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Oracle11g: PL/SQL Programming

Chapter 1

Introduction to PL/SQL



Chapter Objectives

- After completing this lesson, you should be able to understand:
 - PL/SQL and application programming
 - Application models
 - How to locate Oracle resources
 - SQL and PL/SQL tools
 - The databases used in this book
 - SQL SELECT statement and data manipulation syntax



Procedural Languages


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- Programming languages allow actions of the end user to be converted to computer instructions
- Procedural languages allow the inclusion of logic processes
- PL/SQL is a procedural language, SQL is not a procedural language




Application Programming


- Example application screen



Brewbean's Coffee Shop

[Departments](#)

Click [here](#) to continue shopping

[Basket](#)

Item Code	Name	Options	Qty	Price	Total	
7	Columbia	1 lb., Whole Bean	<input type="text" value="1"/>	\$10.80	\$10.80	Remove
9	Ethiopia	1 lb., Whole Bean	<input type="text" value="1"/>	\$10.00	\$10.00	Remove

Subtotal: \$20.80

[Check Out](#)[Search](#)[Account](#)[Order Status](#)



Brewbean's Application

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- Processing needed to support the shopping cart check out button
 - Verify quantities are > 0
 - Calculate shipping cost
 - Calculate taxes
 - Check/update product inventory
 - Check shopper profile for credit card information



The PL/SQL Language

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- Proprietary Oracle language
- Tightly integrated with SQL
- Can increase performance by grouping statements into blocks of code
- Portable to any Oracle platform
- Used within many Oracle tools
- Stored program units can increase security



Application Models

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- Three main components
 - User interface or screens
 - Program logic (brains behind the screens)
 - Database
- Most models are based on a two- or three-tier structure



Two-tier Model

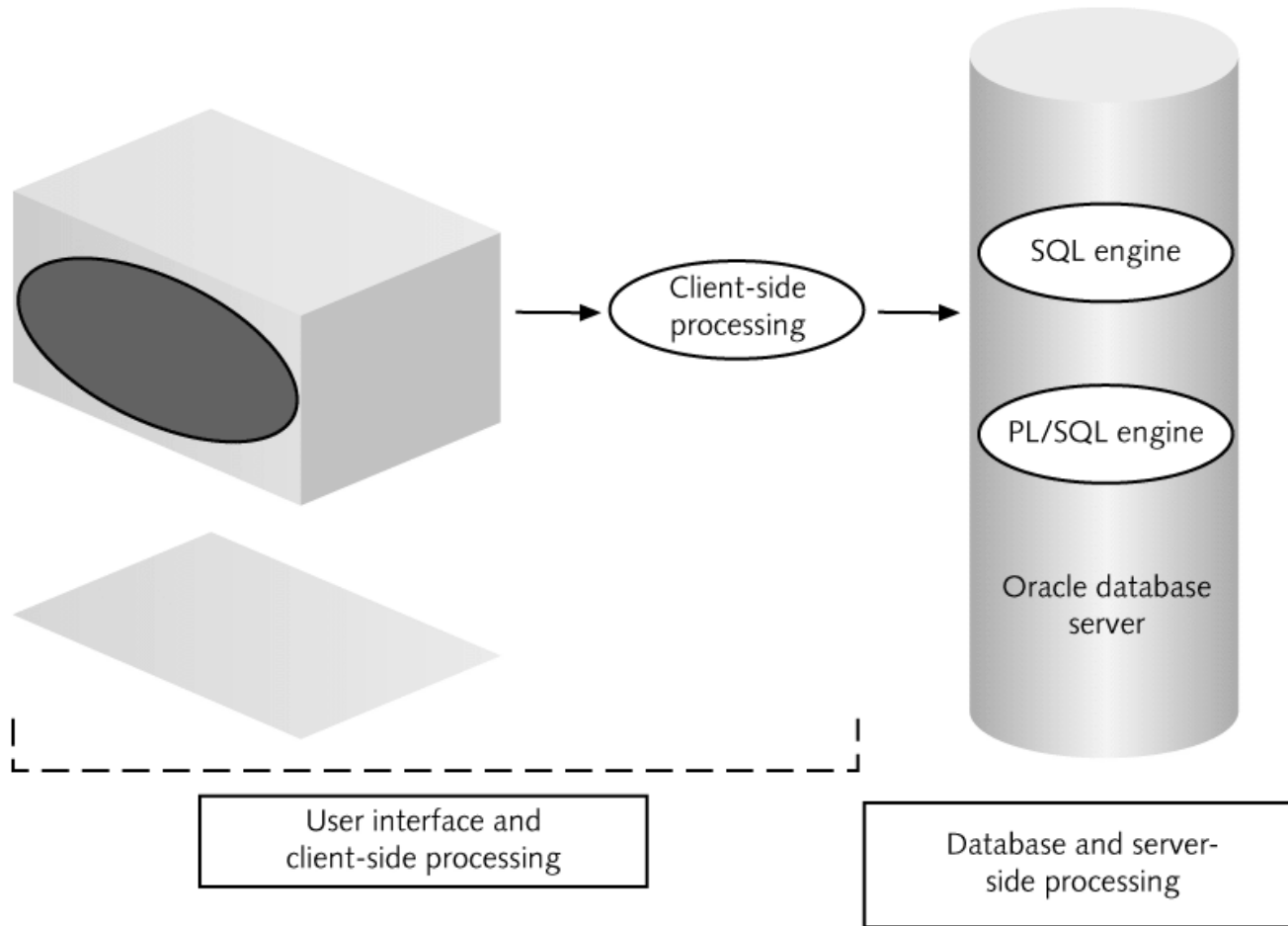
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- Commonly referred to as client/server
- Parts of the processing occur both on the user's computer and the database server
- Named or stored program units are blocks of PL/SQL code saved in the Oracle database to provide server-side processing



