Having Fun With SQL

Why Use SQL?

- SQL is used for data manipulation, definition and administration

- Complex Analysis

- It is the most commonly used database language today

- Universal across all databases

Different Versions of SQL Databases

Retrieving Data from SQL

- Basic SELECT statement

- Limit data results

- Order your data results

- Assign Column Aliases

Retrieve All Records

SELECT * FROM CUSTOMERS

	CUST_ID	CMP_NME	CNT_NME	CNT_TTL	ADDRESS	CITY	REGION	ZIP_CODE	COUNTRY	PHONE	FAX
1	ALFKI	Alfreds Futterkiste ...	Maria Anders ...	Sales Representativ...	Obere Str. 57 ...	Berlin	NULL	12209	Germany	030-0074321 ...	030-0076545
2	ANATR	Ana Trujillo Empared...	Ana Trujillo	Owner	Avda. de la Constit...	México D.F.	NULL	5021	Mexico	(5) 555-4729	(5) 555-3745
3	ANTON	Antonio Moreno Taq...	Antonio Moreno ...	Owner	Mataderos 2312 ...	México D.F.	NULL	5023	Mexico	(5) 555-3932	NULL
4	AROUT	Around the Horn ...	Thomas Hardy ...	Sales Representativ...	120 Hanover Sq. ...	London	NULL	WA1 1DP	UK	(171) 555-7788 ...	(171) 555-675
5	BERGS	Berglunds snabbköp ...	Christina Berglund ...	Order Administrato...	Berguvsvägen 8 ...	Luleå	NULL	S-958 22	Sweden	0921-12 34 65 ...	0921-12 34 67
6	BLAUS	Blauer See Delikatess...	Hanna Moos ...	Sales Representativ...	Forsterstr. 57 ...	Mannheim	NULL	68306	Germany	0621-08460	0621-08924
7	BLONP	Blondesddsl père et f...	Frédérique Citeaux ...	Marketing Manage...	24, place Kléber ...	Strasbourg	NULL	67000	France	88.60.15.31	88.60.15.32
8	BOLID	Bólido Comidas prep...	Martín Sommer ...	Owner	C/ Araquil, 67 ...	Madrid	NULL	28023	Spain	(91) 555 22 82	(91) 555 91 99
9	BONAP	Bon app' ...	Laurence Lebihan ...	Owner	12, rue des Boucher...	Marseille	NULL	13008	France	91.24.45.40	91.24.45.41
10	BOTTM	Bottom-Dollar Mark...	Elizabeth Lincoln ...	Accounting Manag...	23 Tsawassen Blvd. ...	Tsawassen	BC	T2F 8M4	Canada	(604) 555-4729	(604) 555-374
11	BSBEV	B's Beverages ...	Victoria Ashworth ...	Sales Representativ...	Fauntleroy Circus ...	London	NULL	EC2 5NT	UK	(171) 555-1212	NULL
12	CACTU	Cactus Comidas par...	Patricio Simpson ...	Sales Agent ...	Cerrito 333 ...	Buenos Aires	NULL	1010	Argentina	(1) 135-5555	(1) 135-4892
13	CENTC	Centro comercial M...	Francisco Chang ...	Marketing Manage...	Sierras de Granada ...	México D.F.	NULL	5022	Mexico	(5) 555-3392	(5) 555-7293
14	CHOPS	Chop-suey Chinese ...	Yang Wang ...	Owner	Hauptstr. 29 ...	Bern	NULL	3012	Switzerland	0452-076545 ...	NULL
15	COMMI	Comércio Mineiro ...	Pedro Afonso ...	Sales Associate ...	Av. dos Lusíadas, 2...	Sao Paulo	SP	05432-043	Brazil	(11) 555-7647	NULL
16	CONSH	Consolidated Holdin...	Elizabeth Brown ...	Sales Representativ...	Berkeley Gardens 1...	London	NULL	WX1 6LT	UK	(171) 555-2282 ...	(171) 555-919
17	DRACD	Drachenblut Delikate...	Sven Ottlieb ...	Order Administrato...	Walserweg 21 ...	Aachen	NULL	52066	Germany	0241-039123 ...	0241-059428
18	DUMON	Du monde entier ...	Janine Labrune ...	Owner	67, rue des Cinqua...	Nantes	NULL	44000	France	40.67.88.88	40.67.89.89
19	EASTC	Eastern Connection ...	Ann Devon ...	Sales Agent ...	35 King George ...	London	NULL	WX3 6FW	UK	(171) 555-0297 ...	(171) 555-337

