



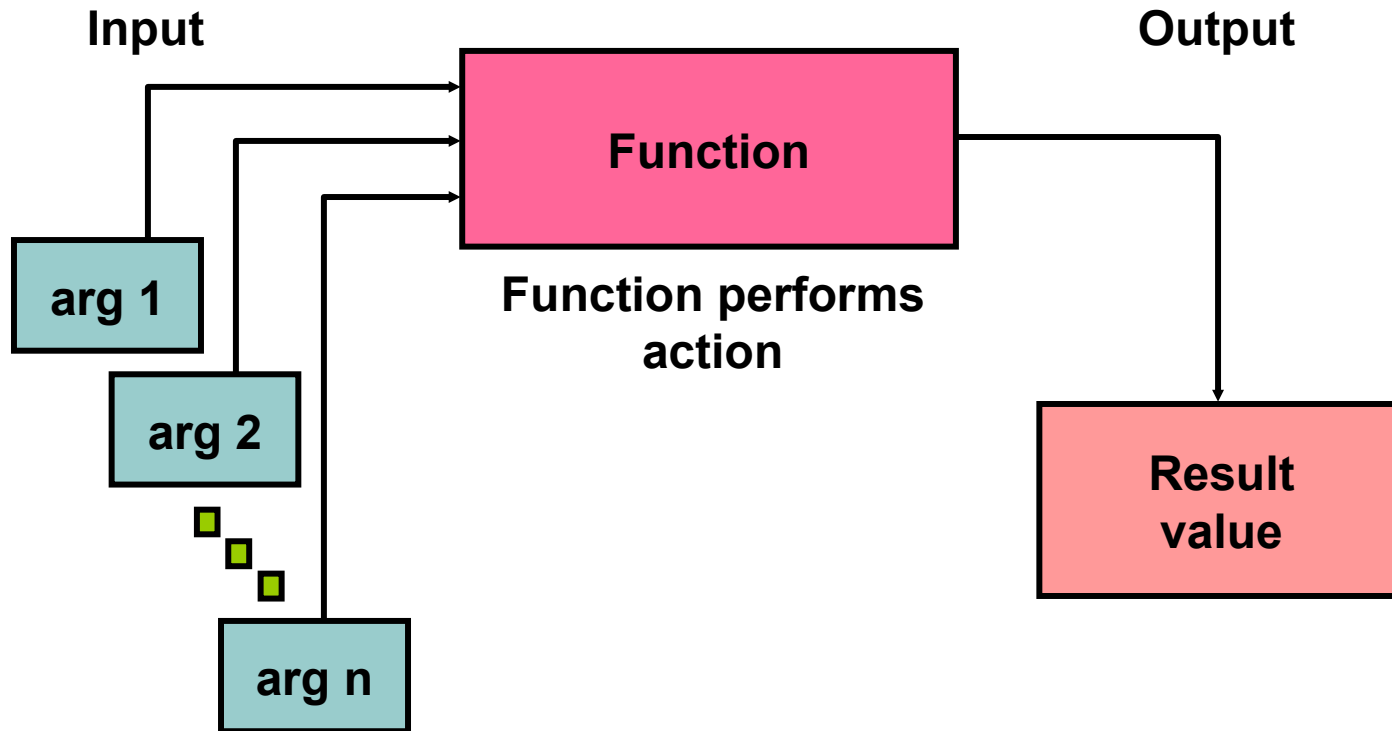
Using Single-Row Functions to Customize Output

