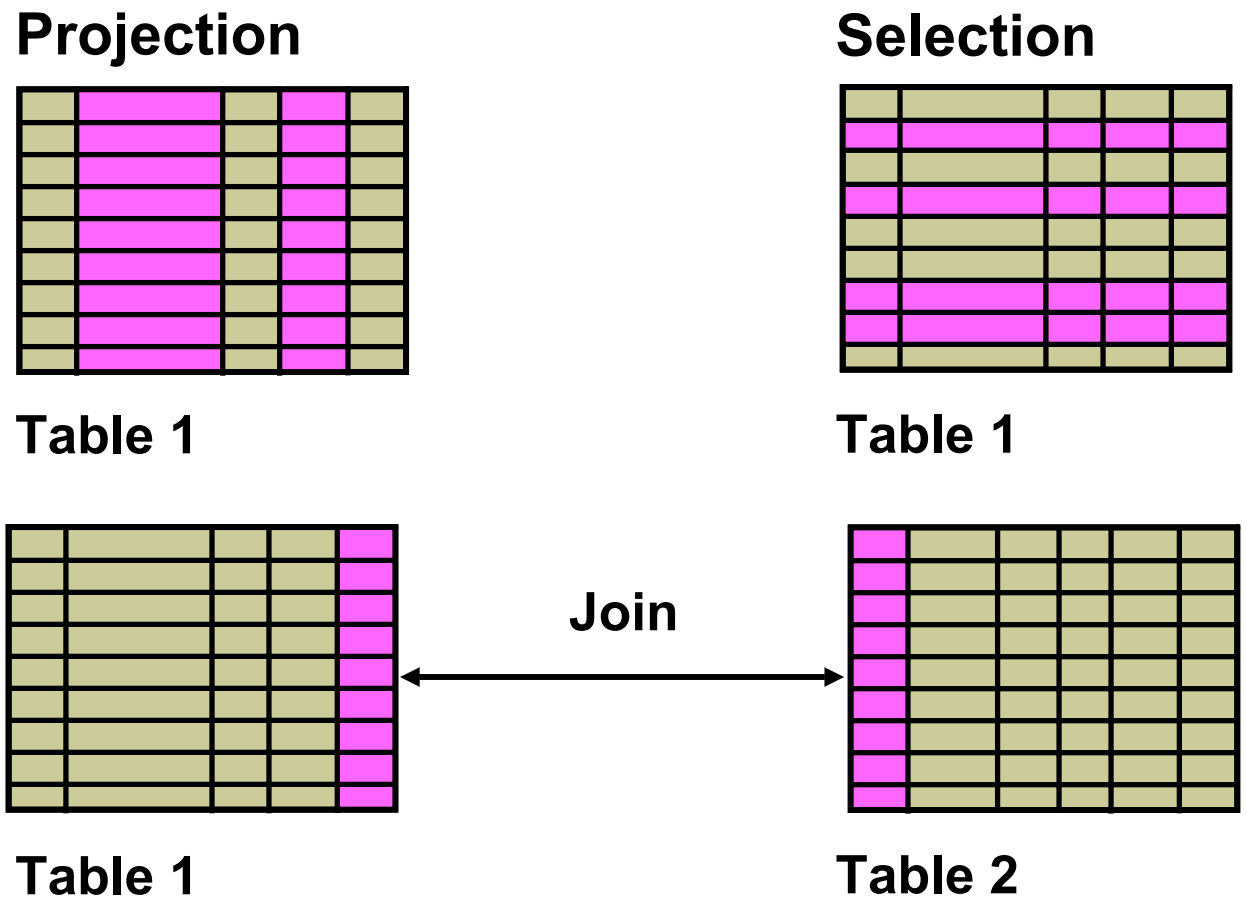
# Retrieving Data Using the SQL SELECT Statement

# 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 *i*SQL*Plus commands**

# Capabilities of SQL SELECT Statements



# 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 *i*SQL*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;
```

| 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 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;
```