Retrieve 10 Records

SELECT * FROM CUSTOMERS
FETCH FIRST 10 ROWS ONLY

	CUST_ID	CMP_NME	CNT_NME	CNT_TTL	ADDRESS	CITY	REGION	ZIP_CODE	COUNTRY	PHONE	FAX
1	ALFKI	Alfreds Futterkiste ...	Maria Anders ...	Sales Representativ...	Obere Str. 57 ...	Berlin	NULL	12209	Germany	030-0074321 ...	030-0076545 .
2	ANATR	Ana Trujillo Empared...	Ana Trujillo	Owner	Avda. de la Constit...	México D.F.	NULL	5021	Mexico	(5) 555-4729	(5) 555-3745 ...
3	ANTON	Antonio Moreno Taq...	Antonio Moreno ...	Owner	Mataderos 2312 ...	México D.F.	NULL	5023	Mexico	(5) 555-3932	NULL
4	AROUT	Around the Horn ...	Thomas Hardy ...	Sales Representativ...	120 Hanover Sq. ...	London	NULL	WA1 1DP	UK	(171) 555-7788 ...	(171) 555-675...
5	BERGS	Berglunds snabbköp ...	Christina Berglund ...	Order Administrato...	Berguvsvägen 8 ...	Luleå	NULL	S-958 22	Sweden	0921-12 34 65 ...	0921-12 34 67 .
6	BLAUS	Blauer See Delikatess...	Hanna Moos ...	Sales Representativ...	Forsterstr. 57 ...	Mannheim	NULL	68306	Germany	0621-08460	0621-08924 ...
7	BLONP	Blondesddsl père et f...	Frédérique Citeaux ...	Marketing Manage...	24, place Kléber ...	Strasbourg	NULL	67000	France	88.60.15.31	88.60.15.32 ...
8	BOLID	Bólido Comidas prep...	Martín Sommer ...	Owner	C/ Araquil, 67 ...	Madrid	NULL	28023	Spain	(91) 555 22 82	(91) 555 91 99 .
9	BONAP	Bon app' ...	Laurence Lebihan ...	Owner	12, rue des Boucher...	Marseille	NULL	13008	France	91.24.45.40	91.24.45.41 ...
10	BOTTM	Bottom-Dollar Mark...	Elizabeth Lincoln ...	Accounting Manag...	23 Tsawassen Blvd. ...	Tsawassen	BC	T2F 8M4	Canada	(604) 555-4729 ...	(604) 555-374...

Order by City - Ascending Order

SELECT *
FROM CUSTOMERS
ORDER BY CITY ASC
FETCH FIRST 10 ROWS ONLY

	CUST_ID	CMP_NME	CNT_NME	CNT_TTL	ADDRESS	CITY	REGION	ZIP_CODE	COUNTRY	PHONE	FAX
1	VAFFE	Vaffeljernet ...	Palle Ibsen	Sales Manager ...	Smagsloget 45 ...	Århus	NULL	8200	Denmark	86 21 32 43	86 22 33 44
2	DRACD	Drachenblut Delikate...	Sven Ottlieb	Order Administrato...	Walserweg 21 ...	Aachen	NULL	52066	Germany	0241-039123 ...	0241-059428
3	RATTC	Rattlesnake Canyon ...	Paula Wilson ...	Assistant Sales Repr...	2817 Milton Dr. ...	Albuquerque	NM	87110	USA	(505) 555-5939 ...	(505) 555-36...
4	OLDWO	Old World Delicatess...	Rene Phillips	Sales Representativ...	2743 Bering St. ...	Anchorage	AK	99508	USA	(907) 555-7584 ...	(907) 555-28...
5	GALED	Galería del gastróno...	Eduardo Saavedra ...	Marketing Manage...	Rambla de Cataluñ...	Barcelona	NULL	8022	Spain	(93) 203 4560	(93) 203 4561
6	LILAS	LILA-Supermercado ...	Carlos González ...	Accounting Manag...	Carrera 52 con Ave...	Barquisimeto	Lara	3508	Venezuela	(9) 331-6954	(9) 331-7256
7	MAGAA	Magazzini Alimentari...	Giovanni Rovelli ...	Marketing Manage...	Via Ludovico il Mor...	Bergamo	NULL	24100	Italy	035-640230	035-640231
8	ALFKI	Alfreds Futterkiste ...	Maria Anders ...	Sales Representativ...	Obere Str. 57 ...	Berlin	NULL	12209	Germany	030-0074321 ...	030-0076545
9	CHOPS	Chop-suey Chinese ...	Yang Wang ...	Owner	Hauptstr. 29 ...	Bern	NULL	3012	Switzerland	0452-076545	NULL
10	SAVEA	Save-a-lot Markets ...	Jose Pavarotti ...	Sales Representativ...	187 Suffolk Ln. ...	Boise	ID	83720	USA	(208) 555-8097 ...	NULL

Order by City - Descending Order

SELECT *
FROM CUSTOMERS
ORDER BY CITY DESC
FETCH FIRST 10 ROWS ONLY

	CUST_ID	CMP_NME		CNT_NME	CNT_TTL	ADDRESS	CITY	REGION	ZIP_CODE	COUNTRY	PHONE	FAX
1	WOLZA	Wolski Zajazd	...	Zbyszek Piestrzenie...	Owner	ul. Filtrowa 68	Warszawa	NULL	01-012	Poland	(26) 642-7012	(26) 642-701
2	LAZYK	Lazy K Kountry Store ...		John Steel	Marketing Manage...	12 Orchestra Terrac...	Walla Walla	WA	99362	USA	(509) 555-7969	... (509) 555-62
3	LACOR	La corne d'abondanc...		Daniel Tonini	Sales Representativ...	67, avenue de l'Eur...	Versailles	NULL	78000	France	30.59.84.10	30.59.85.11
4	LAUGB	Laughing Bacchus W...		Yoshi Tannamuri	Marketing Assistan...	1900 Oak St.	Vancouver	BC	V3F 2K1	Canada	(604) 555-3392	... (604) 555-72
5	BOTTM	Bottom-Dollar Mark...		Elizabeth Lincoln	Accounting Manag...	23 Tsawassen Blvd. ...	Tsawassen	BC	T2F 8M4	Canada	(604) 555-4729	... (604) 555-37
6	LAMAI	La maison d'Asie		Annette Roulet	Sales Manager	1 rue Alsace-Lorrai...	Toulouse	NULL	31000	France	61.77.61.10	61.77.61.11
7	FRANS	Franchi S.p.A.	...	Paolo Accorti	Sales Representativ...	Via Monte Bianco 3...	Torino	NULL	10100	Italy	011-4988260	... 011-4988261
8	WANDK	Die Wandernde Kuh ...		Rita Müller	Sales Representativ...	Adenauerallee 900 ...	Stuttgart	NULL	70563	Germany	0711-020361	... 0711-035428
9	BLONP	Blondesddsl père et f...		Frédérique Citeaux	Marketing Manage...	24, place Kléber	Strasbourg	NULL	67000	France	88.60.15.31	88.60.15.32
10	SANTG	Santé Gourmet		Jonas Bergulfsen	Owner	Erling Skakkes gate ...	Stavern	NULL	4110	Norway	07-98 92 35	07-98 92 47

