

# Designing and Creating Databases

Terry Marris October 2009

## 9 Database Queries

A query involves searching through a database looking for answers to questions. The queries can be saved for re-use time and again.

We see how to:

1. define and execute:
  - a. single condition search on a logical field
  - b. multiple condition search on a date field
  - c. single condition search on number and text fields
  - d. multiple condition search on two or more fields of different data types
  - e. search for specified characters in a text field
2. use wild card operators for specific data e.g. Like \*t\* to find t in a given text
3. use logical operators in a search
4. use relational operators in a search

### Scenario

The secretary, Doug Hole, of the local allotment society, GrowAllot, is getting on a bit (but don't tell him that!). Every year, in September, the plotholders are invited to place their orders for seeds, onions, garlic and potatoes. The orders are sent off in two batches to the seed suppliers, one month apart. When the seeds, potatoes etc arrive, the secretary sorts them into bags for each plotholder to collect. You have volunteered to keep a record of the money received from the various plotholders. You begin by sketching out a few example records, then move on to a more formal design.

ID	Plotholder	Plot	DatePlaced	OrderStatus	ToPay	Paid
1	Rose Bush	99A	22-Sep-09	in progress	£25.00	Yes
2	Doug Hole	56	22-Sep-09	cancelled	£13.50	No
3	Daisy Picking	37B	20-Sep-09	in progress	£56.30	Yes
4	Ivy Plant	38C	19-Sep-09	received	£13.75	Yes
5	June May	24	18-Sep-09	received	£27.75	Yes

<b>Table:</b> tblSeedOrders				
<b>Fields</b>				
<b>Name</b>	<b>Type</b>	<b>Properties</b>	<b>Example</b>	<b>Comment</b>
ID	AutoNumber		2	key field
Plotholder	Text	Field Size = 50	Rose Bush	first name, last name
Plot	Text	Field Size = 4	100D	one, two or three digits - highest number 120 - followed by zero or one letter from A, B, C or D
DatePlaced	Date	Format = Medium Date	22-Sep-09	cannot be before today.
Status	Text	Field Size = 10	placed	pending, placed, received, or cancelled.
ToPay	Number	Format = Currency	£25.00	GBP
Paid	Yes/No		Yes	Logical

Notes: Pending means order received from the plotholder, but not yet placed with the seed suppliers. Placed means order received from the plotholder and placed with the suppliers. Received means the order has been received from the suppliers. Cancelled means order has been cancelled by the plotholder.

Professional database designers would separate Plotholder into two separate fields: FirstName, LastName, and separate Plot into two fields: Number, Letter, to make searches easier and to help with validation. The general rule is: break down fields into their smallest components.

You can either create the database yourself from scratch (the more you practice the better you get) or download SeedOrders from [www.tmarris.com](http://www.tmarris.com).

Notice the process of stepwise refinement. You start with an initial design. Then you review it and improve it. You repeat the review-and-improve process on each new version of your design for as many times as it takes to get it right. It is much easier to improve on something you already have than it is to get something completely right first time.

The Datasheet view of the database is shown below.