Objectives

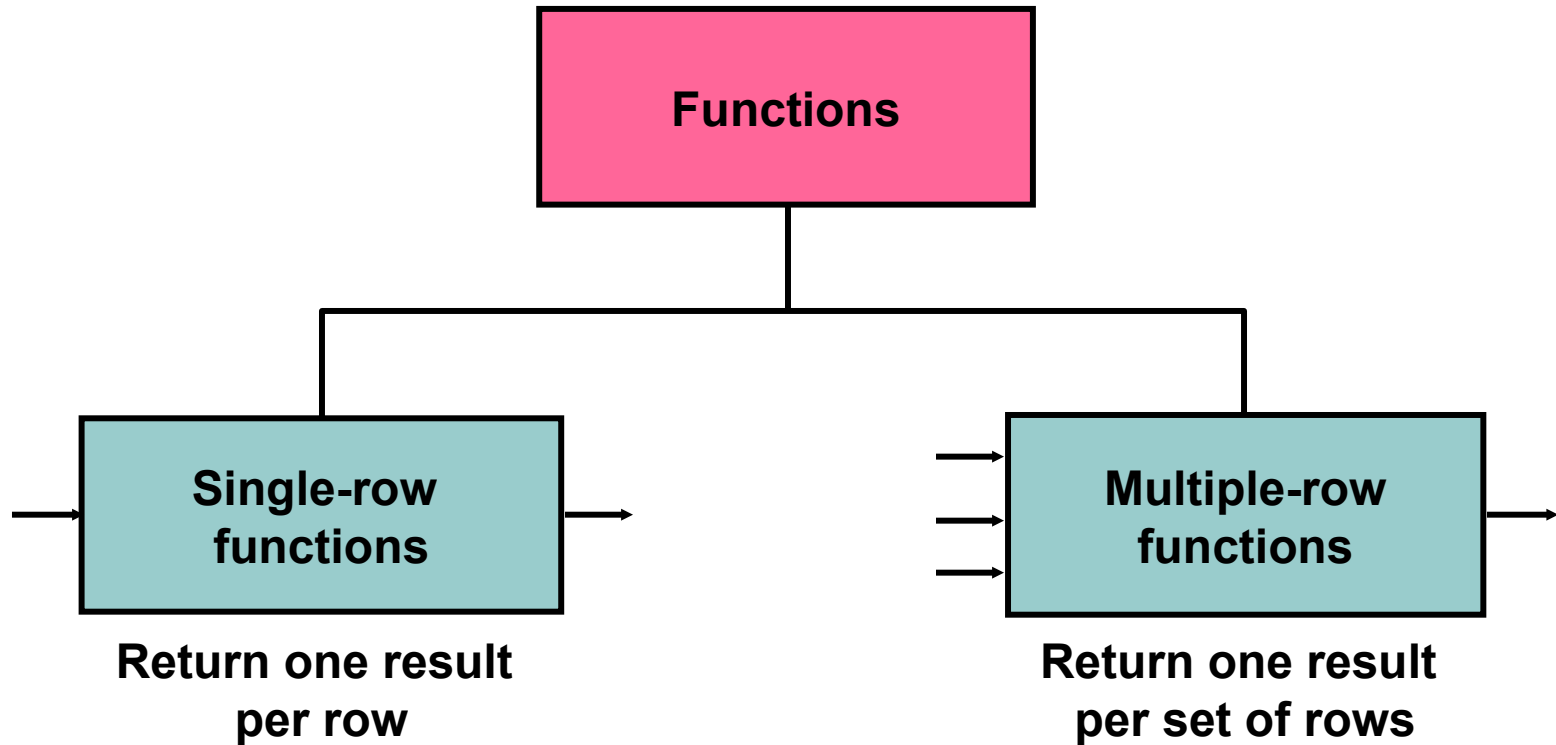
After completing this lesson, you should be able to do the following:

- Describe the various types of functions available in SQL
- Use the character, number, and date functions in `SELECT` statements