Two-tier Diagram

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Three-tier Model

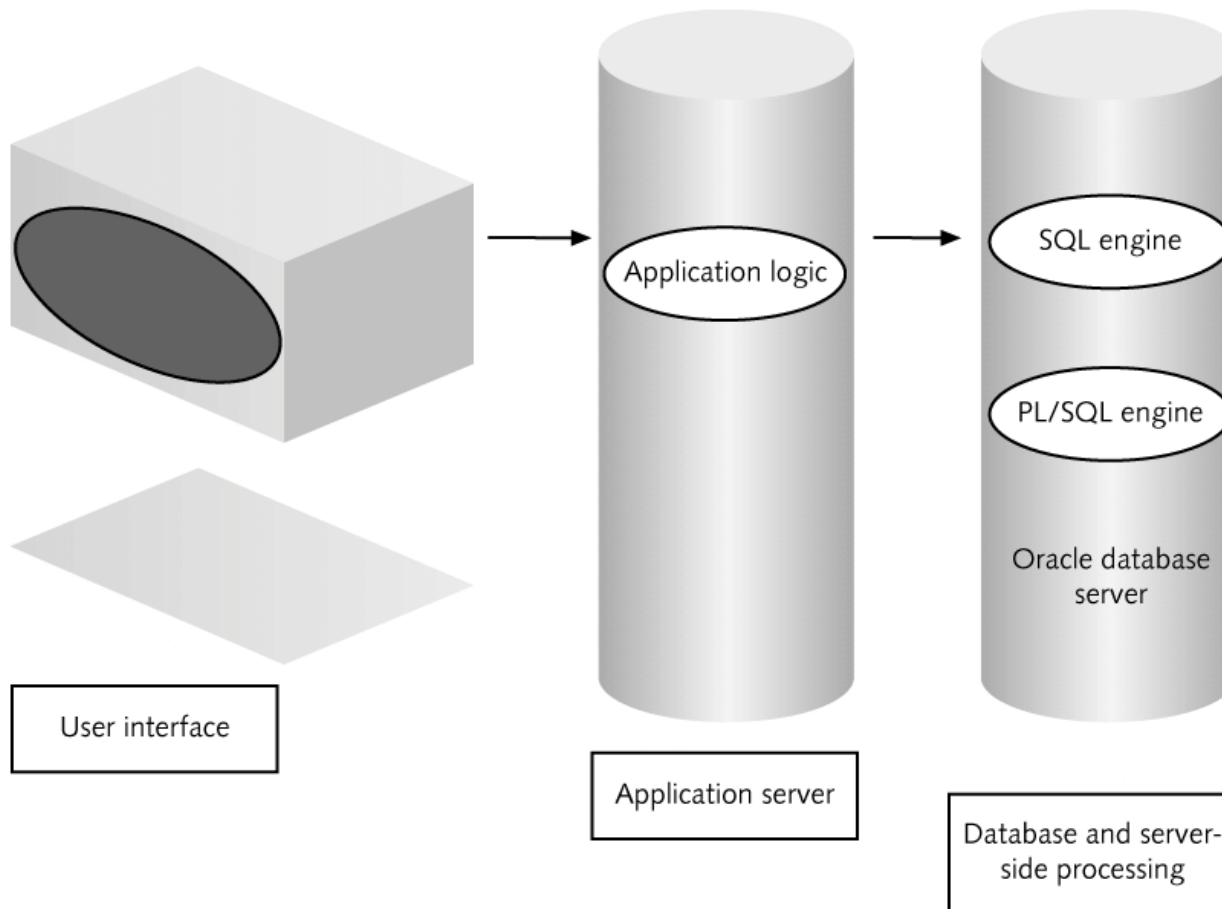
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- Thin client with no code loaded on the user machine (browser access)
- Middle tier is the application server – Forms server for Oracle
- Last tier is the database server
- Processing load is on the middle and last tier
- Maintenance is simplified



