Session 2
Introduction to the Structured Query Language(SQL)

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Objectives

In this lessen we will see the following :

- History of SQL
- The Human Resource Schema
- The Basic SELECT Statement
- Arithmetic Operations
- Operator Precedence
- Column alias
- Concatenation Operations
- Eliminating Duplicate rows in Select

History of SQL

- Structured Query Language (SQL) is the set of statements with which all programs and users access data in an Oracle database.
- Dr. E. F. Codd published the paper, "A Relational Model of Data for Large Shared Data Banks", in June 1970 in the Association of Computer Machinery (ACM) journal.
- Dr. Codd's model is now accepted as the definitive model for relational database management systems (RDBMS)

History of SQL (Continued..)

- The language, Structured English Query Language (SEQUEL) was developed by IBM Corporation, to use Codd's model.

- SEQUEL later became SQL (still pronounced "sequel")

- In 1979, Relational Software, Inc. (now Oracle) introduced the first commercially available implementation of SQL.

- Today, SQL is accepted as the standard RDBMS language.

How SQL Works

- SQL provide benefits for all types of users, including application programmers, database administrators, managers, and end users.

- Technically speaking, SQL is a data sublanguage. The purpose of SQL is to provide an interface to a relational database such as Oracle Database, and all SQL statements are instructions to the database.

- It processes sets of data as groups rather than as individual units.

- It provides automatic navigation to the data.

Capabilities of SQL

SQL provides statements for a variety of tasks, including:

- Querying data
- Inserting, updating, and deleting rows in a table
- Creating, replacing, altering, and dropping objects
- Controlling access to the database and its objects
- Guaranteeing database consistency and integrity
- SQL unifies all of the preceding tasks in one consistent language.

Human Resource Schema

- **Human Resources (HR)**
- **In any company's human resource records, each employee has a unique employee id, email address, job identification number, salary, and manager. Some employees earn a commission in addition to their salary, which is also tracked.**
- **The company also tracks information about jobs within the organization.**
- **Each job has an identification number, job title, and a minimum and maximum salary range for the job. Some employees have been with the company for a long time and have held different jobs within the company.**

Human Resource Schema (continued..)

- When an employee switches jobs, the company records the start date and end date of the former job, the job identification number, and the department.
- The sample company is regionally diverse, so it tracks the locations of not only its warehouses but also of its departments.
- Each of the company's employees is assigned to a department. Each department is identified by a unique department id and a short name.
- Each department is associated with one location.
- Each location has a full address that includes the street address, postal code, city, state or province, and country code.

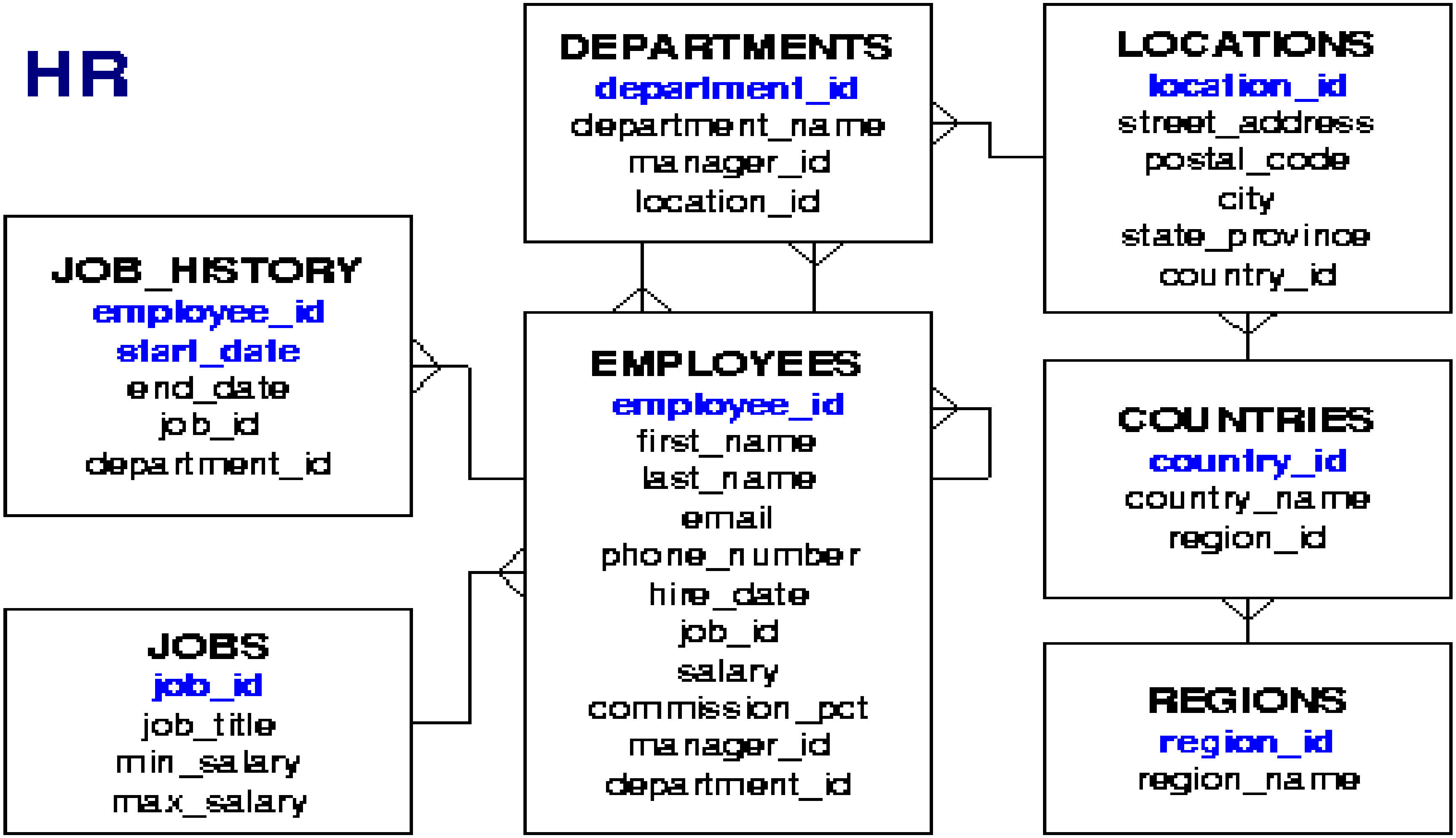
Human Resource Schema (continued..)

