

[Course Link: The Complete Oracle SQL Certification Course](#)

SECTION 1: Database Basics

Thursday, May 28, 2020

12:25 AM

1.

Oracle Database Introduction & Basics of Tables

A **Database** is where you store data.

Its symbol is depicted as follows:

It represents a hard drives with disks

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Information stored in a database are stored in something called **tables** with columns and rows

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Columns: store attributes and numbered starting in the first element.

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Each columns can store specific data types (ie. Text, numbers, integer, dates) and only that datatype

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Rows: Also known as records. The records start at the second row because the first row contains the columns attribute label

SQL pronounced 'sequel' stand for Structured Query Language is a language used to interact with a database

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It is a set of commands that can be sent to the database. (ie return some data back, return a visual data grid, delete tables, etc)

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Tables are the most important objects in SQL. It is where all of the information is stored in a database

Queries: basically a parametrized question that we ask the database. (ie. Employees in department A who hired at date B, and are over the age of C)

Oracle: Software installed in a server or a machine and uses the hardware of that machine

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The server could have many persistent disk

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When someone usually talk about Oracle they are talking about the representation of the entire Oracle infrastructure-a combination of the software and the hardware

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Oracle usually provide companies with the software the hardware including the Oracle database software

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**For this course we are going to be using the *Oracle Cloud Installation*, Which is a cloud instance of the database. We can access this using the application called *Apex* which is a website where you can get access to the database and you can type sql commands right in the browser and it will make changes to the database

3.

Prepare the Sample Data

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In Apex workspace

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Go to > SQL workshop > utilities > sample data sets >> install the DEPT/EMP database

Go to > SQL workshop > SQL commands

Here we can play around with the database and learn the SQL commands

SECTION 2: Single Table Queries (Exercises & Solutions in the Lecture)

4.

[Oracle Exams and Certification Information](#)

In this course we use Oracle 12c installed on the cloud. The SQL Language you'll be practicing is used in Oracle database versions 11G and 12C.

Once you have completed this course in addition to all of the assignments, you'll be ready to take the below exam!

5.

Retrieving Data Using the SELECT Clause

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In this lesson we are going to look at how to view data in a database

The SELECT command helps us query tables

SQL commands are not case sensitive meaning that "select" == "sEleCt" == "SELECT"

SQL Statements: made up of keywords that create expression. The select keyword works with input arguments such as the column attribute and the FROM key word with an input argument of the table name

This particular statement is a query because it is asking for particular data

Keep in mind that the '*' character represents 'all'

Select * from EMP --> means select ALL columns

Here we need to specify a single commands to run at a time. More than once returns an error because it is unclear what it is you want to retrieve from the database

Also it is best practice to keep statements visually clear as per the below examples

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Notice that listing job description lets say from the employee table will output rows with multiple description. This is completely normal, because there are employees with the same job title. BUT lets say we want the distinct output (no repetitions). Then we can use the *DISTINCT* keyword.

It will return fewer records obviously

6. Using the WHERE clause

The *WHERE* keyword help us further specify our query

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"select all columns from the employee table where their jobs are recorded as managers"

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The below SQL query will output all records from the emp table who are manager

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Note that when specifying a data argument like 'MANAGER' it is case sensitive and must be exactly as how it is formatted in the table.

Note also that single quotes must be used

The *AND* key word is a boolean logic that can be used along with the *WHERE* clause

A practise to help trouble shoot why you are not getting any results from the query is the inch back in each keyword of a statement and see where things start working again, or where it starts breaking.

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Order must be correct

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Data must be exact with how it is formatting in the table

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Incorrect logic can result in no data found

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Data does not exist in the table

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SQL command and oracle database interactions

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From the Apex web, when we send an SQL command, that command is then sent to the Oracle database, check if it's a valid statement and then executes those commands

Behind the Scenes:

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ie command: `SELECT * FROM emp WHERE sal = 3000;`

1.

The Oracle software first takes a look at the **FROM** clause, and pulls up the table in which we will be taking a look at.

2.