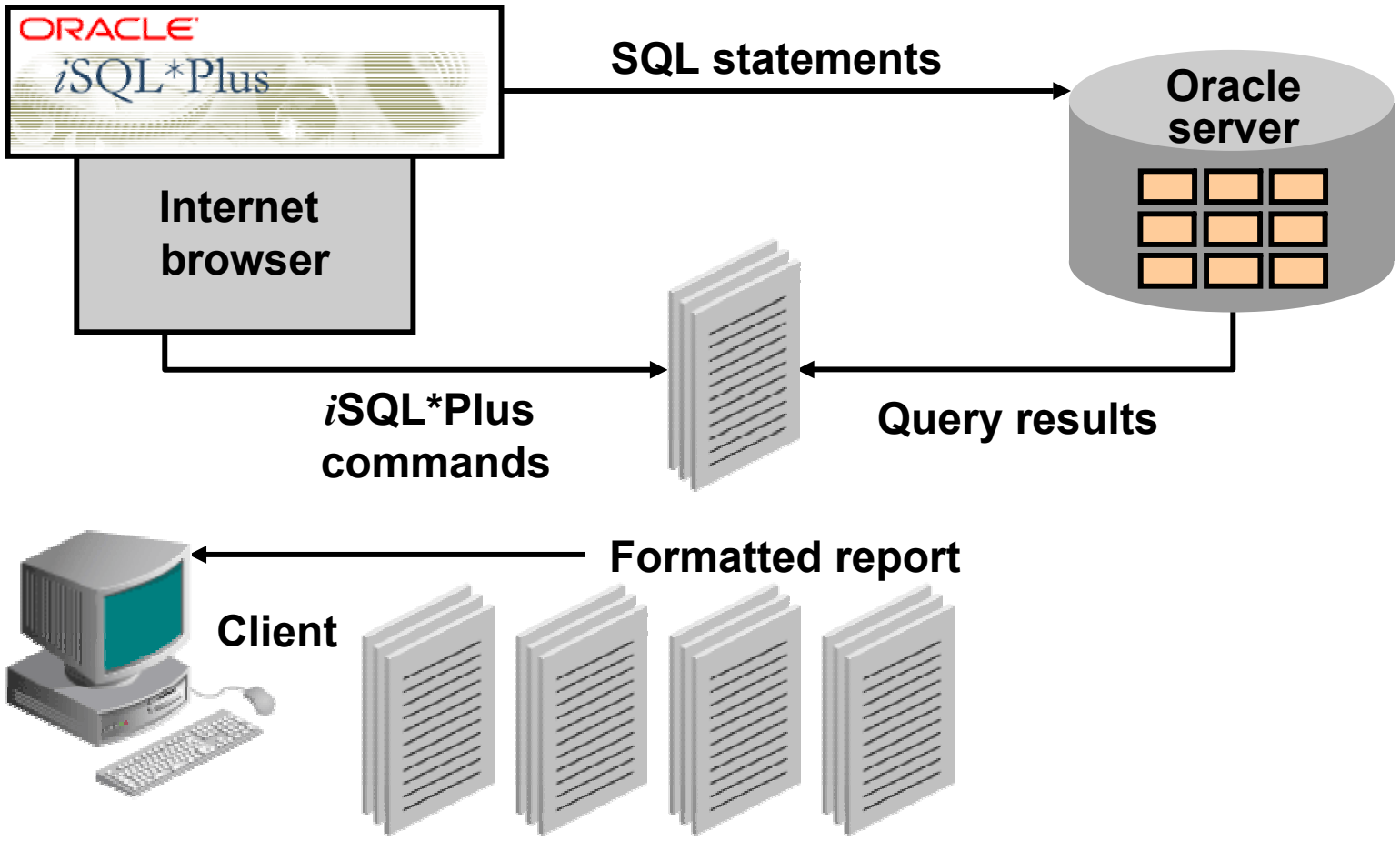
2

| DEPARTMENT_ID |
|---|
| 10 |
| 20 |
| 50 |

...

8 rows selected.

