

IBM<sup>®</sup> DB2<sup>®</sup> Universal Database



# Writing Applications Using the IBM OLE DB Provider for DB2

*Version 7*



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# Writing Applications Using the IBM OLE DB Provider for DB2

Microsoft® OLE DB is a set of OLE/COM interfaces that provide applications with uniform access to data stored in diverse information sources. The OLE DB architecture defines OLE DB consumers and OLE DB providers. An OLE DB consumer is any system or application that uses OLE DB interfaces; an OLE DB provider is a component that exposes OLE DB interfaces.

The IBM® OLE DB Provider for DB2® allows DB2® to act as an OLE DB provider. This support gives OLE DB-based applications the ability to extract or query DB2 data using the native OLE interface. The IBM OLE DB Provider for DB2, whose provider name is IBMDADB2, enables OLE DB consumers to access data on a DB2® Universal Database server. If DB2® Connect™ is installed, these OLE DB consumers can also access data on host DBMS such as DB2 for MVS™, DB2 for VM/VSE, or SQL/400®.

The IBM OLE DB Provider for DB2 offers the following features:

- Support level 0 of the OLE DB provider specification, including some additional level 1 interfaces. For more information, see “Supported Interfaces” on page 7.
- A free threaded provider implementation, which enables the application to create components in one thread and use those components in any other thread.
- An Error Lookup Service that returns DB2 error messages.

Note that the IBM OLE DB Provider resides on the client and is different from the OLE DB table functions, which are already supported by DB2 UDB.

Subsequent sections of this document describe the specific implementation of the IBM OLE DB Provider for DB2. For more information on the Microsoft® OLE DB 2.0 specification, refer to the Microsoft OLE DB 2.0 Programmer’s Reference and Data Access SDK, available from Microsoft Press.

## Version Compliance

The IBM OLE DB Provider for DB2 complies with version 2.5 of the Microsoft OLE DB specification.

## System Requirements

The IBM OLE DB Provider for DB2 supports the following operating systems:

- Microsoft Windows NT<sup>®</sup> 4.0 with Service Pack 3 or later
- Microsoft Windows<sup>®</sup> 95
- Microsoft Windows 98
- Microsoft Windows 2000

To install the IBM OLE DB Provider for DB2, you must first be running on one of the supported operating systems listed above. You also need to install the DB2 Application Development Client, as well as the Microsoft Data Access Components (MDAC) version 2.5 or higher, which was available at the time of writing from the following site: <http://www.microsoft.com/data>.

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## Supported Applications

With the IBM OLE DB Provider for DB2, you can create the following types of applications:

- ADO applications, including:
  - Microsoft Visual Studio<sup>®</sup> C++ applications
  - Microsoft Visual Basic<sup>®</sup> applications
- C/C++ applications which access IBMDADB2 directly using the OLE DB interfaces, including ATL applications whose Data Access Consumer Objects were generated by the ATL COM AppWizard.

## ADO Applications

### ADO Connection String Keywords

To specify ADO (ActiveX<sup>®</sup> Data Objects) connection string keywords, use one of the following approaches:

- In the provider (connection) string, specify the keyword using the format `keyword=value`. Delimit multiple keywords with a semicolon.
- In the `db2cli.ini` file, specify the keywords using the format described in the *CLI Guide and Reference*.

The following table describes the keywords supported by the IBM OLE DB Provider for DB2:

*Table 1. Keywords Supported by the IBM OLE DB Provider for DB2*

Keyword	Value	Meaning
DSN	Name of the database alias	The DB2 database alias in the database directory.
UID	User ID	The user ID used to connect to the DB2 server.
PWD	Password of UID	Password for the user ID used to connect to the DB2 server.



Other DB2 CLI Configuration Keywords also affect the behavior of the IBM OLE DB Provider. For more information on DB2 CLI Configuration Keywords, refer to the *CLI Guide and Reference*.

### **Connecting to a Data Source in a Visual Basic ADO Application**

To connect to a DB2 data source using the IBM OLE DB Provider for DB2, specify the IBMDADB2 provider name and cursor location. Example 1 of “Examples of Connecting to a Data Source” on page 24 shows one way of connecting to a DB2 data source in a Visual Basic ADO application.

### **Enabling Updatable Scrollable Cursors in ADO applications**

Since the IBM OLE DB Provider for DB2 natively supports read-only and forward-only cursors, an ADO application that wants to access updatable scrollable cursors must set the cursor location to `adUseClient`.

### **Limitations for ADO applications**

- ADO applications calling stored procedures must have their parameters created and explicitly bound. The `Parameters.Refresh` method for automatically generating parameters is not yet supported.
- For Visual Basic ADO applications, data controls are not supported for server side cursors. Data controls are available, however, for client side cursor applications.
- The `WithEvents` keyword cannot be used in the declaration of the recordset object for Visual Basic ADO applications using the read-only/forward-only server cursor; that is, when `Cursor Location` is specified as `adUseServer`.

### **ADO Methods and Properties**

The IBM OLE DB Provider for DB2 supports the following categories of ADO methods and properties:

- Command Methods
- Command Properties
- Command Collection
- Connection Methods
- Connection Properties
- Connection Collection
- Errors Properties
- Field Methods
- Field Properties

- Field Collection
- Parameter Methods
- Parameter Collection
- RecordSet Methods
- RecordSet Properties
- RecordSet Collection

Refer to “Supported ADO Methods and Properties” on page 12 for the complete list of supported ADO methods and properties.

