

ALTER TABLE Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlAlterC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"daSQLAlterS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasqlAlterX":1}

Modifies the design of a table after it has been created with the [CREATE TABLE](#) statement.

Note The [Microsoft Jet database engine](#) doesn't support the use of ALTER TABLE, or any of the [data definition language \(DDL\)](#) statements, with non-Microsoft Jet databases. Use the [DAO Create](#) methods instead.

Syntax

```
ALTER TABLE table {ADD {COLUMN field type[(size)] [NOT NULL] [CONSTRAINT index] |  
    CONSTRAINT multifieldindex} |  
    DROP {COLUMN field | CONSTRAINT indexname} }
```

The ALTER TABLE statement has these parts:

| Part | Description |
|------------------------|--|
| <i>table</i> | The name of the table to be altered. |
| <i>field</i> | The name of the field to be added to or deleted from <i>table</i> . |
| <i>type</i> | The data type of <i>field</i> . |
| <i>size</i> | The field size in characters (Text and Binary fields only). |
| <i>index</i> | The index for <i>field</i> . See the CONSTRAINT clause topic for more information on how to construct this index. |
| <i>multifieldindex</i> | The definition of a multiple-field index to be added to <i>table</i> . See the CONSTRAINT clause topic for more information on how to construct this clause. |
| <i>indexname</i> | The name of the multiple-field index to be removed. |

Remarks

Using the ALTER TABLE statement, you can alter an existing table in several ways. You can:

- Use ADD COLUMN to add a new field to the table. You specify the field name, data type, and (for Text and Binary fields) an optional size. For example, the following statement adds a 25-character Text field called Notes to the Employees table:

```
ALTER TABLE Employees ADD COLUMN Notes TEXT(25)
```

You can also define an index on that field. For more information on single-field indexes, see the [CONSTRAINT](#) clause topic.

If you specify NOT NULL for a field, then new records are required to have valid data in that field.

- Use ADD CONSTRAINT to add a multiple-field index. For more information on multiple-field indexes, see the [CONSTRAINT](#) clause topic.
- Use DROP COLUMN to delete a field. You specify only the name of the field.
- Use DROP CONSTRAINT to delete a multiple-field index. You specify only the index name following the [CONSTRAINT](#) reserved word.

Notes

- You can't add or delete more than one field or index at a time.
- You can use the [CREATE INDEX](#) statement to add a single- or multiple-field index to a table, and you can use ALTER TABLE or the [DROP](#) statement to delete an index created with ALTER TABLE or CREATE INDEX.
- You can use NOT NULL on a single field, or within a named [CONSTRAINT](#) clause that applies to either a single field or to a multiple-field named [CONSTRAINT](#). However, you can apply the NOT

NULL restriction only once to a field, or a run-time error occurs.

CONSTRAINT Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlConstraintC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqlCreateTableX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLConstraintS"}

A constraint is similar to an index, although it can also be used to establish a relationship with another table.

You use the CONSTRAINT clause in ALTER TABLE and CREATE TABLE statements to create or delete constraints. There are two types of CONSTRAINT clauses: one for creating a constraint on a single field and one for creating a constraint on more than one field.

Note The Microsoft Jet database engine doesn't support the use of CONSTRAINT, or any of the data definition language (DDL) statements, with non-Microsoft Jet databases. Use the DAO Create methods instead.

Syntax

Single-field constraint:

```
CONSTRAINT name {PRIMARY KEY | UNIQUE | NOT NULL |  
REFERENCES foreigntable [(foreignfield1, foreignfield2)]}
```

Multiple-field constraint:

```
CONSTRAINT name  
{PRIMARY KEY (primary1 [, primary2 [, ...]]) |  
UNIQUE (unique1 [, unique2 [, ...]]) |  
NOT NULL (notnull1 [, notnull2 [, ...]]) |  
FOREIGN KEY (ref1 [, ref2 [, ...]]) REFERENCES foreigntable [(foreignfield1 [, foreignfield2 [, ...]])]}
```

The CONSTRAINT clause has these parts:

| Part | Description |
|--|--|
| <i>name</i> | The name of the constraint to be created. |
| <i>primary1</i> , <i>primary2</i> | The name of the field or fields to be designated the <u>primary key</u> . |
| <i>unique1</i> , <i>unique2</i> | The name of the field or fields to be designated as a unique key. |
| <i>notnull1</i> , <i>notnull2</i> | The name of the field or fields that are restricted to non- Null values. |
| <i>ref1</i> , <i>ref2</i> | The name of a <u>foreign key</u> field or fields that refer to fields in another table. |
| <i>foreigntable</i> | The name of the <u>foreign table</u> containing the field or fields specified by <i>foreignfield</i> . |
| <i>foreignfield1</i> , <i>foreignfield2</i> | The name of the field or fields in <i>foreigntable</i> specified by <i>ref1</i> , <i>ref2</i> . You can omit this clause if the referenced field is the primary key of <i>foreigntable</i> . |

Remarks

You use the syntax for a single-field constraint in the field-definition clause of an ALTER TABLE or CREATE TABLE statement immediately following the specification of the field's data type.

You use the syntax for a multiple-field constraint whenever you use the reserved word CONSTRAINT outside a field-definition clause in an ALTER TABLE or CREATE TABLE statement.

Using CONSTRAINT, you can designate a field as one of the following types of constraints:

- You can use the UNIQUE reserved word to designate a field as a unique key. This means that no two records in the table can have the same value in this field. You can constrain any field or list of fields as unique. If a multiple-field constraint is designated as a unique key, the combined values of all fields in the index must be unique, even if two or more records have the same value in just one of the fields.
- You can use the PRIMARY KEY reserved words to designate one field or set of fields in a table as a primary key. All values in the primary key must be unique and not **Null**, and there can be only one primary key for a table.

Note Don't set a PRIMARY KEY constraint on a table that already has a primary key; if you do, an error occurs.

- You can use the FOREIGN KEY reserved words to designate a field as a foreign key. If the foreign table's primary key consists of more than one field, you must use a multiple-field constraint definition, listing all of the referencing fields, the name of the foreign table, and the names of the referenced fields in the foreign table in the same order that the referencing fields are listed. If the referenced field or fields are the foreign table's primary key, you don't have to specify the referenced fields – by default, the database engine behaves as if the foreign table's primary key is the referenced fields.

CREATE INDEX Statement

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlCreateIndexC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlCreateIndexX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLCreateIndexS"}
```

Creates a new index on an existing table.

Note For non-Microsoft Jet databases, the [Microsoft Jet database engine](#) doesn't support the use of CREATE INDEX (except to create a [pseudo index](#) on an [ODBC linked table](#)) or any of the [data definition language \(DDL\)](#) statements. Use the [DAO Create](#) methods instead. For more information, see the [Remarks](#) section.

Syntax

```
CREATE [ UNIQUE ] INDEX index  
    ON table (field [ASC|DESC][, field [ASC|DESC], ...])  
    [WITH { PRIMARY | DISALLOW NULL | IGNORE NULL }]
```

The CREATE INDEX statement has these parts:

| Part | Description |
|--------------|--|
| <i>index</i> | The name of the index to be created. |
| <i>table</i> | The name of the existing table that will contain the index. |
| <i>field</i> | The name of the field or fields to be indexed. To create a single-field index, list the field name in parentheses following the table name. To create a multiple-field index, list the name of each field to be included in the index. To create descending indexes, use the DESC reserved word; otherwise, indexes are assumed to be ascending. |

Remarks

To prohibit duplicate values in the indexed field or fields of different records, use the UNIQUE reserved word.

In the optional WITH clause, you can enforce data validation rules. You can:

- Prohibit **Null** entries in the indexed field or fields of new records by using the DISALLOW NULL option.
- Prevent records with **Null** values in the indexed field or fields from being included in the index by using the IGNORE NULL option.
- Designate the indexed field or fields as the [primary key](#) by using the PRIMARY reserved word. This implies that the key is unique, so you can omit the UNIQUE reserved word.

You can use CREATE INDEX to create a [pseudo index](#) on a [linked table](#) in an [ODBC data source](#), such as SQL Server, that does not already have an index. You don't need permission or access to the remote server to create a pseudo index, and the remote database is unaware of and unaffected by the pseudo index. You use the same syntax for both linked and native tables. This can be especially useful to create an index on a table that would ordinarily be read-only due to lack of an index.

You can also use the [ALTER TABLE](#) statement to add a single- or multiple-field index to a table, and you can use the ALTER TABLE statement or the [DROP](#) statement to remove an index created with ALTER TABLE or CREATE INDEX.

Note Don't use the PRIMARY [reserved word](#) when you create a new index on a table that already has a primary key; if you do, an error occurs.

CREATE TABLE Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"daSQLCreateTableC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"daSQLCreateTableX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLCreateTableS"}

Creates a new table.

Note The [Microsoft Jet database engine](#) doesn't support the use of CREATE TABLE, or any of the [DDL](#) statements, with non-Microsoft Jet database engine databases. Use the DAO [Create](#) methods instead.

Syntax

```
CREATE TABLE table (field1 type [(size)] [NOT NULL] [index1] [, field2 type [(size)] [NOT NULL] [index2] [, ...]] [, CONSTRAINT multifieldindex [, ...]])
```

The CREATE TABLE statement has these parts:

| Part | Description |
|------------------------|--|
| <i>table</i> | The name of the table to be created. |
| <i>field1, field2</i> | The name of field or fields to be created in the new table. You must create at least one field. |
| <i>type</i> | The data type of <i>field</i> in the new table. |
| <i>size</i> | The field size in characters (Text and Binary fields only). |
| <i>index1, index2</i> | A CONSTRAINT clause defining a single-field index. See the CONSTRAINT clause topic for more information on how to create this index. |
| <i>multifieldindex</i> | A CONSTRAINT clause defining a multiple-field index. See the CONSTRAINT clause topic for more information on how to create this index. |

Remarks

Use the CREATE TABLE statement to define a new table and its fields and field constraints. If NOT NULL is specified for a field, then new records are required to have valid data in that field.

A [CONSTRAINT](#) clause establishes various restrictions on a field, and can be used to establish the [primary key](#). You can also use the [CREATE INDEX](#) statement to create a primary key or additional indexes on existing tables.

You can use NOT NULL on a single field, or within a named [CONSTRAINT](#) clause that applies to either a single field or to a multiple-field named [CONSTRAINT](#). However, you can apply the NOT NULL restriction only once to a field, or a run-time error occurs.

DROP Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlDropC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"daSQLDropS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasqlDropX":1}

Deletes an existing table from a database or deletes an existing index from a table.

Note The Microsoft Jet database engine doesn't support the use of DROP, or any of the DDL statements, with non-Microsoft Jet databases. Use the DAO **Delete** method instead.

Syntax

DROP {TABLE *table* | INDEX *index* ON *table*}

The DROP statement has these parts:

| Part | Description |
|--------------|--|
| <i>table</i> | The name of the table to be deleted or the table from which an index is to be deleted. |
| <i>index</i> | The name of the index to be deleted from <i>table</i> . |

Remarks

You must close the table before you can delete it or remove an index from it.

You can also use ALTER TABLE to delete an index from a table.

You can use CREATE TABLE to create a table and CREATE INDEX or ALTER TABLE to create an index. To modify a table, use ALTER TABLE.

SELECT Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasq|SelectC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasq|SelectX":1} {ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasq|SELECTS"}

Instructs the Microsoft Jet database engine to return information from the database as a set of records.

Syntax

```
SELECT [predicate] { * | table.* | [table.]field1 [AS alias1] [, [table.]field2 [AS alias2] [, ...]]}  
FROM tableexpression [, ...] [IN externaldatabase]  
[WHERE... ]  
[GROUP BY... ]  
[HAVING... ]  
[ORDER BY... ]  
[WITH OWNERACCESS OPTION]
```

The SELECT statement has these parts:

| Part | Description |
|-------------------------------|--|
| <i>predicate</i> | One of the following predicates: <u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u> . You use the predicate to restrict the number of records returned. If none is specified, the default is ALL. |
| * | Specifies that all fields from the specified table or tables are selected. |
| <i>table</i> | The name of the table containing the fields from which records are selected. |
| <i>field1</i> , <i>field2</i> | The names of the fields containing the data you want to retrieve. If you include more than one field, they are retrieved in the order listed. |
| <i>alias1</i> , <i>alias2</i> | The names to use as column headers instead of the original column names in <i>table</i> . |
| <i>tableexpression</i> | The name of the table or tables containing the data you want to retrieve. |
| <i>externaldatabase</i> | The name of the database containing the tables in <i>tableexpression</i> if they are not in the current database. |

Remarks

To perform this operation, the Microsoft Jet database engine searches the specified table or tables, extracts the chosen columns, selects rows that meet the criterion, and sorts or groups the resulting rows into the order specified.

SELECT statements don't change data in the database.

SELECT is usually the first word in an SQL statement. Most SQL statements are either SELECT or SELECT...INTO statements.

The minimum syntax for a SELECT statement is:

```
SELECT fields FROM table
```

You can use an asterisk (*) to select all fields in a table. The following example selects all of the fields in the Employees table:

```
SELECT * FROM Employees;
```

If a field name is included in more than one table in the FROM clause, precede it with the table name and the . (dot) operator. In the following example, the Department field is in both the Employees table and the Supervisors table. The SQL statement selects departments from the Employees table and supervisor names from the Supervisors table:

```
SELECT Employees.Department, Supervisors.SupvName
FROM Employees INNER JOIN Supervisors
WHERE Employees.Department = Supervisors.Department;
```

When a **Recordset** object is created, the Microsoft Jet database engine uses the table's field name as the **Field** object name in the **Recordset** object. If you want a different field name or a name isn't implied by the expression used to generate the field, use the AS reserved word. The following example uses the title Birth to name the returned **Field** object in the resulting **Recordset** object:

```
SELECT BirthDate
AS Birth FROM Employees;
```

Whenever you use aggregate functions or queries that return ambiguous or duplicate **Field** object names, you must use the AS clause to provide an alternate name for the **Field** object. The following example uses the title HeadCount to name the returned **Field** object in the resulting **Recordset** object:

```
SELECT COUNT(EmployeeID)
AS HeadCount FROM Employees;
```

You can use the other clauses in a SELECT statement to further restrict and organize your returned data. For more information, see the Help topic for the clause you're using.

FROM Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlFromC"}
HLP95EN.DLL,DYNALINK,"Example":"daSQLFromX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqlFROMS"}}

Specifies the tables or queries that contain the fields listed in the SELECT statement.

Syntax

```
SELECT fieldlist  
FROM tableexpression [IN externaldatabase]
```

A SELECT statement containing a FROM clause has these parts:

| Part | Description |
|-------------------------|--|
| <i>fieldlist</i> | The name of the field or fields to be retrieved along with any field-name <u>aliases</u> , <u>SQL aggregate functions</u> , selection predicates (<u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u>), or other SELECT statement options. |
| <i>tableexpression</i> | An expression that identifies one or more tables from which data is retrieved. The expression can be a single table name, a saved query name, or a compound resulting from an <u>INNER JOIN</u> , <u>LEFT JOIN</u> , or <u>RIGHT JOIN</u> . |
| <i>externaldatabase</i> | The full path of an external database containing all the tables in <i>tableexpression</i> . |

Remarks

FROM is required and follows any SELECT statement.

The order of the table names in *tableexpression* isn't important.

For improved performance and ease of use, it's recommended that you use a linked table instead of an IN clause to retrieve data from an external database.

The following example shows how you can retrieve data from the Employees table:

```
SELECT LastName, FirstName  
FROM Employees;
```

IN Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlInC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"daSQLINS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasqlInX":1}

Identifies tables in any external database to which the Microsoft Jet database engine can connect, such as a dBASE or Paradox database or an external Microsoft Jet database.

Syntax

To identify a destination table:

```
[SELECT | INSERT] INTO destination IN  
    {path | [path "type"] | ["" [type; DATABASE = path]]}
```

To identify a source table:

```
FROM tableexpression IN  
    {path | [path "type"] | ["" [type; DATABASE = path]]}
```

A SELECT statement containing an IN clause has these parts:

| Part | Description |
|------------------------|--|
| <i>destination</i> | The name of the external table into which data is inserted. |
| <i>tableexpression</i> | The name of the table or tables from which data is retrieved. This argument can be a single table name, a saved query, or a compound resulting from an <u>INNER JOIN</u> , <u>LEFT JOIN</u> , or <u>RIGHT JOIN</u> . |
| <i>path</i> | The full path for the directory or file containing <i>table</i> . |
| <i>type</i> | The name of the database type used to create <i>table</i> if a database isn't a Microsoft Jet database (for example, dBASE III, dBASE IV, Paradox 3.x, or Paradox 4.x). |

Remarks

You can use IN to connect to only one external database at a time.

In some cases, the *path* argument refers to the directory containing the database files. For example, when working with dBASE, FoxPro, or Paradox database tables, the *path* argument specifies the directory containing .dbf or .db files. The table file name is derived from the *destination* or *tableexpression* argument.

To specify a non-Microsoft Jet database, append a semicolon (;) to the name, and enclose it in single (') or double (") quotation marks. For example, either 'dBASE IV;' or "dBASE IV;" is acceptable.

You can also use the DATABASE reserved word to specify the external database. For example, the following lines specify the same table:

```
... FROM Table IN "" [dBASE IV; DATABASE=C:\DBASE\DATA\SALES;];  
... FROM Table IN "C:\DBASE\DATA\SALES" "dBASE IV;"
```

Notes

- For improved performance and ease of use, use a linked table instead of IN.
- You can also use the IN reserved word as a comparison operator in an expression. For more information, see the In operator.

WHERE Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasq\WhereC"}
HLP95EN.DLL,DYNALINK,"Example":"dasq\WhereX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasq\WHERES"}}

Specifies which records from the tables listed in the FROM clause are affected by a SELECT, UPDATE, or DELETE statement.

Syntax

```
SELECT fieldlist  
FROM tableexpression  
WHERE criteria
```

A SELECT statement containing a WHERE clause has these parts:

| Part | Description |
|------------------------|---|
| <i>fieldlist</i> | The name of the field or fields to be retrieved along with any field-name <u>aliases</u> , selection predicates (<u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u>), or other SELECT statement options. |
| <i>tableexpression</i> | The name of the table or tables from which data is retrieved. |
| <i>criteria</i> | An <u>expression</u> that records must satisfy to be included in the query results. |

Remarks

The Microsoft Jet database engine selects the records that meet the conditions listed in the WHERE clause. If you don't specify a WHERE clause, your query returns all rows from the table. If you specify more than one table in your query and you haven't included a WHERE clause or a JOIN clause, your query generates a Cartesian product of the tables.

WHERE is optional, but when included, follows FROM. For example, you can select all employees in the sales department (`WHERE Dept = 'Sales'`) or all customers between the ages of 18 and 30 (`WHERE Age Between 18 And 30`).

If you don't use a JOIN clause to perform SQL join operations on multiple tables, the resulting **Recordset** object won't be updatable.

WHERE is similar to HAVING. WHERE determines which records are selected. Similarly, once records are grouped with GROUP BY, HAVING determines which records are displayed.

Use the WHERE clause to eliminate records you don't want grouped by a GROUP BY clause.

Use various expressions to determine which records the SQL statement returns. For example, the following SQL statement selects all employees whose salaries are more than \$21,000:

```
SELECT LastName, Salary  
FROM Employees  
WHERE Salary > 21000;
```

A WHERE clause can contain up to 40 expressions linked by logical operators, such as **And** and **Or**.

When you enter a field name that contains a space or punctuation, surround the name with brackets ([]). For example, a customer information table might include information about specific customers :