Then the interpreter will look at the **WHERE** clause and its conditions. Pick the ones that satisfy the condition and bring the records to another result set for further narrowing

3.

Then finally the interpreter will look at the SELECT clause to return the subset of the data with the specified selected columns

7.

Using Operators in the WHERE clause

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Not operator: !=

Less than and greater than operator: < >

Less than or equal to and greater than or equal to operator: <= >=

Combining WHERE, OR, AND operators

Results	Exp
EMPNO	
7369	
7876	
7900	
7934	

9.

Query Filtering Continued BETWEEN, IN, NULL

The *IN* and *NOT IN* keyword allows us to include data comparisons in one line instead of writing a bunch of *OR* clauses

The *BETWEEN* and *NOT BETWEEN* operator specifies data within range A and range B.

Note that the this clause is **inclusive**. Results will include A and B

The *IS NULL* and *IS NOT NULL* operator specifies cell which are empty or not empty

10.

Query Filtering Conditions and Operator Precedence

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Practice: records who did not make any commission whose salary is greater than 1100 but less than 5000 and not 3000

Note that you cannot use the *BETWEEN* clause because it is inclusive and we are looking for salaries greater than or greater than or equal to

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Also note that employees who did not make any commission may have an empty cell or a 0 number thus the *IS NULL* operator is not enough to cover this case

Also note that grouping of the *AND* and *OR* operators must be handled with care. Notice that the *or* clause in the below example separates the query in to two and clauses

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It becomes (A & B) || C & D but we want (A & B & D) || C-

Brackets will have precedence in logic evaluation

Logic can be tricky logic that are in the brackets are applied to the record first and then the rest of the logic right to left is then applied to the record

LIKE is an operator that matches data that are not exactly the same but follow a pattern

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The example below searching for job records that start with the letter S. the % character is a placeholder for any character

Aliasing is useful for printing out reports that are clearer to understand. For example we can change DEPTNO to DEPARTMENT # or ENAME to employee NAME.

Note that aliases, we require double quotes "" and that it cannot be too long



NAME	AGE
KING	41
BLAKE	43
CLARK	29

Concatenation is basically the combining of two attributes together into a sentence. The characters used to concatenate things together is pipes ||

ORDER BY is a special clause that's used to sort the data based on a particular column

The default is ascending order, but we can specify how we would like to sort (DESC = descending)

Sorting by multiple columns is also possible. The first column specified will be sorted first, the second column will be sorted in groups based on the first column record, and so on and so forth.

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10
10
20
20
20
20
20
20
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11.

Single Row Functions (SRF) & Using the dual table

A function is a predefined program that performs some task

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sumThese(5,7,5) is a function that returns the sum of all the numbers that were passed in it arguments

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These SRF are performed per row

If you want to test a SFR we need a minimum of select and a from, but we can use the DUAL table which is a dummy table that will output one row used for testing

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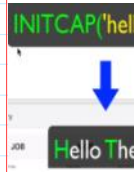
We can call a function inside another function

I



jones IS THE
scott IS THE
ford IS THE M
smith IS THE
adams IS TH

Using Functions in WHERE and Character Based SRFs



Examples:

MARTIN
TURNER
MILLER

100
408
9

** RESOURCE: Techonthenet.com/oracle/functions

14.

Numeric and Date Data Type SRFs

Numeric SRFs: accept numbers as their argument. They are used to conduct mathematical type operations like rounding.

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Round, rounds the numbers based on the specified integer place

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Trunc, cuts off the number to a specified decimal place

Date SRFs:

Sysdate => returns the system (not your personal) date in mm/dd/yyyy

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Systimestamp => returns time and date in dd-MMM-yy [time stamp] AM/PM

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Add-months(['date'], [int]) => add or decrease number of months to the date specified

Months_between(['date'], ['date']) => returns the number of months between the two specified dates

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Trunc(['date'], 'YEAR')

16.

