



# Database Management

BU.330.770

Session 2 (part I)

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# Announcement



- » Assignment #1: [Canvas > Assignments](#) or [Home > Week 3](#)
- » Submit your deliverable to the same posting before the next class.
- » The work should be yours: add necessary explanations or reasonable assumptions you had to make.
- » Late submissions will be accepted within 48 hours from the due but discounted by 50%.
- » Contact the instructor or TA for clarification if you are ever indoubt. You may use MS Teams or Q&A in Course Canvas Home to ask questions.



# Basic Query



# Session Objectives (1/2)

## » Learn the syntax of the SELECT statement

- Identify keywords, mandatory clauses, and optional clauses in a SELECT statement

## » Select and view one or all columns of a table

## » Display multiple columns of a table

## » Use a column alias to clarify the contents of a particular column



# Session Objectives (2/2)

- » Perform basic arithmetic operations in the SELECT clause
- » Remove duplicate lists using either the DISTINCT or UNIQUE keyword
- » Use concatenation to combine fields, literals, and other data

# Let's Run SQL Developer



Oracle SQL Developer

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Connections

- Oracle Connections
- Oracle Cloud
- Database Schema Service Connections

Welcome Page Week2\_Test.sql

Version: 23.1.1.345.2114

## ORACLE SQL Developer

### Database Connection

Recent Databases Detected

Click to add the connection  
No TNS entries found in (USER Home dir=C:\Users\cjung9)

Load a TNS file

Create a Connection Manually

### Getting Started

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- Oracle VirtualBox Appliance
- Docker Images
- Oracle Database XE

### Resources

Community Extensions

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### Related Tools

- Modeler - Data modeling and database design
- SQLcl - The power of SQL Developer in a CLI
- Oracle Live SQL - Learn and share SQL, for free.
- ORDS - REST Enable the Oracle Database

### Feature Screenshots

The SQL Worksheet allows you to run queries and scripts, and offers a code insight feature to help you auto-complete your code.

Oracle SQL Developer - hr

File Edit View Navigate Run Source Team Tools Window Help



# Check the JustLee Database

» Download and Run [Week 2 > JLDB\\_Build.sql](#)

» Verify table contents using the DESCRIBE (or DESC) command

{  
DESC BOOKS;  
DESC CUSTOMERS;  
*describing a table.*

» You may delete all the tables and recreate them by using the JLDB\_Build.sql scripts

*creates tables:* Customers, Orders, Publisher, Author, Books, OrderItems,  
Bookauthors.



# SELECT Statement Syntax

- » Syntax gives the basic structure, or rules, for a command
- » SELECT statements are used to retrieve data from the database
- » A SELECT statement is referred to as a query
- » Optional clauses and keywords are shown in brackets

```
SELECT [DISTINCT | UNIQUE] (*, columnname [AS alias], ...)
```

```
    FROM tablename
```

```
    [WHERE condition]
```

```
    [GROUP BY group_by_expression]
```

```
    [HAVING group_condition]
```

```
    [ORDER BY columnname];
```

Contents in parentheses  
are mandatory:  
use \* or provide specific  
column names





# SELECT Statement Syntax (continued)

- » SELECT and FROM clauses are required
- » SELECT clause identifies column(s)/field(s) to be retrieved
- » FROM clause identifies table(s)
- » Each clause begins with a keyword
  - SELECT, FROM, WHERE... these are all keywords

```
SELECT [DISTINCT | UNIQUE] (*, columnname [AS alias], ...)  
      FROM tablename  
      [WHERE condition]  
      [GROUP BY group_by_expression]  
      [HAVING group_condition]  
      [ORDER BY columnname];
```

A handwritten signature in black ink, appearing to be 'J. J. #', located to the right of the SQL syntax box.



# SELECT Statement Syntax Practice

```
SELECT [DISTINCT | UNIQUE] (*, columnname [AS alias], ...)  
FROM tablename  
[WHERE condition]  
[GROUP BY group_by_expression]  
[HAVING group_condition]  
[ORDER BY columnname];
```

Let's check what tables  
exist under your account

The screenshot shows a database interface with two main windows. The top window is the 'Query Builder' and the bottom is the 'Query Result' window.

**Query Builder:** The SQL statement entered is:

```
1 Select table_name  
2 From user_tables;
```

Annotations in the Query Builder:

- An arrow points from `table_name` to the text: "One of the fields in 'user\_tables'"
- An arrow points from `user_tables` to the text: "Table name, Data Dictionary"

**Query Result:** The window shows the results of the query. It has a title bar 'Query Result x' and a status bar 'All Rows Fetched: 10 in 0.88 seconds'. The results are displayed in a table with one column, 'TABLE\_NAME', and 10 rows.