# SQL and *i*SQL*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**

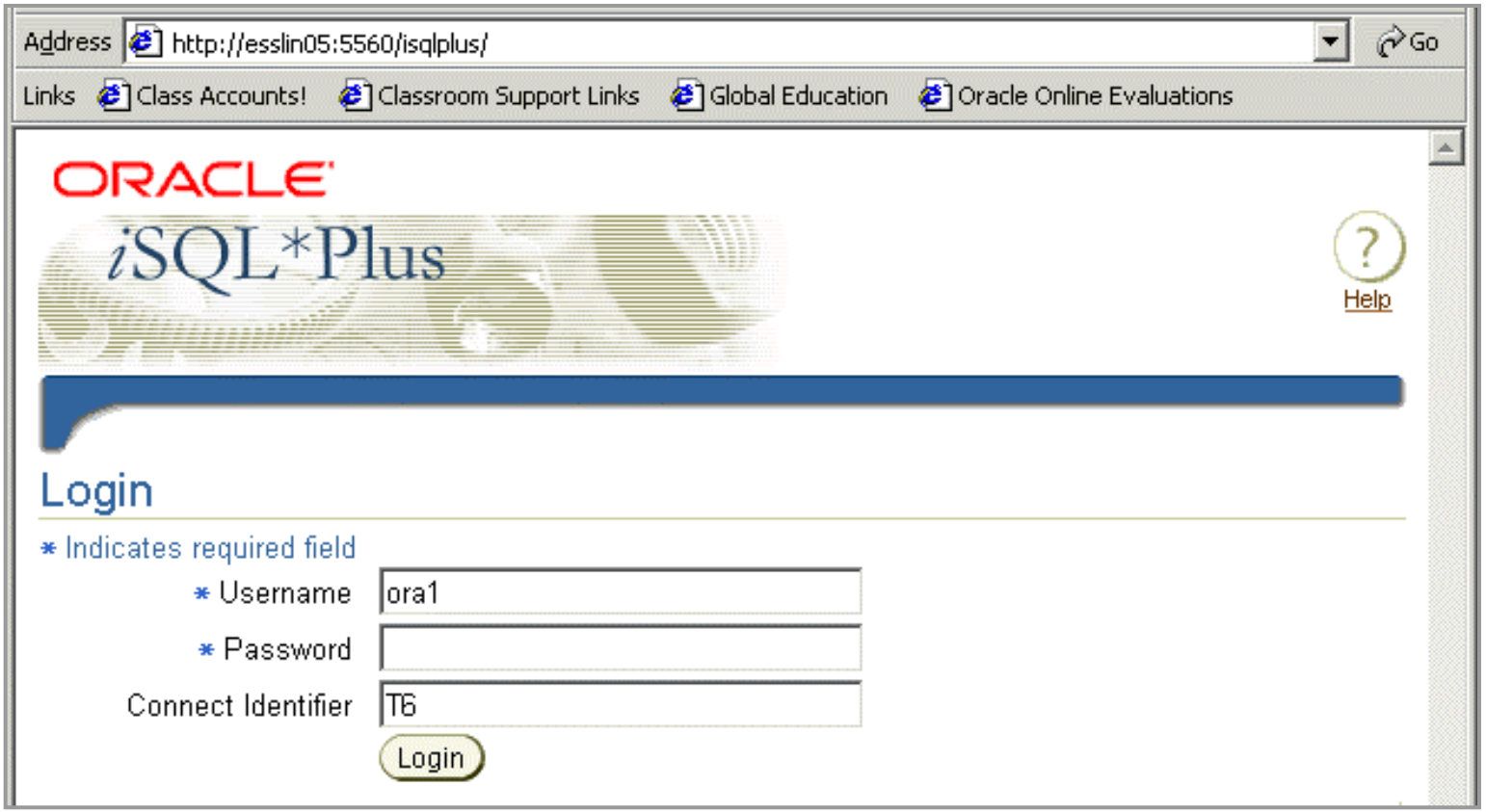
# Overview of *i*SQL*Plus

**After you log in to *i*SQL*Plus, you can:**

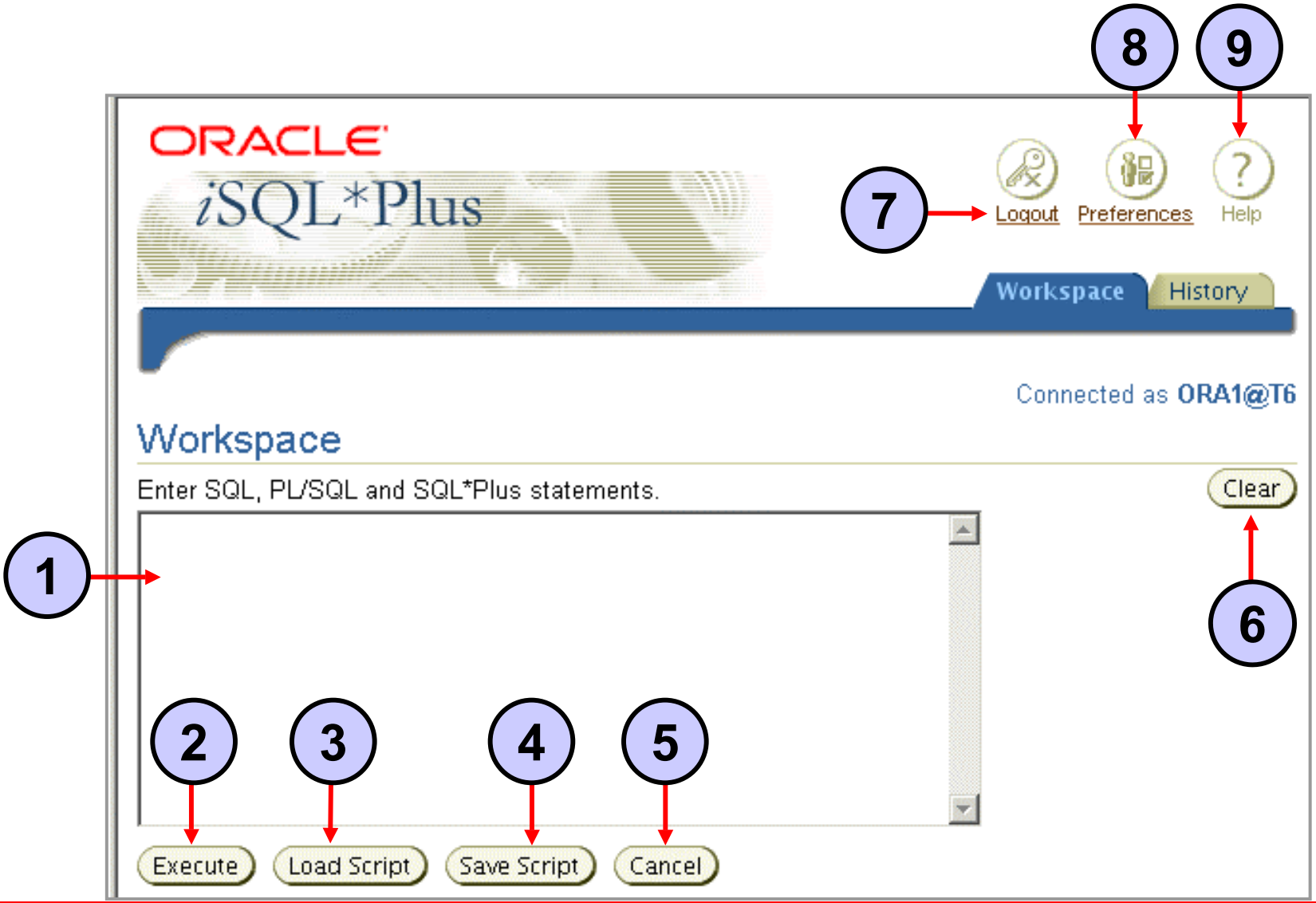
- **Describe table structures**
- **Enter, execute, and edit SQL statements**
- **Save or append SQL statements to files**
- **Execute or edit statements that are stored in saved script files**