Order by City - Ascending and Descending

```
SELECT *
FROM CUSTOMERS
ORDER BY CITY DESC, CMP_NME ASC
FETCH FIRST 10 ROWS ONLY
```

	CUST_ID	CMP_NME		CNT_NME		CNT_TTL		ADDRESS	CITY	REGION	ZIP_CODE	COUNTRY	PHONE	FAX	
1	COMMI	Comércio Mineiro	...	Pedro Afonso		Sales Associate	...	Av. dos Lusíadas, 2...	Sao Paulo	SP	05432-043	Brazil	(11) 555-7647	NULL	
2	FAMIA	Familia Arquibaldo		Aria Cruz		Marketing Assistan...		Rua Orós, 92	Sao Paulo	SP	05442-030	Brazil	(11) 555-9857	NULL	
3	QUEEN	Queen Cozinha	...	Lúcia Carvalho	...	Marketing Assistan...		Alameda dos Canàr...	Sao Paulo	SP	05487-020	Brazil	(11) 555-1189	NULL	
4	TRADH	Tradição Hipermerca...		Anabela Dominques...		Sales Representativ...		Av. Inês de Castro, ...	Sao Paulo	SP	05634-030	Brazil	(11) 555-2167	(11) 555-2168	...

Assigning columns an Alias

```
SELECT
        CUST_ID AS "CustomerIdentification"
      , CMP_NME AS "CompanyName"
      , CNT_NME AS "ContactName"
      , CNT_TTL AS "ContactTitle"
FROM CUSTOMERS
```

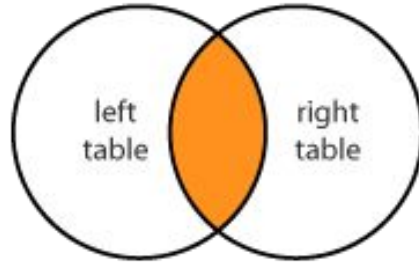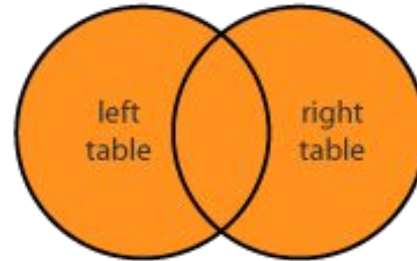|	CustomerIdentification	CompanyName	ContactName	ContactTitle
1	ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative
2	ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner
3	ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner
4	AROUT	Around the Horn	Thomas Hardy	Sales Representative
5	BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator
6	BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative
7	BLONP	Blondesddsl père et fils	Frédérique Citeaux	Marketing Manager
8	BOLID	Bólido Comidas preparadas	Martín Sommer	Owner
9	BONAP	Bon app'	Laurence Lebihan	Owner
10	BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager
11	BSBEV	B's Beverages	Victoria Ashworth	Sales Representative

Why Join Tables Together?

- Combine Related Data

- Comparisons

- Lookups

Types of Joins

INNER JOIN
left table | right table

FULL JOIN
left table | right table

LEFT JOIN
left table | right table

RIGHT JOIN
left table | right table
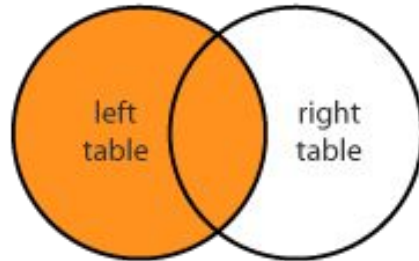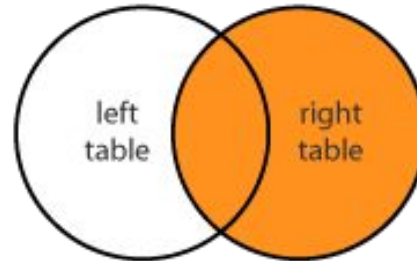
Joining Tables Together - INNER JOIN
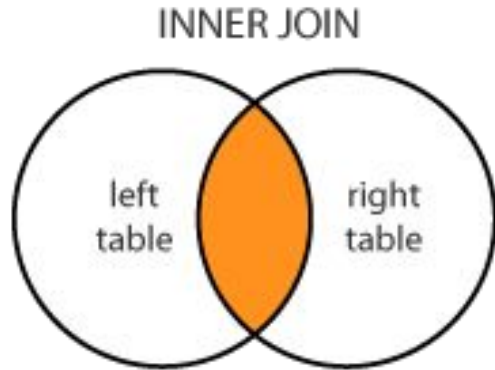
INNER JOIN

left table   right table

(INNER) JOIN: Select records that have matching values in both tables.

