV charset=WE8MSMIN1252	4	
0.05527	0.00002	...NLS: Set Decimal separator=","	4	
0.05528	0.00010	...NLS: Set NLS Group separator=","	4	
0.05538	0.00002	...NLS: Set g nls date format="DD.MM.RR"	4	
0.05540	0.00002	...NLS: Set g nls timestamp format="DD.MM.RR HH24:MI:SSXTF"	4	
0.05542	0.00004	...NLS: Set g nls timestamp tz format="DD.MM.RR HH24:MI:SSXTF TZR"	4	
0.05546	0.00002	NLS: Language=de	4	
0.05548	0.00058	Application 100, Page Template: 1437064621951882	4	

DATE, TIMESTAMP & Co

Kalender in Application Express: Was geht, was ist neu?



Sample Calendar

Demonstrations of calendars in Oracle APEX

Oracle Application Express (APEX) has an integrated calendaring component. This application demonstrates how this component can be used and also shows Oracle APEX plugins which can display calendars useful in some applications. Calendars in Oracle Application Express (APEX) are based on data obtained from SQL queries.

Standard Calendars



Review a collection of Standard Calendars. These Calendars only utilize standard component attributes and no custom Dynamic Action or Javascript code.

Dynamic Action Examples



Calendar Regions are using Dynamic Actions to communicate with other page components in your APEX application.

Calendars and Javascript



Use the jQuery FullCalendar Javascript API and fully exploit the capabilities of your calendar component.

Calendar Styling



Apply custom styles to your Calendar region. Change colors, fonts or add icons to your calendar events.

Calendar Regions



Miscellaneous examples for displaying calendar data.

Administration



Administer this Sample Application.

DEMO

DATE, TIMESTAMP & Co

Ein paar Tipps und Tricks aus der Praxis

Datumsvergleich ...

- Ein DATE enthält Datum und Uhrzeit
- Viele Datumswerte werden mit SYSDATE generiert und gespeichert
- Uhrzeit spielt beim Vergleich eine Rolle!

```
SQL> select * from datum;
```

```
SPALTE
```

```
-----
```

```
02-MAI-17
```

```
SQL> select * from datum where spalte = DATE'2017-05-02';
```

```
No rows selected.
```

Datumsvergleich ...

- Uhrzeit mit TRUNC({date}) entfernen
- Uhrzeit ins NLS_DATE_FORMAT aufnehmen (login.sql, glogin.sql)

```
SQL> select * from datum;
```

```
SPALTE
```

```
-----  
02.05.2017 01:01:06
```

```
SQL> select * from datum where trunc( spalte ) = DATE'2017-05-02';
```

```
SPALTE
```

```
-----  
02.05.2017 01:01:06
```

Datumsliste berechnen

- Start- und Enddatum liegen vor - es braucht alle Tage dazwischen
- 1. Schritt: Zeilen generieren
- 2. Schritt: Join mit BETWEEN

```
select DATE'2001-01-01' + level from dual connect by level <= 31;
```

```
DATE'2001-01-01'+LE
```

```
-----  
02.01.2001 00:00:00  
03.01.2001 00:00:00  
04.01.2001 00:00:00  
05.01.2001 00:00:00  
:  
01.02.2001 00:00:00
```

Datumsliste berechnen

```
with tage as (  
  select DATE'2017-01-01' + level tag from dual connect by level <= 365  
)  
select t.tag, p.name  
  from tage t, projects p  
 where t.tag between p.start_date and p.end_date;
```

TAG	NAME
04.05.2017 00:00:00	Projekt 1
05.05.2017 00:00:00	Projekt 1
06.05.2017 00:00:00	Projekt 1
07.05.2017 00:00:00	Projekt 1
08.05.2017 00:00:00	Projekt 1
09.05.2017 00:00:00	APEX-Connect
09.05.2017 00:00:00	Projekt 1
10.05.2017 00:00:00	APEX-Connect
10.05.2017 00:00:00	Projekt 1
11.05.2017 00:00:00	APEX-Connect



Carsten.Czarski@oracle.com

http://blogs.oracle.com/apexcommunity_deutsch

<http://sql-plsql-de.blogspot.com>

<http://plsqlexecoscomm.sourceforge.net>

<http://plsqlmailclient.sourceforge.net>

Twitter: @cczarski