Three-tier Diagram

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Oracle Documentation

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- Oracle Technology Network (OTN): otn.oracle.com
 - Documentation
 - Sample Code
 - Discussion Forums
- User Web sites: PL/SQL Obsession



SQL & PL/SQL Tools

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- SQL*Plus
- SQL Developer
 - Appendix B
- Other software introduced in appendices
 - TOAD
 - SQL Navigator



SQL*Plus Client Interface

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```
SQL> SELECT firstname, lastname
2      FROM bb_shopper;

FIRSTNAME      LASTNAME
-----
John           Carter
Margaret       Somner
Kenny          Ratnan
Camryn         Sonnie
Scott          Savid
Monica         Cast
Pete           Parker

7 rows selected.

SQL>
```



SQL Developer

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Run Statement button
(used to run SQL statements)

Run Script button
(used to run PL/SQL statements)

Connection pane

Edit pane (for entering statements)

Output pane

Oracle SQL Developer : XE_plbook

File Edit View Navigate Run Versigning Tools Help

Connections x

Connections

- XE_plbook
- XE_system

Worksheet Query Builder

```
1 SELECT firstname, lastname
2 FROM bb_shopper;
```

Query Result x

SQL | All Rows Fetched: 7 in 0.047 seconds

	FIRSTNAME	LASTNAME
1	John	Carter
2	Margaret	Somner
3	Kenny	Ratman
4	Camryn	Sonnie
5	Scott	Savid
6	Monica	Cast
7	Pete	Parker

Messages - Log x

XE_plbook | Line 2 Column 18 | Insert | Modified | Windows: CR/LF Editing



Databases Used

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- Brewbean's Company
 - In text examples
 - Assignments
- DoGood Donor
 - Assignments
- More Movie Rentals
 - Case Projects



