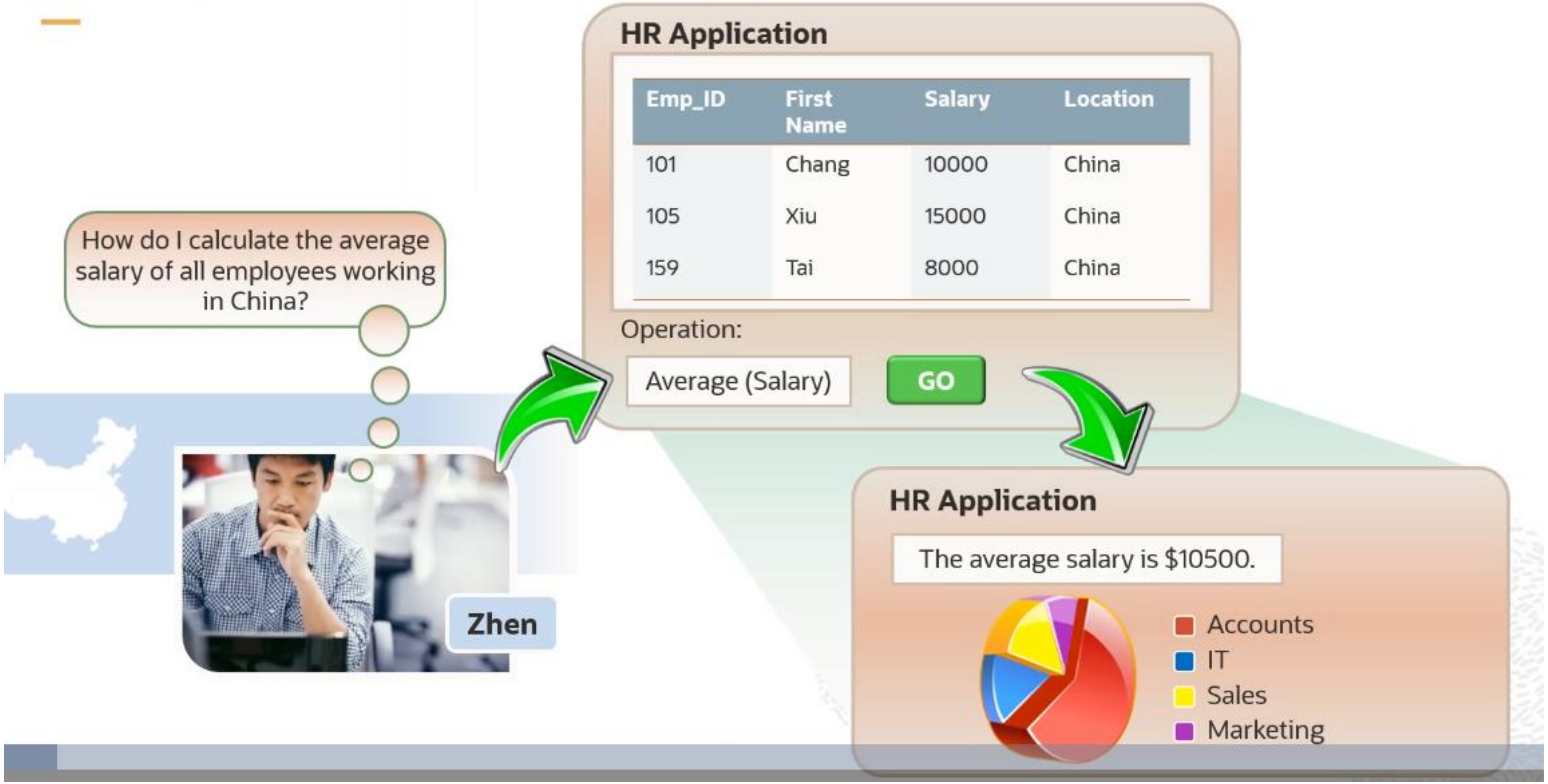
Using Single-Row Functions to Customize Output

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

HR Application Scenario


How do I calculate the average salary of all employees working in China?
Zhen
HR Application
Operation:
Average (Salary)
GO
HR Application

Emp_ID	First Name	Salary	Location
101	Chang	10000	China
105	Xiu	15000	China
159	Tai	8000	China