Joining Tables Together - JOIN

```
SELECT
        A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT "FreightAmount"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
```

	CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
1	VINET	Vins et alcools Chevalier	10248	7/4/96	32.38
2	TOMSP	Toms Spezialitäten	10249	7/5/96	11.61
3	HANAR	Hanari Carnes	10250	7/8/96	65.83
4	VICTE	Victuailles en stock	10251	7/8/96	41.34
5	SUPRD	Suprêmes délices	10252	7/9/96	51.30
6	HANAR	Hanari Carnes	10253	7/10/96	58.17
7	CHOPS	Chop-suey Chinese	10254	7/11/96	22.98
8	RICSU	Richter Supermarkt	10255	7/12/96	148.33
9	WELLI	Wellington Importadora	10256	7/15/96	13.97
10	HILAA	HILARION-Abastos	10257	7/16/96	81.91
11	ERNSH	Ernst Handel	10258	7/17/96	140.51
12	CENTC	Centro comercial Moctezuma	10259	7/18/96	3.25
13	OTTIK	Ottilies Käseladen	10260	7/19/96	55.09
14	QUEDE	Que Delícia	10261	7/19/96	3.05

Joining Tables Together - LEFT JOIN

LEFT JOIN

left table

right table

LEFT (OUTER) JOIN: Select records from the first (left-most) table with matching right table records.
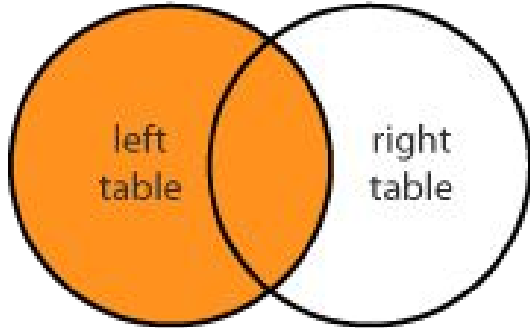
Joining Tables Together - LEFT JOIN

```
SELECT
        A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT "FreightAmount"
FROM ORDERS A
LEFT JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
```

	CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
1	VINET	NULL	10248	7/4/96	32.38
2	TOMSP	Toms Spezialitäten	10249	7/5/96	11.61
3	HANAR	Hanari Carnes	10250	7/8/96	65.83
4	VICTE	Victuailles en stock	10251	7/8/96	41.34
5	SUPRD	Suprêmes délices	10252	7/9/96	51.30
6	HANAR	Hanari Carnes	10253	7/10/96	58.17
7	CHOPS	Chop-suey Chinese	10254	7/11/96	22.98
8	RICSU	Richter Supermarkt	10255	7/12/96	148.33
9	WELLI	Wellington Importadora	10256	7/15/96	13.97
10	HILAA	HILARION-Abastos	10257	7/16/96	81.91
11	ERNSH	Ernst Handel	10258	7/17/96	140.51
12	CENTC	Centro comercial Moctezuma	10259	7/18/96	3.25

Joining Tables Together - RIGHT JOIN

RIGHT JOIN

left table   right table

RIGHT (OUTER) JOIN: Select records from the second (right-most) table with matching left table records.
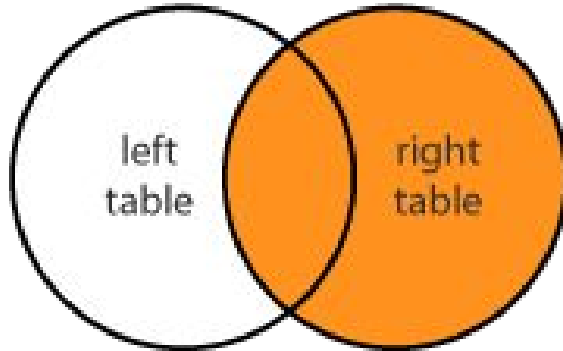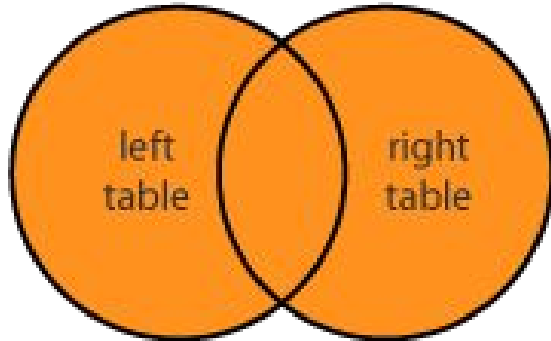
Joining Tables Together - RIGHT JOIN

```
SELECT
        A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT "FreightAmount"
FROM ORDERS A
RIGHT JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
```

	CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
1	TOMSP	Toms Spezialitäten	10249	7/5/96	11.61
2	HANAR	Hanari Carnes	10250	7/8/96	65.83
3	VICTE	Victuailles en stock	10251	7/8/96	41.34
4	SUPRD	Suprêmes délices	10252	7/9/96	51.30
5	HANAR	Hanari Carnes	10253	7/10/96	58.17
6	CHOPS	Chop-suey Chinese	10254	7/11/96	22.98
7	RICSU	Richter Supermarkt	10255	7/12/96	148.33
8	WELLI	Wellington Importadora	10256	7/15/96	13.97
9	HILAA	HILARION-Abastos	10257	7/16/96	81.91
10	ERNSH	Ernst Handel	10258	7/17/96	140.51
11	CENTC	Centro comercial Moctezuma	10259	7/18/96	3.25
12	OTTIK	Ottilies Käseladen	10260	7/19/96	55.09
13	QUEDE	Que Delícia	10261	7/19/96	3.05
14	RATTC	Rattlesnake Canyon Grocery	10262	7/22/96	48.29
15	ERNSH	Ernst Handel	10263	7/23/96	146.06

Joining Tables Together - FULL JOIN

FULL JOIN

left table   right table

FULL (OUTER) JOIN: Selects all records that match either left or right table records.