The Brewbean's Company

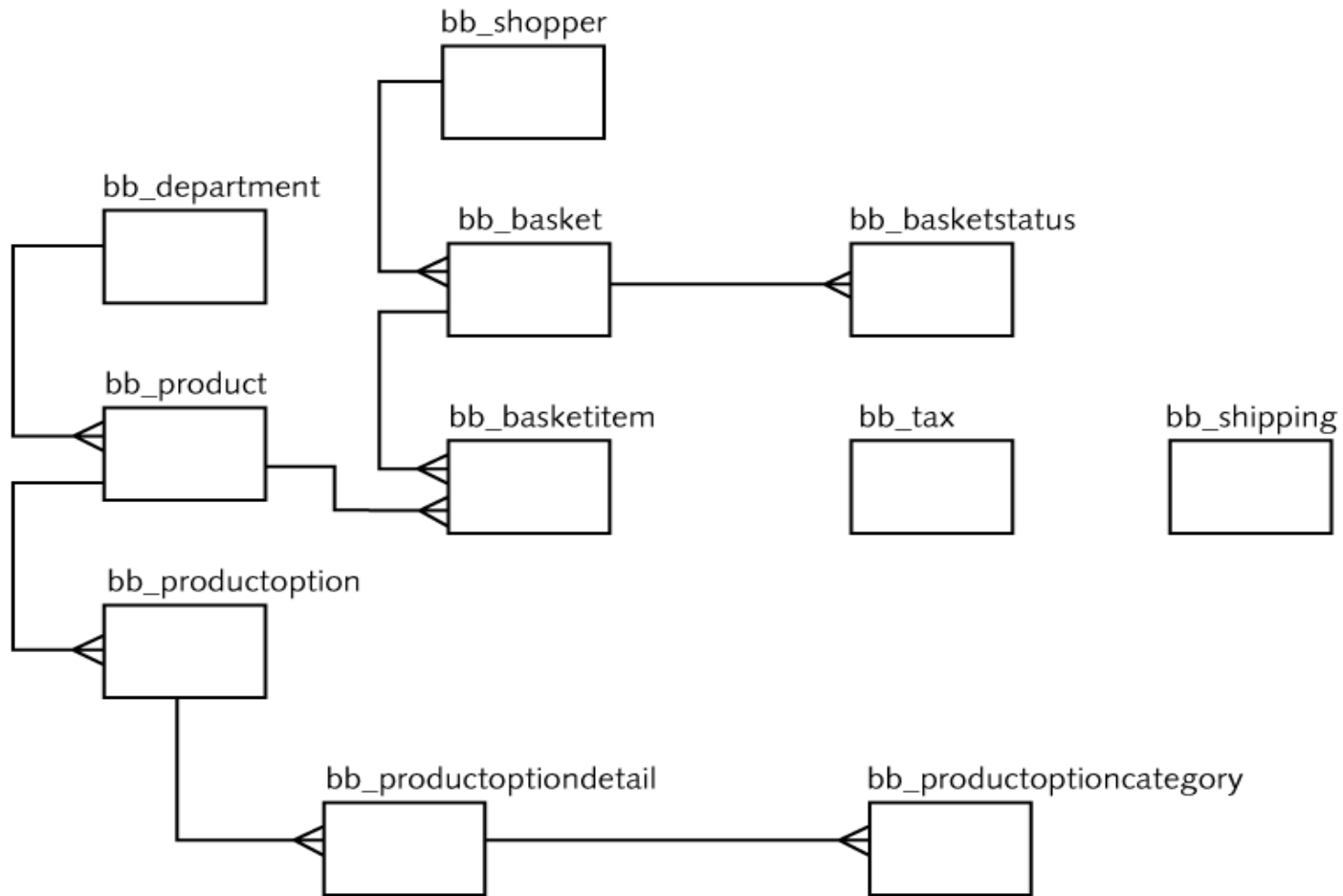
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- Retail coffee and brewing equipment via the Internet, phone, and stores
- Used in chapter explanations, examples, and exercises
- Databases create script provided for each chapter



ERD for Brewbean's DB

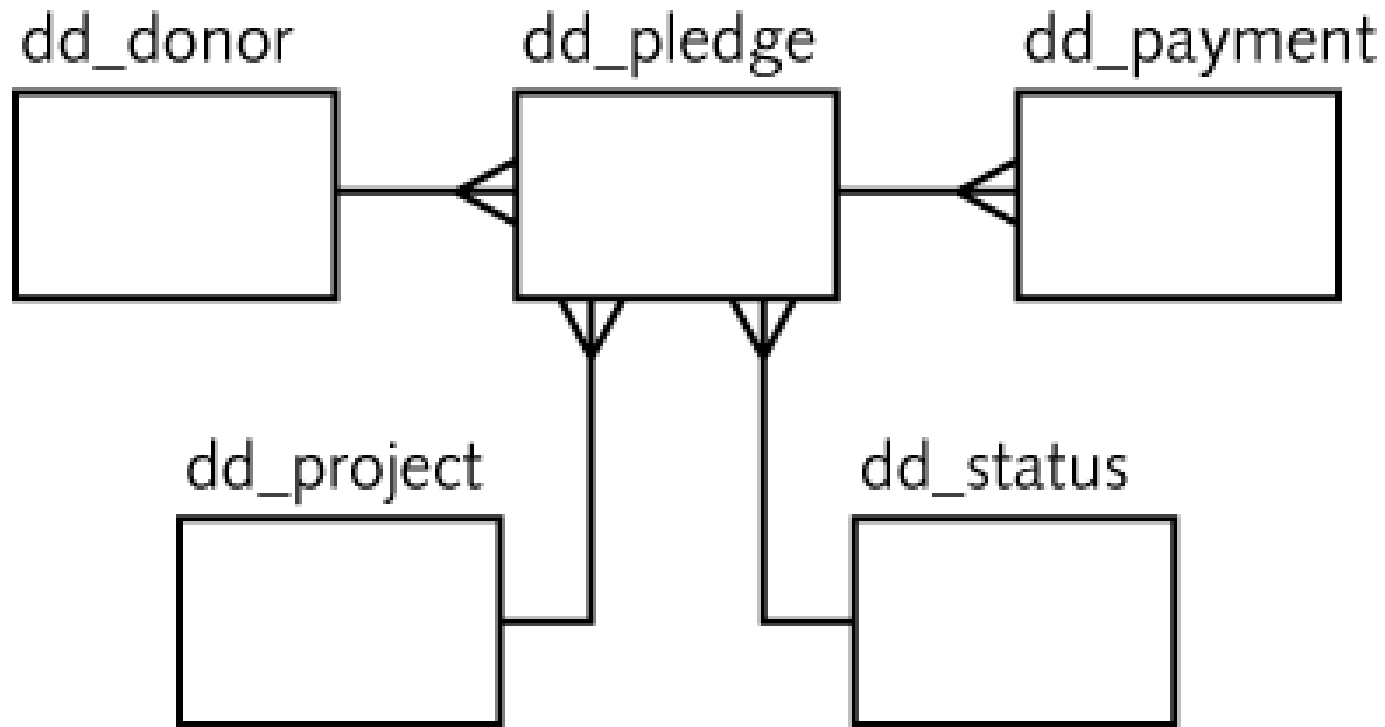
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DoGood Donor ERD

- Track donation, pledges, and payments

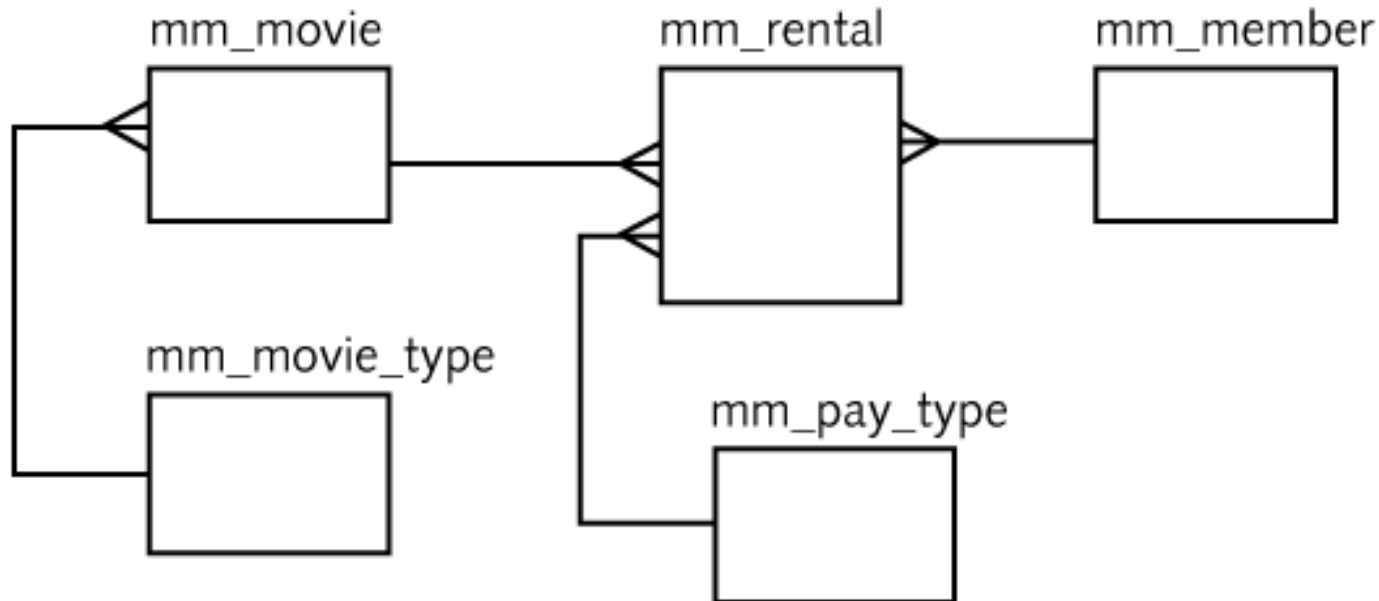




More Movies ERD

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- Movie rental company used in an ongoing case study





SQL Query Syntax

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```
SELECT <columns>
  FROM <tables, views>
 WHERE <conditions>
 GROUP BY <columns>
  HAVING <aggregation conditions>
 ORDER BY <columns>;
```



