

Retrieving Data Using the SQL `SELECT` Statement

Objectives

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

- **List the capabilities of SQL `SELECT` statements**
- **Execute a basic `SELECT` statement**
- **Differentiate between SQL statements and *iSQL*Plus* commands**

Capabilities of SQL `SELECT` Statements

Projection

Table 1

Selection

Table 1

Table 1

Join



Table 2

Basic SELECT Statement

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

- **SELECT** identifies the columns to be displayed
- **FROM** identifies the table containing those columns

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

8 rows selected.

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

8 rows selected.

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.**
- **In *iSQL*Plus*, SQL statements can optionally be terminated by a semicolon (;). Semicolons are required if you execute multiple SQL statements.**
- **In *SQL*plus*, you are required to end each SQL statement with a semicolon (;).**

Column Heading Defaults

- ***i*SQL*Plus:**
 - Default heading alignment: **Center**
 - Default heading display: **Uppercase**
- **SQL*Plus:**
 - **Character and Date column headings are left-aligned**
 - **Number column headings are right-aligned**
 - **Default heading display: Uppercase**

Arithmetic Expressions

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

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide

Using Arithmetic Operators

```
SELECT last_name, salary, salary + 300  
FROM employees;
```

LAST_NAME	SALARY	SALARY+300
King	24000	24300
Kochhar	17000	17300
De Haan	17000	17300
Hunold	9000	9300
Ernst	6000	6300

20 rows selected.

Operator Precedence

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

1

LAST_NAME	SALARY	12*SALARY+100
King	24000	288100
Kochhar	17000	204100
De Haan	17000	204100

20 rows selected.

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

2

LAST_NAME	SALARY	12*(SALARY+100)
King	24000	289200
Kochhar	17000	205200
De Haan	17000	205200

20 rows selected.

Defining a Null Value

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

20 rows selected.

Null Values in Arithmetic Expressions

Arithmetic expressions containing a null value evaluate to null.

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

Kochner	
Klug	
LAST_NAME	12*SALARY*COMMISSION_PCT
...	
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 if it is case-sensitive**

Using Column Aliases

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

NAME	COMM
King	
Kochhar	
De Haan	

...

20 rows selected.

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

Name	Annual Salary
King	288000
Kochhar	204000
De Haan	204000

...

20 rows selected.

Concatenation Operator

A concatenation operator:

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

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

Employees
KingAD_PRES
KochharAD_VP
De HaanAD_VP
...

20 rows selected.

Literal Character Strings

- **A literal is a character, a number, or a date that is included in the `SELECT` statement.**
- **Date and character literal values must be enclosed by 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.

Alternative Quote (q) Operator

- Specify your own quotation mark delimiter
- Choose any delimiter
- Increase readability and usability

```
SELECT department name ||  
       q'[, it's assigned Manager Id: ]'  
       || manager_id  
       AS "Department and Manager"  
FROM departments;
```

Department and Manager

Administration, it's assigned manager ID: 200

Marketing, it's assigned manager ID: 201

Shipping, it's assigned manager ID: 124

...

8 rows selected.

Duplicate Rows

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

```
SELECT department_id  
FROM employees;
```

1

DEPARTMENT_ID
90
90
90

...

20 rows selected.