```
SELECT [Customer's Favorite Restarant]
```

When you specify the *criteria* argument, date literals must be in U.S. format, even if you're not using the U.S. version of the Microsoft Jet database engine. For example, May 10, 1996, is written 10/5/96 in the United Kingdom and 5/10/96 in the United States. Be sure to enclose your date literals with the number sign (#) as shown in the following examples.

To find records dated May 10, 1996 in a United Kingdom database, you must use the following SQL statement:

```
SELECT *
FROM Orders
WHERE ShippedDate = #5/10/96#;
```

You can also use the **DateValue** function which is aware of the international settings established by Microsoft Windows. For example, use this code for the United States:

```
SELECT *
FROM Orders
WHERE ShippedDate = DateValue('5/10/96');
```

And use this code for the United Kingdom:

```
SELECT *
FROM Orders
WHERE ShippedDate = DateValue('10/5/96');
```

Note If the column referenced in the criteria string is of type GUID, the criteria expression uses a slightly different syntax:

```
WHERE ReplicaID = {GUID {12345678-90AB-CDEF-1234-567890ABCDEF}}
```

Be sure to include the nested braces and hyphens as shown.

GROUP BY Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlGroupByC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqlGroupByX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlGROUPBYS"}

Combines records with identical values in the specified field list into a single record. A summary value is created for each record if you include an SQL aggregate function, such as **Sum** or **Count**, in the SELECT statement.

Syntax

```
SELECT fieldlist  
FROM table  
WHERE criteria  
[GROUP BY groupfieldlist]
```

A SELECT statement containing a GROUP BY clause has these parts:

| Part | Description |
|-----------------------|--|
| <i>fieldlist</i> | The name of the field or fields to be retrieved along with any field-name <u>aliases</u> , SQL aggregate functions, selection predicates (<u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u>), or other SELECT statement options. |
| <i>table</i> | The name of the table from which records are retrieved. For more information, see the <u>FROM</u> clause. |
| <i>criteria</i> | Selection criteria. If the statement includes a <u>WHERE</u> clause, the <u>Microsoft Jet database engine</u> groups values after applying the WHERE conditions to the records. |
| <i>groupfieldlist</i> | The names of up to 10 fields used to group records. The order of the field names in <i>groupfieldlist</i> determines the grouping levels from the highest to the lowest level of grouping. |

Remarks

GROUP BY is optional.

Summary values are omitted if there is no SQL aggregate function in the SELECT statement.

Null values in GROUP BY fields are grouped and aren't omitted. However, **Null** values aren't evaluated in any SQL aggregate function.

Use the WHERE clause to exclude rows you don't want grouped, and use the HAVING clause to filter records after they've been grouped.

Unless it contains Memo or OLE Object data, a field in the GROUP BY field list can refer to any field in any table listed in the FROM clause, even if the field isn't included in the SELECT statement, provided the SELECT statement includes at least one SQL aggregate function. The Microsoft Jet database engine can't group on Memo or OLE Object fields.

All fields in the SELECT field list must either be included in the GROUP BY clause or be included as arguments to an SQL aggregate function.

HAVING Clause

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlHavingC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqlHavingX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLHAVINGS"}

Specifies which grouped records are displayed in a SELECT statement with a GROUP BY clause. After GROUP BY combines records, HAVING displays any records grouped by the GROUP BY clause that satisfy the conditions of the HAVING clause.

Syntax

```
SELECT fieldlist  
FROM table  
WHERE selectcriteria  
GROUP BY groupfieldlist  
[HAVING groupcriteria]
```

A SELECT statement containing a HAVING clause has these parts:

| Part | Description |
|-----------------------|--|
| <i>fieldlist</i> | The name of the field or fields to be retrieved along with any field-name <u>aliases</u> , <u>SQL aggregate functions</u> , selection predicates (<u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u>), or other SELECT statement options. |
| <i>table</i> | The name of the table from which records are retrieved. For more information, see the <u>FROM</u> clause. |
| <i>selectcriteria</i> | Selection criteria. If the statement includes a <u>WHERE</u> clause, the <u>Microsoft Jet database engine</u> groups values after applying the WHERE conditions to the records. |
| <i>groupfieldlist</i> | The names of up to 10 fields used to group records. The order of the field names in <i>groupfieldlist</i> determines the grouping levels from the highest to the lowest level of grouping. |
| <i>groupcriteria</i> | An expression that determines which grouped records to display. |

Remarks

HAVING is optional.

HAVING is similar to WHERE, which determines which records are selected. After records are grouped with GROUP BY, HAVING determines which records are displayed:

```
SELECT CategoryID,  
Sum(UnitsInStock)  
FROM Products  
GROUP BY CategoryID  
HAVING Sum(UnitsInStock) > 100 And Like "BOS*";
```

A HAVING clause can contain up to 40 expressions linked by logical operators, such as **And** and **Or**.

ORDER BY Clause

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlOrderByC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlOrderByX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlORDERBYS"}
```

Sorts a query's resulting records on a specified field or fields in ascending or descending order.

Syntax

```
SELECT fieldlist  
FROM table  
WHERE selectcriteria  
[ORDER BY field1 [ASC | DESC ][, field2 [ASC | DESC ]], ...]]]
```

A SELECT statement containing an ORDER BY clause has these parts:

| Part | Description |
|-----------------------|---|
| <i>fieldlist</i> | The name of the field or fields to be retrieved along with any field-name <u>aliases</u> , <u>SQL aggregate functions</u> , selection predicates (<u>ALL</u> , <u>DISTINCT</u> , <u>DISTINCTROW</u> , or <u>TOP</u>), or other <u>SELECT</u> statement options. |
| <i>table</i> | The name of the table from which records are retrieved. For more information, see the <u>FROM</u> clause. |
| <i>selectcriteria</i> | Selection criteria. If the statement includes a <u>WHERE</u> clause, the <u>Microsoft Jet database engine</u> orders values after applying the WHERE conditions to the records. |
| <i>field1, field2</i> | The names of the fields on which to sort records. |

Remarks

ORDER BY is optional. However, if you want your data displayed in sorted order, then you must use ORDER BY.

The default sort order is ascending (A to Z, 0 to 9). Both of the following examples sort employee names in last name order:

```
SELECT LastName, FirstName  
FROM Employees  
ORDER BY LastName;
```

```
SELECT LastName, FirstName  
FROM Employees  
ORDER BY LastName ASC;
```

To sort in descending order (Z to A, 9 to 0), add the DESC reserved word to the end of each field you want to sort in descending order. The following example selects salaries and sorts them in descending order:

```
SELECT LastName, Salary  
FROM Employees  
ORDER BY Salary DESC, LastName;
```

If you specify a field containing Memo or OLE Object data in the ORDER BY clause, an error occurs. The Microsoft Jet database engine doesn't sort on fields of these types.

ORDER BY is usually the last item in an SQL statement.

You can include additional fields in the ORDER BY clause. Records are sorted first by the first field listed after ORDER BY. Records that have equal values in that field are then sorted by the value in the second field listed, and so on.

ALL, DISTINCT, DISTINCTROW, TOP Predicates

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqAllDistinctC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqAllDistinctX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"dasqALLDISTINCTS"}

Specifies records selected with SQL queries.

Syntax

```
SELECT [ALL | DISTINCT | DISTINCTROW | [TOP n [PERCENT]]]  
FROM table
```

A SELECT statement containing these predicates has the following parts:

| Part | Description |
|-------------|--|
| ALL | <p>Assumed if you don't include one of the predicates. The <u>Microsoft Jet database engine</u> selects all of the records that meet the conditions in the <u>SQL statement</u>. The following two examples are equivalent and return all records from the Employees table:</p> <pre>SELECT ALL * FROM Employees ORDER BY EmployeeID; SELECT * FROM Employees ORDER BY EmployeeID;</pre> |
| DISTINCT | <p>Omits records that contain duplicate data in the selected fields. To be included in the results of the query, the values for each field listed in the SELECT statement must be unique. For example, several employees listed in an Employees table may have the same last name. If two records contain Smith in the LastName field, the following SQL statement returns only one record that contains Smith:</p> <pre>SELECT DISTINCT LastName FROM Employees;</pre> <p>If you omit DISTINCT, this query returns both Smith records. If the SELECT clause contains more than one field, the combination of values from all fields must be unique for a given record to be included in the results. The output of a query that uses DISTINCT isn't updatable and doesn't reflect subsequent changes made by other users.</p> |
| DISTINCTROW | <p>Omits data based on entire duplicate records, not just duplicate fields. For example, you could create a query that joins the Customers and Orders tables on the CustomerID field. The Customers table contains no duplicate CustomerID fields, but the Orders table does because each customer can have many orders. The following SQL statement shows how you can use DISTINCTROW to produce a list of companies that have at least one order but without any details about those orders:</p> <pre>SELECT DISTINCTROW CompanyName FROM Customers INNER JOIN Orders ON Customers.CustomerID = Orders.CustomerID</pre> |

```
ORDER BY CompanyName;
```

If you omit DISTINCTROW, this query produces multiple rows for each company that has more than one order.

DISTINCTROW has an effect only when you select fields from some, but not all, of the tables used in the query.

DISTINCTROW is ignored if your query includes only one table, or if you output fields from all tables.

TOP *n* [PERCENT]

Returns a certain number of records that fall at the top or the bottom of a range specified by an ORDER BY clause.

Suppose you want the names of the top 25 students from the class of 1994:

```
SELECT TOP 25
  FirstName, LastName
FROM Students
WHERE GraduationYear = 1994
ORDER BY GradePointAverage DESC;
```

If you don't include the ORDER BY clause, the query will return an arbitrary set of 25 records from the Students table that satisfy the WHERE clause.

The TOP predicate doesn't choose between equal values. In the preceding example, if the twenty-fifth and twenty-sixth highest grade point averages are the same, the query will return 26 records.

You can also use the PERCENT reserved word to return a certain percentage of records that fall at the top or the bottom of a range specified by an ORDER BY clause.

Suppose that, instead of the top 25 students, you want the bottom 10 percent of the class:

```
SELECT TOP 10 PERCENT
  FirstName, LastName
FROM Students
WHERE GraduationYear = 1994
ORDER BY GradePointAverage ASC;
```

The ASC predicate specifies a return of bottom values. The value that follows TOP must be an unsigned **Integer**.

TOP doesn't affect whether or not the query is updatable.

table

The name of the table from which records are retrieved.

DELETE Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlDeleteC"}
HLP95EN.DLL,DYNALINK,"Example":"dasqlDeleteX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqlDELETES"}}

Creates a delete query that removes records from one or more of the tables listed in the FROM clause that satisfy the WHERE clause.

Syntax

```
DELETE [table.*]  
FROM table  
WHERE criteria
```

The DELETE statement has these parts:

| Part | Description |
|-----------------|--|
| <i>table</i> | The optional name of the table from which records are deleted. |
| <i>table</i> | The name of the table from which records are deleted. |
| <i>criteria</i> | An <u>expression</u> that determines which records to delete. |

Remarks

DELETE is especially useful when you want to delete many records.

To drop an entire table from the database, you can use the Execute method with a DROP statement. If you delete the table, however, the structure is lost. In contrast, when you use DELETE, only the data is deleted; the table structure and all of the table properties, such as field attributes and indexes, remain intact.

You can use DELETE to remove records from tables that are in a one-to-many relationship with other tables. Cascade delete operations cause the records in tables that are on the many side of the relationship to be deleted when the corresponding record in the one side of the relationship is deleted in the query. For example, in the relationship between the Customers and Orders tables, the Customers table is on the one side and the Orders table is on the many side of the relationship. Deleting a record from Customers results in the corresponding Orders records being deleted if the cascade delete option is specified.

A delete query deletes entire records, not just data in specific fields. If you want to delete values in a specific field, create an update query that changes the values to **Null**.

Important

- After you remove records using a delete query, you can't undo the operation. If you want to know which records were deleted, first examine the results of a select query that uses the same criteria, and then run the delete query.
- Maintain backup copies of your data at all times. If you delete the wrong records, you can retrieve them from your backup copies.

INNER JOIN Operation

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlInnerJoinC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlInnerJoinX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlInnerJoinS"}
```

Combines records from two tables whenever there are matching values in a common field.

Syntax

```
FROM table1 INNER JOIN table2 ON table1.field1 compopr table2.field2
```

The INNER JOIN operation has these parts:

| Part | Description |
|-----------------------|--|
| <i>table1, table2</i> | The names of the tables from which records are combined. |
| <i>field1, field2</i> | The names of the fields that are joined. If they aren't numeric, the fields must be of the same <u>data type</u> and contain the same kind of data, but they don't have to have the same name. |
| <i>compopr</i> | Any relational comparison operator: "=", "<," ">," "<=," ">=," or "<>." |

Remarks

You can use an INNER JOIN operation in any FROM clause. This is the most common type of join. Inner joins combine records from two tables whenever there are matching values in a field common to both tables.

You can use INNER JOIN with the Departments and Employees tables to select all the employees in each department. In contrast, to select all departments (even if some have no employees assigned to them) or all employees (even if some aren't assigned to a department), you can use a LEFT JOIN or RIGHT JOIN operation to create an outer join.

If you try to join fields containing Memo or OLE Object data, an error occurs.

You can join any two numeric fields of like types. For example, you can join on AutoNumber and Long fields because they are like types. However, you cannot join Single and Double types of fields.

The following example shows how you could join the Categories and Products tables on the CategoryID field:

```
SELECT CategoryName, ProductName  
FROM Categories INNER JOIN Products  
ON Categories.CategoryID = Products.CategoryID;
```

In the preceding example, CategoryID is the joined field, but it isn't included in the query output because it isn't included in the SELECT statement. To include the joined field, include the field name in the SELECT statement – in this case, `Categories.CategoryID`.

You can also link several ON clauses in a JOIN statement, using the following syntax:

```
SELECT fields  
FROM table1 INNER JOIN table2  
ON table1.field1 compopr table2.field1 AND  
ON table1.field2 compopr table2.field2) OR  
ON table1.field3 compopr table2.field3];
```

You can also nest JOIN statements using the following syntax:

```
SELECT fields  
FROM table1 INNER JOIN
```

```
(table2 INNER JOIN [( ]table3  
[INNER JOIN [( ]tablex [INNER JOIN ...]]  
ON table3.field3 compopr tablex.fieldx])  
ON table2.field2 compopr table3.field3)  
ON table1.field1 compopr table2.field2;
```

A LEFT JOIN or a RIGHT JOIN may be nested inside an INNER JOIN, but an INNER JOIN may not be nested inside a LEFT JOIN or a RIGHT JOIN.

INSERT INTO Statement

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqInsertIntoC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqInsertIntoX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqINSERTINTOS"}
```

Adds a record or multiple records to a table. This is referred to as an append query.

Syntax

Multiple-record append query:

```
INSERT INTO target [(IN externaldatabase) [(field1[, field2[, ...]])]  
  SELECT [source.]field1[, field2[, ...]  
  FROM tableexpression
```

Single-record append query:

```
INSERT INTO target [(field1[, field2[, ...]])]  
  VALUES (value1[, value2[, ...])
```

The INSERT INTO statement has these parts:

| Part | Description |
|-------------------------------|---|
| <i>target</i> | The name of the table or query to append records to. |
| <i>externaldatabase</i> | The path to an <u>external database</u> . For a description of the path, see the <u>IN</u> clause. |
| <i>source</i> | The name of the table or query to copy records from. |
| <i>field1</i> , <i>field2</i> | Names of the fields to append data to, if following a <i>target</i> argument, or the names of fields to obtain data from, if following a <i>source</i> argument. |
| <i>tableexpression</i> | The name of the table or tables from which records are inserted. This argument can be a single table name or a compound resulting from an <u>INNER JOIN</u> , <u>LEFT JOIN</u> , or <u>RIGHT JOIN</u> operation or a saved query. |
| <i>value1</i> , <i>value2</i> | The values to insert into the specific fields of the new record. Each value is inserted into the field that corresponds to the value's position in the list: <i>value1</i> is inserted into <i>field1</i> of the new record, <i>value2</i> into <i>field2</i> , and so on. You must separate values with a comma, and enclose text fields in quotation marks (' '). |

Remarks

You can use the INSERT INTO statement to add a single record to a table using the single-record append query syntax as shown above. In this case, your code specifies the name and value for each field of the record. You must specify each of the fields of the record that a value is to be assigned to and a value for that field. When you don't specify each field, the default value or **Null** is inserted for missing columns. Records are added to the end of the table.

You can also use INSERT INTO to append a set of records from another table or query by using the SELECT ... FROM clause as shown above in the multiple-record append query syntax. In this case, the SELECT clause specifies the fields to append to the specified *target* table.

The *source* or *target* table may specify a table or a query. If a query is specified, the Microsoft Jet database engine appends records to any and all tables specified by the query.

INSERT INTO is optional but when included, precedes the SELECT statement.

If your destination table contains a primary key, make sure you append unique, non-**Null** values to the primary key field or fields; if you don't, the Microsoft Jet database engine won't append the records.

If you append records to a table with an AutoNumber field and you want to renumber the appended records, don't include the AutoNumber field in your query. Do include the AutoNumber field in the query if you want to retain the original values from the field.

Use the IN clause to append records to a table in another database.

To create a new table, use the SELECT... INTO statement instead to create a make-table query.

To find out which records will be appended before you run the append query, first execute and view the results of a select query that uses the same selection criteria.

An append query copies records from one or more tables to another. The tables that contain the records you append aren't affected by the append query.

Instead of appending existing records from another table, you can specify the value for each field in a single new record using the VALUES clause. If you omit the field list, the VALUES clause must include a value for every field in the table; otherwise, the INSERT operation will fail. Use an additional INSERT INTO statement with a VALUES clause for each additional record you want to create.

LEFT JOIN, RIGHT JOIN Operations

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlLeftRightJoinC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlLeftRightJoinX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlLeftRightJoinS"}
```

Combines source-table records when used in any FROM clause.

Syntax

```
FROM table1 [ LEFT | RIGHT ] JOIN table2  
ON table1.field1 comppr table2.field2
```

The LEFT JOIN and RIGHT JOIN operations have these parts:

| Part | Description |
|-----------------------|--|
| <i>table1, table2</i> | The names of the tables from which records are combined. |
| <i>field1, field2</i> | The names of the fields that are joined. The fields must be of the same <u>data type</u> and contain the same kind of data, but they don't need to have the same name. |
| <i>comppr</i> | Any relational comparison operator: "=", "<," ">," "<=," ">=," or "<>." |

Remarks

Use a LEFT JOIN operation to create a left outer join. Left outer joins include all of the records from the first (left) of two tables, even if there are no matching values for records in the second (right) table.

Use a RIGHT JOIN operation to create a right outer join. Right outer joins include all of the records from the second (right) of two tables, even if there are no matching values for records in the first (left) table.

For example, you could use LEFT JOIN with the Departments (left) and Employees (right) tables to select all departments, including those that have no employees assigned to them. To select all employees, including those who aren't assigned to a department, you would use RIGHT JOIN.

The following example shows how you could join the Categories and Products tables on the CategoryID field. The query produces a list of all categories, including those that contain no products:

```
SELECT CategoryName,  
Productname  
FROM Categories LEFT JOIN Products  
ON Categories.CategoryID = Products.CategoryID;
```

In this example, CategoryID is the joined field, but it isn't included in the query results because it isn't included in the SELECT statement. To include the joined field, enter the field name in the SELECT statement – in this case, `Categories.CategoryID`.

Notes

- To create a query that includes only records in which the data in the joined fields is the same, use an INNER JOIN operation.
- A LEFT JOIN or a RIGHT JOIN can be nested inside an INNER JOIN, but an INNER JOIN cannot be nested inside a LEFT JOIN or a RIGHT JOIN. See the discussion of nesting in the INNER JOIN topic to see how to nest joins within other joins.
- You can link multiple ON clauses. See the discussion of clause linking in the INNER JOIN topic to see how this is done.
- If you try to join fields containing Memo or OLE Object data, an error occurs.

PARAMETERS Declaration

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlParametersC"}           {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlParametersX":1}           {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlPARAMETERSS"}
```

Declares the name and data type of each parameter in a parameter query.

