International Technical Support Organization

An Approach to ODBC

December 1995
International Technical Support Organization

An Approach to ODBC

December 1995
Take Note!

Before using this information and the product it supports, be sure to read the general information under “Special Notices” on page xi.

First Edition (December 1995)

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Abstract

This document provides information on how to use Lotus Approach 3.0 for Windows as a front end to the IBM DB2 Family, using the Open DataBase Connection (ODBC). This book does not cover the connectivity to other IBM DB2 systems, but this should be a simple well documented process.

It focuses on:

- How to use the DB2 for OS/2 Version 2 new features.
- How to set up the DB2 for OS/2 server and the clients with the proper parameters.
- Which are the product prerequisites.

It provides information that is not covered in other published documents.

This document was written for customers who want to use Lotus Approach as a full front end to DB2 for OS/2. Some knowledge of LAN protocols and relational DataBase usage is assumed.

(87 pages)
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Special Notices

This publication is intended to help customers who want to interface the Lotus Approach Database to an IBM Database 2 (DB2) in a Client Server configuration, through the Open DataBase Connectivity driver (ODBC). The information in this publication is not intended as the specification of any programming interfaces that are provided by DB2 CAE for DOS and for Windows. See the PUBLICATIONS section of the IBM Programming Announcement for DB2 CAE DOS and DB2 CAE Windows for more information about what publications are considered to be product documentation.

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Preface

This Book discusses the usage of the DB2 CAE/Windows Version 2.1 product that connects to the Microsoft Windows Open Database Connectivity (ODBC) interface.

It contains information that will assist technical personnel in the following areas:

• The approach of DB2 Call Level Interface (DB2 CLI) and its ODBC support.
• DOS/Windows client workstation communications configuration.
• DB2 CAE/Windows 2.1 and the ODBC Administrator configuration.
• Example of using DB2 databases from Lotus Approach

This document is intended to help customers install the DB2 Server and the DB2 Client code on DOS and OS/2 machines in order to use Lotus Approach as a front end to DB2.

How This Document is Organized

The document is organized as follows:

• Chapter 1, “Overview: ODBC and IBM DB2”
  This chapter gives an overview of the ODBC architecture and the IBM DB2 products.
• Chapter 2, “Installing the Communications Support”
  This provides the necessary information needed to install and setup the communications support.
• Chapter 3, “IBM Client Application Enabler/Windows (CAE/Win)”
  This chapter describes Client Application Enabler software for Microsoft Windows.
• Chapter 4, “Lotus Approach and ODBC”
  This section provides a brief guide to the installation of Lotus Approach and its configuration.
• Chapter 5, “Using Lotus Approach with DB2/2 via ODBC”
  This section details some of the experiential feedback obtained by connecting Lotus Approach to a DB2 for OS/2 database.
• Appendix A, “General Installation Prerequisites”
  This appendix provides both hardware and software requirement details.

• Appendix B, “Configuration Keywords for DB2CLI.INI”
  This section is a repeat of published reference materials, but is included here for completeness.

• Appendix C, “Test Configuration Information”
  This section contains details of the test configuration used in creating this book.

• Appendix D, “Problems Encountered During Tests”
  Some final thoughts.

Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

• DB2 Information and Concept Guide, S20H-4664
• DB2 Administration Guide, S20H-4580
• DB2 Call Level Interface Guide and Reference, S20H-4644
• DB2 Message Reference, S20H-4808
• DB2 Installing and Using Windows Clients V2, S20H-4789

International Technical Support Organization Publications

• Access to the DB2 Family with ODBC, GG24-4333

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Acknowledgments

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Chapter 1. Overview: ODBC and IBM DB2

The purpose of this chapter is to give you an overview about the ODBC architecture and the IBM DB2 products.

1.1 ODBC Architecture

In this section we are going to talk about the ODBC structure and why we need it. To do this we have used diagrams to let users understand the flow of calls.

1.1.1 SQL Language

Structured Query Language (SQL) is a standard language, used by all relational databases, that allows user to work with them, querying and modifying their structure. Even if all the relational databases use the SQL standard, which is an English-oriented high level standard language, each DBMS uses its own syntax that is different, in most of the cases, from the syntax used by the others.

Example SQL Statements: In this section users can see, through two examples, the different syntax used by the Microsoft SQL Server and the ORACLE Server.

The following is an example of a SQL statement that asks the database manager system to select the names and the addresses of all the people that have a SHIPDATE scheduled on June, 1st 1995:

- Microsoft SQL Server:
  
  ```sql
  Select c.name, o.address
  from cust c, orders o
  where o.shipdate='JUN 01,1995'
  ```

- ORACLE Server:
  
  ```sql
  Select c.name, o.address
  from cust c, orders o
  where o.shipdate='01-JUN-1995'
  ```

The following is an example of SQL statement that asks the DBMS to select a part of customers’ name that live in LONDON:

- Microsoft SQL Server:
  
  ```sql
  ```
Select substr(name,1,10),city
from customer
where city='LONDON'

• ORACLE Server:
  Select substr(name,1,10),city
  from customer
  where city='LONDON'

As you can see, even if the statements are written using the SQL standard we can find differences, for example, in the date management (first case) or in the SQL function names (in the second case the functions SUBSTRING and SUBSTR perform the same action).

To let users access different DBMS with the same application, using the same SQL statement, the ODBC concept was introduced.

1.1.2 Static and Dynamic SQL Statements

The database applications can be categorized in two main groups:

• Applications that use embedded SQL statements: this means that the SQL statement is compiled as well as the entire code to build a program that can perform static SQL statements to databases that have been bound to the program
  – ADVANTAGE: These applications have good performance.
  – DISADVANTAGE: They are static applications. If you want to modify the structure of the databases you are working with, you must modify the code of your program and recompile it.

• Applications that use Call Level Interface: this means that the SQL statements are not compiled but they are put in a buffer at runtime and interpreted by the callable interface. In this case you can have an interactive approach to these applications asking them to perform SQL statement dynamically.
  – ADVANTAGE: These are dynamic applications that can access different databases as well as different DBMS because the SQL statements are interpreted at runtime by the callable interface.
  – DISADVANTAGE: They have poor performance because the SQL statements are not precompiled but they must be interpreted each time they are executed.
1.1.3 ODBC Concept

Open DataBase Connectivity (ODBC) is a growing standard that allows users to interchange data between relational DBMS. A windows ODBC-compliant application can manage databases created by non-relational database managers as well as most relational database managers, such as Microsoft SQL Server, ORACLE Server or IBM DB2 common servers. ODBC is a dynamic callable interface between your Windows application and the various DBMS.

You may use a database manager only if both of the following two conditions are meet:

- The Windows application you are using is ODBC compliant.
- You have the specific loadable driver that allows the interface between ODBC and the database manager format with which you need to work.

If the conditions are verified, you can install loadable drivers and perform dynamic SQL statement to any other database manager systems.

1.1.4 Flow of Calls

In order to create a real SQL standard language various groups have created the ODBC architecture. The ODBC compliant applications perform dynamic SQL statements in a format that is recognized by the ODBC itself. These statements will be translated, using the proper ODBC loadable driver, in a way that lets users access databases created with other database managers transparently.

See Figure 1 on page 4
The following are the steps needed to query the data sources:

- User enters the SQL statement.
- The Windows application puts the statement into a buffer and passes it to the ODBC driver manager.
- The ODBC driver manager loads the ODBC loadable driver associated with the source that it is connecting to.
- The ODBC driver manager passes the SQL statement to the ODBC loadable driver.
- The ODBC loadable driver translates the statement and passes it to the data source.
- The statement is performed at the data source.
- The results are then returned to the application for it to display or perform some other function with them.
1.1.5 Single/Multiple Tier ODBC Drivers

Using the proper ODBC driver you can connect to a database manager system or you can manage a database file created with a database system. Depending on the ODBC drivers, they can be divided in two main categories:

**Single Tier ODBC Driver** An ODBC device driver that allows you to manage a database file format without any connection to database server (data sources on the local workstation).

**Multiple Tier ODBC Driver** An ODBC device driver that allows you to connect to a database server (data sources on the server workstation).

The IBM DB2 ODBC driver is a multiple tier driver with which you can connect to an IBM DB2 common servers.

1.1.6 IBM DB2 Call Level Interface and ODBC

Each IBM DB2 Client Application Enabler is shipped with an IBM DB2 Call Level Interface that allows users, using the SDK product specific for each environment, to write applications that can run against any DB2 common servers; refer to 1.2, “IBM DB2 for OS/2” on page 7 section to have more information about the products above.

Using this interface your applications can talk directly to a IBM DB2 common servers (DB2/2 or DB2/6000) and through the DDCS product to any other DRDA DBMS. See Figure 2 on page 6.
1.1.6.1 IBM DB2 CLI and the ODBC Standard

For the Windows environment Microsoft has developed a callable interface that is the Open DataBase Connectivity (ODBC). Users can write applications using the ODBC driver manager and the ODBC Software Development Kit to query every DBMS that has its specific ODBC loadable driver. This driver is dynamically linked to the application by the ODBC driver manager.
In such a case the IBM DB2 Call Level Interface can be used as an ODBC Loadable Module to allow the ODBC application to reach any IBM DB2 server. See Figure 5 on page 12

1.1.7 What Constitutes ODBC

Even though we can relate the ODBC architecture to files we must remember it is NOT a product. Usually these files are shipped with the ODBC-compliant applications. The following is a list of the most important ODBC files even if they are not the full set of files that the user needs:

- **ODBC.DLL**  
  ODBC driver manager
- **ODBCINST.INI**  
  List of the ODBC loadable drivers installed
- **ODBC.INI**  
  List of data source’s cataloged

Usually, with the Windows application, is also shipped an executable file, the ODBC Administrator Utility, that allows users to manage the ODBCINST.INI and ODBC.INI files. Even if it is possible to modify the above files with any ASCII editor we recommend the use of this utility to install or un-install the loadable driver as well as to catalog or uncatalog data sources.