Joining Tables Together - FULL JOIN

```sql
SELECT
        A.CUST_ID AS "CustomerId"
      , B.CMP_NME AS "CompanyName"
      , A.ORD_ID AS "OrderNumber"
      , A.ORD_DTE AS "OrderDate"
      , A.FRGHT "FreightAmount"
FROM ORDERS A
FULL JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
```

	CustomerId	CustomerId2	CompanyName	OrderNumber	OrderDate	FreightAmount
187	FAMIA	FAMIA	Familia Arquibaldo	10650	8/29/97	176.81
188	FAMIA	FAMIA	Familia Arquibaldo	10725	10/31/97	10.83
189	NULL	FISSA	FISSA Fabrica Inter. Salchichas S.A...	NULL	NULL	NULL
190	FOLIG	FOLIG	Folies gourmandes	10408	1/8/97	11.26
191	FOLIG	FOLIG	Folies gourmandes	10480	3/20/97	1.35

Aggregating Data

- ● Summarize Data

- ● Use Aggregate Functions

- ● Identify Patterns and Trends

Aggregating Data

```
SELECT
        A.CUST_ID  AS "CustomerId"
      , COUNT(*) AS "NumberOfOrders"
      , COUNT( DISTINCT A.CUST_ID ) AS "DistinctCountCustId"
      , SUM(A.FRGHT) AS "SumFreight"
      , MIN(A.ORD_ID) AS "LowestOrder"
      , MAX(A.ORD_ID) AS "HighestOrder"
      , AVG(A.FRGHT) AS "AverageFreight"
      , ROUND(AVG(A.FRGHT),2) AS "AvgFreightRound"
      , DEC(ROUND(AVG(A.FRGHT),2),15,2) AS "AvgFreightRound"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
```

CustomerId	NumberOfOrders	DistinctCountCustId	SumFreight	LowestOrder	HighestOrder	AverageFreight	AvgFreightRound	AvgFreightRound
WELLI	9	1	194.71	10256	10935	21.634444444444444444...	21.630000000000000000000	21.63
SIMOB	7	1	448.85	10341	11074	64.121428571428571428...	64.120000000000000000000	64.12
THEBI	4	1	262.09	10310	10992	65.522500000000000000...	65.520000000000000000000	65.52
FRANR	3	1	171.42	10671	10971	57.140000000000000000...	57.140000000000000000000	57.14
HUNGC	5	1	207.08	10375	10660	41.416000000000000000...	41.420000000000000000000	41.42
FOLKO	19	1	1678.08	10264	11050	88.320000000000000000...	88.320000000000000000000	88.32
CHOPS	8	1	367.24	10254	11041	45.905000000000000000...	45.910000000000000000000	45.91
TRAIH	3	1	70.01	10574	10822	23.336666666666666666...	23.340000000000000000000	23.34
KOENE	14	1	813.68	10323	11028	58.120000000000000000...	58.120000000000000000000	58.12
PICCO	10	1	1186.11	10353	11053	118.611000000000000000...	118.610000000000000000000	118.61

Aggregating Data - CASE STATEMENTS

```
SELECT
        A.CUST_ID AS "CustomerId"
      , B.CMP_NME AS "CompanyName"
      , SUM(A.FRGHT) AS "FreightAmount"
      , CASE
            WHEN SUM(A.FRGHT) > 600 THEN 'CHARGED OVER 600'
            WHEN SUM(A.FRGHT) < 400 THEN 'CHARGED LESS THAN 400'
        ELSE '' END AS "ChargeType"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
```

CustomerId	CompanyName	FreightAmount	ChargeType
ALFKI	Alfreds Futterkiste	225.58	CHARGED LESS THAN 400
ANATR	Ana Trujillo Emparedados y helados	97.42	CHARGED LESS THAN 400
ANTON	Antonio Moreno Taquería	268.52	CHARGED LESS THAN 400
AROUT	Around the Horn	471.95	
BERGS	Berglunds snabbköp	1559.52	CHARGED OVER 600
BLAUS	Blauer See Delikatessen	168.26	CHARGED LESS THAN 400
BLONP	Blondesddsl père et fils	623.66	CHARGED OVER 600
BOLID	Bólido Comidas preparadas	191.17	CHARGED LESS THAN 400
BONAP	Bon app'	1357.87	CHARGED OVER 600
BOTTM	Bottom-Dollar Markets	793.95	CHARGED OVER 600

Aggregating Data - HAVING SUM

```sql
SELECT
        A.CUST_ID AS "CustomerId"
      , B.CMP_NME AS "CompanyName"
      , SUM(A.FRGHT) AS "FreightAmount"
      , CASE WHEN SUM(A.FRGHT) > 600 THEN 'OVER CHARGED' ELSE '' END AS "ChargeType"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
HAVING SUM(A.FRGHT) > 600
ORDER BY A.CUST_ID
```

	CustomerId	CompanyName	FreightAmount	ChargeType
1	BERGS	Berglunds snabbköp	1559.52	OVER CHARGED
2	BLONP	Blondesddsl père et fils	623.66	OVER CHARGED
3	BONAP	Bon app'	1357.87	OVER CHARGED
4	BOTTM	Bottom-Dollar Markets	793.95	OVER CHARGED
5	EASTC	Eastern Connection	832.34	OVER CHARGED
6	ERNSH	Ernst Handel	6205.39	OVER CHARGED
7	FOLIG	Folies gourmandes	637.94	OVER CHARGED
8	FOLKO	Folk och fä HB	1678.08	OVER CHARGED
9	FRANK	Frankenversand	1403.44	OVER CHARGED
10	GREAL	Great Lakes Food Market	1087.61	OVER CHARGED
11	HANAR	Hanari Carnes	724.77	OVER CHARGED
12	HILAA	HILARION-Abastos	1259.16	OVER CHARGED

Aggregating Data - HAVING COUNT

```sql
SELECT
        A.CUST_ID  AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , COUNT(*) AS "NumberOfOrders"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
HAVING COUNT(*) > 10
ORDER BY A.CUST_ID
```