Conversion SRFs and Date Formatting

to_char() => converts date or number into character string, and also change the formatting

For
9
0
\$
.
,

```
select emp
```

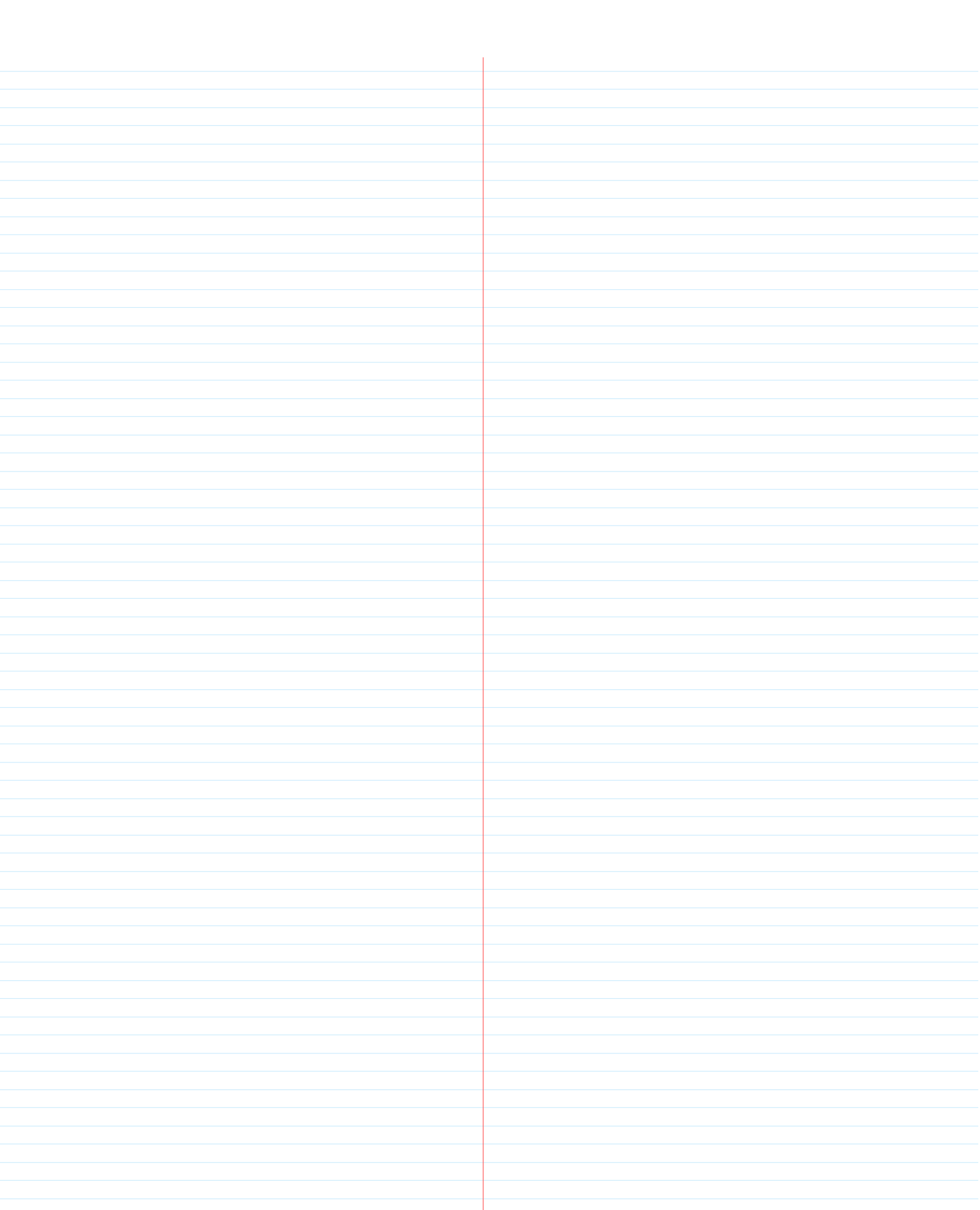
To_date() => we convert a string into a date. The second argument describes how to interpret the string date

16.

Some more Data Functions

`Last_day(d)` => unction that requires a date as an argument. It returns the last day of the month in which the given date falls. The argument is required for this function to work properly.

