

User's Manual

Bullet Query Wizard

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1 Setup of Bullet Query Wizard

The Bullet Query Wizard comes as an Access 97 file called "Bullet Query Wizard.mdb". A few sample tables are included in this .mdb file to illustrate the operation of the query Wizard. The following sections outline how to setup the Bullet Query Wizard for use with another database.

1.1 *Objects needed for Operation*

The following objects will need to be added to the database for proper operation of the Bullet Query Wizard. Some of the objects are protected and others may be changed to allow the developer to adapt the Bullet Query Wizard to operate with the target database. The objects must be imported into the target database through the Access Import function.

The code library BulletLibrary.mde contains the code necessary for the proper operation of the Bullet Query Wizard. As such, this library must be

1.1.1 Tables

Query tables needed for the configuration of the Bullet Query Wizard are marked with an '@' starting the table name. Tables required for storing query information begin with 'Query'.

- @Query Available Tables
- @Query Description Template
- @Query Field List
- @Query Order
- @Query Parameters
- @Query Registration
- @Query Results
- Query
- Query Criteria
- Query Fields
- Query Sorting
- Query Tables

1.1.2 Forms

- @Query Available Tables
- @Query Parameters
- @Query Table Setup
- @Query Results
- _Query About
- _Query Criteria
- _Query Default

- _Query Field Display
- _Query Fields
- _Query Main
- _Query Order
- _Query Registration
- _Query Sorting
- _Query SQL Form
- _Query Status
- _Query Tables

1.2 Specifying Tables on Which to Allow Querying

The Bullet Query Wizard allows the developer to restrict the tables that the end user may query. The tables that the end-user may query can be specified through the @Query Available Tables form. The form is shown below.

Available tables:		Selected tables:	
@All Tables	>> <<	Name	Locked
@Compaction Estimation		Compression	No
@Compaction Estimation Optim		Diffusion	No
@Compaction History		Grainsize	No
@Compression Test		Permeability	No
@Correlations		Shear Strength	No
@Countries		Soils	Yes
@Duplicates Tables		Specific Heat	No
@Equations		SWCC Drying	No
@Equations SWCC		SWCC Wetting	No

Table Name: _____ Locked: ☐

Select the tables you would like the user to be able to query

The available tables list box provides the developer with a list of tables present in the current database. Selecting a table or range of tables and pressing the >> button will copy the tables to the selected list box. All tables present in the selected list box will be available to the end-user for querying.

The developer may also select to lock certain tables. Locking tables will cause the table to always be selected in every query regardless of the tables selected by the end-user. This feature is useful if the results of the querying will always be displayed in a certain form.

The developer should not allow the end-user access to the @Query Available Tables form or the end-user will be able to select which tables to query.

1.3 Including Fields in Querying

SQL allows options when selecting which fields to return for a query. The user may select all the fields in the selected tables. This designation is represented by SELECT * in SQL format. The user may also select just certain fields to view. When certain fields are selected, they will be listed in the SQL statement. Selecting fewer fields to return with the results of the query will allow the query to run faster.

The Bullet Query Wizard allows the developer to specify whether or not the end-user will be allowed to select individual fields for a query. The developer may select the fields option by starting the @Query Parameters form and selecting the fields option. The @Query Parameters form is shown below.



Allowing field selection will give the end-user access to the field selection form in the query Wizard. Disallowing field selection will cause by default all fields in the queries selected tables to be returned (SELECT *).

The end-user should not be allowed access to the @Query Parameters form.

1.4 Setting up the Table Description Tables

The Bullet Query Wizard allows the end-user to view the descriptions and field types of the fields involved in a query. The descriptions of all the fields in the tables the end-user is allowed to query are stored in the @Query Field List table.

The developer will need to run the algorithm provided with the Bullet Query Wizard to build these description tables **after the query tables have been selected (see section 1.2)**. The Bullet Query Wizard provides a function that automatically builds the description tables. The developer may initiate the function by starting the @Query Table Setup form and pressing the **Create!** Button. The form is shown below.