	CustomerId	CompanyName	NumberOfOrders
1	AROUT	Around the Horn	13
2	BERGS	Berglunds snabbköp	18
3	BLONP	Blondesddsl père et fils	11
4	BONAP	Bon app'	17
5	BOTTM	Bottom-Dollar Markets	14
6	ERNSH	Ernst Handel	30
7	FOLKO	Folk och fä HB	19
8	FRANK	Frankenversand	15
9	GREAL	Great Lakes Food Market	11
10	HANAR	Hanari Carnes	14
11	HILAA	HILARION-Abastos	18
12	HUNGO	Hungry Owl All-Night Grocers	19
13	KOENE	Königlich Essen	14

ROW, RANK and DENSE

- Enumerate results

- Ranking results based on partitioned column

Aggregating Data - ROW NUMBER

```
SELECT
        ROW_NUMBER() OVER(ORDER BY A.CUST_ID) AS "RowCount"
        , A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT AS "FreightAmount"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
ORDER BY A.CUST_ID
```

RowCount	CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
1	ALFKI	Alfreds Futterkiste	10643	8/25/97	29.46
2	ALFKI	Alfreds Futterkiste	10692	10/3/97	61.02
3	ALFKI	Alfreds Futterkiste	10702	10/13/97	23.94
4	ALFKI	Alfreds Futterkiste	10835	1/15/98	69.53
5	ALFKI	Alfreds Futterkiste	10952	3/16/98	40.42
6	ALFKI	Alfreds Futterkiste	11011	4/9/98	1.21
7	ANATR	Ana Trujillo Emparedados y helados	10308	9/18/96	1.61
8	ANATR	Ana Trujillo Emparedados y helados	10625	8/8/97	43.90
9	ANATR	Ana Trujillo Emparedados y helados	10759	11/28/97	11.99
10	ANATR	Ana Trujillo Emparedados y helados	10926	3/4/98	39.92

Aggregating Data - RANK and DENSE

```sql
SELECT
        RANK() OVER(ORDER BY A.CUST_ID) AS "RankCustID"
        , DENSE_RANK() OVER(ORDER BY A.CUST_ID) AS "DenseRankCustID"
        , A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT AS "FreightAmount"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
ORDER BY A.CUST_ID
```

RankFreight	DenseRankFreight	CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
1	1	ALFKI	Alfreds Futterkiste	10643	8/25/97	29.46
1	1	ALFKI	Alfreds Futterkiste	10692	10/3/97	61.02
1	1	ALFKI	Alfreds Futterkiste	10702	10/13/97	23.94
1	1	ALFKI	Alfreds Futterkiste	10835	1/15/98	69.53
1	1	ALFKI	Alfreds Futterkiste	10952	3/16/98	40.42
1	1	ALFKI	Alfreds Futterkiste	11011	4/9/98	1.21
7	2	ANATR	Ana Trujillo Emparedados y helad...	10308	9/18/96	1.61
7	2	ANATR	Ana Trujillo Emparedados y helad...	10625	8/8/97	43.90
7	2	ANATR	Ana Trujillo Emparedados y helad...	10759	11/28/97	11.99
7	2	ANATR	Ana Trujillo Emparedados y helad...	10926	3/4/98	39.92
11	3	ANTON	Antonio Moreno Taquería	10365	11/27/96	22.00
11	3	ANTON	Antonio Moreno Taquería	10507	4/15/97	47.45
11	3	ANTON	Antonio Moreno Taquería	10535	5/13/97	15.64

Working with Strings

- Explore various functions to manipulate string results

Working with Strings Results - 1

```
SELECT
    CMP_NME AS "CompanyName"
    , REGION AS "Region"
    , IFNULL(REGION,'NEED VALUE') AS "RegionWithNull"
    , COALESCE(REGION,'NOTHING') AS "DefaultToNothing"
    , CONCAT(CUST_ID,CMP_NME)  AS "ConcatCompName"
FROM CUSTOMERS
```

CompanyName	Region	RegionWithNull	DefaultToNothing	ConcatCompName
Alfreds Futterkiste	NULL	NEED VALUE	NOTHING	ALFKIAlfreds Futterkiste
Ana Trujillo Emparedados y helados	NULL	NEED VALUE	NOTHING	ANATRAna Trujillo Emparedados y helados
Antonio Moreno Taquería	NULL	NEED VALUE	NOTHING	ANTONAntonio Moreno Taquería
Around the Horn	NULL	NEED VALUE	NOTHING	AROUTAround the Horn
Berglunds snabbköp	NULL	NEED VALUE	NOTHING	BERGSBerglunds snabbköp
Blauer See Delikatessen	NULL	NEED VALUE	NOTHING	BLAUSBlauer See Delikatessen
Blondesddsl père et fils	NULL	NEED VALUE	NOTHING	BLONPBlondesddsl père et fils
Bólido Comidas preparadas	NULL	NEED VALUE	NOTHING	BOLIDBólido Comidas preparadas
Bon app'	NULL	NEED VALUE	NOTHING	BONAPBon app'
Bottom-Dollar Markets	NULL	NEED VALUE	NOTHING	BOTTMBottom-Dollar Markets
B's Beverages	NULL	NEED VALUE	NOTHING	BSBEVB's Beverages

Working with Strings Results - 2

```
SELECT
    TRANSLATE(CMP_NME,' ','\/&*?+#;<>-',') AS "TranslateCompName1"
    , TRANSLATE(CMP_NME,'A','C') AS "TranslateCompName2"
    , REPLACE(CMP_NME,'A','Z') AS "ReplaceCompName"
    , CUST_ID||'-'||CMP_NME AS "CombinedCompName"
    , UPPER(CMP_NME) AS "CompanyNameUpper"
    , LOWER(CMP_NME) AS "CompanyNameLower"
FROM CUSTOMERS
```