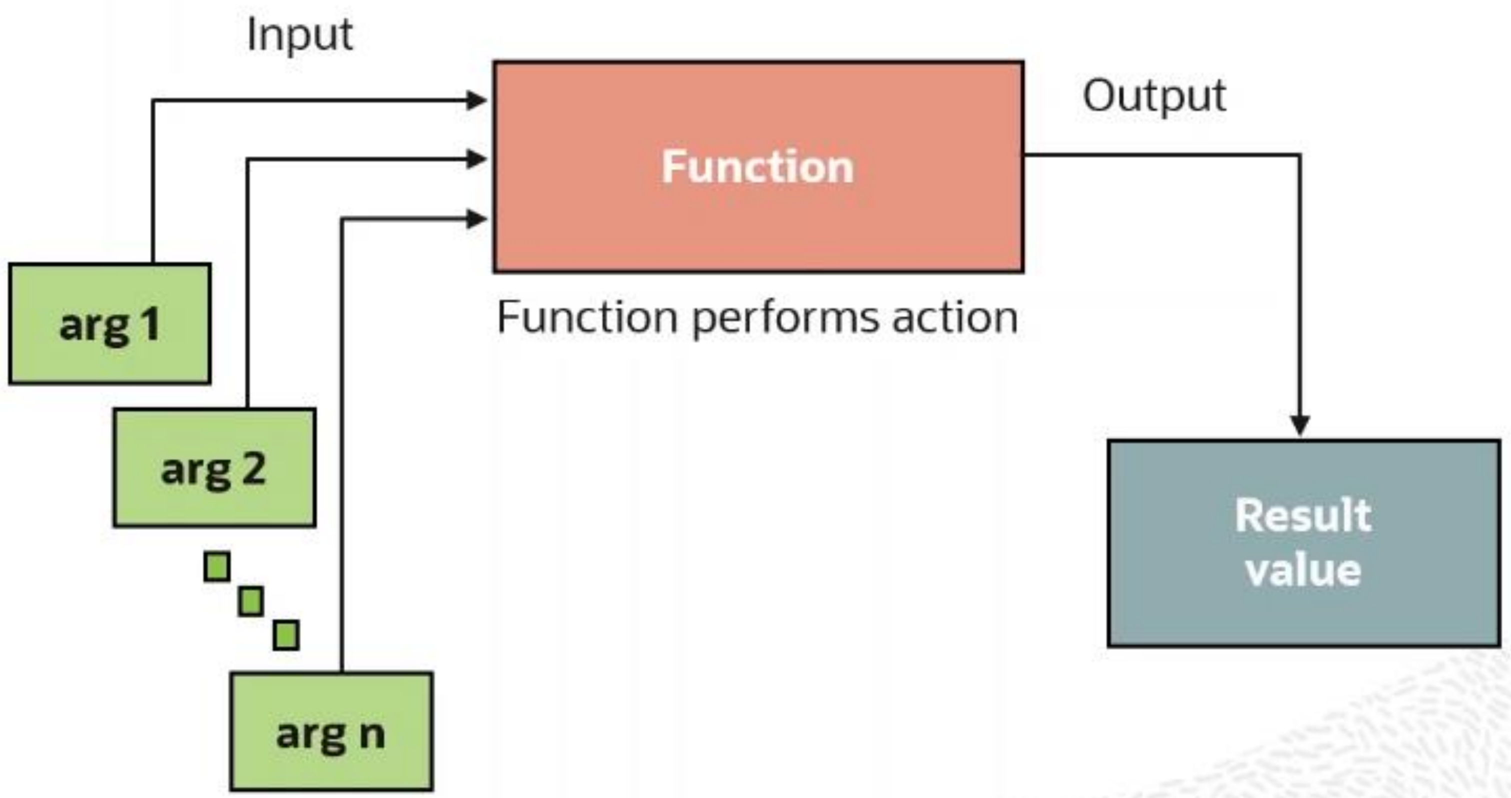
The average salary is $10500.

