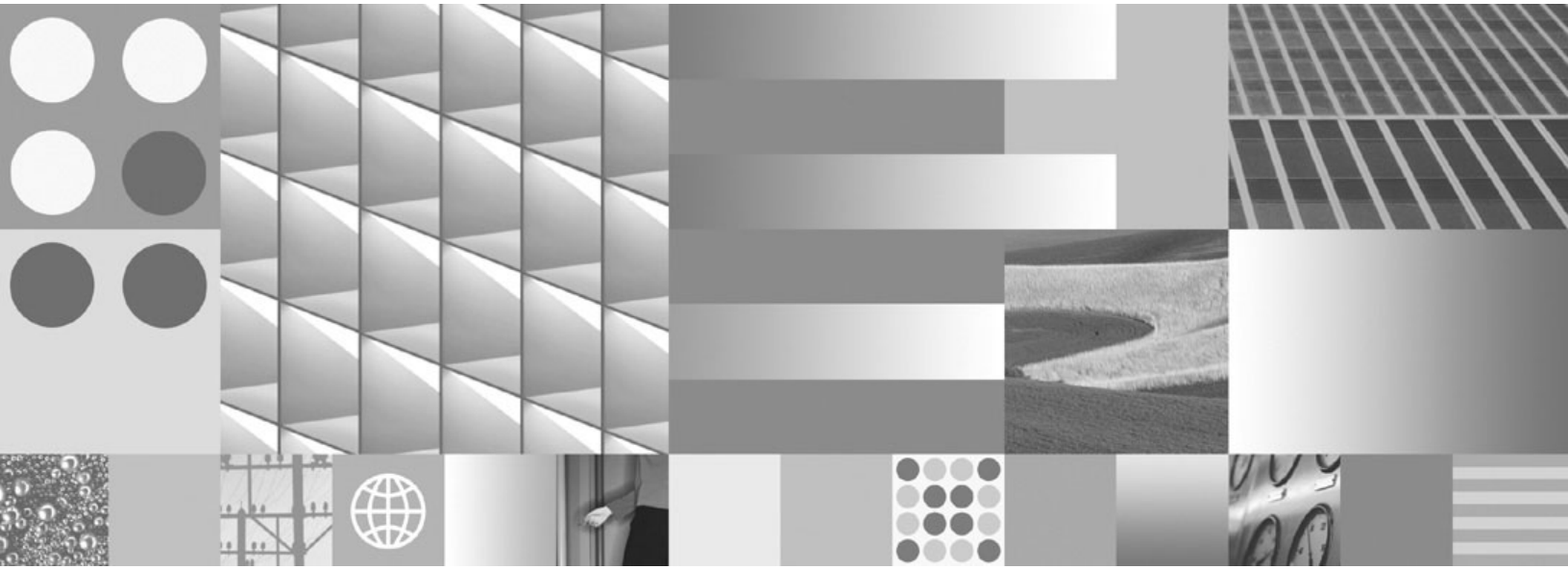
IBM Informix

Version 3.50

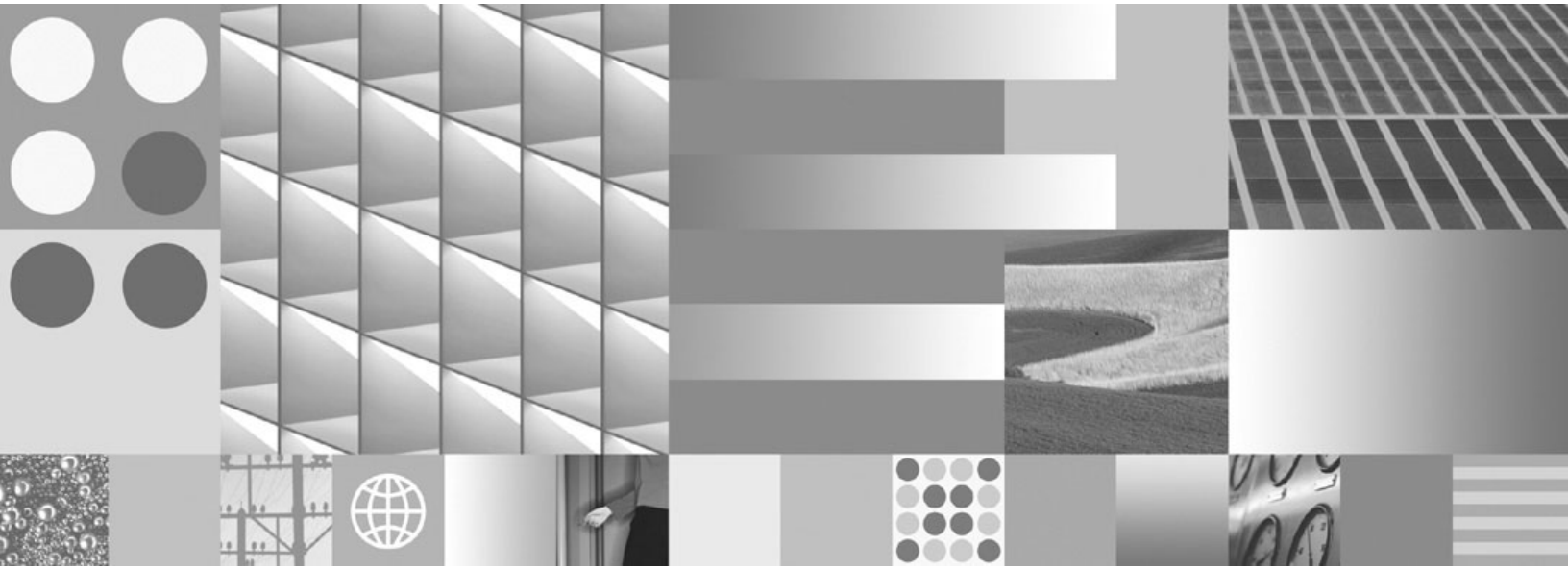


IBM Informix OLE DB Provider Programmer's Guide

SC23-9424-00

IBM Informix

Version 3.50



IBM Informix OLE DB Provider Programmer's Guide

SC23-9424-00

Note:
Before using this information and the product it supports, read the information in "Notices" on page C-1.

Contents

Introduction

In This Introduction

This introduction provides an overview of the information in this publication and describes the conventions it uses.

About This Publication

This publication describes the software requirements for using IBM Informix OLE DB Provider, shows how to install and configure the provider for your use, and explains how to use IBM Informix OLE DB Provider to enable client applications, such as ActiveX Data Object (ADO) applications and Web pages, to access data on an Informix® server.