# Logging In to *i*SQL*Plus

## From your browser environment:



# *i*SQL*Plus Environment



# Displaying Table Structure

**Use the *i*SQL*Plus `DESCRIBE` command to display the structure of a table:**

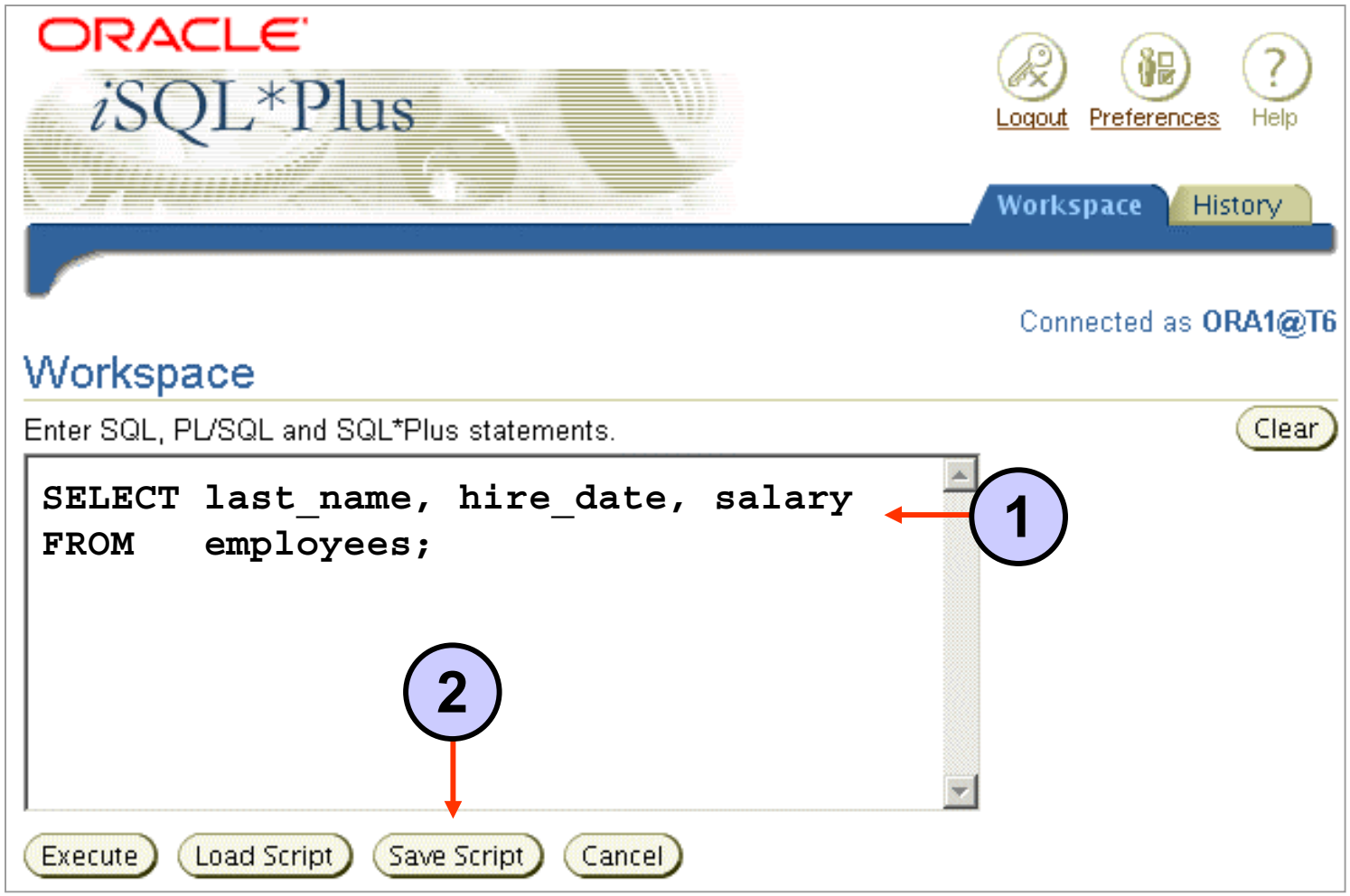