## C/C++ Applications

### Compiling and Linking

C/C++ applications that use the constant CLSID\_IBMDADB2 must include the `ibmdadb2.h` file which can be found in the `SQLLIB\include` directory. These applications must define the `DBINITCONSTANTS` before the `include` statement. The following example shows the correct sequence of statements:

```
#define DBINITCONSTANTS
#include "ibmdadb2.h"
```

### Connecting to a Data Source in a C/C++ Application

To connect to a DB2 data source using the IBM OLE DB Provider for DB2 in a C/C++ application, use one of the two OLE DB core interfaces, `IDBPromptInitialize` or `IDataInitialize`. Connecting to the data source in this way grants the application access to updatable scrollable cursors, instead of the read-only and forward-only cursors natively available. If `IBMDADB2` is created directly by calling the COM API `CoCreateInstance`, then the available cursors will be read-only and forward-only. The `IDataInitialize` interface is exposed by the OLE DB Service Component, and the `IDBPromptInitialize` is exposed by the Data Links Component. See Examples 2 and 3 of “Examples of Connecting to a Data Source” on page 24 for two ways of connecting to a DB2 data source using `IDBPromptInitialize` or `IDataInitialize`.

### Enabling Updatable Scrollable Cursors in ATL Applications

An ATL (Active Template Library) application that wants updatable scrollable cursors, and whose Data Access Consumer Object was generated by ATL COM AppWizard, must use the `OpenWithServiceComponents` method instead of the `Open` method call the wizard generates by default. If the `Open` method is used, the available cursors will be read-only and forward-only. The following example illustrates how to use the `OpenWithServiceComponents` method:

```
// The following line is generated by the wizard in the OpenDataSource method
// hr = db.Open(_T("IBMDADB2"), &dbinit);
// Replace it with the following:
hr = db.OpenWithServiceComponents(_T("IBMDADB2"), &dbinit);
```

---

## Data Services

### Supported Cursor Mode

The IBM OLE DB Provider for DB2 natively supports read-only and forward-only cursors, called Server Cursors. For updatable scrollable cursors, your application should use the OLE DB Cursor Service Component known as the Client Cursor. OLE DB native applications will have updatable and scrollable cursors available when the `IDataInitialize` or `IDBPromptInitialize` OLE DB core interface is used to connect to the database. This is because these interfaces automatically activate the OLE DB Cursor Service Component.

### Data Type Mappings

The IBM OLE DB Provider supports data type mappings between DB2 data types and OLE DB data types. See “Table of Data Type Mappings between DB2 and OLE DB Data Types” on page 16 for a complete list of supported mappings and available names for indicating the data types of columns and parameters.

### Setting Data

The IBM OLE DB Provider supports data conversions for setting data from OLE DB types to DB2 types. Note that truncation of the data may occur in some cases, depending on the types and the value of the data. Please refer to “Table of Data Conversions for Setting Data” on page 18 for a list of supported type conversions.

### Getting Data

For getting data, the IBM OLE DB Provider allows data conversions from DB2 types to OLE DB types. Note that truncation of the data may occur in some cases, depending on the types and the value of the data. Refer to “Table of Data Conversions for Getting Data” on page 20 for a list of supported type conversions.

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## OLE DB Services

To make use of OLE DB services, the IBM OLE DB Provider for DB2 adds a registry entry `OLEDB_SERVICES` under the class ID (CLSID) of the provider with the `DWORD` value of `0xFFFFFFFF`. The meaning of this value is as follows:

*Table 2. OLE DB Services*

Enabled Services	DWORD Value
All Services (default)	0xFFFFFFFF
All Except Pooling and AutoEnlistment	0xFFFFFFFFE
All Except Client Cursor	0xFFFFFFFFB
All except Pooling, enlistment and cursor	0xFFFFFFFF0

Table 2. OLE DB Services (continued)

Enabled Services	DWORD Value
No services	0x00000000

## Threading Model

The IBM OLE DB Provider for DB2 supports the Free Threaded Multithreading model, which allows applications to create components in one thread and use those components in any other thread. There is no support for Apartment Thread or mixed threading.

## Supported Schema Rowsets

Please refer to “Table of Supported Schema Rowsets” on page 21 for a list of schema rowsets supported by `IDBSchemaRowset`. Note that unsupported columns will be set to null in the rowsets.

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## Restrictions

- BLOBs and CLOBs are not supported.
- Enumerator is not available.
- `IBMDADB2` supports auto commit and user-controlled transaction scope with the `ITransactionLocal` interface. Auto commit transaction scope is the default scope. Nested, Distributed, and Coordinated transactions are not supported.
- `IErrorInfo`, `IErrorRecords`, and `ISQLErrorInfo` are not supported. Only the `IErrorLookup` interface is supported.
- `RestartPosition` is not supported when the command text contains parameters.
- `IBMDADB2` does not quote table names passed through the `DBID` parameters, which are parameters used by the `IOpenRowset` interface. Instead, the OLE DB consumer must add quotes to the table names when quotes are required.
- Only a single set of parameters is supported. Multiple parameter sets are not yet supported.
- Named parameters are not supported by the IBM OLE DB Provider. When `ICommandWithParameters::MapParameterNames` is called, `DB_S_ERRORS_OCCURRED` is always returned. Parameter names are ignored in `ICommandWithParameters::GetParameterInfo` and `ICommandWithParameters::SetParameterInfo`, since only ordinals are used.

## Supported Interfaces

Table 3. Comparison of OLE DB Components and Interfaces Supported by the IBM OLE DB Provider for DB2 and the Microsoft OLE DB Provider for ODBC

Interface	DB2	ODBC Provider
<b>BLOB</b>		
ISequentialStream	No	Yes
<b>Command</b>		
IAccessor	Yes	Yes
ICommand	Yes	Yes
ICommandPersist	No	No
ICommandPrepare	Yes	Yes
ICommandProperties	Yes	Yes
ICommandText	Yes	Yes
ICommandWithParameters	Yes	Yes
IColumnsInfo	Yes	Yes
IColumnsRowset	Yes	Yes
IConvertType	Yes	Yes
ISupportErrorInfo	Yes	Yes
<b>DataSource</b>		
IConnectionPoint	No	Yes
IDBAsynchNotify (consumer)	No	No
IDBAsynchStatus	No	No
IDBConnectionPointContainer	No	Yes
IDBCreateSession	Yes	Yes
IDBDataSourceAdmin	No	No
IDBInfo	Yes	Yes
IDBInitialize	Yes	Yes
IDBProperties	Yes	Yes
IPersist	Yes	No
IPersistFile	No	Yes
ISupportErrorInfo	Yes	Yes
<b>Enumerator</b>		
IDBInitialize	No	Yes
IDBProperties	No	Yes