Types of Users

This publication is written for the following users:

- Database administrators who install and configure Informix database servers, databases, and connectivity products
- Developers who write applications using IBM Informix OLE DB Provider

This publication is written with the assumption that you have the following background:

- A working knowledge of your computer, your operating system, and the utilities that your operating system provides
- Some experience with Microsoft® OLE DB
- Some experience working with relational databases or exposure to database concepts

If you have limited experience with relational databases, SQL, or your operating system, refer to the *IBM Informix Dynamic Server Getting Started Guide* for your database server for a list of supplementary titles.

Assumptions About Your Locale

IBM Informix products can support many languages, cultures, and code sets. All the information related to character set, collation and representation of numeric data, currency, date, and time is brought together in a single environment, called a GLS (Global Language Support) locale.

The examples in this publication are written with the assumption that you are using the default locale, **en_us.1252-1**. This locale supports U.S. English format conventions for date, time, and currency. In addition, this locale supports the ISO 8859-1 code set, which includes the ASCII code set plus many 8-bit characters such as é, è, and ñ.

If you plan to use nondefault characters in your data or your SQL identifiers, or if you want to conform to the nondefault collation rules of character data, you need to specify the appropriate nondefault locale.

For instructions on how to specify a nondefault locale, additional syntax, and other considerations related to GLS locales, see the *IBM Informix GLS User's Guide*.

Important: IBM Informix OLE DB Provider follows the ISO string formats for date, time, and money, as defined by the Microsoft OLE DB standards, unless you override this by setting an Informix environment variable or registry entry, such as DBDATE.

What's New in OLE DB Provider for Client SDK, Version 3.50

For a comprehensive list of new features for this release, see the *IBM Informix Dynamic Server Getting Started Guide*. The following changes and enhancements are relevant to this publication.

Table 1. What's New in IBM Informix OLE DB Provider Programmer's Guide

Overview	Reference
BIGINT and BIGSERIAL data types These data types are similar to INT8 and SERIAL8, but have performance advantages.	"Data Type Mappings" on page 2-4 "Data Conversions for Setting Data" on page 2-8 "Data Conversions for Getting Data" on page 2-10

Documentation Conventions

This section describes the following conventions, which are used in the product documentation for IBM® Informix Dynamic Server:

- Typographical conventions
- Feature, product, and platform conventions
- Example code conventions

Typographical Conventions

This publication uses the following conventions to introduce new terms, illustrate screen displays, describe command syntax, and so forth.

Convention	Meaning
KEYWORD	Keywords of SQL, SPL, and some other programming languages appear in uppercase letters in a serif font.
italics	Within text, new terms and emphasized words appear in italics. Within syntax and code examples, variable values that you are to specify appear in italics.

Convention	Meaning
boldface	Names of program entities (such as classes, events, and tables), environment variables, file names, path names, and interface elements (such as icons, menu items, and buttons) appear in boldface.
monospace	Information that the product displays and information that you enter appear in a monospace typeface.
KEYSTROKE	Keys that you are to press appear in uppercase letters in a sans serif font.
>	This symbol indicates a menu item. For example, "Choose **Tools > Options**" means choose the **Options** item from the **Tools** menu.

Feature, Product, and Platform Markup

Feature, product, and platform markup identifies paragraphs that contain feature-specific, product-specific, or platform-specific information. Some examples of this markup follow:

Dynamic Server

Identifies information that is specific to IBM Informix Dynamic Server

End of Dynamic Server

Windows Only

Identifies information that is specific to the Windows operating system

End of Windows Only

This markup can apply to one or more paragraphs within a section. When an entire section applies to a particular product or platform, this is noted as part of the heading text, for example:

Table Sorting (Windows)

Example Code Conventions

Examples of SQL code occur throughout this publication. Except as noted, the code is not specific to any single IBM Informix application development tool.

If only SQL statements are listed in the example, they are not delimited by semicolons. For instance, you might see the code in the following example:

```
CONNECT TO stores_demo
...

DELETE FROM customer
   WHERE customer_num = 121
...

COMMIT WORK
DISCONNECT CURRENT
```

To use this SQL code for a specific product, you must apply the syntax rules for that product. For example, if you are using DB–Access, you must delimit multiple statements with semicolons. If you are using an SQL API, you must use EXEC SQL at the start of each statement and a semicolon (or other appropriate delimiter) at the end of the statement.

Tip: Ellipsis points in a code example indicate that more code would be added in a full application, but it is not necessary to show it to describe the concept being discussed.

For detailed directions on using SQL statements for a particular application development tool or SQL API, see the documentation for your product.

Additional Documentation

You can view, search, and print all of the product documentation from the IBM Informix Dynamic Server information center on the Web at http://publib.boulder.ibm.com/infocenter/idshelp/v115/index.jsp.

For additional documentation about IBM Informix Dynamic Server and related products, including release notes, machine notes, and documentation notes, go to the online product library page at http://www.ibm.com/software/data/informix/pubs/library/. Alternatively, you can access or install the product documentation from the Quick Start CD that is shipped with the product.

Compliance with Industry Standards

The American National Standards Institute (ANSI) and the International Organization of Standardization (ISO) have jointly established a set of industry standards for the Structured Query Language (SQL). IBM Informix SQL-based products are fully compliant with SQL-92 Entry Level (published as ANSI X3.135-1992), which is identical to ISO 9075:1992. In addition, many features of IBM Informix database servers comply with the SQL-92 Intermediate and Full Level and X/Open SQL Common Applications Environment (CAE) standards.

How to Provide Documentation Feedback

You are encouraged to send your comments about IBM Informix user documentation by using one of the following methods:

- Send e-mail to docinf@us.ibm.com.
- Go to the Information Center at http://publib.boulder.ibm.com/infocenter/idshelp/v115/index.jsp and open the topic that you want to comment on. Click **Feedback** at the bottom of the page, fill out the form, and submit your feedback.

Feedback from both methods is monitored by those who maintain the user documentation of Dynamic Server. The feedback methods are reserved for reporting errors and omissions in our documentation. For immediate help with a technical problem, contact IBM Technical Support. For instructions, see the IBM Informix Technical Support Web site at http://www.ibm.com/planetwide/.

We appreciate your suggestions.

Chapter 1. Overview and Setup

In This Chapter

This chapter describes the software you can use with IBM Informix OLE DB Provider and explains how to install and configure it for your use.

Introducing IBM Informix OLE DB Provider

Microsoft OLE DB is a specification for a set of data access interfaces designed to enable a variety of data stores to work together seamlessly. OLE DB components are: data *providers*, data *consumers*, and service components. Data providers own data and make it available to consumers. Each provider's implementation is different, but they all expose their data in a tabular form through virtual tables. Data consumers use the OLE DB interfaces to access data.

You use IBM Informix OLE DB Provider to enable client applications, such as ActiveX Data Object (ADO) applications and Web pages, to access data on an Informix server.

IBM Informix OLE DB Provider is a component of the IBM Informix Client SDK.

