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# Oracle11g: PL/SQL Programming

## Chapter 1

## Introduction to PL/SQL



# Chapter Objectives

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- 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

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- 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	<a href="#">Remove</a>
9	Ethiopia	1 lb., Whole Bean	<input type="text" value="1"/>	\$10.00	\$10.00	<a href="#">Remove</a>

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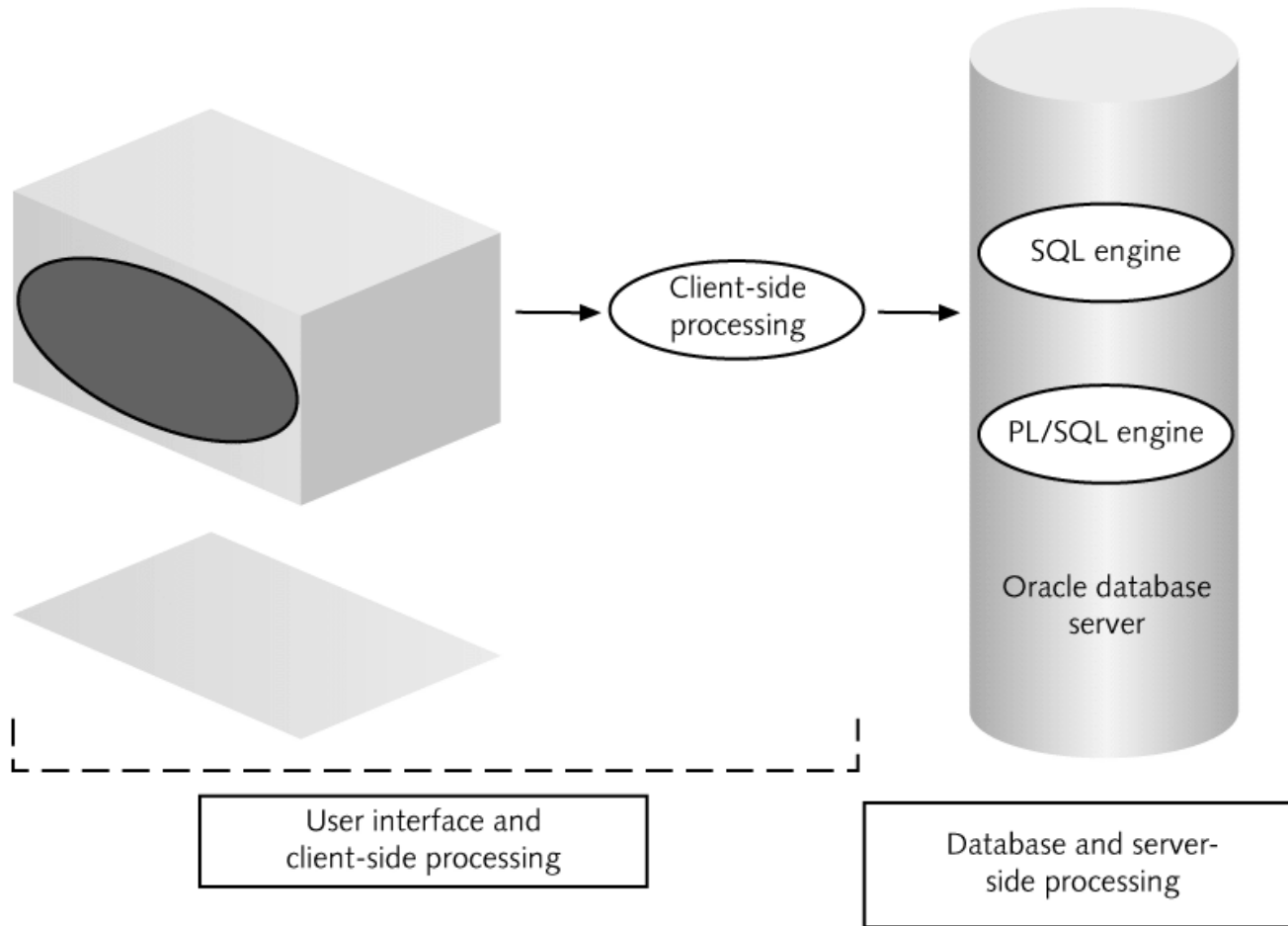
- Commonly referred to as client/server
- Parts of the processing occur both on the user's computer and the database server
- Named or stored program units are blocks of PL/SQL code saved in the Oracle database to provide server-side processing