1.2 IBM DB2 for OS/2

In this section users can find a brief overview about the DB2 for OS/2 family which are the products that use the OS/2 platform. You can also find section or sentences with the subject “DB2 common servers”; this means that the concept explained is valid for both the IBM DB2 Server platform that are the OS/2 (IBM DB2/2) and AIX (IBM DB2/6000).

1.2.1 DB2 for OS/2 : Overview of Products

The DB2 for OS/2 2.1 is the latest version of the IBM DBMS for OS/2 Environment. There are four products in the OS/2 family:

- **DB2 for OS/2**
  - Single-User
  - Server
- **DB2 for OS/2 Software Developer’s Kit (DB2 SDK)**: It gives developers the Application Program Interface (API) to develop their applications.
- **Distributed Database Connection Services (DDCS)**: It allows the DB2 for OS/2 to get a connection to the DB2 installed on main-frames (for example DB2/MVS or DB2/VSE).
  - Single-User (OS/2 only)
We are going to focus our attention only on the main product that is the DB2 for OS/2 engine and especially on the server version. The single-user version works as a stand-alone DBMS in an OS/2 environment, while the server version works as a multi-user database manager system in a LAN with multiple DB2 for OS/2 client (DOS, Windows, OS/2 and UNIX workstations).

We do not need to work with the other components to use Lotus Approach as a front-end of DB2 for OS/2 on a Windows client.

### 1.2.2 DB2 for OS/2: Overview of Components

The DB2 for OS/2 package includes all the following components:

- **Server Engine**: The heart of the database system which runs on the OS/2 platform.
- **CAE/DOS**: Client Application Enabler for the DOS workstation.
- **CAE/WIN**: Client Application Enabler for the Windows workstation. (In our testing we used this code)
- **CAE/OS2**: Client Application Enabler for the OS/2 workstation.
- **CAE/UNIX**: Client Application Enabler for the Unix workstation.

Note: In addition we also need the Multi Protocol Transport Services (MPTS) in order to communicate across our token ring Local Area Network.

See Figure 3 on page 9
Once the server is installed you can install the clients in order for users to access data in the databases. The clients allow you to perform limited operations such as connect to the databases on the servers, import or export data as well as set up the workstation you are working on. There is no provision for the client to manage data directly on the server or change the structure of the database which you are connected to; besides the client will only accept commands from the command line.

Because of this we need an application that is easier and more powerful to use than the CAE/WIN itself is: we are going to use Lotus Approach as an interface between the operator and the CAE/WIN.

See Figure 4 on page 10.

**Note**

Using the DB2 SDK for Windows we are able to perform additional functions against a database we are connected too. The command line interface provided with the SDK is enhanced to provide the ability to perform data definition, data manipulation and data access control.
1.2.3 IBM DB2 Common Server Security

The security in a multi-user environment is important, especially in the case where users can access data on the server from remote workstations, the system administrator must allow users to do only what they need to do or are authorized to do.

IBM DB2 common servers implements the security in two different levels:

- Authentication level. It is provided by operating system functions and its purpose is to check if the user is really who they claim to be.

  There are three authentication levels:

  1. SERVER (user ID and password is validated on the DB2 Server).

  2. CLIENT (user ID and password is validated only on the workstation user is working on).
3. DCS (user ID and password is validated on the host if DDCS is installed, otherwise is validated on the server as if it was a Server authentication level).

• Access control level. It is provided by the database manager the database manager system itself and allows (or does not allow) users to perform operation within the database manager. Access control level is a combination of privileges that are the right to perform a certain operation (CREATE, SELECT, UPDATE...).

DB2 has authorities defined (an authority level is a set of privileges predefined), they are:
  - SYSADM
  - DBADM
  - SYSCTRL
  - User

When a user attempts to access a database on the server, they are validated first (Authentication level) and then the database manager system checks for there access permissions (Access control level). When user is authenticated, they can perform operations for which they have been authorized. For example, they can be allowed to read records in a table while not allowed to add new data to it.

1.2.4 Lotus Approach and DB2 for OS/2

In this book we are going to use Lotus Approach, that is an ODBC-compliant Windows application, as a front end to DB2 for OS/2. In order to do this we need an interface between the Windows application itself and the CAE/WIN. This layer will be given by the ODBC architecture using the ODBC Loadable Driver shipped by IBM (IBM DB2 ODBC Driver). Refer to 1.1.6, “IBM DB2 Call Level Interface and ODBC” on page 5 for more information about the IBM DB2 driver.

See Figure 5 on page 12.
Figure 5. Lotus Approach and DB2 for OS/2 through ODBC

---

**Note**

When you try to connect to DB2 for OS/2 using Lotus Approach you need the IBM DB2 ODBC driver (ODBC loadable driver specific for the IBM environment) as well as the CAE/WIN (Client Application Enabler for Windows) that is the client for the Windows environment.
Chapter 2. Installing the Communications Support

In order to connect the Server machine and the Client machine, we need connectivity between the workstation and the server system, in other words communication support.

DB2 for OS/2 supports APPC, NetBIOS, TCP/IP and Novell IPX/SPX communication protocols for both the server and client machines.

However, for this book, we will concentrate on the NetBIOS protocol.

**Adding NetBIOS Support to an OS/2 Machine:**

You need the IBM LAN Adapter and Protocol Support (LAPS) available in one of the following products:

- IBM NTS/2 Version 1.0,
- IBM OS/2 Extended Services 1.0,
- IBM Communications Manager/2 Version 1.1, or
- IBM Multi Transport Protocol Support (MTPS).
- IBM OS/2 LAN Requester
  (shipped with IBM OS/2 LAN Server Version 2.0 or later).

**Adding NetBIOS Support to a DOS/Windows Machine:**

You need one of the following products:

- IBM LAN Support Program Version 1.2.1 or later, or
- IBM DOS LAN Requester shipped with IBM OS/2 LAN Server Version 2.0, or later.

### 2.1 Preparing the Server

The Server will contain databases that can be accessed remotely or locally. The instructions given here also apply in the case of a stand-alone database.

We assume that the operating system is already installed on the Server. Please refer to the OS/2 documentation to install OS/2 if it is not.
2.1.1 Software Requirements

Here is a list of what you need:

- DB2/2 Version 2.1
- IBM OS/2 Version 2.11 or later, including OS/2 Warp.

You do not need Windows or WinOS2 on this machine if it is only a Server with no local access from Windows clients.

- One of the communications products listed in the “Installing The Communications Support, Preliminary” section above, to provide NetBIOS support.

2.1.2 Installing DB2 on the Server

Refer to the DB2 documentation for installation instructions, keeping in mind the following:

During installation, you will be presented with the “Install - directories” panel, Figure 6 on page 15. Please make sure you install the following components as a minimum:

- Server
- Database Director

If you intend to run Lotus Approach on the same machine, you also need to select:

- Windows Support
2.2 Preparing the Workstations

The Workstation will access the databases on the Server.

We assume that the operating system is already installed on the Workstation. Please refer to the documentation to install the operating system.

2.2.1 Software Requirements for Workstations

Here is a list of what you need for an OS/2 Workstation:

- DB2/2 Version 2.1
- OS/2 Version 2.11 or later (including OS/2 Warp), with appropriate Windows or WinOS2 support.
- One of the communications products listed in the “Installing The Communications Support, Preliminary” section above, to provide NetBIOS support.
2.2.2 Software Requirements for a DOS/Windows Workstation

Here is a list of what you need for a DOS/Windows Workstation:

- CAE/Win, from the DB2/2 Version 2.1 package.
- IBM DOS LAN Support Program.

2.2.3 Installing NetBIOS Support on the OS/2 Workstation

This section describes how you obtain the NetBIOS support that will enable you to run Lotus Approach for Windows under an OS/2 2.x and an OS/2 Warp VDM.

For the support of NetBIOS in an OS/2 2.x DOS environment you require a product called Multi Protocol Transport Services (MPTS).

MPTS is delivered with OS/2 Warp Connect. If you have Warp Connect, you also have MPTS.

DB2/2 Server is also delivered with MPTS.

Start MPTS. This will bring up the Logo panel. (see Figure 7 on page 17) Click on OK.
Figure 7. MPTS Logo Panel

On the next panel, (Figure 8), select “Configure”.

Figure 8. MPTS Install/Configure Menu

You are then offered to configure Adapters and Protocols, Socket MPTS Transport Access, or Non-native Networking: select Adapters and Protocols. (Figure 9 on page 18)
You are then prompted by a selection screen as shown in Figure 10 on page 19.

Selecting the **Configure Workstation** you can easily check your active configuration or setup the environment initially.

To get CAE/Win running using NetBIOS, you need to have a network adapter and the NetBIOS protocol installed.
If not already configured, select the **Network Adapter** installed on your system from the list and select the **Add** option.

Then select the **IBM OS/2 NetBIOS** from the listed protocols and again select the **Add** option.

The installed network adapter and protocol should now be shown in the **Current Configuration** section of the panel.

The next step is to set up or check your selected configuration.

Select your installed network adapter in the **Current Configuration** field and select the **Edit** option. Figure 11 on page 20 shows the configured parameters for the network adapter, as is currently installed.
Depending on whether you specify a locally administered address to be used for your network adapter, there will be an adapter address listed, or the field is left blank. If you are using the universally administered address, this field is left blank - which for most cases will be fine if you are going to use NetBIOS in your environment.