Traditional Join

PL/SQL

The screenshot shows the Oracle XE SQL Developer interface. The top toolbar includes icons for running, saving, and editing. The 'Worksheet' tab is active, displaying a SQL query in the 'Query Builder' section. The query is as follows:

```
1 SELECT p.productname, p.active, d.deptname
2 FROM bb_product p, bb_department d
3 WHERE p.iddepartment = d.iddepartment;
```

Below the query, the 'Query Result' tab is active, showing the results of the query. The status bar indicates 'All Rows Fetched: 10 in 0.046 seconds'. The results are displayed in a table with three columns: PRODUCTNAME, ACTIVE, and DEPTNAME.

	PRODUCTNAME	ACTIVE	DEPTNAME
1	CapressoBar Model #351	1	Equipment and Supplies
2	Capresso Ultima	1	Equipment and Supplies
3	Eileen 4-cup French Press	1	Equipment and Supplies
4	Coffee Grinder	1	Equipment and Supplies
5	Sumatra	1	Coffee
6	Guatamala	1	Coffee
7	Columbia	1	Coffee
8	Brazil	1	Coffee
9	Ethiopia	1	Coffee
10	Espresso	1	Coffee



ANSI Join

The screenshot shows the Oracle SQL Developer interface. The top pane is the 'Worksheet' tab, displaying a SQL query. The bottom pane is the 'Query Result' tab, showing the results of the query. The query is an ANSI JOIN query that selects product names, active status, and department names from the bb_product and bb_department tables.

```
1 SELECT p.productname, p.active, d.deptname
2 FROM bb_product p INNER JOIN bb_department d
3 USING(iddepartment);
```

The query result shows 10 rows of data. The columns are PRODUCTNAME, ACTIVE, and DEPTNAME. The data is as follows:

	PRODUCTNAME	ACTIVE	DEPTNAME
1	CapressoBar Model #351	1	Equipment and Supplies
2	Capresso Ultima	1	Equipment and Supplies
3	Eileen 4-cup French Press	1	Equipment and Supplies
4	Coffee Grinder	1	Equipment and Supplies
5	Sumatra	1	Coffee
6	Guatamala	1	Coffee
7	Columbia	1	Coffee
8	Brazil	1	Coffee
9	Ethiopia	1	Coffee
10	Espresso	1	Coffee



Aggregate function

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The screenshot shows the Oracle SQL Developer interface. The top pane is the 'Query Builder' for a worksheet named 'XE_plbook'. It contains the following SQL query:

```
1 SELECT deptname, COUNT(idproduct)
2   FROM bb_product p INNER JOIN bb_department d
3     USING(iddepartment)
4  GROUP BY deptname;
```

The bottom pane is the 'Query Result' window, showing the results of the query. It indicates that all rows were fetched in 0.047 seconds. The results are displayed in a table with two columns: 'DEPTNAME' and 'COUNT(IDPRODUCT)'.

