Oracle Database 11*g*: SQL Fundamentals I

Volume III • Student Guide

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Additional Practices

Additional Practices: Solutions

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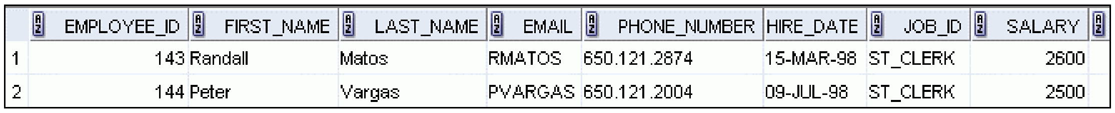
Additional Practices

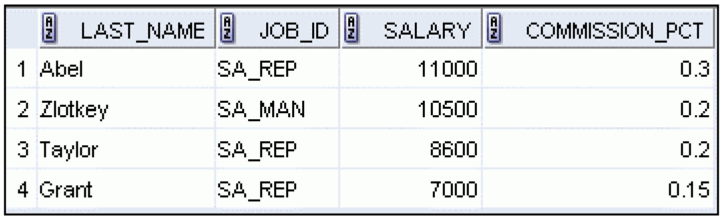
These exercises can be used for extra practice after you have discussed the following topics: Basic SQL `SELECT` statement, basic SQL Developer commands, and SQL functions.

1. The HR department needs to find data for all of the clerks who were hired after the year 1997.



	EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY
1	143	Randall	Matos	RMATOS	650.121.2874	15-MAR-98	ST_CLERK	2600
2	144	Peter	Vargas	PVARGAS	650.121.2004	09-JUL-98	ST_CLERK	2500

2. The HR department needs a report of employees who earn commission. Show the last name, job, salary, and commission of those employees. Sort the data by salary in descending order.



	LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT
1	Abel	SA_REP	11000	0.3
2	Zlotkey	SA_MAN	10500	0.2
3	Taylor	SA_REP	8600	0.2
4	Grant	SA_REP	7000	0.15

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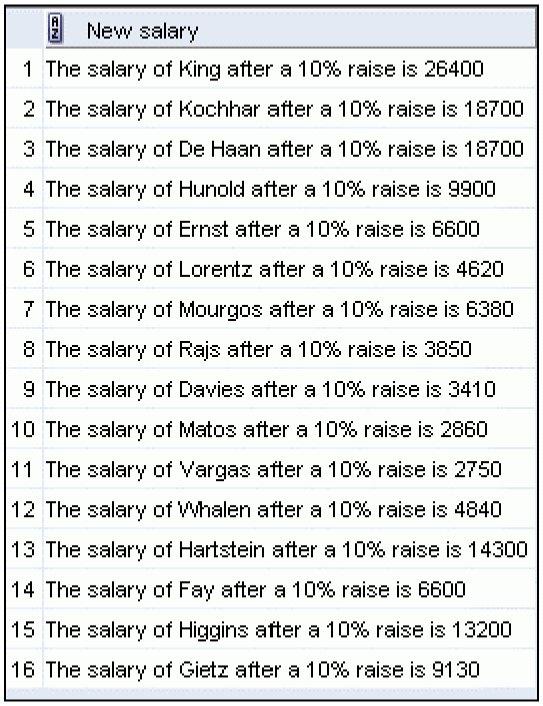
3. For budgeting purposes, the HR department needs a report on projected raises. The report should display those employees who have no commission, but who have a 10% raise in salary (round off the salaries).



	New salary
1	The salary of King after a 10% raise is 26400
2	The salary of Kochhar after a 10% raise is 18700
3	The salary of De Haan after a 10% raise is 18700
4	The salary of Hunold after a 10% raise is 9900
5	The salary of Ernst after a 10% raise is 6600
6	The salary of Lorentz after a 10% raise is 4620
7	The salary of Mourgos after a 10% raise is 6380
8	The salary of Rajs after a 10% raise is 3850
9	The salary of Davies after a 10% raise is 3410
10	The salary of Matos after a 10% raise is 2860
11	The salary of Vargas after a 10% raise is 2750
12	The salary of Whalen after a 10% raise is 4840
13	The salary of Hartstein after a 10% raise is 14300
14	The salary of Fay after a 10% raise is 6600
15	The salary of Higgins after a 10% raise is 13200
16	The salary of Gietz after a 10% raise is 9130

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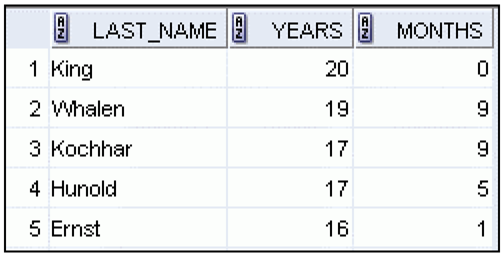
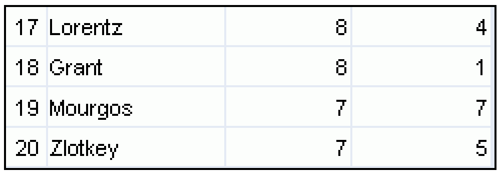
4. Create a report of employees and their length of employment. Show the last names of all the employees together with the number of years and the number of completed months that they have been employed. Order the report by the length of their employment. The employee who has been employed the longest should appear at the top of the list.



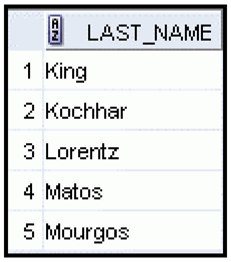
	LAST_NAME	YEARS	MONTHS
1	King	20	0
2	Whalen	19	9
3	Kochhar	17	9
4	Hunold	17	5
5	Ernst	16	1

• • •



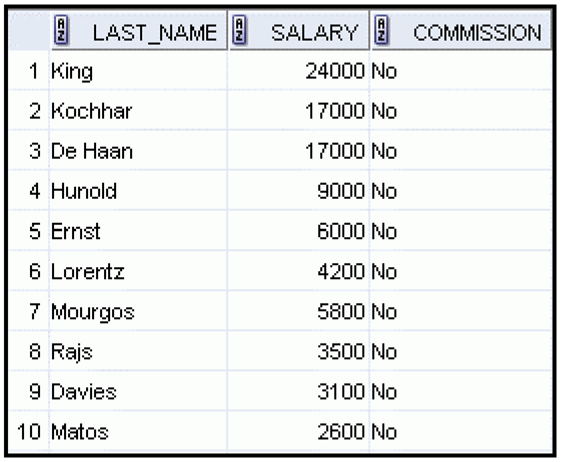
17	Lorentz	8	4
18	Grant	8	1
19	Mourgos	7	7
20	Zlotkey	7	5

5. Show those employees who have a last name starting with the letters “J,” “K,” “L,” or “M.”



	LAST_NAME
1	King
2	Kochhar
3	Lorentz
4	Matos
5	Mourgos

6. Create a report that displays all employees, and indicate with the words *Yes* or *No* whether they receive a commission. Use the `DECODE` expression in your query.
Note: Results are continued on the next page.



	LAST_NAME	SALARY	COMMISSION
1	King	24000	No
2	Kochhar	17000	No
3	De Haan	17000	No
4	Hunold	9000	No
5	Ernst	6000	No
6	Lorentz	4200	No
7	Mourgos	5800	No
8	Rajs	3500	No
9	Davies	3100	No
10	Matos	2600	No

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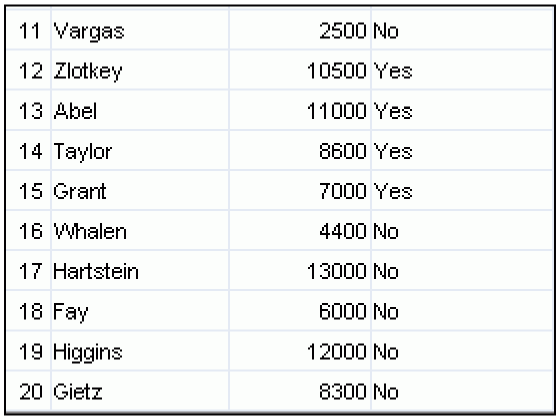
Additional Practices (continued)

6. (continued)



11	Vargas	2500	No
12	Zlotkey	10500	Yes
13	Abel	11000	Yes
14	Taylor	8600	Yes
15	Grant	7000	Yes
16	Whalen	4400	No
17	Hartstein	13000	No
18	Fay	6000	No
19	Higgins	12000	No
20	Gietz	8300	No

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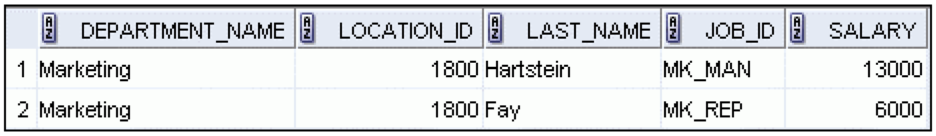
Additional Practices (continued)

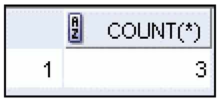
These exercises can be used for extra practice after you have discussed the following topics: Basic SQL `SELECT` statement, basic SQL Developer commands, SQL functions, joins, and group functions.