Table 3. Comparison of OLE DB Components and Interfaces Supported by the IBM OLE DB Provider for DB2 and the Microsoft OLE DB Provider for ODBC (continued)

Interface	DB2	ODBC Provider
IParseDisplayName	No	No
ISourcesRowset	No	Yes
ISupportErrorInfo	No	Yes
<b>Error Lookup Service</b>		
IErrorLookUp	Yes	Yes
<b>Error Object</b>		
IErrorInfo	No	No
IErrorRecords	No	No
ISQLErrorInfo (custom)	No	No
<b>Multiple Results</b>		
IMultipleResults	Yes	Yes
ISupportErrorInfo	Yes	Yes
<b>RowSet</b>		
IAccessor	Yes	Yes
IColumnRowset	No	Yes
IColumnsInfo	Yes	Yes
IColumnsRowSet	Yes	Yes
IConvertType	Yes	Yes
IChapteredRowset	No	No
IConnectionPointContainer	No	Yes
IDBAsynchStatus	No	No
IParentRowset	No	No
IRowset	Yes	Yes
IRowsetChange	Cursor Service Component	Yes
IRowsetChapterMember	No	No
IRowsetFind	No	No
IRowsetIdentity	Yes	Yes
IRowsetIndex	No	No
IRowsetInfo	Yes	Yes
IRowsetLocate	Cursor Service Component	Yes
IRowsetNotify (consumer)	No	No

Table 3. Comparison of OLE DB Components and Interfaces Supported by the IBM OLE DB Provider for DB2 and the Microsoft OLE DB Provider for ODBC (continued)

Interface	DB2	ODBC Provider
IRowsetRefresh	Cursor Service Component	Yes
IRowsetResynch	Cursor Service Component	Yes
IRowsetScroll	Cursor Service Component	Yes
IRowsetUpdate	Cursor Service Component	Yes
IRowsetView	No	No
ISupportErrorInfo	Yes	Yes
<b>Session</b>		
IAlterIndex	No	No
IAlterTable	No	No
IDBCreateCommand	Yes	Yes
IDBSchemaRowSet	Yes	Yes
IGetDataSource	Yes	Yes
IIndexDefinition	No	No
IOpenRowSet	Yes	Yes
ISessionProperties	Yes	Yes
ISupportErrorInfo	Yes	Yes
ITableDefinition	No	No
ITableDefinitionWithConstraints	No	No
ITransaction	Yes	Yes
ITransactionJoin	No	Yes
ITransactionLocal	Yes	Yes
ITransactionObject	No	No
ITransactionOptions	No	Yes
<b>View Objects</b>		
IViewChapter	No	No
IViewFilter	No	No
IViewRowset	No	No
IViewSort	No	No

## Supported Properties

Table 4. Properties Supported by the IBM OLE DB Provider for DB2

Property Group	Property Set	Properties	Default Value	R/W
Data Source	DBPROPSET_DATASOURCE	DBPROP_MULTIPLECONNECTIONS	VARIANT_FALSE	R
		DBPROP_RESETDATASOURCE	DBPROPVAL_RD_RESETALL	R
Data Source Information	DBPROPSET_DATASOURCEINFO	DBPROP_ACTIVESESSIONS	0	R
		DBPROP_ASYNCTXNABORT	VARIANT_FALSE	R
		DBPROP_ASYNCTXNCOMMIT	VARIANT_FALSE	R
		DBPROP_BYREFACCESSORS	VARIANT_FALSE	R
		DBPROP_COLUMNDEFINITION	DBPROPVAL_CD_NOTNULL	R
		DBPROP_CONCATNULLBEHAVIOR	DBPROPVAL_CB_NULL	R
		DBPROP_CONNECTIONSTATUS	DBPROPVAL_CS_UNINITIALIZED	R
		DBPROP_DATASOURCENAME	N/A	R
		DBPROP_DATASOURCEREADONLY	VARIANT_FALSE	R
		DBPROP_DBMSNAME	N/A	R
		DBPROP_DBMSVER	N/A	R
		DBPROP_DSOTHREADMODEL	DBPROPVAL_RT_FREETHREAD	R
		DBPROP_GROUPBY	DBPROPVAL_GB_CONTAINS_SELECT	R
		DBPROP_IDENTIFIERCASE	DBPROPVAL_IC_UPPER	R
		DBPROP_MAXINDEXSIZE	0	R
		DBPROP_MAXROWSIZE	0	R
		DBPROP_MAXROWSIZEINCLUDESBLOB	VARIANT_TRUE	R
		DBPROP_MAXTABLEINSELECT	0	R
		DBPROP_MULTIPLEPARAMSETS	VARIANT_TRUE	R
		DBPROP_MULTIPLERESULTS	DBPROPVAL_MR_SUPPORTED	R
		DBPROP_MULTIPLESTORAGEOBJECTS	VARIANT_TRUE	R
		DBPROP_MULTITABLEUPDATE	VARIANT_FALSE	R
		DBPROP_NULLCOLLATION	DBPROPVAL_NC_LOW	R
		DBPROP_OLEOBJECTS	DBPROPVAL_OO_BLOB (note: BLOBs are not yet supported)	R
		DBPROP_ORDERBYCOLUMNSINSELECT	VARIANT_FALSE	R
		DBPROP_OUTPUTPARAMETERAVAILABILITY	DBPROPVAL_OA_ATEXECUTE	R
		DBPROP_PERSISTENTIDTYPE	DBPROPVAL_PT_NAME	R
		DBPROP_PREPAREABORTBEHAVIOR	DBPROPVAL_CB_DELETE	R
		DBPROP_PROCEDURETERM	"STORED PROCEDURE"	R
		DBPROP_PROVIDERFRIENDLYNAME	"IBM OLE DB Provider for DB2 Servers"	R
		DBPROP_PROVIDERNAME	"IBMDADB2.DLL"	R
		DBPROP_PROVIDEROLEDBVER	"02.00"	R
		DBPROP_PROVIDERVER	"07.01.0000"	R
		DBPROP_QUOTEIDENTIFIERCASE	DBPROPVAL_IC_SENSITIVE	R
		DBPROP_ROWSETCONVERSIONSONCOMMAND	VARIANT_TRUE	R
		DBPROP_SCHEMATERM	"SCHEMA"	R
		DBPROP_SCHEMAUSAGE	DBPROPVAL_SU_DML_STATEMENTS   DBPROPVAL_SU_TABLE_DEFINITION   DBPROPVAL_SU_INDEX_DEFINITION   DBPROPVAL_SU_PRIVILEGE_DEFINITION	R