SQL Functions



Two Types of SQL Functions



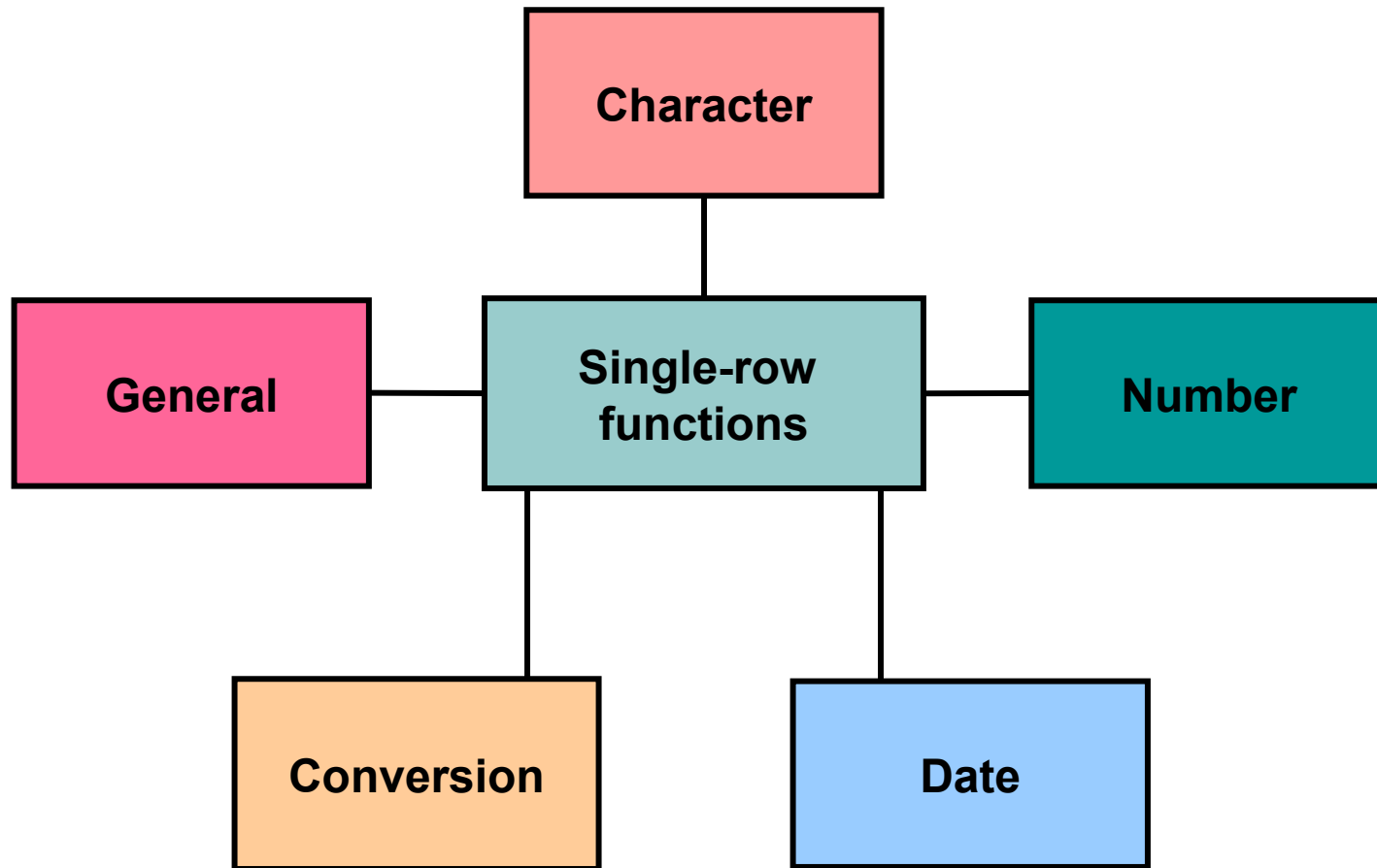
Single-Row Functions

Single-row functions:

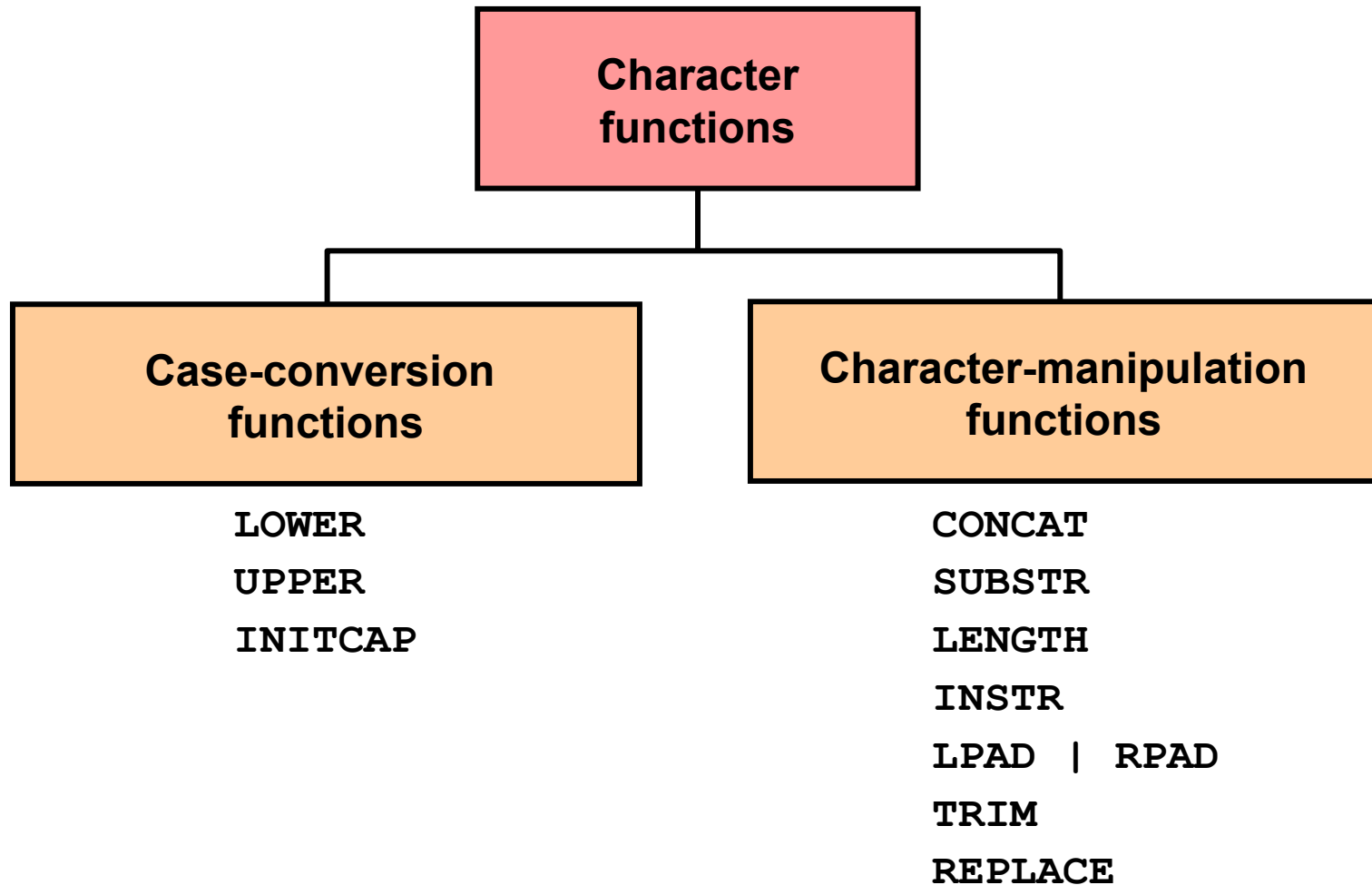
- Manipulate data items
- Accept arguments and return one value
- Act on each row that is returned
- Return one result per row
- May modify the data type
- Can be nested
- Accept arguments that can be a column or an expression

```
function_name [(arg1, arg2,...)]
```