- Select the installed IBM OS/2 NetBIOS protocol from the **Current Configuration** field and select the **Edit** option.

Figure 12 on page 21 shows the configuration window that is opened after the selection.
This is the panel where you may want to change the NetBIOS resources available to your system. In the case where you are using other products concurrently with CAE/DOS, you may be required to configure additional NetBIOS resources.

If you saved your configuration, you should now shutdown your system and reboot, to make sure the changes become active.

This is all that needs to be done from within the MPTS program.

2.2.4 Installing NetBIOS Support on the Windows Workstation

This section describes the necessary steps needed to install a PC DOS System with NetBIOS Support. In this example the IBM Local Area Network Support Program version 1.35 has been used.

As for the OS/2 example, we assume DOS is already installed on the machine and as much memory as possible is available.
The LAN Support Program is installed using the DXMAID utility from the LAN Support Program diskette.

After the initial introductory screen is displayed, the screen shown in Figure 13 is displayed. In this case, the installation will be using a system with a 4MB Token-Ring Adapter. This does not require additional driver diskettes.

After pressing the Enter key, you will be presented with Figure 14 on page 23 below, this shows the chosen configured adapter and protocol drivers.
By pressing the F5 key at this point you have the opportunity to alter the adapter parameters; in this case an address has been utilized to give the ‘locally administered address’ capability. This is always a wise choice as it enables easier problem determination in the future when you know the workstation’s address and location!
Once the installation completes, the system is rebooted. This is in order to load the newly configured token ring device drivers. The following screen shows the new CONFIG.SYS file:

```plaintext
FILES=30
BUFFERS=10
DOS=HIGH
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\WINDOWS\SMARTDRV.EXE /DOUBLE_BUFFER
STACKS=9,256
DEVICE=F:\LSP\DXMA0MOD.SYS 001
DEVICE=F:\LSP\DXMCMOD.SYS N 400000001994,d800,0,0,0
DEVICE=F:\LSP\DXMTOMOD.SYS O=YES
```

*Figure 16. DOS CONFIG.SYS for Native DOS/Windows*
Chapter 3. IBM Client Application Enabler/Windows (CAE/Win)

This section describes how to install the Client Application Enabler for Windows on either an OS/2 or a Windows Workstation.

To run Approach for Windows as a DB2 front end on your OS/2 or Windows workstation, you must install either:

- The IBM DB2 Client Application Enabler for Windows, or
- The IBM DB2 SDK for Windows products.

3.1 Installing CAE/Win

The IBM DB/2 CAE for Windows is installed under WinOS2 or Microsoft Windows.

To install the IBM DB2/2 CAE for Windows workstation you must perform the following steps:

1. Start Windows (or WinOS2),
2. Choose FILE from the Windows Program Manager menu,
3. Click on “Run ..”,
4. Use “Browse” to locate the file INSTALL.EXE on the first diskette of the CAE/WIN diskette set, and select that file,
5. Select “OK” in the “Run” window.

The installation program presents you with the Logo, then with the first of the Install dialog boxes, (Figure 17 on page 26), where you can decide if you want the installation program to update the configuration files.

If you choose not to let the installation program update, a dialog box informs you that the necessary changes to CONFIG.SYS and AUTOEXEC.BAT, will be written to the files CONFIG.ADD and AUTOEXEC.ADD
Figure 17. First Installation Dialog

Figure 18 on page 27 shows the next dialog, “Install - directories”. This gives you a chance to specify on which drive and directory you want to install CAE/Win. The “Disk Space ...” button will let you see how much space is available on the various drives in your system, and give you the opportunity to change drives if needed.
Click on Install once you have decided on the drive and directory.

An Install Progress dialog box shows you the files and subdirectories being installed, as well as the elapsed time.

Once the installation is complete, (Figure 19) notifies you that the installation is complete, and of what to do before starting the product.

The requested components of IBM DB2 Client Application Enabler for Windows are successfully installed. Elapsed time was 00:01:44. Before starting the product, you might need to start the system again to activate any new paths added to your CONFIG.SYS/AUTOEXEC.BAT file.
Figure 20 on page 28 shows an example Windows Program Manager layout after the IBM DB2/2 Client has installed.

![Program Manager Layout](Image)

**Figure 20. Client Application Enabler Layout**

### 3.2 CAE/Win and ODBC Support

In the “IBM DATABASE 2” folder you have an icon that is the “ODBC Installer”. This is the program that adds the IBM DB2 loadable driver in the ODBC configuration files.

Once you have installed the ODBC-compliant application (Approach for example) you can run this program: automatically the DB2 driver is added to the ODBCINST.INI file. You can see the update

- by editing the file above, or
- by using the Administrator utility. This is the preferred method.
Chapter 4. Lotus Approach and ODBC

This chapter is a brief guide about the installation of Lotus Approach and its configuration. It focuses on the capability of Lotus Approach to recognize different file formats and especially on the ODBC interface.

4.1 What is Lotus Approach

Lotus Approach is a flexible database manager with which you can create or modify your own databases and their data, as well as manage database files created by another application, or connect to other database manager servers such as DB2 for OS/2.

Lotus Approach allows users to also create reports, charts and forms to manage data.

4.2 Lotus Approach: Installation and Configuration

The installation of Lotus Approach is very simple, the following are the steps needed to install the product:

1. Choose FILE from the Windows Program Manager menu.
2. Click on “Run ..”.
3. Locate the file INSTALL.EXE that is on the first diskette (or on the CD-ROM) of Lotus Approach product.
4. Select “OK” in the “Run” window.

The installation is started and now the program lets you configure the product through a series of installation windows:

- The first window asks you to insert your name and your company. There is also a button that enables the configuration of Lotus Approach on a file server and share its code with workstations. For these tests this option was not chosen, instead Lotus Approach was installed as stand-alone software on the Windows and WIN-OS/2 machines.
- Next you see a panel through which you can pick out the drive and path where you want the files to be copied to and also allowed to choose one of the following options:
  1. Default features - Automatic install (20 MB).

If you select option number 1 the installation program installs the default features.

If you select option number 2 only the minimum features needed to run the application are installed.

If you select option number 3 the user must choose individual features they need.

See the 4.2.1, “Lotus Approach: Features” section for more information.

- The last window asks you where you want to locate the Lotus Approach icons: the default choice is a new group called “Lotus Applications”. You may however, put them in one of the groups that already exist.

### 4.2.1 Lotus Approach: Features

When you run a “Customize Installation” you are able to see the features that Lotus Approach offers to you. These features appear in a window, that consists of two pages:

The first page lets users select the following components:

- **Lotus Approach Core**
  Lotus Approach Core contains the minimum files necessary to run Lotus Approach.

- **Spell Checker**
  Spell Checker checks for misspelled and repeated words.

- **French Dictionary**
  Feature for the French Dictionary.

- **Help**
  Detailed help file.

- **Tutorial**
  The Tutorial is a good way for beginners to quickly learn how to use Lotus Approach.

- **Sample Database**
  This is a collection of sample databases.

The second page lets users to install the support for various file format:

- Borland Paradox.
- Lotus 1-2-3.
- ODBC support.
- Lotus Notes ODBC driver.
- Microsoft Access ODBC driver.
- Oracle SQL.
- SQL Server, DB2-MDI.

The one you need to install is the ODBC support (Notes and Access Loadable Driver are not necessary for our purpose).

Note that installing all this database support you allow Lotus Approach to work with any of their formats. If you want to recognize a format that is not directly supported by Lotus Approach you need the specific ODBC Loadable Driver. For example, for DB2 for OS/2 you need the IBM DB2 ODBC Loadable Driver, because this is currently an unknown format for Lotus Approach.

See Figure 21 to see how Lotus Approach can read different formats.
4.3 ODBC Administrator Program

Once the Lotus Approach installation is terminated you can add, in the Lotus Application folder, the ODBC Administrator program. Perform the following steps:

1. Put the Lotus Application window in foreground.
2. Choose “New” from the File menu in the Program Manager.
3. Select to add a program.
4. Locate the file ODBCADM.EXE in the Lotus Approach installation directory and select OK.

Now you have a new icon, in your Lotus Application folder, with which you can manage (install or un-install) ODBC Loadable Driver and manage (catalog or uncatalog) data sources.

Figure 22. ODBC Administrator Utility Icon

For our test we have chosen to install, during the Lotus Approach setup, the ODBC support features; we do not need to add the two drivers shipped with
Lotus Approach that are the Lotus Notes and Microsoft Access supports. Because of this, when you run the ODBCADM you do not see any driver listed, obviously you also do not see any data sources cataloged.

Figure 23 shows you the administration utility program.

![Figure 23. ODBC Administrator Utility Program](image)

Through the buttons provided you can:

- Close the program (CLOSE button).
- Get help text for the usage (HELP button).
- Setup (modify) a data source already cataloged (SETUP button).
- Delete a data source previously cataloged (DELETE button).
- Add (catalog) a data source (ADD button).

  To do this you are prompted to choose an ODBC Loadable Driver already installed.

- Install/un-install ODBC Drivers (DRIVERS button).

  Choosing this option users can:
  - Add a new driver (OEM diskette is required).
  - Delete a driver installed.

- Trace the ODBC calls (OPTIONS button).