Tip: This publication describes the characteristics of the *IBM Informix OLE DB Provider*. It does not describe the architecture of OLE DB providers in general or how to program with OLE DB. For information about OLE DB architecture and programming, go to the Microsoft web site (http://www.microsoft.com) and search for "Introduction to OLE DB".

Software Dependencies

IBM Informix OLE DB Provider can be used with the following Informix database servers:

- IBM Informix Dynamic Server (IDS), Version 7.3 and later
- IBM Informix Dynamic Server with Advanced Decision Support and Extended Parallel Options, Version 8.2 and later
- IBM Informix Extended Parallel Server, Version 8.3 and later
- IBM Informix Dynamic Server (IDS), Version 9.2x and later

System Requirements

To use the IBM Informix OLE DB Provider, you must run on one of these supported operating systems:

- Microsoft Windows NT® Version 4.0 with Service Pack 4 or later
- Microsoft Windows® 2003 Server, Microsoft Windows XP, or Microsoft Windows Vista

Installing and Configuring IBM Informix OLE DB Provider

IBM Informix OLE DB Provider is distributed with IBM Informix Connect and the IBM Informix Client Software Development Kit (SDK).

When you install the Client SDK, IBM Informix OLE DB Provider is installed by default. The installation includes other necessary components and performs required updates to the registry.

After installation, you must run the script **coledbp.sql** on the Informix server against the **sysmaster** database as user **informix**. IBM Informix OLE DB Provider requires the stored procedures added to the server by the **coledbp.sql** script. The script is located in the **INFORMIXDIR\etc** directory. (To remove the stored procedures, you can run the **doledbp.sql** against the **sysmaster** database as user **informix**.)

Manual Updates to the Registry

If you need to manually add or remove IBM Informix OLE DB Provider to or from the registry, you can do it as follows.

To add IBM Informix OLE DB Provider to the registry:

1. Using the command prompt, change directory to **INFORMIXDIR\bin**.
   The file **ifxoledbc.dll** is present in this directory.
2. Type the following command and press Enter:
   ```
   Regsvr32.exe ifxoledbc.dll
   ```

To remove IBM Informix OLE DB Provider from the registry:

1. Using the command prompt, change directory to **INFORMIXDIR\bin**.
   The file **ifxoledbc.dll** is present in this directory.
2. Type the following command and press Enter:
   ```
   Regsvr32.exe /u ifxoledbc.dll
   ```

Upgrading from Previous Versions

To upgrade from previous versions of IBM Informix OLE DB Provider, your database administrator should follow these steps:

1. Run the script **doledbp.sql** against the **sysmaster** database as user **informix**.
   Ignore any messages about missing database objects.
2. Run the script **coledbp.sql** against the **sysmaster** database as user **informix**.

Version 2.8 of IBM Informix OLE DB Provider changes the way some features used to operate in earlier versions. If you have used a pre-2.8 version of the IBM Informix OLE DB Provider, the issues you need to be aware of are:

- OLE DB Provider handles the INTERVAL type differently in this release. In pre-2.8 versions, interval data was returned as decimal numbers with different sections of that number corresponding to year, month, day, and other fields within the value. Knowledge of the start and end fields of the interval column was required in order to interpret the decimal number correctly.

  In this release, the default type is a string with the format as described in the *IBM Informix Guide to SQL: Reference*, with the provision that a conversion to a numeric type is also allowed. If a datetime interval is requested in DB_TYPE_I8 format, the number returned will have 1/100,000 seconds as the unit of measure.
- OLE DB Provider handles complex data types, collections, and row types differently in this release. Data of these types is presented in string format as LVARCHAR data. This is similar to the method that is used to interact with this data using the DB–Access tool. As an example of the format being presented, if a column has the definition:

  ```
  my_date     MULTISET(date not null)
  ```

  Data contained in this column is returned to the application in the format:

  ```
  MULTISET{'08/15/2000','02/02/2002','10/11/1999'}
  ```
- Type handling for the DECIMAL, MONEY, and DATETIME types has changed from the previous release. See "Data Types" on page 2-4 for information about how the current release handles these types.

Sample Programs

A sample program, **Demo1**, is included in the following location:

%INFORMIXDIR%\demo\oledbdemo\Demo1

It is a complete project that introduces how to use OLE DB interfaces in a C++ application. It performs the following tasks:

- Connects to IBM Informix Dynamic Server by creating a DataSource object
- Creates a Session object
- Creates a Command object
- Executes SQL statements to perform the following tasks:
  - Drop the table **MyTable**, if it exists
  - Create the table **MyTable**
  - Insert records in **MyTable**
- Deletes the Command object
- Deletes the Session object
- Disconnects the database and server connection and deletes the DataSource object

Another sample program is included in:

INFORMIXDIR\demo\oledbdemo\DistTxn

Support of OLE DB Specifications

The IBM Informix OLE DB Provider supports level 0 of the OLE DB provider specification, including some additional level 1 interfaces. For more information about supported interfaces, see Appendix A, "Supported Interfaces," on page A-1.

The IBM Informix OLE DB Provider is built and tested with Microsoft Data Access Components (MDAC) version 2.8.

Support of LDAP Authentication in Windows

You can use LDAP Authentication in Windows with IBM Informix OLE DB Provider, which is similar to the Pluggable Authentication Module (PAM) that is used on UNIX® and Linux®. When you want to use an LDAP server to authenticate your system users, use the LDAP Authentication Support module. The module contains source code that you can modify to fit your specific requirements. For information on the LDAP Authentication Support module, see the *IBM Informix Security Guide*.

Chapter 2. Using IBM Informix OLE DB Provider

In This Chapter

This chapter describes the kind of applications you can create using IBM Informix OLE DB Provider and discusses how to connect to data sources and manipulate data within your application.

Supported Applications

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

- ADO applications, including:

  Microsoft Visual Studio C++ applications

  Microsoft Visual Basic applications
- C/C++ applications that access Informix databases directly using the OLE DB interfaces, including ATL applications whose Data Access Consumer Objects were generated by the ATL COM AppWizard

For information about ADO connection string keywords, see the section "Connecting to a Data Source," following.

Connecting to a Data Source

IBM Informix OLE DB Provider treats the database (rather than the database server instance) as a data source.

Data source names must be in the following format:

[*database*][@*server*]

The brackets indicate that the enclosed items are optional. If the database name is missing, the client user name is used. If the *@server* name is missing, the default database server is used (corresponding to the value specified by the client's INFORMIXSERVER registry entry).

To specify ADO connection string keywords, specify keywords in the connection string for the Provider using the format keyword=*value*. Delimit multiple keywords with a semicolon.

The following table describes the ADO keywords supported by the IBM Informix OLE DB Provider.