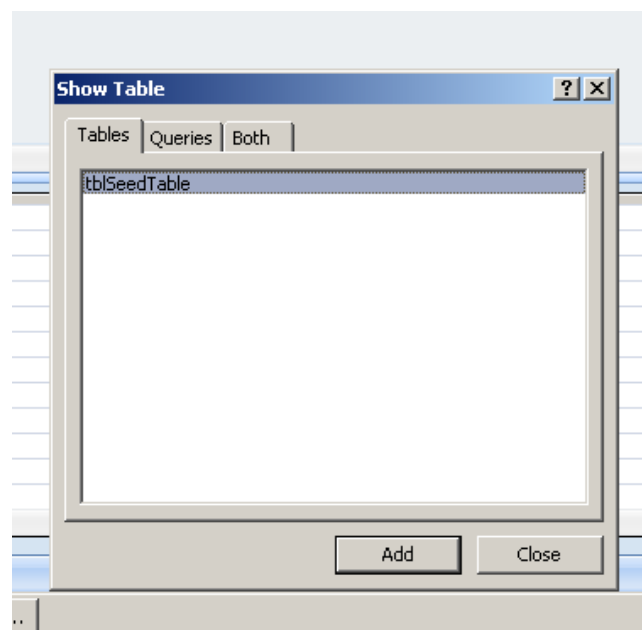
ID	FirstName	LastName	PlotNumber	PlotLetter	DateOfOrder	Status	ToPay	Paid	Add
1	Pearl	Button	100	A	24-Sep-09	pending	£25.00	<input checked="" type="checkbox"/>	
2	Jo	King	95	B	25-Sep-09	placed	£35.00	<input type="checkbox"/>	
3	Barry	Cade	63	C	26-Sep-09	received	£27.00	<input checked="" type="checkbox"/>	
4	Carrie	Oakey	47	D	27-Sep-09	cancelled	£50.00	<input type="checkbox"/>	
5	Priti	Manek	38		28-Sep-09	pending	£17.50	<input checked="" type="checkbox"/>	
6	Tim	Burr	24		29-Sep-09	placed	£19.25	<input type="checkbox"/>	
7	Justin	Case	36		30-Sep-09	received	£15.00	<input type="checkbox"/>	
8	Barb	Dwyer	73	D	01-Oct-09	cancelled	£50.00	<input checked="" type="checkbox"/>	
9	Stan	Still	25	C	01-Oct-09	pending	£12.50	<input type="checkbox"/>	
10	Terry	Bull	3	B	01-Oct-09	placed	£8.00	<input type="checkbox"/>	
*	(New)							<input type="checkbox"/>	

Note: the table could have been better named - but this was not noticed until after all the images were produced. Pooh.

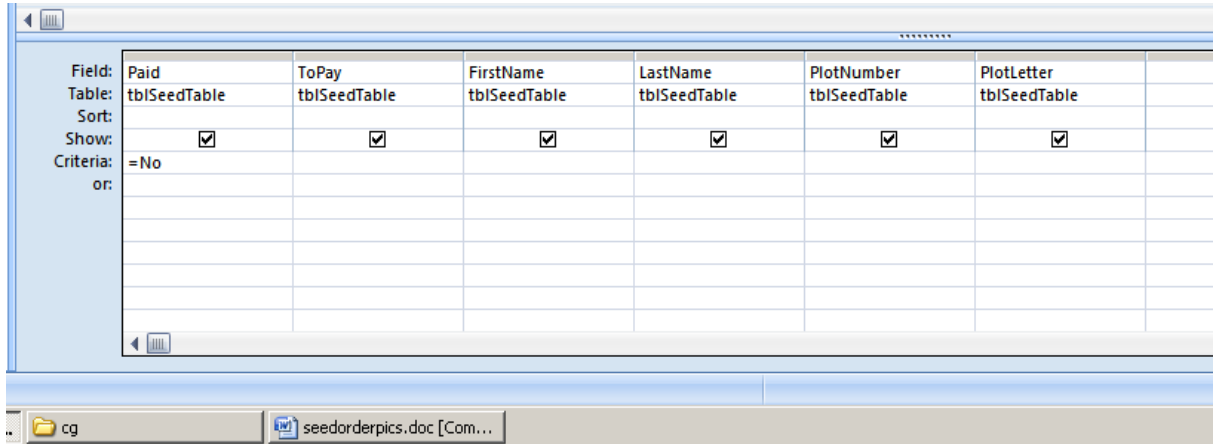
## 9.1 Search on a Logical Field

Who has not paid?