`Next_day(d,c)` => The first argument is the date and the second argument is a text reference to a day of the week. Both arguments are required for this function to work properly. This function returns a valid date representing the first occurrence of the `c` day following the date represented in `d`.



17.

Concluding SRFs and NULL/NULLIF Functions

NVL Functions: used to replace data that is empty with something else

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Ex: Instead of having nothing in a cell we can better represent it by putting a 0 for example in commission

KING
BLAKE
CLARK
JONES
SCOTT
FORD
SMITH
ALLEN
WARD

The NVL function must replace the same data type. Therefore in order to put a string 'no data found' in empty cells of COMM column it must be converted to string first because it is currently data type


```
select emp  
from emp
```

KING
BLAKE
CLARK
JONES
SCOTT
FORD
SMITH
ALLEN
WARD

NULLIF(arg1, arg2) => if arg1 and arg2 matches, it will return a null

```
select emp  
from emp  
where empname = ENAME  
order by empname  
KING  
BLAKE  
CLARK  
JONES  
SCOTT  
FORD
```

Difference between SRFs and Group Functions:

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SECTION 4: Grouping Functions

Grouping functions MIN, MAX, AVG, COUNT, etc

Max(data): returns the maximum number in the data passed

Min(data): returns the minimum number in the data passed

Sum(data): returns the sum of all the data passed

Availdata: returns the average value of the data passed

Avg(data): returns the average value of the data passed

Count(data): returns the number or elements/records/occurrence in the data passed

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Note: that it only counts fields that contain data. It does not count null or empty cells

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We can perform calculations using the functions described above along with other functions

"find the average salary for the managers, salesman, and clerks"

19.

GROUP BY clause and HAVING clause

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Instead of have individual queries for the request above and visualized below, we can use group by clause that allows us to do this in one query


```
3000
10375
1400
2758.333333
5000
5 rows returned
```

Recall that we were able to use SRFs in the WHERE clause; however, we cannot use grouping functions in the WHERE clause

For this, we need to use something else. We use the HAVING clause and it comes after the group by clause

What is we want to group by more than one column?

It will group based on those conditions. "There is 2 clerks in department 20, there are 1 manager in dept 20, there is 1 manager in dept 30, there are 4 salesman in dept 30"

21.

SELECT within SELECT (Sub queries)

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Nested Queries: a select statement within a select statement

We can relate two different tables together, but needs to have a connecting link. Like for example: (deptno) is both in the emp table as well as the dept table



EMPNO
698
499
521
654
900

Note that subqueries will return an error if it is results into more than one record set.

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But we can use the IN clause in order to use this. It can only work for a *list* of elements meaning just one column. Cannot work with a table result

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The equal sign cannot work with subqueries that have more than one result

The below example will output a result of records where the deptno from the emp table matches the deptno in the dept table. Note that the dept table has deptno 40 located in boston, but it does not show up in the results because the emp table does not have a single record in which the deptno is equal to the deptno of boston

Note at aliases can be given to tables as well. But we need to use the alias in the rest of the clause of the query

We can also include subqueries in the from clause which allows for more flexibility in terms of what data we want to take a look at from the other table

Note that the order of declaration matters when we use the left and right join

Note also that right outer join = right join = and left outer join = left join

A good way of determine what records match and not match is to use the FULL OUTER JOIN clause.



7876
7900
7954

24.

Correlated Subqueries with EXIST and NOT EXIST operators

Exists() operator checks if the record exists

Not exists() operator checks if the record does not exist

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This clause is not a good practice as it is inefficient

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The exist clause must ne checked for each record for all records and must be met in order to return any data

But this exist clause is useful for sub queries, more specifically correlated subqueries



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20
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CASE Statement

Very similar to case blocks in programming languages

```
select emp
  when
  when
  when
  when
  else
  end)
from emp;
```

KING
BLAKE
CLARK
JONES
SCOTT
FORD
SMITH
ALLEN

SECTION 6: Creating, Altering, and Updating Objects Using SQL

26.