Syntax

PARAMETERS *name datatype* [, *name datatype* [, ...]]

The PARAMETERS declaration has these parts:

| Part | Description |
|-----------------|--|
| <i>name</i> | The name of the parameter. Assigned to the Name property of the Parameter object and used to identify this parameter in the Parameters collection. You can use <i>name</i> as a string that is displayed in a dialog box while your application runs the query. Use brackets ([]) to enclose text that contains spaces or punctuation. For example, [Low price] and [Begin report with which month?] are valid <i>name</i> arguments. |
| <i>datatype</i> | One of the primary <u>Microsoft Jet SQL data types</u> or their synonyms. |

Remarks

For queries that you run regularly, you can use a PARAMETERS declaration to create a parameter query. A parameter query can help automate the process of changing query criteria. With a parameter query, your code will need to provide the parameters each time the query is run.

The PARAMETERS declaration is optional but when included precedes any other statement, including SELECT.

If the declaration includes more than one parameter, separate them with commas. The following example includes two parameters:

```
PARAMETERS [Low price] Currency, [Beginning date] DateTime;
```

You can use *name* but not *datatype* in a WHERE or HAVING clause. The following example expects two parameters to be provided and then applies the criteria to records in the Orders table:

```
PARAMETERS [Low price] Currency,  
[Beginning date] DateTime;  
SELECT OrderID, OrderAmount  
FROM Orders  
WHERE OrderAmount > [Low price]  
AND OrderDate >= [Beginning date];
```

PROCEDURE Clause

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlProcedureC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlProcedureX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlPROCEDURES"}
```

Defines a name and optional parameters for a query.

Syntax

PROCEDURE *name* [*param1 datatype*[, *param2 datatype*[, ...]]

The PROCEDURE clause has these parts:

| Part | Description |
|----------------------------------|---|
| <i>name</i> | A name for the procedure. It must follow <u>standard naming conventions</u> . |
| <i>param1</i> , <i>param2</i> | One or more field names or <u>parameters</u> . For example: PROCEDURE Sales_By_Country [Beginning Date] DateTime, [Ending Date] DateTime; For more information on parameters, see <u>PARAMETERS</u> . |
| <i>datatype</i> | One of the primary <u>Microsoft Jet SQL data types</u> or their synonyms. |

Remarks

An SQL procedure consists of a PROCEDURE clause (which specifies the name of the procedure), an optional list of parameter definitions, and a single SQL statement. For example, the procedure Get_Part_Number might run a query that retrieves a specified part number.

Notes

- If the clause includes more than one field definition (that is, *param-datatype* pairs), separate them with commas.
- The PROCEDURE clause must be followed by an SQL statement (for example, a SELECT or UPDATE statement).

SELECT...INTO Statement

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqSelectIntoC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqSelectIntoX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqSelectIntoS"}
```

Creates a make-table query.

Syntax

```
SELECT field1[, field2[, ...]] INTO newtable [IN externaldatabase]  
FROM source
```

The SELECT...INTO statement has these parts:

| Part | Description |
|-------------------------------|---|
| <i>field1</i> , <i>field2</i> | The name of the fields to be copied into the new table. |
| <i>newtable</i> | The name of the table to be created. It must conform to <u>standard naming conventions</u> . If <i>newtable</i> is the same as the name of an existing table, a trappable error occurs. |
| <i>externaldatabase</i> | The path to an <u>external database</u> . For a description of the path, see the <u>IN</u> clause. |
| <i>source</i> | The name of the existing table from which records are selected. This can be single or multiple tables or a query. |

Remarks

You can use make-table queries to archive records, make backup copies of your tables, or make copies to export to another database or to use as a basis for reports that display data for a particular time period. For example, you could produce a Monthly Sales by Region report by running the same make-table query each month.

Notes

- You may want to define a primary key for the new table. When you create the table, the fields in the new table inherit the data type and field size of each field in the query's underlying tables, but no other field or table properties are transferred.
- To add data to an existing table, use the INSERT INTO statement instead to create an append query.
- To find out which records will be selected before you run the make-table query, first examine the results of a SELECT statement that uses the same selection criteria.

SQL Subqueries

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqSubqueriesC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqSubqueriesX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"dasqSubqueriesS"}

A subquery is a SELECT statement nested inside a SELECT, SELECT...INTO, INSERT...INTO, DELETE, or UPDATE statement or inside another subquery.

Syntax

You can use three forms of syntax to create a subquery:

comparison [ANY | ALL | SOME] (*sqlstatement*)

expression [NOT] IN (*sqlstatement*)

[NOT] EXISTS (*sqlstatement*)

A subquery has these parts:

| Part | Description |
|---------------------|--|
| <i>comparison</i> | An <u>expression</u> and a comparison operator that compares the expression with the results of the subquery. |
| <i>expression</i> | An expression for which the result set of the subquery is searched. |
| <i>sqlstatement</i> | A SELECT statement, following the same format and rules as any other SELECT statement. It must be enclosed in parentheses. |

Remarks

You can use a subquery instead of an expression in the field list of a SELECT statement or in a WHERE or HAVING clause. In a subquery, you use a SELECT statement to provide a set of one or more specific values to evaluate in the WHERE or HAVING clause expression.

Use the ANY or SOME predicate, which are synonymous, to retrieve records in the main query that satisfy the comparison with any records retrieved in the subquery. The following example returns all products whose unit price is greater than that of any product sold at a discount of 25 percent or more:

```
SELECT * FROM Products
WHERE UnitPrice > ANY
(SELECT UnitPrice FROM OrderDetails
WHERE Discount >= .25);
```

Use the ALL predicate to retrieve only those records in the main query that satisfy the comparison with all records retrieved in the subquery. If you changed ANY to ALL in the previous example, the query would return only those products whose unit price is greater than that of all products sold at a discount of 25 percent or more. This is much more restrictive.

Use the IN predicate to retrieve only those records in the main query for which some record in the subquery contains an equal value. The following example returns all products with a discount of 25 percent or more:

```
SELECT * FROM Products
WHERE ProductID IN
(SELECT ProductID FROM OrderDetails
WHERE Discount >= .25);
```

Conversely, you can use NOT IN to retrieve only those records in the main query for which no record in the subquery contains an equal value.

Use the EXISTS predicate (with the optional NOT reserved word) in true/false comparisons to

determine whether the subquery returns any records.

You can also use table name aliases in a subquery to refer to tables listed in a FROM clause outside the subquery. The following example returns the names of employees whose salaries are equal to or greater than the average salary of all employees having the same job title. The Employees table is given the alias "T1":

```
SELECT LastName,  
FirstName, Title, Salary  
FROM Employees AS T1  
WHERE Salary >=  
(SELECT Avg(Salary)  
FROM Employees  
WHERE T1.Title = Employees.Title) Order by Title;
```

In the preceding example, the AS reserved word is optional.

Some subqueries are allowed in crosstab queries – specifically, as predicates (those in the WHERE clause). Subqueries as output (those in the SELECT list) are not allowed in crosstab queries.

TRANSFORM Statement

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqITransformC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqITransformX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"dasqITransformS"}

Creates a crosstab query.

Syntax

TRANSFORM *aggfunction*
selectstatement
PIVOT *pivotfield* [IN (*value1* [, *value2* [, ...]])]

The TRANSFORM statement has these parts:

| Part | Description |
|------------------------|---|
| <i>aggfunction</i> | An <u>SQL aggregate function</u> that operates on the selected data. |
| <i>selectstatement</i> | A <u>SELECT</u> statement. |
| <i>pivotfield</i> | The field or <u>expression</u> you want to use to create column headings in the query's result set. |
| <i>value1, value2</i> | Fixed values used to create column headings. |

Remarks

When you summarize data using a crosstab query, you select values from specified fields or expressions as column headings so you can view data in a more compact format than with a select query.

TRANSFORM is optional but when included is the first statement in an SQL string. It precedes a SELECT statement that specifies the fields used as row headings and a GROUP BY clause that specifies row grouping. Optionally, you can include other clauses, such as WHERE, that specify additional selection or sorting criteria. You can also use subqueries as predicates – specifically, those in the WHERE clause – in a crosstab query.

The values returned in *pivotfield* are used as column headings in the query's result set. For example, pivoting the sales figures on the month of the sale in a crosstab query would create 12 columns. You can restrict *pivotfield* to create headings from fixed values (*value1, value2*) listed in the optional IN clause. You can also include fixed values for which no data exists to create additional columns.

UNION Operation

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqUnionC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqUnionX":1} {ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqUNIONS"}

Creates a union query, which combines the results of two or more independent queries or tables.

Syntax

[TABLE] *query1* UNION [ALL] [TABLE] *query2* [UNION [ALL] [TABLE] *queryn* [...]]

The UNION operation has these parts:

| Part | Description |
|-----------------|--|
| <i>query1-n</i> | A <u>SELECT statement</u> , the name of a stored query, or the name of a stored table preceded by the TABLE keyword. |

Remarks

You can merge the results of two or more queries, tables, and SELECT statements, in any combination, in a single UNION operation. The following example merges an existing table named New Accounts and a SELECT statement:

```
TABLE [New Accounts] UNION ALL  
SELECT *  
FROM Customers  
WHERE OrderAmount > 1000;
```

By default, no duplicate records are returned when you use a UNION operation; however, you can include the ALL predicate to ensure that all records are returned. This also makes the query run faster.

All queries in a UNION operation must request the same number of fields; however, the fields don't have to be of the same size or data type.

Use aliases only in the first SELECT statement because they are ignored in any others. In the ORDER BY clause, refer to fields by what they are called in the first SELECT statement.

Notes

- You can use a GROUP BY or HAVING clause in each *query* argument to group the returned data.
- You can use an ORDER BY clause at the end of the last *query* argument to display the returned data in a specified order.

UPDATE Statement

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlUpdateC"}           {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlUpdateX":1}             {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlUPDATES"}
```

Creates an update query that changes values in fields in a specified table based on specified criteria.

Syntax

```
UPDATE table  
  SET newvalue  
  WHERE criteria;
```

The UPDATE statement has these parts:

| Part | Description |
|-----------------|--|
| <i>table</i> | The name of the table containing the data you want to modify. |
| <i>newvalue</i> | An <u>expression</u> that determines the value to be inserted into a particular field in the updated records. |
| <i>criteria</i> | An expression that determines which records will be updated. Only records that satisfy the expression are updated. |

Remarks

UPDATE is especially useful when you want to change many records or when the records that you want to change are in multiple tables.

You can change several fields at the same time. The following example increases the Order Amount values by 10 percent and the Freight values by 3 percent for shippers in the United Kingdom:

```
UPDATE Orders  
SET OrderAmount = OrderAmount * 1.1,  
    Freight = Freight * 1.03  
WHERE ShipCountry = 'UK';
```

Important

- UPDATE doesn't generate a result set. Also, after you update records using an update query, you can't undo the operation. If you want to know which records were updated, first examine the results of a select query that uses the same criteria, and then run the update query.
- Maintain backup copies of your data at all times. If you update the wrong records, you can retrieve them from your backup copies.

WITH OWNERACCESS OPTION Declaration

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlWithOwnerAccessOptionC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlWithOwnerAccessOptionX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlWITHOWNERACCESSOptionS"}
```

In a multiuser environment with a secure workgroup, use this declaration with a query to give the user who runs the query the same permissions as the query's owner.

Syntax

```
sqlstatement  
    WITH OWNERACCESS OPTION
```

Remarks

The WITH OWNERACCESS OPTION declaration is optional.

The following example enables the user to view salary information (even if the user doesn't otherwise have permission to view the Payroll table), provided that the query's owner does have that permission:

```
SELECT LastName,  
       FirstName, Salary  
FROM Employees  
ORDER BY LastName  
WITH OWNERACCESS OPTION;
```

If a user is otherwise prevented from creating or adding to a table, you can use WITH OWNERACCESS OPTION to enable the user to run a make-table or append query.

If you want to enforce workgroup security settings and users' permissions, don't include the WITH OWNERACCESS OPTION declaration.

This option requires you to have access to the System.mdw file associated with the database. It's really useful only in secured multiuser implementations.

SQL Aggregate Functions

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"daidxAggregateFunctionsC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"daidxAggregateFunctionsX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"daidxAggregateFunctionsS"}
```

Using the SQL aggregate functions, you can determine various statistics on sets of values. You can use these functions in a query and aggregate expressions in the **SQL** property of a **QueryDef** object or when creating a **Recordset** object based on an SQL query.

Avg Function

Count Function

Min, Max Functions

StDev, StDevP Functions

Sum Function

Var, VarP Functions

Avg Function

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasq/AvgC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasq/AvgS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasq/AvgX":1}

Calculates the arithmetic mean of a set of values contained in a specified field on a query.

Syntax

Avg(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the numeric data you want to average or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

The average calculated by **Avg** is the arithmetic mean (the sum of the values divided by the number of values). You could use **Avg**, for example, to calculate average freight cost.

The **Avg** function doesn't include any Null fields in the calculation.

You can use **Avg** in a query expression and in the SQL property of a QueryDef object or when creating a Recordset object based on an SQL query.

Count Function

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlCountC"}
HLP95EN.DLL,DYNALINK,"Example":"dasqlCountX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqlCountS"}}

Calculates the number of records returned by a query.

Syntax

Count(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the data you want to count or an expression that performs a calculation using the data in the field. Operands in *expr* can include the name of a table field or function (which can be either intrinsic or user-defined but not other SQL aggregate functions). You can count any kind of data, including text.

Remarks

You can use **Count** to count the number of records in an underlying query. For example, you could use **Count** to count the number of orders shipped to a particular country.

Although *expr* can perform a calculation on a field, **Count** simply tallies the number of records. It doesn't matter what values are stored in the records.

The **Count** function doesn't count records that have **Null** fields unless *expr* is the asterisk (*) wildcard character. If you use an asterisk, **Count** calculates the total number of records, including those that contain **Null** fields. **Count(*)** is considerably faster than **Count([Column Name])**. Don't enclose the asterisk in quotation marks (' '). The following example calculates the number of records in the Orders table:

```
SELECT Count(*)  
AS TotalOrders FROM Orders;
```

If *expr* identifies multiple fields, the **Count** function counts a record only if at least one of the fields is not **Null**. If all of the specified fields are **Null**, the record isn't counted. Separate the field names with an ampersand (&). The following example shows how you can limit the count to records in which either ShippedDate or Freight isn't **Null**:

```
SELECT  
Count('ShippedDate & Freight')  
AS [Not Null] FROM Orders;
```

You can use **Count** in a query expression. You can also use this expression in the SQL property of a QueryDef object or when creating a Recordset object based on an SQL query.

First, Last Functions

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqIFirstLastC"}      {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqIFirstLastX":1}        {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqIFirstLastS"}
```

Return a field value from the first or last record in the result set returned by a query.

Syntax

First(*expr*)

Last(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the data you want to use or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

The **First** and **Last** functions are analogous to the **MoveFirst** and **MoveLast** methods of a **DAO Recordset** object. They simply return the value of a specified field in the first or last record, respectively, of the result set returned by a query. Because records are usually returned in no particular order (unless the query includes an ORDER BY clause), the records returned by these functions will be arbitrary.

Min, Max Functions

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqMinMaxC"}           {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqMinMaxX":1}             {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqMinMaxS"}
```

Return the minimum or maximum of a set of values contained in a specified field on a query.

Syntax

Min(*expr*)

Max(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the data you want to evaluate or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

You can use **Min** and **Max** to determine the smallest and largest values in a field based on the specified aggregation, or grouping. For example, you could use these functions to return the lowest and highest freight cost. If there is no aggregation specified, then the entire table is used.

You can use **Min** and **Max** in a query expression and in the SQL property of a QueryDef object or when creating a Recordset object based on an SQL query.

StDev, StDevP Functions

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasq|StDevPC"}
HLP95EN.DLL,DYNALINK,"Example":"dasq|StDevPX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasq|StDevPS"}

Return estimates of the standard deviation for a population or a population sample represented as a set of values contained in a specified field on a query.

Syntax

StDev(*expr*)

StDevP(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the numeric data you want to evaluate or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

The **StDevP** function evaluates a population, and the **StDev** function evaluates a population sample.

If the underlying query contains fewer than two records (or no records, for the **StDevP** function), these functions return a **Null** value (which indicates that a standard deviation can't be calculated).

You can use the **StDev** and **StDevP** functions in a query expression. You can also use this expression in the SQL property of a QueryDef object or when creating a Recordset object based on an SQL query.

Sum Function

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqSumC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqSumS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasqSumX":1}

Returns the sum of a set of values contained in a specified field on a query.

Syntax

Sum(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the numeric data you want to add or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

The **Sum** function totals the values in a field. For example, you could use the **Sum** function to determine the total cost of freight charges.

The **Sum** function ignores records that contain **Null** fields. The following example shows how you can calculate the sum of the products of UnitPrice and Quantity fields:

```
SELECT  
Sum(UnitPrice * Quantity)  
AS [Total Revenue] FROM [Order Details];
```

You can use the **Sum** function in a query expression. You can also use this expression in the SQL property of a QueryDef object or when creating a Recordset based on an SQL query.

Var, VarP Functions

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasq|VarPC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasq|VarPS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasq|VarPX":1}

Return estimates of the variance for a population or a population sample represented as a set of values contained in a specified field on a query.

Syntax

Var(*expr*)

VarP(*expr*)

The *expr* placeholder represents a string expression identifying the field that contains the numeric data you want to evaluate or an expression that performs a calculation using the data in that field. Operands in *expr* can include the name of a table field, a constant, or a function (which can be either intrinsic or user-defined but not one of the other SQL aggregate functions).

Remarks

The **VarP** function evaluates a population, and the **Var** function evaluates a population sample.

If the underlying query contains fewer than two records, the **Var** and **VarP** functions return a **Null** value, which indicates that a variance can't be calculated.

You can use the **Var** and **VarP** functions in a query expression or in an SQL statement.

Calculating Fields in SQL Functions

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlCalculatingFieldsC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqlCalculatingFieldsX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLCalculatingFieldsS"}

You can use the string expression argument in an SQL aggregate function to perform a calculation on values in a field. For example, you could calculate a percentage (such as a surcharge or sales tax) by multiplying a field value by a fraction.

The following table provides examples of calculations on fields from the Orders and Order Details tables in the Northwind.mdb database.

| Calculation | Example |
|---------------------------------|-----------------------------|
| Add a number to a field | Freight + 5 |
| Subtract a number from a field | Freight - 5 |
| Multiply a field by a number | UnitPrice * 2 |
| Divide a field by a number | Freight / 2 |
| Add one field to another | UnitsInStock + UnitsOnOrder |
| Subtract one field from another | ReorderLevel - UnitsInStock |

The following example calculates the average discount amount of all orders in the Northwind.mdb database. It multiplies the values in the UnitPrice and Discount fields to determine the discount amount of each order and then calculates the average. You can use this expression in an SQL statement in Visual Basic code:

```
SELECT Avg(UnitPrice * Discount) AS [Average Discount] FROM [Order  
Details];
```

Between...And Operator

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlBETWEEN"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"dasqlBetweenX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlBetweenS"}

Determines whether the value of an expression falls within a specified range of values. You can use this operator within [SQL statements](#).

Syntax

expr [**Not**] **Between** *value1* **And** *value2*

The **Between...And** operator syntax has these parts:

| Part | Description |
|-------------------------------|---|
| <i>expr</i> | Expression identifying the field that contains the data you want to evaluate. |
| <i>value1</i> , <i>value2</i> | Expressions against which you want to evaluate <i>expr</i> . |

Remarks

If the value of *expr* is between *value1* and *value2* (inclusive), the **Between...And** operator returns **True**; otherwise, it returns **False**. You can include the **Not** logical operator to evaluate the opposite condition (that is, whether *expr* lies outside the range defined by *value1* and *value2*).

You might use **Between...And** to determine whether the value of a field falls within a specified numeric range. The following example determines whether an order was shipped to a location within a range of postal codes. If the postal code is between 98101 and 98199, the **IIf** function returns "Local". Otherwise, it returns "Nonlocal".