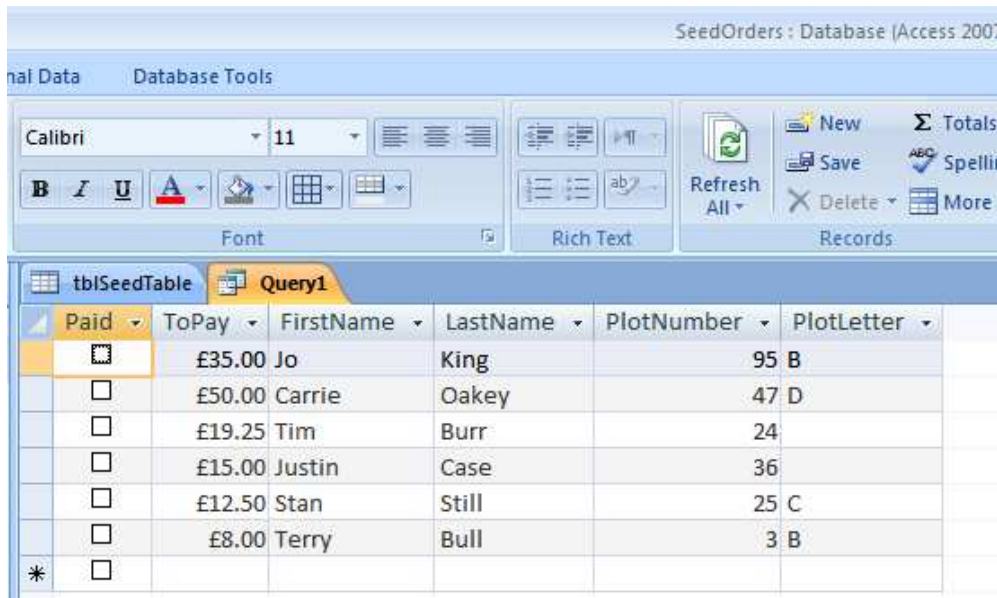
1. Choose Create, Query Design
2. Select the table tblSeedTable. Choose Add then Close



- Click in the next blank field, click the field down arrow, select the field from the drop down list. Repeat for each field you want to show in your query. Here, I have chosen Paid because we want to know who has not paid, FirstName, LastName, PlotNumber and PlotLetter because we want to know who has not paid. In the search Criteria for Paid we write =No to select those who have not paid. (Remember that Paid is a Yes/No field.)



- Run the query by clicking on Run! (top left of Ribbon)
- Check the result. If it is correct save the query: right click on the Query1 tab, choose Save, supply the query name, qryNotPaid, OK.



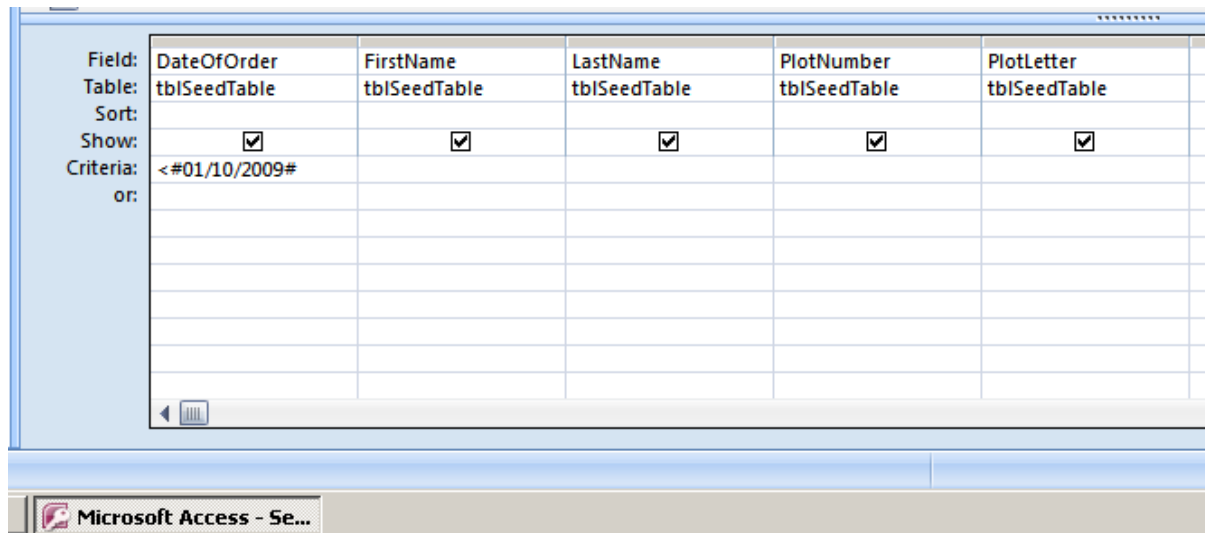
After saving a query, you can run it again, at any time, by rapid double clicking on its name in the Navigation pane.

## 9.2 Search on a Date Field

Who has placed their order before 1 October 2009?

The Criteria in the DateOfOrder field is <#01/10/2009#

Notice that the actual date, 1/10/09, is enclosed within # marks.



