Chapter 5
Dates and Times

Objectives
- Describe the various types of functions that deal with dates and times
- Use date functions in SELECT statements
- Use conversion functions

Working with Dates
- Oracle stores dates in an internal numeric format: century, year, month, day, hours, minutes, seconds.
- The default date format is DD-MON-RR.
.
Two-Digit Years
- Using YY Format
  - If only give the last two digits of the year, the century for the year is assumed to be the same as the present century currently set on the database server.
  - E.g. year = 92 gives 2092
- Using RR Format
  - Uses rules to determine century

The RR Datetime Format Element
- If the specified two-digit year is 00 to 49, then
  - If the last two digits of the current year are 00 to 49, then the returned year has the same first two digits as the current year.
  - If the last two digits of the current year are 50 to 99, then the first 2 digits of the returned year are 1 greater than the first 2 digits of the current year.
- If the specified two-digit year is 50 to 99, then
  - If the last two digits of the current year are 00 to 49, then the first 2 digits of the returned year are 1 less than the first 2 digits of the current year.
  - If the last two digits of the current year are 50 to 99, then the returned year has the same first two digits as the current year..

Examples
```
SELECT
 TO_CHAR(TO_DATE('01-SEP-15', 'DD-MON-YY'), 'DD-MON-YYYY'),
 TO_CHAR(TO_DATE('01-SEP-85', 'DD-MON-YY'), 'DD-MON-YYYY')
FROM dual;
```

```
SELECT
  TO_CHAR(TO_DATE('01-SEP-15', 'DD-MON-RR'), 'DD-MON-YYYY'),
  TO_CHAR(TO_DATE('01-SEP-85', 'DD-MON-RR'), 'DD-MON-YYYY')
FROM dual;
```

Moral

- Always use all 4 digits when specifying the year.

Date Functions

- Date functions operate on values of the DATE datatype.

- All date functions return a value of DATE datatype, except the MONTHS_BETWEEN function, which returns a number.

SYSDATE Function

– The SYSDATE function returns the current date and time from Oracle.

– If you want to only manipulate the CURRENT DATE, and you are not selecting other columns from a table, you may issue a SELECT statement using the Oracle one row table:

```
SELECT  SYSDATE FROM DUAL;
```

Conversion Functions for Dates

- Convert a datetime to a string
  TO_CHAR(date [, format])

- Convert a string to a datetime
  TO_DATE (char [, format])

Examples
```
SELECT ename, hiredate
FROM emp;

SELECT ename, TO_CHAR(hiredate, 'MONTH DD, YYYY')
FROM emp;

SELECT ename, TO_CHAR(hiredate, 'Month DD, YYYY')
FROM emp;

SELECT ename, TO_CHAR(hiredate, 'fmMonth DD, YYYY')
FROM emp;
```

```
SELECT TO_CHAR(SYSDATE, 'Month DD, YYYY, HH24:MI:SS')
FROM DUAL;

SELECT TO_CHAR(SYSDATE, 'Ddspth "of" Month, Year A.D.')
FROM DUAL;

SELECT TO_CHAR(SYSDATE, 'fmDdspth "of" Month, Year A.D.')
FROM DUAL;
```

Date Format Models for "format" of TO_CHAR and TO_DATE

SCC or CC	WW or W
YYYY or SYYYY	IW
YYY or YY or Y	DDD or DD or D
IYYY	DAY
IYY or IY or I	DY
Y,YYY	J
SYEAR or YEAR	AM or PM
RR	A.M. or P.M.
BC or AD	HH or HH12
B.C. or A.D.	HH24
Q	MI
MM	SS or SSSSS
RM	-/ , . ; : (punctuation)
MONTH	"…text.." (string)
MON	

Date Format Prefixes and Suffixes
Prefix:
    FM   (fill mode)
    FX (format exact)
Suffix:
    TH (ordinal number – 4th)
    SP (spelled out number - FOUR)
    SPTH and THSP (spelled out ordinal number – FOURTH)

Note: When prefixes and suffixes are added to a date format, the case (upper, initial, or lower) is determined by the format element, not by the prefix or suffix. 'ddTH' produces "04th" not "04TH"

Date Format Case Control:

Uppercase:
    DAY, DY, MONTH, MON, YEAR, AM, PM, A.M., A.m., P.M., P.m.

Initial Caps:
    Day, Dy, Month, Mon, Year, Am, Pm

Lowercase:
    day, dy, month, mon, year, am, pm

Examples
SELECT TO_DATE('01-SEP-2005'), TO_DATE('01-SEP-05')
FROM dual;

SELECT TO_DATE('September 1, 2005', 'Month DD, YYYY')
FROM dual;

SELECT TO_DATE('05.9.1', 'YY.MM.DD')
FROM dual;

Date Functions

Function	Description
MONTHS_BETWEEN	Number of months between two dates
ADD_MONTHS	Add calendar months to date
NEXT_DAY	Next day of the date specified
LAST_DAY	Last day of the month
ROUND	Round date
TRUNC	Truncate date

Using Date Functions
- MONTHS_BETWEEN ('01-SEP-95','11-JAN-94') = 19.6774194
- MONTHS_BETWEEN ('01-SEP-95','11-JAN-94') = '11-JUL-94'
- NEXT_DAY ('01-SEP-95','FRIDAY')   = '08-SEP-95'
- LAST_DAY('01-SEP-95')   = '30-SEP-95'

Using Date Functions

```
ROUND('25-JUL-95','MONTH')    = 01-AUG-95
ROUND('25-JUL-95','YEAR')     = 01-JAN-96
TRUNC('25-JUL-95','MONTH')    = 01-JUL-95
TRUNC('25-JUL-95','YEAR')     = 01-JAN-95
```

Date Examples

- Date Examples:
  SELECT MONTHS_BETWEEN('25-Jun-2004','6-Oct-2003') "Remaining
    Months"
  FROM dual;

  SELECT MONTHS_BETWEEN('25-Jun-2004',SYSDATE)
      "Remaining Months"
  FROM dual;

  SELECT ROUND(MONTHS_BETWEEN('25-Jun-2004',SYSDATE))
      "Remaining Months"
  FROM dual;

  SELECT TO_DATE('25-Jun-2004','DD-Mon-YYYY') –
    TO_DATE('6-Oct-2003','DD-Mon-YYYY') "Remaining Days"
  FROM dual;

Arithmetic with Dates
  – Add or subtract a number to or from a date for a resultant *date* value.
  – Subtract two dates to find the *number* of days between those dates.
  – Add *hours* to a date by dividing the number of hours by 24.

Using Arithmetic Operators with Dates

```
SQL> SELECT ename, (SYSDATE-hiredate)/7 WEEKS
  2  FROM   emp
  3  WHERE  deptno = 10;

ENAME            WEEKS
--------------------- -------------
KING             830.93709
CLARK            853.93709
MILLER           821.36566
```

Time Zones
- Don't worry about the time zone section of in your textbook.
- Very useful but keep as reference only.

Summary
- The Oracle date stores the date plus time.
- Use TO_CHAR() and TO_DATE() to convert between strings and dates and times.
- The Oracle database always stores all four digits of a year and will interpret two-digit years.
  – Always use 4 digit years!
- Use date functions to get or process dates and times.
- Can use arithmetic on dates.