CMPE 2400- Databases

Lecture 3- Filtering Data with the Where Clause

Where Clause

The **Where** Clause allows us to Filter data based on chosen criteria

SELECT *column1, column2, ...*
FROM *table_name*
WHERE *condition*

Where Clause

- E.g. Let's look at the database called PublishersDatabase.
  - It has a table **Titles** that contains information about some published titles.
- Let's say we want to see the title_id, title, type of publication, and price of all publications where the Royalty is 10 (i.e 10%)
  - Query is shown on next slide

Where Clause

- The query is as follows

```
select title_id, title,[type], price
from PublishersDatabase.dbo.titles
where royalty=10
```

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Results

title_id	title	type	price
BU1032	The Busy Executive's Database Guide	business	19.99
BU1111	Cooking with Computers: Surreptitious Balance Sheets	business	11.95
BU7832	Straight Talk About Computers	business	19.99
PC8888	Secrets of Silicon Valley	popular_comp	20.00
PS1372	Computer Phobic AND Non-Phobic Individuals: Behavior Variations	psychology	21.59
PS2106	Life Without Fear	psychology	7.00
PS3333	Prolonged Data Deprivation: Four Case Studies	psychology	19.99
PS7777	Emotional Security: A New Algorithm	psychology	7.99
TC3218	Onions, Leeks, and Garlic: Cooking Secrets of the Mediterranean	trad_cook	20.95
TC7777	Sushi, Anyone?	trad_cook	14.99

(10 rows affected)

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Relational Operators

Equals	=
Greater Than	>
Less Than	<
Greater Than or Equal To	>=
Less Than or Equal To	<=
Not Equal To	<> (ANSI) != (T-SQL)
Not Greater Than	!> (T-SQL)
Not Less Than	!< (T-SQL)

Exercise 1 - Using Relational Operators

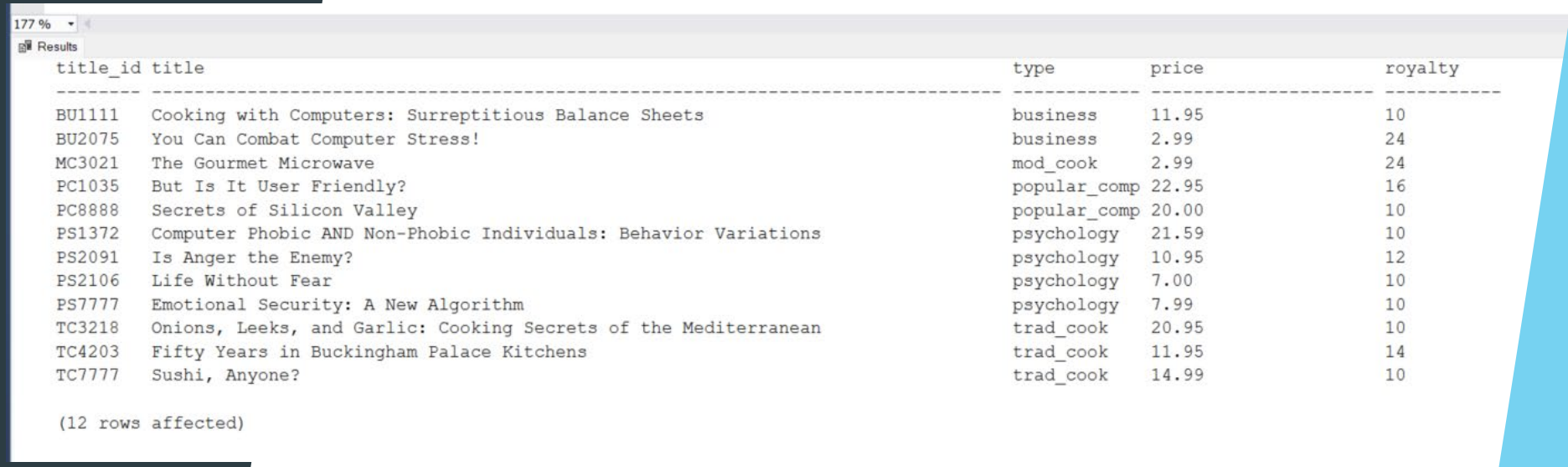
- Write a select query that will display the title_id, title, type, price and royalty from PublishersDatabase, where the royalty is >10.

title_id	title	type	price	royalty
BU2075	You Can Combat Computer Stress!	business	2.99	24
MC2222	Silicon Valley Gastronomic Treats	mod_cook	19.99	12
MC3021	The Gourmet Microwave	mod_cook	2.99	24
PC1035	But Is It User Friendly?	popular_comp	22.95	16
PS2091	Is Anger the Enemy?	psychology	10.95	12
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	11.95	14