- **For each Country, where it has facilities, the company records the country name, currency symbol, currency name and the region where the county resides geographically.**

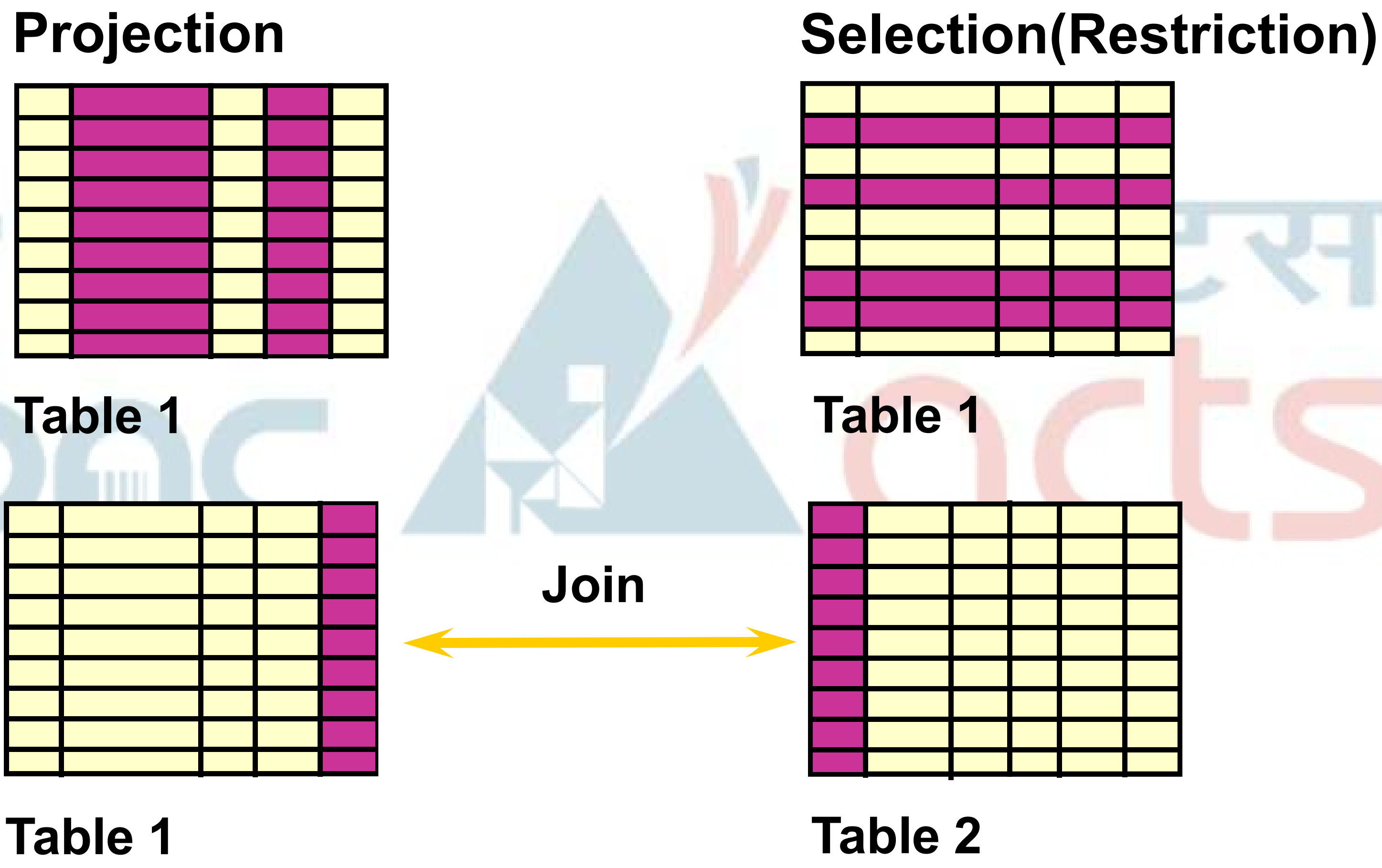
- **Following Slide will show the ER diagram for this HR schema.**

  [For illustrations of queries during this session and other DBT training sessions, we will be using this HR schema].