7. Create a report that displays the department name, location ID, last name, job title, and salary of those employees who work in a specific location. Prompt the user for the location. For example, if the user enters 1800, these are the results:



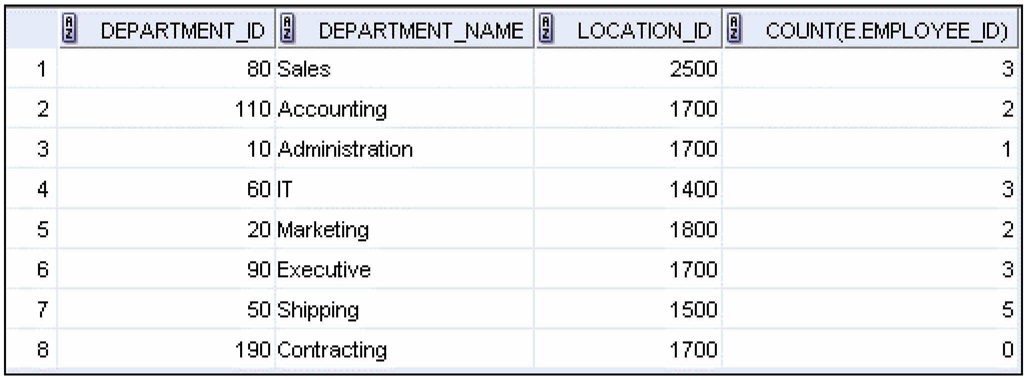
	DEPARTMENT_NAME	LOCATION_ID	LAST_NAME	JOB_ID	SALARY
1	Marketing	1800	Hartstein	MK_MAN	13000
2	Marketing	1800	Fay	MK_REP	6000

8. Find the number of employees who have a last name that ends with the letter "n." Create two possible solutions.



	COUNT(*)
1	3

9. Create a report that shows the name, location, and number of employees for each department. Make sure that the report also includes departments without employees.



	DEPARTMENT_ID	DEPARTMENT_NAME	LOCATION_ID	COUNT(E.EMPLOYEE_ID)
1	80	Sales	2500	3
2	110	Accounting	1700	2
3	10	Administration	1700	1
4	60	IT	1400	3
5	20	Marketing	1800	2
6	90	Executive	1700	3
7	50	Shipping	1500	5
8	190	Contracting	1700	0

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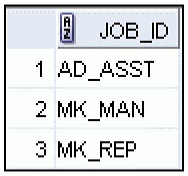
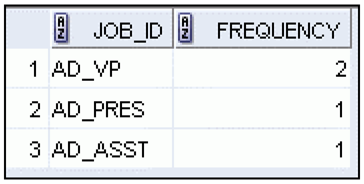
Additional Practices (continued)

10. The HR department needs to find the job titles in departments 10 and 20. Create a report to display the job IDs for those departments.



	JOB_ID
1	AD_ASST
2	MK_MAN
3	MK_REP

11. Create a report that displays the jobs that are found in the Administration and Executive departments. Also display the number of employees for these jobs. Show the job with the highest number of employees first.



	JOB_ID	FREQUENCY
1	AD_VP	2
2	AD_PRES	1
3	AD_ASST	1

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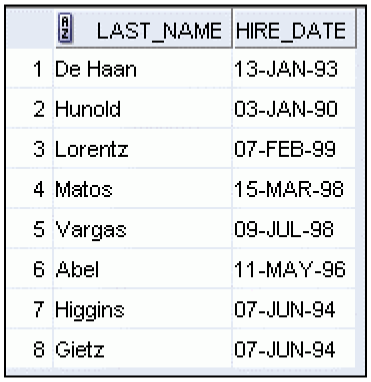
Additional Practices (continued)

These exercises can be used for extra practice after you have discussed the following topics: Basic SQL `SELECT` statements, basic SQL Developer commands, SQL functions, joins, group functions, and subqueries.

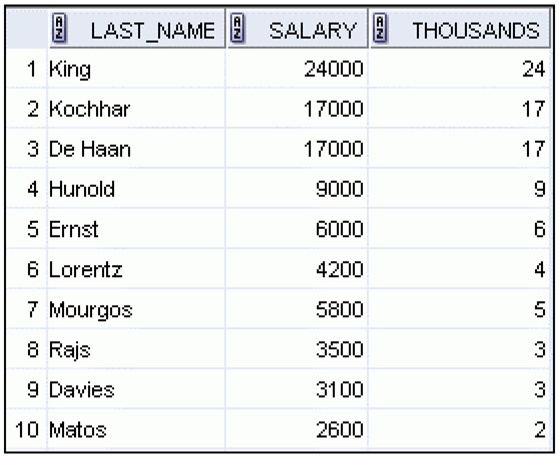
12. Show all the employees who were hired in the first half of the month (before the 16th of the month).



	LAST_NAME	HIRE_DATE
1	De Haan	13-JAN-93
2	Hunold	03-JAN-90
3	Lorentz	07-FEB-99
4	Matos	15-MAR-98
5	Vargas	09-JUL-98
6	Abel	11-MAY-96
7	Higgins	07-JUN-94
8	Gietz	07-JUN-94

13. Create a report that displays the following for all employees: last name, salary, and salary expressed in terms of thousands of dollars.

Note: Results are continued on the next page.



	LAST_NAME	SALARY	THOUSANDS
1	King	24000	24
2	Kochhar	17000	17
3	De Haan	17000	17
4	Hunold	9000	9
5	Ernst	6000	6
6	Lorentz	4200	4
7	Mourgos	5800	5
8	Rajs	3500	3
9	Davies	3100	3
10	Matos	2600	2

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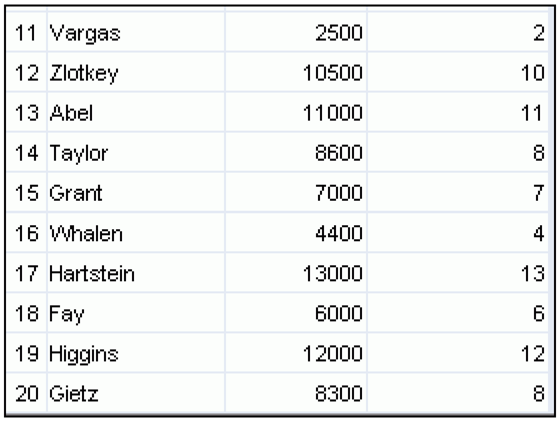
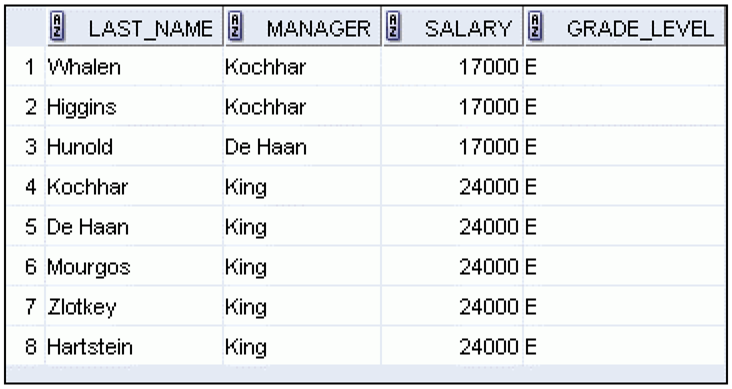
Additional Practices (continued)

13. (continued)



11	Vargas	2500	2
12	Zlotkey	10500	10
13	Abel	11000	11
14	Taylor	8600	8
15	Grant	7000	7
16	Whalen	4400	4
17	Hartstein	13000	13
18	Fay	6000	6
19	Higgins	12000	12
20	Gietz	8300	8

14. Show all the employees who have managers with a salary higher than $15,000. Show the following data: employee name, manager name, manager salary, and salary grade of the manager.