# Two-tier Diagram

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# Three-tier Model

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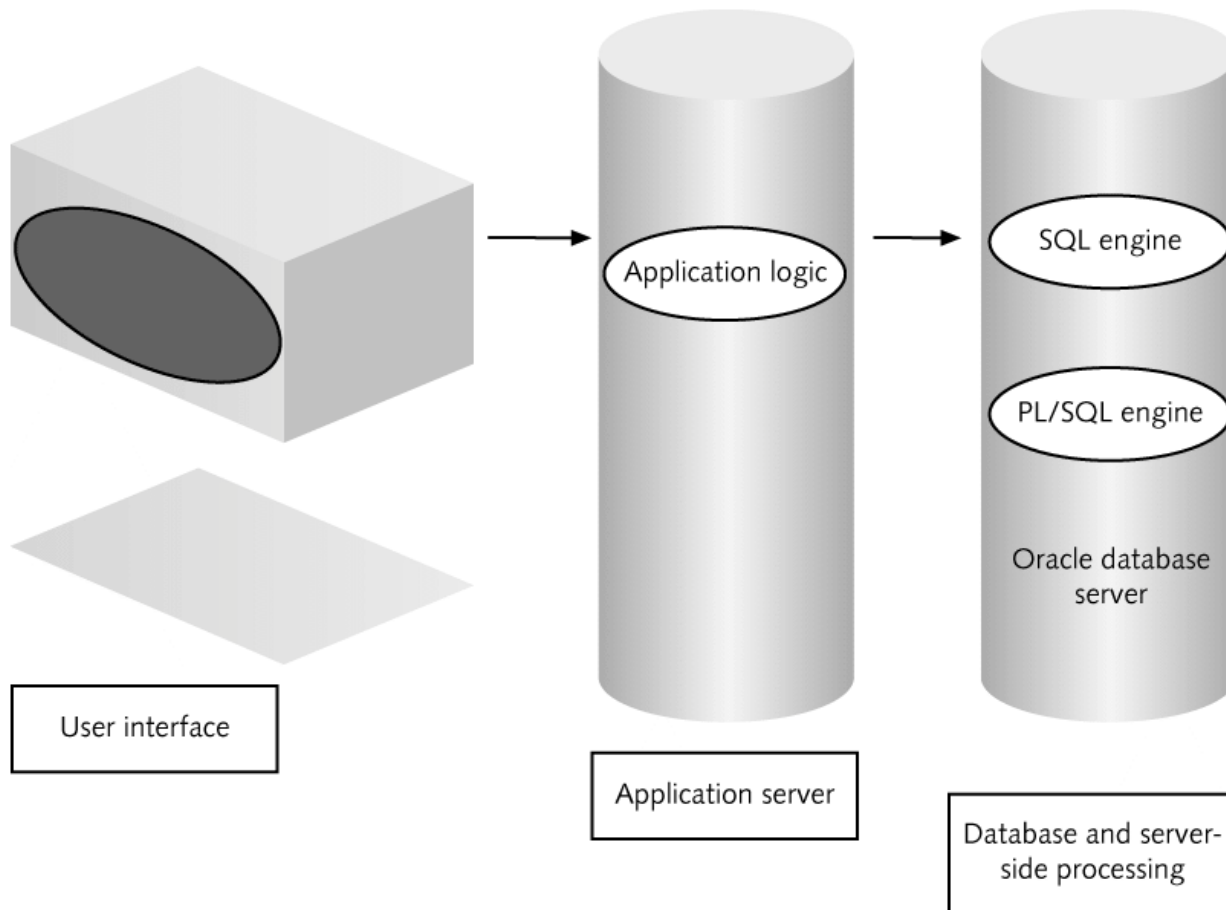
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- Thin client with no code loaded on the user machine (browser access)
- Middle tier is the application server – Forms server for Oracle
- Last tier is the database server
- Processing load is on the middle and last tier
- Maintenance is simplified