```
DESC[RIBE] tablename
```

# Displaying Table Structure

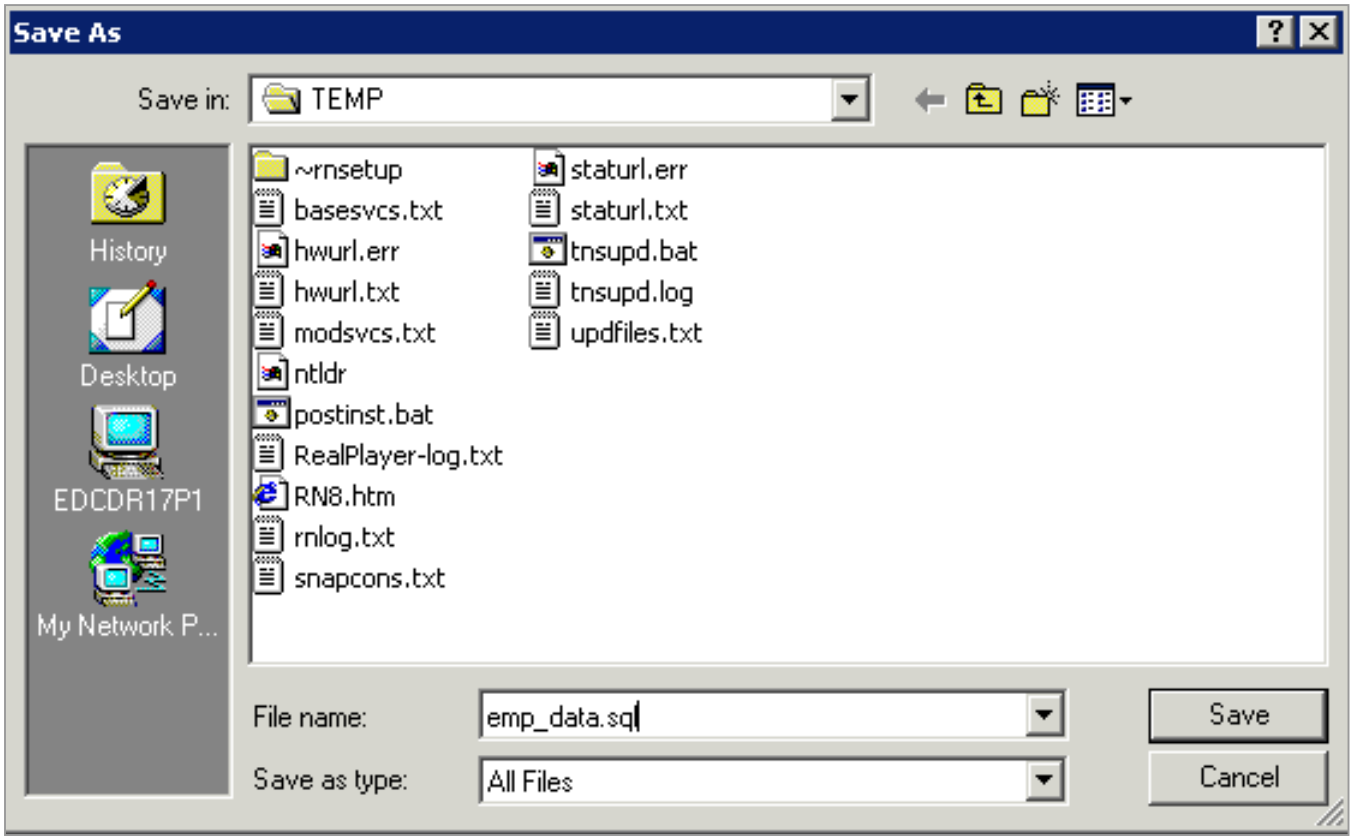
```
DESCRIBE employees
```

| 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) |

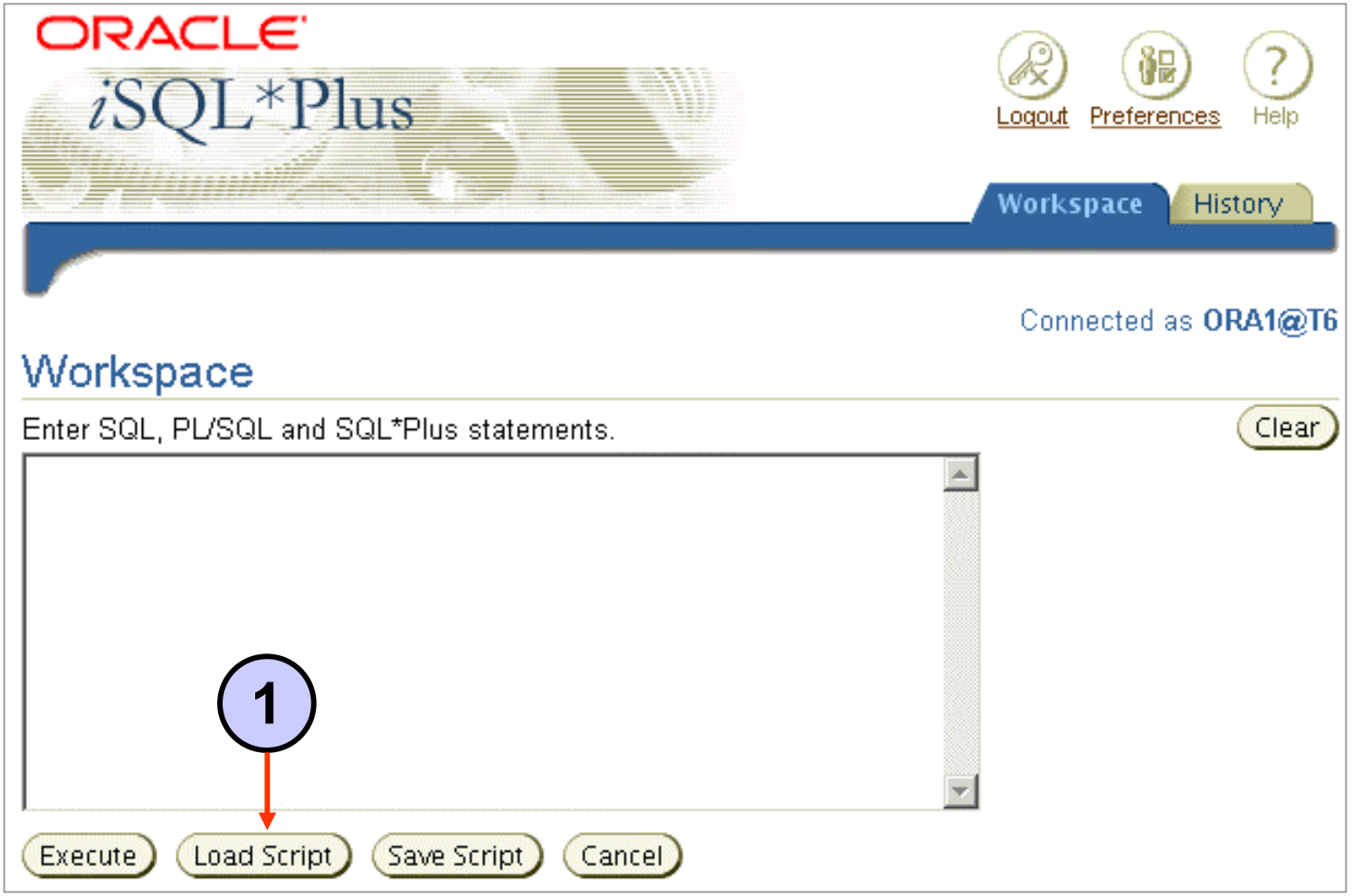