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

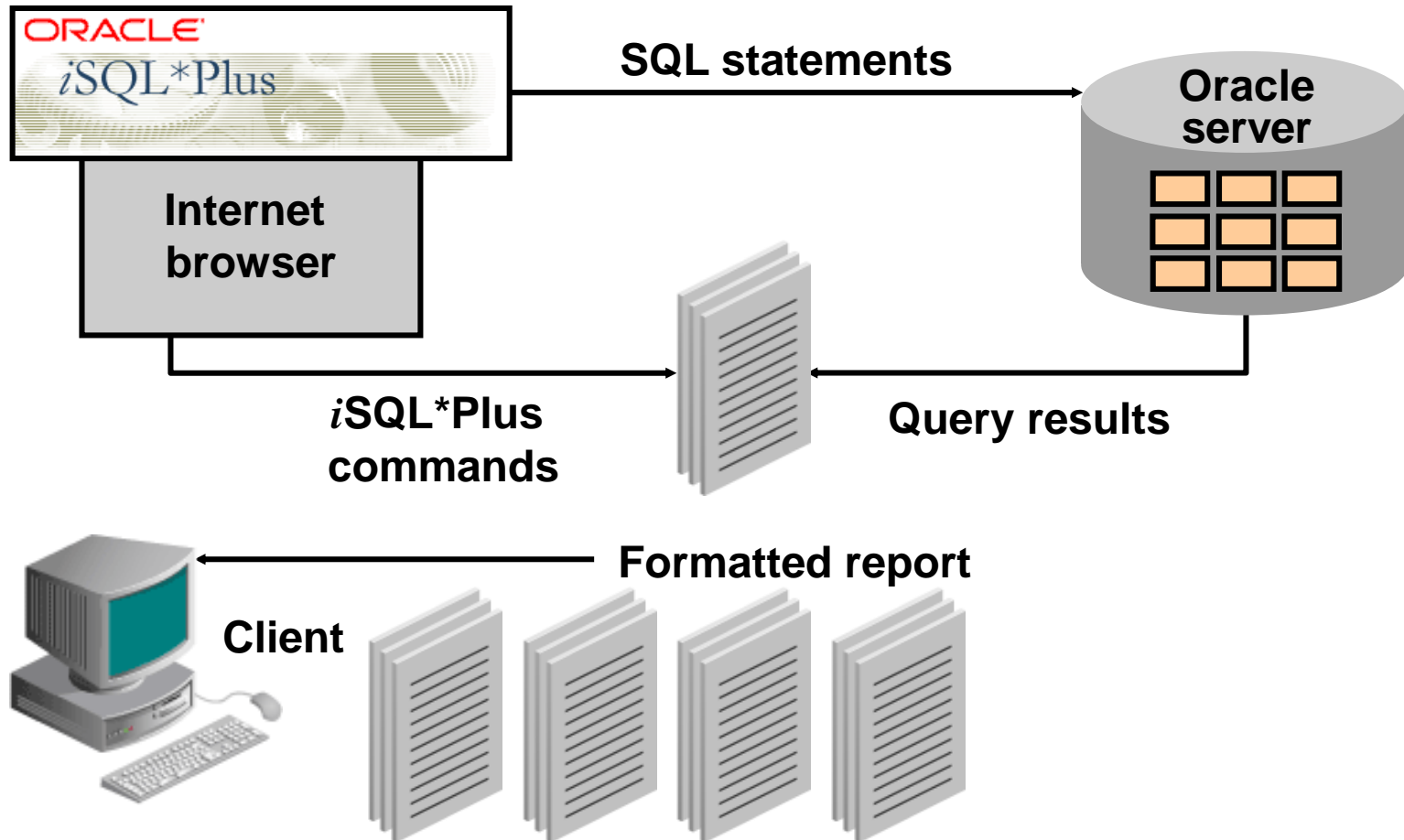
2

DEPARTMENT_ID
10
20
50

...

8 rows selected.

SQL and *iSQL*Plus* Interaction



SQL Statements Versus *i*SQL*Plus Commands

SQL

- A language
- ANSI standard
- Keyword cannot be abbreviated
- Statements manipulate data and table definitions in the database

**SQL
statements**

*i*SQL*Plus

- An environment
- Oracle-proprietary
- Keywords can be abbreviated
- Commands do not allow manipulation of values in the database
- Runs on a browser
- Centrally loaded; does not have to be implemented on each machine