SeedOrders : Database (Access 2007)

Database Tools

Font: Calibri, 11

Rich Text: Bold, Italic, Underline, Text Color, Background Color, Bullets, Numbering, Indent, Decrease Indent, Increase Indent, Paragraph Style, Paragraph Spacing, Paragraph Orientation, Paragraph Direction, Paragraph Style, Paragraph Spacing, Paragraph Orientation, Paragraph Direction

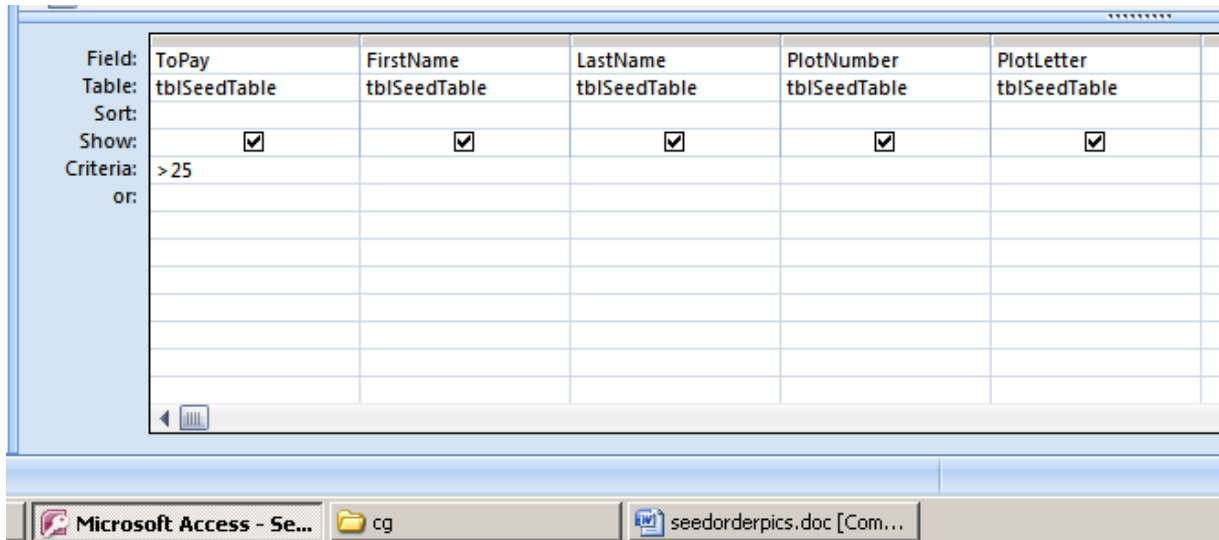
Records: Refresh All, New, Save, Delete, More

DateOfOrder	FirstName	LastName	PlotNumber	PlotLetter
24-Sep-09	Earl	Button	100	A
25-Sep-09	Jo	King	95	B
26-Sep-09	Barry	Cade	63	C
27-Sep-09	Carrie	Oakey	47	D
28-Sep-09	Priti	Manek	38	
29-Sep-09	Tim	Burr	24	
30-Sep-09	Justin	Case	36	
*				

Those who have placed their orders before 1 October 2009.

### 9.3 Search on Number and Text Fields

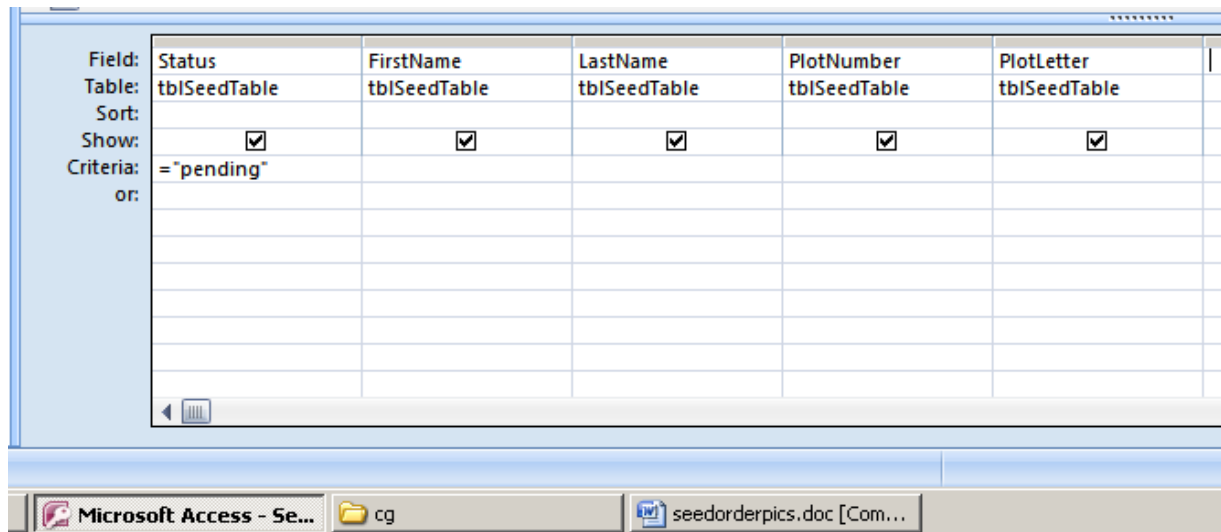
Whose bill is for more than £25? The Criteria in the ToPay field is >25. Note no £ symbol.