# Three-tier Diagram

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# Oracle Documentation

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- Oracle Technology Network (OTN):  
[otn.oracle.com](http://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

The screenshot shows the Oracle SQL Developer application window titled 'Oracle SQL Developer : XE\_plbook'. The interface includes a menu bar (File, Edit, View, Navigate, Run, Versioning, Tools, Help) and a toolbar with various icons. On the left is the 'Connections' pane showing 'XE\_plbook' and 'XE\_system' connections. The main workspace is divided into two panes: the 'Edit pane' at the top containing a SQL query, and the 'Query Result' pane below it displaying the output of the query. The 'Query Result' pane shows a table with 7 rows of data. At the bottom is a 'Messages - Log' pane. The status bar at the very bottom indicates 'Line 2 Column 18 | Insert | Modified | Windows: CR/LF Editing'.

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



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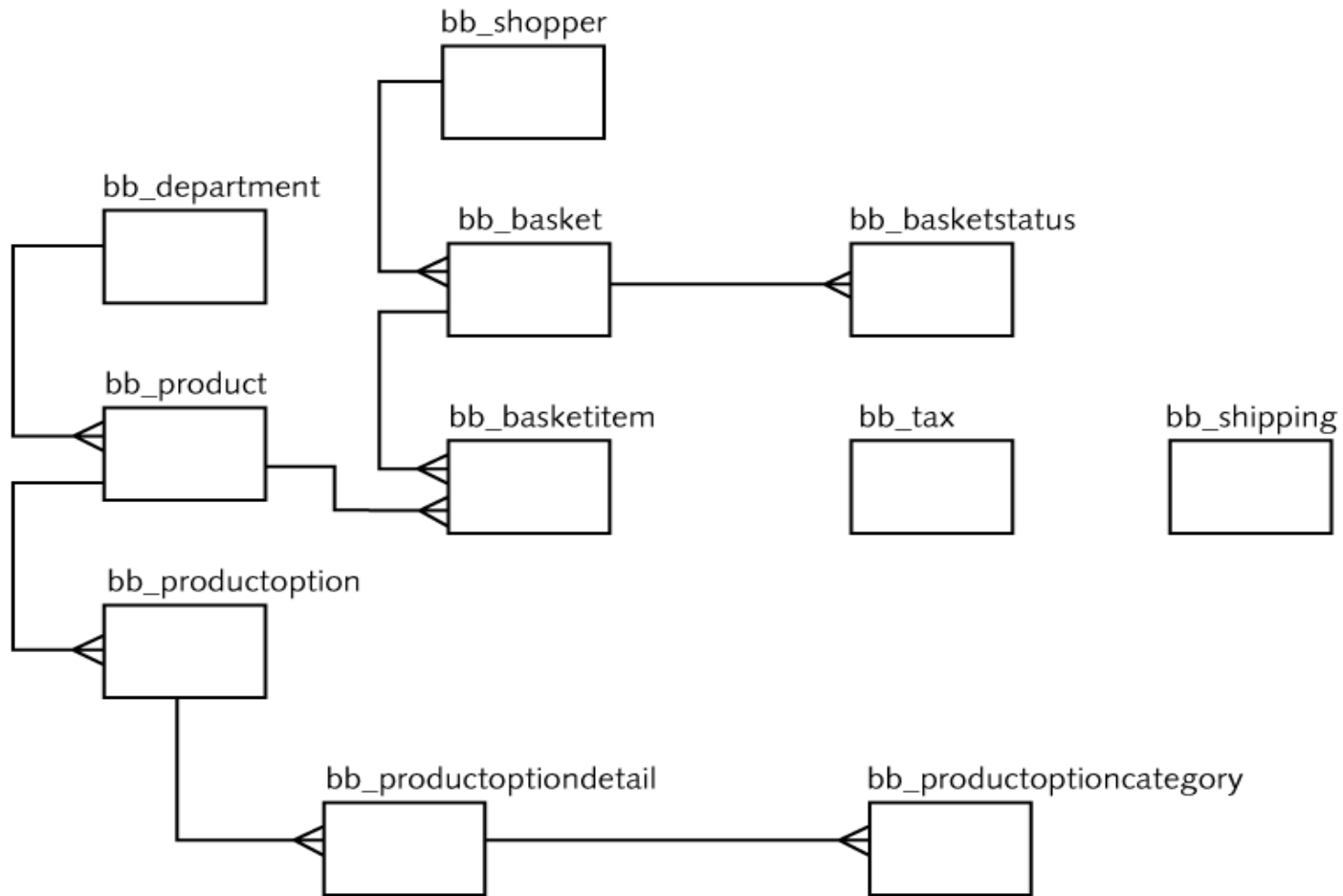
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- Retail coffee and brewing equipment via the Internet, phone, and stores
- Used in chapter explanations, examples, and exercises
- Databases create script provided for each chapter