	TABLE_NAME
1	CUSTOMERS
2	ORDERS
3	PUBLISHER
4	AUTHOR
5	BOOKS
6	ORDERITEMS
7	BOOKAUTHOR
8	PROMOTION
9	ACCTMANAGER
10	ACCTBONUS

# Selecting All Data in a Table



- Substitute an asterisk for the column names in a SELECT clause

Worksheet		Query Builder								
		<pre>SELECT * FROM customers;</pre>								
Script Output x		Query Result x								
		SQL   All Rows Fetched: 20 in 0.036 seconds								
	CUSTOMER#	LASTNAME	FIRSTNAME	ADDRESS	CITY	STATE	ZIP	REFERRED	REGION	EMAIL
1	1001	MORALES	BONITA	P.O. BOX 651	EASTPOINT	FL	32328	(null)	SE	bm225@sat.net
2	1002	THOMPSON	RYAN	P.O. BOX 9835	SANTA MONICA	CA	90404	(null)	W	(null)
3	1003	SMITH	LEILA	P.O. BOX 66	TALLAHASSEE	FL	32306	(null)	SE	(null)
4	1004	PIERSON	THOMAS	69821 SOUTH AVENUE	BOISE	ID	83707	(null)	NW	tpier55@sat.net
5	1005	GIRARD	CINDY	P.O. BOX 851	SEATTLE	WA	98115	(null)	NW	cingl01@zep.net
6	1006	CRUZ	MESHIA	82 DIRT ROAD	ALBANY	NY	12211	(null)	NE	cruztop@axe.com
7	1007	GIANA	TAMMY	9153 MAIN STREET	AUSTIN	TX	78710	1003	SW	treetop@zep.net
8	1008	JONES	KENNETH	P.O. BOX 137	CHEYENNE	WY	82003	(null)	N	kenask@sat.net
9	1009	PEREZ	JORGE	P.O. BOX 8564	BURBANK	CA	91510	1003	W	jperez@canet.com
10	1010	LUCAS	JAKE	114 EAST SAVANNAH	ATLANTA	GA	30314	(null)	SE	(null)
11	1011	MCGOVERN	REESE	P.O. BOX 18	CHICAGO	IL	60606	(null)	N	reesemc@sat.net
12	1012	MCKENZIE	WILLIAM	P.O. BOX 971	BOSTON	MA	02110	(null)	NE	will2244@axe.net
13	1013	NGUYEN	NICHOLAS	357 WHITE EAGLE AVE.	CLERMONT	FL	34711	1006	SE	nguy33@sat.net
14	1014	LEE	JASMINE	P.O. BOX 2947	CODY	WY	82414	(null)	N	jaslee@sat.net
15	1015	SHELL	STEVE	P.O. BOX 677	MIAMI	FL	33111	(null)	SE	sschell13@sat.net

# Selecting One or Multiple Columns from a Table



- Enter the column name in SELECT clause

Worksheet Query Builder

```
SELECT title
FROM books;
```

Script Output x Query Result x

SQL | All Rows Fetched: 14 in 0.034 seconds

	TITLE
1	BODYBUILD IN 10 MINUTES A DAY
2	REVENGE OF MICKEY
3	BUILDING A CAR WITH TOOTHPICKS
4	DATABASE IMPLEMENTATION
5	COOKING WITH MUSHROOMS
6	HOLY GRAIL OF ORACLE
7	HANDCRANKED COMPUTERS
8	E-BUSINESS THE EASY WAY
9	PAINLESS CHILD-REARING
10	THE WOK WAY TO COOK
11	BIG BEAR AND LITTLE DOVE
12	HOW TO GET FASTER PIZZA
13	HOW TO MANAGE THE MANAGER
14	SHORTEST POEMS

- Separate column names with a comma

Worksheet Query Builder

```
SELECT isbn, title, pubdate
FROM books;
```

Script Output x Query Result x

SQL | All Rows Fetched: 14 in 0.02 seconds

	ISBN	TITLE	PUBDATE
1	1059831198	BODYBUILD IN 10 MINUTES A DAY	21-JAN-15
2	0401140733	REVENGE OF MICKEY	14-DEC-15
3	4981341710	BUILDING A CAR WITH TOOTHPICKS	18-MAR-16
4	8843172113	DATABASE IMPLEMENTATION	04-JUN-13
5	3437212490	COOKING WITH MUSHROOMS	28-FEB-14
6	3957136468	HOLY GRAIL OF ORACLE	31-DEC-15
7	1915762492	HANDCRANKED COMPUTERS	21-JAN-15
8	9959789321	E-BUSINESS THE EASY WAY	01-MAR-16
9	2491748320	PAINLESS CHILD-REARING	17-JUL-14
10	0299282519	THE WOK WAY TO COOK	11-SEP-14
11	8117949391	BIG BEAR AND LITTLE DOVE	08-NOV-15
12	0132149871	HOW TO GET FASTER PIZZA	11-NOV-16
13	9247381001	HOW TO MANAGE THE MANAGER	09-MAY-13
14	2147428890	SHORTEST POEMS	01-MAY-15