Table 4. Properties Supported by the IBM OLE DB Provider for DB2 (continued)

Property Group	Property Set	Properties	Default Value	R/W
		DBPROP_SS_SUPPORT	DBPROPVAL_SS_SUPPORT_EXTENDED   DBPROPVAL_SS_SUPPORT_ESCAPECLAUSES   DBPROPVAL_SS_SUPPORT_ANSI92_ENTRY	R
		DBPROP_SERVERNAME	"DB2"	R
		DBPROP_STRUCTUREDSTORAGE	DBPROPVAL_SS_ISEQUENTIALSTREAM	R
		DBPROP_SUBQUERIES	DBPROPVAL_SS_CORRELATEDSUBQUERIES   DBPROPVAL_SS_COMPARISON   DBPROPVAL_SS_EXISTS   DBPROPVAL_SS_IN   DBPROPVAL_SS_QUANTIFIED	R
		DBPROP_SUPPORTEDTXNDL	DBPROPVAL_TC_ALL	R
		DBPROP_SUPPORTEDTXNISOLEVELS	DBPROPVAL_TL_CURSORSTABILITY   DBPROPVAL_TL_READCOMMITTED   DBPROPVAL_TL_READUNCOMMITTED   DBPROPVAL_TL_SERIALIZABLE	R
		DBPROP_SUPPORTEDTXNISORETAIN	DBPROPVAL_TR_COMMIT_DC   DBPROPVAL_TR_ABORT_NO	R
		DBPROP_TABLETERM	"TABLE"	R
		DBPROP_USERNAME	N/A	R
<b>Initialization</b>	DBPROPSET_DBINIT	DBPROP_AUTH_PASSWORD	N/A	R/W
		DBPROP_AUTH_USERID	N/A	R/W
		DBPROP_INIT_DATASOURCE	N/A	R/W
		DBPROP_INIT_HWND	N/A	R/W
		DBPROP_INIT_MODE	DB_MODE_READWRITE	R/W
		DBPROP_INIT_OLEDBSERVICES	0xFFFFFFFF	R/W
		DBPROP_INIT_PROMPT	DBPROMPT_NOPROMPT	R/W
		DBPROP_INIT_PROVIDERSTRING	N/A	R/W
<b>Rowset</b>	DBPROPSET_ROWSET	DBPROP_ABORTPRESERVE	VARIANT_FALSE	R
		DBPROP_ACCESSORDER	DBPROPVAL_AO_RANDOM	R
		DBPROP_BLOCKINGSTORAGEOBJECTS	VARIANT_FALSE	R
		DBPROP_CACHEDDEFERRED	VARIANT_FALSE	R/W
		DBPROP_CANHOLDROWS	VARIANT_TRUE	R
		DBPROP_COMMITPRESERVE	VARIANT_TRUE	R/W
		DBPROP_COMMANDTIMEOUT	0	R/W
		DBPROP_DEFERRED	VARIANT_FALSE	R
		DBPROP_IAccessor	VARIANT_TRUE	R
		DBPROP_IColumnsInfo	VARIANT_TRUE	R
		DBPROP_IColumnsRowset	VARIANT_TRUE	R
		DBPROP_IConvertType	VARIANT_TRUE	R
		DBPROP_IMultipleResults	VARIANT_TRUE	R
		DBPROP_IRowset	VARIANT_TRUE	R
		DBPROP_IRowChange	VARIANT_FALSE	R
		DBPROP_IRowsetFind	VARIANT_FALSE	R
		DBPROP_IRowsetIdentity	VARIANT_TRUE	R
		DBPROP_IRowsetInfo	VARIANT_TRUE	R
		DBPROP_IRowsetLocate	VARIANT_FALSE	R
		DBPROP_IRowsetScroll	VARIANT_FALSE	R
		DBPROP_IRowsetUpdate	VARIANT_FALSE	R
		DBPROP_ISequentialStream	VARIANT_TRUE	R
		DBPROP_ISupportErrorInfo	VARIANT_TRUE	R

Table 4. Properties Supported by the IBM OLE DB Provider for DB2 (continued)

Property Group	Property Set	Properties	Default Value	R/W
		DBPROP_LITERALIDENTITY	VARIANT_TRUE	R
		DBPROP_LOCKMODE	DBPROPVAL_LM_SINGLEROW	R/W
		DBPROP_MAXOPENROWS	0	R/W
		DBPROP_MAXROWS	0	R/W
		DBPROP_QUICKRESTART	VARIANT_FALSE	R/W
		DBPROP_ROWTHREADMODEL	DBPROPVAL_RT_FREETHREAD	R
		DBPROP_SERVERCURSOR	VARIANT_TRUE	R
		DBPROP_UNIQUEROWS	VARIANT_FALSE	R
	DBPROPSET_DB2ROWSET	DBPROP_OPENROWSETSUPPORT	DBPROPVAL_OR_S_TABLE	R
		DBPROP_ISLONGMINLENGTH	32000	R/W
Session	DBPROPSET_SESSION	DBPROP_SESS_AUTOCOMMITISOLEVELS	DBPROPVAL_TI_CURSORSTABILITY	R/W