🟥	Accounts
🟦	IT
🟨	Sales
🟪	Marketing

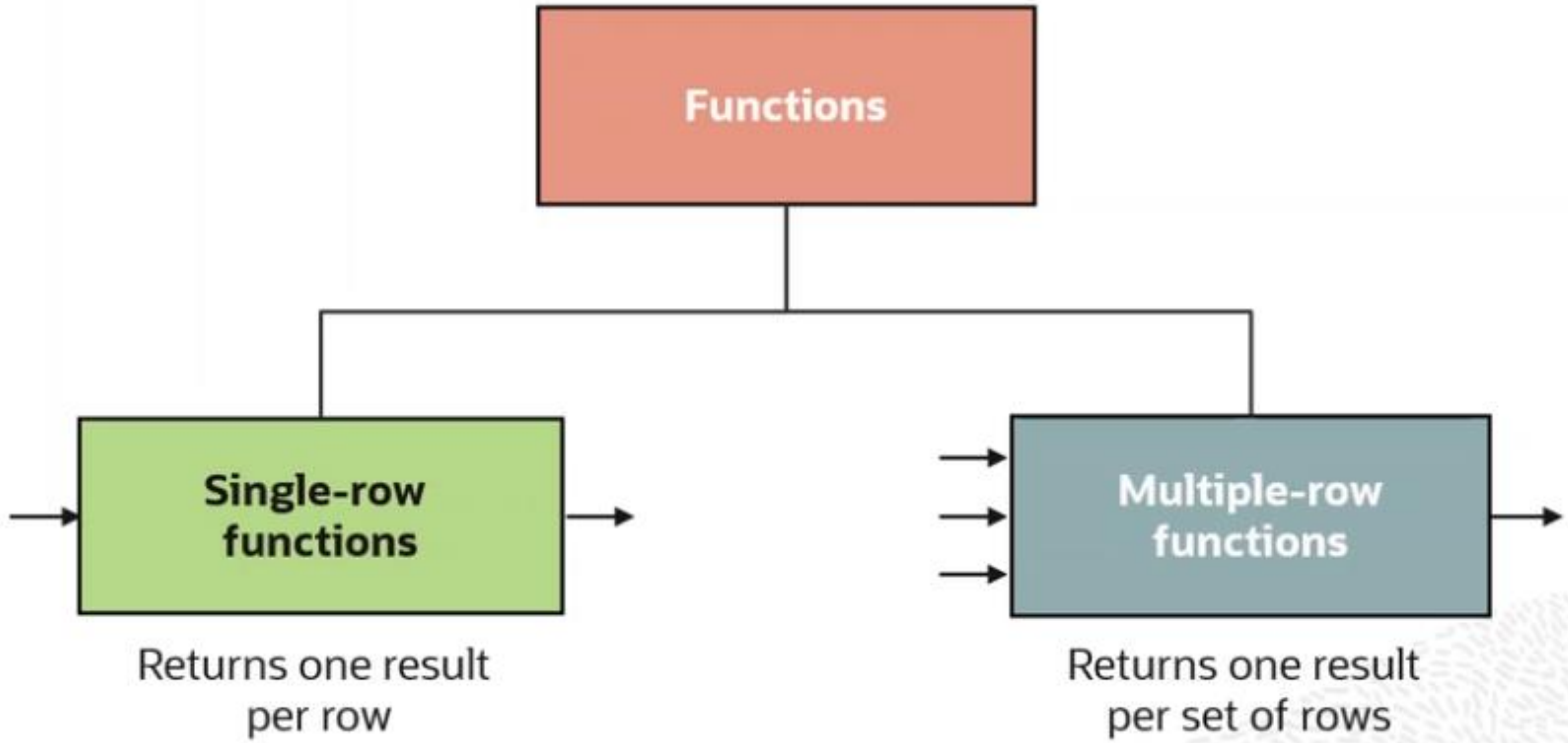
Lesson Agenda

- Single-row SQL functions
- Character functions
- Nesting functions
- Number functions

SQL Functions



Two Types of SQL Functions


Functions
Single-row functions
Multiple-row functions
Returns one result per row
Returns one result per set of rows