Entity relationship diagram of Human Resources



Capabilities of SQL `SELECT` Statements



Projection

Selection(Restriction)

Table 1

Table 1

Join

Table 1

Table 2

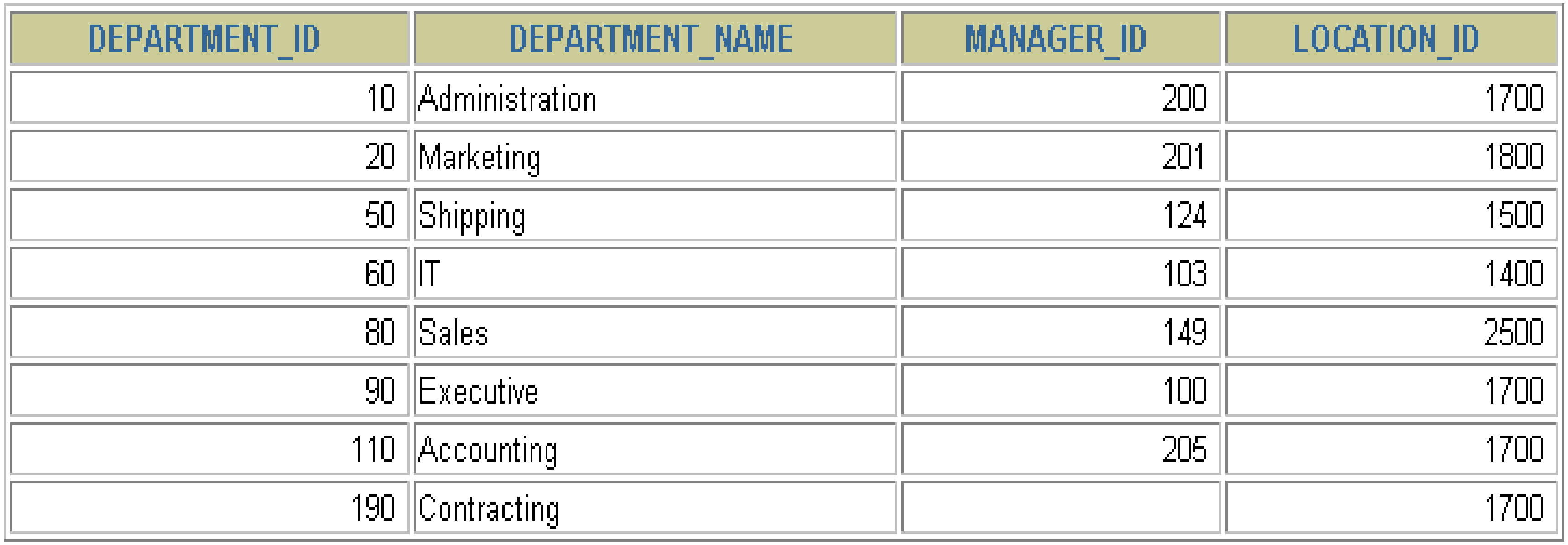
Basic SELECT Statement

```
SELECT *|
{[DISTINCT] column|expression [alias],...}
FROM   table;
```

- SELECT **identifies** ***what*** **columns**
- FROM **identifies** ***which*** **table**