## Supported ADO Methods and Properties

The IBM OLE DB Provider for DB2 supports the following ADO methods and properties:

Table 5. ADO Methods and Properties Supported by the IBM OLE DB Provider for DB2

ADO	Method/Property	OLE DB Interface/Property	IBM OLE DB Support
<b>Command Methods</b>	Cancel	ICommand	Yes
	CreateParameter		Yes
	Execute		Yes
<b>Command Properties</b>	ActiveConnection	(ADO specific)	
	Command Text	ICommandText	Yes
	Command Timeout	ICommandProperties::SetProperties DBPROP_COMMANDTIMEOUT	Yes
	CommandType	(ADO specific)	
	Prepared	ICommandPrepare	Yes
	State	(ADO specific)	
<b>Command Collection</b>	Parameters	ICommandWithParameter DBSCHEMA _PROCEDURE_PARAMETERS	Yes
	Properties	ICommandProperties IDBProperties	Yes
<b>Connection Methods</b>	BeginTrans CommitTrans RollbackTrans	ITransactionLocal	Yes (but not nested) Yes (but not nested) Yes (but not nested)
	Execute	ICommand IOpenRowset	Yes

Table 5. ADO Methods and Properties Supported by the IBM OLE DB Provider for DB2 (continued)

ADO	Method/Property	OLE DB Interface/Property	IBM OLE DB Support
	Open	IDBCreateSession IDBInitialize	Yes
	OpenSchema adSchemaColumnPrivileges adSchemaColumns adSchemaForeignKeys adSchemaIndexes adSchemaPrimaryKeys adSchemaProcedureParam adSchemaProcedures adSchemaProviderType adSchemaStatistics adSchemaTablePrivileges adSchemaTables	IDBSchemaRowset	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
	Cancel		Yes
<b>Connection Properties</b>	Attributes adXactCommitRetaining adXactRollbackRetaining	ITransactionLocal	Yes Yes
	CommandTimeout	ICommandProperties DBPROP_COMMAND_TIMEOUT	Yes
	ConnectionString	(ADO specific)	
	ConnectionTimeout	IDBProperties DBPROP_INIT_TIMEOUT	No
	CursorLocation: adUseClient adUseNone adUseServer	(Use OLE DB Cursor Service) (Not Used) (Not Updatable Forward Only)	Yes No Yes
	DefaultDataBase	IDBProperties DBPROP_CURRENTCATALOG	No
	IsolationLevel	ITransactionLocal DBPROP_SESS _AUTOCOMMITSOLEVELS	Yes
	Mode adModeRead adModeReadWrite adModeShareDenyNone adModeShareDenyRead adModeShareDenyWrite adModeShareExclusive adModeUnknown adModeWrite	IDBProperties DBPROP_INIT_MODE	No Yes No No No No No No
	Provider	ISourceRowset::GetSourceRowset	Yes
	State	(ADO specific)	
	Version	(ADO specific)	
<b>Connection Collection</b>	Errors	IErrorRecords	Yes

Table 5. ADO Methods and Properties Supported by the IBM OLE DB Provider for DB2 (continued)

ADO	Method/Property	OLE DB Interface/Property	IBM OLE DB Support
	Properties	IDBProperties	Yes
<b>Error Properties</b>	Description NativeError Number Source SQLState	IErrorRecords	Yes Yes Yes Yes No
	HelpContext HelpFile		No No
<b>Field Methods</b>	AppendChunk GetChunk	ISequentialStream	Yes Yes
<b>Field Properties</b>	Actual Size	IAccessor IRowset	Yes
	Attributes DataFormat DefinedSize Name NumericScale Precision Type	IColumnInfo	Yes Yes Yes Yes Yes Yes
	OriginalValue	IRowsetUpdate	Yes (Cursor Service)
	UnderlyingValue	IRowsetRefresh IRowsetResynch	Yes (Cursor Service) Yes (Cursor Service)
	Value	Accessor IRowset	Yes
<b>Field Collection</b>	Properties	IDBProperties IRowsetInfo	Yes
<b>Parameter Methods</b>	AppendChunk	ISequentialStream	Yes
	Attributes Direction Name NumericScale Precision Scale Size Type	ICommandWithParameter DBSCHEMA _PROCEDURE_PARAMETERS	Yes Yes Yes Yes Yes Yes Yes
	Value	IAccessor ICommand	Yes
<b>Parameter Collection</b>	Properties		Yes
<b>RecordSet Methods</b>	AddNew	IRowsetChange	Yes (Cursor Service)
	Cancel		Yes

Table 5. ADO Methods and Properties Supported by the IBM OLE DB Provider for DB2 (continued)