ToPay	FirstName	LastName	PlotNumber	PlotLetter
£35.00	Jo	King	95	B
£27.00	Barry	Cade	63	C
£50.00	Carrie	Oakey	47	D
£50.00	Barb	Dwyer	73	D
*				

Pllotholders who have to pay more than £25.00.

Whose order is pending? The Criteria for the Status Text field is ="pending".



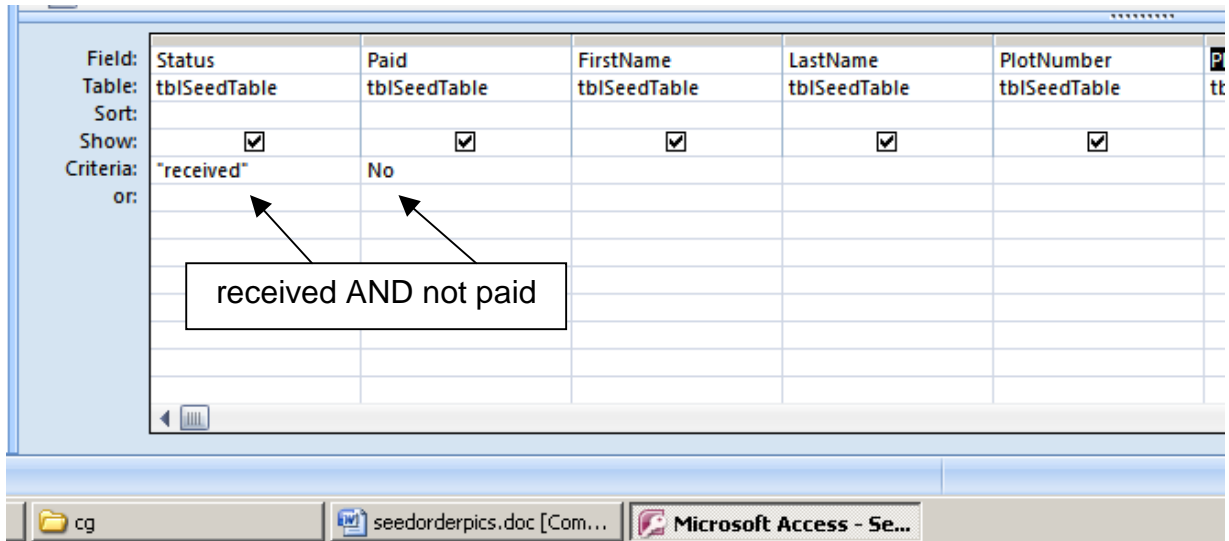
Status	FirstName	LastName	PlotNumber	PlotLetter
pending	Pearl	Button	100	A
pending	Priti	Manek	38	
pending	Stan	Still	25	C
*				

Plotters whose seed orders are pending - waiting for processing by the secretary.