The Administrator program is only an utility that let you to manage the ODBC configuration files at high level (see 1.1.7, “What Constitutes ODBC” on page 7 for more information about these files). Users are recommended to use it to customize their environment.
The following is a sample of ODBC configuration files:

- **ODBCINST.INI**: list of ODBC Loadable Driver installed.

```
[ODBC Drivers]
Lotus Notes=Installed
Access (*.mdb)=Installed
Access 1.x (*.mdb)=Installed
IBM DB2 ODBC DRIVER=Installed

[Lotus Notes]
Driver=c:\os2\mdos\winos2\system\notessq1.dll
Setup=c:\os2\mdos\winos2\system\nsq1cfg.dll

[Access 1.x (*.mdb)]
Driver=c:\os2\mdos\winos2\system\simba.dll
Setup=c:\os2\mdos\winos2\system\simadmin.dll
SQLLevel=0
APILevel=1
FileUsage=2
FileExtnts=*.mdb
DriverODBCVer=01.00
ConnectFunctions=YYN

[IBM DB2 ODBC DRIVER]
Driver=C:\OS2\MDOS\WINOS2\SYSTEM\db2cliw.dll
Setup=C:\OSZ\MDOS\WINOS2\SYSTEM\db2odbc.dll
```

**Figure 24. ODBCINST.INI Sample File**

In this file you can see three ODBC Loadable Driver installed:
- Microsoft Access driver.
- Lotus Notes driver.
- IBM DB2 driver.

- **ODBC.INI**: list of data sources cataloged.
WARNING: Do not make changes to this file without using the ODBC Control panel device or other utilities provided for maintaining data sources. Incorrect changes to this file could prevent ODBC from operating or operating correctly.

[ODBC Data Sources]
Access=Access 1.x (*.mdb)
Local Notes=Lotus Notes
Server Notes=Lotus Notes

[Server Notes]
Driver=c:\windows\system\notessql.dll
Description=Direct Link to Lotus Notes
Server=
Database=
MaxVarCharLen=254
MaxSubquery=20
MaxStmtLen=1024
MaxRel=20
MaxLongVarCharLen=1024
KeepTempIdx=1

[Local Notes]
Driver=c:\windows\system\notessql.dll
Description=Direct Link to Lotus Notes
Server=
Database=
MaxVarCharLen=254
MaxSubquery=20
MaxStmtLen=1024
MaxRel=20
KeepTempIdx=1
MaxLongVarCharLen=1024

[Access]
Driver=c:\windows\system\simba.dll
Description=Microsoft Access Data
FileType=RedISAM
DataDirectory=
SingleUser=False
UseSystemDB=False

Figure 25. ODBC.INI Sample File

In this file you can see three ODBC data sources cataloged:

- Two of them are cataloged through the Lotus Notes driver.
- One of them is cataloged through the Microsoft Access driver.
Chapter 5. Using Lotus Approach with DB2/2 via ODBC

This chapter shows you, step-by-step, how to connect, from a Windows workstation, to an IBM DB2/2 server through the IBM CAE/WIN using Lotus Approach as an high level front-end.

5.1 Using the Client Application Enabler/WIN to Catalog

Once you have installed and configured the CAE/WIN, you may work with it in two different ways:

1. Through the Command Line Processor (CLP). This gives you a shell with which you can perform operations on DB2 for OS/2.

2. Client Setup, this is a graphic utility with which you can:
   - Configure your workstation.
   - Start/Stop traces on your workstation.
   - Catalog nodes.
   - Catalog databases.
   - Connect to databases.

The Client Setup is easier to use than the CLP because of its graphical approach; the Command Line Processor is more powerful than the Client Setup because it allows you to perform more operations (type “?” on the CLP to see all the commands you can use).

Figure 26 on page 38 shows you how to connect to the SAMPLE database on DB2 for OS/2 through the CLP. There are three steps to do so:

1. Catalog the node, that is, the node is the PC where the DB2 for OS/2 is installed.

2. Catalog the database that is on that node.

3. Connect to the database using the proper user ID and password.
From Figure 26, the following may be used for reference:

**R4100291**

Is the name of the PC where the DB2 for OS/2 server is installed. You can use the "get or update database manager configuration" command on the DB2 for OS/2 server CLP.

**JCPC**

Is the alias, on the Windows workstation for the R4100291 PC.

**SAMPLE**

Is the sample database shipped with the DB2 for OS/2 server.

**SAMPLEJC**

Is the alias, on this workstation for the sample database on the server.

**massimo2**

Is one of the users allowed to see the SAMPLE database.

**massimo**

Is the password for the user massimo2.
You can also omit user ID and password if you perform a local logon using the “Logon” icon in the “IBM Database 2” folder before you attempt to work with DB2. In this case user ID and password are registered in a buffer and passed to the UPM on the Server for authentication while you are connecting to the database.

Remember that you must catalog databases, using either the CLP or the Client Setup Utility, to be allowed to catalog data source using the ODBC Administrator Utility.

In this example we have cataloged only the SAMPLE database using the CLP so we will be able to see only the SAMPLE database when you try to catalog databases using the ODBC Administrator through the IBM DB2 ODBC Driver.

### 5.2 Binding the Database Utilities

Before you can start using the database you must BIND the appropriate files with a .BND extension to the cataloged database to be allowed to use database components such as IMPORT, EXPORT and others. Usually the .BND files you need are listed in one or more .LST files.

When you are connecting to an IBM DB2 server (DB2 for OS/2 or DB2 for AIX) you need to bind files listed in two .LST files:

**DB2UBIND.LST** Contains the list of bind (.BND) files required to create the packages for the database utilities.

**DB2CLI.LST** Contains the list of bind (.BND) files required to create packages for the DB2 CLI and the DB2 ODBC driver.

Use the following syntax to bind list files (.LST) to each cataloged database:

```plaintext
connect to <dbname>
bind <path>@DB2UBIND.LST messages bind.msg grant public
bind <path>@DB2CLI.LST messages CLIBIND.MSG grant public
connect reset
```

Where:

- `<dbname>` is the name of the database you wish to connect.
- `<path>` is the path where the .LST file is located.
- `bind.msg` and `clibind.msg` are the output message files.
- ‘grant public’ grants EXECUTE and BIND privileges to PUBLIC.

Remember that:
- The BIND command must be run separately for each database you wish to access and work with.

- If you have different levels or types of clients on your network, you must bind the utilities from each type of client; these utilities have to be bound to each database once from each type of client.

- You may perform the bind operation centrally from the server system or from the individual client systems.

Refer to the publication DATABASE 2 Installing and Using DB2 Clients for Windows, Appendix C for more information about the List Files, Bind Files and Packages.

5.3 Using the ODBC Administrator Utility to Catalog Data Sources

The next step is to install the IBM DB2 Loadable Module and catalog data sources using the ODBC Administrator, refer to the 4.3, “ODBC Administrator Program” on page 32 to get information on how to install it.

5.3.1.1 Installing the DB2 ODBC Driver

To install the IBM ODBC Driver in the ODBC configuration files you must run the “ODBC Installer” icon in the “IBM DATABASE 2” folder. Now you can see it clicking on the “Drivers” button.

Figure 27. DB2 ODBC Driver
5.3.1.2 Cataloging Data Sources

Once you have installed the DB2 Driver you can catalog sources (databases) through it. The steps are very simple:

- Open the ODBC Administrator Utility and click on the “Add” button: you are prompted to choose an ODBC Loadable Driver through which you want to catalog (in our example we have only installed the DB2 Driver)

![Figure 28. ODBC Loadable Driver Selection](image)

- Select the database you want to catalog; because we have chosen the IBM DB2 Driver the program automatically prompt you for the list of the sources you have cataloged through the DB2 Client Application Enabler. In our example we have cataloged, through the CLP, only the SAMPLE database on our server.

![Figure 29. Database Selection](image)
Now your data sources are cataloged and available.

For our test we have created other databases using another node (DB2 for OS/2) following these steps:

1. Installed the IBM DB2 for OS/2 server on another node.
2. Created databases using the Create SQL statement from the CLP of the servers.
3. Cataloged the new databases on the servers.
4. Created, in these databases various tables.
5. Added data to the above tables.
6. Cataloged, through the DB2 CLP the new node and the new databases on the Windows workstation where the Lotus Approach product was installed to perform our test (ODBCTEST alias and DBITSOJC alias for these databases were used).
7. Cataloged, through the ODBC Administrator utility the new data sources.

Steps 1-5 have been performed on the new node (IBM DB2 Server console). Steps 6-7 have been performed on the Windows workstation where we installed the IBM DB2 CAE/WIN and Lotus Approach products.

Now we have different data sources cataloged in the ODBC configuration.
5.4 How to Open Databases and Manage Their Data

In this section we are going to give information on how to open tables and use them to add, delete and modify data. The following are the steps to connect to an IBM DB2 Server from Lotus Approach:

Select a database type We are choosing the “ODBC Data Sources”.

Select a database We are choosing one of the data sources cataloged through the DB2 ODBC driver (this connection is shown in the “Drive” dialog box in the form <userid>@<dbname>).

Select a table Users can now select one of the table listed. These are table that belong to the database <dbname>.

Now we are going to connect to the sample database we have cataloged. Start the Lotus Approach application and follow these steps:

• Select ‘Open’ in the ‘File’ menu.
Select ‘ODBC Data Sources(*)’ in the ‘List File of Types’ menu.
• All the ODBC data sources we have cataloged previously are shown (in our case only the SAMPLE database through the DB2 ODBC driver).

Figure 34. ODBC Sources Selection

• Lotus Approach prompts us to enter the user ID and password for authentication at the server.
The DB2 driver establishes the connection to the server.

Once you are connected you are able to see the tables for the SAMPLE database and open, for example, the STAFF table (note, that the tables are shown in the form <identifier>.<tablename>).
Lotus Approach shows you the table using the default FORM and the default WORKSHEET in the Lotus Approach .APR file you will be able to modify and customize these.

- Default form for the STAFF table.
Figure 38. STAFF Table FORM

- Default worksheet for the STAFF table.
It’s also possible to open other tables at the same time even if they belong to other DB2 databases. To do this we have created another database (the name of this database on the JCPC server is DBITSO and it has been cataloged as DBITSOJC on our Windows workstation).