Selecting All Columns

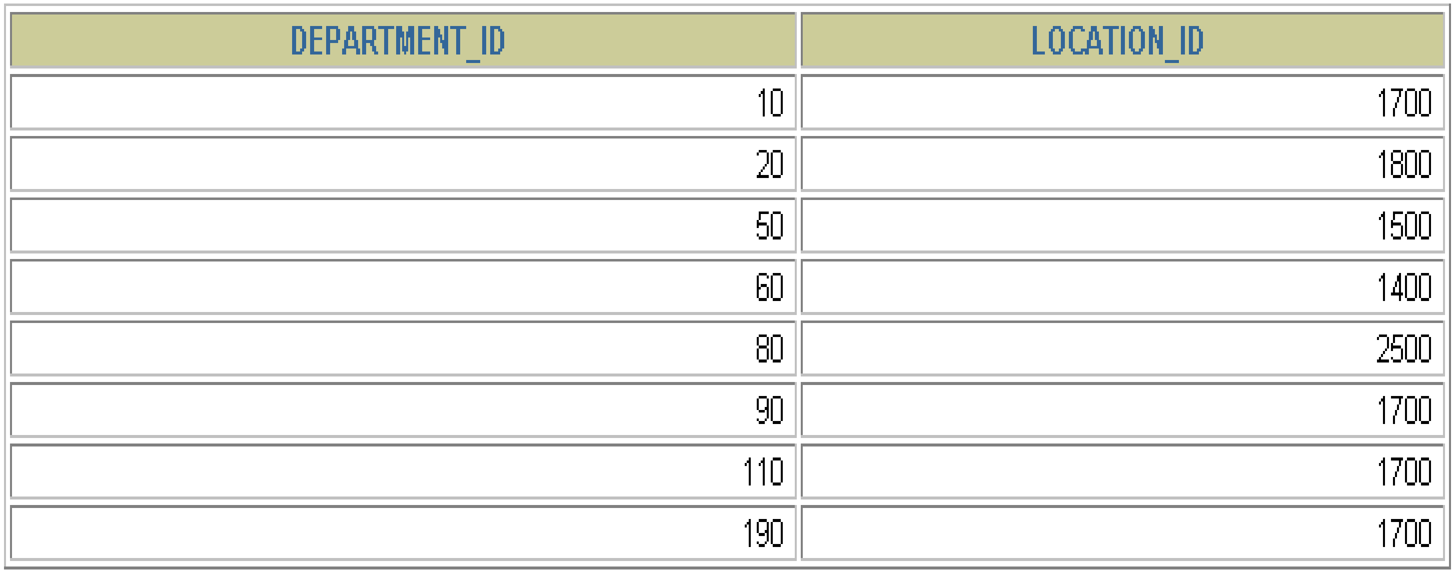
```
SELECT *
FROM   departments;
```



DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
50	Shipping	124	1500
60	IT	103	1400
80	Sales	149	2500
90	Executive	100	1700
110	Accounting	205	1700
190	Contracting		1700

Selecting Specific Columns

```
SELECT department_id, location_id
FROM   departments;
```



DEPARTMENT_ID	LOCATION_ID
10	1700
20	1800
50	1500
60	1400
80	2500
90	1700
110	1700
190	1700

Writing SQL Statements

- **SQL statements are not case sensitive.**
- **SQL statements can be on one or more lines.**
- **Keywords cannot be abbreviated or split across lines.**
- **Clauses are usually placed on separate lines.**
- **Indents are used to enhance readability.**

Arithmetic Expressions

Create expressions with number and date data by using arithmetic operators.

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide

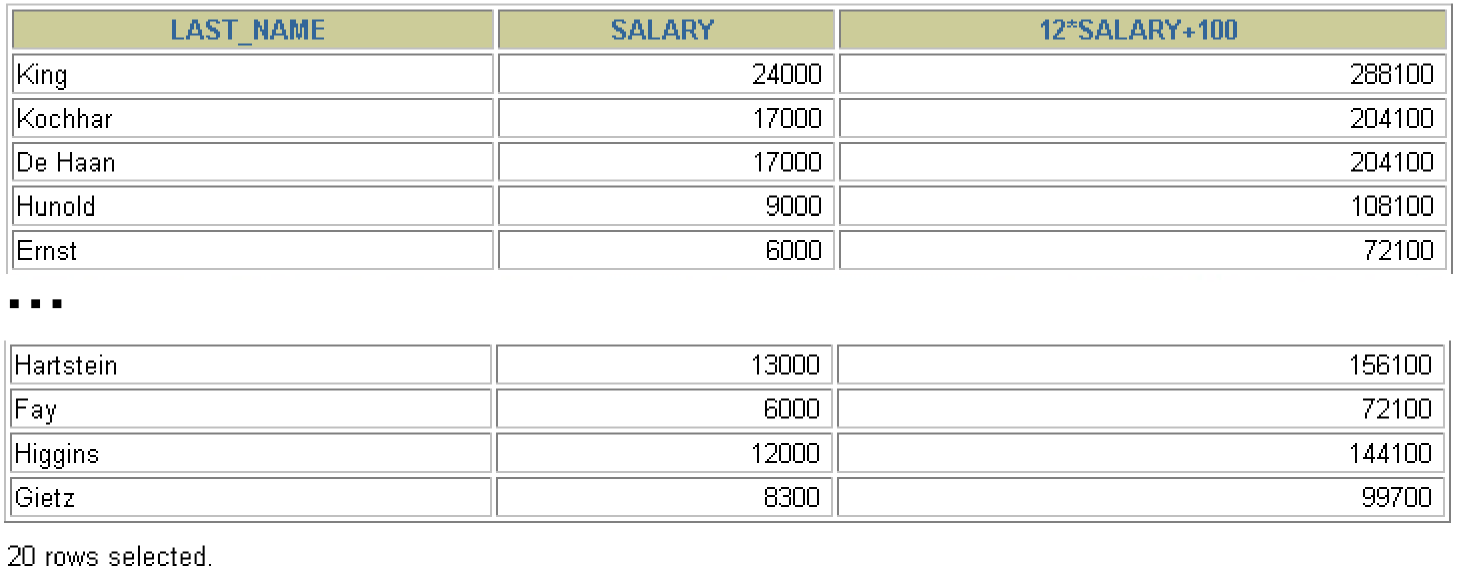
Operator Precedence

* / + –

- Multiplication and division take priority over addition and subtraction.
- Operators of the same priority are evaluated from left to right.
- Parentheses are used to force prioritized evaluation and to clarify statements.