# ERD for Brewbean's DB

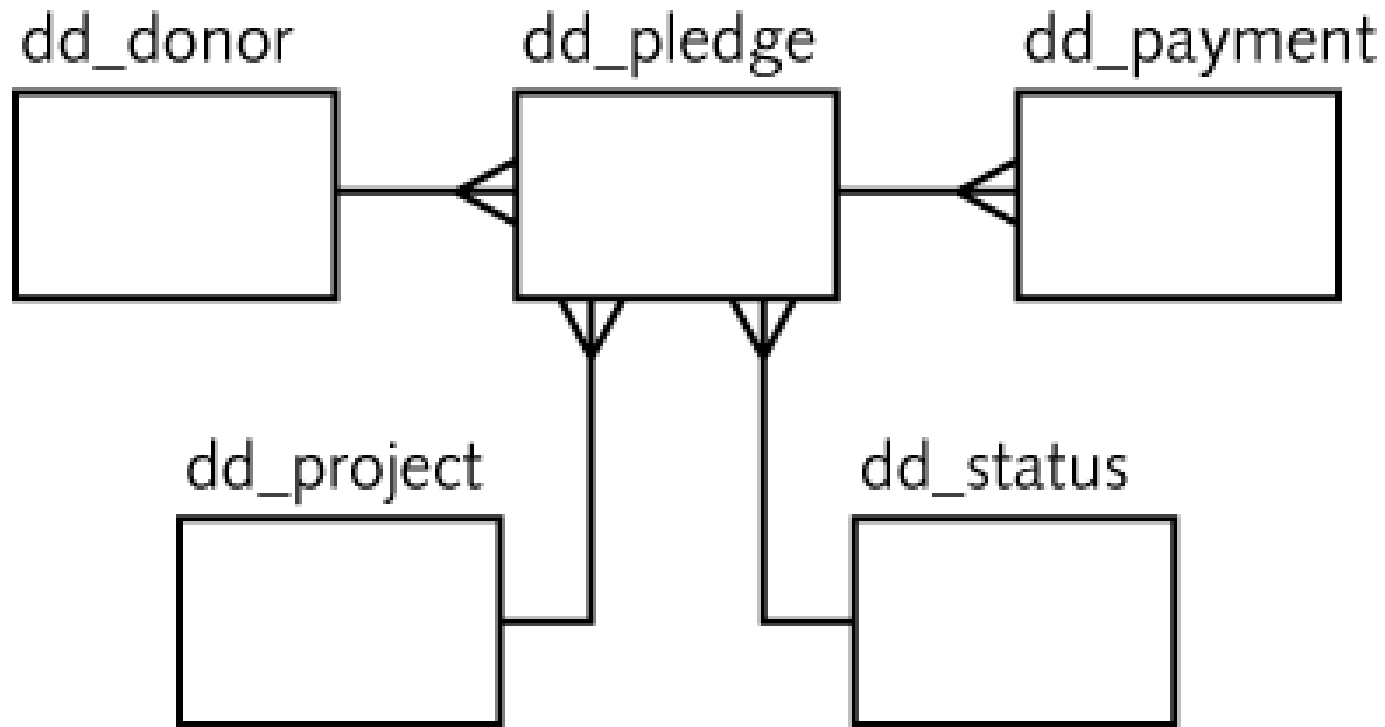
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# DoGood Donor ERD