	LAST_NAME	MANAGER	SALARY	GRADE_LEVEL
1	Whalen	Kochhar	17000	E
2	Higgins	Kochhar	17000	E
3	Hunold	De Haan	17000	E
4	Kochhar	King	24000	E
5	De Haan	King	24000	E
6	Mourgos	King	24000	E
7	Zlotkey	King	24000	E
8	Hartstein	King	24000	E

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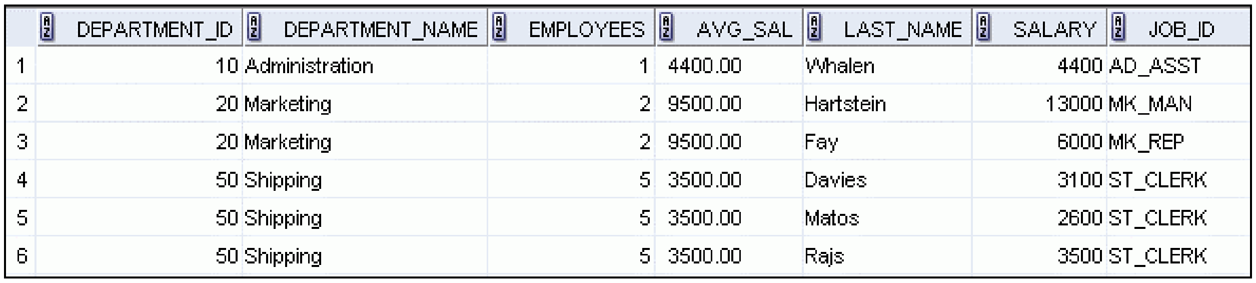
15. Show the department number, name, number of employees, and average salary of all the departments, together with the names, salaries, and jobs of the employees working in each department.



	DEPARTMENT_ID	DEPARTMENT_NAME	EMPLOYEES	AVG_SAL	LAST_NAME	SALARY	JOB_ID
1	10	Administration	1	4400.00	Whalen	4400	AD_ASST
2	20	Marketing	2	9500.00	Hartstein	13000	MK_MAN
3	20	Marketing	2	9500.00	Fay	6000	MK_REP
4	50	Shipping	5	3500.00	Davies	3100	ST_CLERK
5	50	Shipping	5	3500.00	Matos	2600	ST_CLERK
6	50	Shipping	5	3500.00	Rajs	3500	ST_CLERK

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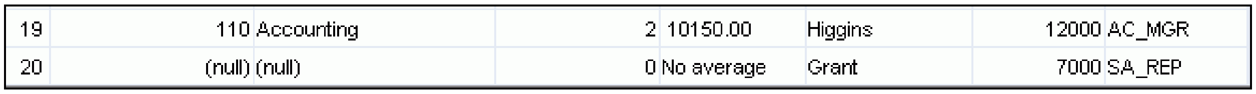
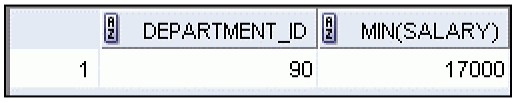


19	110	Accounting	2	10150.00	Higgins	12000	AC_MGR
20	(null)	(null)	0	No average	Grant	7000	SA_REP

16. Create a report to display the department number and lowest salary of the department with the highest average salary.



	DEPARTMENT_ID	MIN(SALARY)
1	90	17000

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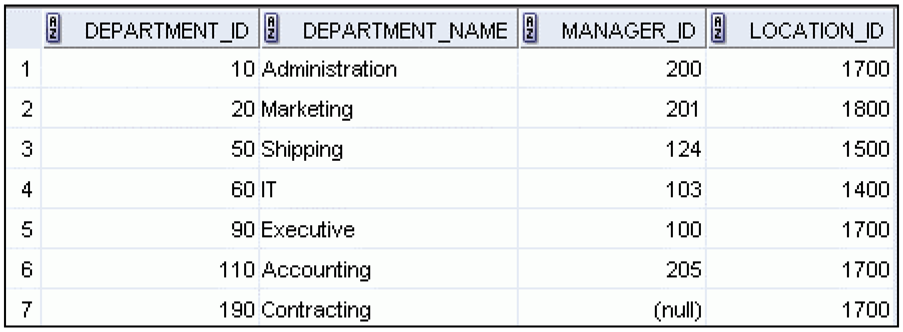
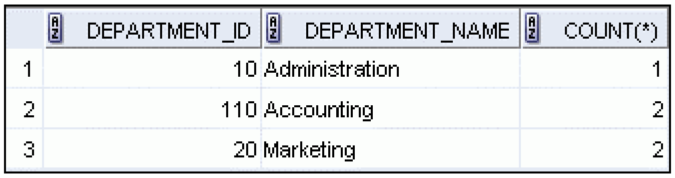
17. Create a report that displays departments where no sales representatives work. Include the department number, department name, manager ID, and the location in the output.



	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	50	Shipping	124	1500
4	60	IT	103	1400
5	90	Executive	100	1700
6	110	Accounting	205	1700
7	190	Contracting	(null)	1700

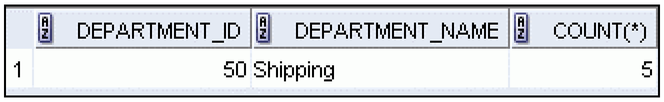
18. Create the following statistical reports for the HR department: Include the department number, department name, and the number of employees working in each department that:

    a. Employs fewer than three employees:



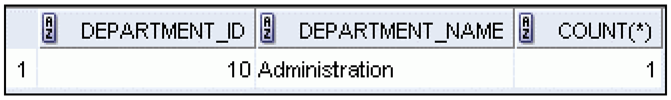
	DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(*)
1	10	Administration	1
2	110	Accounting	2
3	20	Marketing	2

    b. Has the highest number of employees:



	DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(*)
1	50	Shipping	5

    c. Has the lowest number of employees:



	DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(*)
1	10	Administration	1

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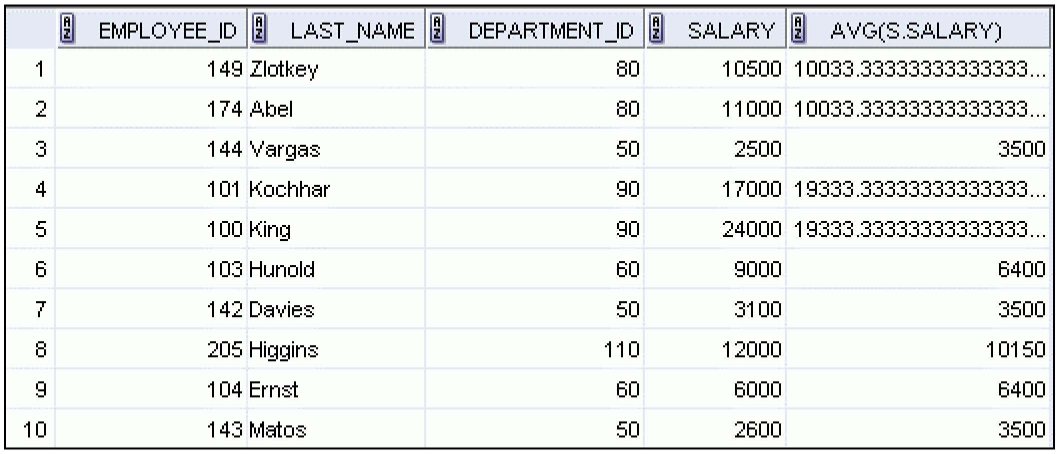
19. Create a report that displays the employee number, last name, salary, department number, and the average salary in their department for all employees.