Operator Precedence

```
SELECT last_name, salary, 12*salary+100
FROM   employees;
```



LAST_NAME	SALARY	12*SALARY+100
King	24000	288100
Kochhar	17000	204100
De Haan	17000	204100
Hunold	9000	108100
Ernst	6000	72100

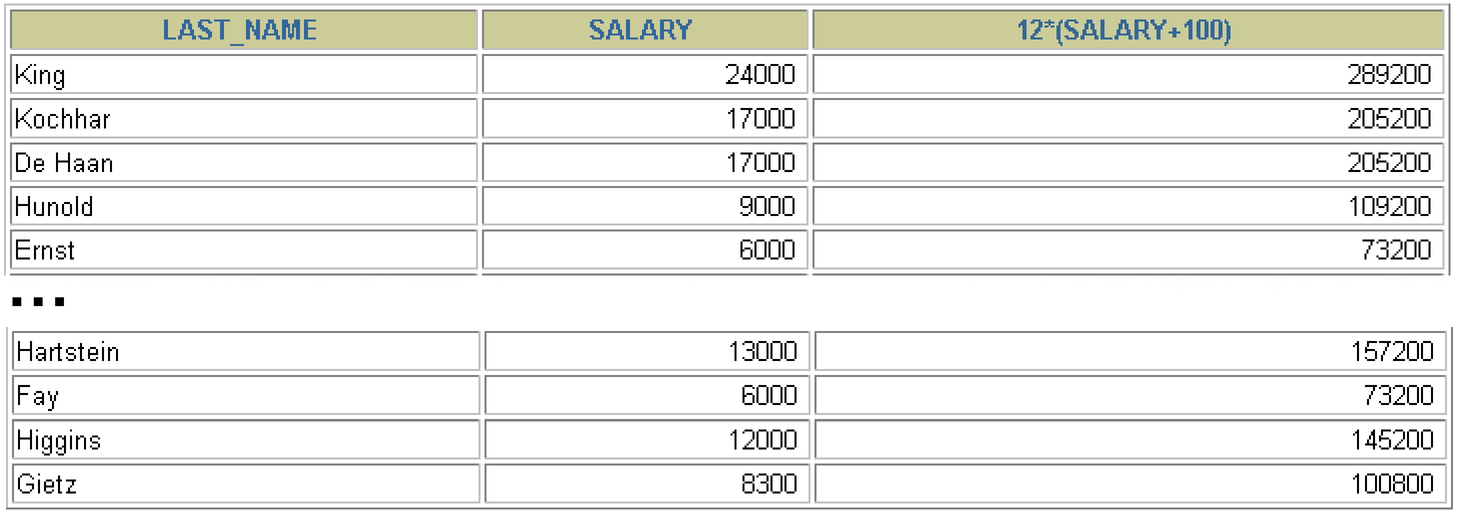
...

Hartstein	13000	156100
Fay	6000	72100
Higgins	12000	144100
Gietz	8300	99700

20 rows selected.

Using Parentheses

```
SELECT last_name, salary, 12*(salary+100)
FROM   employees;
```

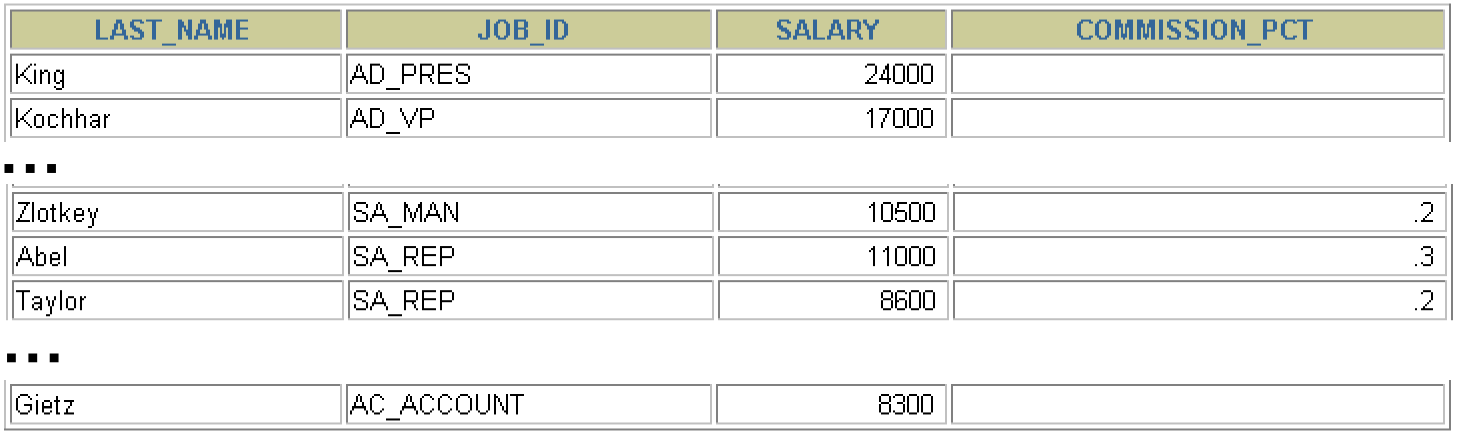


LAST_NAME	SALARY	12*(SALARY+100)
King	24000	289200
Kochhar	17000	205200
De Haan	17000	205200
Hunold	9000	109200
Ernst	6000	73200
...		
Hartstein	13000	157200
Fay	6000	73200
Higgins	12000	145200
Gietz	8300	100800

Defining a Null Value

- **A null is a value that is unavailable, unassigned, unknown, or inapplicable.**
- **A null is not the same as zero or a blank space.**

```
SELECT last_name, job_id, salary, commission_pct
FROM   employees;
```