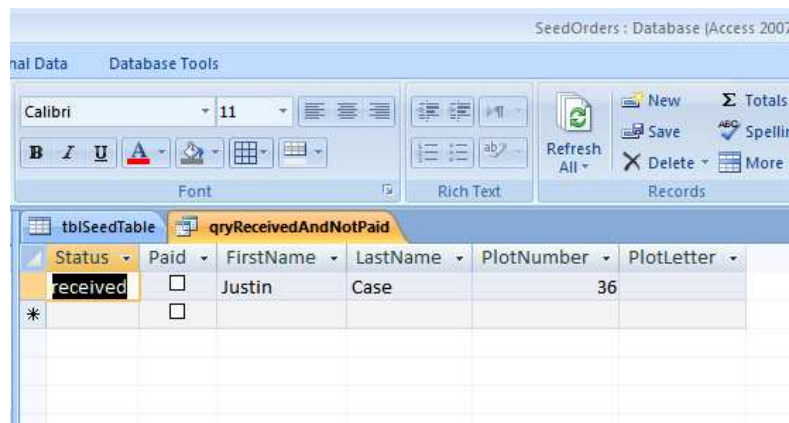
## 9.4 Search on Multiple Fields and Types

Whose seed orders have been received AND the plotholder has not yet paid?

The criteria in the Status field is ="received" and in the Paid field =No. Notice the = symbol has been missed out - this is allowed but it is better style to include it. Notice also no quotes around No - it is not text, but rather a Yes/No value.



The AND criteria go on the same line.

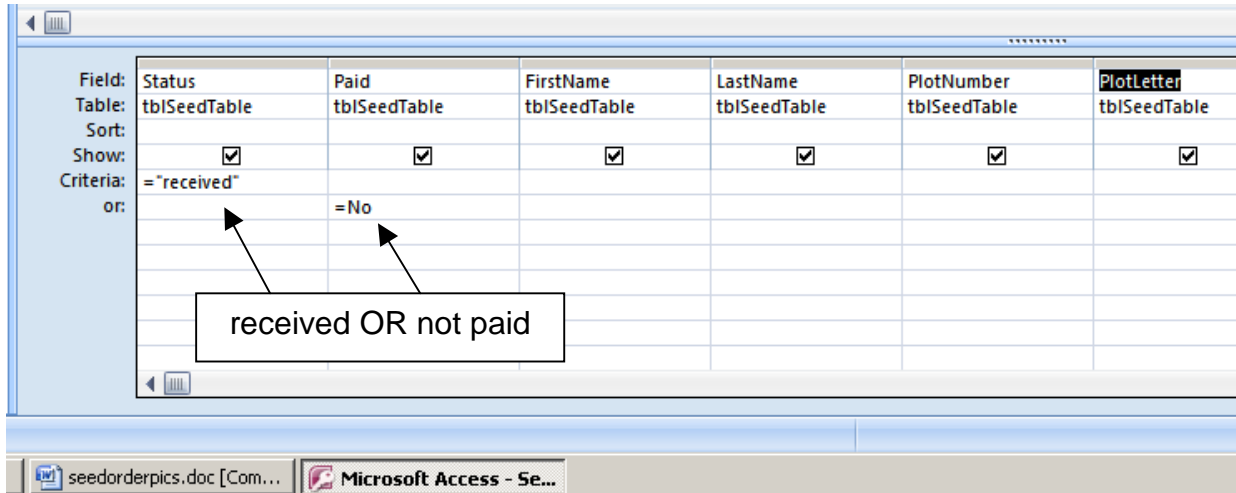


Plotholders whose orders have been received, and-at-the-same-time, have not paid.



Whose seed orders have been received OR the plotholder has not yet paid?

The criteria in the Status field is ="received". The criteria in the Paid field, on the or: line, is =No.



The OR criteria go on different lines.

Status	Paid	FirstName	LastName	PlotNumber	PlotLetter
placed	<input type="checkbox"/>	Jo	King	95	B
received	<input checked="" type="checkbox"/>	Barry	Cade	63	C
cancelled	<input type="checkbox"/>	Carrie	Oakey	47	D
placed	<input type="checkbox"/>	Tim	Burr	24	
received	<input type="checkbox"/>	Justin	Case	36	
pending	<input type="checkbox"/>	Stan	Still	25	C
placed	<input type="checkbox"/>	Terry	Bull	3	B
*	<input type="checkbox"/>				

Either plotholders whose order has been received OR plotholders who have not paid, OR both received and not paid.