TranslateCompName1	TranslateCompName2	ReplaceCompName	CombinedCompName	CompanyNameUpper	CompanyNameLower
Alfreds Futterkiste	Alfreds Futterkiste	Zlfreds Futterkiste	ALFKI-Alfreds Futterkiste	ALFREDS FUTTERKISTE	alfreds futterkiste
Ana Trujillo Emparedados y helados	Ana Trujillo Emparedados y helados	Zna Trujillo Emparedados y helados ...	ANATR-Ana Trujillo Emparedados y hel...	ANA TRUJILLO EMPAREDADOS Y HEL...	ana trujillo emparedados y helados
Antonio Moreno Taquería	Antonio Moreno Taquería	Zntonio Moreno Taquería	ANTON-Antonio Moreno Taquería ...	ANTONIO MORENO TAQUERÍA ...	antonio moreno taquería
Around the Horn	Around the Horn	Zround the Horn	AROUT-Around the Horn	AROUND THE HORN	around the horn
Berglunds snabbköp	Berglunds snabbköp	Berglunds snabbköp	BERGS-Berglunds snabbköp	BERGLUNDS SNABBKÖP	berglunds snabbköp
Blauer See Delikatessen	Blauer See Delikatessen	Blauer See Delikatessen	BLAUS-Blauer See Delikatessen	BLAUER SEE DELIKATESSEN	blauer see delikatessen
Blondesddsl père et fils	Blondesddsl père et fils	Blondesddsl père et fils	BLONP-Blondesddsl père et fils	BLONDESDDSL PÈRE ET FILS	blondesddsl père et fils
Bólido Comidas preparadas	Bólido Aomidas preparadas	Bólido Comidas preparadas	BOLID-Bólido Comidas preparadas ...	BÓLIDO COMIDAS PREPARADAS ...	bólido comidas preparadas
Bon app'	Bon app'	Bon app'	BONAP-Bon app'	BON APP'	bon app'
Bottom Dollar Markets	Bottom-Dollar Markets	Bottom-Dollar Markets	BOTTM-Bottom-Dollar Markets ...	BOTTOM-DOLLAR MARKETS	bottom-dollar markets
B's Beverages	B's Beverages	B's Beverages	BSBEV-B's Beverages	B'S BEVERAGES	b's beverages

Working with Strings Results - 3

```
SELECT
    LENGTH(CMP_NME) AS "LengthCompanyName"
    , LENGTH(TRIM(CMP_NME)) AS "TrimmedCompanyName"
    , LEFT(CMP_NME,LENGTH(TRIM(CMP_NME))-1) AS "RemoveCharacterLeft"
    , SUBSTR(CMP_NME,1,2)  AS "SubstringCompanyName"
    , LOCATE('Bon',CMP_NME) AS "CompaniesWithBon"
    , LOCATE('app',CMP_NME) AS "CompaniesWithapp"
FROM CUSTOMERS
```

LengthCompanyName	TrimmedCompanyName	RemoveCharacterLeft	SubstringCompanyName	CompaniesWithBon	CompaniesWithapp
40	19	Alfreds Futterkist	Al	0	0
40	34	Ana Trujillo Emparedados y helado	An	0	0
40	23	Antonio Moreno Taquerí	An	0	0
40	15	Around the Hor	Ar	0	0
40	18	Berglunds snabbkö	Be	0	0
40	23	Blauer See Delikatesse	Bl	0	0
40	24	Blondesddsl père et fil	Bl	0	0
40	25	Bólido Comidas preparada	Bó	0	0
40	8	Bon app	Bo	1	5
40	21	Bottom-Dollar Market	Bo	0	0

Combining Data With UNION

- UNION combines the result sets of two queries.

- Column data types in the two queries must match.

- UNION combines by column position rather than column name.

- UNION selects only distinct values. To allow duplicate values, use UNION ALL

Combining Data With UNION ALL

```
SELECT
        A.ORD_YR AS "Year"
        , A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
FROM ORDERS A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
UNION ALL
SELECT
        A.ORD_YR AS "Year"
        , A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
FROM ORDERSH A
JOIN CUSTOMERS B ON B.CUST_ID = A.CUST_ID
GROUP BY A.CUST_ID, B.CMP_NME
```

Combining Data With UNION ALL Results

Year	CustomerId	CompanyName
2017	VICTE	Victuailles en stock
2017	WANDK	Die Wandernde Kuh
2017	WARTH	Wartian Herkku
2017	WELLI	Wellington Importadora
2017	WHITC	White Clover Markets
2017	WILMK	Wilman Kala
2017	WOLZA	Wolski Zajazd
2017	VINET	Vins et alcools Chevalier
2016	ALFKI	Alfreds Futterkiste
2016	ANATR	Ana Trujillo Emparedados y helados
2016	ANTON	Antonio Moreno Taquería
2016	AROUT	Around the Horn

Various SQL examples

- Working with Dates

- Working with Subqueries

- Filtering results

- Review Year to Year comparison using WITH

Working with Dates - Convert CCYYMMDD to Date

```
SELECT

    DATE(SUBSTR(CHAR(20170917), 1, 4) || '-'|| SUBSTR(CHAR(20171101),5, 2)
    || '-'|| SUBSTR(CHAR(20171101), 7, 2)) AS "CvtNumericCCYYMMDD"

    , DATE(SUBSTR(CHAR(20170917), 1, 4) || '-'|| SUBSTR(CHAR(20171101),5, 2) || '-'||
    SUBSTR(CHAR(20171101), 7,   2)) - 1 YEAR AS "CvtNumericCCYYMMDD-1Year"

    , TO_DATE('2017-09-17', 'YYYY-MM-DD') AS "CvtStringToDate-YYYY-MM-DD"

FROM sysibm.sysdummy1
```