Keyword	Value	Description
DSN	Name of the database alias	The Informix database alias in the database directory
UID	User ID	The user ID used to connect to the Informix server
PWD	Password	The password for the user ID
Client_locale	Locale	The client locale for the application
Db_locale	Locale	The database locale for the application
UNICODE	True or False	Indicates whether to use IBM Informix GLS Unicode See "Using the UNICODE Provider String Keyword" on page 2-13 for more information.
RSASWS or REPORTSTRINGASWSTRING	True or False	Enables you to control the data mapping for wide strings See "Using the REPORTSTRINGASWSTRING Provider String Keyword" on page 2-14 for more information.
FBS or FETCHBUFFERSIZE	Numeric	The size in bytes of the buffer size used to send data to or from the database. The range of values is 4096 (default) to 32767. If you want to set the fetch buffer size at 32K, for example, set the connection string as ″FBS=32767″ or ″FETCHBUFFERSIZE=32767″. If the value of ″FBS″ or ″FETCHBUFFERSIZE″ is not in the range between 4096 and 32767, then by default the value will be changed to 4096 internally and no error message is returned.

Important: These settings take precedence over the settings of environment variables.

Using Cursors

IBM Informix OLE DB Provider supports the following ADO cursor types:

- Client-side scrollable cursors (**adUseClient** and **adOpenStatic**)

  Client-side scrollable cursors (**adUseClient** and **adOpenStatic**) support bookmarks and have the following limitation: database updates fail when the rowset includes columns of extended data types.

- Server-side scrollable cursors (**adOpenStatic**)

  Server-side scrollable cursors are faster than client-side cursors. If a server-side scrollable cursor is opened on a table (**adCmdTableDirect**) or on a simple SELECT statement (single table, no aggregates, no GROUP BY clause), the cursor can support bookmarks and, with the Version 9.2, or later Informix server, database updates.

- Server-side nonscrollable cursors (**adUseServer** and **adOpenForwardOnly**)

  Server-side nonscrollable cursors (**adUseServer** and **adOpenForwardOnly**) are the fastest cursors. Like server-side scrollable cursors, nonscrollable cursors support updates when opened on a table or (with the Version 9.2, or later Informix server) when opened on a simple FOR UPDATE-compatible SELECT statement. In addition, if a server side nonscrollable cursor is opened on a table or on a simple SQL statement without an ORDER BY clause, the cursor is able to display changes made to the database by other users (unless transaction isolation precludes it).

The following caveats apply to the use of cursors:

- The only scrollable cursor supported by IBM Informix OLE DB Provider is the static cursor. The Provider accepts requests for other types of scrollable cursors (dynamic and keyset), but it supplies a static cursor regardless of which cursor type is requested.
- Since the scrollable cursor is static, it cannot detect changes made to the database by other users. The DBPROP_OWNINSERT, DBPROP_OTHERINSERT, and DBPROP_OTHERUPDATEDELETE properties for scrollable cursors are read-only VARIANT_FALSE.

  Use a nonscrollable cursor (**adOpenForwardOnly**) if you want the functionality that corresponds to setting these properties to VARIANT_TRUE.

- With pre-Version 9.2 Informix servers, the server-side nonscrollable cursor **adUseServer** can update records only when the rowset is opened with **IOpenRowset::OpenRowset()**. The ADO flag corresponding to **IOpenRowset::OpenRowset()** is **adCmdTableDirect**.

  The client-side cursor (**adUseClient**) does not have this limitation.

- Server-side scrollable cursors cannot be opened if the record set includes simple large objects (BYTE and TEXT) or collections.

  You can use a server-side nonscrollable cursor (**adOpenForwardOnly**) or a client-side scrollable cursor (**adUseClient**) with these types.

- The DBPROP_IRowsetScroll property is read-only VARIANT_FALSE for rowsets not opened with **IOpenRowset::OpenRowset()**. It is VARIANT_TRUE for rowsets opened with **IOpenRowset::**
  OpenRowset() if bookmarks are requested (corresponding ADO flags are **adOpenStatic** and **adOpenKeyset**).

- To support bookmarks and the modification or deletion of records, a data source table must include a ROWID column. (A ROWID column is not needed to insert records.)

All fragmented and nonfragmented tables created with the WITH ROWIDS clause (or altered with the WITH ROWIDS clause applied) have this column. The ROWID column itself is not visible to consumers unless it is explicitly selected.

If consumers require a persistent unique ID, create the necessary columns using the SERIAL or SERIAL8 data types.

- Use of DISTINCT, UNIQUE, ORDER BY, GROUP BY, or aggregates in SQL statements makes the cursor unable to detect changes made on the database by other users.
- Any SELECT statement that cannot be used with FOR UPDATE (for example, because it has joins or aggregates) is incompatible with bookmarks and updatability (but not incompatible with scrolling).
- When you work with ADO client-side cursors, specify the table name in the same text case that is used on the server. Otherwise, the database server will return an error. To work around this issue, use ADO server-side cursors.

Data Types

IBM Informix OLE DB Provider supports all built-in and user-defined types. However, see the caveats about using scrollable cursors on data that includes simple large objects and collections in "Using Cursors" on page 2-3.

Data Type Mappings

IBM Informix OLE DB Provider supports data type mappings between Informix data types and OLE DB data types, as shown in the following table.

The data type shown in the column headed **MSDASQL>ODBC 3.80 Type** is the type that an Informix data type maps to when you use the Microsoft OLE DB to ODBC bridge.

Informix Data Type	Pre-Version 2.8 OLE DB Provider Type	MSDASQL>ODBC 3.80 Type	Current OLE DB Provider Type
BIGINT	None	DBTYPE_I8	DBTYPE_I8
BIGSERIAL	None	DBTYPE_UI8	DBTYPE_I8
BLOB	DBTYPE_BYTES	DBTYPE_BYTES	DBTYPE_BYTES
BOOLEAN	DBTYPE_BOOL	DBTYPE_BOOL	DBTYPE_BOOL
BYTE	DBTYPE_BYTES	DBTYPE_BYTES	DBTYPE_BYTES
CHAR	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR
CLOB	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR
DATE	DBTYPE_DBDATE	DBTYPE_DBDATE	DBTYPE_DBDATE
DATETIME	DBTYPE_DBTIMESTAMP	DBTYPE_DBTIMESTAMP Except: DATETIME YEAR TO DAY maps to DBTYPE_DBDATE DATETIME HOUR TO SECOND maps to DBTYPE_DBTIME	DBTYPE_DBDATE or DBTYPE_DBTIME or DBTYPE_DBTIMESTAMP For detailed information, see "The DATETIME Type Mapping" on page 2-6.
DECIMAL See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARNUMERIC	DBTYPE_NUMERIC	DBTYPE_NUMERIC