Now we have two data sources cataloged through the ODBC Administrator and we can connect to both at the same time. Operate as follows:

- Catalog the new database through the CAE/WIN and then through the ODBC Administrator.
- Open the STAFF table following the previous instructions.
- Once you have connected to the SAMPLEJC database and you have opened the STAFF table, select ‘Open’ in the ‘File’ menu.
• Select again ‘ODBC Data Sources(*)’ and open the DBITSOJC database.
• Now you are connected to both databases (with the DBITSOJC database in the foreground).
• Open the table STAFFAGE which is the table we have created and work with both the STAFFAGE(DBITSOJC) and STAFF(SAMPLEJC).
5.4.1 Managing Records in the Tables

When you are connected to the DB2 tables you can manage their data; you can use either the Lotus Approach macro buttons or the Lotus Approach commands available from the menus.

You should refer to the Lotus Approach user manual for more information about how to use these features.

5.4.2 Saving the .APR

When you close a DB2 table Lotus Approach prompts you to save the .APR file, that is the file that contains all the information on how to organize (forms, worksheets, reports) your own data. If you choose to save this file and then you close the connection to the database, Lotus Approach stores the data connected to this .APR physically at the DB2 server with which you were connected. This means that the next time you try to use this .APR,
Lotus Approach, automatically, will establish a connection to the server, prompting you (if needed) for your user ID and password.

5.5 How to Make Joins

In this section we are using two DB2 tables to make a join. Note that you can establish a join between two or more tables even if the tables do not belong to the same database. Follow this steps:

- Connect, on your Lotus Approach workstation, to the databases SAMPLEJC and DBITSOJC, using the ODBC Data Source selection.
- Open the STAFF table (SAMPLEJC).
- Choose the ‘Create’ menu and then the ‘Join…’ option.

![Image of Join Selection](image)

*Figure 43. Join Selection*

- Use the ‘Open’ button to work with other tables
Select the STAFFAGE table (DBITSOJC).

Figure 44. Join window

Figure 45. STAFFAGE Table
• Create a join between the two tables, dragging with the mouse, the fields you wish to be joined.

![Join Creation](image)

• Now you can:
  − Modify the Lotus Approach default form and worksheet adding fields that belong to the joined tables.
  − Create new forms, worksheet, report and crosstab, using fields that belong to the STAFF and STAFFAGE table.

When you save an .APR file on your workstation and it contains fields that belongs to two or more, next time you access the .APR you are prompted to enter the user ID and password for each database you have to connect to.

### 5.6 How to Open Databases and Manage Their Structure

When you are connected to a DB2 database through Lotus Approach you are able to manage its structure. This of course depends on the authorization level associated to the user ID you are using.

Using Lotus Approach you can:
Create a new table in the DB2 database. In this case Lotus Approach will create, automatically, a DB2 index that will be stored in the SYSCAT.INDEXES table; the index is registered in the form <tabname>_idx, where <tabname> is the name of the table you have created.

**Information**

The table name must be in the form <qualifier>.<tabname>, where <qualifier> is the user ID and <tabname> is the name you want to use for the table.

To create a new table from Lotus Approach you must perform the following steps:

- Select ‘new’ from the ‘File’ menu.

- Select the ‘ODBC Data Sources(*)’ and connect to the database where you want to create the new table.

- Specify the name of the new table using the form <qualifier>.<identifier>.
Create your own table using the Lotus Approach tool. Make sure that Lotus Approach refers to this new DB2 table as a new database.

You must select a field in which data must be unique: Lotus Approach needs a unique index to manage the table data.
The table is created and Lotus Approach has generated the default APR file to view it. When you close this table you can save this APR or not; in both cases the table will remain in the database structure.

Modify the structure of DB2 tables erasing or adding fields.
To modify the structure of a DB2 table using Lotus Approach you must perform the following steps:

- Connect to an existing DB2 table using ‘Open’ in the ‘File’ menu.
- Once you have opened the table with the default APR or with a customized APR you must select ‘Design’ in the ‘View’ menu.

Figure 52. Design Mode Selection

- Now you can use the Lotus Approach tools to modify the structure of the table adding or erasing fields.
Export Lotus Approach database to a DB2 database. Make sure that in the Lotus Approach terminology a database is comparable to a DB2 table. The Lotus Approach database will become a DB2 table of the database you choose to export to.

To Export an existing table from Lotus Approach to a DB2 database you should perform the following steps:

- Load, using ‘Open’ in the ‘File’ menu, a table that has been created on your workstation.
- Choose the ‘Export Data’ option in the ‘File’ menu.
In the ‘Export Data’ windows you can now select:

- Where you want to export (select a DB2 database cataloged through ODBC and fill the ‘File Name’ field with the form <qualifier>.<tablename>).
- Which fields you want to export.
Figure 55. Export Window

- The records in the table are then transferred.

Figure 56. Rows Being Transferred
5.7 Data Type Definitions

When you manage the structure of a DB2 database using Lotus Approach, you can only use data types that Lotus Approach recognize; they are:

- Boolean
- Calculated
- Date
- Memo
- Numeric
- Picture Plus
- Text
- Time
- Variable

This means that when you add a field to an existing DB2 table or when you create a new table in a DB2 database the Lotus Approach data type must be converted, automatically, into a DB2 data type. The following is the table of conversions:

<table>
<thead>
<tr>
<th>Lotus Approach Data Type</th>
<th>DB2 Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boolean</td>
<td>CHAR(1)</td>
</tr>
<tr>
<td>Calculated</td>
<td>Not Created 1</td>
</tr>
<tr>
<td>Date</td>
<td>DATE</td>
</tr>
<tr>
<td>Memo</td>
<td>CLOB 2</td>
</tr>
<tr>
<td>Numeric</td>
<td>Double Precision Float</td>
</tr>
<tr>
<td>Pictures Plus 3</td>
<td>BLOB 2</td>
</tr>
<tr>
<td>Text (n)</td>
<td>CHAR(n)</td>
</tr>
<tr>
<td>Time</td>
<td>TIME</td>
</tr>
<tr>
<td>Variable</td>
<td>Not Created 1</td>
</tr>
</tbody>
</table>

1 The Calculated column type and the Variable column type are not created in the DB2 table; they are defined only in the .APR Lotus Approach file.

2 The CLOB field will have a size that is the size specified in the ODBC.INI file; see the 5.7.1, “BLOB and CLOB Data Types” on page 64 section for
more information. If you do not set the environment in the ODBC.INI file, the Memo and Picture Plus data type will be converted in ‘Long Variable Length Character’ in the DB2 table.

You can export Picture Plus fields, but they can only be read by Lotus Approach.

5.7.1 BLOB and CLOB Data Types

Using Lotus Approach Version 3.02 and the last DB2 software level it is possible to work also with BLOB and CLOB data types; to allow Lotus Approach to read this data type you must insert in the ODBC.INI file the following lines:

LONGDATACOMPAT=1
LOBMAXCOLUMNSIZE=32767

Lotus Approach has a 32 KB limit on the size of LOBs therefore you can not specify a value greater than 32767 in the LOBMAXCOLUMNSIZE statement.
Appendix A. General Installation Prerequisites

This book provides specific installation guidance for those who wish to use Approach as a front end to DB2/2 using ODBC and the NetBIOS communications protocol.

There are however other products and combinations that can be used.

This section describes the prerequisites for the other possible combinations.

A.1.1 Hardware Requirements

For DB2 for OS/2, DDCS for OS/2, DB2 SDK for OS/2 and DB2 SDK for Windows Version 2 products:

• The system unit must have a drive capable of reading 3.5 inch diskettes or a CD-ROM.
• The DB2 for OS/2 Planning Guide should be referenced for fixed disk and memory requirements

For DB2 for AIX, DDCS for AIX and DB2 SDK for AIX Version 2 products:

• The system unit must have a drive capable of reading a CD-ROM or 8mm tape.
• The DB2 for AIX Planning Guide should be referenced for fixed disk and memory requirements

A.1.2 Software Requirements

DB2 for OS/2

IBM OS/2 Version 2.11 or later (including OS/2 Warp).

A.1.2.1 Communications

DB2 for OS/2 supports APPC, NetBIOS, TCP/IP and Novell IPX/SPX protocols for both server and client function.

The communication software you require depends on the protocol you wish to use.

The database server can accept requests from multiple protocols concurrently.

If you wish to use several protocols, ensure that you have all the required products installed.
• For APPC connectivity, IBM Communications Manager/2 Version 1.1 or later.
• For IPX/SPX connectivity, Novell NetWare Requester for OS/2 Version 2.10 (also shipped with NetWare 3.x and NetWare 4.x).

Netware Requester for OS/2 Version 2.11 is required for OS/2 Warp.
• For NetBIOS connectivity, you must install the LAN Adapter and Protocol Support (LAPS) available in one of the following products:
  - IBM NTS/2 Version 1.0, IBM OS/2 Extended Services 1.0, IBM Communications Manager/2 Version 1.1 or IBM OS/2 LAN Requester (shipped with IBM OS/2 LAN Server Version 2.0 or later).
  - For TCP/IP connectivity, IBM TCP/IP Version 2.0 for OS/2 (with APAR # PN63689) or later.

A.1.2.2 DB2 SNMP Subagent on OS/2

• Simple Network Management Protocol (SNMP) products include IBM NetView for AIX and IBM NetView for OS/2.

DB2 provides support for SNMP management products via the DB2 SNMP Subagent, included as a component of the DB2 server.

SNMP management products such as NetView allow centralized management of both hardware and software components of a system.

The DB2 SNMP Subagent allows DB2 servers to be managed just like any other SNMP-managed resource.