# Interacting with Script Files



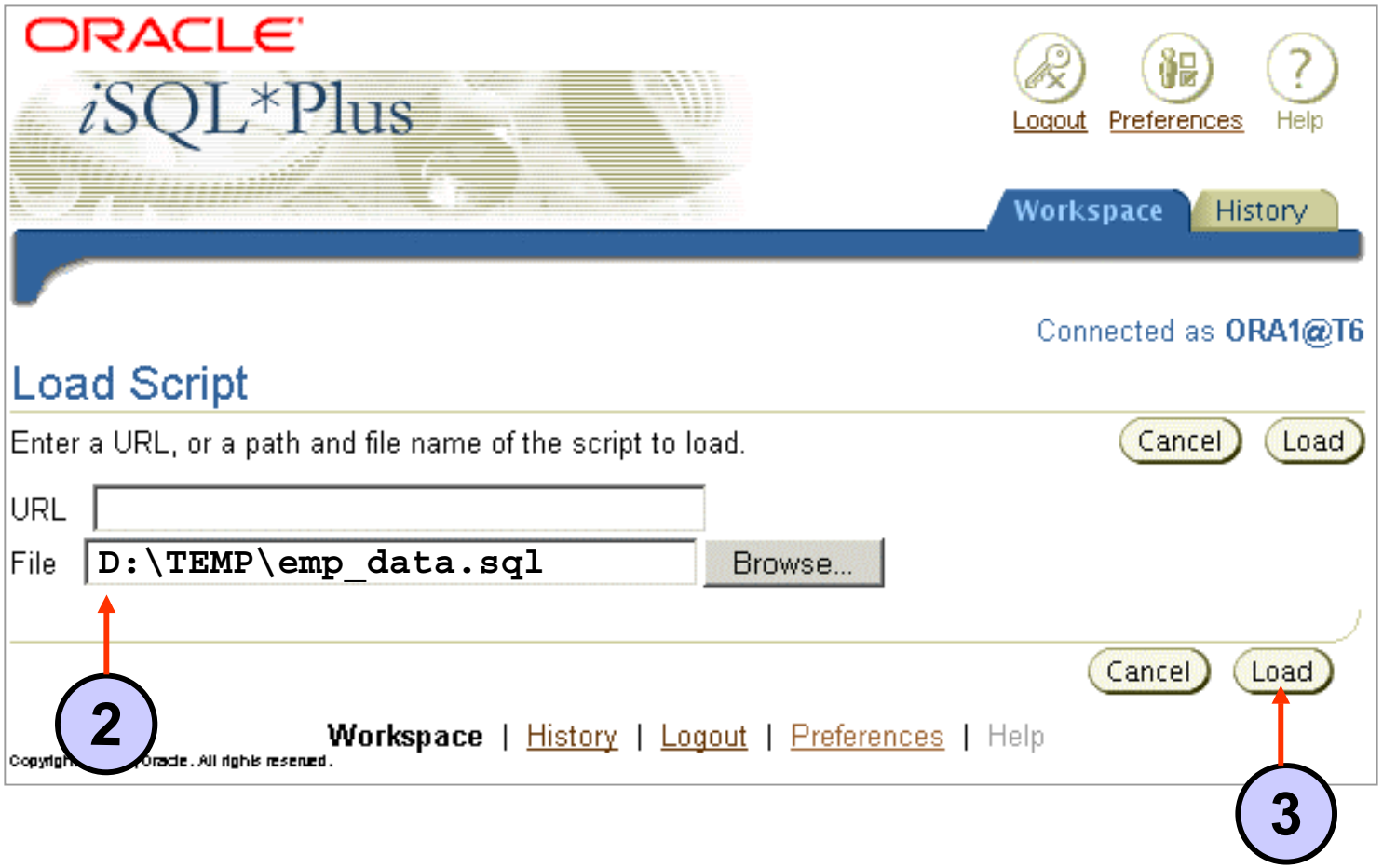
# Interacting with Script Files



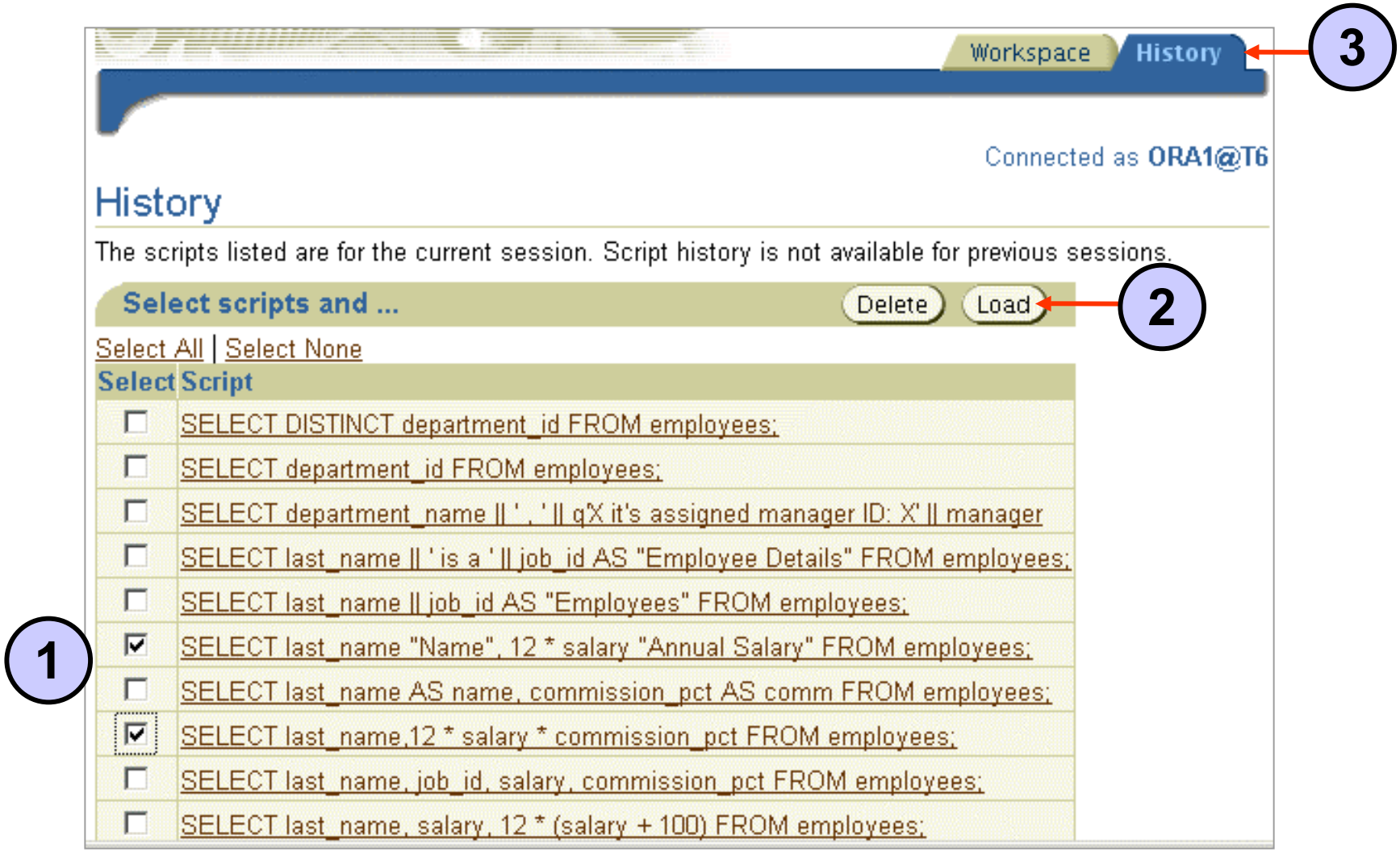
# Interacting with Script Files



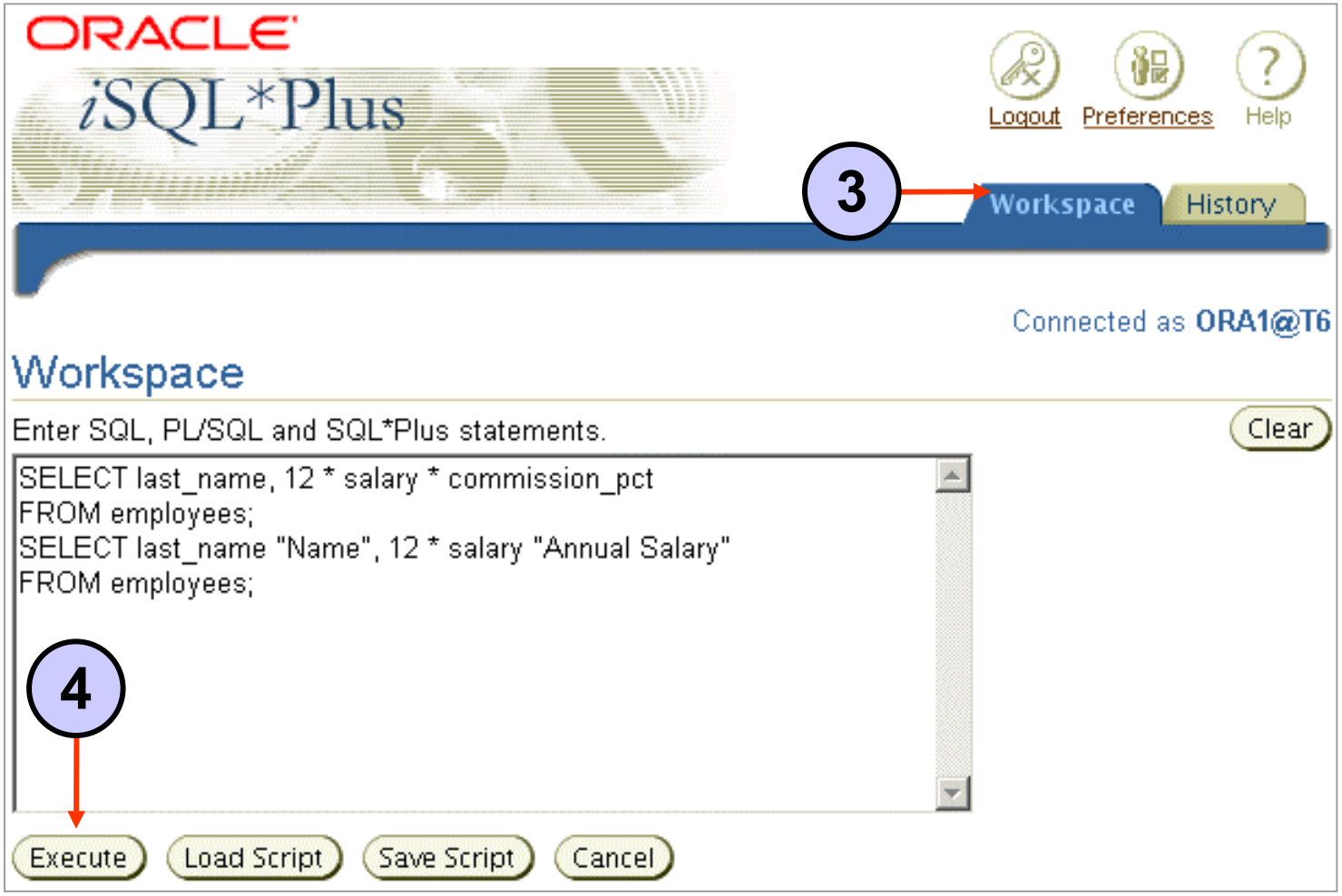