```
SELECT IIf(PostalCode Between 98101 And 98199, "Local", "Nonlocal")  
FROM Publishers
```

If *expr*, *value1*, or *value2* is **Null**, **Between...And** returns a **Null** value.

Because [wildcard characters](#), such as *, are treated as literals, you cannot use them with the **Between...And** operator. For example, you cannot use 980* and 989* to find all postal codes that start with 980 to 989. Instead, you have two alternatives for accomplishing this. You can add an expression to the query that takes the left three characters of the text field and use **Between...And** on those characters. Or you can pad the high and low values with extra characters – in this case, 98000 to 98999, or 98000 to 98999 – 9999 if using extended postal codes. (You must omit the – 0000 from the low values because otherwise 98000 is dropped if some postal codes have extended sections and others do not.)

Comparison of Microsoft Jet Database Engine SQL and ANSI SQL

{ewc HLP95EN.DLL,DYNALINK,"See Also":"daSQLJetVANSIC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"daSQLJetVANSIX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLJetVANSIS"}

Microsoft Jet database engine SQL is generally ANSI-89 Level 1 compliant. However, certain ANSI SQL features aren't implemented in Microsoft Jet SQL. Conversely, Microsoft Jet SQL includes reserved words and features not supported in ANSI SQL.

Major Differences

- Microsoft Jet SQL and ANSI SQL each have different reserved words and data types. For more information, see [Microsoft Jet Database Engine SQL Reserved Words](#) and [Equivalent ANSI SQL Data Types](#).
- Different rules apply to the **Between...And** construct, which has the following syntax:
expr1 [NOT] **Between** *value1* **And** *value2*
In Microsoft Jet SQL, *value1* can be greater than *value2*; in ANSI SQL, *value1* must be equal to or less than *value2*.
- Different wildcard characters are used with the **Like** operator.

| Matching character | Microsoft Jet SQL | ANSI SQL |
|-------------------------|-------------------|----------------|
| Any single character | ? | _ (underscore) |
| Zero or more characters | * | % |

- Microsoft Jet SQL is generally less restrictive. For example, it permits grouping and ordering on expressions.
- Microsoft Jet SQL supports more powerful expressions.

Enhanced Features of Microsoft Jet SQL

Microsoft Jet SQL provides the following enhanced features:

- The **TRANSFORM** statement, which provides support for [crosstab queries](#)
- Additional [aggregate functions](#), such as **StDev** and **VarP**
- The **PARAMETERS** declaration for defining [parameter queries](#)

ANSI SQL Features Not Supported in Microsoft Jet SQL

Microsoft Jet SQL doesn't support the following ANSI SQL features:

- Security statements, such as COMMIT, GRANT, and LOCK.
- DISTINCT aggregate function references. For example, Microsoft Jet SQL doesn't allow SUM(DISTINCT *columnname*).
- The LIMIT TO *nn* ROWS clause used to limit the number of rows returned by a query. You can use only the [WHERE clause](#) to limit the scope of a query.

Equivalent ANSI SQL Data Types

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlEquivalentDataTypesC"} {ewc
 HLP95EN.DLL,DYNALINK,"Example":"dasqlEquivalentDataTypesX":1} {ewc
 HLP95EN.DLL,DYNALINK,"Specifics":"dasqlEquivalentDataTypesS"}

The following table lists ANSI SQL data types and the equivalent Microsoft Jet database engine SQL data types and their valid synonyms.

| ANSI SQL data type | Microsoft Jet SQL data type | Synonym |
|------------------------------|------------------------------------|--|
| BIT, BIT VARYING | BINARY (See Notes) | VARBINARY |
| Not supported | BIT (See Notes) | BOOLEAN, LOGICAL, LOGICAL1, YESNO |
| Not supported | BYTE | INTEGER1 |
| Not supported | COUNTER | AUTOINCREMENT |
| Not supported | CURRENCY | MONEY |
| DATE, TIME, TIMESTAMP | DATETIME | DATE, TIME, TIMESTAMP |
| Not supported | GUID | |
| DECIMAL | Not supported | |
| REAL | SINGLE | FLOAT4, IEEE SINGLE, REAL |
| DOUBLE PRECISION, FLOAT | DOUBLE | FLOAT, FLOAT8, IEEE DOUBLE, NUMBER, NUMERIC |
| SMALLINT | SHORT | INTEGER2, SMALLINT |
| INTEGER | LONG | INT, INTEGER, INTEGER4 |
| INTERVAL | Not supported | |
| Not supported | LONG BINARY | GENERAL, OLEOBJECT |
| Not supported | LONGTEXT | LONGCHAR, MEMO, NOTE |
| CHARACTER, CHARACTER VARYING | TEXT | ALPHANUMERIC, CHAR, CHARACTER, STRING, VARCHAR |
| Not supported | VALUE (See Notes) | |

Notes

- The ANSI SQL BIT data type doesn't correspond to the Microsoft Jet SQL BIT data type, but it corresponds to the BINARY data type instead. There is no ANSI SQL equivalent for the Microsoft Jet SQL BIT data type.
- The VALUE reserved word doesn't represent a data type defined by the Microsoft Jet database engine.

In Operator

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqInOperC"}
HLP95EN.DLL,DYNALINK,"Example":"dasqInOperX":1}

{ewc
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqInOperS"}}

Determines whether the value of an expression is equal to any of several values in a specified list.

Syntax

expr [**Not**] **In**(*value1*, *value2*, . . .)

Remarks

The **In** operator syntax has these parts:

| Part | Description |
|-------------------------------|--|
| <i>expr</i> | Expression identifying the field that contains the data you want to evaluate. |
| <i>value1</i> , <i>value2</i> | Expression or list of expressions against which you want to evaluate <i>expr</i> . |

If *expr* is found in the list of values, the **In** operator returns **True**; otherwise, it returns **False**. You can include the **Not** logical operator to evaluate the opposite condition (that is, whether *expr* is not in the list of values).

For example, you can use **In** to determine which orders are shipped to a set of specified regions:

```
SELECT *  
FROM Orders  
WHERE ShipRegion In ('Avon','Glos','Som')
```

Like Operator

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqLikeC"}
{ewc HLP95EN.DLL,DYNALINK,"Specifics":"dasqLikeS"}

{ewc HLP95EN.DLL,DYNALINK,"Example":"dasqLikeX":1}

Compares a string expression to a pattern in an SQL expression.

Syntax

expression **Like** "*pattern*"

The **Like** operator syntax has these parts:

| Part | Description |
|-------------------|---|
| <i>expression</i> | SQL expression used in a <u>WHERE</u> clause. |
| <i>pattern</i> | String or character string literal against which <i>expression</i> is compared. |

Remarks

You can use the **Like** operator to find values in a field that match the pattern you specify. For *pattern*, you can specify the complete value (for example, `Like "Smith"`), or you can use wildcard characters to find a range of values (for example, `Like "Sm*"`).

In an expression, you can use the **Like** operator to compare a field value to a string expression. For example, if you enter `Like "C*"` in an SQL query, the query returns all field values beginning with the letter C. In a parameter query, you can prompt the user for a pattern to search for.

The following example returns data that begins with the letter P followed by any letter between A and F and three digits:

```
Like "P[A-F]###"
```

The following table shows how you can use **Like** to test expressions for different patterns.

| Kind of match | Pattern | Match (returns True) | No match (returns False) |
|---------------------|----------|----------------------|--------------------------|
| Multiple characters | a*a | aa, aBa, aBBBa | aBC |
| | *ab* | abc, AABB, Xab | aZb, bac |
| Special character | a[*]a | a*a | aaa |
| Multiple characters | ab* | abcdefg, abc | cab, aab |
| Single character | a?a | aaa, a3a, aBa | aBBBa |
| Single digit | a#a | a0a, a1a, a2a | aaa, a10a |
| Range of characters | [a-z] | f, p, j | 2, & |
| Outside a range | [!a-z] | 9, &, % | b, a |
| Not a digit | [!0-9] | A, a, &, ~ | 0, 1, 9 |
| Combined | a[!b-m]# | An9, az0, a99 | abc, aj0 |

Microsoft Jet Database Engine SQL Data Types

{ewc HLP95EN.DLL,DYNALINK,"See Also":"daSQLJetDataTypesC"} {ewc
HLP95EN.DLL,DYNALINK,"Example":"daSQLJetDataTypesX":1} {ewc
HLP95EN.DLL,DYNALINK,"Specifics":"daSQLJetDataTypesS"}

The Microsoft Jet database engine SQL data types consist of 13 primary data types defined by the Microsoft Jet database engine and several valid synonyms recognized for these data types.

The following table lists the primary data types. The synonyms are identified in Microsoft Jet Database Engine SQL Reserved Words.

| Data type | Storage size | Description |
|------------------|----------------------|---|
| BINARY | 1 byte per character | Any type of data may be stored in a field of this type. No translation of the data (for example, to text) is made. How the data is input in a binary field dictates how it will appear as output. |
| BIT | 1 byte | Yes and No values and fields that contain only one of two values. |
| BYTE | 1 byte | An integer value between 0 and 255. |
| COUNTER | 4 bytes | A number automatically incremented by the |

| | | |
|--------------------------|----------|--|
| | | Microsoft Jet database engine whenever a new record is added to a table. In the Microsoft Jet database engine, the data type for this value is Long. |
| CURRENCY | 8 bytes | A scaled integer between – 922,337,203,685,477.5808 and 922,337,203,685,477.5807 |
| DATETIME (See DOUBLE) | 8 bytes | . |
| GUID | 128 bits | A date or time value between the years 100 and 9999. A unique identification number used with remote procedure calls. |
| SINGLE | 4 bytes | A single-precision floating-point value with a range of – 3.402823E38 to – 1.401298E- |

| | | |
|--------|---------|--|
| DOUBLE | 8 bytes | <p>45 for negative values, 1.401298E-45 to 3.402823E38 for positive values, and 0.</p> <p>A double-precision floating-point value with a range of $-1.79769313486232E308$ to $-4.94065645841247E-324$ for negative values, $4.94065645841247E-324$ to $1.79769313486232E308$ for positive values, and 0.</p> |
| SHORT | 2 bytes | <p>A short integer between $-32,768$ and $32,767$.</p> |
| LONG | 4 bytes | <p>A long integer between $-2,147,483,648$ and $2,147,483,647$.</p> |

| | | |
|------------|----------------------|--|
| LONGTEXT | 1 byte per character | 48 and 2,147,483,647. Zero to a maximum of 1.2 gigabytes. |
| LONGBINARY | As required | Zero to a maximum of 1.2 gigabytes. Used for OLE objects. |
| TEXT | 1 byte per character | Zero to 255 characters. |

Note You can also use the VALUE reserved word in SQL statements.

Microsoft Jet Database Engine SQL Reserved Words

{ewc HLP95EN.dll, DYNALINK, "See Also":"daSQLJetSQLReservedWordsC "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"daSQLJetSQLReservedWordsS "}

{button A,JI('','daidxSqlA')} {button B,JI('','daidxSqlB_C')} {button C,JI('','daidxSqlB_C')} {button D,JI('','daidxSqlD')} {button E,JI('','daidxSqlE_H')} {button F,JI('','daidxSqlE_H')} {button G,JI('','daidxSqlE_H')} {button H,JI('','daidxSqlE_H')} {button I,JI('','daidxSqlI')} {button J,JI('','daidxSqlJ_M')} {button K,JI('','daidxSqlJ_M')} {button L,JI('','daidxSqlJ_M')} {button M,JI('','daidxSqlJ_M')} {button N,JI('','daidxSqlN_P')} {button O,JI('','daidxSqlN_P')} {button P,JI('','daidxSqlN_P')} {button Q,JI('','daidxSqlQ_S')} {button R,JI('','daidxSqlQ_S')} {button S,JI('','daidxSqlQ_S')} {button T,JI('','daidxSqlT_Z')} {button U,JI('','daidxSqlT_Z')} {button V,JI('','daidxSqlT_Z')} {button W,JI('','daidxSqlT_Z')} {button X,JI('','daidxSqlT_Z')} {button Y,JI('','daidxSqlT_Z')} {button Z,JI('','daidxSqlT_Z')}

The following list includes all words reserved by the Microsoft Jet database engine for use in SQL statements. The words in the list that aren't in all uppercase letters are also reserved by other applications. Consequently, the individual Help topics for these words provide general descriptions that don't focus on SQL usage.

Note Words followed by an asterisk (*) are reserved but currently have no meaning in the context of a Microsoft Jet SQL statement (for example, **Level** and **TableID**).

A

ADD

ALL

Alphanumeric – See TEXT

ALTER

And

ANY

AS

ASC

AUTOINCREMENT – See COUNTER

Avg

B-C

Between

BINARY

BIT

BOOLEAN – See BIT

BY

BYTE

CHAR, CHARACTER – See TEXT

COLUMN

CONSTRAINT

Count

COUNTER

CREATE

CURRENCY

D

DATABASE

DATE – See DATETIME

DATETIME

DELETE

DESC

DISALLOW

DISTINCT

DISTINCTROW

DOUBLE

DROP

E-H

Eqv

EXISTS

FLOAT, FLOAT8 – See DOUBLE

FLOAT4 – See SINGLE

FOREIGN

FROM

GENERAL – See LONGBINARY

GROUP

GUID

HAVING

I

IEEEDOUBLE – See DOUBLE

IEEESINGLE – See SINGLE

IGNORE

Imp

In

IN

INDEX

INNER

INSERT

INT, INTEGER, INTEGER4 – See LONG

INTEGER1 – See BYTE

INTEGER2 – See SHORT

INTO

Is

J-M

JOIN

KEY

LEFT

Level*

Like

LOGICAL, LOGICAL1 – See BIT

LONG

LONGBINARY

LONGTEXT

Max

MEMO – See LONGTEXT

Min

Mod

MONEY – See CURRENCY

N-P

Not

NULL

NUMBER – See DOUBLE

NUMERIC – See DOUBLE

OLEOBJECT – See LONGBINARY

ON

OPTION

Or

ORDER

Outer*

OWNERACCESS

PARAMETERS

PERCENT

PIVOT

PRIMARY

PROCEDURE

Q-S

REAL – See SINGLE

REFERENCES

RIGHT

SELECT

SET

SHORT

SINGLE

SMALLINT – See SHORT

SOME

StDev

StDevP

STRING – See TEXT

Sum

T-Z

TABLE

TableID*

VALUE

VALUES

TEXT

TIME – See DATETIME

TIMESTAMP – See DATETIME

TOP

TRANSFORM

UNION

UNIQUE

UPDATE

Var

VARBINARY – See BINARY

VARCHAR – See TEXT

VarP

WHERE

WITH

Xor

YESNO – See BIT

SQL Expressions

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlExpressionsC"}           {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlExpressionsX":1}           {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlExpressionsS"}
```

An SQL expression is a string that makes up all or part of an SQL statement. For example, the **FindFirst** method on a **Recordset** object uses an SQL expression consisting of the selection criteria found in an SQL WHERE clause.

The Microsoft Jet database engine uses the Visual Basic for Applications (or VBA) expression service to perform simple arithmetic and function evaluation. All of the operators used in Microsoft Jet SQL expressions (except **Between**, **In**, and **Like**) are defined by the VBA expression service. In addition, the VBA expression service offers over 100 VBA functions that you can use in SQL expressions. For example, you can use these VBA functions to compose an SQL query in the Microsoft Access query Design view, and you can also use these functions in an SQL query in the DAO **OpenRecordset** method in Microsoft Visual C++, Microsoft Visual Basic, and Microsoft Excel code.

Using Wildcard Characters in String Comparisons

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dasqlUsingWildcardC"} {ewc  
HLP95EN.DLL,DYNALINK,"Example":"dasqlUsingWildcardX":1} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dasqlUsingWildcardS"}
```

Built-in pattern matching provides a versatile tool for making string comparisons. The following table shows the wildcard characters you can use with the **Like** operator and the number of digits or strings they match.

| Character(s) in pattern | Matches in expression |
|------------------------------------|---|
| ? | Any single character |
| * | Zero or more characters |
| # | Any single digit (0 – 9) |
| [<i>charlist</i>] | Any single character in <i>charlist</i> |
| [! <i>charlist</i>] | Any single character not in <i>charlist</i> |

You can use a group of one or more characters (*charlist*) enclosed in brackets ([]) to match any single character in *expression*, and *charlist* can include almost any characters in the ANSI character set, including digits. In fact, you can use the special characters opening bracket ([), question mark (?), number sign (#), and asterisk (*) to match themselves directly only if enclosed in brackets. You can't use the closing bracket (]) within a group to match itself, but you can use it outside a group as an individual character.

In addition to a simple list of characters enclosed in brackets, *charlist* can specify a range of characters by using a hyphen (-) to separate the upper and lower bounds of the range. For example, using [A-Z] in *pattern* results in a match if the corresponding character position in *expression* contains any of the uppercase letters in the range A through Z. You can include multiple ranges within the brackets without delimiting the ranges. For example, [a-zA-Z0-9] matches any alphanumeric character.

Other important rules for pattern matching include the following:

- An exclamation mark (!) at the beginning of *charlist* means that a match is made if any character except those in *charlist* are found in *expression*. When used outside brackets, the exclamation mark matches itself.
- You can use the hyphen (-) either at the beginning (after an exclamation mark if one is used) or at the end of *charlist* to match itself. In any other location, the hyphen identifies a range of ANSI characters.
- When you specify a range of characters, the characters must appear in ascending sort order (A-Z or 0-100). [A-Z] is a valid pattern, but [Z-A] isn't.
- The character sequence [] is ignored; it's considered to be a zero-length string ("").

ALTER TABLE Statement Example

This example adds a Salary field with a data type of **Currency** to the Employees table.

```
Sub AlterTableX1()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Add the Salary field to the Employees table  
    ' and make it a Currency data type.  
    dbs.Execute "ALTER TABLE Employees " _  
        & "ADD COLUMN Salary CURRENCY;"  
  
    dbs.Close  
  
End Sub
```

This example removes the Salary field from the Employees table.

```
Sub AlterTableX2()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Delete the Salary field from the Employees table.  
    dbs.Execute "ALTER TABLE Employees " _  
        & "DROP COLUMN Salary;"  
  
    dbs.Close  
  
End Sub
```

This example adds a foreign key to the Orders table. The foreign key is based on the EmployeeID field and refers to the EmployeeID field of the Employees table. In this example, you don't have to list the EmployeeID field after the Employees table in the REFERENCES clause because EmployeeID is the primary key of the Employees table.

```
Sub AlterTableX3()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Add a foreign key to the Orders table.  
    dbs.Execute "ALTER TABLE Orders " _  
        & "ADD CONSTRAINT OrdersRelationship " _  
        & "FOREIGN KEY (EmployeeID) " _  
        & "REFERENCES Employees (EmployeeID);"
```

```
dbs.Close
```

```
End Sub
```

This example removes the foreign key from the Orders table.

```
Sub AlterTableX4()
```

```
Dim dbs As Database
```

```
' Modify this line to include the path to Northwind  
' on your computer.
```

```
Set dbs = OpenDatabase("Northwind.mdb")
```

```
' Remove the OrdersRelationship foreign key from  
' the Orders table.
```

```
dbs.Execute "ALTER TABLE Orders "  
            & "DROP CONSTRAINT OrdersRelationship;"
```

```
dbs.Close
```

```
End Sub
```

CREATE INDEX Statement Example

This example creates an index consisting of the fields Home Phone and Extension in the Employees table.