(6 rows affected)

Exercise 2 - Using Relational Operators

- Write a select query that will display the title_id, title, type, price and royalty from the database PublishersDatabase, for all publications for which the price is not 19.99



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Results

title_id	title	type	price	royalty
BU1111	Cooking with Computers: Surreptitious Balance Sheets	business	11.95	10
BU2075	You Can Combat Computer Stress!	business	2.99	24
MC3021	The Gourmet Microwave	mod_cook	2.99	24
PC1035	But Is It User Friendly?	popular_comp	22.95	16
PC8888	Secrets of Silicon Valley	popular_comp	20.00	10
PS1372	Computer Phobic AND Non-Phobic Individuals: Behavior Variations	psychology	21.59	10
PS2091	Is Anger the Enemy?	psychology	10.95	12
PS2106	Life Without Fear	psychology	7.00	10
PS7777	Emotional Security: A New Algorithm	psychology	7.99	10
TC3218	Onions, Leeks, and Garlic: Cooking Secrets of the Mediterranean	trad_cook	20.95	10
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	11.95	14
TC7777	Sushi, Anyone?	trad_cook	14.99	10

(12 rows affected)

Logical Operators

- List of Familiar logical Operators (equivalent existing in C#)
  - AND *true* if both conditions are true.

    Equivalent to (&&) in C#.
  - OR *true* if either of the conditions is *true*.

    Equivalent to (||) in C#.
  - NOT Inverts the logic of any other logical operator.

    Equivalent to (!) In C#.

Exercise 3- Logical Operators

- Write a select query that will display the title_id, title, type, price and royalty from the database PublishersDatabase, for all publications for which the price is at least $11 and the royalty is greater than 10

Results

title_id	title	type	price	royalty
MC2222	Silicon Valley Gastronomic Treats	mod_cook	19.99	12
PC1035	But Is It User Friendly?	popular_comp	22.95	16
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	11.95	14

(3 rows affected)

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Exercise 4- Logical Operators

- Write a select query that will display the title_id, title, type, price and royalty from the database PublishersDatabase, for all publications for which the price is at least $11 or the royalty is greater than 10

Results

title_id	title	type	price	royalty
BU1032	The Busy Executive's Database Guide	business	19.99	10
BU1111	Cooking with Computers: Surreptitious Balance Sheets	business	11.95	10
BU2075	You Can Combat Computer Stress!	business	2.99	24
BU7832	Straight Talk About Computers	business	19.99	10
MC2222	Silicon Valley Gastronomic Treats	mod_cook	19.99	12
MC3021	The Gourmet Microwave	mod_cook	2.99	24
PC1035	But Is It User Friendly?	popular_comp	22.95	16
PC8888	Secrets of Silicon Valley	popular_comp	20.00	10
PS1372	Computer Phobic AND Non-Phobic Individuals: Behavior Variations	psychology	21.59	10
PS2091	Is Anger the Enemy?	psychology	10.95	12
PS3333	Prolonged Data Deprivation: Four Case Studies	psychology	19.99	10
TC3218	Onions, Leeks, and Garlic: Cooking Secrets of the Mediterranean	trad_cook	20.95	10
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	11.95	14
TC7777	Sushi, Anyone?	trad_cook	14.99	10

(14 rows affected)

Exercise 5- Logical Operators

- Write a query to display the productid, product name, unit price, units in stock and reorder level for all products in the NorthwindTraders database, for which the number of units in stock > 3 times the reorder level and the reorder level is greater than 5.

ProductID	ProductName	UnitPrice	UnitsInStock	reorderlevel
1	Chai	18.00	39	10
6	Grandma's Boysenberry Spread	25.00	120	25
22	Gustaf's Knäckebröd	21.00	104	25
33	Geitost	2.50	112	20
34	Sasquatch Ale	14.00	111	15
36	Inlagd Sill	19.00	112	20
40	Boston Crab Meat	18.40	123	30
41	Jack's New England Clam Chowder	9.65	85	10
55	Pâté chinois	24.00	115	20
58	Escargots de Bourgogne	13.25	62	20
61	Sirop d'érable	28.50	113	25
67	Laughing Lumberjack Lager	14.00	52	10
75	Rhönbräu Klosterbier	7.75	125	25
78	Romulan Ale	19.67	125	25

(14 rows affected)

Exercise 6- Logical Operators

- Using the logical operators, we've seen so far, write a query to display the productid, product name, unit price, units in stock and reorder level for all products in the NorthwindTraders database, for which the number of units in stock is at least 30 but not greater than 40.