The software requirements for using the SNMP Subagent on OS/2 are as follows: DPI 1.1 support provided by TCP/IP Version 2.0 or later.

A.1.2.3 Windows Client On OS/2

• To run Windows DB2 applications on your OS/2 workstation, you must install either the DB2 Client Application Enabler for Windows or DB2 SDK for Windows products.

The software prerequisites, listed later in this section, are the same except OS/2 Version 2.1 or later is used instead of Windows Version 3.1.
A.1.2.4 DB2 Client Application Enabler For OS/2
• The DB2 Client Application Enabler for OS/2 requires OS/2 Version 2.0 with Servicepak Level XR06055 or later (including OS/2 Warp) and one of the following communications products:
  - For APPC connectivity, IBM Communications Manager/2 Version 1.0 or later.
  - For IPX/SPX connectivity, Novell NetWare Client for OS/2 Version 2.10.
  - For NetBIOS connectivity, you must install the LAN Adapter and Protocol Support (LAPS) available in one of the following products:
    - IBM NTS/2 Version 1.0, IBM OS/2 Extended Services 1.0, IBM Communications Manager/2 Version 1.1 or IBM OS/2 LAN Requester (shipped with IBM OS/2 LAN Server Version 2.0 or later).
  - For TCP/IP connectivity, IBM TCP/IP Version 2.0 or later.

A.1.2.5 DB2 Software Developer’s Kit For OS/2
• The DB2 Software Developer’s Kit for OS/2 product has the same software requirements as DB2 Client Application Enabler for OS/2.

A.1.2.6 DB2 Client Application Enabler For Windows V2.1
• Windows Version 3.1 or later.
• One of the following for NetBIOS connectivity:
  - IBM LAN Support Program Version 1.2.1 or later.
  - IBM DOS LAN Requester (shipped with IBM OS/2 LAN Server Version 2.0, or later).
• One of the following for IPX/SPX connectivity:
  - Novell NetWare Requester for DOS (shipped with Novell NetWare Version 3.x or 4.x) plus WINUP9 or later Update Kit for Windows clients (provided by Novell).
  - NetWare Workstation for DOS/Windows Version 1.0 or later, plus WINUP9 or later update kit for Windows clients (provided by Novell).
• One of the following for TCP/IP connectivity:
  - IBM TCP/IP for DOS Version 2.1.0.4 or later.
  - FTP Software Inc., PC/TCP Network Software for DOS Version 2.2 or later.
- Firefox NOV*IX for NetWare Version 2.0 or later and Novell NetWare Requester for DOS (shipped with Novell NetWare Version 3.x or 4.x) plus DOSUP9 or later Update Kit for DOS clients and WINUP9 or later.
- Update Kit for Windows clients (provided by Novell).

**A.1.2.7 DB2 Software Developer's Kit For Windows**
- The DB2 Software Developer's Kit for Windows product has the same software requirements as DB2 Client Application Enabler for Windows.

**A.1.2.8 Program Numbers**
- 41H2114 DB2 for OS/2 Version 2.1 Server
- 41H2112 DB2 for OS/2 Version 2.1 Single-User
- 41H2121 Distributed Database Connection Services for OS/2 Version 2.3 Multi-User Gateway
- 41H2120 Distributed Database Connection Services for OS/2 Version 2.3 Single-User
- 41H2126 DB2 Software Developer's Kit for OS/2 Version 2.1
- 41H2128 DB2 for AIX Version 2.1 Server
- 41H2127 DB2 for AIX Version 2.1 Single-User
- 41H2133 Distributed Database Connection Services for AIX Version 2.3 Multi-User Gateway
- 41H2138 DB2 Software Developer's Kit for AIX Version 2.1
- 41H2142 DB2 Software Developer's Kit for Windows(**) Version 2.1
- 41H2451 DB2 Version 2.1 Product Library

**A.1.2.9 Client Application Enablers**
The IBM DB2 Client Application Enablers give access to application programs running on DOS, Windows, OS/2, AIX, HP-UX and Solaris Operating Environment client workstations to data stored in any of the IBM DB2 relational databases.

The Client Application Enablers provide run-time access to applications that support ODBC and those developed with DB2 Software Developer's Kits.

The DB2 Version 2 Client Application Enablers have been enhanced with the following functions:
- Support for TCP/IP allows DOS, Windows and OS/2 users to use TCP/IP to access DB2 for OS/2 database servers and DDCS for OS/2 gateways.
• The OS/2 TCP/IP implementation (TCPBEUI) provided with LAN Server Version 4.0 is supported by DB2 for OS/2 Version 2.1. TCPBEUI enables NetBIOS subsystems and applications, like DB2/2 configured for NetBIOS, to run on the TCP/IP stack.

• Support for Winsockets for DB2 Client Application Enablers for Windows allows Windows users to connect to any DB2 server using any TCP/IP protocol that is compliant with the Winsockets.

• Call Level Interface support provided for Windows and OS/2 clients fully supports Microsoft ODBC Level 1 and nearly all Level 2 functions.

Windows applications coded using the Microsoft ODBC specification can access data stored in any of the DB2 family of relational databases.

This ODBC driver has been tested with a number of popular Windows applications available in the marketplace today.

Use the Client Application Enablers to access the DB2 family on a Local Area Network (LAN) using these protocols:

<table>
<thead>
<tr>
<th>Client</th>
<th>Communication Protocols Supported</th>
<th>DB2 for OS/2 V2</th>
<th>DB2 for AIX V2</th>
<th>DB2 for HP-UX V1.2</th>
<th>DB2 for Solaris V1.2</th>
</tr>
</thead>
</table>
| DB2 Client Application Enabler for DOS V1.2 | NETBIOS  
IPX/SPX  
TCP/IP  
APPC | Yes  
Yes  
Yes  
No | No  
Yes  
Yes  
No | No  
Yes*  
Yes  
No | No  
Yes*  
Yes  
No |
| DB2 Client Application Enabler for Windows V2.1 | NETBIOS  
IPX/SPX  
TCP/IP  
APPC | Yes  
Yes  
Yes  
No | No  
Yes  
Yes  
No | No  
Yes*  
Yes  
No | No  
Yes*  
Yes  
No |
| DB2 Client Application Enabler for OS/2 V2.1 | NETBIOS  
IPX/SPX  
TCP/IP  
APPC | Yes  
Yes  
Yes  
Yes | No  
Yes  
Yes  
Yes | No  
Yes  
Yes  
No | No  
Yes  
Yes  
No |
| DB2 Client Application Enabler for AIX V2.1 | NETBIOS  
IPX/SPX  
TCP/IP  
APPC | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes |
| DB2 Client Application Enabler for HP-UX V1.2 | NETBIOS  
IPX/SPX  
TCP/IP  
APPC | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes | No  
No  
Yes  
Yes |
<table>
<thead>
<tr>
<th>Client Application Enabler for Sun Solaris V1.2</th>
<th>Communication Protocols Supported</th>
<th>DB2 for OS/2 V2</th>
<th>DB2 for AIX V2</th>
<th>DB2 for HP-UX V1.2</th>
<th>DB2 for Solaris V1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETBIOS</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>IPX/SPX</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>APPC</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Note: Provided by the FireFox, Inc. NOV*IX for NetWare product.

Client Application Enablers for a number of DB2-supported clients are now provided with the DB2 for OS/2 and DB2 for AIX server products in the DB2 Client Pack.

Client Application Enablers for OS/2, AIX, HP-UX, DOS, Windows and the Solaris Operating Environment are available.

Client support for additional workstation operating systems, as it is developed, will be available at no charge to customers of DB2 Version 2.1 server products.
Appendix B. Configuration Keywords for DB2CLI.INI

This section lists the set of optional keywords that you can specify in your DB2CLI.INI file to make better use of the features of IBM RDBMS. On Windows, these keywords can also be placed in the odbc.ini file instead. The default value is underlined for the keyword (if it exists).

**AUTOCOMMIT = 1 | 0**

To be consistent with ODBC, DB2 CLI defaults with AUTOCOMMIT on, which means each statement is treated as a single, complete transaction. This keyword can provide an alternative default, but will only be used if the application does not specify a value for AUTOCOMMIT as part of the program.

1 = on (default)
0 = off

**Note:** Most ODBC Applications assume the default of AUTOCOMMIT to be on. Extreme care must be used when overriding this default during runtime as the application may depend on this default to operate properly.

This keyword also allows you to specify whether autocommit should be disabled in a Distributed Unit of Work (DUOW) environment. If a connection is part of a coordinated Distributed Unit of Work, then implicit commits arising from autocommit processing are suppressed. A coordinated Distributed Unit of Work connection that has autocommit mode turned on will continue to have the implicit commits processed. This may result in severe performance degradations, and possibly other unexpected results elsewhere in the DUOW system. However, some applications may not work at all unless this is enabled. A thorough understanding of the transaction processing of an application is necessary, especially applications written by a third party, before applying it to a DUOW environment.

**BITDATA = 1 | 0**

This keyword allows you to specify whether ODBC binary data types, SQL_BINARY, SQL_VARBINARY, and SQL_LONGVARBINARY are reported as binary type data. IBM DBMSs support columns with binary data types by defining CHAR, VARCHAR, and LONG VARCHAR columns with the FOR BIT DATA attribute. DATABASE 2 for common server will also support binary data via the BLOB data type.
Only set BITDATA = 0 if you are sure that all columns defined as
FOR BIT DATA or BLOB contain only character data, and the
application is incapable of displaying binary data columns.

1 = report FOR BIT DATA and BLOB data types as binary data
types (default).
0 = disabled.