```
Sub CreateIndexX1 ()

    Dim dbs As Database

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Create the NewIndex index on the Employees table.
    dbs.Execute "CREATE INDEX NewIndex ON Employees " _
        & "(HomePhone, Extension);"

    dbs.Close

End Sub
```

This example creates an index on the Customers table using the CustomerID field. No two records can have the same data in the CustomerID field, and no **Null** values are allowed.

```
Sub CreateIndexX2 ()

    Dim dbs As Database

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Create a unique index, CustID, on the
    ' CustomerID field.
    dbs.Execute "CREATE UNIQUE INDEX CustID " _
        & "ON Customers (CustomerID) " _
        & "WITH DISALLOW NULL;"

    dbs.Close

End Sub
```

CREATE TABLE Statement, CONSTRAINT Clause Example

This example creates a new table called ThisTable with two Text fields.

```
Sub CreateTableX1()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Create a table with two text fields.  
    dbs.Execute "CREATE TABLE ThisTable "  
        & "(FirstName TEXT, LastName TEXT);"  
  
    dbs.Close  
  
End Sub
```

This example creates a new table called MyTable with two Text fields, a Date/Time field, and a unique index made up of all three fields.

```
Sub CreateTableX2()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Create a table with three fields and a unique  
    ' index made up of all three fields.  
    dbs.Execute "CREATE TABLE MyTable "  
        & "(FirstName TEXT, LastName TEXT, "  
        & "DateOfBirth DATETIME, "  
        & "CONSTRAINT MyTableConstraint UNIQUE "  
        & "(FirstName, LastName, DateOfBirth));"  
  
    dbs.Close  
  
End Sub
```

This example creates a new table with two Text fields and an Integer field. The SSN field is the primary key.

```
Sub CreateTableX3()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Create a table with three fields and a primary  
    ' key.  
    dbs.Execute "CREATE TABLE NewTable "  
        & "(FirstName TEXT, LastName TEXT, "  
        & "SSN Integer);"
```

```
& "SSN INTEGER CONSTRAINT MyFieldConstraint " _  
& "PRIMARY KEY);"
```

```
dbs.Close
```

```
End Sub
```

DROP Statement Example

The following example assumes the existence of a hypothetical NewIndex index on the Employees table in the Northwind database.

This example deletes the index MyIndex from the Employees table.

```
Sub DropX1()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Delete NewIndex from the Employees table.  
    dbs.Execute "DROP INDEX NewIndex ON Employees;"  
  
    dbs.Close  
  
End Sub
```

This example deletes the Employees table from the database.

```
Sub DropX2()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Delete the Employees table.  
    dbs.Execute "DROP TABLE Employees;"  
  
    dbs.Close  
  
End Sub
```

SELECT Statement, FROM Clause Example

Some of the following examples assume the existence of a hypothetical Salary field in an Employees table. Note that this field does not actually exist in the Northwind database Employees table.

This example creates a dynaset-type **Recordset** based on an SQL statement that selects the LastName and FirstName fields of all records in the Employees table. It calls the EnumFields procedure, which prints the contents of a **Recordset** object to the **Debug** window.

```
Sub SelectX1()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Select the last name and first name values of all  
    ' records in the Employees table.  
    Set rst = dbs.OpenRecordset("SELECT LastName, " _  
        & "FirstName FROM Employees;")  
  
    ' Populate the recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset.  
    EnumFields rst,12  
  
    dbs.Close  
  
End Sub
```

This example counts the number of records that have an entry in the PostalCode field and names the returned field Tally.

```
Sub SelectX2()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Count the number of records with a PostalCode  
    ' value and return the total in the Tally field.  
    Set rst = dbs.OpenRecordset("SELECT Count " _  
        & "(PostalCode) AS Tally FROM Customers;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of  
    ' the Recordset. Specify field width = 12.  
    EnumFields rst, 12  
  
    dbs.Close
```

End Sub

This example shows the number of employees and the average and maximum salaries.

```
Sub SelectX3()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Count the number of employees, calculate the  
    ' average salary, and return the highest salary.  
    Set rst = dbs.OpenRecordset("SELECT Count (*) " _  
        & "AS TotalEmployees, Avg(Salary) " _  
        & "AS AverageSalary, Max(Salary) " _  
        & "AS MaximumSalary FROM Employees;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of  
    ' the Recordset. Pass the Recordset object and  
    ' desired field width.  
    EnumFields rst, 17  
  
    dbs.Close
```

End Sub

The **Sub** procedure EnumFields is passed a **Recordset** object from the calling procedure. The procedure then formats and prints the fields of the **Recordset** to the **Debug** window. The `intFldLen` variable is the desired printed field width. Some fields may be truncated.

```
Sub EnumFields(rst As Recordset, intFldLen As Integer)  
  
    Dim lngRecords As Long, lngFields As Long  
    Dim lngRecCount As Long, lngFldCount As Long  
    Dim strTitle As String, strTemp As String  
  
    ' Set the lngRecords variable to the number of  
    ' records in the Recordset.  
    lngRecords = rst.RecordCount  
    ' Set the lngFields variable to the number of  
    ' fields in the Recordset.  
    lngFields = rst.Fields.Count  
  
    Debug.Print "There are " & lngRecords _  
        & " records containing " & lngFields _  
        & " fields in the recordset."  
    Debug.Print  
  
    ' Form a string to print the column heading.  
    strTitle = "Record "  
    For lngFldCount = 0 To lngFields - 1  
        strTitle = strTitle _  
            & Left(rst.Fields(lngFldCount).Name _
```

```

    & Space(intFldLen), intFldLen)
Next lngFldCount

' Print the column heading.
Debug.Print strTitle
Debug.Print

' Loop through the Recordset; print the record
' number and field values.
rst.MoveFirst
For lngRecCount = 0 To lngRecords - 1
    Debug.Print Right(Space(6) & _
        Str(lngRecCount), 6) & " ";
    For lngFldCount = 0 To lngFields - 1
        ' Check for Null values.
        If IsNull(rst.Fields(lngFldCount)) Then
            strTemp = "<null>"
        Else
            ' Set strTemp to the field contents.
            Select Case _
                rst.Fields(lngFldCount).Type
            Case 11
                strTemp = ""
            Case dbText, dbMemo
                strTemp = _
                    rst.Fields(lngFldCount)
            Case Else
                strTemp = _
                    str(rst.Fields(lngFldCount))
            End Select
        End If
        Debug.Print Left(strTemp _
            & Space(intFldLen), intFldLen);
    Next lngFldCount
    Debug.Print
    rst.MoveNext
Next lngRecCount

End Sub

```

IN Clause Example

The following table shows how you can use the IN clause to retrieve data from an external database. In each example, assume the hypothetical Customers table is stored in an external database.

| External database | SQL statement |
|--|---|
| Microsoft Jet database | <pre>SELECT CustomerID FROM Customers IN OtherDB.mdb WHERE CustomerID Like "A*";</pre> |
| dBASE III or IV. To retrieve data from a dBASE III table, substitute "dBASE III;" for "dBASE IV;". | <pre>SELECT CustomerID FROM Customer IN "C:\DBASE\DATA\SALES" "dBASE IV;" WHERE CustomerID Like "A*";</pre> |
| dBASE III or IV using Database syntax. | <pre>SELECT CustomerID FROM Customer IN "" [dBASE IV; Database=C: \DBASE\DATA\SALES;] WHERE CustomerID Like "A*";</pre> |
| Paradox 3.x or 4.x. To retrieve data from a Paradox version 3.x table, substitute "Paradox 3.x;" for "Paradox 4.x;". | <pre>SELECT CustomerID FROM Customer IN "C:\PARADOX\DATA\SALES" "Paradox 4.x;" WHERE CustomerID Like "A*";</pre> |
| Paradox 3.x or 4.x using Database syntax. | <pre>SELECT CustomerID FROM Customer IN "" [Paradox 4.x;Database=C: \PARADOX\DATA\SALES;] WHERE CustomerID Like "A*";</pre> |
| A Microsoft Excel worksheet | <pre>SELECT CustomerID, CompanyName FROM [Customers\$] IN "c:\documents\xldata.xls" "EXCEL 5.0;" WHERE CustomerID Like "A*" ORDER BY CustomerID;</pre> |
| A named range in a worksheet | <pre>SELECT CustomerID, CompanyName FROM CustomersRange IN "c:\documents\xldata.xls" "EXCEL 5.0;" WHERE CustomerID Like "A*" ORDER BY CustomerID;</pre> |

In Operator Example

The following example uses the Orders table in the Northwind.mdb database to create a query that includes all orders shipped to Lancashire and Essex and the dates shipped.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub InX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Select records from the Orders table that  
    ' have a ShipRegion value of Lancashire or Essex.  
    Set rst = dbs.OpenRecordset("SELECT " _  
        & "CustomerID, ShippedDate FROM Orders " _  
        & "WHERE ShipRegion In " _  
        & "('Lancashire', 'Essex');" )  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of  
    ' the Recordset.  
    EnumFields rst, 12  
  
    dbs.Close  
  
End Sub
```

WHERE Clause Example

The following example assumes the existence of a hypothetical Salary field in an Employees table. Note that this field does not actually exist in the Northwind database Employees table.

This example selects the LastName and FirstName fields of each record in which the last name is King.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub WhereX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Select records from the Employees table where the
    ' last name is King.
    Set rst = dbs.OpenRecordset("SELECT LastName, " _
        & "FirstName FROM Employees " _
        & "WHERE LastName = 'King';")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset.
    EnumFields rst, 12

    dbs.Close

End Sub
```

GROUP BY Clause Example

This example creates a list of unique job titles and the number of employees with each title.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub GroupByX1()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' For each title, count the number of employees  
    ' with that title.  
    Set rst = dbs.OpenRecordset("SELECT Title, " _  
        & "Count([Title]) AS Tally " _  
        & "FROM Employees GROUP BY Title;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 25  
  
    dbs.Close  
  
End Sub
```

For each unique job title, this example calculates the number of employees in Washington who have that title.

```
Sub GroupByX2()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' For each title, count the number of employees  
    ' with that title. Only include employees in the  
    ' Washington region.  
    Set rst = dbs.OpenRecordset("SELECT Title, " _  
        & "Count(Title) AS Tally " _  
        & "FROM Employees WHERE Region = 'WA' " _  
        & "GROUP BY Title;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.
```

```
EnumFields rst, 25
```

```
  dbs.Close
```

```
End Sub
```

HAVING Clause Example

This example selects the job titles assigned to more than one employee in the Washington region.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub HavingX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Select the job titles assigned to more than one
    ' employee in the Washington region.
    Set rst = dbs.OpenRecordset("SELECT Title, " _
        & "Count(Title) as Total FROM Employees " _
        & "WHERE Region = 'WA' " _
        & "GROUP BY Title HAVING Count(Title) > 1;")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print recordset contents.
    EnumFields rst, 25

    dbs.Close

End Sub
```

ORDER BY Clause Example

The SQL statement shown in the following example uses the ORDER BY clause to sort records by last name in descending order (Z-A).

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub OrderByX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Select the last name and first name values from  
    ' the Employees table, and sort them in descending  
    ' order.  
    Set rst = dbs.OpenRecordset("SELECT LastName, " _  
        & "FirstName FROM Employees " _  
        & "ORDER BY LastName DESC;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print recordset contents.  
    EnumFields rst, 12  
  
    dbs.Close  
  
End Sub
```

ALL, DISTINCT, DISTINCTROW, TOP Predicates Example

This example creates a query that joins the Customers and Orders tables on the CustomerID field. The Customers table contains no duplicate CustomerID fields, but the Orders table does because each customer can have many orders. Using DISTINCTROW produces a list of companies that have at least one order but without any details about those orders.

```
Sub AllDistinctX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Join the Customers and Orders tables on the
    ' CustomerID field. Select a list of companies
    ' that have at least one order.
    Set rst = dbs.OpenRecordset("SELECT DISTINCTROW " _
        & "CompanyName FROM Customers " _
        & "INNER JOIN Orders " _
        & "ON Customers.CustomerID = " _
        & "Orders.CustomerID " _
        & "ORDER BY CompanyName;")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 25

    dbs.Close

End Sub
```

DELETE Statement Example

This example deletes all records for employees whose title is Trainee. When the FROM clause includes only one table, you don't have to list the table name in the DELETE statement.

```
Sub DeleteX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Delete employee records where title is Trainee.  
    dbs.Execute "DELETE * FROM "  
        & "Employees WHERE Title = 'Trainee';"  
  
    dbs.Close  
  
End Sub
```

INNER JOIN Operation Example

This example creates two equi-joins: one between the Order Details and Orders tables and another between the Orders and Employees tables. This is necessary because the Employees table doesn't contain sales data, and the Order Details table doesn't contain employee data. The query produces a list of employees and their total sales.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub InnerJoinX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Create a join between the Order Details and
    ' Orders tables and another between the Orders and
    ' Employees tables. Get a list of employees and
    ' their total sales.
    Set rst = dbs.OpenRecordset("SELECT DISTINCTROW " _
        & "Sum(UnitPrice * Quantity) AS Sales, " _
        & "(FirstName & Chr(32) & LastName) AS Name " _
        & "FROM Employees INNER JOIN(Orders " _
        & "INNER JOIN [Order Details] " _
        & "ON [Order Details].OrderID = " _
        & "Orders.OrderID ) " _
        & "ON Orders.EmployeeID = " _
        & "Employees.EmployeeID " _
        & "GROUP BY (FirstName & Chr(32) & LastName);")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 20

    dbs.Close

End Sub
```

INSERT INTO Statement Example

This example selects all records in a hypothetical New Customers table and adds them to the Customers table. When individual columns are not designated, the SELECT table column names must match exactly those in the INSERT INTO table.

```
Sub InsertIntoX1()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Select all records in the New Customers table  
    ' and add them to the Customers table.  
    dbs.Execute " INSERT INTO Customers " _  
        & "SELECT * " _  
        & "FROM [New Customers];"  
  
    dbs.Close  
  
End Sub
```

This example creates a new record in the Employees table.

```
Sub InsertIntoX2()  
  
    Dim dbs As Database  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Create a new record in the Employees table. The  
    ' first name is Harry, the last name is Washington,  
    ' and the job title is Trainee.  
    dbs.Execute " INSERT INTO Employees " _  
        & "(FirstName,LastName, Title) VALUES " _  
        & "('Harry', 'Washington', 'Trainee');"  
  
    dbs.Close  
  
End Sub
```

LEFT JOIN, RIGHT JOIN Operations Example

This example assumes the existence of hypothetical Department Name and Department ID fields in an Employees table. Note that these fields do not actually exist in the Northwind database Employees table.

This example selects all departments, including those without employees.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub LeftRightJoinX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Select all departments, including those
    ' without employees.
    Set rst = dbs.OpenRecordset _
        ("SELECT [Department Name], " _
        & "FirstName & Chr(32) & LastName AS Name " _
        & "FROM Departments LEFT JOIN Employees " _
        & "ON Departments.[Department ID] = " _
        & "Employees.[Department ID] " _
        & "ORDER BY [Department Name];")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 20

    dbs.Close

End Sub
```

PARAMETERS Declaration Example

This example requires the user to provide a job title and then uses that job title as the criteria for the query.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub ParametersX()

    Dim dbs As Database, qdf As QueryDef
    Dim rst As Recordset
    Dim strSql As String, strParm As String
    Dim strMessage As String
    Dim intCommand As Integer

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("NorthWind.mdb")

    ' Define the parameters clause.
    strParm = "PARAMETERS [Employee Title] TEXT; "

    ' Define an SQL statement with the parameters
    ' clause.
    strSql = strParm & "SELECT LastName, FirstName, " _
        & "EmployeeID " _
        & "FROM Employees " _
        & "WHERE Title =[Employee Title];"

    ' Create a QueryDef object based on the
    ' SQL statement.
    Set qdf = dbs.CreateQueryDef _
        ("Find Employees", strSql)

    Do While True
        strMessage = "Find Employees by Job " _
            & "title:" & Chr(13) _
            & "  Choose Job Title:" & Chr(13) _
            & "    1 - Sales Manager" & Chr(13) _
            & "    2 - Sales Representative" & Chr(13) _
            & "    3 - Inside Sales Coordinator"

        intCommand = Val(InputBox(strMessage))

        Select Case intCommand
            Case 1
                qdf("Employee Title") = _
                    "Sales Manager"
            Case 2
                qdf("Employee Title") = _
                    "Sales Representative"
            Case 3
                qdf("Employee Title") = _
                    "Inside Sales Coordinator"
            Case Else
                Exit Do
        End Select
    End While
End Sub
```

```
' Create a temporary snapshot-type Recordset.
Set rst = qdf.OpenRecordset(dbOpenSnapshot)
' Populate the Recordset.
rst.MoveLast

' Call EnumFields to print the contents of the
' Recordset. Pass the Recordset object and desired
' field width.
EnumFields rst, 12
Loop

' Delete the QueryDef because this is a
' demonstration.
dbs.QueryDefs.Delete "Find Employees"

dbs.Close

End Sub
```

PROCEDURE Clause Example

This example names the query CategoryList.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub ProcedureX()  
  
    Dim dbs As Database, rst As Recordset  
    Dim qdf As QueryDef, strSql As String  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    strSql = "PROCEDURE CategoryList; " _  
        & "SELECT DISTINCTROW CategoryName, " _  
        & "CategoryID FROM Categories " _  
        & "ORDER BY CategoryName;"  
  
    ' Create a named QueryDef based on the SQL  
    ' statement.  
    Set qdf = dbs.CreateQueryDef("NewQry", strSql)  
  
    ' Create a temporary snapshot-type Recordset.  
    Set rst = qdf.OpenRecordset(dbOpenSnapshot)  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 15  
  
    ' Delete the QueryDef because this is a  
    ' demonstration.  
    dbs.QueryDefs.Delete "NewQry"  
  
    dbs.Close  
  
End Sub
```

SELECT...INTO Statement Example

This example selects all records in the Employees table and copies them into a new table named Emp Backup.

```
Sub SelectIntoX()

    Dim dbs As Database
    Dim qdf As QueryDef

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Select all records in the Employees table
    ' and copy them into a new table, Emp Backup.
    dbs.Execute "SELECT Employees.* INTO " & _
        & "[Emp Backup] FROM Employees;"

    ' Delete the table because this is a demonstration.
    dbs.Execute "DROP TABLE [Emp Backup];"

    dbs.Close

End Sub
```

TRANSFORM Statement Example

This example uses the SQL TRANSFORM clause to create a crosstab query showing the number of orders taken by each employee for each calendar quarter of 1994. The SQLTRANSFORMOutput function is required for this procedure to run.

```
Sub TransformX1()

    Dim dbs As Database
    Dim strSQL As String
    Dim qdfTRANSFORM As QueryDef

    strSQL = "PARAMETERS prmYear SHORT; TRANSFORM " & _
        & "Count(OrderID) " & _
        & "SELECT FirstName & " " & LastName AS " & _
        & "FullName FROM Employees INNER JOIN Orders " & _
        & "ON Employees.EmployeeID = " & _
        & "Orders.EmployeeID WHERE DatePart " & _
        & "(" & "yyyy", OrderDate) = [prmYear] " & _

    strSQL = strSQL & "GROUP BY FirstName & " & _
        & " " & LastName " & _
        & "ORDER BY FirstName & " " & LastName " & _
        & "PIVOT DatePart(" & "q", OrderDate) " & _

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    Set qdfTRANSFORM = dbs.CreateQueryDef _
        ("", strSQL)

    SQLTRANSFORMOutput qdfTRANSFORM, 1994

    dbs.Close

End Sub
```

