

COMM1822

Term 2 2022

Introduction to Databases for Business Analytics

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Week 7 Group Functions

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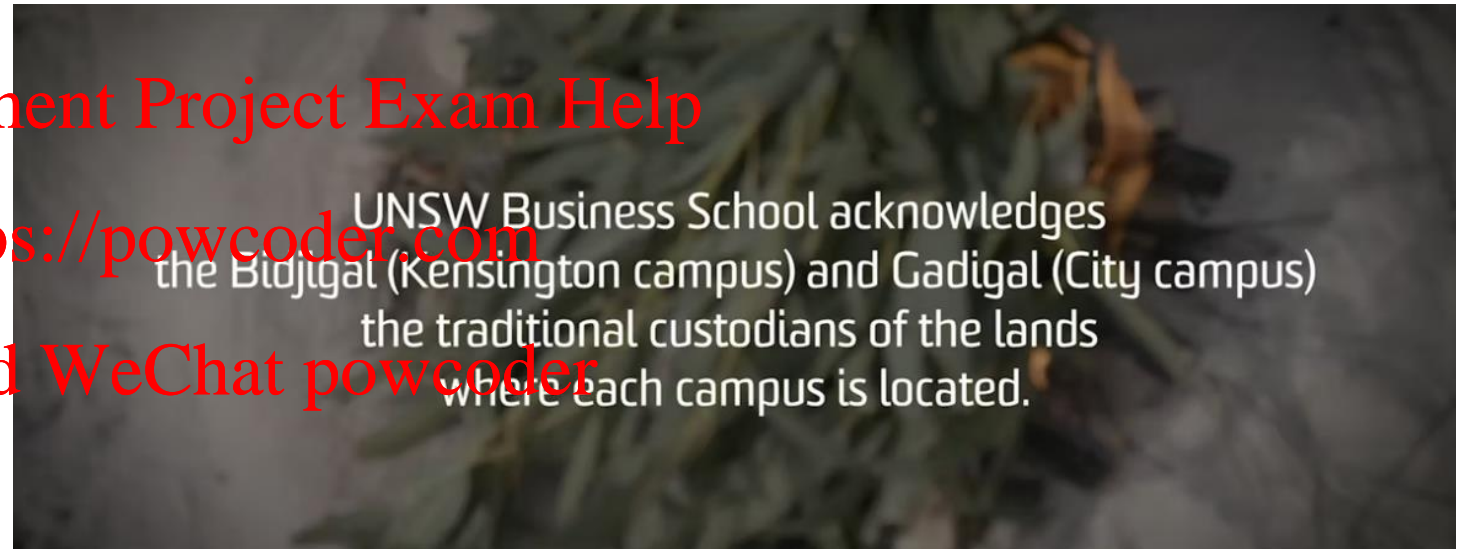
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UNSW Business School. (2022, May 7). *Acknowledgement of Country* [online video]. Retrieved from <https://vimeo.com/369229957/d995d8087f>

At UNSW
you are
free to...



Respectfully
disagree about
anything



Express different
opinions



Write your
beliefs



Show your
beliefs



Leave any club
or organisation



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It's not
acceptable
to...



Attempt to
censor opinions



Use hate
speech



Make threats
or instil fear



Make false
accusations



Access or share
others private
information
without consent

We are
here to
help...



Tell a
teacher



Tell UNSW
Psychology
and Wellness



Report to
UNSW
Complaints



Report
to UNSW
Security



Report a
crime to
police



Find
out
more

SQL Query Structures

SELECT [DISTINCT | ALL] { | [column_expression AS new_name] [, ...] }

FROM table_name [alias] [, ...]

[**WHERE** condition]

[**GROUP BY** column_list]

[**HAVING** condition]

[**ORDER BY** column_list]

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[] : indicates optional elements.

{ } : indicates that the element may or may not appear.

| : indicates “or”.

; : indicates the end of the statement.