ADO	Method/Property	OLE DB Interface/Property	IBM OLE DB Support
	CancelBatch	IRowsetUpdate::Undo	Yes (Cursor Service)
	CancelUpdate		Yes (Cursor Service)
	Clone	IRowsetLocate	Yes (Cursor Service)
	Close	IAccessor IRowset	Yes
	CompareBookmarks		No
	Delete	IRowsetChange	Yes (Cursor Service)
	GetRows	IAccessor IRowset	Yes (Cursor Service)
	Move	IRowset IRowsetLocate	Server Cursor: forward only Cursor Service: scrollable
	MoveFirst	IRowset IRowsetLocate	Yes (Cursor Service)
	MoveNext	IRowset IRowsetLocate	Yes (Cursor Service)
	MoveLast	IRowsetLocate	Yes (Cursor Service)
	MovePrevious	IRowsetLocate	Yes (Cursor Service)
	NextRecordSet	IMultipleResults	Yes
	Open	ICommand IOpenRowset	Yes
	Requery	ICommand IOpenRowset	Yes
	Resync	IRowsetRefresh	Yes (Cursor Service)
	Supports	IRowsetInfo	Yes
	Update UpdateBatch	IRowsetChange IRowsetUpdate	Yes (Cursor Service) Yes (Cursor Service)
<b>RecordSet Properties</b>	AbsolutePage	IRowsetLocate IRowsetScroll	Yes (Cursor Service)
	AbsolutePosition	IRowsetLocate IRowsetScroll	Yes (Cursor Service)
	ActiveConnection	IDBCreateSession IDBInitialize	Yes
	BOF	(ADO specific)	
	Bookmark	IAccessor IRowsetLocate	Yes (Cursor Service)
	CacheSize	cRows in IRowsetLocate IRowset	Yes

Table 5. ADO Methods and Properties Supported by the IBM OLE DB Provider for DB2 (continued)

ADO	Method/Property	OLE DB Interface/Property	IBM OLE DB Support
	CursorType adOpenDynamic adOpenForwardOnly adOpenKeySet adOpenStatic	ICommandProperties	No Yes No Yes (Cursor Service)
	EditMode	IRowsetUpdate	Yes (Cursor Service)
	EOF	(ADO specific)	
	Filter	IRowsetLocate IRowsetView IRowsetUpdate IViewChapter IViewFilter	No
	LockType	ICommandProperties	No
	MarshalOption		No
	MaxRecords	ICommandProperties IOpenRowset	Yes
	PageCount	IRowsetScroll	Yes (Cursor Service)
	PageSize	(ADO specific)	
	Sort	(ADO specific)	
	Source	(ADO specific)	
	State	(ADO specific)	
	Status	IRowsetUpdate	Yes (Cursor Service)
<b>RecordSet Collection</b>	Fields	IColumnInfo	Yes
	Properties	IDBProperties IRowsetInfo::GetProperties	Yes

## Table of Data Type Mappings between DB2 and OLE DB Data Types

Table 6. Data Type Mappings between DB2 Data Types and OLE DB Data Types

DB2 Data Types	OLE DB Data Types Indicators	OLE DB Standard Type Names	DB2 Specific Names
SMALLINT	DBTYPE_I2	"DBTYPE_I2"	"SMALLINT"
INTEGER	DBTYPE_I4	"DBTYPE_I4"	"INTEGER" or "INT"
BIGINT	DBTYPE_I8	"DBTYPE_I8"	"BIGINT"
REAL	DBTYPE_R4	"DBTYPE_R4"	"REAL"
FLOAT	DBTYPE_R8	"DBTYPE_R8"	"FLOAT"
DOUBLE	DBTYPE_R8	"DBTYPE_R8"	"DOUBLE" or "DOUBLE PRECISION"

Table 6. Data Type Mappings between DB2 Data Types and OLE DB Data Types (continued)

DB2 Data Types	OLE DB Data Types Indicators	OLE DB Standard Type Names	DB2 Specific Names
DECIMAL	DBTYPE_NUMERIC	"DBTYPE_NUMERIC"	"DEC" or "DECIMAL"
NUMERIC	DBTYPE_NUMERIC	"DBTYPE_NUMERIC"	"NUM" or "NUMERIC"
DATE	DBTYPE_DBDATE	"DBTYPE_DBDATE"	"DATE"
TIME	DBTYPE_DBTIME	"DBTYPE_DBTIME"	"TIME"
TIMESTAMP	DBTYPE_DBTIMESTAMP	"DBTYPE_DBTIMESTAMP"	"TIMESTAMP"
CHAR	DBTYPE_STR	"DBTYPE_CHAR"	"CHAR" or "CHARACTER"
VARCHAR	DBTYPE_STR	"DBTYPE_VARCHAR"	"VARCHAR"
LONG VARCHAR	DBTYPE_STR	"DBTYPE_LONGVARCHAR"	"LONG VARCHAR"
CLOB - not yet supported	DBTYPE_STR and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	"DBTYPE_CHAR" and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	
GRAPHIC	DBTYPE_WSTR	"DBTYPE_WCHAR"	"GRAPHIC"
VARGRAPHIC	DBTYPE_WSTR	"DBTYPE_WVARCHAR"	"VARGRAPHIC"
LONG VARGRAPHIC	DBTYPE_WSTR	"DBTYPE_WLONGVARCHAR"	"LONG VARGRAPHIC"
DBCLOB - not yet supported	DBTYPE_WSTR and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	"DBTYPE_WCHAR" and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	
CHAR(n) FOR BIT DATA	DBTYPE_BYTES	"DBTYPE_BINARY"	
VARCHAR(n) FOR BIT DATA	DBTYPE_BYTES	"DBTYPE_VARBINARY"	
LONG VARCHAR FOR BIT DATA	DBTYPE_BYTES	"DBTYPE_LONGVARBINARY"	
BLOB - not yet supported	DBTYPE_BYTES and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	"DBTYPE_BINARY" and DBCOLUMNFLAGS_ISLONG or DBPARAMFLAGS_ISLONG	
DATA LINK	DBTYPE_STR	"DBTYPE_CHAR"	"DATA LINK"