Informix Data Type	Pre-Version 2.8 OLE DB Provider Type	MSDASQL>ODBC 3.80 Type	Current OLE DB Provider Type
DISTINCT	Same as underlying type	Same as underlying type	Same as underlying type
FLOAT	DBTYPE_R8	DBTYPE_R8	DBTYPE_R8
INT8	DBTYPE_I8	DBTYPE_I8	DBTYPE_I8
INTEGER	DBTYPE_I4	DBTYPE_I4	DBTYPE_I4
INTERVAL	DBTYPE_NUMERIC	DBTYPE_BYTES	DBTYPE_STR See "The INTERVAL Type Mapping" on page 2-5.
LIST	DBTYPE_VARIANT	DBTYPE_STR See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARIANT
LVARCHAR	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR
MONEY (p<=19 s<=4)	DBTYPE_NUMERIC	DBTYPE_CY	DBTYPE_CY
MONEY (p>19 s<>4) See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_NUMERIC	DBTYPE_NUMERIC	DBTYPE_NUMERIC
MULTISET	DBTYPE_VARIANT	DBTYPE_STR See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARIANT
NCHAR	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR
OPAQUE	DBTYPE_BYTES	DBTYPE_BYTES	DBTYPE_BYTES
Named ROW	DBTYPE_VARIANT	DBTYPE_STR See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARIANT
Unnamed ROW	Same as underlying type	DBTYPE_STR See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARIANT
SERIAL	DBTYPE_I4	DBTYPE_I4	DBTYPE_I4
SERIAL8	DBTYPE_I8	DBTYPE_UI8	DBTYPE_I8
SET	DBTYPE_VARIANT	DBTYPE_STR See "The Decimal and Money Type Mapping" on page 2-6.	DBTYPE_VARIANT
SMALLFLOAT	DBTYPE_R4	DBTYPE_R4	DBTYPE_R4
SMALLINT	DBTYPE_I2	DBTYPE_I2	DBTYPE_I2
TEXT	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR
VARCHAR	DBTYPE_STR	DBTYPE_STR	DBTYPE_STR

The INTERVAL Type Mapping

For Version 2.8, by default, the INTERVAL data type is mapped to a string with the format described in *IBM Informix Guide to SQL: Reference*. However, a conversion to a numeric type is also allowed. Conversion to a string type facilitates the easy display of user-entered data. The alternate numeric conversion facilitates mathematical manipulation of data by an application.

For day-time intervals, the recommended alternate numeric conversion is to DBTYPE_I8. The number returned will have 1/100,000 seconds as the unit of measure.

For year-month intervals, the recommended alternate conversion is to DBTYPE_I8. The number returned will have months as the unit of measure.

Conversions of both day-time and year-month interval types to the types DBTYPE_I4, DBTYPE_I2, and DBTYPE_I1 are also allowed; overflow errors are possible for the smaller types.

Important: For numeric conversions, the format of the returned number is different from the format returned in prior releases of the IBM Informix OLE DB Provider (in order to avoid ambiguity).

The DATETIME Type Mapping

Version 2.8 of IBM Informix OLE DB Provider maps DATETIME types to the smallest type that can contain the start and end fields of the DATETIME value. The following table shows how Version 2.8 IBM Informix OLE DB Provider maps each DATETIME type.

Informix Data Type	Version 2.8 OLE DB Provider Type
DATETIME YEAR TO YEAR DATETIME YEAR TO MONTH DATETIME YEAR TO DAY DATETIME MONTH TO MONTH DATETIME MONTH TO DAY DATETIME DAY TO DAY	DBTYPE_DBDATE
DATETIME HOUR TO HOUR DATETIME HOUR TO MINUTE DATETIME HOUR TO SECOND DATETIME MINUTE TO MINUTE DATETIME MINUTE TO SECOND DATETIME SECOND TO SECOND	DBTYPE_DBTIME
DATETIME YEAR TO HOUR DATETIME YEAR TO MINUTE DATETIME YEAR TO SECOND DATETIME YEAR TO FRACTION DATETIME MONTH TO HOUR DATETIME MONTH TO MINUTE DATETIME MONTH TO SECOND DATETIME MONTH TO FRACTION DATETIME DAY TO HOUR DATETIME DAY TO MINUTE DATETIME DAY TO SECOND DATETIME DAY TO FRACTION DATETIME HOUR TO FRACTION DATETIME MINUTE TO FRACTION DATETIME SECOND TO FRACTION DATETIME FRACTION TO FRACTION	DBTYPE_DBTIMESTAMP

The Decimal and Money Type Mapping

Microsoft Visual Basic and ADO have limitations when handling floating point numbers with a scale greater than 30 and decimals with an undefined scale.

Therefore, some ADO consumers (for example, Microsoft Visual Basic 6) may encounter problems representing Informix DECIMAL or MONEY values.

ADO allows you to specify DBPROP_INIT_PROVIDERSTRING parameters as part of the connection string. Some tools (for example, Microsoft Visual Basic 6) allow you to set DBPROP_INIT_PROVIDERSTRING parameters as "Extended Properties." The parameters are case sensitive.

To allow these consumers to correctly handle decimal values, IBM Informix OLE DB Provider sets the advanced connection option Describe Decimal as Real/Double, so that decimal values with no scale are returned as the type DBTYPE_R8.

To avoid the problem of floating point numbers with a scale greater than 30, IBM Informix OLE DB Provider supplies the provider string option **decasr8=R8**, which you specify by setting the DBPROP_INIT_PROVIDERSTRING initialization property. This parameter instructs IBM Informix OLE DB Provider to map DECIMAL and MONEY values to the standard Windows DBTYPE_R8 data type. This option also resolves the decimals-with-no-scale problem, but can lead to unnecessary truncation of digits.

Starting with version 3.00, when the connection option (**decasr8=R8**) is not used for columns with DECIMAL data type and no scale is specified, the precision and scale are evaluated by the OLE DB Provider using the following formula for the non-ANSI databases:

```
DECIMAL(p) = DECIMAL(MIN(2 * p, 32),(p < 16) ? p : 12 + ((32 - p) / 4))
```

For best results, always specify a scale for DECIMAL data types.

Large Object and User-Defined Data Type Mapping

IBM Informix OLE DB Provider supports large objects and user-defined data types as follows:

- The BYTE data type is reported by **IColumnsInfo::GetColumnInfo()** and appropriate schema rowsets as DBTYPE_BYTES; the TEXT data type is reported as DBTYPE_STR. Values of BYTE and TEXT types are cached in memory.
- Complex data types are reported by **IColumnsInfo::GetColumnInfo()** and appropriate schema rowsets as DBTYPE_VARIANT. The corresponding value is a safe array.

  This mapping is known to work with ADO and Visual Basic/VBScript.
- The CLOB data type is reported by **IColumnsInfo::GetColumnInfo()** and appropriate schema rowsets as DBTYPE_STR with the IS_LONG flag set; the BLOB data type is reported as DBTYPE_BYTES with the IS_LONG flag set.