CONNECTTYPE = 1 | 2

This keyword allows you to specify the default connect type. 1 =
Multiple concurrent connections, each with its own commit scope.
The concurrent transactions are not coordinated. 2 =
Coordinated connections where multiple databases participate
under the same Distributed Unit of Work. This setting works in
conjunction with the SYNCPOINT setting to determine if a
Transaction Manager should be used.

CURRENTSQLID = current_sqlid

This keyword is valid only for those DB2 DBMSs where SET
CURRENT SQLID is supported (such as DB2 for MVS/ESA). Upon a
successful connect, if this keyword is present, then a SET
CURRENT SQLID statement is sent to the DBMS. This allows the
end user and the application to name SQL objects without having
to qualify by schema name.

CURSORHOLD = 1 | 0

This keyword controls the effect of a transaction completion on
open cursors.
1 = cursor hold (default), the cursors are preserved from one
transaction to the next.
0 = cursor no hold, the cursors are destroyed from one
transaction to the next.

This keyword affects the result returned by the DB2 CLI and ODBC
function SQLGetInfo() when called with
SQL_CURSOR_COMMIT_BEHAVIOR or
SQL_CURSOR_ROLLBACK_BEHAVIOR. The value of
CURSORHOLD is ignored if connecting to DB2 for VSE and VM
where cursor with hold is not supported.

This keyword can be used by an end user to improve
performance. If the user is sure that the application:

1. Does not have behavior that is dependent on the
   SQL_CURSOR_COMMIT_BEHAVIOR or the
   SQL_CURSOR_ROLLBACK_BEHAVIOR information returned
   via SQLGetInfo(), and
2. Does not require cursors to be preserved from one transaction to the next, then the value of this keyword can be set to 0. The DBMS will operate more efficiently as resources no longer need to be maintained after the end of a transaction.

**DB2ESTIMATE = 0 | large positive number**

This keyword determines whether DB2 CLI will pop up a graphic window to report estimates returned by the DB2 Version 2 optimizer at the end of SQL query statement preparation.

0 = Estimates are not returned (default)
large positive number = The threshold above which DB2 CLI will display the window to report estimates. This value is compared against the SQLERRD(4) field in the SQLCA returned when the statement was prepared. If the DB2ESTIMATE value is greater, the estimates window will appear.

The graphic window will display the optimizer estimates, along with push buttons to allow the user to choose whether they wish to continue with subsequent execution of this query or to cancel it.

The recommended value for DB2ESTIMATE is 60000. This keyword is ignored for all non-DB2 Version 2 databases. In order for the window to appear, the application must be graphical.

**DB2EXPLAIN = 0 | 1**

This keyword determines whether Explain output is generated by the DB2 Version 2 common server.

0 = No (default) A SET CURRENT EXPLAIN SNAPSHOT=NO will be sent to the server to the Explain Snapshot facility. No snapshot is taken.

1 = Yes A SET CURRENT EXPLAIN SNAPSHOT=YES will be sent to the server to enable the Explain Snapshot facility. A snapshot of the internal representation will be created for each eligible dynamic SQL statement. This explain information is inserted in the SNAPSHOT column of the EXPLAIN_STATEMENT table.

Before the explain information can be generated, the explain tables must be created. See the SQL Reference for additional information. The current authorization ID must have INSERT privilege for the Explain tables.

**DB2OPTIMIZATION = positive number**

This keyword only applies to a DB2 Version 2 server. If it is specified, DB2 CLI will issue the following SQL statement after a successful connection:

SET CURRENT QUERY OPTIMIZATION positive number
This specifies the query optimization level at which the optimizer should operate the SQL queries.

**DBALIAS = dbalias**

This keyword allows for Data Source Names of greater than 8 single byte characters. The Data Source Name (DSN) is the name enclosed in square brackets which denotes the section header in the db2cli.ini file. Typically, this section header is the database alias name which has a maximum length of 8 bytes. If the end user wishes to refer to the data source with a longer, more meaningful name, then he/she can place the longer name in the section header, and set this keyword value to the database alias used on the CATALOG command. Here is an example:

; The much longer name maps to an 8 single byte character dbalias
[MyMeaningfulName]
DBALIAS=DB2DBT10

The end user can specify [MyMeaningfulName] as the name of the data source on connect while the actual database alias is DB2DBT10.

**DBNAME = dbname**

This keyword is only used when connecting to DB2 for MVS/ESA, and only if (base) table catalog information is requested by the application. If a large number of tables exist in the DB2 for MVS/ESA subsystem, a dbname can be specified to reduce the time it takes for the database to process the catalog query for table information, and reduce the number of tables returned to the application.

The value of the dbname keyword maps to the DBNAME column in the DB2 for MVS/ESA system catalog tables. If no value is specified or if views, synonyms, system tables, or aliases are also specified via TABLETYPE, only table information will be restricted; views, aliases, and synonyms are not restricted with DBNAME.

This keyword can be used in conjunction with SCHEMALIST and TABLETYPE to further limit the number of tables for which information will be returned.

**GRAPHIC = 0 | 1**

This keyword controls whether the IBM GRAPHIC (double byte character support) data type is returned if the application queries for the list of data types supported by the DB2 database in the current connection.

0 = disabled (default)
1 = enabled
The default is that GRAPHIC is not returned, since many off the shelf applications do not recognize this data type and cannot provide proper handling.

**LONGDATA_COMPAT = 0 | 1**

This keyword indicates to DB2 CLI whether the application is expecting CLOB, BLOB data types to be reported as SQL_LONGVARCHAR, SQL_LONGVARBINARY or as their native forms, SQL_CLOB, SQL_BLOB.

0 = NO (default)

This mode indicates that the application wishes to reference the LOB data types as SQL_BLOB and SQL_CLOB.

1 = YES

This mode indicates that the application wishes to reference the LOB data types as SQL_LONGVARCHAR and SQL_LONGVARBINARY.

**MAXCONN = 0 | positive number**

This keyword is used to specify the maximum number of connections allowed for each CLI application program. This can be used by an administrator as a governor for the maximum number of connections established by each application. A value of 0 may be used to represent no limit; that is, an application is allowed to open up as many connections as permitted by the system resources.

**MODE = SHARE | EXCLUSIVE**

Sets the CONNECT mode to either SHARE or EXCLUSIVE. If a mode is set by the application at connect time, this value is ignored. The default is SHARE.

**Note:** EXCLUSIVE is not permitted for DRDA connections. Refer to the SQL Reference for more information on the CONNECT statement.

**PATCH1 = { 0 | 1 | 2 | 4 | 8 | 16 | ... }**

This keyword is used to specify a work-around for known ODBC application problems on Windows. The value specified can be for one or multiple work-arounds, or for none. For example, to specify that you want the work-around specified only for the value 1, specify PATCH1=1. If you want work-arounds to be additive, add the patch values together to form the keyword value. For example, if you want patches 1, 4, and 8, then specify PATCH1=13.

0 = No work around (default)

For an up-to-date list of patch values, refer to the DB2ODBC.TXT file which is installed in the directory as the Client Application...
Enabler for Windows. At the time this book is sent for publication, there are no known work-arounds for non-Windows applications.

**PWD = password**

This password value is used if a password is not provided by the application at connect time.

**SCHEMALIST = ‘"schema1", 'schema2' ....’**

A list of schemas in the database.

**Note:** This keyword replaces the OWNERLIST keyword used in previous releases. OWNERLIST is still supported, but SCHEMALIST is the preferred keyword.

If there is a large number of tables defined in the database, a schemalist can be specified to reduce the time it takes for the application to query table information, and reduce the number of tables listed by the application. Each schema name must be delimited with single quotes, separated by commas, and in upper case. The entire string must also be enclosed in double quotes, for example:

```
SCHEMALIST="'USER1', 'USER2', USER3'
```

For DB2 for MVS/ESA, CURRENT SQLID can also be included in this list, but without the single quotes, for example:

```
SCHEMALIST="USER1, CURRENT SQLID, USER3"
```

The maximum length of the keyword value string is 256 characters. This keyword can be used in conjunction with DBNAME, and TABLETYPE to further limit the number of tables for which information will be returned.

SCHEMALIST is used to provide a more restrictive default in the case of those applications that always give a list of every table in the DBMS. This improves performance of table list retrieval in cases where the user is only interested in seeing the tables in a few schemas.

**SYNCPOINT = 1 | 2**

This keyword allows you to specify how commits and rollbacks will be coordinated among multiple database (DUOW) connections.

1 = ONEPHASE (default)

A Transaction Manager is not used to perform two-phase commit, but one phase commit is used to commit the work done by each database in a multiple database transaction.

2 = TWOPHASE
A Transaction Manager is required to coordinate two-phase commits among those databases that support this.

**SYSSCHEMA = sysschema**

This keyword indicates an alternative schema to be searched in place of the SYSCAT (or SYSBM, SYSTEM) schemas when the DB2 CLI and ODBC Catalog Function calls are issued to obtain system catalog information.

**Note:** This keyword replaces the SYSOWNER keyword used in previous releases. SYSOWNER is still supported, but SYSSCHEMA is the preferred keyword.

Using this schema name, the system administrator can define a set of views consisting of a subset of the rows for each of the following system catalog tables: For example, if the set of views for the system catalog tables are in the ACME schema, then the view for SYSIBM.SYSTABLES is ACME.SYSTABLES, and SYSSCHEMA should then be set to ACME.

Defining and using limited views of the system catalog tables reduces the number of tables listed by the application, which reduces the time it takes for the application to query table information. If no value is specified, the default is:

- SYSCAT or SYSBM on version 2.1 of DB2 for common server
- SYSBM on versions prior to 2.1 of DB2 for common server, or DB2 for MVS/ESA and OS/400
- SYSTEM on DB2 for VSE and VM
- QSYS2 on DB2 for OS/400

This keyword can be used in conjunction with SCHEMALIST, TABLETYPE (and DBNAME on DB2 for MVS/ESA) to further limit the number of tables for which information will be returned.