	DEPTNAME	COUNT(IDPRODUCT)
1	Coffee	6
2	Equipment and Supplies	4



WHERE clause filter

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The screenshot shows the Oracle SQL Developer interface. The top toolbar includes icons for running, saving, and other database operations. The 'Query Builder' tab is active, displaying the following SQL query:

```
1 SELECT AVG(price)
2 FROM bb_product
3 WHERE type = 'C';
```

Below the query editor, the 'Query Result' tab shows the execution results. It indicates 'All Rows Fetched: 1 in 0.032 seconds'. The results are displayed in a table with one column, 'AVG(PRICE)', and one row with the value '10.35'.

	AVG(PRICE)
1	10.35



Creating Tables

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The screenshot shows the Oracle SQL Developer application window. The title bar indicates the connection is 'XE_plbook'. The interface includes a toolbar with various icons for execution and editing. The 'Worksheet' tab is active, displaying a SQL script to create a table named 'autos'. The script defines columns for 'auto_id' (NUMBER(5)), 'acquire_date' (DATE), and 'color' (VARCHAR2(15)), and includes a primary key constraint on 'auto_id'. The 'Query Builder' tab is also visible. Below the script editor, the 'Query Result' and 'Script Output' tabs are shown. The 'Script Output' tab displays the message 'table AUTOS created.' and indicates that the task was completed in 0.031 seconds.

```
1 CREATE TABLE autos
2   (auto_id NUMBER(5),
3     acquire_date DATE,
4     color VARCHAR2(15),
5     CONSTRAINT auto_id_pk PRIMARY KEY (auto_id));
```

table AUTOS created.



DML - Insert

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The screenshot shows the Oracle SQL Developer interface. The top toolbar includes icons for running, saving, and other database operations, along with a timer showing 0.078 seconds. The main window is titled 'XE_plbook' and contains a 'Query Builder' tab. The SQL script in the editor is as follows:

```
1 INSERT INTO autos (auto_id, acquire_date, color)
2   VALUES (45321, '05-MAY-2012', 'gray');
3 INSERT INTO autos (auto_id, acquire_date, color)
4   VALUES (81433, '12-OCT-2012', 'red');
5 COMMIT;
6 SELECT * FROM autos;
```

Below the script, the 'Query Result' tab is active, displaying the output of the execution. It shows two rows inserted, a commit message, and a table of the data in the 'autos' table.

Task completed in 0.078 seconds

```
1 rows inserted.
1 rows inserted.
committed.
AUTO_ID ACQUIRE_DATE COLOR
-----
45321 05-MAY-12      gray
81433 12-OCT-12       red
```



DML - Update

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The screenshot shows the Oracle SQL Developer interface. The main window is titled 'XE_plbook'. The 'Query Builder' tab is active, displaying the following SQL code:

```
1 UPDATE autos
2   SET color = 'silver'
3   WHERE auto_id = 45321;
4 SELECT *
5   FROM autos;
```

Below the query editor, the 'Query Result' tab is active, showing the results of the query. The results are displayed in a table with the following columns: AUTO_ID, ACQUIRE_DATE, and COLOR. The table contains two rows of data:

AUTO_ID	ACQUIRE_DATE	COLOR
45321	05-MAY-12	silver
81433	12-OCT-12	red



DML - Delete

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The screenshot shows the Oracle SQL Developer interface. The main window is titled 'XE_plbook'. The 'Query Builder' tab is active, displaying the following SQL code:

```
1 DELETE FROM autos
2   WHERE auto_id = 45321;
3 SELECT *
4   FROM autos;
```

Below the query editor, the 'Query Result' tab is active, showing the execution results. The status bar indicates 'Task completed in 0.015 seconds'. The results display '1 rows deleted.' followed by a table of data from the 'autos' table:

AUTO_ID	ACQUIRE_DATE	COLOR
81433	12-OCT-12	red



Drop Table

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```
1 DROP TABLE autos;
2 SELECT *
3 FROM autos;
```

table AUTOS dropped.

Error starting at line 2 in command:
SELECT *
FROM autos
Error at Command Line:3 Column:7
Error report:
SQL Error: ORA-00942: table or view does not exist
00942. 00000 - "table or view does not exist"



Review to prepare

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- Review SQL statement syntax
- Explore the Brewbean's database