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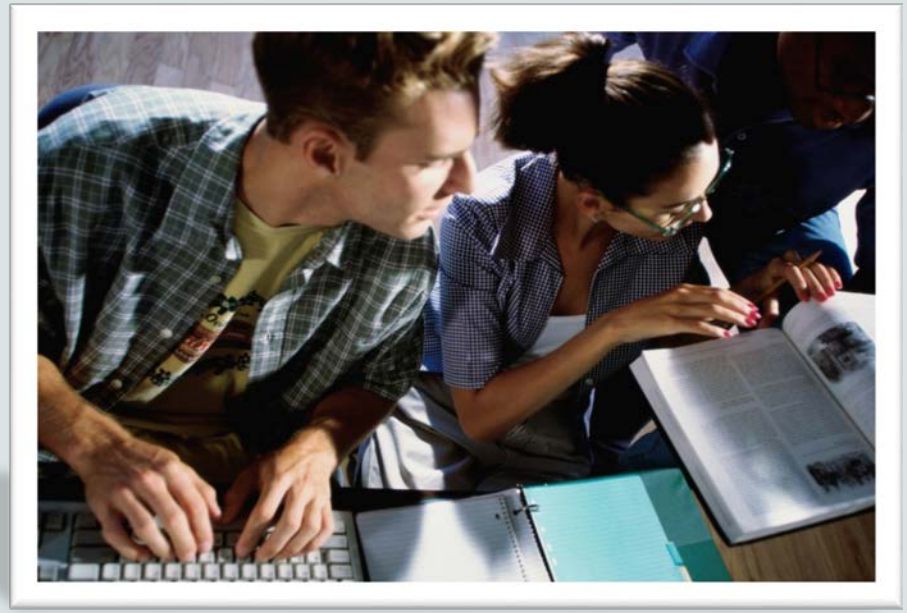
# Database Programming with SQL

## 4-3
## Date Functions



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# Objectives

This lesson covers the following objectives:

- Demonstrate the use of SYSDATE and date functions
- State the implications for world businesses to be able to easily manipulate data stored in date format
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# Purpose

- Have you ever wondered how many days remain in the school year or how many weeks there are until graduation?
- Because the Oracle database stores dates as numbers, you can easily perform calculations on dates using addition, subtraction, and other mathematical operators.
- Businesses depend on being able to use date functions to schedule payrolls and payments, track employee performance reviews and years of service, or keep track of orders and shipments.
- All of these business needs are easily handled using simple SQL date functions.

# Displaying Dates

- The default display and input format for dates is:

  DD-Mon-YYYY

- For example: 02-Dec-2014.
- However, the Oracle database stores dates internally with a numeric format representing the century, year, month, day, hour, minute, and second.
- Valid Oracle dates are between January 1, 4712 B.C., and December 31, 9999 A.D.
- This represents the range of dates that you can store successfully in an Oracle database.

# SYSDATE

- SYSDATE is a date function that returns the current database server date and time.
- Use SYSDATE to display the current date, use the DUAL table.

```
SELECT SYSDATE
FROM dual;
```

| SYSDATE |
| --- |
| 01-Jul-2017 |

# DATE Data Type

- The DATE data type always stores year information as a four-digit number internally: two digits for the century and two digits for the year.
- For example, the Oracle database stores the year as 1996 or 2004, not just as 96 or 04.
- In previous versions, the century component was not displayed by default.
- However, due to changing business requirements around the world, the 4-digit year is now the default display.

# Working with Dates

| Examples: | Result |
|---|---|
| `SELECT last_name, hire_date + 60`<br>`FROM employees;` | Adds 60 days to hire_date. |
| `SELECT last_name, (SYSDATE -`<br>`  hire_date)/7`<br>`FROM employees;` | Displays the number of weeks since the employee was hired. |
| `SELECT employee_id, (end_date -`<br>`  start_date)/365`<br>`  AS "Tenure in last job"`<br>`FROM job_history;` | Finds the number of days employee held a job, then divides by 365 to display in years. |

# Date Functions

- The date functions shown in the table operate on Oracle dates.
- All of the date functions return a value with a DATE data type except the MONTHS_BETWEEN function, which returns a numeric data type value.

| Function | Description |
|---|---|
| MONTHS_BETWEEN | Number of months between two dates |
| ADD_MONTHS | Add calendar months to date |
| NEXT_DAY | Date of the next occurance of day of the week specified |
| LAST_DAY | Last day of the month |
| ROUND | Round date |
| TRUNC | Truncate date |

# Date Functions

- MONTHS_BETWEEN: takes 2 DATE arguments and returns the number of calendar months between the 2 dates.
- If the first argument is an earlier date than the second, the number returned is negative.

| Date Function Examples: | Result | |
|---|---|---|
| `SELECT last_name, hire_date`<br>`FROM employees`<br>`WHERE MONTHS_BETWEEN`<br>`(SYSDATE, hire_date) > 240;` | King<br>Kochhar<br>De Haan<br>… | 17-Jun-1987<br>21-Sep-1989<br>13-Jan-1993<br>… |

# Date Functions

- ADD_MONTHS: takes 2 arguments, a DATE and a number. Returns a DATE value with the number argument added to the month component of the date.
- If the number supplied is negative, the function will subtract that number of months from the date argument.