  This mapping allows ADO to open storage objects on smart large object data and manipulate it with the **GetChunk()** and **AppendChunk()** methods.
- Distinct data types are generally resolved to their source type. For example, if you define an HTML type as a distinct CLOB data type, **IColumnsInfo::GetColumnInfo()** and appropriate schema rowsets report it as DBTYPE_STR with the IS_LONG flag set.
- Opaque data types are reported by **IColumnsInfo::GetColumnInfo()** and appropriate schema rowsets as DBTYPE_BYTES.

Data Conversions for Setting Data

The following tables show the supported data conversions from OLE DB types to Informix types. Note that truncation of data may occur in some cases.

	Informix Data Types															
OLE DB Type Indicator	**SMALLINT**	**INTEGER**	**SERIAL**	**INT8**	**FLOAT**	**SMALLFLOAT**	**DECIMAL**	**MONEY**	**DATE**	**DATETIME**	**INTERVAL**	**CHAR**	**NCHAR**	**VARCHAR**	**NVARCHAR**	**NUMERIC**
DBTYPE_EMPTY																
DBTYPE_NULL																
DBTYPE_RESERVED																
DBTYPE_I1	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
DBTYPE_I4	X	X	X	X	X	X	X	X			X	X	X	X	X	X
DBTYPE_I8											X	X	X	X	X	
DBTYPE_UI1	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
DBTYPE_UI4	X	X	X	X	X	X	X	X			X	X	X	X	X	X
DBTYPE_UI8											X	X	X	X	X	
DBTYPE_R4	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
DBTYPE_CY	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
DBTYPE_NUMERIC	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
DBTYPE_BYTES	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
DBTYPE_STR	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
DBTYPE_VARIANT	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
DBTYPE_IDISPATCH																
DBTYPE_IUNKNOWN																
DBTYPE_GUID												X	X	X	X	
DBTYPE_ERROR																
DBTYPE_BYREF See note following tables	*	*	*	*	*	*	*	*				*	*	*	*	*
DBTYPE_ARRAY																
DBTYPE_VECTOR																
DBTYPE_UDT																
DBTYPE_DBDATE									X	X		X	X	X	X	

OLE DB Type Indicator	Informix Data Types																
	SMALLINT	INTEGER	SERIAL	INT8	FLOAT	SMALLFLOAT	DECIMAL	MONEY	DATE	DATETIME	INTERVAL	CHAR	NCHAR	VARCHAR	NVARCHAR	NUMERIC
DBTYPE_DBTIME									X	X		X	X	X	X	
DBTYPE_DBTIMESTAMP									X	X		X	X	X	X	
DBTYPE_FILETIME									X	X		X	X	X	X	
DBTYPE_PROP_VARIANT	X	X	X	X	X	X	X	X				X	X	X	X	X
DBTYPE_HCHAPTER																
DBTYPE_VARNUMERIC	X	X	X	X	X	X	X	X				X	X	X	X	X

OLE DB Type Indicator	Informix 9.x and Later Data Types										
	BIGINT	BIGSERIAL	LVARCHAR	INT8	SERIAL8	CLOB	BLOB	ROW	SET	MULTISET	LIST
DBTYPE_EMPTY											
DBTYPE_NULL											
DBTYPE_RESERVED											
DBTYPE_I1	X	X	X	X	X						
DBTYPE_I2	X	X	X	X	X						
DBTYPE_I4	X	X	X	X	X						
DBTYPE_I8											
DBTYPE_UI1	X	X	X	X	X						
DBTYPE_UI2	X	X	X	X	X						
DBTYPE_UI4	X	X	X	X	X						
DBTYPE_UI8											
DBTYPE_R4	X	X	X	X	X						
DBTYPE_R8	X	X	X	X	X						
DBTYPE_CY	X	X	X	X	X						
DBTYPE_DECIMAL	X	X	X	X	X						
DBTYPE_NUMERIC	X	X	X	X	X						
DBTYPE_DATE	X	X	X	X	X						
DBTYPE_BOOL	X	X	X	X	X						
DBTYPE_BYTES	X	X	X	X	X		X				
DBTYPE_BSTR	X	X	X	X	X	X	X	X	X	X	X
DBTYPE_STR	X	X	X	X	X	X	X	X	X	X	X
DBTYPE_WSTR	X	X	X	X	X	X	X	X	X	X	X
DBTYPE_VARIANT	X	X	X	X	X			X	X	X	X
DBTYPE_IDISPATCH											

OLE DB Type Indicator	Informix 9.x and Later Data Types										
	BIGINT	BIGSERIAL	LVARCHAR	INT8	SERIAL8	CLOB	BLOB	ROW	SET	MULTISET	LIST
DBTYPE_IUNKNOWN See note following table						X	X				
DBTYPE_GUID											
DBTYPE_ERROR											
DBTYPE_BYREF See note following tables	*	*	*	*	*	*	*	*	*	*	
DBTYPE_ARRAY											
DBTYPE_VECTOR											
DBTYPE_UDT											
DBTYPE_DBDATE			X								
DBTYPE_DBTIME			X								
DBTYPE_DBTIMESTAMP			X								
DBTYPE_FILETIME			X								
DBTYPE_PROP_VARIANT	X	X	X	X	X						
DBTYPE_HCHAPTER											
DBTYPE_VARNUMERIC	X	X	X	X	X						

Important:

- All the OLE DB types that are allowed with one or more of the Informix data types for the DBTYPE_BYREF type are also allowed when combined with DBTYPE_BYREF.
- For DBTYPE_IUNKNOWN, the supported interfaces are ISequentialStream, IStream, and ILockBytes.

Note: The 32K LVARCHAR feature extends LVARCHAR columns to hold up to 32K bytes of data. This feature requires IBM Informix Dynamic Server side support for 32K LVARCHAR, and only works with Informix Dynamic Server Version 9.4 or later.

Data Conversions for Getting Data

The following table shows the supported data conversions from Informix types to OLE DB types. Note that truncation of data may occur in some cases.

All OLE DB types that are allowed with one or more Informix data type are also allowed when combined with DBTYPE_BYREF.