CvtNumericCCYYMMDD	CvtNumericCCYYMMDD-1Year	CvtStringToDate-YYYY-MM-DD
11/01/17	11/01/16	2017-09-17 00:00:00.000000

Working with Dates - Convert Date to CCYYMMDD

```
SELECT

    INT(REPLACE(CHAR(CURRENT DATE, ISO),'-','')) AS "CvtDateCCYYMMDD"
  , INT(REPLACE(CHAR(CURRENT DATE - 1 DAY , ISO),'-','')) AS "CvtDateCCYYMMDD-1Day"
  , INT(REPLACE(CHAR(CURRENT DATE - 1 MONTH, ISO),'-','')) AS "CvtDateCCYYMMDD-1Month"
  , INT(REPLACE(CHAR(CURRENT DATE - 1 YEAR, ISO),'-','')) AS "CvtDateCCYYMMDD-1Year"

FROM sysibm.sysdummy1
```

CvtDateCCYYMMDD	CvtDateCCYYMMDD-1Day	CvtDateCCYYMMDD-1Month	CvtDateCCYYMMDD-1Year
20170917	20170916	20170817	20160917

Subqueries - Filtering

```sql
SELECT
    A.CUST_ID AS "CustomerId"
        , B.CMP_NME AS "CompanyName"
        , A.ORD_ID AS "OrderNumber"
        , A.ORD_DTE AS "OrderDate"
        , A.FRGHT AS "FreightAmount"
FROM  ORDERS A
JOIN  CUSTOMERS B ON B.CUST_ID = A.CUST_ID
WHERE A.ORD_ID IN (
            SELECT ORD_ID
            FROM  ORD_DTLS AA
            JOIN PRODUCTS BB ON BB.PROD_ID = AA.PROD_ID
            WHERE PROD_NME = 'Tofu')
```

CustomerId	CompanyName	OrderNumber	OrderDate	FreightAmount
TOMSP	Toms Spezialitäten	10249	7/5/2015	11.61
KOENE	Königlich Essen	10325	10/9/2015	64.86
WARTH	Wartian Herkku	10333	10/18/2015	0.59
HUNGC	Hungry Coyote Import Store	10375	12/6/2015	20.12
SAVEA	Save-a-lot Markets	10393	12/25/2015	126.56
OCEAN	Océano Atlántico Ltda.	10409	1/9/2016	29.83
WARTH	Wartian Herkku	10412	1/13/2016	3.77

Subqueries - Year to Year Comparison

```
WITH CurSales (CustomerId, CompanyName, CurrentFreightAmount)
AS (
SELECT
    A.CUST_ID
  , B.CMP_NME
  , SUM(A.FRGHT)
FROM  ORDERS A
JOIN  CUSTOMERS B ON B.CUST_ID = A.CUST_ID
WHERE YEAR(A.ORD_DTE) = YEAR(CURRENT DATE)
GROUP BY A.CUST_ID, B.CMP_NME
)
```

Subqueries - Year to Year Comparison

```sql
SELECT
    A.CustomerId AS "CustomerId"
    , C.CMP_NME AS "CompanyName"
    , SUM(B.FRGHT) AS "PreviousFreightAmount"
    , SUM(CurrentFreightAmount) AS "CurrentFreightAmount"
FROM CurSales A
LEFT JOIN  ORDERS B ON B.CUST_ID = A.CustomerId
JOIN  CUSTOMERS C ON C.CUST_ID = A.CustomerId
WHERE YEAR(B.ORD_DTE) = YEAR(CURRENT DATE - 1 YEAR)
GROUP BY A.CustomerId, C.CMP_NME
```

Subqueries - Year to Year Comparison

```sql
WITH CurSales (CustomerId, CompanyName, CurrentFreightAmount)
AS (
SELECT
    A.CUST_ID
    , B.CMP_NME
    , SUM(A.FRGHT)
FROM  ORDERS A
JOIN  CUSTOMERS B ON B.CUST_ID = A.CUST_ID
WHERE YEAR(A.ORD_DTE) = YEAR(CURRENT DATE)
GROUP BY A.CUST_ID, B.CMP_NME
)
SELECT
    A.CustomerId AS "CustomerId"
    , C.CMP_NME AS "CompanyName"
    , SUM(B.FRGHT) AS "PreviousFreightAmount"
    , SUM(CurrentFreightAmount) AS "CurrentFreightAmount"
FROM CurSales A
LEFT JOIN  ORDERS B ON B.CUST_ID = A.CustomerId
JOIN  CUSTOMERS C ON C.CUST_ID = A.CustomerId
WHERE YEAR(B.ORD_DTE) = YEAR(CURRENT DATE - 1 YEAR)
GROUP BY A.CustomerId, C.CMP_NME
```

Working with Dates - Year to Year Comparison

CUSTOMERID	CompanyName	PreviousFreightAmount	CurrentFreightAmount
HUNGC	Hungry Coyote Import Store	207.08	1035.40
QUICK	QUICK-Stop	5605.63	156957.64
PRINI	Princesa Isabel Vinhos	364.86	1824.30
RATTC	Rattlesnake Canyon Grocery	2134.21	38415.78
ISLAT	Island Trading	363.65	3636.50
VICTE	Victuailles en stock	493.25	4932.50
QUEDE	Que Delícia	327.55	2947.95
KOENE	Königlich Essen	813.68	11391.52
TRAIH	Trail's Head Gourmet Provisioners	70.01	210.03
BOTTM	Bottom-Dollar Markets	793.95	11115.30
ALFKI	Alfreds Futterkiste	225.58	1353.48
LONEP	Lonesome Pine Restaurant	79.86	638.88
SAVEA	Save-a-lot Markets	6683.70	207194.70

The secret of getting ahead is getting started.

Mark Twain