SQL Aggregate Functions

- COUNT** : the **number of rows** containing a specified attribute.
- MAX** : the **maximum** value encountered.
- MIN** : the **minimum** value encountered.
- AVG** : the **arithmetic mean** (average) for the specified.
- SUM** : the **total value** for the specified numeric attribute.

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Numeric functions yield only **one single value**.

SQL Aggregate Functions

How many vendors referenced in the PRODUCT table have supplied products with prices that are less than or equal A\$10.00?

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SQL for DBMS Oracle:

```
SELECT      COUNT (DISTINCT V_Code)
FROM        PRODUCT
WHERE       P_Price <= 10.00;
```

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UNIQUE vs. DISTINCT

SELECT **DISTINCT** XY is correct ANSI SQL syntax.

SELECT **UNIQUE** XY is old Oracle SQL syntax (otherwise identical to DISTINCT).

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Note, you still do use UNIQUE to create tables and indexes:

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CREATE TABLE Test (Attribute Numeric NOT NULL **UNIQUE**);

CREATE **UNIQUE** INDEX Unique_Index ON Table (Attribute) TABLESPACE Tablespace;

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Note: Unique indexes guarantee that no two rows of a table have duplicate values in the key column(s). Non-unique indexes do not impose this restriction.

SQL Aggregate Functions

Which product has the highest price?

```
SELECT      MAX (P_Price)
FROM        PRODUCT;
```

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This query displays the highest product price from the product table... 😊
...but does not give us the product details. 😊

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What we need here is a **nested query** (query in a query). The nested (inner) query is performed first.

```
SELECT      P_Code, P_Description, P_Price
FROM        PRODUCT
WHERE       P_Price = (SELECT MAX(P_Price) FROM PRODUCT);
```

SQL Aggregate Functions

What is the total value of all the items carried in inventory?

```
SELECT      SUM(P_Onhand * P_Price)
FROM        PRODUCT;
```

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* : here arithmetic operator for multiplying <https://powcoder.com>

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What is the average of product price?

```
SELECT      AVG(P_Price)
FROM        PRODUCT;
```

Grouping Data in SQL

- ❑ **GROUP BY** <column>

- ❑ A query that includes the **GROUP BY** groups the data from SELECT table(s) and produces **single summary row for each group**

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- ❑ SELECT clause may contain column names, aggregate functions or constants.

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- ❑ The GROUP BY clause is valid only when **used with SQL aggregate functions.**

Grouping Data in SQL

Find out how many product units are available from vendors with a vendor code of less than 21344.

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SELECT V_Code, P_Description, **SUM**(P_Onhand)
FROM PRODUCT
WHERE V_Code < 21344
GROUP BY V_Code, P_Description;

Multiple Table Operations in SQL

“Multiple table operations” are “joining operations”! (see also earlier)

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- ❑ **SELECT** clause identifies the attributes to be displayed.
- ❑ **FROM** clause identifies the tables from which attributes are selected.
- ❑ **WHERE** clause specifies the joining condition for common columns.

Multiple Table Operations in SQL

For multiple tables queries, refer to attributes in the form **table.attribute**.

Student	(StdNo, StdName)
Registration	(StdNo, CourseNo, Major, Grade)
Course	(CourseNo, CourseTitle)

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List the student details for course number 'COMM1822':

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```
SELECT      StdNo, StdName, Major, CourseNo, Grade
FROM        Student, Registration
WHERE       Student.StdNo = Registration.StdNo AND Registration.CourseNo = 'COMM1822';
```

Multiple Table Operations in SQL

Alternatively, use **aliases** instead of the full table names

List the student and course details for student number 38214:

```
SELECT      StdName, CourseTitle, Grade
FROM        Student S, Registration R, Course C
WHERE       S.StdNo = R.StudentNo
              AND C.CourseNo = R.CourseNo
              AND R.StdNo = 38214
```

Exercise

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Logistics Database

Consider the **Logistics Database** from https://www.w3schools.com/sql/sql_count_avg_sum.asp or https://www.w3schools.com/sql/trysql.asp?filename=trysql_select_sum

Tables in the database: **Assignment Project Exam Help**

Customers (CustomerID, CustomerName, ContactName, Address, City, PostalCode, Country)

Category (CategoryID, CategoryName, Description)

Employees (EmployeeID, LastName, FirstName, BirthDate, Photo, Notes)

Suppliers (SupplierID, SupplierName, ContactName, Address, City, PostalCode, Country, Phone)

Products (ProductID, ProductName, SupplierID, CategoryID, Unit, Price)

Shippers (ShipperID, ShipperName, Phone)

Orders (OrderID, CustomerID, EmployeeID, OrderDate, ShipperID)

OrderDetails (OrderDetailID, OrderID, ProductID, Quantity)

Exercise 1

Determine how many categories in the logistics company.

```
SELECT COUNT(*)  
FROM Categories;
```

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Exercise 2

Display the number of products with a price of more than \$36.00.

`SELECT COUNT(*)`
`FROM Products`
`WHERE Price > 36;`

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Exercise 3

Determine the total revenue generated by sales to customer 8. Note: Quantity should be reflected in the total revenue calculation.

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```
SELECT SUM(Price * Quantity)
FROM Products, OrderDetails, Orders
WHERE OrderDetails.ProductID = Products.ProductID
AND OrderDetails.OrderID = Orders.OrderID
AND CustomerID = 8;
```

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Exercise 4

Determine the average revenue generated by orders in the ORDERS table. Note: The total revenue by order must be calculated before finding the average revenue.

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```
SELECT AVG(RevenueSum)
FROM
```

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```
(
    SELECT SUM(Price * Quantity) AS RevenueSum
    FROM Products, OrderDetails, Orders
    WHERE Products.ProductID = OrderDetails.ProductID
    AND Orders.OrderID = OrderDetails.OrderID
    GROUP BY Orders.OrderID
);
```

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Exercise 5

Determine the average price of products by supplier name and category name. Include only the categories Beverages and Condiments and the groups with an average price greater than \$20.

```
SELECT SupplierName, CategoryName, AVG(Price)
FROM Products INNER JOIN Suppliers USING (SupplierID) INNER JOIN Categories
USING (CategoryID)
WHERE CategoryName IN ('Beverages', 'Condiments')
GROUP BY SupplierName, CategoryName
HAVING AVG(Price) > 20;
```

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Result:

Number of Records: 6

SupplierName	CategoryName	AVG(Price)
Aux Joyeux ecclésiastiques	Beverages	140.75
Forêts d'érables	Condiments	28.5
Grandma Kelly's Homestead	Condiments	32.5
Leka Trading	Beverages	46
New Orleans Cajun Delights	Condiments	20.35
Pavlova, Ltd.	Condiments	43.9

Exercise 6

List the customers living in Berlin or London who have recently placed an order totalling more than \$599.

```
SELECT DISTINCT CustomerName
FROM Customers, Products, Orders, OrderDetails
WHERE Customers.CustomerID = Orders.CustomerID
AND Orders.OrderID = OrderDetails.OrderID
AND OrderDetails.ProductID = Products.ProductID
AND (City = 'Berlin' OR City = 'London')
GROUP BY Orders.OrderID, CustomerName
HAVING SUM(Price * Quantity) > 599;
```

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Result:

Number of Records: 5

CustomerName

B's Beverages

Around the Horn

Seven Seas Imports

Eastern Connection

Consolidated Holdings

Exercise 6 – More Explanation

List the customers living in Berlin or London who have recently placed an order totalling more than \$599.