| Date Function Examples: | Result |
|---|---|
| `SELECT ADD_MONTHS (SYSDATE, 12)`<br>`  AS "Next Year"`<br>`FROM dual;` | 01-Jul-2016 |

# Date Functions

- NEXT_DAY: takes 2 arguments, a DATE and a weekday and returns the DATE of the next occurrence of that weekday after the DATE argument.

| Date Function Examples: | Result |
|---|---|
| `SELECT NEXT_DAY (SYSDATE, 'Saturday')`<br>`  AS "Next Saturday"`<br>`FROM dual;` | 04-Jul-2017 |

# Date Functions

- LAST_DAY: takes a DATE argument and returns the DATE of the last day of the month for the DATE argument.

| Date Function Examples: | Result |
|---|---|
| `SELECT LAST_DAY (SYSDATE)`<br>`  AS "End of the Month"`<br>`FROM dual;` | 31-Jul-2017 |

# Date Functions

- ROUND: returns a DATE rounded to the unit specified by the second argument.

| Date Function Examples: | Result | |
|---|---|---|
| `SELECT hire_date,`<br>`  ROUND(hire_date, 'Month')`<br>`FROM employees`<br>`WHERE department_id = 50;` | 16-Nov-1999<br>17-Oct-1995<br>29-Jan-1997<br>… | 01-Dec-1999<br>01-Nov-1995<br>01-Feb-1997<br>… |
| `SELECT hire_date,`<br>`  ROUND(hire_date, 'Year')`<br>`FROM employees`<br>`WHERE department_id = 50;` | 16-Nov-1999<br>17-Oct-1995<br>29-Jan-1997<br>… | 01-Jan-2000<br>01-Jan-1996<br>01-Jan-1997<br>… |

# Date Functions

- TRUNC: returns a DATE truncated to the unit specified by the second argument.

| Date Function Examples: | Result | |
|---|---|---|
| `SELECT hire_date,`<br>`  TRUNC(hire_date, 'Month')`<br>`FROM employees`<br>`WHERE department_id = 50;` | 16-Nov-1999<br>17-Oct-1995<br>29-Jan-1997<br>… | 01-Nov-1999<br>01-Oct-1995<br>01-Jan-1997<br>… |
| `SELECT hire_date,`<br>`  TRUNC(hire_date, 'Year')`<br>`FROM employees`<br>`WHERE department_id = 50;` | 16-Nov-1999<br>17-Oct-1995<br>29-Jan-1997<br>… | 01-Jan-1999<br>01-Jan-1995<br>01-Jan-1997<br>… |

# Date Functions

- Here is an example of a query using multiple date functions.
- The output is displayed on the next slide.

```
SELECT employee_id, hire_date,
  ROUND(MONTHS_BETWEEN(SYSDATE, hire_date)) AS TENURE,
  ADD_MONTHS (hire_date, 6) AS REVIEW,
  NEXT_DAY(hire_date, 'FRIDAY'), LAST_DAY(hire_date)
FROM employees
WHERE MONTHS_BETWEEN (SYSDATE, hire_date) > 36;
```

# Date Functions

- The result set from this query returns 20 rows including:

| EMPLOYEE_ID | HIRE_DATE | TENURE | REVIEW | NEXT_DAY(HIRE_DATE,'FRIDAY') | LAST_DAY(HIRE_DATE) |
|---|---|---|---|---|---|
| 100 | 17-Jun-1987 | 348 | 17-Dec-1987 | 19-Jun-1987 | 30-Jun-1987 |
| 101 | 21-Sep-1989 | 321 | 21-Mar-1990 | 22-Sep-1989 | 30-Sep-1989 |
| 102 | 13-Jan-1993 | 281 | 13-Jul-1993 | 15-Jan-1993 | 31-Jan-1993 |
| 200 | 17-Sep-1987 | 345 | 17-Mar-1988 | 18-Sep-1987 | 30-Sep-1987 |
| 205 | 07-Jun-1994 | 265 | 07-Dec-1994 | 10-Jun-1994 | 30-Jun-1994 |
| 206 | 07-Jun-1994 | 265 | 07-Dec-1994 | 10-Jun-1994 | 30-Jun-1994 |
| 149 | 29-Jan-2000 | 197 | 29-Jul-2000 | 04-Feb-2000 | 31-Jan-2000 |
| 174 | 11-May-1996 | 241 | 11-Nov-1996 | 17-May-1996 | 31-May-1996 |
| 176 | 24-Mar-1998 | 219 | 24-Sep-1998 | 27-Mar-1998 | 31-Mar-1998 |
| 178 | 24-May-1999 | 205 | 24-Nov-1999 | 28-May-1999 | 31-May-1999 |
| More than 10 rows available. Increase rows selector to view more rows. | | | | | |

# Terminology

Key terms used in this lesson included:

- ADD_MONTHS
- LAST_DAY
- MONTHS_BETWEEN
- NEXT_DAY
- SYSDATE
- ROUND
- TRUNC

# Summary

In this lesson, you should have learned how to:

- Select and apply the single-row functions MONTHS_BETWEEN, ADD_MONTHS, NEXT_DAY, LAST_DAY, ROUND, and TRUNC that operate on date data
- Explain how date functions transform Oracle dates into date data or numeric values
- Demonstrate proper use of the arithmetic operators with dates

# Summary

In this lesson, you should have learned how to:

- Demonstrate the use of SYSDATE and date functions
- State the implications for world businesses to be able to easily manipulate data stored in date format


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