***i*SQL*Plus
commands**

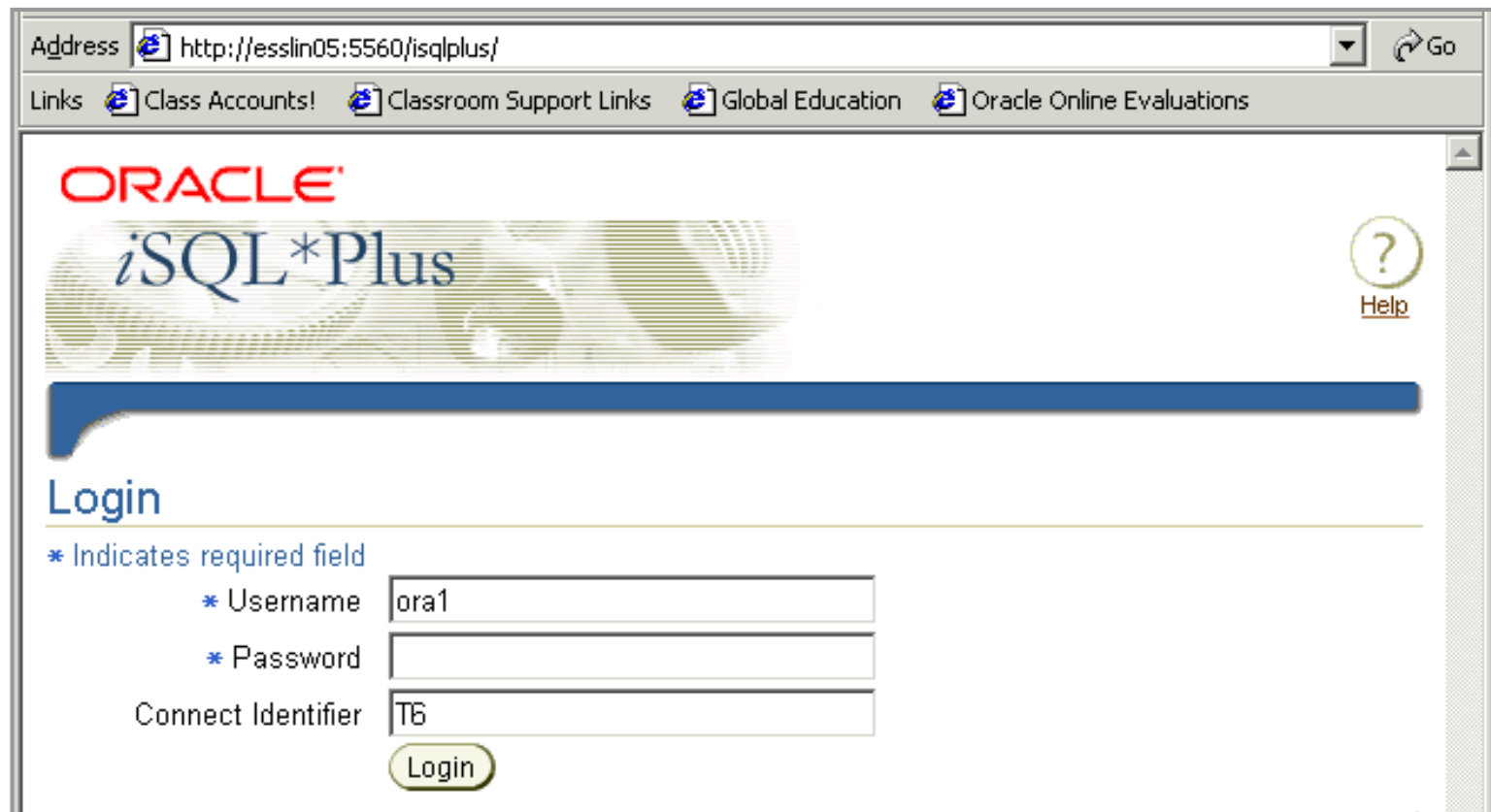
Overview of *iSQL*Plus*

After you log in to *iSQL*Plus*, you can:

- Describe table structures
- Enter, execute, and edit SQL statements
- Save or append SQL statements to files
- Execute or edit statements that are stored in saved script files

Logging In to *i*SQL*Plus

From your browser environment:



The screenshot shows a browser window with the address bar containing `http://esslin05:5560/isqlplus/`. Below the address bar is a links bar with four items: "Class Accounts!", "Classroom Support Links", "Global Education", and "Oracle Online Evaluations". The main content area features the Oracle logo in red, followed by the text "iSQL*Plus" in a blue serif font. To the right of the text is a circular help icon with a question mark and the word "Help" below it. Below this is a blue horizontal bar. Underneath the bar is the heading "Login" in blue. A legend indicates that an asterisk (*) denotes a required field. The login form consists of three input fields: "Username" with the value "ora1", "Password" (empty), and "Connect Identifier" with the value "T6". A "Login" button is positioned below the "Connect Identifier" field.

Address <http://esslin05:5560/isqlplus/> Go

Links [Class Accounts!](#) [Classroom Support Links](#) [Global Education](#) [Oracle Online Evaluations](#)

ORACLE
*i*SQL*Plus [Help](#)

Login

* Indicates required field

* Username

* Password

Connect Identifier

iSQL*Plus Environment

The screenshot displays the Oracle iSQL*Plus interface. At the top left, the Oracle logo and 'iSQL*Plus' text are visible. On the right side of the top bar, there are three icons: a key for 'Logout' (labeled 7), a person for 'Preferences' (labeled 8), and a question mark for 'Help' (labeled 9). Below these icons are two tabs: 'Workspace' (active) and 'History'. The connection status 'Connected as ORA1@T6' is shown on the right. The main area is titled 'Workspace' and contains a text input field with the prompt 'Enter SQL, PL/SQL and SQL*Plus statements.' (labeled 1). To the right of the input field is a 'Clear' button (labeled 6). Below the input field are four buttons: 'Execute' (labeled 2), 'Load Script' (labeled 3), 'Save Script' (labeled 4), and 'Cancel' (labeled 5).