	EMPLOYEE_ID	LAST_NAME	DEPARTMENT_ID	SALARY	AVG(S.SALARY)
1	149	Zlotkey	80	10500	10033.33333333333333...
2	174	Abel	80	11000	10033.33333333333333...
3	144	Vargas	50	2500	3500
4	101	Kochhar	90	17000	19333.33333333333333...
5	100	King	90	24000	19333.33333333333333...
6	103	Hunold	60	9000	6400
7	142	Davies	50	3100	3500
8	205	Higgins	110	12000	10150
9	104	Ernst	60	6000	6400
10	143	Matos	50	2600	3500

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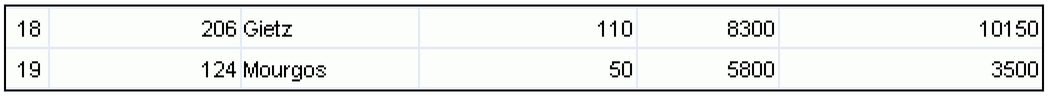
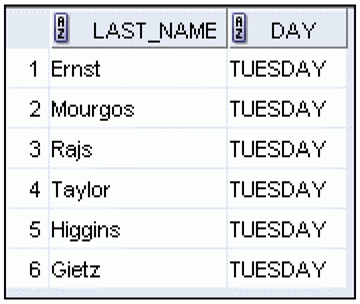


18	206	Gietz	110	8300	10150
19	124	Mourgos	50	5800	3500

20. Show all the employees who were hired on the day of the week on which the highest number of employees were hired.



	LAST_NAME	DAY
1	Ernst	TUESDAY
2	Mourgos	TUESDAY
3	Rajs	TUESDAY
4	Taylor	TUESDAY
5	Higgins	TUESDAY
6	Gietz	TUESDAY

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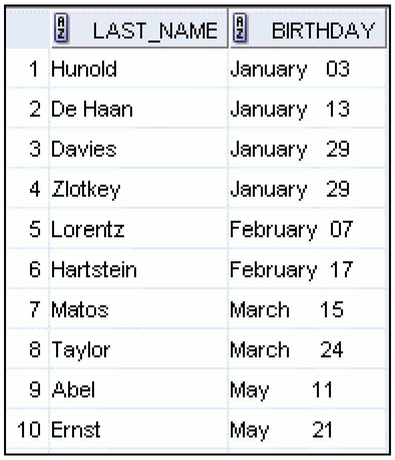
Additional Practices (continued)

21. Create an anniversary overview based on the hire date of the employees. Sort the anniversaries in ascending order.



	LAST_NAME	BIRTHDAY
1	Hunold	January 03
2	De Haan	January 13
3	Davies	January 29
4	Zlotkey	January 29
5	Lorentz	February 07
6	Hartstein	February 17
7	Matos	March 15
8	Taylor	March 24
9	Abel	May 11
10	Ernst	May 21

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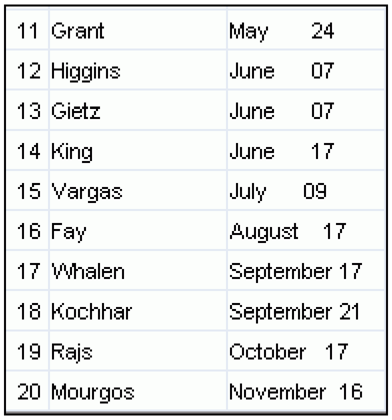

11	Grant	May 24
12	Higgins	June 07
13	Gietz	June 07
14	King	June 17
15	Vargas	July 09
16	Fay	August 17
17	Whalen	September 17
18	Kochhar	September 21
19	Rajs	October 17
20	Mourgos	November 16

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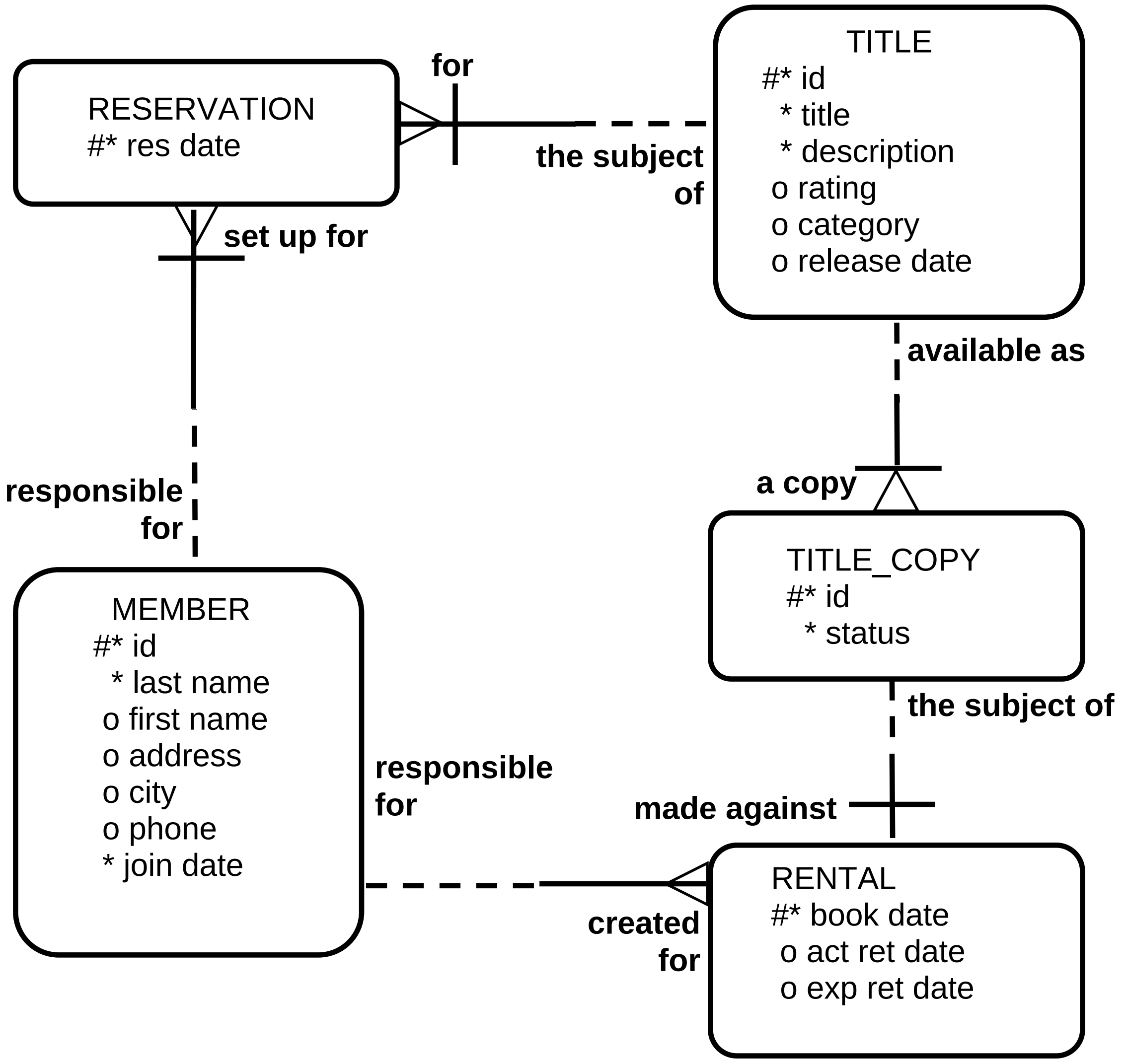
Additional Practices: Case Study

In this case study, you build a set of database tables for a video application. After you create the tables, you insert, update, and delete records in a video store database and generate a report. The database contains only the essential tables.

The following is a diagram of the entities and attributes for the video application:



Note: If you want to build the tables, you can execute the commands in the `buildtab.sql` script in SQL Developer. If you want to drop the tables, you can execute the commands in the `dropvid.sql` script in SQL Developer. Then you can execute the commands in the `buildvid.sql` script in SQL Developer to create and populate the tables. All the three sql scripts are present in the `D:\labs\sql1\labs` folder.

- If you use the `buildtab.sql` script to build the tables, start with step 4.
- If you use the `dropvid.sql` script to remove the video tables, start with step 1.
- If you use the `buildvid.sql` script to build and populate the tables, start with step 6(b).

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Additional Practices: Case Study (continued)

1. Create the tables based on the following table instance charts. Choose the appropriate data types and be sure to add integrity constraints.

   a. Table name: `MEMBER`

Column_ Name	MEMBER_ ID	LAST_ NAME	FIRST_NAME	ADDRESS	CITY	PHONE	JOIN _ DATE
Key Type	PK						
Null/ Unique	NN,U	NN					NN
Default Value							System Date
Data Type	NUMBER	VARCHAR2	VARCHAR2	VARCHAR2	VARCHAR2	VARCHAR2	DATE
Length	10	25	25	100	30	15	

   b. Table name: `TITLE`

Column_ Name	TITLE_ID	TITLE	DESCRIPTION	RATING	CATEGORY	RELEASE_ DATE
Key Type	PK					
Null/ Unique	NN,U	NN	NN			
Check				G, PG, R, NC17, NR	DRAMA, COMEDY, ACTION, CHILD, SCIFI, DOCUMEN TARY	
Data Type	NUMBER	VARCHAR2	VARCHAR2	VARCHAR2	VARCHAR2	DATE
Length	10	60	400	4	20	