## 9.5 Search for Given Characters in a Text Field

The Like operator is used to find specific characters in a given field. Using the plothead's FirstName as the given field:

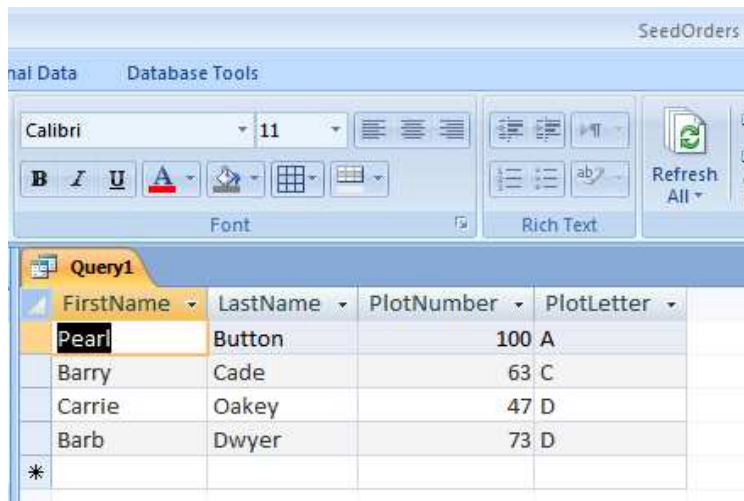
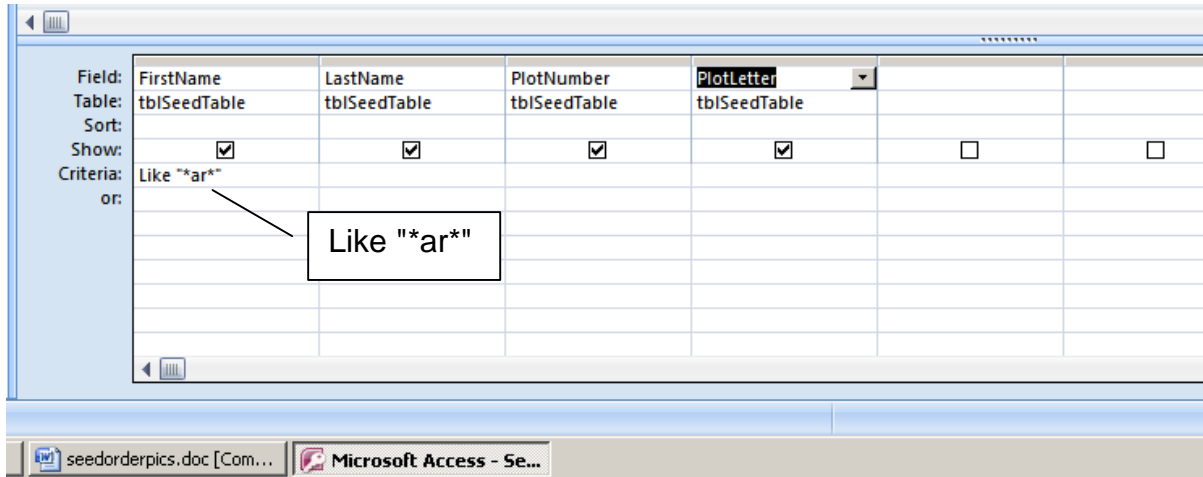
Like "Tim"	matches all records with FirstName = Tim.
Not "Tim"	returns all records with FirstName not = "Tim".
Like "P*"	returns all records with FirstName beginning with P e.g. Pearl, Priti.
Not Like "P*"	returns all records with FirstName not beginning with P.
Like "*arr*"	returns all records with FirstName containing arr e.g. Barry, Carrie
Not Like "*arr*"	returns all records with FirstName not containing arr e.g. Pearl, Jo
Like "*rry"	returns all records with FirstName ending in rry e.g. Barry, Terry
Like "Ba*"	returns all records with FirstName beginning with Ba e.g. Barry, Barb
is Null	returns records with no values in the field
""	(a pair of quotation marks) returns records with the field set to blank
Like "[PT]*"	returns all records with FirstName beginning with P or T e.g. Pearl, Priti, Tim, Terry

## 9.6 Search Using Wildcard Operators

The wildcard operators include:

operator	description	example
?	a single character	p?t matches pat, pet, pit, pot, put, ...
*	zero, one or many characters	p*t matches pat, plot, plant, prettiest, ...