This example uses the SQL TRANSFORM clause to create a slightly more complex crosstab query showing the total dollar amount of orders taken by each employee for each calendar quarter of 1994. The SQLTRANSFORMOutput function is required for this procedure to run.

```
Sub TransformX2()

    Dim dbs As Database
    Dim strSQL As String
    Dim qdfTRANSFORM As QueryDef

    strSQL = "PARAMETERS prmYear SHORT; TRANSFORM " & _
        & "Sum(Subtotal) SELECT FirstName & " " " & _
        & "& LastName AS FullName " & _
        & "FROM Employees INNER JOIN " & _
        & "(Orders INNER JOIN [Order Subtotals] " & _
        & "ON Orders.OrderID = " & _
        & "[Order Subtotals].OrderID) " & _
        & "ON Employees.EmployeeID = " & _
        & "Orders.EmployeeID WHERE DatePart" & _
```

```

    & "(" & "yyyy" & ", OrderDate) = [prmYear] "

strSQL = strSQL & "GROUP BY FirstName & " " " " " _
    & "& LastName " _
    & "ORDER BY FirstName & " " " & LastName " _
    & "PIVOT DatePart("q", OrderDate) "

' Modify this line to include the path to Northwind
' on your computer.
Set dbs = OpenDatabase("Northwind.mdb")

Set qdfTRANSFORM = dbs.CreateQueryDef _
    ("", strSQL)

SQLTRANSFORMOutput qdfTRANSFORM, 1994

dbs.Close

End Sub

Function SQLTRANSFORMOutput(qdfTemp As QueryDef, _
    intYear As Integer)

    Dim rstTRANSFORM As Recordset
    Dim fldLoop As Field
    Dim booFirst As Boolean

    qdfTemp.PARAMETERS!prmYear = intYear
    Set rstTRANSFORM = qdfTemp.OpenRecordset()

    Debug.Print qdfTemp.SQL
    Debug.Print
    Debug.Print , , "Quarter"

    With rstTRANSFORM
        booFirst = True
        For Each fldLoop In .Fields
            If booFirst = True Then
                Debug.Print fldLoop.Name
                Debug.Print , ;
                booFirst = False
            Else
                Debug.Print , fldLoop.Name;
            End If
        Next fldLoop
        Debug.Print

        Do While Not .EOF
            booFirst = True
            For Each fldLoop In .Fields
                If booFirst = True Then
                    Debug.Print fldLoop
                    Debug.Print , ;
                    booFirst = False
                Else
                    Debug.Print , fldLoop;
                End If
            Next fldLoop
        Loop
    End With
End Function

```

```
        Next fldLoop
        Debug.Print
        .MoveNext
    Loop
End With

End Function
```

UPDATE Statement Example

This example changes values in the ReportsTo field to 5 for all employee records that currently have ReportsTo values of 2.

```
Sub UpdateX()  
  
    Dim dbs As Database  
    Dim qdf As QueryDef  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Change values in the ReportsTo field to 5 for all  
    ' employee records that currently have ReportsTo  
    ' values of 2.  
    dbs.Execute "UPDATE Employees " _  
        & "SET ReportsTo = 5 " _  
        & "WHERE ReportsTo = 2;"  
  
    dbs.Close  
  
End Sub
```

UNION Operation Example

This example retrieves the names and cities of all suppliers and customers in Brazil.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub UnionX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Retrieve the names and cities of all suppliers
    ' and customers in Brazil.
    Set rst = dbs.OpenRecordset("SELECT CompanyName, " _
        & " City FROM Suppliers" _
        & " WHERE Country = 'Brazil' UNION" _
        & " SELECT CompanyName, City FROM Customers" _
        & " WHERE Country = 'Brazil';")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 12

    dbs.Close

End Sub
```

SQL Subqueries Example

This example lists the name and contact of every customer who placed an order in the second quarter of 1995.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub SubQueryX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' List the name and contact of every customer
    ' who placed an order in the second quarter of
    ' 1995.
    Set rst = dbs.OpenRecordset("SELECT ContactName, " _
        & " CompanyName, ContactTitle, Phone" _
        & " FROM Customers" _
        & " WHERE CustomerID" _
        & " IN (SELECT CustomerID FROM Orders" _
        & " WHERE OrderDate Between #04/1/95#" _
        & " And #07/1/95#);")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 25

    dbs.Close

End Sub
```

Avg Function Example

This example uses the Orders table to calculate the average freight charges for orders with freight charges over \$100.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub AvgX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Calculate the average freight charges for orders  
    ' with freight charges over $100.  
    Set rst = dbs.OpenRecordset("SELECT Avg(Freight)" _  
        & " AS [Average Freight]" _  
        & " FROM Orders WHERE Freight > 100;")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 25  
  
    dbs.Close  
  
End Sub
```

Count Function Example

This example uses the Orders table to calculate the number of orders shipped to the United Kingdom. This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub CountX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Calculate the number of orders shipped  
    ' to the United Kingdom.  
    Set rst = dbs.OpenRecordset("SELECT" _  
        & " Count (ShipCountry)" _  
        & " AS [UK Orders] FROM Orders" _  
        & " WHERE ShipCountry = 'UK';")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 25  
  
    dbs.Close  
  
End Sub
```

First, Last Functions Example

This example uses the Employees table to return the values from the LastName field of the first and last records returned from the table.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub FirstLastX1()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Return the values from the LastName field of the
    ' first and last records returned from the table.
    Set rst = dbs.OpenRecordset("SELECT " & _
        & "First(LastName) as First, " & _
        & "Last(LastName) as Last FROM Employees;")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 12

    dbs.Close

End Sub
```

The next example compares using the **First** and **Last** functions with simply using the **Min** and **Max** functions to find the earliest and latest birth dates of Employees.

```
Sub FirstLastX2()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Find the earliest and latest birth dates of
    ' Employees.
    Set rst = dbs.OpenRecordset("SELECT " & _
        & "First(BirthDate) as FirstBD, " & _
        & "Last(BirthDate) as LastBD FROM Employees;")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 12

End Sub
```

```
Debug.Print

' Find the earliest and latest birth dates of
' Employees.
Set rst = dbs.OpenRecordset("SELECT " _
    & "Min(BirthDate) as MinBD," _
    & "Max(BirthDate) as MaxBD FROM Employees;")

' Populate the Recordset.
rst.MoveLast

' Call EnumFields to print the contents of the
' Recordset. Pass the Recordset object and desired
' field width.
EnumFields rst, 12

dbs.Close

End Sub
```

Min, Max Functions Example

This example uses the Orders table to return the lowest and highest freight charges for orders shipped to the United Kingdom.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub MinMaxX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Return the lowest and highest freight charges for  
    ' orders shipped to the United Kingdom.  
    Set rst = dbs.OpenRecordset("SELECT "  
        & "Min(Freight) AS [Low Freight], "  
        & "Max(Freight)AS [High Freight] "  
        & "FROM Orders WHERE ShipCountry = 'UK';")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 12  
  
    dbs.Close  
  
End Sub
```

StDev, StDevP Functions Example

This example uses the Orders table to estimate the standard deviation of the freight charges for orders shipped to the United Kingdom.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub StDevX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Calculate the standard deviation of the freight
    ' charges for orders shipped to the United Kingdom.
    Set rst = dbs.OpenRecordset("SELECT " & _
        & "StDev(Freight) " & _
        & "AS [Freight Deviation] FROM Orders " & _
        & "WHERE ShipCountry = 'UK';")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 15

    Debug.Print

    Set rst = dbs.OpenRecordset("SELECT " & _
        & "StDevP(Freight) " & _
        & "AS [Freight DevP] FROM Orders " & _
        & "WHERE ShipCountry = 'UK';")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 15

    dbs.Close

End Sub
```

Sum Function Example

This example uses the Orders table to calculate the total sales for orders shipped to the United Kingdom.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub SumX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Calculate the total sales for orders shipped to  
    ' the United Kingdom.  
    Set rst = dbs.OpenRecordset("SELECT" _  
        & " Sum(UnitPrice*Quantity)" _  
        & " AS [Total UK Sales] FROM Orders" _  
        & " INNER JOIN [Order Details] ON" _  
        & " Orders.OrderID = [Order Details].OrderID" _  
        & " WHERE (ShipCountry = 'UK');")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 15  
  
    dbs.Close  
  
End Sub
```

Var, VarP Functions Example

This example uses the Orders table to estimate the variance of freight costs for orders shipped to the United Kingdom.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub VarX()  
  
    Dim dbs As Database, rst As Recordset  
  
    ' Modify this line to include the path to Northwind  
    ' on your computer.  
    Set dbs = OpenDatabase("Northwind.mdb")  
  
    ' Calculate the variance of freight costs for  
    ' orders shipped to the United Kingdom.  
    Set rst = dbs.OpenRecordset("SELECT " _  
        & "Var(Freight) " _  
        & "AS [UK Freight Variance] " _  
        & "FROM Orders WHERE ShipCountry = 'UK';")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 20  
  
    Debug.Print  
  
    Set rst = dbs.OpenRecordset("SELECT " _  
        & "VarP(Freight) " _  
        & "AS [UK Freight VarianceP] " _  
        & "FROM Orders WHERE ShipCountry = 'UK';")  
  
    ' Populate the Recordset.  
    rst.MoveLast  
  
    ' Call EnumFields to print the contents of the  
    ' Recordset. Pass the Recordset object and desired  
    ' field width.  
    EnumFields rst, 20  
  
    dbs.Close  
  
End Sub
```

Like Operator Example

This example returns a list of employees whose names begin with the letters A through D.

This example calls the EnumFields procedure, which you can find in the SELECT statement example.

```
Sub LikeX()

    Dim dbs As Database, rst As Recordset

    ' Modify this line to include the path to Northwind
    ' on your computer.
    Set dbs = OpenDatabase("Northwind.mdb")

    ' Return a list of employees whose names begin with
    ' the letters A through D.
    Set rst = dbs.OpenRecordset("SELECT LastName, " _
        & " FirstName FROM Employees" _
        & " WHERE LastName Like '[A-D]*';")

    ' Populate the Recordset.
    rst.MoveLast

    ' Call EnumFields to print the contents of the
    ' Recordset. Pass the Recordset object and desired
    ' field width.
    EnumFields rst, 15

    dbs.Close

End Sub
```

Customizing Windows Registry Settings for Data Access Objects

{ewc HLP95EN.DLL,DYNALINK,"See Also":"dahowCustomizingDataAccessC"} {ewc HLP95EN.DLL,DYNALINK,"Specifics":"dahowCustomizingDataAccessS"}

If your application cannot work correctly with the default functionality of the Microsoft Jet database engine, you may have to change the settings in the Windows Registry to suit your needs. The Windows Registry can also be used to tune the operation of the installable ISAM and ODBC driver. If your application can't accept the default behavior of the drivers, which is loaded from the shadow settings, you must create an entry in the Windows Registry for your Microsoft Jet client application and override the default settings to get the appropriate behavior from your application.

Note You should not directly modify settings in the ISAM Formats subfolder. If you need to make any modifications to these settings, use the setup program provided with the drivers to ensure that these changes are correctly made.

To register Jet database engine settings for your application, create a Jet portion in your application's registry tree to manage the settings for the Jet database engine. Then, add any values you want to specify to the registry tree. If you have supplied any values in the Engines subfolder, Microsoft Jet loads those settings when the application starts. Any values not entered in your client application's registry tree are loaded from shadow settings.

For example, to register Jet database engine settings for an application named "Soccer.exe" you would create a client registry tree similar to the following:

```
HKEY_LOCAL_MACHINE\SOFTWARE\MyApps\Soccer\Jet\3.5\Engines
```

In the registry tree, you could override the default settings for the Jet database engine ISAM by setting the PageTimeout to a lower value (the default value is 5, or 500 milliseconds). By setting PageTimeout to 1, your application will invalidate data in the internal cache in 100 milliseconds. To register this new setting for your application, set the

HKEY_LOCAL_MACHINE\SOFTWARE\MyApps\Soccer\Jet\3.5\Engines\PageTimeout value to 1. When you start the application, the Jet database engine instance associated with Soccer.exe is configured with all settings in

HKEY_LOCAL_MACHINE\SOFTWARE\MyApps\Soccer\Jet\3.5\Engines. Any settings not indicated in your client's registry tree will be loaded from the Jet database engine shadow settings for the client machine. For example, if the client application registry folder

HKEY_LOCAL_MACHINE\SOFTWARE\MyApps\Soccer\Jet\3.5\Engines\Jet 3.5 contains only one entry that sets the value of PageTimeout to 1, only that setting will be changed from the default values found in HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Jet\3.5 during application initialization.

You can also edit the Windows Registry to specify:

- Settings used for interaction with Microsoft FoxPro, Paradox, and dBASE databases. See Initializing the Paradox Database Driver, Initializing the Microsoft FoxPro Database Driver, and Initializing the dBASE Database Driver.
- Settings used by Microsoft ODBC for interaction with SQL databases. See Initializing the Microsoft ODBC Database Driver.
- Settings that affect how the Jet database engine reads and saves data. See Initializing the Microsoft Jet Engine Database Driver.

Initializing the dBASE Database Driver

```
{ewc HLP95EN.DLL,DYNALINK,"See Also":"dahowChangingdBASEC"} {ewc  
HLP95EN.DLL,DYNALINK,"Specifics":"dahowChangingdBASES"}
```

When you install the dBASE database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the dBASE database driver.

dBASE Initialization Settings

The Jet\3.5\Engines\Xbase folder includes initialization settings for the Msxbse35.dll driver, used for access to external dBASE data sources. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSXBSE35.dll  
NetworkAccess=On  
PageTimeout=600  
INFPPath=C:\DBASE\SYSTEM  
CollatingSequence=ASCII  
DataCodePage=OEM  
Deleted=On  
Century=Off  
Date=MDY  
Mark=47  
Exact=Off
```

The Microsoft Jet database engine uses the Xbase folder entries as follows.

| <u>Entry</u> | <u>Description</u> |
|---------------|---|
| win32 | The location of Msxbse.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| NetworkAccess | A binary indicator for file locking preference. If NetworkAccess is set to 00, tables are opened for exclusive access, regardless of the settings of the OpenDatabase and OpenRecordset methods' <i>exclusive</i> argument. The default value is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| PageTimeout | The length of time between when data is placed in an internal cache and when it is invalidated. The value is specified in 100 millisecond units. The default is 600 units or 60 seconds. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| INFPPath | The full path to the .inf file directory. The Microsoft Jet database engine first looks for an .inf file in the directory containing the table. If the .inf file isn't in the database directory, it looks in the INFPPath. If there is no INFPPath, it uses whatever index files (.cdx or .mdx) it finds in the database directory. Values are of type String for |

| | |
|-------------------|---|
| | Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| | This entry is not written by the installation procedure. |
| CollatingSequence | The collating sequence for all dBASE tables created or opened using Microsoft Jet. Possible values are ASCII and International. The default is ASCII. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| DataCodePage | An indicator of how text pages are stored. Possible settings are: <ul style="list-style-type: none"> • OEM OemToAnsi and AnsiToOem conversions done. • ANSI OemToAnsi and AnsiToOem conversions not done. The default is OEM. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| Deleted | A binary indicator that determines how records marked for deletion are handled by the Microsoft Jet database engine. A value of 01 corresponds to the dBASE command SET DELETED ON and indicates never to retrieve or position on a deleted record. A value of 00 corresponds to the dBASE command SET DELETED OFF and indicates to treat a deleted record like any other record. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| Century | A binary indicator for formatting the century component of dates in cases where date-to-string functions are used in index expressions. A value of 01 corresponds to the dBASE command SET CENTURY ON and a value of 00 corresponds to the dBASE command SET CENTURY OFF. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| Date | The date formatting style to use in cases where date-to-string functions are used in index expressions. The possible settings for this entry, which corresponds to the dBASE SET DATE command, are American, ANSI, British, French, DMY, German, Italian, Japan, MDY, USA, and YMD. The default is MDY. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| Mark | The decimal value of the ASCII character used to separate date parts. The default depends on the Date setting as follows: <ul style="list-style-type: none"> • "/" (American, MDY) |

- "." (ANSI)
- "/" (British, French, DMY)
- "." (German)
- "-" (Italian)
- "/" (Japan, YMD)
- "-" (USA)

A value of 0 specifies that the system should use the separator usually associated with the selected date format.

The default is 0. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

Exact

A binary indicator for string comparisons. A value of 01 corresponds to the dBASE command SET EXACT ON. A value of 00 corresponds to the dBASE command SET EXACT OFF. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.

dBASE ISAM Formats

The Jet\3.5\ISAM Formats\dBASE III folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|--|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | dBASE III (*.dbf) |
| ImportFilter | REG_SZ | String | dBASE III (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | dBASE Index (*.ndx) |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a dBASE III file. This |

process will overwrite the data if exported to an existing file.

The Jet\3.5\ISAM Formats\dBASE IV folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | dBASE IV (*.dbf) |
| ImportFilter | REG_SZ | String | dBASE IV (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | dBASE Index (*.ndx; *.mdx) |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a dBASE IV file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\dBASE 5.x folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|-----------------|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | dBASE 5 (*.dbf) |
| ImportFilter | REG_SZ | String | dBASE 5 (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |

| | | | |
|------------------|------------|--------|--|
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | dBASE Index (*.ndx; *.mdx) |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a dBASE 5 file. This process will overwrite the data if exported to an existing file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Lotus Driver

```
{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingLotusC "} {ewc HLP95EN.dll, DYNALINK,  
"Specifics":"dahowChangingLotusS "}
```

When you install the Lotus database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Lotus database driver.

Lotus Initialization Settings

The Jet\3.5\Engines\Lotus folder includes initialization settings for the Msltus35.dll driver, used for external access to Lotus spreadsheets. Typical settings for the entries under this heading are shown in the following example.

```
win32=<pathname>\MSLTUS35.dll  
TypeGuessRows=8  
ImportMixedTypes=Text  
AppendBlankRows=4  
FirstRowHasNames=Yes
```

The Microsoft Jet database engine uses the Lotus folder entries as follows.

| Entry | Description |
|------------------|---|
| win32 | The location of Msltus35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| TypeGuessRows | The number of rows to be checked for the data type. The data type is determined based on the most frequently found data type in the selection. If there is a tie, the data type is determined in the following order: Number, Currency, Date, Text, Long Text. If data is encountered that does not match the data type guessed for the column, it is returned as a Null value. On import, if a column has mixed data types, the entire column will be converted according to the ImportMixedTypes setting. The default number of rows to be checked is 8. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| ImportMixedTypes | Can be set to MajorityType or Text. If set to MajorityType, columns of mixed data types will be cast to the predominate data type on import. If set to Text, columns of mixed data types will be cast to Text on import. The default is Text. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| AppendBlankRows | The number of blank rows to be appended to the end of a WK1 worksheet before new data is added. For example, if AppendBlankRows is set to 4, Microsoft Jet will append 4 blank rows to |

the end of the worksheet before appending rows that contain data. Integer values for this setting can range from 0 to 16; the default is 0 (no additional rows appended). Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

FirstRowHasNames A binary value that indicates whether the first row of the table contains column names. A value of 01 indicates that, during import, column names are taken from the first row. A value of 00 indicates no column names in the first row; column names appear as F1, F2, F3, and so on. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.

Lotus ISAM Formats

The Jet\3.5\ISAM Formats\Lotus WK1 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Lotus |
| ExportFilter | REG_SZ | String | Lotus 1-2-3 WK1 (*.wk1) |
| ImportFilter | REG_SZ | String | Lotus 1-2-3 (*.wk*;*.wj*) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Lotus 1-2-3 Version 2 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\Lotus WK3 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--------------|
|-------------------|-----------------------------|---|--------------|

| | | | |
|------------------|------------|--------|--|
| Engine | REG_SZ | String | Lotus |
| ExportFilter | REG_SZ | String | Lotus 1-2-3 WK3 (*.wk3) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Lotus 1-2-3 Version 3 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\Lotus WK4 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--------------|
| Engine | REG_SZ | String | Lotus |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Microsoft Excel Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingExcelC "}
"Specifics":"dahowChangingExcelS "}

When you install the Microsoft Excel database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Microsoft Excel database driver.