1.5 Calling the Bullet Query Wizard From Code

The Bullet Query Wizard may be called from Visual Basic code by placing the function call shown below.

```
Query_Click()
```

1.6 Placement of Query Results

The results of the Bullet Query Wizard may be placed into a query object or a form object in Microsoft Access. The type and name of the destination object may be selected in the '@Query Results' form. An SQL statement to select all records in the object must also be selected.

1.7 Including the Bullet Query Wizard in a Distributable Database

The Bullet Query Wizard is designed to facilitate distribution with a database product. The user needs only to copy the tables and forms necessary for the operation of the Query Wizard to a new database and link in the library database containing the code necessary for the operation of the software. The instructions for linking in the code database (Bullet Routines.mde) are as follows:

Follow these steps in the new database:

1. Create a new module in the database.
2. Select Tools – References to display the References dialog.
3. Click the Browse button on the References dialog.
4. Select "mde files" from the list of file types on the Add Reference dialog that appears.
5. Locate the "Bullet Routines.mde" file and click OK. You should now see "Bullet Routines" in the Available References list box on the References dialog.
6. Click OK to close the References dialog.

The Bullet Query Wizard should now perform normally in your new database.

2 Query Operation

The real power of a database is its ability to let you see the data you want to see, and in the order you want to see it (Microsoft, 1992). Microsoft Access provides a query interface to allow you to construct queries. The limitation of this query interface is that it cannot be included with a distribution database. Some form of query interface must therefore be constructed by developer to allow the end-user to select data they want. Often this can be a complex task. The purpose of the Bullet Query Wizard is to allow developers to add full worrying capabilities without having to spend an enormous amount of development Time.

Structured query language is by far the most popular non-procedural data access language today on computers of all sizes (Litwin, 1997). SQL performs the basis for the way in which Microsoft Access retrieves data from a database.

Unfortunately, SQL can be difficult to learn and slow to type in commands. The Bullet Query Wizard provides a complete system to develop and organize queries based on a set of Access tables. Its friendly user interface allows people unfamiliar with the operation of queries or SQL to retrieve data from a database. Both the development of new queries and the organization of existing queries is made easy.

Bullet Query Wizard supports the building of SELECT queries in Microsoft Access. The developer has control over which tables the user may query. The developer also has control over whether the user may select individual fields for display. The method by which the end user views the query results may be specified by the developer and results may be viewed in forms or query tables. The user may select the order in which the records are displayed as well as the criteria used to select the records. The criteria form allows detailed control over complex selection criteria.

2.1 A Short History of SQL

The following brief history is taken from the Access 97 developers handbook (Litwin, 1997).

Like many database standards, including the relational model itself and query by example, SQL was invented at an IBM research laboratory in the early 1970s. SQL was first described in a research paper presented at an Association for Computing Machinery (ACM) meeting in 1974. Created to implement E.F. Codd's relational model (originally described in an ACM paper in 1970), it began life as SEQUEL (for Structured English Query Language), briefly becoming SEQUEL/2 and then simply SQL.

Today there are hundreds of databases on platforms ranging from billion dollar supercomputers down to thousand-dollar personal computers supporting SQL. This makes it the de facto data access language standard, but at the same time it's also an official standard. There are three American National Standards Institute (ANSI) SQL standards: SQL-86 (the most commonly implemented SQL today), SQL-89 (a minor revision), and the recently published SQL-92 (a major revision),

When most people speak of SQL, they are talking about the SQL-86 or SQL-89 standard, often extended by vendors to make it a more complete language. In the past few years vendors have begun to implement parts of

the much more comprehensive SQL-92 standard. It will take years for many vendors (including Microsoft) to fully implement SQL-92.

2.2 Main Query Form

The main query form shows an itemized list of the queries available for selection of data in the current database. Queries can be added or deleted based on the user's preference.

Properties of a particular query may be viewed by clicking on a particular query and selecting the appropriate property by clicking one of the buttons on the bottom of the form.

All query forms are synchronized to the query selected in the main query form. If a different query is selected in the main form all related forms will be appropriately updated.