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Additional Practices: Case Study (continued)

c. Table name: `TITLE_COPY`

Column Name	`COPY_ID`	`TITLE_ID`	`STATUS`
Key Type	PK	PK,FK	
Null/ Unique	NN,U	NN,U	NN
Check			AVAILABLE, DESTROYED, RENTED, RESERVED
FK Ref Table		`TITLE`	
FK Ref Col		`TITLE_ID`	
Data Type	`NUMBER`	`NUMBER`	`VARCHAR2`
Length	10	10	15

d. Table name: `RENTAL`

Column Name	`BOOK_ DATE`	`MEMBER_ ID`	`COPY_ ID`	`ACT_RET_ DATE`	`EXP_RET_ DATE`	`TITLE_ ID`
Key Type	PK	PK,FK1	PK,FK2			PK,FK2
Default Value	System Date				System Date + 2 days	
FK Ref Table		`MEMBER`	`TITLE_ COPY`			`TITLE_ COPY`
FK Ref Col		`MEMBER_I D`	`COPY_ ID`			`TITLE_ID`
Data Type	`DATE`	`NUMBER`	`NUMBER`	`DATE`	`DATE`	`NUMBER`
Length		10	10			10

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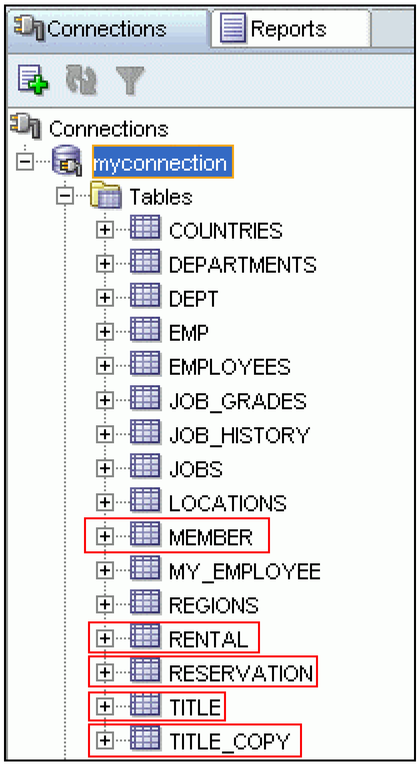
Additional Practices: Case Study (continued)

e. Table name: `RESERVATION`

Column Name	RES_ DATE	MEMBER_ ID	TITLE_ ID
Key Type	PK	PK,FK1	PK,FK2
Null/ Unique	NN,U	NN,U	NN
FK Ref Table		MEMBER	TITLE
FK Ref Column		MEMBER_ID	TITLE_ID
Data Type	DATE	NUMBER	NUMBER
Length		10	10

2. Verify that the tables were created properly by checking in the Connections Navigator in SQL Developer.



Connections
myconnection
Tables
COUNTRIES
DEPARTMENTS
DEPT
EMP
EMPLOYEES
JOB_GRADES
JOB_HISTORY
JOBS
LOCATIONS
MEMBER
MY_EMPLOYEE
REGIONS
RENTAL
RESERVATION
TITLE
TITLE_COPY

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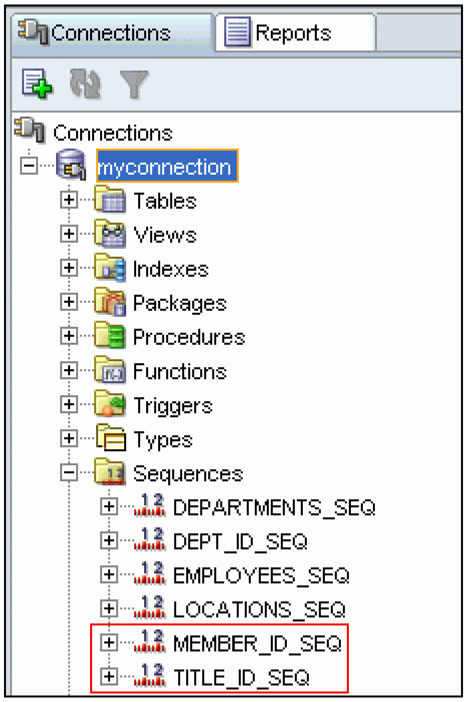
3. Create sequences to uniquely identify each row in the `MEMBER` table and the `TITLE` table.

   a. Member number for the `MEMBER` table: Start with 101; do not allow caching of the values. Name the sequence `MEMBER_ID_SEQ`.

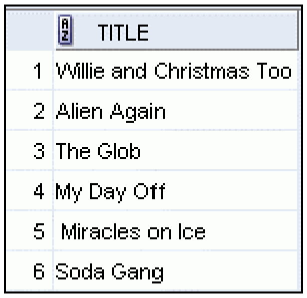
   b. Title number for the `TITLE` table: Start with 92; do not allow caching of the values. Name the sequence `TITLE_ID_SEQ`.

   c. Verify the existence of the sequences in the Connections Navigator in SQL Developer.



4. Add data to the tables. Create a script for each set of data to be added.

   a. Add movie titles to the `TITLE` table. Write a script to enter the movie information. Save the statements in a script named `lab_apcs_4a.sql`. Use the sequences to uniquely identify each title. Enter the release dates in the DD-MON-YYYY format. Remember that single quotation marks in a character field must be specially handled. Verify your additions.



	TITLE
1	Willie and Christmas Too
2	Alien Again
3	The Glob
4	My Day Off
5	Miracles on Ice
6	Soda Gang

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Title	Description	Rating	Category	Release_date
Willie and Christmas Too	All of Willie's friends make a Christmas list for Santa, but Willie has yet to add his own wish list.	G	CHILD	05-OCT-1995
Alien Again	Yet another installation of science fiction history. Can the heroine save the planet from the alien life form?	R	SCIFI	19-MAY-1995
The Glob	A meteor crashes near a small American town and unleashes carnivorous goo in this classic.	NR	SCIFI	12-AUG-1995
My Day Off	With a little luck and a lot of ingenuity, a teenager skips school for a day in New York.	PG	COMEDY	12-JUL-1995
Miracles on Ice	A six-year-old has doubts about Santa Claus, but she discovers that miracles really do exist.	PG	DRAMA	12-SEP-1995
Soda Gang	After discovering a cache of drugs, a young couple find themselves pitted against a vicious gang.	NR	ACTION	01-JUN-1995

b. Add data to the `MEMBER` table. Save the insert statements in a script named `lab_apcs_4b.sql`. Execute commands in the script. Be sure to use the sequence to add the member numbers.

First_ Name	Last_Name	Address	City	Phone	Join_Date
Carmen	Velasquez	283 King Street	Seattle	206-899-6666	08-MAR-1990
LaDoris	Ngao	5 Modrany	Bratislava	586-355-8882	08-MAR-1990
Midori	Nagayama	68 Via Centrale	Sao Paolo	254-852-5764	17-JUN-1991
Mark	Quick-to-See	6921 King Way	Lagos	63-559-7777	07-APR-1990
Audry	Ropeburn	86 Chu Street	Hong Kong	41-559-87	18-JAN-1991
Molly	Urguhart	3035 Laurier	Quebec	418-542-9988	18-JAN-1991

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c. Add the following movie copies in the TITLE_COPY table:
Note: Have the TITLE_ID numbers available for this exercise.

Title	**Copy_Id**	**Status**	**Title**	**Copy_Id**
Willie and Christmas Too	1	AVAILABLE	Willie and Christmas Too	1
Alien Again	1	AVAILABLE	Alien Again	1
	2	RENTED		2
The Glob	1	AVAILABLE	The Glob	1
My Day Off	1	AVAILABLE	My Day Off	1
	2	AVAILABLE		2
	3	RENTED		3
Miracles on Ice	1	AVAILABLE	Miracles on Ice	1
Soda Gang	1	AVAILABLE	Soda Gang	1

d. Add the following rentals to the RENTAL table:
Note: The title number may be different depending on the sequence number.

Title_ Id	**Copy_ Id**	**Member_Id**	**Book_date**	**Exp_Ret_Date**
92	1	101	3 days ago	1 day ago
93	2	101	1 day ago	1 day from now
95	3	102	2 days ago	Today
97	1	106	4 days ago	2 days ago

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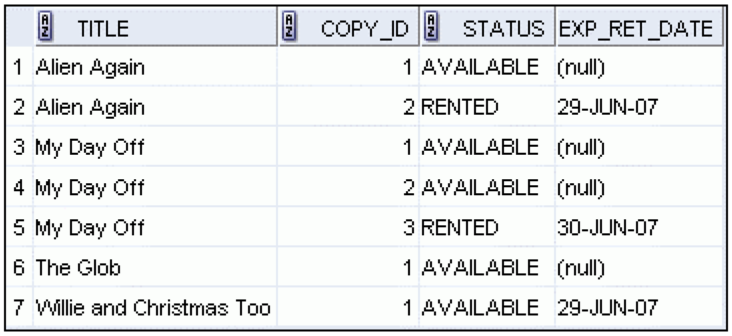
5. Create a view named `TITLE_AVAIL` to show the movie titles, the availability of each copy, and its expected return date if rented. Query all rows from the view. Order the results by title.