ProductID	ProductName	UnitPrice	UnitsInStock	reorderlevel
1	Chai	18.00	39	10
10	Ikura	31.00	31	0
14	Tofu	23.25	35	0
15	Genen Shouyu	15.50	39	5
20	Sir Rodney's Marmalade	81.00	40	0
47	Zaanse koeken	9.50	36	0
52	Filo Mix	7.00	38	25
57	Ravioli Angelo	19.50	36	20
77	Original Frankfurter grüne Soße	13.00	32	15
80	Ransid Frankfurter grüne Soße	13.00	31	15

(10 rows affected)

More Logical Operators

- These operators are new and quite useful.
  - BETWEEN -*true* if the comparison value is between the specified range. For example, if unitsInStock is 35,

    `unitsInStock between 30 and 40` will return *true*.

    - Basically this operator is a nicer way of writing

    ```
    unitsInStock >= 30 and unitsInStock <= 40
    ```

  - IN - *true* if the comparison value is equivalent to one value in the comma separated list.
    For example, if uniPrice = 45, `unitPrice in (1, 45, 90)` will return *true*.

    - Basically this operator is a nicer way of writing

    ```
    unitPrice = 1 or unitPrice = 45 or unitPrice = 90
    ```

Using the “between” operator

- Display the information for all records from PublishersDatabase where the royalties lie in the range of 10%-16%, inclusive.

```
select title_id, title,[type], price, royalty
from PublishersDatabase.dbo.titles
where royalty between 10 and 16
```

> **Results on next slide**

Using the “between” operator

- Results from the previous query

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Results

title_id	title	type	price	royalty
BU1032	The Busy Executive's Database Guide	business	19.99	10
BU1111	Cooking with Computers: Surreptitious Balance Sheets	business	11.95	10
BU7832	Straight Talk About Computers	business	19.99	10
MC2222	Silicon Valley Gastronomic Treats	mod_cook	19.99	12
PC1035	But Is It User Friendly?	popular_comp	22.95	16
PC8888	Secrets of Silicon Valley	popular_comp	20.00	10
PS1372	Computer Phobic AND Non-Phobic Individuals: Behavior Variations	psychology	21.59	10
PS2091	Is Anger the Enemy?	psychology	10.95	12
PS2106	Life Without Fear	psychology	7.00	10
PS3333	Prolonged Data Deprivation: Four Case Studies	psychology	19.99	10
PS7777	Emotional Security: A New Algorithm	psychology	7.99	10
TC3218	Onions, Leeks, and Garlic: Cooking Secrets of the Mediterranean	trad_cook	20.95	10
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	11.95	14
TC7777	Sushi, Anyone?	trad_cook	14.99	10

(14 rows affected)

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Exercise 7- Using the “between” Operator

- Using the **between** operator, write a query to display the productid, product name, unit price, units in stock and reorder level for all products in the NorthwindTraders database, for which the unit price is at least $20 but not greater than $30.

ProductID	ProductName	UnitPrice	UnitsInStock	reorderlevel
4	Chef Anton's Cajun Seasoning	22.00	53	0
5	Chef Anton's Gumbo Mix	21.35	0	0
6	Grandma's Boysenberry Spread	25.00	120	25
7	Uncle Bob's Organic Dried Pears	30.00	15	10
11	Queso Cabrales	21.00	22	30
14	Tofu	23.25	35	0
22	Gustaf's Knäckebröd	21.00	104	25
30	Nord-Ost Matjeshering	25.89	10	15
37	Gravad lax	26.00	11	25
49	Maxilaku	20.00	10	15
55	Pâté chinois	24.00	115	20
61	Sirop d'érable	28.50	113	25
65	Louisiana Fiery Hot Pepper Sauce	21.05	76	0
71	Flotemysost	21.50	26	0

(14 rows affected)

Exercise 8- Using the “in” Operator

- Using the **in** operator, write a query to display the productid, product name, unit price, units in stock and reorder level for all products in the NorthwindTraders database, for which the number of units in stock is anyone of the following values: 5,10,15,20,25,30

ProductID	ProductName	UnitPrice	UnitsInStock	reorderlevel
7	Uncle Bob's Organic Dried Pears	30.00	15	10
19	Teatime Chocolate Biscuits	9.20	25	5
24	Guaraná Fantástica	4.50	20	0
26	Gumbär Gummibärchen	31.23	15	0
30	Nord-Ost Matjeshering	25.89	10	15
35	Steeleye Stout	18.00	20	15
45	Rogede sild	9.50	5	15
48	Chocolade	12.75	15	25
49	Maxilaku	20.00	10	15
51	Manjimup Dried Apples	53.00	20	10
70	Outback Lager	15.00	15	30