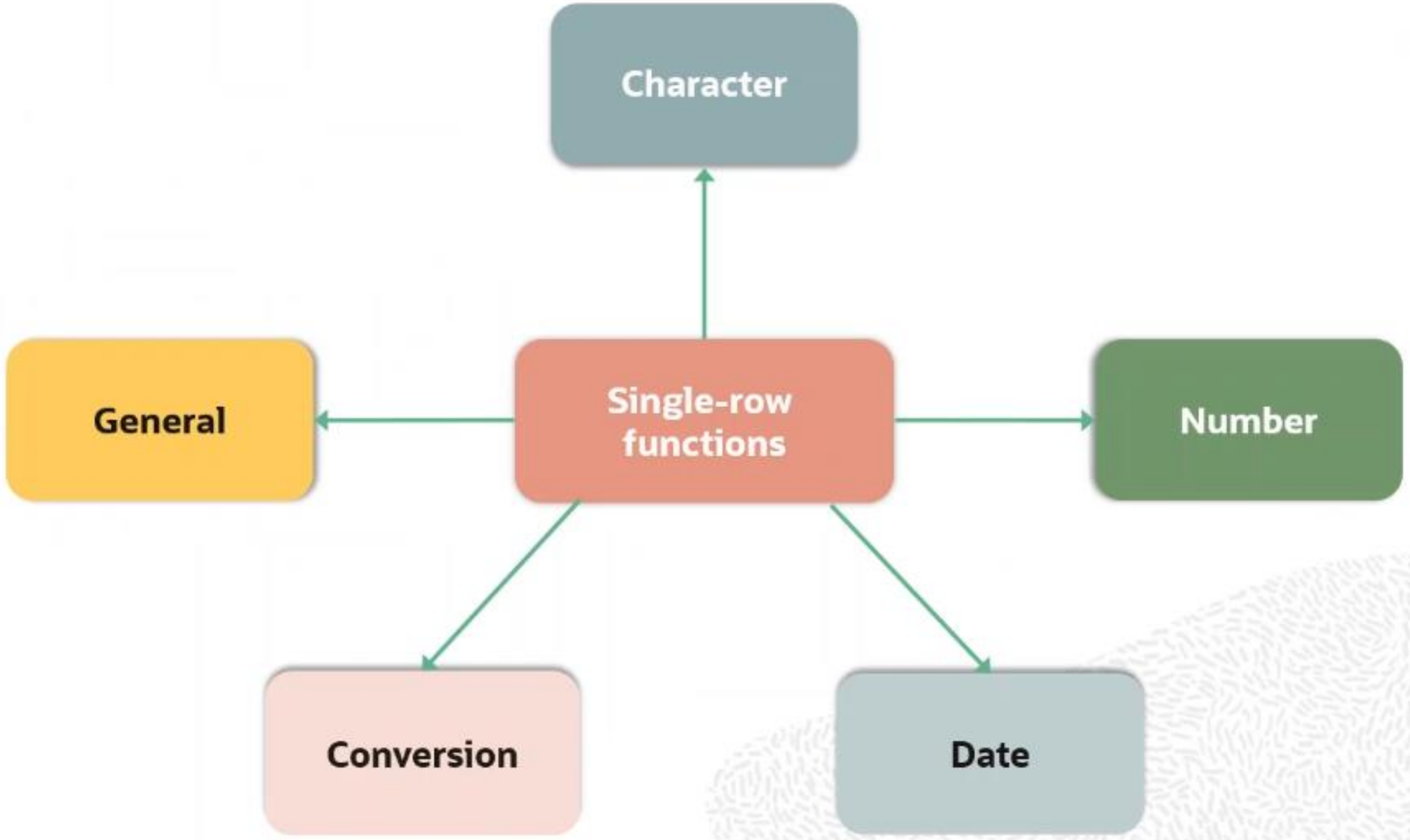
Single-Row Functions

Single-row functions:

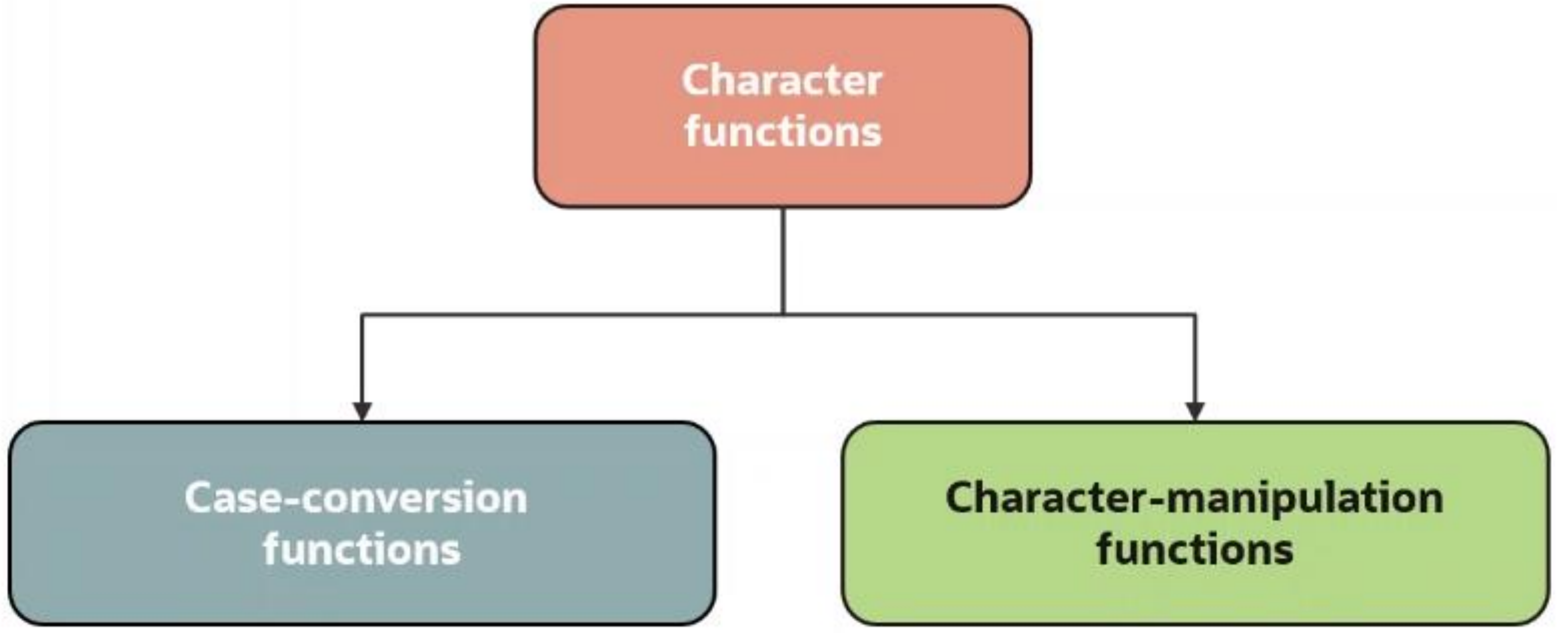
- Manipulate data items
- Accept arguments and return one value
- Act on each row that is returned
- Return one result per row
- Might modify the data type
- Can be nested
- Accept arguments that can be a column or an expression

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

Single-Row Functions



Character Functions



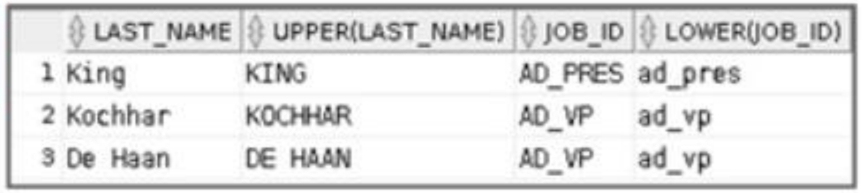
```
LOWER
UPPER
INITCAP (Oracle)
```

```
CONCAT
SUBSTR
LENGTH
INSTR
LPAD | RPAD
TRIM
REPLACE
```