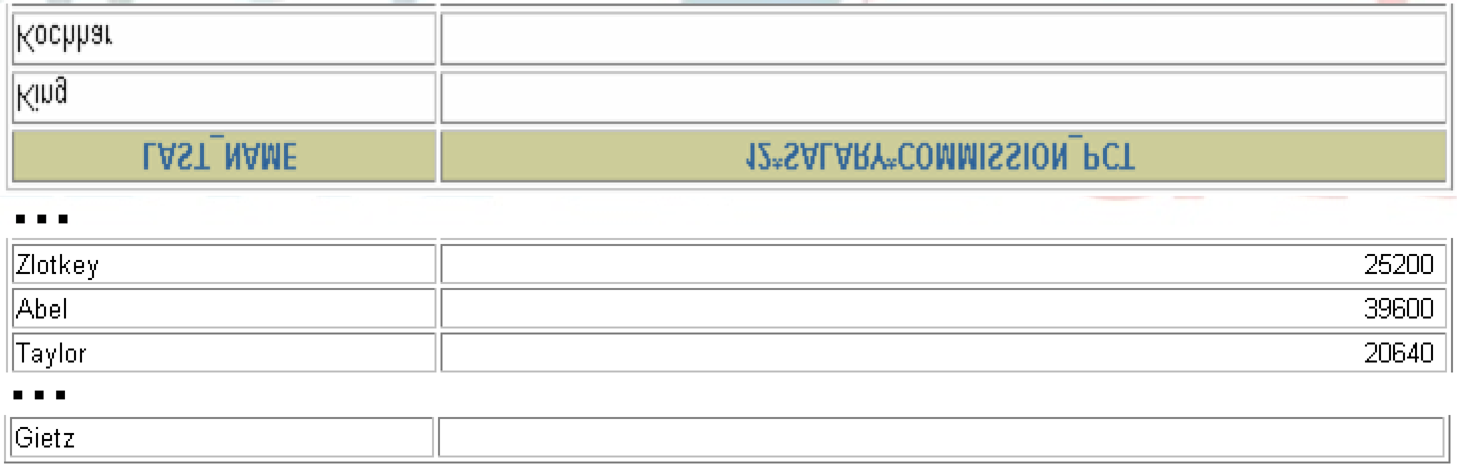


LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT
King	AD_PRES	24000	
Kochhar	AD_VP	17000	
…			
Zlotkey	SA_MAN	10500	.2
Abel	SA_REP	11000	.3
Taylor	SA_REP	8600	.2
…			
Gietz	AC_ACCOUNT	8300	

Null Values in Arithmetic Expressions

Arithmetic expressions containing a null value evaluate to null.

```
SELECT last_name, 12*salary*commission_pct
FROM   employees;
```



LAST_NAME	12*SALARY*COMMISSION_PCT
King	
Kochhar	
...	
Zlotkey	25200
Abel	39600
Taylor	20640
...	
Gietz	

20 rows selected.

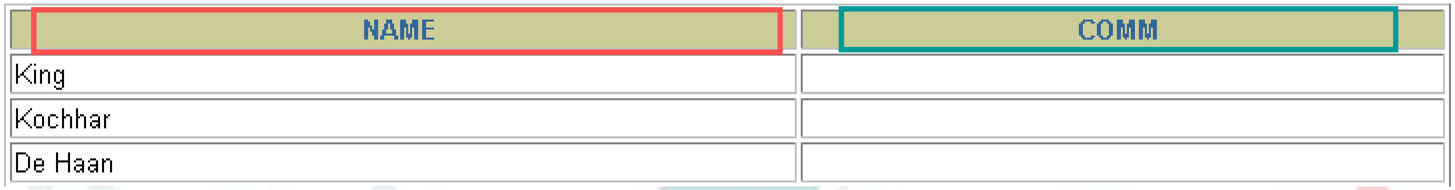
Defining a Column Alias

A column alias:

- Renames a column heading
- Is useful with calculations
- Immediately follows the column name - there can also be the optional AS keyword between the column name and alias
- Requires double quotation marks if it contains spaces or special characters or is case sensitive

Using Column Aliases

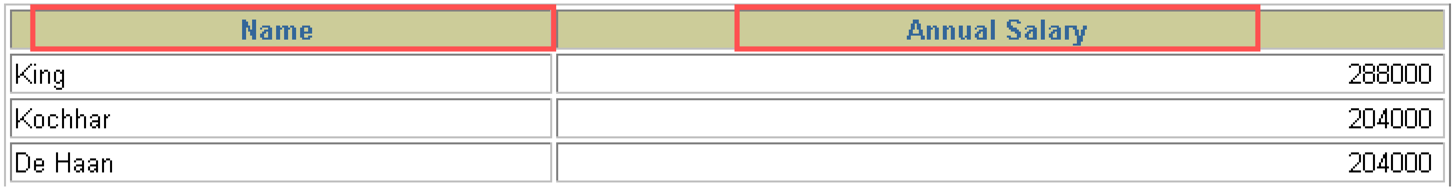
```
SELECT last_name AS name, commission_pct comm
FROM   employees;
```



NAME	COMM
King	
Kochhar	
De Haan	

…

```
SELECT last_name  “Name”,
        salary*12 "Annual Salary"
FROM   employees;
```