**TABLETYPE=‘″TABLE‘ | ′.′ALIAS‘ | ′.′VIEW‘ | ′.′SYSTEM TABLE‘ | ′SYNONYM′”**

A list of one or more table types. If there is a large number of tables defined in the database, a tabletype string can be specified to reduce the time it takes for the application to query table information, and reduce the number of tables listed by the application.

<table>
<thead>
<tr>
<th>DB2 for common server</th>
<th>DB2 for MVS/ESA</th>
<th>DB2 for VSE and VM</th>
<th>OS/400</th>
<th>DB2 for OS/400</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTABLES</td>
<td>SYSTABLES</td>
<td>SYSCATALOG</td>
<td>SYSTABLES</td>
<td>SYSTABLES</td>
</tr>
</tbody>
</table>
Any number of the values can be specified, but each type must be delimited with single quotes, separated by commas, and in upper case. The entire string must also be enclosed in double quotes, for example:

```
TABLETYPE="'TABLE, 'VIEW""
```

The maximum length of the keyword value string is 256 characters. This keyword can be used in conjunction with DBNAME and SCHEMALIST to further limit the number of tables for which information will be returned. TABLETYPE is used to provide a default for the DB2 CLI function that retrieves the list of tables, views, aliases, and synonyms in the database. If the application does not specify a table type on the function call, and this keyword is not used, information about all table types is returned. If the application does supply a value for the table type on the function call, then that argument value will override this keyword value. If TABLETYPE includes any value other than TABLE, then the DBNAME keyword setting cannot be used to restrict information to a particular DB2 for MVS/ESA database.

**TRANSLATEDLL = X:\PATH\DB2TRANS.DLL**

X:\PATH is the directory where the DB2 Client Application Enabler for Windows or the DB2 SDK for Windows product has been installed. DB2TRANS.DLL is the DLL which contains codepage mapping tables. This keyword is used on Windows when connecting to DB2 for OS/2 Version 1 in conjunction with the TRANSLATEOPTION, to provide proper mapping of NLS SBCS characters (such as the umlaut characters in German) to the corresponding characters in the Windows codepage 1004.
Note: This keyword is only used when a Windows application connects to DB2 for OS/2 Version 1. It will be ignored on all other platforms, and when connecting to any other server, since these servers provide unequal codepage support.

TRANSLATEOPTION = database codepage number

Database codepage number is the codepage number of the database in DB2 for OS/2 Version 1 (it can be obtained by querying the database configuration parameters). Specifying TRANSLATEDLL and TRANSLATEOPTION enables the translation of characters from codepage number database codepage number to the Windows 1004 codepage. There are two supported values for database codepage number: 437 and 850. If you specify any other values, a warning is returned on the connect request indicating that translation is not possible.

Note: This keyword is only used when a Windows application connects to DB2 for OS/2 Version 1. It will be ignored on all other platforms, and when connecting to any other server, since these servers provide unequal codepage support.

TXNISOLATION = 1 | 2 | 8 | 16 | 32

Sets the isolation level to:
1 = Read Uncommitted (Uncommitted read)
2 = Read Committed (Cursor stability) (default)
8 = Serializable (Repeatable read)
16 = Repeatable Read (Read Stability)
32 = (No Commit, DATABASE 2 for OS/400 only)

The words in round brackets are the DB2 equivalents for SQL-92 isolation levels. Note that no commit is not an SQL-92 isolation level and is supported only on DATABASE 2 for OS/400. Refer to the SQL Reference for more information on isolation levels.

UID = userid

This userid value is used if a userid is not provided by the application at connect time.

UNDERSCORE = 1 | 0

This keyword allows you to specify whether the underscore character "_" is to be used as a wildcard character (matching any one character, including no character, or to be used as itself). This parameter only affects catalog function calls that accept search pattern strings.
1 = enabled (default).
The underscore is treated as a wildcard matching any one character or none. For example, if two tables are defined as follows:
CREATE TABLE "OWNER"."KEY_WORDS" (COL1 INT)
CREATE TABLE "OWNER"."KEYWORDS" (COL1 INT)

The DB2 CLI catalog function call that returns table information (SQLTables()) will return both of these entries if "KEY_WORDS" is specified in the table name search pattern argument.
0 = enabled
The underscore is treated as itself. If two tables are defined as in the example above, SQLTables() will return only the "KEY_WORDS" entry if "KEY_WORDS" is specified in the table name search pattern argument.

B.1 Configuration Keywords for Debugging

The additional keywords provided below are intended to be used for troubleshooting those DB2 CLI/ODBC applications that do not reflect errors detected by DB2 or the DB2 ODBC driver. Note that these keywords can be in either the ODBC.INI file or the DB2CLI.INI file.

**POPUPMESSAGE = 0 | 1**
Pops up a message box every time DB2 CLI generates an error which can be retrieved using "SQLERROR()". Useful for debugging applications which don’t report messages to users.
0 Do NOT display message box (default)
1 Display message box

**SQLSTATEFILTER = "S1C00","XXXXX","...."**
Use in conjunction with PopUpMessage. This prevents DB2 CLI from displaying errors which are associated with these states.

**APPENDAPINAME = 0 | 1**
The DB2 CLI function (API) name which generated an error is appended to the error message retrieved using "SQLERROR()". The function name is enclosed in curly braces {}.
For example,

"[IBM][CLI Driver]\" CLIxxx: < text >
SQLSTATE=XXXXX {SQLGetData}\"

0 Do NOT display DB2 CLI function name (default)
1 Display the DB2 CLI function name

This keyword is only useful for debugging.
Appendix C. Test Configuration Information

In order to perform our test, we used the following hardware and software:

- **An IBM PS/2 P75, used as a DB2 Server**
  - OS/2 Warp Version 3.0 CSD XR03000
  - DB2 for OS/2 Server Version 2.1 CSD WR08049
  - LAPS Version 2.60.2 CSD WR08000

- **An IBM PS/2 8595, used as a client for DOS/Windows and OS/2**
  - OS/2 Warp Version 3.0 CSD XR03001
  - DB2 for OS/2 Server Version 2.1 CSD WR08049
  - Lotus Approach Version 3.02 for Windows
  - LAPS Version 2.60.2 CSD WR08000 when booted in OS/2
  - IBM LSP Version 1.35 when booted in DOS

- **An IBM PS/2 9595, used as a client for DOS/Windows and OS/2 and as a Server.**
  - OS/2 Warp Version 3.01 CSD XR03004
  - DB2 for OS/2 Server Version 2.1 CSD WR08049
  - Lotus Approach Version 3.02 for Windows
  - Microsoft Windows Version 3.1
  - MPTS Version 2.00.1 CSD WR08000
Appendix D. Problems Encountered During Tests

The initial installation went smoothly.

The first problem we encountered was that Lotus Approach needed a unique index on the DB2 tables, otherwise it would allow read-only access to the data.

- Using a simple REXX program on the DB2 server, we checked for unique indexes (you may also use the CLP to do this!).

/* IBM ITSO - Boca Raton 1995 */

```
Say 'This REXX file may be used to check tables in the supplied'
Say 'database for UNIQUE indexes - remember if the table does not have'
Say 'a UNIQUE index - Lotus Approach 3.1 (via ODBC) will not be able'
Say 'to open the table for read/write!'
Say '
if Rxfuncquery('SQLDBS') <> 0 then do
    rc = RxFuncAdd('SQLDBS', 'DB2AR', 'SQLDBS')
    if RC \= 0 then signal ErrorRC
end
if Rxfuncquery('SQLEXEC') <> 0 then do
    rc = RxFuncAdd('SQLEXEC', 'DB2AR', 'SQLEXEC')
    if RC \= 0 then signal ErrorRC
end

tabnumb = 0
Say 'Enter Database name to check'
PULL DBNAME
Say 'Connecting to the `DBNAME' Database, please wait...'
CALL SQLEXEC 'CONNECT TO `DBNAME'
Say 'Connected!'
Say 'Looking for user defined tables'
sql_one = "SELECT TABNAME FROM SYSCAT.TABLES WHERE DEFINER NOT LIKE `SYS%`"
CALL SQLEXEC 'PREPARE s1 FROM :sql_one'
CALL SQLEXEC 'DECLARE c1 CURSOR FOR s1'
CALL SQLEXEC 'OPEN c1'
DO WHILE (SQLCA.SQLCODE=0)
    CALL SQLEXEC 'FETCH c1 INTO :T_NAME'
    if (SQLCA.SQLCODE=0) THEN DO
        tables.tabnumb = T_NAME
        tabnumb=tabnumb+1
    END
END
CALL SQLEXEC 'CLOSE c1'

Say 'Found `tabnumb' User Tables'
Say 'Checking user tables for indexes, please wait...'
Say ' (Part 1 of 2). REXX Program to Check for Indexes

Figure 57 (Part 1 of 2). REXX Program to Check for Indexes
It was then discovered that we could not update some of the existing DB2 tables.

- We found in RETAIN that there was an APAR about the inability of APPROACH to update records on a table with decimal fields via the ODBC driver.

Toronto provided us with an update to DB2CLIW.DLL, to fix the decimal field problem.

The fix however introduced other problems:

- Errors are reported when creating a DB2 table from Approach
- Errors are reported when exporting an Approach table to DB2
- In both cases, the table is created, along with the index.

The latest CSD level officially available for CAE/Win is WR08050. We should regress to that level and not reinstall the latest private fix received.

While testing further, we also found the character fields were truncated and caused updates to fail if the field was completely filled before saving the record.

CSD WR08050 fixed the character field problem.
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