Single-Row Functions



Character Functions



Case-Conversion Functions

These functions convert the case for character strings:

Function	Result
<code>LOWER('SQL Course')</code>	sql course
<code>UPPER('SQL Course')</code>	SQL COURSE
<code>INITCAP('SQL Course')</code>	Sql Course

Using Case-Conversion Functions

Display the employee number, name, and department number for employee Higgins:

```
SELECT employee_id, last_name, department_id
FROM employees
WHERE last_name = 'higgins';
```

0 rows selected

```
SELECT employee_id, last_name, department_id
FROM employees
WHERE LOWER(last_name) = 'higgins';
```

	EMPLOYEE_ID	LAST_NAME	DEPARTMENT_ID
1	205	Higgins	110

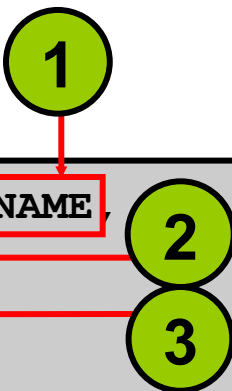
Character-Manipulation Functions

These functions manipulate character strings:


Function	Result
CONCAT('Hello', 'World')	HelloWorld
SUBSTR('HelloWorld',1,5)	Hello
LENGTH('HelloWorld')	10
INSTR('HelloWorld', 'W')	6
LPAD(salary,10,'*')	*****24000
RPAD(salary, 10, '*')	24000*****
REPLACE ('JACK and JUE','J','BL')	BLACK and BLUE
TRIM('H' FROM 'HelloWorld')	elloWorld

Using the Character-Manipulation Functions

```
SELECT employee_id, CONCAT(first_name, last_name) NAME,  
       job_id, LENGTH (last_name),  
       INSTR(last_name, 'a') "Contains 'a'?"  
FROM   employees  
WHERE  SUBSTR(job_id, 4) = 'REP';
```



	EMPLOYEE_ID	NAME	JOB_ID	LENGTH(LAST_NAME)	Contains 'a'?
1	202	PatFay	MK_REP	3	2
2	174	EllenAbel	SA_REP	4	0
3	176	JonathonTaylor	SA_REP	6	2
4	178	KimberelyGrant	SA_REP	5	3



Number Functions

- **ROUND:** Rounds value to a specified decimal
- **TRUNC:** Truncates value to a specified decimal
- **MOD:** Returns remainder of division

Function	Result
ROUND (45.926, 2)	45.93
TRUNC (45.926, 2)	45.92
MOD (1600, 300)	100

Using the ROUND Function

The diagram illustrates the use of the ROUND function in SQL. It shows a query and its output with three numbered annotations:

- 1**: Points to the first argument of the ROUND function, the number 45.923.
- 2**: Points to the second argument of the ROUND function, the number of decimal places (2, 0, or -1).
- 3**: Points to the entire ROUND function expression.