Displaying Table Structure

Use the *iSQL*Plus* DESCRIBE command to display the structure of a table:

```
DESC[RIBE] tablename
```

Displaying Table Structure

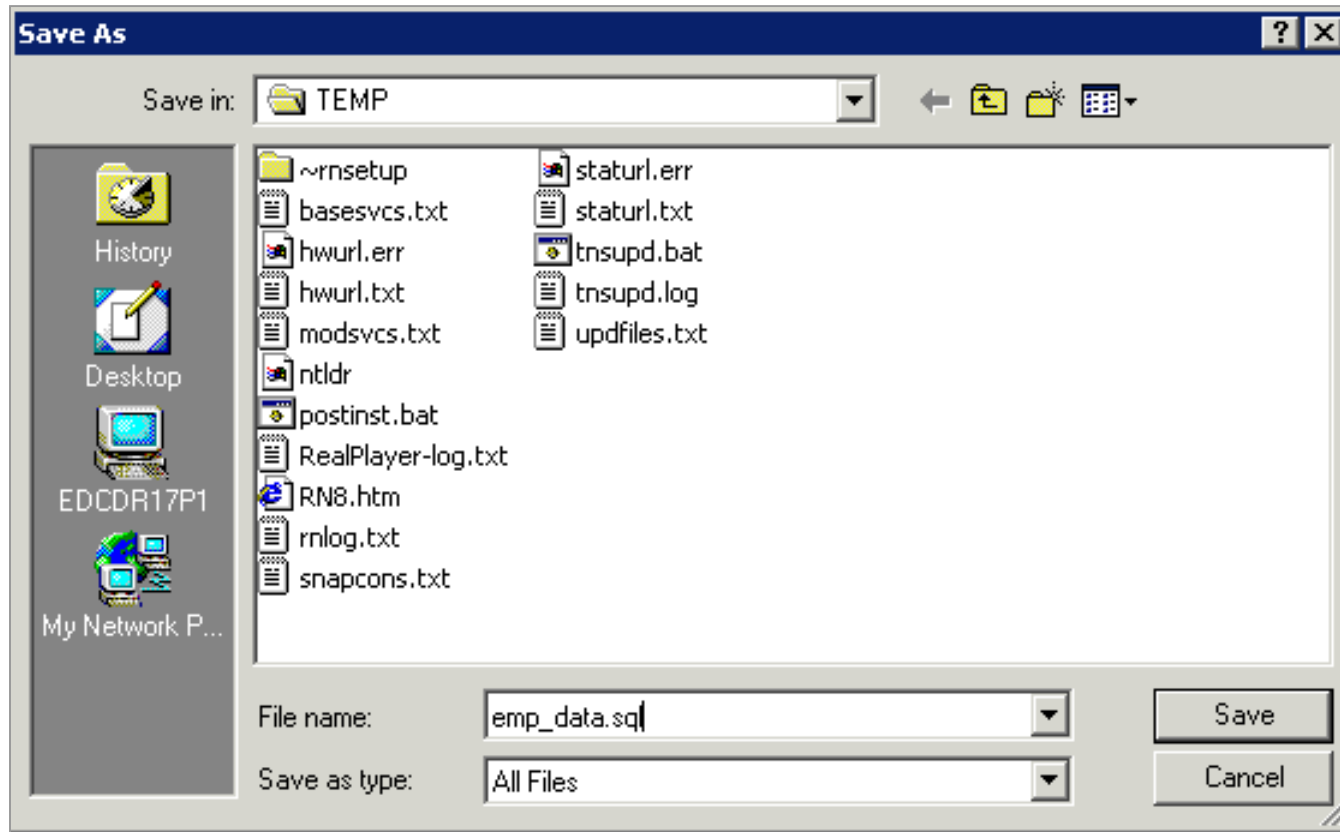
```
DESCRIBE employees
```

Name	Null?	Type
EMPLOYEE_ID	NOT NULL	NUMBER(6)
FIRST_NAME		VARCHAR2(20)
LAST_NAME	NOT NULL	VARCHAR2(25)
EMAIL	NOT NULL	VARCHAR2(25)
PHONE_NUMBER		VARCHAR2(20)
HIRE_DATE	NOT NULL	DATE
JOB_ID	NOT NULL	VARCHAR2(10)
SALARY		NUMBER(8,2)
COMMISSION_PCT		NUMBER(2,2)
MANAGER_ID		NUMBER(6)
DEPARTMENT_ID		NUMBER(4)

Interacting with Script Files

The screenshot displays the Oracle iSQL*Plus web interface. At the top left is the Oracle logo and the text "iSQL*Plus". On the top right, there are icons for Logout, Preferences, and Help. Below these are tabs for "Workspace" and "History". The user is connected as "ORA1@T6". The main workspace area contains a text input field with the SQL statement: `SELECT last_name, hire_date, salary FROM employees;`. A red arrow labeled "1" points to the end of the script. Below the input field is a "Save Script" button, with a red arrow labeled "2" pointing to it. At the bottom of the workspace are buttons for "Execute", "Load Script", "Save Script", and "Cancel". A "Clear" button is located in the top right corner of the workspace area.