Name	Annual Salary
King	288000
Kochhar	204000
De Haan	204000

…

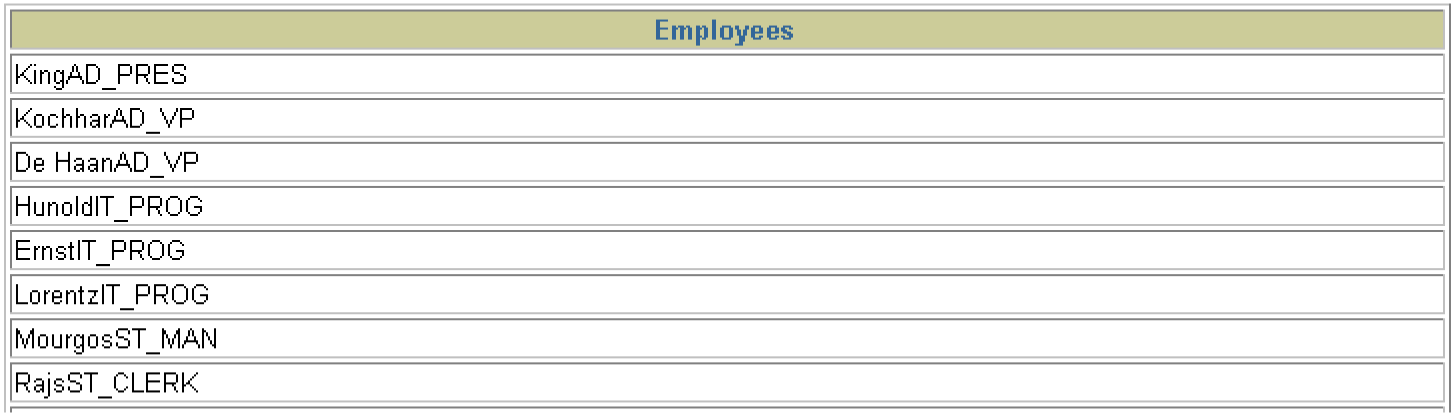
Concatenation Operator

A concatenation operator:

- Concatenates columns or character strings to other columns
- Is represented by two vertical bars (||)
- Creates a resultant column that is a character expression

Using the Concatenation Operator

```
SELECT last_name||job_id AS "Employees"
FROM   employees;
```



Employees
KingAD_PRES
KochharAD_VP
De HaanAD_VP
HunoldIT_PROG
ErnstIT_PROG
LorentzIT_PROG
MourgosST_MAN
RajsST_CLERK

...

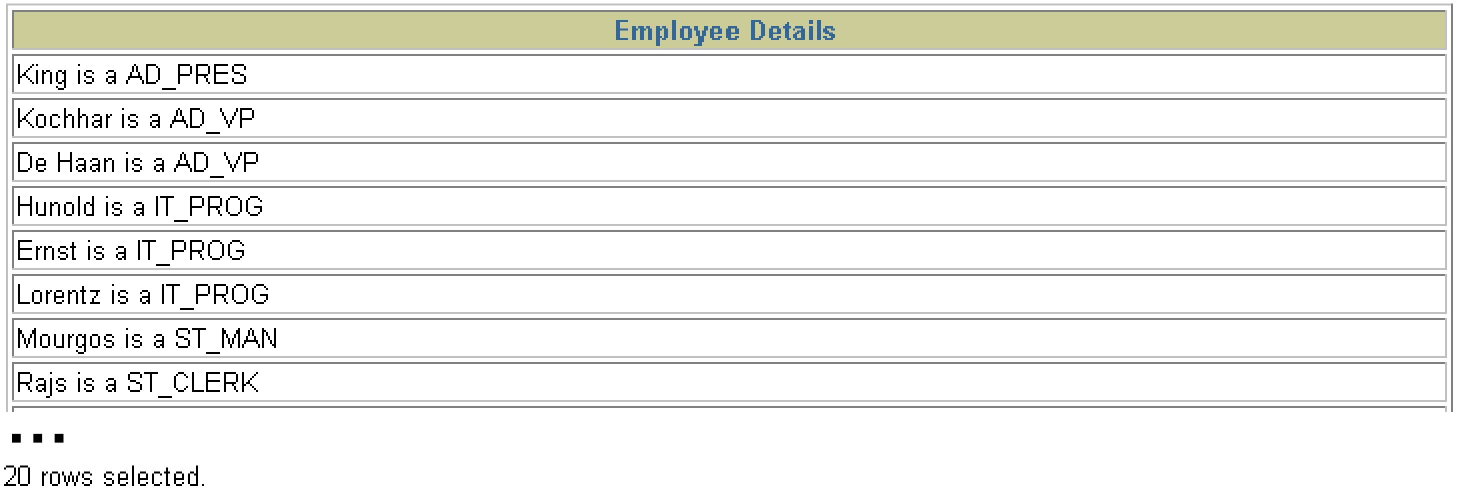
20 rows selected.

Literal Character Strings

- A literal is a character, a number, or a date included in the SELECT list.
- Date and character literal values must be enclosed within single quotation marks.
- Each character string is output once for each
  row returned.