SQL Query:

```
SELECT ROUND (45.923, 2), ROUND (45.923, 0),  
       ROUND (45.923, -1)  
FROM   DUAL;
```

Query Results:

	ROUND(45.923,2)	ROUND(45.923,0)	ROUND(45.923,-1)
1	45.92	46	50

The results show that rounding 45.923 to 2 decimal places yields 45.92, to 0 decimal places yields 46, and to -1 decimal places (nearest integer) yields 50.




DUAL is a public table that you can use to view results from functions and calculations.



Using the TRUNC Function



The diagram shows a SQL query with three callouts:



- Callout 1 points to `TRUNC (45.923, 2)`.
- Callout 2 points to `TRUNC (45.923)`.
- Callout 3 points to `TRUNC (45.923, -1)`.

```
SELECT TRUNC (45.923, 2), TRUNC (45.923),  
       TRUNC (45.923, -1)  
FROM   DUAL;
```

	 TRUNC(45.923,2)	 TRUNC(45.923)	 TRUNC(45.923,-1)
1	45.92	45	40

Using the MOD Function

For all employees with the job title of Sales Representative, calculate the remainder of the salary after it is divided by 5,000.

```
SELECT last_name, salary, MOD(salary, 5000)
FROM employees
WHERE job_id = 'SA_REP';
```

	LAST_NAME	SALARY	MOD(SALARY,5000)
1	Abel	11000	1000
2	Taylor	8600	3600
3	Grant	7000	2000

Working with Dates

- The Oracle Database stores dates in an internal numeric format: century, year, month, day, hours, minutes, and seconds.
- The default date display format is DD-MON-RR.
 - Enables you to store 21st-century dates in the 20th century by specifying only the last two digits of the year
 - Enables you to store 20th-century dates in the 21st century in the same way

```
SELECT last_name, hire_date
FROM   employees
WHERE  hire_date < '01-FEB-88';
```

	LAST_NAME	HIRE_DATE
1	Whalen	17-SEP-87
2	King	17-JUN-87

RR Date Format

Current Year	Specified Date	RR Format	YY Format
1995	27-OCT-95	1995	1995
1995	27-OCT-17	2017	1917
2001	27-OCT-17	2017	2017
2001	27-OCT-95	1995	2095


		If the specified two-digit year is:	
		0–49	50–99
If two digits of the current year are:	0–49	The return date is in the current century	The return date is in the century before the current one
	50–99	The return date is in the century after the current one	The return date is in the current century

Using the SYSDATE Function

SYSDATE is a function that returns:

- Date
- Time

```
SELECT sysdate  
FROM dual;
```

	 SYSDATE
1	10-JUN-09

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

```
SELECT last_name, (SYSDATE-hire_date)/7 AS WEEKS  
FROM employees  
WHERE department_id = 90;
```

	LAST_NAME	WEEKS
1	King	1147.102432208994708994708994708995
2	Kochhar	1028.959575066137566137566137566138
3	De Haan	856.102432208994708994708994708995

Date-Manipulation Functions

Function	Result
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

Function	Result
MONTHS_BETWEEN ('01-SEP-95','11-JAN-94')	19.6774194
ADD_MONTHS ('31-JAN-96',1)	'29-FEB-96'
NEXT_DAY ('01-SEP-95','FRIDAY')	'08-SEP-95'
LAST_DAY ('01-FEB-95')	'28-FEB-95'

Using ROUND and TRUNC Functions with Dates

Assume SYSDATE = '25-JUL-03':

Function	Result
ROUND (SYSDATE, 'MONTH')	01-AUG-03
ROUND (SYSDATE , 'YEAR')	01-JAN-04
TRUNC (SYSDATE , 'MONTH')	01-JUL-03
TRUNC (SYSDATE , 'YEAR')	01-JAN-03

Quiz

Which of the following statements are true about single-row functions?

1. Manipulate data items
2. Accept arguments and return one value per argument
3. Act on each row that is returned
4. Return one result per set of rows
5. May not modify the data type
6. Can be nested
7. Accept arguments that can be a column or an expression

Summary

In this lesson, you should have learned how to:

- Perform calculations on data using functions
- Modify individual data items using functions