## Table of Data Conversions for Setting Data

Table 7. Data Conversions from OLE DB Types to DB2 Types

OLE DB Type Indicator	DB2 Data Types																							
	S M A L L I N T	I N T E G E R	B I G I N T	R E A L	F L O A T I N G	D E C I M A L N U M E R I C	D A T E	T I M E	T I M E S T A M P	C H A R	V A R C H A R	L O N G V A R C H A R	C L O B	G R A P H I C	V A R G R A P H I C	L O N G V A R G R A P H I C	D B C L O B	For Bit Data			B L O B	D A T A L I N K		
																		C H A R	V A R C H A R	L O N G V A R C H A R				
DBTYPE_EMPTY																								
DBTYPE_NULL																								
DBTYPE_RESERVED																								
DBTYPE_I1	X	X	X	X	X	X					X	X												
DBTYPE_I2	X	X	X	X	X	X					X	X												
DBTYPE_I4	X	X	X	X	X	X					X	X												
DBTYPE_I8	X	X	X	X	X	X					X	X												
DBTYPE_UI1	X	X	X	X	X	X					X	X												
DBTYPE_UI2	X	X	X	X	X	X					X	X												
DBTYPE_UI4	X	X	X	X	X	X					X	X												
DBTYPE_UI8	X	X	X	X	X	X					X	X												
DBTYPE_R4	X	X	X	X	X	X					X	X												
DBTYPE_R8	X	X	X	X	X	X					X	X												
DBTYPE_CY																								
DBTYPE_DECIMAL	X	X	X	X	X	X					X	X												
DBTYPE_NUMERIC	X	X	X	X	X	X					X	X												
DBTYPE_DATE																								
DBTYPE_BOOL	X	X	X	X	X	X					X	X												
DBTYPE_BYTES			X			X					X	X	X			X		X	X	X				
DBTYPE_BSTR - to be determined																								
DBTYPE_STR	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X				X
DBTYPE_WSTR														X	X	X								
DBTYPE_VARIANT - to be determined																								



Table 7. Data Conversions from OLE DB Types to DB2 Types (continued)

OLE DB Type Indicator	DB2 Data Types																						
	SMALLINT	INTEGER	BIGINT	REAL	FLOAT	DECIMAL	NUMERIC	DATE	TIME	TIMESTAMP	CHAR	VARCHAR	LONG VARCHAR	CLOB	GRAPHIC	VARGRAPHIC	For Bit Data			LONG VARCHAR	BLOB	DATA LINK	
																	CHAR	CHAR	CHAR				
DBTYPE_IDISPATCH																							
DBTYPE_IUNKNOWN																							
DBTYPE_GUID																							
DBTYPE_ERROR																							
DBTYPE_BYREF																							
DBTYPE_ARRAY																							
DBTYPE_VECTOR																							
DBTYPE_UDT																							
DBTYPE_DBDATE							X		X	X	X												
DBTYPE_DBTIME								X	X	X	X												
DBTYPE_DBTIMESTAMP							X	X	X	X	X												
DBTYPE_FILETIME																							
DBTYPE_PROP_VARIANT																							
DBTYPE_HCHAPTER																							
DBTYPE_VARNUMERIC																							

## Table of Data Conversions for Getting Data

Table 8. Data Conversions from DB2 Types to OLE DB Types

OLE DB Type Indicator	DB2 Data Types																For Bit Data			DATA LINK				
	SMALLINT	INTEGER	BIGINT	REAL	FLOAT	DECIMAL	NUMERIC	DATE	TIME	TIMESTAMP	CHAR	VARCHAR	VARCHAR	CLOB	GRAPHIC	VARGRAPHIC	VARGRAPHIC	DBCLOB	CHAR		VARCHAR	LONG	BLOB	
																						LONG		
DBTYPE_EMPTY																								
DBTYPE_NULL																								
DBTYPE_RESERVED																								
DBTYPE_I1	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_I2	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_I4	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_I8	X	X	X	X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_UI1	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_UI2	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_UI4	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_UI8	X	X	X	X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_R4	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_R8	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_CY	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_DECIMAL	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_NUMERIC	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_DATE	X	X		X	X		X	X	X	X	X	X	X		X	X	X						X	
DBTYPE_BOOL	X	X		X	X	X					X	X	X		X	X	X		X	X	X		X	
DBTYPE_BYTES	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	
DBTYPE_BSTR	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	
DBTYPE_STR	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	
DBTYPE_WSTR	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	
DBTYPE_VARIANT	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X		X	
DBTYPE_IDISPATCH																								

Table 8. Data Conversions from DB2 Types to OLE DB Types (continued)

OLE DB Type Indicator	DB2 Data Types																						
	SMALLINT	INTEGER	BIGINT	REAL	FLOAT	DECIMAL	NUMERIC	DATE	TIME	TIMESTAMP	CHAR	VARCHAR	LONG VARCHAR	CLOB	GRAPHIC	LONG VARCHAR	For Bit Data			BINARY	LONG BINARY		
																	CHAR	VARCHAR	LONG VARCHAR				
DBTYPE_IUNKNOWN											X	X	X		X	X	X		X	X	X		X
DBTYPE_GUID											X	X	X		X	X	X		X	X	X		X
DBTYPE_ERROR																							
DBTYPE_BYREF																							
DBTYPE_ARRAY																							
DBTYPE_VECTOR																							
DBTYPE_UDT																							
DBTYPE_DBDATE							X	X	X	X	X	X	X		X	X	X		X	X	X		X
DBTYPE_DBTIME							X	X	X	X	X	X	X		X	X	X						X
DBTYPE_DBTIMESTAMP							X	X	X	X	X	X	X		X	X	X		X	X	X		X
DBTYPE_FILETIME			X				X	X	X	X	X	X	X		X	X	X		X	X	X		X
DBTYPE_PROP_VARIANT	X	X	X	X	X						X	X	X		X	X	X		X	X	X		X
DBTYPE_HCHAPTER																							
DBTYPE_VARNUMERIC																							

## Table of Supported Schema Rowsets

Table 9. Schema Rowsets Supported by the IBM OLE DB Provider for DB2

Supported GUIDs	Supported Restrictions	Supported Columns	Notes
DBSCHEMA_COLUMN_PRIVILEGES	COLUMN_NAME TABLE_NAME TABLE_SCHEMA	COLUMN_NAME GRANTEE GRANTOR IS_GRANTABLE PRIVILEGE_TYPE TABLE_NAME TABLE_SCHEMA	