OLE DB Type Indicator	Informix Data Types																	
	SMALLINT	INTEGER	SERIAL	BIGINT	INT8	BIGSERIAL	SERIAL8	FLOAT	SMALLFLOAT	DECIMAL	MONEY	DATE	DATETIME	INTERVAL	CHAR	NCHAR	VARCHAR	NVARCHAR	NUMERIC
DBTYPE_EMPTY																			
DBTYPE_NULL																			
DBTYPE_RESERVED																			
DBTYPE_I1	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
DBTYPE_I4	X	X	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	X
DBTYPE_UI1	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
DBTYPE_UI4	X	X	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	X
DBTYPE_R4	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
DBTYPE_CY	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	X
DBTYPE_NUMERIC	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X
DBTYPE_DATE	X	X	X					X	X	X									
DBTYPE_BOOL															X	X	X	X	
DBTYPE_BYTES																			
DBTYPE_BSTR	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
DBTYPE_WSTR	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
DBTYPE_IDISPATCH																			
DBTYPE_IUNKNOWN																			
DBTYPE_GUID																			
DBTYPE_ERROR																			
DBTYPE_BYREF																			
DBTYPE_ARRAY																			
DBTYPE_VECTOR																			
DBTYPE_UDT																			
DBTYPE_DBDATE												X	X		X	X	X	X	
DBTYPE_DBTIME												X	X		X	X	X	X	
DBTYPE_DBTIMESTAMP												X	X		X	X	X	X	
DBTYPE_FILETIME				X	X	X	X					X	X						
DBTYPE_PROP_VARIANT	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
DBTYPE_HCHAPTER																			
DBTYPE_VARNUMERIC	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X

Threading Support

IBM Informix OLE DB Provider supports both free-threading and apartment-threading models. (For more information about these threading models search for "understanding threading models" at the Microsoft web site http://www.microsoft.com.) The free-threading model improves scalability and allows connection caching.

Transaction Support

IBM Informix OLE DB Provider supports both local and *distributed* transactions. A distributed transaction spans two or more database servers (also known as resource managers); these can be heterogeneous servers anywhere on the network.

Distributed Transactions

The *transaction coordinator* that IBM Informix OLE DB Provider supports for distributed transactions is MS DTC (Microsoft Distributed Transaction Coordinator). A transaction coordinator ensures that the distributed system maintains a consistent state.

Local Transactions

For local transactions, the default value of the Autocommit isolation level is read-committed for databases created with logging and read-uncommitted for databases created without logging. The consumer can change the default to read-uncommitted or serializable by setting the DBPROP_SESS_AUTOCOMMITISOLEVEL property.

Important: When the isolation level is set to read-uncommitted for a database that has logging, data can be read from but not written to the database.

Distributed Transaction Support

IBM Informix OLE DB Provider supports distributed transactions coordinated by MS DTC.

Beginning with Windows 2003, if the XA DLL registry entry is not created during installation, you must specifically create it. IBM Informix OLE DB Provider Version 3.0 uses **IfmxConn.dll** as the XA library. Enter the name of the DLL only; do not enter the entire DLL pathname in MS DTC with user-specified DLLs.

When you upgrade to Windows XP SP2 or Windows Server 2003, XA transactions are disabled, which protects MS DTC from denial-of-service attacks. To enable XA transactions, refer to the Microsoft XA Transaction Support information located at http://support.microsoft.com.

Note: MDAC 2.8 SP1 requires IBM Informix OLE DB Provider version 3.00 or later to function properly with MS DTC.

Using Identifiers

IBM Informix OLE DB Provider sets the **DELIMIDENT** environment variable in Setnet32 to `Y`, so that it encloses all identifiers in quotes in the SQL it generates (for example, when it executes an update). You can override this behavior by setting the **DELIMIDENT** environment variable to `N`.

For more information about the **DELIMIDENT** environment variable, see the *IBM Informix Guide to SQL: Reference*.

Tip: Identifiers are case sensitive when enclosed in quotes.

Support for DYNAMIC QUERY EXTENSION

The Dynamic Query Extension feature introduces support for describing input parameters of a prepared statement. This is an enhancement of the Dynamic SQL functionality of the server. This feature requires Informix Dynamic Server server-side support for Dynamic Query Extension, and will work only with IBM Informix Dynamic Server version 9.4 or higher.

To obtain the metadata for the parameters in a query in an OLE DB client, use the GetParameterInfo method of the ICommandWithParameters interface in the Command class.

Support for SQL 99 Joins

The SQL 99 Joins feature extends support for SQL joins from both within and outside of an escape sequence. This feature requires Informix Dynamic Server server-side support for SQL 99 joins, and will work only with IBM Informix Dynamic Server Version 9.4 or higher.

Working with International GLS Locales

This section offers information and tips about using IBM Informix OLE DB Provider with GLS (Global Language Support) locales other than the default locale, **en_us.1252-1**. For complete information about GLS locales, see the *IBM Informix GLS User's Guide*.

Converting Between Unicode and MBCS Character Sets

IBM Informix OLE DB Provider uses Win32 functions to convert between Unicode and MBCS (Multibyte Character Sequence). IBM Informix OLE DB Provider operates under the assumption that the client locale corresponds to one of the installed Windows code pages.

Using the UNICODE Provider String Keyword

If the UNICODE provider string keyword is set to FALSE (default), the code page corresponding to the CLIENT_LOCALE must be present as one of the operating system code pages. In this situation, the OLE DB Provider uses IBM Informix GLS functions to convert from DB_LOCALE to CLIENT_LOCALE, then uses operating system functions to convert from CLIENT_LOCALE to Unicode. This mechanism does not load the IBM Informix GLS code page, which should result in better connection performance but slower code set conversions.

If the UNICODE provider string keyword is set to TRUE, the code page corresponding to the CLIENT_LOCALE need not be present as one of the operating system code pages. This would be required, if you wanted to use, for example, a Hebrew code page on a US English Windows machine. In this situation, the OLE DB Provider uses IBM Informix GLS functions to convert directly from DB_LOCALE to Unicode. This mechanism loads the IBM Informix GLS code page, which may slow connection performance slightly but results in faster code set conversions.

Using the REPORTSTRINGASWSTRING Provider String Keyword

The provider-string keyword RSASWS or REPORTSTRINGASWSTRING in the provider string Extended Properties enables you to control the data mapping for wide strings.

When this keyword is set to TRUE, OLE DB Provider reports DBTYPE_WSTR as a best fit for all the underlying string length data types (CHAR, VARCHAR, TEXT, and so on) and not DBTYPE_STR, which is the normal mapping. The default setting for REPORTSTRINGASWSTRING is FALSE.

The syntax for setting this keyword is as follows (two forms of this keyword are provided; you may use either one):

- Short form:

  `RSASWS=TRUE` or `RSASWS=FALSE`
- Long form:

  `REPORTSTRINGASWSTRING=TRUE` or `REPORTSTRINGASWSTRING=FALSE`

Resolving Problems

This section describes how to resolve problems that you might encounter when installing, configuring, or using IBM Informix OLE DB Provider.

Tip: If the problem you are experiencing does not match one listed here, or the proposed resolution does not work for you, contact Technical Support.

IBM Informix OLE DB Provider Not Registered

When you attempt to connect to an Informix data source, a message says that IBM Informix OLE DB Provider is not registered. IBM Informix OLE DB Provider is not visible in the enumeration (for example, in the Initialize Data Source dialog box in the Microsoft OLE DB query demonstration).

Possible Cause

IBM Informix OLE DB Provider is not installed.

Resolution

IBM Informix OLE DB Provider is distributed with IBM Informix Connect and the IBM Informix Client SDK, Version 2.3 and later; however, it is not installed unless you choose the **Custom** installation option and explicitly select IBM Informix OLE DB Provider.