- Track donation, pledges, and payments

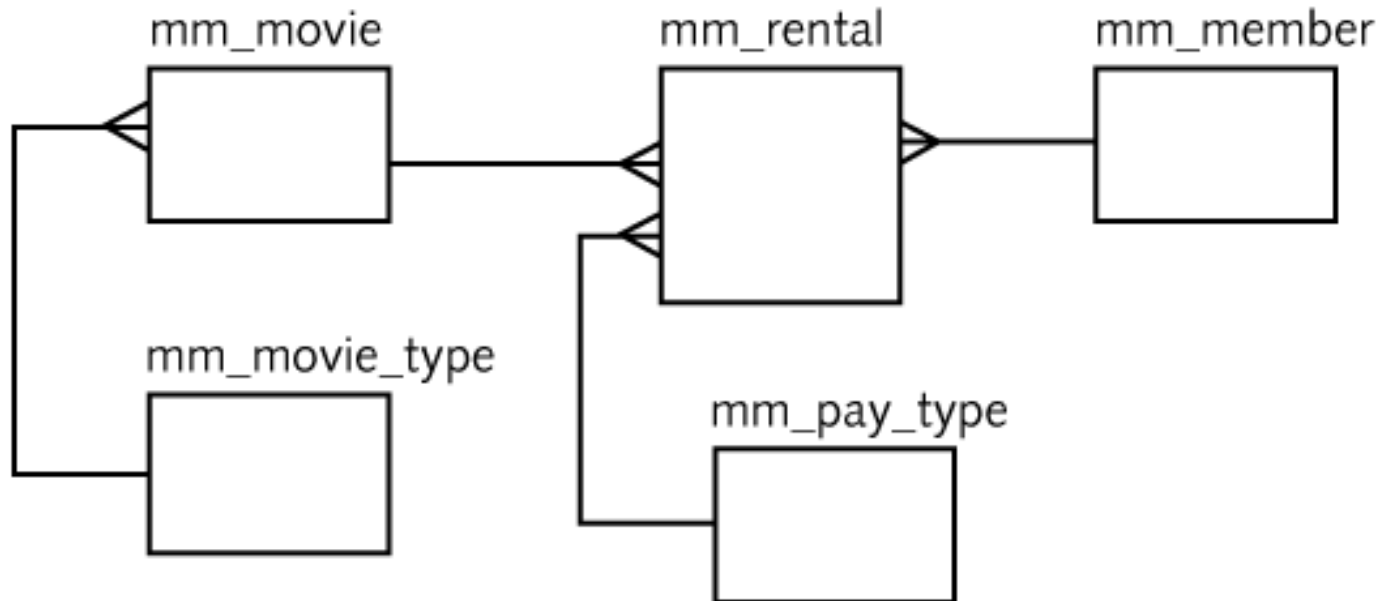




# More Movies ERD

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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 title bar indicates the connection is 'XE\_plbook'. The 'Worksheet' tab is active, displaying a SQL query in the 'Query Builder' view. 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 editor, 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 'Query Builder' tab, displaying the following SQL query:

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

The bottom pane is the 'Query Result' tab, showing the results of the query. It indicates 'All Rows Fetched: 10 in 0 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



# 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 queries, 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 that all rows were fetched 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 reads 'XE\_plbook'. The interface includes a toolbar with various icons for execution, editing, and viewing. The 'Worksheet' tab is active, displaying a SQL script in a text editor. The script is as follows:

```
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));
```

Below the script editor, the 'Query Result' and 'Script Output' tabs are visible. The 'Script Output' tab is active, showing the message 'table AUTOS created.' and a status bar indicating 'Task completed in 0.031 seconds'.



# DML - Insert

PL/SQL

The screenshot shows the Oracle SQL Developer interface. The top toolbar includes icons for running, saving, and other database operations. The main window is titled 'XE\_plbook' and contains a SQL script with the following lines:

```
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 'autos' table with columns 'AUTO\_ID', 'ACQUIRE\_DATE', and 'COLOR'.

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 top toolbar includes icons for running queries, saving, and other database functions. The main window is titled 'XE\_plbook' and has tabs for 'Worksheet' and 'Query Builder'. The 'Worksheet' tab is active, displaying a SQL script with the following lines:

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

Below the script, the 'Query Result' tab is active, showing the output of the query. It indicates that 1 row was updated. Below this, a table of data is displayed:

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 shows '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