   Note: Your results may be different.



	TITLE	COPY_ID	STATUS	EXP_RET_DATE
1	Alien Again	1	AVAILABLE	(null)
2	Alien Again	2	RENTED	29-JUN-07
3	My Day Off	1	AVAILABLE	(null)
4	My Day Off	2	AVAILABLE	(null)
5	My Day Off	3	RENTED	30-JUN-07
6	The Glob	1	AVAILABLE	(null)
7	Willie and Christmas Too	1	AVAILABLE	29-JUN-07

6. Make changes to the data in the tables.

   a. Add a new title. The movie is “Interstellar Wars,” which is rated PG and classified as a science fiction movie. The release date is 07-JUL-77. The description is “Futuristic interstellar action movie. Can the rebels save the humans from the evil empire?” Be sure to add a title copy record for two copies.

   b. Enter two reservations. One reservation is for Carmen Velasquez, who wants to rent “Interstellar Wars.” The other is for Mark Quick-to-See, who wants to rent “Soda Gang.”

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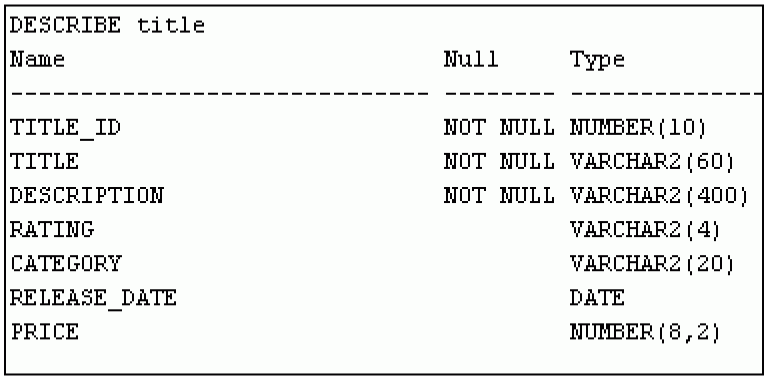
Additional Practices: Case Study (continued)

7. Make a modification to one of the tables.

   a. Run the script `lab_apcs_7a.sql` located in the `D:\labs\sql1\labs` folder, to add a `PRICE` column to the `TITLE` table to record the purchase price of the video. Verify your modifications.



```
DESCRIBE title
Name                           Null     Type
------------------------------ -------- -------------
TITLE_ID                       NOT NULL NUMBER(10)
TITLE                          NOT NULL VARCHAR2(60)
DESCRIPTION                    NOT NULL VARCHAR2(400)
RATING                                  VARCHAR2(4)
CATEGORY                                VARCHAR2(20)
RELEASE_DATE                            DATE
PRICE                                   NUMBER(8,2)
```

Title	Price
Willie and Christmas Too	25
Alien Again	35
The Glob	35
My Day Off	35
Miracles on Ice	30
Soda Gang	35
Interstellar Wars	29

   b. Create a script named `lab_apcs_7b.sql` that contains update statements that update each video with a price according to the preceding list. Run the commands in the script.
   Note: Have the `TITLE_ID` numbers available for this exercise.

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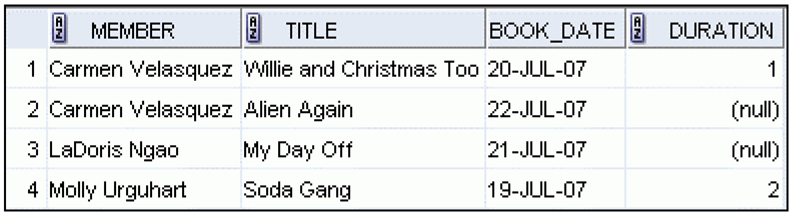
Additional Practices: Case Study (continued)

8. Create a report that contains each customer's history of renting videos. Be sure to include the customer name, movie rented, dates of the rental, and duration of rentals. Total the number of rentals for all customers for the reporting period. Save the commands that generate the report in a script file named `lab_apcs_8.sql`.
   Note: Your results may be different.



	MEMBER	TITLE	BOOK_DATE	DURATION
1	Carmen Velasquez	Willie and Christmas Too	20-JUL-07	1
2	Carmen Velasquez	Alien Again	22-JUL-07	(null)
3	LaDoris Ngao	My Day Off	21-JUL-07	(null)
4	Molly Urguhart	Soda Gang	19-JUL-07	2

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Additional Practices: Solutions

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Additional Practices: Solutions

These exercises can be used for extra practice after you have discussed the following topics: Basic SQL SELECT statement, basic SQL Developer commands, and SQL functions.

1. The HR department needs to find data for all of the clerks who were hired after the year 1997.

```
SELECT *
FROM   employees
WHERE  job_id = 'ST_CLERK'
AND hire_date > '31-DEC-1997';
```

2. The HR department needs a report of employees who earn commission. Show the last name, job, salary, and commission of those employees. Sort the data by salary in descending order.

```
SELECT last_name, job_id, salary, commission_pct
FROM   employees
WHERE  commission_pct IS NOT NULL
ORDER BY salary DESC;
```

3. For budgeting purposes, the HR department needs a report on projected raises. The report should display those employees who do not get a commission but who have a 10% raise in salary (round off the salaries).

```
SELECT 'The salary of '||last_name||' after a 10% raise is '
          || ROUND(salary*1.10) "New salary"
FROM   employees
WHERE  commission_pct IS NULL;
```

4. Create a report of employees and their duration of employment. Show the last names of all employees together with the number of years and the number of completed months that they have been employed. Order the report by the duration of their employment. The employee who has been employeed the longest should appear at the top of the list.

```
SELECT last_name,
       TRUNC(MONTHS_BETWEEN(SYSDATE, hire_date) / 12) YEARS,
       TRUNC(MOD(MONTHS_BETWEEN(SYSDATE, hire_date), 12))   MONTHS
FROM employees
ORDER BY years DESC, MONTHS desc;
```

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5. Show those employees who have a last name starting with the letters “J,” “K,” “L,” or “M.”

```
SELECT last_name
FROM   employees
WHERE  SUBSTR(last_name, 1,1) IN ('J', 'K', 'L', 'M');
```

6. Create a report that displays all employees, and indicate with the words *Yes* or *No* whether they receive a commission. Use the `DECODE` expression in your query.

```
SELECT last_name, salary,
       decode(commission_pct, NULL, 'No', 'Yes') commission
FROM   employees;
```

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These exercises can be used for extra practice after you have discussed the following topics: Basic SQL `SELECT` statement, basic SQL Developer commands, SQL functions, joins, and group functions.

7. Create a report that displays the department name, location ID, name, job title, and salary of those employees who work in a specific location. Prompt the user for the location.

   a. Enter 1800 for location_id when prompted.

```
SELECT d.department_name, d.location_id, e.last_name, e.job_id, e.salary
FROM   employees e, departments d
WHERE   e.department_id = d.department_id
AND     d.location_id = &location_id;
```

8. Find the number of employees who have a last name that ends with the letter "n." Create two possible solutions.

```
SELECT COUNT(*)
FROM   employees
WHERE  last_name LIKE '%n';
--or
SELECT COUNT(*)
FROM   employees
WHERE  SUBSTR(last_name, -1) = 'n';
```

9. Create a report that shows the name, location, and number of employees for each department. Make sure that the report also includes departments without employees.

```
SELECT d.department_id, d.department_name,
       d.location_id,   COUNT(e.employee_id)
FROM   employees e RIGHT OUTER JOIN  departments d
ON     e.department_id = d.department_id
GROUP BY d.department_id, d.department_name, d.location_id;
```

10. The HR department needs to find the job titles in departments 10 and 20. Create a report to display the job IDs for those departments.

```
SELECT DISTINCT job_id
FROM   employees
WHERE  department_id IN (10, 20);
```

11. Create a report that displays the jobs that are found in the Administration and Executive departments. Also display the number of employees for these jobs. Show the job with the highest number of employees first.

```
SELECT e.job_id, count(e.job_id) FREQUENCY
FROM     employees e JOIN departments d
ON  e.department_id = d.department_id
WHERE    d.department_name IN ('Administration', 'Executive')
GROUP BY e.job_id
ORDER BY FREQUENCY DESC;
```

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Additional Practices: Solutions (continued)

These exercises can be used for extra practice after you have discussed the following topics: Basic SQL `SELECT` statements, basic SQL Developer commands, SQL functions, joins, group functions, and subqueries.