# Interacting with Script Files



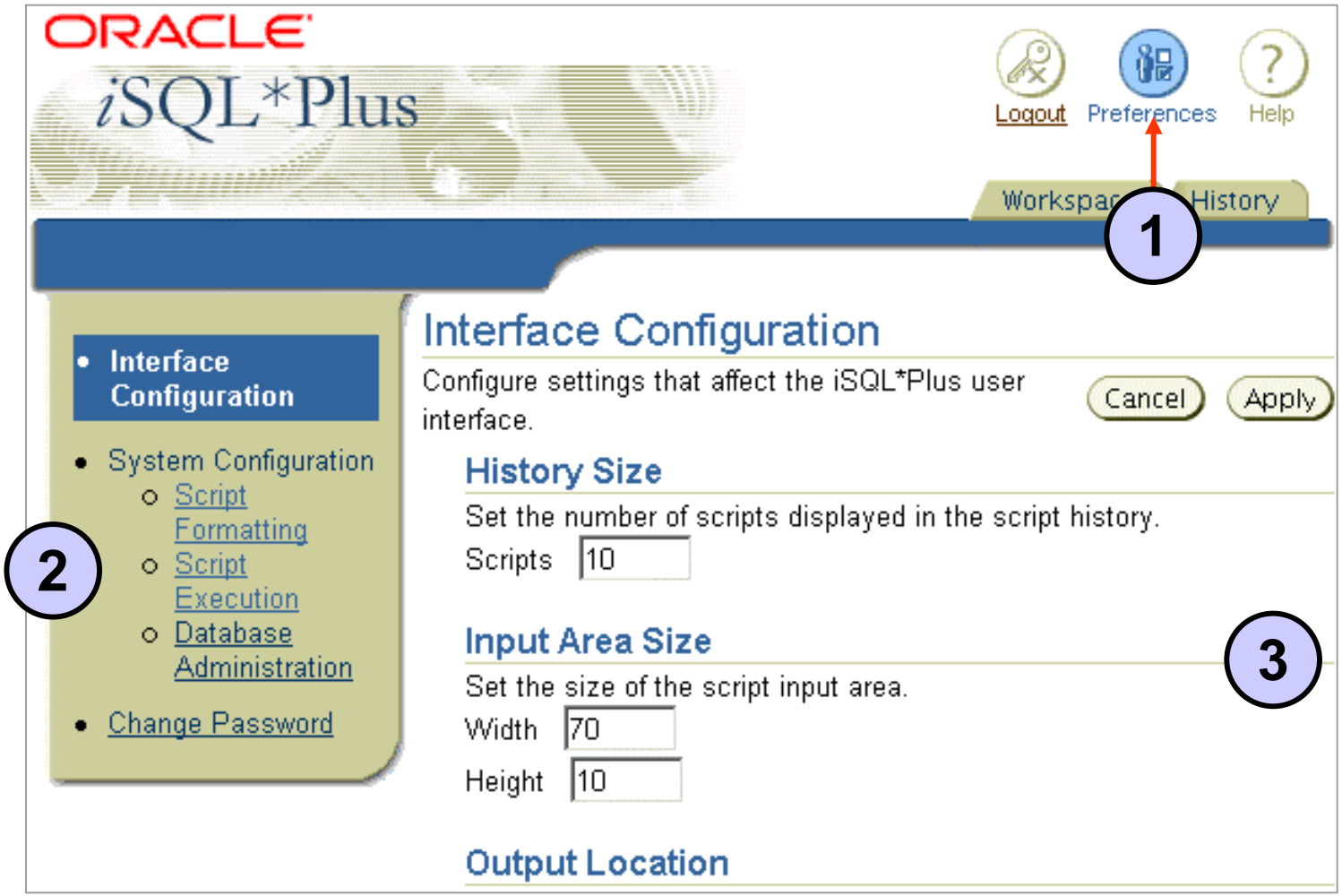
# *i*SQL*Plus History Page



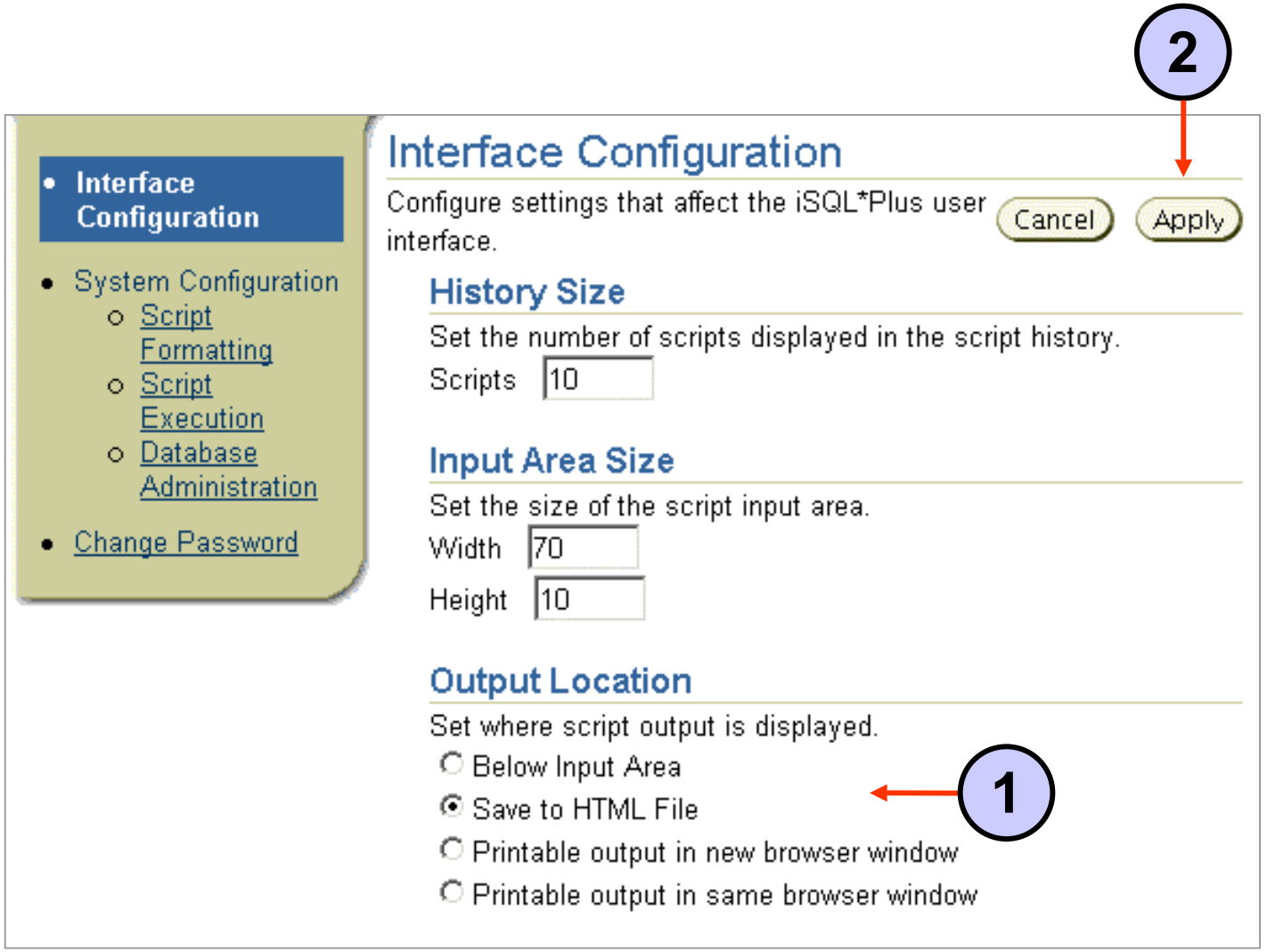
# *i*SQL*Plus History Page



# Setting *i*SQL*Plus Preferences



# Setting the Output Location Preference



# 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 *i*SQL*Plus environment to write, save, and execute SQL statements and *i*SQL*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 *i*SQL*Plus