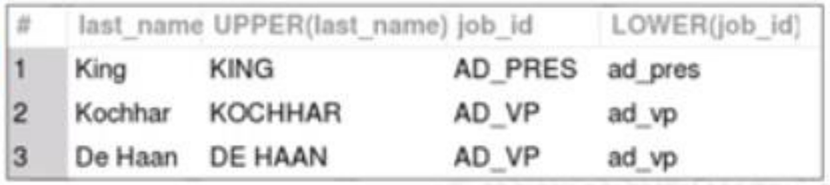
Case-Conversion Functions

You can use the `LOWER` and `UPPER` functions to convert the case of character strings. For example:

```
SELECT last_name, UPPER(last_name), job_id, LOWER(job_id)
FROM   employees
WHERE  department_id = 90;
```



	LAST_NAME	UPPER(LAST_NAME)	JOB_ID	LOWER(JOB_ID)
1	King	KING	AD_PRES	ad_pres
2	Kochhar	KOCHHAR	AD_VP	ad_vp
3	De Haan	DE HAAN	AD_VP	ad_vp



#	last_name	UPPER(last_name)	job_id	LOWER(job_id)
1	King	KING	AD_PRES	ad_pres
2	Kochhar	KOCHHAR	AD_VP	ad_vp
3	De Haan	DE HAAN	AD_VP	ad_vp

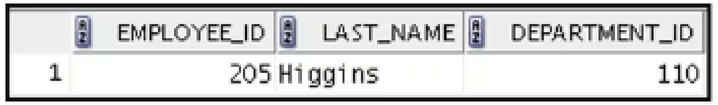
Using Case-Conversion Functions in `WHERE` Clauses in Oracle

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

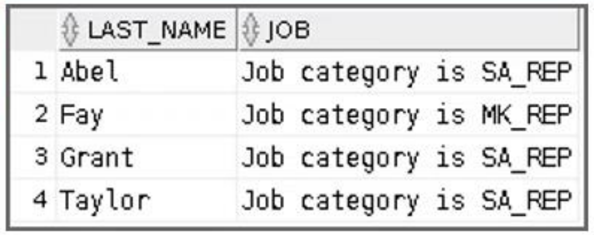
You can use these functions to manipulate character strings:

Function	Result
`CONCAT('Hello', 'World')`	`HelloWorld`
`SUBSTR('HelloWorld',1,5)`	`Hello`
`LENGTH('HelloWorld')`	`10`
`INSTR('HelloWorld', 'W')`	`6`
`LPAD(24000,10,'*')`	`*****24000`
`RPAD(24000, 10, '*')`	`24000*****`

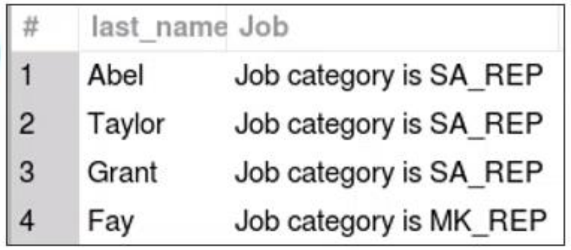
Using Character-Manipulation Functions

1

```
SELECT last_name, CONCAT('Job category is ', job_id)
AS Job FROM   employees
WHERE  SUBSTR(job_id, 4) = 'REP';
```



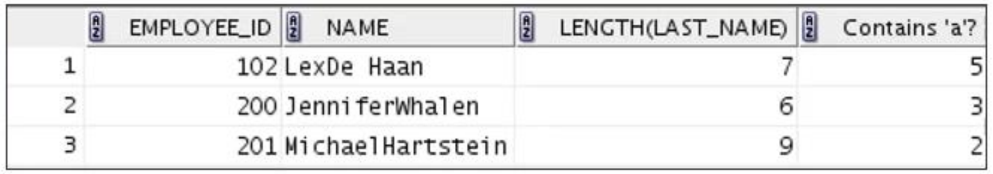
	LAST_NAME	JOB
1	Abel	Job category is SA_REP
2	Fay	Job category is MK_REP
3	Grant	Job category is SA_REP
4	Taylor	Job category is SA_REP



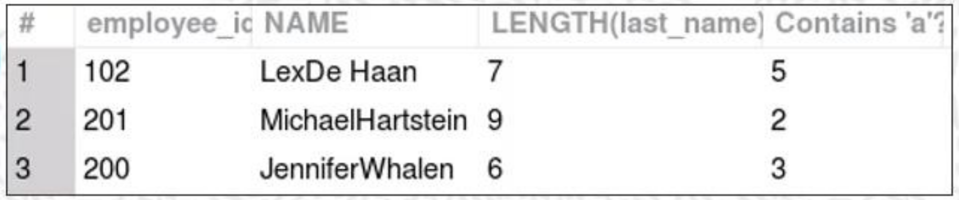
#	last_name	Job
1	Abel	Job category is SA_REP
2	Taylor	Job category is SA_REP
3	Grant	Job category is SA_REP
4	Fay	Job category is MK_REP