12. Show all employees who were hired in the first half of the month (before the 16th of the month).

```
SELECT last_name, hire_date
FROM   employees
WHERE  TO_CHAR(hire_date, 'DD') < 16;
```

13. Create a report that displays the following for all employees: last name, salary, and salary expressed in terms of thousands of dollars.

```
SELECT last_name, salary, TRUNC(salary, -3)/1000  Thousands
FROM   employees;
```

14. Show all employees who have managers with a salary higher than $15,000. Show the following data: employee name, manager name, manager salary, and salary grade of the manager.

```
SELECT e.last_name, m.last_name manager, m.salary,  j.grade_level
FROM   employees e JOIN employees m
ON     e.manager_id = m.employee_id
JOIN   job_grades j
ON     m.salary BETWEEN j.lowest_sal AND j.highest_sal
AND    m.salary > 15000;
```

15. Show the department number, name, number of employees, and average salary of all departments, together with the names, salaries, and jobs of the employees working in each department.

```
SELECT  d.department_id, d.department_name,
        count(e1.employee_id) employees,
        NVL(TO_CHAR(AVG(e1.salary), '99999.99'), 'No average' ) avg_sal,
        e2.last_name, e2.salary, e2.job_id
FROM    departments d RIGHT OUTER JOIN employees e1
ON      d.department_id = e1.department_id
RIGHT OUTER JOIN  employees e2
ON    d.department_id = e2.department_id
GROUP BY d.department_id, d.department_name, e2.last_name, e2.salary,
         e2.job_id
ORDER BY d.department_id, employees;
```

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16. Create a report to display the department number and lowest salary of the department with the highest average salary.

```
SELECT department_id, MIN(salary)
FROM   employees
GROUP BY department_id
HAVING AVG(salary) = (SELECT MAX(AVG(salary))
                      FROM   employees
                      GROUP BY department_id);
```

17. Create a report that displays the departments where no sales representatives work. Include the department number, department name, and location in the output.

```
SELECT *
FROM   departments
WHERE  department_id NOT IN(SELECT department_id
                            FROM employees
                            WHERE job_id = 'SA_REP'
                            AND department_id IS NOT NULL);
```

18. Create the following statistical reports for the HR department: Include the department number, department name, and the number of employees working in each department that:

    a. Employs fewer than three employees:

```
SELECT d.department_id, d.department_name, COUNT(*)
FROM   departments d JOIN employees e
ON     d.department_id = e.department_id
GROUP BY d.department_id, d.department_name
HAVING COUNT(*) < 3;
```

    b. Has the highest number of employees:

```
SELECT d.department_id, d.department_name, COUNT(*)
FROM   departments d JOIN employees e
ON     d.department_id = e.department_id
GROUP BY d.department_id, d.department_name
HAVING COUNT(*) = (SELECT MAX(COUNT(*))
                   FROM   employees
                   GROUP BY department_id);
```

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c. Has the lowest number of employees:

```
SELECT d.department_id, d.department_name, COUNT(*)
FROM   departments d JOIN employees e
ON     d.department_id = e.department_id
GROUP BY d.department_id, d.department_name
HAVING COUNT(*) = (SELECT MIN(COUNT(*))
                   FROM   employees
                   GROUP BY department_id);
```

19. Create a report that displays the employee number, last name, salary, department number, and the average salary in their department for all employees.

```
SELECT e.employee_id, e.last_name, e.department_id, e.salary,
AVG(s.salary)
FROM   employees e JOIN employees s
ON     e.department_id = s.department_id
GROUP BY e.employee_id, e.last_name, e.department_id, e.salary;
```

20. Show all employees who were hired on the day of the week on which the highest number of employees were hired.

```
SELECT last_name, TO_CHAR(hire_date, 'DAY') day
FROM   employees
WHERE  TO_CHAR(hire_date, 'Day') =
       (SELECT TO_CHAR(hire_date, 'Day')
        FROM   employees
        GROUP BY TO_CHAR(hire_date, 'Day')
        HAVING COUNT(*) = (SELECT MAX(COUNT(*))
                           FROM   employees
                           GROUP BY TO_CHAR(hire_date, 'Day')));
```

21. Create an anniversary overview based on the hire date of the employees. Sort the anniversaries in ascending order.

```
SELECT last_name, TO_CHAR(hire_date, 'Month DD') BIRTHDAY
FROM   employees
ORDER BY TO_CHAR(hire_date, 'DDD');
```

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Additional Practices: Case Study Solutions

1. Create the tables based on the following table instance charts. Choose the appropriate data types and be sure to add integrity constraints.

   a. Table name: `MEMBER`

```
CREATE TABLE member
     (member_id       NUMBER(10)
         CONSTRAINT member_member_id_pk PRIMARY KEY,
       last_name      VARCHAR2(25)
         CONSTRAINT member_last_name_nn NOT NULL,
       first_name     VARCHAR2(25),
       address        VARCHAR2(100),
       city           VARCHAR2(30),
       phone          VARCHAR2(15),
       join_date      DATE DEFAULT SYSDATE
         CONSTRAINT member_join_date_nn NOT NULL);
```

   b. Table name: `TITLE`

```
CREATE TABLE title
       (title_id      NUMBER(10)
         CONSTRAINT title_title_id_pk PRIMARY KEY,
       title          VARCHAR2(60)
         CONSTRAINT title_title_nn NOT NULL,
       description    VARCHAR2(400)
         CONSTRAINT title_description_nn NOT NULL,
       rating         VARCHAR2(4)
         CONSTRAINT title_rating_ck CHECK
         (rating IN ('G', 'PG', 'R', 'NC17', 'NR')),
       category       VARCHAR2(20)
         CONSTRAINT title_category_ck CHECK
         (category IN ('DRAMA', 'COMEDY', 'ACTION',
         'CHILD', 'SCIFI', 'DOCUMENTARY')),
       release_date    DATE);
```

   c. Table name: `TITLE_COPY`

```
CREATE TABLE title_copy
       (copy_id        NUMBER(10),
       title_id       NUMBER(10)
         CONSTRAINT title_copy_title_if_fk REFERENCES title(title_id),
       status         VARCHAR2(15)
         CONSTRAINT title_copy_status_nn NOT NULL
         CONSTRAINT title_copy_status_ck CHECK (status IN
         ('AVAILABLE', 'DESTROYED','RENTED', 'RESERVED')),
       CONSTRAINT title_copy_copy_id_title_id_pk
         PRIMARY KEY (copy_id, title_id));
```

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d. Table name: RENTAL

```
CREATE TABLE rental
      (book_date    DATE DEFAULT SYSDATE,
       member_id    NUMBER(10)
         CONSTRAINT rental_member_id_fk REFERENCES member(member_id),
       copy_id      NUMBER(10),
       act_ret_date DATE,
       exp_ret_date DATE DEFAULT SYSDATE + 2,
       title_id     NUMBER(10),
       CONSTRAINT rental_book_date_copy_title_pk
         PRIMARY KEY (book_date, member_id, copy_id,title_id),
       CONSTRAINT rental_copy_id_title_id_fk
         FOREIGN KEY (copy_id, title_id)
         REFERENCES title_copy(copy_id, title_id));
```

e. Table name: RESERVATION

```
CREATE TABLE reservation
      (res_date      DATE,
       member_id     NUMBER(10)
         CONSTRAINT reservation_member_id REFERENCES member(member_id),
       title_id      NUMBER(10)
         CONSTRAINT reservation_title_id REFERENCES title(title_id),
       CONSTRAINT reservation_resdate_mem_tit_pk PRIMARY KEY
         (res_date, member_id, title_id));
```

2. Verify that the tables were created properly by checking in the Connections Navigator in SQL Developer.

   a. In the Connections Navigator, expand Connections > myconnection > Tables.

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3. Create sequences to uniquely identify each row in the `MEMBER` table and the `TITLE` table.

   a. Member number for the `MEMBER` table: Start with 101; do not allow caching of the values. Name the sequence `MEMBER_ID_SEQ`.

```
CREATE SEQUENCE member_id_seq
START WITH 101
NOCACHE;
```

   b. Title number for the `TITLE` table: Start with 92; do not allow caching of the values. Name the sequence `TITLE_ID_SEQ`.

```
CREATE SEQUENCE title_id_seq
START WITH 92
NOCACHE;
```

   c. Verify the existence of the sequences in the Connections Navigator in SQL Developer.

      a. In the Connections Navigator, assuming that the myconnection node is expanded, expand Sequences.