A plothead has presented a hand written order for seeds. The writing is illegible. The plothead's first name could contain ar. Who could the plothead be?



First names containing ar,

### 9.7 Logical Operators

The logical operators include:

operator	description	example
AND	both A AND B must be true	who has cancelled their order AND has paid?
OR	either A OR B is true	either order pending OR order placed OR both order pending and order placed
NOT	if A is true, then NOT A is false, if A is false then NOT A is true	If Paid = true, then NOT Paid = false. If Paid = false, then NOT Paid = true

## 9.8 Relational Operators

The relational operators include:

<b>operator</b>	<b>description</b>	<b>example</b>
<	less than	2 < 3
>	more than	3 > 2
<=	less than or equal to	2 <= 3 3 <= 3
>=	more than or equal to	3 >= 2 3 >= 3
=	equal	2 = 2
<>	not equal	2 <> 3

Notice that:

- less than symbol has its point on the left
- more than symbol has its point on the right
- the equal sign always follows the < or the > as in <= and >=

### Exercise 9.1

1. Describe the use of a filter. You could say something like: Filtering involves selecting just those records you are interested in. A filter is a kind of query e.g. Paid = No to display all the records of plottolders who have not paid.
2. Describe the purpose and use of wildcards to search
3. Describe the use of the logical operators in a search:
  - a. AND
  - b. OR
  - c. NOT

4. Describe the use of the relational operators in a search:

- a. equals =
- b. less than <
- c. greater than >
- d. less than or equal to <=
- e. greater than or equal to >=
- f. not equal to <>

5. Scenario. You have landed the job of database developer for the Tourist Board of the Isles of Smiles. Your first project is to create an accommodation database. You construct a table of example data, which is shown below.

Accommodation in the Isles of Smiles

Type	Area	Room	Children	En Suit	Min Price £	Max Price £	Contact
Bed & Breakfast	Brambles	Single	No	Yes	150.00	200.00	Penny Bunn
Camping	St Agatha		Yes	No	5.00	10.00	Dawn Hobbs
Guest House	St Matthews	Double	Yes	Yes	75.00	150.00	Daisy Rootes
Hotel	St Marthas	Triple	Yes	No	225.00	500.00	Mary Lee
Inn	Trebor	Family	Yes	Yes	225.00	500.00	Bill Me
Self Catering	Brambles	Double	No	No	35.00	70.00	Sue Me
Bed & Breakfast	St Agatha	Triple	Yes	Yes	60.00	120.00	Rob Me
Camping	St Matthews		Yes		7.00	15.00	Esther Munday
Guest House	Trebor	Family	Yes	Yes	150.00	300.00	Albert Hall
Hotel	Brambles	Family	Yes	Yes	175.00	350.00	Jim Hall
Inn	St Agatha	Double	No	Yes	150.00	300.00	Simon Swindells
Self Catering	St Matthews	Double	No	No	40.00	80.00	Jenny Furr
Bed & Breakfast	Trebor	Family	Yes	Yes	75.00	150.00	Andy Mann
Camping	Brambles		Yes	No	7.50	15.00	Carol Singer
Guest House	St Agatha	Family	Yes	Yes	80.00	160.00	Dawn Chorus
Hotel	St Matthews	Family	Yes	Yes	200.00	400.00	Emma Rhoids
Inn	Trebor	Family	Yes	Yes	175.00	350.00	Imran Quik
Self Catering	Brambles	Double	Yes	No	50.00	125.00	Mary Me

Prices per week per room.

- a. Construct the Accommodation database.
- b. Populate (i.e. put data in) your database with the data shown in the table above.
- c. Create and check the results of each of the following queries:
  - i. accommodation in St Matthews
  - ii. Self Catering AND Double accommodation

- iii. Hotel OR Inn
- iv. max price between £200.00 and £250.00 inclusive
- v. contacts with Me in their name
- vi. any two queries of your choice.

**We have seen** how to design, create and use queries.

**Next, we** see how to design, create and use reports.

## **Bibliography**

GROVER C, MACDONALD M & VANDER VEER E *Office 2007 The Missing Manual*  
O'Reilly 2007

*<http://www.simplyscilly.co.uk/site/stay-on-scilly> accessed October 2009*