Creating Your Own Tables & Design Considerations

It is important for each record to have a unique identifier that cannot be empty and cannot be repeated, such as an employee ID or a social security number. This is usually referred to as a **primary key** columns. This must be well thought out before it is assigned and used in the table

It is also good practise to include a data column that is able to relate to other tables (Ex: deptno in dept and emp tables)

Use CREATE TABLE clause to create a table

In paranthese will the data inside the table

Format goes as follows [column name] [data type] [constraints]



27.

Inserting Data into Table

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To insert data we use the INSERT INTO and VALUES keywords

Note that in some database, an official COMMIT statements is required change data in the table



A faster way of inserting many values uses the INSERT ALL command

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Note that it requires a select statement to indicate the end of the inserting

28.

Create Table with Primary Key Constraints

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Primary Key enforces uniqueness

Note that if the command does not executes, nothing is committed to the database

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Able to insert data to a different table that are from different tables

```
( id +
  name
  date
);
CREATE
( id +
  name
  date
);
CREATE
( id +
  name
  date
);
```

Alter Table and Modify Column Attributes

Note that we do not need to specify the column names to enter data, it just needs to map to the correct order of the columns

Use the ALTER key word to alter properties of the table

31.

Create Table with SELECT + UPDATE Data

To create a table that is the same format, data, and properties of another table the following can be done

Note that if we want to add another column that is not nullable, we cannot do that because we are essentially adding empty cells

When using the insert keyword we had to insert an entire record, but if we want to populate just a column of an already existing record, we can use the UPDATE keyword

Context: There are two different tables called existing_customers and new_customers

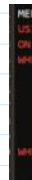
The below example modifies the existing customer table comparing the primary keys with the new_customers table.

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If they matched then the records were updated

o

If they did not match, then the records were added



34.

Sequence Statements

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Cache is an allocation of memory

It is helpful to use the sequence to add ordered ID numbers

Just like there is the SELECT command, there is a DELETE command. The syntax is very similar

Without specifying a where CLAUSE

Foreign key constraint is allows columns to be referred by other tables. Deleting a table may not be allowed due to foreign key constraints

DROP keyword can drop entire tables out of our database. Drops the properties, constraints, etc

TRUNCATE keyword deletes the data from the table, but does not remove the table itself.
Column and constraints still exists

36.

Working with database Index

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Well defined indices on tables is a very important performance tuning method.

Creating an indexed column allows for quicker queries because the command does not have to go through all the columns, but notices that the ename column specified is indexed and will directly look into the that column for the record

It is best practise to index columns that are important and are unique

To remove the index, use the DROP keyword

COMPUTE STATISTICS key word collects data and statistics

Pseudo Columns, System Tables & Deleting duplicates

The ROWID is the address for the record, and it will be unique for every record



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AF26yIA
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We can use the rowid to our advantage by deleting duplicates without a primary key column

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To create a primary key. The column specified will automatically indexed

Its handy to use the `all_tables` variable to find tables

Note that the tables names are stored in all caps

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The below example looks at all the tables in the system and finds all tables named employees. Look for ours :)

Rownum just creates a sequential number and assigned to each records

Synonym keywords creates a pointer to another table

View and other objects and commands

Saving a query to a view

The created view object can be queried just like table

We can search for all the created view objects in the system by using the following

Exercise: create a view called super_employees in which returns all employees that has the highest salary in each store except for Ford

o

Note that we cannot save a view object where there are repeated column names

UNION keyword combines two tables together into one minus the duplicates

UNION ALL does not filter out duplicates

MINUS removes a records

To edit a view you use a REPLACE keyword

40.

Granting and Revoking Privileges

DML: data manipulating language (Select, update, ect)

DDL: data definition language (create, drop, replace)

DCL: Data control language. It is all about privileges and database administrators

Keywords: grant, revoke, role

Grant : allow users privilege to select, update, delete, etc TO certain tables

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Revoke is the opp of grant uses REVOKE and FROM Keyword

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Role is a group of privilage stores in a role. (CREATE ROLE r1, GRANT select, update, replace to r1; alter user u3 defaul role r1)