# Operations within the SELECT Statement

» Column alias can be used for column headings

- SELECT title AS **BookTitle**

Alias for column 'title'

» Perform arithmetic operations

» Suppress duplicates: present unique (distinct) values

» Concatenate data



# Using Column Aliases

- » A column alias can be used to clarify the contents of a particular column
- » List the alias after the column heading
- » **AS** keyword is optional
- » Must enclose the alias in double quotation marks if:
  - it contains blank *space(s)*
  - it contains special *symbol(s)*
  - you want to retain *case*

Note: by default, column names are listed in upper case in the query result.

# Column Alias Example



Worksheet Query Builder

```
SELECT isbn, title as Book_Title  
FROM books;
```

Script Output x Query Result x

SQL | All Rows Fetched: 14 in 0.018 seconds

ISBN	BOOK_TITLE
1 1059831198	BODYBUILD IN 10 MINUTES A DAY
2 0401140733	REVENGE OF MICKEY
3 4981341710	BUILDING A CAR WITH TOOTHPICKS
4 8843172113	DATABASE IMPLEMENTATION
5 3437212490	COOKING WITH MUSHROOMS
6 3957136468	HOLY GRAIL OF ORACLE
7 1915762492	HANDCRANKED COMPUTERS
8 9959789321	E-BUSINESS THE EASY WAY
9 2491748320	PAINLESS CHILD-REARING
10 0299282519	THE WOK WAY TO COOK
11 8117949391	BIG BEAR AND LITTLE DOVE
12 0132149871	HOW TO GET FASTER PIZZA
13 9247381001	HOW TO MANAGE THE MANAGER
14 2147428890	SHORTEST POEMS

Upper by default

Worksheet Query Builder

```
SELECT title "Title of Book, Really?", category  
FROM books;
```

Script Output x Query Result x

SQL | All Rows Fetched: 14 in 0.017 seconds

Title of Book, Really?	CATEGORY
1 BODYBUILD IN 10 MINUTES A DAY	FITNESS
2 REVENGE OF MICKEY	FAMILY LIFE
3 BUILDING A CAR WITH TOOTHPICKS	CHILDREN
4 DATABASE IMPLEMENTATION	COMPUTER
5 COOKING WITH MUSHROOMS	COOKING
6 HOLY GRAIL OF ORACLE	COMPUTER
7 HANDCRANKED COMPUTERS	COMPUTER
8 E-BUSINESS THE EASY WAY	COMPUTER
9 PAINLESS CHILD-REARING	FAMILY LIFE
10 THE WOK WAY TO COOK	COOKING
11 BIG BEAR AND LITTLE DOVE	CHILDREN
12 HOW TO GET FASTER PIZZA	SELF HELP
13 HOW TO MANAGE THE MANAGER	BUSINESS
14 SHORTEST POEMS	LITERATURE

'as' can be omitted



# Using Arithmetic Operations

## » Arithmetic operations in SQL

- Executed left to right
- Multiplication and division are solved first
- Addition and subtraction are solved last
- Override order with parentheses

These are the same as the arithmetic operation orders in math, so there is nothing to remember!



# Example: Arithmetic Operation with Column Alias



Worksheet		Query Builder			
		<pre>SELECT title, retail, cost, retail - cost profit FROM books;</pre>			
Script Output x		Query Result x			
		SQL   All Rows Fetched: 14 in 0.019 seconds			
	TITLE	RETAIL	COST	PROFIT	
1	BODYBUILD IN 10 MINUTES A DAY	30.95	18.75	12.2	
2	REVENGE OF MICKEY	22	14.2	7.8	
3	BUILDING A CAR WITH TOOTHPICKS	59.95	37.8	22.15	
4	DATABASE IMPLEMENTATION	55.95	31.4	24.55	
5	COOKING WITH MUSHROOMS	19.95	12.5	7.45	
6	HOLY GRAIL OF ORACLE	75.95	47.25	28.7	
7	HANDCRANKED COMPUTERS	25	21.8	3.2	
8	E-BUSINESS THE EASY WAY	54.5	37.9	16.6	
9	PAINLESS CHILD-REARING	89.95	48	41.95	
10	THE WOK WAY TO COOK	28.75	19	9.75	
11	BIG BEAR AND LITTLE DOVE	8.95	5.32	3.63	
12	HOW TO GET FASTER PIZZA	29.95	17.85	12.1	
13	HOW TO MANAGE THE MANAGER	31.95	15.4	16.55	
14	SHORTEST POEMS	39.95	21.85	18.1	