2

```
SELECT employee_id, CONCAT(first_name, last_name) NAME,
LENGTH(last_name), INSTR(last_name, 'a') "Contains 'a'?"
FROM   employees
WHERE  SUBSTR(last_name, -1, 1) = 'n';
```



	EMPLOYEE_ID	NAME	LENGTH(LAST_NAME)	Contains 'a'?
1	102	LexDe Haan	7	5
2	200	JenniferWhalen	6	3
3	201	MichaelHartstein	9	2



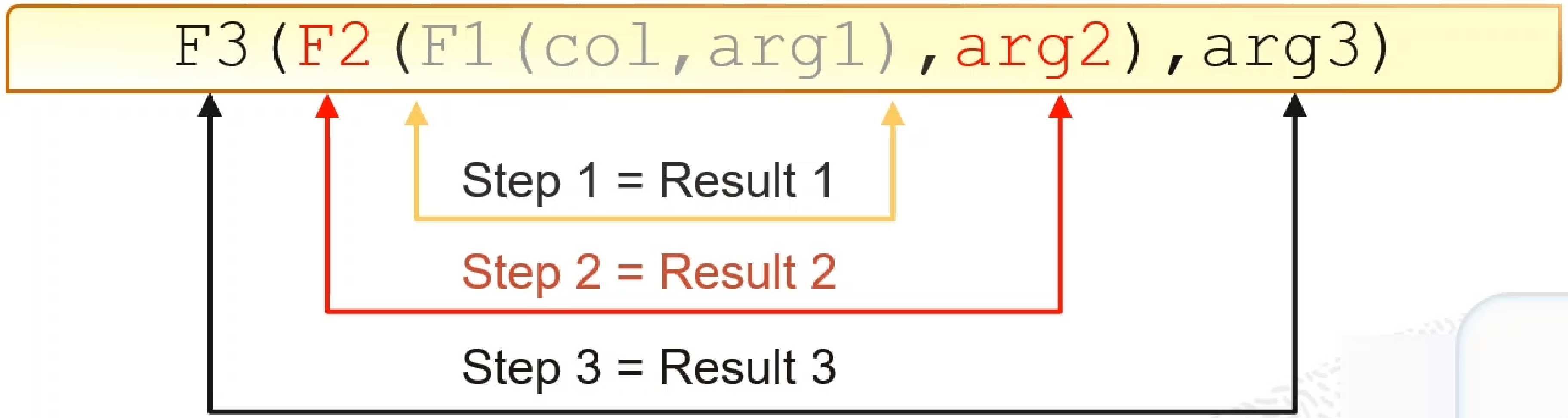
#	employee_ic	NAME	LENGTH(last_name)	Contains 'a'?
1	102	LexDe Haan	7	5
2	201	MichaelHartstein	9	2
3	200	JenniferWhalen	6	3

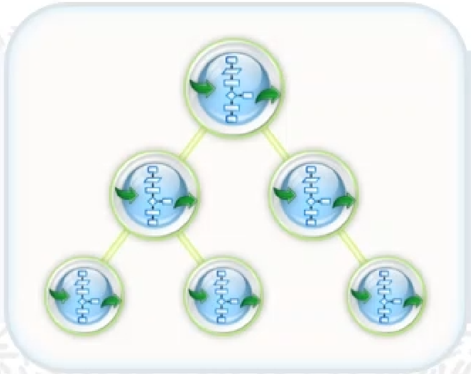
Lesson Agenda

- Single-row SQL functions
- Character functions
- Nesting functions

Nesting Functions

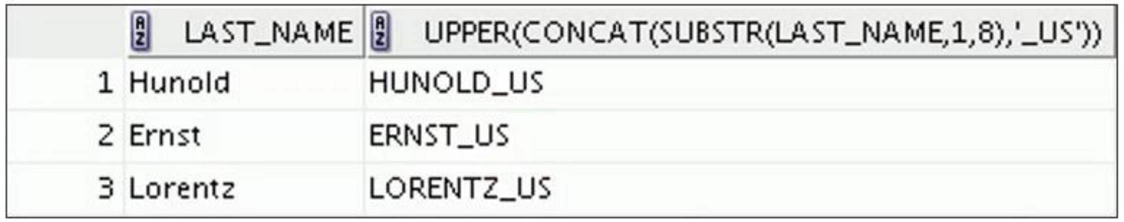
- Single-row functions can be nested to any level.
- Nested functions are evaluated from the deepest level to the least deep level.