Interacting with Script Files



Interacting with Script Files

The screenshot displays the Oracle iSQL*Plus web interface. At the top left, the Oracle logo and 'iSQL*Plus' text are visible. On the top right, there are icons for Logout, Preferences, and Help. Below these is a navigation bar with 'Workspace' and 'History' tabs. The main area shows the user is 'Connected as ORA1@T6'. A large text input field is present with the instruction 'Enter SQL, PL/SQL and SQL*Plus statements.' and a 'Clear' button to its right. At the bottom of the interface, there are four buttons: 'Execute', 'Load Script', 'Save Script', and 'Cancel'. A red arrow points from a blue circle containing the number '1' to the 'Load Script' button.

Interacting with Script Files

ORACLE[®]
iSQL*Plus

[Logout](#) [Preferences](#) [Help](#)

Workspace **History**

Connected as **ORA1@T6**

Load Script

Enter a URL, or a path and file name of the script to load. [Cancel](#) [Load](#)

URL

File [Browse...](#)

[Cancel](#) [Load](#)

2 [Workspace](#) | [History](#) | [Logout](#) | [Preferences](#) | [Help](#)

3

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iSQL*Plus History Page

Workspace History

Connected as ORA1@T6

History

The scripts listed are for the current session. Script history is not available for previous sessions.

Select scripts and ... Delete Load

Select All | Select None

Select	Script
<input type="checkbox"/>	SELECT DISTINCT department_id FROM employees;
<input type="checkbox"/>	SELECT department_id FROM employees;
<input type="checkbox"/>	SELECT department_name ', ' q'X it's assigned manager ID: X' manager
<input type="checkbox"/>	SELECT last_name ' is a ' job_id AS "Employee Details" FROM employees;
<input type="checkbox"/>	SELECT last_name job_id AS "Employees" FROM employees;
<input checked="" type="checkbox"/>	SELECT last_name "Name", 12 * salary "Annual Salary" FROM employees;
<input type="checkbox"/>	SELECT last_name AS name, commission_pct AS comm FROM employees;
<input checked="" type="checkbox"/>	SELECT last_name, 12 * salary * commission_pct FROM employees;
<input type="checkbox"/>	SELECT last_name, job_id, salary, commission_pct FROM employees;
<input type="checkbox"/>	SELECT last_name, salary, 12 * (salary + 100) FROM employees;

iSQL*Plus History Page

ORACLE
*iSQL*Plus*

Logout Preferences Help

3 Workspace History

Connected as **ORA1@T6**

Workspace

Enter SQL, PL/SQL and SQL*Plus statements. Clear

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

4

Execute Load Script Save Script Cancel

Setting iSQL*Plus Preferences

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iSQL*Plus

Logout Preferences Help

Workspace History

1

- **Interface Configuration**
- System Configuration
 - [Script Formatting](#)
 - [Script Execution](#)
 - [Database Administration](#)
- [Change Password](#)

Interface Configuration

Configure settings that affect the iSQL*Plus user interface. Cancel Apply

History Size

Set the number of scripts displayed in the script history.

Scripts

Input Area Size

Set the size of the script input area. **3**

Width

Height

Output Location

2

Setting the Output Location Preference

Interface Configuration

Configure settings that affect the iSQL*Plus user interface. Cancel Apply

History Size

Set the number of scripts displayed in the script history.
Scripts

Input Area Size

Set the size of the script input area.
Width
Height

Output Location

Set where script output is displayed.

- Below Input Area
- Save to HTML File
- Printable output in new browser window
- Printable output in same browser window

1

2

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 display more descriptive column headings
- Use the *iSQL*Plus* environment to write, save, and execute SQL statements and *iSQL*Plus* commands

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

Practice 1: Overview

This practice covers the following topics:

- **Selecting all data from different tables**
- **Describing the structure of tables**
- **Performing arithmetic calculations and specifying column names**
- **Using *iSQL*Plus***