Microsoft Excel Initialization Settings

The Jet\3.5\Engines\Excel folder includes initialization settings for the Msexcl35.dll driver, used for external access to Microsoft Excel worksheets. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSEXCL35.dll  
TypeGuessRows=8  
ImportMixedTypes=Text  
AppendBlankRows=4  
FirstRowHasNames=Yes
```

The Microsoft Jet database engine uses the Excel folder entries as follows.

| Entry | Description |
|------------------|--|
| win32 | The location of Msexcl35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| TypeGuessRows | The number of rows to be checked for the data type. The data type is determined given the maximum number of kinds of data found. If there is a tie, the data type is determined in the following order: Number, Currency, Date, Text, Boolean. If data is encountered that does not match the data type guessed for the column, it is returned as a Null value. On import, if a column has mixed data types, the entire column will be cast according to the ImportMixedTypes setting. The default number of rows to be checked is 8. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| ImportMixedTypes | Can be set to MajorityType or Text. If set to MajorityType, columns of mixed data types will be cast to the predominate data type on import. If set to Text, columns of mixed data types will be cast to Text on import. The default is Text. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| AppendBlankRows | The number of blank rows to be appended to the end of a Version 3.5 or Version 4.0 |

worksheet before new data is added. For example, if AppendBlankRows is set to 4, Microsoft Jet will append 4 blank rows to the end of the worksheet before appending rows that contain data. Integer values for this setting can range from 0 to 16; the default is 0 (no additional rows appended). Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

FirstRowHasNames

A binary value that indicates whether the first row of the table contains column names. A value of 01 indicates that, during import, column names are taken from the first row. A value of 00 indicates no column names in the first row; column names appear as F1, F2, F3, and so on. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.

Microsoft Excel ISAM Formats

The Jet\3.5\ISAM Formats\Excel 3.0 folder contains the following entries.

| Entry name | Windows NT Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|-----------------|------------------------------------|--|
| Engine | REG_SZ | String | Excel |
| ExportFilter | REG_SZ | String | Microsoft Excel 3 (*.xls) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft Excel 3.0 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\Excel 4.0 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|--------------|----------------------|------------------------------------|---------------------------|
| Engine | REG_SZ | String | Excel |
| ExportFilter | REG_SZ | String | Microsoft Excel 4 (*.xls) |
| CanLink | REG_BINARY | Binary | 01 |

| | | | |
|------------------|------------|--------|--|
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft Excel 4.0 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\Excel 5.0 folder contains the following entries, which apply to Microsoft Excel versions 5.0 and 7.0.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Excel |
| ExportFilter | REG_SZ | String | Microsoft Excel 5-7 (*.xls) |
| ImportFilter | REG_SZ | String | Microsoft Excel (*.xls) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft Excel 5.0 file. This process will overwrite the data if exported to an |

existing file.

The Jet\3.5\ISAM Formats\Excel 8.0 folder contains the following entries, which apply to Microsoft Excel 97.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|---------------------------------|---|---|
| Engine | REG_SZ | String | Excel |
| ExportFilter | REG_SZ | String | Microsoft Excel 97 |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 1 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 01 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft Excel 97 file. This process will overwrite the data if exported to an existing file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Microsoft FoxPro Database Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingFoxProC "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingFoxProS "}

When you install the Microsoft FoxPro database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Microsoft FoxPro database driver.

Microsoft FoxPro Initialization Settings

The Jet\3.5\Engines\Xbase folder includes initialization settings for the Msxbse35.dll driver, used for access to external FoxPro data sources. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSXBSE35.dll
NetworkAccess=On
PageTimeout=600
INFPPath=C:\DBASE\SYSTEM
CollatingSequence=ASCII
DataCodePage=OEM
Deleted=Off
Century=Off
Date=MDY
Mark=47
Exact=Off
```

The Microsoft Jet database engine uses the Xbase folder entries as follows.

| Entry | Description |
|---------------|---|
| win32 | The location of Msxbse35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| NetworkAccess | A binary indicator for file locking preference. If NetworkAccess is set to 00, tables are opened for exclusive access, regardless of the settings of the OpenDatabase and OpenRecordset methods' <i>exclusive</i> argument. The default value is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| PageTimeout | The length of time between when data is placed in an internal cache and when it is invalidated. The value is specified in 100 millisecond units. The default is 600 units or 60 seconds. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| INFPPath | The full path to the .inf file directory. The Microsoft Jet database engine first looks for an .inf file in the directory containing the table. If the .inf file isn't in the database directory, it looks in the INFPPath. If there is no INFPPath, it uses |

| | |
|-------------------|--|
| | <p>whatever index files (.cdx or .mdx) it finds in the database directory. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> <p>This entry is not written by the installation procedure.</p> |
| CollatingSequence | <p>The collating sequence for all Microsoft FoxPro tables created or opened using Microsoft Jet. Possible values are ASCII and International. The default is ASCII. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> |
| DataCodePage | <p>An indicator of how text pages are stored. Possible settings are:</p> <ul style="list-style-type: none"> • OEM OemToAnsi and AnsiToOem conversions done. • ANSI OemToAnsi and AnsiToOem conversions not done. <p>The default is OEM. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> |
| Deleted | <p>A binary indicator that determines how records marked for deletion are handled by the Microsoft Jet database engine. A value of 01 corresponds to the Microsoft FoxPro command SET DELETED ON and indicates never to retrieve or position on a deleted record. A value of 00 corresponds to the Microsoft FoxPro command SET DELETED OFF and indicates to treat a deleted record like any other record. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.</p> |
| Century | <p>A binary indicator for formatting the century component of dates in cases where date-to-string functions are used in index expressions. A value of 01 corresponds to the Microsoft FoxPro command SET CENTURY ON and a value of 00 corresponds to the Microsoft FoxPro command SET CENTURY OFF. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.</p> |
| Date | <p>The date formatting style to use in cases where date-to-string functions are used in index expressions. The possible settings for this entry, which corresponds to the Microsoft FoxPro SET DATE command, are American, ANSI, British, French, DMY, German, Italian, Japan, MDY, USA, and YMD. The default is MDY. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> |

Mark The decimal value of the ASCII character used to separate date parts. The default depends on the Date setting as follows:

- "/" (American, MDY)
- "." (ANSI)
- "/" (British, French, DMY)
- "." (German)
- "-" (Italian)
- "/" (Japan, YMD)
- "-" (USA)

A value of 0 specifies that the system should use the separator usually associated with the selected date format.

The default is 0. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

Exact A binary indicator for string comparisons. A value of 01 corresponds to the Microsoft FoxPro command SET EXACT ON. A value of 00 corresponds to the Microsoft FoxPro command SET EXACT OFF. The default is 00. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51.

FoxPro ISAM Formats

The Jet\3.5\ISAM Formats\FoxPro 2.0 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|--|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | Microsoft FoxPro 2.0 (*.dbf) |
| ImportFilter | REG_SZ | String | Microsoft FoxPro (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | FoxPro Index (*.idx; *.cdx) |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the |

| | | | |
|------------------|--------|--------|---|
| ResultTextExport | REG_SZ | String | current database that is linked to the external file. Changing data in the current database will change data in the external file. Export data from the current database into a Microsoft FoxPro 2.0 file. This process will overwrite the data if exported to an existing file. |
|------------------|--------|--------|---|

The Jet\3.5\ISAM Formats\FoxPro 2.5 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|---|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | Microsoft FoxPro 2.5 (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | FoxPro Index (*.idx; *.cdx) |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft FoxPro 2.5 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\FoxPro 2.6 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-----------------|----------------------|------------------------------------|------------------------------|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | Microsoft FoxPro 2.6 (*.dbf) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| IndexFilter | REG_SZ | String | FoxPro Index (*.idx; |

| | | | |
|------------------|------------|--------|---|
| CreateDBOnExport | REG_BINARY | Binary | *.cdx) 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft FoxPro 2.6 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\FoxPro 3.0 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|---|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | Microsoft FoxPro 3.0 (*.dbf) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 01 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft FoxPro 3.0 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\FoxPro DBC folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Xbase |
| ExportFilter | REG_SZ | String | Microsoft FoxPro 3.0 (*.dbc) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Microsoft Jet 2.x Database Engine Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingJetISAMC "}
"Specifics":"dahowChangingJetISAMS "}

When you install the Microsoft Jet 2.x Engine database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You must use the Registry Editor to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Jet Engine database driver.

Note The installation procedure writes only one setting (win32) to the Jet\3.5\Engines\Jet 2.x folder; this is the only valid setting in this folder.

Microsoft Jet Engine Initialization Settings

The Jet\3.5\Engines\Jet 2.x folder contains a single initialization setting for the Microsoft Jet database engine.

```
win32=<pathname>\MSRD2X35.dll
```

The Microsoft Jet database engine uses the following entry to determine the path to the database engine driver.

| <u>Entry</u> | <u>Description</u> |
|--------------|---|
| win32 | Location of the database engine driver (.dll). The pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |

Additional initialization settings for the Microsoft Jet database engine are contained in the Jet\3.5\Engines\Jet 2.x\ISAM folder. Before you can add any of the following values to the registry, you must create the ISAM folder under the Jet\3.5\Engines\Jet 2.x folder.

To create the new folder, open the Jet\3.5\Engines\Jet 2.x folder in the Registry Editor and click Add Key on the Edit menu. In the Key Name: edit box, type ISAM and click OK. The Registry Editor creates a new folder below the Jet\3.5\Engines\Jet 2.x folder.

Note If you are using Windows NT, the Add Key dialog box also contains an edit box for the registry key class; you can leave this setting blank.

Typical initialization settings for the entries in the Jet\3.5\Engines\Jet 2.x\ISAM folder are shown in the following example.

```
PageTimeout=5  
LockedPageTimeout=5  
CursorTimeout=5  
LockRetry=20  
CommitLockRetry=20  
MaxBufferSize=512  
ReadAheadPages=16  
IdleFrequency=10
```

The following entries are used to configure the Microsoft Jet database engine.

| <u>Entry</u> | <u>Description</u> |
|--------------|---|
| PageTimeout | The length of time between when data that is not read-locked is placed in an internal cache and when it's invalidated, expressed in 100 millisecond units. The default is 5 units (or 0.5 |

| | |
|-------------------|--|
| | seconds). Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| LockedPageTimeout | The length of time between when data that is read-locked is placed in an internal cache and when it's invalidated, expressed in 100 millisecond units. The default is 5 units (or 0.5 seconds). Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| CursorTimeout | The length of time a reference to a page will remain on that page, expressed in 100 millisecond units. The default is 5 units (or 0.5 seconds). This setting applies only to databases created with version 1.x of the Microsoft Jet database engine. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| LockRetry | The number of times to repeat attempts to access a locked page before returning a lock conflict message. The default is 20 times; LockRetry is related to CommitLockRetry, which is described below. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| CommitLockRetry | <p>The number of times the Microsoft Jet database engine attempts to acquire a lock on data to commit changes to that data. If the Microsoft Jet database engine cannot acquire a commit lock, changes to the data will be unsuccessful.</p> <p>The number of attempts the Microsoft Jet database engine makes to get a commit lock is directly related to the LockRetry value. For each attempt made to acquire a <i>commit</i> lock, the Microsoft Jet database engine will make as many attempts as specified by the LockRetry value to acquire a lock. For example, if CommitLockRetry is set to 20 and LockRetry is set to 20, the Microsoft Jet database engine will try to acquire a commit lock as many as 20 times; for each of those attempts, the Microsoft Jet database engine will try to acquire a lock as many as 20 times, for a total of 400 attempts.</p> <p>The default value for CommitLockRetry is 20. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.</p> |
| MaxBufferSize | The size of the database engine internal cache, measured in kilobytes (K). MaxBufferSize must be a whole number value |

| | |
|----------------|--|
| | between 9 and 4096, inclusive. The default is 512. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| ReadAheadPages | The number of pages to read ahead when performing sequential scans. The default is 16. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| IdleFrequency | The amount of time, in 100 millisecond units, that Microsoft Jet will wait before releasing a read lock. The default is 10 units or one second. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |

Microsoft Jet Engine ISAM Formats

The Jet\3.5\ISAM Formats\Jet 2.x folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|-------------------------|---|---------|
| Engine | REG_SZ | String | Jet 2.x |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 0 |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Microsoft Jet 3.5 Database Engine

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingJetEngine30C "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingJetEngine30S "}

The following sections describe initialization settings for the Microsoft Jet 3.5 database engine. These registry settings must be added by the user or by your application; the Microsoft Jet 3.5 setup program does not write default values to the \HKEY_LOCAL_MACHINE\Software\Microsoft\Jet\3.5\Engines\Jet 3.5 folder.

Microsoft Jet Engine Initialization Settings

The Jet\3.5\Engines\Jet 3.5 folder contains initialization settings for the Microsoft Jet database engine. Before you can add any of the following values to the registry, you must create the Jet folder under the Jet\3.5\Engines folder.

To create the new folder, open the Jet\3.5\Engines folder in the Registry Editor and click Add Key on the Edit menu. In the Key Name: edit box, type Jet and click OK. The Registry Editor creates a new folder below the Jet\3.5\Engines folder.

Note If you are using Windows NT, the Add Key dialog box also contains an edit box for the registry key class; you can leave this setting blank.

Typical settings for the entries in the Jet\3.5\Engines\Jet 3.5 folder are shown in the following example.

```
PageTimeout=5000
LockRetry=20
MaxBufferSize=
Threads=3
UserCommitSync=Yes
ImplicitCommitSync=No
ExclusiveAsyncDelay=2000
SharedAsyncDelay=0
SystemDB=<pathname>\System.mdb
```

The Microsoft Jet database engine uses the following entries.

| Entry | Description |
|---------------|---|
| PageTimeout | The length of time between when data that is not read-locked is placed in an internal cache and when it's invalidated, expressed in milliseconds. The default is 5000 milliseconds or 5 seconds. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| LockRetry | The number of times to repeat attempts to access a locked page before returning a lock conflict message. The default is 20. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| MaxBufferSize | The size of the database engine internal cache, measured in kilobytes (K). MaxBufferSize must be an integer value greater than or equal to 512. The default is based on the following formula: $((\text{TotalRAM in MB} - 12 \text{ MB}) / 4) +$ |

512 KB

For example, on a system with 32 MB of RAM, the default buffer size is $((32 \text{ MB} - 12 \text{ MB}) / 4) + 512 \text{ KB}$ or 5632 KB. To set the value to the default, set the registry key to

MaxBufferSize=

Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

Threads

The number of background threads available to the Jet database engine. The default is 3.

Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

UserCommitSync

Specifies whether the system waits for a commit to finish. A value of Yes instructs the system to wait; a value of No instructs the system to perform the commit asynchronously. The default is Yes. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.

ImplicitCommitSync

Specifies whether the system waits for a commit to finish. A value of No instructs the system to proceed without waiting for the commit to finish; a value of Yes instructs the system to wait for the commit to finish. The default is No. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.

ExclusiveAsyncDelay

Specifies the length of time, in milliseconds, to defer an asynchronous flush of an exclusive database. The default value is 2000 or 2 seconds. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

SharedAsyncDelay

Specifies the length of time, in milliseconds, to defer an asynchronous flush of a shared database. The default value is 0. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

SystemDB

Specifies the full pathname and filename of the system database. The default is the appropriate pathname followed by the filename

System.mdb. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.

CompactByPKey

Specifies that when you compact tables they are copied in primary-key order, if a primary key exists on the table. If no primary key exists on a table, the tables are copied in base-table order.

A value of 0 indicates that tables should be compacted in base-table order; a non-zero

value indicates that tables should be compacted in primary-key order, if a primary key exists. The default value is non-zero. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51.

Note: This setting only applies to compacting databases created with the Microsoft Jet database engine version 3.0 or later; when you compact databases created with the Microsoft Jet database engine version 2.x, the data is always copied in the order of the base table.

Microsoft Jet Engine ISAM Formats

The Jet\3.5\ISAM Formats folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|--|
| Engine | REG_SZ | String | Jet 3.5 |
| ExportFilter | REG_SZ | String | Microsoft Access (*.mdb) |
| ImportFilter | REG_SZ | String | Microsoft Access (*.mdb) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Microsoft Access database. This process will overwrite the data if exported to an existing file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Configuring the Microsoft Jet Database Engine for ODBC Access

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingMicrosoftODBC " } {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingMicrosoftODBCS "}

The following sections describe Windows registry settings settings for the Microsoft Jet database engine for connection to an ODBC database. These registry settings must be added by the user or by your application; the ODBC Driver Setup program does not write default values to the \HKEY_LOCAL_MACHINE\Software\Microsoft\Access\7.0\Jet\3.5\Engines\ODBC folder.

Initialization Settings for Jet-connected ODBC Databases

The \HKEY_LOCAL_MACHINE\Software\Microsoft\Access\7.0\Jet\3.5\Engines\ODBC folder contains initialization settings for the Microsoft Jet database engine. Before you can add any of the following values to the registry, you must create the ODBC folder under the Jet\3.5\Engines folder.

To create the new folder, open the Jet\3.5\Engines folder in the Registry Editor and click Add Key on the Edit menu. In the Key Name: edit box, type ODBC and click OK. The Registry Editor creates a new folder below the Jet\3.5\Engines folder.

Note If you are using Windows NT, the Add Key dialog box also contains an edit box for the registry key class; you can leave this setting blank.

Typical settings for the entries in the Jet\3.5\Engines\ODBC folder are shown in the following example.

```
LoginTimeout=20
QueryTimeout=60
ConnectionTimeout=600
AsyncRetryInterval=500
AttachCaseSensitive=0
AttachableObjects='TABLE', 'VIEW', 'SYSTEM TABLE', 'ALIAS', 'SYNONYM'
SnapshotOnly=0
TraceSQLMode=0
TraceODBCAPI=0
DisableAsync=0
JetTryAuth=1
PreparedInsert=0
PreparedUpdate=0
FastRequery=0
```

The Jet database engine uses the ODBC entries as follows.

| Entry | Description |
|--------------------|---|
| LoginTimeout | The number of seconds a login attempt can continue before timing out. The default is 20 (values are of type REG_DWORD). |
| QueryTimeout | The number of seconds a query can run (total processing time) before timing out. The default is 60 (values are of type REG_DWORD). |
| ConnectionTimeout | The number of seconds a cached connection can remain idle before timing out. The default is 600 (values are of type REG_DWORD). |
| AsyncRetryInterval | The number of milliseconds between polls to determine if the server is done processing a query. This entry is used for asynchronous processing only. The default is 500 (values are of type REG_DWORD). |

| | |
|---------------------|--|
| AttachCaseSensitive | An indicator of whether to match table names exactly when linking. Values are 0 (link the first table matching the specified name, regardless of case) and 1 (link a table only if the name matches exactly). The default is 0 (values are of type REG_DWORD). |
| AttachableObjects | A list of server object types to which linking will be allowed. The default is: 'TABLE', 'VIEW', 'SYSTEM TABLE', 'ALIAS', 'SYNONYM' (values are of type REG_SZ). |
| SnapshotOnly | An indicator of whether Recordset objects are forced to be of snapshot type. Values are 0 (allow dynasets) and 1 (force snapshots only). The default is 0 (values are of type REG_DWORD). |
| TraceSQLMode | An indicator of whether the Jet database engine will trace SQL statements sent to an ODBC data source in SQLOUT.txt. Values are 0 (no) and 1 (yes). The default is 0 (values are of type REG_DWORD). This entry is interchangeable with SQLTraceMode. |
| TraceODBCAPI | An indicator of whether to trace ODBC API calls in ODBCAPI.txt. Values are 0 (no) and 1 (yes). The default is 0 (values are of type REG_DWORD). |
| DisableAsync | An indicator of whether to force synchronous query execution. Values are 0 (use asynchronous query execution if possible) and 1 (force synchronous query execution). The default is 1 (values are of type REG_DWORD). |
| JetTryAuth | An indicator of whether to try using the Microsoft Access user name and password to log in to the server before prompting. Values are 0 (no) and 1 (yes). The default is 1 (values are of type REG_DWORD). |
| PreparedInsert | An indicator of whether to use a prepared INSERT statement that inserts data in all columns. Values are 0 (use a custom INSERT statement that inserts only non- Null values) and 1 (use a prepared INSERT statement). The default is 0 (values are of type REG_DWORD). Using prepared INSERT statements can cause Nulls to overwrite server defaults and can cause triggers to execute on columns that weren't inserted explicitly. |
| PreparedUpdate | An indicator of whether to use a prepared UPDATE statement that updates data in all columns. Values are 0 (use a custom UPDATE statement that sets only columns that have changed) and 1 (use a prepared UPDATE statement). The default is 0 (values are of type REG_DWORD). Using prepared UPDATE statements can cause triggers to execute on unchanged columns. |
| FastQuery | An indicator of whether to use a prepared SELECT statement for parameterized queries. Values are 0 |

(no) and 1 (yes). The default is 0 (values are of type REG_DWORD).