During installation, the IBM Informix OLE DB Provider DLL is copied to **INFORMIXDIR\bin**. If IBM Informix OLE DB Provider is copied to your computer but still is not visible in the enumeration, make sure the DLL is registered on the local computer.

To register the DLL:

1. Go to **INFORMIXDIR\bin**.
2. Run the **regsvr32** command on the DLL (**ifxoledbc.dll**).

Class Not Registered

When you attempt to connect to an Informix data source, the message `Class not registered` appears.

Possible Cause

The IBM Informix OLE DB Provider DLL might not be loaded.

Resolution

Check that the IBM Informix OLE DB Provider DLL is in the location recorded in the registry entry, which should point to **bin\ifxoledbc.dll** in your IBM Informix Connect or IBM Informix Client SDK installation. If that is not the case, reregister IBM Informix OLE DB Provider (see "IBM Informix OLE DB Provider Not Registered" on page 2-14). Refer to the registry entries section in the Microsoft OLE DB documentation for more information.

Also, make sure that **INFORMIXDIR\bin** is in the system path.

Cannot Establish a Connection

You cannot establish a connection.

Possible Cause

Basic connectivity was not set up.

Resolution

Use **Ilogin** or **DBPing** (included with your IBM Informix Client SDK) to verify that you can connect.

Database Not Found

A connection attempt fails; a message says that the database is not found.

Possible Cause

A bad database name or no database name at all was specified, and no database corresponding to your client user name exists on the server.

Resolution

Make sure that your data source name is specified correctly; see "Connecting to a Data Source" on page 2-2.

Oledbversion Table Not Found

When the application attempts to fetch schema information, a message says that the table **oledbversion** was not found.

Possible Cause

The setup script, **coledbp.sql**, has not been run against the **sysmaster** database of that server.

Resolution

The database administrator must run the setup script against the **sysmaster** database on the server to which you are trying to connect.

Nonalphabetic MBCS Characters Generate Syntax Errors

When you issue an SQL statement against an MBCS database (for example, SJIS-S), the Informix server returns a syntax error if the statement includes table or column names containing MBCS characters not classified as alphabetic in the locale.

Possible Cause

Identifiers that include nonalphabetic characters are not enclosed in quotes.

Resolution

Enclose identifiers in quotes, and make sure **DELIMIDENT** is set. If you have no control over the SQL produced by the application, consider using a locale that classifies the characters in question as alphabetic.

Server-Side Cursor Fails to Update Records

If you open a server-side cursor (**adUseServer**) on an SQL command (**adCmdText**), attempts to perform an update fail with an `ADO provider not capable` error. (This problem applies only to 7.x, 8.x, and 9.1x servers.)

Possible Cause

A server-side cursor that is opened on SQL text against pre-9.2 Informix servers is not updatable.

Resolution

Use the client-side cursor (**adUseClient**) instead, or open the server-side cursor on the table (**adCmdTableDirect**).

Attempt to Use Provider from Web Server or Other Server Fails

An attempt to use OLE DB Provider from the Web server or from a process that runs as a distinct user fails. The typical error message that appears is `ADO cannot find the provider`.

Possible Cause

OLE DB Provider is set up only for the current user.

Resolution

Perform the following steps in order:

1. Verify that you can connect to an Informix data source from an application such as Microsoft Visual Basic 6 or Microsoft Query Demo. (Refer to "Class Not Registered" on page 2-14, "Cannot Establish a Connection" on page 2-15, and Database Not Found in this section.)
2. Make sure that **INFORMIXDIR\bin** is in the system path (as opposed to the user path).
3. Run **INFORMIXDIR\bin\regcopy.exe** and reboot.

Also, make sure that the user has the necessary permissions to access the database, and verify that the data source has been specified correctly (see "Connecting to a Data Source" on page 2-2).

Cannot Connect to Transaction Manager

A connection attempt fails, a message says that the application cannot connect to the transaction manager.

Possible Cause

This message is generated when the MTS installation does not have the latest update of the component DLLs. The interface, **IDtcToXaHelperSinglePipe** that the IBM Informix OLE DB Provider uses to communicate with MS DTC may not be available in the installation (part of **MSDTCPRX.DLL**).

Resolution

This problem occurs due to incorrect setup. You must ensure that the **msdtcprx** DLL is version 1999 or higher. The MTS component files will be get updated by installing Windows NT Service Pack 6. Install the Windows NT Service Pack 6 or higher after the MTS installation.

Driver Not Found Error

When you attempt to run tracing, the server returns an error stating that the driver cannot be not found and may not be installed properly.

Possible Cause

A valid path has not been set in the IFXOLEDBTRACE environment variable to which the system can write a trace file.

Resolution

Set a valid path such as `c:\oledb\trace.txt` in the IFXOLEDBTRACE environment variable.

Appendix A. Supported Interfaces

The following interfaces are implemented by IBM Informix OLE DB Provider:

- IAccessor
- IColumnsInfo
- IColumnsRowset
- ICommand
- ICommandPrepare
- ICommandProperties
- ICommandText
- ICommandWithParameters
- IConvertType
- IDBAsynchStatus
- IDBCreateCommand
- IDBCreateSession
- IDBDataSourceAdmin
- IDBInfo
- IDBInitialize
- IDBProperties
- IDBSchemaRowset
- IErrorLookup
- IGetDataSource
- IIndexDefinition
- IOpenRowset
- IPersist
- IRowsetFind
- IRowsetIdentity
- IRowsetInfo
- IRowsetLocate
- IRowsetScroll
- IRowsetUpdate
- ISessionProperties
- ISupportErrorInfo
- ITableDefinition
- ITransactionJoin
- ITransactionLocal
- ITransactionOptions

Appendix B. Accessibility

IBM strives to provide products with usable access for everyone, regardless of age or ability.

Accessibility features for IBM Informix Dynamic Server

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

Accessibility Features

The following list includes the major accessibility features in IBM Informix Dynamic Server. These features support:

- Keyboard-only operation.
- Interfaces that are commonly used by screen readers.
- The attachment of alternative input and output devices.

Tip: The IBM Informix Dynamic Server Information Center and its related publications are accessibility-enabled for the IBM Home Page Reader. You can operate all features using the keyboard instead of the mouse.

Keyboard Navigation

This product uses standard Microsoft Windows navigation keys.

Related Accessibility Information

IBM is committed to making our documentation accessible to persons with disabilities. Our publications are available in HTML format so that they can be accessed with assistive technology such as screen reader software. The syntax diagrams in our manuals are available in dotted decimal format.

You can view the publications for IBM Informix Dynamic Server in Adobe Portable Document Format (PDF) using the Adobe Acrobat Reader.

IBM and Accessibility

See the *IBM Accessibility Center* at http://www.ibm.com/able for more information about the commitment that IBM has to accessibility.

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