(11 rows affected)

String Comparisons

- When comparing strings, we may look for an exact match or a pattern.
- Consider the table courses from the Classtrak database.
- The table contains a column course_abbrev that contains the course code. We may want an exact match such as all information for the course CNT252 or we may want to match a pattern, such as all information for all courses starting with CNT.
- For exact matching we use the **=** operator
- For pattern matching, we use the **like** operator

Exercise 9

- Write a select query to display the course_id, course abbreviation and course description for the course with abbreviation CNT252, for the course table from the ClassTrak database

The like Logical Operator

- **like** is used for string pattern matching.
  - LIKE evaluates to *true* if the comparison value matches a specified pattern. This operator is used for comparison with strings, and makes use of a set of wildcard characters.

    % - any number of characters (including 0)

    _ - any single character

    [ ] - specify a list of acceptable characters

    [-] - specify a range of characters

    [^ -] - specify a range of unacceptable characters

Exercise 10

- Write a select query to display the course id, course abbreviation and course description for all courses whose abbreviation start with CNT in the course table of the ClassTrak database.

course_id	course_abbrev	course_desc
5	CNT151	c++
6	CNT252	Intermediate 'C'
7	CNT353	Unix & Advanced C
9	CNT353OOP	C++ Programming
10	CNT454	Unix (8wks)
11	CNT462	Internet Programming
15	CNT455	Windows Programming
16	CNT355	SQL
17	CNT453	MFC Programming
18	CNT461	Internet Programming
20	CNT270	Operating Systems
21	CNT257	Windows Programming
22	CNT357	OOD in C#
23	CNT456	ASP.NET
24	CNT457	Windows Advanced

(15 rows affected)

Exercise 11

- Write a select query to display the course id, course abbreviation and course description for all courses whose abbreviation contains the character 4, in the course table of the ClassTrak database

course_id	course_abbrev	course_desc
8	NET495	Client / Server Computing
10	CNT454	Unix (8wks)
11	CNT462	Internet Programming
15	CNT455	Windows Programming
17	CNT453	MFC Programming
18	CNT461	Internet Programming
19	ETC294	ETC294 - PC Repair
23	CNT456	ASP.NET
24	CNT457	Windows Advanced

(9 rows affected)

Exercise 12

- Write a select query to display the course id, course abbreviation and course description for all courses whose description starts with either I or U, in the course table of the ClassTrak database

```
course_id   course_abbrev course_desc
----------- ------------ --------------------------------
6           CNT252       Intermediate 'C'
7           CNT353       Unix & Advanced C
10          CNT454       Unix ( 8wks )
11          CNT462       Internet Programming
12          ETC161/151   Introduction to C/C++
13          ETC161       Introduction to computers
14          ETC151       Introduction to C/C++
18          CNT461       Internet Programming

(8 rows affected)
```

Exercise 13

- Write a select query to display the course id, course abbreviation and course description for all courses whose description starts with any of the letters from U to Z in the course table of the ClassTrak database

```
course_id   course_abbrev course_desc
----------- ------------ ------------------------------
7           CNT353       Unix & Advanced C
10          CNT454       Unix ( 8wks )
15          CNT455       Windows Programming
21          CNT257       Windows Programming
24          CNT457       Windows Advanced
26          CMPE2000     Web Development
27          CMPE2800     Windows Dev
28          CMPE2500     Web Apps

(8 rows affected)
```

Exercise 14

- Write a select query to display the course id, course abbreviation and course description for all courses whose description starts with any letter except I or U, in the course table of the ClassTrak database

course_id	course_abbrev	course_desc
5	CNT151	c++
8	NET495	Client / Server Computing
9	CNT3530OP	C++ Programming
15	CNT455	Windows Programming
16	CNT355	SQL
17	CNT453	MFC Programming
19	ETC294	ETC294 - PC Repair
20	CNT270	Operating Systems
21	CNT257	Windows Programming
22	CNT357	OOD in C#
23	CNT456	ASP.NET
24	CNT457	Windows Advanced
25	CMPE2300	Object Oriented Programming
26	CMPE2000	Web Development
27	CMPE2800	Windows Dev
28	CMPE2500	Web Apps

(16 rows affected)