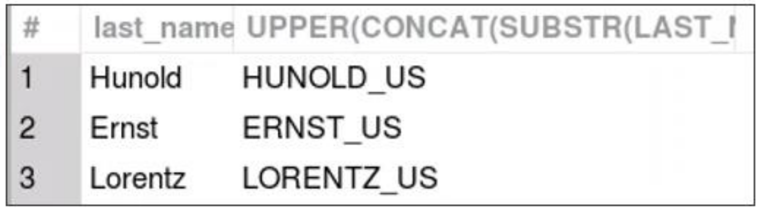


Nesting Functions: Example

```
SELECT last_name,
  UPPER(CONCAT(SUBSTR(LAST_NAME, 1, 8), '_US'))
FROM   employees
WHERE  department_id = 60;
```



	LAST_NAME	UPPER(CONCAT(SUBSTR(LAST_NAME,1,8),'_US'))
1	Hunold	HUNOLD_US
2	Ernst	ERNST_US
3	Lorentz	LORENTZ_US



#	last_name	UPPER(CONCAT(SUBSTR(LAST_
1	Hunold	HUNOLD_US
2	Ernst	ERNST_US
3	Lorentz	LORENTZ_US

Lesson Agenda

- Single-row SQL functions
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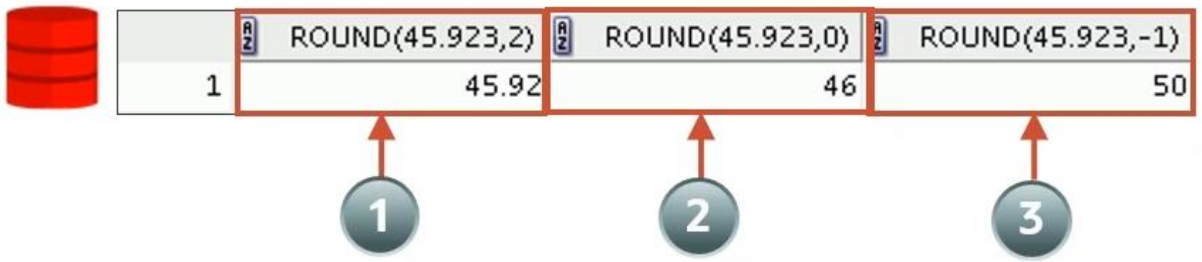
Numeric Functions

- `ROUND`: Rounds value to a specified decimal
- `TRUNC`: (Oracle) or `TRUNCATE`: (MySQL) Truncates value to a specified decimal
- `CEIL`: Returns the smallest whole number greater than or equal to a specified number
- `FLOOR`: Returns the largest whole number equal to or less than a specified number
- `MOD`: Returns remainder of division

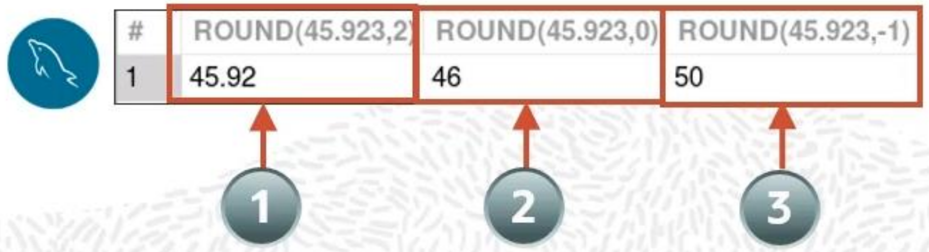
Function	Result
`ROUND(45.926, 2)`	45.93
`TRUNC(45.926, 2)`	45.92
`TRUNCATE(45.926, 2)`	45.92
`CEIL(2.83)`	3
`FLOOR(2.83)`	2
`MOD(1600, 300)`	100

Using the ROUND Function

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

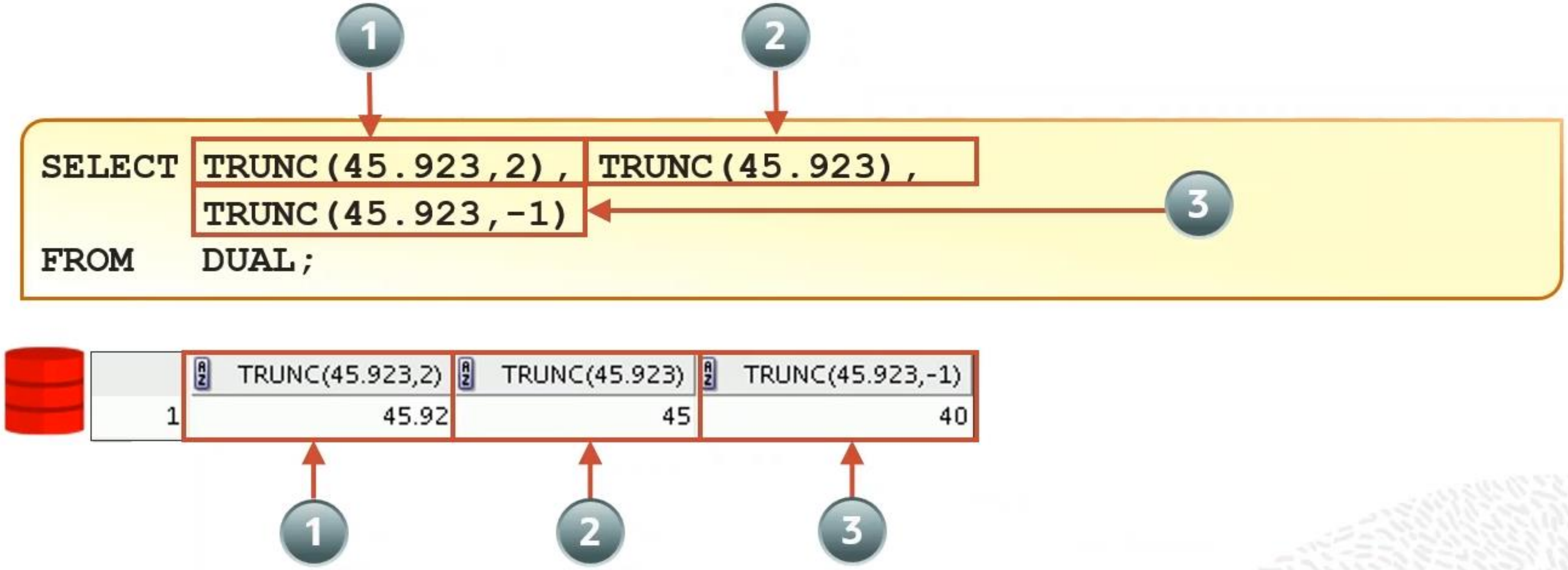


```
     ROUND(45.923,2)  ROUND(45.923,0)  ROUND(45.923,-1)
1              45.92               46                50
```