Table 9. Schema Rowsets Supported by the IBM OLE DB Provider for DB2 (continued)

Supported GUIDs	Supported Restrictions	Supported Columns	Notes
DB_SCHEMA_COLUMNS	COLUMN_NAME TABLE_NAME TABLE_SCHEMA	CHARACTER_MAXIMUM_LENGTH CHARACTER_OCTET_LENGTH COLUMN_DEFAULT COLUMN_FLAGS COLUMN_HASDEFAULT COLUMN_NAME DATA_TYPE DESCRIPTION IS_NULLABLE NUMERIC_PRECISION NUMERIC_SCALE ORDINAL_POSITION TABLE_NAME TABLE_SCHEMA	
DBSCHEMA_FOREIGN_KEYS	FK_TABLE_NAME FK_TABLE_SCHEMA PK_TABLE_NAME PK_TABLE_SCHEMA	DEFERRABILITY DELETE_RULE FK_COLUMN_NAME FK_NAME FK_TABLE_NAME FK_TABLE_SCHEMA ORDINAL PK_COLUMN_NAME PK_NAME PK_TABLE_NAME PK_TABLE_SCHEMA UPDATE_RULE	Must specify at least one of the following restrictions: PK_TABLE_NAME or FK_TABLE_NAME  No “%” wildcard allowed.
DBSCHEMA_INDEXES	TABLE_NAME TABLE_SCHEMA	CARDINALITY CLUSTERED COLLATION COLUMN_NAME INDEX_NAME INDEX_SCHEMA ORDINAL_POSITION PAGES TABLE_NAME TABLE_SCHEMA TYPE UNIQUE	No sort order supported. Sort order, if specified, will be ignored.
DBSCHEMA_PRIMARY_KEYS	TABLE_NAME TABLE_SCHEMA	COLUMN_NAME ORDINAL PK_NAME TABLE_NAME TABLE_SCHEMA	Must specify at least the following restrictions: TABLE_NAME  No “%” wildcard allowed.

Table 9. Schema Rowsets Supported by the IBM OLE DB Provider for DB2 (continued)

Supported GUIDs	Supported Restrictions	Supported Columns	Notes
DBSCHEMA _PROCEDURE_PARAMETERS	PARAMETER_NAME PROCEDURE_NAME PROCEDURE_SCHEMA	CHARACTER_MAXIMUM_LENGTH CHARACTER_OCTET_LENGTH DATA_TYPE DESCRIPTION IS_NULLABLE NUMERIC_PRECISION NUMERIC_SCALE ORDINAL_POSITION PARAMETER_DEFAULT PARAMETER_HASDEFAULT PARAMETER_NAME PARAMETER_TYPE PROCEDURE_NAME PROCEDURE_SCHEMA TYPE_NAME	
DBSCHEMA_PROCEDURES	PROCEDURE_NAME PROCEDURE_SCHEMA	DESCRIPTION PROCEDURE_NAME PROCEDURE_SCHEMA PROCEDURE_TYPE	
DBSCHEMA_PROVIDER_TYPES	(NONE)	AUTO_UNIQUE_VALUE BEST_MATCH CASE_SENSITIVE CREATE_PARAMS COLUMN_SIZE DATA_TYPE FIXED_PREC_SCALE IS_FIXEDLENGTH IS_LONG IS_NULLABLE LITERAL_PREFIX LITERAL_SUFFIX LOCAL_TYPE_NAME MINIMUM_SCALE MAXIMUM_SCALE SEARCHABLE TYPE_NAME UNSIGNED_ATTRIBUTE	
DBSCHEMA_STATISTICS	TABLE_NAME TABLE_SCHEMA	CARDINALITY TABLE_NAME TABLE_SCHEMA	No sort order supported. Sort order, if specified, will be ignored.
DBSCHEMA _TABLE_PRIVILEGES	TABLE_NAME TABLE_SCHEMA	GRANTEE GRANTOR IS_GRANTABLE PRIVILEGE_TYPE TABLE_NAME TABLE_SCHEMA	
DBSCHEMA_TABLES	TABLE_NAME TABLE_SCHEMA TABLE_TYPE	DESCRIPTION TABLE_NAME TABLE_SCHEMA TABLE_TYPE	

---

## Examples of Connecting to a Data Source

The following examples show how to connect to a DB2 data source using the IBM OLE DB Provider for DB2:

- **Example 1:** Visual Basic application using ADO

```
Dim db As ADODB.Connection
Set db = New ADODB.Connection
db.Provider = "IBMDADB2"
db.CursorLocation = adUseClient
...
```

- **Example 2:** C/C++ application using IDBPromptInitialize and Data Links

```
// Create DataLinks
hr = CoCreateInstance (
    CLSID_DataLinks,
    NULL,
    CLSCTX_INPROC_SERVER,
    IID_IDBPromptInitialize,
    (void**)&pIDBPromptInitialize);

// Invoke the DataLinks UI to select the provider and data source
hr = pIDBPromptInitialize->PromptDataSource (
    NULL,
    GetDesktopWindow(),
    DBPROMPTOPTIONS_PROPERTY SHEET,
    0,
    NULL,
    NULL,
    IID_IDBInitialize,
    (IUnknown**)&pIDBInitialize);
```

- **Example 3:** C/C++ application using IDataInitialize and Service Component

```
hr = CoCreateInstance (
    CLSID_MSDAINITIALIZE,
    NULL,
    CLSCTX_INPROC_SERVER,
    IID_IDataInitialize,
    (void**)&pIDataInitialize);

hr = pIDataInitialize->CreateDBInstance(
    CLSID_IBMDADB2, // ClassID of IBMDADB2
    NULL,
    CLSCTX_INPROC_SERVER,
    NULL,
    IID_IDBInitialize,
    (IUnknown**)&pIDBInitialize);
```

---

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