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4. Add data to the tables. Create a script for each set of data to be added.

   a. Add movie titles to the `TITLE` table. Write a script to enter the movie information. Save the statements in a script named `lab_apcs_4a.sql`. Use the sequences to uniquely identify each title. Enter the release dates in the DD-MON-YYYY format. Remember that single quotation marks in a character field must be specially handled. Verify your additions.

```
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES  (title_id_seq.NEXTVAL, 'Willie and Christmas Too',
         'All of Willie''s friends make a Christmas list for
         Santa, but Willie has yet to add his own wish list.',
         'G', 'CHILD', TO_DATE('05-OCT-1995','DD-MON-YYYY'))
/
INSERT INTO title(title_id , title, description, rating,
                  category, release_date)
VALUES   (title_id_seq.NEXTVAL, 'Alien Again', 'Yet another
          installment of science fiction history.  Can the
          heroine save the planet from the alien life form?',
          'R', 'SCIFI', TO_DATE( '19-MAY-1995','DD-MON-YYYY'))
/
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES   (title_id_seq.NEXTVAL, 'The Glob', 'A meteor crashes
          near a small American town and unleashes carnivorous
          goo in this classic.', 'NR', 'SCIFI',
          TO_DATE( '12-AUG-1995','DD-MON-YYYY'))
/
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES    (title_id_seq.NEXTVAL, 'My Day Off', 'With a little
           luck and a lot ingenuity, a teenager skips school for
           a day in New York.', 'PG', 'COMEDY',
           TO_DATE( '12-JUL-1995','DD-MON-YYYY'))
/
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES    (title_id_seq.NEXTVAL, 'Miracles on Ice', 'A six-year-old has
doubts about Santa Claus, but she discovers that miracles really do
exist.', 'PG', 'DRAMA',
           TO_DATE('12-SEP-1995','DD-MON-YYYY'))
/
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES    (title_id_seq.NEXTVAL, 'Soda Gang', 'After discovering a cache
of drugs, a young couple find themselves pitted against a vicious gang.',
'NR', 'ACTION', TO_DATE('01-JUN-1995','DD-MON-YYYY'))
/
```

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```
...
COMMIT
/
SELECT  title
FROM    title;
```

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b. Add data to the `MEMBER` table. Place the insert statements in a script named `lab_apcs_4b.sql`. Execute the commands in the script. Be sure to use the sequence to add the member numbers.

```
SET VERIFY OFF
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'Carmen', 'Velasquez',
        '283 King Street', 'Seattle', '206-899-6666', TO_DATE('08-MAR-
1990',
        'DD-MM-YYYY'))
/
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'LaDoris', 'Ngao',
        '5 Modrany', 'Bratislava', '586-355-8882', TO_DATE('08-MAR-1990',
        'DD-MM-YYYY'))
/
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'Midori', 'Nagayama',
        '68 Via Centrale', 'Sao Paolo', '254-852-5764', TO_DATE('17-JUN-
1991',
        'DD-MM-YYYY'))
/
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'Mark', 'Quick-to-See',
        '6921 King Way', 'Lagos', '63-559-7777', TO_DATE('07-APR-1990',
        'DD-MM-YYYY'))
/
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'Audry', 'Ropeburn',
        '86 Chu Street', 'Hong Kong', '41-559-87', TO_DATE('18-JAN-1991',
        'DD-MM-YYYY'))
/
INSERT INTO member(member_id, first_name, last_name,
            address, city, phone, join_date)
VALUES (member_id_seq.NEXTVAL, 'Molly', 'Urguhart',
        '3035 Laurier', 'Quebec', '418-542-9988', TO_DATE('18-JAN-1991',
        'DD-MM-YYYY'));
/
COMMIT
SET VERIFY ON
```

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c. Add the following movie copies in the `TITLE_COPY` table:
Note: Have the `TITLE_ID` numbers available for this exercise.

```
INSERT INTO title_copy(copy_id, title_id, status)
VALUES (1, 92, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id, status)
VALUES (1, 93, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id, status)
VALUES (2, 93, 'RENTED')
/
INSERT INTO title_copy(copy_id, title_id, status)
VALUES (1, 94, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id, status)
VALUES (1, 95, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id,status)
VALUES (2, 95, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id,status)
VALUES (3, 95, 'RENTED')
/
INSERT INTO title_copy(copy_id, title_id,status)
VALUES (1, 96, 'AVAILABLE')
/
INSERT INTO title_copy(copy_id, title_id,status)
VALUES (1, 97, 'AVAILABLE')
/
```

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d. Add the following rentals to the `RENTAL` table:
Note: The title number may be different depending on the sequence number.

```
INSERT INTO rental(title_id, copy_id, member_id,
                   book_date, exp_ret_date, act_ret_date)
VALUES (92, 1, 101, sysdate-3, sysdate-1, sysdate-2)
/
INSERT INTO rental(title_id, copy_id, member_id,
                   book_date, exp_ret_date, act_ret_date)
VALUES (93, 2, 101, sysdate-1, sysdate-1, NULL)
/
INSERT INTO rental(title_id, copy_id, member_id,
                   book_date, exp_ret_date, act_ret_date)
VALUES (95, 3, 102, sysdate-2, sysdate, NULL)
/
INSERT INTO rental(title_id, copy_id, member_id,
                   book_date, exp_ret_date,act_ret_date)
VALUES (97, 1, 106, sysdate-4, sysdate-2, sysdate-2)
/
COMMIT
/
```

5. Create a view named `TITLE_AVAIL` to show the movie titles, the availability of each copy, and its expected return date if rented. Query all rows from the view. Order the results by title.

   Note: Your results may be different.

```
CREATE VIEW title_avail AS
  SELECT   t.title, c.copy_id, c.status, r.exp_ret_date
  FROM     title t JOIN title_copy c
  ON       t.title_id = c.title_id
  FULL OUTER JOIN rental r
  ON       c.copy_id = r.copy_id
  AND      c.title_id = r.title_id;

SELECT   *
FROM     title_avail
ORDER BY title, copy_id;
```

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6. Make changes to data in the tables.

   a. Add a new title. The movie is “Interstellar Wars,” which is rated PG and classified as a science fiction movie. The release date is 07-JUL-77. The description is “Futuristic interstellar action movie. Can the rebels save the humans from the evil empire?” Be sure to add a title copy record for two copies.

```
INSERT INTO title(title_id, title, description, rating,
                  category, release_date)
VALUES (title_id_seq.NEXTVAL, 'Interstellar Wars',
        'Futuristic interstellar action movie.  Can the
         rebels save the humans from the evil empire?',
        'PG', 'SCIFI', '07-JUL-77')
/
INSERT INTO title_copy (copy_id, title_id, status)
VALUES (1, 98, 'AVAILABLE')
/
INSERT INTO title_copy (copy_id, title_id, status)
VALUES (2, 98, 'AVAILABLE')
/
```

   b. Enter two reservations. One reservation is for Carmen Velasquez, who wants to rent “Interstellar Wars.” The other is for Mark Quick-to-See, who wants to rent “Soda Gang.”

```
INSERT INTO reservation (res_date, member_id, title_id)
VALUES (SYSDATE, 101, 98)
/
INSERT INTO reservation (res_date, member_id, title_id)
VALUES (SYSDATE, 104, 97)
/
```

7. Make a modification to one of the tables.

   a. Run the script `lab_apcs_7a.sql` located in `D:\labs\sql1\labs` folder, to add a `PRICE` column to the `TITLE` table to record the purchase price of the video. Verify your modifications.

```
ALTER TABLE title
ADD  (price NUMBER(8,2));

DESCRIBE title
```

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b. Create a script named `lab_apcs_7b.sql` that contains update statements that update each video with a price according to the list provided. Run the commands in the script.
Note: Have the `TITLE_ID` numbers available for this exercise.

```
SET ECHO OFF
SET VERIFY OFF
UPDATE title
SET    price = &price
WHERE  title_id = &title_id;
SET VERIFY OFF
SET ECHO OFF
```

8. Create a report that contains each customer's history of renting videos. Be sure to include the customer name, movie rented, dates of the rental, and duration of rentals. Total the number of rentals for all customers for the reporting period. Save the commands that generate the report in a script file named `lab_apcs_8.sql`.
Note: Your results may be different.

```
SELECT  m.first_name||' '||m.last_name MEMBER, t.title,
        r.book_date, r.act_ret_date - r.book_date DURATION
FROM  member m
JOIN rental r
ON   r.member_id = m.member_id
JOIN title t
ON   r.title_id = t.title_id
ORDER BY member;
```

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