A query may be applied to the current database by pressing the view query button at the bottom of the main query form. This action will cause the selection of all data which meets the criteria of the currently selected query.

A user may desire to view all data currently available. This can be accomplished by clicking on the view all button at the bottom of the main query form.

Query Name	Creation Date	# of Records
Soils with family	16-Sep-97	820
Soils with grainsize curves	16-Sep-97	6105
Soils with SWCC grainsize and k curves	16-Sep-97	426
SWCC and grainsize	16-Sep-97	832
Wetting and Drying SWCC	16-Sep-97	50
Best SWCCs	16-Sep-97	282
Indian Head Tills	16-Sep-97	28
Soils with permeability curves	16-Sep-97	234
Glacial Tills	16-Sep-97	2
Regina Clay	16-Sep-97	39

The query details form, which is included in the main query form, is used for characterization fields for the current query. Once the user has created a significant number of queries, it is useful to categorize queries based on the detail fields. An example of this may be selecting all queries based on a certain user or a certain key word. The detail fields allow such selection.

Only the query name is required as a minimum for a new query.

2.3 Query Tables

The tables included in the current query is the first step in building a query. The tables selected in the current query must be indicated before any fields can be specified in the criteria or sort order sections of the query.

Relationships between selected tables is determined automatically based on specifications created in the database.

The current version of the Bullet Query Wizard only allows the creation of INNER JOINS on the selected tables.

The tables form corresponds to the FROM clause in SQL syntax. The details of the corresponding SQL statement can be seen at the bottom of the form.

There is a relationship between the tables selected and the fields available in the query criteria section. A table corresponding to each field specified in the criteria section must be present. The query engine will automatically enforce this relationship. **If a table is removed from a query, all criteria containing fields from the deleted table will also be deleted.**

Query Tables

Available tables:

- Compression
- Unfrozen
- Specific Heat
- Thermal
- Shear Strength
- Permeability
- Diffusion
- Soils

Selected tables:

- Permeability
- Soils
- SWCC Drying

SQL:

```
FROM ((Soils) INNER JOIN [SWCC Drying] ON [Soils].[Soil_Counter] = [SWCC Drying].[SWCC Soil_Counter]) INNER JOIN [Permeability] ON [Soils].[Soil_Counter] = [Permeability].[Permeability Soil_Counter]
```

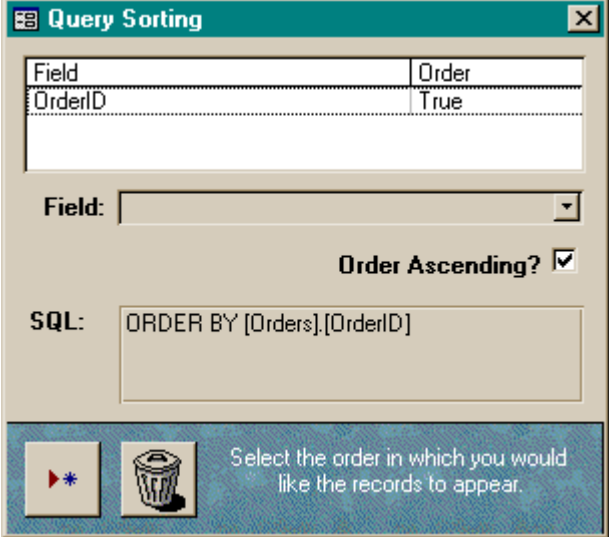
[View Field Descriptions](#)

Select the tables you would like included in the current query.

2.4 Query Sorting

The sorting order form controls if the records in the current query are sorted in an ascending or descending manner.

Each query may only be sorted based on tables included in the current query. The tables included in the current query may be viewed in the query tables form. New sort orders may be added or deleted by pressing the buttons at the bottom of the form.