# NULL Values







» NULL values indicate an absence of a value

Worksheet

Query Builder

```
SELECT title, retail, discount, retail - discount
FROM books;
```

Script Output x Query Result x

    SQL | All Rows Fetched: 14 in 0.024 seconds

	TITLE	RETAIL	DISCOUNT	RETAIL-DISCOUNT
1	BODYBUILD IN 10 MINUTES A DAY	30.95	(null)	(null)
2	REVENGE OF MICKEY	22	(null)	(null)
3	BUILDING A CAR WITH TOOTHPICKS	59.95	3	56.95
4	DATABASE IMPLEMENTATION	55.95	(null)	(null)
5	COOKING WITH MUSHROOMS	19.95	(null)	(null)
6	HOLY GRAIL OF ORACLE	75.95	3.8	72.15
7	HANDCRANKED COMPUTERS	25	(null)	(null)
8	E-BUSINESS THE EASY WAY	54.5	(null)	(null)
9	PAINLESS CHILD-REARING	89.95	4.5	85.45
10	THE WOK WAY TO COOK	28.75	(null)	(null)
11	BIG BEAR AND LITTLE DOVE	8.95	(null)	(null)
12	HOW TO GET FASTER PIZZA	29.95	1.5	28.45
13	HOW TO MANAGE THE MANAGER	31.95	(null)	(null)
14	SHORTEST POEMS	39.95	(null)	(null)

Arithmetic operation result becomes null if the operation contains a null value



# Using DISTINCT and UNIQUE

- » Enter DISTINCT or UNIQUE after SELECT keyword to suppress duplicates

The screenshot shows a database query builder interface. At the top, there are two tabs: 'Worksheet' and 'Query Builder'. The 'Query Builder' tab is active, displaying the following SQL query:

```
SELECT DISTINCT state  
FROM customers;
```

A red underline is placed under the word 'DISTINCT'. A blue arrow points from this underline to the text 'or UNIQUE' on a yellow background. Below the query, there is a toolbar with icons for 'Script Output', 'Query Result', and 'SQL'. The 'Query Result' tab is active, showing the results of the query. The results are displayed in a table with a single column labeled 'STATE' and 12 rows of data.

	STATE
1	FL
2	CA
3	ID
4	WA
5	NY
6	TX
7	WY
8	GA
9	IL
10	MA
11	MI
12	NJ



# Using Concatenation

- » You can combine data with a string literal
- » Use the concatenation operator, ||
- » It allows the use of column aliases

# Concatenation Example



Worksheet    Query Builder

```
SELECT firstname || ' ' || lastname "Customer Name"
FROM customers;
```

Script Output x    Query Result x

SQL | All Rows Fetched: 20 in 0.027 seconds

	Customer Name
1	BONITA MORALES
2	RYAN THOMPSON
3	LEILA SMITH
4	THOMAS PIERSON
5	CINDY GIRARD
6	MESHIA CRUZ
7	TAMMY GIANA
8	KENNETH JONES
9	JORGE PEREZ
10	JAKE LUCAS
11	REESE MCGOVERN
12	WILLIAM MCKENZIE
13	NICHOLAS NGUYEN
14	JASMINE LEE
15	STEVE SCHELL
16	MICHELL DAUM
17	BECCA NELSON
18	GREG MONTIASA
19	JENNIFER SMITH

data value in the 'firstname' column  
+ space  
+ data value in the 'lastname' column

Then, give a new name "Customer Name" to the concatenated result



# Summary (1/2)

- » A basic query in Oracle SQL includes the SELECT and FROM clauses, the only mandatory clauses in a SELECT statement
- » To view all columns in the table, specify an asterisk (\*) or list all of the column names individually in the SELECT clause
- » To display a specific column or set of columns, list the column names in the SELECT clause (in the order in which you want them to appear)
- » When listing column names in the SELECT clause, a comma must separate column names
- » To specify which table contains the desired columns, you must list the name of the table after the keyword FROM

# Summary (2/2)



- » A column alias can be used to clarify the contents of a particular column; if the alias contains **spaces** or special **symbols**, or if you want to display the column with any **lowercase** letters, you must enclose the column alias in double quotation marks (" ")
- » Basic arithmetic operations can be performed in the SELECT clause
- » NULL values indicate an absence of a value
- » To remove duplicate listings, include either the DISTINCT or UNIQUE keyword
- » Use vertical bars (||) to combine, or concatenate, fields, literals, and other data