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

Using the TRUNC Function in Oracle



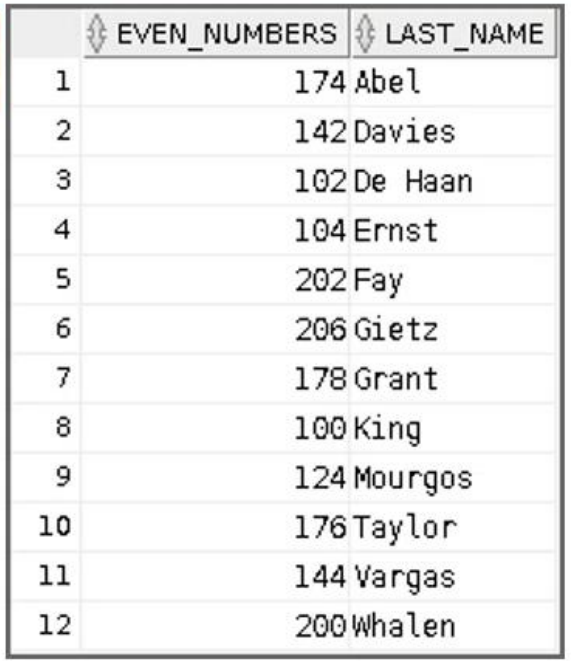
```
SELECT TRUNC(45.923,2), TRUNC(45.923),
       TRUNC(45.923,-1)
FROM   DUAL;
```

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

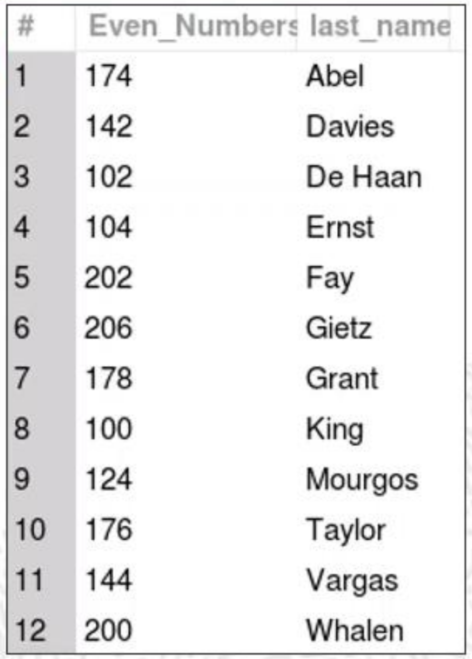
Using the MOD Function

Display the employee records where the employee_id is an even number:

```
SELECT employee_id AS Even_Numbers, last_name
FROM employees
WHERE MOD(employee_id,2) = 0;
```



	EVEN_NUMBERS	LAST_NAME
1	174	Abel
2	142	Davies
3	102	De Haan
4	104	Ernst
5	202	Fay
6	206	Gietz
7	178	Grant
8	100	King
9	124	Mourgos
10	176	Taylor
11	144	Vargas
12	200	Whalen

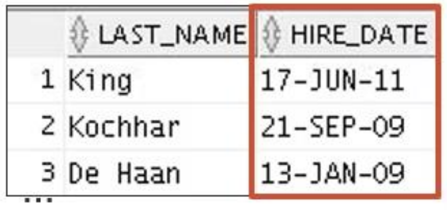


#	Even_Numbers	last_name
1	174	Abel
2	142	Davies
3	102	De Haan
4	104	Ernst
5	202	Fay
6	206	Gietz
7	178	Grant
8	100	King
9	124	Mourgos
10	176	Taylor
11	144	Vargas
12	200	Whalen

Working with Dates in Oracle Databases

- 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-2013';
```



	LAST_NAME	HIRE_DATE
1	King	17-JUN-11
2	Kochhar	21-SEP-09
3	De Haan	13-JAN-09

...