Result with totalling > \$599

Use [Around the Horn](#) for verification

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- Check **City (London)**; Find **CustomerID** (Around the Horn's CustomerID is 4)
- `SELECT City, CustomerID FROM Customers WHERE CustomerName = 'Around the Horn';`
- Find **Around the Horn's Order(s)** (Only two orders in the database with OrderID: 10355, 10383)
- `SELECT OrderID FROM Orders WHERE CustomerID = 4;`
- Find all relevant details, including product price and quantity, about the orders with OrderID = 10355, 10383
- `SELECT * FROM OrderDetails JOIN Products USING (ProductID) WHERE (OrderID = 10355 or OrderID = 10383);`

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Number of Records: 5

CustomerName
B's Beverages
Around the Horn
Seven Seas Imports
Eastern Connection
Consolidated Holdings

Result:

Number of Records: 5

OrderDetailID	OrderID	ProductID	Quantity	ProductName	SupplierID	CategoryID	Unit	Price
285	10355	24	25	Guaraná Fantástica	10	1	12 - 355 ml cans	4.5
286	10355	57	25	Ravioli Angelo	26	5	24 - 250 g pkgs.	19.5
358	10383	13	20	Konbu	6	8	2 kg box	6
359	10383	50	15	Valkoinen suklaa	23	3	12 - 100 g bars	16.25
360	10383	56	20	Gnocchi di nonna Alice	26	5	24 - 250 g pkgs.	38

Total = Price * Quantity = \$1,723.75

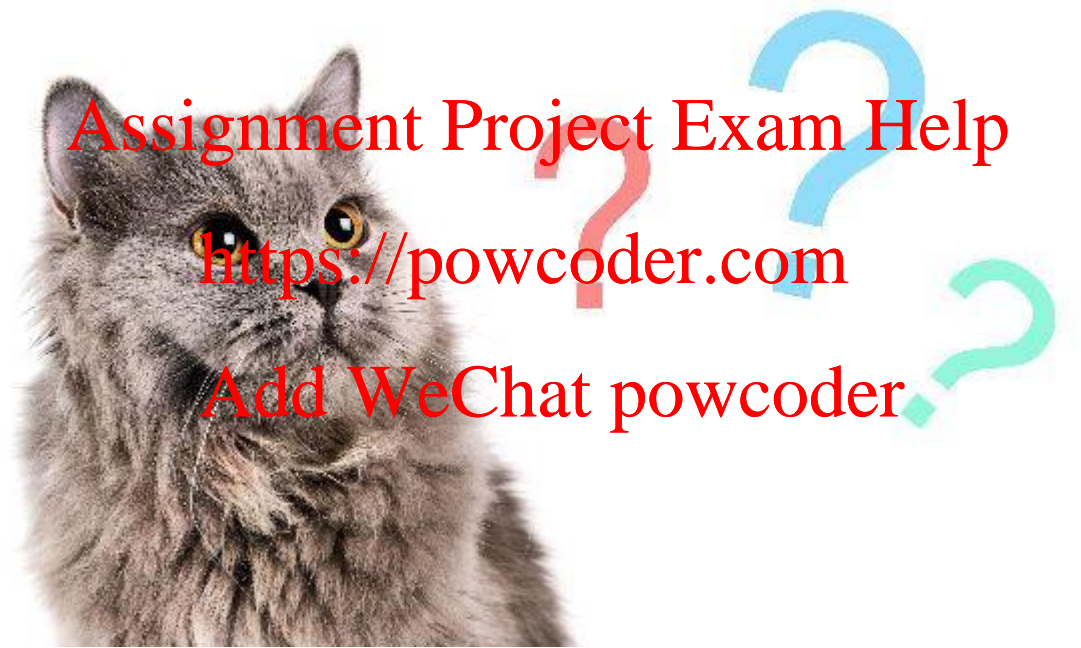
Result with totalling > \$1,723.75

If we set totalling **more than \$1,723.75**, Around the Horn will be disappeared from the result!

Number of Records: 2

CustomerName
Seven Seas Imports
Eastern Connection

Questions



Source: petcare.com.au