The 'Query Sorting' dialog box features a title bar with a close button. It contains a table with two columns: 'Field' and 'Order'. The first row shows 'OrderID' under 'Field' and 'True' under 'Order'. Below the table is a 'Field:' label followed by a dropdown menu. To the right of the dropdown is the label 'Order Ascending?' with a checked checkbox. Below these is an 'SQL:' label followed by a text box containing 'ORDER BY [Orders].[OrderID]'. At the bottom, there are two buttons: one with a red triangle and an asterisk, and another with a trash can icon. To the right of these buttons is the text 'Select the order in which you would like the records to appear.'

Field	Order
OrderID	True

Field:

Order Ascending? ☒

SQL: ORDER BY [Orders].[OrderID]

  Select the order in which you would like the records to appear.

2.5 Query Criteria

The criteria form is the heart of query creation. It allows a subset of information to be selected from the overall dataset. The logic controlling this selection process is specified in the criteria form. The criteria form is shown below:

Field Name	Operator	Value One	Value Two	Bridge	Layer
# Permeability Poin	Greater Than	0		and	1
SWCC Drying Pres	Equal	True		and	1
Soil_Counter	Greater Than	11191		and	1
ksat	Greater Than	0		and	1
Campbell p	Not Equal	Null		and	1

Field Name: [] Operator: [] Value One: [] Bridge: [and] Layer: [1]

SQL: WHERE [Permeability].[# Permeability Points] > 0 and [Soils].[SWCC Drying Present] = True and [Soils].[Soil_Counter] > 11191 and [Permeability].[ksat] > 0 and [Permeability].[Campbell p] <> Null

Select the criteria to use to select a subset of the entire dataset

The criteria specifications included in the Bullet Query Wizard is designed to evaluate all the features of the Microsoft Access query creative interface. Great flexibility has been included to simulate the Microsoft system.

The criteria (s) can be created by selecting options from the criteria editing fields.

The fields available for criteria selection are controlled by the tables selected to be present in the current query. Once a field is selected, an operator must be specified. The field after the operation field may be specified to be either another field in the database, a formula, or a value. Care must be taken to make sure the datatypes of the value specified must match the datatypes of the selected field.

The bridge field specifies the operator to be used between individual criteria. The order that criteria are incorporated into the SQL statement can be controlled by the up and down buttons at the side of the criteria list box.

The layer field allows the nesting of certain criteria one within another. Criteria are nested from lowest to highest layer. A maximum of 5 layers is permitted.

3 Distribution

The registered version of the Bullet Query Wizard may be distributed with the runtime version of Microsoft Access 97. The distribution of the software with developer software is covered by the license agreement shown below.

3.1 License

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3.2 Objects Needed for Distribution

The following objects present in the registered version of the software must be included in the distribution database for proper operation of the Bullet Query Wizard.

3.2.1.1 Tables

Query tables needed for the configuration of the Bullet Query Wizard are marked with an '@' starting the table name. Tables required for storing query information begin with 'Query'.

- @Query Available Tables
- @Query Description Template
- @Query Field List
- @Query Order
- @Query Parameters
- Query
- Query Criteria
- Query Fields
- Query Sorting
- Query Tables

3.2.1.2 Forms

- _Query About
- _Query Criteria
- _Query Default
- _Query Field Display
- _Query Fields
- _Query Main
- _Query Order
- _Query Sorting
- _Query SQL Form
- _Query Status
- _Query Tables

3.2.1.3 Modules

- Query Module
- Query SQL Code
- Query Unprotected

3.3 Objects Available To End User

It is suggested that the developer only allow access to the Bullet Query Wizard through code. Allowing the end-user access to all forms will not necessarily cause damage to query data but will be confusing for the end-user and cause errors to appear.

3.4 Consulting Services

Let us know if the Bullet Query Wizard is not sufficient for your application. Consideration will be given to producing customized versions of the Bullet Query Wizard for certain cases. For any questions regarding customized database applications, please email Murray Fredlund at info@soilvision.com.

4 References

Litwin, Paul, Ken Getz, and Mike Gilbert, 1997, Access 97 Developers Handbook
- Third Edition, Sybex, San Francisco

Microsoft, 1992, Microsoft Access User's Guide, Microsoft Press