Initializing the Paradox Database Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingParadoxC "}
"Specifics":"dahowChangingParadoxS "}

When you install the Paradox database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly (unless necessary); use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Paradox database driver.

Paradox Initialization Settings

The Jet\3.5\Engines\Paradox folder includes initialization settings for the Mspdox35.dll driver, used for access to external Paradox data. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSPDOX35.dll  
PageTimeout=600  
CollatingSequence=ASCII  
DataCodePage=OEM  
ParadoxUserName=Kimberly  
ParadoxNetPath=P:\PDOXDB  
ParadoxNetStyle=4.X
```

The Microsoft Jet database engine uses the Paradox folder entries as follows.

| Entry | Description |
|-------------------|---|
| win32 | The location of Mspdox35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| PageTimeout | The length of time between when data is placed in an internal cache and when it is invalidated. The value is specified in 100 millisecond units. The default is 600 units or 60 seconds. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| CollatingSequence | The collating sequence for all Paradox tables created or opened using Microsoft Jet. Possible values are ASCII, International, Norwegian-Danish, and Swedish-Finnish. The CollatingSequence entry must match the collating sequence used when the Paradox table was built. The default is ASCII. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| DataCodePage | An indicator of how text pages are stored. Possible settings are: <ul style="list-style-type: none">OEM OemToAnsi and AnsiToOem conversions done.ANSI OemToAnsi and AnsiToOem conversions not done. |

| | |
|-----------------|---|
| | <p>The default is OEM. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> |
| ParadoxUserName | <p>The name to be displayed by Paradox if a table is locked by the Paradox ISAM and an interactive user accessing the data from Paradox (rather than the ISAM) attempts to place an incompatible lock. This entry isn't added if the computer isn't on a network. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> <p>Note: If you indicate a ParadoxUserName, you must also specify a ParadoxNetPath and a ParadoxNetStyle or you'll receive an error when trying to access external Paradox data. Also, if you're accessing a Paradox database in multi-user mode over the network, you'll have to add or modify this registry entry manually.</p> |
| ParadoxNetPath | <p>The full path to the directory containing the PARADOX.NET file (for Paradox 3.x) or the PDOXUSRS.NET file (for Paradox 4.x). This entry isn't added if the computer isn't on a network. Usually, you need to change the initial setting (added by the Setup program), which is a best guess at where the file might be. The full ParadoxNetPath (including the drive letter) must be consistent for all users sharing a particular database (directory). Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> <p>Note: If you indicate a ParadoxNetPath, you must also specify a ParadoxUserName and a ParadoxNetStyle or you'll receive an error when trying to access external Paradox data. Also, if you're accessing a Paradox database in multi-user mode over the network, you'll have to add or modify this registry entry manually.</p> |
| ParadoxNetStyle | <p>The network access style to use when accessing Paradox data. Possible values are:</p> <ul style="list-style-type: none"> • 3.x • 4.x <p>(Note that Paradox 3.x users can't set this to 4.x or the driver will use the wrong locking method. Paradox 5.0 users must use the 4.x ParadoxNetStyle setting to ensure proper locking behavior.)</p> <p>This entry isn't added if the computer isn't on a network. This entry should correspond to whatever version of Paradox the users in the group are using. It must be consistent for all users sharing a particular database (directory). The default is 4.x. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.</p> |

Note: If you indicate a ParadoxNetStyle, you must also specify a ParadoxUserName and a ParadoxNetPath or you'll receive an error when trying to access external Paradox data.

Paradox ISAM Formats

The Jet\3.5\ISAM Formats\Paradox 3.x folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Paradox |
| ExportFilter | REG_SZ | String | Paradox 3 (*.db) |
| ImportFilter | REG_SZ | String | Paradox (*.db) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in the current database will change data in the external file. |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Paradox 3 file. This process will overwrite the data if exported to an existing file. |

The Jet\3.5\ISAM Formats\Paradox 4.x folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|---|
| Engine | REG_SZ | String | Paradox |
| ExportFilter | REG_SZ | String | Paradox 4 (*.db) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Paradox 4 file. This |

process will overwrite the data if exported to an existing file.

The Jet\3.5\ISAM Formats\Paradox 5.x folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|-----------------------------|---|--|
| Engine | REG_SZ | String | Paradox |
| ExportFilter | REG_SZ | String | Paradox 5 (*.db) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a Paradox 5 file. This process will overwrite the data if exported to an existing file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Text Data Source Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingTextC "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingTextS "}

When you install the Text Data Source database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Text Data Source database driver.

Text Data Source Initialization Settings

The Jet\3.5\Engines\Text folder includes initialization settings for the Mstext35.dll driver, used for external access to text data files. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSTEXT35.dll
MaxScanRows=25
FirstRowHasNames=False
CharacterSet=OEM
Format=TabDelimited
Extensions=none,asc, csv, tab, txt
ExportCurrencySymbols=Yes
```

The Microsoft Jet database engine uses the Text folder entries as follows.

| Entry | Description |
|-------------------|---|
| win32 | The location of Mstext35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| MaxScanRows | The number of rows to be scanned when guessing the column types. If set to 0, the entire file will be searched. The default is 25. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| FirstRowHas Names | A binary value that indicates whether the first row of the table contains column names. A value of 01 indicates that, during import, column names are taken from the first row. A value of 00 indicates no column names in the first row. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| CharacterSet | An indicator of how text pages are stored. Possible settings are: <ul style="list-style-type: none">OEM OemToAnsi and AnsiToOem conversions done.ANSI OemToAnsi and AnsiToOem conversions not done. The default is OEM. Values are of type String |

| | |
|-----------------------|--|
| Format | for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. Can be any of the following: TabDelimited, CSVDelimited, Delimited (<single character >). The single-character delimiter in the Delimited format can be any single character except a double quotation mark ("). The default is CSVDelimited. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| Extensions | The extension of whatever files are to be browsed when looking for text-based data. The default is txt, csv, tab, asc. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| ExportCurrencySymbols | A binary value that indicates whether the appropriate currency symbol is included when currency fields are exported. A value of 01 indicates that the symbol is included. A value of 00 indicates that only the numeric data is exported. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |

Text Data Source ISAM Formats

The Jet\3.5\ISAM Formats\Text folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|--|
| Engine | REG_SZ | String | Text |
| ExportFilter | REG_SZ | String | Text Files (*.txt; *.csv; *.tab; *.asc) |
| ImportFilter | REG_SZ | String | Text Files (*.txt; *.csv; *.tab; *.asc) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 2 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current |

ResultTextExport REG_SZ String

database that is linked to the external file. Changing data in the current database will change data in the external file. Export data from the current database into a text file. This process will overwrite the data if exported to an existing file.

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Customizing the Schema.ini File

To read, import, or export text data, you need to create a Schema.ini file in addition to including the Text ISAM information in the .ini file. Schema.ini contains the specifics of a text data source: how the text file is formatted, how it is read at import time, and the default export format for files. The following examples show the layout for a fixed-width file, Filename.txt.

```
[Filename.txt]
ColNameHeader=False
Format=FixedLength
MaxScanRows=25
CharacterSet=OEM
Col1=columnname Char Width 24
Col2=columnname2 Date Width 9
Col3=columnname7 Float Width 10
Col4=columnname8 Integer Width 10
Col5=columnname9 LongChar Width 10
```

Similarly, the format for a delimited file is specified as:

```
[Delimit.txt]
ColNameHeader=True
Format=Delimited(!)
MaxScanRows=0
CharacterSet=OEM
Col1=username char width 50
Col2=dateofbirth Date width 9
```

If you are exporting data into a delimited text file, specify the format for that file as well.

```
[Export: My Special Export]
ColNameHeader=True
Format=TabDelimited
MaxScanRows=25
CharacterSet=OEM
DateTimeFormat=mm.dd.yy.hh.mm.ss
CurrencySymbol=Dm
CurrencyPosFormat=0
CurrencyDigits=2
```

```

CurrencyNegFormat=0
CurrencyThousandSymbol=,
CurrencyDecimalSymbol=.
DecimalSymbol=,
NumberDigits=2
NumberLeadingZeros=0

```

The My Special Export example refers to a specific export option; you can specify any variation of export options at connect time. This last example also corresponds to a data source name (DSN) that can be optionally passed at connect time. All three format sections can be included in the same .ini file.

The Jet database engine uses the Schema.ini entries as follows.

| Entry | Description |
|-------------------|--|
| ColNameHeader | Can be set to either True (indicating that the first record of data specifies the column names) or False . |
| Format | Can be set to one of the following values: TabDelimited, CSVDelimited, Delimited(<single character delimiter), or FixedLength. The delimiter specified for the Delimited file format can be any single character except a double quotation mark ("). |
| MaxScanRows | Indicates the number of rows to be scanned when guessing the column data types. If this is set to 0, the entire file is searched. |
| CharacterSet | Can be set to OEM or ANSI, indicating whether the source file is written using an OEM or ANSI code page. |
| DateTimeFormat | Can be set to a format string indicating dates and times. This entry should be specified if all date/time fields in the import/export are handled with the same format. All of the Jet database engine formats except AM and PM are supported. In the absence of a format string, the Windows Control Panel short date picture and time options are used. |
| CurrencySymbol | Indicates the currency symbol to be used for currency values in the text file. Examples include the dollar sign (\$) and Dm. If this entry is absent, the default value in the Windows Control Panel is used. |
| CurrencyPosFormat | Can be set to any of the following values: <ol style="list-style-type: none"> 1. Currency symbol prefix with no separation (\$1) 1. Currency symbol suffix with no separation (1\$) 2. Currency symbol prefix with one character separation (\$ 1) 3. Currency symbol suffix with one character separation (1 \$) If this entry is absent, the default value in the Windows Control Panel is used. |

| | |
|------------------------|---|
| CurrencyDigits | Specifies the number of digits used for the fractional part of a currency amount. If this entry is absent, the default value in the Windows Control Panel is used. |
| CurrencyNegFormat | <p>Can be one of the following values:</p> <ol style="list-style-type: none"> 1. (\$1) 1. -\$1 2. \$-1 3. \$1- 4. (1\$) 5. -1\$ 6. 1-\$ 7. 1\$- 8. -1 \$ 9. -\$ 1 10. 1 \$- 11. \$ 1- 12. \$ -1 13. 1- \$ 14. (\$ 1) 15. (1 \$) <p>The dollar sign is shown for purposes of this example, but it should be replaced with the appropriate CurrencySymbol value in the actual program. If this entry is absent, the default value in the Windows Control Panel is used.</p> |
| CurrencyThousandSymbol | Indicates the single-character symbol to be used for separating currency values in the text file by thousands. If this entry is absent, the default value in the Windows Control Panel is used. |
| CurrencyDecimalSymbol | Can be set to any single character that is used to separate the whole from the fractional part of a currency amount. If this entry is absent, the default value in the Windows Control Panel is used. |
| DecimalSymbol | Can be set to any single character that is used to separate the integer from the fractional part of a number. If this entry is absent, the default value in the Windows Control Panel is used. |
| NumberDigits | Indicates the number of decimal digits in the fractional portion of a number. If this entry is absent, the default value in the Windows Control Panel is used. |
| NumberLeadingZeros | Specifies whether a decimal value less than 1 and greater than -1 should contain leading zeros; this value can either be False (no leading zeros) or True. |

Col1, Col2, ...

Lists the columns in the text file to be read.

The format of this entry should be:

Coln=columnName type [Width #]

columnName: Column names with embedded spaces should be enclosed in quotation marks.

type: Can be Bit, Byte, Short, Long, Currency, Single, Double, DateTime, Text, or Memo.

In addition, the following ODBC Text Driver types are supported:

Char (same as Text)

Float (same as Double)

Integer (same as Short)

LongChar (same as Memo)

Date *date format*

Initializing the HTML (Internet) Source Driver

```
{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingHTMMLC "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingHTMMLS "}
```

When you install the HTML database driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the HTML Data Source database driver.

HTML Data Source Initialization Settings

The Jet\3.5\Engines\Text folder includes initialization settings for the Mstext35.dll driver, used for external access to tables stored within HTML files. Typical settings for the entries in this folder are shown in the following example.

```
win32=<pathname>\MSTEXT35.dll  
MaxScanRows=25  
FirstRowHasNames=False  
CharacterSet=OEM  
Format=TabDelimited  
Extensions=none,asc, csv, tab, txt  
ExportCurrencySymbols=Yes
```

The Microsoft Jet database engine uses the Text folder entries as follows.

| Entry | Description |
|-------------------|---|
| win32 | The location of Mstext35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| MaxScanRows | The number of rows to be scanned when guessing the column types. If set to 0, the entire file will be searched. The default is 25. Values are of type DWORD for Windows 95 and Windows NT 4.0, and of type REG_DWORD for Windows NT 3.51. |
| FirstRowHas Names | A binary value that indicates whether the first row of the table contains column names. A value of 01 indicates that, during import, column names are taken from the first row. A value of 00 indicates no column names in the first row. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |
| CharacterSet | An indicator of how text pages are stored. Possible settings are: <ul style="list-style-type: none">• OEM OemToAnsi and AnsiToOem conversions done.• ANSI OemToAnsi and AnsiToOem conversions not done. The default is OEM. Values are of type String |

| | |
|-----------------------|--|
| Format | for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. Can be any of the following: TabDelimited, CSVDelimited, Delimited (<single character >). The single-character delimiter in the Delimited format can be any single character except a double quotation mark ("). The default is CSVDelimited. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| Extensions | The extension of whatever files are to be browsed when looking for text-based data. The default is txt, csv, tab, asc. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51. |
| ExportCurrencySymbols | A binary value that indicates whether the appropriate currency symbol is included when currency fields are exported. A value of 01 indicates that the symbol is included. A value of 00 indicates that only the numeric data is exported. The default is 01. Values are of type Binary for Windows 95 and Windows NT 4.0, and of type REG_BINARY for Windows NT 3.51. |

HTML Import ISAM Formats

The Jet\3.5\ISAM Formats\HTML Import folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|--|
| Engine | REG_SZ | String | Text |
| ImportFilter | REG_SZ | String | HTML Files (*.ht*) |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 2 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextImport | REG_SZ | String | Import data from the external file into the current database. Changing data in the current database will not change data in the external file. |
| ResultTextLink | REG_SZ | String | Create a table in the current database that is linked to the external file. Changing data in |

the current database will change data in the external file.

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

HTML Export ISAM Formats

The Jet\3.5\ISAM Formats\HTML Export folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|------------------|----------------------|------------------------------------|---|
| Engine | REG_SZ | String | Text |
| ExportFilter | REG_SZ | String | HTML Files (*.htm) |
| CanLink | REG_BINARY | Binary | 00 |
| OneTablePerFile | REG_BINARY | Binary | 01 |
| IsamType | REG_DWORD | DWORD | 2 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |
| ResultTextExport | REG_SZ | String | Export data from the current database into a text file. This process will overwrite the data if exported to an existing file. |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

Initializing the Microsoft Exchange Data Source Driver

{ewc HLP95EN.dll, DYNALINK, "See Also":"dahowChangingHTMMLC "} {ewc HLP95EN.dll, DYNALINK, "Specifics":"dahowChangingHTMMLC "}

When you install the Microsoft Exchange Data Source driver, the Setup program writes a set of default values to the Windows Registry in the Engines and ISAM Formats subkeys. You should not modify these settings directly; use the setup program for your application to add, remove, or change these settings. The following sections describe initialization and ISAM Format settings for the Microsoft Exchange Data Source driver.

Microsoft Exchange Data Source Initialization Settings

The Jet\3.5\Engines\Exchange folder includes initialization settings for the Msexch35.dll driver, used for external access to Microsoft Exchange folders. The only entry in this folder is.

```
win32=<pathname>\MSEXCH35.dll
```

The Microsoft Jet database engine uses this Exchange folder to indicate the location of Msexch35.dll. The full pathname is determined at the time of installation. Values are of type String for Windows 95 and Windows NT 4.0, and of type REG_SZ for Windows NT 3.51.

Microsoft Exchange ISAM Formats

The Jet\3.5\ISAM Formats\Exchange 4.0 folder contains the following entries.

| Entry name | Windows NT 3.51 Type | Windows 95 and Windows NT 4.0 Type | Value |
|-------------------|---------------------------------|---|--------------|
| Engine | REG_SZ | String | Exchange |
| CanLink | REG_BINARY | Binary | 01 |
| OneTablePerFile | REG_BINARY | Binary | 00 |
| IsamType | REG_DWORD | DWORD | 0 |
| IndexDialog | REG_BINARY | Binary | 00 |
| CreateDBOnExport | REG_BINARY | Binary | 00 |

Note When you change Windows Registry settings, you must exit and then restart the database engine for the new settings to take effect.

IN

The IN keyword is used in these contexts:

In Operator

IN Clause

SQL Subqueries

TRANSFORM Statement

ON

The ON keyword is used in these contexts:

INNER JOIN Operation

LEFT JOIN, RIGHT JOIN Operations

ALL

The ALL keyword is used in these contexts:

ALL, DISTINCT, DISTINCTROW, TOP Predicates

SQL Subqueries

UNION Operation

ASC/DESC

The ASC and DESC keywords are used in these contexts:

CREATE INDEX Statement

ORDER BY Clause

BY

The BY keyword is used in these contexts:

GROUP BY Clause

ORDER BY Clause

CREATE

The CREATE keyword is used in these contexts:

CREATE INDEX Statement

CREATE TABLE Statement

DROP

The DROP keyword is used in these contexts:

ALTER TABLE Statement

DROP Statement

INDEX

The INDEX keyword is used in these contexts:

CREATE INDEX Statement

DROP Statement

INTO

The INTO keyword is used in these contexts:

INSERT INTO Statement

SELECT ... INTO Statement

JOIN

The JOIN keyword is used in these contexts:

INNER JOIN Operation

LEFT JOIN, RIGHT JOIN Operations

SELECT

The SELECT keyword is used in these contexts:

SELECT Statement

SELECT ... INTO Statement

TABLE

The TABLE keyword is used in these contexts:

ALTER TABLE Statement

CREATE INDEX Statement

CREATE TABLE Statement

DROP Statement

UNION Operation

WITH

The WITH keyword is used in these contexts:

CREATE INDEX Statement

WITH OWNERACCESS OPTION Declaration