Exercise 15

- Write a select query to display the course id, course abbreviation and course description for all courses whose description starts with any letter except the letters from S to Z in the course table of the ClassTrak database

```
course_id   course_abbrev course_desc
----------- ------------ --------------------------------
5           CNT151       c++
6           CNT252       Intermediate 'C'
8           NET495       Client / Server Computing
9           CNT3530OP    C++ Programming
11          CNT462       Internet Programming
12          ETC161/151   Introduction to C/C++
13          ETC161       Introduction to computers
14          ETC151       Introduction to C/C++
17          CNT453       MFC Programming
18          CNT461       Internet Programming
19          ETC294       ETC294 - PC Repair
20          CNT270       Operating Systems
22          CNT357       OOD in C#
23          CNT456       ASP.NET
25          CMPE2300     Object Oriented Programming

(15 rows affected)
```

Columns containing null values

- We note that **null** is not a value, so a comparison of = null or !=null doesn't make sense
- To verify this, use the Chinook database and try the following queries:
  - select * from customer
  - select * from customer where Company=null
  - select * from customer where Company !=null
- We note that while the 1st query gives us a number of records where the company is null as well as a number of records where the company is not null, the 2 other queries do not give us any results

Columns containing null values

- To Check for null values we use “is null”.
- To Check for non-null values, we use “is not null”
- Try the following queries
  - select * from Customer where Company is null
  - select * from customer where Company is not null
- To change a NULL to a value, use:
  - coalesce(a,b,c,’something’) – returns the first not null value
  - isNull(a,’something’) – returns the second parameter if the first is null

Exercise 16

- Using the Chinook Database, list all the columns for all customers where the company is not null. Order the information by Last Name of the customer.

CustomerId	FirstName	LastName	Company
12	Roberto	Almeida	Riotur
1	Luís	Gonçalves	Embraer - Empresa Brasileira de Aeronáutica S.A.
19	Tim	Goyer	Apple Inc.
16	Frank	Harris	Google Inc.
10	Eduardo	Martins	Woodstock Discos
15	Jennifer	Peterson	Rogers Canada
14	Mark	Philips	Telus
11	Alexandre	Rocha	Banco do Brasil S.A.
17	Jack	Smith	Microsoft Corporation
5	František	Wichterlová	JetBrains s.r.o.

(10 rows affected)

Exercise 17

- Using the Chinook Database, list all the columns for all customers whose last name start with the letters A-H and the company is null. Order the information by Last Name of the customer in reverse order.

CustomerId	FirstName	LastName	Company
53	Phil	Hughes	NULL
6	Helena	Holý	NULL
4	Bjørn	Hansen	NULL
44	Terhi	Hämäläinen	NULL
56	Diego	Gutiérrez	NULL
7	Astrid	Gruber	NULL
27	Patrick	Gray	NULL
23	John	Gordon	NULL
42	Wyatt	Girard	NULL
30	Edward	Francis	NULL
34	João	Fernandes	NULL
41	Marc	Dubois	NULL
26	Richard	Cunningham	NULL
21	Kathy	Chase	NULL
29	Robert	Brown	NULL
18	Michelle	Brooks	NULL
39	Camille	Bernard	NULL
28	Julia	Barnett	NULL

(18 rows affected)

Using Date Functions

- There is a number of built-in functions that work on the DateTime type

  - day (*date*)
    - Returns an integer representing the day of the specified date
  - month (*date*)
    - Returns an integer representing the month of the specified date
  - year (*date*)
    - Returns an integer representing the year of the specified date

Exercise 18

- In this exercise you'll use the database PublishersDatabase.
- Write a query to display the title id, title, type of publication and publication date of all titles published in June 1991

title_id	title	type	pubdate
BU1032	The Busy Executive's Database Guide	business	1991-06-12 00:00:00.000
BU1111	Cooking with Computers: Surreptitious Balance Sheets	business	1991-06-09 00:00:00.000
BU2075	You Can Combat Computer Stress!	business	1991-06-30 00:00:00.000
BU7832	Straight Talk About Computers	business	1991-06-22 00:00:00.000
MC2222	Silicon Valley Gastronomic Treats	mod_cook	1991-06-09 00:00:00.000
MC3021	The Gourmet Microwave	mod_cook	1991-06-18 00:00:00.000
PC1035	But Is It User Friendly?	popular_comp	1991-06-30 00:00:00.000
PS2091	Is Anger the Enemy?	psychology	1991-06-15 00:00:00.000
PS3333	Prolonged Data Deprivation: Four Case Studies	psychology	1991-06-12 00:00:00.000
PS7777	Emotional Security: A New Algorithm	psychology	1991-06-12 00:00:00.000
TC4203	Fifty Years in Buckingham Palace Kitchens	trad_cook	1991-06-12 00:00:00.000
TC7777	Sushi, Anyone?	trad_cook	1991-06-12 00:00:00.000

(12 rows affected)