Using Literal Character Strings

```
SELECT last_name    ||' is a '||job_id
       AS "Employee Details"
FROM   employees;
```



Employee Details
King is a AD_PRES
Kochhar is a AD_VP
De Haan is a AD_VP
Hunold is a IT_PROG
Ernst is a IT_PROG
Lorentz is a IT_PROG
Mourgos is a ST_MAN
Rajs is a ST_CLERK

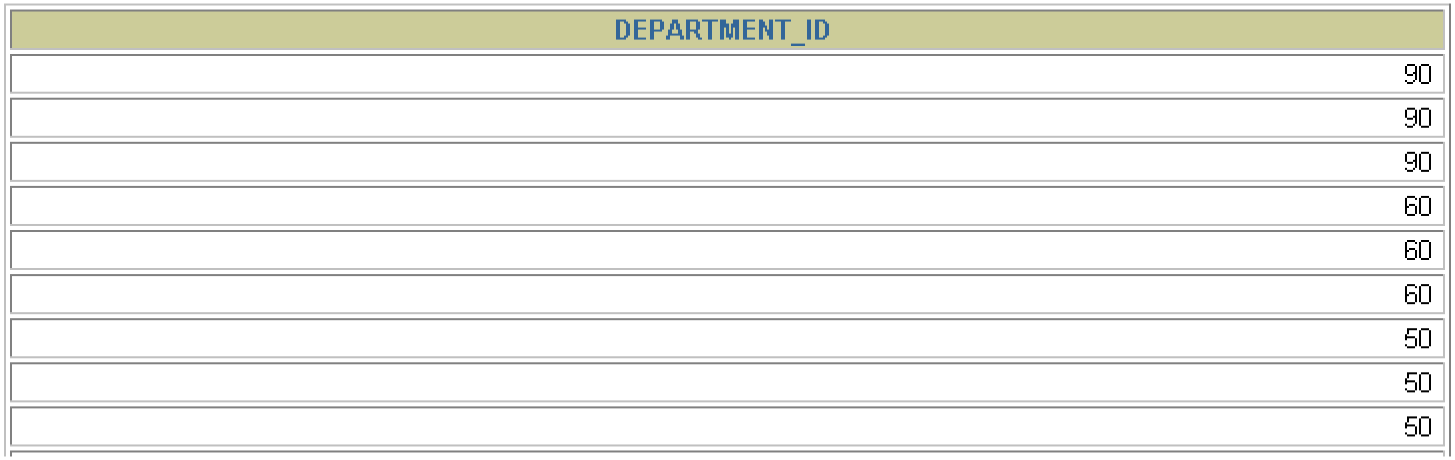
…

20 rows selected.

Duplicate Rows

The default display of queries is all rows, including duplicate rows.

```
SELECT department_id
FROM   employees;
```



DEPARTMENT_ID
90
90
90
60
60
60
50
50
50

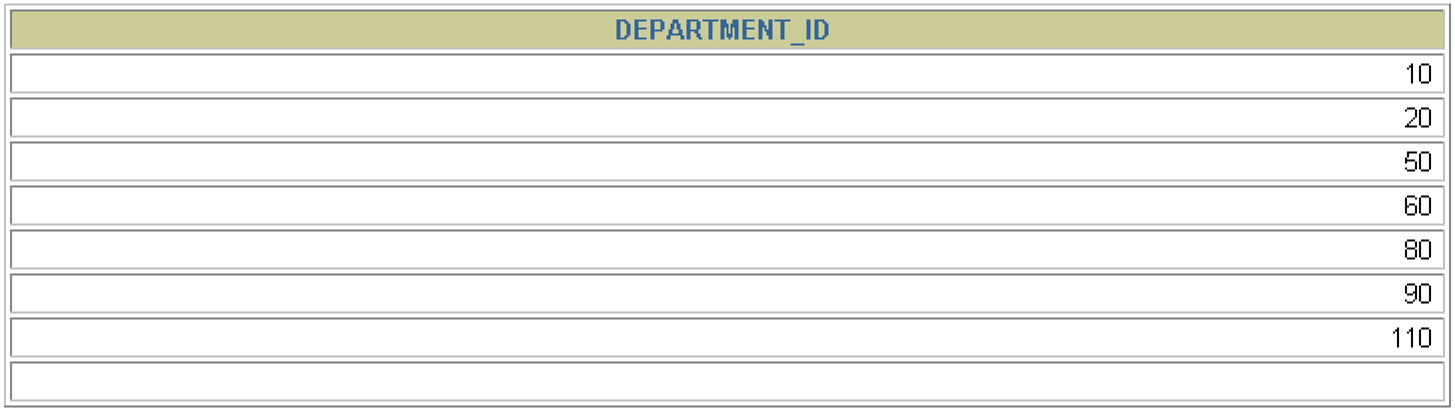
...

20 rows selected.

Eliminating Duplicate Rows

Eliminate duplicate rows by using the `DISTINCT` keyword in the `SELECT` clause.

```
SELECT DISTINCT department_id
FROM   employees;
```



DEPARTMENT_ID
10
20
50
60
80
90
110

8 rows selected.

Summary

In this lesson, you should have learned how to:

- Write a `SELECT` statement that:
  - Returns all rows and columns from a table
  - Returns specified columns from a table
  - Uses column aliases to give descriptive column headings

```
SELECT *|
       {[DISTINCT] column|
        expression [alias],...}
FROM   table;
```

Thank You !